

S.T.600: FULL "HI-SPEED" WIRING SERIES

Popular Wireless

AND TELEVISION TIMES

BUILDING THE
A.C. S.T.600

★ ★
SPECIAL
TELEVISION
ARTICLE

★ ★
"P.W.'s"
LISTENERS'
SERVICE

EVERY
WEDNESDAY PRICE 3^d

No. 649,
Vol. XXVI,
November 10th,
1934.

READERS' OWN REPORTS INSIDE

RESULTS ARE AMAZING

" . . . The results are amazing, and it requires to be heard ere one can realise the very great advance you have made in this, your latest set."

*I. O., 71, Leslie Terrace,
Porth, Glam.*

CUTS OUT ALL INTERFERENCE

" . . . I think you have found the secret we have all been waiting for in the Extractor, which cuts out all local-station interference with such a simple control, but without loss of power, without altering the dial readings, and still keeping the set fully efficient."

*C. G., 68, Brook Street,
Williamstown, Glam.*

FULFILLS EVERY CLAIM

" . . . It is the finest set I've yet seen, doing all you claim and no snags."

*W. C. V., 12, Wyncham Street,
Porth, Glam.*

EXCELLENT REPRODUCTION

" . . . The quality of reproduction was excellent and of very high standard, the sensitivity being no less outstanding."

*W. L. R., 1010, Argyle Street,
Glasgow.*

More About S.T.600

John Scott-Taggart's Finest Set

60 STATIONS AT GLASGOW

" . . . The stations received were 60 in all on both wavebands, every one of these being identified and logged accordingly. Quality of reproduction on these stations was perfect, all being received at good volume."

*T. D., 130, Dumbarton Road,
Glasgow.*

The designer of the famous S.T.600 conducting experiments with the set within one mile of Brookmans Park.





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UNIFORMITY
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*220 S.G.	200,000	1.60	12/6
*220 V.S.G.	110,000	1.60	12/6
*220 V.S.	400,000	1.60	12/6

2-VOLT H.F. PENTODE VALVES

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16 volt .25 amp. Series

*†DVSG	—	2.5	17/6
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4 volt 1 amp. Series PENTODE VALVES

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5885



MANAGING EDITOR: N.F. EDWARDS.

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

**A GOOD YARN
MORE POWER
NOT WANTED**

RADIO NOTES & NEWS

**HUMAN SET
NON-STOP NEWS
STRANGE HARMONIES**

Animals and Radio.

MANY thanks to the sports who furnished me with stories anent (good word, anent!) the above. The best, so far, comes from A. T. H., of Ilford, who blames Central News for the following:

"A Christchurch, N.Z., cat spends hours close to the wireless set, listening with evident appreciation. The other day her master attempted to supply a whistling accompaniment, but puss, after whisking her tail for some time, jumped on his knees and placed her forepaws on his mouth.

"Then she returned contentedly to her place beside the set!"

Kilowatt News.

THERE seems to be no abatement in the race for higher power, and from several sources comes news of more increases, either made or proposed, for the near future. In France Radio-Rennes recently went up to 40 kilowatts. This is just a makeshift until a 120-kw. station is ready to take the air.

Sottens, it is said, is going to double its power soon after Christmas. From Tallinn comes the news that Esthonia is determined to have a nationalised service, and schemes for a new 40-kw. station there are under consideration.

There's one comfort, however. Their interference won't bother the chap who has an S.T.600!

The New Regional.

ESSEX and Hertfordshire are among the best-served radio areas, so I have been somewhat puzzled of late to account for a Bishop's Stortford reader's belief that a new station was to be erected in his area. And how do you think he had got hold of *that* idea?

His mistake arose because he lives not far from Harlow in Essex. The B.B.C. is not at all interested in that Harlow; but they have been probing about round Harlow Hill, near Newcastle, for a site for the new North-East Regional. Somehow these activities must have been attributed to the wrong place, and thus a rumour grows!

Cheering Them Up.

AT one of the Paris underground stations the authorities recently installed a loudspeaker to cheer the waiting passengers.

One sardonic gentleman, after listening politely to it for several minutes, turned to his neighbour and said: "The train service, we know, is infernal. Now they give us this voice of the devil. Both you and I, my friend, are undoubtedly damned!"

Bumper Results.

CRUISING up and down the main streets of Schenectady, N.Y., in a smart car the other day, radio engineers held a two-hour two-way conversation with a station in Sydney, N.S.W.

To S.T.600 BUILDERS.

URGENT CORRECTION.

A very serious and regrettable draughtsman's error occurred in the Stage 10 sketch of the wiring on page 241 of the October 27th issue. Wire 37 is shown incorrectly connected to the grid terminal of the output valve holder. It should be connected to the negative filament terminal (the bottom right-hand one).

The blue print is perfectly correct, and we reproduce this week the whole of the "Hi-Speed" wiring diagrams with Stage 10 duly corrected.

Those who may have already connected up the complete set may have damaged the grid-bias battery, which should consequently be tested.

This was good going, however you look at it. But what made it the more remarkable was that they were using one of the car's bumpers as an aerial!

Divining-Rod Radio.

ONE of those enterprising weeklies that appear so opportunely on

Sunday (to record the doings and misdoings of the previous six days) has drawn attention to M. Henri Mager. He is an expert with the divining rod and, incidentally a human receiving set.

They say he can pick up wireless vibrations merely by standing under an aerial with his twig.

I advise Henri not to try this at one of the B.B.C. stations—some unbelieving engineer might twig *him*! And there's no divining what the engineer would do.

All-Night Wireless.

HATING to think of a wireless set ever being peacefully switched off for the night, an ingenious chap has proposed that a facsimile printer should be joined up at bedtime in place of the loudspeaker. During the night the local station would send out pictures and printed news, and in the morning you would come down for the cup of tea, as usual, and pick up a news roll from the set as well!

This is one of the few novelties that the morning papers have not claimed as the greatest invention of the age. And we can all see why!

Tribal Tunes.

I HEAR that Mr. Philip T. Thornton, of Bristol, who gave us those "Musical-Switchback" talks, has gone off to Morocco to get more strange rhythms.

In order to broadcast native music, Mr. Thornton uses gramophone records, all sorts of musical instruments, speaking voice, singing voice and enthusiastic pals who stamp their feet and moan or croon at his behest. The engineers and other B.B.C. officials simply love it!

On the Ultra-Shorts.

WE in this country do not seem to be using the ultra-short wavelengths anything like so enthusiastically as the Americans. At least two of their broadcasting stations are relayed regularly below 10 metres, and there are over a dozen television stations licensed to work on similar ultra-short wavelengths. Two of these, in New York and Los Angeles, are actually in service, but I have not heard what results are achieved.

If Europe is as active as this it is keeping ultra-quiet about it, though I should be the last to suggest that we crowd our ether any more—even down there. **ARIEL.**



**CUT
RIGHT OUT!**

The Extractor control on the S.T. 600 abolishes swamp areas and allows the powerful local station or Droitwich to be cut out in a few seconds. Moreover, the Extractor circuit does not reduce the sensitivity of the set!

I VISIT THE MIDLAND REGION

THE BROADCASTING HOUSE WHERE ENTHUSIASM PERVADES EVERYTHING, WHERE EVERYONE GETS A CHANCE, AND WHERE INFORMALITY RULES IS HERE DESCRIBED FOR READERS

By

OUR SPECIAL CORRESPONDENT

I DOUBT whether Birmingham is the most cheerful place in the British Isles to visit on a wet autumn day. But after one has left the station and taken a bus up the hill to the big motor showroom which almost conceals the modest entrance to the Midland Regional headquarters of the British Broadcasting Corporation, then one begins to realise that there is truth and more in all they say about the hospitality of the Midlands.

Martyn Webster was the real object of my visit to Broadcasting House, Birmingham. We were to talk over some ideas for a new play. But before I had been in the building five minutes I had been welcomed by almost every member of the station staff, from Percy Edgar—certainly the most popular station director in the world—through the announcers and balance-and-control men, down to one or two authors and composers who happened to be arranging details of a new musical show.

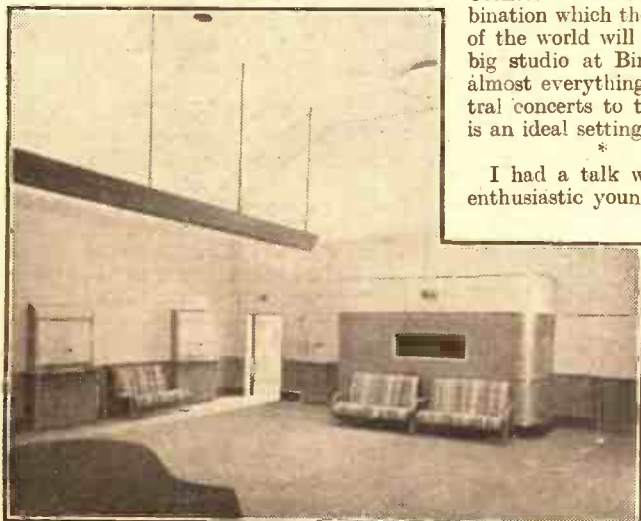
Delightfully Informal Everywhere.

That delightful informality which has earned so much appreciation for the Midland Regional programmes is present throughout the whole of the building. Once you have satisfied the sergeant at the door, no one questions your right to be in the building; no one is too busy to talk to you.

Programme building in the Midlands is not too easy a task. The choice of artists is more or less limited, for it is the policy of the station to make use of Midland talent in the writing and preparing of programmes as well as actually in front of the microphone. The amount of money which can be spent on any one programme would make many a producer throw up his job in despair. But they have a tremendous amount of enthusiasm—and that accounts for everything.

Probably the wisest thing the B.B.C. ever did

The No. 4 Studio



One of the studios in the Birmingham Broadcasting House. Note the silence room at the end with its window through which an orchestra in the studio may be conducted.

was to send Martyn Webster to Birmingham. The one fear which Midland listeners and artistes alike confess to is that the B.B.C. may suddenly decide to take him back to London!

Consideration to Authors.

Nowhere can the author of a radio play receive so much consideration and good advice than in the little office in which Martyn Webster spends the greater part of his life. A local musical enthusiast with an idea for a new revue song walks in and plays over his number on the piano which is squeezed in between the desk and the door. A local journalist with a flair for writing radio sketches is sitting in the armchair by the window. "Good stuff that," says Webster. "Let's hear it again." The journalist writes frantically on the back of an old envelope. And so is born the germ of a new Midland revue.

More than one man whose name appears on the programmes of the Midland Region has set out to seek fame and fortune in London, and has finally found them through the microphone at Birmingham. And more than one London composer has settled in the Midland country, where his talents are at least given a chance of recognition.

On the day I visited Birmingham, Adrian Boulton, B.B.C. Music Director, was rehearsing in the studio with the new Midland Wireless Orchestra which has recently been formed and which is likely to become one of the foremost orchestras in the country. For very many years Percy Edgar and his colleagues have been agitating for such an orchestra. They have been backed up all the time by Adrian Boulton.

A New Orchestral Combination.

And now from the old Midland Studio Orchestra and the City of Birmingham Orchestra has been created a new combination which the most famous conductors of the world will be proud to direct. The big studio at Birmingham (it is used for almost everything, from the largest orchestral concerts to the most intimate revue) is an ideal setting for the new orchestra.

I had a talk with Owen Reed, another enthusiastic young man whose job it is to look after the outside broadcasts. A few weeks ago you may have heard him when he took the Midland



Martyn Webster, to whom a great deal of the popularity of the Midland Region is due.

microphone round the Nottingham Goose Fair. He is now engaged on running a new series, "The Microphone at Large," which will introduce listeners to the life of various villages in the Midlands.

Owen Reed is a born commentator. He depends on no elaborate effects for his programmes. But he spends days beforehand arranging every detail, so that there shall be no break in the continuity of his presentations.

High-speed Production.

On the lighter side of the programmes—the side managed by Martyn Webster—we have a little band of men and women, all young and all equally enthusiastic, who have won the affection of listeners throughout the Midlands. The very fact that the same names—Hugh Morton, Michael North, Alma Vane, Dorothy Summers, Janet Joye—can appear in the programmes week after week without any diminution of listeners' enthusiasm is proof of the freshness of Martyn Webster's production.

Listen almost any Tuesday to the Midland evening programme, and you will see how the secret of high-speed production has been mastered at the Birmingham studios.

And listen, too, to Jack Wilson with his Versatile Five if you want to hear a band which has mastered the presentation of every kind of light music.

Just before I left Birmingham I met Charles Hatton, a Midland journalist who has contributed on more than one occasion to POPULAR WIRELESS. He told me that a play of his—"Counterfoils"—which was written for the POPULAR WIRELESS Radio Play Competition, is shortly to be produced by Martyn Webster. He also introduced me to Jack Hill, pianist and composer, who, besides writing the music for many of the Midland revues, is also a regular contributor to the programmes as a straight pianist, in syncopated numbers and as one of the Three Knaves.

BUILDING THE A.C. S.T. 600



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

The background noise on the S.T.600 A.C. version is negligible if the "humdinger" is adjusted. Hum is so slight that, during intervals in the programme, it cannot be heard beyond two feet from the speaker; in other words, no one in the room could hear any hum from the set. This is a very valuable feature, and the construction of the set and the choice of components, as well as the design of the circuit, contribute to this desirable end.

It is true that the price of a constructor's A.C. receiver is not as competitive as most

including myself, are only awaiting the opportunity.

As regards battery sets, there is no doubt that a highly efficient constructor's design will every time beat the manufactured article. The S.T.600, for example, could stand on its own against any commercial receiver.

My own policy, as regards set design, can be briefly stated thus: The design for the home constructor should be quite different from that of a set for factory production. If this applies to a battery set it applies ten times more so to an A.C. set where factory adjustments and operations are far more essential, and simplicity is only obtainable by having expert workpeople and testing staff.

Concerning Home-Constructor Designs.

The constructor cannot hope to emulate the set manufacturer, and therefore, in my opinion, it is useless to supply him with a design which is nothing more or less than a feeble imitation of a commercial set which he could obtain at the same, or even a cheaper, price.

I myself can design on similar lines to the manufacturer. A set which could compete with any receiver, either made in this country or America, is the Super-Gram de Luxe described in the Exhibition number of

(Continued on page 317.)

IT is a common fallacy that an alternating-current receiver calls for special care in constructing.

This is not so. I suppose that the idea started with the erroneous belief that A.C. sets are in some way dangerous and that shocks are simply lying in wait for harmless constructors.

I have had a 2,000-volt shock myself during valve manufacture, but I have never yet heard of anyone who has obtained a shock from an ordinary A.C. wireless receiver. Some people, no doubt, receive shocks through foolishly dabbling inside the set while the mains are switched on. Even so, it is extraordinary the amount of dabbling that can be done before your hands happen to touch naked terminals with a high voltage across them, though I do not expect that you would allow a current to pass through the body for any length of time.

The Facts of the Case.

Quite a severe shock, however, is obtainable if you tighten a terminal with a tool (e.g. a screwdriver or pliers) where the hand comes firmly in contact with the metal.

All this is simply a warning not to dabble with the internals of a mains set while the current is on.

Because there is some risk of discomfort if one is extremely foolish in handling a mains set, this is no reason for apprehension as regards building such a set oneself. You might just as well refuse to cross a road because if one did so with one's eyes shut there might be some risk of passing over into another world.

It is a source of continual perplexity to me that while hundreds of thousands of people will buy mains units and hitch them to a battery-valve set, yet these people refuse to go the whole hog and work an all-mains set.

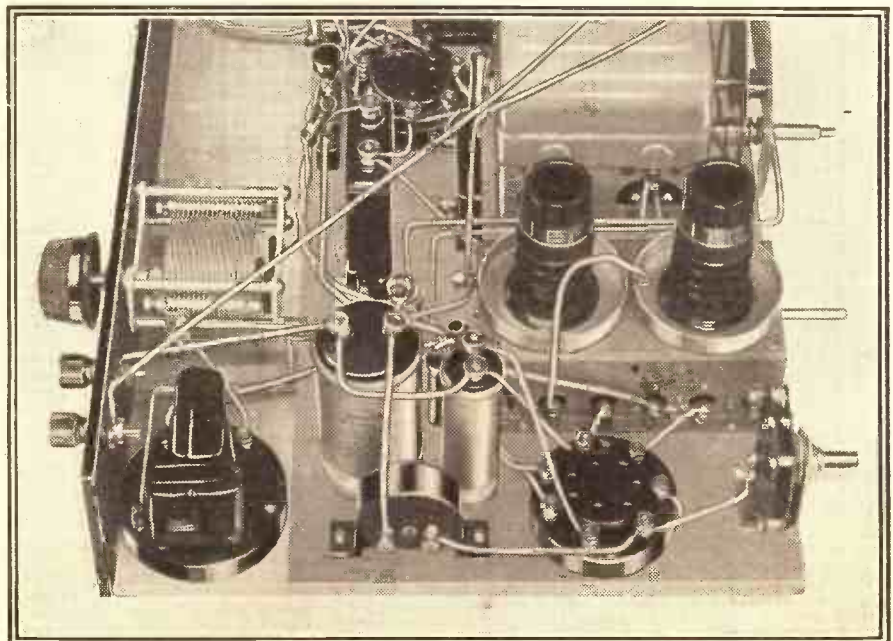
Great Advantages in Mains Working.

There are, of course, great advantages in using all-mains equipment. In the case of the S.T.600, the advantage is not to be gained so much in sensitivity as in output. The mains set is, naturally, pre-eminent when it comes to the production of combined tone and volume. It is true, nevertheless, that there are many who find that the modern superhet in many cases is too liable to pick up or reproduce certain kinds of background noise.

In this article Mr. Scott-Taggart gives final details concerning his all-mains version of the S.T.600. In it the author explains the vital point of "humdinger" adjustment and emphasises the advisability of keeping closely to the components specified.

factory-produced sets. This is regrettable, and is due entirely to the attitude of the component manufacturers. They are deliberately turning aside a huge potential market, and I see no reason why it should not be much cheaper to build an A.C. set than to buy one ready-made. The designers,

THE H.F. END OF THE RECEIVER



In this illustration of the A.C. S.T.600 the cans of the Colvern air-cored coil assembly have been removed. The Extractor coil is clearly seen in the left foreground. The seven-pin valve holders visible above are for the two H.F. pentodes, the Catkin valve being situated in the one nearer the camera.

BUILDING THE A.C. S.T.600

(Continued from page 315.)

"The Wireless Constructor." Even this radiogramophone, which cost about £74, possessed certain operating refinements which could be left out if the set were to be worked by people who knew nothing at all about wireless. But this, in my opinion, is the wrong approach to the problem, and in the A.C. S.T.600 I have provided a set which possesses all the merits of the battery S.T.600, together with those advantages which can only be obtained with mains valves.

Easy to Build.

The construction of the receiver is best undertaken by someone who has already some experience of following the wiring of a blue print. Beyond this slight experience there is no more difficulty in building an A.C. set than in building a battery version. This is particularly the case with the S.T.600, since the main receiver portion is even simpler to build than the battery set. There is no L.F. transformer between valves, since the pentode detector is coupled, directly to the pentode output valve, a resistance coupling being used.

The high-tension supply and the L.T. current are derived from the mains transformer. A metal rectifier of the Westinghouse type is employed, and while this adds slightly to the cost, it lasts for years, and there will never be any question of replacement.

The main portion of the set is constructed

in exactly the same way as the battery S.T.600, a wooden panel, however, not being used. The knobs on the various controls are fitted to the spindles which project through the wooden front of the cabinet. The upper compartment of the cabinet contains the loudspeaker, the loudspeaker

and rectifier equipment can be slid out of the cabinet, but in the ordinary way the base-board would be screwed in position.

As regards the components for the A.C. S.T.600, it is extremely advisable to keep to those specified. This is a good rule in all cases of home-constructed sets; but in the case of an A.C. version, even an expert should think twice before substituting any components. Take, for example, the mains transformer. This is of a semi-shrouded type, and it was found that such a type was necessary if complete absence of hum was to be ensured. The reason is that an unshrouded transformer would induce hum into the transformer of the loudspeaker.



The power pack and the speaker baffle fit into the top portion of the receiver. The hole through which wires pass to the main portion below is partly hidden by the leads running to the rear of the power transformer.

Fine Performance.

The general performance of this set is extraordinarily fine, and I would not have the slightest hesitation in recommending it either as a family set

or as one for the constructor who wishes to get the last ounce out of his receiver as regards sensitivity while preserving all the merits of high fidelity and magnificent volume.

either as a family set or as one for the constructor who wishes to get the last ounce out of his receiver as regards sensitivity while preserving all the merits of high fidelity and magnificent volume.

J. S.-T.

[Editorial Note.—A diagram showing the position of the aerial coupler appears on page 344.]

