

**FREE!! 2 GREAT GIFTS THIS WEEK!!**

# Popular Wireless

**3<sup>D</sup>**  
EVERY  
WEDNESDAY  
No. 753.  
Vol. XXX.  
Nov. 7th, 1936.

**AND TELEVISION TIMES**

*Television-Special Offer Inside!*



# ST800

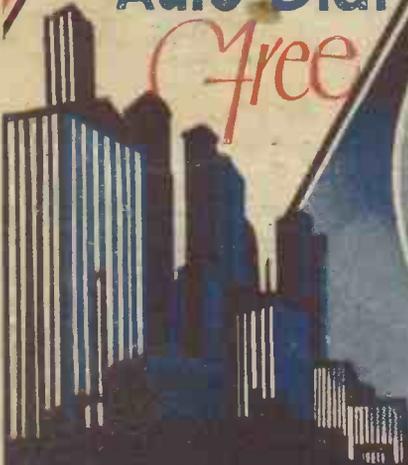
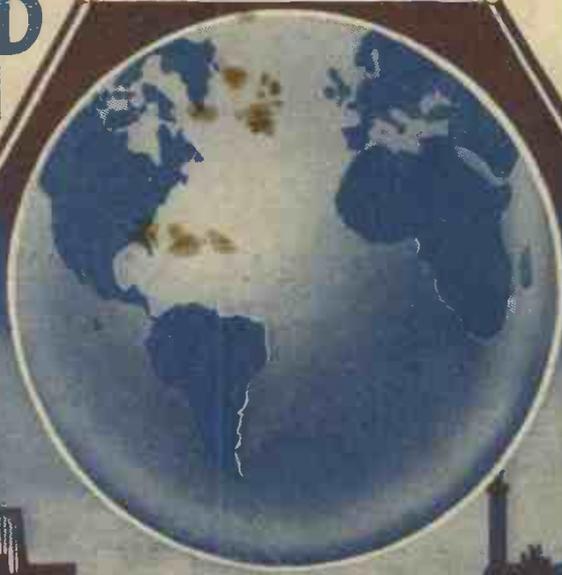
**ALL-WAVE**

**4-BAND  
Auto-Dial**

*Free*

**FULL-SIZE  
1" Blueprint**

*Free*



*World-wide All wave reception!*

**T.C.C.**  
ALL-BRITISH  
CONDENSERS

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**

### BATTERY MODEL

- |   |      |
|---|------|
|   | Each |
| 1 0.004-mfd. condenser T.C.C. type M,     | 1/-  |
| 1 0.001-mfd. condenser T.C.C. type M,     | 8d.  |
| 2 0.005-mfd. condenser T.C.C. type M,     | 9d.  |
| *1 1-mfd. tubular cond'r T.C.C. type 250, | 1/4  |
| (* Incorporated in the coil unit)         |      |

### A.C. MAINS MODEL

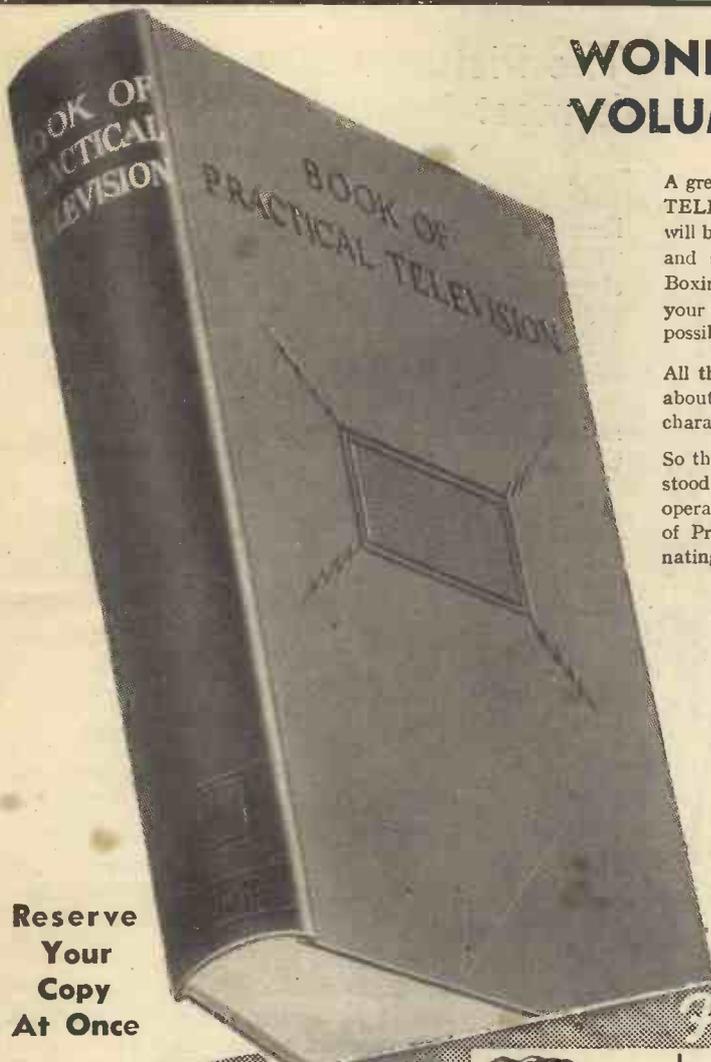
- |  |      |
|--|------|
|  | Each |
| 2 0.5-mfd. tubular condensers T.C.C. type 250, | 2/-  |
| 2 0.1-mfd. tubular condensers T.C.C. type 250, | 1/4  |
| 3 1-mfd. Paper condensers T.C.C. type 50,      | 2/6  |
| 1 50-mfd. Electrolytic cond'r T.C.C. type FW,  | 2/3  |
| 2 8-mfd. Electrolytic (wet) T.C.C. type 802,   | 6/-  |

THE TELEGRAPH CONDENSER COMPANY LIMITED, WALES FARM ROAD, 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 co-operated 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.

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First of all you must write your name and address on Form 1, which is just an ordinary label, on which you must stick a 1d. stamp. Then fill in Form 2, which is your reservation form. Then send these two forms to POPULAR WIRELESS. When they are received in our office, you will be sent a Gift Voucher on which to qualify for your "Book of Practical Television." There are four spaces on this Gift Voucher on which you will have to stick four Tokens cut from the bottom left-hand corner of the last page of reading matter of POPULAR WIRELESS.

When this Gift Voucher is complete—i.e., after four weeks—you are asked to send a P.O. for 3/-. This is to cover the cost of carriage and delivery to your door, cardboard container for packing, and insurance. The "Book of Practical Television" can only be supplied to readers who complete the necessary Gift Voucher. This offer applies only to readers residing in Great Britain and Northern Ireland. Irish Free State readers will be liable for any import duty imposed.



1d. Stamp must be affixed here by YOU

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I hereby apply for GIFT VOUCHER and request you to reserve for me in accordance with your special offer the presentation "Book of Practical Television." I have given a standing order to my newsagent to supply POPULAR WIRELESS regularly each week.

Reader's Name..... (State Mr., Mrs. or Miss)

Full Address.....

Newsagent.....

PLEASE WRITE IN CAPITAL LETTERS. You Must Fill in Label on Left and send with this Reservation Form in unsealed envelope bearing halfpenny stamp.

*A Work of Amazing Interest  
with Many Marvellous Illustrations*

# WONDERS OF ANIMAL LIFE

WEEKLY PARTS 7d.

PARTS 1 & 2 Now Ready

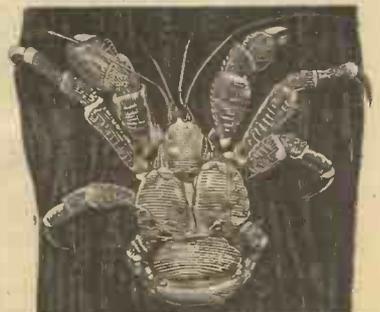
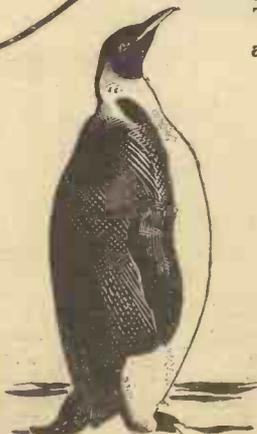
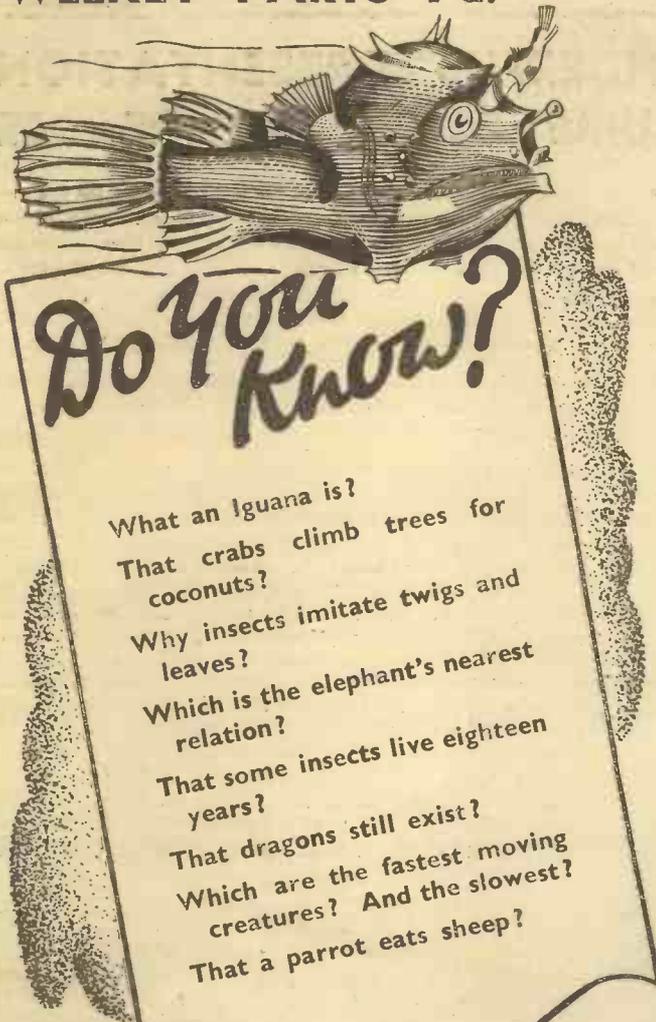
The Pictured Story of all that  
is most interesting in Natural  
History

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 unflinching 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

# FIRST ALL WAVE

# 8000

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

<b>Condensers</b>	Two Ferranti C.2, 3/9 each, and one C.10, 3/-.
<b>L.F. Transformer</b>	Ferranti A.F.8, 11/6; (if a higher-priced Transformer is desired, we suggest the model at 21/-).
<b>Four 4-pin Valveholders</b>	Four Ferranti Baseboard type, 1/3 each.
<b>RESISTORS</b>	30,000-ohm, 1/2-watt. One Ferranti, G.5, 1/-. 5,000-ohm, 1/2-watt. One Ferranti, G.5, 1/-. 20,000 ohm, 1/2-watt. One Ferranti, G.5, 1/-. 1 megohm, 1/2-watt. Two Ferranti, G.5, 1/- each. One '0001-mfd. condenser. Ferranti Mica "M" type, 1/6. Two '0005-mfd. condensers. Ferranti Mica "M" type, 1/6.

## ALL MAINS MODEL

		Each
<b>7-pin Valveholders</b>	Three Ferranti baseboard type	2 9
<b>Mica Condensers</b>	'0001-mfd. Two Ferranti Mica type "M"	1 6
	'0005-mfd. One Ferranti Mica type "M"	1 6
<b>Tubular Condensers</b>	0.5-mfd. Two Ferranti Tubular type	1 0
	0.1-mfd. Two Ferranti Tubular type	1 0
	'05-mfd. One Ferranti Tubular type	1 0
<b>Paper Condensers</b>	4-mfd. Two Ferranti C.15	6 9
	2-mfd. One Ferranti C.2	3 9
	1-mfd. Three Ferranti C.10	3 0
<b>Electrolytic Condensers</b>	50-mfd. One Ferranti C.E.82	1 9
	8-mfd. Two Ferranti C.E.52	5 0
<b>Fixed Resistors</b>	1 megohm. One Ferranti G.1	1 0
	50,000 ohms. Two Ferranti G.1	1 0
	10,000 ohms. One Ferranti G.1	1 0
	100 ohms. One Ferranti G.1	1 0
	20,000 ohms. Three Ferranti G.1	1 0
	15,000 ohms. One Ferranti G.1	1 0
	150 ohms. One Ferranti G.1	1 0
<b>Mains Transformers</b>	Ferranti S.M.34	£1 11 6
<b>L.F. Choke</b>	Ferranti B.2	1 1 0
<b>Loudspeaker</b>	Ferranti D.T.4	2 0 0
<b>L.F. Transformer</b>	Ferranti A.F.8	11 6
<b>Valves</b>	Ferranti VPT.4B	12 6
	Ferranti SPT.4A	12 6

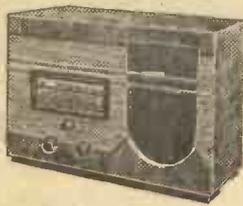
# FERRANTI



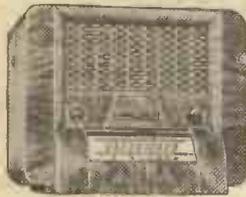
You can get the best out of  
**SHORT WAVES**  
 with a  
**"HIS MASTER'S VOICE"**  
**ALL-WAVE RECEIVER**

"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."



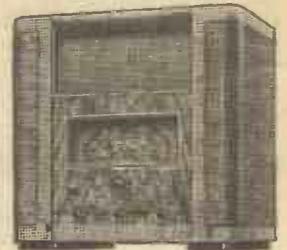
140. All-Wave Battery Receiver, 3 valves. 18-50, 195-560, 785-2000 metres. **9½ GNS.**



486AC/DC. All-Wave Superhet. 4 valves (plus detector) with AVC. 16-50, 198-580, 750-2000 metres. **13½ GNS.**



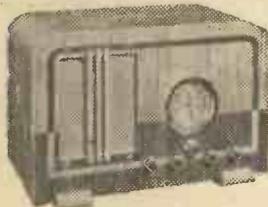
491AC. All-Wave Superhet. 5 valves (plus detector) with AVC. 16.5-52, 195-575, 725-2000 metres. **13½ GNS.**



482AC. All-Wave Superhet. 6 valves (plus detector) with AVC. 16.5-51.5, 200-580, 725-2000 metres. **16 GNS.**



481AC. All-Wave superhet. 6 valves with AVC. 7-16 (covers Television Sound Transmission), 16.7-53, 46-140, 185-560, 750-2200 metres. **18½ GNS.**



480AC. All-Wave Superhet. 6 valves with AVC. 16.7-53, 46-140, 185-560, 750-2200 metres. **17½ GNS.**



488AC. All-Wave Superhet Radiogram. 6 valves with AVC. 7-16 (covers Television Sound Transmission), 16.7-53, 46-140, 185-560, 750-2200 metres. **28 GNS.**



485AC. All-Wave Superhet Auto-radiogram. 6 valves with AVC. 7-16 (covers Television Sound Transmission), 16.7-53, 46-140, 185-560, 750-2200 metres. **36 GNS.**

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**

"His Master's Voice," 98-108 Clerkenwell Road, London, E.C.1.



Editor: G. V. Dowding

Asst. Editors: A. J. Randall, A. S. Clark

NEW STATIONS  
THE "D-STRING"  
LATE LISTENING

# RADIO NOTES & NEWS

SMACK IN EYE  
B.B.C. AND EMPIRE  
WEE SMA' HOURS

### 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!



**JOHN SCOTT-TAGGART**

M.C., M.I.E.E., F.Inst.P., M.Am.I.E.E.,  
M.Am.S.Mech.E., Fel.I.R.E., Barrister-at-Law

works from 10.30 to noon on 31.45 metres.

### Davertry Out-Davertried?

AFTER a good deal of niggardly shilly-shillying 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 meagre plans that an idea grew up that Daventry's new station was World-Beater No. 1.

May I point out, however, that in geographical propinquity 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.

### 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 Yeadoon aerodrome. Hours, 7 a.m. to 10 p.m. W/T call-sign, G J 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 communicating with the Belgian Congo.

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 pioneer series of patents purchased by Marconi's, Edison Swan, Huth Ges, Canadian Marconi, Radio Communication Co., La Radio-technique, Commercial Cable Company, Telefunken, Hazeltine 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 Edison Swan. Introduced the E.S.2 and E.S.4 valves—the 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, "Thermionic 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 Mrs. Assn. of America to advise on valve matters. Chief Engineer, Elstree Radio Laboratories, which produced the first ganged screened-coil set in this country—the only one at Olympia in 1926. Sets won First Prize International Radio Exhibitions in New York and Rotterdam. 1928: Called to the Bar after obtaining a very high position in the Bar 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.

### Late Listening

THIS month and next should be the best season for long-distance ever known, for the natural radio conditions are set fair, and a slice of luck has fallen to the long-distance listener. It so happens that many of the powerful foreign stations will be working late and outside their usual times, in connection with some international radio tests now in progress.

Ordinary wave-lengths and full power will be used, so on your lucky night you may pick up almost

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. Suva generally

any place. November and December will certainly be grand months for the owners of S.T.800's.

(Please turn to page 238.)

REACTION · 0005 MFD

FIXED VANES

NOTE.  
PIGTAIL USED

2 1/2"

MOVING VANES

5000 OHMS

B.T.S.  
H.F. CHOKE.

T.M.C.  
CONDENSER  
BLOCK.

20,000 OHMS

.006 MFD  
COUPLING  
CONDENSER

G.F. TURRET  
SWITCH

VARLEY NICLET  
1:3.5

MAIN  
TUNING COND.  
.0005 MFD.  
J.B.

HAS  
SPECIAL  
PIGTAIL

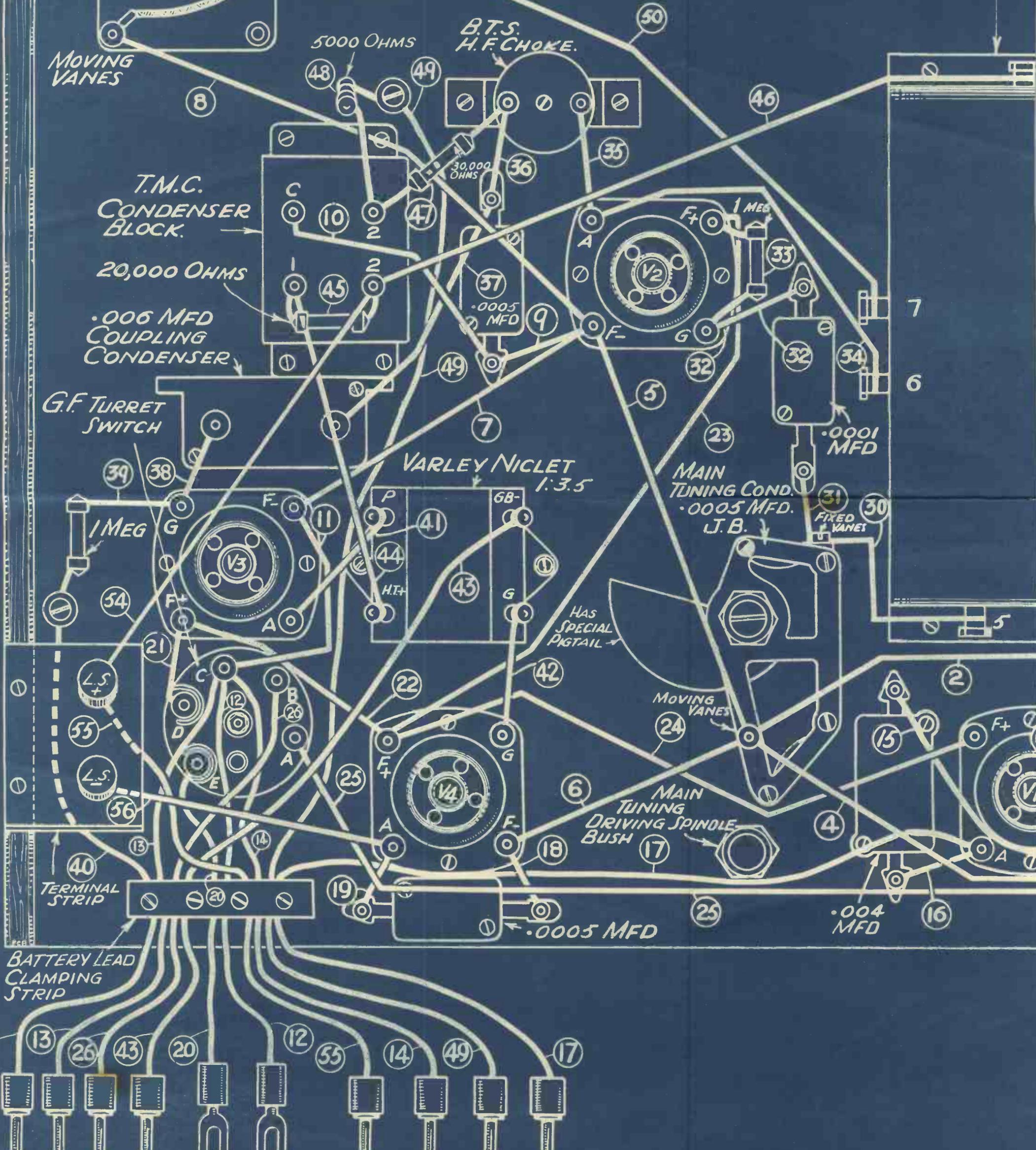
MOVING VANES

MAIN  
TUNING  
DRIVING SPINDLE  
BUSH

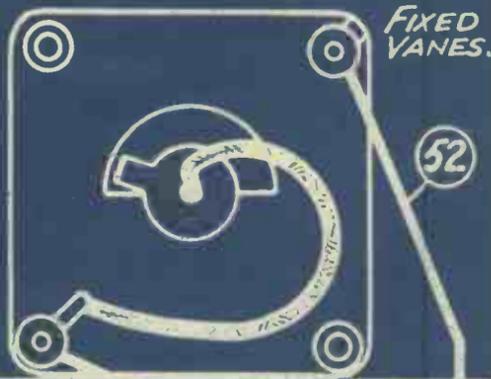
TERMINAL  
STRIP

BATTERY LEAD  
CLAMPING  
STRIP

GB-2 GB+ GB-1 GB-3 L.T.+ L.T- HT+3 HT- HT+2 HT+1



AERIAL COUPLER  
·0005 MFD.



MOVING VANES

FIXED VANES.

52

1/- FULL SIZE BLUEPRINT

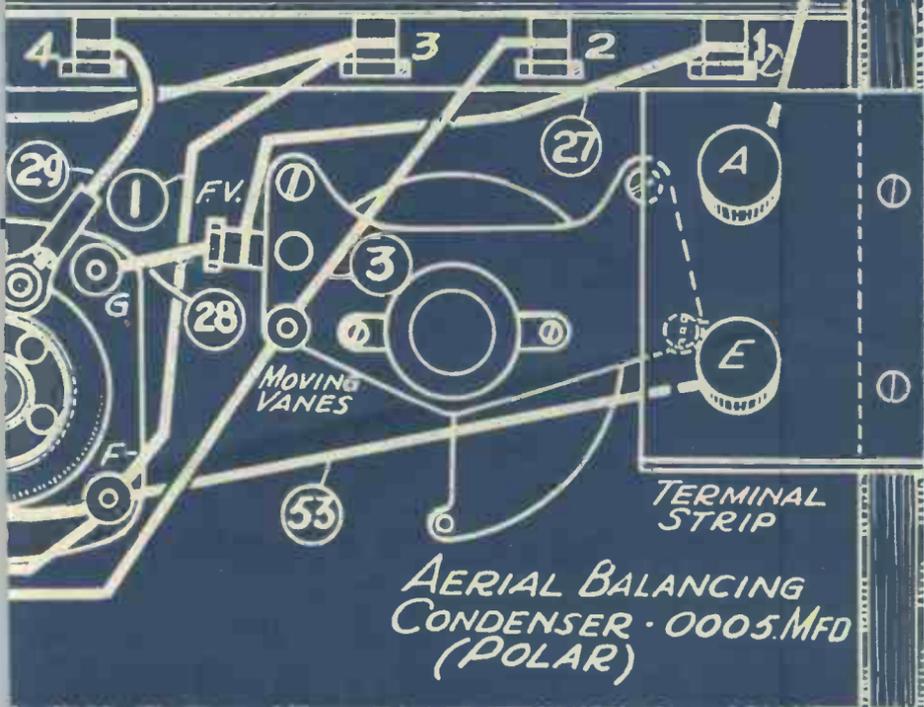
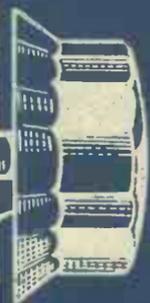
# S.T.800

DESIGNED BY JOHN SCOTT-TAGGART

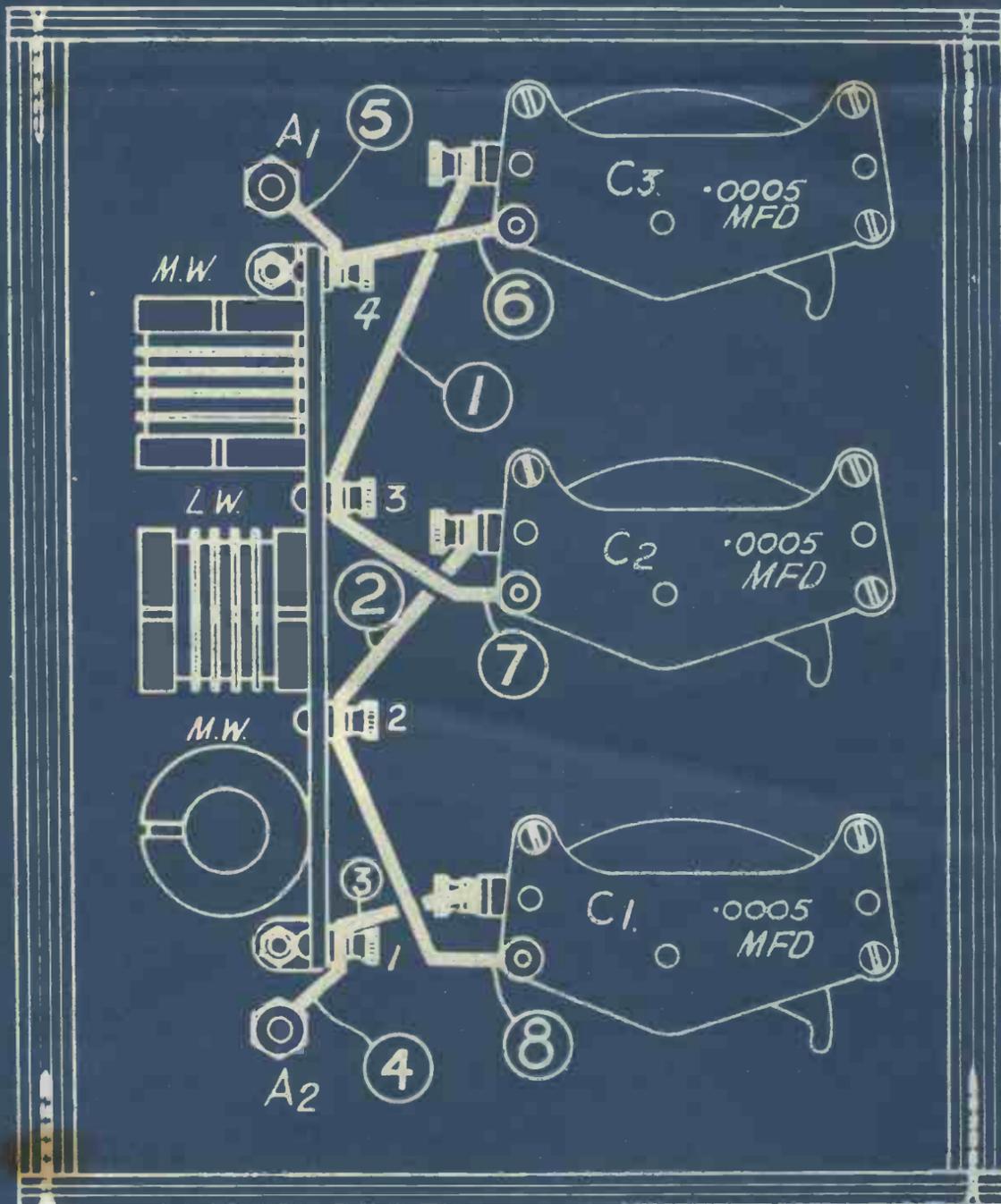
POPULAR WIRELESS, November 7th, 1936

S.T.800  
COIL UNIT  
(B.T.S.)  
ONLY.

