

AN EXPERIMENTAL 5-VALVER



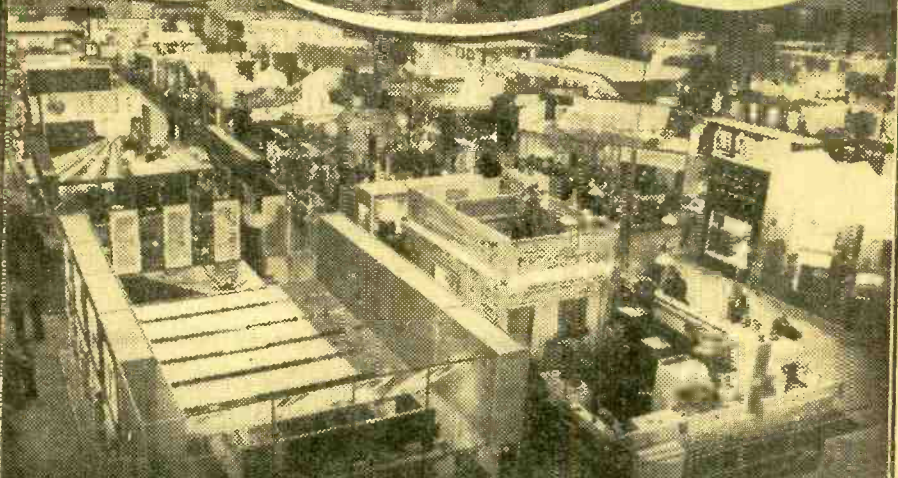
Vol. 30 No. 576

OCTOBER, 1954

EDITOR:
F.J. CAMM

PRACTICAL WIRELESS

**THE NATIONAL RADIO SHOW
1954**

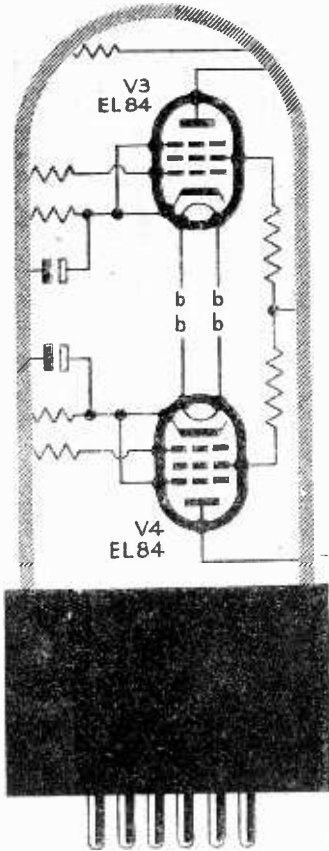


• **PRINCIPAL EXHIBITS REVIEWED** •

**A NEW HI-FI AMPLIFIER
BEGINNER'S GUIDE TO RADIO
TUNERS OR RECEIVERS?
A SIMPLE RADIO CONTROL DEVICE**

IN THIS ISSUE :

**BUILDING COMMUNICATION
RECEIVERS
AMPLIFIER DESIGN
PI-NETWORK FAULTS**



The MULLARD 5 valve 10 watt High Quality Amplifier Circuit

Mullard have designed a new high quality 10 watt audio frequency amplifier circuit around five Mullard valves. It follows conventional lines and comprises a high gain input stage (Mullard EF86), a cathode coupled phase-splitter (Mullard ECC83) and a push-pull output stage employing two Mullard EL84 pentodes.

Its outstanding advantage is that it achieves really high quality reproduction with simple design and modest cost of components.

Full details of the amplifier and data for the valves are available in booklet form price 2/6 from Radio Dealers.

In case of difficulty write enclosing remittance direct to Valve Sales Dept. at the address below.

These are the valves for the Mullard 5 valve 10 watt High Quality Amplifier.

MULLARD EF86
MULLARD ECC83
MULLARD EL84(2)
MULLARD GZ30
 or **EZ80**



MULLARD LTD., CENTURY HOUSE, SHAFTESBURY AVENUE, LONDON, W.C.2

MVM 304

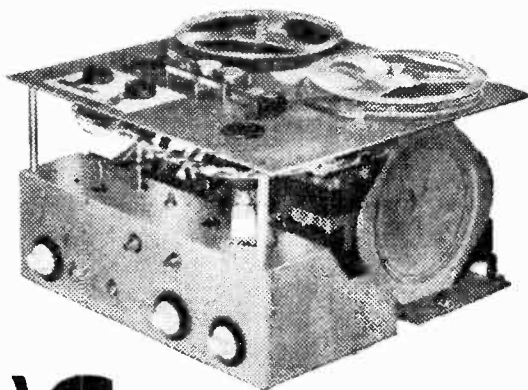
Build your own HIGH FIDELITY Tape Recorder

3 tape speeds · 3 motors · Magic Eye level indicator · coloured signal lamp · one-knob Deck Amplifier control · variable bass & treble controls · Hi-Fi. Speaker

- Precision machined parts—standard radio components
- Easily wired and assembled without previous experience

GUARANTEED BY

T.C.C. · WHITELEY · WEARITE · LAB
N.S.F. · BRENNELL · BULGIN · COLLARO
MULLARD VALVES

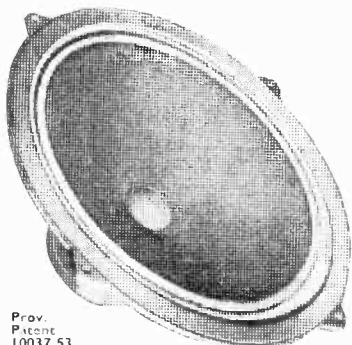


SOUND MASTER

Constructor Envelope with easy step-by-step instructions and simple wiring diagrams

6/6

SOUND MASTER · 10 NORFOLK STREET · LONDON · W.C.2



Prov. Patent 1003753



the famous range of

Stentorian

HI-FI

CAMBRIC CONE UNITS

now includes nine models ●

Model HF510	5" Steel Unit	£1.17.6
" HF510	5" Die cast Unit	£1.19.6
" HF610	6" Steel Unit	£2.10.6
" HF610	6" Die cast Unit	£2.12.6
" HF810	8" Steel Unit	£3. 0.6
" HF812	8" Die cast Unit	£3. 5.6
" HF912	9" Die cast Unit	£3. 9.6
" HF1012	10" Die cast Unit	£3.17.6
" HF1214	12" Die cast Unit	£9.15.6

(Tax paid)

3 or 15 ohms impedance Transformer available if required.

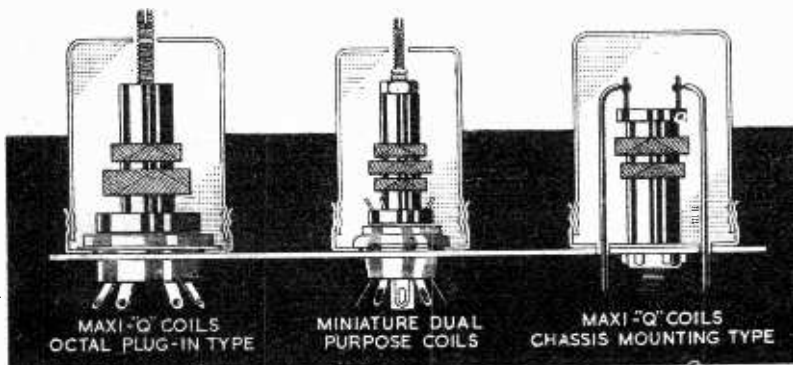
Our High Fidelity units—incorporating the patented Cambric Cone—created a world-wide demand in a matter of months. This phenomenal success has caused us to reorganise our manufacturing programme for this remarkable range, and we can now offer a choice of nine models, up to 12 inches in diameter, each providing outstanding performance in relation to price. Write for details of the new ready-to-assemble Bass Reflex Console Cabinet, or dimensional drawings of recommended cabinet, and leaflets giving full technical details of High Fidelity Units, or ask your dealer to demonstrate. Alternatively, these speakers may be heard at our London Office, 109 Kingsway, W.C.2, any Saturday between 9 and 12 noon.

WHITELEY ELECTRICAL RADIO CO. LTD · MANSFIELD · NOTTS



WE ARE SURE YOU WILL AGREE that our company

has and still continues to give you the finest possible service and value in coil design. We were one of the first to introduce Polystyrene Insulated Formers, then came the Octal Plug-in Type, then B9A Plug-In or Chassis Mounting Miniature Dual Purpose Coils and the last to be introduced was the all-moulded Former single hole fixing with a Polystyrene Nut giving you crackle and corrosion free inductors. Now we think we have reached our last possible improvement. **EVERY COIL IS PROVIDED IN AN AIR-TIGHT ALUMINIUM CONTAINER** the size of which has been mathematically arrived at to enable you to use it as a **SCREENING CAN** for the **ACTUAL COIL** itself.



Range covers from 3.8 to 2,000 metres—Litz Windings—Neosid Iron Cores—Full information on Plug-In and Chassis Mounting Maxi-Q Coils is given in Technical Bulletin DTB.1—Price 1/6.—Miniature Dual Purpose Coil information given in DTB.4 Price 1/6.—No change in Prices.—Send 1/- in stamps for General Catalogue. Cans available separately at 6d each

DENCO (CLACTON) LTD. 357/9, Old Road, Clacton-on-Sea, Essex.



POST THE COUPON TODAY FOR OUR BROCHURE ON THE LATEST METHODS OF HOME TRAINING FOR OVER 150 CAREERS & HOBBIES

PRIVATE AND INDIVIDUAL TUITION IN YOUR OWN HOME

City and Guilds Grouped Certificates in Telecommunications: A.M. Brit. I.R.E. Examination, Radio Amateur's Licence, Radio and Television Servicing Certificates, General Radio and Television Courses, Radar, Sound Recording, etc. Also Courses in all other branches of Engineering and Commerce.

The advantages of E.M.I. training. ★ The teaching methods are planned to meet modern industrial requirements. ★ We offer training in all subjects which provide lucrative jobs or interesting hobbies. ★ A tutor is personally allotted by name to ensure private and individual tuition. ★ Free advice covering all aspects of training is given to students before and after enrolling with us.

NEW LEARN THE PRACTICAL WAY. With many of our courses we supply actual equipment. Courses include: Radio, Television, Electronics, Draughtsmanship, Carpentry, Photography, and Commercial Art, etc.

Courses from £1 per month

POST THIS COUPON TODAY

Send without obligation your FREE book. E.M.I. INSTITUTES, Dept. 32K 43 Grove Park Road, London, W.4. Phone: Chiswick 4417/8.

NAME _____
 ADDRESS _____

 OCT. _____
 SUBJECT(S) OF INTEREST _____

EMI INSTITUTES
 The only Postal College which is part of a world-wide Industrial Organisation.

AUDIO OSCILLATOR UNIT

This compact, pre-calibrated unit is eminently suitable for incorporation in any equipment requiring an accurate source of frequency covering the range 20 ~ to 20 kc/s. Its power requirements are small, and it is supplied complete with drilling template and all accessories required for fitting. When fitted to a high-fidelity amplifier it enables rapid checks of performance to be carried out. At a small additional cost it can be supplied with frequency coverage up to 200 kc/s. Send for full details of this and other instruments, which include :

SIGNAL GENERATOR TYPE 10, price £7/10/- (postage, etc., 3/6).

PATTERN GENERATOR TYPE 4, price £8 (postage, etc., 3/6).

LOW FREQUENCY OSCILLATOR, price £15/15/- (postage, etc., 5/-).

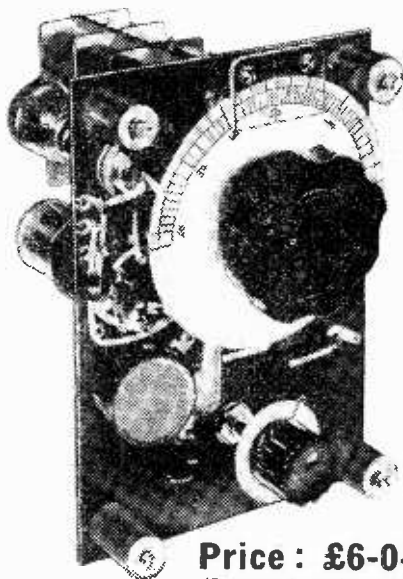
CHECKTEST, price £1/17/6 (postage, etc., 2/-).

CALIBRATED VARIABLE CONDENSER, price £3/3/- (postage, etc., 2/-).

EASY PAYMENT TERMS AVAILABLE.

TRADE AND EXPORT ENQUIRIES INVITED.

HOMELAB INSTRUMENTS LIMITED, 615-617, High Road, London, E.10
Phone : LEY 5651



Price : £6-0-0
(Postage & packing 3/6)

BRIMAR VALVES

More Reliable than EVER!

Brimar's long experience in the manufacture of special quality TRUSTWORTHY valves is now being reflected throughout the entire Brimar range. Improved production methods, new and better assembly jigs, tighter control on the composition of materials, and the closer supervision of vital processes have resulted in valves with more uniform characteristics, greater mechanical strength and a higher standard of reliability as shown in the 12AT7.

The 12AT7 is a very reliable frequency changer and is widely used in modern TV receivers, VHF and UHF communications equipment. It is also frequently employed in industrial equipment, computers, navigational aids and test equipment.



Use the BRIMAR 12AT7—with improved performance —at NO EXTRA COST



now is the time to

BRIMARIZE!

BRIMAR	MULLARD	MARCONI OSRAM	COSSOR EMITRON
12AT7	ECC81	B152 & B309	12AT7

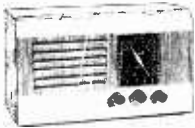
Standard Telephones and Cables Limited FOOTSCRAY, KENT. FOOTscray 3333

BARTON'S (Radio) LIMITED

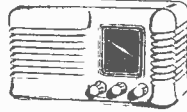
(Dept. PW) 42 TOTENHAM CT. RD., LONDON, W.1. Telephones: LANGHAM 1151;2

Money Back Guarantee on All Goods

BUILD YOUR OWN RADIO!



We can supply all the parts (including valves, 5in. moving coil speaker, cabinet, chassis, and everything down to the last nut and bolt) to enable YOU to build a professional-looking radio. The chassis is punched and drilled ready to mount the components. There is a choice of any of three attractive cabinets—12in. long, 5in. wide by 6in. high, as follows: either ivory or brown bakelite, or wooden, finished in walnut. Complete and easy-to-follow point-to-point and circuit wiring diagrams supplied.



MODEL 1. T.R.F. RECEIVER

This is a 3 valve plus metal rectifier T.R.F. receiver with a valve line-up as follows: 6K7 (H.F.), 6Y4 (DET) and 6Y6 (OUTPUT). The dial is illuminated and when assembled the receiver presents a very attractive appearance. Coverage is for the Medium and Long Wave bands. Operates on 200-250 volts A.C. Mains.

Plus 2/6 Packing, Carriage, Insur. **£5.10.0**

MODEL 2. SUPERHET RECEIVER

This is a powerful midget 4 valve plus metal rectifier Superhet Receiver with a valve line-up as follows: 6K8, 6K7, 6M7 6Y6. The dial is illuminated and coverage is for the Short Wave bands between 16-50 metres, the Medium Wave bands between 190-540 metres, and the Long Wave bands between 1,000-2,000 metres. Operates on 200-250 volts A.C. mains.

Plus 2/6 Packing, Carriage, Insur. **£7.19.6**

T.R.F. RECEIVER We can supply this Receiver ready built at £8 15s. 6d. plus 3/6 p.c.

ALL COMPONENTS SUPPLIED ARE GUARANTEED FOR ONE YEAR

NOTE: We would respectfully suggest to those interested in building this receiver that they send for OUR Instruction Booklet. Intending constructors can then judge for THEMSELVES how comprehensive this Booklet is.

Instruction Booklet and priced Parts List for either of the above available separately at 1/- . This money will be refunded if circuit diagram is returned as NEW within 7 days. When ordering please state Model No.

MAINS NOISE SUPPRESSOR KIT

Consisting of 2 specially designed chokes and 3 condensers. Extremely effective, cuts out all mains noise. Can be assembled in existing receiver or separately as desired. Complete with 4/3 plus 1/- circuit diagram P.C.

WE CARRY LARGE STOCKS OF COMPONENTS AND WELCOME YOUR ENQUIRIES.

TERMS OF BUSINESS: Cash with order (or C.O.D. Post items only); all orders for small items totalling over £2 post free unless otherwise stated.

NOW OPEN ALL DAY SATURDAYS 9-6 p.m. ● PERSONAL SHOPPERS ALWAYS WELCOMED

4-watt AMPLIFIER KIT

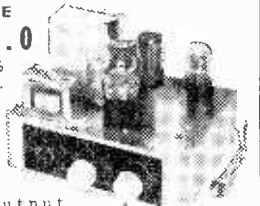
This is a 3 valve 3 stage Amplifier for use with Gramophone, Microphone or Radio. Valve line-up is as follows: 6X17, 6X4, 5Y4. Negative feed-back. Tone control. Voltage adjustment panel incorporated. 4 watts output. For operation on A.C. Mains 200-250 volts.

The complete Kit includes every item down to the last nut and bolt, drilled and punched chassis, and comprehensive point-to-point wiring circuit diagram. Chassis dims.: 8in. x 6in. x 2 1/2in.

ALL COMPONENTS SUPPLIED ARE GUARANTEED FOR ONE YEAR

PRICE **£4.5.0**

Plus 2/6 Pkg. Carr. & Ins.



The Output Transformer supplied

is for use with a loudspeaker of 3 ohms impedance and we would suggest that the output of the completed amplifier justifies the use of one of the latest W.B. H.F. Speakers which can be supplied as follows: 8in., 60 g.; 5in., 67 g.; 10in., 73 g. All plus 2/6 pkg. carr. ins.

Circuit Diagram only, available separately at 1/-. To those who require this Amplifier ready-built we can supply it at £5.1.0 plus 3/6 pkg. carr. ins.

PAXOLIN WAFER ROTARY WAVECHANGE SWITCH

3 wafers, each 2-pole, 5-way. Dim.: 3 1/2 x 2 1/2 in. Spindle projects 1 1/2in., single-hole mounting.

Ask for P/H975 **2/6** Each Post 6d.

or 3 for 7/6 Post Paid.

I.F. TRANSFORMER

465 kc/s standard type. Dim.: 3 1/2 x 1 1/2 in. Pkg.ail and plain A.D.T.

Ask for P/H977 **8/6** Per Pair Post 1/-

or 3 pairs for 22/6 Post Paid.

465 kc/s miniature type. Dim.: 2 1/2 x 1 1/2 in. plain permeability tuned.

Ask for P/H978 **9/6** Each Post 1/-

or 3 pairs for 25/- Post Paid.

DINGHY TELESCOPIC MAST

Aluminium Telescopes from 14 1/2in. to 7ft. Seven sections, base dia.: 1in. Weight 4 oz.

Ask for P/H489 **4/6** Each Post 6d.

CHOKE

Adm. Patt. 1800. 20 H., 300 mA. Test volts 3,000. Weight 14lbs. Dim.: 6 1/2 x 4 1/2 x 4 1/2 in.

Ask for P/H45 **15/-** Each Post 1/6

MAINS TRANSFORMER

Primary 0-230-250 v. A.C. 50 c/s. Sec. 6.3 v. 5 a. 0-210 v., 14 mA. 0-460 v. 200 mA. Size: 5 1/2 x 5 x 4 1/2 in. or 5 x 4 1/2 x 4 in.

Ask for P/H527 **13/6** Each Post 1/6

ROTARY CONVERTER TYPE 185

Input 24 v. D.C. 5a. Output 230 v. A.C. 50 c/s. 100 w. Complete in metal case. Dim.: 12 x 11 x 8 in. With carrying strap.

Ask for P/H914 **£5/19/6** Each Carriage Paid

Prices slashed at Clydesdale

PLEASE NOTE.—Carriage and Postal Charges refer to the U.K. only. Overseas freight, etc., extra.

STAINLESS STEEL AERIAL WIRE 7/015 in reels of approx. 1,500 ft., made by Temco.

Ask for P/H143 **25/-** per Reel Carriage Paid

SUPPRESSOR UNIT 5C/870

Contains 4 H.F. chokes and 4 tubular condensers. 0.1 mfd. 250 v. D.C. carrying 5 amps. (2 sets on each lead), each choke and condenser separately screened in compartments of aluminium alloy box: 4 1/2 x 4 x 2 1/2 in. Four-hole fixing.

Ask for P/H907 **2/6** Each Post 1/- extra

WIRELESS REMOTE CONTROL UNIT "D"

No. 2 Mk. 2. ZA-20491. Wooden box. 7 1/2 x 6 1/2 x 5 1/2 in., with hinged lid, containing 3 relays. 1 make, 500 ohms, 1 make, 20 ohms, and H.D. double coil type. 1,750 ohms coil makes, 200 ohms coil breaks, plus QMB switch and 8 brass terminals.

Ask for P/H803 **7/11** Each Post Paid

SUPPLY UNIT RECTIFIER

for No. 43 Transmitter Ex-Canadian Army. In original wood case. Input 110 v. A.C. 50/60 c/s. 1.7 kVA. Output (HT1) 2,100 v. 375 mA.; (HT2). 500 v. 400 mA. plus H.T. lines 450 v., 265 v., also 383 v., regulated and neg. bias 250 v., 150 v., 80 v. Making three complete power supplies to all fed via double choke condenser. Input circuits: Valves are 4/866A 866. 5Z3. 6SJ7. 2 6A3. VR150/30 (Stab.) and 1 v. (Time delay). The complete unit mounted in metal case with 11 shock mounted. Dim.: 2ft. 6in. x 1ft. 6in. x 1ft. Finish: olive Drab. Weight 120 lbs.

Ask for P/H25 **£25** Each Carriage Paid

RECEIVER 8A

Channel checking unit working on 49-100 metres, contains 5/VR91 (EF50), 1 6K8, 1/VR55 (EBC33), 1/VR53 (EF79) valves. Thermal switch breaking at 85 deg. F., etc. In metal case 8 1/2 x 7 x 10 in.

Ask for P/H477A **29/6** Each Carriage 2/6

POWER UNIT TYPE 268

In transit case. Input 80 v. 1.5 k cps. A.C. Output H.T. 120 v. D.C. bias 3 and 9 v. L.T. 2 v. Smoothed and stabilised. Complete with 5U4G valve, VS110 stabiliser, 12 v. 1 A Metal Rectifier, etc. in attractive metal case with handles. Dim.: 11 x 4 1/2 x 7 1/2 in.

Ask for P/H970 **22/6** Each Carriage Paid

5-WAY GROUPBOARD

Paxolin panel 2 1/2 x 2 1/2 in., with tabs for mounting 5 condensers or resistors; two-hole fixing.

Ask for P/H961 **6d.** Each Post 3d.

24-WAY GROUPBOARD

Paxolin panel 12 3/16 in. x 2 1/2 in. wide, with holes to carry 24 condensers or resistors.

Ask for P/H982 **6d.** Each Post 3d.

CORD DRIVE SPINDLE

Ratio 6-1.

Reverse Vernier Drive, i.e., cord runs outside chassis.

Ask for P/H976 **1/-** Each Post 3d.

or 3 for 3/- Post Paid.

Order direct from —

CLYDESDALE SUPPLY CO. LTD.

2, BRIDGE STREET GLASGOW C.5

Phone: South 2706/9

**Positively the 2 BEST T/Vs yet built
for the Home Constructor!**

The STERN'S "TELE-VIEWERS"

5 CHANNEL SUPERHET RECEIVERS

Suitable for any transmitting channel and for which commercial adaptors will be available.

PERFECT PICTURE QUALITY

SIMPLE DIAGRAMS MAKE
CONSTRUCTION EASY

PERFECT FRINGE AREA RECEPTION

BETTER RECEPTION AT HALF
COMMERCIAL COST

**The "WIDE-ANGLE"
TELE-VIEWER**

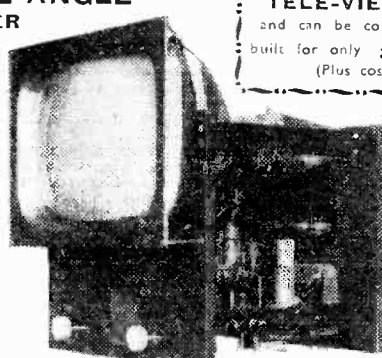
★ This is the most efficient large screen TV yet offered to constructors.

★ Excellent Time Base efficiency producing 15 to 16 Kly with ample scanning power for C.R.T.'s up to 17 inch.

CAN BE COMPLETELY BUILT FOR

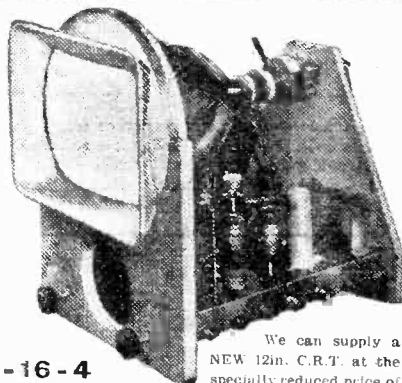
£33 - 0 - 0

(Plus cost of C.R.T.)



This is the 12" TELE-VIEWER

and can be completely built for only **£28-16-4**
(Plus cost of C.R.T.)



We can supply a NEW 12in. C.R.T. at the specially reduced price of **£12.19.6.** (Carr. & Ins. 15. extra.)

The complete set of ASSEMBLY INSTRUCTIONS for these T.V.s are available for 5 each. They include really detailed PRACTICAL LAYOUTS, WIRING DATA AND COMPONENT PRICE LIST. ALL COMPONENTS ARE AVAILABLE FOR INDIVIDUAL PURCHASE. AN ATTRACTIVE TABLE MODEL CABINET FOR THE 12in. Model IS AVAILABLE FOR £6.19.6.

STERN RADIO LTD.

109 & 115, FLEET STREET, E.C.4.

Tel.: CENTRAL 5812-3-4.

**HENRY'S
(RADIO LTD.)**

We have over 20,000 American and B.V.A. valves in stock
ALL VALVES NEW AND GUARANTEED.

1R5	7/6 16U5	7/6 35L6GT	8/6 UY41	9/- AC5/PENDD
1S1	7/6 8U9G	7/6 50L8GT	8/6 4D1	4/- 12 6
1S3	7/6 6N7CT	7/6 12	8/6 8D2	4/- PEN25 6 6
1T1	7/6 8Q7GT	8/6 43	8/6 3D2	4/- PEN46 7 6
1C5	8/- 6S1JGT	8/6 75	8/6 D41	5/- QP25 6 6
3A1	9/- 6X5G	8/6 80	8/6 KT2	5/- SP41 4-
3V4	7/6 6SA7GT	8/6 866A	15/- U52	8/6 SP61 4-
3S4	7/6 8SQ7GT	8/6 1740	37/6 U19	10/- SP41 4-
5Z3G	8/6 8S6G	7/6 31A	50/- Y63	8/6 HL23 DD 6 6
5U4G	8/6 8SK7GT	7/6 EA50	2/- MU14	8/6 VP23 6 6
5Z1G	8/6 8SL7GT	9/- ECH35	12/- PL81	11/- VP41 7 6
6A7G	8/6 8SN7GT	9/- EF51	6/- PL82	10/- U22 8 6
6AC7	8/6 8SCT	10/- EB34	3/6 PX25	12 6 ATP4 4-
6AB6	8/6 8SQ7GT	7/6 EBC33	8/6 PY81	19/- TP22 8 6
6AM6	9/- 6AG7	12 6 EF36	6 6 PY32	8 6 TT233 10-
6BB	7/6 12A6	7/6 EF39	6 6 KT33C	10/- 4IMP 7 6
6C3GT	5/- 12K7GT	8/6 EY51	12/- KT68	12 6 42SPT 7 6
6C6	8/6 12K8GT	8/6 EK32	6 6 GU50	12 6 215SG 4-
6F6G	8/6 12Q7GT	8/6 EF91	9/- XP2V	4/- MS/PEN 7 6
6CG6	8/6 12S7GT	8/6 EL33	8 6 RH (1.5)	4/- MS/PENB 7 6
6H6GT	5/- 12S7J	8/6 EF50	7 6 VU11	4/-
6J5GT	5/- 12SK7	8/6 Red Syl	VU133	4/- VT501 7 6
6J6	9/- 12SR7	7/6 EF30	VU120A	4/- AC/PEN(7) 7 6
6AK5	9/- 25Z6GT	8/6 SP2	QP230	8/-
6J7C	6 6 25Z5	8/6 VP2	VR105 30	8 6 PENDD4020 10-
6K7C	6 6 35Z4GT	8/6 TDD2A	8 6 VR150 30	6 6 12 6
6K8C	9/- 35Z5CT	8/6 DK40	8 6 CK510AX	5/- FC13C 8 6
6L6G	10/- 25A6	8/6 UL41	9/- DI	2/- VP4(7) 8 6
			9/- AC6PEN	6 6 ID5 8 6

INDICATOR UNIT TYPE

182A
This unit contains VCR517 Cathode Ray 6in. tube, complete with Mu-metal screen, 3 EF50, 4 SP61 and 15U4G valves, V/W volume controls, resistors and condensers. Suitable either for basis of T.V. or Oscilloscope. "Radio Constructor" "Scope constructional circuit included. 67/6 (plus 7/6 carr.).
Complete kit of parts, including "182A" Unit, for constructing "Radio Constructor" Oscilloscope, **£8/18/6.**

CATHODE RAY TUBES

(Brand New)
VCR97 (slight cut-off) 15/-
VCR97, guaranteed full TV Picture 40/-
VCR517C, guaranteed full TV Picture ... 35/-
VCR139A, guaranteed full TV Picture ... 35/-
3BP1, guaranteed full TV Picture ... 30/-
Carr. & packing on all tubes, 2/-.

DENCO P.M. FEEDER UNIT

Finest Audio available
Complete kit of parts, including drilled chassis, 5 valves - types 6AM6, 12A6, EB31 and 2 6AB6. Also complete circuit and wiring diagram. **£9/7/6**
Or assembled and aligned, **£8/10/-**. Alignment only, 10/-.

SETS OF VALVES

Ten EF50 (Ex-Brand New Units), 5 each
45/- Set
6K8G, 6K7C, 6Q7G, 5Z4G, 6V6G ... 37/6 ..
1R5, 1S5, 1T4, 1S4 or (3S4 or 3V4) ... 27/6 ..
TP25, HL23 DD, VP23, PEN25 (or QP25) ... 25/- ..
6K8G, 6K7G, 6Q7G, 25AG, 25Z5 or 25Z6G ... 37/6 ..
12K8GT, 12K7GT, 12Q7GT, 35Z4GT, 35L6GT or 50L8GT 37/6 ..
12A7GT, 12SK7GT, 12SQ7GT, 35Z4GT, 35L6GT or 50L8GT 37/6 ..

CRYSTAL MICROPHONE INSERTS



8/6 POST FREE

Ideal for tape recording and amplifiers. No matching transformer required.

Brand New R.F. UNITS
RF24 20-30 mc's 15/- post free
RF25 40-50 mc's 19/6 post free
RF26 50-65 mc's 35/- post free

MORSE PRACTICE KIT

Complete with 400v and 4 volt buzzer on baseboard. 6 - brand new. Post paid.

VCR97-15- With slight cut-off. Suitable for scopes. Brand new. P and p. 2-

CRYSTALS
300 kc/s. 2-pin (U.S.A.) ... 10/-
455 kc/s. 2-pin (U.S.A.) ... 10/-
500 kc/s. 2-pin (British) ... 15/-

F.C.A. 1 57,000 v. wkg. Type CP3800 Bakelite Case 7/6 each.

28-page Catalogue. 3d. Open Mon.-Sat. 9-6. Thurs. 1 p.m.

5, HARROW ROAD, PADDINGTON, LONDON, W.2




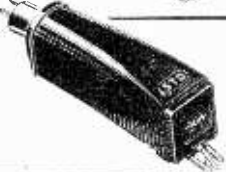


TEL: PADDINGTON 1008 9, 0401.

Bring your equipment up to date with

ACOS REPLACEMENT PICK-UP HEADS

If you already own a fine radiogram or record-player you now have the opportunity of rejuvenating it — of bringing it right up to date for a quite modest sum. Acos Hi-g crystal pick-ups are now available in a range of specially designed "plug-in" models to suit most famous makes of record reproducing equipment.

These Acos "Hi-g" pick-ups, you will find, represent a truly phenomenal advance in pick-up design with regard to both reproduction and tracking characteristics (so important with many of the new microgroove recordings). Ask your Dealer!

MODEL		
HGP 33-1 & HGP 37-1 Collaro		HGP 33-1 Collaro. A Hi-g pick-up head incorporating the HGP 33-1 turnover cartridge for both standard and microgroove records. Will fit Collaro units RC 532; AC 534; AC3/534; 3/RC 532; and the Studio pick-up. HGP 37-1 Collaro. A Hi-g pick-up head incorporating the HGP 37-1 turnover cartridge with cantilever sapphire styli. Designed for both standard and microgroove records. Will fit the above mentioned Collaro units. Both models available in cream or walnut. Ask for Data Sheets No. 4700 and 4800.
HGP 33-1 & HGP 37-1 Garrard		HGP 33-1 Garrard. A Hi-g pick-up head incorporating the HGP 33-1 turnover cartridge for both standard and microgroove records. Will fit Garrard units RC 75M; RC 80M; RC 90; RC 111; Model TA. HGP 37-1 Garrard. A Hi-g pick-up head incorporating the HGP 37-1 turnover cartridge with cantilever sapphire styli. Designed for both standard and microgroove records. Will fit the above mentioned Garrard units. Ask for Data Sheets No. 4700 and 4800.
HGP 39-1		Hi-g pick-up heads incorporating cantilever sapphire styli. Separate heads for standard and microgroove records. Will fit the Acos GP 20 pick-up arm and the Garrard C type adaptor. Used on the following units: RC 72A; RC 75A; RC 80; and the Model M unit. Can be used on any units which at present use the GP 19 heads. Ask for Data Sheet No. 4400.
HGP 35-1		Separate plug-in type Hi-g heads for standard and microgroove records; fitted with cantilever sapphire styli. The crystal unit is identical to that of the HGP 39-1 above. Can be used on Garrard units RC 75M; RC 80M; RC 90; RC 111; and the TA player. Ask for Data Sheet No. 4000
HGP 41-1		Separate Hi-g plug-in type heads for standard and microgroove records incorporating the crystal unit as used in the HGP 39 pick-up head. Will fit Collaro units RC 532; AC 534; AC3/534; 3RC 532. Available in cream or walnut. Ask for Data Sheet No. 4500.
HGP 45		Separate Hi-g pick-up heads for either standard or microgroove records. The crystal unit is identical to that used in the HGP 39-1 head. Will fit Garrard units RC 80; RC 72A; RC 75A; and the Model M player. Can be used on any unit which at present uses the Garrard C adaptor with GP 19 heads. Ask for Data Sheet No. 4600



... always well ahead

PRICE 32/6 (PLUS 10/5 P.T.)

for all types except the HGP 39 models which are

32/- (PLUS 10/3 P.T.)

ACOS devices are protected by patents, patent applications and registered designs in Great Britain and abroad.

GOSMOCORD LIMITED ENFIELD MIDDLESEX

Practical Wireless

EVERY MONTH
VOL. XXX, No. 576, OCTOBER, 1954

Editor: F. J. CAMM

22nd YEAR
OF ISSUE

COMMENTS OF THE MONTH

By THE EDITOR

The Radio Show

THE 21st National Radio Show opened at Earls Court on August 25th. It was the world's largest and most ambitious demonstration of the technique of broadcasting in sound and television. At least 55 sound and television programmes went on the air from the show and there were continuous television programmes on the closed circuit serving 409 receivers. Fifteen television cameras from the small industrial types to the roving eye complete with its own transmitter and power supply were in operation. There was also a full-sized BBC studio of the latest design for sound and television programmes and over 40 manufacturers exhibited sound and television receivers including the multi-channel sets for the forthcoming commercial TV programmes. Trade orders were larger than last year and record the improvement in the National economy. No doubt, the relaxation of hire purchase has loosened the national purse strings.

Great interest was evinced in our new edition of the "Fury Four," constructional details of which will commence shortly.

GROWTH OF HI-FI

ONE of the outstanding developments of the past few months has been the growth of interest in high fidelity. Some years ago, a well-known company put out the design for the Williamson amplifier which set a new standard in reproduction. Another company has recently released details of a high quality amplifier for home constructors and details of it appear elsewhere in this issue. This announcement was speedily followed by another from the sponsors of the Williamson amplifier, giving circuit details of a high quality amplifier designed for use in connection with their metal cone speaker. A well-known firm of radio manufacturers have been giving special high-fidelity demonstrations. We shall publish details of these amplifiers in successive issues. Others, we understand, are on the way.

But the most important developments are the high fidelity tape recordings now available, which are copies of the master tape used for transferring recordings to the standard gramophone disc. The company responsible, H.M.V., have developed the process which has made this possible. These high fidelity recordings will

enable owners of tape recording machines to listen to recorded music free from distortion and what is more important with a constant quality of reproduction. The two first releases have playing times of 40 and 60 min., and will cost three guineas and four guineas, respectively. They comprise recording of Menhuin and Solomon. A second series of tapes with similar playing times are of light music and dance music and will cost 73s. 6d. and 55s. each. The tapes are played on a dual-track reproducer with a speed of 7½ in. a second.

HIRE-PURCHASE RESTRICTIONS ENDED

THE general public will welcome the rescinding of the hire-purchase restrictions, which enforced a deposit of one-third of the total value and for the balance to be repaid over a period of 18 months. This is bound to result in an increased demand and for easier deposit and H.P. terms. The restrictions undoubtedly caused a drop in the sale of both radio and television receivers, and this to some extent has affected licence fees, which, from the TV point of view, should be much higher even than they are.

FOREIGN VALVES

SOME of our readers have been mystified by the fact that some valves they have purchased have been marked "foreign made" but yet include the stamp of the British Radio Valve Manufacturers' Association. This matter was recently taken up in Parliament, and the reply given was that Section 16 of the Merchandise Marks Act requires that goods imported into the United Kingdom must be accompanied by an indication of the country in which the goods were made. It is quite in order for a British manufacturer's name to appear on an article made abroad. It was also made clear that any firm may import radio valves originating in and consigned from Western Europe and certain other countries without further specific authority, beyond the Open General Licence. Large numbers of valves and television tubes, as already announced in this journal, are now being imported because the British valve industry is unable to keep pace with the demand for receivers. —F. J. C.



Round the world of WIRELESS



Battery Demand

NEARLY twice as many battery-operated radio sets were sold in 1953 as in 1952. Most of them were portables, sales of which again this year are surprising some of the manufacturers. This demand has given encouragement to the battery industry, which was already suffering from the transition to all-mains radio well before the war and which was even more apprehensive about the advent of TV.

The popularity of ordinary radio is becoming dependent on mobility, as people now listen in their kitchens, bedrooms and even their bathrooms.

New Manager Appointed

THE appointment is announced of Mr. Albert John Locke as manager of the Hong Kong service depot of the Marconi International Marine Communication Co., Ltd. He has been a member of the Hong Kong technical staff for some time, and takes over his new post immediately.

Mr. Locke, who is a native of Aston, Birmingham, joined the Marconi Marine Company in 1936.

By "QUESTOR"

While You Wait Car Radio Fitted

BECAUSE radio dealers have no space in which to take in cars for sets to be fitted, Pye Telecommunications, Ltd., are launching a new 3-unit car radio, which enables the size of the tuning unit to be kept small, and makes installation easier and neater, thereby relieving the retailer of all installation problems.

New Premises

WE are informed by Watts Radio (Weybridge), Ltd., that they have opened new premises at 8, The Apple Market, Kingston-on-Thames, Surrey.

They have conducted business at that address since August 20th.

Appointments to Directorship

THE Plessey Company, Limited, announce the appointment of Mr. John Hilton, O.B.E., M.I.Mech.E., and Mr. C. D. H. Webb, A.I.E.E., A.I.Mech.E., as executive directors of the company.

Mr. Hilton, who was formerly chief engineer of the Hoffmann group of companies and director of Hoffmann Tweedales, Ltd., joined the Plessey Company in 1949, and Mr. Webb, who is general manager of the Aircraft Electrical Division, in September, 1939.

Broadcast Receiving Licences

THE following statement shows the approximate number of sound receiving licences issued during the year ended June, 1954. The grand total of sound and television licences was 13,512,275.

Region	Number
London Postal	1,613,198
Home Counties	1,439,872
Midland	1,241,227
North-eastern	1,608,718
North-western	1,251,950
South-western	1,007,807
Wales and Border Counties	625,047
Total England and Wales	8,787,819
Scotland	1,090,045
Northern Ireland	223,365
Grand Total	10,101,229

"The Archers" in Book Form

OSCAR-WINNING programme. "The Archers," has at last gone into book form, and it looks as though the novel will be as popular as the radio feature. It is written by Geoffrey Webb and Edward Mason, and published by the publishers of this journal at 8s. 6d. net.

On publication day, Dan and Doris Archer, played by Harry Oakes and Gwen Berryman, appeared in person at Hudson's bookshop in Birmingham to autograph copies. Hundreds of fans met them in the course of the morning and went away proudly carrying the new book.

Temporary Power Reduction

IN order to allow maintenance work to be carried out on the main aerial of the Third Programme transmitter at Daventry on 464 metres it was necessary to withdraw this aerial from service



Radio star Al Read (left), who bases his scripts on real life people and incidents, mingles with the crowd in a London café in the hope of gleaning new material for his next radio show. Light Programme listeners heard him in an excerpt from his stage revue "You'll Be Lucky" on August 16.

for a few days, beginning Wednesday, August 4th. The purpose of the work was to restore the full anti-fading characteristics of this mast radiator in order to improve reception near the fringe of the service area.

During this period the transmitter was operating at reduced power with a reserve aerial and this resulted in some reduction in its range.

Selenium Shortage

IT is announced that there is a shortage of selenium in the U.S.A. and that one well-known manufacturer of rectifiers has announced a scheme for purchasing burnt-out units. It is estimated that during the past five years 400,000 pounds of selenium have accumulated in old rectifiers in the U.S.A.

Clinical Thermometer

ANOTHER use for the thermistor is announced from the U.S.A. A very small carboly thermistor is mounted on the end of a stainless steel probe and this is connected to a mercury cell through a length of flex lead. The thermometer is quicker, unbreakable and, it is claimed, more accurate.

B.I.R.E.

THE London section will hold a meeting at the London School of Hygiene and Tropical Medicine, at Keppel Street, Gower Street, W.C.1, on September 29th, at 6.30 p.m. The subject will be "Computing Circuits in Flight Simulators," and the speaker, A. E. Cutler, B.Sc., Ph.D., of Redifon, Ltd.

Mr. J. Clarricoats an Alderman

THE General Secretary of the R.S.G.B., Mr. J. Clarricoats, a post which he has held for the past 24 years, has now been elected an Alderman of the Borough of Southgate. Since 1945 he has served on the council as a member.

British Radar for Egyptian Navy

RECENTLY at the Marconi works at Chelmsford, England, an important contract was signed between the Egyptian Assistant Air Attaché in Britain, acting on behalf of the Egyptian Government, and officials of Marconi's Wireless Telegraph Co., Ltd.

Under the terms of the contract Marconi's are to supply navigational radar equipment, radio transmitters, receiver and associated test equipment for use aboard five

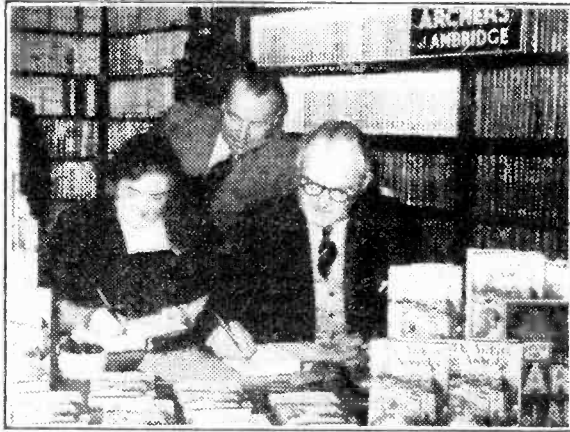
warships of the Egyptian Navy. The vessels to be fitted are the *Tarek*, *Aboukir*, *Damietta*, *Rashid* and *Ibrahim*.

Each ship is to have an installation consisting of a Marconi Radiolocator IV and a Transarctic transmitter/receiver. There will also be a further complete Radiolocator IV supplied to assist in training and maintenance. In addition, eight Marconi communications receivers of various types will be supplied for allocation

Uxendon Hill, Wembley Park, Middlesex.

New Gecalloy Publication

SALFORD ELECTRICAL INSTRUMENTS, LTD., has prepared a publication on the Gecalloy range of materials. Entitled "Gecalloy Low Loss Cores and Micropowder Magnets," the publication describes, with coloured flow sheets, the production and use of various kinds of Gecalloy material. It gives full technical



Dan and Doris Archer, in real life Harry Oakes and Gwen Berryman, autograph copies of "The Archers of Ambridge," watched by Mr. Clark Ramsay, Sales and Publicity Manager of George Newnes, Ltd.

among the ships. The associated test equipment is to be supplied by Marconi Instruments, Ltd.

Radio Amateurs' Examination

ONCE again Grafton Radio Society have made arrangements with the Islington L.C.C. Men's Evening Institutes for an official course of instruction for the Radio Amateurs' Examination to be held during the coming winter months at the Grafton L.C.C. School, Eburne Road, Holloway, N.7 (one minute from the "Nag's Head") in conjunction with the society.

Classes, with Morse instruction to the required speed, will be held on Monday evenings at 7 p.m. to 10 p.m., commencing Monday, September 27th (enrolment week September 20th to 24th)—instructor Mr. A. Perry (G3DKX)—fee 10s.

Application in the first instance should be made to the Grafton Radio Society, Hon. Sec. Mr. A. W. H. Wennell (G2CJN), 145

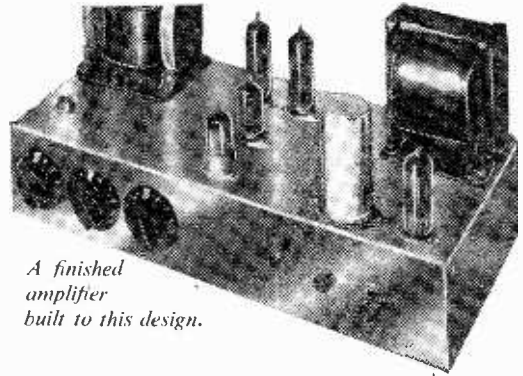
specifications of Gecalloy magnets and low loss cores, and includes graphs showing the performance of these products under varying conditions. There is a section describing suitable designs of low-loss cores and magnets for various applications. The publication also includes a comparison between Gecalloy and other materials, and gives details regarding stability.

R.S.G.B. Convention

A NATIONAL Convention of the Radio Society of Great Britain is to be held in Bristol on September 17th, 18th and 19th. This will be the first time that an event of this size has been staged in the West Country and only the second time that the Society has held a National Convention outside London, the previous occasion being at Manchester in 1949. The Lord Mayor and Lady Mayoress will be among many notable guests at the Convention Dinner to be held in Bristol's Victoria Rooms on September 18th.

The MULLARD 5 Valve 10 Watt Amplifier

AN INTERESTING NEW CONSTRUCTOR DESIGN FOR A FIVE-VALVE TEN-WATT Hi-Fi Unit



A finished amplifier built to this design.

IN accordance with the Mullard policy of providing valve users with comprehensive technical information on valve applications Mullard have designed a five-valve 10-watt high quality amplifier circuit. This circuit enables the fullest advantage to be taken of the latest Mullard audio valves.

There is a rapidly growing enthusiasm for high quality sound reproduction, and this circuit will enable home constructors and equipment manufacturers to build a high-performance amplifier at a comparatively low cost. Messrs. Mullard do not, of course, supply parts or complete units—they have only designed the circuit to make use of their valves. We had the opportunity of hearing a sample built by Messrs. Mullard and were very impressed by its performance.

Although only four amplifying valves and one rectifying valve are used the amplifier is sufficiently sensitive to be driven by many popular gramophone pickups without recourse to expensive pre-amplifying stages. Circuits for tone control and for the compensation of recording characteristics have been developed. Harmonic distortion has been kept to a very low figure—less than 0.4 per cent. at 10 watts output. The frequency response is extremely wide and level, being almost flat from 10 to 20,000 cycles per second.

Frequency Response

Relative to 1,000 c/s the response is not down by more than 1/2 db at the two extremes of 10 c/s and 20,000 c/s. Overall feedback of 26 db is taken from the secondary of the output transformer.

Power Response

From 40-10,000 c/s, maximum output is 1 db relative to 10 watts.

From 20-16,000 c/s, maximum output is 0 db (10 watts).

From 16-30,000 c/s, maximum output is -2 db relative to 10 watts.

Distortion

Less than 0.4 per cent. at 10 watts. Total harmonic distortion has been measured at 40 c/s, 400 c/s and 2,000 c/s. For the rated output of 10 watts the total distortion is:—

- Less than 0.4 per cent. at 40 c/s.
- „ „ 0.2 „ „ „ 400 c/s.
- „ „ 0.3 „ „ „ 2,000 c/s.

Hum and Noise

73 db below 10 watts. With the ear close to the loudspeaker no hum can be detected and residual

The Circuit

The circuit of the amplifier (Fig. 1) is of conventional form. A single-ended high-gain pentode (EF86) feeds a cathode-coupled phase-splitter using the high- μ double triode ECC83. The balanced output voltages derived from the ECC83 are used to drive the grids of two EL84 pentodes in push-pull. Negative voltage feedback is applied from the secondary of the output transformer to the cathode of the input valve.

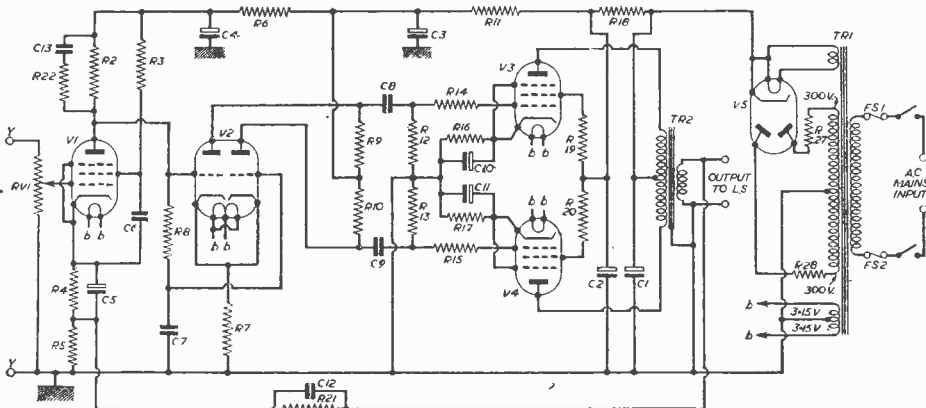


Fig. 1.—Theoretical circuit design.

noise is only a slight rustle. Under normal listening conditions hum and noise are completely inaudible. Hum and noise are 73 db below 10 watts, or 74 db below the maximum rated output of 12.5 watts.

