

AN A.C. STRAIGHT THREE/FOUR • •

PRACTICAL ^{1/3} WIRELESS

OCTOBER
1956

EDITOR: F.J. CAMM



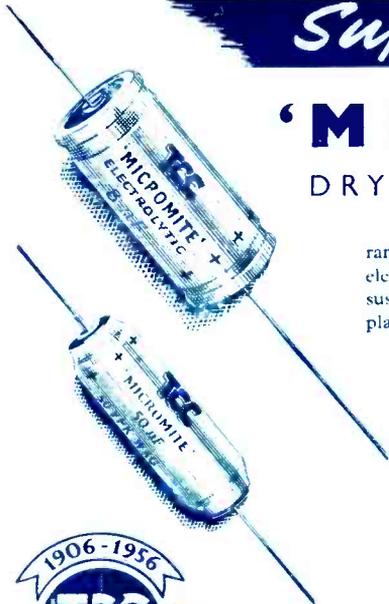
Complete Show Report

Supreme in Service

'MICROMITE'

DRY ELECTROLYTIC CONDENSERS

These small but high quality electrolytics have proved so popular that the range has been greatly extended. The use of high-gain etched foil electrodes keeps size and weight down, making the condensers suitable for suspension wiring. Conservatively rated; long shelf life ensured; green plastic insulating sleeving prevents short-circuits.



Capacity in μ F.	Peak Wkg. Volts	Surge Volts	Dimns. in Ins.		Type No.	List Price Each
			Length	Diam.		
50	12	15	1 1/2	1/8	CE87B	2/9
25	50	60	1 1/2	1/8	CE88DE	3/-
1	350	400	1 1/2	1/8	CE86L	2/6
8	350	400	1 1/2	1/8	CE99LE	3/3
16	350	400	2	1/8	CE91LE	4/-
32	350	400	2	1/8	CE93LE	6/-
4	450	550	1 1/2	1/8	CE99PE	3/3
8	450	550	1 1/2	1/8	CE90PE	3/6
16	450	550	1 1/2	1/8	CE92PE	5/-
32	450	550	2	1/8	CE94PE	7/6



THE TELEGRAPH CONDENSER CO. LTD

RADIO DIVISION : NORTH ACTON · LONDON · W.3 · Telephone : ACOrn 0051

HIGH FIDELITY AT REALISTIC COST!

H.F. 1012. 10" Hi-Fi Unit
£4. 19. 9 ▶

See and hear these and all other W.B. lines at our London Office (109 Kingsway, W.C.2) any Saturday between 9 a.m. and 12 noon.

H.F. 1214. Full Range 12" Unit
14,000 gauss
£9. 15. 6 ▶

▶ T.816. Special 8" Mid-Range and High Frequency Unit. 16,000 gauss magnet. £6. 10. 0

Tweeter Units
£4. 4. 0 & £12. 12. 0

The New W.B.12 High Fidelity Amplifier
Price £25

Ready to assemble Cabinets from
£5. 10. 0

TV and Record Storage Cabinets
£9. 14. 3 & £10. 4. 9



Details of all the outstanding W.B. products on request

WHITELEY ELECTRICAL RADIO CO. LTD · MANSFIELD · NOTTS



RADIO COMPONENTS — RETURN OF POST SERVICE

Below we give details of a small section of our extensive stock of Radio and Television Components. All items are usually held in stock and all orders are normally dealt with on the day they are received.

COMPONENTS

CONDENSERS—Ceramic. 1, 1.2, 1.5, 1.8, 2, 3, 3.9, 4, 4.7, 5, 6.8, 8, 8.2, 10, 15, 22, 27, 50 pF. All 6d. each. 56, 62, 91, 100, 110, 120, 150, 300, 330, 390 pF. All 9d. each. 100 pF, 200 pF, 500 pF, 1000 pF. 1.000 pF, 2.200 pF, 3.000 pF, 5.000 pF, 10.000 pF. All 9d. each.

N750 Ceramic. 2 pF, 3.9 pF, 5 pF, 6.8 pF, 8.2 pF, 10 pF, 15 pF, 20 pF. All 9d. each. **Hunts W99 Miniature Tubular**. 100 pF, 200 pF, 500 pF, 1000 pF. All 60 v.; .001 mfd., .002 mfd., .350 v., .005 mfd., 150 v., .01 mfd., 150 v. All 1/3 each.

.006 mfd., 600 v., .01 mfd., 350 v., .02 mfd., 350 v., .04 mfd., 150 v. All 1/3 each. **Silver Mica**. 7, 10, 18, 22, 27, 33, 40, 63, 75, 100, 150, 150 pF. All 6d. each. 150, 180, 220, 300, 340, 470, 500, 540, 560, 680, 1.000, 1.200, 1.500, 2.200, 2.700, 3.300, 5.000, 5.500, 6.000, 7.500, 8.200 pF. All 9d. each. 01 mfd. 20 v.

We carry a wide range of condensers. A full list is available free upon request.

RESISTORS—We stock very many types of Resistors, including Erie Types 3 and 9, Morgan Types T and R, including a wide range of 5% and 10% values. TSL and LAB High Stability, also wire wound in several sizes. Fully detailed list available.

COILS. Full range of Weartle "P" Coils, Osborn "Q" Coils, and Denco Chassis and Miniature Coils. Leaflets on all makes available.

DENCO COIL PACKS. All in stock. CP3/370, CP3/500, 44/9, CP4 L, CP4 M, 35- each, CP3 F, 68 7, CP3 F/G, 69/9, CP4 L G, CP4 M G, 43 5, CP3 G, 54 7, Denco Booklet D/P39 gives full details of all Coil Packs with circuits, 1/6.

E.I.C. PLUGS AND SOCKETS. As specified for the Mullard Amplifier, Pre-Amplifiers and F.M. Tuner, Miniature Jones Type, Flex Plugs, 4 pin, 5/9; 6 pin, 6/9. Flex Socket, 4 pin, 5/3; 6 pin, 6/9. Chassis Plug, 4 pin, 3/6; 6 pin, 5-. Chassis Socket, 1 pin, 3/6; 6 pin, 4/3.

VALVE HOLDERS. McMurdo, B7C less front screen, Black, 9d. Nylon Loaded, 10d. Ceramic, 1/3. With bottom shield, Black, 1/3. Nylon, 1/4. Nylon with anti-microphonic mount, 2-. Cans to fit, 2in. and 2 1/4in., 9d. each.

ERA. With bottom shield, Black, 1/1. Nylon, 1/1. B9A. Without bottom shield, Black, 10d. Nylon, 11d.

VHF Low Loss, 1/6. With bottom shield, Black, 1/6. Nylon, 1/7. Nylon with anti-microphonic mount, 2/3. Cans to fit, 2in., 9d.; 2 1/4in., 10d. International, Octal. Black Moulded, Amphenol, 6d.