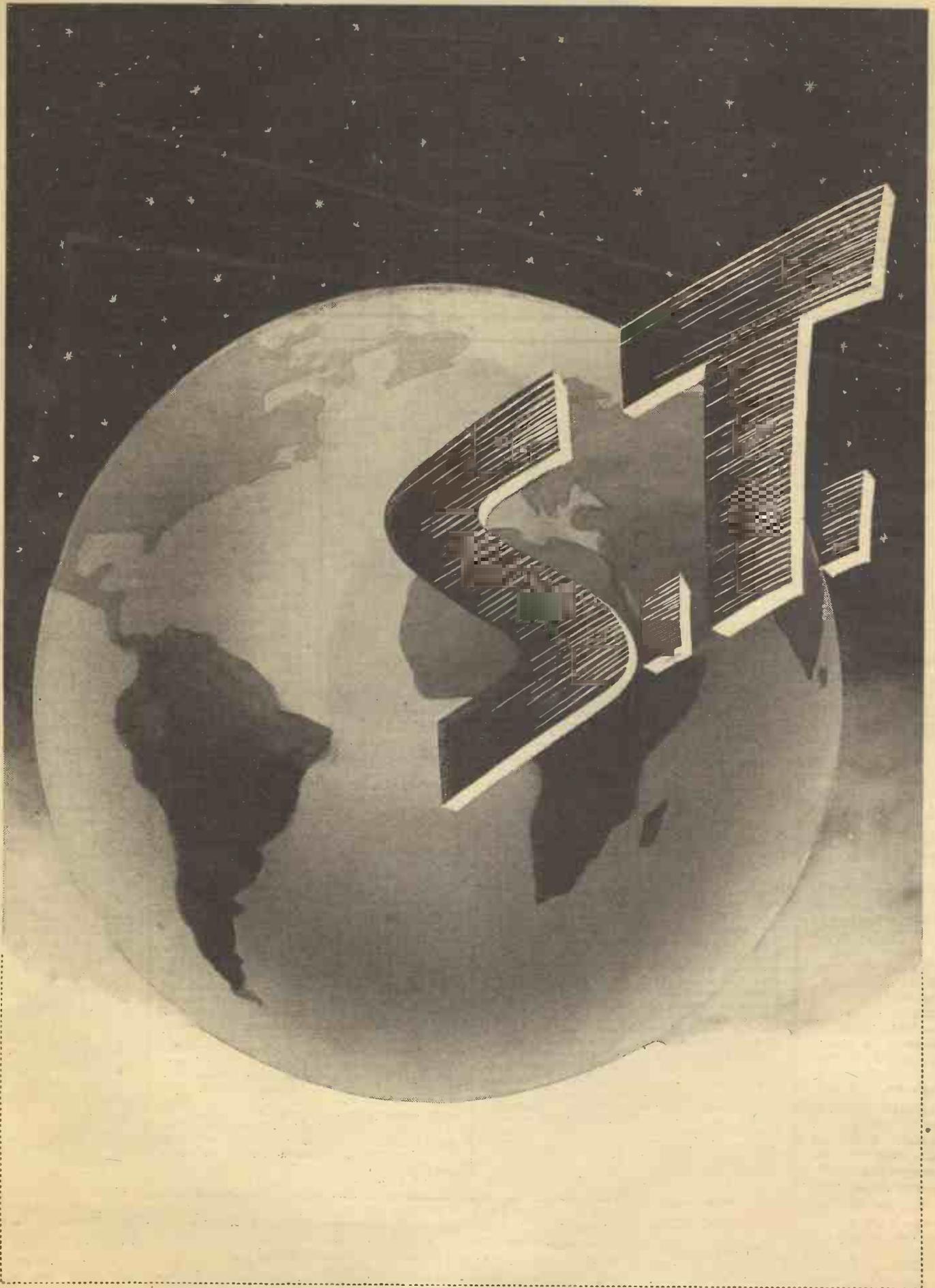
WAVE-CHANGE  
SWITCH

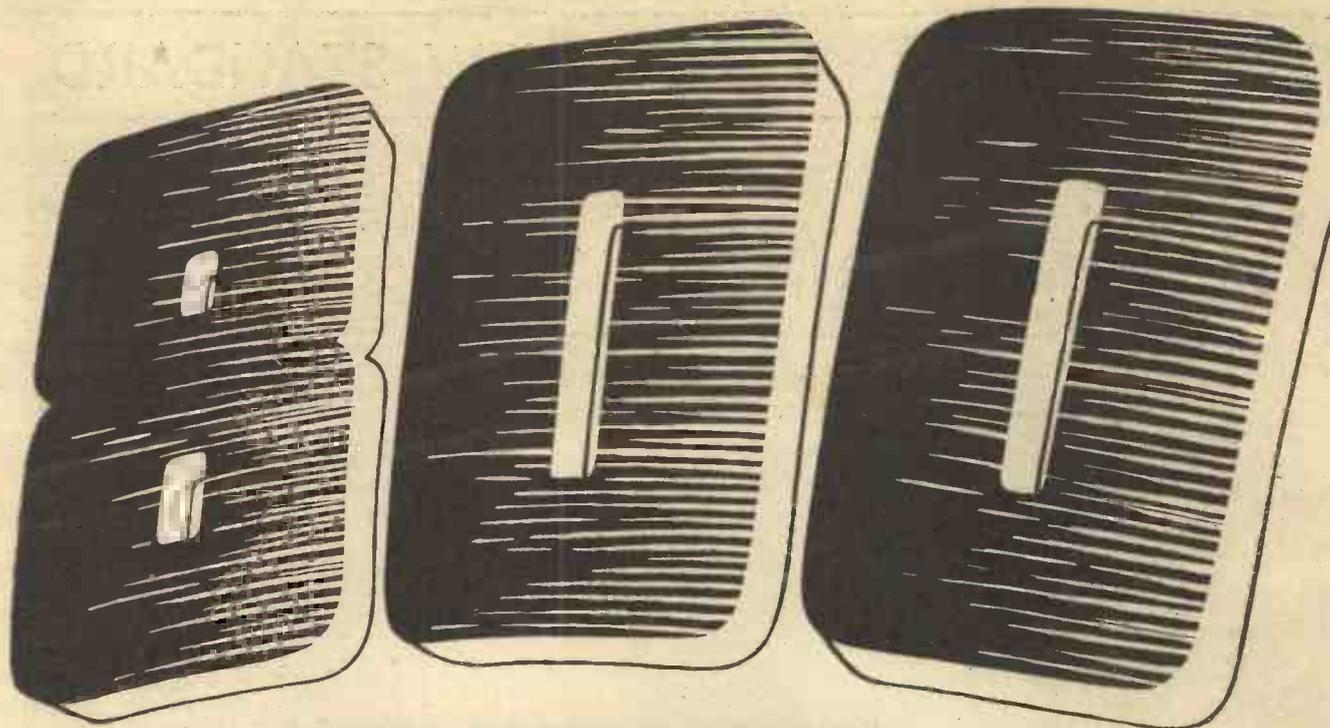


AERIAL BALANCING  
CONDENSER ·0005.MFD  
(POLAR)



TRIPLE EXTRACTOR UNIT  
VIEW FROM UNDERNEATH





## JOHN SCOTT-TAGGART

### PRESENTS HIS ALL-WAVE WHOLE-WORLD TRIUMPH

#### PART I



**OUTSIDE** somewhere fireworks are exploding. But even Gunpowder 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 puerile snobbery, its adolescent lust for collecting glorified radio cigarette cards—a craze whose only justification is the concealment of even more appalling attic wall-paper. 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 “fascinating” if it comes from far enough off. Distance lends unbelievable enchantment. Laugh, jackass, laugh—and the whole short-wave world laughs with you. Cry for real entertainment or performance and you cry alone.

#### 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—even though 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 sneered 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 fans have cunningly stemmed the advance by rumours of great difficulties; they have invented strange passwords and called for cunning components having little loss.

But the fact remains that their day is done. History will repeat itself. When Mrs. Potts 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 QSL cards which serve as rather unimaginative wallpaper for his “den.”

I think I can hear a few fireworks going off already! But I am really quite impartial. A section of the short-wave persuasion have my respect and encouragement; another section that preens itself so superior to “these wet-nosed B.C.L.’s”<sup>\*</sup> is really unworthy of any shafts of satire.

And even some writers come into this category. They have put all their eggs into one short-wave basket and then tried to teach their grandmother how to suck them.

The short-wave country has only recently become really attractive. Of course, there

<sup>\*</sup> B.C.L.—Ham term for “broadcast listener.”

have been fishermen’s tales of rare catches to whet the appetites of the humbler settlers on the long and medium. But in any case there has been a dearth of reliable guides. Most of them were pro-ham—renegades ready to parley with the B.C.L., but still gibbering the short-wave shibboleths.

#### Now We Can Look Forward

Short-wave reception can now no longer remain the prerogative of a fanatical clique. Their glory is gone. The S.T.800 will—for the first time, I believe—put short-wave listening on a sane, sober, nation-wide basis. I have bided my time I have been responsible for no damp squibs I have, when necessary, poured cold water on short-wave designers of seidlitz-powder mentality; and there has been a fizz. But this refusal to try for a cheap short-wave success has now resulted in a robust successful set which will appeal to both the hard-headed and the ham-fisted.

Why have I waited? Partly because I was dissatisfied with the general prevalent technique and wanted to develop my own, and partly because the strength of stations, periods of working and quality of programmes were inadequate. It is no good the time being ripe if the programmes are “rotten.” But now we can look forward to stronger signals and better programmes every month. The short waves have “arrived”—and the S.T.800 is the set with which to welcome them.

#### PART II

#### The All-Wave Boom

**WE** are on the eve of a great Renaissance in radio. From a national affair, radio interest stretched out to

## S.T.800

## SETS A NEW STANDARD



The designer holding his new receiver—a wonderful combination of simplicity, sensitivity, selectivity, and amazing range.

embrace 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 medicinal 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 correspondents 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 view-point. 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 often exciting 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 aereals. 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  
**67s. 6d.**

This was the log of stations received by Mr. L. W. Orton on the S.T.800. Java, Mexico, Sydney, New York—all the glamour of the world. Read his report on page 211. And the set costs only 67s. 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 that serviceable, 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 dowers 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 timorous 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 super-heterodyne 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 solved. 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. Two tuned circuits for short-wave selectivity. Triple Extractor for swamp areas.
- 3 REAL H.F. AMPLIFICATION** at last achieved on the short waves. No dummy circuits or aperiodic arrangements. Medium and long wave technique now, at last, possible on short waves.
- 4 GORGEOUS TONE.** Real quality of reproduction is a main plank in the set's platform. The S.T.800 combines a really fine medium and long-wave set with a short-wave receiver designed not as a toy but to give entertainment.
- 5 MAJESTIC VOLUME.** A huge output for a quality battery set, for those who like to let things rip. But economy of H.T. current whenever you want it.
- 6 MAINS UNIT OPERATION** if you desire to use your "eliminator." The S.T.800 has been designed to work off mains 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 four bands: 13-35, 28-85, 180-580, 900-2,000 metres, obtained in a second. Every station in "World Radio" list of short-wave stations is covered.
- 8 SIMPLER OPERATION** than any previous S.T. set. Anode selectivity switch makes it easy. All the controls work similarly and just as effectively on all wavebands.
- 9 UNI-PLANE CONSTRUCTION**—so immensely successful for easy building and certainty of results—is now applied to an all-wave set. Everything on one board. Rapid construction guide and Hi-Speed diagrams give every step in construction—even the screws to use.
- 10 NO HAND-CAPACITY**—the great bugbear 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 conditions, and obtaining all the great merits of reaction on short waves is child's play.
- 12 ECONOMY.** The S.T.800 only costs 67s. 6d.—an almost ridiculously low price for a set of such sterling worth. It is the cheapest of all S.T. national sets, although it receives from the ends of the earth.

convinced 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 intention of very high sensitivity, and the use of four good valves and true, each pulling its full weight on the short waves. The first and most astonishing impression will be that the short waves have been treated in a robust manner. There is nothing old-maidish or prim about the controls or the operation of this set on the short waves. You handle it in *exactly* the same robust way that you would handle the broadcast on the ordinary broadcast wavebands. Where are all the special low-loss components, the special valveholders, the slow-motion reaction controls, the elaborate metal chassis and all the other paraphernalia which the writers on short-wave technique and the enterprising manufacturers have led us to expect? They are missing. There is as little humbug about the design of this set as there is in any other solid engineering job.

### Design in a Groove

The fact of the matter is that the usual sort of circuit suitable for short-wave reception would not be tolerated for a second on the usual medium and long broadcast bands. Pages—hundreds of them—in the technical press are devoted to considering all the petty variations on what boils down to a single tuned circuit with reaction. Who nowadays would ever dream of using such a circuit for ordinary broadcast reception? It is tolerated on the short waves because anything else is considered difficult or impracticable. We thus have the pitiful spectacle of constant repetitions of all the niggling precautions and unimaginative experiments with this simple single circuit.

If we are told once, we are told a thousand times how to avoid threshold howl (an unpleasant squawking, as reaction is made critical), how one valve is better than three or how three valves are better than

one, how hand-capacity effects can—with luck—be avoided in a dozen different ways, how telephone receivers are much better than loudspeakers, how important it is to avoid dead-spots which attack short-wave sets like scarlet fever, how terribly important short leads are and so on and so on, almost ad infinitum and certainly ad nauseam.

The whole of this dreary recital has been going on for years like a very old gramophone record, battered and worn, which keeps on repeating the same old line.

### Astronomers

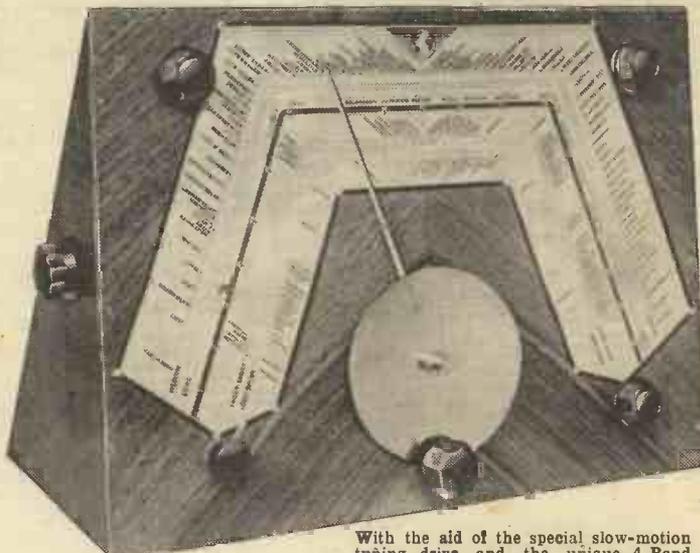
What short-wave technique has needed is a terrific blast of fresh air to blow away the musty atmosphere in which it has dozed fitfully for so long. It has lain on its back, vaguely kicking its legs in the air, but never dying. It has been buttressed by fabulous tales of miraculous receptions, although less emphasis has been given to the fact that these have been obtained with tautened eardrums and purple face and often only between 2 a.m. and 3 a.m. on the first Thursday in a month with an "r" in it during Leap Year.

These radio travellers' tales of far Cathay are now being retailed by radio enthusiasts who have become astronomers, who—not satisfied with keeping two ears to the telephones—keep one eye on the sun. 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 slow-motion tuning drive, and the unique 4-Band setting for your local station. The set above, although it looks well, has merely a panel and two side-pieces. Other cabinet arrangements are possible.

most outlandishly elaborate components cannot stand an earthly chance against even the roughest multi-circuit receiver.

All this has already been found out on other wavebands. At one time we did have visions of doing everything with one valve, but now we hardly blink when we learn that 23 valves are used in a television set. My policy on the S.T.800 is to provide so high a degree of selectivity, and such an enormous magnification by four valves used to the full, that any paltry gains by the use of special components would

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 cajoled with effeminate fingerings, but as sound entertainment brought in by a rugged set designed with blunt common-sense.

short-waves as if you could not get the long-wave Droitwich or Luxembourg.

#### Prepared for the Future

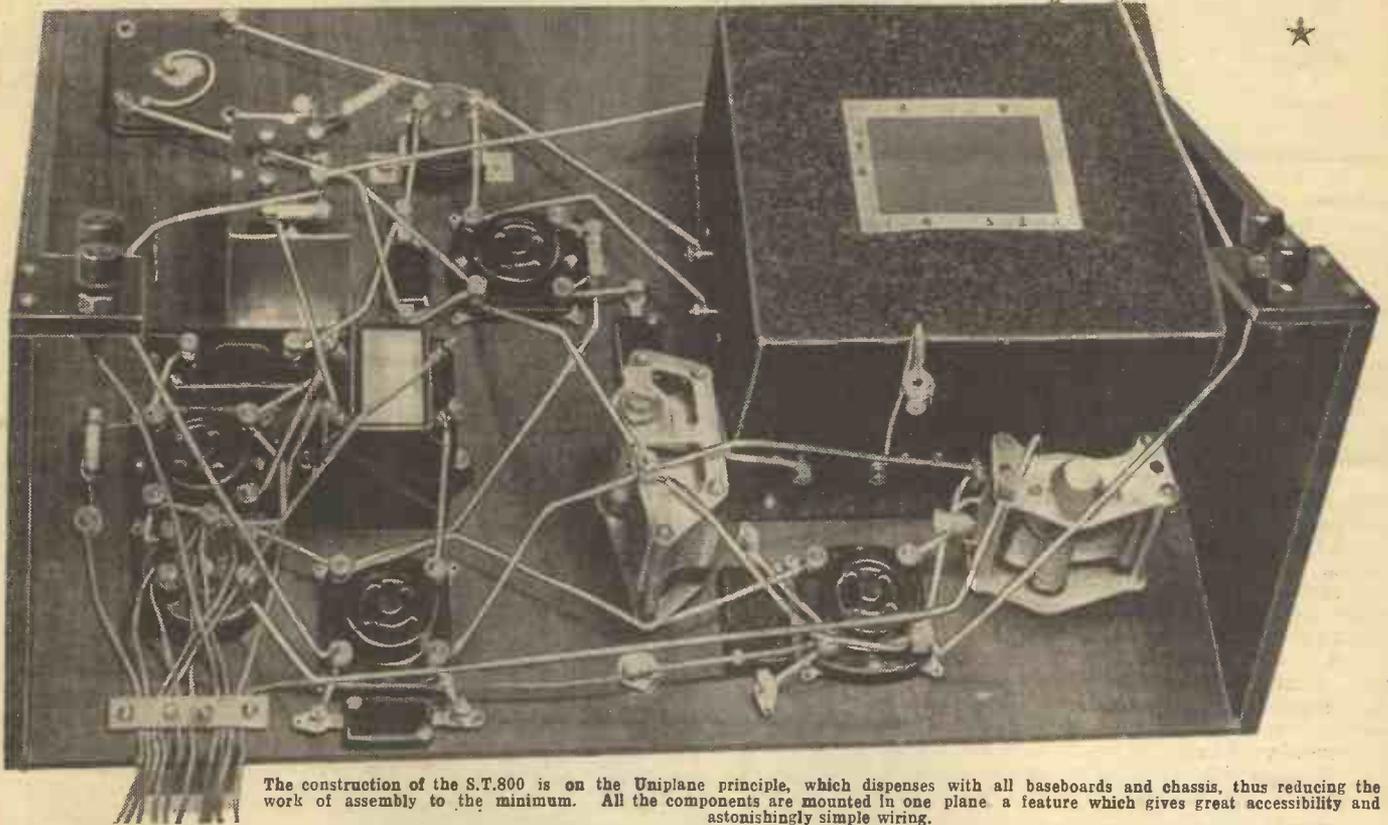
Apart from the recognised stations already well worth getting, who knows but what some of the at present insignificant stations will blossom into ether shakers of the first magnitude? It has happened scores of times on the other wavebands. The 1 kilowatt station of to-day is the 100 kilowatt broadcaster 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-

valves. Since that date I have hardly bothered to explain the merits of having 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.

### UNIPLANE CONSTRUCTION IS SIMPLE AS ABC



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.

#### 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 if you are inexperienced it is forgivable. 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

signers, for commercial or technical reasons, have—mistakenly, in my view—chopped down the wavelength range of their sets and offered the decapitated result to an inexperienced public that at present cannot make head nor tail of the short waves—and never will with these particular sets!

Look out, therefore, not for a Some-wave or even a Majority-wave, but an All-wave set. It is better to be sure than short.

##### Performance Above the Average

Having covered every possible station on, say, the complete list of short-wave stations in "World Radio," my next requirement was that performance as regards sensitivity and selectivity should be very much above the average standard. This meant more tuned circuits and additional controls and it certainly meant four valves. Up to 1932, when the S.T.400 was published, it was regarded as impossible to get the home-constructing public to build a set using more than three

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 three valves if I had thought they would give the desired results. The bare cost of a three-valve set is less than that of a four-valve receiver, but the entire cost of three pentodes makes such a set considerably dearer, as well as less efficient, than a four-valve combination, such as in the S.T.800.

Extra valves not only greatly increase the sensitivity of a set, but they make the operation much simpler and enable greater selectivity to be obtained, as the couplings to the tuned circuits may be made looser, i.e. the natural selectivity of the circuit may be increased while signal strength may be kept up by the great margin of safety as regards sensitivity. From every point of view an extra three-electrode valve at about

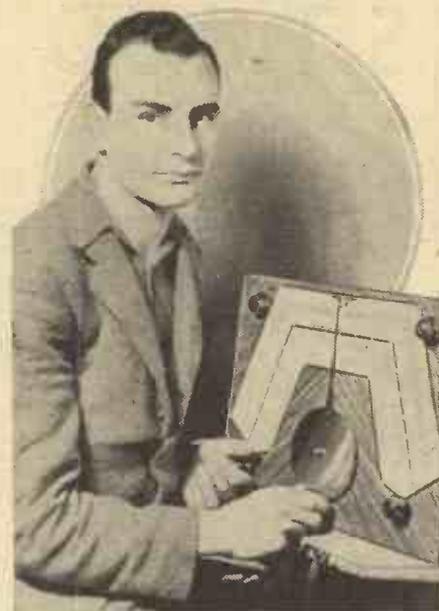
(Please turn to page 212.)

# 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



Mr. Orton with the S.T.800 during his tests which are described on this page.

"I Came for a Kiss" and "Indian Love Call") from a South American station which appeared to be HC2ISP, in Guayaquil, Ecuador. HI1ABP, in Colombia, was, however, a more powerful signal. This station, by the way, announces in English as well as Spanish, and styles himself "Radio Colombia." Our old friends, COCH, Havana-Cuba, and PRF5, Rio de Janeiro, Brazil, came in at good volume, also.

On one occasion I picked up an unknown American station upon about 33 metres which was broadcasting a news report. Volume was poor, and I was unable to catch any call.

The 49-metre band is one of the most interesting at the present time. In the evening I picked up 7LO, Nairobi, which was transmitting a musical programme, and after 10 p.m. I found the band absolutely full of stations—mostly South American.

These South American stations choose all manner of unusual ways of giving identification signals. Some have gongs, others chimes and trumpets. More romantic are police sirens, car horns, bugles

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 YV5RMO, Maracaito, Venezuela; PRA8, Pernambuco, Brazil (which was creating considerable interference with W1XAL); HI1ABG, Barranquilla, Colombia; HI4ABB, Manizales, also in Colombia; and XEBT, 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 W1XAL, at Boston; an organ recital by Jesse Crawford from W3XAL, at Boundbrook; and a news report from CKCX, in Toronto, Canada.

## Australia and Java

On the 30-metre band I received VK2ME, Sydney, at about 7 a.m., and a little later, between 8 and 8.30 a.m., I listened to a service, with a lady preacher, which was being relayed by VK3ME, Melbourne, Australia. In all cases reception was on the loudspeaker.

The 25-metre band also provided very interesting results. I tuned-in W1XAL, Boston, U.S.A.; W2XE and W8XK, Pittsburgh, all at good strength, as well as Moscow, Rome, Paris, Daventry and Zeesen.

W8XK, Pittsburgh, and W2XAD, 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. W3XAL, however, was unheard.

GSH was heard at good volume on the 13-metre band, and PLE, Bandoeng, 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, "Kingsthorpe," Willowbank, 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 1s. 0d. 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 kit, which involves no extra cost. The wire (18 gauge), insulating sleeving, screws, 4 washers and fibre strip can be bought locally for 1s. 9d.—the cheapest way.

These items are free if a complete Peto-Scott kit is bought.

TO handle a receiver which brings in station after station from far-flung countries is an unforgettable experience. But when those stations are received at good loudspeaker strength the thrill is far greater.

The S.T.800 is a set that has those qualities, and many besides. It is, for instance, a good "quality" set—reproduction is amazingly real. It also brings in all the important—and many unimportant—stations between 200 and 2,000 metres, whilst the long-distance abilities of the receiver can be gauged by the fact that within twenty-four hours of switching it on for the first time I had received stations in every continent upon the short waves, and from three continents (Europe, Africa and America) upon the medium waves, all upon the loudspeaker.

## Daylight Reception

Perhaps you would like to hear of my experiences with the S.T.800. I put it through its paces, I assure you. I did my best to find a weak point, and the fact that I failed pleases me tremendously, for I realise that constructors of the set are going to enjoy themselves at the dials as they have seldom enjoyed themselves with a radio set. I predict that electric-light consumption will increase throughout the country through S.T.800 users staying up late listening to America!

My first test with the set was to discover how many medium-wave stations would come in at sufficient strength to provide alternative programmes to the British stations during daylight. I admit that the results exceeded my expectation, for, besides logging the main British stations, as well as Hilversum, Normandy and Brussels (which are almost locals), I tuned-in Bolzano, Italy; Athlone; Stuttgart; Vienna; Prague; P.T.T. Paris; Stockholm; Rome; Munich; Leipzig; Poznan, Poland; Königsberg, and several others, at good loudspeaker strength.

## Africa and America

During the evening I added dozens (I am not exaggerating) of European stations to my log, as well as Rabat, in Africa.

The receiver is ideal for distant reception upon the medium waves, and during the early morning (just after 3 a.m.) I tuned-in numerous American stations upon this band. Stations identified (and received on the loudspeaker) included WCAU, Philadelphia; WPG, Atlantic City; WABC, New York; WBZ-WBZA, Springfield-Boston; WGY, Schenectady; and LR4, Buenos Aires. Numerous other Latin-American stations were heard, but their calls were unheard.

So much for medium waves.

Short-wave reception was truly amazing. Such stations as W1XK, Boston; W2XAF, Schenectady; and W3XAU, Philadelphia, could be relied upon to give reception with a power and clarity equal to London from 9 p.m. onwards. Indeed as early as 7 p.m. W1XK often produced a powerful signal.

## Latin-America.

The 40-metre band has become very interesting lately. More and more stations

(Continued from page 210.)

five shillings is the cheapest component in a set.

From an operating point of view sensitivity is all-important on the short waves. During six months of intensive research and experiment on the S.T.800, I have never once used telephone receivers. The whole of the work from an aural point of view has been done on the loudspeaker. Telephones are all very well for the short-wave ham, but the S.T.800 is not designed for hams. It is not offered to those who are accustomed to hold their breaths lest the faint whisperings of a distant short-wave station be missed. Nor is the S.T.800 offered to those who regard short-wave tuning as a secret art only to be learnt by years of patient practice. My idea has always been that an all-wave set should operate in the same way on all wave-bands. A very high degree of sensitivity capable of giving loud signals on weak stations has always seemed to me to be essential. Searching may be a fascination for some, but to the average person it means profitless labour. How much better it is to be able to get a station quite well even though the set is not perfectly tuned! Having once received it, you can proceed to improve it on the S.T.800 just as you can improve the reception of stations on the medium and long waves.

#### Selectivity is Vitally Necessary

After sensitivity a basic requirement on the short waves is selectivity. This may cause surprise as short waves are popularly supposed to be "selective." It is quite true to say that tuning is sharper. But sharp tuning and sharp selectivity are entirely different matters. A set can tune very sharply and yet be very unselective. This applies to nine out of ten amateur short-wave receivers. The apparent selectivity is entirely fallacious, and is due to the fact that the station comes and goes with the tiniest movement of the condenser, but actually this tiny movement produces a big change in kilocycles. The test of selectivity is not the short distance of the movement of the condenser over which the desired station can be received, but the success in separating two stations near to each other in wavelength.

Many of the short-wave stations are about nine kilocycles apart. For example, Zeesen DJN on 31.45 metres is 10 kilocycles off Jely on 31.48 metres. Both of these stations will give excellent signals, but the idea that because they are working on short wavelengths therefore the selectivity must be great and the stations easily separable is a complete and unadulterated fallacy. As a fact, selectivity on short waves is worse and, unless you appreciate the need for selectivity, you will certainly not value the two tuned circuits and extra selectivity devices of the S.T.800 for the short waves.

#### A Fault of the Average Set

On the average short-wave set, although this is never mentioned by most regular writers on the subject, the selectivity is disgraceful. It is at once noticeable when one of the stations is heard particularly loudly on any given occasion. For example, if no attempt is made to get extra selectivity, it is possible for such a station as Rome or Madrid or Zeesen in the 31 metres group of stations to swamp its neighbours, and even to cover a quarter of the dial. And what of the enormously powerful

Morse stations that work cheek by jowl with short-wave stations? This very rarely happens on the usual broadcast bands. It calls for real selectivity.