Output Resistance

0.9Ω on 15Ω output. The output resistance of 0.9Ω on a 15Ω output is sufficiently small in practice to ensure adequate electrical damping of the speaker coil.

Tone Control

10 db boost in treble and bass ; 10 db attenuation in treble and 5 db attenuation in bass. The tone-control unit provides boost and attenuation at both treble and bass frequencies.

Details of a well-known type of tone control using a wide range, passive circuit are included on page 588 (Fig. 2). The treble control is RV23 and the bass control RV24.

This circuit produces an attenuation of about 12 times. Because of the high sensitivity of the amplifier

—50 mV at Y-Y with feedback—the tone control unit is suitable for use with a crystal pick-up having a relatively large output, without the need arising for a separate valve pre-amplifier. The input voltage at X-X (Fig. 2) must be approximately 600 mV to load the amplifier fully.

Pick-ups and Equalising Networks

The Collaro "O" and "P" "Studio" pick-up heads and the Acos Hi-g microgroove and standard pick-ups are particularly suitable for use with the amplifier. Details of some equalising networks which have been found very satisfactory are given in Fig. 3. They are designed to match into the input impedance of the tone control circuit, and were derived using the Decca K1804A (78 r.p.m.) and Decca LXT2695 (33 1/3 r.p.m.) recordings.

Detailed Circuit Description

The first stage of amplification is provided by the EF86 in a circuit having a gain of approximately 150 times. The negative feedback voltage from the

LIST OF COMPONENTS

RESISTORS

- RV1—Variable, carbon, 1 MΩ (log. law).
- R2—Fixed, carbon (high stability), 180 kΩ (10%—1 W.).
- R3—Fixed, carbon, 1 MΩ (10%—1 W.).
- R4—Fixed, carbon, 1.8 kΩ (10%—1 W.).
- R5—Fixed, carbon, 100 Ω (5%—1 W.).
- R6—Fixed, carbon, 100 kΩ (10%—1 W.).
- R7—Fixed, carbon, 68 kΩ (10%—1 W.).
- R8—Fixed, carbon, 1 MΩ (10%—1 W.).
- R9—Fixed, carbon, 100 kΩ (10%—1 W.).
- R10—Fixed, carbon, 100 kΩ (10%—1 W.).
- R11—Fixed, carbon, 33 kΩ (10%—1 W.).
- R12—Fixed, carbon, 820 kΩ (10%—1 W.).
- R13—Fixed, carbon, 820 kΩ (10%—1 W.).
- R14—Fixed, carbon, 4.7 kΩ (20%—1 W.).
- R15—Fixed, carbon, 4.7 kΩ (20%—1 W.).
- R16, R17—Fixed, carbon :
 Normal loading, 270 Ω (5%—3 W.).
 Low loading, 390—47 Ω (5%—3 W.).
- R18—Fixed, carbon, 1.2 kΩ (10%—1 W.).
- R19—Fixed, carbon, 47 Ω (20%—1 W.).
- R20—Fixed, carbon, 47 Ω (20%—1 W.).
- R21—Fixed, carbon (see below) (5%—1 W.).
- R22—Fixed, carbon, 18 kΩ (10%—1 W.).
- RV23—Variable, carbon, 2 MΩ (log. law).
- RV24—Variable, carbon, 2 MΩ (log. law).
- R25—Fixed, carbon, 1.5 MΩ (10%—1 W.).
- R26—Fixed, carbon, 150 kΩ (10%—1 W.).
- R27—Fixed, carbon (see below) (20%—1 W.).
- R28—Fixed, carbon (see below) (20%—1 W.).

The resistors for R9 and R10 should be matched to within 5%, and the larger used for R10.

The values of R27 and R28 depend on the winding resistances of the mains transformer and on the choice of rectifier. They must be chosen to make the total effective limiting resistance of each anode of the rectifier up to the required value.

The total limiting resistance, R_{lim}, in series with each anode of the rectifier must be at least 47 Ω for the GZ30 or at least 215 Ω for the EZ80. The amount of series resistance, R_t, contributed by the transformer is :—

$$R_t = \frac{1}{2} R_s + n^2 R_p$$

where R_s = resistance of secondary.

R_p = resistance of primary.

n = ratio of number of turns on half the secondary to number of turns on the primary.

Thus if R_t is less than R_{lim}, then R27 and R28 must both be chosen equal to the difference between them.

CAPACITORS

- C1, C2—Double Electrolytic, 50 + 50 μF 350 v.v.
- C3—Electrolytic, 10 μF 350 v.v.
- C4—Electrolytic, 10 μF 350 v.v.
- C5—Electrolytic, 100 μF 12 v.v.
- C6—Paper, 0.02 μF 350 v.v.
- C7—Paper, 0.1 μF 350 v.v.
- C8—Paper, 0.1 μF 350 v.v.
- C9—Paper, 0.1 μF 350 v.v.
- C10—Electrolytic, 100 μF 25 v.v.
- C11—Electrolytic, 100 μF 25 v.v.
- C12—Ceramic or Mica. See below.
- C13—Ceramic, 100pF (20%).
- C14—Ceramic, 33pF (10%).
- C15—Ceramic or Mica, 680pF (10%).
- C16—Ceramic or Mica, 270pF (10%).
- C17—Ceramic or Mica, 3,300pF (10%).

The values of the resistor R21 and its shunt capacitor C12 in the main feedback loop depend upon the impedance of the loudspeaker. A selection of values is given below :—

Speaker Impedance Ohms	C12 (μF)	R21 (kΩ)	Tolerance ± %
3.75	180	15	5
7	120	22	5
15	82	33	5

VALVES (Mullard)

- V1—EF86.
- V2—ECC83.
- V3, V4—2 x EL84.
- V5—GZ30 or EZ80. See note below.

The EZ80 must not supply a current of more than 90 mA.

MAINS TRANSFORMER (TRO)

Primary—10-0-200-220-240.
 Secondaries—Normal loading ; 300-0-300 100 mA ;
 3.15-0-3.15 2 A ; 0-5 2 A. Low loading ; 300-0-
 300 60 mA ; 3.15-0-3.15 2 A ; 0-6.3 1 A.

FUSES

FS1, FS2—1 amp.

secondary of the output transformer is introduced across the 100Ω resistor, R5, in the cathode circuit. In a feedback amplifier with a wide frequency response stability can be achieved only if the required difference in phase is maintained between the input signal and the feedback voltage.

The EF86 has accordingly been coupled directly to the following stage in order to reduce the phase shift at low frequencies. The C-R network (C13, R22) shunting the anode load produces an advance in phase which increases the stability of the amplifier at high frequencies.

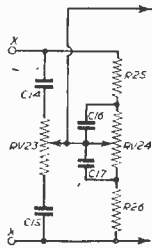


Fig. 2.—The tone controlling input circuit. The pick-up or equalising circuit is connected across X-X.

Phase Splitter

The output stage is fed by an ECC83 double triode operated as a cathode coupled phase splitter. The two grids are coupled together by R8, the second being capacitively earthed by C7. The correct value of 1.5 volt grid-to-cathode bias is produced when the anode voltage of the EF86 is 70 volts. Anode resistors R9 and R10 (=100 kΩ) should be matched within 5 per cent., R10 being given the larger value.

The use of the cathode coupled circuit provides for low distortion and facilitates direct coupling to the first stage. The gain obtained with the cathode-coupled circuit is about half that obtained from each valve section operated as a normal voltage amplifier. Nevertheless, it is sufficient as the ECC83 has an amplification factor of 100.

Output Stage

The output stage is equipped with two EL84 output pentodes operated in a self-biased push-pull circuit. The anodes are fed from the reservoir capacitor C1, the screen grids and the rest of the amplifier being supplied via R18 and C2. Separate bias resistors R16, R17 are used. Stopper resistors (R14, R15, R19, R20) are included in the control and screen-grid leads.

A resistor with a value of about 1 kΩ may be placed across the output terminals to prevent instability from occurring with a disconnected loud-speaker.

Operating Conditions

Alternative modes of operating two EL84s in a push-pull output stage are available, and may be referred to as the "normal loading" conditions, the anode-to-anode impedance being 8,000Ω and the quiescent anode current 2 x 36 mA.

An alternative set of operating conditions will result in lower distortion when the amplifier is used

for the reproduction of speech and music. Under these alternative conditions the anode-to-anode load is reduced to 6,000Ω and the quiescent anode current to 2 x 24 mA. This may be termed "low loading" operation.

For low loading operation the appropriate value of both cathode resistors R16 and R17 is 437Ω (=390Ω+47Ω), as compared with the value of 270Ω each for normal loading (that is, for the Class AB conditions given in the data).

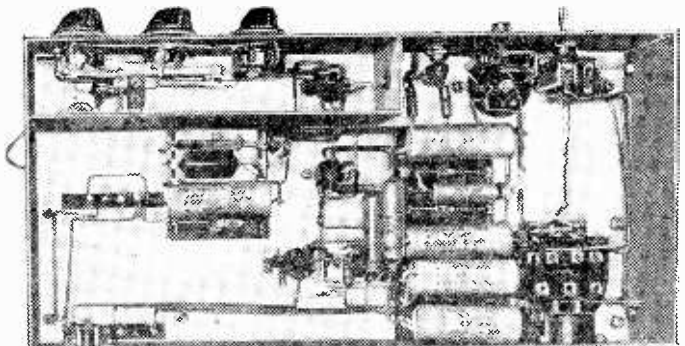
The H.T. consumption is considerably smaller when the output stage is adjusted for low loading.

CIRCUIT VOLTAGES			
Testing Point	Voltage (v.)		Meter Range
	D.C.	A.C.	
C1	320	The ripple across C1 is 4v normal loading, and 2.5v low loading, measured with a valve voltmeter.	1,000 v. D.C.
C2	3		
Cathodes V3, V4	10		1,000 v.
Anodes V3, V4	12		100 v.
Screen grids V3, V4	310		1,000 v.
C3	310		1,000 v.
C4	255		1,000 v.
Anodes V2	210		1,000 v.
Cathodes V2	71.5		1,000 v.
C4	182		1,000 v.
Anode V1	70		1,000 v.
Screen-grid V1	65		1,000 v.
Cathode V1	1.5		25 v.

These voltages were measured with Model 8 Avometer (20,000Ω/v.) with zero input signal.

In consequence the standing dissipation in the output stage is reduced from 11 watt at each anode, to 7.5 watt at each anode, the output valves then being run well below their maximum permissible anode dissipation of 12 watts. There will also be less ripple on the H.T. line. As a measure of economy the mains transformer can be given a lower rating provided the amplifier is to remain permanently adjusted to low loading.

Effective distortion for the low-loading adjustment cannot be measured easily because standard measurements of harmonic distortion and intermodulation distortion are not practicable when the maximum output is approached. A low level sine wave, however, may be used to measure frequency response on condition that the output power does not exceed 1-1.5 watts, otherwise excessive distortion will occur. Normal square-wave testing can be undertaken, but



Underside of an amplifier built to this design.

the input should not exceed a level similar to that used for the low-level sine wave.

Peak Handling Capacity

Larger peak currents are produced in the output stage under low loading conditions than with normal Class AB operation. These peak currents are of short duration with a speech and music input. They are supplied by the reservoir capacitor C1, which is of large value (50 μ F). When the amplifier is at the point of overload on peak signal the momentary fall in line voltage should not be more than 2 volts on the nominal line voltage of 320 volts.

As the current in the output stage increases there follows an increase in the bias voltage across the cathode resistors at a rate determined by the time constant of the bias networks. Measurements have shown that in practice this increase in bias is not likely to exceed 1 volt. The working conditions of the output stage are such that the output valves

are then driven back into a region where lower distortion is obtained.

As a result, however, of any change in the bias of the output stage a variation in gain will occur; but the distortion which is introduced in this way is held to a low level by the large amount of negative feedback.

Output Transformer

The output transformer is the most important component in a feedback amplifier, and it is essential that it shall give adequate performance. It is therefore advisable to obtain the output transformer from a manufacturer who has undertaken to build this component specially for the amplifier. It is essential that a component meeting the minimum specification be used, otherwise there will be instability and deterioration in performance.

Of the output transformers currently available the Partridge PPO may be recommended.

Rectifier

The GZ30 full-wave rectifier can supply a current drain of 125 mA and is completely suitable for all applications of the amplifier. With the GZ30 sine wave testing can be pursued up to full output power. Under practical conditions, with speech and music inputs, the GZ30 will have sufficient current reserve to supply an F.M. unit in conjunction with the amplifier.

The GZ30 has a five-volt heater and is mounted on the octal base.

Most readers will not have the necessary equipment to undertake sine wave testing at high output powers. Rectifier type EZ30 can then be recommended, the restriction being that the EZ80 must not supply a current in excess of 90 mA. Thus the EZ80 can be fitted when the amplifier is to be permanently adjusted to "low loading" condition, since sine wave inputs can then be used to produce an output power of up to 1-1.5 w. Under "normal loading" conditions the power output can be increased up to 6 w. before overloading of the EZ80 will occur. Square wave testing can be used with the EZ80 for both the normal loading and low loading adjustments, provided the input is of a similar level to that used for the corresponding sine wave testing.

The EZ80 should not be expected to supply the additional current required for radio feeder units and the like.

The EZ80 has a 6.3 volt heater and is mounted on the B9A (novol) base.

It can be seen that before making up the amplifier some consideration must be given to the way it is to be used and how this will affect the choice of rectifier.

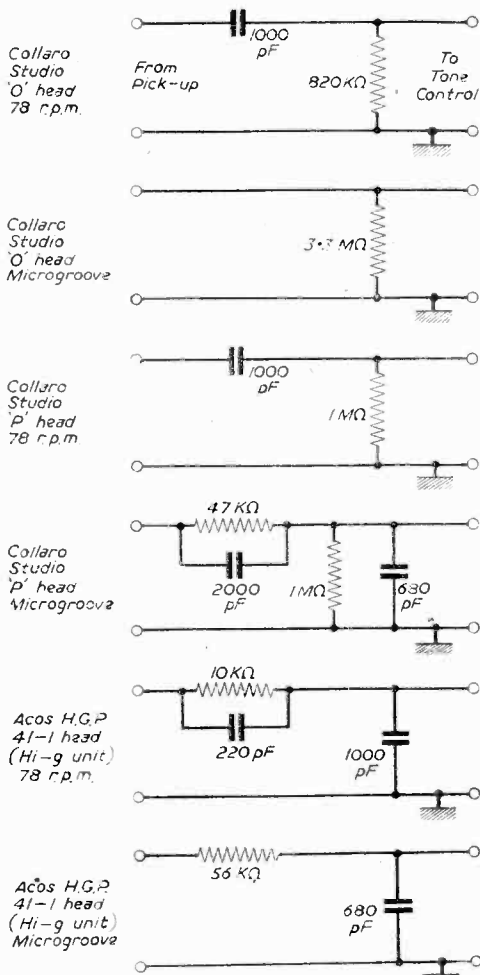


Fig. 3.—Equalising networks suitable for use with the tone control input unit.

JOIN THE PRACTICAL GROUP

Edited by F. J. CAMM

- PRACTICAL WIRELESS** 1/-
Every Month.
- PRACTICAL MECHANICS** 1/-
Every Month.
Devoted to Mechanics, Science and Invention.
- PRACTICAL ENGINEERING** 6d.
Every Friday.
For Engineers, Mechanics, Designers and Works Managers.
- PRACTICAL MOTORIST & MOTOR CYCLIST** 1/-
Every Month.

An Experimental 5-Valver

CONSTRUCTIONAL DETAILS OF A LONG-RANGE GENERAL-PURPOSE RECEIVER

By N. T. Cook

THE Built-in Pre-amplifier (PRACTICAL WIRELESS, June, 1953) aroused more interest than the writer had anticipated when preparing it. Though it made good allowance for individual knowledge and techniques it seems the preference is for pieces complete as they appear. This article should cover all the points criticised in the original "pre-amplifier" and also those beginners who seek a lay-out that they can build up exactly to the book.

The circuit (p. 592) shows a 5-valve superhet, and a glance at V2 and V3 show they constitute the pre-amp. scheme first advanced by the writer (an audio boost arrangement that would cover another (H.F.) function). The "pre-amp." here, though, is not identical to the original. Considering the other parts working from left to right of the diagram will ensure no details are skipped or missed.

One waveband only is shown for simplicity as the diagram is already well noted with small figures, letters, etc. This one waveband aspect should not need extraordinary cost or thought to convert to other ranges as desired. Selectivity being such an important point to-day the circuit includes three features intended to assist listening on radio.

Feature one is bound up with the value of L1 in microhenrys. Some aerial loading (or reaction) coils are designed to be virtually self-tuned above or below a given band. We are not so much concerned though with theory of coil self-resonances as we are with the actual value of L1. A glance is often sufficient to guide one to an inductance estimate especially where wire gauges are the same for both L1 and L2. From the usual value of L2 for the medium band (170 μ H) it should not be too hard to estimate L1, and, in any case, a precise figure is not necessary. The idea is to note the wavelength(s) that are most troublesome to reception at your point and CO, the aerial series capacitor shown dotted in the circuit, can be chosen to act, with L1, as an acceptor wavetrap to the interfering frequency. Note the possibility of including the receiver I.F. of 465 kc/s in this scheme. For a similar reason, using an opposite effect note the aerial switch that brings in VC1 or VC2, these two capacitors are pre-set so that they tune L1 to give greater reactive coupling at a given frequency. The whole idea depends on individual requirements and, of course, on particular values of L1. As is well known, interference varies with locality; thus any attempt to set values at this point would be rather futile. A full list of the main components is given on page 592.

Tracking

When indulging in such "boosts and cuts," however, bear in mind that superheterodyne high-frequency stages are designed for accurate tracking (never perfectly achieved) and users of coilpacks and other pre-calculated devices should allow for the effects experiment here may cause (gaps and other manifestations of tracking "slip"). Relative to the foregoing we may consider the technique used on receivers with H.F. stages preceding the frequency-

changer (and sometimes with straight receivers). The technique is the insertion of capacitors parallel to each H.F. transformer primary so that such windings are intended to favour a particular wavelength (and sometimes to overcome a dead spot).

The remainder of the first stage is conventional, though some readers may think the triode-hexode grid (triode oscillator section) should be tuned. However, arguments exist elsewhere on this point, and will not be exemplified here. Where coilpacks are used oscillator coils should always be connected as the coilpack designers recommend, as, in design, inter-electrode capacities are allowed for normally.

Next in the circuit is the "Pre-amplifier" in modified form. Note that the 6J7 has been replaced by a double-diode pentode of 6B8/G type. The 6J7 is the more sensitive valve for audio work, and where A.V.C. control of this stage is not envisaged note that the 6J7 can be retained as detailed in a previous issue mentioned in this article. Do not think, though, that the valve shown will give poor advantage. Far from it, for its gain under these conditions should be in the region of 50-58 times. Though one can read of triodes that give a gain of 40 times such gain is rarely realised in practice, and usually requires unusual anode voltages. The main drawback to the 6J7 is its sharp cut-off characteristic, and could have made trouble at H.F. unless critically adjusted. In many instances (a modern trend this) readers adopting the idea would possess multi-valve apparatus for reception, and could afford to dispense with one stage of A.V.C. control and still retain an efficient A.V.C. control (A.V.C. systems improve as the number of tubes affected increases; this is still true for simple A.V.C. techniques). Such possibilities were all (perhaps wrongly) left to individual circumstances and tastes. The valve used here cannot be doubted, for its characteristic makes it admirable for its double function. It is neither a sharp cut-off type, nor a remote cut-off, but a compromise which need hardly be named.

Circuit Details

Triode gain is still optional (switching it as cathode follower loses a very slight fraction of input valve signal). If its gain is desired as a normal triode A.F. amplifier the following switch sections should be omitted with associated components: poles g-h-e (f, as a glance will show, should be retained to accept either radio "detected" signals or gram. from V2). For the benefit of constructors a clear diagram of each valve base is given. Also for those not wishing to "mess" with cathode-following (!) omit R19, R27, C17, C28 and remove "cold" end of R20 to chassis.

The A.V.C. system here is of the delayed type as this gives a notable advantage when listening for weak transmissions in that the receiver remains at maximum sensitivity. The former statement is just to mention one advantage of delayed A.V.C., of course. When preparing text one has continually to watch

lest straying into lengthy and valueless (from a practical aspect) paths is indulged in; readers of "ideas" are not concerned with patches of theoretical wrangling. And nothing short of several volumes can do justice to some theoretical pros and cons. Before discussing the A.V.C. here note that the diodes of V2, the 6B8G are not used. Possibly they can be used for some other function, but such is left to individual thought. The delay action is achieved as follows: With R26 in circuit the cathode potential should (on radio) be around the region of 10-12 volts to chassis. This must be overcome at the A.V.C. diode before any appreciable A.V.C. rectified voltage appears. At the same time neither the grid nor the signal diode (D2) of the valve are affected by the cathode potential, because R14 couples the signal diode directly to the cathode and in the case of the grid only R18 is effective for bias purposes as the volume control VR2 is connected to the junction of R18 and R26. The value of R18 sets the grid bias at -2 with anode current calculated at the expected anode voltage. Because of the connection of the volume-control C27 must be included as without it no proper low-volume setting would exist as normally found (i.e., the lowest setting might still be too loud.

Quality

Variable control VR1 is not by any means a critical value. No tone compensation or correction is shown with it because of the diversity of pick-up types available to those interested in this circuit. The value assigned to VR1 is thus purely nominal, and must be in view of the varying tastes and requirements in this type of entertainment. Also, there exist many circuits for tone modifications, "cuts" "boosts" and so on. Some of the latter are quite complex, others only amount to one condenser or resistor. Experiment with the pick-up used, the VR1 value bought or to hand, and components as desired is the best practice at this point.

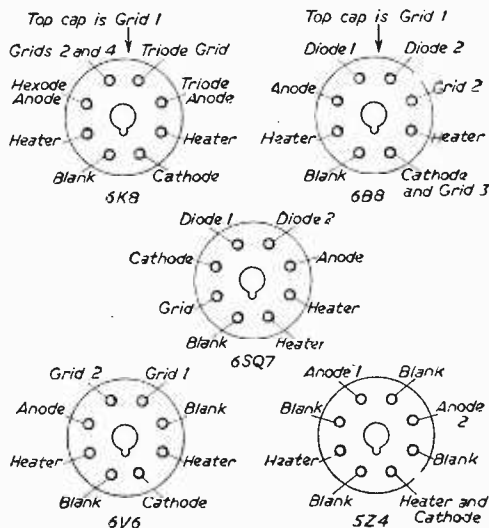
Full decoupling is shown throughout the whole receiver, and is a salient feature of good, modern constructions. Also the rectifier has a reserve of current available (about 60 mA.), provided an appropriate mains transformer is selected. The mains capacitors shown as "z" can be either a double (high-voltage) unit, preferably mica, or made up with two. Such simple schemes cannot pretend to suppress mains, of course, but often keep out many minor mains disturbances.

Fuses are of vital importance to this unit or any other for that matter. They represent an immediate protection against expensive breakdowns (failure of H.T. smoothing would mean possible loss of mains transformer and rectifier valve if F3 were not included).

Protection

Domestic fuse ratings will not protect receiver transformers from overload (shorting) damage whereas F1 and F2 will give such protection. If either fail, leaving F3 intact, the cause lies between the receiver side of the fuseholder and transformer output extremities. Various types of surge can blow fuses that are rated near to their normal load (for maximum safety). Thus otherwise inexplicable blow-outs can be explained by this if thorough testing reveals no faults in circuit. Such troubles vary with locality (again) and before raising fuse ratings check all factors.

Finally, when noting how delayed A.V.C. is arrived at note any attempt to raise the "inoperative" voltage by raising R26 is not to be recommended as



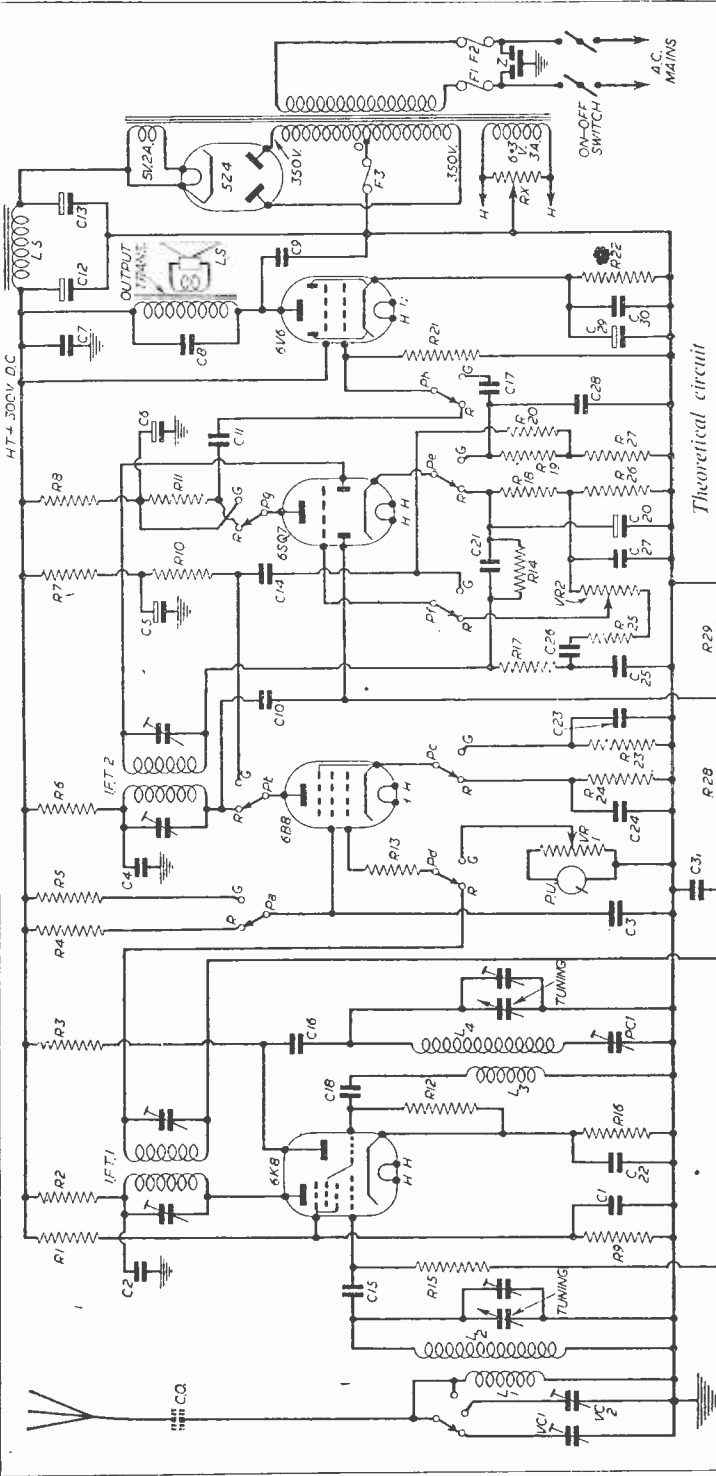
Details of valve base connections.

a point to consider is the heater cathode stress on this valve. It is advisable to screen all anode and grid leads in audio stages and coupling capacitors (A.F.) are best of the screened or mica type, to counteract hum tendencies.

Construction

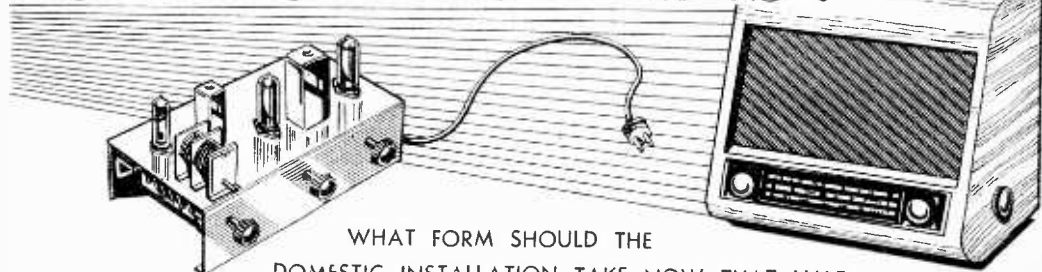
It should be pointed out that no layout or blueprint is available for this particular design. A receiver built to it has, in fact, been in use for some time with very satisfactory results, but the layout is not unduly critical and the circuit is considered to be of such a nature that its construction should not be undertaken by those who are not sufficiently experienced to convert the theoretical diagram into a practical design. In any case the lining up of the circuit to obtain maximum efficiency calls for a certain amount of skill, and simpler designs are, of course, available for the inexperienced constructor. Another detail which should be mentioned at this point is that correspondence cannot be entertained regarding changes, such as a battery version or a D.C. version of this circuit. It is usual on publication of a circuit in these pages to receive a large amount of correspondence asking for individual modifications, and whilst we are always willing to try to assist readers who experience difficulties, it is obvious that a complete design always calls for a bench test, and it is impracticable to carry out such tests for each reader who wishes to make some changes in the circuit to suit his particular need.

Where permanent magnet loudspeakers are used, L5 will not, of course, be the speaker field, but should be a reliable choke of 20 to 30 henrys. Its D.C. resistance can be up to 1,000 ohms with efficiency. The H.T. smoothed should not be 10 volts over the figure shown without resistor adjustments. The mains switch is best of the two-pole type as same give clean isolation and make for safety.



- RESISTORS.** (All 1/2 watt unless otherwise stated.)
 R1—25 K.Ω (2 w.). R28—1 M.Ω.
 R2—10 K.Ω. R29—1 M.Ω.
 R3—50 K.Ω (1 w.). VR1—50 K.Ω (var.).
 R4—100 K.Ω (1/2 w.). VR2—500 K.Ω (var.).
 R5—1.15 M.Ω (1 w.). R6—25-30 Ω, w. w.
 R7—25 K.Ω. R7—10 K.Ω. R8—20-500 K.Ω.
 R8—5 K.Ω. R9—100 K.Ω. R9—10 K.Ω.
 R9—100 K.Ω. R10—200 K.Ω (1/2 w.).
 R10—250 K.Ω. R11—250 K.Ω.
 R11—250 K.Ω. R12—50 K.Ω.
 R12—50 K.Ω. R13—100 Ω.
 R13—100 Ω.
- LIST OF PARTS CAPACITORS.** (All 500 volts working unless stated otherwise.)
 C1—80 μhenrys. C13—8 μF (elec.).
 C2—1,000 Ω, field, or choke. C14—0.01 μF (s. or m.).
 C3—5 μF. C15—100 pF (m.).
 C4—0.05 μF (m.). C16—80 pF (m.).
 C5—16 μF (elec.). C17—0.025 μF (s.).
 C6—16 μF (elec.). C18—100 pF (m.).
 C7—1 μF. C19—25 μF 25 v.w. (elec.).
 C8—300 pF. C20—25 μF 25 v.w. (elec.).
 C9—0.002 μF. C21—100 pF (m.).
 C10—80 pF (m.). C22—0.05 μF.
 C11—0.025 μF (s.). C23—2 μF 10 v.w.
 C12—16 μF (elec.). C24—0.01 μF, +.001 μF (m.).
 C25—100 pF (m.). C26—0.2 μF (s.).
 C26—0.2 μF (s.).
- TRANSFORMERS.**
 L1—See text.
 L2—170 μhenrys.
 L3—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L4—465 kc/s. (2), centre-tapped.)
 L5—See text.
 L6—170 μhenrys.
 L7—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L8—465 kc/s. (2), centre-tapped.)
 L9—See text.
 L10—170 μhenrys.
 L11—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L12—465 kc/s. (2), centre-tapped.)
 L13—See text.
 L14—170 μhenrys.
 L15—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L16—465 kc/s. (2), centre-tapped.)
 L17—See text.
 L18—170 μhenrys.
 L19—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L20—465 kc/s. (2), centre-tapped.)
 L21—See text.
 L22—170 μhenrys.
 L23—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L24—465 kc/s. (2), centre-tapped.)
 L25—See text.
 L26—170 μhenrys.
 L27—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L28—465 kc/s. (2), centre-tapped.)
 L29—See text.
 L30—170 μhenrys.
 L31—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L32—465 kc/s. (2), centre-tapped.)
 L33—See text.
 L34—170 μhenrys.
 L35—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L36—465 kc/s. (2), centre-tapped.)
 L37—See text.
 L38—170 μhenrys.
 L39—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L40—465 kc/s. (2), centre-tapped.)
 L41—See text.
 L42—170 μhenrys.
 L43—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L44—465 kc/s. (2), centre-tapped.)
 L45—See text.
 L46—170 μhenrys.
 L47—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L48—465 kc/s. (2), centre-tapped.)
 L49—See text.
 L50—170 μhenrys.
 L51—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L52—465 kc/s. (2), centre-tapped.)
 L53—See text.
 L54—170 μhenrys.
 L55—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L56—465 kc/s. (2), centre-tapped.)
 L57—See text.
 L58—170 μhenrys.
 L59—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L60—465 kc/s. (2), centre-tapped.)
 L61—See text.
 L62—170 μhenrys.
 L63—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L64—465 kc/s. (2), centre-tapped.)
 L65—See text.
 L66—170 μhenrys.
 L67—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L68—465 kc/s. (2), centre-tapped.)
 L69—See text.
 L70—170 μhenrys.
 L71—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L72—465 kc/s. (2), centre-tapped.)
 L73—See text.
 L74—170 μhenrys.
 L75—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L76—465 kc/s. (2), centre-tapped.)
 L77—See text.
 L78—170 μhenrys.
 L79—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L80—465 kc/s. (2), centre-tapped.)
 L81—See text.
 L82—170 μhenrys.
 L83—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L84—465 kc/s. (2), centre-tapped.)
 L85—See text.
 L86—170 μhenrys.
 L87—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L88—465 kc/s. (2), centre-tapped.)
 L89—See text.
 L90—170 μhenrys.
 L91—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L92—465 kc/s. (2), centre-tapped.)
 L93—See text.
 L94—170 μhenrys.
 L95—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L96—465 kc/s. (2), centre-tapped.)
 L97—See text.
 L98—170 μhenrys.
 L99—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L100—465 kc/s. (2), centre-tapped.)
- COILS**
 L1—See text.
 L2—170 μhenrys.
 L3—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L4—465 kc/s. (2), centre-tapped.)
 L5—See text.
 L6—170 μhenrys.
 L7—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L8—465 kc/s. (2), centre-tapped.)
 L9—See text.
 L10—170 μhenrys.
 L11—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L12—465 kc/s. (2), centre-tapped.)
 L13—See text.
 L14—170 μhenrys.
 L15—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L16—465 kc/s. (2), centre-tapped.)
 L17—See text.
 L18—170 μhenrys.
 L19—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L20—465 kc/s. (2), centre-tapped.)
 L21—See text.
 L22—170 μhenrys.
 L23—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L24—465 kc/s. (2), centre-tapped.)
 L25—See text.
 L26—170 μhenrys.
 L27—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L28—465 kc/s. (2), centre-tapped.)
 L29—See text.
 L30—170 μhenrys.
 L31—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L32—465 kc/s. (2), centre-tapped.)
 L33—See text.
 L34—170 μhenrys.
 L35—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L36—465 kc/s. (2), centre-tapped.)
 L37—See text.
 L38—170 μhenrys.
 L39—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L40—465 kc/s. (2), centre-tapped.)
 L41—See text.
 L42—170 μhenrys.
 L43—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L44—465 kc/s. (2), centre-tapped.)
 L45—See text.
 L46—170 μhenrys.
 L47—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L48—465 kc/s. (2), centre-tapped.)
 L49—See text.
 L50—170 μhenrys.
 L51—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L52—465 kc/s. (2), centre-tapped.)
 L53—See text.
 L54—170 μhenrys.
 L55—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L56—465 kc/s. (2), centre-tapped.)
 L57—See text.
 L58—170 μhenrys.
 L59—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L60—465 kc/s. (2), centre-tapped.)
 L61—See text.
 L62—170 μhenrys.
 L63—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L64—465 kc/s. (2), centre-tapped.)
 L65—See text.
 L66—170 μhenrys.
 L67—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L68—465 kc/s. (2), centre-tapped.)
 L69—See text.
 L70—170 μhenrys.
 L71—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L72—465 kc/s. (2), centre-tapped.)
 L73—See text.
 L74—170 μhenrys.
 L75—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L76—465 kc/s. (2), centre-tapped.)
 L77—See text.
 L78—170 μhenrys.
 L79—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L80—465 kc/s. (2), centre-tapped.)
 L81—See text.
 L82—170 μhenrys.
 L83—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L84—465 kc/s. (2), centre-tapped.)
 L85—See text.
 L86—170 μhenrys.
 L87—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L88—465 kc/s. (2), centre-tapped.)
 L89—See text.
 L90—170 μhenrys.
 L91—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L92—465 kc/s. (2), centre-tapped.)
 L93—See text.
 L94—170 μhenrys.
 L95—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L96—465 kc/s. (2), centre-tapped.)
 L97—See text.
 L98—170 μhenrys.
 L99—Osc. reac. coil, 25:1 (15 Ω speech coil).
 L100—465 kc/s. (2), centre-tapped.)
- Output Trans. Ratio.**
 50:1 (3 Ω imp. speech coil, 25:1 (15 Ω speech coil).
 Switch—8-pole, 2-way.
- THEORETICAL CIRCUIT**

TUNERS OR RECEIVERS?



WHAT FORM SHOULD THE
DOMESTIC INSTALLATION TAKE NOW THAT V.H.F.
IS TO BE ADDED TO THE RANGE OF TRANSMITTERS?

By W. J. Delaney

THE news that the BBC are authorised to inaugurate a chain of V.H.F. stations utilising frequency modulation will no doubt please many listeners, but although districts hitherto badly covered will now be able to receive relays of the Home, Light and Third programmes there are some added complications. An amateur living in one of the new areas will require a normal broadcast receiver if he is interested in long-distance reception: if he has a television receiver this will be a separate set, and the proposed new commercial transmissions (and latter alternative BBC transmissions) on Band III will call for another receiver, and if he is a gramophone fan he will have a gramophone pre-amplifier combined with tone controls. All of this means that he needs five separate pieces of equipment which in the modern home will require some housing. Obviously, if full advantage is to be taken of the different classes of transmission some new type of layout will be called for, and some suggested ideas will now be outlined.

Tuners

Fig. 1 shows in block formation the simplest arrangement to enable a listener to take advantage of all of the items mentioned above. One main amplifier is suggested, with the receiving sections made up as separate units, connected as required to the main amplifier. On the face of it, this should be the simplest solution, but there are a number of snags. First, the principal feature of FM and modern TV transmissions is the very high quality which is available, and this means that the amplifier must be designed with this end in view. Ordinary broadcasting does not call for such high quality owing to the 9 Kc/s bandwidth which has to be adhered to, and this means that heterodyne whistles and other troubles may arise using a normal broadcast tuner. This may be made a "local station" unit, but then it would probably be found that the FM tuner would receive those stations so that there would be no point in using such a local tuner. Long-distance broadcasts on the medium- and long-waves do not offer a very high standard of musical entertainment so perhaps this tuner could be dispensed with, and a small three- or four-valve midget receiver could be employed for the odd occasions when long-distance reception is required, and this would simplify the main installation. All the gramophone tone-correction and pre-amplification may be included in one unit

and this would enable the "standard" amplifier to be used, and then the main radio tuners could all include a single stage of audio amplification so that the outputs from all of the units would match into the amplifier. Again, this introduces some problems. A local FM station (for instance, Wrotham, Norwich, Sutton Coldfield or Holme Moss) will use an effective radiated power of 120 kW, whilst the Band III TV transmitter may be at such a distance that it provides a signal only half of that of the FM transmitter. Therefore, additional audio stages will have to be provided in this case.

Cathode Follower

The final stage in the various units would preferably be a cathode follower and this would enable ordinary types of selector switch to be employed, or plugs and socket terminations, without loss of quality or hum pick-up. Unfortunately, however, this is only one side of the picture. The television transmissions radiated by the BBC are both vertically and horizontally polarised, and no details are yet available as to the polarisation of the proposed Band III transmissions. For the V.H.F. FM transmissions quite a small aerial will be needed and in

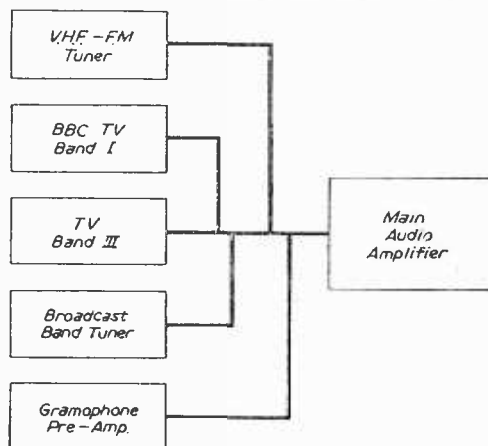


Fig. 1.—Block diagram of the various tuners which will probably be needed for future use.

many cases this could be an indoor arrangement. But the broadcast band will call for a larger aerial than the others, and this means that a minimum of four aerials as shown in Fig. 2 would normally be called for. These would have to be spaced from each other fairly well to avoid interaction or unusual tuning effects. The broadcast aerial could be of the indoor type, but this would probably defeat the aims, in the same way as would a small self-contained mains receiver, and it is possible that the V.H.F. aerial might serve also for the Band III TV transmission. However, some form of aerial switching will certainly be needed and at the moment it cannot be foreseen how such aerial selection could be carried out by means of a selector switch. At the frequencies used, a low-loss ceramic type of switch would certainly be needed and the bunching of the aerial leads and the "free" aerials in space, unless earthed or otherwise prevented from interfering with the aerial in use would introduce many difficulties. Would it be possible to erect some form of telescopic aerial

missions the following details are given: The stations will be in the band 88 to 95 Mc/s and will relay the three existing programmes (Home, Light and Third). The location of the stations and the power are as follows:—

	Effective radiated power kW
Wrotham (Kent)...	120
Pontop Pike (near Newcastle) ...	60
Divis (Northern Ireland) ...	60
Meldrum (near Aberdeen) ...	60
Norwich ...	120
South Devon ...	60
Sutton Coldfield ...	120
West Wales ...	60
Holme Moss ...	120

The areas to be covered by these transmitters are as follows:—

Wrotham.—South-east England, including the London area and extending as far west as Basingstoke and Bognor Regis. Towards the north the coverage will link up with that of Sutton Coldfield and Norwich. To the south and east it will extend along the coast of Sussex and Kent except for a small area embracing Deal, Dover and Folkestone.

Pontop Pike.—The whole of the county of Durham and the North Riding of Yorkshire, most of Northumberland and part of Cumberland.

Divis.—An area including the city of Belfast, and extending to the borders of Eire in the south, as far as Cookstown in the west and Coleraine in the north, and as far as the coast on the east.

Meldrum.—All those parts of Morayshire, Banffshire, Aberdeenshire, Kincardineshire and Angus north-east of a line running roughly from Elgin to Montrose.

Norwich.—The whole of East Anglia, joining the service areas of London and Sutton Coldfield in the south and west and extending northwards to Boston and Skegness.

South Devon.—The whole of Devon and Cornwall, except possibly for small areas in North-east Devon and the extreme west of Cornwall.

Sutton Coldfield.—An area extending as far as Chester and Gainsborough in the north, Oxford in the south and Welshpool in the west, and linking up with the service area of Norwich in the east. This area includes the Nottingham district, where reception of the Midland Home Service on the medium wavelength is unsatisfactory.

West Wales.—The site of this station has not yet been finally settled, but it is expected to serve an area including the whole of the coast of Cardigan Bay and extending for a few miles inland.

Holme Moss.—The area bounded on the north by a line running roughly from Barrow to Bridlington and on the south by a line from Rhyl to Cteethorpes:

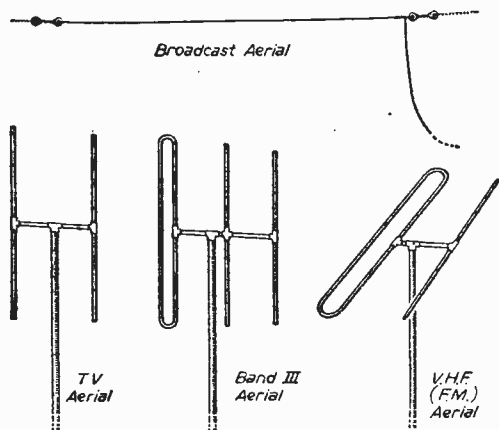


Fig.—Some aerial arrays which will probably all be seen together on some house-tops.

which could be controlled from inside the house, and opened out to the required length? Alternatively, will some new type of aerial come into use which will be effective on all bands? One recalls the original H.M.V. all-wave aerial, with its suspended matching transformers, but at V.H.F. these would certainly prove inefficient. The cage type of "slot" aerial has come into use on normal television bands, and perhaps some modification of this could be employed. Much of the advantage of the FM transmissions on V.H.F. is due to the removal of man-made static, and obviously a properly designed aerial plays quite a part in assisting in this direction. A large, badly-made aerial will probably nullify the advantages of quiet reception, so this must be borne in mind in arranging the final design. No doubt some experimenters have already foreseen some of these problems and have commenced experiments, but in most cases it will be necessary to wait for actual transmissions in order to carry out reliable tests as to the efficiency of different schemes.

BBC FM

For those who are interested in the new FM trans-

NEWNES RADIO ENGINEER'S POCKET BOOK

By F. J. CAMM

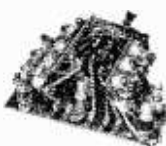
5/-, or by post 5/3

Obtainable from booksellers, or by post from George Newnes, Ltd. (Book Dept.), Tower House, Southampton Street, Strand, W.C.2.



radio products ltd.

(Dept. P.52) 418 BRIGHTON ROAD, SOUTH CROYDON, SURREY. Telephone: Croydon 514819



These really powerful units in compact form give quality and performance right out of proportion to their midget size and modest cost. Osmor "Q" Coils have everything that only the highest degree of technical skill can ensure—extra selectivity, super sensitivity, adaptability. Size only 1 1/2 x 3 1/2 x 2 1/2 with variable iron-dust cores and Polystyrene formers. Built-in trimmers. Tropicalised. Pre-tinned Receiver-tested and guaranteed. Only 5 connections to make. All types for Mains and Battery Superhets and T.R.F. receivers. Ideal for the reliable construction of new sets, also for conversion of the 21 Receiver, TR.1195, Type 18, Wartime Utility and others. Send to-day for particulars!



SEPARATE COILS

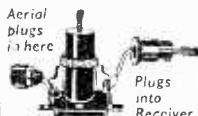
4 -

A full range is available for all popular wavebands and purposes. Fully descriptive leaflets and connection diagrams available. (Optional) new simple fixing 2d. extra. Just note these "5 Star" Features. * Only 1in. high. * Packed in damp-proof containers. * Variable iron-dust cores. * Fitted tabs for easy connection. * Low loss Polystyrene formers. L. or M.W. T.R.F. REACTION COIL TYPE QR 11-12 4/9.

A range of coils for F.M. Receivers shortly available. A special design of coils now available for reflex circuits.

OSMOR STATION SEPARATOR

The Separator may easily be tuned to eliminate any one station within the ranges stated and fitting takes only a few seconds. Sharp tuning is effected by adjusting the brass screw provided.



7/6

COMPLETE

TYPE METRES

- 1—111-250
- 2—218-283
- 3—267-341
- 4—319-405
- 5—395-492
- 6—455-567
- 7—1450-1550
- 8—410-550 k.c.

CHASSIS CUTTER



Type	Hole Sizes	Prices
1	1in. x 1 1/2in.	19/6
2	1 1/2in. x 1 1/2in.	18/9
3	1in. x 1 1/2in.	22/6
4	1 1/2in. x 2in.	27/3

Illustr. price list on request.

I.F.s. 465 k/c. Permeability-tuned with flying leads. Standard size 1 1/2in. x 1 1/2in. x 3 1/2in. For use with OSMOR coilpacks and others. 14/6 pair. Midget I.F.s 465 k/c. 1 1/2in. x 1 1/2in. x 2 1/2in. 21/- pair. PRE-ALIGNED. 1/6 extra. both types.

FREE!

Send 5d. (stamps) for fully descriptive literature including "The really efficient 5-valve Superhet Circuit and practical Drawings," 6-valve ditto, 3-valve (plus rectifier) T.R.F. circuit, Battery portable superhet circuit, Coil and Coilpack leaflets, Chassis Cutter leaflet, and full radio and component lists, and interesting miniature circuits, etc.

DIALS—VARIOUS DIALS CALIBRATED TO COILS

Metal dials, overall size 5 1/2in. square. Cream background, 3-colour Type ML, L.M.S. waves. M2, L & M. waves. M3, M. and 2.S. waves. Price 3/6 each. Pointer 1/6; Drum, Drive, Spring and Cord, 3/2. Type A glass dial assembly, measuring 7in. x 7in. (9 1/2 x 9 1/2 overall). Mounts in any position. Choice of two 3-colour scales. 24/6. P. & P. 1/6.

OUR TECHNICAL DEPT. WILL BE PLEASED TO ANSWER (BY LETTER ONLY) ANY ENQUIRY RELATING TO CIRCUITS IN WHICH OSMOR COILS OR COIL PACKS ARE USED OR ARE INTENDED TO BE USED.

WE ENDEAVOUR TO KEEP ABREAST OF THE TIMES BY BUILDING THE VARIOUS CIRCUITS PUBLISHED IN "WIRELESS WORLD," "PRACTICAL WIRELESS," "RADIO CONSTRUCTOR," ETC. WE KEEP STOCKS OF THE COMPONENTS SPECIFIED.

"PRACTICAL WIRELESS"

Coronet Four; Beginners' Superhet; Modern High Power Amplifier 2; Attache Case Portable; R1155 Converter; A.C. Band-Pass 3; Modern 1-Valver; 3-speed Autogram, modern reflex, etc.

"WIRELESS WORLD"

"No Compromise" TRF Tuner, "Midget Mains Receiver," Sensitive 2-valve Receiver, Television Converter (special coils in cans available), Midget sensitive T.R.F., etc.

"RADIO CONSTRUCTOR"

Converting the TR1195 receiver to a general purpose s/het receiver simple crystal diode set. Radio feeder units, Economy 8 W.P.P. Amplifier. Circuit and details available for adding push-pull to the 5'6 valve Osmor superhet.

A LIST OF FIXED CAPACITIES AS REQUIRED FOR SWITCH TUNING AVAILABLE ON APPLICATION.