COLORBOND PVC CONNECTING WIRE. Available stranded (1/32 s.w.g.) or single (1/22 s.w.g.) in eleven colours, 12 yards on handy metal spool, 2/6 each.

CRYSTAL SET COMPONENTS. Teltron HAX Crystal Set Coil. Specially made for use with crystal diodes. With circuit, 2-. Suitable Crystal, 2/6. Tuning Condenser, 3/10. Knob, 8d. Small metal chassis with aerial, earth and phone sockets, tuning dial, 2/9. Headphones, high impedance, 14/6, 17/6 and 21/6.

SUNBEAM. Multicore Ersin. 60/40 Radio Grade, 5-; 2/6 and 6d. packets. 1lb. Reels, 59/50, 15-. ARAX (not for radio), 6d.

EDDYSTONE COMPONENTS. Wide range in stock. Eddystone illustrated catalogue, 1-.

TOOLS

SCREWDRIVERS. Insulated with pocket clip, 1-. **PLIERS**. Pointed nose, 6in., 5/6. **SIDE CUTTERS**. 3in., 5/6.

SPECIAL OFFERS

COLLIARO Studio Pick-up. Available with "C" (High output) or "P" (Low output) input. Supplied with one piece arm or with plug-in head as required. Normally £3.15.2. **OUR PRICE £2.19.6d.**

ENGLISH ELECTRIC CATHODE RAY TUBES. T901. We have a limited number of these tubes at the very special price of £9.19.6. (Carriage 3/- extra).

BAND 3 CONVERTER COILS. Set of ready wound coils for the converter described in "Wireless World", May, 1954. Normally 15-.

RECORD CHANGERS

H.S.R.—The latest four-speed model. Fitted with ACOS turn-over cartridge, 27.19.6.

COLLIARO—RC456. The new four-speed model fitted with the famous Studio Pick-Up, £9.15.0.

GARRARD—RC88. The latest Garrard three-speed model. Garrard CC2 cartridge fitted, £13.5.0.

NEW STABILISERS—Coskor S100 in original boxes. Normally 7/6. **OUR PRICE 2-.**

LOUD SPEAKERS

GOODMANS. All 15 ohms. 8in. Axiette, £6.13.6. 12in. Audiom 60, £9.2.9. Axiom 150 Mk. II, £10.15.9. Acoustical Resistance Units, ARU72, £2.15.3. Goodmans Cross Over Chokes, 37" a pair, £ Special 10 mid. Paper Condensers for Cross Over Units, 18-.

WHITELEY H.F. RANGE.—All with universal speech coil. 5in. HF512, 51/8; 6in. HF512, 53/6; 8in. HF512, 83/6; 9in. HF512, 88/6; 10in. HF1012, 99/9. Also the new 8in. units, HF816, £8.17.0; T816, £8.10.0. Tweeter T10, £4.4.0. Cross over unit, 30-. Special Cross Over unit for T816, 38/6.

WHITELEY CABINETS. Packed flat for home assembly. Bass Reflex Corner Console for 10in., £11.11.0. Bass Reflex Console, £10.10.0. Hi-Fi Reproducer Console. For Tone Deck or Record Changer and amplifier with record storage space, £12.12.0. Illustrated leaflet available on Whiteley Speakers and Cabinets.

G.E.F.—The famous Metal Cone Speaker. £9.5.0. We now have the new Presence Unit for this speaker, £3.19.6. This is a "must" for all owners of the Metal Cone Speaker.

WIAFEDAL E. 10" Bronze/CSB, £5.11.3. 8in. Super 8/CS, £8.19.11.

TSL.—Moving Coil Tweeter, 39/6. Electrostatic Tweeters. LSHT5, 12/6. LS4518, 17/6. LSH100, 21-. 65 mH. Cross over chokes for TSL Tweeters, 7/6 each.

TEST INSTRUMENTS

AVO.—Model 8, £23.10.0. Model 7, £19.10.0. **TAYLOR**.—Model 71, £13.15.0. Montrose, £3.10.0.

PULLIN. Series 100, £13.15.0. Miniature, £9.15.0.

AMPLION.—Test Meter, £5.19.6.

PIPCO.—32/6.

ADVANT.—Signal Generator, P1, £22.10.0.

RADAR.—Kilo-Volter. For EHT measurements. Reads up to 30 kV., £3.19.6.

RECORDING TAPES

PURETONE.—Special Offer. 1,200ft. Paper Base Tape. Normally 21. Special Price, 15-.

LONG PLAY TAPE.—1,800ft. on 7in. reel. Scotch Boy, 54-. Emtape, 50-. BASF, 55-. 900ft. on 5in. reel. Scotch Boy, 35-. Emtape, 28-.

STANDARD TAPE. 1,200ft. on 7in. reel. Scotch Boy, 35-. Emtape, 35-. BASF, 40-. 600ft. on 5in. reel. Scotch Boy, 21-. Emtape, 21-.

CONTINENTAL TAPE.—550ft. Standard Tape on 5in. reel. Emtape, 28-. BASF, 34-.

We stock all sizes of empty spool and many tape accessories. Send for our Recording Tape List.

TELEVISION

CO-AX CABLE. First Grade. Semi-Air Spaced. Entirely suitable for Band 3. 10d. per yard.

CO-AX PLUGS AND SOCKETS.—Bellong Lee L734F Plug, 1/3. Chassis Sockets. Surface L604S, 1/3. Flush L734F, 1/-. Cable Sockets L734J. For making cable joints with standard plug, 2-. Sliding Box, 4/6. Insulated Plug for A.C./D.C. Sets, 1/3.

AERIAL CROSS OVER BOXES.—For combining the feeders from Band 1 and Band 3 Aerials. Bellong Lee, 13-.

ATTENUATORS.—Co-ax. Standard in type, 6, 12, 18, 24 and 36db., 5/6 each.

300 OHM FEEDER CONNECTORS.—Bellong Lee, Flex Plug L677/P, 10d. Flex Socket L677/J, 11d. Chassis Socket L733 S, 11d.

300 OHM FEEDER. Twin Plastic, 6d. yard.

C.R.T. ISOLATING TRANSFORMERS.—Elstone. Mains Primary with optional 20-, 30-, Boost. Made for either 2, 4, 6, 3 and 13 valve tubes. State voltage required when ordering, 18- each.

COIL FORMERS.—Haynes Type. With screening can. Two Types, 2in. and 1 1/2in. tall. Formers, 5d. each. Cans, 6d. each. Plug or plates, 1d. each. Cores, Standard, 1/6 or 2/6 each.

TELETRON CONVERTERS.—Mark 1 and 2. Instruction Leaflet, 3d. each. Coil Sets, Mk. 1, 15-; Mk. 2, 17/6. Drilled Chassis. Converter only, 3/9. Wide Chassis for converter and power unit, 6-. LF50 Valves, 10- each. Transformer, giving 200 v. and 6.3 v. for power pack, 10-. Suitable Rectifier, 250 v, 50 mA., 6/6.