All the knobs of the S.T.800 work in exactly the same way on each waveband so that anyone who can work, say, an S.T.700, will find no change when he comes down to the short waves on the S.T.800. The absence of any need for special skill in tuning or extra care in operating makes success certain even for those who have never heard a short-wave station before.

Another requirement was that the S.T.800 should work on a mains unit (or "eliminator") just as well as on batteries. This at once raised the question of the voltages for the different valves and the elimination of all risk of "motor-boating."

The next requirement was that although the set is intended to work from a 120-volt H.T. battery (or, of course, a mains unit

## S.T.800

### A MAGIC CARPET

Switch on New York! Hear the big film stars broadcasting from Hollywood! Tune in a world-championship sports commentary from Chicago! Listen to America's finest dance bands! Get news on Sunday afternoons and thrilling plays and first-class variety Sunday evenings!

Don't be a radio stay-at-home and grumble if the B.B.C.'s programmes are poor, and the Continent can't give you anything but foreign talks and heterodynes.

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.

On the S.T.800 the term "local station" entirely loses its significance. With this set your loudest station may be one situated at a far end of the earth. That is one of the amazing experiences which awaits you when you have this modern magic carpet connected to your aerial. Eddie Cantor or Bing Crosby coming in on the loudspeaker with greater volume than the B.B.C.'s chamber music!

Until you have listened to the short-wave programmes from the six continents on the S.T.800, you cannot have the faintest idea of the marvellous wealth of radio entertainment which is available.

In addition, there are the scores of long- and medium-wave stations which the S.T.800 will also bring in with exceptional facility.

And all on an inexpensive instrument which anyone can build and manipulate. A magic carpet available to everyone!

The Editor.

of any of the usual types), operation should be successful down to 90 volts. Here, again, there are all-wave sets which will only work successfully when all the batteries are at full strength. But no one wishes to throw away a battery because its voltage has dropped a little, and so I made it a condition for myself that the S.T.800 should work down to 90 volts H.T. The difficulty here, again, especially in combination with the other essential requirements, 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 coils 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 a handsome printed white celluloid duplicate of it is obtainable from Celluloid Printers, Ltd., Kingston By-Pass Road, Surbiton, Surrey, the price being 2/6. A very handsome professional finish is given to the set by this dial (which is also washable if erasures are to be made), but extra cardboard 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 a sense all these basic requirements are a call for better performance and stable technique.

The time has now come to leave behind the soap-box-cum-pram-wheel stage of short-wave reception. 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 every ten minutes, but to give genuine radio entertainment for several years to come. Just as the wireless experimenter of the pre-broadcasting era was engulfed by the mass of home constructors, 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 bands. 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. Provided he can get 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, or how weird the reception. He has heard the laughing jackass interval signal and that is about all that really matters.

That era is now over. Let us forget it.

(Please turn to page 250.)

# 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 is 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 even 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 also of great value. I undertook this journey as much to learn as to show. No one could possibly brand me as a London designer, ignorant of conditions in the farther parts of the country. 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.B.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 chief interest 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.

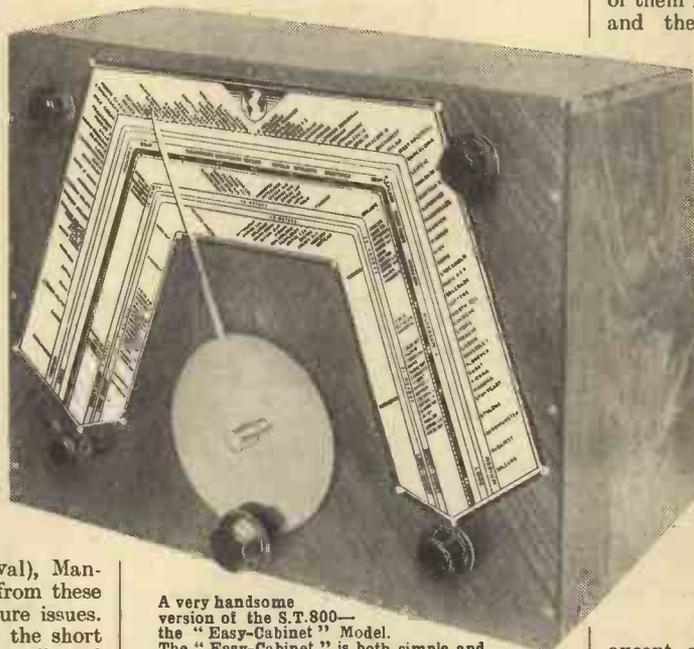
It is my custom to make no claims or say what a set will do. As usual, reports

are given as to what the set has done, but the statements of results are not mine.

Hitherto I have demonstrated sets myself. 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. Kelsey, 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 16 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 building" 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 rest 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.



A very handsome version of the S.T.800—the "Easy-Cabinet" Model. The "Easy-Cabinet" is both simple and inexpensive, consisting of the panel, which you must have in any case, and three pieces of wood forming the two sides and the top. These may be obtained, cut to size, drilled and ready for fitting, from Messrs. Peto-Scott. If this cabinet is used the side-pieces are not ordered, but instead, an Easy-Cabinet at 3/6.

Rapid Guide, and a total of 16 will be available. All work exactly alike—an

#### An Invitation

London, Exeter, Birmingham, Manchester and Glasgow already have sets. I should like to hear from Edinburgh, Cardiff, Hull, Belfast and one or two other large towns to which sets might be sent. The first recipient should be a responsible person who will keep a general eye on the set as it circulates in his town.

The scheme, limited as it is, is nevertheless proof of the confidence the S.T.800 deserves. In a few weeks the certain result will be a stream of enthusiastic letters. Meanwhile, I hope you will get on with building the set yourself. There is nothing to wait for except confirmation—and still more confirmation—of the excellent results you yourself will, by then, be enjoying. J. S.-T.

**Special Note.** All applications for loan of sets must be sent direct to POPULAR WIRELESS, Tallis House, Tallis Street, London, E.C.4. Mark envelope "Loan of S.T.800."

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

*No other designer has such a long string of successes to his credit. Read these earlier reports.*

#### S.T.300

I should like to testify to its amazing sensitiveness and selectivity.—S. MILLS, 27, SEYMOUR HOUSE, COMPTON ST., LONDON, W.C.

The set is extraordinarily selective and sensitive for a 3-valve.—W. IRONS, 173, GOSSET ST., LONDON, E.2.

I can only characterise it as remarkable indeed.—C. ROPSEY, 21, PRINCES AVENUE, GREENFORD, MIDDX.

#### S.T.400

The set was absolutely uncanny—what every wireless enthusiast has only dared to dream about.—FRED HOWARTH, 112, CHURCH ROAD, KEARSLEY, LANCASHIRE.

The quality of reproduction was very fine indeed.—ROBERT YOUNG, GARDONALD GARDENS, GLASGOW.

#### S.T.500

The sensitivity, quality and volume is tremendous, while the selectivity is as good as you have claimed it to be.—G. J. MILLARD, 65, BEECH GROVE, ACOMB, YORK.

It is really a remarkable set.—WALTER A. CROSS, 170, WALLACE ROAD, SHEFFIELD 3.

#### S.T.600

The set has a wonderful punch behind it.—W. J. SHIPLEY, 109, CLEVERLY ESTATE, WORMHOLT ROAD, SHEPHERD'S BUSH, LONDON, W.12.

The selectivity of the set is amazing.—R. D. BEEBE, 24, SHEPHERD'S BUSH GREEN, W.12.

#### S.T.700

The quality of reproduction was superb, and the set is undoubtedly the high-water mark of design.—GEO. MACLOCHLAN, 10, WARKWORTH GARDENS, GREAT WEST ROAD, ISLEWORTH, MIDDX.

The S.T.700 came through the most difficult of tests with flying colours. Truly a wonderful set.—T. POLLETT, 2, GREENHAM ROAD, LONDON, N.10.

I think it is wonderful that a set costing so little will do so much.—W. R. WALTHAM, 1, ONSLOW MEWS, SOUTH KENSINGTON, S.W.7.



# 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.400, 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  $4\frac{1}{2}$  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  $-16\frac{1}{2}$  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 an 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!

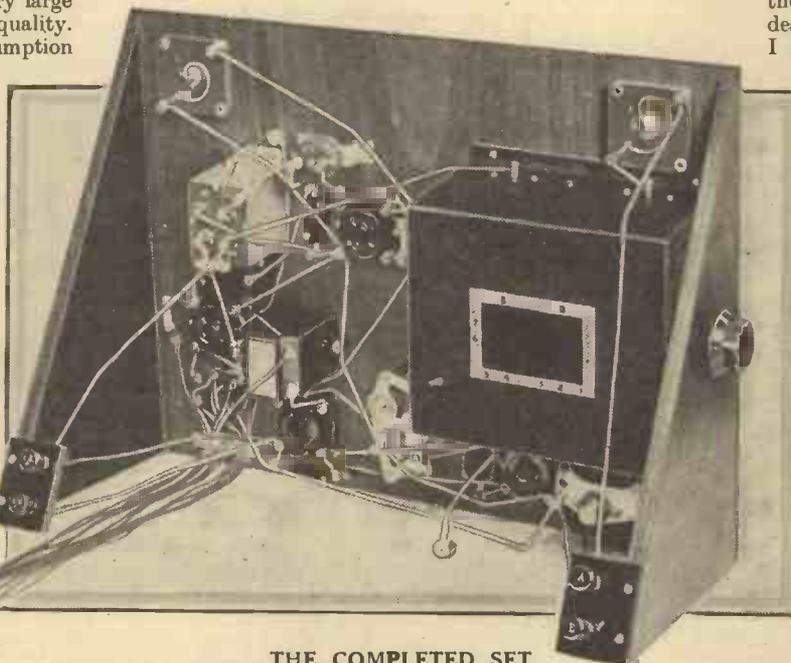
#### Threshold Howl

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 COMPLETED SET

This photograph shows the All-Wave Masterpiece in its completed form, ready for its four valves and batteries to be added. It is then ready to search all the corners of the world's ether for vivid programmes that will delight every listener.

switching inside the coil unit, which thus contains several components which are usually placed outside.

The reaction condenser is at the "earthy" end of the reaction circuit—a departure from the S.T.700. This calls for suitable design in the coil itself, but it results in stopping hand-capacity on this control. But the elimination of hand-capacity calls

(Continued from previous page.)

occurs before you have attained critical reaction, you are going to miss nearly all the short-wave stations. The trouble is extremely common, and in some quarters has been thought incurable. No doubt it is if the design of the set is wrong. But a condenser here or there or a certain value of a component, or in fact a dozen features of design may be an ingredient of the problem or its solution.

The problem is for the designer, and although you may get grunts and threshold howl on a "hook-up," you will not experience any trouble on the S.T.800 whatever you do. On all wavebands the reaction slides silkily into oscillation without any fuss. It was the greatest single problem with this set, but the solution—built into the design—is a lasting success.

Selectivity on the first circuit is obtained primarily with the aerial coupler condenser. The input circuit, incidentally, is designed to work effectively with a Triple Extractor if this device is used. The selectivity on the second circuit is obtained not by a potentiometer control, as on the S.T.600 and S.T.700, but by a switch which enables you to use either zero volts on the grid of the H.F. pentode or  $-3$  volts or  $-4\frac{1}{2}$  volts according to choice. Fully left, the switch is at "off," and the accumulator is switched off. In the half-way position the set is switched on and  $-4\frac{1}{2}$  volts bias is applied to the grid of the first valve, this increasing selectivity, although reducing signal strength, which, however, can usually be restored by critical reaction. When the switch is fully to the right the set remains "on," but the bias is reduced to zero. Signals are therefore strongest, but selectivity is only "normal."

#### Saves Cost

The switch saves cost, and is more reliable than some potentiometers, while operation, of course, is greatly simplified. With a potentiometer dozens of possible combinations were possible. In practice, however, I found that one needed only two positions. As you no longer have a gradual volume control, you will use the aerial coupler for this purpose. Remember the inviolable—though often violated—rule that even with critical reaction signals should be a little below their absolute maximum. Unless you start with signals weak before applying reaction, you will get distortion and no real selectivity. The correct adjustment of the initial signal strength will now be obtained by the aerial coupler.

The Triple Extractor is, of course, external to the main circuit, and calls for no details here. It consists simply of three very efficient 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!

temptuous thoughts for months and years, you can realise that I would never ditch the medium and longs for the sake of the shorts, or, on the other hand, reluctantly throw in a short-wave band as a sop to contemporary fashion.

#### Four Valves Pulling Their Weight.

The S.T. 800, on the face of it, is obviously a first-rate set for the medium and long wavebands—after all, the bread-and-butter of the average listener. While as regards the cake, you certainly have not mere crumbs thrown carelessly to gratify the whim of a public woefully ignorant of what to expect. Instead, you have a full-blown fighting circuit, with four valves all pulling their weight on the short waves. You have two tuned circuits for selectivity, an H.F. valve that really does its job, and an aerial coupler and selectivity switch as valuable on the short waves as on those higher up. Nothing half-hearted about that as a short-wave circuit, you will agree.

The successful use of an H.F. stage is a triumph in itself. You may have heard of buffer and aperiodic circuits using an H.F. valve, but getting nothing out of it. But dead-spots are thus avoided! The petty despots of the short-wave world are for ever droning drearily of spots of one kind or another. If it's not dead-spots, it's sun-spots. Anything that makes for spottiness in reception is the subject for endless sermons and moanings. Whereas the real practical remedy is a set designed as a finished article with a great margin of safety—not a bread-board hook-up for hams.

#### Insult to Intelligence.

Scores of designs use an aperiodic (i.e., untuned) aerial circuit. What a pathetic confession of technical impotence! What a futile waste of a valve! What a throw-back to coherer days!

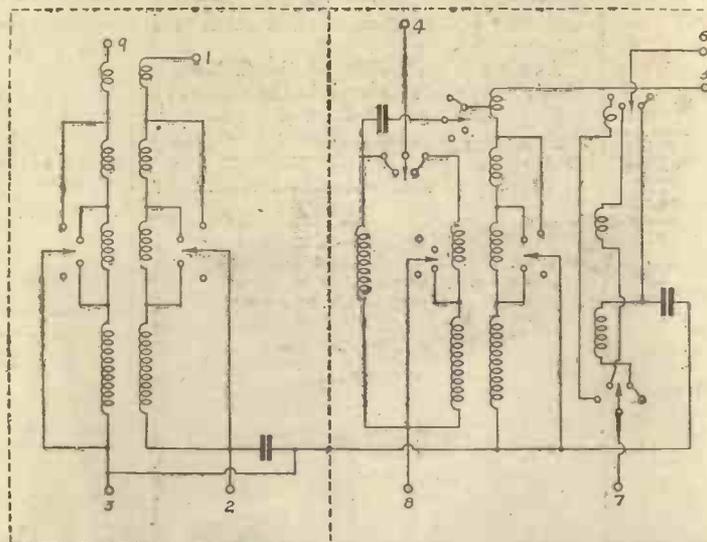
Thirty years ago such an arrangement might have passed muster. Now it is often a waste of good money and an insult to the intelligence. Just disconnect the tuning condenser from one of the circuits of your present receiver and see what happens! An immediate precipitous drop in signal strength and a collapse in selectivity. There is nothing about the short waves to save them from the same calamity.

But the tradition in short-wave amateur technique is to ignore ordinary theory and practice. The average short-wave experimenter spends pounds in the wrong direction, adopts wasteful expedients, clutches at any trivial device, however technically inefficient, if it will help him—however slightly—as he dithers on the edge of failure. He is the sort of man who crosses the English Channel on a floating bicycle and dreams of walking to America on a pair of pontoon floats.

And what is he content with when he operates his galaxy of glamorous gadgets? The wavering laugh of a kookaburra in

(Please turn to page 252.)

## THE S.T.800 COIL UNIT



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

At the other extreme we have the average all-wave design hitherto offered to the constructor. Here the appeal is frankly to the short-wave enthusiast, and the medium and long wavebands are thrown in as a make-weight. Such a set is usually of the Det. and 2 L.F. type.

No attempt is made to use an H.F. valve because the designer is honest enough to realise he has not the skill to get amplification out of it on the short waves. He, of course, loses in sensitivity, but as no one else has used real honest-to-goodness H.F. amplification on the short waves, he is not worried by competition. As regards the medium and long waves, he gets appalling selectivity, but he does not mind this, as his real interest lies in short-wave reception. He has certainly produced an all-wave receiver—all the waves coming in at once. He has sold his medium- and long-wave birthright for a mess of short-wave pottage; and—on such a set—what a mess it usually is!

Having harboured these critical and con-

# B.T.S. Exclusively Specified by Mr. John Scott-Taggart

## QUADWAVE TUNER

for the

### S.T.800

#### B.T.S. PLUG-IN COILS

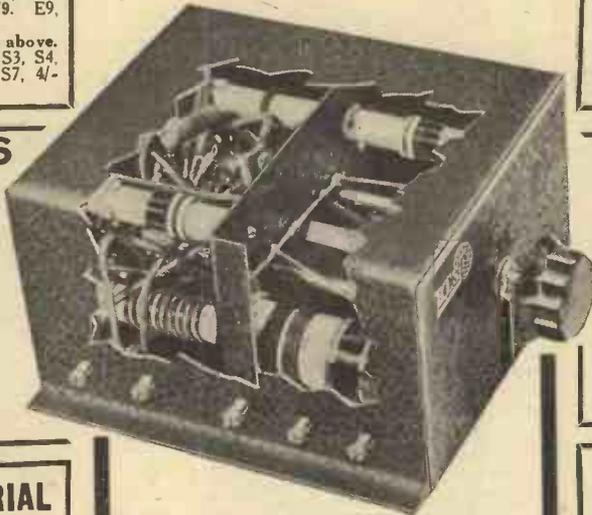


4-PIN Type: E1, 9-14; E2, 12-26; E3, 22-47; E4, 41-94 metres, 2/9 each. E5, 76-170 metres, 3/-. E6, 150-325 metres, 3/6. E7, 260-510 metres, 3/6. E8, 490-1,000 metres, 3/9. E9, 1,000-2,000 metres, 4/-.  
6-PIN, Wavelengths as above. Type S1, S2, 3/3 each; S3, S4, 3/6 each; S5, 3/9; S6, S7, 4/- each; S8, 4/6; S9, 5/-.

#### B.T.S. COIL BASES

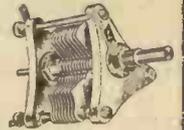


Designed for use with B.T.S. Coils and are constructed so as to be adjusted for either baseboard or sub-chassis mounting.  
4-PIN—The sockets mounted on special low loss ceramic compound insulating ring. For use in all short wave circuits either as a coil or 4-pin valve holder. Type 4 CH 1/6  
6-PIN—Similar to the 4-pin type, but with a base of special low power factor moulding specially prepared for short-wave work. Suitable for all receiving and transmitting circuits where 6-pin bases are required. Type SPB 2/-



#### B.T.S. Ultra Short Wave TUNING CONDENSER

FOR GANGING.—With extension to back end of main spindle, permitting ganging up to one or more condensers of same type. Brass vanes and spindle ensure low losses and minimum H.F. resistance. Positive connections to both fixed and moving vanes, the latter supported by two stealan end plates of solid and efficient construction. Type GTC 32 0'0002 mfd. 5/9



#### 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 gears protected by a dirt and dust-proof cover. DRIVE ONLY 6- WITH SCALE. Escutcheon, convex glass 2/6 and retaining ring extra.



#### B.T.S. ANTI-NOISE AERIAL

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



Abolish man-made static, with this amazing new All-British Artificial Outfit. 90% of the trouble experienced in all-wave reception is NOISE, which the B.T.S. Anti-Noise Aerial efficiently suppresses, vastly improving your radio reception on ALL wavebands. In addition to an aerial transformer, the outfit includes a special set transformer, fitted with switch for reception on ALL WAVEBANDS. This EXTRA component will improve the sensitivity and selectivity of your receiver. Suitable for all sets, A.C. Battery and D.C. and ALL WAVEBANDS Complete Outfit, ready for instant erection. 25/-

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

This choke has been specially designed to work efficiently on wavelengths between 15-2,000 metres, and is suitable for any all-wave receiver. Section wound to minimise interaction. Neat aluminium case, with two small brackets for fixing. Overall size including brackets and terminals 2 1/2 ins. high, 2 1/2 ins. wide and 1 1/2 ins. deep. Type AWC 1. 3/- Also available with a screened lead from top of can with clip for connecting to valve cap. Type AWC 2. 3/6



#### 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, long, medium and short, it is completely assembled in metal case with black crystalline finish, and is ready for mounting into your S.T.800. 21/-

ALSO EXCLUSIVELY SPECIFIED

#### B.T.S.

#### S.T.800 H.F. CHOKE



Mr John Scott-Taggart says "No other possible." To make sure of obtaining none other than B.T.S. look for the orange carton with the B.T.S. trade mark. REFUSE ALL SUBSTITUTES. 1/9

#### YOU NEED THESE BOOKS!

"TEN TESTED SHORT AND ALL-WAVE CIRCUITS." 24 pages of diagrams and details of 10 up-to-the-minute Short and All-Wave Circuits for the Constructor.  
"THE SHORT WAVE CONSTRUCTOR." 2nd issue of the amazingly popular B.T.S. Magazine for world-wide listeners, containing constructional articles on 3 new circuits and pages of interesting information on every aspect of world-wide reception. Price 3d. from Dealers or Newsagents, or both the above will be sent post free from the Publishers for 3d. in stamps.  
SEND THE COUPON BELOW.

ALL GOOD DEALERS Stock B.T.S. Products. In cases of difficulty send cash direct with name and address of nearest dealer.

# B.T.S.



To Publicity Department

BRITISH TELEVISION SUPPLIES LTD. 8, Charing Cross Rd., London, W.C.2.

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

NAME B. Davies  
ADDRESS "Thorncliff" Monda,  
Oswestry, Shropshire. P.W.1

# S.T.800 PILOT AUTHOR KITS

Mr. JOHN SCOTT-TAGGART *again chooses* A PETO-SCOTT CABINET

**CABINETS** Here are, without a doubt, the finest Cabinets even Peto-Scott, Cabinet Craftsmen since 1919, have ever produced. Designed, assembled, finished and hand French polished by experts of London's piano trade. These cabinets are of ample size to accommodate all batteries and each is supplied complete with an extension spindle for the wave-change switch.

**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**.

## A.C. MAINS S.T.800 KIT

CASH OR C.O.D. £9:16:6  
Carriage Paid.

**"A"** OR YOURS FOR 18/-  
Balance in 11 monthly payments of 18/-

Comprises complete kit of components as FIRST SPECIFIED and used by Mr. J. Scott-Taggart, including Peto-Scott Ready-Drilled and polished Walnut plywood panel, ready-drilled terminal strips, aluminium brackets, mains lead, nuts and bolts, less valves, cabinet, speaker and Extractor Kit.

CASH OR C.O.D. £11:15:0  
Carriage Paid

**"B"** OR YOURS FOR 21/6  
Balance in 11 monthly payments of 21/6

As for Kit "A," but including set of 3 Specified Valves, less cabinet and speaker.

CASH OR C.O.D. £13:12:6  
Carriage Paid

**"C"** OR YOURS FOR 25/-  
Balance in 11 monthly payments of 25/-

As for Kit "A," but including valves and specified Peto-Scott A.C., S.T.800 "LL" Cabinet, illustrated below, with speaker baffle, less speaker.

If Extractor Unit Kit is required with any of the above Kits, add £14:0 to Cash or C.O.D. prices, or 2/3 to deposit and to each monthly payment.

	£	s.	d.
3 specified valves	1	18	6
1 Peto-Scott drilled and polished walnut veneered panel	3	3	
4 Peto-Scott Aluminium Brackets, with nuts and bolts, 2 drilled Terminal Strips and twin electrolytic condenser bracket	2	3	
1 WB specified speaker, Type EMS..	3	10	0

## 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 C.O.D. 37/6. (Carr. and part packing 2/6 ex.) Balance in 6 monthly payments of 6/6.

### FINISHED INSTRUMENT

**A.C. S.T.800** Exact to Specification. Complete with valves and specified W.B. speaker, in Peto-Scott Consolette Cabinet (illustrated above). Cash or C.O.D. Carriage Paid. £19:10:0 or £5 down and Balance in 11 monthly payments of 29/-.

Yours for **£5**

## S.T.800 BATTERY VERSION TABLE MODEL



**DIMENSIONS:**  
Width 18½ in.;  
Height 14½ in.;  
Depth 12 in.

### DEMONSTRATIONS

daily at 77, City Road, London, E.C.1 (Clerkenwell 5911); 62, High Holborn, London, W.C.1 (Holborn 3248).

**2/6 DOWN**

**CABINET only** 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 C.O.D. 17/6. (Carriage and part packing 2/6 extra.) Balance in 5 monthly payments of 4/-

Yours for **2/6**

### 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 Walnut table cabinet illustrated above, less batteries. Cash or C.O.D. Carriage paid, £7/2/6. Balance in 11 monthly payments of 13/-.

Yours for **13/-**

## S.T.800 BATTERY VERSION CONSOLETTA MODEL



**CABINET only** Another beautiful cabinet (illustrated left), built from the finest woods, Australian Walnut veneered front and wings, and complete with speaker baffle board, battery shelf, and extension spindle. Cash or C.O.D. 35/- (Carriage and packing 2/6 extra.)

Balance in 6 monthly payments of 6/-  
**DIMENSIONS:** Width 20 in.; Height 24 in.; Depth 12½ in.

Yours for **5/-**

### 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 C.O.D. Carriage Paid, £8.19.6. Balance in 11 monthly payments of 16/6.

Yours for **16/6**

## S.T.800 BATTERY VERSION Type "LL" MODEL

**CABINET only** (As illustrated in left-hand column). Australian Walnut veneered front. Hand French polished, macassar fret. Lift-up lid. Dimensions W., 20½"; H., 15½"; D., 14½". Speaker baffle-board. Cash or C.O.D. 37/6. (Carr. and part packing 2/6 ex.) Balance in 6 monthly payments of 6/6.

Yours for **5/-**

**FINISHED INSTRUMENT** Exact to specification. Complete with FIRST SPECIFIED valves, Peto-Scott Matched de Luxe speaker Type 102 and walnut consolette Cabinet Type LL (as illustrated in left-hand column), less batteries.

Cash or C.O.D. Carriage Paid, £9:15:0. Balance in 11 monthly payments of 17/9.

Yours for **17/6**

*Buy by Post - its Quicker - CASH - C.O.D. - EASIWAY*

# Guaranteed Exact to Mr. John Scott-Taggart's FIRST SPECIFICATION-Fit the Blueprint EXACTLY

## 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 RECOM-  
MENDED BY MR. SCOTT-  
TAGGART ON PAGE 247.

Comprising:—B.T.S. "Quadwave" Tuning Unit, Aerial balancer condenser, Turret switch, B.T.S. H.F. Choke, 3- $\frac{1}{2}$ -watt resistors 5,000 ohms and (2)—1 megohm, 2 mica fixed condensers .0001 and .0005 mfd.

CASH OR C.O.D. 33' 6

or 5/- down and 8 monthly payments of 4/-.

**5/-**  
DOWN

### PARTS INCLUDED IN KIT "A"

KONECTAKIT (as detailed below), VALUE 3/-, GRATIS WITH EVERY COMPLETE S.T.800 KIT.

	£	s.	d.
1 B.T.S. S.T. 800 "Quadwave" Coil Unit	1	0	0
1 B.T.S. S.T. 800 H.F. Choke	1	9	0
2 PETO-SCOTT Ready drilled Ebonite terminal strips, 2 in. x 1 $\frac{1}{2}$ in.	6		
1 PETO-SCOTT Ready-drilled and polished walnut plywood panel	3	3	
2 PETO-SCOTT Ready drilled and polished Side pieces	1	0	
1 J.B. S.T.800 Main tuning condenser and pointer	6	6	
1 POLAR S.T.800 Aerial balancer condenser	5	6	
2 GRAHAM FARISH S.T.800 Litlos condensers with flanged nuts	3	6	
1 GRAHAM FARISH Turret switch with flanged nut	2	0	
1 T.M.C. Block condenser, 2 mfd. x 2 mfd. x 1 mfd., Type B1007	4	0	
1 VARLEY Niclet L.F. transformer ratio 1/3.5	7	6	
4 BENJAMIN Vibrolider 4-pin valve-holders	3	4	
5 BULGIN or DUBILIER $\frac{1}{2}$ -watt resistors	2	6	
4 T.C.C. type "M" condensers, .004, .0001 (2) .0005 mfd.	3	2	
1 LISSEN Mica .006 mfd. condenser	1	0	
4 BELLING-LEE type R terminals, A, E, LS +, LS—	1	0	
<b>KIT "A" CASH OR C.O.D.</b>	<b>£3</b>	<b>7</b>	<b>6</b>

### EXTRAS

4 specified valves	1	6	6
8 wander plugs and 2 accumulator connectors as specified	1	9	

### OR YOURS FOR

Complete Kit of components exactly as FIRST specified and used by Mr. J. Scott-Taggart and shown in the detailed list in centre column, with Konectakit (Gratis with Complete Kit) but less wander plugs, accumulator connectors, valves, Extractor Kit, Cabinet and Speaker.