THE ALL-MAINS S.T.600 IS BUILT FROM THE COMPONENTS IN THIS LIST

Component.	Type Used by J. Scott-Taggart.	Make.	Component.	Type Used by J. Scott-Taggart.	Make.
Cabinet	For A.C. S.T.600	Peto-Scott	Condensers	1 1-mfd. 200 v. wkg. (type T.50)	T.C.C.
Extractor Coil	S.T.600 "Ferrocart"	Colvern		1 2-mfd. (type T.50)	"
Condenser	2-gang, with front concentric trimmer	J.B. Unitune, or Formo, Polar Uniknob, Telsen W.427, Ormond Colvern or Wearite Varley		1 .02-mfd. tubular 400 v. working (type 300)	"
Coil assembly	S.T.600			1 50-mfd. dry electrolytic 12 v. working (type 3001)	Dubilier
Mains transformer	2-0-2v. 4A., 205/240 volts 180 mA. (type E.P.37)	R.I.	Chokes	Reaction choke (used for aerial reaction)	Lissen
Smoothing choke	20 henries at 60 mA. (type D.Y. 51)	Westinghouse Amplion		Reaction choke (screened) (used for anode reaction) (type H.M.S.)	Graham Farish
Metal rectifier	Style H.T.S	T.C.C.	Terminal blocks	2 double terminal (type W.204)	Telsen
Paper condensers	2 4-mfd. 700-volt test, 300 volt working	Rola F.6.-P.2,000 or W.B. Celestion, R.&A. B.T.S.	Potentiometer	30-ohm ("Humdinger")	Claude Lyons
Electrolytic condensers	2 8-mfd. wet. 440-volt D.C. max. working voltage (type 802)		Valve holders	3 7-pin (type V.H.15)	Bulgin
Loudspeaker	Energised, with 2,000-ohm field		Aluminium bracket for electrolytic condensers	To take two condensers	Peto-Scott or home-made
Variable condenser	.0005-mfd. solid dielectric with insulated spindle and insulated bush. (For aerial reaction)		Resistors	1 100-ohm, 1 watt	Erie
Differential condenser	.00015-mfd. solid dielectric with insulated spindle and insulated bush. (For anode reaction)	B.T.S.		2 20,000-ohm, "	"
Volume control	5,000-ohm graded for variable-mu with terminals, fitted with mains type toggle on-off switch with terminals	Colvern		1 25,000-ohm, "	"
Potentiometer	50,000-ohm linear with terminals (type V.C.36)	Bulgin	Bracket	1 200,000-ohm, "	"
Extractor tuning condenser	.0005-mfd. air-dielectric	Polar No.4 direct drive (with plain knob extra)	Grid leak	1 100,000-ohm, "	"
Combined twin fuse-holder and mains connector	Type F.15	Bulgin	Terminals	2 10,000-ohm, "	"
Condensers	.0005-mfd. solid dielectric W.358		Terminal strip	1 500,000-ohm, 1/2 watt Ohmite	Graham Farish
	3 1-mfd. tubular 350 v. working (type T.250)	Telsen Reaction	Baseboard	1 500-ohm, "	"
	2 .0003-mfd. (Mica)	T.C.C.		1 150-ohm, 1 watt	Erie
	1 .00005-mfd. (Mica)	Lissen	Brackets	For holding 50-mfd. condenser	Peto-Scott or home-made
	1 .5-mfd. (type 9200)	Dubilier	Wire		"
	1 1-mfd. (type 9200)	"			"
			Valves	H.F. V.M.P.4 Catkin	Peto-Scott
				Det. A.C./V.P.1	Lewcos "Glazite" or British Radiophone "Pullback," Bulgin "Quikwyre."
				Output. A.C.2/Pen.	Osram
					Mazda

SIR JOHN REITH, now back in London after his highly successful tour of South Africa, will turn attention to the task of carrying the B.B.C. through the forthcoming transition period between Charters. He is determined that the Government inquiry, if there is one, shall be turned to account by the B.B.C. And his first objective is likely to be financial.

He wishes the B.B.C. to have a much bigger share of licence revenue, and he will get some satisfaction on this score. He will also aim at constitutional control of wireless exchanges and of other disseminating organisations. That he will succeed herein is more doubtful, because he will have the Post Office pretty actively against him.

In any event, the coming struggle is one after his own heart, and the Director-General of the B.B.C. can promise himself a really happy time in the next eighteen months or so.

"Mannin Veg Veen."

"Mannin Veg Veen" is the correct title of a national Manx programme that the B.B.C. will broadcast to the world on Sunday, November 25th, at six o'clock. Malcolm Frost, the producer, hopes to go one better than the first programme of the kind, which he was responsible for in 1930.

There will be Manx traditional airs, word pictures of customs and various novel devices for reproducing "atmosphere." Malcolm Frost, himself a native Manxman, achieved his first recognition in America as a radio producer with his effort of four years ago.

Droitwich Problems.

The Droitwich transmitter is not settling down without its peculiar difficulties and problems. Fading and night distortion are the cause of some correspondence with listeners. Every year, at the change-over from summer to winter time, there is an influx of complaints to the B.B.C. because of alleged fading and night distortion on the long waves. The transfer from Daventry to Droitwich has made no difference in this cause of complaint.

Something new, however, has happened in another connection. There has been some mysterious induction. Although the cause has not yet been located definitely, it is believed to be one of the short-wave transmitters getting on to the Droitwich line passing through Daventry. Another point causing some perplexity is the fading at Sheringham and at Ilfracombe, both within the service area of the station.

The Midland Transmitter.

Installation work on the new Midland transmitter at Droitwich is going on so well that it is now certain that the station will be radiating public tests before Christmas. This means that there is a good prospect of the transmitter being commissioned for service early in February. When it is ready there is to be a reshuffle of home wavelengths, the Midlands getting a lower one than now.

From Birmingham.

Arthur Catterall and Stanford Robinson, two distinguished musical personalities at Broadcasting House, are to visit Birmingham in mid-November.

Catterall will play the concerto in a Sibelius programme, which the City of Birmingham Orchestra is giving in the Town Hall on Thursday, November 15th. The concert will be broadcast.



PERSONALITIES OF THE AIR (4).

Miss Jane Carr, radio, stage and film star, is also well known as a television artist, while her film "On the Air," in which she appeared with Roy Fox and his band, has recently been released. Miss Carr first appeared on the London stage in 1932. She has broadcast regularly in various radio programmes, and has been in many of the "White Coons" productions. Born in 1910 at Whitley Bay, Northumberland.

Stanford Robinson will be the guest conductor of the B.B.C. Midland Orchestra in the Birmingham studio on Saturday, November 17th. Winifred Lawson, the solo artist on that occasion, has close

New Dance Band.

With dance music constituting the first choice among the items preferred by so many listeners at the present time, the opening broadcast by a new dance band is an event of considerable importance.

Tune in to the Midland Regional wavelength on Monday, November 12th, to hear a new ten-piece combination formed by the manager of Tony's Dance Hall, Birmingham, from bands which he has organised in various parts of the country during ten years.

Eddie Carney is the musical director, and among the members is Stanley Rawlins, the "musical boy wonder," who can play twelve different instruments and can sing in three languages.

A Choral Programme.

The first and last choir to broadcast from the old Stoke-on-Trent relay station, the Potteries Choral Society, which recently celebrated its silver jubilee, is to broadcast some operatic choruses from Manchester on Sunday, November 11th.

Not all its members are connected with the potting industry, school teachers, shop assistants and clerks all having their places and "pulling their weight." The society specialises in unaccompanied singing, but it has often collaborated with Foden's Motor Works Prize Band in such works as "Elijah" and "Hiawatha," and it will do so again in the operatic-choruses programme on November 11th.

"Underground Britain."

National listeners have already heard some of Mr. Pat Forrest's talks in the "All-in-a-Day's Work" series.

On Wednesday, November 14th, he is beginning another series for North Regional listeners entitled "In Search of Underground Britain," in which he will describe collieries in Yorkshire, Durham, Cumberland and Lancashire, a lead mine in Derbyshire and the only remaining salt mine in Cheshire.

Mr. Forrest knows his subject, at any rate so far as coal is concerned, because, in the course of his varied career, he worked for several years as a miner in a Durham pit until eventually he became a qualified manager.

From what one can see without undue imagination, there is no reason why Mr. Forrest should cease giving talks for a very long time, since he has been a fair-ground pugilist, farm hand, newspaper reporter and editor, managing editor, advertising agent, "ideas man," air pilot and some other things as well.

"Murder in the Midlands."

A honeymoon couple, caught in some dense fog while motoring, find themselves in a private drive.

The big house in the grounds, whence they quite naturally go to make inquiries as to their whereabouts, appears to be deserted. However, the door is not locked, although no response comes from the repeated ringings of the bell.

They open the door and look inside. There is a corpse in the hall.

What happens subsequently will be known to those who listen to "Murder in the Midlands," which is down for the Midland Regional programme on November 13th.

O.H.M.

SIR JOHN REITH'S NEXT TASK

NEWS AND VIEWS ABOUT BROADCASTING

associations with Birmingham, apart from her many appearances there with the D'Oyly Carte Company.

LISTEN TO THESE NEXT WEEK

LONDON REGIONAL. November 14th: Tessa Deane and John Hendrik as heroine and hero in "Invitation to the Waltz," the first radio collaboration of Holt Marvell and George Postford since "Good-night, Vienna." It is understood that "Invitation to the Waltz" will be filmed at Elstree.

MIDLAND REGIONAL. November 16th: The third of "The Microphone at Large" series is to be broadcast from Tewkesbury Abbey. Music from both the organs, and change-ringing of the peal of twelve bells will be included in the programme. Tewkesbury Abbey was dedicated in 1123, and is famous for its Norman work.

WEST REGIONAL. November 15th: The second issue of "West Country Gazette" will be presented by Francis Worsley. The contents include an Editorial, Gardening Notes, To-day's Birthday, Music Notes, and "Off the Tape"—a topical supplement.

NORTH REGIONAL. November 15th: The band of the 2nd Battalion of the Northumberland Fusiliers will broadcast from Leeds under the baton of J. L. Evans.

SCOTTISH REGIONAL. November 12th: One of the liveliest discussions ever broadcast will take place when John R. Allan will move a motion for the "Abolition of the Highland Cult," and will be opposed by Dr. W. Mackay Mackenzie.

TELEVISION

A SPECIAL PRACTICAL SERIES FOR ALL READERS

By L. H. THOMAS

In his progression in the art of television reception Mr. Thomas has reached the stage where the fitting of an automatic synchronising device on the simple disc televiewer has been achieved.

LAST time I dealt with the need for some form of automatic synchronising device, without going into the practical details of how such a device can be arranged.

Since these notes are to be essentially practical in nature, I am going on this week to deal with the more simple of the means employed to obtain a steady picture.

Remember the "facts and figures" with which the last article concluded. There are $12\frac{1}{2}$ complete pictures per second, and each of them is built up of thirty vertical strips. Thus the duration of each of these strips is $\frac{1}{375}$ of a second.

THE PHONIC WHEEL

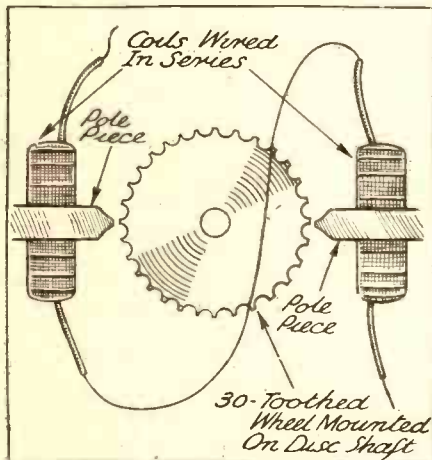


Fig. 1.—A simple form of synchronising device.

In the transmitting apparatus a "mask" of some form is employed, so that at the top of its sweep on each vertical strip the light beam is cut off—in other words, there is a minute period of darkness at the top of each of the thirty strips.

This, one can see, has the effect of introducing a strong "pulse" into the amplifiers 375 times a second, and this "pulse" constitutes the so-called "synchronising signal" which is automatically incorporated into the television signals.

The Toothed Armature.

This can be made use of at the receiving end by a very ingenious yet very simple device, the scheme of which is roughly shown in Fig. 1. Two small electro-magnets are mounted on either side of a 30-toothed wheel of laminated steel.

The two pole pieces of the magnet are so arranged that there is a very small clearance between them and the teeth of the wheel, so that if a current is passed through the coils the wheel is at once pulled round into the position shown in Fig. 1—with a pair of teeth directly opposite the pole pieces.

If we mount this toothed wheel on the same shaft as our scanning disc, let us consider what happens. The whole thing will be rotating (when conditions are correct) at $12\frac{1}{2}$ revolutions per second. Seeing that there are thirty teeth, this will mean that 375 times per second a pair of teeth will be directly opposite the pole pieces.

Thus, when our picture is steady, it will be held steady by the strong pulse passing through the pole pieces 375 times a second. In other words, this pulse will occur just as a pair of teeth are opposite the pole pieces.

Now, suppose, for the sake of argument, that the motor starts to run a little more slowly—which would normally cause the pictures to start "drifting" downwards. What happens now is this: Instead of the "pulse" arriving at the crucial fraction of a second, it will arrive just before the teeth have reached the position where the greatest pull of the magnets is exerted, and the strong pulse through the magnets will try to speed things up a little and restore the status quo, even though the motor may be trying to run slowly.

Easily Connected in Circuit.

It thus resolves itself into a fight between the motor and the synchronising pulse. If you have enough current passing through the coils, the latter will win and your picture will remain steady.

There, in the simplest possible language, you have the working of the Magnetic Toothed-Wheel Synchroniser, which, by the way, is a Baird patent. We must now set about putting it into its correct place in the scheme of things in our television receiver.

Fig. 2 shows the most elementary way of doing it. The synchronising coils are simply wired in series with the neon tube, in the plate circuit of the last valve. This method is quite satisfactory if you have sufficient high tension available; but the drop across the coils and the neon tube may amount to 150-200 volts, so that you will need 300 or 350 volts on the last valve.

If you turn to Fig. 2 in the first article of this series (page 127, Oct. 13th issue) you will see that I advocated the use of a separate source of D.C. bias for the neon tube. If you are using this method it is quite convenient to wire the synchronising coils in series with the neon tube; or it is possible to put them directly in the plate circuit and leave the neon tube as it is.

A more refined method, which I will deal with later, employs a special transformer designed to resonate strongly at 375 cycles, and an extra valve which

amplifies this 375-cycle impulse, and nothing else. The synchronising device is then wired in the plate circuit of this valve, and a really strong "pull" can be obtained, which will hold the picture steady in the teeth of all sorts of opposition.

(In passing I might mention that, with mains like mine, something of this sort is a dire necessity!)

In practice the synchroniser is definitely invaluable. Even with a D.C. motor running from accumulators it is a difficult matter to obtain a really steady speed for more than a few minutes at a time; and when one's hand has to be constantly on the control rheostat one hasn't the time or the mind for improving the radio side of things.

Very Strong Control Obtained.

One judges the pictures solely by the fact that they are either moving or stationary, and tends to neglect the criticism of other kinds that is probably necessary!

On the last transmission to which I "looked in," my synchroniser was working so well that one could deliberately alter the setting of the motor rheostat, and beyond a slight "rocking" nothing happened to the picture.

Naturally, this same system is equally applicable to disc, mirror-drum and mirror-screw receivers, since they all incorporate a rotary unit of some sort which is revolving $12\frac{1}{2}$ times per second. Just at present we are only concerned with the practical aspects of the disc method. But a clear understanding of this synchronising scheme

EASILY ARRANGED

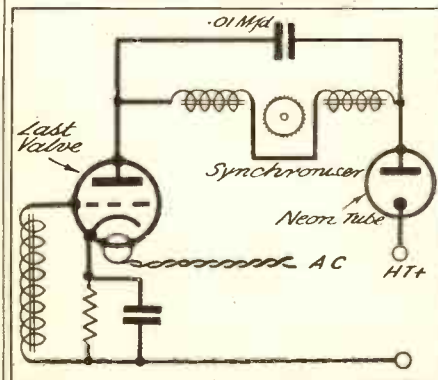


Fig. 2.—The fundamental circuit for providing automatic synchronism.

is essential; once it has been grasped there is no need to worry about it when the other systems are tried out.

Other systems have been developed, but the Magnetic Toothed-Wheel method is the simplest for home-constructors.

(Another Television article appears on page 339.)

MY "BOOK OF PRACTICAL RADIO"

By

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

I AM not at all sure that I ought to say anything about my new book which the publishers of POPULAR WIRELESS have just produced and offer to readers.

Self-praise is proverbially no commendation, but the relationship between myself and the wireless public is an unusual one. I have, for example, to tell the public what my various sets will do. The measure of success of a designer-writer is the extent to which the public places confidence in him personally.

Sooner or later every designer is tempted to recommend to the public some product of his own work which is, for some reason or another, below the high standard at which he might wish to aim. Sometimes the reduction in standard is due to designing down to a particular price, or the publishers may desire to boost some set for circulation-raising reasons.

Sincerity is Essential to Success.

I have always set my face against any such policies as regards my own work. The reason is partly one of general principle, but also one of shrewd common sense. The wireless public, like the elephant, never forgets. It will quite heartlessly trample on anyone who lets it down.

I have seen it so often in twenty years of radio journalism. Exaggerated promises, even if made only once, have ruined many designers. Sometimes the fault has not even been that of the designer, but of those who publish his products. Clever publicity may sell something once, but for anyone in my position, which, I think, has been fairly secure for twenty years, a policy of sincerity and responsibility is essential to continued success.

My ambition has always been to obtain and hold the faith of those interested in wireless. I have gone to an infinity of trouble to build up that faith, and such an exhausting activity as demonstrating my S.T.600 all over the country is just an example.

When I say that I have a good thing to recommend to the public I think I shall be believed. To-day I am recommending you to obtain my new *Book of Practical Radio*.

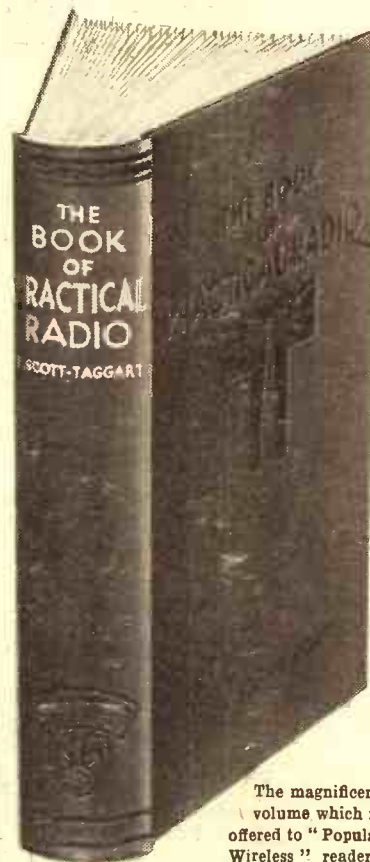
Almost a Lifetime of Experience.

There is a possibility that announcements regarding this work may have been overlooked by some readers in the natural and general excitement regarding the S.T.600. This would be a pity, because *The Book of Practical Radio* embodies almost a lifetime of practical experience in the operating, handling, constructing, designing and servicing of wireless receivers.

The large number of readers of POPULAR WIRELESS who last year obtained *The Manual of Modern Radio* will immediately reserve a copy of *The Book of Practical Radio*. The two books are of similar size, weight and binding. They are companion

volumes in that sense, and the reader will obtain a book which is very beautifully printed on excellent paper and superbly bound.

How the publishers can afford to offer what would ordinarily cost a guinea for as little as 2s. 10d. is astonishing. I will not say that it is a mystery to me because there is no mystery about it. It is frankly an attempt to obtain regular readers for POPULAR WIRELESS. The publishers are prepared, if necessary, to lose heavily in the production of this beautifully printed book in order to obtain more readers for POPULAR



The magnificent volume which is offered to "Popular Wireless" readers.

WIRELESS. A second reason is that this book is so full of practical information and advice that it is bound to popularise radio and so help the circulation of POPULAR WIRELESS.

The publishers don't tell you anything about this, but I am telling you frankly why a guinea book can be offered for 2s. 10d., which sum, of course, covers a multitude of expenses such as carriage, containers, insurance, etc.

There is, of course, not a word of advertising whatsoever in my book. There are 384 pages (not 320 as was stated in the first advertisement) of concentrated information. The book is entirely practical from beginning to end. May I suggest that you make a point of reading the chapter headings given in the original advertisement in the main S.T.600 number of POPULAR WIRELESS?

Do Not Miss It!

There is something intensely personal about a practical book, because it reflects the author's personal experience. To this extent it differs from a more theoretical work such as my *Manual of Modern Radio*. Frequently, a theoretical subject may be read about in different books or articles, but practical advice is something essentially personal, and if you value my advice I believe you will value my *Book of Practical Radio*.

Over 50,000 copies of my *Manual of Modern Radio* were obtained by readers, and there are many thousands to-day who are unable to obtain this book, which can only be printed economically in huge quantities at a time. There is no doubt that there will be many disappointed readers in a month or two's time who, by neglect to reserve their copies at once, have lost for ever the opportunity of obtaining the *Book of Practical Radio*.

Do not imagine that there will be any other way of obtaining this work. There is no other way, as the object of the Presentation scheme (and it certainly amounts to a presentation) is to obtain regular readers for POPULAR WIRELESS. It is absolutely essential that the six coupons should be collected. For those who obtained the original S.T.600 copy of POPULAR WIRELESS (dated October 27th) there will only be three more weeks to complete the coupons.

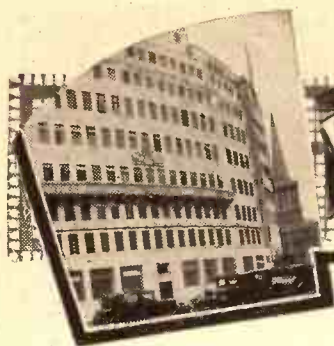
It is Right Up To Date.

A much larger demand is expected for *The Book of Practical Radio* than for my *Manual of Modern Radio*. Although the two books can be regarded as companion volumes, the new book is absolutely self-contained and will obviously have a very much wider appeal because no one who possesses a wireless receiver can fail to benefit from the advice in this second book. It is also easy to understand, and yet so detailed that anyone absolutely new to radio will find much to help him. Anyone who has ever built a set of mine will obtain extra-value from the book, since there are many hints and tips in connection with my sets and, as some indication of how "red-hot" the book is, my latest set—the S.T.600—comes into the discussions!

I am confident that you will be delighted to have this *Book of Practical Radio* at hand on innumerable occasions, and therefore advise you to take immediate steps to reserve your copy before it is too late.

EXTRA SPOT-ON DIALS

Every constructor of the S.T.600 will probably desire at some time to have one or more spare Spot-On Dial cards. The only way (and a very cheap way) to get these is to buy another copy of the Oct. 27th issue of "Popular Wireless." This issue can be obtained by placing a firm order with your Newsagent or Bookstall. Plans are being considered for the production of a printed celluloid 100-station dial and if these mature full details will be given in an early issue of "Popular Wireless."



P.W.'s LISTENERS' SERVICE

The most comprehensive weekly Guide to modern receivers



HOORAY! DADDY'S WINNING!

