FREE!! 2 GREAT GIFTS THIS WEEK!!

Popular Wireless
AND TELEVISION TIMES
Television - Special Offer Inside!

5T.800
ALL-WAVE
4-BAND
Auto-Dial FREE

FULL-SIZE
1/2 Blueprint FREE

World-wide All Wave Reception!
SPECIFIED for the S.T. 800

Once again T.C.C. condensers are specified for "Star" Receiver — and for the same reason DEPENDABILITY. Dependability is the result of specialised experience and T.C.C. HAVE MADE CONDENSERS AND CONDENSERS ONLY FOR 28 YEARS.

<table>
<thead>
<tr>
<th>BATTERY MODEL</th>
<th>A.C. MAINS MODEL</th>
</tr>
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<tbody>
<tr>
<td>Each</td>
<td>Each</td>
</tr>
<tr>
<td>1 0.004-mfd. condenser T.C.C. type M, 8d.</td>
<td>2 0.5-mfd. tubular condensers T.C.C. type 250, 2½d.</td>
</tr>
<tr>
<td>1 0.001-mfd. condenser T.C.C. type M, 8d.</td>
<td>2 0.1-mfd. tubular condensers T.C.C. type 250, 1½d.</td>
</tr>
<tr>
<td>2 0.0005-mfd. condenser T.C.C. type M, 9d.</td>
<td>3 1-mfd. Paper condensers T.C.C. type 50, 2½d.</td>
</tr>
<tr>
<td>*1 1-mfd. tubular condenser T.C.C. type 250, 1½d</td>
<td>1 56-mfd. Electrolytic condenser T.C.C. type FW, 2/3d.</td>
</tr>
<tr>
<td></td>
<td>2 8-mfd. Electrolytic (wet) T.C.C. type 802, 6½d.</td>
</tr>
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* Incorporates in the coil unit

THE TELEGRAPH CONDENSER COMPANY LIMITED, WALES FARM, NORTH ACTON, W.3
The First and Only Comprehensive Book Dealing with the New TELEVISION

Written and prepared under the direction of G. V. Dowding (Associate I.E.E.)

WONDERFUL PRESENTATION VOLUME FOR EVERY READER

A great new form of home entertainment has begun to sweep the country. TELEVISION! Broadcasting Vision Added to Sound. With it you will be able to sit by your own fireside and have the world of entertainment and sport brought to you. Variety! Drama! Tennis! Football! Boxing! Travelogues! News! Famous personalities will walk on to your television screen and speak to you with greater intimacy than is possible in cinemas.

All those who have radio sets should make a point of learning something about this amazing new development, for it is revolutionary in both character and potentialities.

So that the story of this marvellous new development can be fully understood and appreciated by everyone a group of leading experts have cooperated to produce a wonderful illustrated volume entitled "The Book of Practical Television." It describes in simple language all the fascinating processes which make Vision by Wireless possible. Such things as Cathode-Ray Tubes and Time Bases, which will be familiar objects to-morrow, are introduced to you, and you are shown pictures of the apparatus and circuits used in the new television sets. No other work dealing with the new television has yet been published which is so comprehensive as the "Book of Practical Television." It gives the whole story entertainingly, simply and lavishly illustrated with sketches and actual photographs of television sets and the results they give.

This book is Superbly Bound in Rich Shade of Green Cloth with Silken Finish and contains 26 CHAPTERS, 384 PAGES, including 63 ART PLATES, and over 300 ILLUSTRATIONS.
A Work of Amazing Interest
with Many Marvellous Illustrations

WONDERS of ANIMAL LIFE

WEEKLY PARTS 7d.

Do You Know?

What an Iguana is?
That crabs climb trees for coconuts?
Why insects imitate twigs and leaves?
Which is the elephant’s nearest relation?
That some insects live eighteen years?
That dragons still exist?
Which are the fastest moving creatures? And the slowest?
That a parrot eats sheep?

PARTS 1 & 2 Now Ready

The Pictured Story of all that is most interesting in Natural History

Famous naturalists, scientists, and popular authors will tell in this new work the fascinating story of the marvels of nature; the astounding realities and mysterious ways of the thousand and one inhabitants of the animal kingdom. Each part will contain chapters on the life histories, habits and customs of animals, birds, fishes, reptiles and insects. The complete work will present a thrilling panorama of animal life to which you can turn again and again with unfailing interest.

MARVELLOUS ILLUSTRATIONS

WONDERS OF ANIMAL LIFE will contain the most marvellous collection of animal photographs ever brought together; photographs that bring to your fireside the living realities of jungle, forest, river, air, and sea. Some of the photos have been taken at risk of life and limb; there are pictures of wild animals taken within a few feet of their fangs. There are photos which have taken days of patient waiting to secure; some which the animals have been trapped into taking themselves. WONDERS OF ANIMAL LIFE is in no sense a conventional natural history. It will have all the authority of an acknowledged text book but will be a thousand times more interesting.

The work will be completed in about fifty weekly parts. Each part will contain a wealth of fascinating pictures and a superbly printed FULL-SIZE COLOUR PLATE. These colour plates will add immeasurably to the value and attractiveness of the work.

OVER 2000 PHOTOGRAPHS AND OVER FIFTY COLOUR PLATES
Ferranti were the first manufacturers to offer a complete range of all-wave receivers to the public. As makers of components designed and built to last a lifetime they recommend those listed on this page for use in Mr. Scott-Taggart’s first all-wave receiver.

They are obtainable from all good radio dealers, but should you have any difficulty write direct to FERRANTI LTD., RADIO WORKS MOSTON, MANCHESTER, 10.

### BATTERY MODEL

<table>
<thead>
<tr>
<th>Component</th>
<th>Details</th>
</tr>
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<tr>
<td>Condensers</td>
<td>Two Ferranti C.2, 3/9 each, and one C.10, 3/-</td>
</tr>
<tr>
<td>L.F. Transformer</td>
<td>Ferranti A.F.8, 11/6; (if a higher-priced Transformer is desired, we suggest the model at 21/2-).</td>
</tr>
<tr>
<td>Four 4-pin Valveholders</td>
<td>Four Ferranti Baseboard type, 1/3 each</td>
</tr>
<tr>
<td>Resistors</td>
<td>30,000-ohm, 1-watt. One Ferranti, G.5, 1/-; 5,000-ohm, 1-watt. One Ferranti, G.5, 1/-; 20,000-ohm, 1-watt. One Ferranti, G.5, 1/2; 1 megohm, 1-watt. Two Ferranti, G.5, 1/3 each.</td>
</tr>
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### ALL MAINS MODEL

<table>
<thead>
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<tbody>
<tr>
<td>7-pin Valveholders</td>
<td>Three Ferranti baseboard type, 2 each</td>
</tr>
<tr>
<td>Tubular Condensers</td>
<td>0.5-mfd. Two Ferranti Tubular type, 1/6. 0.1-mfd. Two Ferranti Tubular type 1/6. 0.05-mfd. One Ferranti Tubular type 1/6.</td>
</tr>
<tr>
<td>Paper Condensers</td>
<td>0.05-mfd. Two Ferranti C.15, 2 each. 0.025-mfd. One Ferranti C.15, 3 each. 0.010-mfd. Three Ferranti C.10, 3 each.</td>
</tr>
<tr>
<td>Electrolytic Condensers</td>
<td>0.001-mfd. One Ferranti C.E.82, 2 each</td>
</tr>
<tr>
<td>Fixed Resistors</td>
<td>1 megohm. One Ferranti G.1, 1 each. 50,000 ohms. Two Ferranti G.1, 1 each. 10,000 ohms. One Ferranti G.1, 1 each. 25,000 ohms. Three Ferranti G.1, 1 each. 15,000 ohms. One Ferranti G.1, 1 each. 150 ohms. One Ferranti G.1, 1 each.</td>
</tr>
<tr>
<td>Mains Transformers</td>
<td>Ferranti S.M.34, 2 each.</td>
</tr>
<tr>
<td>L.F. Choke</td>
<td>Ferranti B.2, 1 each.</td>
</tr>
<tr>
<td>Loudspeaker</td>
<td>Ferranti D.T.4, 2 each.</td>
</tr>
<tr>
<td>L.F. Transformer</td>
<td>Ferranti A.F.8, 2 each.</td>
</tr>
<tr>
<td>Valves</td>
<td>Ferranti V.P.40, 12 each. Ferranti S.P.4A, 12 each.</td>
</tr>
</tbody>
</table>
You can get the best out of SHORT WAVES with a “HIS MASTER’S VOICE” ALL-WAVE RECEIVER

“His Master’s Voice” engineers at the “H.M.V.” Research Laboratories at Hayes, Middlesex, the largest of their kind in the Empire, have devoted many years to the design of all-wave receivers and radiograms. Many owners of amateur transmitters use “His Master’s Voice” all-wave receivers, because of their efficiency on short waves, for two way working with other amateurs in all parts of the world.

The circuit design of “His Master’s Voice” all-wave instruments enables them to receive quite low-powered transmitters in U.S.A., Australia and other distant countries with good regularity and the best possible reproduction. Before you buy an all-wave or short-wave receiver you are advised to compare its performance with an “H.M.V.”

Among the refinements incorporated in “His Master’s Voice” All-Wave receivers and radiograms are two-speed tuning knobs, vernier scales, enabling the precise position for the reception of each station to be noted, and cathode ray fluid light tuning indicators. Some “H.M.V.” models have a short wave range commencing at 7 metres, enabling the television sound transmissions and amateur broadcasts on 10 metres to be heard, under favourable conditions.

BACKED BY 38 YEARS ‘SOUND’ EXPERIENCE
You Have Been Warned...

And it came to pass a week ago that a certain man spake unto his friends saying, "Look out next week," and his friends said "When?" and he said "Next week."

Now when the seventh day arrived certain guys of wisdom and understanding, they remembered, and rose early: they went to the seller of books, they gave him three pence, and verily they got what they wanted.

But some were foolish, and exceeding chancy chaps. So it happened that when the multitude presently said to the foolish ones, "Verily, this S.T. hath worked a miracle and produced an 800-wow set," the foolish ones thirsted to get in on it. Then went they in haste to the seller of books, who said "Soul Doubt," or words to that effect.

And the name of the good man who spake early warning to his friends, it was I, Ariel, your anonymous scribe. And the name of the set it was S.T.800. For it is a very HOT set, all wave. And there is no other set like unto it—no, not in all the land!

Late Listening

Late Listening

News of New Stations

The Air Ministry has notified airmen that the new direction-finding service and other wireless communication is available for pilots approaching Yeadon aerodrome. Hours, 7 a.m. to 10 p.m. W/T call-sign, G.G.

Belgium is erecting a short-waver of 44 kw. for telephony, or of 88 kw. if used for telegraphy, and intends to substitute this for the 9-kw. station now used for communication with the Belgian Congo.

The Suva station is reaching far beyond the South Seas now that it has a new transmitter, and Amalgamated Wireless (Australasia), who run the station, would like to hear from listeners in this country who may hear Suva. Address to the station there, or to the Company's head office, Sydney, N.S.W.

John Scott-Taggart


The author—one of the most brilliant and eminent radio engineers of this country—was born in 1897. His first design was published in the first volume of the first radio magazine twenty-three years ago. 1917: His first valve patent and the beginning of a long series of patents purchased by Marconi's, Ediswan, Huth Cos., Canadian Maccon, Radio Communication Co., La Radio-technique, Commercial Cable Company, Tele-funkens, Haseltine Corporation, etc. Both in this country and America his patents are in the list under which practically every manufacturer is licensed. As wireless officer in Royal Engineers during the war, gained Mention in Despatches, and later the Military Cross for gallantry under fire. 1919: In charge manufacture of valves for Government at Ediswan Swamp. Introduced the E5.2 and E8.4 valves—first types designed for the public. 1920: Head of Patent Dept., Radio Communication Co. Chief Adviser on patents to Mullard Radio Valve Co. Member of Committee, Radio Soc. of Great Britain. 1921: Lectured before British Association; published at 23 years of age his famous 440-page book on the valve, "Thermionics Tubes." Followed later by a dozen text-books on radio. 1923: Founded "Modern Wireless," "Wireless Constructor," and other radio periodicals. 1924: Chief Adviser on wireless patents to His Master's Voice. Member sub-committee Engineering Standards Association. Selected with Prof. G. W. O. Howe and S. R. Mullard by Radio Mfrs. Assn. of America to advise on valve matters. Chief Engineer, Electric Radio Laboratories, which produced the first ganged screened-coc set in this country—the only one at Olympia in 1926. Sota won First Prize International Radio Exhibitions in New York and Rotterdam. 1926: Called to the Bar after obtaining a very high position in the Barr Final examinations. 1931: Series of articles on Television. 1933: Author of "Manual of Modern Radio" (424 pages) and 1934: "Book of Practical Radio" (384 pages). Nearly a million copies of his books have been sold. He holds the coveted distinction of Fellow of the Institute of Radio Engineers on the recommendation of Marchese Marconi and three Past-Presidents and possesses the highest professional status given by the Institution of Electrical Engineers, the Institute of Physics, American Society of Mechanical Engineers and other learned societies. Is a barrister-at-law but practises as a consulting engineer. To the public he is best known for his designs and radio publications; in professional circles, he is chiefly noted for his pioneer inventive work on valves and valve circuits, and as a great international legal authority on radio patents.

Daventry Out-Daventried?

After a good deal of niggardly shilly-shallying the B.B.C. decided to give Britain an Empire station at Daventry that was worthy of the proud name. The extra equipment, new aerials, and bigger buildings were so exciting and heady after the original miserable plans that an idea grew up that Daventry's new station was World-Beater No. 1.

May I point out, however, that in geographical propriety to Berlin there is a village called Zeesen and an array of aerials that thwart the eye and tickle the sky!

At Zeesen is centred not only the radio telephone, but also a commercial wireless network. Short-wave listeners will know the "D-string" concerts, all from D-stations at Zeesen; professional wireless operators also know the commercial D's. The services are all concentrated together, so Daventry cannot afford to be smugly sure of superiority.
JOHN SCOTT-TAGGART

PRESENTS HIS ALL-WAVE WHOLE-WORLD TRIUMPH

PART I

OUTSIDE somewhere fireworks are exploding. But even Gun-powder Plot is a pop-gun plan compared to my ambitious proposal to dynamite the present short-wave world. It is overdue to totter on its axis.

I object to its school-boy childishness, its absurd jargon, its slavish clinging to the skirts of transatlantic vulgarism (our own breed is enough), its purile snobbery, its adolescent lust for collecting glorified radio cigarette cards—a craze whose only justification is the concealment of even more cigarettes. I shudder at its average technique, its "old men" its hams, and its slobbery sentiment. But, above all, I despise the almost subterranean level of its standards of performance.

The most dithery drivel is found "far inside." What is true of anything shall, I shudder at the puerile snobbery, its school-boy childishness, its first-rate name. But the fact remains that their day is done.

History will repeat itself. When Mrs. Poits next-door can hear the Fiji Islands every night as clear as a bell (or whatever standard of clarity she favours), Lionel Wilkinsop will tear down the ESL islands every night as clear as a bell. It is overdue to enjoy the medium and the long.

Moreover, the short-wave fancy fan has cunningly stemmed the advance of the invading army has stood still, quite happy for cunning components having little loss.

But the fact remains that their day is done. History will repeat itself. When Mrs. Poits next-door can hear the Fiji Islands every night as clear as a bell (or whatever standard of clarity she favours), Lionel Wilkinsop will tear down the ESL islands every night as clear as a bell.

Their Day is Done

At this annual rodeo I propose to ride a bucking hobby-horse that can only just be tamed. I shall make more enemies per paragraph than usual: but shall console myself by replacing each by a hundred new short-wave enthusiasts.

Ten per cent of the short-wave experimenters are the salt of the earth. The rest are the stones and gravel—impediments to any genuine progress. Their day is done—eventhough they stop up all night.

Events will drive them forth and this article is but a small cog in the machinery of events. Amateur reception of radio was once the province of the few. Broadcasting swept these amateurs away. Most of them disappeared. They had become commonplace. The harder ones betook themselves to the short waves.

These ancient Britons of radio, driven down in wavelength by the invading hordes of home-constructors, have in their new fastnesses snared at the poor folk content to enjoy the medium and the long. The invading army has stood still, quite happy to cultivate the rich ground of ordinary broadcasting. Moreover, the short-wave fancy fans have cunningly stemmed the advance of the invading army has stood still, quite happy to cultivate the rich ground of ordinary broadcasting.

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embraces Europe. Now it is to encompass the world.

Propaganda is partly responsible. Rome sends a regular Italian programme for America—and excellent entertainment it is. The medical powder is inconspicuous and the jam very thickly laid on. But even the powder is interesting. Who did not want to know if Addis Ababa had fallen? It all came over on the short waves. At the moment of writing I am getting Government news from Madrid at great strength—and in English—which is very welcome, as the British newspaper corresponds all seem to be with the rebels, anti-Reds, patriots, traitors, loyalists, or whatever Franco's men are called in your newspaper.

Many Programmes In English

Germany puts out much in English, while Portugal—our traditional ally—also speaks our tongue. Moscow gives us the Communist viewpoint. America, of course, speaks a version of English.

All nations are realising the value of these news bulletins which are sandwiched between excellent concerts—a rare feast of news and always enjoyable entertainment. Competition for the ears of the world will bring—is bringing—in its train greater power and better programmes. Whether the programmes are Red or Black, the future for the listener is rosy.

Wars and revolutions have thrust importance upon the modest, shrinking short-wave broadcast stations. Dictators with big voices want them to carry over the seven seas. Great leaders want to shout down the corridors not only of Poland but of the world.