VIEW MASTER CONVERTER.—We stock all the parts for this and to supply complete kits. Fully detailed list available.

VIEW MASTER AND TELEKING.—We have all items for these sets in stock.

FREQUENCY MODULATION

KITS.—We stock all components for the Jason (Radio Constructor), Denco, Mullard and Osram Circuits. All items available separately.

TSL TUNER.—We can supply this well-known F.M. Tuner, complete with power supply for £13.15.0.

JASON TUNER.—This latest model with penetrability built-in, available, £18.12.6. Power Unit, £13.0.6.

GRAMMOPHONE PICK-UPS

ACOS.—G230. Supplied with one HGP 39 Head. Please state whether standard or LP head is required. £3.12.0. Extra head, 44/6.

REPLACEMENT CARTRIDGES.—Acos RCP37, 41 7. Collaro Studio "C" and "P". 41 7. Collaro Transcription, 48/6.

REPLACEMENT STYLUS. We have a wide range of these. See our stylus list for full details. Collaro Studio "O" and "P", 7-. B.P. PICK-UP R.M.—Standard model, £3.2.11. All other B.J. items stocked, including the new Super Arm, £16.3.5.

HIGHWAYMAN BATTERY PORTABLE

We can supply full constructional details and all components for this excellent design. Complete kit, which includes a two-tone rexine cabinet, £10. Instruction envelope, 1/6. All items available separately.

CREDIT TERMS 3 - IN THE £ DEPOSIT

Anything we sell can be supplied on Credit Terms. The Deposit is 3 - in the £ and the balance in seven monthly payments. Send details of your exact requirements and we will send our quotation.

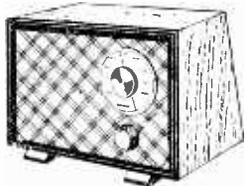
TERMS OF BUSINESS. Cash with order or C.O.D. Please add postage to orders under £3. We charge C.O.D. fees on C.O.D. orders under £5.

WATTS RADIO KINGSTON-ON-THAMES, SURREY

Telephone : KINGSTON 4099

Shop Hours : Monday, Tuesday, Thursday—9 a.m. to 5.30 p.m. Wednesday—9 a.m. to 1 p.m. Friday, Saturday—9 a.m. to 6 p.m.

THE SKYSEARCHER
An all mains set for 19/6



This is a 2-valve plus-metal rectifier set useful as an educational set for beginners, also makes a fine second set for the bedroom, workshop, etc. All parts, less cabinet, chassis and speaker, 19/6. Post & ins. 2/6. Data free with parts or available separately 1/6.

THE REALITE



This is a complete fluorescent fitting, stove-enamelled white, with starter and ballast all ready to install. Price 2/5-, plus 4/6 carriage and packing, 40-watt tube, 10/-, no extra for packing if ordered with fittings.

MINIATURE MOTOR



Size only 2 1/2 ins. long by 1 1/2 ins. diameter—American made—laminated poles and armature—intended for 28-volt D.C. but O.K. on lower D.C. voltages and A.C. mains, through step-down transformer—price 10/6, post, etc., 2/-.

MULTI-METER KIT



Parts suitable for making a multi-meter to measure volts, milliamps and ohms. Kit containing all the essential items including moving-coil meter, resistors, range selector, calibrated scale, etc., etc., is only 15/-, plus 1/- post and packing.

W.D. CIRCUIT DETAILS

Diagrams and other information extracted from official manuals. All 1/6 per copy, 12 for 15/-.

- American Service Sheets
- A.1134
 - DC.348
 - BC.312
 - R.103A
 - B.C.342
 - RA-1B
 - R-208
 - R-1155
 - R-1124A
 - R-1132A/R-1481
 - R-1147
 - R-1224A
 - R-1382
 - R-1355
 - B.C.1206-A/B
 - B-453-A (or-B)
 - B-453-A (or-B)
 - B-453-A (or-B)
 - Transmitter H1154
 - Fifty-eight walkie talkie
 - Frequency meter
 - B.C.221
- R.109
 - 78 receiver
 - 78 receiver
 - R28/ARC5
 - R1116/A
 - RA-1B
 - AR88D
 - AN/APA-1
 - 78
 - 76
 - R.T.18
 - CAV-46-AAM-
 - R.A.D.A.R.
 - A.S.B.-3
 - Indicator 62A
 - Indicator A.S.B.3
 - Indicator 62
 - Indicator 6K
 - R.F. unit 24
 - R.F. unit 26
 - R.F. unit 25
 - R.F. unit 27
 - Wireless set No. 19
 - Demobbed valves

The "CRISPIAN" Portable Radio

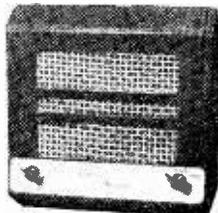


A 4-valve truly portable battery set with very many good features as follows: Ferrite rod aerials, low consumption valves, superhet. circuit with A.V.C. ready-built and aligned chassis if required, beautiful two-tone cabinet covered with I.C.I. Rexine and Tygan. Guaranteed results on long and medium waves anywhere. All parts, including speaker and cabinet, are available separately or if all ordered together the price is £7.15 complete, post and ins. 3/6, ready-built chassis 30/- extra. Instruction booklet free with parts or available separately price 1/6.

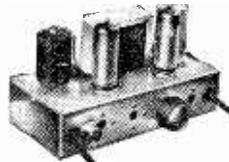
are available separately or if all ordered together the price is £7.15 complete, post and ins. 3/6, ready-built chassis 30/- extra. Instruction booklet free with parts or available separately price 1/6.

OFFICE INTERCOM.

This is a 2-station "master" unit comprising an A.C. mains operated push-pull amplifier with built-in P.M. speaker which acts as microphone or loudspeaker depending on whether switch is set to "talk" or "listen." Complete in polished cabinet ready to work. Price only £4/19/6, plus 3/6 carriage and insurance. Sub stations 19/6 each.

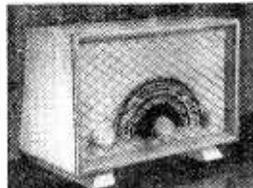


PRODUCTION INCREASED — CIRCUIT IMPROVED—PRICE REDUCED



To-day's best value in Band III Converters suitable for your T.V. or money refunded. Complete ready to operate. 49/6 non mains, or 69/6 mains, post and insurance, 3/6.

THIS MONTH'S SNIP. THE WOLSEY 4-VALVE SUPERHET



This excellent little receiver employs standard circuitry and is ideal as a second receiver for bedroom, kitchen, etc. It is a broadcast band set and will receive with only a few feet of aerial all stations of reasonable local strength. With a longer aerial hundreds of stations can be received. Complete, ready to work in modern-looking oak cabinet—limited quantity offered this month at £6.15.0, plus 5/- carriage and insurance. Overall size approximately 11 1/2" x 7" x 8".