BURNING SETS FOR SECRECY!

SOME idea of the meticulous care which goes into the design of H.M.V. receivers in the early stages may be gauged from the fact that more than 400 experimental models are evolved in the course of a year, and every single one of them is burnt in order that details of the experiments may remain secret!

Research Extensions.

These illuminating facts are revealed for the first time in an H.M.V. announcement concerning forthcoming extensions to their research laboratories at Hayes—extensions which, when completed, will make them the largest of their kind in the British Empire.

The new building is to contain rooms specially designed for radio research, and, to ensure freedom from atmospheric and other electrical disturbances while tests are being made, the walls and ceilings are to be completely covered with wire netting.

These extensions are part of an ambitious scheme to make 1935 the greatest year in H.M.V. radio marketing, and, judging by present indications, it certainly looks as if they will succeed.

Already more than 12,000 employees are at work in the vast 80-acre factory of H.M.V., where the enormous total of 1,150 tons of raw material is used each week. H.M.V. now have their own foundry, electric generating station, bakelite moulding plant, timber yard and saw mill, and railway siding.

The Fifty-Thousandth Model.

Some indication of the popularity of H.M.V.'s low-priced radiogramophone is provided by the news that this famous firm has just produced the fifty thousandth model, and there is every indication that this tremendous total will be surpassed by the latest addition to the range, the "Five-Forty-A" at 22 guineas.

Mr. Richard Haigh, the English manager of H.M.V., said in an interview: "We anticipate such a large demand for our new popular-priced radiogramophone that we



Little Rosemary Scott, daughter of the famous airman, was a keen follower of her daddy's progress in the great Mildenhall-to-Melbourne Air Race, and it is of interest to note that the set on which she listened to the various broadcast reports is the set which is the subject of our Triple Test this week.

have made arrangements to work night and day on many shifts in the factories between now and Christmas, and expect to produce more radiogramophones in this period than at any other time in our history."

The only obvious comment, with suitable acknowledgments, is simply "this is progress, that was"!

BIG INCREASE IN CAR-RADIO POPULARITY

ACCORDING to information which has just reached us from Messrs. E. K. Cole, Ltd., this season has seen a big increase in car-radio popularity, and during the recent Motor Show the Ekco demonstration cars, to which, of course, are fitted Ekco car-radio installations, had a waiting list so long that they were kept working even after the B.B.C. stations had finished transmitting for the night!

A Bright Outlook.

An official of E. K. Cole, Ltd., told "P.W." that it is predicted that car radio will soon be as popular here as it is in America, where over 700,000 sets were sold last year alone.

The apparatus which has been designed by Ekco for use "on the road" costs 20 guineas, and current for the valves is obtained from a rotary converter which works off the car batteries, and which, of course, is included in the price.

The actual circuit employed is that of a seven-stage superhet, and one of the salient features of this particular installation is that there is claimed to be no variation of sound level, even when the car is turned in a complete circle.

This constancy of output is achieved by the skilful use of compensated automatic volume control, which makes the set non-directional as well as eliminating fading in areas where local conditions are bad.

Why not Write for Details.

There are several other novel features in the design of the Ekco car radio equipment, among which may be mentioned the inclusion of a noise-suppression circuit for the elimination of background noises while tuning, and a tone control.

The makers have indicated that they will be pleased to supply full details of this installation to any "P.W." readers who care to write to them at Ekco Works, Southend-on-Sea.

A PROUD MOMENT FOR ATLAS



Messrs. H. Clarke & Co. (Mer.) Ltd., were this year awarded the Manchester "Evening Chronicle" cup for the best value-for-money exhibit at the recent Show. Mr. A. Clarke, son of the founder of the company, is here seen receiving the cup from Alderman Titt at the Manchester Theatre Royal.

WHY K.B. RADIO IS RELIABLE

Some illuminating details of the searching tests that have to be made with the manufactured article to ensure dependable performance.

BY THE PRESS DEPARTMENT OF KOLSTER-BRANDES, LTD.

DURING the past few years the makers of K.B. radio have concentrated upon the problem of eliminating, as far as is practicable, the many types of faults to which the average radio receiver is subject. They have systematically attacked these problems from the point of view of the particular susceptibility of certain components to develop faults after a period of use.

It has been found that no amount of ordinary testing and inspection will guard against those defects which are likely to occur after a period of time; therefore a series of exhaustive tests have been instituted with a view to subjecting certain components and the completed receivers to conditions similar to those met with in transit and in actual use.

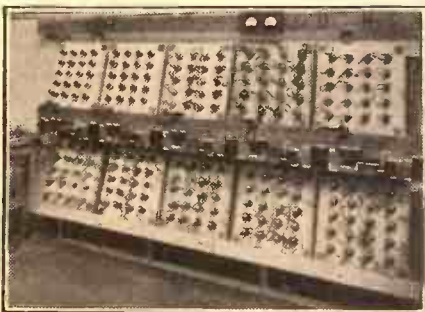
It is well known that valves are responsible for many disappointing failures; and although in a "straight" test a valve may appear to be perfectly satisfactory, there is no guarantee that it will continue to function satisfactorily over a period of time, or that it will withstand reasonable handling. In order to obviate this uncertainty, Kolster-Brandes, Ltd., have installed in their factory at Sidecup a very rigorous "soak" test which aims at reproducing artificially conditions similar to those which the valve would have to withstand in actual use.

A Severe Vibration Test.

Every valve entering the K.B. factory is inserted in the rack shown in the photograph in this column, and, with all the normal voltages applied to the electrodes, is allowed to remain there for one hour. At the end of this period the tray containing a number of valves is transferred to the "vibration" test. In this test the valves are subjected to appreciable mechanical vibration, at the rate of 200 vibrations per minute for 15 minutes. During this time the normal voltages are applied, as in the "soak" test. Afterwards each valve is examined for mechanical defects and its characteristics are carefully checked.

A similar "soak" test is applied to speakers. An input of 2 watts, at a frequency of 50 cycles per second, is applied to each speech coil, and the purpose of the test is to reveal any rattles or other faults which might not develop during the subsequent tests which are of shorter duration. Finally, each speaker is carefully tested against a standard speaker for satisfactory response to a wide range of audible frequencies.

Each receiver chassis, previously having been checked for continuity of circuits, resistance values, etc., is carefully calibrated and tested for sensitivity and selectivity at six different frequencies generated by a crystal-controlled master oscillator. Any chassis that falls short



Every valve entering the K.B. factory is inserted in the test rack shown above to ensure absolute reliability.

of the required standards is immediately rejected. The valves used in the chassis during these tests are the ones actually supplied with the completed receiver.

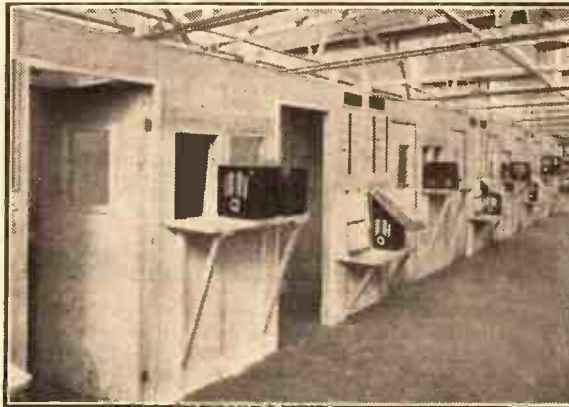
Every K.B. receiver is, of course, subjected to final inspection and tests before it leaves the factory; but immediately prior to these each mains-operated receiver is put on a final "soak" test, with the normal mains voltage applied, for a minimum period of two hours. It has been found that the majority of defects which are likely to occur in a newly manufactured receiver develop during the first hour or two of its operating life, and this prolonged "soak" test goes a long way towards ensuring that the subsequent purchaser will obtain an

OUR TRIPLE-TEST SET THIS WEEK

For the first time in our new series of "triple-tests" we are pleased to be able to publish this week a comprehensive report of one of the new season's "Universal" models. The K.B. model "381"—the set in question—is a striking tribute to the progress that has been made in this interesting field of development, and the observations of our technical staff on page 325 leave no possible doubt about the efficiency of this type of set.

instrument that will give him continuous, trouble-free reception.

The picture below shows some of the sound-proof "final-test" cabins to which K.B. receivers are immediately transferred at the conclusion of the "soak" test, and where they are subjected to very thorough inspection and actual reception tests "on the air" before being passed to the dispatch department.



Before any K.B. set is passed to the despatch department it has to undergo rigorous tests in one of the "final-test" cabins seen above.

WHAT IS A MAINS AERIAL?

THE waves sent out by a broadcasting station generate electrical currents in all metallic things within their range. Of course, they are for the most part very minute currents. But the complicated network of wires comprising the electric light and power mains of a city have a quite respectable amount of broadcasting current generated in them by the ether waves of the more powerful broadcasting stations.

This fact was realised many years ago, but in comparison with the current which can be "collected" by an aerial of even modest dimensions the "broadcasting current" existing in the mains is small. But now radio sets are much more sensitive than they used to be, so more and more use is being made of the mains as an aerial.

A Very Simple Scheme.

The system is simplicity itself. The aerial terminal of the set is connected to the mains instead of to the usual form of aerial.

A small condenser is interposed, however, and the duties of this component are most important. Its main job is to ensure that only the right current is taken from the mains and led to the aerial circuit of the set.

The "broadcasting current" is what is known as



... Messrs. A. J. Balcombe, Ltd., have just released another new battery receiver in their famous "Alba" range, and that the set, which is to retail at £7 10s. 6d., including batteries, incorporates an ingenious station-finding idea known as "Searchlight Tuning."

... On account of the ever-increasing demand for their products, Ultra Electric, Ltd., have just embarked upon the construction of an enormous factory at Western Avenue, Acton, and that when completed it will provide over 100,000 square feet of manufacturing space.

... A clever industrial news film, entitled "1935 Radio in the Making"—a film depicting the production of K.B. receivers at the firm's Sidecup factory—has now been generally released, and it is to be seen (if it has not already been screened) at cinemas all over the country.

... In order to ensure 100-per-cent satisfaction when their sets get into the hands of listeners, Kolster-Brandes have now instituted facilities enabling them to submit to elaborate tests every single valve which leaves their premises in a set (see column 1).

... Ample supplies are now available of the new Powertone "Universal" receiver, an A.C./D.C. four not a superhet) which sells at the astonishingly low price of £6 10s. 6d. complete.

... Messrs. Vidor, Ltd., of West Street, Erith, Kent, who are, of course, the manufacturers of the famous Vidor Universal and Vidor battery receivers, have just introduced a new "no-deposit" hire-purchase system by which these sets can now be delivered for a first payment of only 3s. 6d. or 3s. respectively.

... To cater for the demands for Halcyon 4501 A.C./D.C. receivers, the makers have had to increase the size of their factory at Valetta Road, Acton, by the addition of a new wing which provides additional floor space to the extent of some 3,000 square feet.

... Two particularly attractive battery receivers one, a straight model at 8 guineas and the other an eight-stage, four-valve superhet model at 13 guineas, have just been released by Messrs. Radio Instruments (details will appear in our next issue).

a "high-frequency current," which means to say that it changes its direction (i.e. flows first the one way and then the other) very rapidly—actually some hundreds of thousands of times per second.

You can think of this current as existing in the mains-supply system quite independently of the current which lights your electric lamps and works your electric fires, vacuum cleaners and so on.

This current may be D.C. (direct current), in which case it flows only in the one direction. But even if it is A.C. (alternating current) and does change its direction of flow periodically, this direction change will be comparatively slow—only about fifty times per second as compared with the hundreds of thousands of times per second of the high-frequency current induced into the mains by the broadcasting stations.

The Question of Interference.

The above-mentioned little condenser will, because of its small electrical capacity, offer an extremely high resistance to the ordinary A.C., but it is a quite easy path for the high-frequency currents. With D.C. the condenser constitutes a complete barrier, but still allows the high-frequency currents to pass.

Therefore it can be seen that it is a simple matter to use the mains as an aerial, and many listeners will know how convenient and effective the scheme can be in practice.

There is one drawback, although this does not always make itself felt. This is that there often exists a quantity of interfering high-frequency currents in a mains-supply system, and the mains-aerial connection enables them to obtain an easy access to the set.

That is why sometimes mains aeriels introduce unwanted noises, although, as we have said, they are frequently extremely satisfactory.

S.T. 600

IMPORTANT Miscellaneous Components, Parts, Kits, Finished Receivers or Accessories for Cash or C.O.D. or H.P. on our own system of Easy Payments. Send us a list of your wants. We will quote you by return. C.O.D. orders value over 10/- sent carriage and post charges paid (**GREAT BRITAIN ONLY**). Hire purchase terms are **NOT** available to Irish and Overseas customers.

S.T.600 STRUCTAKIT

Comprising Peto-Scott Ready-Drilled Walnut-faced Panel, 16 in. x 9 1/2 in.; Metaplex Baseboard, 16 in. x 10 in.; Ready-Drilled Terminal Strip, 16 in. x 3 in. and Platform, 4 in. x 4 in. Exactly as **FIRST** specified by Mr. John Scott-Taggart. Cash or C.O.D. 6/8, Postage 6d, Extra. With **FREE** copy S.T.600 issue "P.W." including S.T.'s 100-STATION "SPOT-ON"

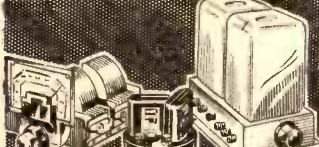
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6/6

S.T.600 CONVERSION KIT

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S.T.600 BATTERY VERSION
KIT "A" £4:19:6 OR YOURS FOR **7/6**
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KIT "A" SPECIFICATIONS

These are the Parts **FIRST** Specified and **USED** by Mr. John Scott-Taggart.

- | | |
|---|------|
| 1 Peto-Scott baseboard, 16" x 10", with Metaplex section 16" x 7 1/2", with ready-drilled 4" x 4" platform | 1 9 |
| 1 Peto-Scott ready-drilled terminal strip, 16" x 3" x 3/16" | 1 9 |
| 1 Peto-Scott ready-drilled and polished walnut ply panel 16" x 9 1/2" | 3 0 |
| 1 Polar Compax -00075-mfd. | 2 9 |
| 1 Telsen type W.358 -0005-mfd. react. condenser | 2 6 |
| 1 Graham Farish "Litlos" -0005-mfd. mid-log-line reaction condenser | 2 0 |
| 1 Graham Farish "Litlos" -0003-mfd. solid dielectric differential condenser | 2 0 |
| 1 Graham Farish 1-mfd. fixed condenser | 2 0 |
| 4 Benjamin valve holders, 4-pin Vibrolider type | 3 4 |
| 2 T.M.C. Hydra 250-v. working 2-mfd. fixed condensers, type 25 | 6 0 |
| 1 T.M.C. Hydra -006-mfd. tubular condenser | 9 9 |
| 1 T.C.C. 0-1-mfd. tubular condenser | 1 4 |
| 1 B.T.S. disc reaction choke | 2 6 |
| 1 Lissen disc reaction choke | 2 0 |
| 2 Lissen fixed condensers, mica type, -00005-mfd. and -0005-mfd. | 1 0 |
| 2 Ferranti 1-megohm resistances, type G.H.I., mounted in holders | 3 0 |
| 3 Dubilier 1-watt. metallised resistances—25,000, 75,000 and 200,000 ohms | 3 0 |
| 1 Dubilier type 9200 fixed condensers, .5 and 1-mfd. | 4 6 |
| 2 Erie 1-watt resistances, 50,000 and 300,000 | 2 0 |
| 1 Wearite or Colvern S.T.600 main coil assembly | 12 8 |
| 1 Colvern Ferrarist S.T.600 Extractor coil | 8 6 |
| 1 Formo 2-gang condenser, with 5 1/2" pointer | 11 0 |
| 1 Ormond S.T.600 Extractor condenser | 3 0 |
| 1 Varley Niclet L.F. transformer 1-3-5 | 7 6 |
| 1 Belgian type G.M.25 combined 25,000-ohm graded volume control with terminals and 3-pt. on-off switch, w/terminals | 5 9 |
| 10 Belling-Lee type "R" terminals—A, E, HT+1, HT+2, HT+3, LT+, LT-, LS-, GB-1, Pick-up | 2 6 |
| 8 Clix wanderer plugs—GB+, GB-2, GB-3, GB-4, HT-, HT+1, HT+2, HT+3 | 1 0 |
| Wire, screws, flex, etc. | 2 0 |
- Copy of "Popular Wireless," Oct. 27th 1934, with full-size Blue Print and S.T.'s 100-STATION "SPOT-ON" DIAL and other "P.W." **FREE GIFT** Grats

KIT "A" CASH OR C.O.D. £4:19:6

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KIT "A" CASH or C.O.D. £9:15:0
 Carriage Paid
 OR YOURS FOR **17/9**
 Balance in 11 monthly payments of 18/-

Comprises complete Kit of Components as **FIRST** specified by Mr. John Scott-Taggart, including ready-drilled terminal strip and Metaplex baseboard, less valves, cabinet and speaker.

- | | |
|--|---|
| KIT "B." As for Kit "A," but including set of 3 Specified Valves. Cash or C.O.D. Carriage Paid, £12/8/6. | OR YOURS FOR 22/9
Balance in 11 monthly payments of 23/-. |
| KIT "C." As for Kit "A," but including Valves and Specified Peto-Scott A.C. S.T.600 Cabinet with Speaker Baffle and Mains Unit Shelf, less Speaker. Cash or C.O.D. Carr. Paid, £13/8/6. | OR YOURS FOR 25/6
Balance in 11 monthly payments of 25/9. |

VALVES: Set of 3 Specified Valves, £2/13/6. or 5/- deposit and 9 monthly payments of 6/-. Rola Speaker if required with the above, add £1/15/0 to Cash or C.O.D. price, or 3/3 to deposit and each monthly payment.

KIT "A" Comprising complete kit of components, as first specified by Mr. John Scott-Taggart, including Peto-Scott Ready-Drilled Walnut-faced Panel, Metaplex baseboard, Ready-drilled plywood platform and Terminal Strip, and copy of "Popular Wireless" with free full-size blue print and S.T.'s 100 STATION "SPOT-ON" DIAL and other "P.W." **FREE GIFT**, less valves, cabinet and speaker.

KIT "B" CASH or C.O.D. £7:4:0
 Carriage Paid
 OR YOURS FOR **13/3**
 Balance in 11 monthly payments of 13/3.

As for Kit "A," but including set of 4 first specified valves, less cabinet and speaker.

KIT "CT" CASH or C.O.D. £8:1:6
 Carriage Paid
 OR YOURS FOR **14/9**
 Balance in 11 monthly payments of 14/9.

As for Kit "A," but including valves and Peto-Scott S.T.600 table cabinet, less speaker.

KIT "CC" CASH or C.O.D. £8:19:0
 Carriage Paid
 OR YOURS FOR **16/6**
 Balance in 11 monthly payments of 16/6.

As for Kit "A," but including valves and Peto-Scott S.T.600 Consolette cabinet, with speaker baffle, and battery shelf, but less speaker.

AGAIN S.T. CHOOSES and SPECIFIES PETO-SCOTT CABINETS S.T.600 TABLE CABINET

BATTERY MODEL
EXCLUSIVELY SPECIFIED by Mr. John Scott-Taggart for the S.T.600. Exquisitely designed with finest macassar and walnut veneers. Constructed of carefully selected wood and hand french polished by London's leading craftsmen. Lift-up lid. Cash or C.O.D., 17/6. (Carriage and part packing 2/6 extra.) Yours for **2/6** and 4 monthly payments of 5/- (including carriage & packing).

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EXCLUSIVELY SPECIFIED by Mr. John Scott-Taggart for the S.T.600. Another beautiful cabinet built by master craftsmen from the finest woods. Exquisite walnut veneers and modern black fret. Hand french polished by London's experts. With Baffle Board and Battery Shelf. Yours for **5/-** and 6 monthly payments of 6/- (including carriage & packing). Cash or C.O.D., 35/-. (Carriage and part packing, 2/6 extra.)

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"THE BOOK OF PRACTICAL RADIO" represents the essence of the author's 22 years of practical radio experience as applied to radio receivers.

Famed as an inventor and a pioneer of radio valve work, Mr. Scott-Taggart possesses a vast experience of handling, designing, experimenting with and—when necessary—"putting right" every possible kind of receiver.

EXPERT ADVICE

If you obtain this book it will be like having John Scott-Taggart at your side, showing you how to get the most out of your set, how to construct a design and how to put right a set which does not work correctly.

The author deals not only with general principles, but gives scores of examples of faults and how to trace and cure them speedily and effectively.

Even if you do not think you need practical advice, the chances are that once you have this book, you will get better results from your present set.

Reserve your copy of this book immediately. Huge quantities are being printed, but the demand will be tremendous. Over 50,000 copies of the author's "Manual of Modern Radio" were completely sold out, and there are thousands who cannot

now obtain the book through delaying to accept our offer of last year. Fill up the forms to-day!

Although this book is absolutely self-contained, no one who already has the "Manual of Modern Radio" will want to miss this new book, printed and bound in the same way, which gives between its two covers all the practical information and advice which every person interested in radio requires.

THE S.T. CIRCUITS

Incidentally, there are special sections dealing with all the S.T. sets, so that, if you possess one or intend to do so, this book will be invaluable.

There is really no substitute for such a book, unless it be to serve a very long apprenticeship at the art of radio.

The practical detail is amazing. Do you realise, for example, that there are twenty possible causes of hum in a mains receiver? Yet each is tabulated and discussed in this book.

HOW TO TEST YOUR SET

Do you know how to test a set and find a fault without a single instrument? Do you know how to test the insulation and capacity of a condenser without a single meter? Such matters are dealt with so as to cater for all classes of reader.

An extremely valuable and original feature of the book is the set of numbered fault tests which infallibly point the way to any kind of fault.

NUMEROUS ILLUSTRATIONS

There is a wealth of "how-to-do" sketches and photographs, and the whole atmosphere of the book is intensely practical.