Violent nationalism, rampant imperialism, rabid internationalism all want kilowatts and aerials. But for the listener it means broader interests, long-distance excitements and the earth as a playground.

The extremely odd hours of working and the weak transmissions showed the frankly experimental nature of many short-wave broadcast stations. But all that is changing rapidly—amazingly rapidly. Some "short-wavers" are already on a suitable set—louder than the "local."

Simultaneously there is a sudden all-wave boom in receivers all over the world. While there were only a few short-wave experimenters anxious for QSL cards, there was little encouragement to build bigger and better short-wave stations. There is little use in shouting if there is no one to listen. But when whole nations are equipped with all-wave sets there will be a vast impetus to short-wave transmission.

162 STATIONS
— IN 24 HOURS —

for 67's. 6d.

This was the log of stations received by Mr. L. W. Orton on the S.T.800, Sydney, Australia. All the glamour of the world. Read his report on page 211. And the set costs only 87's. 6d!

We are only on the fringe because this re-equipment of the nations is only beginning, although it will be very rapid.

Already American short-wave stations are bluntly telling foreign schoolboys that they will not answer letters asking "Was that you?" At one time they were very glad of reports. Now they regard them as insults. This shows the trend from experimental to regular service programmes. I prophesy a vast improvement in the strength of American transmissions in a very short period. Trade used to follow the flag; then it tended to follow the films; to-morrow it may follow the kilowatts. Be that as it may, one thing is certain: the megaphone has given place to the megacycle.

The third reason for the dawn of a new and exciting short-wave era is the improvement in short-wave transmission technique.

Suitable Sets Will Be Available

The fourth and last reason why a short-wave era is upon us is the producible, robust, easily-handled all-wave sets will be available—shorn of all hanky-panky and accepted as ordinary simple-to-work receivers and not as mysterious divining rods for a holy and exclusive sect of ether dowsers and sun-spot searchers.

PART III

Circuit Dabbling

The short waves have been the happy hunting ground for the circuit-dabbler with whom I am secretly in sympathy. In early days, we played with a hundred or two circuits. But things settled down and, given a lead, they will settle down in short-wave work. The S.T.800 will take the short waves from the experimental bench to the dining-room table. The days are numbered for the time-wasting tinkering of bread-board dilettanti.

The experimenter's neighbour who has built the S.T.800 will, without any previous experience of the short waves, be producing results which will make him realise that once again a great popular movement has not only caught up the experimenter but overtaken him.

Hitherto short-wave technique has lacked any sort of leadership. Those who have claimed to know most have been most loath to prefer one arrangement to another. Even such fundamental matters as superheterodyne circuit or straight circuit, one valve or more valves, loudspeaker or telephones are left glorious uncertainties which will give hours of delightful amusement to the experimenter.

The Short-Wave Problem Solved

I have watched all this for years biding my own time. Now I am offering an all-wave receiver in which the short-wave problem is solved as I think it should be. I give you no alternatives. I do not say that there is much to be said for this and a lot to be said for that. I am a convinced believer that for a particular job there is a best method of accomplishing a definite result. Uncertainty is the result of lack of definite data, or absence of reliable measurements.

My own solution of the short-wave problem is to provide variable selectivity, two tuned high-frequency circuits, a stage of high-frequency amplification that really works, four valves each pulling its weight, and at the end of the chain a loudspeaker which will give you something worth hearing. And to these essentials are added a score of vital details of design which do not concern the constructor, as they are built into the components and the design.

Some readers will regard my vigorous remarks as egotistical. I am not hesitant or diffident because I am so thoroughly
ENJOY THE WORLD!

Twelve chief reasons why S.T.800 is a triumphant success.

1. ENORMOUS SENSITIVITY, so essential for short-wave reception and world-wide range on the loudspeaker. Four valves pull their full weight on all four wavebands.

2. RAZOR-EDGE SELECTIVITY combined with easy station finding and tuning. Adjustable selectivity on all wavebands.

3. REAL H.F. AMPLIFICATION or last achieved on the short waves. No dummy circuits or schematic arrangements. Medium and long wave technique never at lost, possible on short waves.

4. GORGEOUS TONE. Real quality of a main plank in the set, platform. The S.T.800 combines a really fine quality of the radiocondition and long-wave sets and short-wave receiver designed not as a toy but to give entertainment.

5. MAJESTIC VOLUME. A huge output (as pedal cycles, and the spots on the sun's surface) received from the ends of the earth. Many all-wave sets will not.

6. MAINS UNIT OPERATION if you desire to use your "eliminator." The S.T.800 has been designed to work off main units as well as batteries. Many all-wave sets will not.

7. WAVE-CHANGING by the simple turning of one knob—nothing else. Any one of your bands: 13-35, 20-45, 100-500, 500-2000 metres, obtained in a second. Every station on "World Radio" list of short-wave stations is covered.

8. SIMPLER OPERATION than any previous S.T. set. ANODE selectivity switch makes the set work similarly and just as effectively on all wavebands.

9. UNI-PLANE CONSTRUCTION—so simple, successful for easy building and certainty of right—now applied in an all-wave set. Everything on one board. Band, construction guide and Hi-Speed diagrams give every step in construction— even the screws to use.

10. NO HAND-CAPACITY—the greatest bless of short-wave reception. The S.T.800 is extraordinarily stable and a revelation to those experienced in short-wave working.

11. REACTION is silky smooth. There is no trace of threshold howl under any circumstances; and obtaining all the great merits of reaction on short waves is child's play.

12. ECONOMY, The S.T.800 only costs 6/- 6d.—as an almost ridiculously low price compared to the other sets. It is the cheapest of all S.T. national sets, although it receives from the ends of the earth.


confident that the S.T.800 will once for all take the short waves out of the hands of the fiddling few and give them a source of everyday entertainment to the hard-headed majority. There is nothing niggling or messy about the short-wave side of the S.T.800. I have set out with the bold idea of making a really good valve set; for those who like to let things rip. But economy of H.T. current whenever you want it.

Astronomers

What short-wave technique has needed is a terrific blast of fresh air to blow away the musty atmosphere in which it has dozed fitfully for so long. It has lain on its back, vaguely kicking its legs in the air, but never dying. It has been buttressed by fabulous tales of miraculous reactions, although less emphasis has been given to the fact that these have been obtained with accustomed ears and all new ears and wide ears and fresh ears.

Sunspot cycles are spoken of as familiarly as pedal cycles, and the spots on the sun's surface are watched for as anxiously as a solicitous mother looks for them on the chest of her adolescent offspring. So often the experimenter neglects to take the bold step. If it is selectivity you want, it is not a folly to have elaborate, expensive and specialised components when you are going to try to do everything on one tuned circuit. The folly lies in relying on one circuit. Such a circuit with the

STATION LOGGING MADE EASY

With the aid of the special size-union tuning drive, and the unique 4-Band Auto-Selector stations in all parts of the world is as simple as finding the dial setting for your local station. The set above, although it looks well, has nearly a panel and two side-pieces. Other cabinet arrangements are possible.
be merely a drop in the ocean and a gilding of the lily. If you are accustomed, with baited breath and aching ears, to strain for a weak snatch of garbled music from afar, you may be excused if you dip deep into your pockets to gain some petty improvement. But when you sit back in a comfortable chair and tune in stations from all over the world on your loudspeaker with no more trouble than picking up a good station on the medium or long wavebands, then you know you are getting the benefit of a bold policy towards the short waves: a policy not of regarding them as delicate, mysterious things, to be coaxed with effeminate fingerings, but as sound entertainment brought in by a rugged set designed with blunt common sense.

UNIPLANE CONSTRUCTION IS SIMPLE AS ABC

PART IV
Basic Requirements

A VITAL requirement is that the short-waveband coverage should be complete. Are you prepared to build a set that from the start inevitably and inexorably cuts you off from some of the world's finest stations and programmes? Perhaps you just think of short-waves as short-waves, and leave it at that. Perhaps you are inexperienced and forgiveable. This is new territory; it is not surprising if many people do not know its real boundaries. Some sets cover from 19 metres to 48 metres. Others from 16 metres to 45 metres, and so on. The S.T.800 covers from 13 metres to 85 metres without a gap. In other words, every short-wave broadcasting station on earth could, if conditions were good enough, be received on the S.T.800. On many so-called all-wave sets, you are as badly off on the short-waves as if you could not get the long-wave Droitwich or Luxembourg.

Prepared for the Future

Apart from the recognized stations already well worth getting, who knows but what some of the at present insignificant stations will blossom into ether shakers of the first magnitude? It has happened scores of times on the other wavebands. The 1 kilowatt station of to-day is the 100 kilowatt broadcaster of to-morrow. So first see that when to-morrow comes your set is one that can tune to that station, for if it cannot your set is obsolete. No matter how well it might work it will be stone deaf to perhaps the best programmes of the ether.

I can well appreciate why many de-

sire to gain some petty improvement. But when you sit back in a comfortable chair and tune in stations from all over the world on your loudspeaker with no more trouble than picking up a good station on the medium or long wavebands, then you know you are getting the benefit of a bold policy towards the short waves: a policy not of regarding them as delicate, mysterious things, to be coaxed with effeminate fingerings, but as sound entertainment brought in by a rugged set designed with blunt common sense.

The construction of the S.T.800 is on the Uniplane principle, which dispenses with all baseboards and chassis, thus reducing the work of assembly to the minimum. All the components are mounted in one plane, a feature which gives great accessibility and astonishingly simple wiring.

The four valves of the S.T.800 are a great improvement over any possible combination of three valves. The improvement will usually be about fifty times. Needless to say, there was nothing to stop me from choosing four instead of three valves. But those merits call for emphasis when we come down to the short waves, where everything I have ever said regarding controls and sensitivity apply even more so. Please believe me when I say that four valves are desirable on the medium and long-wave bands and essential for the short waves. It is possible to get considerable sensitivity by using a pentode detector and pentode output valve in conjunction with a high-frequency valve. This triple-pentode receiver is a popular three-valve combination, but the simplest arithmetic will rapidly prove that even with two ordinary three-electrode valves instead of the final pentode, the set can be made very much more sensitive.
I RECEIVE ALL CONTINENTS ON S.T.800!

By Leslie W. Orton

As President of the Anglo-American Radio and Television Society, Leslie W. Orton is not only a critical listener but is also a capable appraiser of scientific values in receiver design.

have arrived upon this wavelength, and the latest arrivals are South American stations. The S.T.800 brought these in with wonderful volume. I listened to a programme of gramophone music (including such tunes as and a most every conceivable thing which makes a noise slightly out of the ordinary. The idea is good, but there are so many novel ideas used that the poor listener forgets which represents each station, and is therefore little better off than if there were no such identification signals!

Stations I identified by call included Y Y 5 R M O, Maracaibo, Venezuela; P R A B, Pernambuco, Brazil (which was creating considerable interference with W 1 X A L); H I 1 A B G, Barranquilla, Colombia; H I 4 A B B, Manizales, also in Colombia; and X E B T, Mexico City.

North American stations also provided good signals upon this band, and, among other things, I heard a programme dedicated to the Mississippi River from W 1 X A L, at Boston; an organ recital by Jesse Crawford from W 3 X A L, at Boundbrook; and a news report from C K C X, in Toronto, Canada.

Australia and Java

On the 30-metre band I received W 3 X M E, Sydney, at about 7 a.m. A little later, between 8 and 8.30 a.m., I listened to a service, with a lady preacher, which was being relayed by W 3 X M E, Melbourne, Australia. In all these cases reception was on the loudspeaker.

The 25-metre band also provided very interesting results. I tuned-in W 1 X A L, Boston, U.S.A.; W 2 X E, and W 8 X K, Pittsburgh, all at good strength, as well as Moscow, Rome, Paris, Daiverty, and Zeesen, W 8 X K, Pittsburgh, and W 2 X A D, Schenectady, as well as many European stations, provided excellent signals on the 20-metre band, whilst still lower down, on the 16-metre band, I received the European stations at excellent strength. W 3 X A L, however, was unheard.

G S H was heard at good volume on the 15-metre band, and F E, Bandung, Java, and many radio-telephone stations were heard at excellent strength. Indeed, the S.T.800 seems as much at home on 13 metres as on 2,000. It is a truly remarkable receiver, and I am confident that all who construct it will never regret it.

There is one fault I find with the receiver: I find it extremely difficult to break away from it at night! LESLIE W. ORTON, "Kingsthorne," Willow bank, Uxbridge.

67s. 6d.

This is the amazingly low price of the standard S.T.800 kit complete with panel and two side-pieces. If you want the easy-cabinet, you save 5d. on the side-pieces but pay 3s. 6d. for the top and new side-pieces. But you should order this at the time if you want it. The set requires no special cabinet. You get all the effects of a cabinet for 3s. 6d., while many will be satisfied with the quite pleasing standard cabinet above, which involves no extra cost. The wire (18 gauge), insulating sleeving, screws, 4 washers and three step can be bought locally for 1s. 9d.—the cheapest way.

These items are free if a complete Petco Scott kit is bought.
A Fault of the Average Set

One of the stations is heard particularly loudly on any given occasion. For example, and even to cover a quarter of the dial. It is possible for such a station as Jeloy on 3148 metres. Both of these stations tuned circuits and extra selectivity devices in wavelength.

Selectivity is Vitally Necessary

Selectivity on short waves is worse and, in fact, selectivity is all-important on the short waves. This may cause surprise as short waves are popularly supposed to be “selective.” It is quite true to say that tuning is sharper. But actually this tiny movement produces a complete and unadulterated fallacy.

The S.T.800 is able to bring the radio stations of the world into your parlour by the flick of a switch. Sixty-seven shillings and sixpence, the cost of the complete set of parts for the S.T.800, is the price of your life-time season ticket for a seat in the stalls of the world-theatre of broadcasting.

As a fact, on the average short-wave set, although it calls for real selectivity. The S.T.800 4-Band Auto-Dial you will certainly not value the two tuned circuits and extra selectivity devices of the S.T.800 for the short waves.

A MAGIC CARPET

On the average short-wave set, although it is at once noticeable when short-wave stations which the S.T.800 scores of long- and medium-wave programmes are poor, and the Continent can’t give you anything if they are available. In a sense all these basic requirements are a call for better performance and stable technique.

The S.T.800 is not designed for hams. It is chiefly the reaction. A proper functioning reaction system is always essential for the short waves and an ample margin of safety enables you to use a battery down to 90 volts.

Stations Tuned by Name

A further requirement I laid down for the S.T.800 was that all stations should be capable of being tuned by name and not by degrees or any other hole-and-corner system. With the S.T.800 4-Band Auto-Dial you always know where you are, and even if there are slight discrepancies in cocks or condensers, you nevertheless can calibrate the set with absolute accuracy. A dial card is to be found inside every copy of this issue of POPULAR WIRELESS, and some printed white celluloid duplicate of it is obtainable from Celluloid Printers, Ltd., Kingston By-Pass Rd., Surbiton, Surrey, the price being 2½. A very handsomely professional finish is given to the set by this dial (which is also washable if measures are to be made), but extra card-board dial cards are obtainable from the publishers of this journal, or more conveniently by simply buying any further copies of this issue of POPULAR WIRELESS if they are available.

In the all-wave era which is now over, the soap-box-cum-pram-wheel stage of short-wave reception is a thing of the past. My sympathies and instincts lean towards the experimenter. But my work for this paper is to provide finished designs, not for experiment, not to be pulled to pieces by experimenters, but to give genuine radio entertainment for several years to come. Just as the wireless experimenter of the pre-broadcasting era was enquired after by the manufacturers, so will the admired and envied short-wave enthusiast of to-day disappear as such in the all-wave era which is now upon us.

The Passing of a Bad Era

The most striking thing about the history of short-wave reception is that in every possible respect the standard demanded has been incomparably lower than that of the usual broadcast band. At the beginning of broadcasting the most abominable quality of reception was tolerated. To receive anything at all was so wonderful that the manner of its reception was of quite secondary importance. That is exactly the attitude to-day of the average short-wave listener. Yet Sydney, Australia, or Tokio, or a South American station, he does not care how appalling the fading, how weak the signals, how distorted the quality of the reception. He has heard the laughing jackass interval signal and that is about all he wants.
**GREAT DEMONSTRATION SCHEME**

**16 CENTRES THROUGHOUT BRITAIN**

**S.T.800 Proves Its Brilliant All-Wave Performance**

A GREAT hear-for-yourself scheme is in operation. As a two-hour demonstration inadequate to cover the 24 hours-a-day entertainment to be obtained from this 160-station set, readers are invited to borrow an S.T.800 and listen to it in their own homes at any hour they please.

With only 16 sets I realise how totally inadequate such an unprecedented step must be. But it is something. The old method was for a London designer to produce the set in London, describe it technically—almost contemptuously—and leave things at that. Such is still the usual policy.

Although experience alone might justify my taking such a course, actually I have gone out of my way—in one case, two thousand miles out of my way—to demonstrate my chief sets of the year. The S.T.400 tour—from Land's End to John o'Groats—was spectacular, but—from Land's End to John o'Groats—was spectacular, but—I can only characterise it as remarkable indeed.—C. AMBROSE.

As a two-hour demonstration this October, but all letters this year I have demos-

The S.T.600, and last year the S.T.700, also took me once more to the chief centres—and also to within one mile of the B.C.C. stations!

**Excellent Results**

This year I have demonstrated the S.T.800 in London, Birmingham (where I got entangled in the Annual Carnival), Manchester and Glasgow. Reports from these places will appear in this or future issues. The project set for me lay in the short waves, as I know the "medium" and "long" conditions very well already. The results (just ordinary aerials were used) were excellent and—backed with four valves—the S.T.800 will perform admirably anywhere in Britain on all wave-bands.