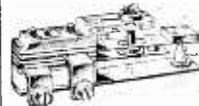
RECORD PLAYER £4/10/0



Latest rim drive 3-speed motor with metal turntable and rubber mat. Small mod. makes speed easily variable for special effects and dance work. Using famous Cosmocord HJ-G turn-over crystal. Separate sapphire for each speed. Neat bakelite case with pressure adjustment. **Special Snip Offer This Month** The two units for £4/10/-, plus 5/- post and insurance, or made up on board as illustrated, £5/10/-, plus 5/- post.

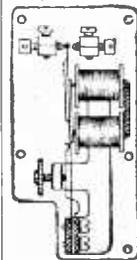
ELECTRIC BLANKET WIRE
Waterproof P.V.C. covered, so blanket washable. 161 ohms per foot—16 per yard. 14 yards, ideal for average blanket. £1 post free.

THERMOSTATS

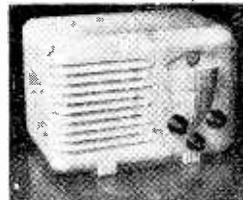


Useful for the control of appliances such as convector heaters, vulcanisers, hot plates, etc. Adjustable to operate over the temperature range 50-550 deg. F. 11 amp., 3/6; 25 amp., 8/6; 3 amp. QMB, 5/6; 5 amp. QMB, 15/-.

HIGH-SPEED RELAY



This is a miniature type relay with change-over platinum contacts. Bobbins are 250 ohms each. Brand new—limited quantity, 7/6 each, post 1/6.



MAINS-MINI

Uses high-efficiency coils, covers long and medium wavebands and fits into the neat white or brown bakelite cabinet—limited quantity only. All the parts, including cabinet, valves, in fact, everything, £4/10.0, plus 3/6 post. Constructional data free with the parts, or available separately 1/6.

CAR STARTER CHARGER KIT

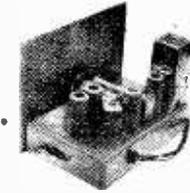
All parts to build 6- and 12-volt charger which can be connected to a "flat" battery and will enable the car to be started instantly. Kit comprising the following:—
Mains transformer 18/6
5-amp. rectifier 17/6
Regulator Stud Switch 3/6
Resistance Wire 2/6
Resistance Former 2/6
Mains on off Switch 1/-
0.5 amp. Moving Coil Meter 9/6
Constructional Data 1/6
or if bought all together price is 52/6, plus 2/- post and packing.

BABY ALARM



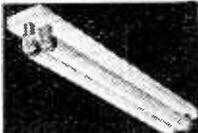
Unlike most baby alarms; this not only enables you to hear baby but also to talk to him. Price complete with one microphone and 10ft. twin flex, £6.19.6, carriage 3/6, additional microphone, 19/6.

F.M. TUNER



This tuner is based upon the very successful circuit published by Data Publications. We have made up models at all branches and will gladly demonstrate. Stability is extremely good and making and aligning most simple. Cost of all parts, including valves, prepared metal chassis, wound coils and stove enamelled scale, slow-motion drive, pointer, tuning knob, in fact everything needed, is £6/12/6. Data is included free with the parts or is available separately, price 2/-.

THE TWIN 20



This is a complete fluorescent lighting fitting. It has built-in ballast and starters—stove enamelled white and ready to work. It is an ideal unit for the kitchen, over the work-bench, and in similar locations. It uses two 20-watt lamps. Price, complete less tubes, 29/6, or with two tubes, 39/6. Post and insurance 5/-. Extra 20-watt tubes, 7/6 each.



MULLARD AMPLIFIER "510"

A Quality Amplifier designed by Mullard. Power output exceeds 10 watts. Frequency response almost flat from 10 to 20,000 C.P.S. For use with the Acros "Hi G" and other good pick-ups. Made up and ready to work for £12/10/- plus 10/- carriage and insurance.

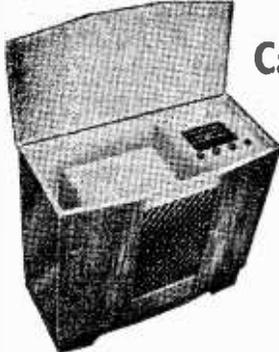


CONNECTING WIRE

P.V.C. covered in 100ft. coils—29 a coil or four coils—different colours. 10/- post free.

12in. T.V. CABINET—15/-

We are offering these at not much more than the cost of the plywood they contain. If not wanted for T.V. many useful items can be made—record storage cabinet, H.F. loudspeaker case, book case, etc., etc. Price 15/- carriage 3/6.



Cabinets For All

This is the "Empress," undoubtedly a beautiful piece of furniture, elegantly veneered in figured walnut and in white sycamore. The radio section is raised to convenient level but is not drilled or cut. The lower deck acts as the

motor board, again is uncut. It measures 16" x 14" and has a clearance of 3" from the lid. There is a compartment for the storage of recordings. Overall dimensions of this essentially modern cabinet are 3ft. wide, 2ft. 8in. high and 1ft. 4 1/2in. deep. Price £14.14.0. carriage and insurance 20/-.

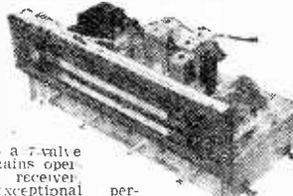
THE UNI—T.V.

Undoubtedly the most up-to-date television for the home constructor. You can build all or only part and the set when finished will be equal to a factory-made equivalent. What other constructor T.V. has all these features?

- ★ Made up units if required.
- ★ All miniature valves.
- ★ Metal rectifier.
- ★ No expensive transformers.
- ★ 13-channel circuitry.
- ★ Multi-vibrator time bases.
- ★ Ferrux cube, E.H.T. and scan coils.
- ★ 34/37 Mc/s I.F.
- ★ Suitable for any modern 12, 14 or 17in. tube.
- ★ Modern contemporary cabinet if required.

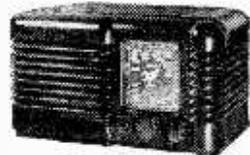
The building cost (less tube) is only £29.10.0, plus 10/- carriage and insurance. All parts guaranteed 12 months. Full information and data free with parts or available separately price 3/6.

AM/FM RADIOGRAM CHASSIS



This is a 7 valve A.C. mains operated receiver. An exceptional performer on long, medium and short A.M. bands and on the new V.H.F. Land. It is an ideal unit for a quality radiogram. Special features include magic eye tuning indicator, extra long scale and pointer travel—latest circuitry employing full A.V.C. feed-back, etc., etc. Undoubtedly one of the finest AM/FM chassis available today. Chassis size 17in. x 6 1/2in. x 7 1/2in. Price £29/17/6. Carriage, packing and insurance 20/- extra.