**7/-**  
DOWN

Balance in 11 monthly payments of 6/3.

**KIT CASH OR C.O.D. £4:14:0**  
Carriage Paid

**"B" OR YOURS FOR 8/6**  
Balance of 11 monthly payments of 8/6

As for Kit "A," but including set of 4 FIRST Specified valves only, less cabinet and speaker, etc.

**KIT CASH or C.O.D. £5:11:6**  
Carriage Paid

**"CT" OR YOURS FOR 10/3**  
Balance in 11 monthly payments of 10/3

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

**KIT CASH or C.O.D. £6:9:0**  
Carriage Paid

**"CC" OR YOURS FOR 11/9**  
Balance in 11 monthly payments of 11/9

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

**KIT CASH or C.O.D. £6:11:6**  
Carriage Paid

**"CLL" OR YOURS FOR 12/-**  
Balance in 11 monthly payments of 12/-

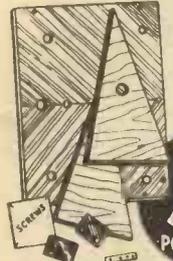
As for Kit "A," but including FIRST SPECIFIED valves and Peto-Scott Console cabinet Type "LL" only, with speaker baffle, but less speaker, etc.

★ If the above kits are required complete with 8 wander plugs and 2 accumulator connectors as specified, ADD 1/9 to Cash or C.O.D. prices or 1/9 to the Deposit.

★ If Extractor Kit is required with any of the above Kits, add £1 4 0 to Cash or C.O.D. prices, or 2/3 to deposit and to each monthly payment.

## STRUCTAKIT 1

Every part guaranteed exact to Mr. John Scott-Taggart's First Specification.



COMPRISES ● Peto-Scott Ready drilled and polished walnut veneered panel, 16 in. x 12 in. with 6 nickel-plated screws, ● 2 walnut-finished and polished side-pieces, ● 2 drilled ebonite terminal strips, 2 in. x 1 $\frac{1}{2}$  in., ● Battery lead clamping strip, ● All necessary screws for fixing above.

**5' 9**  
POST FREE

Cash ONLY 5/9 POST FREE

## STRUCTAKIT 2

Every part guaranteed exact to Mr. John Scott-Taggart's First Specification.



COMPRISES ● Wood parts for Mr. J. Scott-Taggart's "EASI" cabinet, consisting of 2 cabinet side pieces, cabinet top, all ready drilled and French polished ● Ready drilled and polished walnut veneered panel 16 in. x 12 in. with 6 nickel-plated

**8' 6**  
POST FREE

screws ● 2 Ready drilled ebonite terminal strips, 2 in. x 1 $\frac{1}{2}$  in., ● Battery lead clamping strip ● All necessary screws for fixing above.

Cash or C.O.D. 8/6 (Post Free).

**RECOMMENDED SPEAKER for S.T. 800**  
MODEL 37J. Makes an unmistakable improvement in volume and realism of reproduction.  
Cash or C.O.D. Carriage Paid £1/12/6.  
Or 2/6 down and 11 monthly payments of 3/-.  
Any other W.B. speaker on DOWN attractive Easy Terms.



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

## KONECTAKIT SPECIAL S.T.800 OFFER

Supplied GRATIS with Every Complete Kit

A Peto-Scott "Konectakit," containing all the items listed below, is supplied GRATIS with complete kits "A," "B," "CT," "CC," "CLL," Comprises: 6 No. 4 $\frac{1}{2}$ " (nickel-plated), 4 No. 4 $\frac{1}{2}$ ", 14 No. 4 $\frac{1}{2}$ ", 8 No. 4 $\frac{1}{2}$ ", 10 No. 4 $\frac{1}{2}$ ", and 4 No. 3 $\frac{1}{2}$ " round-head wood screws, 4 brass washers,  $\frac{1}{8}$ " x  $\frac{1}{8}$ " hole, 8 nickel-plated 6BA x  $\frac{1}{2}$ " round-head screws, 16 nickel-plated 6BA nuts, 20ft. 16-gauge tinned copper wire, 15ft. of insulated sleeving, 20ft. of rubber-covered flex, 1 fibre battery lead clamping strip. This Konectakit may alternatively be purchased with incomplete kits, or separately at the 3/- special price, post paid, of .....

## S.T. 800 EXTRACTOR KIT

Complete kit of parts, comprising specified triple extractor coil, 3 variable condensers, Peto-Scott drilled and polished panel and side pieces for Extractor Box, 2 terminals and necessary screws, connecting wire, etc.  
Cash or C.O.D. Carriage Paid, 24/-.

PETO-SCOTT CO. LTD., 77 (P.W.4), CITY ROAD, LONDON, E.C.1

Telephone: Clissold 9875

West End Showrooms: 62 (P.W.4), High Holborn, W.C.1. Holborn 3248

Please supply .....

..... against Cash/C.O.D./H.P.

I enclose £ s. d. Cash/H.P. deposit.

Name .....

Address .....

EST.: 1919.

ANY ITEM SUPPLIED SEPARATELY—ORDERS OVER 10/- SENT C.O.D. CARRIAGE AND POST CHARGES PAID

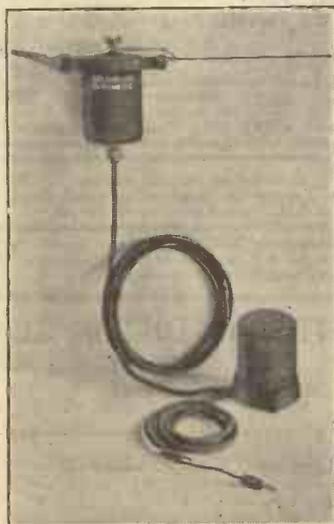
# HOW TO CUT THE CRACKLE OUT OF RADIO

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 gutters, zinc roofing, etc.—a most uncommon circumstance.

Many outdoor aerial gadgets 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.



British regd. design. British patents applied for.

The "Eliminoise" (Belling-Lee Trade Mark) Anti-interference aerial, all-wave, in three bands, 10-50, 200-800, 1,000-2,000 metres. Price 35/- Cable extra. per yard, 8d.

## Notes by Belling & Lee, Ltd., on the Suppression of Electrical Inter- ference with Broadcast Reception.

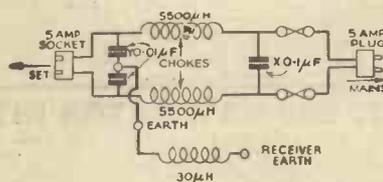
When a really good outdoor aerial is *in situ* and the lead-in kept fairly clear of the house, the nearest it approaches the mains may be where it meets the receiver. In these circumstances set lead suppression may be the cure, as the suppressor, fitted at the plug point, ensures that the lead as it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

This is an advertisement by Belling & Lee Ltd., who will gladly send free literature describing their various interference suppressors. Those who are rather more technically-minded should send 1s. 2d. in stamps or P.O. for a new 76-pp. treatise on the subject of interference suppression. The address is: Belling & Lee Ltd., Cambridge Arterial Road, Enfield, Mddx.

## A GENEROUS OFFER TO P.W. READERS



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 radiogram and whether or not it is "all-wave." 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."

reproduce the circuit of the new Belling-Lee set lead suppressor, type 300: 2,000 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 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.

### S.T.800

This most modern version of the all-wave receiver calls for the erection of an all-wave anti-interference aerial such as the "Eliminoise"; but remember, if mains-conducted interference is also present, you will require in addition a set lead suppressor, type 300.

### Interference from Alexandra Palace

Since television transmission commenced, many readers situated within a three-miles' radius of Alexandra Palace must have experienced 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 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.

# TRIPLE EXTRACTION

## AN ESTABLISHED TRIUMPH

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.

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

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

(Continued on next page.)

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

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



AT ONE  
MILE FROM  
THE B.B.C.

52  
STATIONS  
RECEIVED  
HERE

The amazing demonstrations, given within one mile of the Brookmans Park station, proved the extraordinary effectiveness of the Triple Extractor. It enabled over fifty stations to be received with the B.B.C. blazing away across the fields. The demonstrations were given in the joinery workshop of Shadbolt and Nash, illustrated above, where Mr. Scott-Taggart began his work on extractors two years ago.



# AMERICA! TOKIO! JAVA! BOMBAY! SYDNEY!



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.

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: What a compact, well-thought-out job it is. 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 aerial—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 result is 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

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

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,  
PHI, DJE.

19-metre band:  
HAS3, W2XAD,  
DJQ, W2XE,  
DJB, GSF, PCJ,  
W8XK, HVJ,  
(Moscow) RKI.

20-metre band:  
WQV, JVH, D2H,  
HJ5ABE.

25-metre band:  
RNE, TPA3,  
W2XE, 2RO,

W8XK, DJD,  
W1XAL, GSD.

27-metre band: PLP.

28-metre band: LSK, ORK.

#### The Higher Short Waves.

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

40-metre band: Usual crop of amateurs—what I call the "O.M." band.

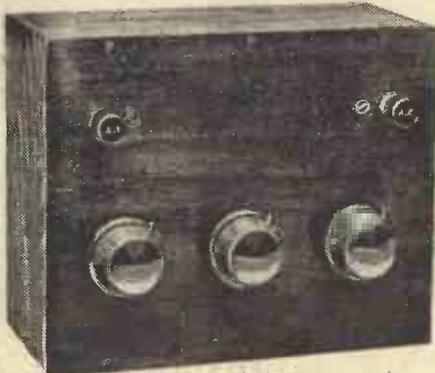
49-metre band: PRADO, VUC,  
Belgrade, DJM, OER2, OXY,  
W8XAL, W3XAU, W1XAL, DJC.

### 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



The Triple Extractor is joined between the aerial and the aerial terminal on the set.

50-metre band: HVJ, PMY.

C. H. Hopwood.

East Cornwall Research Laboratory (Wireless Station 2AAV), Calstock, 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 PHI, Zeesen DJE (Germany). 19 metres: Budapest HAS3, Schenectady W2XAD (U.S.A.), Zeesen DJQ, Wayne W2XE (U.S.A.), Zeesen DJB, Empire GSF, Eindhoven PCJ (Holland), Pittsburgh W8XK (U.S.A.), Moscow RKI, Vatican HVJ. 20 metres: Tokio JVH. 25 metres: Moscow RNE, Radio Colonial (Paris) TPA3, Pittsburgh W8XK (U.S.A.), Zeesen DJD, Wayne W2XE (U.S.A.), Rome 2RO, Empire GSD, Boston W1XAL (U.S.A.).

27 metres: Bandoeng (Java) PLP. 28 metres: Ruyssedele 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. 38 metres: Radio Nations HBP (Switzerland). 49 metres: Calcutta VUC, Belgrade (Yugoslavia), Zeesen DJM, Vienna OER2, Skamlebaek OXY (Denmark), Riobamba PRADO (South America), Cincinnati W8XAL (U.S.A.), Philadelphia W3XAU (U.S.A.), Boston W1XAL (U.S.A.), Zeesen DJC, Vatican HVJ (Italy).

Brookmans Park were given and 52 stations received on the speaker. Full details and readers' enthusiastic reports were given last year. The Midlands were equally enthusiastic over the taming of Droitwich.

So effective is the Triple Extractor that no change has been 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 swamping will not need the additional device.

### YOU HAVE EVERYTHING!

In this number of *Popular Wireless* you have everything you need to start building the S.T.800.

There is nothing to wait for.

Place your order at once for kit or components. But intending builders should certainly make sure of the next few issues of this journal in which will appear further S.T.800 articles.

# You should hear the S.T. 800 WITH THIS NEW SPEAKER!



**"HIVAC" PX.230 VALVE**

Owing to the increasing following this Valve has among "quality" enthusiasts particular care has been taken in designing the W.B. "1937 STENTORIAN" to ensure the provision of accurate matching to its characteristics. The following letter from the High Vacuum Valve Company is particularly interesting in view of Mr. Scott-Taggart's exclusive choice of the Hivac PX.230 valve:—

Dear Sirs,

We are pleased to inform you that we have found your "1937 STENTORIANS" types 37S and 37J, eminently suitable for use with the Hivac PX.230 Valve. The matching arrangements are perfectly satisfactory, and the Speakers do full justice to the quality of the valve's output.

Yours faithfully,  
HIGH VACUUM VALVE COMPANY,  
(Signed) H. Diggle.

**PRICES**

**CABINET MODELS**

Senior	63/-
Junior	49/6d.
Baby	29/6d.

**CHASSIS MODELS**

Senior	42/-
Junior	32/6d.
Baby	23/6d.

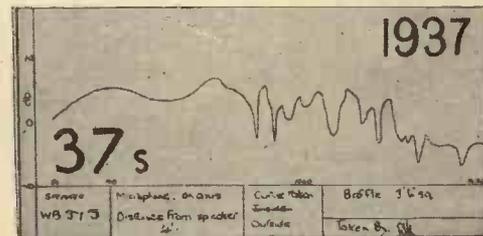
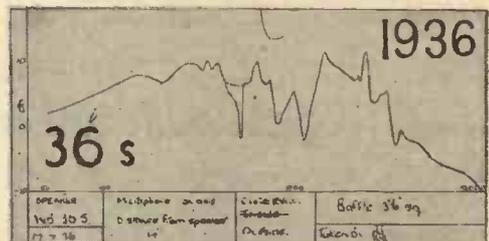
The newest Stentorian—triumphant result of a year's work by brilliant technicians—will make just as important a difference to the S.T. 800 owner as it does to other wireless "fans."

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

Models at 39/6 and over Available on hire purchase from **7/6** Down



# 81 STATIONS ON THE SPEAKER!

IN SWAMP CONDITIONS

A RADIO thrill of a lifetime was the outcome of my week with the most amazing battery all-waver that it has ever been my privilege to test!

That is my verdict of the S.T.800. And I was never more sincere in my life.

In thus referring to my experiences with Mr. Scott-Taggart's latest masterpiece, I feel that I must bring up all the literary big guns that I can muster purposely to stress the extent of my sincerity, for as far as short waves are concerned, at any rate, let me make no bones of the fact that I am a tough nut to crack.

After more than ten years of globe-trotting on waves below 50 metres, I suppose I rank as one of the much-maligned short-wave fanatics: the type of person that warms up but never really boils over even if Sydney in Australia is rattling the rafters on the loud-speaker. In other words, a dyed-in-the-wool enthusiast that takes a heck of a lot of pleasing.

And for once in my lifetime I'm pleased. Tickled-to-death. Never before—and I say this with cold, calculating deliberation—have I tested a set with the equivalent number of valves that is anywhere near comparable in performance with this remarkable design.

Am I surprised? Well, frankly, I'm not. Could there be a greater or more significant tribute to Mr. Scott-Taggart's genius as a designer than the legion of listeners who to-day use his sets? Would not this fact alone lead one to suppose that our distinguished contributor's entry (as regards published designs) into the all-wave field would be the occasion for his *pièce de résistance*?

Make no mistake about it; it most certainly is. S.T.800 is unquestionably the finest all-waver for the battery user that I have ever

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.

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

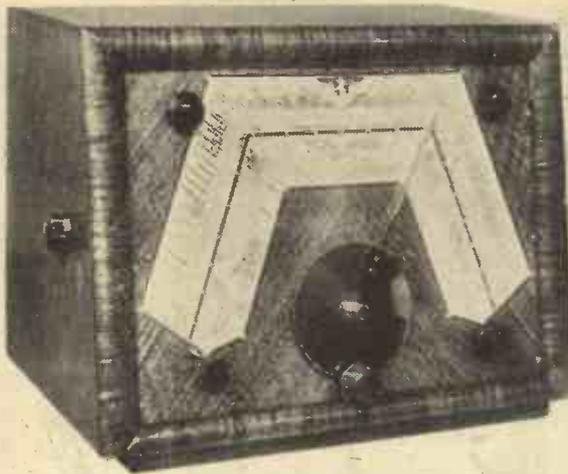
Consider first of all the medium and long waves. Excluding relays, there are over one hundred stations actually marked by name around the S.T.800 dial. With my outside aerial almost within the shadow of the Crystal Palace—a radio “blanket” if ever there was one—I have received 81 stations on the speaker, 77 of those named on the dial and four others!

Now for a confession. I have never done such a thing before since I have lived in my present home! True, hitherto I have steadfastly maintained that I am not what might be termed a European listener. But at least I have explored the continent of Europe before now, and my apathy to ordinary broadcast listening has taken root, I think, mainly because I had given up hope of finding a set that would enable me to pick out my programmes at will without having to endure the cacophonous accompaniment of two or three other stations at one and the same time. I admit to being a stickler for “clean” programmes. Call me fussy, if you like. But I simply writhe in agony at the slightest suggestion of “monkey chatter.”

I could say that I still have no time for European broadcasting. But I can't! I can't because the S.T.800 is the first set that I have ever tried that has made me feel that I am missing something by not interesting myself in the broadcasting affairs of Europe!

And when I say missing something, I don't mean merely stations. Stations as such just leave me cold. I've tried dozens of sets that would give me stations. Hundreds of them. But its programmes I want—honest-to-goodness entertainment that I can sit down and listen to—and Mr. Scott-Taggart, with his S.T.800, has achieved what I have (Please turn to page 249).

## AN ALTERNATIVE CABINET



The S.T. 800 in one of the alternative cabinet designs suggested by Messrs. Peto-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 120-volt H.T. with 16½ volts on the grid of the PX 230, and I was amazed to find that it was only 5 milliamps although full loudspeaker signals of excellent quality were obtained with 4½ volts on the H.F. valve (i.e. on/off switch in half-way position), and 10 milliamps when no voltage was applied to grid of the H.F. valve.

The following stations were received at good L.S. strength:

1 p.m. (midday).—Athlone, Stuttgart, Brussels No. 1, Paris PTT, Berlin, Hamburg, Brussels No. 2, Breslau, Poste Parisien, Hilversum, Rennes, Fécamp, Lille, Bourn.-Plymouth, and all the Regional stations. The long waves came in as usual, the triple extractor cutting out Droitwich, 16 miles away, completely from Radio Paris, Motala, Warsaw, Moscow, etc.

The following is the reception log commencing Saturday, October 24th, 1936.

3 p.m. 19 m. Zeesen DJQ (R9): Beethoven Concert. W 2 X A D, Schenectady (R7): “Charioters” in Cowboy Songs. Zeesen, D. J. B (R9): Beethoven Concert. Telephony station

talking French. G S F, Sports commentaries.

16 m.—W 2 X E Wayne, U.S.A. (R6): Relaying Col. B. S. from New York. Sketch. Telephony station. Zeesen DJE (R9): Classical music, Heinz Steinbok Orchestra.

4 p.m. 25 m.—German station.

31 m.—G S B (R9). Also Jeloy.

25 m.—Rome (R7). Zeesen DJD (R7).

Radio Colonial, France (R8/9): Exchange Report and News in Arabic.

4.58 p.m. 19.58 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, Genoa, etc., free from Midland Regional. Moscow 4, Bucharest and Rabat were amongst these.

10.15 p.m. 25 m.—G S D (R7): Announcements and Pianoforte. Rome (R9): News in English. Woman announcer.

31 m.—C T I A A Lisbon, Zeesen DJN (R.9).

19 m. G S P (R6): Pianoforte.

11.35 p.m. Further six medium-wave stations, making total 56.

12 (midnight) Sunday, October 25th, 1936.

31 m.—Moscow (R9): Talk on Constitution, followed by news on Non-Intervention Committee. Announced wavelength as 31.25 m.

G S B (R9): Sports Commentaries. Madrid

E A Q (R9): Sermon by Judge Rutherford, followed by “In a Persian Market,” by Ketelby.

Schenectady: Sketch.

5 a.m. 31 m.—DJN and DJA (R9): Orchestra.

49 m.—Pittsburgh (U.S.A.) W 8 X K: Dance

music, “You,” and “When I'm With You.” Bound Brook (U.S.A.) W 3 X A L: Dance music.

5.15 a.m. 49 m.—Cuba Havana, 49.92 (R8): Call and Talk. 48.92 (R7): Rumba. Two Spanish-speaking station, (R6 and 7).

9.45 a.m. 31 m.—Zeesen (R9): Concert and

Talk. Jeloy (R8): Bells and Church Service.

11.45 a.m. 40 m.—Amateurs G 2 M F,

G 6 M L, G 2 A Q, G 2 A K, G 6 I M, etc.

2.35 p.m. 19 m.—Budapest: News and

Anthem. Schenectady (U.S.A.) W 2 X A D:

“The Voice of Electricity.”

3.10 p.m. 13 m.—Wayne (U.S.A.) W 2 X E

(R7): Service and Sermon by Rev. John J.

Gilbert. George Burns and Grace Allen at a

children's programme sponsored by a mince-

meat firm. Concerts from CBS till this

station closed at 6 p.m.

3.30 p.m. 16 m.—Bound Brook (U.S.A.)

W 3 X A L: Sketch.

The above gives a good idea of what the set

will do, especially as W 2 X E was heard at a

steady R7 for three hours.

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 built all

Mr. Scott-Taggart's sets, and I am convinced

the S.T.800 is in more ways than one the best.

The tonal 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. PERRINS.

101, Sycamore Road, Aston, Birmingham, 6.



# It - From the Ends of the Earth!

HILLS

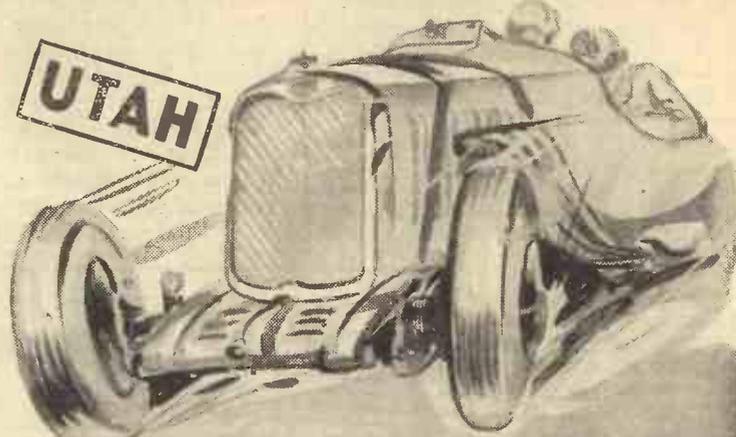
UTAH

IRELAND  
 BORDAUX  
 POSTE PARISIEN  
 BRÉSIL  
 ALGERIA  
 BRUSSELS 2  
 TOULOUSE  
 WAMBURG  
 LIMOGES  
 LONDON REGIONAL  
 POZNAŃ  
 STRASBOURG  
 VALENCIA  
 BERLIN  
 MOSCOW 4  
 BUCHAREST  
 MILAN  
 WEST REGIONAL  
 BARCELONA  
 LEIPZIG  
 TOULOUSE P.T.T.  
 SCOTTISH REG.  
 KATOWICE  
 MARSEILLES  
 MUNICH  
 MADRID  
 KIEV  
 ROME  
 STOCKHOLM  
 PARIS P.T.T.  
 BELGRADE  
 SOTTENS  
 NORTH REG.  
 COLOGNE  
 LYONS  
 PRAGUE  
 LISBON  
 BRUSSELS I  
 RABAT  
 VIENNA  
 MADONA  
 STUTTGART  
 ATHLONE  
 BEROMUNSTER  
 BUDAPEST  
 MEDIUM  
 BOLZANO  
 LONG

DEUTSCHLAND  
 RADIO PARIS  
 MOSCOW  
 TOKIO  
 RUSTENBERG  
 BIRMINGHAM  
 HILVERSUM I  
 LISBON INT.  
 MADRID  
 ALBON C.T.A.  
 ROME  
 RADIO NAT.  
 ENDRÖVEN  
 SYDNEY  
 WIRELESS  
 RAY

MOTALA REYKJAVIK DROITWICH DEUTSCHLAND  
 100 110 120

49 METRES  
 PITTSBURGH D.B.  
 ZEESEN  
 EMPIRE G.S.F.  
 VATICAN  
 SOFIA  
 TOKIO  
 WARSAW  
 REYKJAVIK  
 MOSCOW  
 RADIO COL.  
 PITTSBURGH  
 EMPIRE G.S.F.  
 ROME  
 BOSTON  
 ZEESEN  
 EMPIRE G.S.F.  
 HULZEN  
 STOCKHOLM

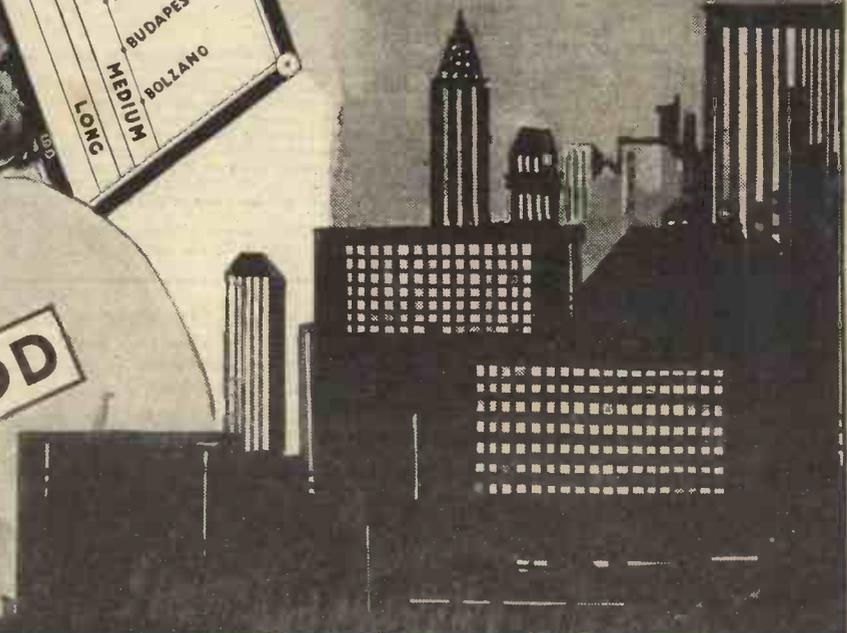


MADISON GARDENS

QUEEN MARY



HOLLYWOOD



# "NEW YORK IS CHILD'S PLAY ON S.T.800"

THE average broadcast listener who has never had personal experience of the short waves is missing a tremendous lot. He probably thinks of short-wave reception as a pastime for the expert; as something terribly tricky and difficult; and he thinks of weak little stations only tuned in after many minutes of hard labour at the controls.

If anything is capable of showing him how absolutely wrong he is, the S.T.800 will do it. I have been listening on this set at my home for the past few days, and the Editor has asked me to pass on my candid opinions about it.

## Splendid Performance

Let me say at the outset that I think it is an ideal means of "bringing short waves to the drawing-room." Its performance on the medium and long waves is excellent, but I need not dwell on that, as I have been asked to cover the short-wave side of the set only.

The one thing that it will bring home to many listeners to whom short-wave reception has been a closed book is this: that there are literally dozens of stations working on wavelengths between 12 and 80 metres that are almost as strong, and as easy to receive, as your local station.

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 31-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 Americans were, 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 29 to 70 metres. Thanks to the peculiar

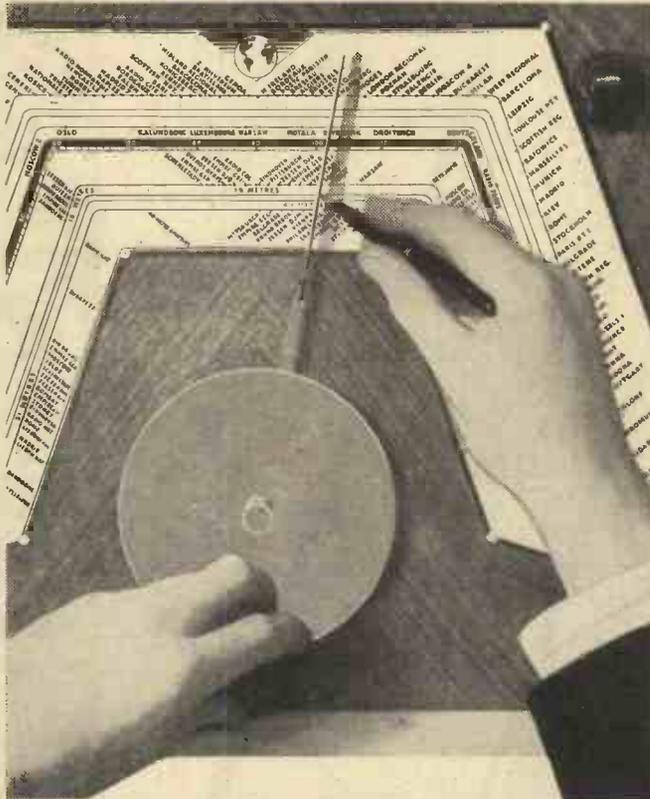
## — Says "W.L.S." in this test-report.

The S.T.800 was under the eye of one of the most critical of short-wave experts while in the hands of "W.L.S." Readers will have learnt from his articles that our famous contributor is never satisfied with a short-wave receiver unless every valve is pulling its full weight with 100 per cent. efficiency.

tain, 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.