It is my custom to make no claims or promises, but I have given a number of demonstrations this October, but all letters this year are from those who have operated the set themselves. Duplicate sets were lent in the case of Messrs. Hopwood, L. Orton, "W. L. S.,” and G. T. Kelley, with no information whatever except the operating notes exactly as given in this issue. The first two gentlemen I have never met. Mr. Perrins received a personal explanation of the operation. Five duplicate sets have so far been sent out, all built from my excellent check on my instructions and on the ease of duplicating results.

Frankly, these 10 sets dotted about the country can, because of the small number, do little directly to popularise the S.T.800. If you are thinking of "hearing before buying" your chances are slim. At the very least, 10,000 will build the S.T.800; 10,000 into 16 "won't go"—it would take many years! Fortunately, 99 out of a 100 of my readers are not "doubting Thomases." I go to far greater lengths than any other designer to give you details and evidence of performance. Now I am distributing S.T.800 sets to act as "references." Five of them have been built in my laboratories and the tests have very kindly been assembled by Peto-Scott Co., Ltd. All are made according to the instructions in this issue, which have actually been used.

As usual, reports from Messrs. Peto-Scott will, by then, be enjoying.

**S.T.800—LIKE EVERY PREVIOUS "S.T." SET—MEANS SUCCESS**

<table>
<thead>
<tr>
<th>No other designer has such a long string of successes to his credit. Read these earlier reports.</th>
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<tr>
<td>S.T.390</td>
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<td>I should like to testify to its amazing sensitiveness and selectivity.—S. MILLS, 27, SEYMOUR HOUSE, COMPTON ST., LONDON, W.1.</td>
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<td>The set is extraordinarily sensitive and selective for a hearing.—W. TRUM, 173, GOSSET ST., LONDON.</td>
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<td>The set more than satisfies any listener.—FRED HOSKIN, 112, CHURCH ROAD, KIRKLAND, LANCASHIRE.</td>
</tr>
<tr>
<td>The set was absolutely uncanny—what every wireless enthusiast has only dared to dream about.—FRED HOSKIN, 112, CHURCH ROAD, KIRKLAND, LANCASHIRE.</td>
</tr>
<tr>
<td>The sensitivity, quality and volume is far better than what you have claimed it to be.—C. MILLARD, 45, SEACH GROVE, ACOYM, YORK.</td>
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The quality of reproduction was superb, and the set is undoubtedly the highest-water mark of design.—B. MACLOCHLAN, 2, WARKWORTH GARDENS, GREAT WEST ROAD, ISLINGTON, MIDDX. |

The S.T.700 came through the most difficult of tests with flying colours. Truly a wonderful set.—T. POLLETT, 3, GROVE HOUSE, LONDON, N.10. |

The S.T.700 was sent to the most difficult of tests with flying colours. Truly a wonderful set.—T. POLLETT, 3, GROVE HOUSE, LONDON, N.10. |

The quality of reproduction was excellent.—W. D. BEEBE, 24, SHEPHERD'S BUSH GREEN, W.12. |

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S.T.800: A BRILLIANT CIRCUIT FOR WORLD-WIDE RECEPTION
Designed by John Scott-Taggart

Amazing simplicity characterises this circuit, with its remarkable performance on long, medium and the distance-annihilating short waves. The special S.T.800 four-band tuning unit is shown in two sections to illustrate how it combines the functions of aerial tuning and coupling between H.F. and detector valves.
4 VALVES-4 BANDS-6 CONTINENTS!

The Secrets of the S.T.800's Success

Real H.F. Amplification—Immense Sensitivity with 4 Valves pulling their Full Weight—Adjustable Super-Selectivity—Simple Operation—All these Merits on every Waveband

DETAILS OF THE S.T.800 CIRCUIT

The circuit of the S.T.800 is associated on all wavebands with four valves: the first an H.F. pentode, the second a triode detector, the third a triode "1st L.F." and the fourth an ordinary triode power output valve such as that used on the S.T.600, S.T.600 or S.T.700, but preferably a P.X.230 for really good quality.

If you already have a triode output I should not recommend the purchase of a new valve, but if you are starting from "scratch," or have doubts about your valve, I should advise the P.X.230. This valve will give a very large output with excellent quality. Naturally the H.T. consumption for a given bias on its grid will be larger, but you overcome this by applying more bias e.g. -12 volts. It is the same valve as I used on the S.T.700.

The H.T. consumption for average reception with G.B. -1 at -4 volts applied to the grid of the first valve with on-off turret switch half-way is only 5 milliamperes, the G.B. -3 being at -10½ volts. With on-off fully right the set takes 10 milliamperes.

The Coil Unit

The S.T.800 circuit is the same for all four wavebands with one exception—namely, that on the two short wavebands the second H.F. circuit is parallel-fed from the anode of the pentode—a small H.F. choke and a coupling condenser being included in the coil unit itself. On medium and long waves I use a H.F. transformer, the primary being connected directly in the anode circuit of the H.F. pentode. The change in circuit is automatically carried out inside the coil unit, so the constructor is not concerned with it except as a point of interest.

A very great deal of design work and research has gone to the making of this coil unit, which is the first all-wave unit of its kind. At any rate, I found nothing suitable when I looked round for a one-switch all-wave coil unit. Plugging-in coils may be all right for the experimenter, but it is a messy and tiresome business. There is great delight to be obtained by receiving broadcasting on any of four bands by an instantaneous movement of a single switch.

Another great feature of the S.T.800 is that all the controls work in the same way and have the same merits on all wavebands. The reaction is reduced (by a small by-pass condenser) on the medium and long wavebands, but this, again, is introduced by for more than this. Other parts of the set are liable to cause a change of tuning or reaction as you move your hands towards or away from any control. One could write pages on the experiments which have resulted in the near-perfect-as-possible freedom from hand-capacity.

Two other great problems on the short waves are (a) rough reaction and (b) threshold howl. In both cases it is impossible to apply really critical reaction. The result is that your sensitivity falls off very greatly while selectivity—that untalked-of fault of nearly all short-wave sets—also suffers. Smoothness of reaction is one of those matters achieved partly by design and sometimes by luck. I like to think the delightful smoothness of reaction and absence of hysteresis on the S.T.800 is due to careful design; but even if there has been a little luck, the result remains the same!

Threshold Howl

As regards threshold howl I was dogged by ill-luck, and the complete elimination of this ruinous vice of short-wave sets was only accomplished after weeks of work on the problem. I probably know more about threshold howl than anyone in Britain! Most readers will have experienced the defect on the ordinary wavebands. As you approach the critical reaction point the set bursts into a low note growl. Sometimes the growl only occurs when the set is oscillating at high-frequency due to too much reaction. Under these conditions the trouble is annoying, but not harmful on the medium waves as it need not occur. But on the short waves it is fatal. It means you cannot make the set oscillate for the purpose of finding a station by the whistle method, which is very useful even when the station is capable of filling the house with its programme when properly tuned.

If the threshold howl is of the kind that

(Continued overleaf.)
The Triple Extractor is, of course, external to the main circuit, and calls for no details here. It consists simply of three very eficient tuned circuits in series between the aerial and the aerial terminal of the set.

In general, except for the highly desirable short-wave modification, the selectivity switch mentioned above, and the position of the reaction condenser, the circuit follows the highly successful lines of the S.T.700, and on the medium and long waves the established success of last year's set makes it obvious that the scores of enthusiastic letters received would apply equally to the S.T.800.

Personally, I should like to add all the refinements and special ideas I have ever thought of, but, after all, I am designing a national set, not a Christmas-tree.

High Sensitivity and Selectivity

I offer the S.T.800 as an extremely sensitive and selective short-wave set combined with a medium- and long-wave receiver of established efficiency of design. The average commercial battery all-wave set is an ordinary receiver with a dash of short waves to keep in fashion. The H.F. valve is either not used at all, or acts as a dummy. Wave-range is limited. Results on the short waves are very poor. But there you are—it's an all-wave set, and that's what people want these days!

THE S.T.800 COIL UNIT

The interior connections of the all-wave coil unit are illustrated here. These connections, of course, are made differently for the constructor.

The S.T.800, on the face of it, is obviously a first-rate set for the medium and long waves—but after all, the bread-and-butter of the average listener. When it comes to the short waves, you will agree. It consists simply of three very efficient tuned circuits in series between the aerial and the aerial terminal of the set.

The wavering laugh of a kookaburra in the wavering, walking to America on a pair of pontoon floats, and what is he content with when he operates his galaxy of glamorous gadgets?
Exclusively Specified by
Mr. John Scott-Taggart

QUADWAVE TUNER
for the
S.T.800

B.T.S. PLUG-IN COILS

6-PIN Type: E1, E2, E3, E4, E5, E6, E7, E8, E9, S1, S2, S3, S4, S5, S6, S7, S8, S9, E10

B.T.S. COIL BASES

Designed for use with B.T.S. Coils and are constructed so as to be adjusted for either sub-chassis or sub-chassis mounting.

B.T.S. ANTI-NOISE AERIAL

Cuts Out Noise and Increases Efficiency on Every Waveband FOR THE S.T.800

The B.T.S. QUADWAVE TUNER was especially designed by B.T.S. at the request of Mr. John Scott-Taggart and therefore is the ONLY unit for the S.T.800. Covering all wavebands, including those for short-wave work, this chassis is completely assembled in metal case with black crystaline finish, and is ready for mounting into your S.T.800.

B.T.S. Ultra Short Wave Tuning Condenser

FOR GANGLING—With extension to back end of main spindle, permitting ganpling up to one or more condensers of same type. Brass vanes = and winding of low loss, and minimum H.F. resistance. Positive connections to both fixed and moving vanes, the latter supported by two tension and glides of solid and efficient construction. Type GTC 320.0002 mild steel.

B.T.S. SLOW MOTION DRIVE

The new B.T.S. Drive will enable you to tune your short wave set with smooth, minute accuracy. Provided with last and low ratios of 8:1 and 100:1, and geared preciously by a brass and dustproof cone. DRIVE ONLY 6/6

B.T.S. ALL-WAVE H.F. CHOKE

This choke has been specially designed to work efficiently on wave-lengths between 25-2,000 metres, and is suitable for any all-wave receiver. Section wound to minimise interaction. Neat aluminium case, with small brackets for fixing. Overall size including brackets and terminals 24 in. long, 7 in. wide and 1½ in. deep. Type AWC 4. Also available with a screened lead from top of can with slip for connecting to valve. Type AWC 2, 3/6

ALL GOOD DEALERS

B.T.S.

To Publicity Department


Please send me "Ten Tested Short and All-Wave Circuits" and No. 2 of "The Short Wave Constructor," for which I enclose 4d. in stamps.

NAME

C. Davies

ADDRESS

Thorncliffe, Morda, Oswestry, Shropshire

P.W.1
**S. T. 800 PILOT AUTHOR KITS**

Mr. John Scott-Taggart again chooses A PETO-SCOTT CABINET

**FINISHED INSTRUMENTS**
All the 3 Cabinets illustrated and described below are available either separately for the home constructor of the S.T.800, or in the form of a complete, finished instrument, housing the S.T.800, fully assembled, exactly tested and READY TO PLAY. Every Peto-Scott Finished Instrument is AERIAL TESTED ON ACTUAL BROADCASTING.

<table>
<thead>
<tr>
<th>A.C. MAINS S.T.800</th>
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<tr>
<td><strong>KIT</strong> CASH or G.O.D.</td>
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<tr>
<td><strong>“A”</strong> OR YOURS FOR</td>
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<td>Balance in 11 monthly payments of</td>
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<td>3 specified valves...</td>
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<td>Peto-Scott drilled and polished Australian walnut veneered panel...</td>
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<td>Peto-Scott Aluminium Brackets...</td>
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**Peto-Scott "LL" CABINET**

For Mr. J. Scott-Taggart's A.C. version of the S.T.800, but equally suitable and highly recommended for the Battery Model. Australian walnut veneered front. Hand French polished, macassar fret. Lift-up lid. Speaker baffle board. Cash or G.O.D. Carriage Paid. £19:10:0 or £5 down and balance in 11 monthly payments of 20/.

**FINISHED INSTRUMENT**


**FINISHED INSTRUMENT**

Built exactly to Mr. J. Scott-Taggart's specification by Peto-Scott's expert technicians. Complete with FIRST SPECIFIED valves and Peto-Scott Matched Deluxe Speaker. Table cabinet illustrated above, less batteries. Cash or G.O.D. Carriage Paid. £7:8:6. Balance in 11 monthly payments of 13/.

**CABINET**

Exquisitely designed walnut finished cabinet, as illustrated above, with sloping front and crossbanded moulding. Constructed of carefully selected wood and hand French polished. Complete with extension spindle. Cash or G.O.D. £17:6. (Carriage and part packing 2/6 extra.) Balance in 5 monthly payments 64/.

**FINISHED INSTRUMENT**


**FINISHED INSTRUMENT**


**S. T. 800 BATTERY VERSION**

**TABLE MODEL**


**CONSOLETE MODEL**

DIMENSIONS: Width 20 in.; Height 24 in.; Depth 13 1/2 in.

**BATTERY VERSION**

Type "LL" MODEL

FINISHED INSTRUMENT

Exact to specification. Complete with FIRST SPECIFIED valves, Peto-Scott Type 101 matched speaker and walnut consolette cabinet (illustrated on left), less batteries. Cash or G.O.D. Carriage Paid, £8:19:6. Balance in 11 monthly payments of 16/.

FINISHED INSTRUMENT

KIT "A" Cash or C.O.D. Carriage Paid 67' 6

S.T.700 to S.T.800 CONVERSION KIT
COMPLETE SET OF PARTS NECESSARY TO CONVERT YOUR S.T. 700 TO THE ALL-WAVE S.T.800, EXACTLY AS RECOMMENDED BY MR. SCOTT-TAGGART ON PAGE 247.

Comprising :-
1. B.T.S. "Quadwave" Coil Unit
2. B.T.S. S.T.800 H.F. Choke
3. PETO-SCOTT Ready drilled Eboutino terminal strips, 2 in. x 1 in.
4. PETO-SCOTT Ready drilled and polished walnut plywood panel
5. PETO-SCOTT Ready drilled and polished side pieces
6. J.B. S.T.800 Main tuning condenser and pointer
7. POLAR S.T.800 Aerial balance condenser
8. GRAHAM FARISH S.T.800 Litho condensers with flanged nuts
9. GRAHAM FARISH Turret switch with flanged nut
10. T.M.E. Holt condenser, 2 mfd. x 2 mfd. x 1 mfd. Type B1007
11. VALVETICE L.F. transformer ratio 1.35
12. BENJAMIN Vibrodler 4-pin valve-holders
13. BULGIN or DUBLIER 4-way resistors
14. DUBILIER 4-way 6-shaped condensers, 001 - 005 mfd.
15. LISSEN Mica 006 mfd. condenser
16. S.T.800 SPECIAL EXTRACTOR KIT

Balance in 11 monthly payments of 8/6.

KIT CASH or C.O.D. Carriage Paid £4:14:0
"B" OR YOURS FOR £5:11:6 Balance in 11 monthly payments of 10/3

As for Kit "A," but including FIRST SPECIFIED valves only, less cabinet and speaker, etc.

KIT CASH or C.O.D. Carriage Paid £6:9:0
"CC", OR YOURS FOR £6:11:6 Balance in 11 monthly payments of 11/9

As for Kit "A," but including FIRST SPECIFIED valves and Peto-Scott S.T.800 Consolette cabinet only, with speaker baffle, and battery shelf, but less speaker, etc.

KIT CASH or C.O.D. Carriage Paid £7:12:0
"CLL", OR YOURS FOR £7:12:0 Balance in 11 monthly payments of 12/.

As for Kit "A," but including FIRST SPECIFIED valves and Peto-Scott Consolette cabinet Type "L.L." only, with speaker baffle, but less speaker, etc.

If the above kits are required complete with 3 muller strips and 2 polished accumulators as specified, ADD 1/3 to Cash or C.O.D. prices or 1/3 to Deposit and in each monthly payment.

PETO-SCOTT CO. LTD., 77 (P.W.4), CITY ROAD, LONDON, E.C.1
West End Showrooms: 62 (P.W.4), High Holborn, W.C.1
Telephone: Clissold 9875
Holborn 3248

Please supply:

I enclose £ s. d. Cash/H.P. deposit.

Any order over 10/- sent C.O.D. ; Carriage and Post Charges Paid
How to Cut the Crackie Out of Radio

Much has been written in Popular Wireless about electrical interference, how it is created, etc. We do not want to go over the same ground, but we do want to emphasise what can be done by the listener under ordinary circumstances, and to make it clear how radio fashions, such as all-wave listening, affect the situation.

If yours is a mains set and your programme is spoilt by the characteristic " static " effect, remove your aerial. If the noise persists you can generally be sure that most of the trouble is reaching the receiver via its mains lead, and the plugging in of a Belling-Lee set lead suppressor will probably effect the necessary cure.

If the interference stops with the removal of the aerial, some part of the aerial and/or lead-in is within the field of interference, which is probably being re-radiated from the electric wiring of the premises. At this point it is as well to make clear that where interference is prevalent no form of indoor aerial should be used as such devices depend upon the house wiring for their pick-up. To a greater degree do these remarks apply to mains aerial arrangements. Any outdoor aerial is better than one indoors, unless you are fortunate in having a large house with a long ridge under which it is possible to stretch a 30-40 aerial wire not less than 15-20 feet from any conductor including water pipes in the attic, iron guttering, zinc roofing, etc.—a most uncommon circumstance.