NEW CIRCUIT



OCCASIONAL 56—we have evolved a new T.R.F. circuit and have had really good results, equal in fact to many superhets. You really should try this circuit. All parts including valves (6K7, 6J7, 6V6, and 6X5) and Bakelite case with back cost only £5/10/-, plus 2/6 post and insurance. Data included with the parts is also available separately, price 2/-.

HUGE MINISTRY PURCHASE

R.1155—yours for £2 down

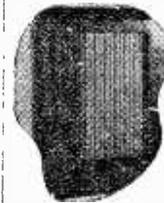
Frequency 75 kc/s to 18 mc/s—10 valves—metal case—robust receiver

—cost over £69 to make—will give 10 years of service, very little used. Price £10 or 5 payments of £2. Carr. & transit case 15/- ex.



SOMWEAVE

This really lovely loud-speaker fabric we offer at approximately a third of today's cost. It is 42in. wide and our price is 12/- per yard, or panels 12in. x 12in., 1/3 each. This is also very suitable for covering plain wooden case, for portable radio amplifiers, etc.



INDUSTRIAL OVERHEAD HEATER



Garages, large workshops, and other places difficult or impossible to heat by normal means can now have "warm spots" at relatively low cost (1d. per hour where

electricity costs 1d. per unit). The Infray Major gives light as well as heat and has controls giving four variations. Consumption at full power is 1 kW. Price complete with chains, ready to work, £7.10.0, carriage and insurance 5/-.

ELECTRONIC PRECISION EQUIPMENT, LTD.

Post orders should be addressed to E.P.E., LTD., Dept. 5, 123, Terminus Road, Eastbourne. Post enquiries to Eastbourne with stamped envelope, please.

- | | | | |
|---------------------------------------|-----------------------------|---|---|
| 42-46, Windmill Hill, Ruislip, Middx. | 152-3, Fleet Street, E.C.4. | 29, Stroud Green Rd., Finsbury Park, N.4. | 249, Kilburn High Road, Kilburn, Maida Vale 4921. |
| Phone: RUISLIP 5780 | Phone: FLEET 2833 | Phone: ARCHWAY 1049 | |
| Half day, Wednesday. | Half day, Saturday. | Half day, Thursday. | |

THE "WEYRAD" AM/FM RECEIVER

A COMPLETELY NEW DESIGN SPECIALLY DEVELOPED
FOR THE AMATEUR CONSTRUCTOR

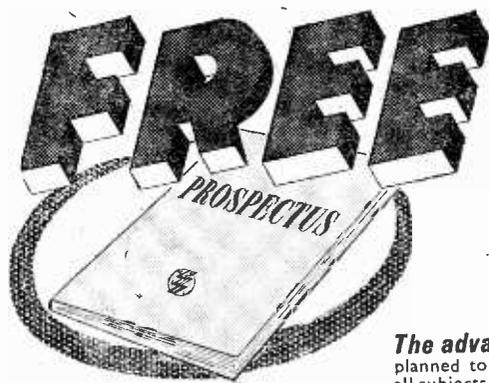
This publication gives full information on the Assembly and Alignment of a Four-Band Seven-valve Receiver, including All Chassis details, Circuits and Wiring Diagram.

Up-to-the-minute components and valves provide a high standard of performance (equivalent to an eight-valve circuit) and complete coverage of the sound broadcast bands, ensuring that the set will not "date" for many years.

- ★ Latest Type Mullard Valves
- ★ "Weyrad" Coil Pack, I.F. Transformers, Tuning Scale, I.F. Filter, Mains and Output Transformers
- ★ Aluminium Chassis available with all punching and bending complete
- ★ All Condensers, Resistors and other components by well-known manufacturers

FULLY ILLUSTRATED BOOKLET, PRICE 2s. 6d.