Above all, of course, is the fact that the book is by John Scott-Taggart, F.Inst.P., A.M.I.E.E. His other books have sold to the extent of 800,000 copies—the greatest possible tribute to his ability to write the kind of book that people read and appreciate.

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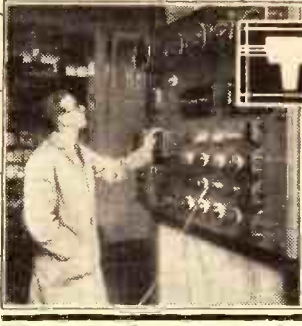


TECHNICAL TESTS

TECHNICAL TESTS No. 6:

THE K.B. MODEL "381"

A five-valve Super for universal mains operation.



ACCORDING to statistics recently published, not until 1945 or 1946 will the unification of mains voltages and supplies under the plan which is at present proceeding—the grid system—be completed.

Ten years! And until that time has elapsed there will always be in this country a certain number of districts that are on D.C. mains.

That fact alone surely constitutes the strongest argument in favour of sets that can be operated universally on either A.C. or D.C. mains without adjustment other than perhaps that of voltage range.

After all, at the present rate of technical progress, no set remains up to date for ten years, or even for half that time, and in these circumstances the adaptability of "universal" sets is a feature the advantages of which are obvious.

But despite these advantages and many more that could be advanced, the number of such sets at present available is exceedingly small by comparison with the commercial-set market as a whole. In fact, it is so small that in the absence of technical assurance to the contrary, the ordinary listener might have grounds for thinking that there must be some definite reason for it.

The only possible reason is that it was not until fairly recently that "universal" valves have reached that stage of perfection which permits of them being used in commercially built designs. There is certainly no technical reason—that much we have been able to prove to our complete satisfaction in the series of tests which we have just conducted with the K.B. Model "381" universal superhet. In fact, on the contrary, there would appear to be technical advantages.

A Fine Receiver.

Every single one of the tests in this series so far has been of a superhet—of an ordinary "one-type-of-supply" superhet—and in consequence we welcomed the opportunity of testing the K.B. universal super because it provided us with facilities not only for making direct comparisons, but for determining exactly what progress has been made commercially in the design of "any-mains" receivers.

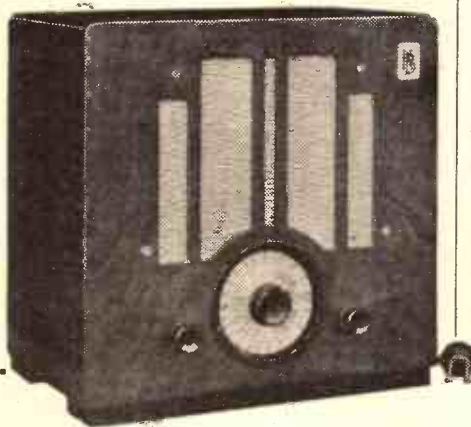
The results were illuminating in that they proved conclusively that the standard type of instrument with which we are all familiar has nothing over the universal design. From all the important aspects—those of sensitivity, selectivity and quality of reproduction—the K.B. universal super is indeed a fine example of present-day technical excellence, and if its astonishingly low price of ten guineas is an indication of what may be expected generally when universal sets become the rage, then let us hope that that time is not far distant!

So far as the actual design of the K.B. Model "381" is concerned, the circuit follows standard practice, and apart from the introduction of one or two clever refinements, there is nothing that is strikingly different about it.

In our estimation that is an advantage. To ensure absolute dependability there is a lot to be said in favour of the use of a standard,

well-tried circuit as opposed to some doubtful and perhaps freakish principle.

A cleverly designed band-pass filter, which is both capacitatively and inductively coupled, serves to join the aerial circuit to the first valve—a pentagrid frequency changer combining the functions of first detector and oscillator.



TECHNICAL SPECIFICATION

GENERAL DESCRIPTION.—Five-valve (including rectifier) table model superhet for operation on universal mains, i.e. A.C. or D.C.

CIRCUIT ARRANGEMENT.—Standard superhet, comprising pentagrid frequency-changer (combined first detector and oscillator); variable-mu intermediate-frequency amplifier; double-diode triode, combining the functions of demodulation, L.F. amplification, and diode rectification for the automatic control of volume on the first two valves, and pentode output. Input circuit is capacitatively and inductively coupled band-pass filter, and L.F. valve is resistance-capacity coupled to output pentode. Set is de-

signed for use with the standard K.B. "Rejcostat" system.

CONTROLS.—Three in number, consisting of one main tuning, combined volume control and on-off switch and wave-change switch.

SPECIAL FEATURES.—(1) Freedom from mains hum; (2) Excellent quality of reproduction, with maximum undistorted output in excess of 2 watts; (3) Small power consumption (55 watts); (4) Well-finished cabinet of extremely pleasing design.

MAKERS.—Kolster-Brandes, Ltd., Cray Works, Sidcup, Kent.

CASH PRICE AND HIRE - PURCHASE TERMS.—10 guineas, or first payment of 28s. (which includes 3s. insurance) and twelve monthly payments of 18s.

The output from this "mixer" valve is fed into a double-tuned I.F. transformer, which in turn is coupled to a variable-mu I.F. amplifying valve. Demodulation, or, if you prefer it, second detection, is carried out by one of the diodes of the double-diode triode which is next in circuit sequence.

The triode section of this three-in-one valve functions as an L.F. amplifier in the ordinary way, but the second diode is the rectifier which is used in connection with the attainment of automatic volume control. Incidentally, the rectified output potential from this valve is fed back as bias for both of the first two valves.

It is a welcome change to find that the output from the triode section of the double-diode triode is resistance-coupled to the pentode output valve. It may appear to be only a small point, but there is evidence to prove that it has a lot to do with the high quality of reproduction which is given by the "381." Moreover, the absence of transformer low-frequency coupling no doubt accounts for the fact that this set, although a superhet, seems to have a much quieter background when receiving distant stations.

In this connection we feel that K.B. are deserving of special praise for the efforts that they have made in the design of this set to eliminate mains-borne interference. A suitably bypassed mains type H.F. choke is included in series with each of the mains leads, and, as a result the set is remarkably quiet in operation. As a matter of interest, of all the mains sets that have been through our hands recently there is no doubt at all that this particular instrument is the quietest from the point of view of mains hum. In our opinion, that is a most important consideration.

Extremely Sensitive.

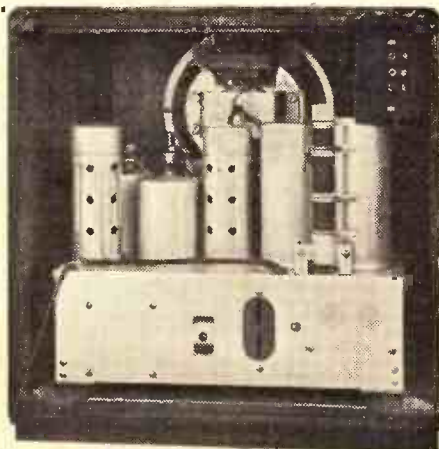
In the first of our series of tests, which, of course is the one that we carry out with the modulated oscillator and screened reception cabinet, the K.B. Model "381" gave a very convincing account of itself. There is little doubt that the sensitivity claims of the makers of from 15 to 30 microvolts is indeed a modest one, and the overall amplification for the type of set is if anything slightly up on our standard tolerances for the particular circuit arrangement employed.

On the medium waves the selectivity of the set is quite up to standard, and is such as to permit of the reception of a large number of stations—many more, in fact, than are actually marked by name on the dial.

We cannot, however, speak quite so highly of the long-wave performance, for although the general sensitivity of the set is well maintained, there is a slight tendency for "side-splash" if the dimensions of the aerial much exceed what may be termed the average.

Out of fairness to the makers we feel that it is only right to add that for some reason or other practically every commercial super that we have tried of late has suffered from the same failing, but it is really nothing very much to worry about. That is why one can almost

(Continued on next page.)



The extreme compactness of the K.B. Model "381" testifies to the skill with which the instrument has been designed.

THE "MAN-IN-THE-STREET" TESTS

EUROPE ON A PIECE OF WIRE!

The story of an extraordinary accident which occurred during the tests by our chance-chosen critic, and which constituted a striking tribute to the sensitivity of the K.B. "381" receiver.

"It is one of the new 'Universal' sets," I said, "and all you have to do is to tune it and listen, afterwards telling me exactly what you think of it."

I was introducing the K.B. 5-valve superhet (Model "381") to an unprejudiced member of the public, who had consented to test it from an ordinary user's point of view, under "P.W.'s" unique scheme of man-in-the-street criticism. He was Mr. R. S.



Mr. R. S. Scott, who lives "within the shadow" of the Crystal Palace, was particularly impressed with the absence of directional effects in the reproduction of the K.B. "381."

Scott, of 12, Queensthorpe Road, London, S.E.26—a business man, not connected in any way with wireless.

At once Mr. Scott inquired: "What is a Universal set?" I explained that "Universal" meant that the set could be used equally well from either A.C. or D.C. mains. And that this recent development was now available to the public for only ten guineas.

He nodded, switched on, and then proceeded to familiarise himself with the tuning; the right-hand section of the set's dial is devoted to the medium waves and the left-hand section to the long, and in a few minutes Mr. Scott was tuning in dozens of stations.

"It's extremely selective," he said, "and the slightest touch seems to be all that is necessary to go from one station to the next. But, honestly, I wish that faint hiss was not there all the time." I, too, had noticed that the background was as loud as though the set were being worked "all out," so we checked it over to make sure that nothing was wrong. And then we made a very surprising discovery.

Instead of being connected to the aerial under the roof, as we had supposed, we found that the temporary lead reached only to the door of the room; and the set had been giving us those dozens of programmes with only a short wire.

This was put right in a moment, and in came the programmes again—at magnificent volume this time and without the slightest trace of the background.

A Remarkable Result.

"Well, that's astonishing!" said Mr. Scott. "What amazes me is that they were so loud without an aerial. This is grand now, without a sign of that hiss; but however did it manage to get so many stations without an aerial?"

I explained that, with the delayed automatic control circuit employed by the K.B. "381," even the very weak stations were automatically brought up to full loudspeaker strength, but the enormous magnification required for such small inputs then caused the set to become ultra sensitive. And that was why we had been conscious of the background.

With a properly connected aerial this had completely disappeared, and Mr. Scott walked to the

far corner of the room—an unusually large one—to listen really critically to the quality.

"That's what I like," he commented. "Perfectly clear in every corner of the room! So many sets make you feel you ought to sit close to the loud-speaker, so as not to miss anything spoken. But this is just as clear over there as right in front of it. That's an excellent feature of it."

To test selectivity again the Midland Regional was separated cleanly and completely from Katowice, the station immediately above it—both being very loud indeed and very, very clear.

"Yes, that's grand," said Mr. Scott, and then he tuned in first Stockholm and then its relay from Horby, to note how the set automatically brought the programme up to full strength from the weaker station. "Wonderful!" he exclaimed. "Just as clear from one as from the other, and not a shred of interference with either."

"I could go on playing with this set all night!" he continued, "but I suppose you want me to say what I think about the look of it also. I must say it's a fine cabinet—I do like wood for that."

"But, you know," he went on, "though it is not a thing I should worry about, I wonder that they put that little 'K.B.' monogram on the front. It's beautifully done and quite inconspicuous, but all the same I can imagine—speaking as a business man—that some people would rather have the set without that. Just as a matter of taste, you know."

"I seem to have been praising it a lot," he concluded thoughtfully, "but there is still one other thing strikes me."

"It's this: The neatness and compactness of it are deceiving. To see it in a shop, standing beside a big radiogram or something like that, you would never guess at the really wonderful tone and quality it gives."

"In fact," he summed up, "I'm not sure that that is not the most remarkable thing about it—compactness that lets it stand unobtrusively in any corner, combined with the performance of a far more expensive set."

P. R. B.

TECHNICAL TESTS: No. 6

The K.B. Model "381"

(Continued from previous page.)

skate over it with abandon. Droitwich of course, is quite free from interference, and the same thing applies to the four or five other powerful long-wavers. But it is not easy to get trouble-free reception from Deutschlandsender and the less powerful ones.

However, as we have previously indicated, that is nothing to worry about, for with forty or fifty stations to choose from on the medium waves, there are not many listeners who would quibble about the loss of a few on long waves, especially when in all other respects the set is so outstandingly good.

At a time when "man-made" static is so prevalent, and with no immediate prospects of legislation to combat the menace, K.B., we feel, are to be congratulated for having taken steps in the design of this set to overcome the difficulty.

The model "381" is what is known as a "Rejectostat" receiver; in other words, provision is made in the design for the elimination of unwanted static interference such as is caused by electrical apparatus, etc., and this particular system is exclusive to K.B. designs.

The "Rejectostat" System.

"Man-made" static interference can enter the circuits of a receiver in three different ways. It can be caused by the direct impingement of the interfering wave on the receiver circuits themselves, it can enter by way of the supply mains, or it can be picked up on the aerial system, in which case it is usually the down-lead which is to blame.

Adequate steps have been taken in the design of the model "381" to guard against the possibility of trouble through the first two of these three common sources; but where trouble exists, due to static being picked up by the down-lead, a "Rejectostat" aerial system, which is a standard "extra" for the set, is also necessary.

By way of concluding our practical tests with this instrument, we actually produced some "home-made" static and were agreeably surprised to find that it had little or no effect upon the results of the "381."

The K.B. "381" is undoubtedly a fine set, and at the price of only 10 guineas it represents remarkable value for money.

WHAT I THINK OF THE K.B. "381"

By OUR MUSIC CRITIC

I WAS invited to a friend's house the other evening and was asked to give a criticism on his set. The quality was really good, and I enjoyed the orchestral items very much; but the speech, and specially intervals in the talks, were ruined by a rather obtrusive mains hum.

It is rather disconcerting to have what should be a dramatic silence in a play interrupted by a rough note, as if a double bass or cello were playing a long-drawn-out A flat—that is about the pitch, I think, just over an octave below middle C.

That Annoying Hum.

Some sets get the note an octave lower still, but in such a case it is usually fairly faint, and in the majority of sets the higher note persists. As a matter of fact, it is rarely that I do not hear that annoying hum, and the fact that I have just been listening to a receiver that is free from it has emphasised in my mind the really tragic fact that so many otherwise good sets are marred by the hum parasite.

The set which is so admirably free from interference of this kind is the K.B. "381," and I must congratulate the designers on the fact. Probably there is a very simple technical reason for its absence here and its presence in many other sets, but I am no technician.

In other respects as well the K.B. "381" is excellent. It is particularly brilliant, and vocal and light orchestral items are most enjoyably reproduced. The cymbals and drums come through unusually well, I think, while violins and the piano and cello high notes are particularly good.

Box resonance is commendably absent, a fact that always appeals to me, as I am a keen talks listener, and any pronounced resonances in the speech frequencies always ruins my enjoyment.

The Pick-up Question.

The K.B. "381" is not fitted with pick-up terminals, so I could not test it on my favourite "examination records"; and I think that is a pity, for I have little doubt that records would sound exceedingly good on the set if a carefully chosen pick-up were employed.

I recommend the makers to consider seriously



Our Music Critic, an acknowledged authority on such matters—but whose name, for obvious reasons, we are unable to divulge—makes a point of following the musical score when listening to or chrestal renderings in order to determine the quality merits of the set he is reviewing.

this little omission, for I believe a great many listeners obtain quite a goodly proportion of their pleasure from the use of gramophone records played on their radio receivers.

As an all-round musical instrument I consider the K.B. "381" is excellent value for money—its cost is but £10 10s.—and really the reproduction of the major portion of the musical scale is very fine.

FOR S.T.600

NEW TYPE



CONDENSER

600 B

DESIGNED TO

SCOTT-TAGGART'S

OWN SPECIFICATION

A new J.B. Condenser "600 B" has been specially designed to Mr. J. Scott-Taggart's own Specification for the S.T.600 Battery Model. Insist on the J.B. "600 B," and ensure the best results from your S.T.600. The "600 B" satisfies the designer, so it's bound to satisfy you!

REMEMBER!

The J.B. Unitune Condenser is specified for the A.C. version of the S.T.600. Use only the designer's components.

HERE IT IS

The A.C. Mains Set of the season. The latest "S.T." masterpiece. Of course, the power pack includes a Westinghouse Metal Rectifier. Why "of course"? Because a Westinghouse Metal Rectifier is permanent. It will deliver a constant and unfailing high-tension supply for as long as the set itself is in use . . . and longer. Because it is the only rectifier worthy of such a good set.



You'll want a copy of "The All-Metal Way, 1935" before you start building this set. Not only is it a catalogue of Westinghouse Metal Rectifiers and their uses, but it is also a modern treatise on the A.C. Mains operation of wireless receivers. It's indispensable to all on A.C. Mains.

A.C. S.T.600

Send 3d. in stamps to Dept. P.W., The Westinghouse Brake & Saxby Signal Co., Ltd., 82, York Road, King's Cross, London, N.1, and read why a



METAL RECTIFIER is specified

GRANDEATHER'S WHISKERS!

Are they
IN or OUT



HERE'S dear old grandpa cosily tucked up in bed. But where are his Whiskers? Everyone is searching for them and trying to solve the mystery—are they in or out of bed?

Any number can play this exciting and most amusing of all card games—it's as simple as A B C. The pack comprises 48 cards, with brightly coloured pictures on the front which can be made into more than 1,000 uproariously funny figures. The backs of the cards form a series of six intriguing Jig-Type Puzzles—simple ones for the children and more perplexing ones for the grown-ups.

You simply must join in the search for Grandfather's Whiskers this winter. The children will enjoy the fun as much as you.

Made by John Waddington Ltd.,
Makers of the World's Finest
Playing Cards.

Great 3 in 1 Puzzle-Game

On Sale Everywhere



PRICE

1/-

"SECRET RESERVE" OF S.T.600

Extra performance—which was never needed on any demonstration—obtainable without altering set.

HOW TO DOUBLE SELECTIVITY

IT is quite common for many successful companies to be vastly more prosperous than they appear from a casual glance at their balance sheets.

Such companies have what is popularly known as a "secret reserve." Sometimes up-to-date factories are valued at one pound, or the company's investments, now enormously valuable, are in the books at their original low-cost price.

The S.T.600 possesses a secret reserve of selectivity of which I have said nothing in my articles. I have said nothing because all the demonstrations, and any resulting letters, are based on the set wired exactly as described. The set has been so designed.

But, built into the design, there is a reserve of selectivity—a secret store set by for a rainy day. It does not concern you now or next year, or the year after that. But, to change the metaphor, it is something "up your sleeve," an ace of trumps!

In three words, it is "anode-bend detection." In the S.T.400 I went into the question of "anode-bend" versus "grid-condenser" detection, and explained that, even though anode bend was not as sensitive, it gave greater selectivity, and I used it on the S.T.400 for that reason.

There was at once a revival of the old controversy, but the "400" proved the merits of anode-bend detection.

The Grid Condenser.

When I came to design the S.T.500, which gives greater output but is less sensitive on weaker signals than the S.T.400, I had to use a more sensitive detector, and I decided in favour of leaky-grid condenser rectification.

I overcame much of the heavy "damping" effect of grid currents by using an unusually low value of grid condenser, namely, .00005 mfd. when formerly a .0003 mfd. was commonly used.

This principle is repeated in my latest set, the S.T.600, and there is a great reserve of selectivity already built in the set, especially as regards jamming by a powerful local, which, in my opinion, will become far more powerful before very long.

But over and beyond that is the available selectivity given by anode-bend detection. There are no grid currents to "damp" the second tuned circuit of the set, which thus becomes, under natural conditions, considerably more selective. There are also more subtle merits as regards selectivity.

By using anode-bend detection the selectivity of the S.T.600 is at least doubled on any and every station!

At no demonstration was anode-bend detection resorted to, not even at Brookmans Park or Slaithwaite. But you can accept it as a fact that it would give an even higher degree of selectivity than any described in the various letters. I admit that this reserve has not been needed, but one never quite knows what is going to happen in the future.

Designed to Last.

Unlike more optimistic designers, I expect the worst and design to meet it. The S.T.600 is designed—like the Pyramids—to last! Hence my provision of this card to trump the worst onslaughts of interference.

One reason why I did not describe anode-bend detection in use is that it was not necessary; the other was that anode-bend detection is less sensitive. Admittedly, the

sensitivity as regards anode-bend detection. Add to this the fact that, by the time you may want to use "anode bend," the stations of Europe will themselves be more powerful.

The only requirement to use anode-bend detection is a short length of wire with a grid-bias plug at the end! The internal connections of the set are not altered. That is simple enough, isn't it?

But it is simple because I thought of this secret reserve of selectivity when designing the S.T.600. It was there throughout my tour, but never used because I never found it necessary to draw on this reserve.

You will note in the drawings, blue print of the S.T.600, and especially the installation sketch showing the terminal strip, that the terminal G.B.-1 is connected by a very short wire to the terminal L.T.+.

To work on anode bend you throw away this short wire and connect terminal G.B.-1 to the $-1\frac{1}{2}$ -volts socket in the grid-bias battery. A grid-bias plug, of course, is desirable, and it should be labelled G.B.-1.

Almost instantaneous comparisons between "anode bend" and "leaky grid" can be made by putting the G.B.-1 plug into $-1\frac{1}{2}$ volts and then pulling it out and screwing under L.T.+.

The set will require slight adjustment, especially of anode reaction.

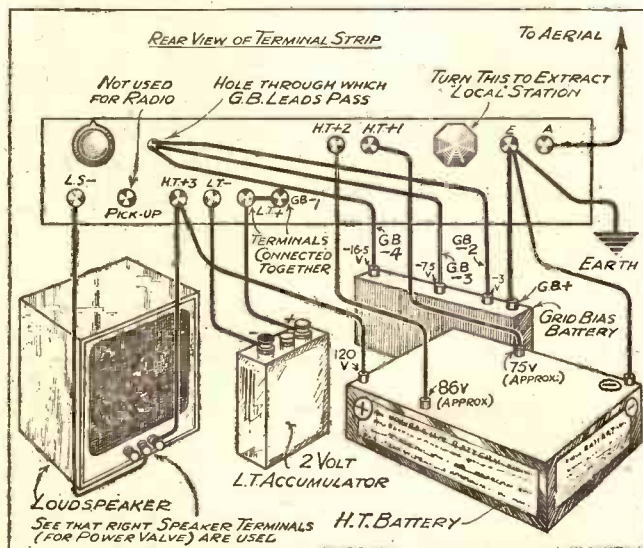
Twice as Good.