Many outdoor aerials are little better than indoor aerials because they depend upon the length of wire of the lead-in for their collection, and the lead-in is invariably within the field of interference created by the house wiring.

Notes by Belling & Lee, Ltd., on the Suppression of Electrical Interference with Broadcast Reception.

When a really good outdoor aerial is in situ and the lead-in kept fairly clear of the house, the nearest it approaches the mains may be where it meets the receiver. In these circumstances set lead suppression may be the cure, as the suppressor, fitted at the plug-point, ensures that the lead as it approaches the receiver is filtered and free of interference.

Where set lead suppression does not effect a cure, fit an anti-interference aerial and remember that few all-wave aerials are efficient as anti-interference aerials on short, medium, and long-wave channels. The "Eliminoise" aerial, manufactured by Belling-Lee is efficient on Luxembourg and on 10 metres. It is as easy to erect as an ordinary aerial, and it has no switching.

Let us be clear on this point that no anti-interference aerial can give satisfaction unless the active part or collector is outside the field of interference, and this means that it is useless to think of fitting it to an indoor aerial or to an outdoor gadget fixed to the eaves of the house.

How Radio Fashions Affect the Design of Suppressors

This year has seen a remarkable boom in all-wave receivers. Belling-Lee admit that their last year's anti-interference aerial is useless on short waves, and they have had to redesign their set lead suppressors to be efficient down to 10 metres. A last season's set lead suppressor will give no suppression below 50 metres. For those who are interested, we reproduce the circuit of the new Belling-Lee set lead suppressor, type 300: 2000 to 10 metres, 1-amp.; price, 21s.

Battery-driven Receivers

A battery-driven receiver is nearly as prone to electrical interference as a mains set; its aerial picks it up from neighbours' electric wiring or telephone wires, gutters, gas pipes, or direct from the source of the noise. An "Eliminoise" aerial fitted above the house or at the other end of the garden is the cure; or, if you know the cause, there is a Belling-Lee appliance suppressor to silence it.

Interference from Alexandra Palace

Since television transmission commenced, many readers situated within a three miles' radius of Alexandra Palace have been experiencing interference in the form of the sound accompaniment of the television programme coming in all round the dial. The Belling-Lee "Telefilter," price 2s., has been designed to combat this trouble. Generally one only is required, and readers of "Popular Wireless" will have no difficulty in fitting it at the set end of the aerial. Belling-Lee would welcome cards from readers experiencing this trouble, and in particular they would like to know how far from the Palace this interference has been noticed.

Although no firm can guarantee that any one suppressor will cure every kind of interference, one firm, Belling-Lee, are prepared to send a set lead suppressor, similar to the one illustrated above, C.O.D., on the understanding that if it is not the correct cure in your case, the money will be refunded, less C.O.D. and postage charges. You are expected to approach your dealer in the first instance, but if unable to obtain this service locally the makers would like the name and address of your dealer. When applying to Belling-Lee for this service be sure to say whether yours is a "all-wave" or whether not it is. The prices for these suppressors range from 17s. 6d. to 21s., and the address of the firm is Cambridge Arterial Road, Enfield. These units require no skill to use; you merely plug in. Please mention "Popular Wireless."
THE TRIPLE EXTRACTOR CUTS OUT YOUR LOCAL STATIONS LIKE A KNIFE. IT COMPLETELY ANNIHILATES "SWAMPING," AND ONCE SET DOES NOT REQUIRE ANY FURTHER ADJUSTMENT. EQUALLY EFFECTIVE ON LONG AND MEDIUM WAVES, THE EXTRACTOR ENTIRELY BANISHES ALL B.B.C. INTERFERENCE.

It is true to say that a new lease of life was given to home construction when the principle was adopted of overcoming B.B.C. swamping as a separate problem. Hitherto it was usual to attempt to make a set sufficiently selective to cut out the B.B.C. Only with a most elaborate and expensive outfit was this possible, and it was often accompanied by a weakening of foreign stations.

In 1934 I introduced the single "extractor" circuit for cutting out one medium wave "local" or Droitwich. As the medium-wave nationals were not abolished (as had been expected), the Triple Extractor was introduced last year. Its success has been phenomenal. It definitely ends the B.B.C. swamping problem.

It is 25 times as efficient as the 1934 S.T.600 extractor and simultaneously it will cut out a local, National, a local Regional and Droitwich. In practice, of course, you allow enough of each to come through to give full loudspeaker results when the set is properly tuned. But you do not affect other stations. What the Triple Extractor does, in effect, is to transport you any distance you like from the B.B.C. Actually foreign stations will come in as much as a hundred times louder if you live in the B.B.C. swamp area. The reason is this: The selectivity of a set is tied up with its sensitivity. To cut out your local you have to drain the life-blood out of all stations. On the S.T.400, by reducing the "couplers" you may cut out the local, but the set's ability to pick up foreign stations is gravely impaired. You throw out the baby with the bath-water!

When the Triple Extractor is used, there is no need to reduce sensitivity by reducing couplers or volume control. The swamping B.B.C. stations are cut out or reduced to desirable strength by a separate little box right outside the set. The result is that all foreign stations or distant B.B.C. stations are received with the set working at its best.

The Triple Extractor consists of three iron-core coils and three really efficient air condensers. One terminal goes to the aerial and the other to the set, the box being placed on the window-sill or on the left of the S.T.800. The three knobs tune the condensers. The two outside knobs will tune out two medium-wave B.B.C. stations, while the middle knob is for cutting out Droitwich.

The adjustment is simplicity itself, and it can actually be carried out in half a minute. You tune to, say, the medium-wave National on the main set and then tune one of the outer Extractor knobs until the National disappears. Then tune the local Regional on the set and tune it out on the other outer knob of the Extractor. Then go over to the long waves, tune in Droitwich, and cut it out again with the middle knob of the Extractor. That's all! You can allow as much as desired of any of these stations to come through by slightly readjusting the appropriate Extractor knob.

Having once adjusted the Triple Extractor you do not need to touch it again. It does not require adjustment for each foreign station.

(Continued on next page.)
Dear Sir,—Having received a telegram to collect an S.T.800 from Tavistock Station, I proceeded in haste and picked it up; but surely that light cardboard box could not be it—but it was! Once in the lab, I unpacked it, and my first impression was: it takes up so little room and can be got at so easily.

Right quickly was it connected up and at once did it do its job—“Hurrah, un­damaged!” —a very good thing, as there was no circuit diagram, nor were there any but simple operating instructions. Here I may say I have made and handled every S.T. receiver yet designed; they have never let me down.

Since then—at the correct times—I have tried out the receiver in what I may call my preliminary tests on a quite ordinary serial—30 ft. vertical and 15 ft. horizontal—but with a very good earth. Each station was checked and rechecked so that no mistake should be made.

Entertainment Value

The results are stated below, and only stations that could be heard at good signal strength were logged—for I took it to be that the designer’s idea is to have the stations for entertainment and instruction, shall we say—by that I mean news and talks, etc.—but at a strength that does not entail straining one’s ears to hear what is said or played.

The medium and long waves were just as good and selective as on the S.T.700, and I used the Triple Extractor for these wavebands; it would serve no object to enumerate them, but I can assure you the stations were there.

Passing on to the short wavebands, I found that the absence of background was a notable feature—and it was a pleasure to hear a programme without any hissing—and one of my jobs of work is to record various S.W. stations, so I claim to be a good judge as to what is good and what is not.

Briefly, I checked up the following stations:

13.94 metres:
- W2XE.

16-metre band:
- LSY, W3XAL, PHJ, DJE.

19-metre band:
- HASS, W3XAD, DQJ, W2XE, DJB, GSF, PCJ, W8XK, HBJ, (Moscow) KKI.

23-metre band:
- WQV, JYH, D2H.

25-metre band:
- RXE, TPA3.

50-metre band:
- HBJ, ORK.

The Higher Short Waves.

30-metre band:
- LRX, CT1AA, 2RD, HBL, VK2ME (faint), W3XAU, PCJ, GSC, W1XK, VUB, DJA, DJN, LKJ, GSB, HAT4, HBP.

40-metre band:
- PRADO, VUC, Belgrade, DJJ, OER2, OXY, W8XAL, W3XAU, W1XAL, DJC.

TRIPLE EXTRACTION

(Continued from previous page.)

station, nor do you touch it when changing over to another waveband.

As the device was fully described last year, there is no need to repeat all the details. Public demonstrations at only one mile from the two B.B.C. stations at Brookmans Park were given and 52 stations received on the speaker. Full details and readers’ enthusiastic reports were given last year, and we are equally enthusiastic over the taming of Drintwich.

So effective is the Triple Extractor that the change of the clock was made in the design. But the average constructor, of course, will build the S.T.800 first and then consider whether the Triple Extractor is necessary. The natural selectivity of the set itself is high, and those who are well away from the “ends-of-the-earth” possibilities of the S.T.800:

50-metre band: HBJ, PMY.

East Cornwall Research Laboratory (Wireless Station 24 A F), Oustock, Cornwall, England.

EDITORIAL NOTE: Amongst Mr. Hopwood’s list appear the following, which in their full names indicate more strikingly the “ends-of-the-earth” possibilities of the S.T.800:

13.94 m.: Wayne (U.S.A.);
16-metre band: Bound Brook W3XAL (U.S.A.), Huizen, Zeesen DJE (Germany).
19-metre band: RAS3, Schenectady W2XAD (U.S.A.), Zeesen DQJ, Wayne W2XE (U.S.A.), Zeesen DJB, Empire GSF, Eindhoven PCJ (Holland), Pittsburgh W8XK (U.S.A.), Moscow RKK, Vatican HVJ.
27 metres: Bandong (Java) PPL.
28 metres: Ruyselede ORK (Belgium).
30 metres: Lisbon CT1AA, Radio Nations HBL (Switzerland), Sydney VK2ME (faint) Australia, Philadelphia W3XAU (U.S.A.), Eindhoven PCJ (Holland), Empire GSC, Millis W1XK (U.S.A.), Bombay VUB, Zeesen DJA, Zeesen DJN, Empire GSB, Budapest HAT4, HBP.
38 metres: Radio Nations HBP (Switzerland).
49 metres: Calcutta VUC, Belgrade (Yugoslavia), Zeesen DJM, Vienna OER2, Skamlebaek OXY (Denmark), Rhiamba PRADO (South America), Cincinnati W8XAL (U.S.A.), Philadelphia W3XAL (U.S.A.), Boston W1XAL (U.S.A.), Zeesen DJC, Vatican HVJ (Italy).

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## Results on the S.T.800 in the West of England

Mr. C.H. Hopwood, A.M.I.R.E., who runs the East Cornwall Research Laboratory and is an amateur transmitter, working the S.T.800.

### Popular Wireless, November 7th, 1936.
You should hear the S.T. 800

WITH THIS NEW SPEAKER!

The newest Stentorian—triumphant result of a year's work by brilliant technicians—will make just as important a difference to the S.T. 800 owner as it does to other wireless "fans."

The superlative realism and "life" with which it renders radio music, will add enormously to the constructor's pride in this new receiver. The high degree of sensitivity in the speaker will not only increase the entertainment value of normal programmes; it will add materially to the number of short-wave stations satisfactorily "logged."

Whether you are building an S.T.800, or continuing with your present set, you should take advantage of the new high performance this startling speaker brings.

Ask your dealer to demonstrate, and hear for yourself!

The newest Stentorian—triumphant result of a year's work by brilliant technicians—will make just as important a difference to the S.T. 800 owner as it does to other wireless "fans."

The superlative realism and "life" with which it renders radio music, will add enormously to the constructor's pride in this new receiver. The high degree of sensitivity in the speaker will not only increase the entertainment value of normal programmes; it will add materially to the number of short-wave stations satisfactorily "logged."

Whether you are building an S.T.800, or continuing with your present set, you should take advantage of the new high performance this startling speaker brings.

Ask your dealer to demonstrate, and hear for yourself!

Study this curve taken from the 1936 Stentorian Senior—which, as you know, was good.

Now see the enormous improvement this new speaker represents.

1937 STENTORIAN

The NEW Speaker with the NEW realism

WHITELEY ELECTRICAL RADIO CO LTD., INFORMATION DEPT., MANSFIELD, NOTTS.
No alternative recommended—
BECAUSE there IS no alternative!

THE designer of the new S.T.800 specifies BENJAMIN VIBROLDERS and definitely states "no alternative recommended." This deserved compliment to Benjamin superiority means that the keen constructor will accept nothing else. If you have any difficulty in obtaining Vibroliders from your local dealer (who should have adequate stocks), communicate with us.

The BENJAMIN VIBROLDER
Anti-microphonic, dust-proof, with one-piece spiral spring contacts and self-limiting lugs. Fitted with terminals and Soldering Tags.

PRICE EACH

BENJAMIN
VIBROLDER
THE BENJAMIN ELECTRIC LTD.,
BRANTWOOD WORKS, TOTTENHAM, N.17.
"81 STATIONS ON THE SPEAKER!"

IN SWAMP CONDITIONS

These were the remarkable results obtained on the S.T.800 by Mr. G. T. Kelsey, the well-known short-wave expert and inventor of the short-wave adaptor. Read what he says.

laid hands on. Not only, by comparison, does it put in the shade all so-called equivalents on the medium and long waves, but it is a first-class short-wave world-getter that leaves one—yes—I'll actually say staggered with its performance.

Judge for yourself from my own results.

AN ALTERNATIVE CABINET

The S.T. 800 in one of the alternative cabinet designs suggested by Messrs. Fero-Scott.

S.T.800'S SUCCESS IN THE MIDLANDS

Dear Sir,—It has been my privilege to test, myself the S.T.800, and the results obtained have been exceptionally good. The all-wave feature of the set is the main attraction. The selectivity controls and the H.F. stage (which is tuned on all bands) work equally well on the short waves as on the medium and long. The operation is comparatively easy, as the main tuning control is so smooth in action. Like the S.T.700, the large dial and pointer enables calibration of the set to be done quickly. I tested the consumption of the set, using a 120v H.T. with 164 volts on the grid of the PX 230, and I was amazed to find that it was only 5 milliamperes with full loudspeaker signals of excellent quality, which were only obtained with 44 volts on the H.F. valve (i.e. off/cut in half-way position), and 10 milliamperes when no voltage was applied to the grid of the H.F. valve.

The following stations were received at good strength:

- W3X AD: Sketch.
- 4.32 p.m. 10.00 p.m.: Prague—Announcements in English.
- 7 p.m.: Obtained 50 medium and long-wave stations at full L.S. strength, including Hilversum No. 2 and North Ireland, Geneva, etc., free from Midland Regional. Moscow 4, Bucharest and Rabat were amongst these.
- 10.15 p.m. 25 m.—G 5 D (R7): Announcements and Phonofonate. Rome (R9): News in English. Woman announcer.
- 31 m.—C T I A Lisbon, Zeezen D J N (R.9).
- 19 m. G 5 P (R6): Phonofonate.
- 11.15 m. Further six medium-wave stations, making total 20.
- 12 (midnight) Sunday, October 25th, 1936.

In conclusion, should anyone need any assistance with this set I will be pleased to help them as far as possible. I have so far brought all My. Scott-Taggart's sets, and I am convinced that the S.T.800 is the best. The total quality of the S.T.800 is superb, and on many short-wave stations as good as from the "local "B.B.C."

Yours faithfully,

LESLIE A. PERRIN

101, Soycroo Road, Aston. Birmingham 8.
Twenty-Four Hours Entertainment - From the Ends of the Earth!
Twenty-Four Hours Entertainment - From the Ends of the Earth!
RECEPTION AS A PASTIME FOR THE EXPERT; DRAWING-ROOM. "Its performance Splendid Performance at my home for the past few days, and the how absolutely wrong he is, the S.T.800 at the controls. Tuned in after many minutes of hard labour and he thinks of weak little stations only lot.

Short-Wave Say that the omission of the reception right out of it for the station. Are almost as strong, and as between 12 and 80 metres that has been a closed book is this: to whom short-wave reception bring home to many listeners set only.

America on the Spot

LEAVING THE THRILLS OF " DX " reception right out of it for the present, it is just plain fact to say that the omission of the short-wave range from your broadcast receiver means that you are completely missing 30 or more alternative programmes that you ought to be able to listen to.

LocaL Station Strength The short-wave broadcast stations are divided into groups, and in the 34-metre group alone are the following "local-station" signals—Lisbon (2 transmissions), Rome, Radio Nations, Eindhoven, Zeesen (2 transmissions), and Jeloy. All these I heard with real "local-station" strength and quality on the S.T. 800. But in between them are such stations as Philadelphia, Schenectady, Boston, Bandoeng and Rio de Janeiro, which are no more than names from the atlas unless you can receive short waves.

It would be an exaggeration to speak of these as "locals"; but at least two of the American stations on more than one occasion when I listened. Schenectady, W 2 X A F, on 31-48 metres, filled the room with music and baseball commentaries, and this without any particular care being taken over tuning in.

The S.T.800 covers the entire range of short waves on which interesting transmissions can be found. Its "short-short" range tunes roughly from 12 to 34 metres, and its "long-short" range from about 70 to 76 metres. Thanks to the peculiar characteristics of the short waves, there is no hour of the day and night when you cannot switch such a set on and hear many transmissions that would otherwise be lost to you.