Single variable condensers.....	9/-	Smoothing choke 70 mA.....	6/6	Mains Trans. 250-0-250.....	29/6
2 Gang variable condensers.....	12/6	Output Trans. for 0v5 25A6.....	7/6	350-0-350.....	35/-
3 Gang variable condensers.....	17/6	Fill. trans., 6.3 v. 5 v. output.....	8/6	Push-pull Trans. heavy duty.....	40/-
Reaction variable condensers.....	3/10		& 15/6	Chassis for various circuits	
Potentiometers less swit.....	4/-	Capacitors to .1 mfd., 10d., 25uF x		from	5/-
Potentiometers with swit.....	6/6	25 v., 3.6, 50 x 25, 3.6, 50uF x 50 v.,			
Switches 4 P. 3 way.....	3/6	3.6, 500 12 v., 3.6, 8 x 16 mfd., 5 v.,			
Switches 4 P. 2 way.....	3/6	3232, 5 3.			
Trimmers					
Single bank.....	10d.				
Two bank.....	2/4				
Three bank.....	3/6				

ALL 1w RESISTORS 6d. each (On marked cards)

SPECIAL REDUCTION in sets for PUBLISHED CIRCUITS

SPECIAL COILS for SPECIAL CIRCUITS

(Such as Midget Sensitive T.R.F. W.W.) A modern reflex receiver P.W.

DESIGNERS ARE ASSURED OF FULL CO-OPERATION

PLEASE LET US KNOW YOUR REQUIREMENTS

NEWCOMERS TO RADIO. WE HAVE A NEW DEPARTMENT READY AND WILLING TO HELP

SEND US YOUR PROBLEMS



INVITE YOU TO BUILD THIS PORTABLE FOR ONLY

6 1/2 GNS.

Full details, circuit diagrams, point to point wiring instructions, and complete list of components. Available 2/- ea. Case can be supplied separately. Available in the following attractive colours:

- Lizard Grey
 - Blue
 - Maroon
 - Brown
- Dial, 13 each.
Chassis, 3-.



—COLLARO " AC37 GRAMOPHONE MOTOR.

Television pre-amplifier by Plessey, complete with valve (EP42) input and output sockets, leads for H.T. and L.T. supplies, etc., 21/- each.

Governor controlled to run at 78 L.P.M., suitable 100-125 v. and 200/250v. Complete with 10cm. turntable. Price 46/-. Post and packing 2/6.

LOUDSPEAKER UNITS

- 3in. Plessey Round type for portables, 12/9 each.
- Elac 3in. Square type speaker, 2 to 3 Ω, 13/6 ea.
- Plessey 5in. unit, 13/6 each.
- Elac 4in. unit with 5in. fitting, 13/6 each.
- Elac 4 1/2in. unit, 14/6 each.
- Lectrons and R. & A., 5in. units, 16/6 each.
- 10in. Plessey lightweight, 19/6 each.
- 10in. Elac, 22/6.
- 10in. Goodmans, 26/6.
- 5in. Lectrons, with output transformer, 20/-.
- Truvox, 8x11, 12in. unit, 49/6.
- Truvox water speaker, 6in., 20/-.
- Plessey 5in. mains energised, 1,500Ω field, 21/-.
- 4 1/2in. unit with 600Ω field, 17/6.
- 5in. Goodmans PM unit, 14/9.

PORTABLE RECORDING OR PROJECTOR CASES.

Revine covered. (Ready for carrying 15in. x 9 1/2in. x 5 1/2in.). Internal dimensions, 14in. long, 11 1/2in. deep, 3 1/2in. front height, 8 1/2in. rear height. Weight 5 1/2lb. Price 13/6 each. Postage and Packing 2/6.

ENAMELLED COPPER WIRE ON 1/2in. REELS.

14 S.W.G.	... ..	1/6
16 S.W.G.	... ..	1/6
18 S.W.G.	... ..	2/1
20 S.W.G.	... ..	2/2
22 S.W.G.	... ..	2/5
24 S.W.G.	... ..	2/7
26 S.W.G.	... ..	2/9
28 S.W.G.	... ..	2/11
30 S.W.G.	... ..	3/1
32 S.W.G.	... ..	3/3
34 S.W.G.	... ..	3/5
36 S.W.G.	... ..	3/7
38 S.W.G.	... ..	3/11
40 S.W.G.	... ..	4/2

STAND-OFF PORCELAIN INSULATOR by Bulgin, 3 hole fixing with wing nut, 1/- each.

LEAD THROUGH POLYSTYRENE INSULATOR. 3 hole fixing, 6d. each.

44Ω VARIABLE RESISTOR, completely encased with inscriptions on the front, viz. fast slow, on-off and pointer knob. 3 amps. is the maximum current which it will take. Ideal for Model Railways, 5/- each.

THE COMPACT TELEVISION AERIAL BY FAMOUS MANUFACTURER. Supplied complete with universal mounting and backplate in neutral brown finish. Overall length 3ft. 6in. Packed in carton 30/- in. long. Complete with full instructions Cat. No. C14. Original price 59/-.

Our price 19/6.

LINE CORD

2 amp. and 3 amp., 2 core, 1/6 each.

OUTPUT TRANSFORMER

Portable output transformer, 2/9 each.

FOR TERMS SEE OUR FULL PAGE ADVERT ON PAGE 631

ALPHA RADIO SUPPLY CO.
5/6 VINCES CHAMBERS, VICTORIA SQUARE, LEEDS 1.

CAPACITY RESISTANCE BRIDGE CR50

Measures 10pFd to 100mFd and 1 ohm to 10 megohms in fourteen ranges. Neon leakage test for condensers. Balance indication given by magic eye fed from high gain pentode. Internal standards of 1%. In specially designed metal case finished black crackle. Complete with all valves and instructions ready for mains operation. ONLY £6.19.6, plus 4/6 carr. or £3 deposit and four monthly payments of 22/-.

VALVE VOLTMETER VV50

Measures 0-2.5, 5, 25, 50 and 250 volts DC in five ranges with input impedance of 11 megohms. Direct readings given on standard 2 1/2in. 100 micro-Amp meter. Special three way probe unit enables AF and RF voltages to be measured having same ranges as for DC. In similar matching case to CR50. Complete with all valves and instructions ready for mains operation. ONLY £7.19.6, plus 4/6 carr. or £3 deposit and five monthly payments of 22/-.

SIGNAL GENERATOR SG50

Covers 100 kc/s to 80 Mc/s in six ranges on fundamentals (not harmonics) either unmodulated or with internal 400 cps. modulation. Uses EF91's and SenTerCel rectifier. Deliveries will commence in mid-September. ONLY £7.19.6, plus 6/- carr.

If not satisfied with instruments return within three days and money refunded in full and without question.

Sole London stockists: CHARLES BRITAIN (RADIO) LTD., 11, Upper Saint Martin's Lane, W.C.2., near Leicester Square.

Hire purchase terms apply only to orders sent direct to manufacturer. If further details required please send a stamped addressed envelope for reply by return post. Trade enquiries are welcomed.

If you want value for money—then make sure it's Grayshaw.

GRAYSHAW INSTRUMENTS

54, Overstone Road, Harpenden, Herts

A Boon to D.C. Areas!



"METEOR III"

Universal A.C.-D.C. MAINS SET

Only screwdriver, pliers and soldering iron required to make this attractive 3 valve, all mains set (2 wavebands). Complete parts including valves, Ready-to-use Chassis, Brown or Ivory Moulded Cabinet.

Complete Kit

97/6

plus 2/6 for post & pkg.

A.C. MODEL ONLY 95/-

Money Back Guarantee

NORMAN H. FIELD

68, Hurst St., Birmingham 5.

Instructions, Point to Point Wiring Diagrams and Parts List, 1/- POST FREE.



'On Your Wavelength'

BY THERMION

Propagation of Very Short Waves

THE increasing use of the frequency bands above 30 Mc/s and their importance for the development of television and other uses has made the study of the propagation of very short waves an important one. An investigation of ground wave propagation over irregular terrain at frequencies of 100 and 600 Mc/s has been made and propagation curves for general use have been constructed for the band 50 and 800 Mc/s. At larger distances a study has also been made of the effect of weather conditions on field strength levels. The statistical information gained, together with data supplied by the G.P.O. and the BBC, has been used in the preparation of propagation curves which have been adopted by the International Radio Consultative Committee for general use in the appropriate geographical regions.

Commercial Radio ?

I KNOW that the Beveridge Report advised in favour of commercial TV but against commercial radio, but I wonder how long it will be before we have commercial radio in this country? If commercial TV is successful, I see no reason ethical or otherwise why we should not also have commercial radio programmes. I do not suggest the sort of programme where a Beethoven Symphony is interjected with enjoiners to buy somebody's pills, but programmes of a quality similar to that which has been laid down for commercial TV. I know that there are many in this country against this sort of publicity, particularly the Church, and the Lord's Day Observance Society, that antiquated body of busybodies which interferes with the liberty of the subject and should have been proscribed by the State years ago. If people wish to spend their Sundays in a particular way, even if they are minorities, there is no one to say them nay. But because they have decided that their method of spending the Sabbath is the best, I see no reason why they should impose their method on me or anyone else. They may be wrong!

We are a squeamish race. We are resistant to change. In many instances we are hypocrites about it. The BBC, for example, does not permit publicity over the air, but does not hesitate to use programme time to plug its publications. It is, therefore, opposed to publicity, not on ethical grounds but on monopolistic grounds. Commercial radio could put over far better programmes than we receive from the BBC, excellent though those programmes are. We are all agreed that in the past five years the BBC programmes have improved in diversity and quality. Commercial interests could provide that spirit of competition which is necessary to act as a stimulant. At present the BBC has no competitor and it, therefore, can do what it likes, and certainly does what it likes. However, we are to have I.T.A. programmes within a year and it is my view that there will be pressure from commercial interests to carry the idea into radio.

It would provide additional revenue and a greater variety of programmes.

The "Fury Four"

THE announcement that there is to be a new edition of the "Fury Four," that famous receiver which first saw the light of print in our issue dated January 28th, 1933, whetted my appetite, for I was one of the first to build that receiver. Incidentally, for the first time in the history of radio journalism, the whole of the front page of a daily paper, to wit the *Daily Mail*, was used to announce the free gift blueprint of the "Fury Four." Looking back, a comparison between the original set and the present gives one an indication of the great changes which have taken place in the last 20 years. The present receiver is less than half the size of the original. This is due to the almost universal adoption of the chassis system of construction, the gradual reduction in size of components and the elimination of certain components which hitherto were necessary to stabilise the set. Components are more reliable nowadays. Transmissions are more stable and valves much more reliable; tuning coils are now midgets; the old swinging reaction coil and plug-in coils have vanished with spaghetti resistances, and the clumsy valve holders are now unknown. Although many of the original "Fury Fours" are still being operated I should be surprised if they are not now scrapped in favour of this brilliant modern version.

Evening Courses

IT is a sign of the times that most of the technical institutes now run courses in radio, television and electrical engineering. The prospectus of the Polytechnic, Regent Street, for 1954/5 outlines National Certificate courses in electrical engineering, a five-year course in radio and television engineering and a four-year course in radio and television servicing.

The second-year course of the latter prepares the student for the City and Guilds of London Institute Intermediate Examination in radio service work, and the third year for the written and practical examinations culminating in the award of the Radio Servicing Certificate awarded jointly by the City and Guilds of London Institute and the Radio Trades Examination Board. The fourth and final year prepares the student for the Television Servicing Certificate Examinations. The session commences on September 27th and enrolment day is September 22nd.

The Radio Show

AT the time of writing these notes the Radio Show has not opened its portals to the vast multitudes who undoubtedly will visit Earls Court this year, and I prophesy that attendance records will be broken and that sales will achieve a new high. The relaxation of the hire purchase regulations means that many who had put off buying a new radio or television receiver will now take the plunge. Constructors will undoubtedly gravitate to our stand to see the new edition of the "Fury Four."

AMPLIFIER DESIGN

7.—UNTUNED AMPLIFIERS—CONTINUED

By R. Hindle

(Continued from page 536 September issue)

NEGATIVE feedback will take place progressively more and more as frequency decreases and this reduces the gain. Inadequate by-passing, therefore, causes a reduction in low-frequency gain just as an inadequate coupling capacitor does.

Decoupling

The discussion up till now has made an assumption that must be brought to light. It has been assumed that each valve circuit is separate and quite distinct from the others except so far as coupling components have been deliberately included in the circuit. In actual fact this would be so only if each valve were completely isolated and screened, and did not have power equipment in common with the other valves. It is uneconomic, of course, to have separate power packs for each stage, and so we look for the next best. Ideally, the common power pack should have zero impedance, in which case there is no common impedance to cause coupling between the stages, and this is just as good as separate power packs, but like most ideals this is unattainable. There are methods of reducing the power supply impedance to a very small figure, but for ordinary amplifier work it is generally necessary only to provide good smoothing, and to put as large a capacitance as possible at the final smoothing position. The effectiveness of these measures is then enhanced to the necessary degree by introducing decoupling. This consists of a resistance in series with the power supply which forms a potentiometer with a capacitance put in parallel with the valve being fed. The aim is to have as little fed-back signal as possible across the capacitance, where it will affect the valve, and as great a proportion as possible across the series resistance where it will do no harm. Obviously, therefore, the aim is to use as large a resistance as possible and as large a capacitance as possible. The size of resistance permissible is limited, however, by the H.T. voltage that the designer can afford to drop, and rarely can more than 10/20,000 ohms be used unless the power pack is made to give a much higher voltage than the valve requires. The limita-

A Series of Articles Dealing with the Theoretical Considerations of Amplifier Design, and Containing at a Later Stage Constructional Details of Various Types of Amplifier.

tion in capacitance is chiefly a question of physical size and cost; it will need to be larger the lower the frequencies to be handled. The effectiveness of the components chosen for de-

coupling is measured by the product of capacitance and resistance (just as was found to be the case with intervalve coupling components) and this product should at least equal the period of the lowest frequency to be handled. The period is the time in seconds for one complete cycle of the frequency and the components should be measured in $M\Omega$ and μF . The frequency to be taken is not merely the lowest frequency that is likely to come out of the speaker, but is the lowest frequency that the amplifier is likely to be fed with and to amplify, independent of whether it will be heard. Taking 25 c/s as the lowest frequency likely to be experienced the period is one-twenty-fifth of a second or .04 second, so $M\Omega$ multiplied by μF must equal .04. Supposing a resistor of 22 K Ω is used (R1). This is $\frac{22}{1000}$ of 1 M Ω and so the capacitance must be $\frac{.04 \times 1000}{22} = 2\mu F$. This is the bare minimum, so in order to provide a satisfactory safety margin 8 μF will be specified.

Volume Control

It is often necessary, of course, to vary the gain of an amplifier. This can be done by varying the

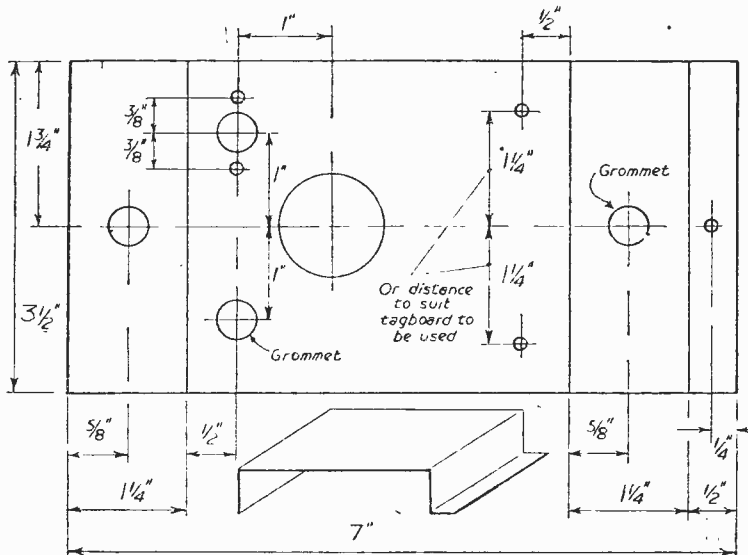


Fig. 27 and 28.—Details of the chassis as cut and bent to shape.

ponents to be used, and these should be obtained and checked before commencing to drill. No holes for fixing screws for the valveholder are shown. The best way is to punch the $\frac{3}{16}$ in. hole in the position indicated. Then drop the valveholder into it and position the holder so that the pins take up the relative positions shown in the wiring diagram, Fig. 29 (though remembering that Fig. 29 gives the view as seen underneath the chassis). The position of the fixing holes can then be marked through the valveholder and drilled. The hole at the rear of the chassis is fitted with a large grommet of a size suitable to accommodate the four-way cable; the grommet on the top and towards the front of the chassis is smaller and passes the $\frac{1}{4}$ in. coaxial cable conveying the signal to the following unit.

It will be noticed that the modern miniaturised components are specified. These match the valve and allow the very compact design, but the reader who has followed the earlier parts of this series will know that there is the additional benefit of reduced stray capacitances. The first step, having shaped and drilled the chassis, is to mount the valveholder, the volume control, the coaxial input socket and the two tag strips. The wiring can then be proceeded with, and a wire-by-wire description is given below. Stress must be placed on the fact that the chassis is not used for the earth return leads. Instead, a busbar earth of stout wire is used and this contacts the chassis at only one point, i.e., at the outside mounting screw of the coaxial input socket. This is very important and should be followed by the constructor who should note that the busbar is anchored to the tag strips; *not* to the earthing tags in contact with the chassis but to floating tags.

If the wires are put on in the following order no difficulty will be experienced. The component mentioned in the left-hand column is wired between the points indicated or if no component is specified the points mentioned are connected together. Wiring is carried out using 24 gauge tinned copper wire in sleeving except for the earthing busbars, which should be in about 16 gauge tinned copper wire without sleeving. Shape the busbars carefully from lengths of wire that have been stretched to straighten them out before starting to solder them into place. They should be bent so that the wire runs at about 1 in. from the under surface of the chassis.

The only change in the design developed theoretically is at C4. Theory prescribed a $.02 \mu\text{F}$ component, but this was seen to be the minimum value and a larger capacitance would be better rather than worse from a low frequency point of view. From the point of view of upper frequency response as well as for convenience in construction the capacitor should be physically small and the Dubilier type 410 is ideal for the purpose, but a $.02 \mu\text{F}$ component is not available in this range. There is one of $.03 \mu\text{F}$ and this is specified. If a $.05 \mu\text{F}$ component is available in this miniature range it could be used without noticeable difference.

1. Earth busbar, 16 gauge wire from tag 1 of two-way tagboard to solder tag under holding-down bolt of coaxial input socket. Wire should be shaped to pass $\frac{3}{16}$ in. away from the volume control.
2. Earth busbar, 16 gauge wire from tag 5 of large tagboard to join first busbar.
3. Pass a length of coaxial cable (about 2ft. was used by the author for first tests) through the

hole in the top of the chassis with a grommet, remove lin. of the PVC covering and strip the braid back, leaving a pigtail of the braid which solders to the earth busbar. Bare the end of the inner and solder to tag 2 of the small tagboard.

4. R1. 22 K Ω . From tag 1 to tag 4 of the large tagboard.
5. C1. 8 μF positive to tag 1 of large tagboard; negative to earth busbar.
6. R5. 2,200 Ω } From tag 8 of valveholder
C3. 100 μF } (positive of C) to earth busbar.
7. R2. 100 K Ω . From pin 1 of valveholder to tag 1 of large tagboard.
8. Lead 1 (coded red) of volume control to pin 2 of valveholder.
9. Lead 2 of volume control to earth busbar.
10. Lead 3 of volume control to input coaxial socket.
11. R3. 2,200 Ω } From pin 3 of valveholder to
C2. 100 μF } earth busbar.
12. Pin 4 of valveholder to earth busbar.
13. Pin 5 of valveholder to tag 3 of large tagboard.
14. Pin 9 of valveholder to tag 2 of large tagboard.
15. C4. $.03 \mu\text{F}$. From pin 7 of valveholder to pin 1 of valveholder. (Bridge the component over valveholder with $\frac{1}{16}$ in. leads supporting each end.)
16. R6. 1 M Ω . From pin 7 of valveholder to earth busbar.
17. R4. 100 K Ω . From pin 6 of valveholder to tag 4 of large tagboard.
18. C5. $.1 \mu\text{F}$. From pin 6 valveholder to tag 2 of small tagboard.
19. Pass the end of a length of 4-way cable through the grommet at the back of the chassis and connect to the large tagboard, indicating the coding colours as follows:
 - Tag 2—Heater.
 - Tag 3—Heater.
 - Tag 4—H.T. positive.
 - Tag 5—H.T. negative (and amplifier earth).

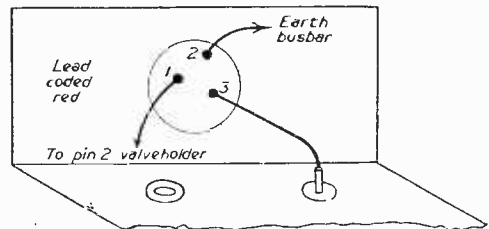


Fig. 30.—Fix volume control with connections in positions indicated.

Note that the heater connections are arranged to allow for either A.C. or universal working. If the unit is put into use with a power pack other than those to be shortly described care must be taken with the heater connections. Working from an A.C. supply, the lead from tag 3 must go to earth and the lead from tag 2 must go to one side of the 6.3 winding. The other end of the winding must also go to earth. For universal mains circuits with series connected filaments the lead from tag 2 is not connected and the lead from tag 3 goes to the remainder of the heater chain so that the present amplifier valve is at the earthy end of the chain.

(To be continued)

The Beginner's Guide to Radio



The Eighteenth Article of a Series Explaining the Fundamentals of Radio Transmission and Reception. This Month Further Notes on Testing Instruments and Measurements are Given By F. J. CMM

RESISTANCE values for any other voltage ranges can be worked out in the same way. It will be obvious that when the voltage to be measured is above 50 the resistance of the meter can be ignored without affecting the accuracy of the measurement to any great extent.

Resistance Measurement

The milliammeter may be used to measure resistances by connecting it in series with a resistance, (Fig. 75 last month). When measuring the values of

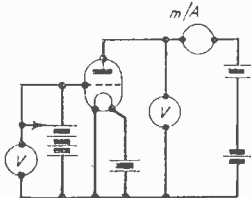


Fig. 78.—Circuit of a valve tester, by means of which characteristic curves can be plotted.

small resistances (less than 100 ohms) this method is not very suitable for extreme accuracy. In this case use should be made of a resistance bridge, the circuit arrangement of which is shown in Fig. 76. The resistances R1, R2 and R3 are of known value, whilst R is the unknown and R1 and R2 are adjusted until current ceases to flow through the galvanometer marked G. The value of R can be found from the equation $R1/R2 = R/R3$. Simplified this becomes:

$$\frac{R1 \times R3}{R2} = R.$$

A simple resistance bridge is shown in practical form in Fig. 77, where it can be seen that the resistances R1 and R2 are replaced by a length of resistance wire a yard long attached to a base-board to which is attached a 3ft. rule. R3 is of known value whilst the galvanometer should be of the centre zero type. The battery (an ordinary flash-lamp type will do, or an accumulator) is connected up and the crocodile clip is connected to one gal-

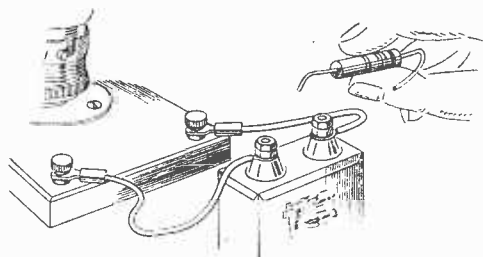


Fig. 79.—Measuring resistances by the flash method.

vanometer terminal and pressed against the length of resistance wire and moved along it until a zero reading is shown on the galvo. Then the above calculation can be made, taking R1 and R2 as being proportional to the distances of the clips from the two ends of the resistance wire. This is, of course, a very simple arrangement intended for demonstration purposes.

A simpler formula for calculating shunts is $R_s = \frac{R_m}{(N-1)}$, where R_s = the value of the shunt. R_m = the value of the meter resistance and N the multiplication factor.

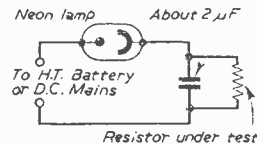


Fig. 80.—The circuit for testing resistances, using a neon lamp.

A more finished resistance bridge can be made by providing a slider to make contact with the resistance wire and fitting suitable terminals to a base-board so that the necessary components can be quickly wired up. The resistance wire can be 20 gauge Eureka, and it should be soldered at each end to tags fitted under the terminal. Resistances of about 10, 20 and 50 ohms will be required for R3.

A Valve Tester

A valve tester which will enable the experimenter to plot characteristic curves of valves can be quite simply made from the circuit shown in Fig. 78. This tester is, of course, intended for battery valves but a similar one could be made for A.C. valves, or a combination instrument for both could simply be devised on similar lines.

Testing Coils

It is sometimes interesting to compare the efficiencies of various types of tuning coil and in this case a valve voltmeter should be used. This consists of a circuit comprising a single valve,

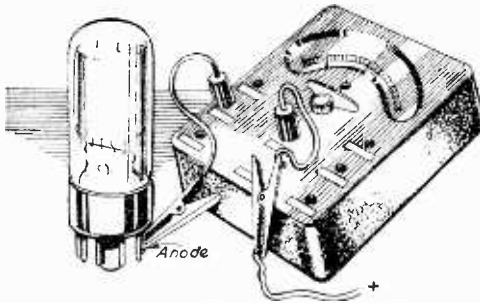


Fig. 81.—When testing the total H.T. current of a pentode, or a screened-grid valve, it is not sufficient to insert the milliammeter in the anode lead as shown here, as this does not include the screening grid current. Take care to insert the plugs in the correct (— and +) sockets of the meter.

arranged for anode bend rectification and having a milliammeter connected in its anode circuit. A simple arrangement of such a device is shown in Fig. 78. In this case, the milliammeter should have a maximum deflection of 1 milliamp, as this low reading enables very accurate results to be obtained.

Using Valve Voltmeter

In using a valve voltmeter the first thing to do is to adjust the grid-bias voltage by altering the position of the negative tapping and by varying the potentiometer setting until the milliammeter shows a reading of about .5 milliamps. When that is done, any tuned circuit which is connected to aerial and earth lead can be connected to the two terminals marked "Input." The circuit is then tuned to the local station or to the frequency of a local oscillator, and the increased reading of the instrument noted. The coils which are to be compared can then be connected in circuit, one at a time, and the readings carefully noted in each case. In each instance, the efficiency of the coil is represented by the change in anode current when it is connected in circuit. It is possible to calibrate the valve voltmeter so that actual voltage readings can be taken of H.F. currents, but that would only be necessary in the case of special laboratory work.

Useful Adjuncts

A number of small components and accessories are desirable for use in conjunction with measuring instruments. These include a pair of test prods, which can be connected to the instrument and the two metallic ends of the prods used to make contact with various parts of the circuit when taking measurements. Another useful accessory is a split-anode valve adaptor. This consists of a combined valve holder, plug and socket which can be placed in a valve holder between the valve pins and the sockets. The grid and filament pins are connected directly to the corresponding sockets but in the case of the anode pin this is brought out to the terminal on the side of the adaptor, the anode socket being connected to

another terminal on the adaptor. Thus, the anode current of any valve under exact working conditions can be measured by fitting the adaptor and connecting a milliammeter to its two side terminals.

The Characteristic Curve

Valve manufacturers issue useful books on their valves, giving what are known as the characteristics of the valve. In addition to tabulated details there is a graph. It will be found that the bottom line of this graph bears a number of figures marked "Grid Volts." The right- or left-hand edge of the graph bears a number of figures marked "Anode Current" and the thick lines running across the squares are labelled "Anode Volts." Sometimes these three sets of figures are referred to by their technical abbreviations, V_g for Grid Volts, V_a for Anode Volts and I_a for Anode Current. The grid volts line is usually divided into two parts, a zero line being placed near the right-hand edge, and the volts to the left of this being marked "negative" and those to the right "positive." This set of curves provides all the details which are known as the characteristics of the valve.

Plotting a Characteristic Curve

You may plot your own characteristic curve in the following way. Connect up a valve holder, a grid-bias battery, an H.T. battery and a L.T. battery in the usual way. A milliammeter should be inserted in the anode lead, between plate and H.T. positive. Now prepare a piece of squared paper with a grid potential line and mark the right-hand line with a series of numbers from 0 to 30. Insert the valve in its holder. With no grid-bias and 60 volts H.T. note the current indicated by the milliammeter. On the squared paper make a dot on the zero line where the line corresponding to the anode current intersects. Next plug the grid-bias plug into the 1.5 volt socket, and note the anode current, making a dot on the chart above the 1.5 volt line at the point of intersection with the new anode current figure. (To be continued)

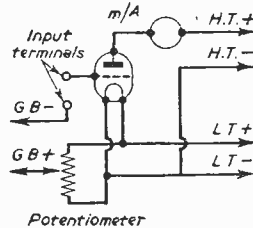


Fig. 82.—The circuit arrangement of a valve voltmeter which is suitable for comparing the efficiency of various coils.

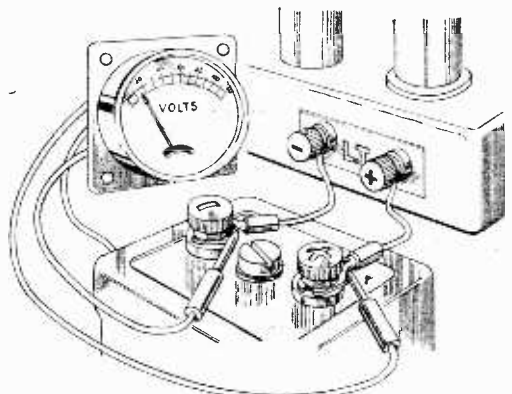
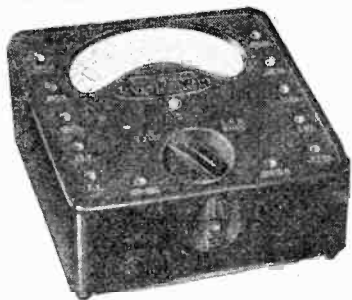


Fig. 83.—The correct way to test the voltage of an accumulator is while it is under load, that is, while it is connected to the set and switched on.



'AVO' Precision ELECTRICAL TESTING INSTRUMENTS

A dependably accurate instrument for testing and fault location is indispensable to the amateur who builds or services his own set.

The UNIVERSAL AVOMINOR

(as illustrated) is a highly accurate moving-coil instrument, conveniently compact, for measuring A.C. and D.C. voltage, D.C. current, and also resistance: 22 ranges of readings on a 3-inch scale. Total resistance 200,000 ohms.

Size: 4 1/2 ins. x 3 1/2 ins. x 1 1/2 ins.
Nett weight: 18 ozs.

Complete with leads, interchangeable prods and crocodile clips, and instruction book.

Price: £10 : 10 : 0

The D.C. AVOMINOR

is a 2 1/2-inch moving coil meter providing 14 ranges of readings of D.C. voltage, current and resistance up to 600 volts, 120 milliamperes, and 3 megohms respectively. Total resistance 100,000 ohms.

Size: 4 1/2 ins. x 3 1/2 ins. x 1 1/2 ins.
Nett weight: 12 ozs.

Complete as above
Price: £5 : 5 : 0

D.C. Voltage
0-75 millivolts
0-5 volts
0-25 "
0-100 "
0-250 "
0-500 "

A.C. Voltage
0-5 volts
0-25 "
0-100 "
0-250 "
0-500 "

D.C. Current
0-2.5 milliamps
0-5 "
0-25 "
0-100 "
0-500 "

Resistance
0-20,000 ohms
0-100,000 "
0-500,000 "
0-2 megohms
0-5 "
0-10 "

GUARANTEE: The registered Trade Mark "Avo" is in itself a guarantee of high accuracy and superiority of design and craftsmanship. Every new AvoMinor is guaranteed by the Manufacturers against the remote possibility of defective materials or workmanship

Sole Proprietors and Manufacturers:—
AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO., LTD.
Winder House, Douglas Street, London, S.W.1. Phone: VICTORIA 3404-9

THE Osram

"NINE-ONE-TWO"

A book you simply must get!

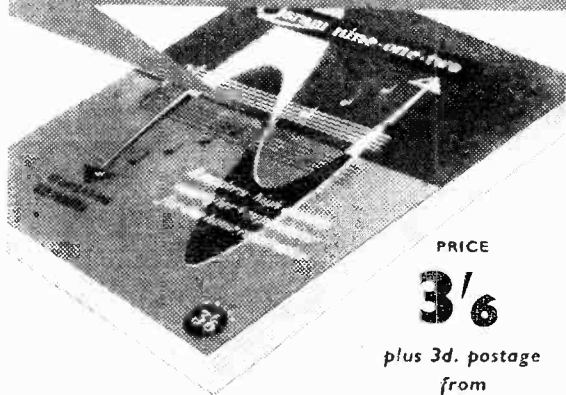
As the "Williamson" KT66 Amplifier—designed around Osram Valves—set the standard in its class throughout the world, so now the Osram 912 sets the standard in high quality sound for everyman.

- * Complete circuit data
- * Easily followed wiring diagram
- * Specified components of highest quality only
- * Performance curves

Much other valuable information for the Home Constructor is in the book—"The Osram 912"—a practical sequel to "Art and Science in Sound Reproduction."

NOTE THESE POINTS:—

- Full power output (12 watts) within 1db from 30 to 20,000 cycles sec. (9 octaves).
- Provision for 4 controls of frequency response (in addition to volume control), to achieve the requirement of "Art" in listening.
- Uses the famous Osram Z729 low noise pentode—acknowledged the lowest measured microphony and hum level of any comparable valve in the world.
- Uses NEW Osram power pentodes type N709 in push-pull "ultra-linear" output stage, with selective feedback.
- Sets a startlingly new standard (combined with G.E.C. speaker in octagonal loaded port cabinet) in the realism possible from listening to modern L.P. records. Variable "slope" control allows for reduction of surface noise in older cherished records, with minimum reduction in higher frequency response.



PRICE
3/6
plus 3d. postage
from

THE GENERAL ELECTRIC COMPANY LTD., MAGNET HOUSE, KINGSWAY, W.C.2

Great Britain's Valve Mail-Order House

0Z4	8/-	6H6	6/6	25Z4	9/-	EL32	9/6	NH(1.5)	6/-
1B4	10/-	6A5	7/6	25Z5	10/-	EL50	7/-	Y63	8/6
1C6	9/6	6B6	12/-	32	3/6	H63	7/6	AC6PEN	8/6
1G4	8/6	6U7	10/6	35	9/6	HL4	10/-	ACP1	8/6
1L5	6/6	6K6	10/6	35	9/6	HL41	10/-	ACD	10/6
1LA4	9/6	6K7G	8/9	35L6	10/6	HL41DD	11/-	ACSP3	11/6
1P5	9/6	6K8	13/-	35W4	11/-	KL35	9/-	DDT13	11/6
1R4	9/6	6L5G	7/6	35Z4	11/-	KT32	10/6	HL13	10/6
1R5	10/-	6L6	12/-	35Z5	11/-	KT44	11/-	HL23	7/9
1S4	10/-	6L7	11/6	37	10/6	KT51	12/-	HL133DD	9/6
1S5	10/-	6N7	11/6	41	10/6	KT66	12/6	HL1320	10/6
1T4	10/-	6Q7	12/-	42	10/6	KT72	10/-	HL41	9/6
1T5	9/6	6R7	7/9	46	10/6	KT74	10/-	HL41DD	12/6
1U5	10/-	6SA7	9/6	50L6GT	11/-	KTW61	9/6	TI30C	14/6
1V	9/6	6SC7	9/6	53KU	12/6	KTW62	6/6	TI162	10/-
2A6	9/6	6SH7	8/6	57	9/6	KTW63	8/6	TI142	13/-
2X2	8/-	6S7	9/6	58	10/-	KTW73	10/3	UF41	11/6
3D6	9/-	6SK7	9/6	62IFT	14/6	KTW74	10/3	4D1	9/6
3S4	10/6	6SL7	11/6	72	10/6	KTZ41	11/6	8A1	11/6
3V4	10/6	6SN7	11/6	73	10/6	KTZ63	8/6	8P2	11/6
5X4	12/-	6SS7	6/-	117Z6	10/6	L13	10/6	8P2	6/6
5Z3	11/-	6T118	8/6	117N7GT	17/-	PEN25	10/-	41MPT	8/6
5Y3	11/-	6U7	9/6	805	40/-	PEN383	12/-	210LF	6/6
5U4	12/-	6V6	10/6	807	9/6	PEN1340	10/-	PX230	6/6
5Z4	11/-	6ZV5	10/-	860	15/6	PENDD2530	11/6	LP2	5/6
6A8	11/6	6W5	11/-	866A	9/6			QP22B	11/-
6A4S	9/-	6X4	10/-	846Z4	9/6	PENDD1380	11/6	PI222	12/6
6A7	8/6	6X5	10/6	9004	7/6			DDT4	12/-
6A4S	9/6	7A7	10/6	854	5/6	PEN46	10/6	R3	11/6
6A1.5	8/6	7B7	11/6	955	6/6	SP41	5/6	U12	11/6
6AK6	9/6	7C5	10/6	956	6/6	SP42	10/6	U12	12/6
6A M6	12/-	7E6	10/6	1299A	9/-	P41	9/-	12SF5	5/6
6AQ5	9/6	7H7	10/6	1625	9/6	TI233	13/-	31	3/6
6AT6	10/-	7N7	10/6	1626	9/6	TP22	10/6	ML4	7/6
6B4	9/-	7Q7	11/-	7183	6/6	TP1340	12/-	MSPEN	12/6
6B7	11/-	7R7	11/-	OD3,VR150	14/6	U7 & U74	10/-	TI2321	14/6
6B8	10/6	7S7	12/6			U21	10/-	U18	11/6
6RA6	11/6	7Y7	10/6	D41	8/6	U22	11/6	84215	8/6
6BF6	11/6	7Y4	10/6	D12	8/6	U2	11/6	PM2	7/6
6BH6	11/-	12AT6	14/-	D43	8/-	UF41	10/6	QP21	8/6
6H6	11/-	12C8	10/6	D63	8/-	UC7	10/6	MH4	9/-
6BK7	11/-	12H6	6/6	DH73	10/-	VP23	9/6	EP39	9/6
6BV6	11/-	12J5	8/-	DL23	8/6	VP41	10/-	EP34	5/6
64	8/6	12SA7GT	10/6	DL83	10/-	VP133	10/6	ERC33	7/6
6C6	9/-	12SH7	8/6	DL74	10/-	W17	10/-	EF36	7/6
6C8G	11/-	12S17	9/6	EC31	13/6	W76	10/3	EK32	9/6
6D6	9/-	12SK7	10/-	EX1.80	14/6	W77	10/-	SP61	6/6
6E6	10/-	12SR7	9/-	EX31	12/-	X17	10/-	SP41	4/9
6E8	12/-	2Y4	9/6	EX22	9/6	N73	11/6	P41	5/9
6G6G	9/-	14F6	10/-	E12	11/6	X78	10/-	D1	4/6
6G8	9/6	25AC5	6/6	E13	11/6	XP1.5)	6/-	EF50	9/6

RADIO BULLS VALVES
246 HIGH ST. HARLESDEAN

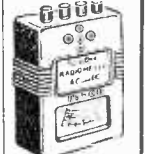
E.A50	5/6	MSPEN	5/-
EF8	7/6	MSPenB	5/-
MSPENB	10/6	P2	3/-
U17	9/6	P215	2/-
VP13	9/6	PM12M	3/-
VP23	6/6	PM124A	7/6
VP23	7/-	SP13	4/-
ATP4	5/6	VP13C	7/-
ATP7	9/6		
S130	6/6		
VP2	8/-		
SP2	5/6		
KT2	6/6		
4D1	6/6		
01A	2/-		
1R4	3/-		
1H6	3/-		
1LN5	7/-		
2A6	2/-		
2A7	3/-		
2B7	2/-		
6F7	7/6		
6F32	7/6		
6I7	5/-		
9D2	7/-		
12A	2/-		
12SF5	6/6		
31	3/6		
35L6	8/-		
48	4/-		
50Y6	2/-		
954	2/-		
117Z6	7/6		
4T8A	6/-		
4T8A	5/-		
4TSP	5/-		
138FA	5/6		
41M1L	3/-		
Z1A	3/6		
20MSTH	8/-		
215P	2/-		
2201F	4/-		
ACHLDD	6/-		
EF6	17/6		
KTZ63	5/-		
MSP4	5/-		

BRITISH, AMERICAN, BATTERY, A.C. and UNIVERSAL TYPES.
All fully American made

PLUS POST 9d.
Subject to Stock and Prices
Send Stamp for Complete List



"Demobbed" Valve Manual. Most comprehensive Cross-Reference Equivalents Book. 2/6.



SERVICE SHEETS
The one you require enclosed if available in a dozen assorted of our best choice.
10 6.

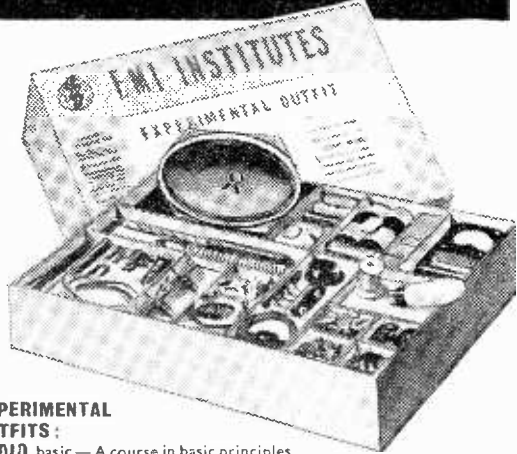
All-in-one Radio-meter A.C./D.C. Tests everything in Radio. With Test Prods. Post 1/6 29 6

NEW!

RADIO & T.V. OUTFITS

LEARN THE PRACTICAL WAY

Specially prepared sets of radio parts (which you receive upon enrolment) with which we teach you, in your own home, the working of fundamental electronic circuits and bring you easily to the point when you can construct and service radio sets. Whether you are a student for an examination; starting a new hobby; intent upon a career in industry; or running your own business — these Practical Courses are intended for YOU — and may be yours at very moderate cost.



EASY TERMS FROM £1 A MONTH

All lessons and equipment supplied immediately and becomes your own property.

POST THIS COUPON TODAY

Please send me your FREE book on Practical Courses:
I am interested in.....
To: E.M.I. INSTITUTES, Dept. 32X, 43 Grove Park Road, Chiswick, London, W.4.
NAME.....
ADDRESS.....
C.O.D. 10.36

EXPERIMENTAL OUTFITS:

- RADIO basic — A course in basic principles.
- RADIO — Instruction and equipment from which you build a Radio Receiver.
- TELEVISION — Instruction and equipment for building a Television Receiver.

Also for Mechanics Electricity, Chemistry, Photography, Carpentry, Draughtsmanship, Commercial Art, Amateur S.W. Radio, Languages.

E.M.I. INSTITUTES The only Postal College which is part of a world-wide Industrial Organisation

Programme Pointers



"Diplomacy"

AS a very young man I can remember a most exciting and dramatic play at Wyndham's Theatre called "Diplomacy," by Victorien Sardou. Among the stars in the cast were Gladys Cooper and the late Sir Gerald du Maurier. The potential enemy in those days was Germany and, although the nationalistic plotting and counter-plotting, spying and counter-spying of this most well-constructed piece were strictly Ruritanian in their imaginativeness, one was made to feel that the sinister Baron Stein and his associates were plotting for Germany against England. Further, was not the author a Frenchman?

Although my judgments in those days were less experienced and mature than I trust they are now, everyone, during a run of hundreds of performances, was tremendously thrilled and fascinated. There must have been something in both the play and the acting. But recently in the Monday night theatre series, there seemed absolutely nothing. The plot seemed jejune and naïve to the point of being Dick Bartonish or P.C.49-ish. Forty years of international immorality and knavery had done its work, presumably, and left me too sinister or biased to care two straws as to what happened or "whodunnit." And as for the acting, my only memory of it is a most hideous conglomeration of catarrhal sickish foreigners talking pigeon English and trying to speak a language about which they knew nothing. Up they came one after the other: it was as though all the day trippers on a Bank holiday had been rounded up on Folkestone and Boulogne harbours and hurled into the cast. The Countess Zicka—Freda Jackson—was the worst offender. But listen to the names of the others: Madame la Marquise de Rio Zares, Baron Stein, Count Orloff, Mion, Antoine, etc. That all these were at it hammer and tongs throughout almost the entire length of the piece in broken English, to everyone's boredom and ennui, was the producer's fault. I won't mention any names other than Miss Jackson's and Gerard Heinz's as Stein in what was to me a dreadful show.

Other Plays

Another silly piece, this time the bored audiences forgathered on a Saturday evening, was "Who Killed Rikhjovic?" by Rex Reinitz. The story concerned the killing of the potential Wimbledon champion, whilst in course of play on the centre court, by means of refresher tablets which he sucked between games. This is a procedure very rare, I believe, if not entirely unknown in the tennis hierarchy—the sucking, not the killing. These pieces of fantastic adventure, which the BBC is so fond of these days, tell us nothing of real life or of real people whatsoever. For the devotee of the "Penguin Green-Back" they may have their excitements. The best member of the cast was the actual BBC's Wimbledon commentator, Max Robertson, who

Our Critic, Maurice
Reeve, Reviews Some
Recent Programmes

purported to be commenting this bizarre match. The crowd of centre court fans was too small and too obviously under a conductor's baton to convey much realism.

A much more interesting piece that concerned itself with realities which, if long since past and not very apposite to everyday life, are none the less an important, shattering and decisive episode in English history, was "My Lord Cardinal," written for radio by Donald Ford. Readers who didn't listen will guess that it dealt with the Henry the Eighth—Katherine—Anne Boleyn triangle. Maxine Audley, Balfol Holloway, James McKechnie, Catherine Salkeld, etc., gave it interest and realism.

But the *chef d'œuvre* of the theatrical month was an excellent production of a masterpiece, Sheridan's "The Rivals." "Give us the tools and we'll get on with the job," said the Prime Minister in darker days. Actors and producers must often quote the sentiment in words to suit a changed context. The deed usually works the trick. Barbara Couper pointed all the Mrs. Malapropisms effectively. Lydia Languish, in the person of Isabel Dean, won all our hearts, whilst Ivan Sampson as Sir Anthony Absolute, Richard Bebb as Capt. Anthony, Simon Lack as Bob Acres, T. St. John Barry as Sir Lucius o'Trigger, as well as all the others, passed across the stage in true eighteenth century fashion.

Programme Clash

I welcome back "The Name's the Same," probably the best of the current series of parlour games. It is a pity, though, that it is now timed for nine o'clock on the Light. It bites into the first quarter of an hour of the Monday night theatre on the Home Service, which starts at 9.15. This could surely be avoided.

Brian Johnston is a most excellent and highly-informed cricket commentator, but I do wish he wouldn't talk so fast. Cricket is such a slow-moving game that there is really no need to emulate Raymond Glendenning at football or Max Robertson at tennis.

The "Frankly Speaking" series of interviews was successfully continued when Colin McInnes, C. R. Hewett and Roger Bannister questioned Viscountess Astor. There are few more interesting items in current programmes than these questionings of famous public figures. One could sometimes wish the questioners were less diffident and shy seeming, and assume a bolder front as if to say "We don't care a rap whether you are the notorious Sir this or Dame that . . . All we want is the low-down, and the lower the better." Lady Astor is a forceful personality and has touched life at many points.

She was at her most amusing when talking on her American home and upbringing.

Farewell Broadcast

Ever ready, to encourage youth and promising talent, Adelina de Lara, eighty-two years young, was

allowed to give her farewell broadcast. She has already given more than one publicly. Her piece was Schumann's Kreisleriana, a task for any virtuoso male pianist of sixty. The same composer's "Scenes from Childhood" would have better suited her.

News from the Clubs

WEST LANCS RADIO SOCIETY

Hon. Sec. : Mr. S. Turner, 5, Balfie Street, Seaforth, Liverpool, 21.

THE club now has a 1154 transmitter and 1155 receiver, generously donated by Mr. F. Carter, who is a keen and enthusiastic member of the club. The club call sign is G3JQA, but operations are restricted at the moment owing to the lack of a good aerial. Future events include a talk on Superhets by H. Hipple (G3BNO), a radio film strip and a talk and discussion on the National Field Day (June 12th to 13th). The club meets every Tuesday at 8 p.m. over Gordon's sweet-shop, corner of St. Johns Road, Waterloo.

THE ACTON, BRENTFORD AND CHISWICK RADIO CLUB (G3IU)

Hon. Sec. : R. G. Hindes (G3IGM).

THANKS to notices published in "P.W." the club membership continues to rise weekly. Meetings are held each Tuesday night from 7 p.m. to 10 p.m. at the A.E.U. Rooms, 66, Chiswick High Road, W.4. Many contacts have been made with the club's low power transmitter on the 80 and 160 metre bands. G3NE gave an interesting lecture recently on "Parasitics," and Pat Hawkes (G3VA) lectured on "The History of Amateur Radio." The club will operate with the call G5LQ/P on NFD from the L.P.I.B. Sports Ground at Acton Town.

SOUTH MANCHESTER RADIO CLUB

Hon. Sec. : M. Barnsley (G3HZM), 17, Cross Street, Bradford, Manchester, 11.

THE following programme of lectures has been arranged: Sept. 10: Design of Mains Transformers and Chokes: N. Ashton (G3DQU). Sept. 24: Power Pack Design: M. Barnsley (G3HZM). Oct. 8th: Annual General Meeting.

New members are continually coming along in order to hear the simple lectures which have been instituted into the meetings, and which take place before the main lecture. Any readers who wish to come along will be very welcome.

THE CLIFTON AMATEUR RADIO SOCIETY

Hon. Sec. : C. H. Bullivant (G3DIC), 25, St. Fillans Road, London, S.E.6.

ONCE again the Clifton A.R.S. has enjoyed a full month of events. On July 2nd a Junk Sale took place, on July 16th a session of "Any Questions," whilst on July 30th club member B. Herbert (G2W1) gave a very interesting talk on the Tesla Oscillator. Constructional evenings were held on July 9th and 23rd.

The second D.F. contest took place on Sunday, July 25th. The weather was unkind, but six teams took the field in the hunt for the club transmitter, G3GHN/P, operating in the 80 metre band. The winner was C. Hatfull (G3HZI), assisted by R. Popp. Second was E. Strong assisted by D. Reed and D. Wenham.

The proposed programme for September is: September 10th: 8th Annual General Meeting. September 17th: Constructional Evenings. September 24th: "Radio Receiving Valves and their Manufacture": Mr. G. P. Thwaites (Standard Telephones & Cables, Ltd.).

Meeting are held every Friday at 7.30 p.m. at the clubrooms, 225, New Cross Road, London, S.E.14.

READING RADIO SOCIETY

Hon. Sec. : L. A. Hensford (G2BHS), 30, Boston Avenue, Reading, Berks.

THE meeting on October 9th will be devoted to the showing of Messrs. Mullard's films "The Manufacture of Radio Valves" and "The Industrial Application of Ultrasonics." On October 30th Mr. Edwards, of the A.E.I. Research Laboratory, Aldermaston, will be giving one of his lectures on Electronics.