## AMERICA ON THE SPOT



This photograph shows the Dot system of exact station logging being carried out. The method of procedure is as follows: Between the medium and long-wave station names will be found two parallel lines. On the line nearer the medium-wave stations is marked a dot in pencil where the pointer crosses the line, the set being correctly tuned to a particular station. This dot is then joined by a pencil or ink "junction line" to the dot at the end of the name of the station being received. This is done for all the stations received on the medium. Similar dots are placed on the other parallel line nearest the long-wave station names, and junction lines drawn to the appropriate long-wave station names. Similar parallel dot-lines are provided between the short-short and long-short wave names.

This system ensures 100% correct calibration of each station. Slight variations between coils and condensers make the scheme an ideally accurate one.

## 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 were 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.

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 wavelengths, 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 cer-

## S.T.800 CELLULOID DIALS

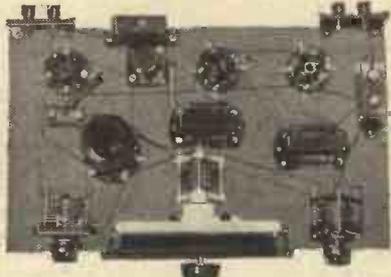
A really handsome reproduction of the S.T.800 dial card in white celluloid is available. It is obtainable for 2s. 6d. post free from Celluloid Printers Ltd., Kingston By-pass Road, Surbiton, Surrey. Errors of dot-marking can be washed off or erased with ease. This dial, which has one or two recent stations added, is otherwise similar to the card, but naturally is permanent, and gives the set a real professional finish.

# S.T.800 PILOT AUTHOR KITS

● ON THE EASIEST OF EASY TERMS ●

## N.T.S. ALL WAVE 3

12-2,000 METRES



Build a set that will receive the whole world direct, for a very small outlay. Includes everything for immediate assembly: 1 Slow Motion Dial; 3 6-pin coils, 12/26, 260/510, and 1,000/2,000 metres; 1 6-pin coil base, 3 4-pin baseboard mounting valveholders; 1 short-wave H.F. Choke; 3 variable condensers, .0001, .0002 and .00016 MFD.; 2 terminal mounts; 4 terminals; 2 L.F. Transformers; 2 fixed resistances; 3 fixed condensers; 3 component brackets; 1 switch; 1 metal-sprayed baseboard; 1 coil connecting wire; 1 wiring diagram. Cash or C.O.D. Carriage Paid, £2/2/0, or 5/- down and 8 monthly payments of 5/-.

**5/-**  
DOWN

## N.T.S. S.W. ADAPTOR

12-94 Metres



Hear America and all the World DIRECT on your present set, for only 17/6. Complete Kit of parts to build a reliable short-wave adaptor for use with any BATTERY receiver.

Kit comprises all parts for instant assembly including metal-sprayed base-board, 2 variable condensers, .00016, .0001 MFD., 2 base-board mounting 4-pin holders, short-wave H.F. choke, grid leak, fixed condenser, adaptor plug terminal mount, two terminals, 3 4-pin plug-in coils, 12/26, 22/47, and 41/94 metres, 1 component bracket, slow-motion drive, trimming condenser, connecting wire and wiring diagram. Built in one evening. Cash or C.O.D. Carriage Paid 17/6, or 2/6 down and 7 monthly payments of 2/6.

**2/6**  
DOWN

## N.T.S. MARVEL S.G.3 KIT

Newly-developed circuit, modern to the minute and using tested and matched components. The Kit includes advanced 2-gang air-spaced condenser of advanced design, Slow Motion Dial, wave-wound coils on bakelised formers; super L.F. Transformer; solid dielectric reaction condenser; complete with ready-drilled chassis and all necessary valveholders, small condensers and resistances. (Blueprint showing How to Build the Marvel S.G.3 supplied FREE with each Kit.)



Cash or C.O.D. Carriage Paid £1/12/6, 3/6 down and 8 monthly payments of 4/-.

## ★ ONE-VALVE ★ Short-Wave RECEIVER

Complete Kit of parts to build an efficient experimental short-waver covering 12/94 metres. Comprises Metaplex baseboard, variable and fixed condensers, switch, valve and coil holders, H.F. choke, terminals, slow motion drive, 3 short-wave coils, connecting wire, and FULL WIRING DIAGRAM. Less valve. Every part for immediate assembly. Cash or C.O.D. Carriage Paid 19/6, or 2/6 down and 8 monthly payments of 2/6. N.T.S. Lightweight headphones 7/6 pr. extra.

**2/6**  
DOWN

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

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

Complete Kit of first specified parts, with KONECTAKIT (Gratis), but less wander plugs, accumulator connectors, valves, Extractor Unit Kit, cabinet and speaker. Balance in 11 monthly payments of 6/3.

**7/-**  
DOWN

**KIT "B"** As for Kit "A," but including 4 first specified valves, less cabinet, and speaker. Cash or C.O.D. Carriage Paid £4/14/0, or 12 monthly payments of 8/6.

**KIT "GT"** As Kit "A" but including valves and Peto-Scott S.T.800 Table Cabinet, less speaker. Cash or C.O.D. Carriage Paid £5/11/6, or 12 monthly payments of 10/3.

**KIT "CG"** As Kit "A," but including valves and Peto-Scott S.T.800 Console Cabinet, with speaker baffle and battery shelf, less speaker. Cash or C.O.D. Carriage Paid £8/9/0, or 12 monthly payments of 11/9.

**KIT "CLL"** As Kit "A," but including valves and Peto-Scott S.T.800 Console Cabinet, Type "LL," with lift-up lid, and speaker baffle, less speaker. Cash or C.O.D. Carriage Paid £8/11/6, or 12 monthly payments of 12/-.

● If Extractor Kit is required with any of the above Kits, add £1/4/0 to Cash or C.O.D. prices, or 2/3 to deposit and to each monthly payment.

● If 8 wander plugs and 2 accumulator connectors are required with above Kits, add 1/9 to Cash or C.O.D. prices, or 1/9 to deposit.

B.T.S. S.T.800 "QUADWAVE" TUNER, as specified. Cash or C.O.D. Carriage Paid 21/-. 4 Specified Valves £1/6/6

## Peto-Scott CABINETS and FINISHED INSTRUMENTS

### TABLE MODEL

**CABINET ONLY.** Walnut finished, with sloping front and cross-banding moulding, including extension spindle. Cash or C.O.D., 17/6. Carr. and pkg. 2/6 extra. Or 2/6 down, balance in 5 monthly payments of 4/-.

**FINISHED INSTRUMENT.** Exactly to specification. With first specified valves and S.T.800 TABLE CABINET (described left), less batteries. Cash or C.O.D. Carriage Paid, £7/2/6. Or 13/- down, balance in 11 monthly payments of 13/-.

### CONSOLETTA MODEL

**CABINET ONLY.** Australian walnut veneered front and wings. Corded maché fret backing, and complete with speaker baffle, battery shelf and extension spindle. Cash or C.O.D., 35/- Carr. and pkg. 2/6 extra. Or 5/- down, balance in 6 monthly payments of 6/-.

**FINISHED INSTRUMENT.** Exactly to specification, including first specified valves and S.T.800 Console Cabinet (described left), and matched speaker, less batteries. Cash or C.O.D. Carriage Paid, £8/19/6. Or 16/6 down, balance in 11 monthly payments of 16/6.

### TYPE "LL" MODEL

**CABINET ONLY.** Australian walnut veneered front. Macassar fret with corded maché backing. Lift-up lid. Speaker baffleboard.

**FINISHED INSTRUMENT.** Exactly to specification, including first specified valves, and S.T.800 Console Cabinet (described left), less batteries. Cash or C.O.D. Carriage Paid, £9/15/0. Or 17/6 down, balance in 11 monthly payments of 17/9.

Cash or C.O.D., 37/6. Carr. and pkg. 2/6 extra. Or 5/- down, balance in 6 monthly payments of 6/6.

## A.C. MAINS S.T.800

### KIT "A" £9-16-6

Complete Kit of author's first specified parts, less valves, cabinet, speaker and Extractor Unit. Cash or C.O.D. Carriage Paid, £9/16/6, or 12 monthly payments of 15/-. Peto-Scott specified A.C. S.T.800 cabinet 1 17/6 (Carriage and packing, 2/6 extra.) 3 specified valves 1 18/6 W.B. specified speaker, Type "EM/S" 3 10/0

## W.B. STENTORIAN

IMMEDIATE DELIVERY

YOURS FOR **2/6** DOWN

### EASIEST OF EASY TERMS

Any W.B. 1937 cabinet or chassis model speaker supplied on easy terms. Cabinet models available with the new "Long Arm" remote control device, if required. SEND FOR FULL DETAILS.

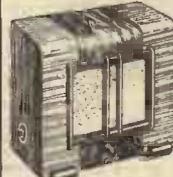


**MODEL 37J.** Makes an unmitigable improvement in volume and realism of reproduction. Perfectly matches any receiver as principal or extra speaker. Cash or C.O.D. Carriage Paid £1/12/6.

Or 2/6 down and 11 monthly payments of 3/-.

**MODEL 37B.** Highly efficient Baby Speaker with an adaptation of the famous "Microloade" matching device. Cash or C.O.D. Carriage Paid £1/3/6, or 2/6 down and 10 monthly payments of 2/6.

## CABINET MODELS



**MODEL 37SC** (illustrated). A Cabinet instrument giving superb reproduction, with power handling capacity of up to 5 watts undistorted. The turn of a switch adjusts it to match any set made. With volume control.

Cash or C.O.D. Carr. Paid £3/3/0, or 5/- down and 11 monthly payments of 5/9.

**5/-**  
DOWN

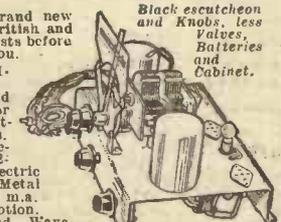
**MODEL 37JC.** W.B. Junior model speaker in handsomely finished cabinet (illustrated). Cash or C.O.D. Carriage Paid £2/9/6, or 5/- down and 11 monthly payments of 5/-.

**REMOTE CONTROL.** If the above cabinet models are required complete with "Long Arm" remote control device, add 15/6 to Cash or C.O.D. prices, or add 1/6 to deposit and to each monthly payment.

## - N.T.S. S.G.3 CHASSIS - AT LESS THAN COST PRICE

Each chassis brand new and tested on British and Foreign Broadcasts before dispatched to you.

Black escutcheon and knobs. Less Valves, Batteries and Cabinet.



**CIRCUIT COMPONENTS:** Screened Grid H.F. Detector and Pentode Output Valves. Screened wave-wound coils. 2-Gang Air Dielectric Condenser. Metal Chassis. Only 9 m.a. H.T. consumption. Illuminated and Wave-length Calibrated Dial. Wave range 200-2,100 metres.

**LIST PRICE £4.4.0 OUR PRICE 27/6**  
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56 (P.W.15), Ludgate Hill, London, E.C.4. Please send me CASH/C.O.D./H.P.:

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EST. 1924



**RAPID**

# Construction Guide

## 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, by being told exactly what to do and when. Actually, you can build the S.T.800 from the blue-print alone, but for extra speed and certainty of success, you cannot do better than follow the rapid guide in detail. Naturally, the guide is based on the actual components used in my original set.

If you have bought a complete author's kit, including the panel and side-pieces, or if you have bought a kit of the panel and side-pieces, cross out sections (C), (D), (E).

(A) Collect and examine required components. If you have an author's specification kit, check each item to see that it corresponds to my list of parts actually used. Handle J.B. tuning condenser with care, keeping moving vanes closed. Bending of vanes would affect calibration of station names.

(B) Tighten terminal securing nuts (not terminal heads) on components where necessary.

(C) Using Fig. 1, mark out on the front (not back) of panel the position of the holes. With a fine-pointed bradawl prick all the hole positions. Using a 1/4-in. twist drill, start each 1/4-in. hole carefully, using light pressure and turning the drill in a reverse direction at first; this is to avoid splitting the veneer. Continue drilling these 1/4-in. holes in the ordinary way. Centre bits are recommended for all the remaining large holes in panel, but twist drills may be used. Drill these holes.

(D) Drill 1/4-in. hole in a side-piece, as shown in Fig. 2.

(E) Drill terminal strips and battery lead clamping strip according to Figs. 3 and 4.

(F) Fit terminals to terminal strips.

(G) Screw terminal strips to side-pieces. The terminal strips are screwed at the bottoms of the back edges of the side-pieces (this is not obvious from the blue-print which shows the plan view), the terminal strip containing the aerial terminal being fixed to the side-piece with the hole in it.

(H) To each of the four T.C.C. Type M condensers (.0001 mfd., .0005 mfd., .0005 mfd., .004 mfd.) fit a pair of 3/4-in. 6 BA screws and nuts, unless already fitted.

(I) Four bare wires are now fixed to terminals on the coil unit as follows: A 4-in. 18 gauge wire has one end connected to terminal No. 1 on the coil unit, this wire coming out towards No. 2 terminal. A 3-in. wire is connected to terminal No. 2, this wire pointing vertically towards the top of the can of the coil unit. A 6-in. wire is connected to terminal No. 3, and points towards terminal No. 4. A 4-in. wire is also connected to terminal No. 3 on the coil unit, but this wire points outwards from the can of the coil unit, and pointing a little towards terminal No. 4. These wires are all in the general direction they will ultimately occupy in the original set, as shown by the blue-print and photographs.

(J) Lay the panel face downwards on a cloth-covered table (to avoid scratching veneer). Lay blue-print right way round on back of panel. Keep blue-print steady with a weight. Lay the following components on the blue-print in the positions they occupy on the blue-print and prick through the panel the fixing holes of these components, the bradawl actually going through the fixing holes in the components themselves: Coil unit, valve-holders, H.F. choke, Varley Niclet, Lissen .006 mfd. coupling condenser, T.C.C. Type M .004 mfd. condenser, .0005 mfd. T.C.C. Type M condenser, .0005 mfd. Type M T.C.C. condenser, .0001 mfd. T.C.C. Type M condenser, T.M.C. Block condenser.

(K) Screw the following components on the back of panel, using the sizes of screws indicated (remembering that if you use too long a screw, it would project through the panel). At the end of the list are two anchoring screws whose positions are given in the blue-print and may be traced by following wires 40 and 49. Coil unit (four 1/4-in. No. 3 round-head brass screws), valve-holders (each is fixed on with two 1/4-in. No. 4 round-head brass

screws), B.T.S. H.F. choke (two 1/4-in. No. 4 round-head brass screws), Varley Niclet (two 1/4-in. No. 4 round-head brass screws), Lissen .006 mfd. condenser (1/4-in. No. 4 round-head brass screws), T.C.C. .004 mfd. condenser (two 1/4-in. No. 4 round-head brass screws), T.C.C. .0005 mfd. condenser (two 1/4-in. No. 4 round-head screws), T.C.C. .0005 mfd. condenser (two 1/4-in. No. 4 round-head screws), T.C.C. .0001 mfd. condenser (two 1/4-in. No. 4 round-head brass screws), T.M.C. Block condenser (four 1/4-in. No. 4 round-head brass screws). Insert, but not fully, two 1/4-in. No. 4 round-head brass screws, each screw passing through two 3/4-in. brass washers with 1/4-in. hole, one of these screws being later used for anchoring HT+2 flex lead (i.e. wire 49) and also a 5,000 ohm resistor (No. 48) and the other screw anchors (39) and (40). Fit battery lead clamping strip (four 1/4-in. No. 4 round-head brass screws).

(L) Fit aerial coupler condenser, anode reaction condenser and turret switch, having removed knobs in each case. Remove knob pointer and pointer locking-nut of the aerial balancing condenser

this upper hole 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. Fit fixing nut to bush of driving spindle at the back of the panel.

### THIS COMPLETES THE FIXING OF COMPONENTS.

Now you are going to wire the components. For this you 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. The blue-print is always the final authority.

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 spindles.

**TURN TO HI-SPEED WIRING SERIES,** on page 234. This series consists of a number of pictures of back of panel showing the connecting wires divided into small groups in their order of wiring. This system makes it possible to find any wire

### S.T.800 PANEL DRILLING DIMENSIONS

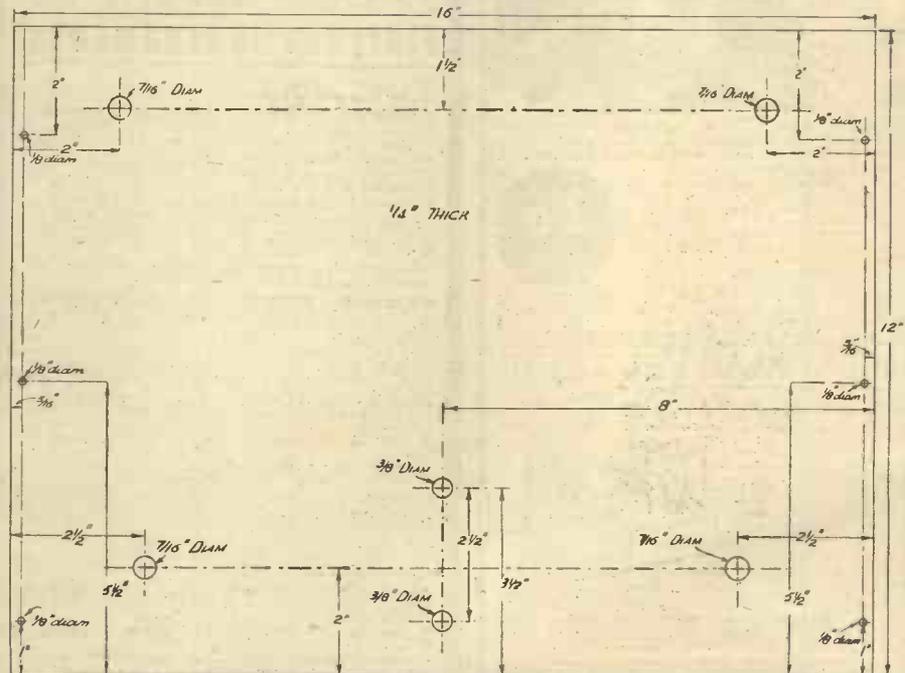


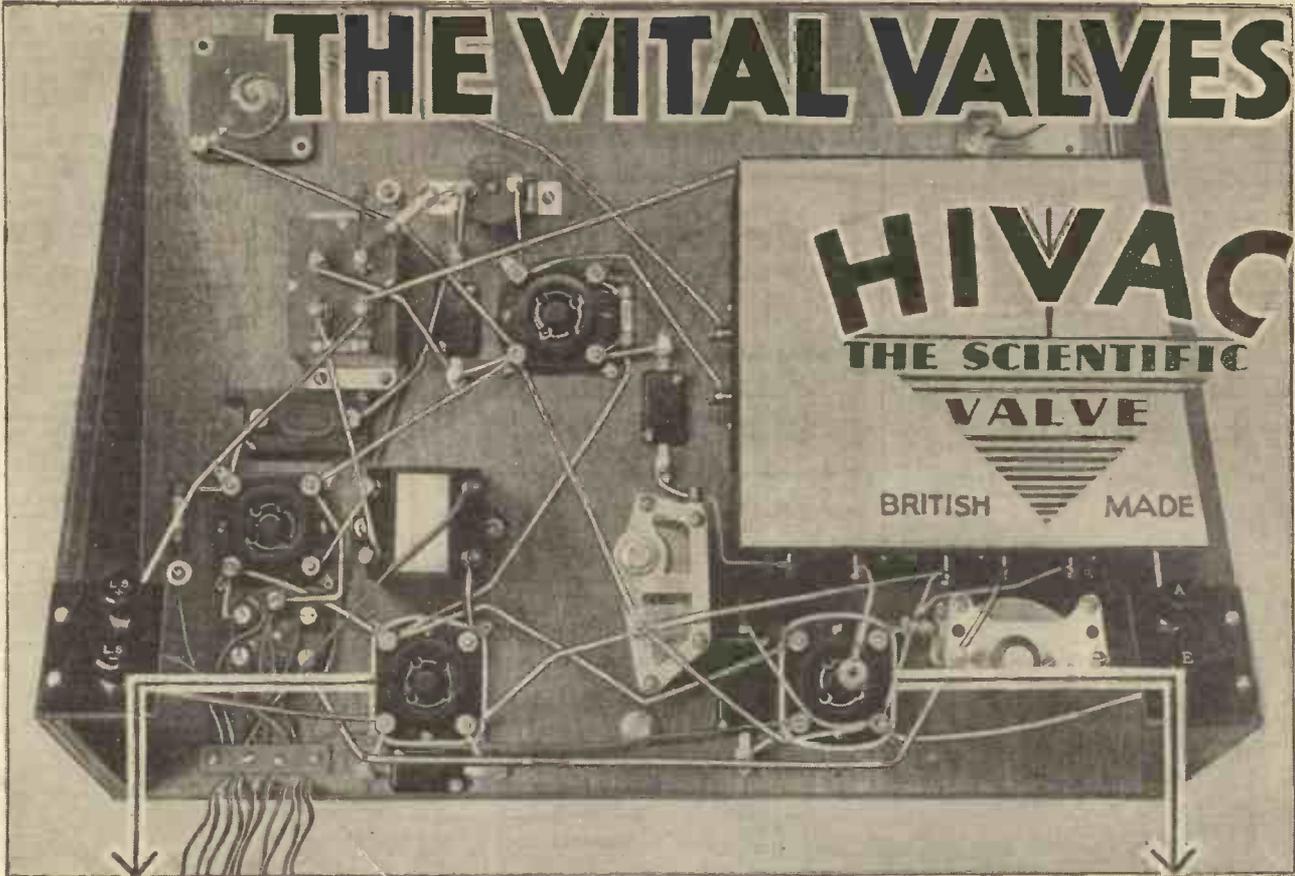
Fig. 1.—The positions of the various holes on the panel are given here. When marking out the drilling centres the instructions given under section "C" in the Rapid Construction Guide should be followed carefully.

(.0005 mfd. Polar slow-motion air condenser), Remove fixing nut and fit condenser to panel replacing fixing nut on front of panel. Remove fixing nut from bush of slow-motion driving spindle. Remove fixing nut from the main J.B. tuning condenser and pass the fixing bush on the condenser through the appropriate hole in the panel holding the condenser up against the back of the panel. Fit bush of slow-motion driving spindle through its appropriate hole in panel from the front so that the remaining hole in the metal spacing strip slips over the main bush of the tuning condenser. If

immediately on the blue-print. The wires in all 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 diagrams 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 tinned copper wire. Over each wire connection is slipped a suitable

(Please turn to page 232.)



**JOHN SCOTT-TAGGART  
AGAIN SHOWS A PREFERENCE  
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**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.

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*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 VALVES AS SPECIFIED FOR THE "S.T.700" ARE NOW CHOSEN FOR THE "S.T.800"**

# RAPID CONSTRUCTION GUIDE

(Continued from page 230.)

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. Incidentally, the method of wiring is just as easy if not easier than any other method.

The best procedure for wiring is as follows: Lay a length of sleeving in the position which will ultimately be occupied by the wire itself between the two terminals. Cut the sleeving to the required length. The wire itself requires a little stretching to take out the kinks. This can be done in several ways: you can hold one end in a vice and pull on the other end of the wire. The wire should be pulled sufficiently hard till you feel it "gives" a little, after which it will be found that the wire is stiff and straight. The wire may also be stretched straight between two persons each having an end wrapped round pliers or a piece of wood. Cut the wire into approximately three-foot lengths for easy handling. When wiring up two points in the set, slip the correct length of sleeving, as described above, over a three-foot length of the wire. Now cut the wire so that it projects outside the sleeving at each end by  $\frac{1}{2}$  in. This method of wiring makes it necessary for the initial length of sleeving to be correct, and the measurement of the sleeving should therefore always be done accurately from the side of one terminal to the side of the other terminal, following the line of the wiring as shown in the illustrations. The  $\frac{1}{2}$  in. at each end should be shaped into a round loop. Now have a cup of tea.

(M) USING BLUE-PRINT AND HI-SPEED DIAGRAMS (reading notes beneath them) WIRE UP THE SET UP TO WIRE (51). The lengths of battery leads (40), (13), (26), (43), (20), (12), (55),

(14), (49), (17) are suggested under the Hi-Speed diagrams. It is vitally important to get the right wander-plugs on the right wires.

In tightening the terminals on condenser block, avoid over-tightening as this will cut wire; do not finally tighten these or any other terminals till all the wires are on.

The leads going to the grid-bias battery, the H.T. battery and the accumulator may be 14/36 single rubber-covered flex or Maxamp wire, which latter is stiff wire with insulation which may be slipped back.

**S.T.800**

**THE POWER SUPPLY**

Batteries: H.T. 120 v.—Drydex, G.E.C.,  
Aerialite, Milnes H.T. Unit,  
Lissen, Fuller.  
G.B. 165 v.—Drydex, Lissen.  
L.T. 2 v.—Exide, Lissen, Fuller.

Mains Units: Ekco, Atlas.

**SUITABLE LOUDSPEAKERS**

W.B., Rola, Blue Spot, Amplion, Wharfedale  
(No significance attaches to the order of makes.) J. S.-T.

Leave  $\frac{1}{2}$  in. bare at each end of each wire. Bend one of the ends  $\frac{1}{2}$  in. from the end back on itself and push the loop so formed into the hole in the side of the appropriate Belling and Lee Midget wander-plug, having loosened the head 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.

(N) Having completed wire (51), remove knob on wave-change spindle of coil unit and FIT THE SIDE-PIECES shown in the drawings. Now complete the wiring by adding wires (52), (53), (54), (55), (56). Check the whole of the wiring of the set by the method suggested at the end of this guide. Make certain the battery leads are correctly labelled. A mistake is highly likely and may burn out your valves.

(O) FIT DIAL CARD AS FOLLOWS: Cut out the dial card along the outer edge of the black border. Place the card in the approximate position it will occupy on the panel. Now accurately position the card as follows: the outside corners should be the same distance from the sides of the panel. A degree scale will be found between the long-wave station names and the short-wave station names: At the left side will be found a line corresponding to 0 degrees. This line should be exactly  $3\frac{1}{2}$  in. up from the bottom of the panel, while the 180 degrees mark in the corresponding position on the other side should also be  $3\frac{1}{2}$  in. from the bottom of the panel. Prepare ten ordinary-plated brass pins (if a pin is of a type that could be bent it can be used) by cutting them diagonally with wirecutters or pliers about  $\frac{1}{4}$  in. from their heads. You have now ten very short and pointed pins. Any other type of very short miniature nails may be used.

There are ten small white circles with black centres along the border of the dial card. Keeping the dial card flat on panel, start with the two top circles and prick through centre of circles with some thin pointed instrument (I used a drawing pin) for about  $\frac{1}{4}$  in. into the wood. Insert a prepared pin into this hole and push hole with any hard, flattish-ended instrument (I used the handle of a screwdriver). Then fix two pins in the two holes on the inside border opposite the two upper pins already fitted. Now fit pins in the two lowest holes, i.e. at each extreme pointed end. Fit the other pins in any order desired.

(P) STAND SET IN ITS NORMAL POSITION WITH DIAL FACING YOU. Turn spindles of aerial coupler and anode reaction condenser fully

(Please turn to page 235.)

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

Component	Make Used by Designer	Suitable Alternative Makes
1 Coil unit for S.T.800	B.T.S.	No other possible.
1 Main tuning condenser, .0005 mfd., with silent pigtail and with pointer for S.T.800	J. B.	No other fits dials.
1 Aerial balancer, .0005-mfd., air-tuning condenser for S.T.800	POLAR	
1 Aerial coupler, .0005 mfd., with silent pigtail and flanged nut for S.T.800	GRAHAM FARISH Littos log-mid-line	B.T.S. (mention S.T.800).
1 Reaction condenser, .0005 mfd., with silent pigtail and flanged nut for S.T.800	GRAHAM FARISH	B.T.S. (mention S.T.800).
1 Turret switch with flanged nut (look for it before purchase)	GRAHAM FARISH	B.T.S. (mention S.T.800).
1 Block condenser (2 mfd. + 2 mfd. + 1 mfd.); similar to that used in S.T.700	T.M.C. B.1007	Or separate condensers by Dubilier, type B.B.; T.C.C. type 50; T.M.C., type 30; B.I.C., Amplion, Ferranti.
1 L.F. transformer	VARLEY Niclet Standard 1:3.5	
1 H.F. choke for S.T.800	B.T.S.	No other possible.
4 4-pin valve holders	BENJAMIN Vibroholders	No alternative recommended.
1 30,000-ohm $\frac{1}{2}$ -watt resistor	BULGIN	Ferranti G'5, Dubilier, Erie 1 watt, Polar N.S.F. 1 watt.
1 5,000-ohm $\frac{1}{2}$ -watt resistor	BULGIN	Ferranti G'5, Dubilier, Erie 1 watt, Polar N.S.F. 1 watt.
1 20,000-ohm $\frac{1}{2}$ -watt resistor	BULGIN	Ferranti G'5, Dubilier, Erie 1 watt, Polar N.S.F. 1 watt.
2 1-megohm $\frac{1}{2}$ -watt resistors	BULGIN	Ferranti G'5, Dubilier, Erie 1 watt, Polar N.S.F. 1 watt.
1 .004-mfd. condenser	T.C.C., type M.	Lissen Mica, Dubilier type 610.
1 .0001-mfd. condenser	T.C.C., type M.	Lissen Mica, Dubilier type 610.
2 .0005-mfd. condensers	T.C.C., type M.	Lissen Mica, Dubilier type 620.
1 .005-mfd. condenser	LISSEN Mica	T.C.C. type M, mica, Dubilier type 610 mica.
4 Terminals (A, E, L.S., L.S.-)	BELLING-LEE type R.	Clix type A, Bulgin type T.L.
2 Terminal strips (Ebonite 2 in. x $1\frac{1}{2}$ in. x $\frac{1}{8}$ in.)	PETO-SCOTT	
1 Panel, 16 in. x 12 in.	"	
2 Side pieces	"	
1 Fibre battery-lead clamping strip	"	
Screws, Flex, Connecting wire—18 gauge, Sleeving	"	
<b>OPTIONAL</b>		
8 Wander plugs, H.T.—, H.T.+1, H.T.+2, H.T.+3, G.B.+ , G.B.- 1, G.B.- 2, G.B.- 3	BELLING-LEE	Clix, Bulgin.
2 Accumulator connectors, L.T.+ L.T.—	BELLING-LEE	Clix, Bulgin.