With one day's listening on this set I logged America on five different wavelength, and at all times between 3 p.m. and midnight. Always, of course, on the speaker, and always with sufficient volume and freedom from interference and fading to be of real interest and programme-value. Those who are making their first acquaintance with short waves will, I am quite certain, be amazed by the performance of this set, which should be a real eye-opener to them. But the short-wave enthusiast will also be considerably impressed by its sensitivity and selectivity, which I found well above the usual standard expected from a good short-wave receiver designed expressly for the purpose of receiving short waves only.

They will know that it is not always an easy matter to pull in W 2 X A F (Schenectady, New York) at 11 p.m. without a lot of trouble from the loud European stations; with the "800" this was child's play.

High Amplification

This is due, largely, to the use of an H.F. stage which really does give a large amount of amplification. Without using it to the full, tuning is very simple and the stations come in one after the other; but by making full use of the "balancer" control they can be brought up to tremendous strengths. Quite apart from the short-wave broadcast bands, there are two amateur wavebands—near 20 and 40 metres—which are full of intensely interesting transmissions. Although most of these are made on quite low powers, they come in without giving any evidence of that, and telephony transmissions that are badly "sandwiched" between others can be tuned in with 100 per cent. readability with a little care.

The set was completely free from any hand-capacity effects, and the open tuning-scale is a tremendous help in operating.

An Ideal Receiver

Incidentally, the aerials used for short-wave reception are a 60-foot outdoor affair and also a wire round the picture-rail, all indoors, and 20 feet in length. There did not appear to be much difference in results when the indoor aerial was used.

In short, the S.T.800—quite apart from its outstanding qualities on the medium and long-wave bands—is an ideal short-wave receiver for those who look for real uninterrupted loudspeaker reception and good programme value.—W.L.S.
S.T.800 PILOT AUTHOR KITS

ON THE EASIEST OF EASY TERMS

N.T.S. ALL WAVE 3
13-2,000 METRES

Build an exact replica of Mr. J. Scott-Thomas's original 3-Wave with a Pilot Author Kit. Complete with specified parts ready to assemble. Purchasers of a complete S.T.800 Kit are supplied with KONDUKATIR (value 3/-) GRATIS.

KIT "A" CASH OR C.O.D.
CABINET PAID 67/6

KIT "B" As for Kit "A", but including 4 feet's B.S.437 B1, 8 tubes, one 16-metre and one 20-metre receiver, and speaker. Cash or C.O.D. Carriage Paid £1/12/6, or 12 monthly payments of £2 10 0.

KIT "CT" As Kit "A" but including valves and Gold-Encased Pentode 800 Receiver. Cash or C.O.D. Carriage Paid £3/16/6, or 12 monthly payments of £2 10 0.

KIT "CG" As Kit "A", but including valves and Special Gold-Encased 800 Receiver. Cash or C.O.D. Carriage Paid £3/16/6, or 12 monthly payments of £2 10 0.

KIT "CL" As Kit "A", but including valves and Special Gold-Encased 800 Receiver. Cash or C.O.D. Carriage Paid £3/16/6, or 12 monthly payments of £2 10 0.

Peto-Scott CABINETS and FINISHED INSTRUMENTS

TABLE MODEL
CABINET ONLY. Walnut finish, sloping front and cross-handing mouldings, incl. extension gimmick. Cash or C.O.D. Carriage Paid £1/12/6.

CONSOLE MODEL

TYPE "LL" MODEL

LIST PRICE OUR PRICE 27/-
£4.4.0

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EST. 1924
THESE SIMPLE STEP-BY-STEP DETAILS GUARANTEE YOUR SUCCESS

This rapid construction guide is based on the same principles as those in previous years. Experience has shown that not only is the absolute novice assisted, but even the experienced constructor is being held back towards success. Actually, you can build the S.T.800 from the blue-print alone, but the extra security and confidence of having the diagram is essential. We recommend that you do not deviate from the diagram of the original set which is based on a number of components used in my original set.

My advice is to buy the blue-print together with the author's kit including the panel and side-pieces, or if you have bought the blue-print and side-pieces, cross out sections (C), (D), (E).

(A) Collect and examine required components.

(B) Drill terminal holes in side-pieces. The terminal holes are spaced at the bottom of the holes in the side-pieces (this is not obvious from the blue-print which shows the plan view). The terminal holes containing the terminal groups to be fixed in the side-pieces with the holes in it.

(C) To each of the four T.C.C. Type M condensers (0.0001 mfd., 0.0005 mfd., 0.0005 mfd., 0.004 mfd.) fit a pair of 1-in., 6 BA screws and nuts, unless already fitted.

(D) Lay panel face downwards, resting it on two books or cloth-covered blocks of wood: this is to prevent scratching of the veneer and to prevent pressure on control sections.

(E) The positions of the various holes on the panel are given here. When marking out the drilling centres around on back of panel.

(F) Lay the blue-print right-way round on back of panel. Keep the blue-print steady with a weight.

(G) Lay the blue-print right-way round on back of panel. Keep the blue-print steady with a weight.

(H) To each of the four T.C.C. Type M condensers (0.0001 mfd., 0.0005 mfd., 0.0005 mfd., 0.004 mfd.) fit a pair of 1-in., 6 BA screws and nuts, unless already fitted.

(I) Insert, but not anchoring HT +2 flex lead (i.e. wire 49) and also screw passing through two I-in. No. 4 round-head brass screws). T.M.C. Block condenser (four I-in. No. 4 round-head brass screws). Insert, but not fully, two I-in. No. 4 round-head brass screws, each screw passing through two I-in. No. 4 round-head brass screws. T.M.C. Block condenser (four I-in. No. 4 round-head brass screws). Insert, but not fully, two I-in. No. 4 round-head brass screws, each screw passing through two I-in. No. 4 round-head brass screws.

(J) Fit the fixing nut to the main bush of the main tuning condenser at the front of the panel. Fit anchoring HT +2 flex lead into bush of tuning condenser.

This completes the fixing of components.

Now you are going to wire the components. For this you will need the blue-print and the Hi-Speed series of wiring diagrams on page 234. Use the Hi-Speed drawings to help find wire on blue-print and the Hi-Speed instructions (under the drawings) as guide to the shape, when this is necessary. You also place a tick against wire numbers below Hi-Speed diagram as each wire is completed.

This makes it possible to find any wire immediately on the blue-print. The wires in my diagrams are numbered strictly in their order of connection, which has been carefully worked out for speed and simplicity of construction. Note the hints under the Hi-Speed drawings regarding certain of the wires. The side-pieces are shown in position on all the Hi-Speed drawings but actually they are not fixed until after wire 51 has been fixed.

The recommended wire is S.W.G. 18 stranded copper wire. Use copper wire connection is slipped a suitable wire to anchor HT +2 flex lead into bush of tuning condenser. If this upper bolt does not slip over the main bush, it indicates that the distance between the two holes in the wooden panel is not accurate, and you will require to elongate the lower hole in the appropriate direction to rectify matters, e.g. with a round file.

Fit the fixing nut to the main bush of the main tuning condenser at the front of the panel.
JOHN SCOTT-TAGGART
AGAIN SHOWS A PREFERENCE
FOR HIVAC—AS SPECIFIED
FOR THE S.T.800
ALL-WAVE RECEIVER

When such an acknowledged valve expert as the designer of the "S.T.800" selects two Hivac valves from the numerous types and makes available, there is no need for us to further impress upon the reader the importance of using these highly efficient valves.

Hivac valves are used by leading experts the world over.

Hivac 1937 Replacement Chart
Free on request.

HIVAC PX.230
This is a sensitive valve having a large undistorted power output which is obtained by the use of three Hairpin Filaments suspended by self-adjusting springs.

BRITISH 7'6 MADE

HIVAC VP.215 (Met)
This is the 4-pin Variable-mu H.F. Pentode type valve which was specially developed for "S.T." Receivers. It is unquestionably the most perfectly shielded valve of its type on the market.

BRITISH 9'6 MADE

HIVAC VALES AS SPECIFIED FOR THE "S.T.700" ARE NOW CHOSEN FOR THE "S.T.800"
length of 1 mm. insulating sleeving. It is important to use this wire for all high-frequency circuits for technical reasons in connection with short waves, and therefore it is best to wire the whole set with this wire. Established method of wiring is just as easy if not easier than any other method.

The best procedure for wiring in as follows: Lay a length of sleeving in the position which will ultimately be occupied by the wire itself between the two terminals to the side of the other terminal; follow the line of the wiring as shown in the diagrams. Now have a cup of tea. Illustrations. (Continued from page 230.)

The leads going to the grid-bias battery, the H.T. battery and the accumulator may be 14/0.04 single rubber-covered flex or Maxamp wire, which latter is still wire with insulation which may be slipped back.

Leaves 5 in. at each end of each wire. Bend one of the ends 5 in. from the end back on itself and push the loop so formed into the hole in the side of the appropriate Polar or Lee Midget wander-plug, having loosened the bead of wander-plug. Tighten head of wander-plug. Fit other end of wire to correct component.

None of the wander-plugs is in the actual list of components of the set, because constructors will already have these. The make specified is especially recommended.

**TABLE OF COMPONENTS FOR THE S.T.800 BATTERY MODEL**

<table>
<thead>
<tr>
<th>Component</th>
<th>Make Used by Designer</th>
<th>Suitable Alternative Makes</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.T.S.</td>
<td>J. B.</td>
<td>No other possible.</td>
</tr>
<tr>
<td>POLAR</td>
<td></td>
<td>No other possible.</td>
</tr>
<tr>
<td>BENJAMIN Vibroders</td>
<td></td>
<td>B.T.S. (mention S.T.800).</td>
</tr>
<tr>
<td>BULGIN</td>
<td></td>
<td>Or separate condensers by: Dubilier, type B.B.; T.C.C., type 90; T.C.C., type 91; B.C., Amplion, Ferranti.</td>
</tr>
<tr>
<td>BULGIN</td>
<td></td>
<td>No other possible.</td>
</tr>
<tr>
<td>T.C.C., type M</td>
<td></td>
<td>No other possible.</td>
</tr>
<tr>
<td>Lissen Mica, Dubilier type 610.</td>
<td></td>
<td>No other possible.</td>
</tr>
<tr>
<td>Lissen Mica, Dubilier type 610.</td>
<td></td>
<td>No other possible.</td>
</tr>
<tr>
<td>T.C.C., type M</td>
<td></td>
<td>No other possible.</td>
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<tr>
<td>Lissen Mica, Dubilier type 610.</td>
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<td>POLAR</td>
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<td></td>
<td>No other possible.</td>
</tr>
<tr>
<td>Lissen Mica, Dubilier type 610.</td>
<td></td>
<td>No other possible.</td>
</tr>
<tr>
<td>PHILIPS</td>
<td></td>
<td>No other possible.</td>
</tr>
<tr>
<td>BELLING-LEE</td>
<td></td>
<td>No other possible.</td>
</tr>
<tr>
<td>BELLING-LEE</td>
<td></td>
<td>No other possible.</td>
</tr>
</tbody>
</table>

**TRIPLE EXTRACTOR UNIT**

<table>
<thead>
<tr>
<th>WEARIES</th>
<th>POLAR No. 4 with knob (men. No. S.T.800)</th>
<th>B.T.S. &quot;Popular Lox&quot; (without dial or slow motion, but with small knob). Or sound R. 493 (box condenser), with small knob (only really effective if condensers may be used).</th>
</tr>
</thead>
<tbody>
<tr>
<td>PETO-SCOTT</td>
<td></td>
<td>Clix type A, Bulgin type T.L.</td>
</tr>
</tbody>
</table>

**LIST OF COMPONENTS FOR THE S.T.800 BATTERY MODEL**

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<tr>
<th>Component</th>
<th>Make Used by Designer</th>
<th>Suitable Alternative Makes</th>
</tr>
</thead>
<tbody>
<tr>
<td>V.P.215 met.-HIVAC.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L. met.-MAZDA L.21-OSRAM, MARCONI.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P.X.230-HIVAC.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**MISCELLANEOUS REQUISITES FOR S.T.800**

(Rapid Construction Guide shows where these are used.)

**WIRE**—20 feet of 18 S.W.G. bare tinned copper.

**SLEEVING**—Three-feet lengths 1 mm. insulating sleeving.

**WASHERS**—4 brass 1 in. head hole.

**FLEX**—20 feet 14/0.04 single rubber-covered flex.

**SCREWS**—10 in. No. 4 round-head brass.

**FLEX**—20 feet 14/0.04 single rubber-covered flex.

**SCREWS**—10 in. No. 4 round-head brass.

**SIDE-PIECES** |                        |                          |
100% SAVING
by using
the
T.M.C.
B1007
in your
S.T.
800
instead of
3 separate
condensers
Not only will you save money but
you will be sure of having the best
condenser.
It was solely specified by Mr. Scott-
Taggart for the S.T.700, and it has
been again specified this year for
the S.T.800.
Write for new catalogue, “P.W.” Edition
TELEPHONE MANUFACTURING CO., Ltd.,
Hollingsworth Works, London, S.E.21

IRISH FREE STATE
S.T.800
FIRST SPECIFIED COMPONENTS
We supply complete kits (including copy of
“Popular Wireless” and free blueprint). For
fastest delivery order from us. Any
component supplied separately, also speakers,
batteries, etc.
Send for price list. Post orders
given prompt attention.
W. B. KAY,
21, SOUTH KING STREET, DUBLIN.
Phone: 51975

The S.T.800 would be unsuccessful—
if you failed to supply it with ample H.T. current. That
applies to all battery sets. H.T. current is their life-
blood. In the case of the S.T.800, Mr. Scott-Taggart
has designed a first-class battery set and it just isn’t
fair to him to nullify his labours and the fruits of his
genius by starving the set of H.T.
Mind you, dry-cell H.T. batteries are perfectly satis-
factory—while they are new. But they are made only
to give out current and not to regain it, with the result
that their voltage drops steadily. You can run the
S.T.800 for ever from dry batteries and get the per-
formance Mr. Scott-Taggart intended, if you could
afford to replace the battery whenever the voltage
drop affected the performance. That, however,
would be an expensive business.
The radio enthusiasts who know what is what, prefer
to use a MILNES H.T. SUPPLY UNIT. Then they
are sure of full voltage all the time. The Milnes Unit
never has a chance to run down. It recharges auto-
matically from the L.T. without wastage current, when-
ever the set is not in use.
A Milnes Unit will keep the S.T.800 (or any other
battery set) working at maximum efficiency all the
time and at a fraction of previous running costs. The
only expense for a Milnes Unit is for L.T. charging,
which is seldom more than a few pence a week.
The S.T.800 is so good a set that it is worthy of
the best H.T. supply avail-
able. It is worthy of the

POST THE COUPON
FOR FREE DESCRIPTIVE BOOK

MILNES RADIO CO. LTD., CHURCH ST., BINGLEY YORKS
Please send your FREE
Book about the Milnes Unit. No obligation.
PLEASE WRITE IN BLOCK LETTERS
Stick coupon to envelope flap to avoid loss.
NAME
STREET
TOWN
COUNTY
C.6
S.T.800 HI-SPEED WIRING DIAGRAMS

Wires 1, 2, 3, 4, 5. Every wire in every diagram should go absolutely straight between terminals or by quickest route (no bending near terminals) unless otherwise stated. Wire (1) must clear every part of aerial balancer by 3/8 in.

Wires 6, 7, 8, 9, 10. Wire (6) horizontal 13 in., then slopes to valve holder. Wire (9) straight but bends where thimble condenser block case.

Wires 11, 12, 13, 14, 15. Wires (11), (12), (13), (14) are used exactly as shown. Wire (13) goes quickest way. Make certain correct wander-plugs used, and accumulator "trade" on (12). (13) is 21 in. (14) is 21 in.

Wires 16, 17, 18, 19, 20. Make sure correct wander-plugs attached; accumulator connection on (20) must be correct. (20) is 10 in. (17) is 27 in.

Wires 21, 22, 23, 24, 25. Wire (22) as shown. Wire (23) as shown and flat against panel. Wire (24) as shown. Wire (25) as shown but steadily sloping all way up to aerial balancer.

Wires 26, 27, 28, 29, 30. Correct wander-plug must go on (26). Wire (27) must close terminals 2 and 3 and aerial balancer. Wire (29) vertically for 8 in. from terminal and then across to anode. Wire (30) must not touch case. (26) is 23 in.

Wires 31, 32, 33, 34, 35. Wire (34) clears terminal on the way. Wire (35) horizontal 1 in. at choke end.

Wires 36, 37, 38, 39, 40. Wire (36) horizontal 1 in. at choke end. Wire (37) as shown. Wire (39) note anchoring screw. Connections must be looped between two washers. Wire (40) along surface of panel. Correct wander-plug on (40). (40) is 22 in.

Wires 41, 42, 43, 44. Wire (42) quickest route. Wire (43) quickest route. Wire (44) just clears terminal P on Niclet. (43) is 24 in.

Wires 45, 46, 47, 48. Wire (45) as shown (resistor must not touch container of condenser). Wire (46) quickest route. Resistor (47) must pass container. Note anchoring screw. Lower end of wire must be between two washers.

Wires 49, 50, 51, 52. Wire (49) as shown and on surface of panel. Correct wander-plug on (49). (49) is 28 in.

Wires 53, 54, 55, 56. Wire (53) straight but must clear moving vanes, when out, by 3 in. Wire (54) Sikh bend half-way to permit clearing valve by 1 in. and to allow withdrawal of valve. (55) is 21 in.

Wires 57, 58, 59, 60. Wire (57) as shown and flat against panel. Wire (60) horizontally 1 in. at choke end. Wire (61) as shown but steadily sloping all way up to aerial balancer.
Rapid Construction Guide

(Continued from page 232.)

anti-clockwise (fully to left). Fit their white spots pointing exactly in a horizontal anti-clockwise (fully to left). Fit knob with its white spot pointing in a horizontal direction to the left. Tighten up the grub screw.