WEYMOUTH RADIO MANUFACTURING CO., LTD., CRESCENT ST.
WEYMOUTH, DORSET



**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
15/- 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



FOR VALVES
GUARANTEED
ALL TESTED
BEFORE
DESPATCH

0Z1	5/6	6174	8/3	EF80	10/-	
1A5	3/6	6V6GT	7/-	EP22	8/6	
1A5GT	6/-	6V6GT	7/6	CL50	10/6	
1A7	11/6	6X4	7/6	EF41	11/-	
1C2	9/6	6X5GT	7/8	EP86	12/6	
1C2GT	9/6	6X5GT	7/6	EP89	12/6	
1H5GT	10/6	7B5	9/6	EL2	2/6	
1L4	6/6	7B7	8/6	EL32	6/6	
1L15	5/-	7C5	8/-	EL41	10/6	
1N5	10/6	7C6	8/-	EL42	11/6	
1R5	8/-	7H7	9/-	EL44	11/-	
1R5GT	9/6	7H7	9/-	EM34	10/-	
1R5	7/8	7H7	8/6	EM39	11/-	
1T4	7/8	7Y4	8/6	EY51	11/6	
1U5	7/6	7Y	10/6	EY86	12/-	
2X2	4/8	7/7	8/6	EY91	6/-	
3A1	7/-	80	8/6	EZ40	10/-	
3D6	5/6	807	6/6	EZ41	11/-	
3Q4	9/6	8D2	2/9	EZ50	10/-	
3Q5	9/6	8D2	3/9	E1148	2/-	
3R4	7/6	8001	5/6	FW4,300	10/-	
3V4	8/6	8003	5/6	GZ32	12/6	
4D4	3/-	8004	5/8	H30	5/-	
42	8/-	9006	5/8	HL2	3/-	
5R4GY	9/6	954	2/-	HL320	4/-	
5U4C	8/-	955	4/9	HL320D1	8/-	
5Y4G	8/-	955	3/8	KL35	8/6	
5Y4GT	8/-	10C1	12/6	KT2	5/-	
5Z44	8/6	10C2	10/6	KT33C	10/6	
6V7	11/6	10F1	11/-	KT61	13/-	
6B4G	10/6	10F9	11/6	KT66	12/-	
6A47	6/6	10P13	11/6	KTW61	7/6	
6A45	6/6	10P14	13/6	KTW63	8/6	
6A63	6/6	10P15	13/6	KTZ41	6/-	
6A15	6/6	12A47	8/-	LP29	5/9	
6AM5	5/-	12A77	9/6	MS/PEN	5/9	
6AM6	7/6	12A77	9/6	P91	3/-	
6A45	7/6	12A77	10/6	P215	5/-	
6A76	8/6	12B56	10/6	PEX25	5/-	
6B8	4/-	12C8	7/-	PEX40	7/-	
6B46	7/6	12H6	3/-	PEX220A	4/-	
6B56	8/6	12J5	4/6	PCX84	10/-	
6B59	8/6	12J7	9/6	PCF80	9/6	
6B57	10/-	12K7	9/6	PCF82	12/6	
6C4	7/6	12K8	11/6	PCX83	12/6	
6C5GT	6/6	12Q7	9/6	PL81	12/6	
6C6	6/6	12S07	2/8	PL82	10/6	
6C9	10/6	12S67	7/6	PL83	12/6	
6C16	7/6	12S47	3/8	PP225	5/-	
6D5	6/6	12S77	8/6	PK25	13/6	
6F1	12/6	12K87	8/6	PY80	10/6	
6F6G	7/6	12S07	3/8	PY81	10/6	
6F6M	7/6	12R17	7/6	PY82	8/-	
6F13	14/-	15D2	5/-	R19	13/6	
6F14	12/6	20A1	10/6	SP220	6/9	
6F15	15/-	20P2	13/6	U10	9/-	
6G6G	4/6	20L1	12/6	U22	8/-	
6H6	2/6	25L6GT	9/8	U25	13/6	
6J5G	5/-	25T4GT	10/-	U403	10/-	
6J5GT	5/6	25V5	9/6	U404	11/8	
6M	6/6	25V24	9/9	U4F42	11/6	
6M6	6/6	25Z4G	9/-	UB41	9/-	
6J7C	6/-	25Z6GT	9/6	UBC41	10/-	
6K69	7/-	25L7GT	9/-	UBC42	11/-	
6K70	5/9	33V4	9/-	UP41	10/-	
6K7M	6/9	35Z4GT	9/6	UL41	11/-	
6K8G	8/9	35Z5	9/-	UY41	10/-	
6K8GT	6/9	50L6GT	8/6	VR21	3/-	
6L6G	6/6	50L6GT	8/6	VR53 (EP59)	VR25	6/3
6L7	7/6	ATP4	5/-	VR54 (EP59)	VR54	6/6
6N7	7/6	EP75M	10/-	VR54 (EP59)	VR54	6/6
6Q7GT	9/-	EAP30	10/-	VR55 (EP59)	VR55	7/8
6SA7GT	8/-	EAP42	12/6	VR56 (EP59)	VR56	7/8
6M67	7/6	EB41	9/-	VR57 (EP59)	VR57	8/6
6M17	6/-	EB44	10/-	VR58 (EP59)	VR58	8/6
6M17	6/-	EB44	10/-	VR59 (EP59)	VR59	8/6
6M17	6/-	EB44	10/-	VR60 (EP59)	VR60	8/6
6M17	6/-	EB44	10/-	VR61 (EP59)	VR61	8/6
6M17	6/-	EB44	10/-	VR62 (EP59)	VR62	8/6
6M17	6/-	EB44	10/-	VR63 (EP59)	VR63	8/6
6M17	6/-	EB44	10/-	VR64 (EP59)	VR64	8/6
6M17	6/-	EB44	10/-	VR65 (EP59)	VR65	8/6
6M17	6/-	EB44	10/-	VR66 (EP59)	VR66	8/6
6M17	6/-	EB44	10/-	VR67 (EP59)	VR67	8/6
6M17	6/-	EB44	10/-	VR68 (EP59)	VR68	8/6
6M17	6/-	EB44	10/-	VR69 (EP59)	VR69	8/6
6M17	6/-	EB44	10/-	VR70 (EP59)	VR70	8/6
6M17	6/-	EB44	10/-	VR71 (EP59)	VR71	8/6
6M17	6/-	EB44	10/-	VR72 (EP59)	VR72	8/6
6M17	6/-	EB44	10/-	VR73 (EP59)	VR73	8/6
6M17	6/-	EB44	10/-	VR74 (EP59)	VR74	8/6
6M17	6/-	EB44	10/-	VR75 (EP59)	VR75	8/6
6M17	6/-	EB44	10/-	VR76 (EP59)	VR76	8/6
6M17	6/-	EB44	10/-	VR77 (EP59)	VR77	8/6
6M17	6/-	EB44	10/-	VR78 (EP59)	VR78	8/6
6M17	6/-	EB44	10/-	VR79 (EP59)	VR79	8/6
6M17	6/-	EB44	10/-	VR80 (EP59)	VR80	8/6
6M17	6/-	EB44	10/-	VR81 (EP59)	VR81	8/6
6M17	6/-	EB44	10/-	VR82 (EP59)	VR82	8/6
6M17	6/-	EB44	10/-	VR83 (EP59)	VR83	8/6
6M17	6/-	EB44	10/-	VR84 (EP59)	VR84	8/6
6M17	6/-	EB44	10/-	VR85 (EP59)	VR85	8/6
6M17	6/-	EB44	10/-	VR86 (EP59)	VR86	8/6
6M17	6/-	EB44	10/-	VR87 (EP59)	VR87	8/6
6M17	6/-	EB44	10/-	VR88 (EP59)	VR88	8/6
6M17	6/-	EB44	10/-	VR89 (EP59)	VR89	8/6
6M17	6/-	EB44	10/-	VR90 (EP59)	VR90	8/6
6M17	6/-	EB44	10/-	VR91 (EP59)	VR91	8/6
6M17	6/-	EB44	10/-	VR92 (EP59)	VR92	8/6
6M17	6/-	EB44	10/-	VR93 (EP59)	VR93	8/6
6M17	6/-	EB44	10/-	VR94 (EP59)	VR94	8/6
6M17	6/-	EB44	10/-	VR95 (EP59)	VR95	8/6
6M17	6/-	EB44	10/-	VR96 (EP59)	VR96	8/6
6M17	6/-	EB44	10/-	VR97 (EP59)	VR97	8/6
6M17	6/-	EB44	10/-	VR98 (EP59)	VR98	8/6
6M17	6/-	EB44	10/-	VR99 (EP59)	VR99	8/6
6M17	6/-	EB44	10/-	VR100 (EP59)	VR100	8/6

Packing and Postage - 6d. per valve.
SAME DAY SERVICE

ARE YOU BUILDING THIS POPULAR KIT ?

Modern Portable. A.C./D.C. Mains/Battery Receiver. Four valves, DK96, DL96, etc. 2 Waveband Superhet. In an attractive Lizard Grey Case, size 8 1/2 in. x 8 1/2 in. x 4 1/2 in. Full Kit of Parts down to last nut and bolt.

£9.9.0.



Or if you prefer you can build the battery version first, for £7/17/6 and add the mains components later. Post extra on Kit 3/-.

Full Circuit Diagram, Shopping List, and Point-to-Point Wiring Diagram, 2/6.