## TRIPLE EXTRACTOR UNIT

1 Triple Extractor iron-core coil	WEARITE	
3 .0005-mfd. air-variable condensers	POLAR No. 4 with knob (mention S.T.800)	J.B. "Popular Log" (without dial or slow motion, but with small knob), Ormond R.483 (log condenser), with small knob (only really efficient air condensers may be used).
1 Wooden box—5 wood pieces	PETO-SCOTT	Clix type A, Bulgin type T.L.
2 Terminals, A.I., A.Z.	BELLING-LEE, type R.	

## VALVES

V.P.215 met.—HIVAC. L. met.—MAZDA. L.21—OSRAM, MARCONI. P.X.230—HIVAC.

## 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. SCREWS.—10  $\frac{1}{8}$  in. No. 4 round-head brass.  
SLEEVEING.—5 three-foot lengths 1 mm. insulating sleeving. 14  $\frac{1}{2}$  in. No. 4 " " "  
WASHERS.—4 brass  $\frac{1}{2}$  in. with  $\frac{1}{4}$  in. hole. 8  $\frac{1}{2}$  in. No. 4 " " "  
FLEX.—20 feet 14/36 single rubber-covered flex. 4  $\frac{1}{2}$  in. No. 3 " " "  
10  $\frac{1}{8}$  in. No. 4 " " "

J.S.-T.

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## 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 satisfactory—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 performance 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 automatically from the L.T. without wastage current, whenever 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 available. It is worthy of the

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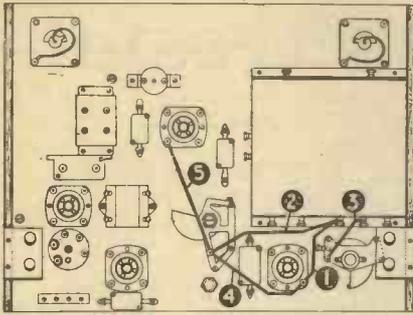
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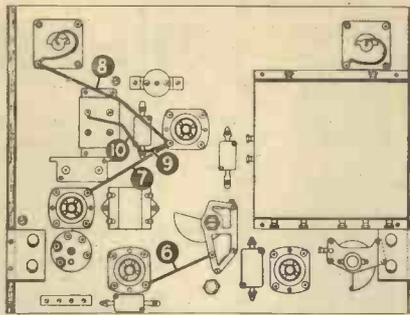
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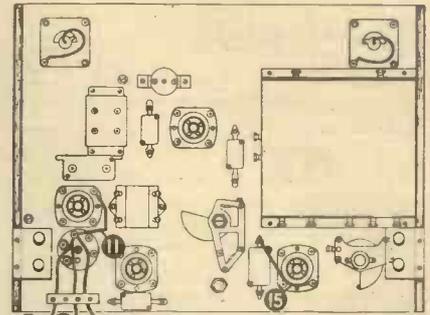
# S.T.800 HI-SPEED WIRING DIAGRAMS



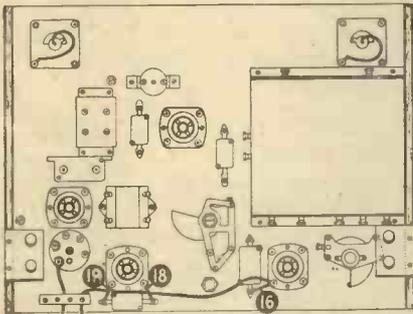
**WIRES 1, 2, 3, 4, 5.** Every wire in every diagram should go absolutely straight between terminals or by quickest route (no bending near terminals) unless otherwise stated. Wire (1) must clear every part of aerial balancer by  $\frac{1}{4}$  in.



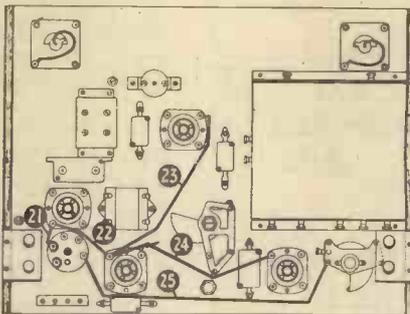
**WIRES 6, 7, 8, 9, 10.** Wire (6) horizontal  $1\frac{1}{4}$  in. then slopes to valve holder. Wire (8) straight but bends where touches condenser block case.



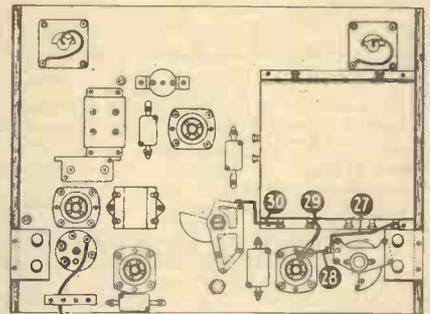
**WIRES 11, 12, 13, 14, 15.** Wires (11), (12), (13), (14) to go exactly as shown. Wire (15) goes quickest way. Make certain correct wander-plugs used, and accumulator "spade" on (12). (13) is 21 in. (12) is 21 in. (14) is 21 in.



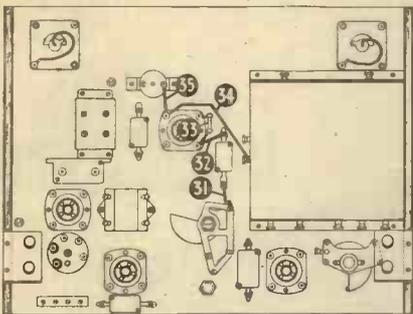
**WIRES 16, 17, 18, 19, 20.** Make sure correct wander-plugs attached; accumulator connection on (20) must be correct. (20) is 20 in. (17) is 27 in.



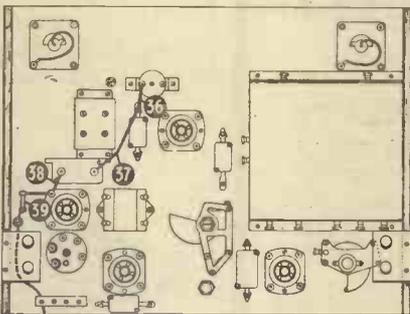
**WIRES 21, 22, 23, 24, 25.** Wire (22) as shown. Wire (23) as shown and flat against panel. Wire (24) as shown. Wire (25) as shown but steadily sloping all way up to aerial balancer.



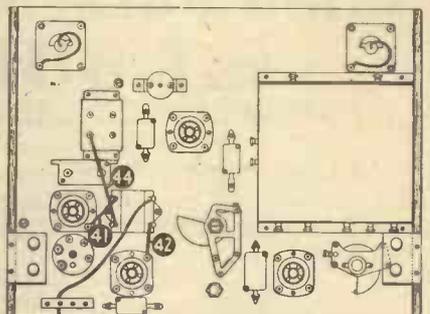
**WIRES 26, 27, 28, 29, 30.** Correct wander-plug must go on (26). Wire (27) must clear terminals 2 and 3 and aerial balancer. Wire (29) vertically for 4 in. up from terminal and then across to anode. Wire (30) must not touch case. (26) is 21 in.



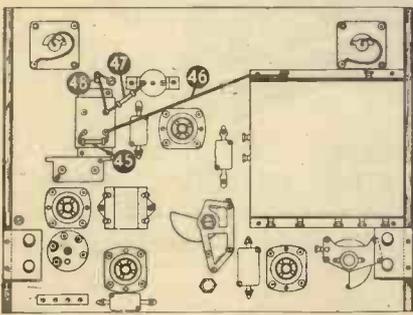
**WIRES 31, 32, 33, 34, 35.** Wire (34) clears terminal on the way. Wire (35) horizontal  $\frac{1}{2}$  in. at choke end.



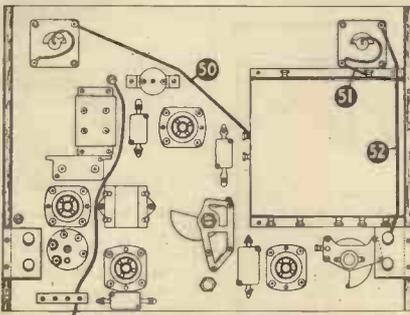
**WIRES 36, 37, 38, 39, 40.** Wire (36) horizontal  $\frac{1}{2}$  in. at choke end. Wire (37) as shown. Wire (39), note anchoring screw (connections must be looped between two washers). Wire (40) along surface of panel. Correct wander-plug on (40). (40) is 22 in.



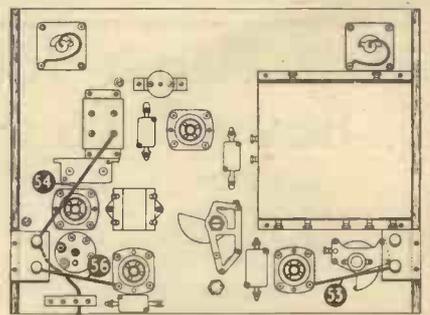
**WIRES 41, 42, 43, 44.** Wire (42) quickest route. Wire (43) quickest route. Wire (44) just clears terminal P on Niclet. (43) is 24 in.



**WIRES 45, 46, 47, 48.** Wire (45) as shown (resistor must not touch container of condenser). Wire (46) quickest route. Resistor (47) must clear 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. Note anchoring screw; wire must be between two washers. 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  $\frac{1}{2}$  in. Wire (54) slit h, bend half-way to permit clearing valve by  $\frac{1}{2}$  in. and to allow withdrawal of valve. (55) is 25 in.

## RAPID CONSTRUCTION GUIDE

(Continued from page 232.)

anti-clockwise (fully to left). Fit their knobs with their white spots pointing exactly in a horizontal direction to the left. Tighten up their grub-screws. Turn spindle of turret switch fully anti-clockwise (fully to the 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 (fully to the left) so that the vanes are completely open. Screw on pointer to the screwed spindle, so that  $\frac{1}{2}$  in. of the spindle is exposed between the pointer and the end of the spindle, seeing that 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 (as distinguished from the screwed) spindle.

Remove the knob from the driving spindle of the slow-motion drive. Remove spring and sleeve washer from spindle of drive. Turn main spindle fully anti-clockwise (fully to the left) so the condenser vanes are fully open. Place pointer disc on spindle of condenser with the pointer pointing exactly to the line marked 0 degrees on the dial, care having been taken that the pointer disc just rests on the flange of the driving spindle. Now tighten the grub screw in boss of pointer-disc. Replace sleeve washer on drive spindle. Place spring over this washer. Place knob on drive spindle and press down an appropriate amount and tighten grub screw. The correct pressure for the drive for best results may be found by varying the pressure of the knob. Fit knob on wave-change spindle of coil unit.

**YOUR SET IS NOW COMPLETE.** (See separate article on installation and operation. It is desirable to check the wiring before attempting to install.)

## THE S.T.800 WIRING CHECK INSTRUCTIONS

PROVIDED great care is taken, the best way for a constructor to check his wiring is to take each wire in order from the Hi-Speed series and then to look at his own set and see whether the wire connects the same points. This has to be done very conscientiously, one wire at a time, making sure that the wire goes to the right side of each component, and where there are two components of a similar kind, such as valveholders, making certain that you have got hold of the right component.

### BATTERY-LEAD CLAMP

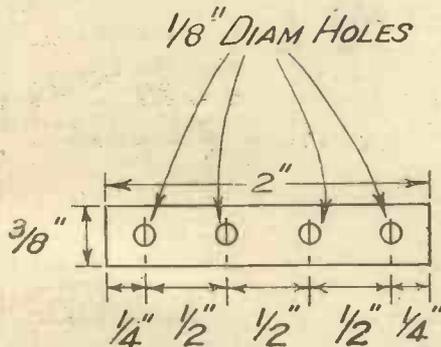


Fig. 1.—A piece of fibre, drilled and cut as above, is used to secure the battery leads and remove all strain from the points where they join components.

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 written down.

It is possible that, although you have all the wires correctly in place, you have added one or more wires unnecessarily. The way to look for this is to write down a list of all the components in the set, and also the four terminals, A, E, L.S., L.S.—. Against each component and the terminals mentioned, write down the number of wires that go to it; this information is obtained from the blue-print. Then take each component in your set and count the number of wires that go to it. You will thus find out 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 in all cases, 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 lead (29), 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 set (without valves) with dial facing you. Place loudspeaker on right of set and preferably not pointing directly towards it. The triple extractor is not connected at this stage, or not connected at all

### TERMINAL STRIPS

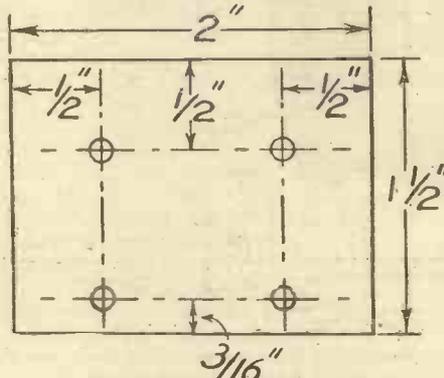


Fig. 3.—Both the terminal strips of ebonite are identical and are prepared in accordance with these dimensions.

unless swamping is experienced. The two-volt accumulator is placed behind the left-hand end of set. The high-tension battery, which should be of the 120-volt type (the bigger capacity types are always cheaper in the long run), is placed behind the right-hand end of set. The grid-bias battery can be placed between the accumulator and the high-tension battery—the position of these batteries is not very important, but the leads should not be long. Long leads to the accumulator especially may result in a drop of voltage at the valveholders. Suggested lengths are given under the Hi-Speed diagrams.

Connect the aerial lead (after scraping or sandpapering) to terminal A on one of the terminal strips and connect the earth lead (a short earth lead is desirable, if possible)—after similar treatment—to terminal E. The loudspeaker is connected to terminals L.S.+ and L.S.—. There is no special way round in the case of a moving-coil loudspeaker. All connections to wander-plugs should be absolutely perfect. Many troubles, crackles, and often disconnections altogether are due to faulty connections in wander-plugs. I strongly favour testing all leads by the aid of a voltmeter or a flash-lamp battery and bulb, or other method, as much more trouble than you imagine is caused by faulty contacts in leads.

Join the L.T.+ and L.T.— to the correct terminals on the accumulator. Insert the H.T.— plug in the negative socket of 120-volt H.T. battery. Insert H.T.+1 plug in +72 volts (or near voltage) socket. Insert H.T.+2 in socket just below the maximum socket (i.e. usually 108 volts). The constructor can experiment with this tapping if he wishes, and if the H.T. begins to run down he may have to use a higher voltage on the H.T.+2 which goes to the detector anode.

Insert H.T.+3 in +120 volt socket. The grid-bias plugs are fitted as follows: G.B.+ is inserted in the G.B.+ of the battery, which should be of the 164-volts type; the G.B.—1 is connected in —4½ volts; this position

can be altered according to the degree of selectivity required; the G.B.—2 is inserted in —3 volts; the G.B.—3 is inserted in —12 volts, the exact position of this being dependent upon the desire for H.T. economy. Actually, the higher voltage you can make this the better from the point of view of H.T. economy, provided distortion is not noticed.

Check all the above connections most carefully, preferably getting someone to read them out slowly to you while you follow the wires. An astonishingly large number of constructors get their leads on to the wrong terminals: this may cause a serious short-circuit, or may affect the efficiency of the set, and the constructor may not know of it for weeks. There is no excuse for this on the S.T.800, as all the plugs and terminals are easily identified, and none of them is duplicated. All terminals should be firmly tightened up. The plugs should also make good contact and should not be smeared with bitumen.

Switch on by turning the switch in the bottom right-hand corner of the panel fully to the right.

A good precaution now is to connect a voltmeter or flash-lamp bulb across the filament terminals on each valveholder in turn, taking care that it is across the filament terminals.

The lamp should light up normally. If a very bright light is obtained, or the bulb is fused, external wiring, and if necessary internal wiring, should be checked. If a voltmeter is used, it should read about two volts. If it reads much more, wiring should be checked.

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

Insert H.F. pentode (Hivac VP 215 Met.) in valveholder nearest aerial terminal of set. Connect free end of wire (29) which has been "in the air" to top of this valve. Insert detector triode valve (Mazda L.2. Met.) in valveholder nearest terminal 7 of coil unit. Check this carefully, as the type of detector valve is important in this set. Insert "first L.F." valve (Osram or Marconi L21, clear or metallised) in valveholder nearest L.S.+ terminal. Insert power valve (Hivac PX 230) into valveholder nearest bottom edge of panel.

Check valves to see that they are in their correct valveholders. Here again constructors quite often get poor results by having valves in their wrong valveholders.

Check once again all battery voltages, including that of the grid-bias plugs. A vast amount of trouble is caused by grid-bias plugs being in their wrong positions, and yet frequently quite good results are obtainable even when these plugs are in their wrong positions, the constructor not realising for that reason that he could get much better results if the plugs were correctly placed.

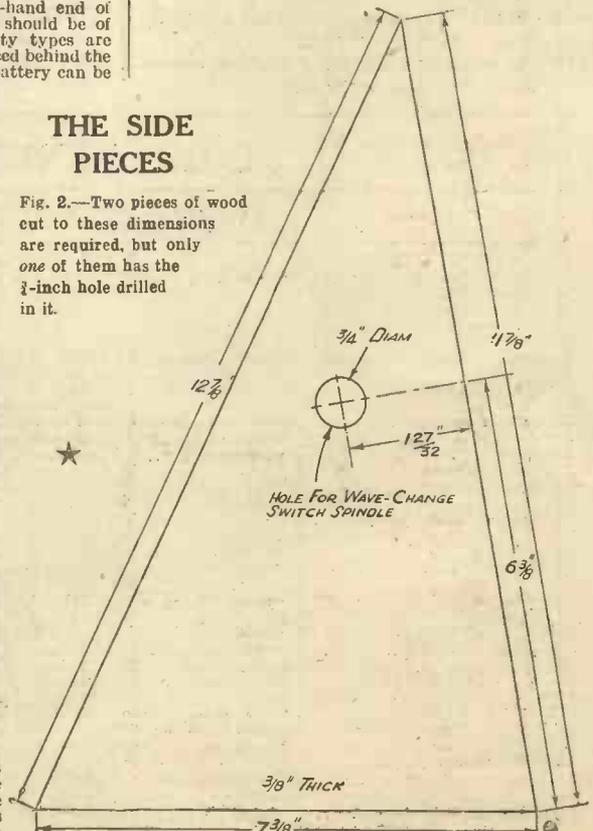
Put H.T.— plug back into H.T.— socket on H.T. battery.

The aerial lead, it should be noticed, should be kept away from the loudspeaker and high-tension battery side of the set, and similarly the leads to the loudspeaker should not trail round the left-hand side

(Please turn to page 248.)

## THE SIDE PIECES

Fig. 2.—Two pieces of wood cut to these dimensions are required, but only one of them has the 3/4-inch hole drilled in it.





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

# THE A.C. S.T.800

## FIRST DETAILS OF THE ALL-MAINS VERSION OF JOHN SCOTT-TAGGART'S GREAT NEW 4-BAND DESIGN

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 model, and there is no need to recapitulate

them here. Suffice it to say that the sensitivity of the A.C. version is very high, and the resultant benefit on the short wavebands is very marked.

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

(Please turn to page 245.)

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

Component	Value	Make used by J. Scott-Taggart	Component	Value	Make used by J. Scott-Taggart
Coil unit for S.T.800		B.T.S.	L.F. choke		VARLEY DP 10 (250 ohms)
Aerial balancer condenser	.0005-mfd.	POLAR (for S.T.800)	Metal rectifier		WESTINGHOUSE type HT9
Main tuning condenser with silent pigtail and special slow-motion drive for S.T.800		J.B. (special for S.T.800)	On-off switch		BULGIN S.80
Aerial coupler with silent pigtail	.0005-mfd. solid dielectric	GRAHAM FARISH (special for S.T.800)	Safety twin mains fuseholder		BULGIN type F.19
Reaction condenser	.0003-mfd. solid dielectric	GRAHAM FARISH (with pigtail modified)	Energised loudspeaker		W.B. special type with 1,500 ohms field and multi-ratio terminals with terminals suitable for Mazda AC/2 Pen (same speaker as used for AC/S.T.700)
Volume control	10,000-ohm wire-wound (must be wire-wound)	COLVERN ST5C (to match other knobs use a Graham Farish knob)	L.F. transformer		VARLEY Niclet standard 1:3.5
Valveholders	3 7-pin	W.B. baseboard type	Terminals	A, E	BELLING-LEE type R
Mica condensers	2 .0001-mfd.	DUBILIER type 620	1 twin electrolytic condenser bracket with terminal		PETO-SCOTT
Tubular condensers	1 .0005-mfd.	DUBILIER type 620	Mains lead	10 feet	PETO-SCOTT
Paper condensers	2 .05-mfd.	T.C.C. type 250	Mains plug		BULGIN P.28
	1 .05-mfd.	T.C.C. type 250	Cabinet with panel and baffle assembly	Specify S.T.800 when ordering	PETO-SCOTT
	2 4-mfd.	DUBILIER type 4422/E	1 terminal strip	3 x 2 in. (drilled)	PETO-SCOTT
	1 2-mfd.	DUBILIER type BB	1 terminal strip	3 x 1 1/2 in. (drilled)	PETO-SCOTT
Electrolytic condensers	3 1-mfd.	T.C.C. type 50	4 aluminium brackets for mounting terminal strips		PETO-SCOTT
	1 50-mfd.	T.C.C. type FW	Connecting wire	18-gauge (important) and sleeving	
	2 8-mfd.	T.C.C. wet 802	1 extension spindle for wave-change switch		B.T.S.
Fixed resistors	1 1-megohm	ERIE 1 watt	Triple Extractor (if used) as for Battery S.T.700 and S.T.800		
	2 50,000 ohms	ERIE 1 watt			
	1 10,000 ohms	ERIE 1 watt			
	1 100 ohms	ERIE 1 watt			
	3 20,000 ohms	POLAR-NSF 1 watt			
	1 15,000 ohms	POLAR-NSF 1 watt			
	1 150 ohms	POLAR-NSF 1 watt			
H.F. choke		B.T.S. (for S.T.800)			
Tone control	50,000 ohms potentiometer	GRAHAM FARISH "Ohmite" type			
Mains transformer		FERRANTI SM. 34			

### VALVES

Osram or Marconi VMP 4G Osram or Marconi MSP 4 Mazda AC 2/Pen

# RELIABILITY WINS AGAIN



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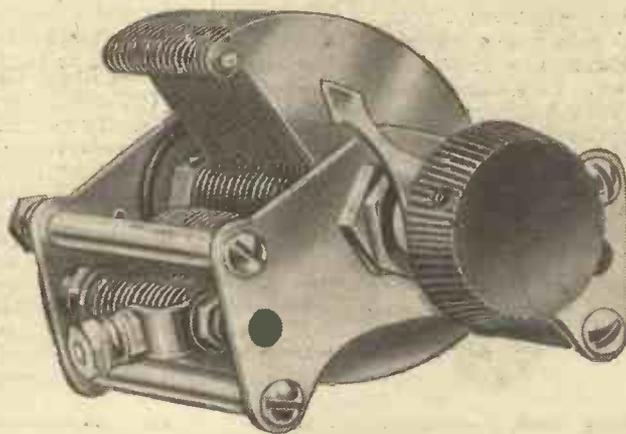
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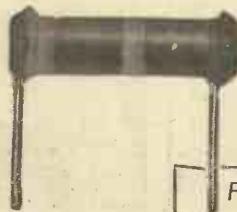
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## RADIO NOTES & NEWS

(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. 'Tis a poetic 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 wavemeter lamp from their "self-aerial" 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!

### Notes for Wanderers

THOSE of my readers who swelter beneath the tropic palm, or who find, on waking in the morning, that their artificial dentures are the centre of a tumbler of ice—in other words, Empire chaps—will rejoice to know that the B.B.C. and the

Foreign Office have been getting together over this little matter of the Daventry broadcasts on short waves. Upshot is that, when necessary, B.B.C. notices will be sent out in Morse from Rugby with the British International Press. World-wide range guaranteed.

'Nother thing is a sort of Empire news-sheet, sent by the B.B.C. to overseas subscribers, with notes on programmes, artists, and what-all.

Finally, there's a little matter of £250,000 to be spent by the New Year on gingering up the Empire station. "Lot of money, John Bull," said his friends. "Lot of Empire," says John.

### Does Radio Destroy Real Music?

BUSINESS never leads me to Birkenhead, and I have no intention of selling any goods there; nevertheless, I sometimes see the "Birkenhead Advertiser," and in a recent issue I came across the following: "Radio is the very road to destruction of real music. Constant radio music is a danger.—Fritz Kreisler."

I would not quarrel with this Fritz Kreisler over a Brahms interpretation, nor over the twiddle-bit that precedes the ninth oompah-oompah in Dvorak's Lethergo; for Fritz Kreisler, we know, is a great artist.

But the statement quoted above is a

sweeping statement, my Fritz. Is it not? What do the Old Birkonians say? Is there another advertiser or man of big business who can speak with authority in this matter?

### 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 vir-

tually 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 aerial 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 wavelengths. 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.

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

ARIEL



## 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 with 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

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 mains results with battery operation.

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.

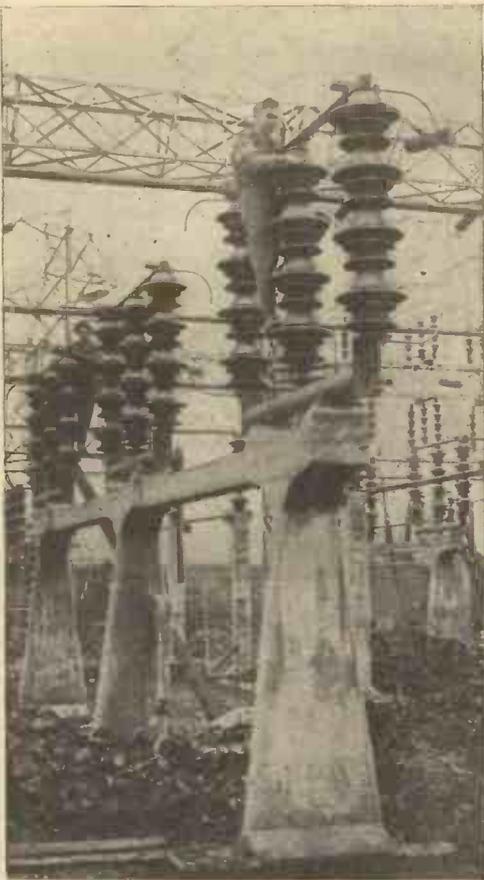


"The S.T. 800 with a cabinet loudspeaker makes an attractive combination. The photo shows the W. B. Stentorian Senior."—Editor.

valves must match the bias instead of the bias matching the valves.

It goes without saying that with a mains set, making the above-mentioned change-over from one type of valve to the other, you want to be sure that the two valves have the same type of filament, for example, they must be both indirectly heated or both directly heated.

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P.W.12 **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 W 6 X A O, at Los Angeles, on a wavelength of 63 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.

A simple 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.

Three hundred lines are used for each picture, which is scanned in "straight" form, interlacing not being employed. The number of frames per second is twenty-four.

A frequency band of from twenty-four cycles to 800 kilocycles is stated to be desirable. The images radiated are negative, and line and frame synchronising 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 lookers to send their reports on. This is a very good idea, for it enables a mass of valuable information, ready tabulated and in standard form, to be amassed.

Not only are such items as clarity and strength asked for, but also details of the location of the receiver and of the type of surroundings and design of aerial used.

As the Don Lee station has now been operating different television systems for some years, the data on reception that they have collected must be pretty big, and should stand them in very good stead when television broadcasting on a commercial basis is commenced.