Turn the spindle of the aerial balancing condenser fully anti-clockwise to the left so that the vanes are completely open. Place pointer disc on spindle of drive. Turn main spindle until the pointer points exactly horizontally to the left. Fit the lock nut to the end of the spindle, thus locking the pointer, taking care that the pointer is not moved round from its correct horizontal position pointing to the left, as the lock nut is tightened, the pointer being held to prevent this occurring. Now set the knob of the plain disc (i.e., distinguished from the screwed spindle) to the left. Remove the knob from the driving spindle of the slow-motion drive. Remove springs and sleeve washer from spindle of drive. Turn main spindle fully anti-clockwise to the left so that the condenser vanes are fully open. Place pointer disc on spindle of drive. Turn main spindle exactly horizontally to the line marked 0 degrees on the dial, care having been taken that the pointer disc just rests on the line marked 0 degrees on the dial, care having been taken that the pointer disc just rests on the line marked 0 degrees on the dial, making certain that you have got job of the right component.

BATTERY-LEAD CLAMP

Fig. 4.—A piece of fibre, drilled and cut as shown, is used to secure the battery leads and remove all strain from the points where they join components.

Having found the wire correct on the set, you should then have another glance at the Hi-Speed diagram as a final check. Each wire thus checked may be ticked off or marked down as correct.

It is possible that, although you have all the wires correct, you have added one or two wrong wires unnecessarily. The way to look for this is to write down the numbers of the components in the Hi-Speed diagram and also the four terminals, A, E, L.S. + and L.S. −. Against each terminal you will write down the number of wires that go to it; this information is duplicated in the signal print-out. Place your wire from component in your set and count the number of wires which come from it. You will then be able to see which components have an extra connection. This can then be removed. This check, of course, is not really necessary unless your set definitely does not work, or there is a short-circuit.

The checking with the Hi-Speed diagram, however, is recommended as a means, before any attempt is made to install the set.

INSTALLING THE S.T.800

These instructions are as precise and accurate in detail as those for building the set.

Before connecting any batteries to the S.T.800, see that the free end of the (D9), which is for later connection to the anode, i.e., top of H.F. pentode valve, is "in the air." If it touches any metal it may cause a short-circuit when the batteries are first connected. An extra precaution would be to wrap the free end in paper temporarily.

Turn on the set, i.e., made to install the set.

Place loudspeaker on right of set and preferably not pointing directly towards it.

Now set the knob of the plain disc facing you. Place loudspeaker on right of set and preferably not pointing directly towards it.

There is a constructor to check his wiring is to take great care is taken, the best way provided. Here there are two components of a similar kind, such as valveholders, making certain that you have conscientiously, one wire at a time, making sure that you have got job of the right component.

Provided great care is taken, the best way provided. Here there are two components of a similar kind, such as valveholders, making certain that you have conscientiously, one wire at a time, making sure that you have got job of the right component.

The way to look for this is to write down an appropriate amount and tighten grub-screw.

This has to be done very carefully, one wire at a time, making sure that you have got job of the right component.

The high-tension battery, which should be of the 164-volts type, is caused by faulty contacts in leads. There is no special way of looking for this kind of mistake. The high-tension battery-the positive terminal of the high-tension battery—should be of the 164-volts type. It may cause a short-circuit when the batteries are first connected.

A good precaution now is to connect a voltmeter or flash-lamp bulb across the terminals of the high-tension battery in order to test for short-circuits.

Check off set by turning switch fully to the left. Take out the H.T.—plug from the H.T. battery.

Insert H.F. pentode (Hitheco, V.R. 218) in valveholder nearest aerial terminal of set. Connect free end of wire (D9) which has been "in the air" to top of cross of valve. Insert detector triode valve (Mazda, L21, clear or metallised) in valveholder nearest L.S. + terminal. Insert booster valve (Hitheco, PX 280) in valveholder nearest L.S. − terminal. The lamp should light up normally. If a very high light is obtained, or the bulb is fused, external wiring, and if necessary internal wiring, should be checked. If no light is obtained, find out the correct terminals on the accumulator. This can then be altered according to the degree of selectivity required; the G.B. 3 is inserted in 12 volts, the exact position of this being dependent upon the desires for H.F. economy. Actually, the higher voltage you can make this, the better from a point of view of H.F. economy, provided distortion is not noticed.

Check all the above connections most carefully. Provisions are made to install the set.

The checking with the Hi-Speed diagram, however, is recommended as a means, before any attempt is made to install the set.

Check this carefully, as the type of detector valve is important in this circuit. The high-tension battery is "in the air." If it touches any metal it may cause a short-circuit when the batteries are first connected. An extra precaution would be to wrap the free end in paper temporarily.

Turn on the set, i.e., made to install the set.

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THE A.C. S.T.800
FIRST DETAILS OF THE ALL-MAINS VERSION
OF JOHN SCOTT-TAGGART'S GREAT NEW
4-BAND DESIGN

An attractive de-luxe appearance is a feature of the A.C. model.

THERE is still a very large following for a straight set in the A.C. operated field. The superb quality of reception which one can obtain with an absolute minimum of background noise is, of course, the chief reason for the popularity of this type of set. These qualities are particularly important in connection with the reception of short waves, as background noise is a serious bugbear when other types of circuit are used. The A.C. version of the S.T.800 is particularly successful, and although the price is by no means low compared with that of the highly competitive two-waveband superheterodyne models now available, yet everything is of the best. For example the speaker is of a particularly good type, and considerably better than that used in most commercial receivers. With regard to the circuit itself, one or two changes are required on account of the extra sensitivity of mains valves. It is not possible to reproduce a battery circuit exactly in a mains version, and it is not desirable to do so. The usual combination for a mains set of this kind comprises three valves with the second valve coupled to the last by means of resistance. This is the arrangement that I used last year with the S.T.700, but it has been modified this year by the use of a parallel-fed transformer as extra sensitivity is required on the short wavebands. The arguments in favour of a very high degree of sensitivity have already been given in connection with the battery circuit exactly as extra sensitivity is required on the short wavebands.

Apart from the quality of reproduction, the A.C. S.T.800 incorporates one or two features which make it a most desirable domestic receiver. For example, the dial alone is very complete as regards station names, and absolute accuracy is obtainable in tuning as the owner of the set himself can, with great ease, calibrate it by putting the dots on the four dot-lines.

A Compact Design

The general arrangement of the set, with its horizontal panel and inclined lid, is extremely attractive and compact. The cabinet, however, is not as expensive as it looks, and although any room will look the better for what is an attractive addition to its furnishings, the drain on the pocket is comparatively small. In any mains set it is desirable to keep strictly to the components originally used. These are as far as possible the same as those used in the S.T.700, with additional components. The valves also are the same, so that a conversion from one set to the other should be very simple indeed.

For example, the dial and volume control are exactly as those used in the S.T.700, with additional components. The valves also are the same, so that a conversion from one set to the other should be very simple indeed.

An attractive de-luxe appearance is a feature of the A.C. model.

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Apart from the quality of reproduction, the A.C. S.T.800 incorporates one or two features which make it a most desirable domestic receiver. For example, the dial alone is very complete as regards station names, and absolute accuracy is obtainable in tuning as the owner of the set himself can, with great ease, calibrate it by putting the dots on the four dot-lines.

A Compact Design

The general arrangement of the set, with its horizontal panel and inclined lid, is extremely attractive and compact. The cabinet, however, is not as expensive as it looks, and although any room will look the better for what is an attractive addition to its furnishings, the drain on the pocket is comparatively small. In any mains set it is desirable to keep strictly to the components originally used. These are as far as possible the same as those used in the S.T.700, with additional components. The valves also are the same, so that a conversion from one set to the other should be very simple indeed. The coil unit is the same as that for the battery set, and the same applies to the two variable condensers. The condensers here and there have been changed, but only the brand has been given in connection with the battery circuit exactly as extra sensitivity is required on the short wavebands. The arguments in favour of a very high degree of sensitivity have already been given in connection with the battery circuit exactly as extra sensitivity is required on the short wavebands. The arguments in favour of a very high degree of sensitivity have already been given in connection with the battery circuit exactly as extra sensitivity is required on the short wavebands. The arguments in favour of a very high degree of sensitivity have already been given in connection with the battery circuit exactly as extra sensitivity is required on the short wavebands. The arguments in favour of a very high degree of sensitivity have already been given in connection with the battery circuit exactly as extra sensitivity is required on the short wavebands.

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(Turn page to 245.)

COMPONENTS FOR THE A.C. S.T.800

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
<th>Make used by J. Scott-Taggart</th>
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<tbody>
<tr>
<td>L.F. choke</td>
<td>..</td>
<td>WESTINGHOUSE type HTX</td>
</tr>
<tr>
<td>Metal rectifier</td>
<td>..</td>
<td>BULGIN type F.10</td>
</tr>
<tr>
<td>On-off switch</td>
<td>..</td>
<td>BULGIN type F.10</td>
</tr>
<tr>
<td>Safety twin mains fuse holder</td>
<td>..</td>
<td>BULGIN type F.10</td>
</tr>
<tr>
<td>Energised loudspeaker</td>
<td>..</td>
<td>BULGIN type F.10</td>
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<tr>
<td>L.F. transformer</td>
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<td>BULGIN type F.10</td>
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<tr>
<td>Terminals</td>
<td>..</td>
<td>BELLING-LEE type R</td>
</tr>
<tr>
<td>1 twin electrolytic condenser</td>
<td>..</td>
<td>BULGIN type F.10</td>
</tr>
<tr>
<td>Mains lead</td>
<td>..</td>
<td>BULGIN type F.10</td>
</tr>
<tr>
<td>Mains plug</td>
<td>..</td>
<td>BULGIN type F.10</td>
</tr>
<tr>
<td>Cabinet with panel and baffle assembly</td>
<td>..</td>
<td>BULGIN type F.10</td>
</tr>
<tr>
<td>Terminal strip</td>
<td>..</td>
<td>BULGIN type F.10</td>
</tr>
<tr>
<td>4 aluminium brackets for mounting terminal strips</td>
<td>..</td>
<td>BULGIN type F.10</td>
</tr>
<tr>
<td>Connecting wire</td>
<td>..</td>
<td>BULGIN type F.10</td>
</tr>
<tr>
<td>1 extension spindle for wave-change switch</td>
<td>..</td>
<td>BULGIN type F.10</td>
</tr>
<tr>
<td>Triple Extractor (if used)</td>
<td>..</td>
<td>BULGIN type F.10</td>
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<tr>
<th>Component</th>
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<tr>
<td>Mazda AC 2/Pen</td>
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(Please turn to page 245.)

(Turn page to 245.)
RELIABILITY
WINS AGAIN

A Westinghouse H.T.9 is specified for the A.C. S.T.800

Have you noticed that, whenever a designer of repute produces a new mains set, a Westinghouse Metal Rectifier is always specified for the H.T. supply? The reasons are summed up in one word—"Reliability." Without the steady and constant high tension supplied by a Westinghouse Metal Rectifier, no set can continue to give of its best.

Use the coupon to get full details.

WESTINGHOUSE
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WESTINGHOUSE BRAKE & SIGNAL CO., LTD.,
62, York Road, King's Cross, London, N.I.
Please send me "THE ALL METAL WAY, 1937," for which I enclose 3d. in stamps.

Name
Address
**RADIO NOTES & NEWS**  
*Continued from page 205.*

**Smack in the Eye for Poets**

PEOPLE in love have often toyed with the idea that every person has his own wavelength, to which another personality may be attuned. The poet, in a romantic mood, thought, and that there may be some basis for it is shown by phenomena experienced in ultra-short-wave experiments. Persons standing near an aerial working on 3-6 metres may—if they don’t mind undertaking a dangerous experiment—light a wavermeter lamp from their “self” effects.

Romanticism urges me to say that the lamp glows when placed over the heart; but this is not so, and I regret to inform the lover that the little light takes no notice at all of the heart. Move the lamp in a southerly or abdominal direction, however, and the lamp responds, reaching its zenith when exactly over (I regret to say) the tum.

The result of all this is that the effective load on the H.T. battery is greatly reduced and, speaking in popular language, you can get more results with less expenditure.

I should just mention before leaving this subject that the B.B.C. had given me in an hour of alleged Regional setting, and he gave me more laughs between 12.55 and 1.0 a.m. than the B.B.C. had given me in an hour of alleged variety.

True, the American stations are liable to fading, but that’s just as well; otherwise, I would have the missus leaning over the banisters half the night, with her feet and her temper at opposite temperatures.

**TECHNICAL JOTTINGS**

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

IF you have a receiver which is designed for a power valve in the output stage and you want to change over to a pentode in that stage, it will be necessary to make some alterations to the set. On the other hand, curiously enough, if the set is designed for a pentode in the output stage it is then comparatively simple to substitute the power valve.

**Contradictory At First Sight**

At first sight this looks rather contradictory, because you would think that if A may be substituted for B, then B may equally be substituted for A. The explanation is, however, that whereas the power valve will work in pentode conditions, the pentode will not necessarily work in ordinary power valve conditions.

With a battery set you will have to make certain that the power valve which is going to be used instead of the pentode is one which consumes approximately the same H.T. current, and also you will need to make sure that the correct amount of grid bias is provided. A further point is that the flex lead which was connected to the side terminal of the pentode does not make contact with any other part of the set. To be sure of this it is as well to wrap it around some insulating tape. If a five-pin pentode is provided you will not have to worry about any flex lead.

The Mains Set Difficulty

If the receiver is of the mains type you will not only have to be careful about the H.T. consumption of the two alternative valves being the same, but in addition to this you will have to make sure that they require the same amount of grid bias. You will appreciate the importance of this because whereas with a battery set you can adjust the grid bias to suit either valve, with the mains set the grid bias will probably be supplied automatically from the fixed resistance inside the set and cannot easily be altered; consequently the grid bias will be too heavy for the usual type of H.T. battery and consequently the battery has only a comparatively short life. Another practical point is the difficulty of getting the two valves effectively matched.

The advantages of the push-pull arrangements as regards getting the maximum volume out of a set are too well known to need any comment, but there have been until comparatively recently difficulties in the way of the employment of this arrangement with battery sets. One of the chief points to be noted is that, with the ordinary arrangement, the anode current is too heavy for the usual type of H.T. battery and consequently the battery has only a comparatively short life. Another practical point is the difficulty of getting the two valves effectively matched.

Using Class B

These difficulties have been largely done away with since Class B valves made their appearance. For one thing, the two parts of the Class B valve are properly matched, thus saving the trouble and uncertainty of trying to match valves for yourself whilst, for a second point, the Class B amplification system gives a low or relatively low average current.

The result of all this is that the effective load on the H.T. battery is greatly reduced and, speaking in popular language, you can get more results with less expenditure.

I should just mention before leaving this point that the Class B system requires a special transformer and you should not try to work it with an ordinary transformer.

**Popular Wireless, November 7th, 1936.**

**The Wee Sma’ Hours**

NOW that we have settled down to winter time again I should like to remind you that the direct reception of American broadcast programmes is possible to virtually every wireless set in the British Isles.

You may never have heard an American station on your set, but that is only because they knock on your ear at such outlandish hours—any time after midnight, and more particularly from 2 a.m. onwards.

So if you happen to be sitting up late one night, don’t worry because the B.B.C. announcer has gone to bed, but just switch on as usual, and listen to what you can find on the medium wave strength. I tuned in a chap the other night, just below the London Regional setting, and he gave me more laughs between 12.55 and 1.0 a.m. than the B.B.C. had given me in an hour of alleged variety.

I tuned in a certain Empire news-machine and what-all.

True, the American stations are liable to fading, but that’s just as well; otherwise, I would have the missus leaning over the bannisters half the night, with her feet and her temper at opposite temperatures.
THE MOST SUCCESSFUL ELECTRICAL WORK OF THE YEAR

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This important work contains sound, up-to-date, authoritative information written by experts in every branch of the profession, and covers thousands of problems and questions of everyday work. It differs from all other works on electrical engineering because:

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Please send me, carriage paid, for seven days! FREE examination, "THE ELECTRICAL ENCYCLOPEDIA," complete in four volumes. It is understood that I may return the work on the eighth day after I receive it, and that there the matter ends. If I keep the books I will send you on the eighth day a First Payment of 2/6, and, beginning 30 days after, thirteen further monthly payments of 5/- each, and a final one of 1/6, thus completing the purchase price. (Price for Cash on the eighth day, 70/-.)

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State if Householder: __________________________
Parent's signature: __________________________
required under 21: __________________________
Date: __________________________
P.W. No: __________________________

PLEASE FILL IN ALL PARTICULARS ASKED.
TELEVISION TOPICS—Collected by A. S. Clark

A weekly feature which will keep the reader au fait with all the latest news and developments in television science. It will appeal alike to the newcomer to television and the advanced experimenter.

AMERICAN TRANSMISSIONS

REGULAR television transmissions are sent out by the Don Lee experimental station WPXI, at Los Angeles, on a wavelength of 614 metres. There are two two-hourly sessions each day except Sundays, and a few technical details of the system in use should be of interest to readers. The intense line image is broadcast for a short time in each transmission. Being steady, this enables tests to note the effect of various adjustments to be made on a stationary grid and in standard form, which is scanned in "straight" form, interfering not being necessary. The number of frames per second is twenty-four.

A television band of from twenty-four cycles to 800 kilocycles is stated to be desirable. The images radiated are both vertical and horizontal syncronising signals are incorporated in the modulation on normal lines.