MAINS TRANSFORMERS—3-way Mounting Type

MT1: Primary: 200-220-240 v. Secondaries: 250-0-250 v. 80 m/a 0.6:3 v. 4 amp. 0-1 v. 2 amp. Both tapped at 4 v. ... each 18/6

MT2: Primary: 200-220-240 v. Secondaries: 350-0-350 v. 80 m/a 0.6:3 v. 4 amp. 0-3 v. 2 amp. Both tapped at 4 v. ... each 19/3

MT3: Primary: 200-220-240 v. Secondary: 50 v. 2 amps. Taps at 3 v., 4 v., 6 v., 8 v., 9 v., 10 v., 15 v., 18 v., 20 v., 24 v. ... each 18/6

Please add 2/- per transformer post and packing.

SPECIAL OFFER

Indicator Unit Type 6 with Tube. Less Valves. Many useful Components 17.3. Carriage Paid. Antiferret Aerial Type C/D4 Indoor ... with full instructions, etc. 13/6, each. Carriage Paid.

Aerial to Band III Aerials

5 element, 702 A7. An array with universal lin.-2in. mast-head bracket, suitable channels 8, 9 and 10. Price 41/-, carriage 4/6. Aerolite Coaxial outlet boxes at 4/6 each. Aerolite Coaxial plugs and sockets at 1/1 each. Transformers T1154N, 25/- each. Transformers T1154H, 37/- each. Transformers T1154 in rough condition, 15/- each. Carriage and postage on above transformers is 12/6. Meters 0-100 m.a. panel mounting, 7/8 each. Meters 0-5 amp. R.F. panel mounting, 7/6 ea.

GRT ISOLATION TRANSFORMERS

NR9A 2 v.; NR9B 4 v.; NR9C 6.3 v.; NR2D 10.5 v.; NR9E 12.5 v. Price 10.8/6 each, all for use on receivers with own transformer. NR14 Input 220/240 v., output 2-21-21-21-3 volts at 2 amps. 17/8 each. NR12 Input 220/240 v. Mains output 0-2-4-6-8-10-12 volts 25%, and 50%, BOOST, 21/- each. NR15 Input 220/240 v. Output 6.3 v. with 25% and 50% BOOST. Price 17/6 each.

OUR ILLUSTRATED CATALOGUE

IS NOW AVAILABLE

Send 6d. in stamps for your copy.

VR51 (EP59)	4/-
VR51 (Sylvania)	4/-
VR52 (CA50)	1/6
VR53 (EP59)	6/6
VR54 (EP59)	6/6
VR55 (EP59)	7/8
VR56 (EP59)	8/6
VR57 (EP59)	8/6
VR58 (EP59)	8/6
VR59 (EP59)	8/6
VR60 (EP59)	8/6
VR61 (EP59)	8/6
VR62 (EP59)	8/6
VR63 (EP59)	8/6
VR64 (EP59)	8/6
VR65 (EP59)	8/6
VR66 (EP59)	8/6
VR67 (EP59)	8/6
VR68 (EP59)	8/6
VR69 (EP59)	8/6
VR70 (EP59)	8/6
VR71 (EP59)	8/6
VR72 (EP59)	8/6
VR73 (EP59)	8/6
VR74 (EP59)	8/6
VR75 (EP59)	8/6
VR76 (EP59)	8/6
VR77 (EP59)	8/6
VR78 (EP59)	8/6
VR79 (EP59)	8/6
VR80 (EP59)	8/6
VR81 (EP59)	8/6
VR82 (EP59)	8/6
VR83 (EP59)	8/6
VR84 (EP59)	8/6
VR85 (EP59)	8/6
VR86 (EP59)	8/6
VR87 (EP59)	8/6
VR88 (EP59)	8/6
VR89 (EP59)	8/6
VR90 (EP59)	8/6

LOUD SPEAKERS

All PM Types 1:33 Transformers

5in. Types by Elec. Lectra. Celestian, etc. ...	17/3
6 1/2in. Types by Goodmans, Roln. R. & A. ...	18/6
8in. Types by Goodmans, Plessey, R. & A. ...	19/3
10in. Types by R. & A. Celestian, etc. ...	25/3
6 1/2in. Wafar Speaker by Truvox, suitable for Car Radio, etc. ...	50/-
12in. Plessey Lightweight ...	25/-
Elliptical Speakers, Goodmans, 4in. x 7in. ...	10/3



OUTPUT TRANSFORMERS	CHARGER RECTIFIERS—All Full Wave
Multi Ratio Type, each ...	6/3
Midget for 384 Output, each ...	4/8
Standard 5,000 ohms, each ...	4/6
Standard 10,000 ohms, each ...	4/6
12 volt 1 amp., each ...	5/3
12 volt 2 amp., each ...	8/6
12 volt 3 amp., each ...	13/3

WHEN ORDERING PLEASE QUOTE DEPT. "PW."

5/6 VINCES CHAMBERS VICTORIA SQUARE LEEDS I.

TERMS: Cash with order or C.O.D. Postage and Packing charges extra, as follows: Orders value 10/- add 1/-; 20/- add 1/6; 40/- add 2/-; £5 add 3/- unless otherwise stated, Minimum C.O.D. fee and postage 3/-. All single valves postage 6d.
MAIL ORDER ONLY

R.S.C. BATTERY CHARGING EQUIPMENT

ASSEMBLED CHARGERS

- 6 v. 1 amp. 19/9
 - 6 v. or 12 v. 1 amp. 25/9
 - 6 v. 2 amps. 29/9
 - 6 v. or 12 v. 2 amps. 38/9
 - 6 v. or 12 v. 4 amps. 56/9
- Above ready for use. Carr. 2/9.
With mains and output leads.

HEAVY DUTY KIT

12 v. 30 amp. Suitable for Garage or firm with a number of vehicles. Mains input 200/250 v. 50 c/s. Outputs 12 v. 15 amp. twice. Consists of Mains Trans. 2 Metal Rectifiers, 2 Meters, 4 Fuses, 4 Terminals, 2 Rheostats and circuit. Only 9 gns., carr. 15/-.

BATTERY CHARGER KITS

Consisting of Mains Transformer, F.W. Bridge, Metal Rectifier, well ventilated steel case. Fuses, Fuse holders, Grommets, panels and circuit. Carr. 2/6 extra.

- 6 v. or 12 v. 1 amp. 22/9
- 6 v. 2 amps. 25/9
- 6 v. or 12 v. 2 amps. 31/6
- 6 v. or 12 v. 4 amps. 49/9

BATTERY CHARGER KIT

Consisting of F.W. Bridge Rectifier 6/12 v. 5 a. Mains Trans., 0-9-15 v. 6 a. output and variable charge rheostat with knob. Only 45/9.

ASSEMBLED CHARGER

6 v. or 12 v. 2 amps. Fitted Ammeter and selector plug for 6 v. or 12 v. Louvred metal case, finished attractive hammer blue. Ready for use. With mains and output leads. Double Fused. Only 46/9 Carr. 3/6.

All for A.C. MAINS 200-250 v., 50 c/s. Guaranteed 12 months.