Let me remind you that normally (i.e. when not "anode bending") L.T.+ and G.B.-1 terminals must be connected by a wire as shown in all my illustrations.

Here, then, is my Secret Reserve. The set is really twice as good as you thought it was and twice as good as anyone has said it is.

J.S.-T.

CHANGING TO ANODE BEND



To obtain the anode-bend method of rectification, all that is necessary is to remove the wire between the L.T.+ and G.B.-1 terminals and to connect G.B.-1 to a plug inserted in 1.5 volts negative on the bias battery.

S.T.600, with its two high-efficiency pentodes and two stages of L.F. amplification, is extremely sensitive, but I wished to retain every ounce of this sensitivity.

It is interesting to note that on every aerial on which I demonstrated the S.T.600—indoor or outdoor—the set was only worked at about one-tenth of its sensitivity! Aerial couplers and volume controls were never used to the full, except when no aerial was connected.

One could, therefore, well afford the loss of

at Brookmans Park on Saturday evening of last week.

Having conducted this demonstration within a mile of Brookmans Park transmitting station was a great test, but the way the various stations came in at great signal strength without interference certainly proves the selectivity of the set.

The S.T.600 is indeed a wonder set and its performance is amazing.

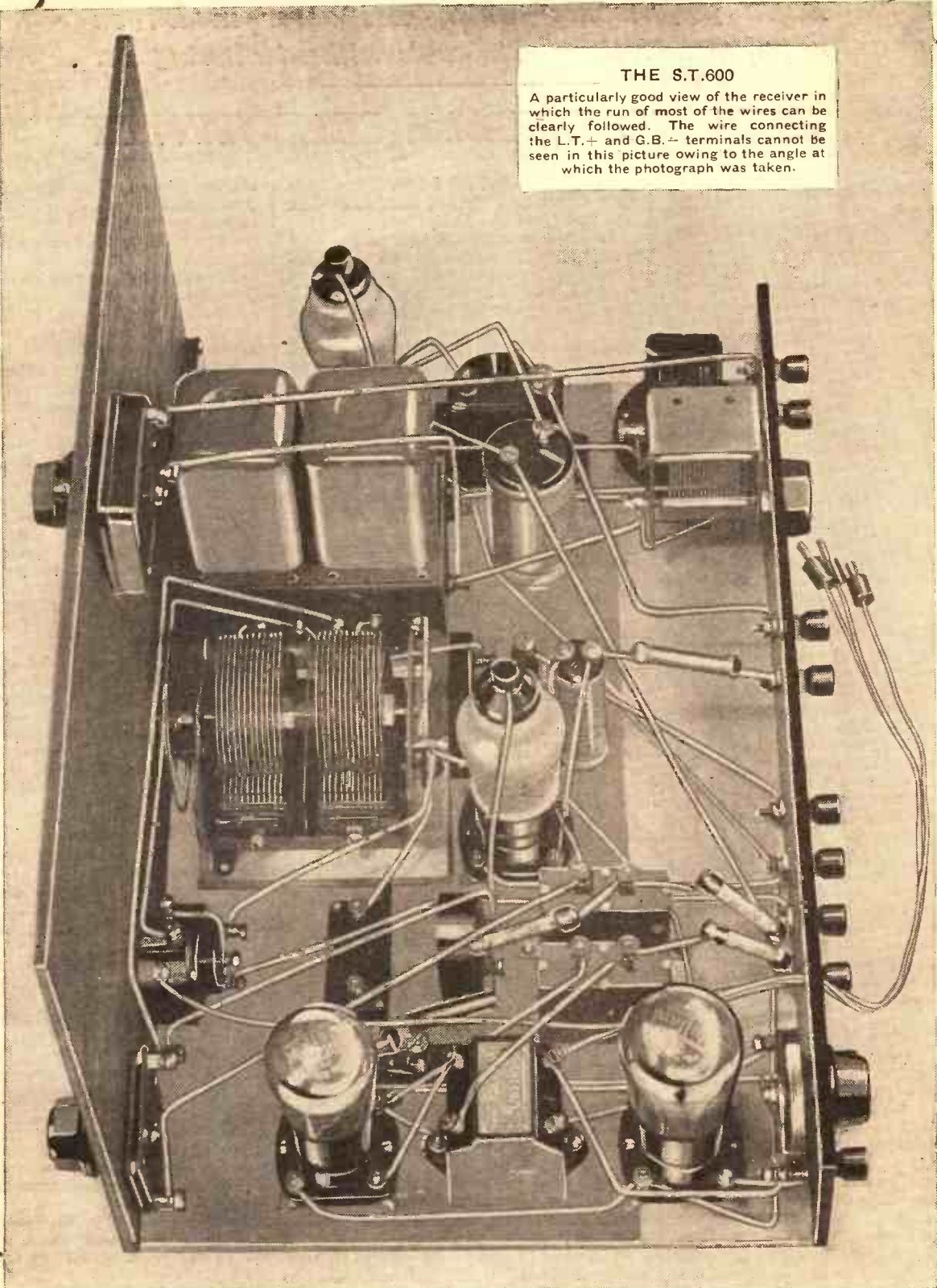
GEO. E. KIRKHAM, "White Cottage," 2, Battersea Park Road, London, S.W.8.

"A WONDER SET."

Dear Sir,—I should like to take this opportunity of thanking you for your kind invitation to attend the demonstration of the S.T.600

THE S.T.600

A particularly good view of the receiver in which the run of most of the wires can be clearly followed. The wire connecting the L.T.+ and G.B.- terminals cannot be seen in this picture owing to the angle at which the photograph was taken.



S.T.600—THE SET FOR THE FUTURE

Are You Preparing For a Great Increase in B.B.C. Swamping?

Mr. JOHN SCOTT-TAGGART'S FORESIGHT

Alone of all the designers, Mr. John Scott-Taggart took a very gloomy view of ether conditions two years ago. His prophecies have proved correct. To-day he forecasts a big increase of B.B.C. swamping which will render every set in Britain obsolete. In designing the S.T.600 he foresaw this and designed his set at Brookmans Park itself! In the following article he brilliantly attacks those critics who say the S.T.600 has unnecessary reserves of selectivity.—THE EDITOR.

A FEW years ago, I initiated a policy of looking ahead and not just designing for current ether conditions.

Since then the position has become steadily worse, and, unlike most designers, I have assumed that conditions are going to grow a great deal worse.

My prophecies in this direction have resulted in my being dubbed "the dismal designer of radio." Two years ago I cheerfully told you that you might be in the frying-pan, and that soon you would be in the fire. I was told that I was making an unnecessary and sensational attempt to make your flesh creep, and that actually the worst had been seen.

To say that things are going worse is not calculated to make one popular in trade circles. It is said to "unsettle the public." If they think that interference is going to become worse they will not buy sets and trade will languish. Better, therefore, to tell the public that everything in the garden is lovely; that there are clouds about, but that the sun will soon be shining; that the Prague Plan will make things better.

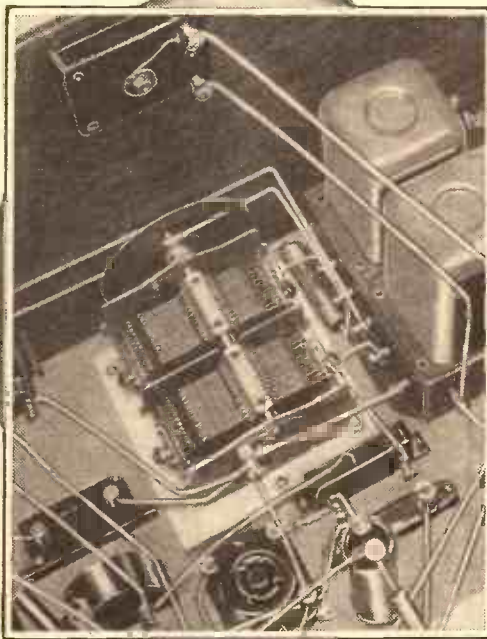
I am content to let others believe these things, but my own policy is to design my sets on the assumption that things will get worse as regards interference. If they don't—well and good; we will have receivers which are better than they need be. If, on the other hand, they get worse, those who build my sets will be cheerful on dry land while the rising tide of interference is slowly suffocating the optimists.

Please listen for a moment again to what I said on November 15th, 1932:

"Conditions are so bad and are going to get so much worse with more Regionals and vastly higher-powered foreign stations coming on the ether..."

Now direct your attention to page 206 of the main S.T.600 number of POPULAR WIRELESS. You will find there my comparative diagram of station powers over a sample stretch of the medium wave-band. Note the rising kilowatts, the huge differences between adjacent stations. Was I right or not? Am I a sensationalist or a super-prophet, justified by events? That diagram is the answer.

I am afraid I am not a very trusting soul when it comes to the power of broadcasting stations. I have little faith in the B.B.C. Just remember what the B.B.C. have done with regard to Daventry. They have multiplied its power by five and



moved it to Droitwich. The masts reach 700 feet—nearly as high as the Eiffel Tower. A station by another name may certainly sound sweeter, but it is drowning good foreign programmes on millions of sets to-day.

Don't let it be thought for a second that I am accusing the B.B.C. of any sort of bad faith. I think their policy of increased power is a sound one. But they are indifferent to whether you want foreign programmes or not. It is their job to provide you with a good British programme.

It is also their national duty to provide a station which can compete in strength with foreign stations. The country with the most powerful station has the most far-reaching voice. Warsaw, with its 100 kilowatts, thought itself a great station until Moscow put 500 kilowatts into its aerial and could flood Poland with its signals. Now Warsaw is planning for 500 kilowatts.

Britain must and will join in the great scramble for power. Adjacent stations will continue to vary enormously in their aerial output with disastrous results to selectivity.

Let me now make a promise and later see what you have to say about its effect on your own receiver. The strength of Regional programmes is 50 kilowatts. I believe that this will go up to 100 kilowatts, possibly more. You may think you are to-day in the swamp area. To-morrow the swamp will become a flood.

You who are comparatively comfortable at 20 miles will, some cheerful evening, be transported to the equivalent of 5 miles from the B.B.C. And the reason? Simply that the present service range of the B.B.C. Regional is totally inadequate. Go to Yarmouth, as I have done, and you will find German stations immeasurably stronger than the B.B.C. They would laugh at you if you spoke about London being "the local."

Are you prepared for this new state of affairs? I doubt it. Most of you are having trouble already as regards selectivity. The S.T.600, however, has been designed for a vast increase in swamping.

The most startling achievement of the S.T.600 is its ability to cut out a powerful local station. The Regional B.B.C. stations are situated close to large residential centres, with the result that most constructors are under the shadow of a local.

It is the duty of the B.B.C. to provide a good programme strength as is necessary for effective reception. The service area of all the Regional stations is at present inadequate. Powerful as the B.B.C. stations are, their range from an absolutely reliable service point of view is not more than 50 miles. At that distance fading is often very noticeable, and interference from foreign stations common. The chances of the B.B.C. increasing the power of their stations is, in my opinion, one hundred to one. Droitwich is a step in the right direction on the long waves, but the future as regards the medium waves is fraught with the greatest danger to the owners of sets of to-day.

With these remarks you are forewarned. But with the S.T.600 you are forearmed.

S.T.600: BRILLIANT RESULTS

Still Further Proofs of the Amazing Performance which the S.T.600 Gives in all parts of the Country.

ALL CLAIMS FULLY SUBSTANTIATED

"58 STATIONS AT AMAZING VOLUME."

Dear Sir,—Let me take this opportunity of thanking Mr. J. Scott-Taggart for demonstrating the S.T.600 in my home. It was indeed a very great privilege. So, for the benefit of those living in South Wales, I would like to mention the points that appealed to me strongly.

There was no "mush" that one generally hears with superhets. The selectivity was most realistic, absolutely cutting out the "locals" in one degree. Right through the demonstration not one station interfered with another. I took down a list, in the early part, of 58 stations, all at amazing volume—but this did not include some of the smaller stations.

The big test of S.T.600 against the S.T.400 was the strength at which you brought in the following stations: Bourn.-Plym., Fécamp, Copenhagen, Monte Ceneri, Athlone, Riga, Moscow, Lwow, Oslo, Huizen.

There is no comparison.

Later on in the test, when all stations were working, I failed to notice any station on the dial that you could not get in without any trouble at all, so I think that it is absolutely essential that one should have the 100-station chart.

I have no doubt whatever that the whole lot would come in easily on the S.T.600 in these parts, as this test was carried on with an outdoor aerial of about 20 feet, with a lead-in of 30 feet indoors and a long earth lead.

The quality of reception was faultless. The "Spot-On" dial invention brings the constructor right to the forefront in radio. No matter what you do with aerial coupler or any of the other controls, your station still comes in dead on the spot.

The performance of the Extractor was amazing (one only was used). It wiped West Regional and West National right off the map, but one could get stations either side at full loudspeaker strength; yet it took no more than a few seconds to adjust.

Lastly, I must refer to the "no-aerial no-earth" test. To put it as one of my guests said: "Why use an aerial at all?" 'Nough said!

It is a family set as well as the constructor's best investment, and I shall be ready to demonstrate this set to anyone who has any doubts as soon as I have got all the parts together. At present I am starting to mourn for my good old S.T.400. Its death is due any moment now!

WM. MORGAN, 91, Birchgrove Street, Porth, Rhondda.

"THE FINEST SET I'VE YET SEEN."

Dear Sir,—Allow me to add my humble thanks for the recent demonstration of your latest set, the S.T.600.

It is a truly remarkable set, doing all you

claim for it under actual working conditions of a private dwelling.

I was particularly struck by the new Extractor, which did really cut out the "unwanted" local, without in any way diminishing the general sensitivity. The way foreign stations were brought in at full loudspeaker strength without an aerial demonstrated the set's wonderful sensitivity.

I also appreciate the way you allowed members of those gathered to hear the demonstration to operate the set, thus proving that anyone with average set experience could emulate your successful results.



Mr. Scott-Taggart photographed at Cardiff during his recent tour of Wales, where he demonstrated the S.T.600 to "P.W." readers.

Another notable feature was that the tuner indication position was not affected by different settings of other controls.

It is the finest set I've yet seen, doing all you claim and no snags.

W. C. VAUGHAN, 12, Wyndham Street, Porth, Glam.

SENSITIVITY MOST AMAZING.

Dear Sir,—Having been present at the demonstration of your S.T.600, I feel I must congratulate you on its success. The stations received free from overlap was most amazing, also the sensitivity of it without an aerial. ¶

I think you have found the secret we have

all been waiting for in the Extractor, which cuts out all local-station interference with such a simple control, but without loss of power, without altering the dial readings, and still keeping the set fully efficient.

C. GUNNING, 68, Brook Street, Williams-town, Glam.

"DEFINITE IMPROVEMENT IN WIRELESS RECEIVING SETS."

Dear Sir,—Having been fortunate enough to have attended your demonstration of your new set, the S.T.600, I can honestly say that this set is a definite improvement in wireless receiving sets.

To be able to "cut" the local station entirely off the dial is in itself an advantage, but on top of this one is able to have programmes until now confined solely to sets having twice the number of valves.

The selectivity and volume of this four-valve set are amazing.

T. NICHOLLS, 13, York Street, Porth.

"IN A CLASS FAR ABOVE ANY OTHER YET DESIGNED."

Dear Sir,—I was fortunate in being present at your demonstration of the S.T.600, at Porth, S. Wales, on October 25th, and must certainly admit that the results far exceeded my expectations.

The sensitivity of the set (even when abnormally selective) was simply amazing, the incorporation of the aerial reaction contributing very much to this end.

The set was tried with and without aerial, and the number and volume of stations received without any aerial whatsoever is ample proof of its extreme sensitivity.

In the Extractor I am sure you have provided this receiver with a control which places it in a class far above any other yet designed.

The West Regional and West National are our bugbear; but the Extractor, set to reduce the spread of West Regional, leaves Poste Parisien on the one side and Hilversum on the other quite clear of the Regional, without (as in the case of couplers) reducing the volume of the other stations received.

The same applies to the long waves. The Extractor, set to reduce the spread of Droitwich, confines the activities of this powerful station to within 2 or 3 degrees of its exact tuning point, thus leaving such stations as Berlin on the one side and Eiffel Tower on the other clear of interference.

The long waves were demonstrated using a piece of wire 5 feet long for an aerial, when some 14 stations were received on the loudspeaker, a truly amazing performance.

In conclusion, I must add that the setting of these controls does not in any way alter the readings on the tuning dial, which remain constant for each individual station, this

—OBTAINED IN SOUTH WALES

making possible the fixing of a station-marked dial, when tuning would be simplicity itself.

H. TOWELL, 97, High Street, Porth, Glam., S. Wales.

"VERY GREAT ADVANCE."

Dear Sir,—Being in possession of your S.T.400, I was rather dubious whether you could do much better on your S.T.600. But, lo and behold, the results are amazing, and it requires to be heard ere one can realise the very great advance you have made in this, your latest set.

The "Spot-On" dial is a very ingenious and important idea, and a long-felt want, and I am sure that there will be hundreds blessing you for this alone.

The volume of the set is colossal, without in the least affecting the quality, which is most beautiful.

But to me that Extractor of yours is the little fellow that does the big job, and is the most marvellous invention ever seen to cut out the local station.

The selectivity seems commonplace with the aid of this device, and you have to search for the local when he is about.

I have the greatest confidence that many will thank you for your latest creation, and will bless the day they have the S.T.600 in their home.

Thanking you for your great kindness in coming to Rhondda to demonstrate,

IVOR OATRIDGE, 71, Leslie Terrace, Porth, Rhondda.

60 STATIONS ON AN INSIDE AERIAL.

Dear Sir,—I wish to convey my sincere appreciation for the opportunity given to attend your recent demonstration of the S.T.600 in Glasgow.

I was greatly impressed by the comparatively small spread of locals and general selectivity of the S.T.600. Had time permitted, the 60 stations received would have easily exceeded 100.

The quality of reproduction was excellent and of very high standard, the sensitivity being no less outstanding, which was thoroughly demonstrated by the loud signals from Cork and Fécamp, etc., on the inside aerial.

A point that appealed to all clearly was the absence of any effect on tuning when various improving controls were used, and the ability to go back exactly to any station, a feature that improves the value and importance of the Scott-Taggart new "Spot-On" dial, which can be operated with ease and simplicity, a wonderful improvement in radio design, and should be welcomed by many "P.W." readers ambitious to construct a receiver for family use in general.

Another important feature I observed was the Extractor you tuned at the back of the set, which enabled you to cut out the local stations within a few seconds, and once done need never be altered.

I might mention, for the benefit of "P.W." readers and other wireless periodical readers, the severe conditions under which Mr. Scott-Taggart demonstrated his S.T.600, having to contend with electrical interference from numerous electric signs spread around the area where his test was carried out. He can be warmly congratulated on the magnificent results, despite so obvious a handicap.

From all points of view I would say without hesitation that the S.T.600 is vastly superior to any of your previous sets, and my S.T.400, which has given me every satisfaction for the past 18 months, will now require to give way to your latest and best.

Should any reader in this locality desire any further particulars of the test, it will be my pleasure to supply same.

In conclusion, please accept my sincere wishes for the success of your best and latest achievement.

WM. L. READ, 1010, Argyle Street, Glasgow, C.3.

"SPOT-ON" DIAL A BOON TO ALL.

Dear Sir,—With reference to your demonstration, I have great pleasure in highly recommending your set.

The selectivity of your S.T.600 is absolutely marvellous, the cut-out on the locals being knife-edge.

When receiving as many stations as 50 under very poor conditions, and on a very short aerial, I do not hesitate to say it is the greatest set of its kind I have ever heard.

Comparing it with your S.T.300, 400 or 500, I think it takes first place in every detail.

DEMONSTRATIONS WITH "POPULAR WIRELESS" IN READERS' HANDS

Immediately after the publication of the S.T.600 in "Popular Wireless" Mr. John Scott-Taggart set off with the S.T.600 to Wales. To keen and critical audiences he demonstrated the S.T.600. Here are the first letters, from Porth, a mining town in the Rhondda Valley. All those who have written had read the full description of the S.T.600 in "Popular Wireless," and some had brought copies with them to check in practice the printed claims made for this amazing set. Every listener expected a great deal after reading the articles, but it is obvious how delighted they were with the actual performance of the set. As regards selectivity in Wales; Mr. Scott-Taggart states that Hilversum and Poste Parisien were always received absolutely clear of West Regional, while Madrid EAJ7 and Copenhagen were clear of West National (same wavelength as London National). Demonstrations were always given of the set on (a) the listener's own aerial, (b) on a few feet of wire loosely thrown in the room and (c) with no aerial at all. In each case startlingly effective results were obtained.

The new "Spot-On" dial with all the stations marked will be a boon to all.

The set is very easy to work. As for the "Extractor," it's almost as good as knocking an unwanted local station out of action, and it only takes about six seconds to work.

One point about your set is that it does not matter which control you turn: you do not alter the station's reading on the dial; therefore you have no trouble in going back to any station marked on the dial.

The demonstration of your wonderful set was one of the most pleasant nights I have had, and I would gladly give my opinion to anyone interested in it. I would recommend anyone to build this wonderful set.

JOHN DAWSON, 146, Ledaig Street, Glasgow, E.1.

PERFECT REPRODUCTION.