A GOOD IDEA

In order to obtain as much data as possible about the reception of the station, special printed forms are available for visitors to send in their reports on. This is a very good idea, as it enables a mass of valuable information to be amassed. Not only are such items as clarity and strength deviated rather than absorbed, a fact which is borne out by their appearing again right behind a screen so long as one is far enough behind it. In future, when we know more about the subject, it may be possible to predict the effect of screening by buildings simply by more-or-less extending the principles of air-flow to a similarly shaped object.

"TELEFRAMES"

Items of general interest

The technique of television definitely seems to behamen the headwaters of the various systems being experimented with, both mechanical and electrical methods, in the various parts of the world. Nowadays we find interfacing scanning, for instance, in England, Holland, and in the United States of America. Last month, for instance, we read about the latest developments in German television stations.

INCREASING SERVICE AREA

It has been suggested that low-power repeater stations, on the lines of those used in America for facsimile transmission, could be used in dead spots within the metropolitan area of Alexandra Palace. But why not take the idea a step further and provide a chain of such repeater stations around the outer edges of the service area, and so not only extend its bounds, but also increase the reliability of the area normally to be covered?

CONDENSERS IN SERIES

The old condenser fact that two of the same value in series doubles the value of one had the value should be remembered by television experimenters. Not so much, because they must not have a component of the correct value, but rather from a voltage point of view.

Condensers with a high working voltage are often required in time bases, but may not always be available. But two condensers of a certain working voltage, when placed in series, will stand double the voltage of either, being of the same value, only half the total voltage is in existence across each.

Thus, suppose you want a 0.05 condenser with a working voltage of 500 volts. You can just as well use two 0.025 with working voltages of 250, in series. There are far more likely to be on hand already, thus saving money and probably avoiding delay while the right single component is procured.

ULTRA-SHORT WAVE SHADOWS

Experiments in the shape of shaded heights, for ultra-short wave by condensers, square trees, iron buildings, etc., show an important feature. The parts shielded from the lines of force, and taking on a similar shape, are caused when the object is placed in an air stream.

It thus seems possible that the waves are simply deviated rather than absorbed, a fact which is borne out by their appearing again right behind a screen so long as one is far enough behind it. In future, when we know more about the subject, it may be possible to predict the effect of screening by buildings simply by making use of the principles of air-flow to a similarly shaped object.

POLITICIANS TELEvised

Films of the Prime Minister and Governor Landon have been transmitted from the television Laboratories to the Congress of the Variety Artists Federation, in friendly discussion of such highly technical considerations in popular language. The parts of the book are very up-to-date, and are to be complimented on their skilful descriptions of such highly technical considerations in popular language.

A MULLARD TUBE

A Mullard cathode-ray tube is available for television with a screen diameter of twelve inches, the overall length is twenty-six inches, and is priced at the standard amount of fifteen guineas.

Voltage requirements and details are as follows: The heater, which is internally connected to the cathode, takes 4 volts. There is an added voltage of 3.5, and the current consumed is approximately one ampere.

There are three anodes, the third being 7.5, taking a voltage of 6,000, but 3,000 is sufficient to work the tube satisfactorily. The working voltages of the second anode are from 650 to 1,000 and the field plate requires 280 volts.

A station on top of the Empire State Building in New York.

A station on top of the Empire State Building in New York. Thirty pictures a second were sent with 541 lines. But 441 lines are going to be used in the future for this station.

BIRMINGHAM READY FOR TELEVISION

The appeal from G.P.O. line from London to Birmingham, which is suitable for television programmes, was completed towards the end of last month. Alexandra Palace is already devoted by a solution with Broadcasting House, as also is the latter with the G.P.O. So all Birmingham wants now is a television transmitter.

VARIOUS FEES ASKED

The various questions, in friendly discussion with the B.B.C., have suggested that higher fees should be paid to artists for television performances than for ordinary broadcasting. It involves the whole of their show and not merely the sound side. They are also suggesting a different type of contract when the Baird intermediate-film system is used than for the Marconi-E.M.I. system with its Ekranov systems. It is a case of permanent firm is made which could be used again.

WATER CHARTS BY TELEVISION

Experiments have been conducted in Germany in the transmission of weather reports to aeroplane pilots. The advantage claimed is that the details are instantly visible to the pilot instead of having to be laboriously copied down as in the ordinary way.

ORDERS GALORE

One large television firm states that they have received orders for 15,000 sets at £100 each. This is three times the number they expected by this time! Who says television is too expensive to catch on?

A NEW WORK

The rapid development of television technique is a simple justification of yet another work of the popular-technical type on the subject. Television: How It Works was written by Herbert McKay, and has just been published by the Oxford University Press at 5s. The contents of the book are very up-to-date, and every amateur dealt with is handily explained in a simple manner. There are no mathematics in the book at all. Such recent items as the Raffa camera, used as Alexandra Palace, find a place in the contents and there are many very excellent photographs.

The authors have not hesitated to tackle such subjects as electronic tubes and polarized light, and are to be complimented on their skilful descriptions of such highly technical considerations in popular language.

THE SERVICE STARTS

When you get this copy of Popular Wireless the B.B.C.'s London television service will have started. In simple words like that, it does not seem anything tremendous. But it is so. Remember, it is the first television service in the whole world to which the prefix "experimental" does not apply.

This week marks a new era in radio. Can't you visualise yourself in the future years looking back and saying: "I can remember when television first really started, and..." But there were very few sets in use at that time. But that number will grow.

Popular Wireless will keep you up to date with all the news about television we have on wireless, programmes, pictures, and construction. Keep in "synchronism" with this new invention by reading Popular Wireless regularly.
The **GOLDEN WHARFEDALE**
The speaker to do justice to the S.T.800

The S.T.800 is a first-class set—you may depend on its designer for that. Surely it is worth while getting the best out of it by fitting a speaker worthy of its performance. The "Golden" Wharfedale will reproduce, faithfully, everything the set brings in. It is the most efficient speaker in the Wharfedale range and, probably, on the market. It has a rigid die-cast aluminium chassis, a highly efficient ALNI magnet and specially designed cone and coil assembly. The result, in reproduction, is appreciated by everyone. It gives living realism. Works efficiently with 1-watt input and handles up to 7 or 8 watts undistorted.

**RESPONSE CURVE OF "GOLDEN" WHARFEDALE**
Microphone 4 ft. on axis. 1-watt input.

"Wireless World" says: "A glance at the response curve shows that important improvements have been effected. The general flatness is remarkable. At the top end the output is much better sustained, while in the bass a clean bass response is maintained up to a much higher input level."

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<thead>
<tr>
<th>PRICE LIST</th>
<th>OF POPULAR WHARFEDALE CHASSIS</th>
<th>Universal</th>
<th>Less Transformer</th>
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<tr>
<td>Standard</td>
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<td>18/6</td>
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<td>Bronze</td>
<td>35/-</td>
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<tr>
<td>Golden</td>
<td>55/-</td>
<td>42/6</td>
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<td>Cabinet Extension Speakers from 30/-</td>
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**Do you smoke a DE LUXE TOBACCO?**
Airman Navy Cut De Luxe appeals to the particular smoker who wants a luxury tobacco at a moderate price. Essentially a Navy Cut it is ready for the pipe and requires no "rubbing."

**PIFCO makes certain...**
Your radio has no secrets from the Pifco Radiometer. Anyone, however inexperienced, can trace faults with this wonder instrument. Any radio set can be tested—either A.C. or D.C., Mains or Battery operated. Solidly constructed, with fine bakeslite case, the Pifco Radiometer has readings for high and low voltage, milliamperes, continuity test, and a special socket for testing valves.

**SHERLOCK HOLMES SAYS...**
"The ALL-IN-ONE" RADIO-METER for A.C. or D.C.
Finest bakeslite, cast iron. Makes all tests. For home or portable use. Price 12/6.

Get one of these amazing instruments from your local dealer today, or write for the Pifco Radiometer Folder, post free from PIFCO LTD., WATLING STREET, MANCHESTER, or London Office, 150, Charing Cross Road, W.C.2.
WHILST in no way essential to enable wonderful results to be obtained from the S.T.800, a properly designed all-wave aerial has definite advantages over the ordinary type. For instance, due to their special design and the types of downlead employed, some of the all-wave aerials considerably reduce the amount of man-made static interference which is experienced.

Outstanding of the all-wave anti-interference aerial is the Eliminoise, made by Messrs. Belling and Lee, Ltd., Cambridge Arterial Road, Enfield, Middlesex. This firm has specialised for many years in anti-interference gear of all types, so that it is only to be expected that they should have turned out a particularly efficient job.

No Need to Keep it Short

Man-made static interference is usually worse on short waves than on medium and long, so that an aerial whose downlead is quite impervious to all-electric fields is likely to prove very valuable for long-distance work on the S.T.800.

An ordinary 7/22 single-wire aerial is used with the "Eliminoise," and it is worthy of note that it does not have to be kept short, in fact not less than 40 feet is desirable. The feature of the aerial is in the special downlead screened cabling and the transformers used at either end of it.

A great advantage of the downlead is that its length is unimportant, so that the aerial proper, the horizontal wire, may be erected at the best spot for freedom from surrounding objects and interfering fields. No loss of efficiency is entailed by having the aerial at the bottom of a long garden with the set in a front room of the house.

Details of some special All-Wave Aerials which are on the market.

By A. S. CLARK

No switching is employed on the downlead coupling units, and connection to the set is by means of two flex leads, one of which goes to aerial on the set and one to the set's earth terminal.

The kit, complete with full instructions for erection, costs £5 5s. The special downlead is supplied separately at 8d. a yard, since the amount required will vary so largely with different circumstances.

IN CONSOLETT FORM

An S.T.800 receiver in a Consolette type cabinet made for it by Messrs. Peto-Scott, Ltd.

Another all-wave anti-static aerial which is very interesting is the H.M.V. This also has a screened downlead and is priced at £7. 6sd. complete.

In this arrangement there are three aerials proper, one of 5 feet, one 39 feet, and one 60 feet. These run out in different directions from the aerial transformer, which is at the top of the downlead.

At the set end of the downlead is another transformer which is provided with a switch to adjust this transformer to suit the appropriate wavelength. This transformer provides the necessary coupling to the receiver.

The range of this aerial system is from 7 to 2000 metres, and it is particularly efficient on the commonly used broadcast bands.

The B.T.S. Aerial

A less expensive type of all-wave aerial is that made by B.T.S. It is what one could describe as a non-balanced type of dipole, that is to say the two sides of the aerial are of unequal lengths.

In the centre of these two wires is fixed the aerial transformer, which feeds the receiver transformer via the special transmission-line downlead. This lead is not screened but consists of two wires so twisted together that they are desensitised to interference. A switch on the receiver transformer provides a change-over from long and medium waves to short waves.

Another all-wave aerial is the Electron, which costs £6. This is laid out on somewhat similar lines to the B.T.S., but has only one coupling unit, namely that at the receiver end of the downlead.

Sockets on this enable adjustments for different wavelengths to be made by means of plugs on the downlead and set connections.

Here are tabloid impressions of some recent broadcasts:

The Boxing Lesson

Very successful, perhaps a little too long. Capt. Lister, former amateur heavyweight champion, had right ideas. Kept programme light, amusing, instructive. Dressed boxers in black and white and kept score. Reproduced exchanges in slow motion.

First Weather Chart by Television

Another bright Cecil Lewis idea, but may become dim with usage. Viewed shown map and attempt made to familiarise them with the symbols and isobars of the meteorologist. We are going to see the deep depression over Iceland. What fun!
"TELEVISION LIVER"

By K. D. ROGERS

In which he explains some of the forms of interference to which television is susceptible and describes how they appear on the screen.

The cathode-ray television receiver is a delicate piece of work prone to ailments and requiring the "doctor" on frequent occasions. It is remarkably robust considering the amazing complications that have to be carried out in the way of circuit arrangements. Yet the best of radio sets go wrong at times, and these brief, light-hearted notes are for the guidance of those who encounter "illness" in their television sets, or are interested in the subject. I cannot hope to tell you how to cure the troubles here, I can but guide you to the sort of cause to look for and suspect.

There is one beautiful sickness that can beset the television receiver. It has two forms, but comes fundamentally from the same "germ." I think we can call it "television blues."

The word "blues" has, as you know, two meanings. It may be used to denote sad-
RADIO TERRITORIAL QUESTIONS AND ANSWERS

**THOSE NEEDLES**

Y. F. H. (St. Albans)—I went to the local radio dealer to buy a radio in a town near here the other day and bought a pair of those chromium needles for use in a radiogram. You know the sort that are supposed to be for 60 playings. I was surprised to hear the dealer say, "They are very good, but, of course, you cannot use them for 60 playings—twenty is more the mark." Is he right?

You have got me in somewhat of a cleft stick. I have obviously got to give the lie to one or other. But perhaps you have not studied the "directions for use" on the packet. It says, "With care this needle should give 60 playings." Note the words "with care and sound use."

I have never found that 60 playings can be obtained when the quality of the reproduction suffers, but it depends on the type of pick-up you use, and the quality of the set and phonograph. I prefer to use the needle for about 25 to 30 playings, but I don't like the case described here. I am unwell after that. I am finnicky, however, and so probably was the dealer.

I am not going to say either the dealer or the maker is wrong. But perhaps you have not studied the "directions for use" on the packet. But perhaps you have not studied the "directions for use" on the packet. I do not believe 60 playings are possible, but I will tell you what I think. I will not use pick-up, and they are rather sensitive to worn needles. They soon detect any roughness when they are made of this metal, and if they are not made of this metal they detect the high notes well.

If you use a magnetic pick-up you may not notice the wear so early. I shall not say that I recommend you to use these needles. I prefer to use 25 to 30 playings, but I certainly do not consider that such a length of playing is impossible. So much depends on what you call "sound use." I prefer to use the needle for about 25 to 30 playings, and they are rather sensitive to worn needles. They soon detect any roughness when they are made of this metal, and if they are not made of this metal they detect the high notes well.

But why electric fires? Surely they are used on a large scale for the copies.

There is far too much unnecessary interference with radio nowadays. There is far too much unnecessary interference with radio nowadays. But why electric fires? Surely they are used on a large scale for the copies.

**COMPULSORY SUPPRESSORS**

G. W. F. (Teignmouth)—I was in the papers on October 18th, that next year we may have to fit suppressors on our electrical apparatus, such as electric sewing-machines, domestic refrigerators, and electric fires. They say that the fitting will be compulsory, and is designed to stop radio interference. But why electric fires? Surely they do not cause interference.

Most of them certainly do not, but I have known fires—and those that do not include a rotating fan—employ the most electrical fire suppressors, for instance those of the series that are supposed to be for 60 playings. They may have to fit suppressors on our electrical apparatus, such as electric sewing-machines, domestic refrigerators, and electric fires. They say that the fitting will be compulsory, and is designed to stop radio interference. But why electric fires? Surely they do not cause interference.

**HERE WE ARE AGAIN**

Extract from a letter from W. H. Carter, Southend-on-Sea. "I have been dealing with push-pull in these brief explanatory notes, but I have not mentioned the paraphase method of obtaining push-pull. It is not quite the same as the ordinary, because no transformer is used (other than, perhaps, an output transformer for coupling to the loudspeaker), and so the voltage phase reversal necessary for push-pull cannot be obtained by a split winding. Yet for push-pull we must have such a voltage phase reversal—when the valve is playing its part it has its grid made more positive the other must have its grid made more negative.

How is it done in this case? By a very ingenious method which allows resistance coupling to be employed throughout, thereby obtaining a possible quality of reproduction. The output to the amplifier is through an ordinary valve A then the output from this valve is split and so it goes to two valves B and B1. Now the output of B gets the full voltage output from A, B1 would also get the full output if it were not for the potentiometer control P. But as B is the output valve, and B1 is merely a phase reversal valve, when a voltage phase reversal is obtained in B, B1 is not affected. Therefore, the voltage input of B is cut down so that the amplification of B1 times that of B results in a signal in a signal equal to that given by the output of B alone.

In figure: suppose the output from A is 1 volt. Suppose that the amplification given by B is 10. Then we get 100 volts output from that side of the amplifier. Now, C is the same type of valve as B, and both are coupled to a push-pull output. Obviously, then, C must not have more than a volt input on its grid. Thus we must nullify the amplification of B1. This is done by the potentiometer which is used to cut down the signal to that given by the output of B alone. In figure: suppose the output from A is 1 volt. Suppose that the amplification given by B is 10. Then we get 100 volts output from that side of the amplifier. Now, C is the same type of valve as B, and both are coupled to a push-pull output. Obviously, then, C must not have more than a volt input on its grid. Thus we must nullify the amplification of B1. This is done by the potentiometer which is used to cut down the signal to that given by the output of B alone.
RADIOTIORIAL
QUESTIONS & ANSWERS
(Continued from previous page.)

valves here? Surely it would save a great deal of money and saving breakages, and set users would welcome them. When do you think metal valves will be introduced in this country?

Without being funny, I should say about 1922. Sounds funny, but it is a fact that metal valves were produced in the first half of that year, and “P.W.” was the first paper to announce the fact.

But the metal valve does not save so much as you might think. The glass type rarely gets broken, and though the metal valve was popular it has been dropped into disuse simply because the extra cost of production does not warrant the change from glass to metal.

I am talking about the ordinary valves, of course, not the special types that may be used in the future for short-wave working on very short wavelengths.

THE A.C. S.T.800
(Continued from page 238.)

been changed, and the previous components may equally well be used.

The operation of the A.C. version is identical with that of the battery set, and no special instructions need be given. Needless to say, no adjustments internally should be made while the set is connected to the mains.