WARRINGTON AND DISTRICT RADIO SOCIETY (G3CKR)

Hon. Sec. : G. H. Flood, 32, Capethorne Road, Orford, Warrington.

THE annual Inter-Club Top Band Telephony Contest, organised by this Society, takes place on Sunday, September 26th, and is open to all TX and RX members of neighbouring societies. Further details from Hon. Sec.

A visit to the Port Radar Station, Gladstone Dock, Liverpool, is being arranged.

Meetings will be held on September 7th and 21st at the King's Head Hotel, Winwick Street, 7.30 p.m.

LEICESTER RADIO SOCIETY

Hon. Sec. : W. N. Wibberley, 21, Pauline Avenue, Belgrave, Leicester.

DURING the month of August the Leicester Radio Society held another of its popular D.F. Field Days. Members arranged themselves in parties of three or four, and in spite of the weather had a very enjoyable day.

Many books have been added to the Society's new library and the librarian is compiling an up-to-date list which will be issued to members.

The Experimental Transistor Group has been devoting its activities to the design of new equipment, and group members have taken part in all the transistor transmission trials with great success.

G2BVW gave a talk in July on V.H.F. circuits, and several members have built equipment as a result of his lecture.

The arrangements for the forthcoming Autumn and Winter sessions are now in hand, and a list of lectures will be published very soon.

BRADFORD AMATEUR RADIO SOCIETY

Hon. Sec. : F. J. Davies, 39, Pullan Avenue, Bradford.

THE 1954/55 syllabus is now practically complete and the first meeting of the winter season is on Tuesday, September 14th, 1954.

The syllabus caters for a variety of interests and includes a visit to one of the TV. link stations, and lectures on oscilloscopes, transistors and amateur test equipment. A copy of the syllabus will gladly be sent on application to the secretary.

ROMFORD RADIO SOCIETY

THE address of the secretary of the above society, Mr. N. O. Miller, has been changed from 10, Rom Crescent, Romford, to 18, Mascalls Gardens, Brentwood, Essex.

BOOK RECEIVED

"RADIO VALVE DATA: Characteristics of 2,000 Valves and C.R. Tubes." Compiled by the Staff of "Wireless World." Fourth Edition, Published on August 23rd, 1954, at 3s. 6d. net (postage 4d.), for "Wireless World" by Hiffe & Sons, Ltd. Size 11in. by 8½in. 100 pages.

THE latest edition of this widely-used reference book contains full operating data on over 2,000 types of British and American radio valves and some 200 cathode-ray tubes. Seventeen British valve manufacturers are represented, all of whom have co-operated with "Wireless World" in ensuring that the information given is accurate, comprehensive and up-to-date.

The main tables give the electrical characteristics of each valve, and separate tables show their base connections. The main tables further classify the valves into current, replacement or obsolete types, as recommended by the makers. An index enables any valve to be found in the tables immediately, while a valuable new feature is the full list of equivalents.

"Radio Valve Data" is an essential tool for every radio designer, service engineer, dealer and experimenter.



Aerialite, Ltd.

IN addition to many popular and well-known aerials there will be some new lines, especially in the Band III range. Two new aerials (Models 88 and 89) will also be seen, together with radio aerials, car aerials and interesting small accessories. These include coaxial plugs, attenuators, aerial distributor boxes, lightning arresters, mounting devices, etc. A wide range of cables will also be on view here.

[Stand No. 64]

Antiference, Ltd.

THE full range of aerial equipment exhibited here will include television aerials, indoor aerials, F.M. and Band III aerials, car aerials, etc. Special export models will also be on view, and amongst the other products will be the "Exstat" aerial, vertical rod aerial, plugs, sockets and other incidental items.

[Stand No. 34]

Associated Technical Manufacturers, Ltd.

THE full range of "Arrell" television aerials are shown, incorporating the unique polythene insulator. Several new types are among those on view, including an "X" type at a very low price. Band III aerials appear for the first time in readiness for the opening of commercial transmissions. The "Arrell" co-axial plug and socket, together with outlet boxes, are also included in the exhibit. Several examples of thermo-plastic moulding and a full range of television co-axial and balanced twin feeder make up the total of television components shown.

[Stand No. 25]

Automatic Coil Winder & Electrical Equipment Co. Ltd.

A WIDE range of electrical and electronic instruments will be found. In addition to the well-known range of "AVO" equipment, two new multi-range instruments will be of interest. These are the "AVO" electronic multimeter, a 96 range valve voltmeter, and the "AVO" valve tester type 160. Both instruments incorporate novel features, are suitable for use in any climate, and meet the conditions of various British inter-service specifications.

It is hoped to show a model of an entirely new signal generator specially designed to cover the requirements of receivers catering for present and future television stations, and stations transmitting frequency modulated programmes. [Stand No. 51]

Balcombe, Ltd., A. J.

RADIO and television receivers are to be shown here, amongst which is what is claimed to be the smallest all-wave superhet—the C.114. This is the sixth successive year in which this model has been shown. Other radio models include portables, amongst which is a

small portable radiogram operating from batteries or mains. Three console radiograms, big-screen television receivers, and a combined 17in. TV plus three-speed radiogram will also be shown.

[Stand No. 35]

Belling & Lee, Ltd.

A VERY wide range of the smaller accessories will be seen here, including television aerials, radio aerials, amplifiers, aerial terminations, interference

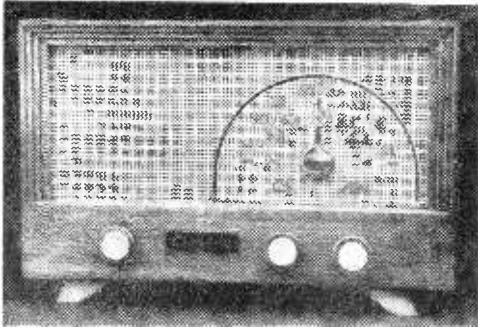
SPECIAL NOTE

This review has been compiled from information supplied by exhibitors, as we go to Press with this issue before the show opens. The omission of certain exhibits is, therefore, explained by the fact that the manufacturers concerned have not, at the time of going to Press, supplied us with the information. Further reports will appear next month.

suppressors, terminals, fuseholders, connectors, etc. Aerials for the new television Band III will be seen, and the amplifiers will include a model designed for installation in blocks of flats, etc., for the distribution of television or radio signals to a number of widely separated points. [Stand No. 67]

Bulgin & Co., Ltd.

ONCE again the enormous range of small items will be shown, including switches of all types, connectors, cut-outs, fuses, connectors, plugs and



Champion Model 800—An unusual dial is used on this receiver.

sockets, lampholders and signal lamps, test prods, terminals, knobs and dials. Many of these are already familiar to most constructors, but there are dozens of new lines which should be inspected.

[Stand No. 99]

Bush Radio, Ltd.

HERE will be seen "as usual" the Peter Pan model DAC.90A, which is now in its ninth year of continuous production, a mains-battery model first introduced last year and for which a special mains unit is available, and other table and console radios. One V.H.F. sound receiver will be seen, but no type of adaptor for radio sets produced in past seasons. A wide range of television models will also be shown.

[Stands 86 and 89]



One of the Collaro gramophone units.

Chald Products, Ltd.

HERE will be seen the "Squarial" and the "Javelin"—two new television aerials of unusual design. [Stand No. 26]

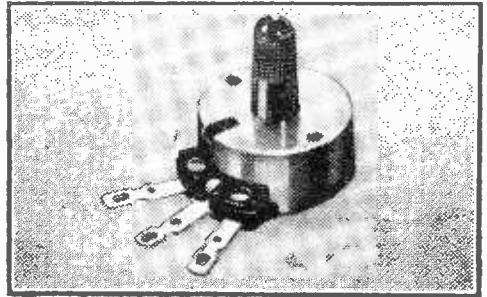
Champion Elec. Corporation

A MIDGET broadcast-band only receiver, a three-speed record player and amplifier, a four-valve battery portable, a transportable three-speed radiogram and a bureau radiogram with record storage space are amongst the models to be seen on this stand. Model 800 sets a new idea in cabinet design, being very contemporary in appearance. (See illustration on this page.) [Stand No. 33]

Collaro, Ltd.

A VERY wide range of record players, turntable units and similar items will be shown here, including some new models such as the "54"—a high-fidelity record changer which mixes 7in., 10in. and 12in. records and has a constant change time at all record speeds. Also on show will be the new AC37554 three-speed gramophone unit incorporating the new one-piece lightweight pick-up arm and new turntable with a further reduction in selling price.

[Stand No. 11]



A miniature pre-set volume control from the Dubilier range.

Co-operative Wholesale Society, Ltd.

THE range of "Defiant" radio and television receivers will be shown here. The television receivers are dealt with separately in our companion paper. Amongst the radio models are a mains-battery four-valver and an A.C. super-radiogram with three-speed record changer and record-storage space. [Stand No. 106]

Cosmocord, Ltd.

HERE will be seen the well-known Acos products—pick-ups, microphones and other electro-acoustic devices employing crystals. The pick-ups cover a very wide range, being available as replacement heads or complete with carrier-arm. The microphones include a non-directional lapel type, as well as a vibration unit suitable for use in the reproduction of musical instruments of the stringed type. [Stand No. 44]

Cossor, Ltd., A. C.

AMONGST the radio models to be seen here will be provision, for the first time, for receiving F.M. transmissions which should commence in the

near future. The "Melody Master," covering three wavebands and incorporating 7 valves will also receive existing A.M. transmissions. A new radiogram, Model 522, has seven valves and a magic-eye and is also adaptable to receive the F.M. signals. A wide range of TV receivers will also be seen.

[Stand No. 57]

Decca Record Co. Ltd.

ON this stand the exhibits will range from a comprehensive tele-radiogram to a single-valve record reproducer. Fitted with a 6in. elliptical loudspeaker, this has a 3-speed motor and turn-over crystal pick-up and costs 19 gns. Among the television models will, of course, be the already familiar projection models. These will be covered in our companion paper.

[Stand No. 39]



A modern style record storage cabinet by H. E. Gibbs.

Dubilier Condenser Co. (1925) Ltd.

HERE will be seen a vast range of mica, ceramic, electrolytic and paper condensers, together with fixed and variable resistors and suppressors for radio and television purposes. The resistors include the smallest $\frac{1}{2}$ watt unit (the BTS) and include special high-stability types as well as those which are wire-wound. The condensers are supplied in an extremely wide range suitable for radar, and other electronic purposes.

[Stand No. 83]

Edison Swan Electric Co. Ltd.

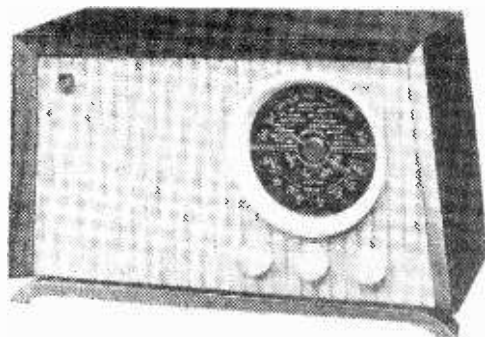
THE main feature on this stand will be aluminised cathode-ray tubes. Apart from these, however, will be seen a wide range of radio valves and many interesting Ediswan-Clix radio components. Amongst these will be valveholders and plugs and sockets. The exhibit will be completed by Ediswan stabilised power units, a low-frequency oscillator and the Ediswan portable electrical recording equipment for medical and industrial use.

[Stand No. 37]

E.M.I. Sales & Service Ltd.

ON the four stands occupied by this firm will be seen H.M.V. and Marconiphone radio and television receivers, H.M.V., Columbia, Parlophone and M.G.M. records, and an interesting array of electronics equipment including an analogue computer. The radio receivers of the H.M.V. and Marconiphone Companies will be seen on Stands Nos. 10 and 13, whilst the records will be on Stand No. 9 and E.M.I. Sales and Service on No. 73.

[Stands 9 and 73]



This is one of the Alba receivers—Model 3112.

Ever Ready Co. (Gt. Britain) Ltd.

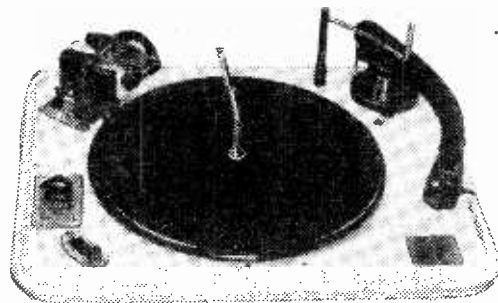
DRY batteries of all types will be seen here, together with some radio receivers in which they are employed. Of these the All-dry type will be predominant and incorporate portables as well as table models. The famous "Saucepan Special" will be on show together with other export-only models. Among the home models the "Skyscraper"—an all-dry model designed for strong reception in difficult areas, and having four wavebands—should prove an attraction.

[Stand No. 66]

Fitton Ltd., F.N. (Ambassador Radio)

HERE will be seen the well-known Ambassador receivers, which will include a "Viscount" de-luxe auto-radiogram at £79 10s, which has nine wavebands and a Garrard record changer, and sundry television models.

[Stand No. 41]



A complete record player from the range of Garrard units.

Garrard Eng. & Mfg. Co. Ltd.

INCLUDED in the wide range of gramophone units on this stand will be some new models, such as the Model 301 Transcription motor and the GCE3 ceramic turnover pick-up. A noticeable feature of the exhibits here, is that a new finish has now been adopted and all record changers and record players are now cream and brown. Three-speed players and mixed changers may be seen, and many are now standard equipment in complete commercial radiograms. [Stand No. 71]

Gibbs Ltd., H. E.

HERE may be seen a range of cabinets of all types. On page 609 is an illustration of a record storage cabinet, finished in blonde Australian walnut veneers, with sliding doors and a special metal fitment to take 170 records. Measuring 24in. by 15in. by 28in. high, this costs £8 8s. [Stand No. 20]

General Electric Co. Ltd.

THE G.E.C. will be showing many new radio and television receivers. On the radio side there is a new table radiogram, a new compact mains portable and a new transportable mains table model. The television display features new G.E.C. all-programme receivers, also adaptors which will equip the older type of single-programme receiver for alternative programme reception. A new 17in. television receiver developed especially for export markets is also being shown. [Stand No. 68]

Hartley Baird, Ltd.

HERE will be shown a range of television receivers designed for "double band viewing." A turret selector covers Band I and Band III, and our companion paper *Practical Television* deals more fully with these. [Stand No. 88]

Hunt (Capacitors), Ltd., A. H.

AGAIN miniature and standard fixed capacitors for all radio, electronic and electrical use will be exhibited, and the range will include electrolytics, metallised paper, foil and paper and silvered mica components. In addition many well-known standard types in stacked mica will be seen, in company with some samples of Bondac printed circuits, and a capacitor analyser and resistance bridge. [Stand No. 90]

Invicta Radio, Ltd.

THE main exhibit on this stand will be the Invicta 57 radiogram. This is a five-valve (including rectifier) A.C. radiogram, covering long, medium, trawler and short wavebands, and is fitted with a B.S.R. Monarch changer. With record storage space and a 10in. speaker, this costs 53 gns., including P.T. [Stand No. 95]

J. Beam Aerials, Ltd.

THE main portion of this exhibit will consist of television aerials, for both the Band I and Band III transmissions—horizontally and vertically polarised. [Stand No. 31]

Kolster Brandes, Ltd.

HERE will be seen a comprehensive range of radio, radiograms and television receivers, including multi-channel TV and F.M. radio. Some of the

radio receivers have had an F.M. band added, whilst certain of last year's models are retained. Lower-priced radiograms will be featured and will include the LG.40AM/FM, a model with A.M. and F.M. bands, push-pull output and bass tone control. [Stand No. 70]

Marconiphone Co., Ltd.

AS part of the E.M.I. group many of the chassis in the receivers seen on this stand will be found also in the H.M.V. models on Stand 10. Three new radio models will be seen, a five-valve portable of the mains-battery type, an A.C./D.C. "Companion" receiver, and a five-valve three-waveband table receiver with inbuilt aerial. Three new radiograms will also be seen. A number of television receivers will also be displayed and are covered elsewhere. [Stand No. 13]

Masteradio, Ltd.

TWO new models are being introduced at this year's show, a Model GP200—a portable record player retailing at 16 gns., and the RG356, a three-speed auto-change table radiogram retailing at 36 gns., and known as the "Mastergram." [Stand No. 62]

Mullard, Ltd.

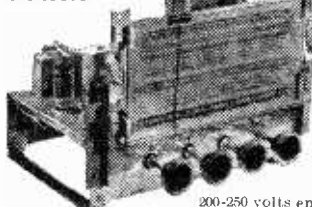
IN addition to the range of popular Mullard valves and tubes to be seen here, the main display will be on electronics and the part they play in modern life. The new amplifier design which they have produced will also be shown, whilst a large working model will show how the modern valve functions. Radio and television receivers of various types will also be seen. [Stand No. 59]

(Continued on page 613)



This is the Masteradio record player—Model GP200.

A COMPLETELY ASSEMBLED "ALL-WAVE" SUPERHET CHASSIS



Model B.3-A 5-valve 3 waveband Superhet Receiver for operation on A.C. mains 100-120 volts and 200-250 volts employing the very latest miniature valves. It is designed to the most modern specification, great attention having been given to the quality of reproduction which gives excellent clarity of speech and music on both Gram and Radio, making it the ideal replacement Chassis for that "Old Radiogram," etc.

Brief specifications:—Model B.3—Valve line up, 6BE6, 6BA6, 6AT6, 6BW6, 6X4. Waveband Coverage: Short 16-50; Medium 187-550; Long 900-2,000 metres. Controls (1) Volume with on-off; (2) Tuning (flywheel type); (3) Wave change and Gram; (4) Tone (3 position switch operative on Gram and Radio). Negative Feedback is employed over the entire audio stages. Chassis size, 11in. x 7in. x 8in. high. Dial size, 9in. x 4in. Price, complete and READY FOR USE excluding speaker, £12/12/- (Carr. and Pkg. 7/6 extra). Or H.P. Terms £3 4/- Dep. 12 Months at 17/6. MODEL B.3 H.P.P.—This model is the B.3-A Receiver but incorporates two 6BW6 VALVES in PUSH-PULL, resulting in really excellent quality reproduction up to approximately 6 watts. Price £15 15/- (Plus 7/6 carr. and ins.) or H.P. Terms £3/19/- Dep. 12 months at £12 2.

MODERNISE YOUR OLD RADIOGRAM FOR

£ 23

We offer this Auto-changer complete with Model B.3-3 wavebands advertised together with 10in. p.m. Speaker for £23/6/- plus 10/- carr. and ins., or H.P. Terms £5 16/- Dep. and 12 months of £1 12/10. or with B3PP Model for £26/9/- plus 10/- carr. and ins. or H.P. Terms £6/11/- Dep. and 12 months of £1 17/4.

A GENUINE SPECIAL OFFER!

The COLLARO 3RC/521

3-SPEED AUTO-CHANGE UNIT

£9/19/6 H.P. Terms £2 10/- Dep. and 11 months at 15/9 (plus 7/6 carr. and ins.)

Normal price £18/10/-

- These units will auto-change on all three speeds. 7in., 10in and 12in.
- Incorporating Hi-Fi Crystal Turnover Head
- They have separate sapphires for L.P. and 78 r.p.m. which are moved into position by a simple switch.
- Minimum base-board size required 13in. x 12in. with height above 5in. and height below baseboard 2in.
- A bulk purchase enables us to offer these BRAND-NEW UNITS, including mounting instructions, at this exceptional price.



The "SUPER-SIX" FOR HOME CONSTRUCTORS

A compact and highly efficient superhet Radiogram chassis of outstanding quality.

YOU CAN BUILD IT FOR

£10/7/6 Including the OCTAL VALVE LINE-UP.

£12/7/6 with the miniature valves.

We will supply it assembled and READY FOR USE for

£13/13/0 (Plus 7/6 Carr. & Ins.) H.P. Terms £3 10/6 deposit and 12 months at 19/-

Incorporating the new B.V.A. Miniature Valve Line-up.

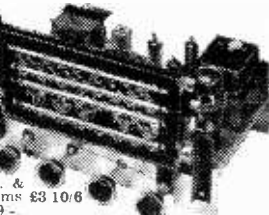
This receiver is designed to the very latest specification and provision is made to incorporate either the standard Octal Valve Line-up or the new B.V.A. range of miniature valves. Great attention has been paid to the quality of the reproduction of both Radio reception and Record playings, and excellent clarity of speech and music is obtained.

A few brief details:

- Covers 3 wavebands 18-50 metres, 190-550, and 800-2,000 metres.
- Employs 6 valves having PUSH-PULL for 5-6 watts output.
- Incorporates delayed A.V.C. on all wavebands and pre-selective feedback.

THE INSTRUCTION and ASSEMBLY MANUAL is available for 2/-, it contains very detailed practical drawings and circuit diagrams and a complete Component Price List.

• A 4 position Tone Control operates on both Radio and Gram.
- Has independent mains supply socket for a Record Player.
- Size of Assembled Chassis 12in. x 8in. x 6in. Dial aperture 8in. x 4in.
- For operation on A.C. mains 200-250 volts 50 cycles.



! OUTSTANDING OFFER !

A BULK PURCHASE ENABLES US TO OFFER THIS "PUSH-PULL" 7 VALVE SUPERHET RECEIVER

For only £12/19/6

(Carr. and Ins. 7/6 extra). H.P. Terms £3 4/- Dep. 12 months at 18/4.

These receivers, Model AW3-7 are made by a well-known set manufacturer and incorporate the latest Osram Valve Line-up of X79—W77—DH77—H77—U78 and two N78's in Push-Pull for approx 7 watts output. They cover 3 wavebands 18-50 metres, 190-550 and 800-2,000 metres, and are for operation on A.C. mains 200-250 volts. They make an excellent replacement Radiogram Chassis having a P.C. connection on the chassis. Extension speaker connection is also provided.

Overall size of chassis: 12in. long x 7in. x 6in. high, dial aperture 8in. x 4in. (Dial Reel also available for 4/6). THESE RECEIVERS ARE BRAND NEW, FULLY GUARANTEED.



A 12 WATT "HIGH FIDELITY" AMPLIFIER

Push-Pull

Comprising a Main Amplifier Chassis and a Remote Control Pre-Amplifier-Tone Control Unit. The remote control unit measures only 7in. x 4in. x 2in. and contains four controls, being: Bass-Treble-Volume and a Radio, Gram, Microphone Switch control. It incorporates its own feedback circuit on the Bass Channel. Loop negative feedback is employed on the Main Amplifier which has a valve line up of 6J5-6N7-6U4 with two 6X25's in push-pull and 6J5 and 6SN7 are used in the remote control unit.

THE COMPLETE KIT IS AVAILABLE FOR £14/3/- (Carr. & Ins. 5/- extra.) THE COMPLETE UNIT ASSEMBLED £17/0/0 (Carr. & Ins. 5/- extra.) H.P. Terms £4/5/- Deposit, 12 Months at £13/11.

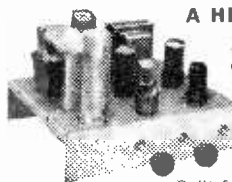
The measured frequency range of the amplifier with this unit shows an excellent response from 14,000 cycles down to 20 cycles, the bass and treble controls allowing independent control of gain at both ends of the frequency range from zero to a gain of 50. It can be seen, therefore, that ample correction is provided to suit any type of pick-up with any type of recording. Input voltage for maximum output is 70 mV, 6.3 volts at 2 amps, and 30 mA. H.T. is provided for tuning unit, etc. This Amplifier compares well with the Williamson and similar designs at a fraction of their cost. The complete set of assembly instructions are available for 2/-.

A HIGH QUALITY 8-10 WATT IDEAL AMPLIFIER

THE IDEAL AMPLIFIER FOR GENERAL HOME USE AND FOR SMALL HALLS, ETC.

Price of COMPLETE KIT including Valves and Drilled Chassis, etc. £7/10/0

(Plus 2/6 Carr. & Ins.) We will supply it completely



Built for £9/0/0 (Plus 3/- Carr. & Ins.)

Designed for high quality reproduction up to an output of 10 watts, having 6V6's in Push-Pull and incorporating negative feedback. It is suitable for use with all types of Pick-ups and most types of microphones and the output transformer provides for use of 3 and 15 ohm speakers. H.P. Terms £10/10/0

- Valve line up 6J5, 6SN7, 5Z4, with V6's in push-pull.
- The undistorted output level of up to 10 watts is produced from an input of 25 volts.
- First-class reproduction of Radio (where a Tuning Unit is used) and Record Playing.
- Separate Bass Boost and Treble Controls provide an excellent range of frequency control.
- Very satisfactory results are obtained with an average type of high impedance Moving Coil or Crystal Microphone, a clear speech level of approx. 5 watts output being obtained.
- Power supplies (HT and GT) are available for a Tuning Unit.
- For operation on A.C. Mains 200-250 volts 50 cycles.
- THE ASSEMBLY MANUAL is available for 1/- and includes detailed layouts and component Price List.

STERN RADIO Ltd.

109 & 115, FLEET STREET, E.C.4

TELEPHONE: CENTRAL 5612/3/4

"High Fidelity at moderate cost"...

Introducing the

"RD MINOR" MK. II

A compact high-performance gramophone amplifier

MAIN FEATURES:—

- * 4.5 watts Output
- * Distortion at 3.5 watts less than .25%
- * Frequency response +.5DB 30-15,000 cps.
- * Hum —80DB below 3.5 watts
- * NFB 16DB
- * Matching for 3 and 15 ohm speakers
- * Operation from the majority of modern lightweight pick-ups
- * Treble cut control
- * Compensation for STD and LP records
- * Miniature valves throughout.

PRICE: £12.17.6

Illustrated leaflets describing the MINOR II and our other current high fidelity products available post free on request.

ROGERS DEVELOPMENTS Co.

Manufacturers of Precision Built Sound Equipment

"RODEVCO HOUSE,"

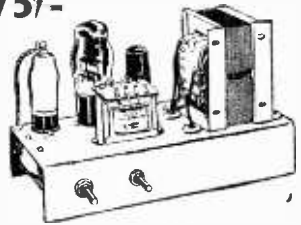
116, BLACKHEATH ROAD, GREENWICH, S.E.10

Telephone: TIDeway 1723.

Demonstration Times: Mon.-Fri. 9.30 - 5.30
Sat. - 9.30-12.30

WHY PAY MORE ?

A 4-watt AMPLIFIER KIT for only 75/-



A 3-Valve Amplifier that you can build for use with Gramophone, Microphone or Radio Receiver, using 6V6, 6Q7 and 5Z4 Valves. For A.C. Mains 200-250V. Unusual feature of this kit is the inclusion of a pre-assembled and wired group board with the "heart" of the Amplifier. Complete down to the last nut and bolt and comprehensive point to point wiring details in illustrated manual.

20 page Manual (including fault tracing data) usually 3/6. FREE to Readers of this magazine upon receipt of large S.A.E.

FULLY GUARANTEED 12 MONTHS

M.O.S E & G MAIL ORDER SUPPLY CO.

The Radio Centre

33 Tottenham Court Road, London, W.1. Tel. MUSEum 6657

FREE TO AMBITIOUS ENGINEERS!

This 144-page Book

Have you sent for your copy ?



'ENGINEERING OPPORTUNITIES'

is a highly informative guide to the best-paid Engineering posts. It tells you how you can quickly prepare at home on "NO PASS—NO FEE" terms for a recognised engineering qualification, outlines the widest range of modern Home-Study Courses in all branches of Engineering and explains the benefits of our Employment Dept. If you're earning less than £15 a week you cannot afford to miss reading this unique book. Send for your copy to-day—FREE.

--- FREE COUPON ---
Please send me your FREE 144-page "ENGINEERING OPPORTUNITIES"

WHICH IS YOUR PET SUBJECT?

- Mechanical Eng.
- Electrical Eng.
- Civil Engineering
- Radio Engineering
- Automobile Eng.
- Aeronautical Eng.
- Production Eng.
- Building, Plastics, Draughtsmanship
- Television, etc.

GET SOME LETTERS AFTER YOUR

- NAME!**
A.M.I.Mech.E.
A.M.I.C.E.
A.M.I.P.E.
A.M.I.M.I.
L.I.O.B.
A.F.R.Ae.S.
B.Sc.
A.M.Brit.I.R.E.
CITY & GUILDS
GEN. CERT.
OF EDUCATION
etc., etc.

NAME

ADDRESS

Subject or Exam. that interests me

British Institute of Engineering Technology, 409B, College House, 29-31, Wright's Lane, Kensington, W.8.

BIET

RADIO MAIL

SEE OUR WORLD-FAMOUS RANGE OF TEST GEAR AT YOUR LOCAL DEALER:

- RES/CAP. BRIDGE, 31/6
- INDUCTANCE BRIDGE, 42/6
- AUDIO BRIDGE, 38/6
- 465 kc/s I.F. ALIGNER, 17/6
- R. M. TWIN MULTI-OHMER, 25/-
- SPOT FREQUENCY SIGNAL GENERATOR, 35/-

Home and Overseas trade terms and illustrated lists on request. If not yet in your district send direct, adding 1/6 for carriage. C.O.D., 1/- plus carriage.

RADIO MAIL

(Dept. F), RALEIGH, STREET, NOTTINGHAM

A REALLY SMALL RADIO RECEIVER

This radio receiver, although as small in size as a matchbox, gives loud, clear reception of the BBC Home, Light and Third Programmes on the medium waveband, about 180-550 metres. The set also tunes the Light Programme on the long waves, 1500 metres. No catwhiskers, valves or batteries are required and the receiver works off a short indoor aerial in many districts.

PRICE **10/-** POST FREE

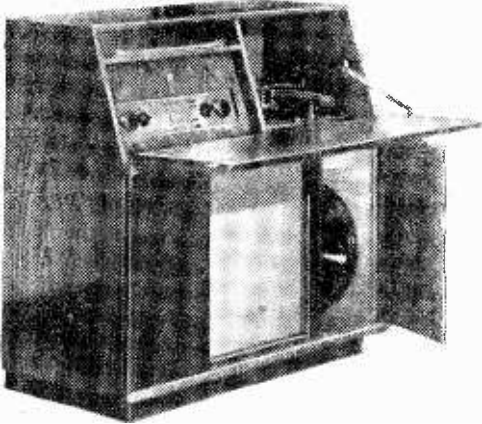
This offer applies only to Gt. Britain and Northern Ireland

SWIFT RADIO

102, BATH RD., WILLSBRIDGE, Nr. BRISTOL

Multicore Solders, Ltd.

ON this stand will be seen for the first time the new five-core solder wire. In conjunction with Thorn Electrical Industries they will also be showing the actual assembling, wiring and soldering of Ferguson TV tuners. At the close of each day these tuners will be sent to the Ferguson works for incorporation in receivers. It is estimated that more than 25,000 soldered joints will be made during the run of the show, using the standard factory size 7lb. reels of solder. [Stand No. 100]



A typical modern radiogram—Pam Model 966/RG.

Murphy Radio, Ltd.

IN addition to television receivers, Model U198 and 212 radio receivers will also be seen. The latter is built into what the makers term a "semi-baffle"—a cabinet which cuts out boxy reproduction. It has an 8in. speaker. Model U198 is intended for those who find their main interest is in television—it is a small transportable designed for high quality reproduction and wide range of reception, with a special bass compensating circuit. It has a maroon plastic cabinet. [Stand No. 40]

Nera of England, Ltd.

TELEVISION equipment mainly of the projection type will be the main exhibit on this stand. Picture sizes from the domestic 30in. model to the 84in. "Panoramavision" screen will be shown. [Stand No. 208]

Pam (Radio & Television), Ltd.

TWO stands are to be occupied by Pam Radio, Stand No. 4 being devoted to an exhibition and demonstration of a television converter unit. This is to enable users of five-channel receivers to receive stations on Band III. High-fidelity radio receivers and an all-dry battery portable will also be seen on their other stand. [Stands 4 and 84]

Peto-Scott Electrical Instruments, Ltd.

THREE television receivers will be seen in addition to a new table receiver, the R.54. This is a five-valve three waveband superhet selling at £14 6s. 2d. plus P.T. A Bureaugram automatic radiogram and a record reproducer will also be on show. The latter has a three-speed changer and a one-valve amplifier and costs £22. [Stand No. 60]

Philips Electrical, Ltd.

ON Stands 96/97 will be a full range of radio and television receivers and record players. Increased prominence is being given this year to Philips records. Two new radio receivers to be seen are an A.M./F.M. table model and a clock radio receiver. The latter is a five-valve set with four pre-set stations and is for A.C. mains operation only. It acts as an ordinary alarm clock, will switch the set on at a pre-arranged time and switch off and on again at pre-set times. In addition it incorporates a socket for a five-amp three-pin plug for the attachment of any other electrical apparatus up to 750 watts. [Stands 96 and 97]

Pilot Radio, Ltd.

A 13-channel TV tuner is the main exhibit, but in addition the Little Maestro is still going well and seems as popular as ever. A battery-mains portable is also to be seen and high-fidelity is an important feature of some of the remaining radio models. Model X.754 is a new table model which makes a feature of the trawler waveband, side controls, magic eye tuning and an extra large baffle area for the 8in. speaker. [Stand No. 59]

Pye, Ltd.

ALTHOUGH again television is to be the main feature of this stand, some interesting radio receivers and high-fidelity record reproducers will also be seen. [Stand No. 94]

Radio Society of Gt. Britain

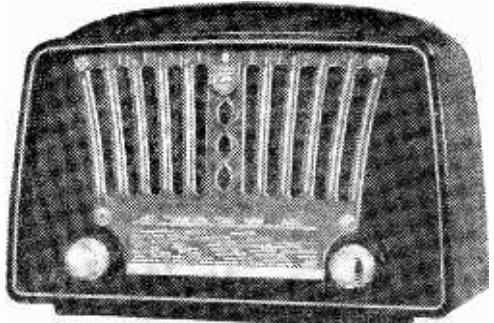
ON this society's stand will be many items of an amateur nature, built by members and including single-sideband transmitters and receivers. Many interesting historic pieces of equipment will also be on show. [Stand No. 209]

Regentone Radio & Television, Ltd.

RADIO and television receivers will be seen on this stand, and the TV receivers will incorporate 13-channel tuners. [Stand No. 38]

Rola Celestion, Ltd.

THE interesting display of sound reproducers to be seen on this stand includes many of the Rola and Celestion loudspeakers which have been in use for many years by both amateurs and commercial manufacturers. The Truvox P.A. equipment will also be shown here. [Stand No. 3]

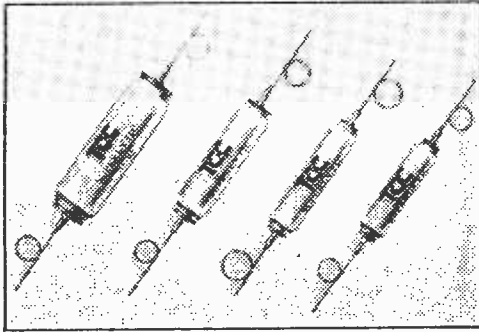


Philips Model 141U—A modern plastic-fronted design.

Rudman, Dalington (Electronics), Ltd.

THE main exhibit on this stand is the Reflectograph magnetic tape recorder, which has simplified slot loading and continuously variable speed, from 3.75 to 8.5ins. per second. The model is available as a transportable or in a console cabinet.

[Stand No. 207]



T.C.C. condensers of the "Superlytic" type. See these on Stand No. 101.

Sobell Industries, Ltd.

A NEW model, the 515RG, makes its appearance this year, and the main feature of the whole range of equipment is the use made of colour in both moulded plastics and the specially woven flexible plastics in conjunction with wood veneers. The radio receivers now embody switched gramophone pick-up input, and provision for external loud-speakers, with internal muting. With the exception of Model 515STG, which has a single-player, three-speed gramophone mechanism, all gramophones incorporate three-speed mixer type changers with crystal pick-up.

[Stand No. 12]

Standard Televisions & Cables, Ltd.

HERE will be seen an extensive range of SenTerCel selenium rectifiers, battery chargers, germanium photo-electric cells and power rectifiers. These will be shown on Stand No. 82, whilst on Stand No. 6 will be an exhaustive range of Brimar valves and picture tubes for television.

[Stand No. 82]

Stella Radio and Television Co., Ltd.

THE Stella exhibit will include two table radio receivers, a console radiogram, a record player and four table television receivers. A display of illuminated colour transparencies will illustrate how easily the Model ST.105U may be carried about the house. A special feature of Model 102A is the bass compensation for low positions on the volume control.

[Stand No. 55]

Taylor Electrical Instruments, Ltd.

THE usual comprehensive range of "Windsor" instruments will be seen here and include moving coil and moving iron and electrostatic panel mounting meters; a range of multi-range meters; a mains-operated resistance-capacity bridge; a mains-operated valve tester; a circuit analyser; a volume indicator and sundry similar types of service or laboratory equipment.

[Stand No. 54]

Telegraph Condenser Co., Ltd.

AMONG the exhaustive range of condensers featured on this stand, six newly developed ceramics for modern TV receivers will be seen. Amongst the electrolytics, the new "Superlytic" tubulars set a new standard in the performance of this class of condenser, in that for the first time it is possible to think in terms of insulation resistance for an electrolytic. They are primarily intended for grid coupling in L.F. amplifiers, but may be used elsewhere in a circuit. This year the mechanical feature of the stand will be centred round the unit which simulates the daily conditions that might be experienced at any factory, and by switching in suitable power factor correction condensers immediately shows the reduction in current consumption and kVA demand on the appropriate indicator, thus emphasising the financial advantages that can result from the installation of T.C.C. power factor correction condensers.

[Stand No. 101]

Ultra Electric, Ltd.

AN extended range of television and radio receivers is to be seen here, and will include a luxury radiogramophone. Amongst old friends will be the Ultra Twin and the Troubadour, the latter in a new presentation. The new radiogram incorporates a record changer of the 3-speed type with turn-over pick-up, and has separate tone controls for bass and treble. A similar model is also designed to pick up the proposed new F.M. transmissions.

[Stand No. 69]

Valradio, Ltd.

IN addition to projection television equipment this firm will also be showing some multi-channel tuners and some power units suitable for D.C. mains supplies.

[Stand No. 29]

Vidor, Ltd.

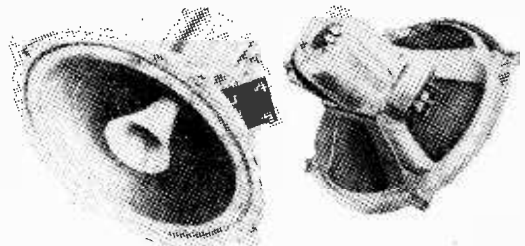
SUPPORTING their claim that the Vidor range includes portables for every purpose, this exhibit will embrace six models for home and outdoor use. They will include a long-life battery attaché case receiver and some attractive mains-battery models. Special export models will also be seen, in company with some television receivers.

[Stand No. 87]

Waveforms, Ltd.

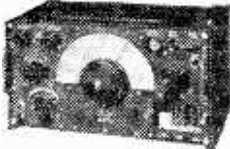
WAVEFORMS will introduce this year a new portable TV signal generator and most of the exhibits on this stand will have the main application to television.

[Stand No. 75]

(Concluded on page 634)

Two views of the Stentorian Duplex loudspeaker by Whiteley-Electrical.

EX-A.M. RECEIVER TYPE R.1155



5 Frequency ranges : 16.5-7.5 Mc/s : 7.5-3.0 Mc/s : 1,500-600 kc/s : 300-200 kc/s : 200-75 kc/s. Supplied in maker's original wood transit case.

LASKY'S PRICE
Secondhand, Grade 1. £9.18.6
Secondhand, Grade 2. £7.18.6
Carriage 17/6 extra, including 10/- returnable on packing case.

ASSEMBLED POWER PACK/OUTPUT STAGE FOR R.1155 RECEIVER
For use on 200-250 v. A.C. mains. Complete with 2 valves. In metal case size : 12 x 7 x 5 1/2 ins.
LASKY'S PRICE 79/6. Carr. 5/- extra.
Power Pack as above. Fitted with 6 1/2 in. p.m. speaker.
LASKY'S PRICE £5.5-. Carriage 5/- extra.

R.1132A RECEIVERS.
Tested, soiled condition.
Grade 1. Specially selected. 79/6
Grade 2. Secondhand..... 59/6
Carriage 10/- per unit extra.

EX-GOVERNMENT MAINS POWER UNITS. For R.1132A. Working order, for 200-250v. A.C. mains.
LASKY'S PRICE59/6
Carriage 7/6 extra.

BAKER'S SELURST SPEAKERS



"Stalwart." 12in. 15 ohms impedance. Frequency response 30-13,500 c.p.s. Power handling capacity 15 watts, peak A.C. **PRICE** £5/10.
"Standard." 12in. 15 ohms impedance. Frequency response 30-14,500 c.p.s. Power handling capacity 20 watts, peak A.C. **PRICE** £6/10.
"De-Luxe." 12in., 15 ohms impedance. Re-entry cone. Frequency response 18-17,000 c.p.s. Power handling capacity 15 watts, peak A.C. **PRICE** £8/10/-, Carriage 3/6 per speaker extra.

RESIN CORED SOLDER. 7/6 per 1-lb. reel.

L. & M. WAVE T.R.F. COILS. With Circuit, 4/6 pair.

L. & M. DUAL WAVE SUPERHET COILS. Aerial and oscillator 5/11 pair.

100K. CARBON POTENTIOMETERS. Less switch. **SPECIAL OFFER.** 1/6 each.

I.F. TRANSFORMERS
MINIATURE TYPE 465 Kc/s. 1 x 1 x 2 1/2 ins. **PRICE** 9/6 pair.
MIDGET TYPE 465 Kc/s. 1 x 1 1/2 x 2 1/2 ins. **PRICE** 8/6 pair.
WEARITE TYPE 550. 445-520 Kc/s. 8/6 per pair.
WEARITE TYPE 500. 450-170 Kc/s. 8/6 per pair.

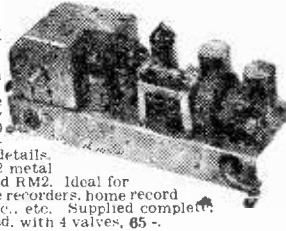
PLASTIC ESCUTCHEON

With dark screen filter.
12in. 12/6
16in. 25/-

BRIMISTERS
Type CZ.1. 1/8 each. CZ.3. 10 1/2 each or 9/- doz.

CRYSTAL DIODES
Wire ends. Glass.....1/6
Type WX.6. Wire ends.....1/6

3-WATT MIDGET AC/DC AMPLIFIERS PUSH PULL VERY HIGH GAIN



4 valves : 2 U1A1 in push pull, 1 UCH42 and 1 UAF42. Input voltage 100/110 A.C./D.C. Very easily converted to 230 volts. Supplied with circuit diagram, and full details. Size : 9 x 4 x 4 ins. Uses 2 metal rectifiers, 1 each KM1 and RM2. Ideal for ships record players, tape recorders, home record players, baby alarms, etc., etc. Supplied complete, fully assembled and wired, with 4 valves, 65/-.

GANGED TUNING CONDENSERS .0005 MFD.
Standard 2-gang. Size : 2 1/2 x 1 1/2 x 2 1/2 in. 1in. Spindle..... 5/-
Standard 3-gang. Size : 2 1/2 x 1 1/2 x 3 1/2 in. 1in. Spindle..... 7/6
Midget 2-gang with trimmers. Size : 1 1/2 x 1 1/2 x 2 1/2 in. 1in. Spindle..... 7/6
Midget 3-gang with trimmers and perspex cover. Size : 1 1/2 x 1 1/2 x 2 1/2 in. 1in. Spindle..... 12/6

CYLDON 5-CHANNEL SWITCHED TELETUNERS



Instant and positive selection of any one of the 5 B.B.C. television channels, by a single control knob. Uses EF80 RF pentode and ECC81 or 12AT7 Double Diode Triode as frequency changer. Tuning is obtained by switching incremental inductances. Size : 4 1/2 x 2 1/2 x 2 1/2 ins. Spindle 2 1/2 in. long, 1in. diameter. I.F. Output 9.5-14 Mc/s., noise figure on all channels better than 10.5dB., I.F. rejection better than 45dB on all channels. Power gain 24dB.

LASKY'S PRICE, less valves, 12/6. Post Free. Valves for tuner available, at 12/6 each.

RADIO CABINETS



Size : 12in. wide, 6 1/2 in. deep. 8in. high. Finished in medium walnut veneer, with high polish. Complete with back, chassis, and dmf, calibrated L. M. and S.

LASKY'S PRICE.....16/11
Carriage 2/6 extra.

THE TELE KING

5 Channel 16 or 17 inch SUPERHET RECEIVER



This famous and well tried home constructor set, can now be built for £29.10/-. Tube and cabinet extra.

EVERY COMPONENT CAN BE SUPPLIED SEPARATELY.

Full constructional data, wiring diagrams and circuits
PRICE 6/- POST FREE

WRITE NOW FOR OUR NEW TELE KING PRICE LIST. WE CAN SAVE YOU MONEY.

LASKY'S RADIO,

LASKY'S (HARROW ROAD), LTD.,
370, HARROW ROAD, PADDINGTON, LONDON, W.9.
Telephones : GUNningham 1979-7214.

Hours : Mon. to Sat. 9.30 a.m. to 6 p.m. ; Thurs., half day, 1 p.m. Postage and packing charges (unless otherwise stated) : on orders value £1-1s. 0d. extra : £5-2s. 0d. extra : £10-3s. 6d. extra ; over £10 carriage free. All goods fully insured in transit.



TELESCOPIC PORTABLE AERIAL MASTS

Made of lightweight but extremely strong alloy. Extends to 15ft. Guyed at top and centre. Supplied complete with all guy lines.
LASKY'S PRICE 32/6
Carriage free.

R.F. 25 UNITS. Complete with 3 valves. New 19/6. Secondhand 15/-. Carriage 2/6 each extra.

SUPERHET COIL PACKS

With Circuit.
No. 1. L.M.S.G. Size : 4 1/2 x 5 x 2 1/2 in. With 1in. spindle.....19/6
No. 2. M.S.S. Size : 4 x 4 x 3in. With 1in. spindle.....16/-
Both for use with 465 Kcs I.F.

LOUDSPEAKERS

First Quality. All 3 ohms speech coil. Less output trans.
5in.14/6 8in.19/10
6 1/2 in.15/- 10in.19/6

ENERGISED SPEAKERS

8in. With O/Trans. 600Ω.....15/6
8in. Less O/Trans. 600Ω.....12/6
8in. Less O/Trans. 1,200Ω.....12/6
6in. With O/Trans. 600Ω.....14/-

TELEVISION SELENIUM RECTIFIERS

The very latest "Sentercel" S.T.C. range.
K3/40, 3.2 kV..... 6/-
K3/45, 3.6 kV..... 8/2
K3/50, 4.0 kV..... 8/8
K3/100, 8.0 kV.....14/8
K3/160, 12.8 kV.....21/6
K3/200, 16 kV..... 26/-

METAL RECTIFIERS

6 and 12 volt F.W.
2a. ... 9/- R.M.1 ... 3/10
3a. ... 9/11 R.M.2 ... 4/3
4a. ... 12/- R.M.3 ... 5/-
6a. ... 19/6 R.M.4 ... 16/-
6 Volt 12 Volt
1 amp. 2/6 1 amp. 3/11
4 amp. 4/6 1 amp. 6/6

COLIARO 3-SPEED AUTO CHANGERS. Model 3RC 521. New and Unused.



Cream or fawn finish. Complete with hi-fidelity "studio" turn-over crystal pick-up.
LASKY'S PRICE.....£9.19.6
Carriage free.

MAGNETIC RECORDING TAPE. SPECIAL OFFER. Plastic. 600 feet reels. 6 1/2. Paper Base. 1,200 feet reels. 17/3. Postage 1/6 per reel extra.

AERIAL ROD SECTIONS. Steel, heavily copper plated. 12in. long, 1in. diameter. Any number may be fitted together. **PRICE** 2/6 per doz. Post free.

300 PF. FEED THROUGH CONDENSERS. Ceramic. 6d. each. 4/6 per dozen.

20 PF. AIR SPACED TRIMMERS. 9d. each. 7/6 per dozen.

S.R.S.**THE "SUPEREX ATTACHE"****4 VALVE SUPERHET BATTERY****PORTABLE RECEIVER**

Building cost approx.

£7-15-0

Plus 4/6 Post and Packing.

A really efficient Portable Radio Receiver readily built by anyone. Ideal for holidays and country week-ends. 4 Valve

Superhet. Long and Medium Wave lengths which ensures best selectivity and signal strength in all areas. Cabinet 11 1/2 in. x 8 1/2 in. x 4 1/2 in. soundly constructed and handsomely finished in two contrasting colours of high quality I.C.I. Rexine—Wine and Grey, Green and Grey, Blue and Grey, Light Brown and Grey. Equal in appearance and performance to any ready-made model selling at around £15. Send for "Superex" Construction Booklet with complete Easy to Follow assembly instructions, with theoretical and practical diagrams, also full priced list of recommended parts 1/6 Post Free, credited if components purchased later.

SEND FOR RADIO AND TV. CATALOGUE

with detailed descriptions and illustrations of all types of Radio and TV. components in stock. Price 6d. Post Free.

TERMIN.—Cash with Order or C.O.D. Extra charge for C.O.D. Please add postage.

OPEN.—9 a.m. to 6 p.m. Monday to Saturday : 1 p.m. Thursday.

SUPERIOR RADIO SUPPLIES

37, HILLSIDE, STONEBRIDGE, N.W.10.

Phone : ELGar 3644

G2AK This Month's Bargains G2AK

FISK SOLARISCOPIES.—Complete with charts. Give World time, light and darkness paths. Invaluable to the DX man. List, 2/1/-, our price 7/6, post free.

PANL Home Crackle. Black, Brown or Green, 3/6 bottle. P. & P., 1/-.

TEST METER. 7 ranges as follows : 1.5 v. 3 v. 150 v. 6 ma., 60 ma., 5,000 ohms, 25,000 ohms, 2 1/2 in. Dia. scale M.C. meter. Rotary selector switch, Black bakelite case. 6 x 4 1/2 x 4 1/2, fitted with removable lid, also provision for internal batts., ranges can be easily extended. Bargain Price, 30/-, plus 1/6 post.

MULTI-METER BASIC UNIT.—400 Microamp. F.S.D., scaled 8 ranges A.C./D.C. volts, HI and LO ohms, complete with rectifier made by Triplet, U.S.A. Only 32/6 post free.

POCKET VOLTMETERS. Dual range, 0-15 v. and 0-250 v., 345 O.P.V., M.C. Worth 50/-, our price 17/6, post free.

CRYSTAL HAND MICROPHONES. High quality, very sensitive. Chrome finish, complete with screened lead and standard jack plug. Our price only 25/- ea. Few only.

VALVES. B7G base, 1T4, 1S5, 1R5, 1S4, 354, 3V4, 7/6 ea., or 4 for 27/6. 807's, 10/- ea. or 2 for 17/6. Most of the 1.4 v. B7G range available at 8/6 ea.