Dear Sir,—Here is my detailed opinion of your new set, the S.T.600:

The selectivity of your new set was demonstrated in rooms occupied in the heart of the city, shut in by four-storey buildings on all sides. I should like to say that stations were separated with ease, giving no interference

from neighbouring locals, which have been cut down to a minimum of spread. Actual neighbours could be separated, e.g. Beromunster clear from Athlone. Also on the long waves selectivity was excellent, Droitwich being cut down to a very small spread.

The stations received were 60 in all on both wavebands, every one of these being identified and logged accordingly.

Quality of reproduction on these stations was perfect, all being received at good volume.

The effect of aerial reaction and sensitivity on weak signals was fully demonstrated when Cork was received at local-station strength on 15 ft. of wire strung across the room, also requiring no effort to separate it from nearby stations. Fécamp was also received very well on the same aerial, likewise Moscow and several other long-wave stations.

The tuning of the set was by no means affected by alterations of any of the other improving controls, which you proved to us by tuning back to stations already logged: the tuning arm remained in the same position in which it had previously been; even when you were using the small indoor aerial it still remained the same as on the outdoor one.

Your new "Spot-On" dial, in my opinion, is an excellent idea and most accurate, which will be a great boon to the constructor, and also give your set a commercial look.

The operation of your set is much easier than any of your previous designs; this, above all things, should appeal to many constructors.

Your device, namely the Extractor, which you operated from the back of the set to cut down the spread of Scottish Regional, was what I term "some Extractor," judging by the way it cut out our locals and tuned in such stations as Leipzig, etc., quite free from any interference whatsoever.

Your S.T.600 is certainly all you have said it is, and I must give in by saying that it beats a good set—the S.T.400—of which it has been designed to take the place.

The most outstanding points of the set were ease of operation and selectivity, also volume and the quality of reproduction from the small aerial, which shows the remarkable sensitivity of the set.

I am afraid my faithful friend, the S.T.400, will be replaced by his successor, the S.T.600. I will be only too pleased to give any information which any constructor may wish regarding the demonstration.

T. DICKSON, 129, Dumbarton Road, Glasgow, W.1.

"QUALITY COULD NOT BE BETTER."

Dear Sir,—I am writing to thank you for your recent demonstration of the S.T.600. The machine pleased me greatly. The selectivity was very good, a large number of stations being received—I think it was about 50.

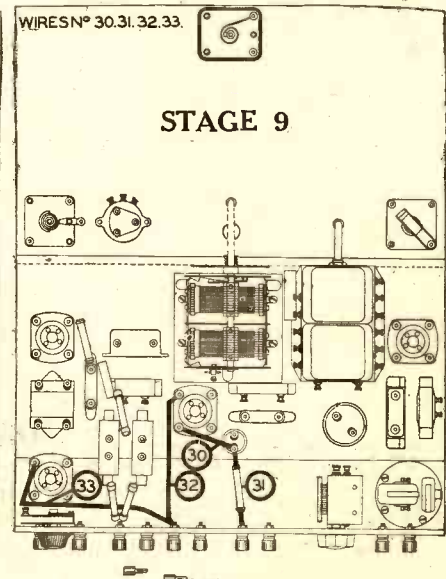
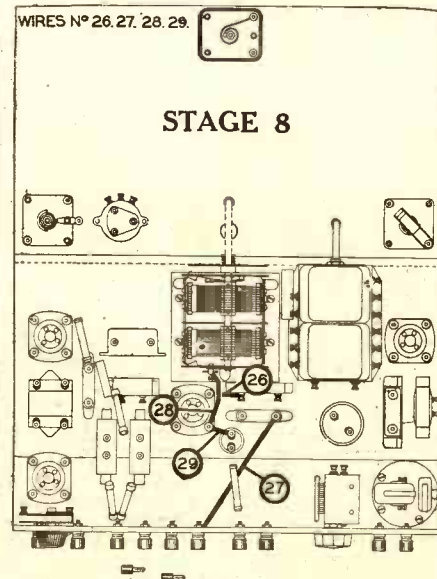
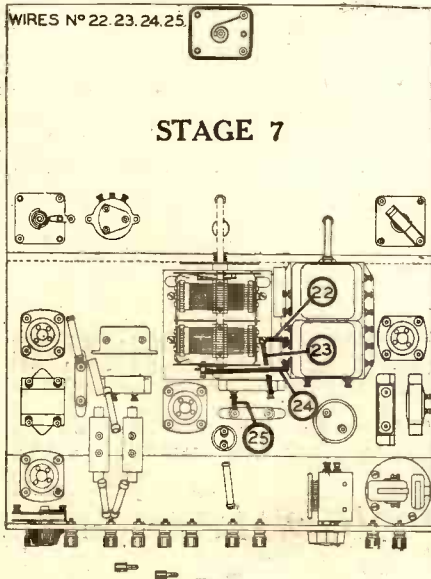
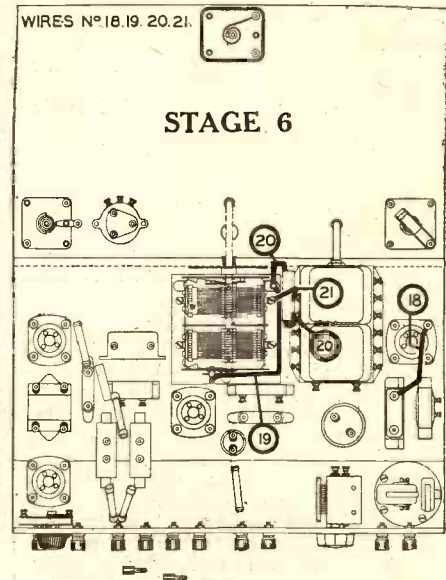
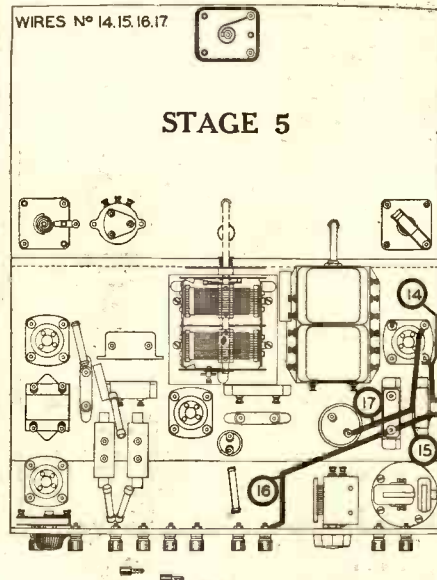
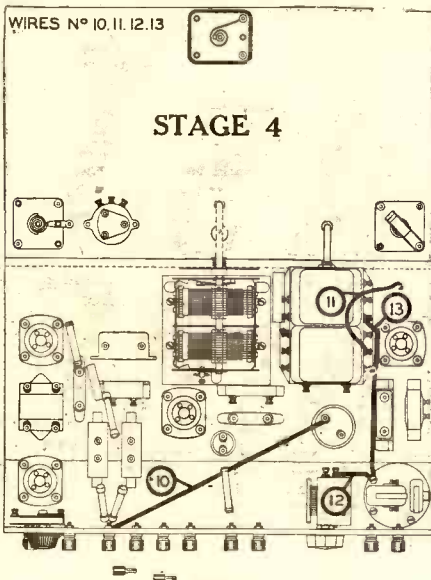
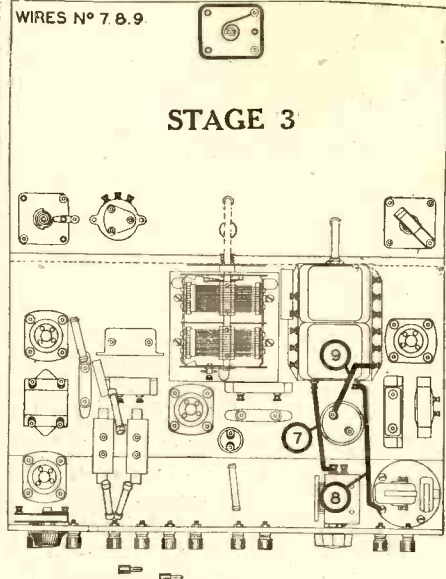
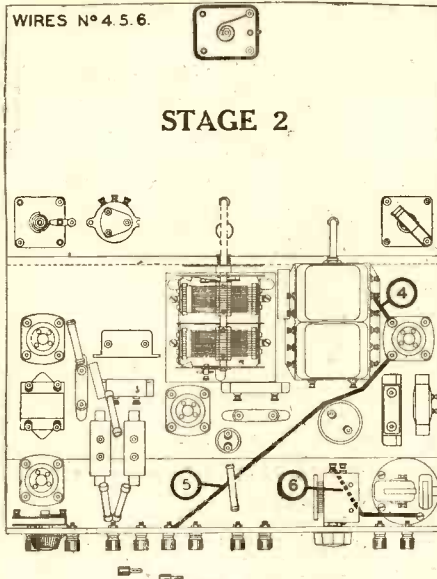
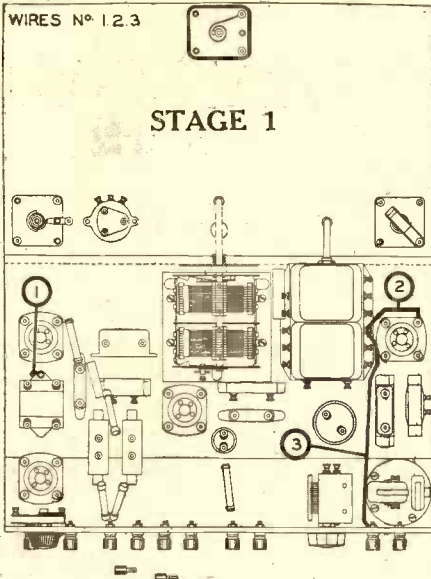
The quality couldn't be better. The whole wavelength range was covered right down to Fécamp, which was very loud—this on a very ordinary aerial, which I am sure didn't do the machine justice.

One thing which struck me in particular was the absence of any effect on tuning when the various improving controls were used, also the ease of operation. The local-station Extractor was very efficient and easily adjusted; this is a real boon to those troubled with powerful local transmissions. Another excellent feature was the "Spot-On" dial, which gives the S.T.600 a real touch of class.

By comparison with your previous S.T. sets, the S.T.600 is miles ahead.

WM. B. HOTCHKISS, 51, Inglefield Street, Glasgow, S.2.

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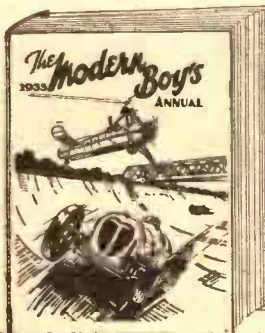


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MAINS TRANSFORMER
LIST No. EP37 . . 25'6

FIRST CHOICE

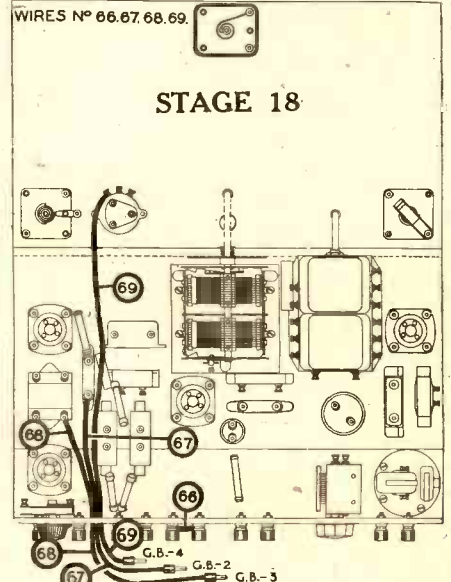
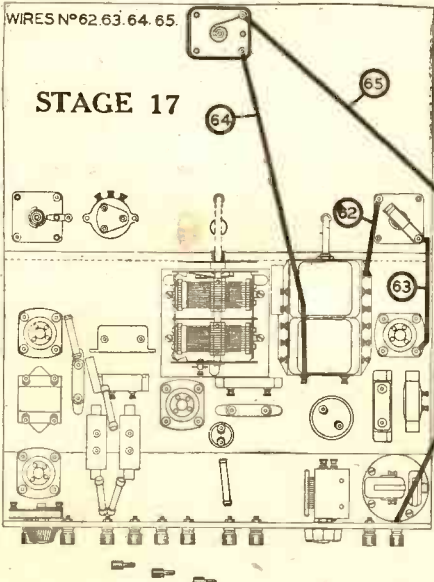
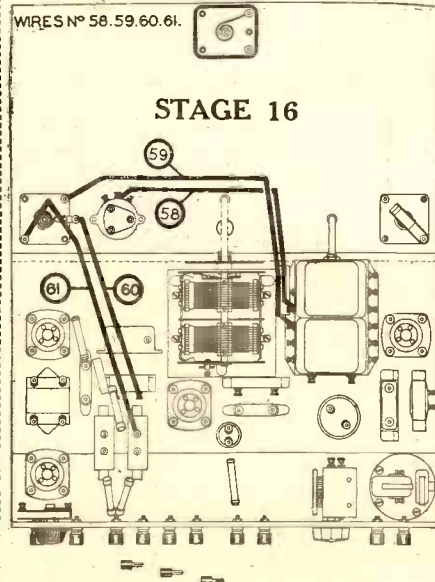
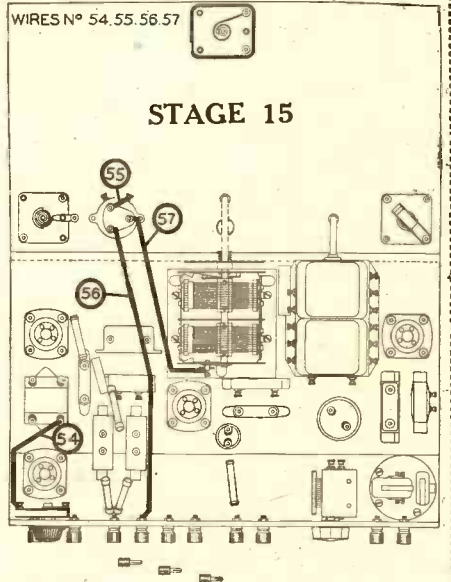
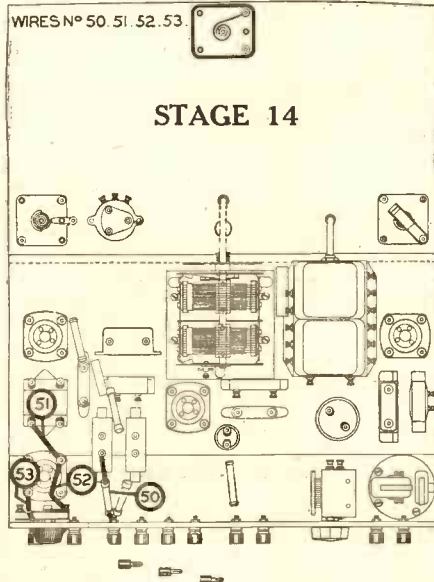
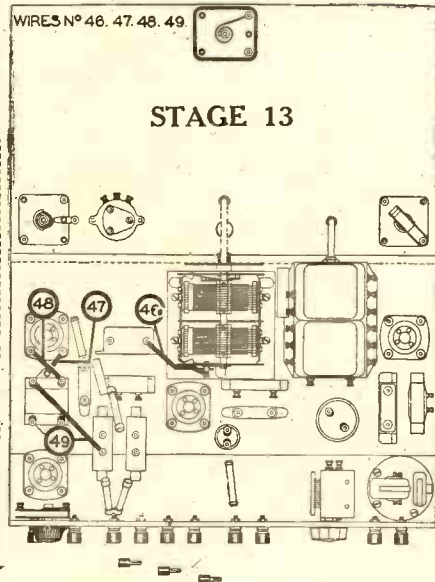
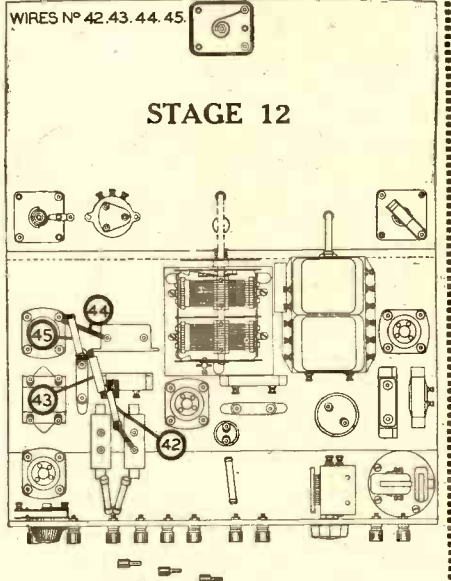
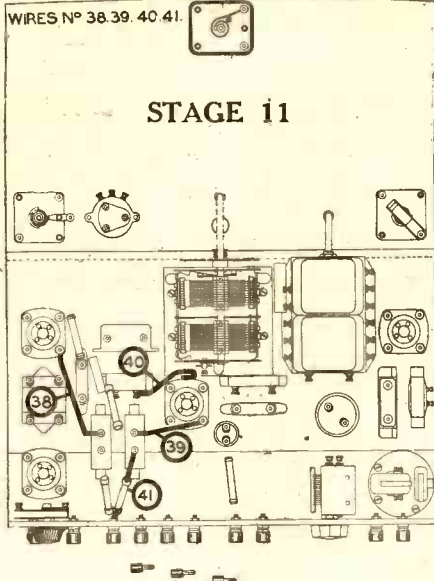
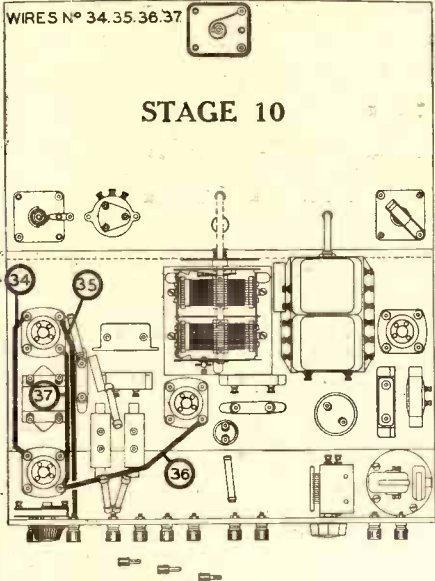
For both the battery and A.C. S.T. 600 circuits, Varley is the designer's first choice for two important components. For the battery circuit, a Varley L.F. Transformer is specified; for the A.C. circuit a Varley Mains Transformer. Get the best out of **your** S.T. 600 set by using the designer's specified components. Write to-day for an illustrated catalogue of Varley components.

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S.T.600—"HI-SPEED" WIRING SERIES



ON THE SHORT WAVES

Conducted by W.L.S.

I HAD originally intended to deal with pentodes this week, but so many readers seem to want something in the way of a "freak" to try out that I have held them over for the time being.

As a matter of fact, I don't think there is such a thing as a "freak" circuit. Some of them (such as the one I am dealing with now) happen to look very curious on paper, but their operation can be explained quite logically. I have yet to meet a circuit that worked respectably and could really be described as a "freak," apart from its appearance when drawn in theoretical form.

One Continuous Coil.

This particular one is best described as a "Modified Ultraudion," and has actually been developed from a transmitting circuit. That doesn't necessarily mean anything, since lots of detector circuits are simply transmitting arrangements altered a little to make efficient rectification, as well as oscillation, possible.

The merits of this one are simplicity of construction and operation, together with the fact that the tuning condenser can still be "dead" at one end. Unfortunately, the reaction condenser has to have both sides "up in the air," but I didn't find hand-capacity effects at all troublesome on that account.

Just study the arrangement. The coils are connected in series to form one large coil, which goes to the grid (via the grid condenser) at one end and the plate (via the reaction condenser) at the other.

The Tuning Condenser.

The really unconventional point about it is the way in which the tuning condenser is connected. Instead of being connected across the coil, it is taken from a point on the coil (not necessarily the centre) to earth. It is advisable to use coils of roughly the same relative sizes as your normal grid and reaction coils would be in the standard circuit.

If you use two similar coils you will find that your tuning range with a .0001 condenser becomes very small indeed, because somewhere between the grid and anode ends of that "combined" coil is a point that is at earth potential. If you connect the tuning condenser from there to earth it won't have any effect at all!

I am not claiming that this arrangement will give marvellous results, or anything

A NOVEL DETECTOR CIRCUIT

W. L. S. gives details of an interesting receiver that has been developed from a transmitting circuit.

startling like that. It is simply a circuit that is worth trying, particularly when you have your baseboard all ready and so little trouble is involved. Experiment with different sizes of coils, and even, if you like, with different sizes of tuning condenser, and you will come across several interesting effects.

The rest of that can safely be left to my readers, and I now want to go on and deal with some correspondence that I have received concerning this whole series of "try-out" receivers.

First of all, will all those who have written and asked me why I don't give baseboard measurements, lists of suitable

As for baseboard measurements, surely the proportions are all you want. You can get those fairly well from the diagrams, and an odd half-inch here and there won't make a great deal of difference. I don't agree with the idea of too much spoon-feeding, and think of the extra satisfaction you derive from making a set when you are left to your own devices a little.

Most readers, I am glad to say, are full of enthusiasm about this idea of changing your circuit every now and then with so little trouble. I won't mention any of them by name, but one expresses his delight with the single-valver, which, he says, was the first single-valver he's ever had respectable results from.

The "Other" Detector Circuit.

The funny thing is that it was so perfectly straightforward and unoriginal that I can't see why it should be better than any other single-valver, unless the other one was defective in some way.

Another comments on the two-valver, and says that he proceeded to "hot it up" before I described how to do it, and he found our minds had worked almost on parallel lines, except that I suggested an A.C. valve as detector.

A Houndsditch reader mentions that he has built the two-valver, and uses two valves of the H.L. class, but is worried because he hardly gets any signals with $4\frac{1}{2}$ -volts bias on the L.F. valve.

Too Much Bias.