## "TELEFRAMES"

Items of general interest

THE technique of television definitely seems to be settling down. At one time the various systems being experimented with, both mechanical and otherwise, varied very widely in principle.

Nowadays we find interlaced scanning, for instance, in England, Holland, Germany and America. Similarly, a total number of lines around 400 is usual.

Cathode-ray tubes are the most popular form of reception, and the Iconoscope or electron camera is being used in more and more systems for transmission. And the transmission of synchronising by a drop in the carrier almost to zero is proving the best idea.

And so it looks as though sudden changes and revolutionary new principles are not likely, but that development will be along present lines, just as radio, once the thermionic valve was well established, progressed step by step and not by any sudden leaps and bounds.

### 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 normal service area of Alexandra Palace.

But why not take the idea a step farther and provide a ring of 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 give the equivalent of one half the value should be remembered by television experimenters. Not so much, mark you, because they may 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 because, being of the same value, only half the total voltage is in existence across each.

Thus, suppose you want a .005 condenser with a working voltage of 500 volts. You can just as well use two .01, with working voltages of 250, in series. These 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 shadows caused to ultra-short waves by conductors such as trees, iron buildings, etc., show an interesting feature. The parts shielded from the waves take on very similar shapes to those which 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 more or less applying the principles of airflow to a similarly shaped object.

### POLITICIANS TELEVIEWED

Films of both President Roosevelt and Governor Landon have been transmitted from the television

## 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 it 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. The supply for this may be either A.C. or D.C., and the current consumed is approximately one ampere.

There are three anodes, the third taking a maximum 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 first anode requires 250 volts.

On the screen a negative voltage of 60 is used. Finally, the tube is known as type E46-12, and a suitable Mullard rectifier, HV1, is available for the H.T. supply.

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

Thirty pictures a second were sent with 343 lines. But 441 lines are going to be used in the future for this station.

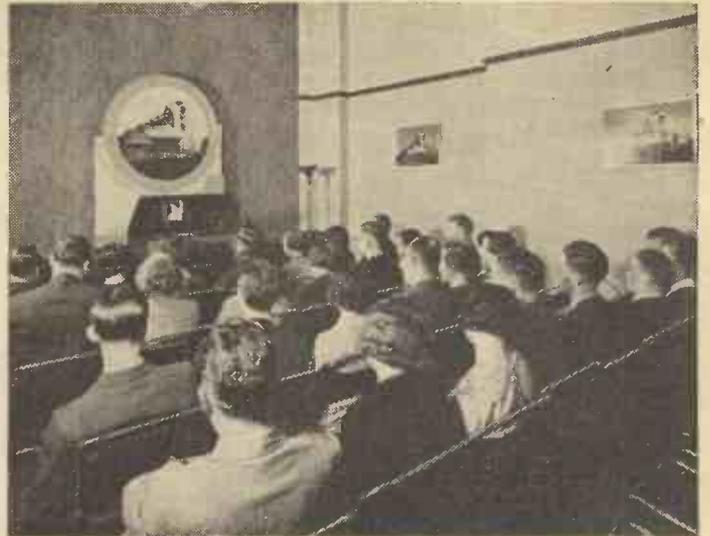
### BIRMINGHAM READY FOR TELEVISION

The special high-definition G.P.O. line from London to Birmingham, which is suitable for carrying television programmes, was completed towards the end of last month. Alexandra Palace is already joined by suitable cabling with Broadcasting House, as also is the latter with the G.P.O. So all Birmingham wants now is a television transmitter!

### VARYING FEES ASKED

The Variety Artists Federation, in friendly discussions with the B.B.C., has suggested that higher fees

Due to the very special nature of this issue, we have had to hold over "Television for Beginners," by G. Stevens, this week. This valuable series will be continued again as usual next week.



Two television theatres have been constructed by H.M.V. at their head office so that dealers and prospective purchasers may see the sets in operation. The larger one is seen above and accommodates forty people, who are all able to see the programmes clearly.

should be paid to artists for television performances than for ordinary broadcasting since 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 Emitron camera. The reason is that in one case a permanent film is made which could be used again.

### WEATHER CHARTS BY TELEVISION

Experiments have been conducted in Germany in the transmission of weather reports to aeroplane pilots. The advantage claimed is that all 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, we understand, 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 ample justification of yet another work of the popular-technical type on the subject. "Television: A Guide for the Amateur," by Sydney A. Moseley and Herbert McKay, has just been published by the Oxford University Press at 5s.

The contents of the book are very up-to-date, and every subject dealt with is lucidly explained in a simple manner. There are no mathematics in the book at all. Such recent items as the Emitron camera, used at Alexandra Palace, find a place in the contents and there are many very recent photographs.

The authors have not hesitated to tackle such subjects as electron-optics and polarised 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.

Put in simple words like that, it does not seem anything tremendous. But it is. 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 adding: "But there were very few sets in use at the time." But that number will grow.

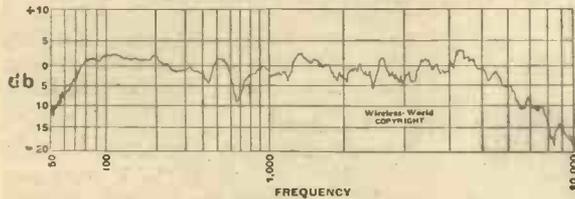
POPULAR WIRELESS will keep you up to date with all the news about television receivers, programmes, developments, and construction. Keep in "synchronism" with this new science [by reading POPULAR WIRELESS regularly.

# 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 ½-watt input and handles up to 7 or 8 watts undistorted.



RESPONSE CURVE OF "GOLDEN" WHARFEDALE

Microphone 4 ft. on axis. 1-watt input.

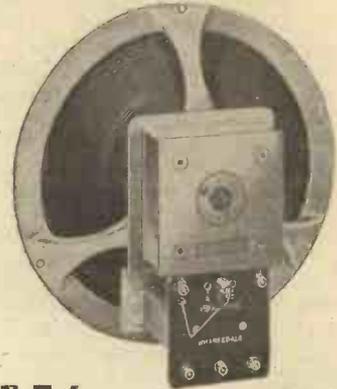
An independent test reported in "WirelessWorld," Aug. 14th, 1936.

"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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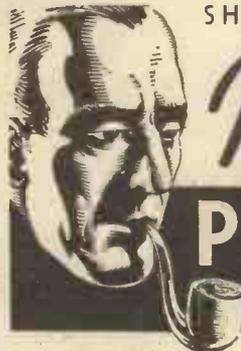


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# All-Wave Aerials For The S.T.800

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 aerials on the market 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.

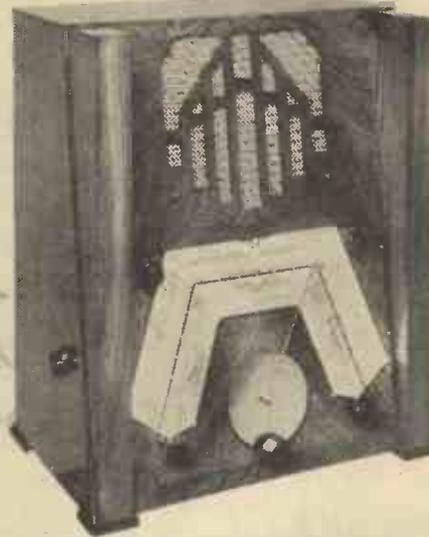
Details of some special All-Wave Aerials which are on the market.

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 35s. The special downlead is supplied separately at 8d. a yard, since the amount required will vary so largely with different circumstances.

## IN CONSOLETTA FORM



An S.T.800 receiver in a Consolelette 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 37s. 6d. 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 15s. 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.

# SEEN ON THE AIR

News and Views on the Television Programmes

By L. MARSLAND GANDER

WHEN the Television Committee proposed that two systems should operate side by side under identical conditions, their chief motive was to provide the competition which would carry television to perfection. Last week I saw that stimulus at work in dramatic circumstances.

The Baird Co. had pinned its faith to the intermediate film system. Only a week before the official opening of the station an electron camera, which dispenses with film and picks up a scene direct, like the human eye (and like the Emitron camera of the rival firm), was secretly installed in the Baird studio.

This was a surprise, indeed. The purpose was to test it against the intermediate film system, while members of the Television Advisory Committee watched the reception over the air and adjudicated.

By the time this appears the decision will have been made. I can only say that at home I watched several test transmissions with the camera and though them excellent. All through the week-end, after the camera

had been first installed, the Baird engineers worked far in the night with rare devotion.

Several nights I switched on my receiver at 11 p.m. and found them still at it—the incessant game of trial and error. They lived at Alexandra Palace. Here's wishing them good luck.

\* \* \*

I have just seen one of the most remarkable television sets yet built, the work of Mr. W. J. Nobbs, of the Mervyn Sound and Vision Company. It promises to bring construction of a television receiver within the powers of the experienced amateur.

In brief, the set is sold in four sections which may be assembled in the home; the voltage in the cathode tube has been reduced to 3,000 and the price of the whole outfit according to Mr. Nobbs, to about £40. Users would, of course, want a sound receiver as well, costing £9 10s.

On this outfit, in Central London, I saw the Puppet show transmitted by the B.B.C. Without question the set does its job and does it well.

Here are tabloid impressions of some recent broadcasts:

## The Boxing Lesson

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

## First Weather Chart by Television

Another bright Cecil Lewis idea, but may become dim with usage. Viewers 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!

## PUZZLE SOLUTION.

The solution to the puzzle which appeared on page 190 of last week's Popular Wireless is as follows: The meeting opened with eighteen members. Eleven of them went to 'see a man about a dog.' If the chairman had gone with them this would have made twelve in all, or two thirds of the total number. Of course, if only nine had gone then half of the original number would be left.

# "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*



Man-made static looks somewhat like snow. It is shown in this sketch on a vertically scanned picture.

"I SAW stars . . ." sang the dance-band crooner. But he wasn't referring to television, though he might well have been eulogising radio's latest and greatest development. Television is an undoubted success; every radio engineer will agree with that, and so will everyone who has seen the broadcasts from the Alexandra Palace.

But there are two sorts of stars which can be seen in the television receiver—the legitimate twinkle of the artists, and the not so legitimate "spots before the eyes" that betoken "television liver."

Let us talk a little about the latter complaint, an illness afflicting the apparatus—not the person looking at it.

"Television liver" is a peculiar sickness but it is not a very common one, thanks to the energies of the radio doctors—engineers if you like to call them by their proper name.

"Spots before the eyes" is an affliction that we used to get a great deal during the early television tests, with cathode-ray tubes especially. It consists of a series of white blotches which float tantalisingly across the picture, or in the form of "rain" pouring down on the poor artist being televised in a most disconcerting manner.

I have said that it is not a common complaint nowadays. It is not if the television receiver is properly made and well installed. But it is a possible complaint, and because it is one that has given the engineers a very bad time in the past, I thought you might be interested to know something about it.

## Bus Spots!

"Television liver," or "Cathodic spottens," can be caused—like a cold in the head—by many things. As no cure has been found that will ensure the exit of the common cold, so no cure or prevention has been discovered that will unfailingly banish this television disease. But it will be conquered at last, and the B.B.C. and the many radio engineers working on television are rapidly approaching the perfect cure.

What is the cause, or rather what ARE the causes? Well, one might be a great big L.P.T.B. bus passing down your road, close to your television aerial, or it might be an Austin Seven. Either will give you quite an acute attack of "television liver." The cure in this case is the proper design of receiving aerial, so arranged that it will not pick up interference of the kind emanating from the electrical systems of these vehicles.

But as a cold will be brought on either

by an external draught or by some germs which have assailed the body through the mouth and food, so can T.L. be produced by external interference or by interference that reaches the set through the mains power feed—like the germs which hide so securely in your food springing out when safely inside to produce gastric flu or some such nasty complaint. (You must forgive me if my medical knowledge is a bit rocky—the analogy is the main thing.)

Through the mains into your television apparatus may come the most persistent "germs." High-frequency interference that will give the most realistic attack of "spots" unless they are trapped at the outset by well-designed filters.

## C. R. Tube Blues

You may hear these "germs" at work in your sound section of the outfit without seeing anything on the screen, or you may "see things" without the ear being disturbed. But whether you see or hear, or both, you may rest assured that the main cause of "spots" is interference from outside—either direct on the aerial or through the mains.

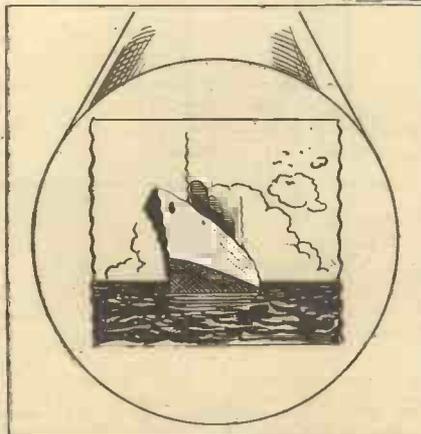
I have tried to illustrate the attack of T.L. which comes through interference, but, of course, the sketches must necessarily be rather rough.

There is another form of "television liver" which we can almost describe as D.T.'s. It takes the form of the most weird jumping about of the picture.

## AN ATTACK OF THE BLUES

Both the troubles illustrated in these sketches have the same source—A.C. hum. On the right it is seen as heavy black bands, and below as a wavy effect at the edges and on the picture.

Sometimes the picture will jump sideways at some portion, or it will shimmy a little before settling down again to proper behaviour.



The cause is usually some fault in the time-base of the receiver. If the scanning system "sticks," the discharge valve or valves lagging a bit at the beginning of the scanning of a line we get the shimmy or jumpy effect I have mentioned.

But by all this you must not come to the

conclusion that the cathode-ray television receiver is a delicate piece of work prone to diseases 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-

ness and mourning, or it may be intended to convey some sort of rhythmic dance or movement.

In the case of television it conveys just those two ideas, one for each symptom of the disease.

The first one—the "mourning" kind—shows up as heavy black shadows and bands across the picture. They may be stationary or they may drift about. They are caused by L.F. hum in the receiver or being induced into the cathode-ray vision receiver, the time-base, or even direct into the tube.

## A Slow "Shimmy"

The second "blues" is the rhythmic sort. It shows on the screen in the form of wavy edges, giving the picture a sort of flag effect, or a definite slow "shimmy." It may even inspire the artists on the screen to emulate the movement to some extent. Yet again it is caused by the same things—L.F. hum, usually in the form of 50- or 100-cycle impulses being fed into the television time-base and affecting the scanning and operation of the time-base.

# HOW LONG WILL A NEEDLE LAST?

—This and Other Readers' Queries are Interestingly Dealt With

## THOSE NEEDLES

Y. F. H. (St. Albans).—*I went to the local radio dealer in a town near here the other day and asked for some 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 should.

I have never found that 60 playings can be obtained with these needles without the quality of the reproduction suffering, but it depends on the type of pick-up you use, and the quality of the set and speaker. I prefer to use the needle for about 25 to 30 playings, but there is no doubt that they are useful long after that. I am finicky, however, and so probably was that dealer.

I am not going to say either the dealer or the maker is wrong. So much depends on what you call worn out when referring to a gramophone needle. I discard mine very early—but I use a piezo-crystal pick-up, and they are rather sensitive to worn needles. They soon detect any roughness when they are used on a set that reproduces 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 play the needles the full 60, but I certainly do not consider that such a length of playing is impossible, by any means.

No hard-and-fast rule can be made, that is why the makers of the needles have worded their "directions" as they have. So do not get the idea that either the maker or the dealer is "trying one over" on you.

## COMPULSORY SUPPRESSORS

G. W. R. (Teignmouth).—*I saw in the papers on October 18th, that next year we may have to fit suppressors on our electrical apparatus, such as electric sewing-machines, vacuum cleaners, 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 arrangement or flicker scheme to give a coal-fire effect—which have caused crackling in a set. It may be due to bad contacts somewhere, or to the expanding of the elements causing variations in resistance. Anyhow, whatever the cause, I have experienced such interference. But I imagine that the inclusion of fire is to cover these imitation coal fires which have a flicker mechanism incorporated, and which, being just minor "fans," might give rise to interference.

It will be a good thing if compulsory fitting of suppressors is introduced. There is far too much unnecessary interference with radio nowadays.

## HERE WE ARE AGAIN

Extract from a letter from W. H. Carter, Stream Lane, Hawkhurst, Kent.—*"Would any reader of POPULAR WIRELESS be kind enough to let me have two back copies of 'P.W.' containing blueprints of the S.T.400 and S.T.500. I would recompense anyone for the copies."*

So there you are. A chance to do your good deed for the week. Drop Mr. Carter a line, will you? If you have the necessary copies, and let him write to you to arrange for the sending of them.

## THAT CHANGING NOTE

W. B. W. (Rotherham) writes to tell me some mathematical formulæ which concerns the apparent drop in pitch in a note played by a musical instrument as one recedes from it. You may remember that in "P.W." for September 12th I discussed the lowering of

the pitch of a note played by a cornet when heard by the passengers in a passing motor-car.

In this letter, which I reproduce for your benefit, W. B. W. goes further into the matter. He says:

Actually what happens is that an observer in the car, when approaching, does not hear the true note

The Editor cannot accept responsibility for manuscripts or photos. Every care will be taken to return MSS. not accepted for publication. A stamped, addressed envelope must be sent with every article. All Editorial communications should be addressed to the Editor, "Popular Wireless," Tallis House, Tallis Street, London, E.C.4. All inquiries concerning advertising rates, etc., to be addressed to the Advertisement Offices, John Carpenter House, John Carpenter Street, London, E.C.4. The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless reception. As much of the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and specialities described may be the subjects of Letters Patent, and the amateur and the Trader would be well advised to obtain permission of the patentees to use the patents before doing so.

but one higher, and when the observer passes he hears a drop in the note, and as he goes away he hears a note lower than the real one. A similar kind of thing happens when the source is moving and the observer still. Formulae can be deduced to find the apparent pitch in each case.

Case (a). Observer moving and source still. Let  $V$  = velocity of sound.  $v$  = velocity of observer moving towards the source.  $N$  = number of waves per second emitted by source.

In 1 second the observer receives  $N$  waves: that is,  $N$  waves + number in space  $v$ , since while the waves travel to B he travels to C, and therefore receives an extra number.



## TECHNICALITIES EXPLAINED—No. 29

### PARAPHASE AMPLIFICATION

I have already dealt 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 so 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 one push-pull valve is having its grid made more positive the other must have its grid made a similar amount more negative. How is it done in this case? By a very ingenious method which allows resistance coupling to be employed throughout, thereby obtaining the best possible quality of reproduction. The input to the amplifier is through an ordinary valve "A," then the output from this valve is split so that it goes to two valves EQUALLY. Thus 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 followed by a similar output valve to B, namely C, it is obvious that there would be too much amplification if B1 and C were used "all out" in "opposition" to B. Therefore, the voltage input of B1 is cut down so that the amplification of B1 times that of C results in a signal strength EQUAL to that given by the output of B alone. In figures: suppose the output from A is 1 volt. Suppose that the amplification given by B is 10. Then we get 10 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 we do by the potentiometer which is used to cut down the output of the valve to 1 volt. A constant signal for this is not necessary. All that has to be done is for a pair of phones to be placed in the main H.T. circuit—where if the push-pull output is balanced there should be no audible signal—and turn the potentiometer P until no signal is heard in the phones. Then the outputs from B and C are equal.

But wavelength =  $\frac{V}{N} = \lambda$   
 $\therefore$  Number of waves in space  $v$   
 $= \frac{v}{\lambda} = \frac{v}{\frac{V}{N}} = \frac{vN}{V}$   
 $\therefore n = N + \frac{vN}{V}$   
 $= N \left( \frac{V+v}{V} \right)$

This is the frequency of the note heard when the observer approaches, but if the observer moves away he hears  $N \left( \frac{V-v}{V} \right)$ .

Case (b). Source moving, observer still. Let  $v$  = velocity of source moving towards observer. This time there are  $N$  waves in space  $V-v$ , since while the first waves travel to B-A has moved up to C.



$\therefore$  Actual wavelength =  $\frac{V-v}{N} = \lambda$   
 But frequency  $n$  of note heard by observer =  $\frac{v}{\lambda}$

$\therefore n = \frac{V}{V-v} = N \left( \frac{V}{V-v} \right)$

This is the frequency of the note heard by the observer as the source approaches, and if the source moves away, the observer will hear a note of frequency  $n = N \left( \frac{V}{V+v} \right)$ .

This effect is called the Doppler Effect. The above also applies to light. If a star is approaching the earth, the light waves are pressed closer together and the spectrum is shifted towards the violet end. By measuring this shift, astronomers have found at what relative speeds certain stars are moving towards or away from the earth.

By the Doppler Effect the sun's speed of rotation has been found, and also Saturn's rings have been shown to be rotating more rapidly at the inner edge than at the outer edge, proving that they are not solid, but are made up of numberless small rocks.

## IN—AND OUT AGAIN

C. J. (Wrexham).—*I have been reading about the metal valves used in some of the American sets. Why cannot we have metal (Continued on next page.)*

**RADIOTORIAL  
QUESTIONS & ANSWERS**

(Continued from previous page.)

valves here? Surely it would save a great deal of money in 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 1932. Sounds funny, but it is a fact that metal valves, in the shape of the catkin type, came into use in 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 types rarely get 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 236.)

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.

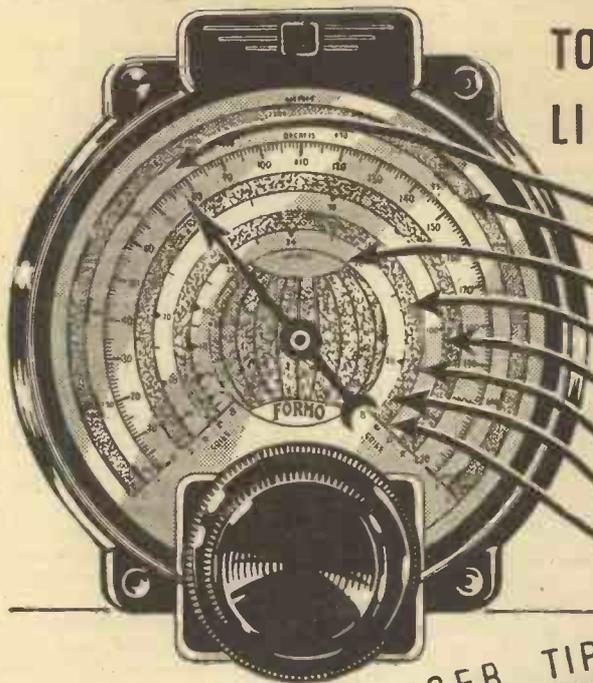
The construction of the set is exceptionally simple, the main portion of the receiver being mounted on the back of the main panel, the power equipment being provided on a baseboard slipping into the bottom of the cabinet. The bottom of the panel is Metaplexed in parts for the primary purpose of avoiding 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.800. While the addition of two bands of short waves completes what most readers will regard as a very attractive proposition. **J. S.-T.**

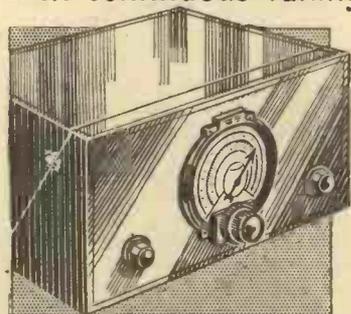
**ASTONISHING NEW  
BROADCASTS NOW AVAILABLE  
TO Every  
LISTENER**



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- 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 12-2000 metres



This amazing Kit  
can be yours for less than  
**14<sup>d</sup>**  
PER WEEK  
OR 57<sup>6</sup> CASH

Why be content with a receiver which is only designed to receive an infinitesimal 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 short-wave stations in all parts of the globe. These are the stations which the Multiwave receiver can give you, programmes of 100 per cent. 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 1s. 4d. 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  
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Dear Sirs.—Please send me:  
Contact Star circuits, describing four best circuits including the Multiwave, price Post Free 1/-.

- I am interested in Hire Purchase
- I am not interested in Hire Purchase.

Name *G. Davies*  
Address *"Shorncliffe" Morda,*  
*Aswester, Southampton*

# RANDOM RADIO REFLECTIONS

By VICTOR KING

How Much Is a Voice Worth? Buying a Set.

## WHAT PRICE AN ANNOUNCER?

**H**OW 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 Tauber will get a thousand pounds for each of his seven days of tonsillian 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 poisanility.

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—and I bet you'll still be miles out. I'll tell you. Take careful 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 (good pun that) 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 Cantor, 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 radio 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.

The minimum weekly wage for a London newspaper reporter is nine guineas.

For some years I contributed one unsigned article every Friday to one of the dailies at five guineas a time. Sometimes they used the full eight hundred words I wrote, sometimes only about one hundred and fifty words. But the fee was always the same. Used to take me about one hour to do that weekly chore.

Eventually I got so bored by the job I threw it in.

And I swore I'd never take on another regular "feature."

Yet here I am doing these weekly notes for "P.W."

And liking it!

## ARE THEY BETTER?

**B**ELEVE it or not! A friend rang me up the other day to ask my advice concerning the buying of a radio set. He's been abroad for some years. Was once an enthusiastic home constructor. "Are these modern sets really any better for bringing in the distant stations than the sets we used to build?" he asked. "I used to get marvellous results on my Det., 2 L.F. hook-up."

Shades of the honeycomb coil! Give me strength! Signal strength!

"My dear Rip Van Winkle," I gasped, "apart from such modernistic things as H.F. amplification, we have even managed to squeeze extra grids into our valves."

I then went on to chatter enthusiastically about superhets and AVC. By the way, on second thoughts I'll stick full-stops among those letters—A.V.C. Mustn't follow the bad example set by my morning

(Continued on next page.)

## 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.

**T**HE 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 the 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 get quite 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.

This 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 .001 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 measurement, and the following proportions (by volume) give you the densities tabulated against them.

Parts Water	Parts Acid	S.G. of Elec.
4½	1	1.200
3½	1	1.230
3¼	1	1.260

From these figures it will be seen that density of concentrated brimstone sulphuric acid is taken as being approximately 2.375, 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.

**RANDOM RADIO REFLECTIONS**

(Continued from previous page.)

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 for L.F. coupling condenser.
- .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  $\frac{1}{4}$  in. and made  $\frac{3}{8}$  in. wide. The hole in S.T.700 for volume control should be enlarged to  $\frac{7}{16}$  in.)

Easy-cabinet (a hole for wave-change switch will be made in left-hand side-piece).

Aerial coupler (pigtail should preferably be altered. Remove brass strip, cutting one end of pigtail from it. Shorten pigtail to shape shown on S.T.800 blue print. Connect free end under nut which fixed brass strip).

Anode reaction condenser (pigtail preferably treated in same manner).

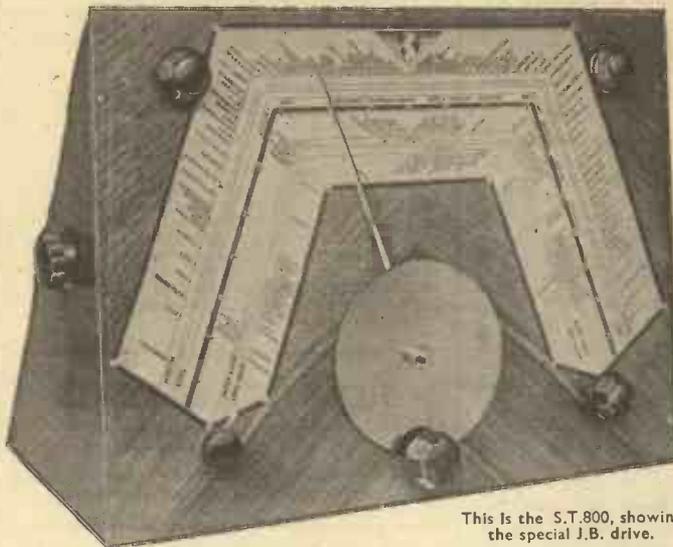
Main tuning condenser. (As the S.T.700 condenser stands, it will be inclined to be noisy when tuning-in on short waves. If you can push pigtail into a position where it does not rub against anything this trouble will not occur. But it is best to remove end of pigtail which is clamped under terminal on end-plate; slip a length of insulating sleeving over the pigtail; re-connect end of pigtail to terminal on end-plate. New builders will find the new J.B. condenser for S.T.800 already has an insulated pigtail.)

Triple Extractor is same as for S.T.700—if used.

**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 35 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

*Epecially designed for the S.T. 800*



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

**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 pigtail, 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.1. Tel: HOP 1837

# INTERNATIONAL RADIO BUREAU

260, DEANSGATE, MANCHESTER  
HAVE PLEASURE IN ANNOUNCING THEIR

## DIPLOMA S.T.800

Kit of first specified components packed in an attractive SEALED CARTON containing a SIGNED and NUMBERED WARRANTY which fully GUARANTEES EVERY COMPONENT to stand up for its work or to be replaced FREE OF CHARGE.

IMMEDIATE DELIVERY—ORDER TO-DAY!