HEADPHONES. Low resistance type CLR No. 3, 9/6. DLR No. 2, 13/6. High resistance CHR Mark 2, 17/6, and the most sensitive of all DHR. No. 5B, 18/6 per pair. P. & P., 1/- pair.

METERS. 0-5 ma. 2 in. square, 10/-, 0-50 ma., 7/6, 0-10 A. D.C., 7/6, 0-1 ma., 20/-, 0-350 ma. thermo, 7/6, 0-4 A. 5/2 1/2 in. flush 0-100 mA, 0-10 mA, 12/6 ea. Germanium Diodes, 2/- ea., or 6 for 9/-, Deaf-Aid Crystal mike units, 12/6 ea.

V.H.F. FANS. Air Space Co-axial Cable, 150 ohms, good to 600 Mc/s : normal price, 3/11 per foot. Our Price, 20 yard coil, £1. Very limited quantity available.

Postage free on all orders over £1 except where specifically stated. **PLEASE PRINT YOUR NAME AND ADDRESS.**

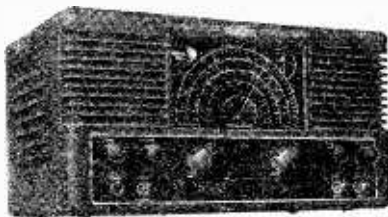
C. H. YOUNG, G2AK

All callers
110, Dale End,
Birmingham 4 (CEN 1635)

Mail Orders—
102, Holloway Head,
Birmingham 1 (MID 3254)

HOME RADIO OF MITCHAM

are specialists in

EDDYSTONE**SHORT WAVE RECEIVERS AND COMPONENTS**

We carry the full range of all Eddystone short wave components in stock and can despatch any item *by return*. The fully illustrated Eddystone catalogue is available price 1/3 post paid. The following receivers in stock at time of going to press, 740, 750, 840. *Open every day including Sats. until 6.30 p.m. (Wed. 1 p.m.)*

HOME RADIO OF MITCHAM

187, London Road, Mitcham, Surrey. MIT 3282.
Buses 44, 77, 80, 88, 115, Trolley 630 and Green Line
711 pass the door.

SOUTHERN RADIO'S WIRELESS BARGAINS

TELESONIC 4-Valve Battery Portable. Complete with Hivac Valves. In Metal Carrying Case. Simply converted to Personal Portable. £2 including Conversion Sheet.

TRANSMITTER-RECEIVERS. Type "18" Mark III. COMPRISING SUPERHET RECEIVER and TRANSMITTER. TWO UNITS CONTAINED IN METAL CARRYING CASE. Complete. 8-Valves. BARGAIN CLEARANCE OF REMAINING STOCK, £4/10/0.

RECEIVERS TYPE "109." 8-VALVES WITH VIBRATOR PACK FOR 6-volts BUILT-IN SPEAKER. 1.8 to 8.5m/cfs. Contained in Metal Case. Perfect. 100 ONLY, £5. Bargain Clearance of Remaining Stock.

BOMBSIGHT COMPUTER. Ex-R.A.F. New. Contains Gyro Motors, Rev. Counters, Gear Wheels, etc., etc. Ideal for Model Makers, etc., £3/5/0, plus 10/- carriage.

CRYSTAL MONITORS. Type 2. New in Transit Case. Less Crystals, 8/- each.

LUFBRA HOLE CUTTERS. ADJUSTABLE 3/4 in. to 3 1/2 in. For Metal, Wood, Plastic, etc., 6/6.

RESISTANCES. 100 Assorted. Useful Values, Wire and, 12/6 per 100.

CONDENSERS. 100 Assorted. Mica, Metal Tub, etc., 15/- 100 PLASTIC CASES. 14in. by 10 1/2 in. Transparent, Ideal for Maps, Photos, Display, etc., 5/6.

STAR IDENTIFIERS. Type I A-N. Covers both Hemispheres. In Case, 5/6.

CONTACTOR TIME SWITCHES. Complete in Sound Proof Case. 2 Impulses per sec. Thermostatic Control, 11/6.

REMOTE CONTACTORS for use with above, 7/6.

MORSE TAPPERS. Standard Type ex-Govt., 3/6. Heavy Duty Type "D", 8/6. COMPLETE MORSE PRACTICE SET with BUZZER, 6/9.

DIMMER CONTROLS. Bakelite. Wire Wound. New, 1/3 each.

MAGNETIC RELAYS SWITCH. Bakelite. 5 c/723. 2/6 each.

METERS AND AIRCRAFT INSTRUMENTS. Only need adjustment or with broken cases. TWELVE INSTRUMENTS (including 3 brand New Aircraft Instruments), 35/- for TWELVE ITEMS.

Full List of RADIO BOOKS, 2/6d.

SOUTHERN RADIO SUPPLY LTD.,

11, LITTLE NEWPORT STREET, LONDON, W.C.2

GERrard 6653.



TRANSMITTING TOPICS

PI NETWORK TANKS

By O. J. Russell, B.Sc. (G3BHJ)

THE Pi network tank circuit is at present enjoying a boom in popularity with amateur transmitters. This high popularity is due to its good reputation as a cure for TVI troubles. Pi output tank circuits, however, are not necessarily a complete cure for TVI. The use of other measures such as effective screening of the transmitter, efficient by-passing of power leads, cannot be overlooked. Only with due attention to all the TVI aspects of a transmitter can one be reasonably sure of preventing TVI. It can be said, however, that Pi network tanks do provide a high degree of TVI harmonic discrimination and are a very valuable device in this respect. Many cases of TVI have in fact been cured by a changeover to Pi tank circuits. However, it is not claimed that they are an infallible remedy in themselves against TVI. Furthermore, by one or two measures it is possible still further to increase their effectiveness as TVI suppressing devices.

Orthodox tank circuits—with elaborate precautions—can provide about as much TVI reduction as a Pi network tank. The merit of the Pi network, however, is that it inherently provides a high degree of rejection without elaborate precautions. It should be stressed, however, that this is not automatically so. The high degree of harmonic rejection is provided in a Pi network feeding from the PA anode into a low impedance load—usually an 80 ohm coaxial line. Where a Pi network is used to feed energy into "any old length of wire" directly from the output harmonic rejection may be quite small. Further—unless the constants of the Pi network are reasonably correct—even the use of 80 ohm coaxial line into a further tuned aerial coupler (Fig. 1) may not give effective harmonic rejection. Correctly speaking, the

80 ohm coaxial cable should be terminated in a reasonably matched load in order to ensure high harmonic rejection. One way of setting up for this condition is to use an actual 80 ohm resistive load (Fig. 2) for setting up the tuning of the Pi tank. When this has been done, the coaxial cable can be transferred to the aerial coupling circuit, and power

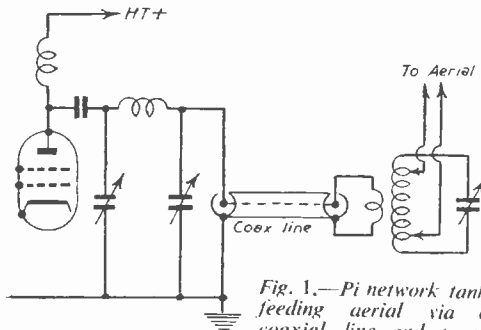


Fig. 1.—Pi network tank feeding aerial via a coaxial line and tuned aerial matching unit, enabling good TVI rejection to be obtained.

drawn by adjusting the aerial network without disturbing the Pi tank settings. Final loading can then be effective by minor adjustments only of the Pi tank circuit. This enables operation to be conducted with the tank circuit operating in the correct condition for harmonic suppression. A Pi tank may in fact be operated so as to load power into an aerial and yet not suppress harmonics fully.

Fig. 3.—Essential components in the Pi network: R.F. choke, blocking condenser CB, anode tuning condenser CA and load condenser CL.

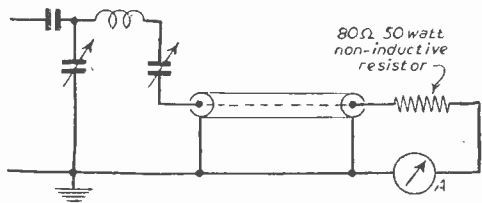
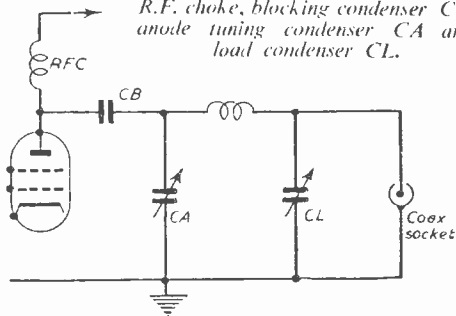


Fig. 2.—Pi tank load adjustment can be checked by use of a dummy 80 ohm load and R.F. ammeter (A).



Inductance Values

One failing is to use a tank coil of too great an inductance. While this may enable power to be drawn into an aerial, it will not provide optimum harmonic rejection. The general calculation of Pi networks to deliver power into arbitrary values of load is somewhat involved. However, in the usual amateur case where power is to be delivered into a coaxial line it enables these difficulties to be short-circuited. To design the tank circuit, calculate the correct operating value of tank capacity as for a single ended tuned circuit. With the aid of the

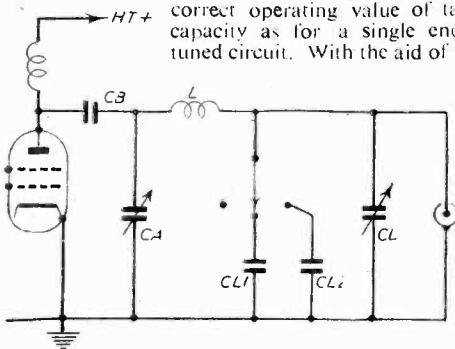


Fig. 4.—Switched fixed capacitors enable smoother and wider load control to be effected without an excessively large value of variable loading condenser (CL).

graphical chart previously published in these pages, this is simple. For operating with the Pi tank, however, use some 20 per cent. to 40 per cent. more capacity than this for the setting of the anode tuning condenser CA as shown in Fig. 3. The actual value of the "loading" or output capacity CL will vary from some three times to some nine times the value of CA. Selecting these values therefore will give ample range of adjustment in loading up on a specific frequency. It will also be noted that H.T. is blocked off from the Pi tank by the use of a blocking condenser CB. This should be a high-grade high-voltage mica or ceramic condenser of at least .001 μ F capacity. It should be rated for a voltage of at least the D.C. anode voltage rating for CW operation, and at least twice the D.C. anode voltage for telephony operation. A safety margin is obtained, therefore, by using a condenser rated to withstand, say, three times the D.C. anode H.T. voltage. An alternative

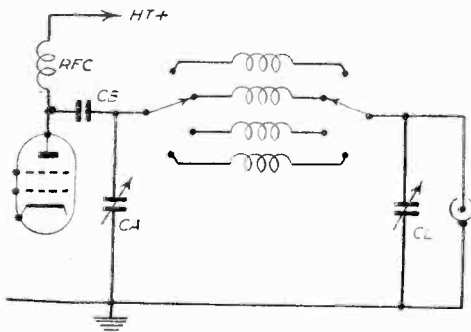


Fig. 5.—Switching independent tank coils is the simplest method of band-changing.

position for the blocking condenser would be at the low voltage output end, but unfortunately this would require a very large capacity condenser. This would be expensive, and might introduce other troubles, so that isolation of the whole of the Pi tank in the manner of Fig. 3 is the practical solution. Notice also that although the tuning condenser CA has no D.C. voltage to withstand, it still has to withstand the full R.F. voltage. Accordingly, for CW operation it must be rated to withstand a peak voltage equal to the D.C. H.T. supply voltage, and twice this value for anode modulated telephony operation. However, the output condenser CL has only moderate voltages to withstand—if the network is operated correctly—and an ordinary receiving variable is the choice for this position. However, this applies only if the network is used correctly to step-down into an 80 ohm or similar low-impedance cable. With the use of the Pi tank to load directly into "any odd length of wire" high voltages may appear at the output end. The TVI fearing operator, therefore, should not consider any other operation than to feed into a low-impedance line. Also cost mounts steeply if a high voltage variable condenser has to be used at the output end as well!

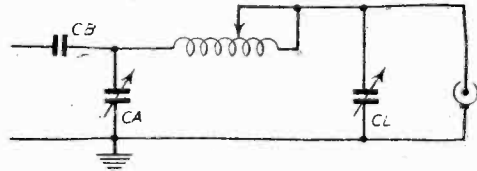


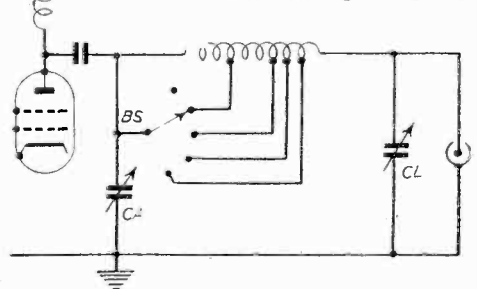
Fig. 6.—The variable inductor is often employed where suitable surplus "roller coaster" inductances are available.

Practical Aspects

We may now consider some practical arrangements of a Pi network tank circuit for use on a number of bands. The lowest frequency band fixes the maximum size of plate variable condenser CA that will be required. 80 metres represents the usual band, as 160 metres can be covered by a small topband rig. The problem then is to obtain optimum conditions for operation upon the bands 80 metres to 10 metres. A reference to the chart previously supplied will enable the maximum tuning capacity required for 80 metre operation to be determined. This chart figure should be increased by some 30 per cent., and

(Continued on page 621)

Fig. 7.—The switched tapped inductance is the popular method of bandswitching. The simple system shown has certain disadvantages. See text.



14 DAYS' FREE TRIAL

Send only £1 deposit—refunded if tool not approved.

1in. DRILL

Robust tool with trigger switch and self-centring chuck. Drills, sands, polishes, grinds, sharpens. Also, with attachments, drives: lathe, saw bench, rise and fall, grinder, buffer, etc.

Price £5. 19. 6 cash, or 20/- deposit. Carriage and Packing 2.6.

Horizontal Stand
17/6. post 1/6

Vertical Bench Stand
£3.7.6. post 2.6.

Lathe Stand

£5. 5. 0. or 20/- deposit. Carriage and Packing 5/-.

The four items £15. 9. 6. or £3 deposit.

HANDY BATTERY THREE

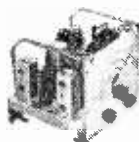
Constructional data showing how to make useful portable loudspeaker set. (Total cost 70/-, including cabinet) is available. Price 1.6.

MULTI-METER KIT

The Multi-meter illustrated measures D.C. volts, D.C. m.amps and ohms. It has a sensitivity of 500 ohms per volt and is equally suitable for the keen experimenter, service engineer or student. All the essential parts including 2in. moving coil meter, selected resistors, wire for shunts, 8-point range selector, calibrated scale, stick on range indicator or and full instructions for making are available as a kit, price 15/- plus 9d. post and packing.

MAKE A RADIO

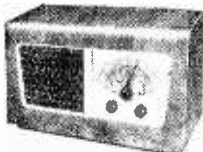
Using our parts in one evening you can make an all mains 4 valve radio with bakelite case, then you will be giving £12 present which costs you only £5.15.0. or £2 deposit. (Carr. and insurance 5/-) Data book 1.5.



BEEHOVEN 5-VALVE SUPERHET

Complete with valves and Rola loudspeaker, ready to work off A.C. mains—three waves (U.M. and S.) large dial, slow motion drive, dust cored coils, etc. £8. 17. 6. or £2 deposit (balance over 12 months), carr. 7.6.

Fine walnut veneered and polished cabinet to take the Beethoven 5-valve Superhet with 6in. loudspeaker, thus making a really excellent model—worth £18 £20. Price 49.6. carr. and packing 5/- extra. If bought with the Beethoven chassis, the hire purchase deposit is £3. carr. 10/-.



THE SUPERIOR 15in.

up to the minute big picture TV for only £37. 10. 0. A 20-valve television for the amateur constructor, all components, valves and 15in. Cosor Cathode Ray Tube costs £37.10.0 plus £1 carriage and insurance or £12. 10. 0 deposit and 12 monthly payments of £2. 11. 6. Constructor's envelope giving full details and blueprint, 7/6. Returnable within 14 days if you think you cannot make the set.

MAINS MIDGET RADIO

This is an excellent little radio in an attractive cabinet to which can be affixed transistors, thus making it extra suitable for nursery or child's bedroom. The circuit is a T.R.F. for A.C. mains operation. All the parts—bakelite cabinet, valves, knobs, back—in fact everything will cost you only £3.15.0. plus 2/6 postage. Construction data free with the parts or available separately at 1/6.

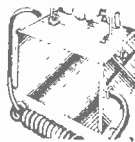
MAGNETRON MAGNETS

The immense power of these magnets makes them ideal for a magnetic chuck and, of course, many other purposes. Price 30/- each, carriage 7.6.



4ft. long made from heavy gauge sheet steel (galvanised), 1 kW. suitable A.C. or D.C. Price £2. or with thermostat £3.15.0. Note: The thermostat mounts separately and will control up to three heaters.

PORTABLE BATTERY CHARGER



Stands on running board or box—gives 11 amp. charge. Price 29.6. Ready to use complete with car size croc. clips. State whether six or twelve volt battery.

ELECTRIC CLOTHES HORSE

Warm room as it dries clothes, towels, etc.—stove enamelled rails—A.C. or D.C. 650 watts. Size 3ft. x 3ft. x 5in. Made to sell at 12 gns., fully guaranteed only £3. 19. 6. carr. 5/6.



Complete kit comprises battery control unit, starter lamp, lamp holders, crosby and wiring diagram. Price less tube 22.6. plus 1/6 post with tube 20/-, carriage and insurance 5.6. Tubes 7.6 each carr. free, minimum quantity 6.

CONSTRUCTOR'S PARCEL



3 colour, 3 wave band scale covering standard Long, Medium, and Short wavebands, scale pan, chassis punched for standard 5 valve superhet, pulley, driving head, springs, etc., to suit. Scale size 14 1/2 in. x 3 1/2 in. Chassis size, 15 in. x 5 in. x 2 in. deep. Price 15.-, plus 1/6 post. Note: We have a really excellent walnut veneered cabinet for this, price only 37.6.

AUTO RADIOGRAM

From 25 gns.

Good assortment of cabinets, chassis, and auto changers, available at all branches—total cost from 25 gns.



ADJUSTABLE THERMOSTAT

250 v. heavy silver contacts can be adjusted to operate between 70 deg.-300 deg. F. These are suitable for aquarium heaters, electric blankets, etc., etc. 1 Amp. Model. 3.6. 2 Amp. Model. 5.6. 5 Amp Model. 8.6. Post. etc., 6d. extra.



CONNECTING WIRE SNIP

P.V.C. insulated 23 s.w.g. copper wire in 100ft. coils, 2.9 each. Colours available: Black, Brown, Red, Orange, Pink, Yellow, White, Transparent. 3 coils for 10.-.

Another Address for Personal Shoppers

We are pleased to announce that we have taken premises in the Kilburn district. The address is:—

249, KILBURN HIGH ROAD, KILBURN, LONDON, N.W.

ELECTRONIC PRECISION EQUIPMENT, LTD.

Post orders should be addressed to Dept. 7, RUISLIP.

Personal shoppers, however, can call at:

42-46, Windmill Hill, Ruislip, Middx. Phone: RUISLIP 5730 Half day, Wednesday.
152-3, Fleet Street, E.C.4. Phone: CENTRAL 2833 Half day, Saturday.
29, Stroud Green Road, Finchbury Park, N.4. Phone: ARCHWAY 1049 Half day, Thursday.

RADIO KIT 19/6



Build this high-quality portable radio for less than 49/6. Exceptionally sensitive twin-triode circuit, using unique assembly system. Can be built by anyone in 45 mins. Size only 6 1/2 in. x 5 in. x 3 in. in handsome black-creakle steel case with beautiful black and gold dial (stations printed!). Covers all medium and long waves. Uses only one self-contained all-dry battery! Many unsolicited testimonials—Mr. Norton of Oxford, writes: "Yesterday evening on the medium waveband, I counted 32 separate stations; I am very pleased with the set—which is well worth the money." Mr. Kniser of Ipswich, writes: "I think it is a wonderful station getter, with lovely tone and ample volume on all. Its performance is almost unbelievable, and it gives me stations I've never been able to net on my large radio." **SEND TODAY!**, cheque C.W.O.D. for 22/- (includes 2/6 packing post), for Case, Handle, Dial, Plans, Parts Lists, etc. sent by return.

BRIGHTON RADIO CO. (Dept. P.W.5), 69, PRESTON ST., BRIGHTON, 1, SUSSEX.

BENSON'S BETTER BERGANS

METERS—New, boxed, M.C. 2 1/2 in. Pl. rd., 100 micro-amp., 35/-; 15/0/15 v. 10/8; 10/0/10 mA, Prod., 10/8; Electrostatic 1,500 v. Proj., 20/-; 10 mA., 78/- doz. 130 v. (1 mA. P.S.D.). Rec., 15/6; 10 mA., 20 mA., 100 mA., 200 mA., 200 mA., M.I., 15 v., 20 a. Proj. T.C. 3 a. M.C., 20 a. All at 8/- each. 2 1/2 in. sq. M.C. 5 mA., 100 mA., T.C. 3 a. at 7/- each. 2 1/2 in. Rd. Proj. M.C. 30 mA., 7-2 1/2 in. sq. ft. 20 v. M.C. 8-6. R1155, slow motion drives, 7/6; I.F. Filter, 2/6. Coils packs, new, 17/6. Used, 10/6. CONDENSERS. Variable, min. spindle, 15, 25, 50, 75 p.f., 1/3. DYNAMOTORS, sotted cases, D.T. (approx. 250 v., 80 mA., at 6 v.), 8/6. 12 v. to 250 v. cased, 17/6; uncased, 10/6. Filters for these, 2/6. WAVEMETERS, new, 3 VR92, 3 VR136, 1/635, 140/250 Mc/s. (less meters), 30/-; I.F. T., new, cased, 7 Mc/s. (R1235), or 10 1/2 Mc/s., 1/6. R.F. UNITS, type 24, 15/-; 25, 17/6; 26, 27, 35/-; Universal Avometer, replacement front panels, 3/6. CHOKE LS 84 100 mA., 7/6; 2H 200 mA., 4/6; 10H 150 mA., 8/6. Record Players, new (famous makers), 24 1/2 in. and 28, Ktd. P.C., 79/6. POWER UNIT 285, 230 v., 50 v. input. Outputs D.C. 2 kV., 5 mA., 350 v., 150 mA., A.C. 6, 3 v., 10 a., and 5 a. 3 valves. New, 85/-, carr. paid inland, U.S.A. RE. RAY'S PR7M, 11 valves, Mtd., 20 v. dynamotor, 27, 27 1/2 Mc/s. Non. iron, 24, carr. paid inland. MICA RESISTANCE STRIPS, 800 Ω 3 a. with 2 taps, 1/6. TRANSFORMERS, new, std. mains input; 230-0-250 v., 70 mA., tapped 200 v., 6.3 v., 3 a., 4 v., 2 a., 10/6; 500 v. H.W., 6.3 v., 3 a., 4 v., 2 a., 12/6; 11 v., 20 v., 15-20 a., H.W. 30 -; 230 v. to 6.3 v., 5 a. and 10 a., 17/6; 2 kV., 5 mA., 2 v., 2 a., 25 -; 350-0-750 v., 150 mA., 5 v., 2 a., 25/-; Postage 2/- each. CERAMICONS N750K 22 to 100 p.f.s. 25/- per 100. BLOWERS, 1 1/2 in. 8/6; 2 1/2 in. 7/6.

List and enquiries S.V.E. please Terms: Cash with order. Postage extra. Immediate despatch.

Callers and Post Callers in v
W.A. BENSON (PW), SUPERADIO
308 Rathbone Rd., (W) Chapel, LTD., 118
Liverpool 13. Whitechapel, Liver-
STO 1864. pool 1. ROY 1190

COMMUNICATIONS RECEIVER R.1155. The famous ex-Bomber Command Receiver known the world over to be supreme in its class. Covers 5-wave ranges 18.5-7.5 mc/s., 7.5-3.0 mc/s., 1,500-500 kc/s., 500-200 kc/s., 200-75 kc/s. and is easily and simply adapted for normal mains use, full details being supplied. Aerial tested before despatch these are in EXCELLENT CONDITION IN MAKERS ORIGINAL TRANSIT CASES. ONLY £9/19/6.

A factory made Power Pack, Output Stage and Speaker, contained in a black cracked cabinet to match the receiver, can be supplied at ONLY £5/10/0. Operates receiver immediately.

DEDUCT 10/- IF PURCHASING RECEIVER & POWER PACK TOGETHER.
Please add carriage costs of 10/6 for Receiver and 5/- for Power Pack.

100 MICROAMPS METERS. 2 1/2 in. Circular Flush Mounting. Widely calibrated scale of 15 divisions marked "Yards," which can be re-written to suit requirements. These movements are almost unobtainable elsewhere and being made in 18 MAKERS CARTONS are snip. ONLY 42/6.

TRANSFORMERS.—Manufactured to our specifications and fully guaranteed Normal Primaries. 425v.-0-425 v. 250 mA., 4.3 v. 4 a., 6.3 v. 4 a., 5 v. 3 a. ONLY 50/-; 350 v.-0-350 v. 160 mA. 6.3 v. 6 a., 6.3 v. 3 a., 5 v. 3 a. ONLY 42/6; 250 v.-0-250 v. 100 mA. 6.3 v. 6 a., 5 v. 3 a. ONLY 32/6; 350 v.-0-350 v. 150 mA., 6.3 v. 5 a., 0-4-5 v. 3 a. ONLY 32/6. The above are fully shrouded upright mounting. 5.5 kV. E.H.T. with 2 windings of 2 v. 1 a. ONLY 72/6; 7 kV. E.H.T., with 2 windings of 1 a. ONLY 82/6. BRAND NEW. ONLY 27/6 (postage, etc. 2/6).

CRYSTALS. British Standard 2-pin 500 kc/s. 15/-; Miniature 200 kc/s. and 465 kc/s. 10/- each.

SPRAGUE CONDENSERS.—1 mfd. 600 v. wkg. 9/6 per dozen.

RECEIVER 25 7/3.—Another purchase of these very popular receiving sections of the TR.1196. Makes an ideal basis for a mains operated All Wave Superhet. full modification data being supplied. Complete with 6 valves, 2 ea. EF36 and EF39, and 1 ea. EB32 and EB33. BRAND NEW. ONLY 27/6 (postage, etc. 2/6). Or a few less valves, but complete with the 465 kc/s. I.F.S. etc., 8/6 (post. etc., 2/6).

6 VOLT VIBRATOR PACKS.—Made by H.R.O. of America. Output 165 v. 80 mA., 6.3 v. 3 a. Contains 6X5 rectifier and full smoothing. Self contained in black cracked cabinet size 7 1/2 in. x 3 in. ONLY 22/6 (postage, etc. 2/-).

AMERICAN ROTARY TRANSFORMERS.—12 v. D.C. input, output 255 v. 65 mA. Useful for car radio, or running electric shaver from car battery, etc. ONLY 22/6.

VACUUM PUMPS.—These are ex-R.A.F. rotary vane type, and are ideal for handy-men and model makers, etc. New and Unused. ONLY 22/6 (postage, etc., 2/-).

INDICATOR UNITS, TYPE 6.—Contain VR97 Tube with mu-metal screen, 4 valves; EF50 and 2 of EB31. NEW CONDITION. ONLY 59/6 (carriage, etc., 7/6).

METERS		
F.S.D.	SIZE AND TYPE	PRICE
1	m.a. D.C. 2 1/2 in. Flush square	15/-
1	" D.C. 2 1/2 in. Flush circular	22/6
1	" D.C. 2 in. Desk type	25/-
5	" D.C. 2 in. Flush square	7/6
100	" D.C. 2 in. Flush circular	12/6
150	" D.C. 2 in. Flush square	7/6
500	" D.C. 2 in. Flush circular	12/6
500	thermo 2 in. Flush square	5/-
500	thermo 2 in. Proj. circular	5/-
20 amps	D.C. 2 in. Proj. circular	7/6
40-0-40 amp	D.C. Car type m.c. Car motor	12/6
15 volts	A.C. 2 1/2 in. Flush, circ., mov. iron	8/6

All meters Brand New in Maker's cartons

Amounts given for carriage refer to in and only.

U.E.I. CORPORATION,
138, Gray's Inn Road, London, W.C.1
(Phone: TERMINUS 7937)

(Open until 10 a.m. Saturdays. We are 2 mins. from High Holborn (Chancery Lane Station) and 5 mins. by bus from King's Cross.)

"A!" "UNIQUE" "AMAZING!"
"FINE VALUE!" "Mr. Denny of Hollywood Radio Institute recommends"
"THE TOPS" "is thrilled"
"Dr. —" "Mr. Camm was right"

Remarks like these are received by every post. You, too, will feel the same way about the famous

RODING "HOME CONSTRUCTOR'S HANDBOOK"

Send, to-day, the modest sum of 2/6d. and obtain the best value for money the radio enthusiast can get!

Printed on the finest glossy art paper it contains large blueprint, circuits, parts lists and technical descriptions enabling YOU to build any or all of the following high-class equipment—

- ***3-VALVE 3-BAND SUPERHET. FEEDER UNIT.
- ***4-VALVE 3-BAND SUPERHET. "NORM." / HI-FI / GRAM." FEEDER UNIT.
- ***4-VALVE 3-BAND A.C. SUPERHET. ("CORONET.")
- ***5-VALVE 3-BAND A.C. SUPERHET. RECEIVER.
- ***5-VALVE 3-BAND A.C. D.C. SUPERHET. RECEIVER.
- ***6-VALVE 3-BAND A.C. SUPERHET. RECEIVER.
- ***6-VALVE 3-BAND A.C. D.C. SUPERHET. RECEIVER.
- ***3-VALVE 2-BAND T.R.F. SUPER QUALITY FEEDER AND TONE CONTROL UNIT.
- ***FEEDER AMPLIFIER AND POWER PACK.
- ***MAGIC EYE TUNING INDICATOR UNIT.
- ***SIGNAL TRACER A.C.
- ***5-WATT QUALITY AMPLIFIER A.C. WITH NFB.
- ***10-WATT PUSH - PULL QUALITY AMP. A.C. WITH NFB.
- ***SIGNAL GENERATOR A.C. ETC., ETC.

Set Building and Servicing Hints, Facts and Formulae, Resistance Colour Code, Symbols, etc., etc., and our current Catalogue. Not only can you supply FREE FULL SIZE working drawings (see Handbook for full details), but nothing is left to chance. All parts supplied by us are fully identified, and our tuning units are completely pre-aligned. **REMEMBER—YOU REQUIRE NO TEST CLEAR!**

*Mr. F. J. CAMM uses our R.I. TUNING UNITS—Why Don't You?

*In the AC1 CORONET, A.C. D.C. CORONET, and BATTERY CORONET. All parts for these fine receivers always in stock—send stamp for the list you want.

Also obtainable at leading book sellers and component stockists.

RODING LABORATORIES
(DEPT. P9),
BOURNEMOUTH AIRPORT,
CHRISTCHURCH, HANTS.

thus roughly a third of the value should be added to the chart figure. The output capacity or "matching" capacity that feeds into the coaxial line will vary from about six times the anode or "tuning" capacity as, say, for a single 807 running at 600 volts at 100 mA to about four times the anode capacity in the case of a pair of 807s running at a total of 200 mA at 600 volts.

As only low voltages appear at the matching condenser end, and a high value of capacity is needed to load up on the 80 metre band, it is often recommended that the output condenser be a two-gang receiving variable of 500 pF per section with the two sections paralleled. This gives a total capacity of 1,000 pF. This may be a little cramping, however, when operating on the higher frequency bands, so that a single 500 pF condenser or even a 300 pF may be used with auxiliary fixed condensers switched in for matching on the L.F. bands. This spreads the matching adjustment comfortably (Fig. 4).

Bandswitching

Bandswitching the Pi tank may be performed in several ways. The simplest solution is to switch in a fresh coil for each band (Fig. 5). This is a solution free from trouble, but for the bands 3.5, 7, 14, 21 and 28 Mc/s five coils are needed. As it is advisable to screen the tank assembly in the interests of TVI suppression, much chassis space is occupied. However, one commercial Pi tank unit does employ separate tank coils quite successfully and compactly.

However, the more usual approach is to use some form of variable inductance. Two alternative methods are in use. In Fig. 6 is shown the roller type of variable inductance. Such roller type variable inductors are available on the surplus market, and one type was available as a "spare" for the celebrated 145 VFO. At least one well-known operator, G5US, is running a 150 watt rig with a variable inductor tank. With the usual variable inductors available, the only precaution is not to adjust the

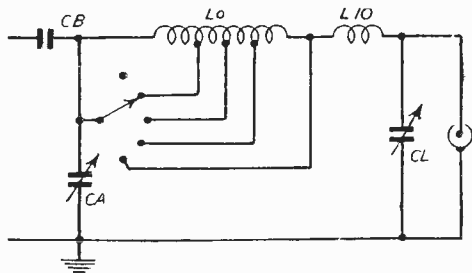


Fig. 8.—Switching losses due to short-circuited turns are reduced by using a separate 10 metre band coil L10.

inductor while the PA is running, as this may cause R.F. arcing and pit the roller and inductance wire so that poor contact eventually results. With this proviso the "roller coaster" type of variable inductor is very satisfactory. Moreover with the inductance itself variable the need for a fully variable "matching condenser" disappears, and a range of fixed matching condensers may be switched in for matching. Alternatively, only a small variable together with a range of fixed condensers can be employed.

Fig. 7 illustrates the more usual tapped inductance

method with a bandswitch linked to the taps. This again is a generally satisfactory solution. The taps are selected, so that approximately the optimum value of tank capacity needed for any band (as calculated from the tank capacity chart previously given) is required for resonance. In practice by determining the maximum inductance required for 80 metres, it is a simple matter to find the correct tap points for the other bands by using temporary clips. Once determined, the final tap points can be soldered into position.

An Objection

There is one objection to the tapped type of tank in which the unwanted sections of coil are shorted

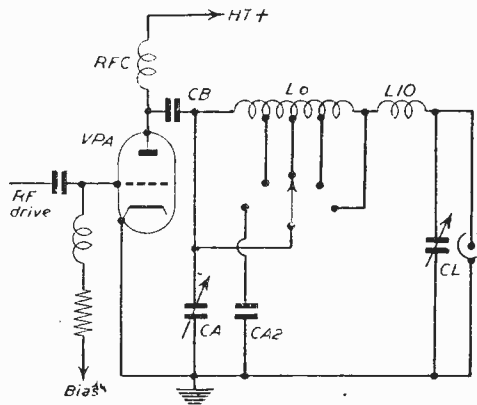


Fig. 9.—A large tank condenser may be avoided by using an auxiliary fixed condenser (CA2) for 80 metre operation connected to the 80 metre switch position.

out. The shorting out of turns is generally liable to deteriorate the efficiency of a coil, and many amateurs are not happy at the carefree shorting of turns necessitated by the tapped Pi tank method. In point of fact, the only serious trouble, as might be expected, occurs upon 10 metres, where almost all the coil is shorted out. The tiny piece of coil in use is closely coupled to the unwanted short-circuited sections, so that losses may become excessive. The solution is to provide a separate coil for 10 metre operation, as shown in Fig. 8. This coil is connected to the main coil, but physically separate from it. Thus, the coil is not coupled to the short-circuited turns magnetically, and operates at high efficiency. Also as the coil is in circuit on 21 Mc/s and 14 Mc/s it helps in reducing the losses on these bands as well. This is because the "shorted turns" are only a part of the total in circuit inductance, so that losses are reduced.

With the use of an auxiliary coil for 10 metre operation, the switched Pi tank is a very effective and satisfactory performer. There is yet another point to notice, however. In the case of paralleled 807s running at the full CW input of 120 to 150 watts, the tank tuning capacity required for 80 metre operation comes out at around 250 pF. An anode tank condenser of this capacity capable of transmitter use is rather large. One solution is to arrange that the bandswitch provides extra fixed tuning capacity on the 80 metre position. This enables a

smaller (100 pF) tank capacity to be used. Fig. 9 shows a way of doing this. Fortunately high-voltage ceramic condensers are now made at a low cost for TV purposes that are suitable for use in this position.

It should be noted that the most important feature of the Pi network tank transmitter has not yet been mentioned. This is the anode choke. The anode choke is connected directly to the PA anode, and as it is effectively in parallel with the Pi tank, it is essential that it be a choke of high impedance at all the frequencies covered by the Pi tank. Unfortunately this is a difficult design problem for the choke manufacturer. This especially as the 21 Mc/s band has to be covered. It is easy to find chokes that will operate satisfactorily on some of the bands and not on others. The usual symptom of choke defect is that the PA anode current does not dip with tuning, even when the PA is unloaded. Also a neon lamp run along the choke windings may reveal violent R.F. voltages in the middle of the choke. In one case investigated the neon when applied directly to the PA anode could hardly be persuaded to light, while midway down the anode choke it lit brilliantly. A partial cure in such cases is to connect a second choke

between the anode and the main choke. This enabled good R.F. output to be obtained from the PA in the above case, although the auxiliary choke became extremely hot. The only real cure is a new choke meeting the requirements of high impedance over a wide frequency range. This question of choke efficiency is one of the most important aspects of successful Pi tank circuit operation, and it is believed that Eddystone may shortly market a choke specially designed for high efficiency in this type of circuit. Certainly no commercial choke is available that is really satisfactory in this circuit, and generally home-made chokes are used. If a commercial choke is made available it would be welcome, as home-constructed chokes often require much laborious "fiddling" to give good results on all bands. Much disappointment with Pi tanks can be traced to this choke question, and a good ready-made choke should be assured of a ready market. Certainly amateurs everywhere would welcome the commercial solution of this question. Those who have had difficulties with Pi tanks, therefore, are invited to investigate choke efficiency with some care.

A Simple Radio Control Device

I WAS interested in the letter from your correspondent, G. Paish (Devon) (February issue), who asks for information on remote control for models. The following idea should provide a simple method for controlling a model boat by means of radio impulses.

It consists of a disc of insulating material having 10 pairs of contact studs (more or less according to the number of operations) arranged at equal intervals round the circumference. These studs are connected to the appropriate parts of the boat's mechanism to be controlled, the actual connections will be self-explanatory from the diagram.

The circuit through the studs is completed by means of a rotating contact arm held on a spindle passing through the centre of the disc.

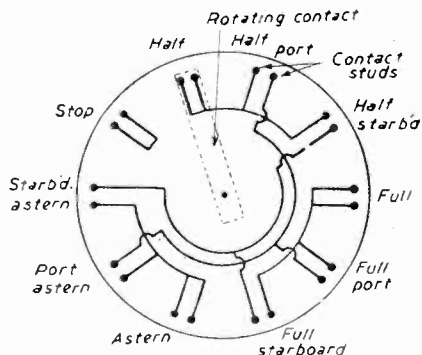
The spindle itself is connected to a wheel with 10 saw-teeth cut in it, and which works as follows: A pawl constructed of springy brass sheet and fixed to a soft-iron armature, suitably hinged in front of an electromagnet, engages behind a tooth.

When the electromagnet is energised, the armature

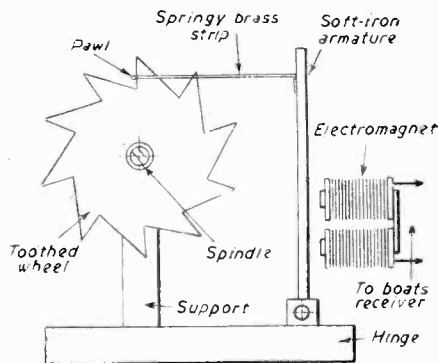
is attracted, and the pawl takes one tooth with it in moving forward. On de-energising the electromagnet, the armature is pulled by a spring, the pawl rides over the next tooth and comes in behind it ready for the next cycle of operations.

In this way it is possible (by sending the appropriate number of pulses) to select any one pair of contact studs and so control the movement of the boat.

The circuit controlling the electromagnet is closed by a relay in the boat's radio receiver. Impulses can be sent from the transmitter by means of a morse



Wiring details for the control arm.



Practical arrangement of the control.

key, and a repeating mechanism could be provided to indicate the position of the control switch in the boat.

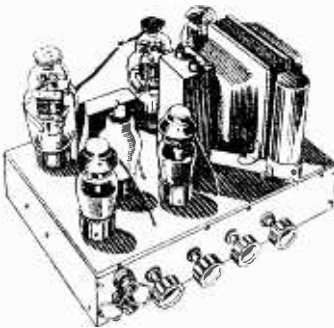
Rudder movement is effected by two electromagnets (one for port, one for starboard), the mechanism, which works against a spring, returning to a central position when the electromagnets are de-energised.

The mechanism must rotate in one direction only, and for this reason a back-stop should be provided to prevent the toothed wheel from reversing.—W. G. KEEL (Glasgow).

R.S.C. 25 WATT QUALITY AMPLIFIER 9 Gns.

We firmly believe our All "Push-Pull" Quality Amplifier to be by far the best value in amplifiers offered to-day. The volume of its rich fidelity reproduction is completely controllable, from the sound of a quiet intimate conversation to the full, glorious volume of a great orchestra. Its sensitivity is so high that in areas of fair signal strength it can be operated straight from a crystal receiver. Entirely suitable for standard or long playing records in small homes or in large auditoriums. For electronic organ or guitar or for garden parties or dance bands. The kit is complete to the last detail, and includes easy to follow point-to-point wiring diagrams.

Outputs for 3 or 15 ohm speakers. Twin volume controls with twin input sockets allow SIMULTANEOUS INPUTS for BOTH MICROPHONE and GRAM, or TAPE and RADIO. SEPARATE BASS and TREBLE CONTROL. S. S. riving both LEFT and C. OUT. FOUR NEGATIVE FEEDBACK



LOOPS with 15 db in the main loop from output transformer to voltage amplifier. Frequency response - 3 db. 50-20,000 c.p.s. HUM and DISTORTION LESS THAN 0.5

H.M.V. LONG PLAYING RECORD TURNABLE WITH CRYSTAL PICK-UP (Sapphire Stylus). Speed 33 1/3 r.p.m. For A.C. mains 200-250 v. Limited supply. Brand New Cartoned. Perfect. Only £3.19.6. Plus cart. C. (Normal price £8 approx.).

BATTERY SET CONVERTER KIT. All parts for converting any type of Battery receiver to All Mains. A.C. 200-250 v. 50 c/s. Kit will supply fully smoothed H.T. of 120 v., 90 v. or 60 v. at up to 40 mA, and fully smoothed L.T. of 2 v. at 0.4 to 1 a. Price, complete with circuit, wiring diagrams and instructions, only 43/6. Or ready to use, 8/9 extra.

PERSONAL SET BATTERY SUPERSEDER KIT. A complete set of parts for construction of a Unit (housed in metal case) to replace Batteries where A.C. Mains supply is available. Input 200-250 v. 50 c/s. Output 90 v. 10 mA and 1.4 v. 250 mA, fully smoothed. For 4-valve receivers. Price complete with circuit. Only 35/9. Or ready for use, 42/6. Size of unit, 5 1/4 x 4 x 1 1/2 in.

BATTERY CHARGER KITS For mains 200-250 v. 50 c/s. To charge 8 v. acc. at 2 a. 25/6. To charge 6 or 12 v. acc. at 2 a. 31/6. To charge 6 or 12 v. acc. at 4 a. 49/9. Above consist of transformer, full wave rectifier, fuses, fuseholders and steel case. Any type assembled and tested, 6/9 extra.

THE SKY CHIEF T.R.F. RECEIVER A design of a 4-stage, 3-valve 200-250 v. A.C. Mains receiver with selenium rectifier. It consists of a variable MU high gain H.F. stage followed by a low distortion grid detector triode. The next stage is a further triode amplifier with tone correction by negative feedback. Finally comes the output stage consisting of a parallel connected double triode giving ample output at an extraordinary low level of distortion. Point to point wiring diagrams, instructions, and parts list, 2/6. This receiver can be built for a maximum of £4.18/- including attractive Brown or Cream Bakelite or Walnut veneered wood cabinet 12 x 6 1/2 x 5 1/2 in.

ELECTROLYTICS (Current production. Not ex-Govt.).

Tubular Types	8µF 500 v.	2/11
8µF 350 v.	1.9	1.9
8µF 450 v.	1.11	2/9
8µF 500 v.	2/11	2/11
16µF 350 v.	2/3	3/2md 450 v. 4/9
16µF 450 v.	2/9	40µF 450 v. 4/11
22µF 350 v.	3/6	64µF 450 v. 4/9
32µF 350 v.	3/6	8-8µF 350 v. 3/9
25µF 25 v.	1/3	8-8µF 450 v. 3/9
50µF 12 v.	1/3	8-16µF 450 v. 2/11
50µF 50 v.	2/3	8-16µF 450 v. 3/11
Can Types		
8mf 350v.	1/3	16-16µF 450 v. 4/11
8µF 450 v.	2/3	16-32µF 350 v. 5/3
		32-32µF 450 v. 5/11

RECORDING TAPE. Best Quality. Plastic. 1.00 ft. Reels only 18/9.

Terms C.O.D. or C.O.D. NO C.O.D. under £1. Post 1/- extra under 10/-, 1/6 extra under £1; 2/- extra under £2; 2/6 extra under £3. Open 9 to 5.30; Sats. until 1 p.m. List 6d. Trade List 5d. S.A.E. please with all enquiries.

per cent. measured at 10 watts, comparing favourably with most highest priced amplifiers. Six B.V.A. valves, Marconi/Osram KT series output valves. A.C. only, 200-250-250 v. 50 c/s, input, 420 v. H.T. LINE. Paper reservoir condenser. Compact chassis. Matched components. Size 14-10-9in. Available in kit form at the amazingly low price of 99s. Plus carriage 7/6. Or ready for use 50/- extra.

R.S.C. 8-10 WATT "PUSH-PULL" HIGH-FIDELITY AMPLIFIER A3

Complete with integral Pre-amp. Tone control stage (as All amplifier), using negative feedback, giving humproof individual bass and treble lift and cut tone control. Six Negative Feedback Loops. Completely adjustable hum and distortion. Frequency response - 3 db. 30-20,000 c.p.s. Two independently controlled inputs. Six B.V.A. valves, A.C. mains 200-250 v. input only. Outputs for 3 or 15 ohm speakers. Kit of parts complete in every detail. £7.19.6. plus S. carriage, or ready for use 45/- extra.

CONSOISER HIGH FIDELITY LIGHTWEIGHT MAGNETIC PICK-UP COMPLETE WITH MATCHING TRANSFORMER. A fortunate purchase enables us to offer limited supplies. Brand New and Perfect at a fraction of normal price. Only 26/6.

FOUR-STATE FEEDER UNIT. Design of a High Fidelity Tuner Unit. L. & M. Wave. Full decoupling. Self contained heater supply. Detailed wiring diagrams parts list, and illustration. 2/6. Total building cost, £3.15/-.

COAXIAL CABLE. 75 ohms. 1 in., 7d. yard. Twin Screened Feeder, 9d. yard.

P.M. SPEAKERS. All 2-3 ohms. 6in. Goodman, 16/9. 8in. Plessey, 15/8. 10in. Plessey, 18/6. 10in. R.A., 29/6. 10in. Rola with trans., 29/6. 12in. Truxon, 49/9. 10in. W.B. "Stentorian" 3 or 15 ohm HF1012 10 watts. Highly recommended for use with any of our amplifiers. £3 13/6.

M.E. SPEAKERS. All 2-3 ohms. 6in. Rola. Field 600 ohms, 11/9. 10in. R.A., Field 1,000 or 1,500 ohms, 23/9.

VOLUME CONTROLS with long (1in.) spindles, all values, less switch 2/9, with S.P. switch 3/9. D.P. sw., 4/9.

A PUSH-PULL 3-4 watt HIGH-GAIN AMPLIFIER FOR £3.12.6. For mains input 200-250 v. 50 c/s. Complete kit of parts including circuit, point to point wiring diagram, and instructions. Amplifier can be used with any type of Feeder Unit or Pick-up. This is not A.C./D.C. with "live" chassis, but A.C. only with 400-0-400 v. trans. Output is for 2-3 ohm speaker. We can supply a suitable 10in. unit by Rola at 25/9. The amplifier can be supplied ready for use for 25/- extra. Carr. 2/6. Full descriptive leaflet, 7d.

BRAND NEW COLLARO 3 SPEED AUTOMATIC RECORD CHANGERS. Type RC3 521, with Orthodynamic Magnetic Pick-up and matching trans. Separate (switched) Alloy Stylus for standard or long-playing records. Mains input 200-250 v., £9.19/6. Plus Carr. 5/-.

COLLARO 3-SPEED MIXER AUTO-CHANGERS. RC.3 522 with "Plug-in" Crystal Heads for Mains 200-250 v. 50 c/s. Brand New cartoned, £10.10/- Carr. 5/-.

MICROPHONES. Crystal type, good quality. Recommended for use with our amplifiers. Hand type, 59/6; Stand type, 66.19.6.

R.S.C. MAINS TRANSFORMERS

Intervolced and Impregnated. Primarys 200-230-250 v. 50 c/s Screened TOP SHROUDED DROP THROUGH

250-0-250 v. 70 mA. 6.3 v. 2.5 a.	12.11
260-0-260 v. 70 mA. 6.3 v. 2 a. 5 v. 2 a.	14.11
350-0-350 v. 80 mA. 6.3 v. 2 a. 5 v. 2 a.	17.9
275-0-275 v. 80 mA. 6.3 v. 2 a. 4 v. 2.5 a.	14.11
250-0-250 v. 100 mA. 6.3 v. 4 a. 5 v. 3 a.	21.11
300-0-300 v. 100 mA. 6.3 v. 4 v. 4 a. e.t.	21/-
0-4.5 v. 3 a.	...
350-0-350 v. 100 mA. 6.3 v. 4 a. 5 v. 3 a.	21.6
350-0-350 v. 150 mA. 6.3 v. 4 a. 5 v. 3 a.	27.9
350-0-350 v. 150 mA. 6.3 v. 2 a. 6.3 v. 2 a.	...
5 v. 3 a.	29.11

FULLY SHROUDED UPRIGHT

250-0-250 v. 60 mA. 6.3 v. 2 a. 5 v. 2 a.	16.9
Midget type 2.5-3 in.	...
350-0-350 v. 70 mA. 6.3 v. 2 a. 5 v. 2 a.	18.9
250-0-250 v. 100 mA. 6.3 v. 4 a. 5 v. 3 a.	22.9
250-0-250 v. 100 mA. 6.3 v. 6 a. 5 v. 3 a.	23.9
for R1355 conversion	29.9
300-0-300 v. 100 mA. 0-4-6.3 v. 4 a.	22.9
0-4.5 v. 3 a.	...
350-0-350 v. 150 mA. 6.3 v. 4 a.	22.9
0-4.5 v. 3 a.	...
350-0-350 v. 250 mA. 6.3 v. 6 a. 4 v. 1 a.	31.6
C-26 v. 2 a. 4 v. 3 a. for Electronic Ent. Television	69.6
425-0-425 v. 200 mA. 6.3 v. 4 a. C.T.	...
6.3 v. 4 a. C.T. 5 v. 3 a. Suitable Williamson Amplifier, etc.	47.9
Economy Quality Amplifier type	59.6
450-0-450 v. 250 mA. 6.3 v. 6 a. 6.3 v. 6 a.	...
5 v. 3 a.	69.9

ELIMINATOR TRANSFORMERS Primarys 200-250 v. 50 c/s. 120 v. 40 mA 7.9 80 v. 10 mA, 7-0-7 v. 250 mA ... 8.11

CHARGER TRANSFORMERS

All with 200-230-250 v. 50 c/s Primarys; 0-9-15 v. 1.5 a. 14.9; 0-9-15 v. 3 a. 16.9; 0-9-15 v. 6 a. 22.9; 0-4-8-15-24 v. 3 a. 22.9.