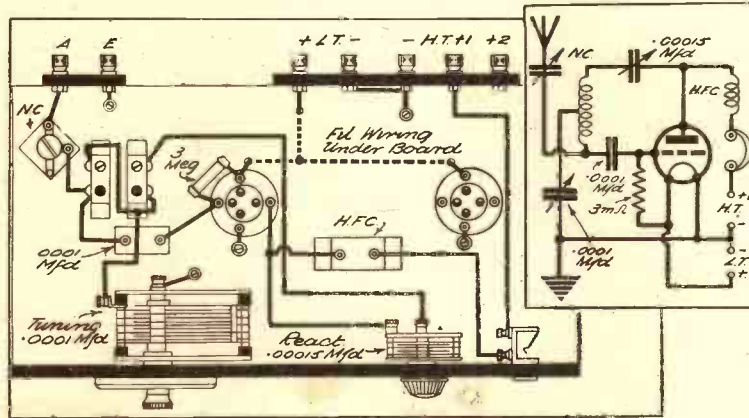
I shouldn't think so, either! Four and a half volts is far too much for the H.L. type of valve, especially with moderately low values of H.T. I only use $1\frac{1}{2}$ myself. The fact that the valve is being used as a note-mag. doesn't imply

the fact that it wants a lot of bias, so why try to use $4\frac{1}{2}$?

One ingenious reader has suggested that, instead of the baseboard and panel, I should use an aluminium chassis so liberally perforated as to make it look like a piece of "Meccano."

Lastly, will the reader who wants a 5-metre receiver on this "standard baseboard" please take my word for it that it can't be done? It would mean too many alterations in the layouts of parts, and, anyway, there's not enough on 5 metres to keep one busy for a week. A 5-metre set is a useful addition to the "stable," but one wants an ordinary short-waver as well.

THIS ARRANGEMENT IS WELL WORTH TRYING



Although this circuit looks curious on paper, it is quite simple in operation. Note that the moving vanes of the tuning condenser are maintained at earth potential.

components and all the rest of it please reassure themselves that all these things are not important. I don't claim to be giving full constructional details so that anyone can go ahead and make a perfect copy of my own receiver.

Use any parts you have, so long as they are good. If a circuit will work with Messrs. A's .0001 tuning condenser, there is no particular reason why it shouldn't work with Messrs. B's ditto, provided that both Messrs. A and Messrs. B know how to make a tuning condenser.

ON THE SHORT WAVES—Page 2.



ONE of the most interesting short-wave broadcasts ever staged will take place on December 7th, when H.R.H. the Duke of Gloucester, attending a concert in Brisbane, will launch the new liner Orion at Barrow-in-Furness. The whole ceremony (both ends) will be broadcast in the Empire programme.

The unique part of it all is that the crowds at Brisbane will hear the actual launching, while the crowds at Barrow-in-Furness will hear the Duke performing the ceremony from the other side of the world.

Dealing with "Fade-out."

Short-wave listeners are frequently puzzled about this time of the year by the fact that stations that they have been accustomed to hearing are no longer there. The novice might be excused for imagining that there was something wrong with his receiver.

The old hand, of course, knows that the "shorter short-waves" fade out earlier each day until about December 21st. Anything below 25 metres may almost be regarded as a "daylight wave" at this

PROGRAMME VALUE IS IMPROVING

FOR a long time one has thought of short-wave reception as something rather freakish and exciting rather than as a real means of entertainment. Stations come and stations go, and one just twiddles the knobs and writes their call-signs down on a piece of paper. (Frequently one writes to W. L. S. and is described as having forwarded an amazing list of stations heard.)

This, in its way, is all very well, but is bound to pall sooner or later, when there are no new stations to listen for. It will always attract the newcomer to short waves, because he's having a thrill he's never had before, but the "old hand" eventually becomes blasé.

The American Stations.

I'm an old hand myself, and I freely admit that I *am* blasé in that particular way. To tune in Oshkosh, Wisconsin, just for the sake of hearing his dear old carrier-wave and knowing that he's still putting some modulation on it doesn't attract me at all.

But I *do* still get a thrill when I can tune in a short-wave programme, leave the set alone, and really sit back and enjoy something that I know is a closed book to the mere broadcast listener with a ready-bought medium-and-long-wave set.

time of the year, and the 19- and 16-metre broadcast bands are of little use after the early evening.

The remedy, of course, is to do one's evening listening on the 31-, 40- and 49-metre wavebands, and to save up the shorter waves for the occasions on which one is at home during daylight.

Transmissions to the Antipodes.

G 2 L Z and G 2 H Y, members of the Anglo-American Radio and Television Society, are running a regular transmission schedule for the benefit of New Zealand

IMPORTANT NOTICE

A very regrettable draughtsman's error occurred in the Stage 10 sketch of the wiring on page 241 of the October 27th issue. Wire 37 is shown incorrectly connected to the grid terminal of the output valveholder. It should be connected to the negative filament terminal (the bottom right-hand one).

The blueprint is perfectly correct, and we reproduce this week on pages 334 and 336 the whole of the "Hi-Speed" wiring series with stage 10 duly corrected.

members of the society. The schedule is as follows:

G 2 L Z, 40-metre band, 250 watts, 7 to 7.30 a.m. G.M.T., on the first and second Saturday in each month.

G 2 H Y, 40-metre band, 5 to 5.30 a.m., first and second Saturdays; 7 to 7.30 a.m., third and fourth Saturdays.

Although transmitting primarily to New Zealand, these two transmitters will be glad of reports from any overseas readers

Short-wave programmes are good nowadays—definitely. Some of the American network programmes are altogether admirable, especially if one has been well trained in their curious language by long and constant practice at the talkies. Some of the regular daily and weekly features put out by the N.B.C. and Columbia networks are well worth waiting for.

I used to listen to Amos 'n' Andy

THE RECEIVING SECTION



In the centre of this picture can be seen the receiver and, to the left of it, the wavemeter of an amateur transmitting station. The microphone is also visible and, to the right, a part of the transmitter can be seen.

night after night, regardless of the sleep I was losing. But there are plenty of other good turns, between 7 p.m. and midnight, that one wants to hear more of.

who hear them on this schedule. Reports to 10, Denecroft Gardens, Grays, Essex, please.

South American Transmissions.

The station that was queried as Y V 3 R C, Caracas, Venezuela, in the 31-metre band, has been definitely identified by several readers as P R F 5, Rio de Janeiro, Brazil.

Y V 3 R C now works on 25.65 metres, and, considering that his power is listed as only 200 watts, comes over amazingly well.

More Europeans!

Probably it is good news for overseas readers that more European short-wave stations are arriving on the air. Personally, I am not overjoyed at the prospect. There is an Italian on about 31 metres with the call-sign I R M; the Vatican City station, H J V, is active on the 19-metre band; and the old Vienna station, U O R 2 (now O E R 2), is back again.

The Russians I give up as a bad job. The Spaniards, three Dutchmen, at least two Swiss stations, and goodness knows how many Germans are also on the air. In London some sections of the short-wave spectrum are beginning to sound like the medium-wave broadcast band. Luckily the "locals" begin to fade out when the real D X is coming over.

A Cuban Station.

A Cuban "amateur" station with the call-sign C M 6 X S is being reported on 36.5 metres, which certainly isn't anywhere near the amateur bands. Apparently he is behaving as a broadcasting station. The better-known station, C O C, at Havana, continues to work on 49.96 metres.

It is a fortunate coincidence that I have been talking about loudspeaker reception on the previous page. It is quite easy, nowadays, either by using two pentodes in the way I have described, or by using a three- or four-valve receiver, and one certainly gets a thrill out of it that is denied the headphone listener.

I am finding in my post-bag an ever-increasing number of letters from overseas readers. Whatever they may say about the reception of the Empire station, they invariably comment upon the excellence of the programmes provided for them. We all know how they love to hear Big Ben and the other familiar sounds of London, but, sentiment apart, they really do appreciate the programme fare.

Real Entertainment.

They, in many cases, have no local station with which to compare the short-wave transmission, and it might be argued, therefore, that any well-designed programme would suit them. But even those who *have* locals tell me that they are listening more and more to the short-waves.

Why shouldn't we do the same? We don't all listen to our local throughout the whole evening, and we don't all want the interminable talks put out by some of the medium-wave Europeans. What is more natural, then, than to break out on the short-wave side and really settle down to listen to some of them for their very real "programme value"? W. L. S.

AN IMPORTANT HOME-CONSTRUCTOR INNOVATION.

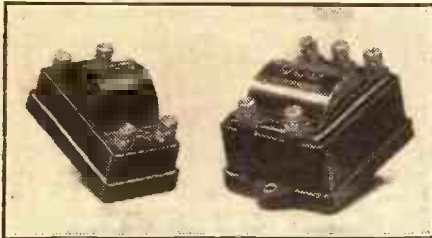
THE most important operation in the assembly of a radio receiver is the wiring. It can almost be said to be the only operation that really matters.

It is not without its difficulties, however simple the arrangement of components. Maybe some of the components have soldering tags, and that means tackling something which only a minority can be certain of doing well.

And even if there are screw terminals it is not always as easy to make good connections as it ought to be. Perhaps the terminals are rather small and the wire tends to screw away and out from them as the terminal head is rotated. Perhaps the terminal heads are nuts which can only be reached with pliers with the greatest of difficulty.

But now Messrs. Graham Farish have solved all these difficulties with a new-type terminal designed especially for the constructor. It

INEXPENSIVE TRANSFORMERS



Two Graham Farish components; on the left, the compact "Max," and on the right, the "Quip" for the new Q.P.P. valves.

enables first-class and secure connections to be made with the greatest ease.

The head of this patent terminal is milled so that it can be screwed down quickly with the fingers. In addition there is a slot enabling

SIMPLIFYING WIRING

Details of some components which make set-building easier and ensure secure connections.

one to apply a screwdriver for the final tightening.

The base of the terminal is square, and is raised at each corner. These raised corners prevent the wire from coming off. A lead joined to a Graham Farish terminal "stays put."

These very excellent terminals are to be seen on the Graham Farish "Max" and "Quip" Transformers.

The "Max" is an L.F. transformer for parallel-feed connection, and by varying its connections a number of ratios from 1-1 to 1-7½ is possible.

It is one of the smallest transformers we have seen, and its small dimensions are due to the use of a special alloy for the core. It is completely enclosed within a finely moulded bakelite case with a screened base.

Excellent Tonal Response.

When used correctly in a parallel-feed circuit its response is equal to that of resistance-capacity coupling for quality, while it has the advantage over this method of increasing the amplification by means of the stepping-up of the voltage.

It is an excellent component, and retails at the surprisingly low price of 4s. 6d.

The Graham Farish "Quip" Transformer is designed for the new Q.P.P. valves, or any push-pull circuit requiring a high step-up ratio, parallel fed. The step-up ratio is 1-8, and it has the necessary high primary inductance to enable a straight-line performance to be obtained over a wide range of frequencies.

The price of the "Quip" is 10s. 6d., and this, too, is really good value for money.

A USEFUL PLUG.

MOST constructors have probably experienced difficulty in connecting aerial and earth leads to their sets. The wire used for these leads is generally the same kind that serves for the aerial itself.

And the most popular of all is probably 7/22—i.e. seven strands of No. 22-gauge wire twisted into the one conductor.

A thick conductor of this nature does not lie easily under ordinary terminals, and so the constructor is forced to adopt some such expedient as using only one strand for connection or soldering on a thinner and more easily handled wire.

However, in continuance of their policy of connection simplification, Lectrolinx Ltd. have now produced a special plug for aerial and earth leads.

SECURITY



Clix aerial and earth plugs.

It has the standard size of pin and will fit into any normal socket, but it can take abnormally thick leads and hold them securely and efficiently.

The method of joining the lead reveals another "Clix" feature which is both ingenious and effective. All that has to be done is to pass the wire through the looped end of the specially shaped divided pin portion of the device and screw on the insulated head.

The wire is then held very firmly—more firmly, indeed, than is the case with many of the alternative methods involving fiddling screws.

The plug also makes an easy and good fit into a socket, for the pin is resilient over the whole of its length.

That Extra Fifteen Minutes!

EVERY keen television man is remarking on the boon that the B.B.C. have conferred upon us. Forty-five minutes really gives one time to forget one's technical interests for a little while and really settle down to "look in." Incidentally, the first of the Saturday afternoon transmissions was a great success and possessed real "programme value" that could not possibly have been achieved by a transmission of sound alone.

Encouragement.

"I think it wise at this moment to quote a very unbiased authority, Signor Marconi, who recently said that the most fruitful avenues in which the young engineer could direct his energy were directional wireless and television." Mr. John L. Baird speaking, but in March, 1928!

It is rather strange (or isn't it?) to note that these same two "avenues" are still being explored to-day, and in no uncertain fashion, but that one has led to a development which will probably be the salvation of the other. I refer to the extraordinary results obtained with directional transmissions on the ultra-short waves.

In the U.S.A. the 5-metre wave, hitherto regarded as "quasi-optical," has been tamed sufficiently to make it cover 100 or 200 miles with 100% reliability and very simple equipment at both ends.

In this country the future of television seems to be entirely tied up with the development of ultra-short

TELEVISION JOTTINGS

Some topical notes and news items of interest to all.

waves, which are the only portion of the radio spectrum with sufficient "room" to accommodate high-definition television transmissions.

A Useful Handbook.

I have received for review a copy of the "Practical Television Handbook," price 1s., published by B. Bennett, A.T.S., of Station Road, Redhill, Surrey. Mr. Bennett has made a real attempt to cover a lot of ground in a small space, and this little

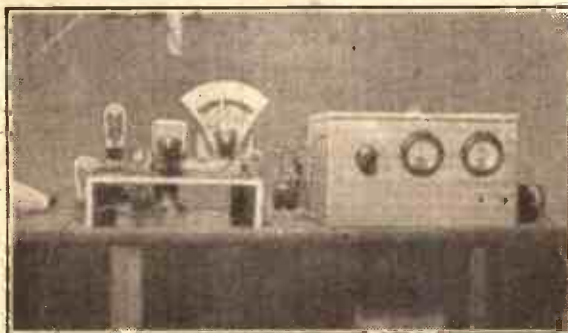
handbook contains, in concentrated form, practically all the information that the not-too-experienced amateur requires.

The construction and operation of simple disc and mirror-drum receivers are dealt with in a lucid manner, and constructional details are included. Altogether, a very useful shillingsworth for the television amateur.

A New Society?

Plans are on foot for the formation of a Television Society in Croydon and District. Those who are prepared to lend a hand are keen to know, in advance, how much support they may expect. Will *everyone* within easy range of Croydon who would be interested in such a society please sit down now, address a post-card to me, c/o POPULAR WIRELESS, Tallis House, Tallis Street, E.C.4, and tell me so?

A SIMPLE "VIEWING" RECEIVER



The radio receiver and the amplifier used by Mr. L. H. Thomas in his television experiments.

Television on Short Waves.

Several readers report hearing television transmissions from U.S.A. on short waves, and want to know whether they can make anything of them. Unfortunately (to my knowledge, at least) there are no 30-line transmissions in the States, where they don't go below 60 and 45. Such transmissions are therefore of little interest to anyone except the owner of cathode-ray equipment. The "variation of the lines" between different countries is a snag at the moment, and I hope that some international standard will be reached before long.

L.H.T.

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

ACCIDENTS WILL HAPPEN.

The great reputation for reliability which has been earned by the leading British radio firms sometimes leads readers to suppose that it is utterly impossible to lay the blame for a fault on a valve or coil if it is new and of first-class make.

This is a wrong view. Occasionally cases do occur in which, after correspondence, our Query Department advises new parts to be returned to the manufacturers for examination.

And one great advantage of dealing with first-class British firms is that they attend to such complaints with care, as the following typical case will show.

The original query, which was from a Bridgend reader, stated: "Until this week I was able to receive the two locals (West Regional and West National) with immense volume. If anything, louder than on the S.T.400, and this without using aerial or anode reaction.

"But distant stations, say Athlone, Luxembourg or Fécamp, were very poor, and the set had to be on the point of oscillating to receive them, whereas with the S.T.400 I often had to tone them down. And now the set has almost failed.

"On switching on one day last week the programme started at full strength for about five seconds, and then dropped to about half strength. Since then I have been only able to receive the two locals, and although still receiving these at good loudspeaker strength I now have to use aerial reaction full on and anode reaction about a quarter on."

After further correspondence this reader wrote again, as follows:

"In your reply, re the lack of range and sudden drop in output, you advised the return of valves to the makers for their inspection.

"This I did, though I frankly admit that I doubted if this was my trouble, seeing that they were new valves and working well on the local station.

"After a considerable delay (caused by my not returning valves through my dealer) I have just had them returned. The result of their inspection showed the S.G. and Class B valves to be faulty.

"They have replaced same, and now, thanks to you, my troubles are ended."

The moral is obvious—buy the parts specified by the designer. He knows exactly how they should perform; and if by some extraordinary accident you are supplied with a faulty part the trouble can be quickly located and you can be sure of receiving prompt attention.

Had this reader been using a valve of unreliable make he could not have returned it for inspection, so he might have unnecessarily bought new parts, and in the end a new valve as well.

THE LEANING LOUDSPEAKER.

W. N. (Wimbledon Park, S.W.19).—"I get a 'zizz' on certain notes unless I lean the loudspeaker back to touch the wall, at an angle of about 45 degrees. What is the cause of that?"

Something is loose, mechanically. Possibly one or more nuts need tightening, or else you are using heavily metallised gauze to cover the aperture, and this is vibrating against the woodwork.

Keep everything tight, and you will overcome the "zizz." The coil, too, may be out of centre.

DECOUPLING THE ANODE CIRCUIT.

D. O. (Gateshead).—"It is the 'National Eckersley Three,' using two K.G.O. coils and a K.G.R.

(Continued on next page.)

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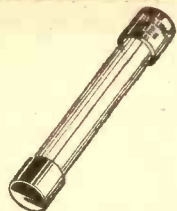
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RADIOFORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

"When the battery gets down I find quality (otherwise perfect) goes 'wonky,' and I am told I can cure this by decoupling the anode circuit of the H.F. valve.

"If you think this is likely to be beneficial, what are the corrections I should have to make on the set to carry out this improvement?"

Decoupling of the H.F. valve's anode circuit has been found beneficial in cases where there is a tendency to instability, so we agree that you should try it, and we think it will probably clear up the trouble completely.

You require an additional 5,000-ohm fixed resistance with holder—a Graham Farish "Ohmite," Ferranti "Synthetic," or similar resistance will do perfectly.

Mount it on the underside of the chassis next to the 25-mfd. condenser which is connected to terminal 2 of the K.G.R. coil.

Then re-wire as follows: Connect 2 of the K.G.R. coil (via hole in chassis) to the terminal of the 25-mfd. condenser, and also to one terminal of the additional 5,000-ohm resistance.

The other terminal of the 25-mfd. condenser remains connected to the metallised chassis.

The remaining terminal of the additional 5,000-ohm resistance should be connected to that terminal of the original 5,000-ohm resistance which is nearer the panel.

(Note that the lead which previously connected the nearer-to-panel terminal of the original 5,000-ohm resistance to the terminal 2 of the K.G.R. coil should be removed.)

EXTRA L.F. DECOUPLING FOR THE "MAGIC."

C. McL. A. (Glasgow).—"I am a proud possessor of the 'Magic III.' I have brought it up to date by fitting a Telsen dual-range coil, and now I have fitted an Ekco eliminator (H.T., L.T. and G.B. model).

"Now comes the point. When trying to bring out those weak foreigners, and giving it a little extra volume control it starts whistling, and I can't get them to full loudspeaker strength.

"I want a decoupling resistance. But I don't know exactly what stage to fit it to, so am looking forward to your help."

In receivers which, like the "Magic III," incorporate two low-frequency stages, the inclusion of a resistance and condenser in the H.T. feed to the first L.F. valve (in addition to the decoupling for the detector) is often beneficial.

The connections in the case of the "Magic III" are very simple. Instead of the primary of the second L.F. transformer being joined direct to H.T.+2, a 10,000-ohm resistance is placed in this lead.

Then a 4-mfd. condenser is joined between the transformer side of the new resistance and the L.T.—wiring, this being all the alteration that is necessary to decouple the second L.F. stage.

EFFECT OF CHANGING THE VALVES.

T. R. E. (Bellingham).—"As the valves were running for such long periods we thought it would be advisable to get them replaced.

"To save buying new we got two from my cousin, which had worked well in his S.T.500 and were nearly new.

"But with these the quality is not so good as the old set, nor so good as when the same valves (the nearly new ones) were in their own set.

"Would this be anything to do with the different transformers used in the two S.T.500's?"

The difference in transformers might make a very big difference to quality, and is probably the explanation of your results.

For the satisfactory working of a Class B stage it is essential that the combination of the driver valve, driver transformer and Class B valve be correctly arranged.

If any deviations are made from the original S.T.500 specification, the ratio of the driver transformer must be suitable for the particular driver and Class B valves to be employed.

Further information upon this important point can be obtained from the makers of the transformer it is intended to use.

It is always advisable to check up the valve and transformer data before assembling a Class B stage, unless the designer's specifications are being followed implicitly.

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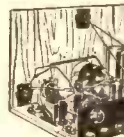
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KIT "1" Comprising B.R.G. Kit of matched components, including specified Formo 2-gang condenser, with Colvern coils, Peto-Scott ready-drilled walnut-faced panel and terminal strip, with Metalex baseboard, less valves, cabinet & speaker. Cash or C.O.D. Carriage Paid, £3/19/6.

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(Continued on page 344.)

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1 One watt 100,000 Ω Resistance	-	1 0
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THE BEST ITEM

Candid comments by our broadcasting critic about recent programmes.

MONDAY night was a good night for listeners, as it included Gerald Heard, Alistair Cooke (on the "Cinema"), Jack McLaren, a rolling stone whose adventures in New Guinea, etc., were most thrilling and well told.

Then by way of contrast there was Gillie Potter, who was in something like his old form and had evidently devoted a lot of time to his "topics," for they were smart and up to date. I really think the individualists have pleased us best this week.

Starting in the morning with "How I Keep House," and winding up with Sir James Jeans, there was a good Tuesday programme for listeners who like talks.

From the way "Old Words to New Music" opened, we fancied we were in for a treat, but it seemed to peter out rather.