	2 s. d.
2 PETO-SCOTT ready drilled ebonite terminal strips, 2 in. X 1 1/2 in.	6
1 PETO-SCOTT ready drilled and polished walnut plywood panel with 6 nickel-plated screws	3 3
2 PETO-SCOTT ready drilled and polished side pieces	1 0
1 B.T.S. S.T.800 Quadwave coil unit	1 10
1 J.B. S.T.800 main tuning condenser and pointer	6 6
1 POLAR S.T.800 aerial balancer condenser	5 6
2 GRAHAM FARISH S.T.800 Littos condensers with flanged nuts	3 6
1 GRAHAM FARISH turret switch with flanged nut	2 0
1 T.M.C. block condenser, 2 mid. X 2 mid. X 1 mid. type B1007	4 0
1 B.T.S. S.T.800 H.F. choke	1 9
1 VABLEY Niclet L.F. transformer, ratio 1/3.5	7 6
4 BENJAMIN Vibrider 4-pin valveholders	3 4
5 BULGIN 1-watt resistors, 30,000, 5,000, 20,000 ohms (2) 1 megohm	2 6
4 T.C.C. type "M" condensers, .004, .0001 (2) .0005 mid.	3 2
1 LISSÉN type .006 mid. condenser	1 0
4 BELLING-LEE type "R" terminals, A, E, LSI, LS	1 0

KIT "A," CASH OR C.O.D. CARRIAGE PAID, £3 7 6

**DIPLOMA KIT "A."** Complete Kit of first specified parts, less wander plugs, spade terminals, valves, Extractor Unit Kit, cabinet and speaker, £37/10.  
**DIPLOMA KIT "B."** As for Kit "A," but including 4 first specified valves, less cabinet and speaker. Cash or C.O.D. Carriage Paid £4/14/0.  
**DIPLOMA KIT "CT."** As Kit "A," but including valves and Peto-Scott S.T.800 Console/ette speaker. Cash or C.O.D. Carriage Paid £5/11/6.  
**DIPLOMA KIT "CC."** As Kit "A," but including valves and Peto-Scott S.T.800 table cabinet, less cabinet, with speaker, baffle and battery shelf, less speaker. Cash or C.O.D. Carriage Paid £6/9/0.  
**DIPLOMA KIT "CLL"** As Kit "A," but including valves and Peto-Scott S.T.800 Console/ette cabinet, type "LL," with lift-up lid, and speaker baffle, less speaker. Cash or C.O.D. Carriage Paid £6/11/6.  
 If 8 wander plugs and 2 spade terminals are required with above Kits, add 1/8 to Cash or C.O.D. prices.

### KONECTAKIT SPECIAL OFFER

A Peto-Scott "Konectakit," containing all the items listed below, is supplied gratis with complete kits A, "B," "C," "CC," "CLL" Comprises: 6 No. 4 1/2" (nickel-plated), 4 No. 4 3/4", 14 No. 4 1/2", 8 No. 4 3/4", 10 No. 4 1/2", and 4 No. 3 1/2" round-head wood screws, 4 brass washers, 3/8" X 1/2" hole, 8 nickel-plated 6BA X 3/8" round-head screws, 16 nickel-plated 6BA nuts, 20ft. 18-gauge tinned copper wire, 15ft. of insulated sleeving, 20ft. of rubber-covered flex, 1 fibre battery lead clamping strip.  
 This Konectakit may alternatively be purchased with incomplete kits, or separately at the special price, post paid, of 3/-

	s. d.
<b>TRIPLE EXTRACTOR KIT.</b>	
1 Extractor panel and 4 sides for box, all ready drilled and polished complete with screws	2 0
1 Wearing triple extractor iron-ore coil	7 6
3 Polar .0005 condensers No. 4 with knob at 4/5 each	13 3
2 Belling-Lee type R terminals (A.1-A.2) at 3d. each	6
"Maxamp" wire for connecting and various screws	9

If Extractor Kit required with any of the above Kits, add £1/4/0 to cash price.

### RECOMMENDED EXTRAS FOR THE ABOVE KIT:

	2 s. d.
1 Hivao VP215 Met. 4-pin	9 6
1 Mazda L2 Met.	4 9
1 Osram L21	4 9
1 Hivao FX230	7 6
<b>DIPLOMA VALVE KIT AS ABOVE</b>	1 6 6
Hivao Valve Kit	1 4 6
1 W.B. Stentorian 378 chassis	2 2 0
Peto-Scott Table Cabinet	17 6
Part carriage and packing extra 2/6	
Peto-Scott Upright Console/ette Cabinet, with speaker baffle, and battery shelf	115 0
Part carriage and packing extra 2/6	
Peto-Scott type LL Console/ette Cabinet, with speaker baffle and lift-up lid	117 6
Part carriage and packing extra 2/6	

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**INTERNATIONAL RADIO BUREAU,  
260 DEANSGATE, MANCHESTER**

## INSTALLING THE S.T.800

(Continued from page 235.)

of the set. The aerial lead should always be kept away from the earth lead.

Set the pointer of your main tuning condenser to a local Regional station name. Turn the wave-change switch to the medium waveband, i.e. next to the full right-hand position looking at the set from the left. Turn the aerial coupler about half-way. Turn anode reaction fully anti-clockwise (fully to the left). Turn aerial balancer knob so that the pointer points in a direction approximately parallel with the direction of the main pointer. Turn turret switch fully right to switch on set at full signal strength.

If it is found that the pointer points a little to either side of the name of an identified station, about the centre of the dial, the position of the pointer-disc on the main spindle can be altered by slackening the grub-screw, holding the vanes, and turning the disc one way or the other to a small extent by turning the driver knob. Then tighten grub-screw.

**Use of Mains Units.** If a mains unit is employed, the H.T.+1 connection is taken to the S.G. socket on the mains unit; if there is a high voltage S.G. socket, this is generally to be preferred. The H.T.+2 connection is taken to the highest of the intermediate tappings. The H.T.+3, of course, goes to the maximum socket on the mains unit. As many mains units will give 150 volts, the maximum grid bias may be increased to 15 volts.

## HOW TO OPERATE THE S.T.800

Only very brief instructions are given here. Further details will appear next week.

**EXAMINE** photographs of controls and note what they do. Remember there are two tuned circuits. The first has its selectivity affected by the aerial coupler and its tuning by the aerial balancer (bottom left-hand knob). The second circuit, tuned by the main knob with long pointer, is made more selective by having turret switch at the first "on" position (half-way), while the reaction knob also improves selectivity greatly.

**Aerial Coupler.** Normally about a third from the left. Turn left for reducing signal strength or improving selectivity. Turn right for stronger signals (but selectivity is reduced). Tuning is not appreciably affected. Main dial not affected at all, but very slight readjustment on aerial balancer may improve signals after alteration of aerial coupler.

**Aerial Balancer.** As this tunes the aerial circuit it is a vital control; if not accurately tuned you will not properly receive the desired station. You do not, however, need to know or remember its position. Its pointer will point approximately parallel to (or a little to the left of) the main tuning pointer. Tuning is done after main pointer has been set.

**On-off and Selectivity Switch.** (Bottom right-hand corner.) When full left, set is off. When first position to right, set is at ultra-selective, but set is not fully sensitive. When switch knob is full right signals are loudest but selectivity is only normal.

**Main Tuning Knob.** Tunes the second circuit i.e. the anode circuit. Alteration of reaction should be followed by slight readjustment of this knob.

**Wave-change Switch.** On left side of set. Looking from the left side when the knob is turned fully left (anti-clockwise) you are on the short-short-waves. First position to right is long-short waveband. Next position is medium waveband. Fully to right (clockwise) you are on the long waves (Droitwich, etc.).

**Calibrating the S.T.800.** You should start logging as soon as possible so as to get a few easily recognised stations marked with a dot. As the aerial balancer is not calibrated, "old hands" may find things a little strange at first, but this feeling disappears rapidly as you mark up a few stations. Pick up your locals first and reduce their strength, e.g. by turning aerial coupler to left and selectivity switch half-way. Apply reaction so as to get a fine tuning point. The aerial balancer should be tuned to give loudest signals, its pointer being approximately parallel or a little to left of main pointer. Mark a dot in pencil where main

pointer crosses the dot-line nearest the outer ring of stations. Join dot by pencil line to end of station name.

If the pointer does not point at the station name you can slightly slacken grub screw which holds condenser drive disc to the condenser spindle. The pointer-disc can then be turned a little to left or right as the case requires; the grub screw is then tightened.

Having marked your local you can always go back to it by setting the main pointer to it and then turning the aerial balancer until the station comes in. (Do not forget to adjust the aerial balancer.) Repeat the process on other easily recognised medium-wave stations. Intermediate stations are easily found by noting the general angle of the junction lines to the station names.

When the set is not in its most selective condition it is possible for the main pointer to be set at a foreign station and the aerial balancer as it is turned may bring in some other station, due to its not being correctly adjusted. For example, the local station may come in. You rapidly learn to ignore these stations and continue to turn the aerial balancer until the actual station wanted comes in. The final test to make sure you have the wanted station is to move the main pointer to each side of its correct position. Signals should weaken which ever way you move the main pointer. If they do not weaken (unless signals are already very strong) it means you are on the wrong station, due to an incorrect setting of the aerial balancer.

The simplest way of tuning is to set your main pointer to the station dot, make the set oscillate with reaction. You will no doubt hear a whistle. Then turn the aerial balancer to a point where the whistle suddenly changes note. Loosen reaction and there is your station. This system, although fool-proof, is only used for logging very weak stations, but the system can be recommended for short waves owing to sharpness of tuning on those bands.

**Tuning the Short Waves. 1st method.** The short waves may be received with aerial balancer pointer fully to the left, tuning being accomplished with the main pointer and reaction, the selectivity switch being turned fully to right. The set may be made to oscillate with the reaction and the main pointer turned to around the middle of a group of short-wave stations. Heterodyne whistles will be heard. Gradually reduce reaction until set stops oscillating and by careful tuning on main pointer and by keeping reaction critical you will pick up a number of stations.

**2nd method.** Having received a station you can make it much louder by turning the aerial balancer knob until the signal comes into tune on the balancer. You may find that as it does this the set oscillates. In that case you will have to reduce the reaction. This second method is usually only advised when the short-wave signals are strong.

**3rd method.** Make the set oscillate by use of plenty of reaction (use more than is necessary just to start oscillation). Keep the aerial-balancer pointer more or less parallel, but a little to the left of the main pointer. Pick up a station on the main pointer by its heterodyne whistle. Leave go of the main tuning control and turn the aerial balancer either way until the whistle suddenly changes character. This will only occur at one point. You will find that you can get a silent point adjustment on the aerial balancer and that if you tune the balancer to either side the note of the whistle will rise. At the silent point the aerial balancer may be regarded as in tune. Leave it alone. Now go back to the main tuning knob and adjust it while reducing reaction to the normal critical non-oscillating condition. In this process you will hear the whistle appear again and you should not "lose" it by over-rapid alteration of either reaction or main tuning knob. It will be found that the reaction knob will affect tuning somewhat, but if you keep the whistle or the clear station itself within hearing by suitable tuning of the main pointer, this will cause no ill-effect.

**4th method.** A final polish for the satisfaction of experts may be given as follows: Tune a trifle below the station on the aerial balancer and get the station at its loudest by trial "swinging" of the main tuning control. Then tune very slightly higher on the aerial balancer, repeating the swinging. Signal should be

(Continued on next page.)

## 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 aerial balancer signals will begin to fall off in strength. During these tests (which actually only take a second or two) reaction should be kept critical.

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 aerial 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 aerial coupler and volume control if necessary. Now slowly alter 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 become louder.

(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 that 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 225.)

considered for long enough to be the impossible. A whole gamut of noise-free, interference-free, quality-perfect programme providers that are a joy to hear.

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 Americans on the 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 recommend 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 even the alternative components in my list; there is a real danger here, and the responsibility for substitution becomes the supplier's and not mine.

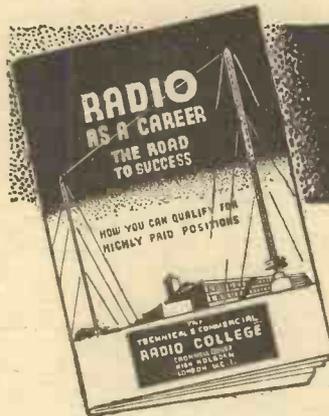
The valves specified are those I found the best for this particular set. The detector valve is the most important. With other types you may not get enough reaction on the short waves.

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 B.T.S. coil unit and specified J.B. condenser can be used with the Auto-Dial. Only a Niclet transformer is advised.

Don't ruin the set to save twopence. Keep to my list of components. If you don't, and your set's a failure, it's your own funeral. You've been warned. J. S.-T.

THERE WILL BE MORE ABOUT THE S.T. 800 IN NEXT WEEK'S "POPULAR WIRELESS," INCLUDING FULL DETAILS FOR BUILDING THE TRIPLE EXTRACTOR AND THE A.C. MODEL.



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**S.T.800**  
(Continued from previous page.)

desired station and then simply turn the aerial balancer knob till the station comes in. This has proved a very simple and effective system in the case of the S.T.700, and is repeated with every confidence. The slow-motion was not used on the S.T.700, and it is actually not necessary for medium and long waves on the S.T.800, but on the short waves it is invaluable. But it is quite unnecessary to keep any record of the position of the condenser. To indicate, however, whereabouts you are on this condenser, there is a small brass arrowhead which should always point in the same direction, more or less, as the long pointer on the main tuning condenser. Nothing need be said about the top right-hand condenser which is for providing reaction. But a few words are necessary about the knob down in the bottom right-hand corner. On the S.T.700 and on the S.T.600 I used a potentiometer for controlling the amplification of the first valve. Experience has shown that this is not really necessary and that two positions only are sufficient, one being maximum, i.e. with zero volts on the grid of the valve, and the other position being minus 3 volts or thereabouts. This second position results in a fall in sensitivity of the receiver, but a rise in selectivity on the main tuned circuit, i.e. the one associated with the long pointer. The special switch employed enables the set to be switched off or on, to either normal selectivity or ultra selectivity. When I say there is a falling off in sensitivity, this is purely relative, as, even with the set in the ultra selectivity condition, practically every station can be obtained at full loudspeaker strength by the aid of reaction. This knob, then, is not a control, and the result is that instead of the constructor being faced with the possibility of a thousand different combinations of adjustments or control, he now only has two and, for normal purposes, only one (the aerial coupler). As a result, the set is much simpler to operate than the S.T.700 and we are now really back to the position of having two tuned circuits and a reaction knob.

The switch on the left-hand side of the set gives us the four wavebands. When the switch is fully left (anti-clockwise), looking from the left of the set, we are on the shortest waveband. Turn the switch one stud to the right and you are on the upper of the two short-wave bands. A further movement of the switch brings you to the medium waves, while full right gives us the long waves. Nothing else whatever is altered except this simple switch which changes from one waveband to another, and on each waveband all the controls work exactly the same way. The set is the same set for all wavelengths, as regards number of valves used, effectiveness of controls, and operation. On the short waves, the second tuned circuit becomes "parallel-fed," but this is automatically carried out in the coil unit and does not concern the constructor. The great point is that all the merits of aerial couplers and adjustable bias, proved of such value in previous sets, are equally successful on the short-wave bands.

In brief, you will find the S.T.800 as delightful to work on the short as on the usual wavelengths. The policy of a big margin of safety has proved itself up to the hilt.

J. S.-T.

**L.R.S. 'Designer' KITS**

**for the ALL-WAVE S.T.800**

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Complete kit of parts for this remarkable new Receiver available:—  
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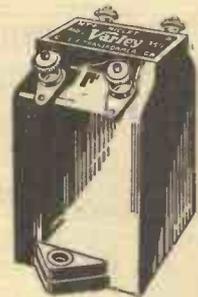
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**S.T. 800**

Mr. John Scott-Taggart has paid tribute to the sound engineering of Varley by specifying exclusively the "Niclet" L.F. Transformer in both models of the S.T.800.

Mr. Scott-Taggart has always held a very high opinion of Varley products, and this, his latest choice, is ample confirmation of our supremacy in the component world. We are still the pioneers of radio. Write to Varley of Woolwich for free illustrated catalogue describing the whole wide range of our components.



The "Niclet" L.F. Intervalve Transformer. Ratio 1:3.5. List No. DP 21 45 Henries. Price 7/6d.

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PRICES. BP 111 £1 1 0 BP 113 £1 1 0  
BP 112 13 6 BP 114 13 6



We flatter ourselves that these ganged tuning units of ours are a good deal ahead of their time. Incorporate one of these units in your own set. We don't say that you will be "amazed" or "staggered" at the result. But we do say that you will be most agreeably surprised.



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PLEASE BE SURE TO MENTION "POPULAR WIRELESS" WHEN COMMUNICATING WITH ADVERTISERS. THANKS!

## 4 VALVES—4 BANDS—6 CONTINENTS!

(Continued from page 216.)

Australia, or a noise like the feeding of lions which he boasts is a South American station; or the noise of a ship at sea ploughing the waves in a storm which is Terra del Fuego; or, just as frequently, a noise like the feeding of lions on a ship at sea ploughing the waves in a storm.

No wonder the public has hitherto held off the short waves. They do not want this sort of stuff. The great increase of power of short-wave stations and the entry of practical designers with vastly higher standards of reception, are the two factors which will change the short waves from a monthly stunt to an everyday entertainment.

The emphasis has always been on the wrong facts. There have been too many waving palms in the advertisement matter and too many wavery whispers in the loud-speaker. I say definitely that even if you could only get a single station well on the short waves it would be worth having the short-wave band. If you could only get a single station, and that an American one, on the short waves, the additional band would be worth while.

No one but a ham wants a dithering refrain which might be the Bolivian national anthem or—"Has anybody here seen Kelly?" I, personally, would prefer to forget such a reception and concentrate on the now many stations which, on a good set, will give you a 24-hour service of real entertainment. Hearing a good American programme all over the house, if desired, means far more to me than some freak reception of an amateur in Shanghai—although the S.T.800 will give you that as well. By all means enjoy the occasional surprise items, but do not build or buy a set on the expectation of them. There is much solid fare from Europe and America—regular reception at excellent strength on the short waves. It is this real entertainment, if easily obtained, as it is on the S.T.800, which will "sell" the short waves. And every month sees new or more powerful stations intended to give pleasure to the public, not just a "kick" to the experimenter.

I have given tongue to many a jibe at the appallingly low standard which satisfies the average short-wave fan. It is in that critical frame of mind that I have designed my idea of a short-wave receiver. That it will be built in tens of thousands is a conviction born of the confidence the constructing public has placed in me in the past. The fear of letting down that public with a half-solution of the short-wave problem has kept me off such sets as

regards published designs. But in the S.T.800 I have at last a set which can brave out even my own past criticisms. I commend it to your judgment. In no other kind of set is faith in the individual designer so essential.

Place that faith again in the S.T.800 and you will reap worth-while enjoyment from the ends of the earth. JS-T.

## A BIG BOOK ABOUT BROADCASTING

THIS is an announcement of interest to all who search for entertainment among the B.B.C. programmes. And we hope that they find it—sometimes! But, of course, even if the B.B.C. tried twice as hard they would be unable to please all of us all the time.

However, between the highspots you can now read all about your favourite radio stars—in "Radio Pie," a big book about broadcasting. This book costs only sixpence, but it is printed in photogravure and is a miracle of modern printing.

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Then there is a big special section called "Broadcasting Bands on Parade," full of lively, interesting reading and giving details of the famous bands and their personnel. "Round the Clock with the B.B.C." and "Behind the Scenes of Television" are two more of the outstanding features.

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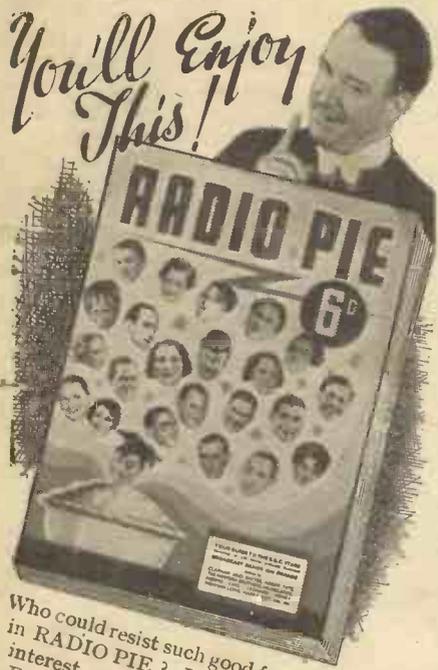


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**Osram Valves**  
REGD TRADE MARK  
Made in England

**TYPE N43**  
POWER AMPLIFYING PENTODE  
With Indirectly Heated Cathode  
(For operation from A.C. Mains).

The OSRAM N43 is an indirectly heated pentode designed to combine high sensitivity, large undistorted power output and a low value of interelectrode capacity. To achieve these results the type has a high value of mu, a conductive grid and employs an electrode design with a grid taken in a tip cap connection which results in a grid-to-anode capacitance considerably lower than in a normal power amplifying pentode.

Type N43 is also particularly applicable to high frequency receivers or amplifiers, or to the output stage of a channel in television receivers which are required with a very wide band of audio frequencies.

**CHARACTERISTICS**

Heater Volts ..... 250  
Heater Current ..... 0.15 A  
Anode Volts ..... 250  
Screen Volts ..... 100  
Grid Volts ..... 0  
Anode Current average ..... 100 mA  
Screen Current average ..... 100 mA  
Anode Dissipation ..... 10 W  
Mutual Conductance ..... 10000  
Optimum Load Resistance ..... 10000  
Automatic Bias Resistance ..... 10000

Interelectrode Capacities:  
Grid to Anode ..... 1 pF  
Anode to other Electrodes (Output) ..... 1 pF  
Grid to other Electrodes ..... 1 pF

**TYPE W42**  
VARIABLE MU SCREEN PENTODE  
Indirectly Heated Cathode  
(Operation from A.C. Mains).

W42 is a Variable Mu Screen Pentode with a high frequency or intermediate frequency output. The variable mu is obtained by variation of the control grid bias. The type is suitable for use in a V.C. to be applied without modulation. The control grid is taken to a focus cup which reduces the input capacity and of the layout of certain receiver designs.

**CHARACTERISTICS**

Heater Volts ..... 250  
Heater Current ..... 0.15 A  
Anode Volts ..... 250  
Screen Volts ..... 100  
Grid Volts ..... 0  
Anode Current average ..... 100 mA  
Screen Current average ..... 100 mA  
Anode Dissipation ..... 10 W  
Mutual Conductance ..... 10000  
Optimum Load Resistance ..... 10000  
Automatic Bias Resistance ..... 10000

Interelectrode Capacities:  
Grid to Anode ..... 1 pF  
Anode to other Electrodes (Output) ..... 1 pF  
Grid to other Electrodes ..... 1 pF

**TYPE U13**  
RECTIFYING VALVE  
With Directly Heated Filament  
(Full Wave).

The OSRAM U13 is a Rectifying Valve incorporating a dual electrode system in one bulb. Rectification of both half cycles of the A.C. wave is obtained when the valve is fed from an A.C. supply through a suitable transformer.

The value of the emission when the valve is operated from a 250 V A.C. supply through a transformer with a secondary voltage of 100 V is 0.6 amp approx.

**CHARACTERISTICS**

Heater Volts ..... 250  
Heater Current ..... 0.15 A  
Anode Volts ..... 250  
Screen Volts ..... 100  
Grid Volts ..... 0  
Anode Current average ..... 100 mA  
Screen Current average ..... 100 mA  
Anode Dissipation ..... 10 W  
Mutual Conductance ..... 10000  
Optimum Load Resistance ..... 10000  
Automatic Bias Resistance ..... 10000

Interelectrode Capacities:  
Grid to Anode ..... 1 pF  
Anode to other Electrodes (Output) ..... 1 pF  
Grid to other Electrodes ..... 1 pF

**TYPE D42**  
SINGLE DIODE  
With Indirectly Heated Cathode

The OSRAM D42 is a Single Diode Valve with more generous emission than type D41.

It is suitable for use as a second Detector in super-regenerative receivers, and also as a rectifier to provide A.C. voltage.

Type D42 is not suitable for use as a power rectifier.

**CHARACTERISTICS**

Heater Volts ..... 250  
Heater Current ..... 0.15 A  
Anode Volts ..... 250  
Screen Volts ..... 100  
Grid Volts ..... 0  
Anode Current average ..... 100 mA  
Screen Current average ..... 100 mA  
Anode Dissipation ..... 10 W  
Mutual Conductance ..... 10000  
Optimum Load Resistance ..... 10000  
Automatic Bias Resistance ..... 10000

Interelectrode Capacities:  
Grid to Anode ..... 1 pF  
Anode to other Electrodes (Output) ..... 1 pF  
Grid to other Electrodes ..... 1 pF

**TYPE H41**  
MINIATURE LOW CAPACITY TRIODE  
(With Indirectly Heated Cathode)

The OSRAM H41 is an indirectly heated triode of special design intended to reduce the capacity between the heater and the grid. The capacity between the heater and the grid is reduced by the use of a minimum number of turns in the heater winding. In order to achieve this the electrical supports are taken to a common metal instead of to the normal base. The type is suitable for use in the normal low frequency stage of a receiver.

**CHARACTERISTICS**

Heater Volts ..... 250  
Heater Current ..... 0.15 A  
Anode Volts ..... 250  
Screen Volts ..... 100  
Grid Volts ..... 0  
Anode Current average ..... 100 mA  
Screen Current average ..... 100 mA  
Anode Dissipation ..... 10 W  
Mutual Conductance ..... 10000  
Optimum Load Resistance ..... 10000  
Automatic Bias Resistance ..... 10000

Interelectrode Capacities:  
Grid to Anode ..... 1 pF  
Anode to other Electrodes (Output) ..... 1 pF  
Grid to other Electrodes ..... 1 pF

**TYPE H42**  
DETECTOR AND AMPLIFYING TRIODE  
With Indirectly Heated Cathode  
(For operation from A.C. Mains).

The OSRAM H42 is a detector and amplifying triode of special design intended to reduce the capacity between the heater and the grid. The capacity between the heater and the grid is reduced by the use of a minimum number of turns in the heater winding. In order to achieve this the electrical supports are taken to a common metal instead of to the normal base. The type is suitable for use in the normal low frequency stage of a receiver.

**CHARACTERISTICS**

Heater Volts ..... 250  
Heater Current ..... 0.15 A  
Anode Volts ..... 250  
Screen Volts ..... 100  
Grid Volts ..... 0  
Anode Current average ..... 100 mA  
Screen Current average ..... 100 mA  
Anode Dissipation ..... 10 W  
Mutual Conductance ..... 10000  
Optimum Load Resistance ..... 10000  
Automatic Bias Resistance ..... 10000

Interelectrode Capacities:  
Grid to Anode ..... 1 pF  
Anode to other Electrodes (Output) ..... 1 pF  
Grid to other Electrodes ..... 1 pF

**TYPE U16**  
RECTIFYING VALVE  
With Directly Heated Filament  
(Half Wave).

The OSRAM U16 is a Half Wave Rectifier Valve designed primarily to supply the accelerator, or anode voltage to Cathode Ray Tubes. For this purpose it is capable of withstanding an anode voltage up to 5,000 volts R.M.S. and the rectified current output is adequate.

The type is not intended for power rectification purposes where rectified currents greater than 2 milliamperes are required.

**CHARACTERISTICS**

Heater Volts ..... 250  
Heater Current ..... 0.15 A  
Anode Volts ..... 250  
Screen Volts ..... 100  
Grid Volts ..... 0  
Anode Current average ..... 100 mA  
Screen Current average ..... 100 mA  
Anode Dissipation ..... 10 W  
Mutual Conductance ..... 10000  
Optimum Load Resistance ..... 10000  
Automatic Bias Resistance ..... 10000

Interelectrode Capacities:  
Grid to Anode ..... 1 pF  
Anode to other Electrodes (Output) ..... 1 pF  
Grid to other Electrodes ..... 1 pF

**TYPE U17**  
RECTIFYING VALVE  
With Directly Heated Filament  
(Half Wave)

The OSRAM U17 is a high voltage Half Wave Rectifier designed primarily to supply the accelerator, or anode voltage up to 2,500 volts R.M.S. and the rectified current output is adequate.

The type is not intended for power rectification purposes where rectified currents greater than 2 milliamperes are required.

**CHARACTERISTICS**

Heater Volts ..... 250  
Heater Current ..... 0.15 A  
Anode Volts ..... 250  
Screen Volts ..... 100  
Grid Volts ..... 0  
Anode Current average ..... 100 mA  
Screen Current average ..... 100 mA  
Anode Dissipation ..... 10 W  
Mutual Conductance ..... 10000  
Optimum Load Resistance ..... 10000  
Automatic Bias Resistance ..... 10000

Interelectrode Capacities:  
Grid to Anode ..... 1 pF  
Anode to other Electrodes (Output) ..... 1 pF  
Grid to other Electrodes ..... 1 pF

To all those who require full and comprehensive technical data and characteristic curves of any particular valve, these leaflets will give you all the information you require.

Any leaflet available post free on request

There is also a copy of the Osram Valve Guide at your disposal giving full particulars (including circuits) of the whole valve range, in handy pocket size.