SMOOTHING CHOKES

250 mA 3-5 H 50 ohms	11.9
150 mA 7-10 H 250 ohms	11.9
100 mA 10 H 175 ohms Potted	8.9
80 mA 10 H 350 ohms	5.6
60 mA 10 H 400 ohms	4.11

E.H.T. TRANSFORMERS

2,000 v. 5 mA. 2-6-2 v. 1.1 a. 2-0-2 v. 1.1 a. for VCR97, VCR517, etc.	36.6
5,000 v. 5 mA 2 v. 2 a.	39.6

OUTPUT TRANSFORMERS Midget Battery Pentode 66L for 384, etc. ... 3/9 Small Pentode 5,000 to 30 ... 3/9 Standard Pentode, 5,000 to 30 ... 4/9 Multi-ratio 40 mA. 30L, 45L, 60L, 90L. Class B Push-Pull ... 5.6 Push-Pull 10-12 watts 6V6 to 3D or 15D ... 15.9 Push-Pull 10-12 watts to match 6V6 to 4-5-8 or 15D ... 16.9 Push-Pull 20 watts, sectionally wound, 6L6, KT66, etc., to 3 or 15Ω ... 47.9 Economy Quality Amplifier type ... 47.9

RADIO SUPPLY CO. (LEDS) LTD. THE CALLS, LEEDS, 2

KINGSTON ON THAMES

NOW OPEN

A shop catering exclusively for the Home Constructor.

FULL HIRE PURCHASE FACILITIES
ONLY 2/- in the £ DEPOSIT

WATTS RADIO

8, Apple Market, Kingston-on-Thames, Surrey
Telephone : Kingston 4099.

REP HIGH GAIN COILS



Dual Range Miniature Crystal Set Coil **2/6** with Circuit

Dual Range Coil **4/-** with 2 Mains and 2 Battery Circuits

Matched Pair Dual Range T.R.F. Coils with Reaction **8/-** pair With Battery and Mains Circuits

- All coils wound on low loss formers.
- Individually tested and guaranteed.
- Post 3d. on all orders.
- Trade supplied.

RADIO EXPERIMENTAL PRODUCTS, LTD.
33, MUCH PARK ST., COVENTRY

NEW 4th Edn. !

WIRELESS WORLD

RADIO VALVE DATA

With characteristics of 2,000 British and American valves and 150 Cathode Ray Tubes. Special Quality Valves and Equivalent Valves (direct plug-in replacements) are included in the Index.

PRICE 3/6 POSTAGE 1d

The Radio Amateur's Handbook, by the "A.R.R.L." Price 30/- postage 1.-

Basic Electronic Test Instruments by Turner. Price 32.- postage 1.-

Television Engineers' Pocket Book by Molloy & Hawker. Price 10/6. postage 6d.

Everyman's Wireless Book by Camm. Price 12/6. postage 6d.

Practical Wireless Encyclopaedia by Camm. Price 21.- postage 1.-

The Oscilloscope at Work. Price 15.- postage 6d.

THE MODERN BOOK CO.

(Britain's largest stockists of British and American Technical Books).

19-23, PRAED STREET, (Dept. P10), LONDON W.2.

Please write or call for our catalogue. Phone PADDINGTON 4185. Open all day Saturday.

18

CIRCUITS
for 2/6 only

SHOW BUMPER NUMBER !

Enlarge again !
Sales Now Breaking All Records !

Our Super-Handbook, "The Home Constructor" with its supplements all the above P.L.U.'s super-simplified layout and point-to-point wiring diagrams and FULL constructional details for building a variety of superhets. P.L.U.'s full constructional details for building a superhet Coil Pack P.L.U.'s full constructional details for building a superhet Code, Formulae, and "Know-How" P.L.U.'s priced parts lists for all our circuits P.L.U.'s full constructional details for building a superhet Car Radio P.L.U.'s Radiogram supplement P.L.U.'s Radio Control supplement catalogue. Circuits of Feeder Units, Superhets, Amplifiers, TRF sets, Test Equipment, etc., etc.

YOU CAN'T GET BETTER VALUE! IT'S TOPS!
"The most helpful book in the Trade"

SEND FOR A COPY TODAY

SUPACOILS (Dept. P.10)
21, Markhouse Road, London, E.17

COPPER WIRE

S.W.G.	ENAMELLED		TINNED	
	2 ozs.	4 ozs.	2 ozs.	4 ozs.
16	1/4	2/-	1/4	2/-
17	1/4	2/1	1/4	2/1
18	1/4	2/2	1/4	2/2
19	1/4	2/3	—	—
20	1/5	2/4	1/5	2/4
21	1/5	2/5	1/6	2/5
22	1/6	2/6	1/6	2/6
23	1/7	2/7	1/7	2/7
24	1/7	2/8	1/7	2/8
25	1/8	2/9	1/8	2/9
26	1/8	2/10	1/8	2/10
27	1/9	2/11	1/9	2/11
28	1/9	3/-	1/9	3/-
29	1/10	3/1	1/10	3/1
30	1/10	3/2	1/11	3/5
31	1/11	3/3	2/-	3/6
32	1/11	3/4	2/1	3/8
33	2/-	3/5	2/2	3/10
34	2/-	3/6	2/3	4/-
35	2/1	3/7	2/4	4/2
36	2/1	3/8	2/6	4/5
37	2/2	3/10	2/7	4/8
38	2/3	4/-	2/9	4/11
39	2/4	4/2	2/10	5/2
40	2/5	4/4	3/-	5/6

POSTAGE EXTRA.
POST ORDERS ONLY PLEASE.
Send stamp for comprehensive lists.

CRYSTAL SET
INCORPORATING THE SILICON
CRYSTAL VALVE
Adjustable Iron Cored Coil.
RECEPTION GUARANTEED
Polished wood cabinet, 15/-, post 1/-
A REAL CRYSTAL SET, NOT A TOY

POST RADIO SUPPLIES
33 Bourne Gardens, London, E.4

VALVES

	Ex-Govt.	Boxed and Guaranteed.			
1R5	8/-	6X5GT	9/-	EF39	9/6
1S7	8/-	12A6	8/-	EF50	7/6
1T1	8/-	12SH7	5/6	EF54	6/6
3V1	8/-	26L6GT	10/-	EK32	9/6
5U4C	8/6	35L6GT	10/-	EL32	7/6
5Z4G	9/-	50L6GT	10/-	FL35	11/6
6AC7	5/6	807	10/6	KT33C	10/-
6AL5	7/6	931A	9/0-	KTZ41	8/6
6AM6	11/6	ATP4	7/6	L63	6/6
6CG6	7/6	CV67	25/-	PEN46	10/6
6H6	4/-	CV174	25/-	SI30	7/-
6J5G	6/6	DA41	20/-	SP41	3/6
6J6	11/6	DH77	10/6	SP61	5/-
6K7M	8/6	E1192	7/8	V872	6/-
6K7GT	8/-	E1320	10/6	V1120B	9/6
6K8G	11/6	E1336	10/6	VR105 3011-	
6L9C	11/6	E284	3/6	VR150 3010-	
6NTG	10/6	EB303	8/6	VS70	10/6
6SL7GT	9/6	EC52	6/6	VS110A	7/-
6SN7GT 11-		EC54	6/6	VU111	4/-
6V6GT/G 9-		EF36	7/8	VU120A	4/6

WILCO ELECTRONICS Dept. P.W.
203, Lower Addiscombe Rd., Croydon

Fidelia

HAND BUILT RADIO UNITS

THE FIDELIA MAJOR 10

Hand built high quality radiogram chassis at economic price. 10 valve, model illustrated, £32-8-4. De-luxe 9 valve model £25-5-0. 7 valve £21-12-0. 8 valve £24-18-4.

Technical data sheets free. Electro Acoustic Developments, 2 Amhurst Road, Telscombe Cliffs, Sussex.

H.A.C. SHORT WAVE EQUIPMENT

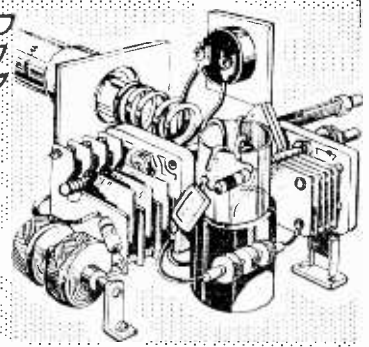
Noted for over 18 years for...
S.W. Receivers and Kits of Quality.

Improved designs with Denco coils :
One-Valve Kit, Model "C" Price, 25/-
Two " " " " " " " " 50/-

All kits complete with all components, accessories, and full instructions. Before ordering call and inspect a demonstration receiver, or send stamped, addressed envelope for descriptive catalogue.

"H.A.C." SHORT-WAVE PRODUCTS
(Dept. TH), 11, Old Bond Street, London, W.1.

SHORT-WAVE SECTION



BUILDING COMMUNICATIONS RECEIVERS

1.—R.F. AND F.C. STAGES

THE possibility of building a communications type receiver is an attractive one, and in some ways this type of receiver lends itself very well to modification. It is a comparatively easy matter to add further wavebands, as required, to provide additional R.F. or I.F. stages, or to introduce special features such as a beat-frequency oscillator, tuning meter, etc. It is, therefore, quite feasible to begin with a straightforward four or five valve circuit, which tunes only one waveband, and to add other stages and coils until a very comprehensive receiver is arrived at. It is, therefore, proposed to deal with the design and construction of such receivers. R.F. and F.C. stages will be covered first. The circuit of a communications type receiver may conveniently be split up into a number of sections, and I.F., B.F.O., and A.F. stages can be dealt with later, together with S-meters, noise-suppressor circuits and similar features.

The term "communications receiver" is generally applied to a receiver having a higher standard of sensitivity and selectivity than that of the usual type of domestic receiver. Provision will usually be made for tuning wide bands of frequencies, and band-spreading and other features may be present. It is worth noting, however, that extreme complication and a large number of valves are not essential in a communications receiver. Some of the simpler models widely used employ only five or six valves, and may have no R.F. stage. On the other hand, it is possible to add R.F. and I.F. stages until a much greater number of valves will be employed.

When the construction of such a receiver is first considered a large, stout chassis should be chosen. Cramped construction is undesirable, and limits future additions. Rigidity is an essential feature for stable, easy tuning on the higher fre-

quencies, and a really high-class tuning drive is very important. With suitable circuits an extremely high degree of selectivity can be achieved and a poor drive will become very troublesome. The possible limitations of the power pack should also be kept in mind. If a push-pull output stage is not required, however, a transformer and rectifier able to deliver 80 to 100 mA will be ample, while the total consumption of many excellent circuits can be kept within the 60 mA limit.

Band Selection

Some older receivers of good type employ plug-in coils, and these may still be obtained and used if simplicity is essential. Good efficiency is possible with such coils, and there is the added advantage that extra coils for further wavebands may be purchased and inserted at any time. Against their use is the relative awkwardness of band changing, especially

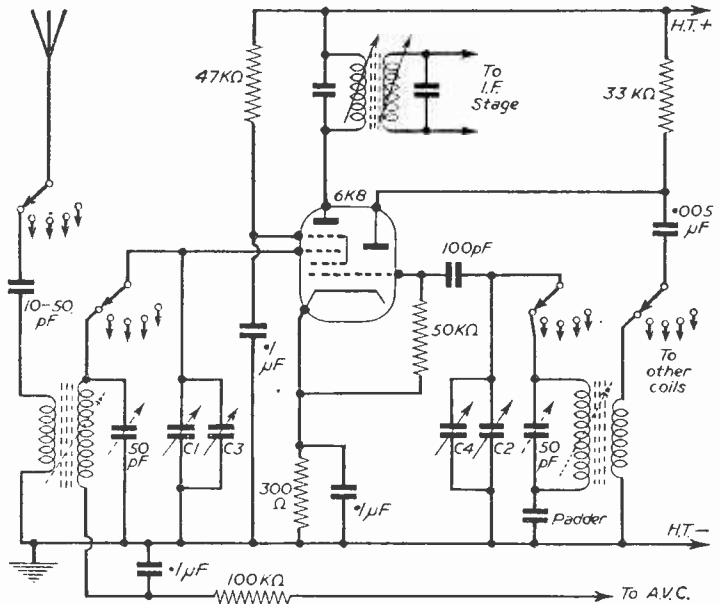


Fig. 1.—Multi-band switching and bandspread.

with three or more tuned circuits, and wavechange switching is preferable for home construction.

A circuit suitable for the F.C. stage is shown in Fig. 1, and several points require note. The wavechange switch should have a sufficient number of "ways" to permit of sufficient wavebands—usually

R.F. Stage

Such a stage is effective in reducing types of interference which arise through insufficient selectivity in the F.C. tuned circuit, and values for the readily obtainable 6K7 type are shown in Fig. 2. A manual R.F. gain control is provided in addition to A.V.C., and this is usual in this type of receiver, where individual R.F., I.F. and A.F. manual controls may permit of best possible results under all circumstances.

Each tuning coil will be of the type used in the F.C. first tuned circuit and aligned to gang with it. If bandspreading is used, then the condenser should have a third section, for the R.F. stage. Any provision for panel operated trimming of the R.F. stage is not usually required in modern designs, but is worth while with home-wound coils. Such a trimmer may be of 50 pF, wired in parallel with the main tuning condenser, and all the 50 pF trimmers otherwise used with the R.F. coils may then be omitted. If the panel trimmer is set to a mid-way position adjustment

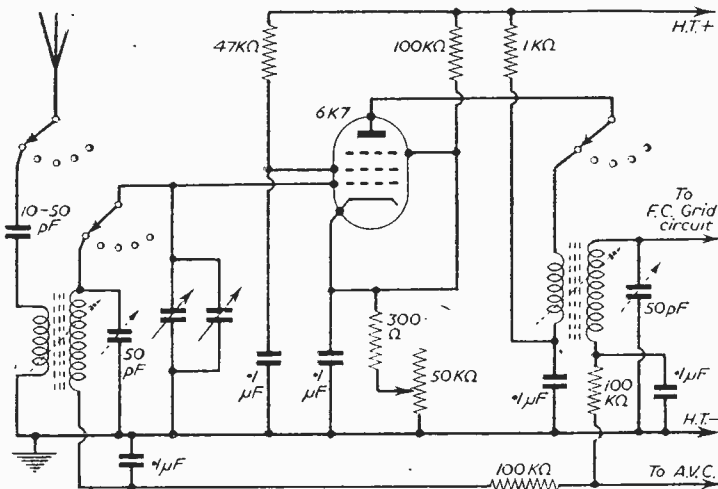


Fig. 2.—R.F. stage with R.F. gain control.

five or six, though three or four would be sufficient in some cases. If unit type coils are used, as shown, extra coils can be wired in with extreme ease. The receiver may, therefore, be put into operation as soon as possible upon the most desired band, with a single pair of coils, appropriately wired. In the interests of stability and selectivity transformer type coupling is best throughout, so that a four-pole switch will be necessary, or a six-pole type if an R.F. stage is to be added later.

C1 and C2 are sections of the gang condenser. If all-wave working is intended this may be .0005 μ F. If short waves are primarily in view a capacity of .00015 to .0003 μ F for each section would be more appropriate. A three-gang condenser is required if an R.F. stage is to be added. C3 and C4 are the bandspreading condenser sections (if this form of tuning is used), and would normally be of about .000015 μ F (15 pF). If space exists this condenser may be added later, if not fitted originally. In addition, each tuning coil has a pre-set for initial alignment. This may be wired in parallel with the tuned winding or to chassis. For ease of alignment, small size and general efficiency small dust-cored coils are most suitable throughout.

The selectivity of the first tuned circuit can be increased to a useful extent by using a small pre-set or fixed capacitance in series with the aerial coupling winding, as shown. When a wide range of frequencies is tuned it is best to have an individual condenser for each band. The most suitable values for S.W. bands would result in a severe loss of signal strength on higher wavelengths, and particularly on the L.W. band.

Though the values given are suitable for a 6K8 other valve types can be used. The 6K8 is, however, readily obtainable and capable of efficient operation up to 60 Mc/s. with average circuits.

of it should prove necessary only when a "difficult" station is being received.

A somewhat similar stage may be made up, using the non-YM 6J7 type of valve, operated in a state of maximum gain. A circuit for this is shown in Fig. 3 and can give high sensitivity. If this circuit is used it should be remembered that the life of the 6J7 will be in the neighbourhood of about only 500 hours' operating time.

Usually it will be satisfactory to use one efficient R.F. stage, and many highly expensive communications receivers are limited to this. Though two or more R.F. stages are possible it is more convenient to employ extra I.F. stages. Ganging difficulties are thereby avoided, as is possible instability arising from wave-change switching. (Continued on page 629.)

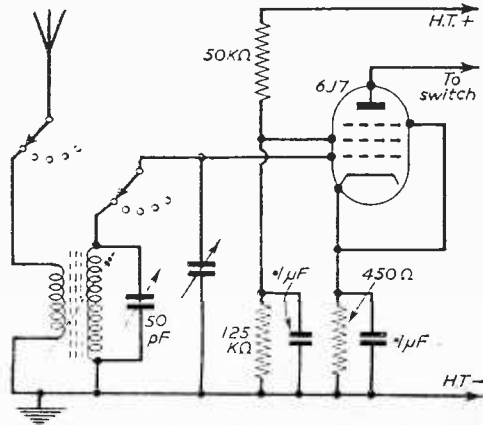


Fig. 3.—Stage giving high signal-to-noise ratio.

Volume Controls
 80 ohm **CABLE COAX**
 Midjet Edison type. Long spindles. Guaranteed 1 year. All values 10,000 ohms to 5 Meg. ohms.
 No. Sw. S.P.S. D.P.S. 3/4 4/- 49
COAX PLUGS, 1.2, SOCKETS, 1/2, LINE CONNECTOR, 1/2, OUTLET BOXES, 4/6.

BALANCED TWIN FEEDER per yd. 6d. 4 80
TWIN SCREENED FEEDER per yd. 6d. 4 80
50 OHM COAX CABLE, 8d. per yd. 6d. 4 80
TRIMMERS, Ceramic, 20, 70 pf., 1/2, 100 pf., 150 pf., 1/3; 250 pf., 1/6; 600 pf., 1/8.
RESISTORS—All values: 10 ohms to 10 meg., 1/4 w. 4d.; 1 w. 6d.; 1 w. 8d.; 2 w. 1/-; High Stability, 1 w. 1/2, 2/-. Preferred values 100 ohms to 10 Meg.

WIRE-WOUND RESISTORS—Best Makes Miniature Ceramic Type—5 w. 15 ohms to 4 K., 1/2; 10 w. 20 ohms to 6 K., 2/3; 2 w. 30 ohms to 1 K., 2/3; 5 w. Vitreous, 12 K. to 25 K., 3/4.
WIRE-WOUND POTS, 3 WATT. FANOM MAKE
 Pre-Set. Min. T.V. Type. Knurled Slotted Knob. All Values. 100 ohms to 5 K., 3/4 ea. 50 K., 4/6. 100 K., 6/6. Ditto Carbon Track **W.W. EXT. SPEAKER 50K to 2 Meg., 3/4.**
OFF TRANSFORMERS. Heavy duty 70 ma., 4/6. Small Tapped pentode, 3/9.

L.P. CHOKES—100 ma., 15/-; 200/250 h., 100/150 ma., 12/8; 5 h. 200 ma., 15/-; 15 h. 100 ma., 10/6.
LYNX, 3h. 250 ma., 13/6. SIMPLEX, 10h. 150 ma., 10/6. MAINS TRANS.—Made in our own workshops to high grade specification. Fully inter-leaved and impregnated. Tapped prim. 250 v./250 v. Heater Trans. 4.5 v. 41 amp. 7.5 d.t. 2.5 v. 3 amp. 10/6; ditto, 12 v. 7.5 amp. 7/6. 250-0-250, 80 ma., 6.3 v. 2 a. 4 v. 2 a., ditto 500-0-500, ditto 250-0-250, 21/6. **AMPLIFIER TRANS.** 250 v. 50 ma. 1 wave, 6.3 v. 2 a. Fully shrouded, 17/6. **View-matic, Auto Inc., 35/-; Telecine, 30/-; LYNX, 30/-; Coronet, 30/-; Simplex, 35/-.** Re-winds and Specials to requirements.

SOUNDMASTER SPECIALS.—Mains Trans. 35/-, L.F. Choke, 10/8. C.P. Trans., 5/6. Envelope, 6/6. Modified Wafer switch, 22/8. Size only 1 1/2".
GOODMANS.—Latest Wide Angle Infrared Type Focus Unit. Variable Focus and adjustable Micro-Shift, 35/-. **ELAC.**—C.R.T. Ion Traps, 2/6.

TAPE RECORDING DEVICES
LIGHTWEIGHT XTAL HAND MIKES. Chrome finish—Quality and sensitivity to only 25/-.
ELECTRODYNAMIC MIKE INSERT—U.S.A. make, perfect construction. Size only 1 1/2". diam. by 1 1/2". Bargain Price 3/9. Matching Trans. 3/9.

WOODEN WALNUT CABINET.—12in. x 7in. x 5in. H.F. or super. comp. painted chassis, 4in. back-plate drive, pulley etc., 2/6. Plug post 2/6.
TYANA.—Midjet Solenoid Iron. 200/220 v. 200/250 v., 14 1/2". **TYANA TRIPLE THREE.**—Complete with detachable bench stand, 19/6.
NEW SOLON MIDGET IRON.—25 w., 19/6. 10/4AL FOR RADIO CONTROL.
C.R.T. HEATER ISOLATION TRANSFORMER.—Low leakage windup with 25% sec. boost. Ratio 1:1.25, 2 v. 10/8; 4 v. 10/6; 6.3 v. 10/8; 12 v., 10/8. **MAINS PRIMARIES** and Specials to Order.
MIKE TRANS.—Ezetinet. Ratio 30:1; 2:1; 1:1.
V-HOLDERS.—Par. Int. Oct. 4d.; 1/2; 1/3; 1/4; 1/5; 1/6; 1/8; 1/10; 1/15; 1/20; 1/30; 1/40; 1/60; 1/80; 1/100; 1/150; 1/200; 1/300; 1/400; 1/600; 1/800; 1/1000; 1/1500; 1/2000; 1/3000; 1/4000; 1/6000; 1/8000; 1/10000; 1/15000; 1/20000; 1/30000; 1/40000; 1/60000; 1/80000; 1/100000; 1/150000; 1/200000; 1/300000; 1/400000; 1/600000; 1/800000; 1/1000000; 1/1500000; 1/2000000; 1/3000000; 1/4000000; 1/6000000; 1/8000000; 1/10000000; 1/15000000; 1/20000000; 1/30000000; 1/40000000; 1/60000000; 1/80000000; 1/100000000; 1/150000000; 1/200000000; 1/300000000; 1/400000000; 1/600000000; 1/800000000; 1/1000000000; 1/1500000000; 1/2000000000; 1/3000000000; 1/4000000000; 1/6000000000; 1/8000000000; 1/10000000000; 1/15000000000; 1/20000000000; 1/30000000000; 1/40000000000; 1/60000000000; 1/80000000000; 1/100000000000; 1/150000000000; 1/200000000000; 1/300000000000; 1/400000000000; 1/600000000000; 1/800000000000; 1/1000000000000; 1/1500000000000; 1/2000000000000; 1/3000000000000; 1/4000000000000; 1/6000000000000; 1/8000000000000; 1/10000000000000; 1/15000000000000; 1/20000000000000; 1/30000000000000; 1/40000000000000; 1/60000000000000; 1/80000000000000; 1/100000000000000; 1/150000000000000; 1/200000000000000; 1/300000000000000; 1/400000000000000; 1/600000000000000; 1/800000000000000; 1/1000000000000000; 1/1500000000000000; 1/2000000000000000; 1/3000000000000000; 1/4000000000000000; 1/6000000000000000; 1/8000000000000000; 1/10000000000000000; 1/15000000000000000; 1/20000000000000000; 1/30000000000000000; 1/40000000000000000; 1/60000000000000000; 1/80000000000000000; 1/100000000000000000; 1/150000000000000000; 1/200000000000000000; 1/300000000000000000; 1/400000000000000000; 1/600000000000000000; 1/800000000000000000; 1/1000000000000000000; 1/1500000000000000000; 1/2000000000000000000; 1/3000000000000000000; 1/4000000000000000000; 1/6000000000000000000; 1/8000000000000000000; 1/10000000000000000000; 1/15000000000000000000; 1/20000000000000000000; 1/30000000000000000000; 1/40000000000000000000; 1/60000000000000000000; 1/80000000000000000000; 1/100000000000000000000; 1/150000000000000000000; 1/200000000000000000000; 1/300000000000000000000; 1/400000000000000000000; 1/600000000000000000000; 1/800000000000000000000; 1/1000000000000000000000; 1/1500000000000000000000; 1/2000000000000000000000; 1/3000000000000000000000; 1/4000000000000000000000; 1/6000000000000000000000; 1/8000000000000000000000; 1/10000000000000000000000; 1/15000000000000000000000; 1/20000000000000000000000; 1/30000000000000000000000; 1/40000000000000000000000; 1/60000000000000000000000; 1/80000000000000000000000; 1/100000000000000000000000; 1/150000000000000000000000; 1/200000000000000000000000; 1/300000000000000000000000; 1/400000000000000000000000; 1/600000000000000000000000; 1/800000000000000000000000; 1/1000000000000000000000000; 1/1500000000000000000000000; 1/2000000000000000000000000; 1/3000000000000000000000000; 1/4000000000000000000000000; 1/6000000000000000000000000; 1/8000000000000000000000000; 1/10000000000000000000000000; 1/15000000000000000000000000; 1/20000000000000000000000000; 1/30000000000000000000000000; 1/40000000000000000000000000; 1/60000000000000000000000000; 1/80000000000000000000000000; 1/100000000000000000000000000; 1/150000000000000000000000000; 1/200000000000000000000000000; 1/300000000000000000000000000; 1/400000000000000000000000000; 1/600000000000000000000000000; 1/800000000000000000000000000; 1/1000000000000000000000000000; 1/1500000000000000000000000000; 1/2000000000000000000000000000; 1/3000000000000000000000000000; 1/4000000000000000000000000000; 1/6000000000000000000000000000; 1/8000000000000000000000000000; 1/10000000000000000000000000000; 1/15000000000000000000000000000; 1/20000000000000000000000000000; 1/30000000000000000000000000000; 1/40000000000000000000000000000; 1/60000000000000000000000000000; 1/80000000000000000000000000000; 1/100000000000000000000000000000; 1/150000000000000000000000000000; 1/200000000000000000000000000000; 1/300000000000000000000000000000; 1/400000000000000000000000000000; 1/600000000000000000000000000000; 1/800000000000000000000000000000; 1/1000000000000000000000000000000; 1/1500000000000000000000000000000; 1/2000000000000000000000000000000; 1/3000000000000000000000000000000; 1/4000000000000000000000000000000; 1/6000000000000000000000000000000; 1/8000000000000000000000000000000; 1/10000000000000000000000000000000; 1/15000000000000000000000000000000; 1/20000000000000000000000000000000; 1/30000000000000000000000000000000; 1/40000000000000000000000000000000; 1/60000000000000000000000000000000; 1/80000000000000000000000000000000; 1/100000000000000000000000000000000; 1/150000000000000000000000000000000; 1/200000000000000000000000000000000; 1/300000000000000000000000000000000; 1/400000000000000000000000000000000; 1/600000000000000000000000000000000; 1/800000000000000000000000000000000; 1/1000000000000000000000000000000000; 1/1500000000000000000000000000000000; 1/2000000000000000000000000000000000; 1/3000000000000000000000000000000000; 1/4000000000000000000000000000000000; 1/6000000000000000000000000000000000; 1/8000000000000000000000000000000000; 1/10000000000000000000000000000000000; 1/15000000000000000000000000000000000; 1/20000000000000000000000000000000000; 1/30000000000000000000000000000000000; 1/40000000000000000000000000000000000; 1/60000000000000000000000000000000000; 1/80000000000000000000000000000000000; 1/100000000000000000000000000000000000; 1/150000000000000000000000000000000000; 1/200000000000000000000000000000000000; 1/300000000000000000000000000000000000; 1/400000000000000000000000000000000000; 1/600000000000000000000000000000000000; 1/800000000000000000000000000000000000; 1/1000000000000000000000000000000000000; 1/1500000000000000000000000000000000000; 1/2000000000000000000000000000000000000; 1/3000000000000000000000000000000000000; 1/4000000000000000000000000000000000000; 1/6000000000000000000000000000000000000; 1/8000000000000000000000000000000000000; 1/10000000000000000000000000000000000000; 1/15000000000000000000000000000000000000; 1/20000000000000000000000000000000000000; 1/30000000000000000000000000000000000000; 1/40000000000000000000000000000000000000; 1/60000000000000000000000000000000000000; 1/80000000000000000000000000000000000000; 1/100000000000000000000000000000000000000; 1/150000000000000000000000000000000000000; 1/200000000000000000000000000000000000000; 1/300000000000000000000000000000000000000; 1/400000000000000000000000000000000000000; 1/600000000000000000000000000000000000000; 1/800000000000000000000000000000000000000; 1/1000000000000000000000000000000000000000; 1/1500000000000000000000000000000000000000; 1/2000000000000000000000000000000000000000; 1/3000000000000000000000000000000000000000; 1/4000000000000000000000000000000000000000; 1/6000000000000000000000000000000000000000; 1/8000000000000000000000000000000000000000; 1/100; 1/15000000000000000000000000000000000000000; 1/200; 1/300; 1/400; 1/600; 1/800; 1/1000; 1/1500; 1/2000; 1/3000; 1/4000; 1/6000; 1/8000; 1/100; 1/15000; 1/200; 1/300; 1/400; 1/600; 1/800; 1/1000; 1/1500; 1/2000; 1/3000; 1/4000; 1/6000; 1/8000; 1/100; 1/15000; 1/200; 1/300; 1/400; 1/600; 1/800; 1/1000; 1/1500; 1/2000; 1/3000; 1/4000; 1/6000; 1/8000; 1/100; 1/15000; 1/200; 1/300; 1/400; 1/600; 1/800; 1/1000; 1/1500; 1/2000; 1/3000; 1/4000; 1/6000; 1/8000; 1/100; 1/15000; 1/200; 1/300; 1/400; 1/600; 1/800; 1/1000; 1/1500; 1/2000; 1/3000; 1/4000; 1/6000; 1/8000; 1/100; 1/15000; 1/200000000000

Wireless Supplies Unlimited

(founded 1925, originally Stratford, E.15.)

Still on the go, and STILL carrying the MOST COMPREHENSIVE STOCKS of Component Parts in the Industry!

Get all your requirements from one source, and experience SAME-DAY SERVICE!

Dependable American paper-dielectric Capacitors in metal (not cardboard) cases. Genuine SPRAGUE tubulars; not substitutes, not leaky reactors.			
.001 μ F.	1,000 v. D.C. wkg.	71d.	each
.002 "	1,000 v. "	"	"
.005 "	1,000 v. "	71d.	"
.01 "	1,000 v. "	9d.	"
.02 "	750 v. "	9d.	"
.1 "	350 v. "	101d.	"
.25 "	500 v. "	1/-	"
Genuine SOLAR Oil-Filled "Bath-tubs"			
.1 μ F.	1,000 v. D.C. wkg.	1/3	each
.25 "	400 v. "	9d.	"
Post 6d. up to six, 9d. up to twelve. Any quantity supplied, subject to stocks remaining available.			

WIRELESS SUPPLIES UNLIMITED

(Proprs. Unlimitex Radio Ltd.)
264-266, OLD CHRISTCHURCH RD., BOURNEMOUTH, HANTS.

Bournemouth 4567.
Grams: Limitrad, Dournemouth.



Don't scrap that failing car battery or radio cell! Try Renewbat conditioner. Works like a charm. Simple and safe to use. Full instructions. Car size 3/-. p.p. 6d.; Radio size 1/9.

CHAMPION PRODUCTS,
43, Uplands Way, London, N.21.
Phone: LA 9 4457

THE POCKET LOUDSPEAKER SET

Using our clear drawings and instructions you can build a midget loudspeaker receiver small enough to fit in the jacket pocket. This receiver is fully self-contained—no aerial, earth or external power supply being required. The midget batteries used are of the new laser type specially produced by a famous British maker for this class of receiver. Only one single-gang midget variable condenser is used for tuning, and the receiver requires no alignment. The midget components chosen are current British production, not surplus or foreign.

Instructions and Drawings, including Theoretical Circuit and Point-to-Point Wiring Diagram.

PRICE 3/6 POST FREE

This offer applies only to Gt. Britain, Irish Republic and Northern Ireland.

SWIFT RADIO

102, BATH RD., WILLSBRIDGE, Nr. BRISTOL.

Orders by post only.

FIRST-CLASS RADIO COURSES . .

GET A CERTIFICATE!

QUALIFY AT HOME—IN SPARE TIME

After brief, intensely interesting study—undertaken at home in your spare time—YOU can secure your professional qualification. Prepare for YOUR share in the post-war boom in Radio. Let us show you how!

FREE GUIDE

The New Free Guide contains 132 pages of information of the greatest importance to those seeking such success-compelling qualifications as A.M.Brit.I.R.E., City and Guilds Final Radio, P.M.G. Radio Amateurs, Exams., Gen. Cert. of Educ., London B.Sc. (Eng.), A.M.I.P.E., A.M.I.Mech.E., Draughtsmanship (all branches), etc., together with particulars of our remarkable Guarantee of

SUCCESS OR NO FEE

Write now for your copy of this invaluable publication. It may well prove to be the turning point in your career.

FOUNDED 1885—OVER 150,000 SUCCESSSES

NATIONAL INSTITUTE OF ENGINEERING

(Dept. 461), 148, HOLBORN, LONDON, E.C.1

ANNAKIN'S BARGAINS

Switch Magnetic Relay, 5c 723, 24 v. 16. Specially wired, 6d. yd., 4 - doz. Valve Screens, 6d., 4 mid 220 v. Electro. cont. 6d., 25 mid 250 v. cont. 3d. 1 meg. preset pots., 6d., 1.5 k Ω 2 k Ω pots. w.c. 1/-, Res. coils 1 k Ω , 1 k Ω or 67 k Ω (only unwind), 6d. each, 5 - doz. R.F. chokes, 2 or 1.5 mho. 1 - large flat 10A 8453, 3d. Tagbits, 5 tub. condens. 1/4 w. 12 v., 5 other res., 1s., 1/11 1/2 (15 v. post-alc.), 4 & 8 MFD. others, 3/6, 1/20 2/-. All above postage EXTRA. Free lists. Money back guarantee. C.W.O. only.

25, ASHFIELD PLACE, OTLEY, YORKS.

1954-5

CATALOGUE

JUST RELEASED

- ★ 60 PAGES
- ★ 2000 COMPONENT TYPES
- ★ 500 ILLUSTRATIONS

PRICE 1/-

COVENTRY RADIO

189, DUNSTABLE ROAD, LUTON

Tel: Luton 2677

COMPONENT SPECIALISTS SINCE 1925

LYONS RADIO LTD.

3, GOLDHAWK ROAD, Dept. M.T. SHEPHERDS BUSH, LONDON, W.12. Telephone - SHEPHERDS Bush 1728

L.T. TRANSFORMERS. Primary 200 250 v. 50 cps. mains. Secondary: 3, 4, 5, 6, 8, 9, 10, 12, 15, 18, 20, 24 or 30 volts for a total loading of 2 amps. Excellent for model railways, accumulator charging, experimental work, etc. Brand new and guaranteed. All connections clearly marked. PRICE ONLY 18/6, post 1/9.

R.F. UNITS TYPE 32. These converter units are similar to the better known type 24 or 25, but all three stages, Aerial, Oscillator and Mixer are tunable independently by means of variable condensers. Frequency range is 20-30 Mc/s. and three valves type VR65 are employed. PRICE 25/-. post 2/6.

VALVE SPECIALS. All as new and unused and guaranteed. OZ4, 6/-; VP23 6/6; 6L7, 7/6; 866A, 866A, 12/6; 6H6 metal, 3/6; CV138 (EF91/6A M6), 7/6; CV173 (EF55), 12/6; VR65A (SP41), 2/6 each, post 6d., or 3 for 6/- or 6 for 10/-.

REMOTE CONTROL UNITS TYPE 8. Consists of a nicely made wooden panel, 12 x 10 x 3/4 in., which looks like teak, to the right is a row of 7-4BA terminals mounted on a paxolin strip and to the left a heavy duty MORSE KEY. Air Min. TYPE "D." In condition as new. PRICE 10/6, post 2/6.

24 v. ACCUMULATORS. American made, as new and unused, 11 amp-hour capacity (at 5 hr. rate). Size 11 x 10 x 3 1/2 ins., with terminals projecting on one side. PRICE 39/6, carriage 6/-.

MORSE CODE Training

Send for the Candler

BOOK OF FACTS

It gives details of all Courses which include a Special one for securing amateur licence. CANDLER SYSTEM CO, Dept. 5LO 52b, Abingdon Road, London, W.8. Candler System Co., Denver, Colorado, U.S.A.

SPARKS' DATA SHEETS

SHORT WAVES

Two New Designs Now Ready

All-dry Battery operation. Simplified Band-Spread Tuning. Latest Eddystone Plug-in Coils down to 10 Metres. High-Efficiency Pentode Detector Circuit with Dual Control Reaction Circuit. Thoroughly Proved and Tested.

No. S.W.DX.1. Single Valver.
No. S.W.DX.2. Two-Valver. (Det., plus Pentode output).

SIMPLE CONSTRUCTION PLUS EFFICIENCY

Full-Size Simplified Data Sheet, showing every detail, plus Descriptive and Operational Instructions: 2/6 each, plus 21d. stamp

NEW MULLARD AMPLIFIER

Quality enthusiasts will welcome the new 10 watt A.C. 5-Valve Amplifier by Mullard, Ltd., and I am happy to announce that I am publishing my version of a Tested, Practical Layout, etc., in my usual Data Sheet Form. Design No. MS/LO 44. Price of Data Sheet with Descriptive matter, etc., etc., 3/6, post free. The frequency response of this circuit is truly exceptional.

MANY OTHER DESIGNS AVAILABLE

Send 21d. stamp for Latest List COMPONENTS AND DRILLED CHASSIS SUPPLIED

L. ORMOND SPARKS (P).

8, Court Road, Swanage, Dorset.

directly to 6C5 anode. However, the special mixer valve is preferable if to hand. In either Fig. 5 or Fig. 6 A.V.C. bias may be applied to the 6L7 as shown for the 6K8 in Fig. 1. The 6C5 coils, with related padders, as listed by the coil manufacturer, would be the same as with the 6K8 stage. A 6K7 is equally suitable, with S.G. wired to anode for triode operation.

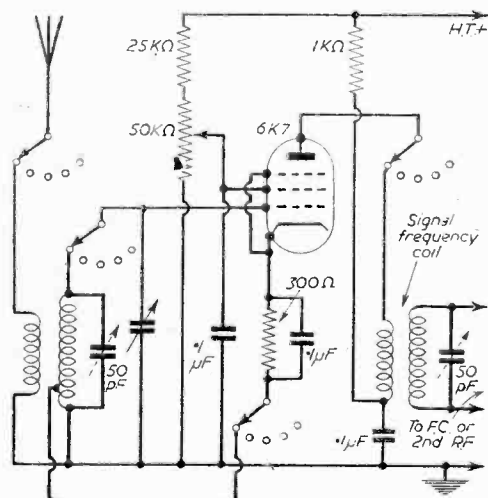


Fig. 7.—Regenerative preselector or R.F. stage.

For V.H.F. working a separate oscillator usually becomes essential, but is by no means necessary for all bands between about 15 and 2,000 metres. Such V.H.F. oscillators are not within the scope of the present circuits, and would use acorn or other V.H.F. valve types. There are numerous button-based and other mains type valves which will give excellent results in communications type receivers, but these are not shown in the present instance because the acorn types are particularly cheap and easy to obtain, and extremely robust. In this direction it is worth noting that these valves are obtainable also in G and GT types, this suffix denoting large and small glass envelopes. If space permits such types may be used, but screening cans will in most cases be required for them.

Regenerative R.F. Stage

In some circuits sensitivity may be increased by introducing regeneration of a controllable nature into the R.F. stage, and cathode coupling, as shown in Fig. 7, has various advantages. Here the 50 K-ohm potentiometer acts as regeneration control, allowing the stage to be brought right up to the point of oscillation on any frequency. Such an arrangement is primarily of advantage when the maximum possible efficiency is required from a limited number of valves, or when a single-valve pre-selector, in separate cabinet, is to be made up for inclusion between aerial and receiver.

The degree of cathode coupling will require to be rather smaller than in Fig. 5, so that the stage can reach a condition of quite high gain before oscillation commences. It is particularly convenient with home-wound coils, where a tapping may readily be provided.

In a single-band receiver without wavechange switch, such regeneration can be added with great ease.

Hum and Power Supplies

As any final circuit is likely to have a high degree of gain every care should be taken to keep hum down to the lowest possible limit, or weak signals may be lost. In this direction adequate smoothing of the rectifier output is essential, with individual decoupling

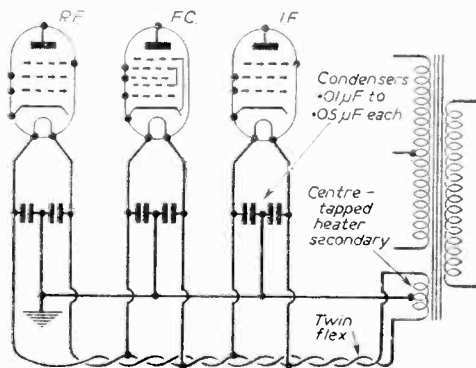


Fig. 8.—Heater connections for high-gain receiver.

of the earlier stages of the receiver. Full-wave rectification is best, with one or two smoothing chokes of adequate inductance and smoothing condensers of 16 to 32 mfd.

Leads carrying A.C. should be kept away from those in the grid and signal circuits, and no coil, by-pass condenser or other component should be connected to the same chassis earthing tag as is used for a heater or other A.C. circuit. Twin flex against the chassis is recommended for heater wiring, and by-pass condensers may be added, as shown in Fig. 8. If there is no centre-tap on the heater winding of the transformer two resistors of about 30Ω to 50Ω may be wired in series, their junction being used as a centre-tapping point.

With care in this direction hum may be kept to an insignificant level. If it *does* arise, and other components are above suspicion, a faulty valve should be suspected. In some circuits leakage of quite high value, arising between heater and cathode, can induce hum, which may be amplified by subsequent stages to a very troublesome level.

(To be continued.)

STANDARD TEXT BOOKS

By F. J. CAMM

PRACTICAL WIRELESS ENCYCLOPÆDIA, 21/-. by post 21/10. EVERYMAN'S WIRELESS BOOK, by post, 13/-. NEWNES RADIO ENGINEER'S POCKET BOOK, by post, 5/3. THE SUPERHET MANUAL, by post 6/4. RADIO TRAINING MANUAL, by post, 6/4. WIRELESS COILS, CHOKES AND TRANSFORMERS, by post, 6/4. REFRESHER COURSE IN MATHEMATICS, by post, 8/10. MATHEMATICAL TABLES AND FORMULAE, by post, 5/3. MASTERING MORSE, 1/-. by post, 1/3

Obtainable from
GEORGE NEWNES, LTD.,
Tower House, Southampton Street, Strand, W.C.2.

ALPHA FOR VALVES

We may have the type you require—Drop us a line—Reply by return post.

VALVES GUARANTEED NEW AND BOXED

LOCTALS. 7H7, 7C5, 7C6, 7H7, 7Y4, 7S7, 7Q7, AH 8 6 ea.

ETG BATTERY MIDGETS. 1R5, 1T4, 1S4, 1S5, AH 7 6 ea. 3R4, 3Q4, 3V4, AH 8 6 ea.

BATTERY OCTALS. 1A0T, 1N0T, 1H3GT, 3Q3GT, AH 10 6 ea. 1F5GT (DL35), 8 6 ea.

MISCELLANEOUS. 074, 6-1, 2X2, 5-1, 401, 2-9, 954, 2-1, 955, 4-9, 956, 3-8, 9001, 8-1, 9002, 6-1, 9003, 8-1, 9004, 6-1, EK32, 8-1, VR150, 30, 9-1, VR105, 30, 9-1, A76 PEN, 5-6, EL148, 2-1, EF36, 6-6, H30, 8-1, K73, 5-1, PX25, 15-1, MS PEN, 6-1, PEN25, 8-1, VP23, 5-6, PEN46, 8-6, PEN200A, 4-9, QP22B, 7-6, U22, 8-1, U25, 15-1, EF39, 6-6, RB33, 7-6, SP61, 3-9, SP41, 3-6, EF50, 6-1, EF50 (SYD), 8-1, EF54, 7-1, EC52, 5-9, V111, 3-6, VL120A, 3-6, X65, 10-1.

B9A RANGE. PL81, 13-6, PL82, 11-6, PY80, 10-6, EBF80, 11-6, 6R80, 11-6, E2180, 11-6, YF81, 10-6, PY82, 10-6.

MAINS MINIATURES. 6A15, 7-1, 6A55, 9-1, 6A66, 7-6, 6A76, 9-1, 6R66, 9-1, 6R4, 8-1, 906, 9-1, 12A7T, 9-1, 12A7U, 9-1, 12A7X, 9-1, R12 (BY51), 13-6.

MAINS OCTALS. 6U46, 8-6, 6Z46, 8-6, 6A6, 9-6, 6F86, 7-6, 6H8GT, 4-1, 6U5GT, 5-6, 6J76, 6-6, 6K76, 6-1, 6R81, 8-9, 6L81, 9-1, 6L7, 7-6, 6L17GT, 8-1, 6R87, 9-1, 6U51, 8-6, 6X56V, 7-6.

B8A RANGE. ECH32, 10-6, EF41, 10-1, EF42, 10-8, EAF42, 11-6, EB41, 10-1, EB41, 11-1, EL41, 10-6, EL42, 11-6, EZ40, 10-6, EZ41, 10-6, UAF42, 11-6, U44, 10-1, U44, 11-1.

RECTIFIERS. VU64 (U14), 8-6, VU39 (MU14), 8-6, VU820 (PW4), 500, 9-9, 35ZGT, 8-6.

UX RANGE. 6A7, 9-6, 75, 10-1, 616, 7-3, 64 6 6, 42, 9-1, 80, 8-6.

B7G RANGE. EF91, 7-6, EF92, 8-6, EB91, 7-1, EL90, 9-1, EL91, 9-1, EY91, 9-1.

12A6, 6-9, 12C8, 8-1, 12K7, 9-1, 12Q7, 9-1, 12K8, 9-1, 12R67, 5-6, 12R47, 5-1, 12R37, 7-6, 12R87, 6-6, 12R97, 8-6, 25A6G, 9-1, 25L6GT, 8-6, 35Z4, 9-1, 35Z6, 8-6, 35L6GT, 8-6, 35Z4, 8-6, 50L6GT, 8-6, 10L11, 11-1, 11S3, 11-1, EF55, 10-1.

Wire Ended Types
8 mfd. 40v. cardboard cover-1 1/11
30 mfd. 450 v. ... 3/8

Bias Condensers
Tag ended metal types.
12 mfd. 50 v. ... 1/-
25 mfd. 25 v. ... 1/3
50 mfd. 12 v. ... 1/-
50 mfd. 50 v. ... 2/6
100 mfd. 12 v. ... 1/0
100 mfd. 25 v. ... 1/0

Wire Ended Types Cardboard Covered
25 mfd. 25 v. ... 1/8
50 mfd. 12 v. ... 1/9
100 mfd. 50 v. ... 2/3

LOUDSPEAKER CABINETS



Available for 6in. and 8in. Speaker units. Polished walnut finish. A very attractive cabinet at quarter of 10-days prices.
Price: 6in. Type Cabinet, 15/6 each. Price: 8in. Type Cabinet, 19/6 each. See page 598 under loudspeakers for suitable speaker units.

"AEROVOX" Condenser Clips, 1d each.

HIGH VOLTAGE CONDENSER. 30 mfd. 5 kv. D.C. working.

JUNCTION BOXES. Type 5X 2344, 20-2w.

PUSH BACK WIRE. Size 7/012. Available in colours, blue, green, red. Price 21d. yard.

RECORDING TAPE. 1,200ft. Wound on a "Cylon" reel, 18/6 each.

NEEDLE CLIPS. 1d. each.

"WHANDA" Wire and Cable Stripper. To strip cable of diameters 1/16, 1/8, 1/4, ideal for coaxial cable, 5/- each.

NYLON BRAIDED DRIVE CORD. 25 yds. reels, 1/9 each.

AMERICAN RELAY. 451 Input-amps with leads No. AZ0545. Price 1/9 each.

IRON LEADS. Black and white flat iron leads, bonded ends, 1/3 each.

POTENTIOMETER PANEL. 4 Potentiometers on panel, 50 k. S.P.S.: 750 W/W; 25 k. carbon; 5 k. W/W. All with long spindle, with leads of different colours terminating in an 11-pin plug. Price 7/6 each.

SLEEVING. 4 mm. Permafoil insulation, 4d. yd. Varnished cotton, 1 mm. yellow only, 11d. yd. 1 mm. sleeving, various colours 1d. yd. Repeat this has to be our choice of colours at this special price.

FOR BUILDING—T.R.F. OR SUPERHER. THIS IS THE MOST POPULAR CABINET ON SALE TO-DAY



Complete with drilled chassis, dial, bak plate, pointer, dial drive and drum, etc. Price 27/6. Post 2/-.



THE ALPHA AMPLIFIER

3 valves (6H84, 6V6GT, 6X4GT) A.C. mains fully insulated, neat, feel back (input and current), controlled volume and tone, dust input net work, for modern crystal or Hi-Fi, magna. Loss than 1 per cent. total 2nd and 3rd harmonic distortion at 3 watts output from 1,000 C.P.S. Complete ready for use, 79/6. Post extra.