A PERFECT VOICE.

G. K. Chesterton, on "Books in General," was a wee bit too sarcastic, or so he seemed. I should say he was over the heads of most of his listeners. He was certainly over mine. It wasn't easy to follow him, but a gem or two stuck out now and again.

I couldn't face Delius in the first of the Symphony Concerts, although I did listen to and enjoy Dr. Geoffrey Shaw introducing the concert. Here was a man who one felt certain was absolutely sure of himself. And as for his voice, it was tip top.

"Madam Butterfly," relayed from Sadler's Wells Theatre, failed to grip me for once, but the disappointment I felt on this account was atoned for by the item that followed it. "Some Day," by Harold Kelly, turned out to be a perfect hour and a quarter.

This play was something after the style of "Cavalcade." In fact, some of the incidents reminded me very much of Noel Coward's piece. "Some Day" was full of good dialogue, and, as far as I could judge, was perfectly acted. Honestly, I have not enjoyed anything so much for some time.

Of course, it is sentimental, and here and there pathetic, but, as Elizabeth Severn (splendidly portrayed after the Hyde Park episode by Gladys Young) said now and again, one was not made unhappy, only sad. The scene, too, in which John Wilborough and Eileen Purcell figure (1883, the Ranch in Texas) was good enough, in my opinion, to hold the attention and interest of every listener. Even the few moments of the school scene were first class.

I should say that not a family that can really call itself a family and is interested in family life could have failed to have enjoyed every minute of "Some Day." I wonder what the regular dramatic critics thought of it!

NOEL COWARD'S RETURN.

Mention of Noel Coward reminds me of his debut before the mike in a Henry Hall Guest-Night programme. It wasn't a distinguished appearance, chiefly because, I think, the two new songs of his that he sang lacked that something that distinguishes Noel Coward's compositions from anyone else's. They didn't, for instance, compare with the several bits of Coward music Henry Hall's band played by way of introduction.

By the way, I understand that Henry Hall is mighty popular in Austria. Listeners there will listen to him before anybody or anything. They never miss his early-evening programmes. His late music they have to forgo.

Undoubtedly the most momentous idea of the week was the inclusion of Richard Tauber in Vienna in a studio production from London. Radio artists may view this new departure with dismay, as it indicates that absence from the country, say for holiday purposes, need no longer be an excuse for a non-appearance in a bill. Stanley Holloway, for instance, may feel now that his present holiday in the South of France (if it isn't over) is the last in which he finds business cannot interfere with pleasure. C. B.

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7/6 KIT A. Complete parts. Cash or C.O.D., £4/19/6 or 7/6 secures delivery, balance by 11 monthly payments of 9/3.

12/- KIT B. Complete parts, including specified valves. Cash or C.O.D., £7/3/0 or 12/- secures delivery, balance by 11 monthly payments of 13/-.

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AN IDEAL INDOOR AERIAL

Some observations of interest to all who are handicapped by space restrictions.

HAVE you ever tried to knock insulated staples into lath and plaster walls? They go in easily enough, I know, but the trouble is that they have an unhappy knack of coming out again almost as easily, and the neat and tidy indoor aerial that you have planned in your mind's eye turns out, alas, to be something very far removed from neat or tidy!

The ideal way, of course—the way which is advocated by all who sponsor advice on the subject—is to fix the wire which is to form the aerial to the top of the picture rail. But they all seem to neglect telling you what to do when the room in which you are trying to fix an aerial happens to be devoid of a picture rail.

I have no doubt that many readers of "P.W." have their own pet ways of getting over the difficulty satisfactorily, but surely there are few ways from the points of view of ease and tidiness to compare with the aptly termed Invisible Aerial such as that which is produced by the British Pix Co., Ltd.

I think it is an excellent idea, and for the benefit of those of you who may not have heard of it, perhaps I should explain that it is made in the form of an adhesive tape which sticks anywhere. The neutral-tinted fabric strip in which the actual aerial is enclosed is available in 30- and 60-ft. lengths at 2s. and 3s. 6d. respectively, and an end in each case is neatly finished off for connection to the aerial terminal of the set.

The tape is coated with a patented rubber compound that remains permanently sticky, and it can be pressed on to, or taken off, even a polished surface without leaving any mark.

It appeals to me as being an ideal way over the indoor-aerial difficulty, and for all ordinary purposes a 30-ft. length should be adequate.

If you are interested and experience any difficulty in obtaining supplies, write direct to the makers at 118, Southwark Street, London, S.E.1.

Exide and the Queen Mary.

A striking tribute to the reliability of Exide batteries was provided at the recent launching of the Queen Mary, when the mechanism which released the liner at her launch was operated by an Exide battery.

This interesting fact was mentioned by Mr. D. P. Dunne, the Managing Director of Exide Batteries, in his address at the Annual Exide Motor Show Luncheon which recently took place at the Clarendon Restaurant, Hammersmith.

On such an auspicious occasion as the launching of the world's largest liner, extreme reliability was absolutely vital, and that Exide batteries should have been chosen is indeed a tribute to their efficiency.

Although this is a little off the beaten track, it is a point well worth remembering when it comes to buying your next wireless battery, for Exide batteries were not chosen in this instance just because they looked pretty!

"Simplifies Soldering."

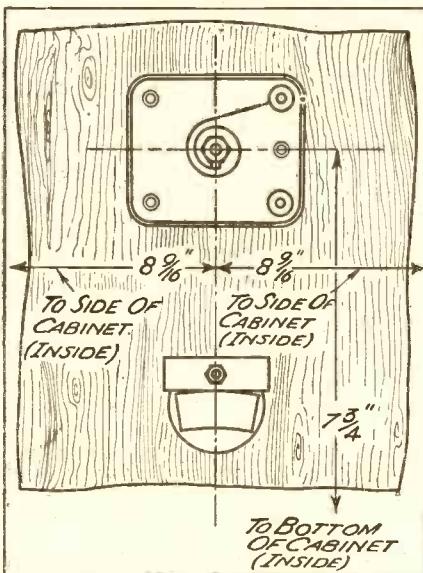
When I was a lad (no, I haven't yet lost all my hair!) I will remember those amusing little sketches and rhymes which used to appear from time to time to advertise "Fluxite." Little did I think in those days that in years to come I should reach a stage where I would sooner be without my baby than my "Fluxite." And that is saying a lot!

It's a matter of taste, I know, and not all of us want to solder in a home-construction era of no soldering. But it isn't for wiring sets that I find my "Fluxite" and soldering outfit primarily of use. It's when it comes to joining the lead-in to the aerial and so forth that I find it so very useful.

These thoughts have been brought to mind by a leaflet which has just reached me from the makers, in which is described the very latest "Fluxite" idea—the "Fluxite" Gun. It is somewhat like a grease gun in appearance and operation, and since it costs only 1s. 6d. I shall have to see what can be done about it.

Next time you are in the local ironmonger's have a look at it. It may change all your ideas about the difficulties of soldering if you happen to belong to the "can't-solder" class! G. T. K.

FOR THE A.C. S.T. 600



The sketch above shows the position of the aerial coupler condenser, which is fixed on the front of the cabinet and not on a bracket like the other "panel" controls. The two terminals on it are connected to the two long leads that are seen in the wiring diagram (page 316), one coming from the aerial terminal and the other from terminal 8 of the coil unit. The aerial terminal lead is joined to the moving vanes of the coupler.

S.T. 600 Service Agents

(Continued from page 342.)

- Nottingham .. Roflan Service Co., Cropwell Butler.
- Peterborough .. A. E. Barnes, "Harroby," Peterborough Rd., Farcet.
- Rugby .. J. J. Grant, 23, Holbrook Avenue.
- Sutton-in-Ashfield Vardy's Radio Service, The Garage, Leeming Lane; Mansfield Woodhouse and New Cross, Sutton-in-Ashfield.

ZONE 10.

- Bedford, Buckingham, Cambridge, Essex, Hertford, Huntingdon, North London, Middlesex, Oxford. TOWN. SERVICE AGENT.
- Bow .. E. Crespin, 155, Bow Common Lane, E.3.
- Edmonton .. R. Reason, 75, Woodlands Rd., Hertford Rd., N.9; E. Westbrook, 103, Silver St., N.9.
- Finchley .. A. Giddy, 74, Station Rd., Church End, N.3; W. Williams, 13, Redbourne Avenue, Church End, N.3.
- Forest Gate .. Excel Service, 54, Upton Lane, and 186a, Green St., E.7.
- Ilford .. Newbury Radio & Battery Service, Warren's Garages, Ley St.
- Luton .. G. Hare, "Fairbank," Dunstable Rd. West.
- South Hornchurch A. W. Lines, 12, Station Parade.
- Stoke Newington.. W. G. Milford, 39, Allen Rd.
- Walthamstow .. Central Motor & Cycle Works, 12, Blackhorse Lane, E.17.

ZONE 11.

- Berkshire, Channell Islands, Hampshire, Kent, South London, Surrey, Wiltshire. TOWN. SERVICE AGENT.
- Amesbury .. E. H. Keel, Earl's Court Rd.
- Bromley .. T. Edwards, 62, Martins Rd.
- East Croydon .. Croydon & District Electric Service, 98, Cherry Orchard Rd.
- Deal .. L. P. Spain, 20, St. Andrews Rd.
- Dulwich West .. D. J. Morgan, 160, Clive Rd., S.E.21.
- Fulham .. A. Poole, 20m, Peabody Buildings, Lillie Rd.
- St. Mary Cray .. K. H. Spanner, 5, Hayfield Rd.
- Tunbridge Wells.. C. F. Hode, 113, Upper Grosvenor Rd.
- Woking .. D. S. Bradford, 25, Maybury Rd.
- Wokingham .. J. Goswell, Waterloo Rd.

ZONE 12.

- Cornwall, Devon, Dorset, Somerset. TOWN. SERVICE AGENT.
- Bath .. L. Marchant, Freshford.
- Falmouth .. A. E. Cornish, 11, Kimberley Rd.
- Penzance .. H. Clark, 2, Coinage Hall Flats.

ZONES 13 and 14.

- Ireland (Irish Free State). TOWN. SERVICE AGENT.
- Belfast .. T. A. Holland, 35, Stranmillis Park; H. Thomlinson, Jr., 12, Belgravia Avenue.
- Dublin .. R. J. Clarke, 17, Pearse St.; H. Collins, 3, Tara St.; G. Norton, 43, St. Mary's Terrace, Ballybough Rd.

S.T. 600 IS A GOOD SET—WHY NOT MAKE IT PERFECT, UP-TO-DATE AND UNIVERSAL WITH UNIVERSAL HIGH VOLTAGE VALVES?

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Free technical advice for converting your set willingly given. Write for leaflets D giving you details of these wonderful Valves and also particulars of full range of UNIVERSAL RECEIVER KITS, AMPLIFIERS AND SHORT-WAVE ADAPTORS.



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S.T.600 COMPONENT WARNING!

By JOHN SCOTT-TAGGART

ON page 228 of the main S.T.600 number of POPULAR WIRELESS I warned all prospective builders of the S.T.600 that if they departed from my one and only efficient signed list of parts and valves on that page, it would be "their own funeral."

Frankly, I think the S.T.600 should be built as I built it, and I accept no responsibility whatsoever for any bad results you may get by building from a kit which does not contain the complete list of makes and types in my list.

The Question of Kits.

All kinds of phrases and wording of an ingenious character will be used to lure you from the correct path. You can take my list of valves and components as final. It will not be modified or added to, and you can take it that no kit has received my "personal approval." The only kind of kit I "personally approve" is one which enables a duplicate of my set to be built and is used in conjunction with the two Cossor 210V.P.T. 4-pin metallised valves and the Mullard P.M.2D.X. and P.M.202.

And even when you receive any kit stated to be according to the author's first specification, check over the components to see that they are the first mentioned and not alternatives. If there has been any substitution insist on immediate replacement.

If you fail to receive satisfaction from any kit supplier, POPULAR WIRELESS will investigate the matter. But my own personal attitude has always been consistent on this matter of kits, and it is this: If you depart from the list of components and valves and have trouble, I wash my hands of the whole matter.

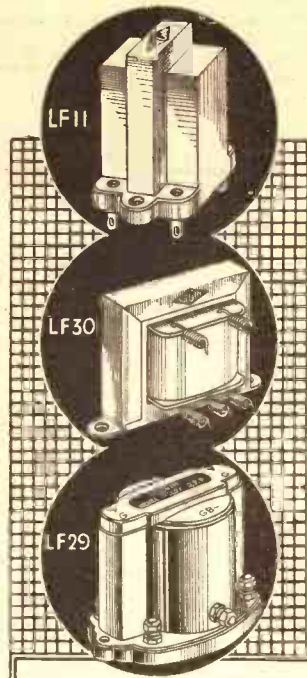
Keep to the Official List.

I say emphatically that if, to save money, you are tempted by offers that I disapprove of on technical grounds, you must bear the consequences. Even if you buy alternative components at the same price, and these are not on my one and only list on page 228 of the main S.T.600 issue of POPULAR WIRELESS, then you must bear the consequences yourself.

All kinds of misuse of my name is made in connection with apparatus, and some of it I cannot stop until after the damage has been done. But if you ignore my urgent recommendation to study closely my one and only official list of components and valves, you may easily experience all kinds of trouble. If you do, please don't write to me. I've done my best to warn you.

My aim is not to have a huge number of sets built; it is to have a huge number of constructors getting perfect results.

SEE THE SPECIAL NOTICE
ON PAGE 313



BULGIN NEW LINES

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NICKEL-ALLOY L.F. TRANSFORMER.

List No. L.F.11. A small L.F. transformer for 'fed connection.' Primary inductance, 75-95 H., turns ratio, 1:4. Connecting tags at base, moulded bakelite case. Use feed condenser = 0.5 — 1.0 mF. Even response, 50-8,000 c/s.

List No. L.F. 11, 5/6 each.

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List No. L.F.30. A high-ratio nickel-alloy cored L.F. transformer for 'fed' or direct connection. Carries 6 mA. d.c. Turns ratio, 1:9 (C.T.). High amplification and even response.

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List No. L.F.29. Exactly similar to the above, but in handsome mottled-green bakelite case. Either model may be used in Class A amplification, ignoring the C.T.

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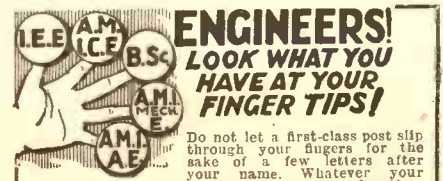
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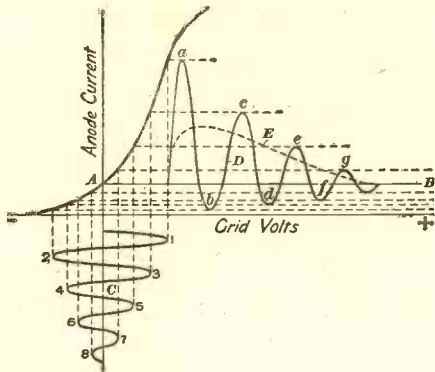


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Address

LOUDSPEAKER "RATTLE"

High-Frequency Chokes — Smoothing D.C. Mains — How Bakelite Is Made.

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

THAT "rattle" that you so often hear in loudspeakers — other people's, as a rule — is not always due to the speaker itself. More often than not it is present in the output of the set before it ever gets to the loudspeaker. If such is the case, naturally you cannot expect the loudspeaker to do other than reproduce it.

Assuming, however, for the moment that the output of the set is reasonably perfect and that the rattle really *is* in the speaker, then, in armature-type speakers, it is probably due to a loose nut on the reed, where the diaphragm is held. Remember that there is normally very vigorous vibration here, which may easily cause the nut to work loose in course of time.

It is, however, a very simple matter to correct this, if it proves to be the cause of the rattle.

A Cracked Diaphragm.

Another cause is a cracked or distorted cone diaphragm. This will jump about in an extraordinary way and on certain notes will rattle like nothing on earth. You should remove a diaphragm that is as bad as this and either repair it or fit a new one. New diaphragms can be obtained nowadays for a few pence, complete and ready for fitting.

But, as I say, by far the greater number of cases of rattling are due to the set itself.

It is most likely that the output valve is overloaded. To overcome this you should see that it is receiving its full amount of H.T. voltage and correct grid bias, and that the volume control — if before the output valve — is properly used.

Use a Milliammeter.

A milliammeter in the anode circuit of the output valve will probably prove a revelation to you. Make sure (by adjusting the grid bias) that when the valve has the specified H.T. voltage on it, the anode current agrees with that specified by the makers of the valve. Note also whether the reading on the milliammeter is steady.

With a moving-iron speaker the defects due to overloading the output of the set may not be so noticeable, as this type of speaker tends to cover this up a bit. But a moving-coil unit won't help you if the set is wrong.

Is It Overloading?

The overloading may not be in the output valve — it may be in the detector or in the first L.F. amplifier, if one is used. Detector overloading is more likely to occur when the detector is preceded by a powerful H.F. valve, such as a screened grid, especially on powerful or local stations. A variable condenser in the aerial lead will help you to cut down the H.F. input. Another method is to substitute a variable- μ valve for the screened-grid valve.

Finally, you might try power-grid detection, using plenty of H.T. voltage on the detector and a grid condenser of 0.0001 mfd., with a quarter of a megohm leak.

High-Frequency Chokes.

Now that high-frequency chokes can be bought all ready screened, there is no need for you to screen them yourself. In fact, it is better not to do so, as the manufactured article is really very efficient in this respect. The top connection is sometimes brought out through a metallised braiding.

Before the introduction of iron-cored coils it used to be necessary to increase the size of the choke in order to increase its inductance value. Nowadays, however, you can get a very small and compact iron-cored choke having an inductance value equal to that of a choke of the ordinary kind several times its size.

High-frequency chokes for short-wave work have also been greatly improved and can now be had with a high inductance and yet with negligible self-capacity.

The self-capacity is kept low by clever spacing of the turns.

Matching Valve and Speaker.

The matching up of the valve and the loudspeaker is a matter of great importance for efficiency and tone. Since there are such

S.T.600

SIX MONTHS' FREE SERVICE!

The Editor desires to announce that the Query Department of "Popular Wireless" will deal with all postal queries on the S.T.600 for six months absolutely free of charge. Only a stamped, addressed envelope is necessary for a reply.

A Special S.T.600 Advisory Committee has been formed with Mr. John Scott-Taggart himself as consulting engineer, to deal by correspondence with all matters relating to this magnificent set.

a great variety of valves on the market to-day, it means that there must inevitably be a wide selection of output transformers. Different ratios are required for matching between different combinations of valves and speakers. One very handy instrument for this purpose is made by the Telsen people; it has a standard primary, with three tappings on the secondary, giving three useful ratios.

Ferranti's make quite a variety of output transformers for every purpose, whilst Lissen's make, amongst other transformers, a tapped instrument for Q.P.P., so that when using two pentodes on this system the right ratio can be obtained.

Smoothing D.C. Mains.

A good deal is said about smoothing with A.C. mains, but the man with D.C. supply does not find himself so well catered for. There is still quite a large amount of D.C. in use in this country, so the needs of the D.C. listener should not be overlooked.

(Continued on next page.)

LOUDSPEAKER "RATTLE"

(Continued from previous page.)

Smoothing on D.C. mains would seem, at first sight, to be much simpler than on A.C. mains. In fact, however, it is often more troublesome. D.C. current is generated as A.C. and is then rectified by the commutator of the machine—which is, after all, little else but a synchronous mechanical rectifier. The process of rectification leaves what is known as D.C. "ripple" or "commutator ripple," and it is this that is sometimes so hard to get rid of.

Use By-pass Condensers.

A good plan is to insert two H.F. chokes in the mains leads. These chokes, unlike most chokes ordinarily used in the set, must be of comparatively stout wire, capable of carrying the whole of the current supply to the set.

One choke should be placed in each lead, and then a pair of condensers should be joined across the mains leads into the set, on the sides of the chokes nearer to the set. The condensers should be of 1 or 2 mfd. each, joined in series, and the centre-point should then be connected to earth. If any H.F. energy passes through the chokes this will be by-passed to earth by the condensers instead of passing through the set. Messrs. Ward & Goldstone and Messrs. Wright & Weaire may be mentioned as makers of suitable chokes for this purpose, but there are several other good types of choke on the market that may be used.

How Bakelite is Made.

Have you noticed how bakelite has come into fashion for radio sets during the past few years and how its very popularity has caused some people to look about for something "different"?

I often find that people who are very familiar with bakelite do not realise how it comes to be so useful.

It comes to the works of the bakelite "moulders" in the form of powder. This arrives in sacks, for all the world like cement powder, that except it is of various colours.

The "moulds" for making the various articles are fashioned in solid steel (very much like "press-tools"), and when ready the mould is heated, filled with dry powder and put into a heated press. Here the powder is squeezed into every crevice of the mould and at the same time "baked" until it is a solid mass. The time for baking depends upon the size of the moulding, the nature of the powder and other factors; it is often from one to three minutes.

Bakelite is extremely useful for radio purposes, because it can be so easily moulded to any desired shape and because it has a fine appearance and takes a high polish, and also because it is a very good insulator.

A FINE BOOK

THERE is no finer book for the boy with a hobby than Every Boy's HOBBY ANNUAL. Crammed with enthralling articles on woodwork, model making, railways, aeroplanes, and a score of other subjects dear to the heart of every boy, this Annual costs 6s. only and makes an excellent present for the alert youngster.

S.T.600 Battery Model

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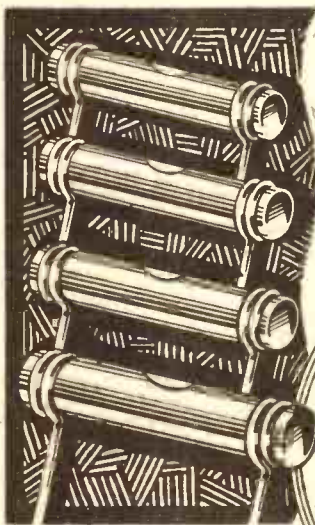
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