The construction of the set is exceptionally simple, the main portion of the receiver being mounted on the back of the main panel, the power equipment being provided on a baseboard slipping into the bottom of the cabinet. The bottom of the panel is Metaplexed in parts for the primary purpose of avoiding hum.

A small initial bias is given to the grid of the first valve to prevent running into grid current, and the volume control is a potentiometer which varies the negative bias on this valve. For the mains set a fuller control of volume is desirable, and a potentiometer is used in preference to a single variation of bias voltage as is the case of the battery model.

There is a prevalent opinion that A.C. receivers are in some ways more difficult to build than battery sets. There is no foundation at all for this supposition. Except for the fact that there is a little more to do in the constructing, there is no difference. The power components are nowadays extremely reliable, and they are for the most part exactly the same as those used in commercial sets except for such details as casings. Another objection which has sometimes been raised against A.C. sets is the fact that you are dealing with high voltages which are liable to give one a shock. Of course, if people dabble with pliers and screw-drivers, or even paddle their hands inside a set while the mains are connected, they deserve all they get, but even then they rarely get all they deserve!

The actual voltages of the valves are not so very much higher than those in a battery set, and it will be noticed that many components are exactly the same as those for a battery receiver.

If you desire really high grade quality, combined with all the advantages of an accurately calibrated dial, and a handsome appearance of the finished set, you could hardly better the A.C. S.T.500. While the addition of two bands of short waves completes what most readers will regard as a very attractive proposition.

J. S.-T.

ASTONISHING NEW BROADCASTS
NOW AVAILABLE TO EVERY LISTENER

MEDIUM WAVE
LONG WAVE
SHORT WAVE
TRAWLER
AIRCRAFT
SHIPPING
POLICE
AMATEUR

ALL AT YOUR FINGER TIPS ON THE...

MULTIWAVE

The amazing ALL-WAVE KIT RECEIVER

With continuous tuning from 12,200 metres

Why be content with a receiver which is only designed to receive an in-finitesimal number of the multitude of stations on the air? Imagine the interest you will find in listening not merely to broadcasts, but to vital communications between shipping, trawlers, aircraft, police and the like, to far distant amateur transmitters, and to the vast number of broadcast shortwave stations in all parts of the globe. These are the stations which the Multiwave receiver can give you, programmes of 100 percent interest for 24 hours of every day. Why not investigate this amazing and revolutionary design? It is not an expensive set—you can build it for less than Is. 4 5d. a week. Its extremely simple construction can be undertaken by the veriest novice. It is, in short, a set which gives more stations than any yet produced, and yet at a price which defies comparison.

FILL IN COUPON FOR FULL DETAILS—NOW!

Graham-Farish Ltd., Dept. M.3, Bromley, Kent.

Dear Sirs,—Please send me:

Contact Star circuits, describing our best circuits including the Multiwave, price Post Free 1/-.

I am interested in Hire Purchase

I am not interested in Hire Purchase.

Name—

Address—

Sunderland

G. W. D. WADSWORTH

RADIOPOPULAR
WHAT PRICE AN ANNOUNCER?

HOW much is a golden voice worth? Bing Crosby knocks up about two hundred thousand a year for crooning. A vocalist in a dance band (grade A) receives about twenty pounds per week for emitting fruity sentimentality. A Tauter will get a thousand pounds for each of his seven days of tonillian existence.

Eight or nine pounds a week is paid by the B.B.C. for a golden voice for announcing, plus a university education, plus a command of three or four languages, plus poise and poiseness. But, after all, the voice is the commodity. That is what comes over the air. And maybe eight or nine pounds per week is quite a fair price to pay for a few hours in aggregate of a pleasant but unemotional voice.

What do you think they pay those high-speed, brimming-with-vivacity announcers you hear in the American programmes? Two hundred pounds per week? Have another guess — I bet you'll still be miles out. I'll tell you. Take care of note. These are authentic figures I'm about to release.

The average salary for an American announcer is six pounds per week! And that, my disbelieving brethren, is for the full-time announcer. The "mean" salary (I'm afraid it) for part-time announcers is two pounds ten shillings per week.

There's disillusionment for you! An artist of good talent retained on the staff of an American broadcasting station for "supporting" programmes on average receives eight pounds per week. Only the higher executives hit the twenty-pound mark. Engineers receive from four to nine pounds.

It's only the international stars like Eddie Canfor, Sophie Tucker, Fred Astaire, and so on, who can command those really spectacular fees of five hundred pounds a shot.

Whatever you see said to the contrary about the subject in the newspapers, it is a fact that the B.B.C. rank and file is comparatively well paid. But the average pay for the written word is more than that for the spoken word.

There is a newspaper correspondent who collects two thousand pounds per year for two or three articles a week, mainly, so it would seem, for criticising the B.B.C. It would be amusing if there were a vice versa about that!

If you can gather my drift.

THAT BATTERY ACID

The mixing of battery acid solution is an important part of a set's maintenance. Here are some useful hints about it.

THE question of the correct mixing of acid for an accumulator is a very important one, for the wrong strength of acid, or the use of hard tap water instead of distilled water, may result in the battery being ruined, or else in its life being seriously reduced.

If you have in your neighbourhood, at a handy distance, a distributor of one of the special brands of accumulator acid, the problem is solved for you, for this acid is already mixed and can be poured direct into your battery.

How it is done

Otherwise you will have to mix up your own acid, and there are certain precautions to be observed in carrying out this process. First, you must have the right materials to begin with. These are pure concentrated sulphuric acid, obtainable from a chemist at about 3d. an ounce (the price, I find, varies with the district and how well-dressed you look), and ordinary distilled water.

Under no circumstances, except those of extreme urgency, should tap water be used in an accumulator, for it contains impurities which will give rise to trouble sooner or later.

Secondly, the vessel used to mix the acid in must be acid-resisting. A tin, obviously, must not be used. Either china, glass or enamel may be used, but if an enamel vessel is employed be sure that it is not chipped.

Thirdly — and this is most important — always add acid to the water, never do the reverse, or there may be serious consequences.

A Point to Remember

Sulphuric acid does not just mix with water or dissolve in water as would methylated spirit or salt respectively. Actually, it combines with it chemically, and in doing so a considerable amount of heat is generated. Sulphuric acid, as a matter of fact, has a very great affinity for water, and combines with it rather violently, especially if there is only a small amount of water and a lot of acid. So if water is added to acid the heat generated may be sufficient to make the acid boil violently, and hot acid may be projected on to hands and face.

If, however, the acid is poured slowly into the water the large bulk of water (on account of the proportions used), and the fact that the acid is added to the water, does not give rise to a sudden increase in temperature. At the same time, the water will be hot — hotter, indeed, than the hand can bear — so that mixing, under any circumstances, should be done slowly.

It is important that the acid and water be mixed in the correct proportions in order to produce the desired density "electrolyte," as the dilute acid is known.

That varies with different types and the makers of the battery, or the label on the side, should always be consulted before starting to mix your acid.

Use a Hydrometer

If you have a hydrometer it is a simple matter to read off the density of the acid after you have mixed it. Make sure, however, that you take your readings after the acid has been allowed to cool down, for just after mixing, when the electrolyte is still very hot, the density reading you obtain will be much lower than it should be. An approximate correction is given by reckoning a decrease of 0.01 in density for every 3 degrees rise in temperature, the normal temperature at which the density should be read being 15 degrees Centigrade. Without a hydrometer, you will have to mix acid and water by measuring and the following proportions (by volume) give you the densities tabulated against them.

From these figures it will be seen that density of concentrated brimstone sulphuric acid is taken as being approximately 1.87. The correct density is 1.260, and this will enable you to work out your own proportions.

When making the final adjustments to the electrolyte to get it exactly the right density, add acid or water (as may be required) very gradually, and stir it well with a glass rod after each addition before taking a reading.
newspaper. This bright publication saves quite a bit of space and ink by never using full-stops in abbreviations.

A good stunt, but not, in my view, ethical. If I were a Master of Arts and a Member of the Institution of Civil Engineers I'd hate to be shown as Victor King, MA, MICE. Looks like a call for help, doesn't it?

CONVERT THE S.T.700 TO THE S.T.800!

THE following components used in the S.T.700 may be used again in the S.T.800. They represent a large proportion of the whole set.

T.M.C. condenser block.
-0005-mfd. Lissen.
-006-mfd. Lissen may be used in position of -004-mfd. in S.T.800.
20,000-ohms Ferranti.
30,000-ohms Ferranti.
Varley Niclet.
A, E, L.S. + terminals.
All wander-plugs.
Four 4-pin Benjamin "vibrolders."
Two terminal strips (require cutting down).
Panel (holes will be correct, except that S.T.700 switch hole requires elongating towards bottom of panel to extent of ¼ in. and made ½ in. wide. The hole in S.T.700 for volume control should be enlarged to ½ in.).
Easy-cabinet (a hole for wave-change switch will be made in left-hand side-piece).
Aerial coupler (pigtails should preferably be altered. Remove brass strip, cutting one end of pigtails from it. Shorten pigtails to shape shown on S.T.800 blue print. Connect free end under nut which fixed brass strip).
Anode reaction condenser (pigtails preferably treated in same manner).
Main tuning condenser. (As the S.T.700 condenser stands, it will be inclined to be noisy when tuning-in on short waves. If you can push pigtails into a position where it does not rub against anything this trouble will not occur. But it is best to remove end of pigtails which is clamped under terminal on end-plate; slip a length of insulating sleeving over the pigtails; re-connect end of pigtails to terminal on end-plate. New builders will find the new J.B. condenser for S.T.800 already has an insulated pigtails.)
Triple Extractor is same as for S.T.700---if used.

THE TUNING WAS ENTRUSTED TO US . . .

An entirely new J.B. Slow-Motion Drive was specially designed to Mr. John Scott-Taggart's own specification for his wonderful new set, the S.T.800.

This new drive is used with a '0005 mfd. main tuning condenser, with silent pigtails, which is matched to the circuit. The price complete is 6'6d., or drive only, 2'6d.

The S.T.800 has captured the imagination of thousands of constructors, and there is bound to be a great rush for components. You will be well advised to secure yours now, and start right away in building this great set.

JACKSON BROS. (LONDON), LTD.
72, ST. THOMAS STREET, S.E.I. Tel: HOP 1837

Especially designed for the S.T. 800

This is the S.T.800, showing the special J.B. drive.

A FINE BOY'S BOOK

CHUMS ANNUAL (8/6) is as good as ever and still retains its place as a leading annual for the manly boy of to-day. This year's issue contains more than 36 gripping short stories, lavishly illustrated; many practical articles, book-length stories of adventure and mystery, and four superb colour plates. Four hundred and sixteen pages in all, and each one a thrill! This is one of the finest gift books now on the bookstalls.
INSTALLING THE S.T.800
(Continued from page 235.)
of the set.
The aerial lead should always be kept away from the mains leads.
Set the pointer of your main tuning condenser to a local broadcast
frequency. Turn the whole receiver until the signal is loudest.
Set the switch to be full right (clockwise) at the station you
want to tune. Tune the aerial coupler about half-way. Turn
the whole receiver until the signal is loudest. Tune the
next station, etc.

HOW TO OPERATE THE S.T.800
Only very brief instructions are given here.

EXAMINE photographs of controls and note what they do. Remember there are
two tuned circuits. The first has its selectivity affected by the aerial coil and
its tuning by the aerial balance (bottom left-hand knob). The second circuit, tuned
by the main tuning knob, will be approximately 150 volts, the maximum
value. The maximum socket on the mains unit.

The simplest way of tuning is to set your main
pointer to the station you want to hear. Tune the aerial
balancer fully to the left, tuning being accomplished by swivelling
the aerial balancer. Then tune the aerial balancer to
the station to which you wish to change. You will hear a
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HOW TO OPERATE THE S.T.800

(Continued from previous page.)

louder. Keep on with this process till signals are at their loudest. If you over-tune on the set of a particular station the signals will begin to tail off in strength. During these tests (which actually only take a second or two) reaction should be looked for.

Note. As usual on straight sets, as you tune higher up the dial more reaction is needed, this applying to all wavebands. Another point useful to note is that an increase of reaction may require tuning down a trifle on the main pointer, and vice versa.

How to Adjust the Triple Extractor. Connect Triple Extractor Unit between aerial lead and aerial terminal of set. Aerial lead goes to A1 on Triple Extractor, while A2 on Triple Extractor is joined by a wire to terminal on set.

(a) At first have all three extractor condenser knobs turned fully clockwise (to right).
(b) Tune the S.T.800 set to receive your local National medium-wave station, or your relay station if this causes swamping. Signals should be loud but not made unnecessarily so. Reduce serial coupler and volume control if necessary. Now slowly turn that knob on the Triple Extractor which is nearest terminal A1, until the local National is cut out. On either side of the silent point the National will be loudest.
(c) Tune S.T.800 to receive your other medium-wave local—the Regional. Signals should be loud but not be allowed to overload set. Reduce volume control and aerial coupler if necessary. Now slowly turn middle knob on the Triple Extractor nearest to terminal A2 until Regional disappears.
(d) Switch S.T.800 to long waveband and tune in Droitwich, in the ordinary way, not permitting it to overload the set. Reduce volume if necessary. Now slowly turn middle knob on Triple Extractor until Droitwich disappears.
(e) You can now slightly readjust any of the three knobs to allow just as much B.B.C. signal to get through to main set as you wish. Remember which station each Triple Extractor knob controls.
(f) Never let the Triple Extractor knobs be "just anywhere." They may be extracting the very station you are looking for. Midland Regional listeners may set both outside Extractor knobs to Midland Regional. When not needed, it is best to take the whole Triple Extractor out of circuit. Its extreme usefulness will, however, be appreciated in all districts suffering from B.B.C. swamping.

J. S. T.

"81 STATIONS ON THE SPEAKER"

(Continued from page 235.)

considered for long enough to be the impossible. A whole gamut of noise-free, interference-free, quality-perfect programme provides:

As for short waves—an aspect of broadcast reception in which I am right on my own ground—I've had the time of my life although, perhaps, not without a deal of "barracking" from the wife for the irregularity of my retiring hour!

Americans with Regularity

It isn't that I have had to stay up. Goodness only knows I've probed to the corners of the earth all hours of the day. But I just haven't been able to tear myself away from it. And gosh! What a set!

On what I call an average sort of evening, I have been able to receive seven or eight American stations on one speaker with a regularity that has amazed me. But I shall have more to say about the short-wave results next week.

BEFORE YOU BUILD THE S.T.800

A Warning by J. Scott-Taggart.

I WANT to warn you! It's about components and valves; insist on getting those I used or recommended in my signed list. Every statement you hear or read should be verified by looking at my official list.

You obviously cannot do better than build an exact duplicate of my own set. That is clearly the safest method. It will also enable you to get the full benefits from the Rapid Construction Guide. If your dealer will not supply the components, order direct from the manufacturers or reliable kit people.

Check Your Choice.

I ask you to check your proposed choice against my own list of components in this issue and to trust to my judgment. Remember that every S.T.800 kit does not necessarily include all the alternative components in my list; there is a real danger here, and the responsibility for substitution becomes the supplier's and not mine.

The valves specified are those I found the best for this particular set. The detector valve is the most important. With other types you may not get enough reaction on the short waves.

Speakers should be chosen by ear. All the makers produce good models, and I cannot single one out to recommend; the order in my list means nothing. Hear your speaker first.

Don't upset my design. You don't know why I have done this and not that. I do. Only the S.T.S. coil unit and specified J.B. condenser can be used with the Auto-Dial. Only a Nicelt transformer is advised. Don't ruin the set to save trouble. Keep to my list of components. If you don't, and your set is a failure, it's your own fault. You've been warned. J. S. T.-
BUILD YOUR OWN BATTERY CHARGER!

Follow this diagram and build your own charger from a HEAYBERD Kit in 30 minutes.

Electradix BARGAINS

This BATTERY SUPERSAIRES specially designed for the Home, Office, Car and Boat use.

Parts List

- 100 mfd. coupling condenser, 10/-. Carefully choose your capacitor to suit the power you have available. The 100-mfd. condenser is ample for all household use.

- 13 fans, 10/-. These fans are necessary for cooling the receiver. They can be obtained at any hardware store.

- 50 mfd. smoothing condenser, 50/-. This condenser is used to smooth out the power supply and is necessary for proper operation of the receiver.

- 50 mfd. rectifier condenser, 50/-. This condenser is used to convert the alternating current to direct current.

- 50 mfd. starting condenser, 50/-. This condenser is used to start the receiver and is necessary for proper operation.

- 50 mfd. grid condenser, 50/-. This condenser is used to control the grid current and is necessary for proper operation.

- 50 mfd. plate condenser, 50/-. This condenser is used to control the plate current and is necessary for proper operation.

- 50 mfd. main tuning condenser, 50/-. This condenser is used to control the frequency of the receiver and is necessary for proper operation.

- 50 mfd. aerial coupling condenser, 50/-. This condenser is used to couple the aerial to the receiver and is necessary for proper operation.

- 50 mfd. m.d.d. condenser, 50/-. This condenser is used to control the doubling of the frequency and is necessary for proper operation.

- 50 mfd. pre-focused condenser, 50/-. This condenser is used to focus the aerial and is necessary for proper operation.

- 50 mfd. reaction condenser, 50/-. This condenser is used to control the reaction of the receiver and is necessary for proper operation.

- 50 mfd. rectifier condenser, 50/-. This condenser is used to control the rectification of the receiver and is necessary for proper operation.

- 50 mfd. smoothing condenser, 50/-. This condenser is used to smooth out the power supply and is necessary for proper operation.

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