HEADPHONES

Type CLR. Low resistance 120Ω, 7/6 pair.
Type CHR. High resistance 4,000Ω, 11/- pair.
Type DHR. a super job, 13-9 pair. Headbands, wide type, 1-9 each.
Headbands, by Trimm Radio Mfg. Co., Chicago, U.S.A. 1,200Ω each earpiece, light headband complete with lead and Irganic jack plug, 13/6 pair.

SPECIAL PURCHASE

Volume controls with switch. All 2/- each
Single Pole switch: 20kΩ, 100kΩ, 1 megΩ, 1 megΩ, 1 megΩ.
Double pole switch: 50kΩ, 1 megΩ. All by well known makers. Suitable for TV, etc.

BUY NOW WHILE STOCKS LAST.

HYDROMETER by Exide (Canada), complete in wood case, 7/6 each.
BELL TRANSFORMER "CONCORDIA." 3 v., 5 v., 8 v., 1 amp fused. In bakelite case, 8/6 each.

TERMS: Cash with order or C.O.D. Postage and Packing charges extra, as follows: Orders value 10/- add 9d.; 20/- add 1/-; 40/- add 1/6; 25/- add 2/- unless otherwise stated. Minimum C.O.D. fee and postage 2/6.

MAIL ORDER ONLY

ENGRAVED KNOBS

Control knobs, clearly engraved in gold. Size "A" diameter 1 1/2 in. Size "B" diameter 1 in. Both in two colours, Walnut or Cream. Inscriptions available.

RADIO: "Volume," "Vol./On/Off," "Wavechange," "On/Off," "Tuning," "S.M.L. Gram," "Radio-gram," "Tone."

TELEVISION: "Contrast," "Brightness On/Off," "Focus," "Brightness."

AMPLIFIER: "Treble," "Bass" (Plus any above).

TAPE RECORDER: Record Play. Prices: Size "A," 1/6; "B," 1/2. Plain knobs can be supplied in either size, 1/- each and 8d. each respectively.

MAINS TRANSFORMERS 3-way Mounting Type

MT1. Primary 9-210-230-250 v. Secondary 250-0-250 v., 80 mA., 6.3 v., 4 amps., 5 v., 2 amps., with taps at 4 v., on filament winding. Price 17/6 each.

MT2. Primary 9-210-230-250 v. Secondary 250-0-250 v., 80 mA., 6.3 v., 4 amps., 5 v., 2 amps. Both filament windings tapped 4 v. Price 17/6 each.

MT3. 30 volt 2 amp. (tappings as follows: 3, 4, 5, 6, 8, 9, 10, 12, 15, 18, 20, 24 v. 17/6 each.

CONDENSERS

The following is a selection from our stocks of manufacturers' surplus condensers all by well-known makers. DUBHELE, B.I., BEC (EDISWAN), SPRAGUE, etc.

Aluminium Can Types, Clip Fixing	Capacitance	Price
8 x 8 mfd. 450 v.	...	4/-
8 x 16 mfd. 450 v.	...	4/-
8 x 24 mfd. 250 v.	...	3/-
8 x 32 mfd. 475 v.	...	3/9
12 x 4 mfd. 450 v.	...	2/-
16 mfd. 450 v.	...	2/6
16 x 8 mfd. 250 v.	...	4/-
16 x 16 mfd. 350 v.	...	3/3
20 x 20 mfd. 500 v.	...	4/9
20 x 24 mfd. 500 v.	...	2/9
25 x 16 mfd. 350 v.	...	3/6
32 x 8 mfd. 350 v.	...	3/6
32 x 16 mfd. 350 v.	...	4/6
32 x 32 mfd. 450 v.	...	6/11
32 x 32 x 8 m.A. 350 v.	...	5/6
32 x 32 mfd. 350 v. 25 mA. 25 v.	...	5/9
64 mfd. 350 v.	...	2/-

B.R. Range	Price
B.R.850 5mfd. 500 v.	2/9 ea.
B.R.1650 10 mfd. 500 v.	3/3 ea.
B.R.2050 20 mfd. 500 v.	3/6 ea.
B.R.3050 30 mfd. 500 v.	4/- ea.
B.R.501 50 mfd. 12 v.	1/9 ea.

Midget Metal Types	Price
2 mfd. 350 v.	1/9
8 mfd. 350 v.	1/1
8 x 8 mfd. 350 v.	3/1
8 x 8 mfd. 450 v.	4/-
16 mfd. 350 v.	2/9
16 x 8 mfd. 450 v.	4/-
16 x 16 mfd. 450 v.	4/6
16 x 24 mfd. 350 v.	4/9
24 mfd. 350 v.	2/9
32 mfd. 350 v.	4/9
32 x 32 mfd. 350 v.	4/9
250 mfd. 12 v.	1/9

RECEIVER 1132A
Contains EK32; 4 EF39; 6H6; 6J5; 3 SP61; P41 in good condition. Fitted with tuning meter. Slow-motion drive calibrated dial complete with circuit diagram. 49/6 each. Carriage and packing, 7/6.

ALPHA RADIO SUPPLY CO.

5/6 VINCES CHAMBERS, VICTORIA SQUARE, LEEDS 1.

CYLDON 5-CHANNEL TV. PIE-TUNER VALVES: 6BW7 and 12A77. Fit one of these to your set for better pictures, 52/6. Less valves, 15/-.

SPECIAL OFFER. New and boxed ARP12 VP23 valves, 5/6 each, 4 for 21.

TYPE 6 "SCOPE" UNIT with VCR 138 31in. C.R. Tube, etc., and Conversion Circuit. 58/6.

FISHING ROD AERIALS. 12in., Set 3, 7/6. Mounting Base, 3/6.

0.5 AMP METERS. 2 1/2in. square M.c., 11/-.

GERMANIUM DIODES. 3/9.

P.M. SPEAKERS. 8in. 20 - 5in., 14/6; 6in., 16/6; 10in., 27/6. Leading makes.

SELENIUM RECTIFIERS. F.W. 6 or 12 v. 4A, 22/6; 6A, 30/-; 3A, 14/6; 100 mA, 3/6; 1A, 8/6; 2A, 2A, 30/-; 250V, 100 mA, H.W., 9/-; 250V, 275 mA., 17/-; 250V, 600mA 6/6.

TRANSFORMERS. 200-240 volts, tapped 3-4.5-6-8-9-10-12-15-18-20-24 and 30 volts at 2 A. 21/6. Tapped 17-11-5 volt 5 A., 22/6; Tapped 17-11-5 V. 1 A., 16/6; 6.3V., 21 A., 8/6. One year guarantee.

CR. MICROPHONES AND TRANSFORMERS. 15/6.

EX-W.D. PHONES. Low Resistance. 9/6.

MINIATURE VALVES. New 9001, 9002, 9003, 7/6; 6AG5, 184, 185, 174, 1R5, 10/6; 6AL5, 8/6; 12A77, 6AM6, DH77, 6AT6, EF91, NF22, EY31, 6BE6, 11/6.

NEW VALVES. 35Z4, 35Z5, 25Z4, 25L6, U2B1, U50, 5Y3GT, 6K7GT, 6V6GT, 50L6, 42, 80, 11/6; 6K8GT, 11/25, 12/6.

NEW 0-100 MICRO-AMP. METERS, 41in. Flush Mounting. Made by Ernest Turner, £3/2 6.

TR.1196. Transmitter Section. New and complete. 4.6/3 Mc.s. Easily converted. Less valves, 15/-; with valves, £2.

Throat Microphones with cord, 4/-.

ALL POST PAID IN U.K.

THE RADIO & ELECTRICAL MART 253b, Portobello Road, London, W.11. Phone: Park 6026.

CONDENSER CLEARANCE!!

All new goods. (Types at same prices may be mixed to make up dozens.)

MICA 10, 15, 20, 30, 50, 70, 75, 120, 150, 200, 250, 1,200 p.f., 3 1/2 doz., 14/25; type 1, 400, 450, 500, 550, 600 p.f., 2 1/2 doz., 10/25; type 2, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 150, 200, 250, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 900, 1,000, 1,200, 1,500, 2,000, 2,500, 3,000, 3,500, 4,000, 4,500, 5,000, 5,500, 6,000, 6,500, 7,000, 7,500, 8,000, 8,500, 9,000, 9,500, 10,000, 10,500, 11,000, 11,500, 12,000, 12,500, 13,000, 13,500, 14,000, 14,500, 15,000, 15,500, 16,000, 16,500, 17,000, 17,500, 18,000, 18,500, 19,000, 19,500, 20,000, 20,500, 21,000, 21,500, 22,000, 22,500, 23,000, 23,500, 24,000, 24,500, 25,000, 25,500, 26,000, 26,500, 27,000, 27,500, 28,000, 28,500, 29,000, 29,500, 30,000, 30,500, 31,000, 31,500, 32,000, 32,500, 33,000, 33,500, 34,000, 34,500, 35,000, 35,500, 36,000, 36,500, 37,000, 37,500, 38,000, 38,500, 39,000, 39,500, 40,000, 40,500, 41,000, 41,500, 42,000, 42,500, 43,000, 43,500, 44,000, 44,500, 45,000, 45,500, 46,000, 46,500, 47,000, 47,500, 48,000, 48,500, 49,000, 49,500, 50,000, 50,500, 51,000, 51,500, 52,000, 52,500, 53,000, 53,500, 54,000, 54,500, 55,000, 55,500, 56,000, 56,500, 57,000, 57,500, 58,000, 58,500, 59,000, 59,500, 60,000, 60,500, 61,000, 61,500, 62,000, 62,500, 63,000, 63,500, 64,000, 64,500, 65,000, 65,500, 66,000, 66,500, 67,000, 67,500, 68,000, 68,500, 69,000, 69,500, 70,000, 70,500, 71,000, 71,500, 72,000, 72,500, 73,000, 73,500, 74,000, 74,500, 75,000, 75,500, 76,000, 76,500, 77,000, 77,500, 78,000, 78,500, 79,000, 79,500, 80,000, 80,500, 81,000, 81,500, 82,000, 82,500, 83,000, 83,500, 84,000, 84,500, 85,000, 85,500, 86,000, 86,500, 87,000, 87,500, 88,000, 88,500, 89,000, 89,500, 90,000, 90,500, 91,000, 91,500, 92,000, 92,500, 93,000, 93,500, 94,000, 94,500, 95,000, 95,500, 96,000, 96,500, 97,000, 97,500, 98,000, 98,500, 99,000, 99,500, 100,000, 100,500, 101,000, 101,500, 102,000, 102,500, 103,000, 103,500, 104,000, 104,500, 105,000, 105,500, 106,000, 106,500, 107,000, 107,500, 108,000, 108,500, 109,000, 109,500, 110,000, 110,500, 111,000, 111,500, 112,000, 112,500, 113,000, 113,500, 114,000, 114,500, 115,000, 115,500, 116,000, 116,500, 117,000, 117,500, 118,000, 118,500, 119,000, 119,500, 120,000, 120,500, 121,000, 121,500, 122,000, 122,500, 123,000, 123,500, 124,000, 124,500, 125,000, 125,500, 126,000, 126,500, 127,000, 127,500, 128,000, 128,500, 129,000, 129,500, 130,000, 130,500, 131,000, 131,500, 132,000, 132,500, 133,000, 133,500, 134,000, 134,500, 135,000, 135,500, 136,000, 136,500, 137,000, 137,500, 138,000, 138,500, 139,000, 139,500, 140,000, 140,500, 141,000, 141,500, 142,000, 142,500, 143,000, 143,500, 144,000, 144,500, 145,000, 145,500, 146,000, 146,500, 147,000, 147,500, 148,000, 148,500, 149,000, 149,500, 150,000, 150,500, 151,000, 151,500, 152,000, 152,500, 153,000, 153,500, 154,000, 154,500, 155,000, 155,500, 156,000, 156,500, 157,000, 157,500, 158,000, 158,500, 159,000, 159,500, 160,000, 160,500, 161,000, 161,500, 162,000, 162,500, 163,000, 163,500, 164,000, 164,500, 165,000, 165,500, 166,000, 166,500, 167,000, 167,500, 168,000, 168,500, 169,000, 169,500, 170,000, 170,500, 171,000, 171,500, 172,000, 172,500, 173,000, 173,500, 174,000, 174,500, 175,000, 175,500, 176,000, 176,500, 177,000, 177,500, 178,000, 178,500, 179,000, 179,500, 180,000, 180,500, 181,000, 181,500, 182,000, 182,500, 183,000, 183,500, 184,000, 184,500, 185,000, 185,500, 186,000, 186,500, 187,000, 187,500, 188,000, 188,500, 189,000, 189,500, 190,000, 190,500, 191,000, 191,500, 192,000, 192,500, 193,000, 193,500, 194,000, 194,500, 195,000, 195,500, 196,000, 196,500, 197,000, 197,500, 198,000, 198,500, 199,000, 199,500, 200,000, 200,500, 201,000, 201,500, 202,000, 202,500, 203,000, 203,500, 204,000, 204,500, 205,000, 205,500, 206,000, 206,500, 207,000, 207,500, 208,000, 208,500, 209,000, 209,500, 210,000, 210,500, 211,000, 211,500, 212,000, 212,500, 213,000, 213,500, 214,000, 214,500, 215,000, 215,500, 216,000, 216,500, 217,000, 217,500, 218,000, 218,500, 219,000, 219,500, 220,000, 220,500, 221,000, 221,500, 222,000, 222,500, 223,000, 223,500, 224,000, 224,500, 225,000, 225,500, 226,000, 226,500, 227,000, 227,500, 228,000, 228,500, 229,000, 229,500, 230,000, 230,500, 231,000, 231,500, 232,000, 232,500, 233,000, 233,500, 234,000, 234,500, 235,000, 235,500, 236,000, 236,500, 237,000, 237,500, 238,000, 238,500, 239,000, 239,500, 240,000, 240,500, 241,000, 241,500, 242,000, 242,500, 243,000, 243,500, 244,000, 244,500, 245,000, 245,500, 246,000, 246,500, 247,000, 247,500, 248,000, 248,500, 249,000, 249,500, 250,000, 250,500, 251,000, 251,500, 252,000, 252,500, 253,000, 253,500, 254,000, 254,500, 255,000, 255,500, 256,000, 256,500, 257,000, 257,500, 258,000, 258,500, 259,000, 259,500, 260,000, 260,500, 261,000, 261,500, 262,000, 262,500, 263,000, 263,500, 264,000, 264,500, 265,000, 265,500, 266,000, 266,500, 267,000, 267,500, 268,000, 268,500, 269,000, 269,500, 270,000, 270,500, 271,000, 271,500, 272,000, 272,500, 273,000, 273,500, 274,000, 274,500, 275,000, 275,500, 276,000, 276,500, 277,000, 277,500, 278,000, 278,500, 279,000, 279,500, 280,000, 280,500, 281,000, 281,500, 282,000, 282,500, 283,000, 283,500, 284,000, 284,500, 285,000, 285,500, 286,000, 286,500, 287,000, 287,500, 288,000, 288,500, 289,000, 289,500, 290,000, 290,500, 291,000, 291,500, 292,000, 292,500, 293,000, 293,500, 294,000, 294,500, 295,000, 295,500, 296,000, 296,500, 297,000, 297,500, 298,000, 298,500, 299,000, 299,500, 300,000, 300,500, 301,000, 301,500, 302,000, 302,500, 303,000, 303,500, 304,000, 304,500, 305,000, 305,500, 306,000, 306,500, 307,000, 307,500, 308,000, 308,500, 309,000, 309,500, 310,000, 310,500, 311,000, 311,500, 312,000, 312,500, 313,000, 313,500, 314,000, 314,500, 315,000, 315,500, 316,000, 316,500, 317,000, 317,500, 318,000, 318,500, 319,000, 319,500, 320,000, 320,500, 321,000, 321,500, 322,000, 322,500, 323,000, 323,500, 324,000, 324,500, 325,000, 325,500, 326,000, 326,500, 327,000, 327,500, 328,000, 328,500, 329,000, 329,500, 330,000, 330,500, 331,000, 331,500, 332,000, 332,500, 333,000, 333,500, 334,000, 334,500, 335,000, 335,500, 336,000, 336,500, 337,000, 337,500, 338,000, 338,500, 339,000, 339,500, 340,000, 340,500, 341,000, 341,500, 342,000, 342,500, 343,000, 343,500, 344,000, 344,500, 345,000, 345,500, 346,000, 346,500, 347,000, 347,500, 348,000, 348,500, 349,000, 349,500, 350,000, 350,500, 351,000, 351,500, 352,000, 352,500, 353,000, 353,500, 354,000, 354,500, 355,000, 355,500, 356,000, 356,500, 357,000, 357,500, 358,000, 358,500, 359,000, 359,500, 360,000, 360,500, 361,000, 361,500, 362,000, 362,500, 363,000, 363,500, 364,000, 364,500, 365,000, 365,500, 366,000, 366,500, 367,000, 367,500, 368,000, 368,500, 369,000, 369,500, 370,000, 370,500, 371,000, 371,500, 372,000, 372,500, 373,000, 373,500, 374,000, 374,500, 375,000, 375,500, 376,000, 376,500, 377,000, 377,500, 378,000, 378,500, 379,000, 379,500, 380,000, 380,500, 381,000, 381,500, 382,000, 382,500, 383,000, 383,500, 384,000, 384,500, 385,000, 385,500, 386,000, 386,500, 387,000, 387,500, 388,000, 388,500, 389,000, 389,500, 390,000, 390,500, 391,000, 391,500, 392,000, 392,500, 393,000, 393,500, 394,000, 394,500, 395,000, 395,500, 396,000, 396,500, 397,000, 397,500, 398,000, 398,500, 399,000, 399,500, 400,000, 400,500, 401,000, 401,500, 402,000, 402,500, 403,000, 403,500, 404,000, 404,500, 405,000, 405,500, 406,000, 406,500, 407,000, 407,500, 408,000, 408,500, 409,000, 409,500, 410,000, 410,500, 411,000, 411,500, 412,000, 412,500, 413,000, 413,500, 414,000, 414,500, 415,000, 415,500, 416,000, 416,500, 417,000, 417,500, 418,000, 418,500, 419,000, 419,500, 420,000, 420,500, 421,000, 421,500, 422,000, 422,500, 423,000, 423,500, 424,000, 424,500, 425,000, 425,500, 426,000, 426,500, 427,000, 427,500, 428,000, 428,500, 429,000, 429,500, 430,000, 430,500, 431,000, 431,500, 432,000, 432,500, 433,000, 433,500, 434,000, 434,500, 435,000, 435,500, 436,000, 436,500, 437,000, 437,500, 438,000, 438,500, 439,000, 439,500, 440,000, 440,500, 441,000, 441,500, 442,000, 442,500, 443,000, 443,500, 444,000, 444,500, 445,000, 445,500, 446,000, 446,500, 447,000, 447,500, 448,000, 448,500, 449,000, 449,500, 450,000, 450,500, 451,000, 451,500, 452,000, 452,500, 453,000, 453,500, 454,000, 454,500, 455,000, 455,500, 456,000, 456,500, 457,000, 457,500, 458,000, 458,500, 459,000, 459,500, 460,000, 460,500, 461,000, 461,500, 462,000, 462,500, 463,000, 463,500, 464,000, 464,500, 465,000, 465,500, 466,000, 466,500, 467,000, 467,500, 468,000, 468,500, 469,000, 469,500, 470,000, 470,500, 471,000, 471,500, 472,000, 472,500, 473,000, 473,500, 474,000, 474,500, 475,000, 475,500, 476,000, 476,500, 477,000, 477,500, 478,000, 478,500, 479,000, 479,500, 480,000, 480,500, 481,000, 481,500, 482,000, 482,500, 483,000, 483,500, 484,000, 484,500, 485,000, 485,500, 486,000, 486,500, 487,000, 487,500, 488,000, 488,500, 489,000, 489,500, 490,000, 490,500, 491,000, 491,500, 492,000, 492,500, 493,000, 493,500, 494,000, 494,500, 495,000, 495,500, 496,000, 496,500, 497,000, 497,500, 498,000, 498,500, 499,000, 499,500, 500,000, 500,500, 501,000, 501,500, 502,000, 502,500, 503,000, 503,500, 504,000, 504,500, 505,000, 505,500, 506,000, 506,500, 507,000, 507,500, 508,000, 508,500, 509,000, 509,500, 510,000, 510,500, 511,000, 511,500, 512,000, 512,500, 513,000, 513,500, 514,000, 514,500, 515,000, 515,500, 516,000, 516,500, 517,000, 517,500, 518,000, 518,500, 519,000, 519,500, 520,000, 520,500, 521,000, 521,500, 522,000, 522,500, 523,000, 523,500, 524,000, 524,500, 525,000, 525,500, 526,000, 526,500, 527,000, 527,500, 528,000, 528,500, 529,000, 529,500, 530,000, 530,500, 531,000, 531,500, 532,000, 532,500, 533,000, 533,500, 534,000, 534,500, 535,000, 535,500, 536,000, 536,500, 537,000, 537,500, 538,000, 538,500, 539,000, 539,500, 540,000, 540,500, 541,000, 541,500, 542,000, 542,500, 543,000, 543,500, 544,000, 544,500, 545,000, 545,500, 546,000, 546,500, 547,000, 547,500, 548,000, 548,500, 549,000, 549,500, 550,000, 550,500, 551,000, 551,500, 552,000, 552,500, 553,000, 553,500, 554,000, 554,500, 555,000, 555,500, 556,000, 556,500, 557,000, 557,500, 558,000, 558,500, 559,000, 559,500, 560,000, 560,500, 561,000, 561,500, 562,000, 562,500, 563,000, 563,500, 564,000, 564,500, 565,000, 565,500, 566,000, 566,500, 567,000, 567,500, 568,000, 568,500, 569,000, 569,500, 570,000, 570,500, 571,000, 571,500, 572,000, 572,500, 573,000, 573,500, 574,000, 574,500, 575,000, 575,500, 576,000, 576,500, 577,000, 577,500, 578,000, 578,500, 579,000, 579,500, 580,000, 580,500, 581,000, 581,500, 582,000, 582,500, 583,000, 583,500, 584,000, 584,500, 585,000, 585,500, 586,000, 586,500, 587,000, 587,500, 588,000, 588,500, 589,000, 589,500, 590,000, 590,500, 591,000, 591,500, 592,000, 592,500, 593,000, 593,500, 59

Open to Discussion



Re T.V.I

SIR,—It would appear from your correspondents that nobody ever takes the trouble to read the conditions of the schedule on the back of a receiving licence.

Para 3 of the Sound Licence and Para 4 of the TV Licence state:

“The apparatus shall be so maintained that it does not cause interference with any other wireless telegraphy.”

Surely this applies equally to interference from the time bases of a TV set as it does to the radiations of an oscillating receiver, and the last four words of the paragraph applies as much to amateur reception as to the reception of broadcasting.

If the terms of this paragraph are enforced, then the owner of an offending TV set can be made to switch off until the interference is suppressed.

If the Post Office fail in their duty to enforce their own terms for granting a licence, then I see no reason at this point why legal action cannot be taken and an injunction be obtained to restrict the use of the offending set until such times as the set is made interference free.

Perhaps some of your legal minded readers would like to take the matter up.—**JOHN W. ROBINSON** (G5UP via Carnforth).

Super-regen Experiments

SIR,—I thought that PRACTICAL WIRELESS readers might be interested to hear of my experiences with super-regenerative receivers. This type of receiver, now long past its prime, possesses extraordinary sensitivity. Selectivity is low but may be appreciably increased by the use of regenerative R.F. stage preceding the detector. These receivers are mistakenly supposed to be useful only at V.H.F. This is not so, as I have in my possession a receiver, working on this principle, comprising super-regenerative detector and L.F. stage which brings in numerous amateurs on the 160 metre band, as well as picking up ship-to-shore telephony and various commercial communications stations. The main snag in connection with these receivers is that only a very low value tuning capacitor is permissible—a high L/C ratio is essential for satisfactory performance. This could presumably be overcome by the use of a variable inductance as a bandset control; the final tuning (bandspread) being done within the limits of the capacitor. Although both gain and signal/noise ratio are lower at the low frequency regions, I have had amazing results from my own receiver operating on a 3ft. aerial. I consider

these little sets the answer to the poor man's problem in connection with expensive and complicated communications receivers.—**H. RIDDLE** (Maidstone).

The Coronet Battery 4

SIR,—I have taken your PRACTICAL WIRELESS and PRACTICAL TELEVISION magazines for the last three years and have built several of your battery sets, as we are on 110 D.C. on the ship. I built your Coronet Battery 4 when I was last at home. I have taken it with me up to the Persian Gulf and now down to here. It has been excellent in every way. I had the Home programme and the Light all through the Mediterranean and once at Abadan.—**A. S. BASHFORD** (Capetown, S. Africa).

Modern Reflex Receiver

SIR,—Since you published the above circuit of mine I have had complaints from some of your readers who have constructed this receiver. The trouble appears to be that they can receive the Home programme perfectly at good volume but instability is encountered when attempts are made to tune in the Light. This fault was not apparent in the original receiver but there are two simple modifications which can be made which should clear up any trouble experienced in this respect. It is suggested that the components be added in order till the trouble is removed.

(a) Connect 1,000 pF mica condenser directly between the triode anode and chassis.

(b) Connect $\frac{1}{2}$ meg. $\frac{1}{2}$ watt resistor between pentode control grid (g1) and chassis.

(c) Adjust trimmers with volume control full up on the Light programme for greatest volume consistent with stability.

The addition of (b) will probably cause a slight drop in volume but this should not be serious as the receiver has plenty in hand.

A point to watch when wiring the set is that the triode grid leak resistor (390 k Ω) goes to the cathode of the valve and *not* to chassis as is usually done with this type of detector. This mistake usually shows itself by very poor volume and oscillations. It is also good practice with T.R.F. receivers of this type to mount the aerial coil vertically above the chassis and the R.F. coil horizontally below the chassis. This will make stray coupling between the coils negligible.

I may add that the original receiver is still working perfectly and experiments are proceeding with a superhet version.

Hoping these notes will be of some help to those of your readers having trouble with this receiver.—**C. M. STEWART** (Glasgow S4).

Whilst we are always pleased to assist readers with their technical difficulties, we regret that we are unable to supply diagrams or provide instructions for modifying surplus equipment. We cannot supply alternative details for receivers described in these pages. WE CANNOT UNDERTAKE TO ANSWER QUERIES OVER THE TELEPHONE. If a postal reply is required a stamped and addressed envelope must be enclosed with the coupon from page iii of cover.

SIR,—I would like to thank your contributor C. M. Stewart for his "Modern Reflex Receiver," which solved my problem of a birthday present for our excellent German cook! I am a "superhet" man, but the results astonish me. May I offer a warning and a suggestion. This set is dangerous if no isolating series condenser is placed in the lead to the aerial: something around 500 pF makes it safe and selective. The suggestion is to use the energising winding of a mains energised speaker to save space on the chassis where the choke would go.—RICHARD PAGE (B.A.O.R.5.).

Modifying R1132A

SIR,—With regard to the query as to 144 Mc/s reception with R1132A, made by F. J. Walker, the following modification I carried out (based on an article by S. T. Smith (G3BS1) in a 1949 R.S.G.B.) may be of some help.

Remove the coils and rewind as follows: Aerial coil—2 turns, $\frac{3}{4}$ in. inside diameter, $\frac{1}{4}$ in. long. Frequency changer coil—the same as above. R.F. anode coil—1 $\frac{1}{4}$ turns, $\frac{3}{4}$ in. inside diameter. Oscillator—2 turns $\frac{3}{4}$ in. inside diameter, $\frac{1}{4}$ in. long.

Solder on to original columns, keeping ends of oscillator and anode R.F. coils (which are small for the gap between the pillars) as short as possible.

(When tracking, open or close the R.F. and oscillator coils for maximum performance.) If the frequency changer grid coil will not respond to 144 Mc/s, then remove the 5 μ F ceramic condenser (C16 on circuit) which is connected across this coil.

A spacing of $\frac{1}{64}$ in. in R.F. and F.C. coupling will give maximum gain with little loss of second channel rejection. By removing an outside rotor-vane from each section of the tuning condenser (the nearest to the front panel in the oscillator section) a simple bandspread is obtained.

(Note.—The vanes must *not* be unsoldered, but removed, using a pair of pliers.) Adjust oscillator

to about 133 Mc/s for 50 deg. dial reading. If there is difficulty to get this high oscillation, then the following will rectify this:

Replace the 10,000 ohms resistor (R11) by a (2 watt) 3,000 ohm resistor and a second 7475 neon stabiliser is connected in series with the original. While the form of bandspread used is extremely simple and reasonably good, this matter is best left to the taste of the person carrying out any modifications. The tuned circuits are aligned by tuning for maximum noise.—M. J. SHEPHERD (Canvey Island).

The Ground Plane Antenna

SIR,—I am an ardent reader of PRACTICAL WIRELESS, and have met with great success with the "Ground Plane" antenna recently described.

I have been using a 132ft. long wire for a long time, and have only got a fair amount of DX (not good DX) until a friend of mine who has a ground plane told me to erect one. However, he gave me no dope on one, but I remembered seeing the article and studied it.

Coming to the conclusion that I had to use materials I had available, I used $1\frac{1}{2}$ in. alloy tubing cut to 16ft. $5\frac{1}{2}$ in. mounted on top of a 20ft. wooden mast taking H radials N, S, E, W at an angle of 45 degrees from ground, cut to 17ft. 2in. each, using them, and guy rope, as guys.

This antenna with 60 watt TX was put on the air at 21.44 G.M.T. on August 5th, 1954, and has since produced the following:—

W2EWD — 5 8 9 !!	5A2FA — 5 6 9
4X4DH — 5 6 9	KH6IJ — 5 6 9
LU2HH — 5 5 9	

which is five new continents!

Surprising, isn't it? Seeing that I have been pounding DX for months without result. Maybe it is conditions, maybe the TX, and maybe the antenna!—DAVID BUTLER (G13JEX), Belfast.

RADIO SHOW

(Continued from page 614)

Westinghouse Brake & Signal Co., Ltd.

HERE will be seen again a selection from their extensive range of metal rectifiers. These extend from small instrument type units to those designed for industrial use and for extreme high voltages in television and other equipment. [Stand No. 2]

Whiteley Electrical Radio Co., Ltd.

THE well known "Stentorian" loudspeakers will be prominently displayed on this stand including the new high-fidelity types. In addition cabinets and TV trolley tables will be seen, whilst the exhibit will also incorporate a display of amplifiers and the now familiar Radio Sonde apparatus used for weather

forecasting. Volume controls, coils, valveholders and many other small items will make up a pleasing exhibit. [Stand No. 105]

Wolsey Television, Ltd.

HERE will be seen various types of aerial designed for television reception. In addition special aerials for use in the reception of the new F.M. transmissions will also be shown. [Stand No. 16]

Wright & Weaire, Ltd.

IN addition to the many well-known Wearite components such as coils, I.F. transformers, vibrators, audio transformers, switches, etc., there will be seen the well-known Ferrograph Recorder. This instrument has been standardised by NATO and other inter-services units and is available in various types.

[Stand No. 74]

Editorial and Advertisement Offices: "Practical Wireless," George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. Phone: Temple Bar 4533. Telegrams: Newnes, Rand, London.

Registered at the G.P.O. for transmission by Canadian Magazine Post.

The Editor will be pleased to consider articles of a practical nature suitable for publication in "Practical Wireless." Such articles should be written on one side of the paper only, and should contain the name and address of the sender. Whilst the Editor does not hold himself responsible for manuscripts, every effort will be made to return them if a stamped and addressed envelope is enclosed. All correspondence intended for the Editor should be addressed: The Editor, "Practical Wireless," George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. Owing to the rapid progress in the design of wireless apparatus and to our efforts to keep our readers in touch with the latest developments, we give no warranty that apparatus described in our columns is not the subject of letters patent. Copyright in all drawings, photographs and articles published in "Practical Wireless" is specifically reserved throughout the countries signatory to the Berne Convention and the U.S.A. Reproductions or imitations of any of these are therefore expressly forbidden. "Practical Wireless" incorporates "Amateur Wireless."



TEST INSTRUMENTS ON THE HIRE PURCHASE

All Taylor Instruments are available through our own privately operated Hire Purchase scheme, and shown below are the advantageous terms on which some of our most popular models are available.

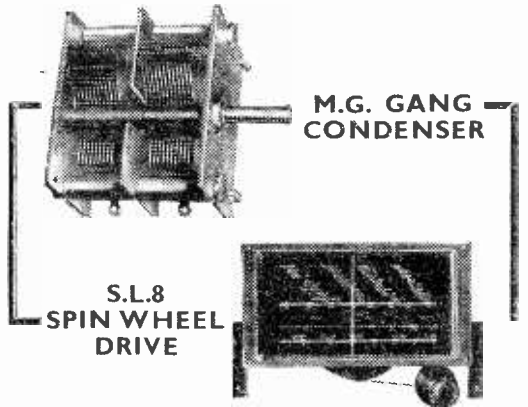
Write now for full details of this useful Taylor service!

<p>£1.17.6 DEPOSIT and 10 monthly payments of ... £1.4.0</p>	<p>MODEL 71A Multirange UNIVERSAL METER</p>
<p>£2.8.0 DEPOSIT and 10 monthly payments of ... £1.10.8</p>	<p>MODEL 72A Multirange UNIVERSAL METER</p>
<p>£2.5.0 DEPOSIT and 10 monthly payments of ... £1.8.8</p>	<p>MODEL 77A Multirange UNIVERSAL METER</p>
<p>£3.6.0 DEPOSIT and 10 monthly payments of ... £2.2.1</p>	<p>MODEL 88A Multirange UNIVERSAL METER</p>
<p>£1.8.6 DEPOSIT and 10 monthly payments of ... 18/2</p>	<p>MODEL 120A Multirange UNIVERSAL METER</p>
<p>£3.7.6 DEPOSIT and 10 monthly payments of ... £2.3.0</p>	<p>MODEL 66A SIGNAL GENERATOR</p>
<p>£3.16.6 DEPOSIT and 10 monthly payments of ... £2.8.9</p>	<p>MODEL 45B VALVE TESTER</p>

TAYLOR ELECTRICAL INSTRUMENTS LTD.

Montrose Avenue, Slough, Bucks. Slough 21381.

PRECISION BUILT MATCHED COMPONENTS



M.G. GANG CONDENSER

Available as 1, 2 or 3 gang, 490 p.F. nominal capacity, matched and standardised to close limits. Supplied with trimmers if required.

Other capacities available—details on request.

Cadmium plated steel frame.
Aluminium Vanes.

Low loss non-hygroscopic insulation.

Spindle $\frac{1}{16}$ in. dia. projects $1\frac{1}{16}$ in. from front plate.

Front area $2\frac{3}{8}$ in. x $2\frac{3}{8}$ in. including sweep of vanes.

Length excluding spindle :	Price
1 gang — $1\frac{1}{16}$ in.	9/3d.
2 gang — $2\frac{3}{8}$ in.	14/-d.
3 gang — $3\frac{3}{8}$ in.	18/3d.

S.L.8 SPIN WHEEL DRIVE

A precision slide rule drive. Complete with 3-band glass scale, 9 in. x $4\frac{1}{2}$ in.

Printed—short, medium and long wave bands with station names.

Scale length 7 in.

The spin wheel drive gives easy control through a ratio of 24-1. Fitted with constant velocity coupling, eliminating strain on the Condenser, and providing mechanical and electrical isolation from vibration and noise.

Supplied with florentine bronze escutcheon.

Price — 27/6d. complete.

Always specified for SPARKS DATA SHEETS to whom we wish continued success on their 10th anniversary.

Write for fully illustrated catalogue.

JACKSON

BROS. (LONDON) LTD.
KINGSWAY · WADDON
SURREY

Telegrams :
WALFILCO, SOUPHONE, LONDON
Telephone : CROYDON 2754-5

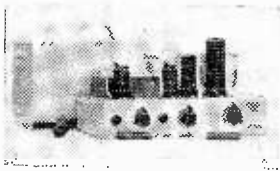


L 4679 A

PRATTS RADIO

1070 Harrow Road, London, N.W.10.

Tel. LADBROKE 1734.



(No. Scrubs Lane)
AMPLIFIERS College General Purpose, ready to use, units. Model AC10E (as illustrated), 10 watt, 4 valve unit. Neg. Feedback. Separate Pentode mike Stage and Separate Mike and Gram Inputs, 2 Faders and Tone Control. £10.7.6. Model AC15E, 6 Valve Unit with P Pull Output of 14-15 watts. Separate Pentode Mike Stage and Separate Tone Control. Feedback over 3 Stages £14.14.0. Model AC32E, larger version of AC15E with output of 32 watts £19.15.0. Model U10E for D.C.A.C. Mains. SPEC. as AC15E output 9-10 watts. 6 valves. £12.19.6. All the above amplifiers are complete with cases and chrome handles. Outputs match 3, 8 or 15 ohm speaker. All A.C. models (inc. Q9C) have H.T., L.T. outlet for tuning unit, etc. All amplifiers are enclosed and have sectionalised output transformers with Super Sileor Laminations.

Mike and Gram Inputs, 2 Faders and Tone Control. Feedback over 3 Stages £14.14.0. Model AC32E, larger version of AC15E with output of 32 watts £19.15.0. Model U10E for D.C.A.C. Mains. SPEC. as AC15E output 9-10 watts. 6 valves. £12.19.6. All the above amplifiers are complete with cases and chrome handles. Outputs match 3, 8 or 15 ohm speaker. All A.C. models (inc. Q9C) have H.T., L.T. outlet for tuning unit, etc. All amplifiers are enclosed and have sectionalised output transformers with Super Sileor Laminations.

QUALITY AMPLIFIER CHASSIS for Records Radio and Crystal Amplifiers. Latest ACOS, Collaro, B.S.R. and Garrard types available. B.S.R. 3-speed Single Player in Rexine Case. £9.9.0. Three-Speed Auto-Changer (mixed) version, Monarch Changer £16.16.0.

MICROPHONES AND PLAYERS. Full range for use with our Amplifiers. Latest ACOS, Collaro, B.S.R. and Garrard types available. B.S.R. 3-speed Single Player in Rexine Case. £9.9.0. Three-Speed Auto-Changer (mixed) version, Monarch Changer £16.16.0.

SPEAKERS QUALITY TYPES. W.B. H.F. 8in. 60/6; 9in. 67/-; 10in. 73/6. Goodmans Axiom £50 110.7.6. Audiom 60 £8.19.6.

TAPE RECORDING. Complete Recorders from £44.13.0. Tape Amplifiers £15. Truxox Tape Deck £25.2.0. Wearite £35. OSC. Units, etc., available. Send for List TRI.

ALL GOODS AVAILABLE ON ONE-THIRD DEPOSIT. BALANCE OVER 12 MONTHS. ALL GOODS ARE BRAND NEW AND CARRIAGE FREE. DEMONSTRATIONS DAILY. NEAREST STATION KENSAL GREEN.

WE PAY TOP PRICES

FOR AMERICAN SURPLUS ELECTRONIC EQUIPMENT

LOOK AT THESE EXAMPLES

For equipment in good condition

Receiver R54 APR4, complete	£200
Transmitter ET4336	£110
Test Set TS13	£100
Frequency Meter TS175 U	£30
Receiver BC348R	£25
Receiver R89 ARN5	£25

We pay similar remarkable prices for

Receivers :	R111/APR5, R5 ARN7, AR88D BC340
Transceivers :	ARCL, TCS, BC800, RT1 APN2
Transmitters :	T11/APN3, ART13
Indicators :	ID1/APN3, BC115L, BC115Z
Test Sets :	Any unit with prefix "TS" also IE15, I-206, I-100.
Modulators :	BC1091, BC1142
Synchroniser :	BC1148
Power Units :	RA34, RA42, RA62, RA83, RA90, MG149, PE158, DM38
Tuning Units :	TN17, TN18, TN19, TN44, TU57, TU58, TU59
Control Gear :	BC1150, BC1145, JB91, JB95, JB96, JB102, C45-ARCL

And almost every American made unit even if not mentioned above.
 *Phone us immediately, transfer charge.

TO HAMS WHO PURCHASED BC348, BC342, BC312, etc. Post to us all the bits and pieces which you removed, i.e., plugs, sockets, dynamotors, etc. We will pay you several pounds for this junk. You need not write - just send it.

TO OVERSEAS BUYERS

We have the largest stock in Europe of American Government surplus electronic equipment and we would be pleased to quote by return of post against your enquiries. The following are a few examples only of the equipment which we can supply from stock.

ET4336 Transmitter SCR720C Search Radar, complete
 BC348 Receiver ART13 Transmitter

Deal with the firm that has been established for twenty-five years

ALTHAM RADIO CO.

JERSEY HOUSE, JERSEY STREET, MANCHESTER 4
 Telephone : Central 7934/5/6

WEYRAD

COILS COIL PACKS I.F. TRANSFORMERS AND TV. COMPONENTS

Among the very wide range of components which we produce, types will be found to meet the majority of requirements :

"H" TYPE COILS

Individual iron-cored, Aerial, H.F. Transformer, and Oscillator types providing continuous coverage from 12-2,000 metres.

"B" SERIES COIL PACKS

Miniature 3-band units covering Long, Medium and Short Wave bands or Medium and 2 Short Wave bands. Alternative tuning capacities 365 pF or 483 pF.

P.4. I.F. TRANSFORMERS

Improved types are being introduced to maintain even higher standards of performance and reliability. For frequencies in the range 460-470 kc/s. Dust-core Trimming.

ILLUSTRATED CATALOGUE - 6d.

WEYMOUTH RADIO MFG. CO., LTD.,
 CRESCENT STREET - - WEYMOUTH.

- T/V TECHNOLOGY
- RADIO ENGINEERING
- ELECTRONICS
- RADIO SERVICING

There's a big future in T/V and Radio. Act now! Increase your knowledge. Back up experience with a sound theoretical background. I.C.S. offer courses of instruction in—

**T/V TECHNOLOGY
 ADVANCED SHORT-WAVE RADIO
 RADIO ENGINEERING
 RADIO SERVICE ENGINEERING
 RADAR
 ELEMENTARY ELECTRONICS
 FREQUENCY MODULATION**

I.C.S. will also coach you for the following examinations:—

B.I.R.E. ; P.M.G. Certificate for Wireless Operators ; Radio Servicing Certificate (R.T.E.B.) ; C. & G. Telecommunications, etc., etc.

DON'T DELAY—WRITE TO-DAY for free descriptive booklet, stating which subject or examination interests you. Fees include all books needed. Examination students coached until successful. Reduced terms for H.M. Forces.

Dept. 170D, I.C.S., 71, Kingsway, W.C.2.

INTERNATIONAL CORRESPONDENCE SCHOOLS,
 (Dept. 170D), International Buildings, Kingsway,
 London, W.C.2.

Please send booklet on

Name Age

(Block letters, please)

Address



You can rely on us

OFFERS:—

VALVES. 6V6G, 7/6; 5Z4G, 8/9; 6Q7GT, 8/9; 6BW7, 8/-; 6AM6, 6/9; EM34, 7/6; 6U5G, 6/-; EL32, 7/6; 12A6, 6/-; 6SH7, 6/-; 12A07, 9/-; 12A77, 9/-; 3S4, 11/-; 6BW6 (6V6 in miniature), 7/-; 7C6, 6/6; 77, 6/6; 6BG6, 6/6; AC6Pen, 6/-; 6BE6, 7/-; 6BA6, 7/-; 6X4, 7/6; MSPen (7 pin), 5/-; 12SC7, 4/6.

Xtal Diodes. 1/6; Elac Elliptical Speakers, 6in. x 4in. with Transformer, 22/6; Jackson SL8, 27/6; SL5, 26/6; Full Vision 12/6; Drums, 1 1/2in., 1 1/4in., 2 1/4in., 2 1/2in., 1 1/4; 16-16 mfd. 450 v., 3/9; 64-125 mfd. 275 v., 3/9; Solid Dielectric Variable Condensers, .0001, .0002, .0005 mfd., 3/10 each; .0003 and .0005 Twingangs, 6/- each; Volume Controls less switch, 2/3; with switch, 4/-; D.P. switch, 5/-; Filament Transformers, 200/250 v. primary, 6.3 v. 1.4a., 7/6; 6.3 v. 3a., 10/6; 2-a. Charging Transformer for 2v. 6v. or 12v., 19/6; Tubular Condensers, .001, .002, .005, .01, .02, .05, 1.6d. each; 25 mfd. 1/-; 5 mfd., 1/3; .0001, .0002, .0003, .0005 mica, 6d.

RESISTORS.—1 w. and 1/2 w., 4d.; 1 w., 8d.; 2 w., 1/4; 7 w., 2/3; 10 w., 2/6; 2 per cent. high stability, 1/6 each. H.P. Chokes, MW L.W. 2/9; S.W. choke 3/9; Twin mains suppressor choke, 3/3; "BIB" Wire Stripper 3/6; Trimmers, 4/70 pf., 9d.; 40-100 pf., 9d.; 20-250 pf., 1/-; 100-550 pf., 1/3; 150-700 pf., 1/6; Twin 50 pf. Trimmers, 5d. pair; R.E.P. Crystal Set Coil with circuit, 2/6; H.P. Coil with circuits (mains and battery), 4/-; Midget matched pair with circuits, 8/-; Neon Voltage Indicators A.C./D.C., 5/-; Engraved Knobs, 1 1/2in. diam. walnut or ivory, 1/6 each.

BOOKS.—Radio Gadgets, 3/6; TV Faults, 5/-; Radio Instruments, 4/6; T.V. Instruments, 5/-; Magnetic Recording, 4/6; Amplifier Circuits, 2/6; Radio Control Models, 5/-; Oscilloscope Book, 5/-.

All Proprietary Components Denco, Weymouth, etc., stocked. Quotes, S.A.E. Surplus Booklet, 6d. Post 6d. up to 5/-, 1/- up to £1, 1/6 to £2. C.O.D. (over £1).

RADIO SERVICING CO. 32, SOUTH EALING ROAD, LONDON, W.5.
EALING 5737. Next to South Ealing Tube Station.

HANNEY OF BATH offers:—

P.W. SIX-VALVE A.C. SUPERHET. Osmor 3-Band R.F. coilpack, 68/-; Osmor pre-aligned I.F.'s, 16/- pf.; Elstone mains trans. to specification, 32/-; Denco 16 x 8 x 2 1/2in. chassis, 11/- etc., etc. Priced parts list available on application.

FREQUENCY MODULATION. For Wrotham high fidelity Transmissions. DENCO technical bulletin giving circuit and point to point wiring diagram for building an F.M. Feeder unit. 1/6. We have all components available. Priced parts list on application.

W.R. STENTORIAN High Fidelity Speakers. HF610, 50/6; HF810 60/6; HF912 67/-; HF1012 (3 or 150), 73/6.

ACOS Hig Pick-ups. HGP 20-1 std., or LP 68/8. Heads only std. or LP, 42/3.

COILPACKS. DENCO, CP4/L and CP 4/M, 33/4; CP 3/370 pf. and CP 3/500 pf., 42/8. OSMOR "Q" HO, 48/-; LM, 40/-; Batt., 50/-; TRF, 40/-; HF stage for HO pack, 20/-; EFA 4-Station pack, 43/8. We stock COILS by Weymouth, Osmor, Wearlie, Denco, Teletron and R.E.P.

ELSTONE Mains Trans. for the SIMPLEX TV, 48/-.
VIEWMASTER, WIDE ANGLE VIEWMASTER CONVERSION. Complete set of parts for converting existing Viewmaster to W.A., less valves, tube and mask, £14 18/6. W.A. Conversion instructions, 3/6; WB.113, 48/6; WB.114, 23/6; WB.115, 42/-; WB.116 and WB.117, 7/6 each; WB.118, 22/6; WB.119, 26/9; WB.121, 3/6; WB.124, 10/6; Westinghouse 36/EHT/30, 17/-; Plus condensers and resistors per our general list.

MULLARD "UNIVERSAL" LARGE SCREEN A.C./D.C. TELEVISOR. Denco drilled chassis with all mechanical parts, 53/6; FD124 duomax focaliser, 37/6; 1A/342 rectifiers, 37/2; Goldsman droppers DK37, 6/8; DK35, 6/7/6. VA1098 varite res, 4/6. Other Denco parts, please see below.

WIDE ANGLE COMPONENTS. ALLEN, Teleking Chassis, 50/-; Coils (TK & Super-Visor), 44/6; LO 308, 40/-; FO 405, 21/-; DC 305, 39/6; FC 302, 31/-; GL 16 & 18, 7/6 each; SC 312, 21/-; AT 310, 30/-; OP 117, 9/-; BT 314, 15/-; DENCO Chassis Magnaview, 37/6; Chassis, Super-Visor, 51/6; Coils (TK & Super-Visor), 41/2; WA/DCAI, 43/-; WA/FCAI, 31/-; WA/LCI and WC/7/6 each; WA/FMAI, 21/-; WA/LOTI, 42/-; WA/FBTI, 16/-; Send 6d. stamps for our General List of components for Viewmaster, Soundmaster, Williamson Amplifier, Teleking, Magnaview (Primar & English Electric large screen TV), Super-Visor, Mullard Universal. Close tolerance Silver Micas, etc., etc. Please add 1/- postage to orders under £1.

L. F. HANNEY
77, LOWER BRISTOL ROAD, BATH
Tel.: 3811

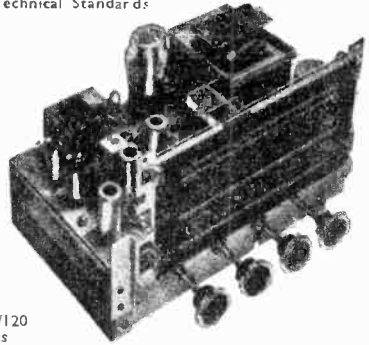
DIRECT FROM THE MANUFACTURER

DULCI RADIO/RADIOGRAM CHASSIS

Built to Highest Technical Standards

FULLY GUARANTEED

All chassis 1 1/2in. x 7in. x 8 1/2in. high. Latest type valves 6BE6, 6BA6, 6AT6, 6BW6, 6X4. Flywheel tuning. Negative feedback over entire audio section. Engraved knobs. 3 tone positions for radio and gram.



For A.C. Mains 100/120 and 200/250 volts

- Model B3.—Long, Medium, Short 5 Valves. Output 31 watt **£12/12/0**
- Model B3.—Plus Push Pull Stage 6 Valves. Output 6 watt **£15/15/0**
- Model B3.—Double Feature with P/Pull & R.F. Stage, 7 Valves. Output 6 watt **£18/18/0**
- Model B6.—Six Wavebands, Med., Long, 4 Short. (3 Bands spread.) 5 valves. Output 31 w. **£15/15/0**
- Model B6.—Plus Push Pull Stage 6 Valves. Output 6 watt **£18/18/0**
- Model B6.—Double Feature with P/Pull & R.F. Stage, 7 Valves. Output 6 watt **£23/2/0**

ALL PRICES TAX PAID

Escutocheon for 9in. x 5in. dial, 4/9 extra. Matching speakers P.M. type 3 ohms, 8in. or 10in. available. Chassis sent under money back guarantee conditions against remittance. Free particulars from the manufacturers.

THE DULCI CO. LTD.,
99 VILLIERS RD., LONDON, N.W.2. Telephone: Willesden 7778

SAFEGUARD YOUR SET ECONOMICALLY

55' FOR 5/-

AND NOT AN INCH WASTED

ERSIN Multicore SOLDER



ERSIN MULTICORE SOLDER makes every electrical connection in your equipment a sound, permanent joint. Countless jobs—construction, repair—can be done with one 5 cent. tin. And, because ERSIN MULTICORE contains 3 cores of extra-active, non-corrosive Ersin Flux to prevent oxidation, "dry" and H.R. joints, it solders instantly, without trouble, waste or extra flux. Get a carton today.

MULTICORE WORKS, HEMEL HEMPSTEAD, Herts. • BOXMOOR 3638.

RECEIVERS & COMPONENTS

OSMOR for really efficient Coils, Coilpacks, and all Radio Components as specified for many "Practical Wireless" circuits. See advert. on page 595 for free circuits offer or send 5d. (stamps) to **OSMOR RADIO PRODUCTS LTD.** (Dept. PC10), 418, Brighton Road, South Croydon. (Tel.: Croydon 5148/9.)

CONDENSERS. 2mf 150v. 5mf 30v. 25mf/25v. 25mf/12v. 50mf/12v. 50mf/50v. all 1/-. Cans. 8 x 8/50 3/6, 8 x 16/450 3/9, 16/350 2/3, 16/500 3/6, 32/350 2/9, 32/450 3/8, 8 x 8 x 32/275 4/, 16 x 24/350 3/9, 100, 275 3/4, 1,000 6v 4/-. Midget Vol. Controls. 100k. 1/2 meg. 2 meg. 1/9 each. S.A.E. Lists. All Valves and Components. E. S. S., 133, Leavesden Rd., Watford, Herts.

EX-AM. mounted tubular condensers bakelite case. .05mf. 800v. d.c. wkg. 9d. ea.; 25mf. 1kv.d.c.w. 1/-; .001mf. 4kv.v. 1/-; .01mf. 4kv.v. 1/-; .02mf. 5kv.v. 1/6; Block metal case 2mf. 750v.d.c.w. 21in. x 2in. x 21in. 1/6; ditto 4mf. 600v.d.c.w. tall can. 5/-; T.C.C. electrolytics 200-200.200mf. 275v. al. can 7/6; 8mf. 350v. al. tube 1/3; B.T.H. crystal diode CG5M. 1/6 ea. or 15/- doz. All goods guaranteed—**GLADSTONE RADIO**, Gladstone Place, Newton Abbot, Devon

ALUM. CHASSIS. 4-sided, 18 s.w.g., 12 x 9 x 2 1/2in. 6/- (postage 9d.); special sizes, prices in proportion; Hoies 2d. each, riveted corners 1/4 extra. **WOOD & TOY**, 51, Windfield Rd., Worcester.

BENTLEY LTD., 38, Chalcot Road, N.W.1, PRIMROSE 9090, offer: Electrolytics. 16 x 8 x 8. 500v. 3/6; 8 x 8 x 8. 400v. 3/-; 16 mid. 500v. 2/9; 8 mid. 500v. 2/6; 32 mid. 350v. 2/-; 16 mid. 350v. 1/6; 24 mid. 350v. 1/9; 4 mid. 350v. 1/-; 4 mid. 200v. Micro-pack. 1/-; 2 mid. 350v. 1/10; 12 mid. 50v. Micro-pack. 9d. Volume Controls, with switch: 2 meg. 3/6; 1 meg. 3/6; 5 meg. 3/6; 50k. 1/-; 100k. 3/-. Without switch: 50k. 1/-; 100k. short spindle. 1/-; 1 meg tropical short spindle. 1/-; 500 ohm wire wound. 1/6; 550 ohm. 100k. preset wire wound. 1/6. Switches: Double pole on/off. 1/-; Wavechange 4 pole. 3-way. 1/6; 2 pole. 2-way short spindle. 1/-. Plugs and Sockets. 7 pin. 2/6 pair. Philips 4-wave superhet Coils. 7/6 set. Dubilier Minicap Condensers: .01. .002. .001. .005 mfd. 4/- per doz.; .005 mfd. 2.2kV mica. 1/6. Westectors: WK6. W1. 9d. Wirewound Vitreous Resistors: 40. 70. 75. 90. 130. 150. 270. 500. 680. 800. 1k. 1.5k. 2k. 2.2k. 2.7k. 3.2k. 3.5k. 4.7k. 4.7k. 5k. 6.8k. 7.5k. 15k. 20k. 25k. 30k. 35k. 39k. all 10 watts at 1/-. 100. 100. 100. 500. 1k. 10k. all 20 watts at 2/-. Metal Rectifiers: Selenium. RM4. 12/-, 260v. 80ma. 7/6. Westinghouse. ex-units. 250v. 40ma. 4/-; 250v. 80ma. 7/-. Midget plastic cases containing Volume and Selector Controls, ideal for crystal sets, deaf aids, etc. 3/6. Glass Dials: S.W. 6d. M & L. 3-wave. 5-wave. all 1/-, 9-wave 1/6. L.F. Chokes: 100 ma 3/-. Ex-Govt. new semi-midget multi-ratio output Transformers. 2/-; Mike Transformers. 1/6; 7-way press button Units, soiled. 1/-; Assembly bargains: Relay actuating gear Train and contacts. 2/6; Unit consisting of transformer. 5 condensers and 6 resistors. 2/-; Unit consisting of iron-cored coil, transformer, condensers, resistors and choke. 2/-. Valve-holders: English 5-pin. 3d.; English 7 pin ceramic. 6d.; EF50 type ceramic 1/-; BG. 5d.; BA. 7d.; mt-octal. 6d. Post extra. See page 632 for bargain list of Valves.

RATES: 5/- per line or part thereof, average 8w words to line & minimum 2 lines. Box No. 1-extra. Advertisements must be prepaid and addressed to Advertisement Manager, "Practical Wireless," Lower House, Southampton St., Strand, London, W.C.2.

ELMO OFFERS: Four full sides 16 s.w.g. All Chassis. 7in. x 5in. x 2in., 4/6. 6in. x 4in. x 2in. 4/-. 9in. x 3in. x 2 1/2in. 6/-. 10in. x 8in. x 2 1/2in. 7/-. 12in. x 8in. x 2 1/2in. 7/6. 12in. x 9in. x 2 1/2in. 8/6. 14in. x 10in. x 2 1/2in. 9/6. 16in. x 10in. x 3in. 11/-. Main Trans. 200/250. 250/0/250. 80ma. 0 4 8.3v 4 amp. 0 4/5v 2 amp. 350 0/350. 80ma. ditto. 20/- each. Moulded Int. Octal Valveholders. 6d. each. 5/- doz. Electrolytics. Tub. 8x 450v 2/-, 16 x 350v 2/3, 16 x 8 500v 4/11. Cans. 8 x 450v 2/6, 12 x 8. 350v 2/9, 16 x 450v 3/3. 32 x 450v 3/6. Valves. 6J5. 6C5. 5/-; 6K7. 6K6. 6J7. 7/-; 6X5. EL32. VF52. 6V6. 6V3. 7/6; 25Z6. 8/-; 65N7. Y63. J6. 25Z4. 8/6; 6SL7. 9/-; 5V4G. 5U4G. 9/6; 1H5. 1N5. 11/-, post 4d. per valve. Vol. Conts. 1/4. 1/2. 1 meg. 2/9; 1/2. 1 meg. SP/5W. 1/9 each. Special offer, ready built 4 watt 3-valve amplifier, mains trans. FW rect., tone control. 210/250 A.C. output to 3 ohm speaker. £4/7 6, p.p. 2/6. Post 1/- up to £1. post free over. c.w.o.: c.o.d. extra. **ELMO PRODUCTS.** 230a. Uting Avenue, Liverpool. 4.

BRAND NEW METERS: 0-15v. A.C. 2 1/2in. M.I. 9/6 each; 0-30ma. D.C. 2in. M.C. 7/6 each; 0-30ma. D.C. 2 1/2in. M.C. 9/6 each; 0-100ma (scaled 0-300). D.C. 2in. M.C. 7/6 each. The cheapest Multi-Range Meter on the market. Measures: 0-6v D.C. 0-6v A.C. 0-240v D.C. 0-240v A.C. 0-30ma D.C. 0-30ma A.C. plus a circuit-testing scale powered by internal battery and a valve socket for testing English 4- and 5-pin valves; brand new in makers boxes with instruction leaflet at 29/6 each, post 1/6. Meter Rectifiers, full bridge type, by Westinghouse. 12/6 each; half-wave type. STC.. 2/6 each. Transistors, brand new G.E.C. type. GET. 2/3/6 each. If you are not on our mailing list send stamp for new list to-day. **SERVIO RADIO.** 156/8, Merton Road, Wimbledon. S.W.19. LIBerty 6525.

1,000 NEW METERS. 2in. upwards, milli. volts, amps. asstd., £275; 30 Si. Generators, No. 103, soiled outside, perfect internally, offers? AR88D, mint condition, offers? **AUTOREX** ELECTRONICS, New Whittington, Cheshire.

R.F. UNITS, Types 26 at 37/6, 25 at 17/6, 24 at 12/6; brand new in original cartons. E.W.S. CO. 69, Church Rd., Moseley, Birmingham.

VALVE BARGAINS. 1R5. 1S5. 3V4. 6/- each, 174 5/1, 6V6 6/6. MISC. BARGAINS. Germanium Diode. 1/9; enclosed Morse Keys, 2/6. Cabinet walnut veneered, ideal for that spare set or bedroom radio with s/het. chassis and dial and 3 knobs. 18/-, cabinet separate 16/- Dini. 12 x 6 x 6. All items new, money back guarantee. Post paid. A BLACKBURN. 5, West End Lane, Kilburn, N.W.6.

SERVICE SHEETS for Radio and Television, over 2,000 models. S.A.E. enquiries. W. GILBERT, 24, Frithville Gardens London, W.12

SERVICE SHEETS for hire. Radio, etc., 1933-1939; all Standard Radio and Elect. Components in stock: s.a.e. with enquiries to F.I.E.L.D., 80, Oldfield Rd., London, N.16

VALVES

NEW, BOXED, VALVES, 8/3, post free. 90/- dozen, 1T4, 1S4, 1S5, 1R5, 3B4, 3V4, 5Z4, 5U4, 3Y3, 6K8, 6Q7, 6SL7, 6SN7, 6AT6, 6X4, 6BE6, 6BA6, 6A7, 6A8, 6BW6, 6AM6, 6AL5, 12K7, 25L6, 25Z4, 25Z6, 35L6, 35Z4, 80, 12A7, 12A07, ECL80, PY80, PY82, UY41, UCH42, Amph Bases, all types. 6d.; Valves at 6/3, p/3e, 6V6, 6K7M, 6J7M, 6J5M, EF36, ELF2, EF50, 6X5, 6C5, 7C5; At 3/6 each. SP41, SP61, 12J5, 6H6M, Mic. Trans. 2/-; C/diodes, 1/6; V/ctrls., all values, 2/6; SP/sw., 3/6; W.W. ctrls., 3-watt, 5K and 25K 3/6; Pre-set 250 ohm. 2K, 2.5K, 5K, 10K, 20K, 30K 2/6; Fil/trans., 200/240v. 6v at 1.5A. 5/9; I.F. Trans., 465Kcs, midget, 9/6; semi/midget, 9/6; standard, 8/6 pr.; T/gang, .0005, 5/6; Electrical Spkrs 7in. x 4in., 16/9, 10in. P.M., 23/6; Coilpacks, 3-watt, l. m. s., 23/6. S.A.E. new lists. 13,000 Valves in stock. **RADIO UNLIMITED,** Elm Road, London, E.17. (KEY. 4813.)

MODERN T.V. and Radio Valves and Components. Brand New or Salvage. Limited quantities only, due to business closing down. Don't hesitate, send for list, price and range may surprise you. Examples: EF80, ECL80, EY51, 6AM6, 6BA6, 6AL5, PL81, PY81, 6V6, EF36, EF39. Line Output and E.H.T. Trani Focus Coils and Magnets etc., etc. No dealers. **CENTRAL LONDON DISTRIBUTIONS,** 52, York Street, London, W.1.

ALL TYPES of Valves required for cash. State quantity and condition. **RADIO FACILITIES LTD.**, 38, Chalcot Road, N.W.1. (PRIMROSE 9090.)

6V6G AND GT, matched in pairs, new, boxed, 17/- per pair; p. and p. 1/- R. J. COOPER, 32, South End, Croydon, Surrey.

45/- OFFERED for 813 Type Valves: any quantity purchased. Write: **PYPE-HAYES RADIO,** 606, Kingsbury Road, Birmingham, 24

NEW VALVES WANTED, small or large quantities: PL81, EY51, K761, 5Z4G, 5R4, 5U4, 3Q5, all television; prompt cash. **WM. CARVIS LTD.,** 103, North St., Leeds, 7.

VALVES. Same Day Service, all guaranteed new and boxed. 14v. miniatures, 1S5, DAF91, 1R5, DK91, 1T4, DF91, 3S4, DL92, 3V4, DL94, 1S4, 3Q4, N18, DK92, 7/6; any 4 for 27/6; 6AM6, EF91, 6F12, Z77, 8D3, 6AL5, EB91, D77, 6X5GT, EF39, 6/9; any 8 for 50/-; EF92, W77, EF54, 5/6; 6K7G, 6K7GT, 6/-; 6BA6, 6BE6, 6BH6, 6BJ6, 6/6; 6V6G, 6V6GT, 6J7GT, 6F6G, KT63, 6BW6, 6X4, 12AX7, EBC33, U2, EF60, 807, 7B7, 7C7, 7C8, 7H7, 7S7, 7/6; 1C5GT, DL35, 5Y3GT, U50, PV02, 35A5, 6C4, 6AM5, EL91, 7/9; 5Z4G, MU14, 7Y4, U78, DH77, 6AT6, 6J6, 25Z5, 35LGT, 50L6GT, 25L6GT, 35Z3, 35Z6GT, 35Z5GT, 80, 6LD20, 8/6; 25Z4G, 6A8G, 6K8G, 6K8GT, 6Q7GT, 6BW7, 6SN7GT, 12A7, 12K7GT, 12Q7GT, UL41, UY41, EF41, EZ40, EZ41, ECL80, EAC91, ECC81, U09, U40, 9/-; EF80, AZ31, PY80, EL41, ECH42, EBC41, UBC41, UF41, 10LD11, 10F9, 10/-; PL82, PY81, UCH42, 12K8GT, 12A07, 6A7, 6F1, 6F15, 10F1, 10P13, 10/6; EM34, PL31, 11/-; EY51, PL83, 10C2, 1H5GT, DAC32, 1N5GT, DF33, CY31, 12/-; CL33, U25, UF42, X78, EF80, UBF80, R19, 13/6; G73, 1A7GT, DK32, N78, 15/-; EF7A, FZ30, 6U4GT, U08, 2U8, 17/-; EL38, PL38, 22/6; Postage 4d per valve extra. **READERS RADIO** 24 Colberg Place, Stamford Hill, London, N.16. (STA. 4587.)

WALNUT Radiogram Cabinets of distinction; stamp details. R. SHAW, 69, Fairlop Rd., E.11.

THE WIRELESS SCHOOL.—Training in Wireless, Telegraphy, RADIO HOUSE, Manor Gdns., N.7.

THE INSTITUTE of Practical Radio Engineers Home Study Courses are suitable coaching text for I.P.R.E. and other qualifying examinations. Fees are moderate. Syllabus of seven modern courses post free from SECRETARY, I.P.R.E., 20, Fairfield Road, London, N.8.

FREE! Brochure giving details of Home Study Training in Radio, Television, and all branches of Electronics! Courses for the hobby enthusiast or for those aiming at the A.M.Brit.I.R.E., City and Guilds Telecommunications, R.T.E.B., and other professional examinations. Train with the College operated by Britain's largest electronic organisation; moderate fees. Write to Dept. PW28, E.M.I. INSTITUTES, London, W.4.

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64, inclusive, or a woman aged 18-59, inclusive, under the age of 65, or the employment is excepted from the provisions of the Notification of Vacancies Order, 1952.

ENGINEERS.—Radio T.V. Service for Appointments within the salary range £400-£750. Apply: BROADMEAD WIRELESS CO. LTD., 123, The Broadway, Wimbledon.

A.M.I.MECH.E., A.M.Brit.I.R.E., City and Guilds, etc., on "no pass—no fee" terms; over 95% successes. For details of exams, and courses in all branches of engineering, building, etc., write for 144-page handbook, free. B.J.E.T., Dept. 242B7, 29, Wright's Lane, London, W.8.

Best Buy at Britain's

RECEIVER TYPE CR100.—A super communications receiver covering 60 kc/s to 30 Mc/s in six bands. Built-in A.C. mains power pack, 2 R.F. stages, 3 I.F. stages, variable selectivity Xtal Filter, B.F.O., etc. Good condition, complete with new valves and air tested. A bargain at £27.10.0, plus £1 carriage.

RI15 RECEIVERS.—A few slightly soiled models of this well-known receiver still available. Price £27.19.6, plus 10/6 carriage. A.C. mains power packs for same at £4.10.0, £5.5.0, £6.10.0, carr. 3/6. Send S.A.E. for full details. Or 1/3 for Circuit, etc.

TR.1196 RECEIVERS (25 73).—This is a six-valve superhet receiver with 465 kc/s I.F.'s. Complete with all valves—2 EF91, 1 EK92, 2 EF35, 1 EB353. In Good Condition with full conversion data. ONLY 27/6 each, plus 2/6 post.

POWER PACK TYPE 301.—This was the mains power pack used for the complete TR.1196. Contained in a neat black case size 8 1/2 in. x 4 1/2 in. x 6 1/2 in. high. For 20-250 volts A.C. 50 cps. Outputs 250-0-250 v., 6.3 v. at 2.8 amps., 6.3 v. at 6 amps. for 6X5 rectifier, 31 v. at 3 amps. supplies metal rectifier for bias. The transformer is a massive job. Price ONLY 37/6. Plus 2/6 post.

E.M.I. OUTPUT METER.—Desk Type, consists of a 2 1/2 in. 1 mA. meter with full wave bridge rectifier. Two ranges 0-500 milliwatts and 0-5 watts. Brand New and boxed with full instructions at about third of list price. ONLY 35/- each, plus 1/6 post.

METER RECTIFIERS.—S.T.C. Full wave bridge 2 mA. as used in the above instrument. Brand New. Snp 5/6 each. Brand New Salford Instrument Rectifiers, full wave bridge type, 1 mA., 11/6; 5 mA., 8/6.

CHARLES BRITAIN (RADIO) LTD.



11, Upper Saint Martin's Lane, London, W.C.2. TEL 0545

Shop hours, 9-6 p.m. (9-1 p.m. Thursday)

—OPEN ALL DAY SATURDAY—

WINWOOD FOR VALUE. New, boxed, Sylvaia, 6L6G, 5U4G, EF50, 6SL7, 6SN7, all at 8/6 each; Valve sets, 524, 6V6, 6Q7, 6K7, 6K8, 29 6; 1T4, 1S5, 1R5, 3S4, 28 -; EF91, EB91, 6 for 32 6; EF80, 8 6. Dupliier 8mf-500v 2/3, 8 x 8-500v 3 6, 16 x 16-500v 4 3. Hunts 25mf-25v 1 4, 0.1-150v 6 doz., 0.1-500v 7 9 doz., 0.65-500v 7 6 doz. Small waxed 01, 04 (00) 002 005, all at 3 - doz. Lists, WINWOOD, 12, Carnarvon Road, London, E.10. (Mail only)

LOUDSPEAKERS repaired promptly. MODEL LOUDSPEAKER SERVICE, Bullington Rd., Oxford.

TAPE DECKS.—Due to cancelled South American export order we have been able to purchase on very favourable terms a limited quantity of a very well-known Tape Deck in kit form which we are offering at a knock-out price of £6 19 6. Full details by return of post from: HOTAX PRODUCTS LTD., 59, Gray's Inn Rd., London, W.C.1.

TAPE AMPLIFIER Designs, inc. 7-stage, perfect recordings, many useful tips. 3/-, J. ARNOLD, A.T.C.L., 33, Athelstan Rd., Southampton.

GERMANIUM DIODES, 1/- each; large quantities cheaper. BDC, 591 Green Lanes, London, N.8.

NEW and Used Correspondence Courses; Educational Books, bought, sold. Catalogue, COURSES, 28, Dean Road, London, N.W.2.

I.P.R.E. TECHNICAL PUBLICATIONS. 6,500 Alignment Peaks for Super-heterodynes, 5/9, post free. Data for constructing TV Aerial Strength Meter, 7/6. Sample copy The Practical Radio Engineer, quarterly publication of the Institute, 2/-; membership and examination data, 1/-; Secretary, I.P.R.E., 20, Fairfield Rd., London, N.8.

RADIO AND TELEVISION COMPONENT CATALOGUE

Available on request to

J. T. FILMER,

MAYPOLE ESTATE, BEXLEY, KENT

Tel: Bexleyheath 7267

ASTRAL RADIO PRODUCTS

(T. G. Howell)

SPECIAL OFFER, still available Midget I.F.T.s 465 Kc/s, 13.16in. square x 1 1/2 in. high. BRAND NEW, 8 - pair, high "Q" postage 6d.

T.R.P. COILS as used in the original model 3 Band, all dry 3 (April '51) P.W. 6 8 pair, postage 6d, also Universal Push Button 4.

DUAL WAVE H.F. Coil as used in original models Summer All Dry Portable, Modern 1 & 2 Valver, etc. 4 3 each, postage 3d.

"K" TYPE COILS as used in the original model A.C. Bandpass 3, 3 3 per coil, Osc. & S.W. Band also available. Postage 6d.

NOW READY our new booklet "HOME RADIO" containing full details for constructing from a crystal set to 2-valver, fully illustrated with list of component suppliers, etc. 32 pages, beautifully printed and in simple language, price 2 - per copy, plus 2d. postage. Send for your copy now. Frame, Aerials, chokes, etc., etc. List 1/6, stamp.

135, THE RIDGWAY, WOODINGDEAN, BRIGHTON, 7.

5 in 3

Free leaflet tells how range extender gives 5 octaves from 3 octave electronic keyboard. Imitates whole orchestra. Is simply built from simple instructions. Get your free copy now.

C & S, 10 Duke St., Darlington, Co. Durham

ELECTROLYTICS, capacity, voltage, size, type of mounting, price, post paid: 8, 450v. 1 x 2, clip. 2/-; 50, 12v. 3 x 1 1/2, tag. 1/6; 150, 25v. 1 x 2, clip. 1/-; 250, 12v. 2 x 1 1/2, wire, 2/3; 16 - 16, 450v. 1 1/2 x 2, clip. 4/-; 40 - 40, 275v. 1 1/2 x 2, clip. 3/3; 24 - 24 - 16, 350 425v. 1 1/2 x 2, clip. 4/9; 60 - 200, 275 350v. 1 1/2 x 1 1/2, clip. 6/6; 4, 150v. 1 x 1 1/2, clip. 1/1; 500 12v. 4 x 1 1/2, tag. 1/6; 150, 25v. 1 x 2, clip. 1/9; 32 - 32, 350 425v. 1 x 2, clip. 5/-; 8 - 16, 450 525v. 1 x 2, clip. 4/-; 2, 450 525v. 1 x 1 1/2, tag. 1/6; 2, 350v. 1 x 1 1/2, tag. 1/3; 8, 450v. 1 x 2, clip. 1/9; 32 - 32, 450 525v. 1 1/2 x 3, W.E. 5/6; 16 - 16, 450 525v. 1 1/2 x 2, W.E. 4/6; all alicans. Some with sleeves, all voltages wkg., surge where marked, new stock, guaranteed. Set of 3 Components comprising line output trans. with E.H.T. winding to give 7K5, using EY51 (heater winding for EY51 also included), and fitted with width control. Scanning coils, low impedance line and frame, focus coil (optional high (10,000 ohms) or low (200 ohms)). Set of 3, 42/-, plus 2/- postage. Diagram of line trans. supplied. Mains Trans. P.R.I. 0-210-240, SEC. 250-0-250v. 80ma: 6.3v. 2.5a; 6.3v. 0.6a. 12/-; Mains Trans. P.R.I. 200-250v. SEC. 305-0-305v. 30ma. 800v. 5ma. 6.3v. 4.2a. 6.3v. 0.4a. 2v. 2a. 4v. 1.1a. 5v. 2.3a. These mains have been taken from ex-Govt. equipment; some may have tag panels broken but guaranteed O.K., 13/- post paid and ideal for scopes. RADIO CLEARANCE LIMITED, 27, Tottenham Court Road, London, W.1. (Telephone: Museum 9188.)

EX W.D. unused fluorescent Lighting Sets for 12 and 24v. D.C. input, 230v. A.C. output; Rotary Converter, Choqe, P.P. Condenser, Leak Transformer for 85 watt sodium lamps. The whole enclosed in metal box, £5 to clear. A. J. PHILPOTT, Fountain Sq., Fenton, Stoke-on-Trent.

D.C. MULTIMETER KIT

Converts any 1 mA. or 500 µA. meter into a useful 17 range Multimeter. Complete with instructions. The kit consists of 6 High Stability 1% Resistors, 3 other Resistors, a Potentiometer, and Shunt S51 or S505 as required. These give 10 Voltage, 6 Current, and 1 Resistance Ranges. Price 26/-.

A.C. D.C. MULTIMETER KIT

As above, but with 4 extra High Stability 1% Resistors and Westinghouse Meter Rectifier to give an additional 4 A.C. Voltage Ranges. Price 45/6. Plugs, Sockets, Terminals, Switches and Croc. Clips are available for above.

UNIVERSAL SHUNTS

1% accuracy for any 1 mA. or 500 µA. meter. Only one simple adjustment to make, no calibrating meter being required. Boxed with instructions. Guaranteed one year. S505 (4 mA.) covers 1, 5, 25, 100 and 500 mA. S51 (1 mA.) covers 2, 10, 50, 200 mA. and 1 Amp. Price 15/-.

FIXED UNIVERSAL SHUNTS

For 1 mA., 100 Ohm and 500 µA 500 Ohm meters. No calibrating or adjustment, just wire up and use. Ranges as S51 and S505. Price 15/-.

RESISTANCE BOXES

Set of 12 Wirewound Resistors, accuracy 0.5%, values 1, 2, 2.5, 10, 20, 50, 100, 200, 200, 500 Ohms to give all values of resistance from 1 to 1,110 Ohms in 1 Ohm steps. For Plug type boxes. Price 30/- per set.

PRECISION RESISTORS

Any value, 1 Ohm to 1,000 Ohms, accuracy 0.5%. Eureka wound on flat strip. Price 2/9.

VIEWMASTER ASSEMBLED SOUND VISION GLASSES.

£4-12-6 to £7-18-6 assembled, aligned and tested. Complete kits from £18-10-0.

CLEARANCE BARGAIN

This month we are offering parcels of assorted radio components. Really amazing value. New Volume Controls, Switches, etc., 10/- and £1.

MASSEY, HULL

RF UNITS

BRAND 24 or 25 NEW
Less Valves

10/-

1.6 Postage

10R APN4 Rx Chassis. £1. carr. paid.
38 SET.—T.R. complete with valves. 38/-
48 SET.—T.R. complete with valves. £4.10-
T1403—Tx. 2-4 M s. 10-40 watt. with valves. 2 6V6, 1 EBC33.
 1 807. 45. Less Valves. £3.
TRANSFORMER.—250v. 50 ✓ input. 250-250 v. 30 mA.
 6.3 v. 2.2a. 6.3 v. 0.7a. 6.3 v. 0.5a. 12 - each. 14 v. 17.5 v.
 20 a. 35 - each.
R.C.A. T4336 POWER TRANSFORMER.—2,000v.-
 2,000v. £4. Also a few with output 1,850 v.-1,850v. 400mA.
 £3.10.0.
CHOKE.—10H. 120mA. 12 -. Brand New.
CONDENSERS. B.E.C. 450 v. wkg. 8 mfd. 2-. 8 - 8 mfd.
 3-9. 15 - 16 mfd. 4 6. Tublier 500 v. 20 mid. 3-. 32 mid.
 5 -. 100 mixed Tubular and Mica. Assorted Values. £1.
POTENTIOMETERS. All Values to 2 Meg. Less switch.
 2.6. 1. 1. 2 Meg. with switch. 4 6 each.

SP61 2/6 VALVES LIST EF50 4/-

EA50	2-	ML3	4-	2X2	5 4	1399A	5-
Pen220	2 6	7193	2 6	VU113	3 6	VU111	3 6
VR91	4-	HL2	2 6	VR21	2 6	HL41	2 6
VR116	2 9	D1	2-	EB34	2-	CV18	2-
IT4	7-	IS1	7-	1R5	7-	IS5	8-
EF36	4-	EF34	5-	EF39	7-	EL50	9-
EC52	5-	EC54	5-	FK32	7 6	EP91	8 6
5U4G	5-	5Z4	8 6	VC33	8 6	FW4 500	8 6
U22	7 6	B8C33	7 6	MU2	8 6	5Z3	8 6
6J5	5-	6J5M	6 6	6SK7	6 6	6AC7	7 6
6K7	6-	6SN7	9-	6Q7	8 6	6K8	11-
807	6-	U18 20	8 6	6X5	7 6	6AM6	7 6
APT4	4-	PK25	12-	12H6	4-	CV188	5 6
TV11	5-	S130	5-	964	3 6	955	5-
CV73	4 6	MU14	8 6	EL32	7-	PT15	6 6
6BW6	9-	6BW7	9-	9BW6	9-	6AT6	8 6
6AL5	7 6	CV83	5-	RK34	2 6	SP41	2 6

VINER'S (MIDDLESBROUGH).
 28, EAST STREET, MIDDLESBROUGH
 Telephone: MID 3418

BUILD THIS AMAZING RADIO FOR YOUR HOLIDAY

FOR **30/-**
 POST FREE



- Selective tuning.
- Accorn low drain valve.
- Loud clear tone.
- Long range.
- No earth.
- Short aerial, 2ft.
- Welded steel case.
- Easy to assemble.
- All parts for this set are sold separately.

Ideal for:

- Fishing, Camping
- Cycling, Touring
- On the beach, etc.

MAIL ORDER ONLY

This little set was designed to give you a real personal portable radio that you can enjoy anywhere without disturbing others. Use it on camping trips, in bed, in your office, or just anywhere. Send 2/- for layout, wiring diagram and Component Price List.

Details of our 30 - Short Wave Receiver are now ready. Send 2 - for Layout, Circuits and Component Price List.

R. C. S. PRODUCTS (RADIO) LTD.,
 11, OLIVER ROAD, LONDON, E.17

FREE!

to YOU!
 -if you seek
SUCCESS!

If you lack the qualifications which would get you a better job, more pay and quicker progress; if you wish to know how The Bennett College can guarantee to teach you up to qualification stage by one of the easiest, quickest and soundest methods of mind training; if you wish to learn how Personal Postal Tuition can prove that you are cleverer than perhaps you think you are — if you like the idea of studying in your own time, at your own pace, with your own tutor guiding you, helping you, teaching you by post — send at once for this recently published important book "Train your mind to SUCCESS". It is quite free. Just fill in the coupon below and name the subject you are interested in (some of the many Courses available are listed here). Then send in the coupon to us TODAY. You will never, never regret it. But do it today. Act NOW!

WHAT'S YOUR LINE?

Building Carpentry Commercial Art Diesel Engine Draftsmanship Electrical Eng. Fire Engineering Mechanical Eng. Motor Engineering Quantity Surveying Radio Eng. Surveying Surveyor's Exams. Telecommunications Textiles Wireless Telegraphy GENERAL CERT. OF EDUCATION	Accountancy Exams. Auctioneer's Exams. Book-keeping Civil Service Costing English General Education Journalism Languages Mathematics Police Subjects Salesmanship Secretarial Exams. Shorthand Short Story Writing and many others
--	---

BENNETT COLLEGE

(DEPT. J 1048), SHEFFIELD

Please send me, without obligation, a free copy of "Train your mind to SUCCESS" and the College Prospectus on:

SUBJECT _____

NAME _____

ADDRESS _____

AGE (if tender 21) _____

1979 Please write in Block Letters

THIS DAY

COULD BE THE TURNING-
POINT IN YOUR LIFE.

THIS COUPON

COULD BE YOUR PERSONAL
PASSPORT TO SUCCESS.

Send it NOW!

DUKE & Co

Tele: GRA 6677

MONEY BACK GUARANTEE

621 ROMFORD RD. LONDON, E.12.

CWO
OR
COD

3 MONTHS GUARANTEE

12in. TUBES £5

CRM121-A & B. A few other types available. As we have been selling for the last three years. Picture shown to callers. INSU-Carr. and Packing. 15.6 extra. We have some tubes with burns and cathode to heater shorts - ideal for testing. 30 - each.

AMPLIFIERS.—77.6. Push-pull. 4 valve and rec. Full tone range variable. Output 3-7.5 ohms matching. A.C or Universal. Post 2.6.

AMPLIFIERS.—57.6. 4 watts. 3 valves. Switched tone range 2.5 ohms output. Good quality A.C or Universal. Post 2.6

ACCUMULATORS.—7.9. 2 volt 45 ampere. Ever-Ready. Post 2.3.

H.T. BATTERIES.—3.9. 60 v. W.D. Tested. 90 v. Portable. 7.9 (Baterymax). 90 v. x 11 v. 6.9. Post on H.T. batteries 1.9. 41 v. I.T. Batteries (ideal for bells). 1.6. post 6d.

SPOTLIGHTS.—8.9. Butler's ex-W.D. new. 7 1/2 in. dia., 6 in. deep. Pre-1000s - fitting post 1.3. Buis for above. 6 v. 36 watt or 12 v. 48 watt. 4.6. post free.

CAR RADIO TRANSFORMER.—5 9 (New) 6 v. 350-350. Drawings can be supplied, 1- each, post on Trans. 1.3.

METAL RECTIFIERS.—8.9. T.V. type (salvage). Guaranteed. Post 1.3. Halfwave 200 v. at 250 mA. also small type 250 v. at 60 mA. 8 9/2 post 1/-. New T.V. type. 300 v. at 250 mA. 12.6. post 1/3. Full wave.

SIDE LIGHTS.—1.9. Infra-red glass. Ideal tail lamps when glass is changed. Post 9d.

SURPLUS VALVES AND SALVAGE

10.9	8.9		
EBF80	6V6G		6.9
PY81	6V6CT		1S5
PL81	EF90 (Mullard)		1S4
PL83	ECC81		6K7
PY80	KT261		3V4
			DL94

2/d. stamp for FREE CATALOGUE.

Practical Wireless

BLUEPRINT SERVICE

PRACTICAL WIRELESS

No. of
Blueprint

CRYSTAL SETS

- 1/6d. each**
 1937 Crystal Receiver ... PW71*
 The "Junior" Crystal Set ... PW94*
2s. each
 Dual-Wave "Crystal Diode" ... PW95*

STRAIGHT SETS

Battery Operated

- One-valve : 2s. each**
 The "Pyramid" One-valver (HF Pen) ... PW93*
 The Modern One-valver ... PW96*
Two-valve : 2s. each.
 The Signet Two (D & LF) ... PW76*
3s. each.
 Modern Two-valver (two band receiver) ... PW98*
Three-valve : 2s. each.
 Summit Three (HF Pen, D, Pen) ... PW37*
 The "Rapide" Straight 3 (D, 2 LF (RC & Trans)) ... PW82*
 F. J. Camm's "Sprite Three (HF, Pen, D, Tet) ... PW87*
3s. each.
 The All-dry Three ... PW97*
Four-valve : 2s. each.
 Fury Four Super (SG, SG, D, Pen) ... PW34C*

Mains Operated

- Two-valve : 2s. each.**
 Selectone A.C. Radiogram Two (D, Pow) ... PW19*
Three-valve : 3s. 6d. each.
 A.C. Band-Pass 3 ... PW99*
Four-valve : 2s. each.
 A.C. Fury Four (SG, SG, D, Pen) ... PW20*
 A.C. Hall-Mark (HF Pen, D, Push Pull) ... PW45*

SUPERHETS

- Battery Sets : 2s. each.**
 F. J. Camm's 2-valve Superhet ... PW52*
Mains Operated : 3s. 6d. each.
 "Coronet" A.C.4 ... PW100*
 AC/DC "Coronet" Four ... PW101*

No. of
Blueprint

SHORT-WAVE SETS

Battery Operated

- One-valve : 2s. each.**
 Simple S.W. One-valver PW88*
Two-valve : 2s. each.
 Midget Short-wave Two (D, Pen) ... PW38A*
Three-valve : 2s. each.
 Experimenter's Short-wave Three (SG, D, Pow) ... PW30A*
 The Perfect 3 (D, 2 LF (RC and Trans)) ... PW63*
 The Band-spread S.W. Three (HF, Pen, D, (Pen), Pen) ... PW68*

PORTABLES

- 1s. 6d.**
 The "Mini-Four" All-dry (4-valve superhet) *

MISCELLANEOUS

- 2s. each.**
 S.W. Converter-Adapter (1 valve) ... PW48A*
 (2 sheets), 7s. 6d.
 The P.W. 3-speed Auto-gram ... *
 The P.W. Electronic Organ (2 sheets), 7s. 6d. *

TELEVISION

- The Practical Television Receiver, (3 sheets), 10/6
 The "Argus" (6in. C.B. Tube), 2/6*
 The "Super-Visor" (3 Sheets) 7/6*
 The "Simplex" ... 3/6*

All the following blueprints, as well as the PRACTICAL WIRELESS numbers below are pre-war designs, kept in circulation for those amateurs who wish to utilise old components which they may have in their spare box. The majority of the components for these receivers are no longer stocked by retailers.

AMATEUR WIRELESS AND WIRELESS MAGAZINE

STRAIGHT SETS

Battery Operated

- One-valve : 2s.**
 B.R.C. Special One-valver ... AW387*
Mains Operated
Two-valve : 2s. each.
 Conoelectric Two (D, Pen), A.C. ... AW403

SPECIAL NOTE

THESE blueprints are drawn full size. The issues containing descriptions of these sets are row out of print, but an asterisk denotes that constructional details are available, free with the blueprint.

The index letters which precede the Blueprint Number indicate the periodical in which the description appears. Thus P.W. refers to PRACTICAL WIRELESS, A.W. to *Amate or Wireless*, W.M. to *Wireless Magazine*.

Send (preferably) a postal order to cover the cost of the Blueprint (stamps over 6d. unacceptable) to PRACTICAL WIRELESS, Blueprint Dept., George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

No. of
Blueprint

SHORT-WAVE SETS

Battery Operated

- One-valve : 2s. each.**
 S.W. One-valver for American ... AW429*
Two-valve : 2s. each.
 Ultra-short Battery Two (SG, det Pen) ... WM402*
Four-valve : 3s. each.
 A.W. Short Wave World-beater (HF Pen, D, RC Trans) ... AW436*
Standard Four-valver Short-waver (SG, D, LF, P) ... WM383*

Mains Operated

- Four-valve : 3s.**
 Standard Four-valve A.C. Short-waver (SG, D, RC, Trans) ... WM391*

MISCELLANEOUS

- Enthusiast's Power Amplifier (10 Watts) (3/-) WM387*
 Listener's 5-watt A.C. Amplifier (3/-) ... WM392*
 De Luxe Concert A.C. Electrogram (2/-) ... WM403*

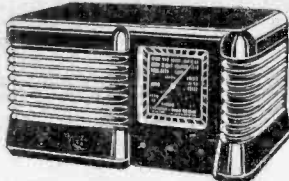
QUERY COUPON

This coupon is available until Oct. 6th, 1954, and must accompany all Queries, sent in accord with the notice on page 633.
 PRACTICAL WIRELESS, Oct., 1954.

PLASTIC CABINET as illustrated, 11½ x 6½ x 5½ in., in walnut, cream, or green. ALSO IN POLISHED WALNUT. complete with T.R.F. chassis, 2 waveband scale, station names, new waveband, backplate, drum, pointer, spring, drive spindle, 3 knobs and back, 22/6. P. & P. 3/6.

As above with Superhet Chassis, 23/6. P. & P. 3/6.

As above complete with new 5in. speaker to fit and O.P. trans. 35/- P. & P. 3/6 with Superhet Chassis 39/- P. & P. 3/6.



Used metal rectifier, 230 v. 50mA. 3/6; wave with trimmers, 6/6; M. & L. T.R.F. coils 5/-; 3 Govt. valves, 3v/h and circuit, 4/6; heater trans. 6/-; volume control with switch, 3/6; wave-change switch, 2/-; 32 x 32 mfd., 4/-; bias condenser, 1/-; resistor kit, 2/-; condenser kit, 4/-; M & L Superhet Coils with circuit, 6/6; iron cored 465 IFS, 7/6; min. gang, 5/6; volume control with switch, 4/-; wave-change switch, 2/6; heater trans., 7/6; 4 3in. 1/5; 4 Ex Govt. valves, metal rectifier and Xtal diode with circuit, 14/6; 25 x 25 mfd., 1/-; 16 x 16 mfd., 3/3; condenser kit (17), 7/6; resistor kit (11), 3/6.

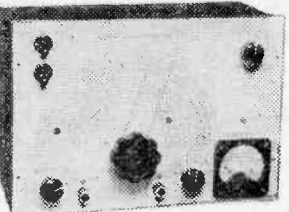
All dry A.C. mains battery unit, 200/250/-; Metal case size 9 x 3 x 3in., by famous manufacturer incorporating Westinghouse metal rectifiers, 3 500 mfd., 16 x 21 mfd. mains trans., 3 smoothing chokes, output 90 v. 10 mA. 1.4 v., 25 amp. P. & P. 49/6.

Medium and Long Wave Crystal set, in attractive plastic cabinet incorporating Germanium diode, 16/-.

Headphones to match above, per pair 7/6.

COMPLETELY BUILT SIGNAL GENERATOR

Coverage 12° Kc/s-320 Kc/s., 300 Kc/s-900 Kc/s., 900 Kc/s-2.7 Mc/s., 2.7 Mc/s-8.5 Mc/s., 8.5 Mc/s-25 Mc/s., 17 Mc/s-50 Mc/s., 25 Mc/s-75 Mc/s. Metal case 10 x 6½ x 4½ in., 8/2 of scale 6½ x 3½ in., 2 valves and rectifier. A.C. mains 230/250 v. Internal modulation 400 c.p.s. to a depth of 30%. Modulated or unmodulated R.F. output continuously variable 100 millivolts. C.W. and mod. switch, variable A.F. output and moving coil output meter. Black crackle finished case and white panel, £4/19/6. or 34/- deposit and 3 monthly payments of 25/-. Post and Packing 4/- extra.



High impedance plastic recording tape by famous manufacturer, 1.20 feet complete on spool, 17/6. P. & P. 1/6. 500 feet 8/- P. & P. 1/6.

Terms of business: Cash with order. Dispatch of goods within three days from receipt of order. Where post and packing charge is not stated, please add 1/6 up to 10/-, 2/- up to 21, and 2/6 up to £2. All enquiries S.A.E. Lists 5d. each.

D. COHEN, 23, HIGH STREET, ACTON, W.3.

Hours of Business: Saturdays 9-5 p.m. Wednesdays 9-1 p.m. Other days 9-4.30 p.m.

(Opposite Granada Cinema)

Pr. 200.250 v., secondary 3, 4, 5, 6, 8, 9, 10, 12, 15, 18, 20, 24 and 30 volt at 2 amps.

13 Drop thro' 280-0-280, 200 mA., 6 v. 5 amps. 5 v. 3 amps. 27/6.

Heater Transformer. Pri. 230-250 v. 6 v. 1½ amp., 6/-; 2 v. 2½ amp., 5/-.

R.L. MAINS TRANSFORMERS, chassis mounting, feet and voltage panel. Primaries 200/250.

350-0-350 75 mA. 6.3 v. 3 a. tap 4 v. 6.3 v. 1 a. 13/6.

350-0-350 70 mA. 4 v. 5 a. 4 v. 2.5 a. C.T., 18/- P. & P. on above transformers 2/-.

500-0-500 130 mA. 4 v. C.T. 4 a. 4 v. C.T. 4 a. 4 v. C.T. 2.5 a. 27/6.

500-0-500 250 mA. 4 v. C.T. 5 a. 4 v. C.T. 5 a. 4 v. C.T. 4 a. 39/6.

P. & P. on the above transformers 3/-.

32 mfd., 350 wkg. 2/6

16 x 24 350 wkg. 4/-

4 mfd. 200 wkg. 1/3

40 mfd., 450 wkg. 3/6

16 x 8 mfd., 500 wkg. 4/6

16 x 16 mfd., 500 wkg. 5/9

8 x 16 mfd., 450 wkg. 5/9

32 x 23 mfd., 350 wkg. 4/-

32 x 32 mfd., 350 wkg. and 25 mfd., 25 wkg. 6/6

25 mfd., 25 wkg. 11/11

250 mfd., 12 v. wkg. 8/1

16 mfd., 500 wkg., wire ends 3/3

8 mfd., 500 v. wkg., wire ends 2/8

8 mfd., 350 v. wkg., tag ends 1/6

32 mfd., 25 wkg., wire ends 1/9

100 mfd., 350 wkg. 3/6

100 x 200 mfd., 350 wkg. 9/6

16 x 16 mfd., 350 wkg. 3/3

Ex Govt. 8 mfd., 500 v. wkg., size 31 x 12 2/6

60 x 100 mfd., 220 wkg. 7/6

16 x 32 mfd., 350 wkg. 6/-

50 mfd., 180 wkg. 1/9

65 mfd., 220 wkg. 1/6

8 mfd., 150 wkg. 1/6

60 x 100 mfd., 220 wkg. 8/6

50 mfd., 12 wkg. 11/6

32 x 32 mfd., min. 275 wkg. 4/-

50 mfd., 50 wkg. 3 mfd., wkg., wire ends 1/9

Miniature wire ends moulded 100 pt., 500 pt., and 601 ea 7/4.

CONSTRUCTOR'S PARCEL, comprising chassis 12½ x 8 x 2½ in., cad. plated 19 gauge, v.h., 1P and trans. cut-outs, backplate, 2 supporting brackets, 3 waveband scale, new wavelength station names. Size of scale 11½ x 4½ in., drive spindle, drum, 2 pulleys, pointer, 2 bulb holders, 5 paxolin international octal valve holders, 4 knobs, and pair of 465 IFS. 16/6. P. & P. 1/6.

AS ABOVE, but complete with 16 x 16 mfd., 350 wkg. and semi-shrouded drop thro' 280-0-280 in. a. 6 v. 3 amp. Pri. 200-250, and twin-gang, 31/6. P. & P. 3/6.

Trimmers, 5-40 pt., 5d.; 10-100, 10-250, 150 pt., 10d.

Germanium crystal diode, 1/6. post paid.

PATTERN GENERATOR 40-70 Mc/s. direct calibration, checks frame and line time base, frequency and linearity, vision channel alignment, sound channel and sound rejection circuits, and vision channel band width. Silver plated coils, black crackle finished case, 10 x 6½ x 4½ in. and white front panel. A.C. mains 200/250 volts. This instrument will align any TV receiver. Cash price, £3/19/6. or £1/9/0 deposit and 3 monthly payments of £1. Post and packing 4/- extra.

TV. CONVERTER for the new commercial stations, complete with 2 valves. Frequency - can be set to any channel within the 186-196 Mc/s. band, I.F. - will work into any existing TV receiver, designed to work between 42-68 Mc/s. Sensitivity 10 Mu/v. with any normal TV set. Input - arranged for 30 ohm feeder, 80 ohm feeder can be used with slight reduction in R.F. gain. Circuit EF80 as local oscillator. ECC81 as R.F. amplifier and mixer. The gain of the first stage, grounded grid R.F. amplifier, 10 db. Requires power supply of 200 v. D.C. at 25 mA., 6.3 v. A.C. at 0.6 amp. Input filter ensuring complete freedom from unwanted signals. 2 simple adjustments only. £2/10/0 Post and packing 2/6.



PERSONAL PORTABLE CABINET-In cream-coloured plastic, size 7 x 4½ x 3½ in. Complete 4-valve chassis, scale and 3 knobs. Takes miniature 90 v. and 71 v. batteries, 10/- P. & P. 2/-.

3in. P.M. SPEAKER to fit above, 10/-. Miniature output transformer, 5/-; Miniature wave-change switch, 2/-; Miniature 1-pole 4-way used as Volume and Off. 2/-; 4 BTG valveholders, 2/4; Midget twin gang 3in. dia. 3in. long and pair medium and long-wave T.R.F. coils 3in. long x 1in. wide; complete with 4-valve all-dry mains and battery circuit, 6/6; Condenser Kit, comprising 11 miniature condensers, 3/6; Resistor Kit, comprising 15 miniature resistors, 4/6, 2½ x 2½ mfd., 1/6. P. & P. 2/6. Valves to suit above 10/- ea. Point to Point Wiring-Diagram 1/-.



View of chassis as it would look when assembled with valves inserted.

Extension speaker cabinet, in contrasting walnut veneers, size 15 x 10½ in. Will take 6½ or 8in. speaker, 17/6. P. & P. 2/-.

Volume Controls, Long spindle less switch, 50 K, 500 K, 1 meg. 2/6 each. P. & P. 3d. each.

Volume Controls, Long spindle and switch, 1, 1, 1 and 2 meg., 4 - each; 10 K, and 50 K, 3/6 each; 1 and 1 meg. long spindle, double pole switch, miniature, 5/-.

Standard Wave-change Switches, 3-pole 3-way, 1/9; 5-pole 3-way, 1/9. Miniature 2-pole 4-way, 4-pole 3-way, 2/6.

Valveholders, Paxolin octal, 4d. Moulded octal, 7d. EF30, 7d. Moulded BTG, 7d. Octal amphenol, 7d. Octal pax., 4d. Mazda Amphenol, 7d. Mazda pax., 4d. 8BA, 18A amphenol, 7d. BTG with screening can, 1/6. Duodecal paxolin, 8d.

Twin-gang .0005 Tuning Condensers, 5/-; With trimmers, 6/6.

Midget .00037 dust cover and trimmers, 8/6.

P.M. SPEAKERS with less trans. 13/6

3in.	13/6
5in.	16/6
6in.	16/6
8in.	13/6
10in.	15/6

Post and packing on each of the above, 1/6 extra.

RADIOGRAM CHASSIS - 5 valve A.C./D.C. 3-way band superhet, 185/255 volts 19-49, 200/550 and 1,000/2,000 metres. Fly-wheel tuning frequency, 470 Kc/s iron-cored coils and IFS. Size of chassis, 13 x 6½ x 2½. Complete with valves and 8in. P.W. speaker, p. & p., 5/-, £8/17/6.