Assembled 6 v. or 12 v. 4 amps. Fitted Ammeter and variable charge selector. Also selector plug for 6 v. or 12 v. charging. Double fused. Well ventilated steel case with blue hammer finish. **69/6**
Ready for use with mains and output leads. Carr. 3/6.

R.S.C. MAINS TRANSFORMERS (GUARANTEED)

Interleaved and impregnated. Primaries 200-230-250 v. 50 c/s Screened. TOP SHROUDED DRY THROUGH

- 250-250 v. 70 mA. 6.3 v. 2.5 a. 13/9
- 250-0-250 v. 70 mA. 6.3 v. 2.5 a. 5 v. 2 a. 16/9
- 300-0-300 v. 70 mA. 6.3 v. 2.5 a. 16/9
- 350-0-350 v. 80 mA. 6.3 v. 2.5 a. 5 v. 2 a. 18/9
- 250-0-250 v. 100 mA. 6.3 v. 4 a. 5 v. 3 a. 22/9
- 300-0-300 v. 100 mA. 6.3 v. 4 a. 5 v. 3 a. 22/9
- 350-0-350 v. 100 mA. 6.3 v. 4 a. 5 v. 3 a. 22/9
- 350-0-350 v. 100 mA. 6.3 v. 4 a. C.T. 0-4-5 v. 3 a. 23/9
- 350-0-350 v. 150 mA. 6.3 v. 4 a. 5 v. 3 a. 29/9

FULLY SHROUDED UPRIGHT FILAMENT TRANSFORMERS

All with 200-250 v. 50 c/s primaries 6.3 v. 1.5 a. 5/9; 6.3 v. 2 a. 7/6; 0-4-6-3 v. 2 a. 7/9; 12 v. 1 a. 7/11; 6.3 v. 3 a. 8/11; 6.3 v. 6 a. 17/8; 12 v. 3 a. or 24 v. 1.5 a. 17/8.

CHARGER TRANSFORMERS

All with 200-230-250 v. 50 c/s Primaries: 0-9-15 v. 11 a. 11/9; 0-9-15 v. 3 a. 16/9; 0-3-5-9-17 v. 3 a. 17/9; 0-3-5-9-17.5 v. 4 a. 18/9; 0-9-15 v. 5 a. 19/9; 0-9-15 v. 6 a. 22/9.

SMOOTHING CHOKES

- 250 mA 5 H 100 ohms 12/9
- 150 mA 7-10-250 ohms 11/9
- 100 mA 10 H 200 ohms 8/9
- 80 mA 10 H 350 ohms 5/6
- 60 mA 10 H 400 ohms 4/11

OUTPUT TRANSFORMERS

Midget Battery Pentode 66; 1 for 354. etc. 3/9

Small Pentode 5,000 Ω 3 Ω 3/9

Small Pentode 78,000 Ω to 3 Ω 3/9

Standard Pentode, 5,000 Ω to 3 Ω 4/9

Standard Pentode, 78,000 Ω to 3 Ω 4/9

Multi-ratio 40 mA. 30:1, 45:1, 60:1, 80:1, Class B Push-Pull 5/6

Push-Pull 10-12 watts 6V6 to 3 Ω or 15 Ω 15/9

Push-Pull 10-12 watts to match 6V6 to 3-5-8 or 15 Ω 16/9

Push-Pull 15-18 watts, 6L6, KT66, 22/9

Push-Pull 20 watts, sectionally wound 6L6, KT66, etc., to 3 or 15 Ω 47/3

Williamson type exact to spec. 85/-

UNREPEATABLE OFFER

5Y3G, 5/9 5U4G, 6/9 6K7G, 2/9
 MU14, 7/9 5Z4G, 7/9 KT44, 5/9
 35Z4, 5/9 EF80, 6/9 ECC83, 6/9
 6J5G, 3/9

6SN7GT, 6SL7GT, 5/9

MANUFACTURERS' SURPLUS MAINS TRANSFORMERS. Primaries 250-250 v. 50 c/s. Fully shrouded upright mounting 425-0-425 v. 150 mA. 6.3 v. 3 a. 5 v. 3 a. 29/11, post 29. Wearite 325-0-325 v. 100 mA. 6.3 v. 2.5 a. 5 v. 2 a. 19/8. Drop Through Chassis type 250-0-250 v. 70 mA. 6.3 v. 2.5 a. 10/9.

EX-GOVT. TRANSFORMERS. 230/250 v. 50 c/s 8.8 v. 4 a. 9/9; 460 v. 200 mA. 6.3 v. 5 a. 25/9; 300-0-300 v. 150 mA. 4 v. 3 a. 9/9; 0-10-10-20 v. 35 a. 69/8, carr. 7/6.

EX-GOVT. SMOOTHING CHOKES

- 250 mA, 5 H 50 ohms 12/9
- 150 mA, 10 H 100 ohms 11/9
- 150 mA, 6-10 H 150 ohms Trop. 6/9
- 100 mA, 10 H 150 ohms Tropicalised 3/11
- L.T. type 1 amp. 2 ohms 2/9

EX-GOVT. METAL BLOCK (PAPER) CONDENSERS

- 4 mfd. 500 v., 2/9; 4 mfd. 1,000 v., 2/9;
- 4 mfd. 1,500 v., 5/9; 6 mfd. 500 v., 6/9;
- 8 mfd. 500 v., 4/9; 10 mfd. 500 v. 6/9;
- 15 mfd. 500 v., 6/9; 4 mfd. 400 v. plus 2 mfd. 250 v., 1/11.

EX-GOVT. E.H.T. SMOOTHERS

- 5 mfd. 2,500 v. Blocks, 3/9; 1 mfd. plus 1 mfd. 8,000 v., 9/8.

EX-GOVT. ELECTROLYTICS. Removed from unused equipment. 6-16 mfd. 550 v., 1/3; 16-16 mfd. 350 v., 1/3; 1,000 mfd. 6 v., with clip. 1/9; 50 mfd. 50 v., with clip. 8d.

CONTROL PANEL with six position, 3 wafer Yaxley switch, pointer knob, 2 S.P.S.T. switches, various plugs and sockets. Only 1/6.

EX-GOVT. VALVES (NEW)

1T1	7/9	6X3GT	7/9	EB91	5/9
1R5	7/9	6L6G	11/9	EF33	4/9
1S5	7/9	807	7/9	EL32	5/9
8K9G	9/9	12A5	7/9	EL91	5/9
6K9G	9/9	15D4	4/9	KT63	11/9
6S17GT	6/9	25Z4G	9/9	SP41	1/11
EF39	5/9	MH4	4/9	SP21	2/9
6V6GT	6/9	6AT3	7/9	FX25	14/9

EX-GOVT. UNIT RDE1. Brand new, cartoned. Complete with 14 valves, including 524, E.H.T. rectifier, Trans. Choke, etc. Only 29/9, carr. 7/6.

ELECTROLYTICS (current production) NOT EX-GOVT. Can Type:

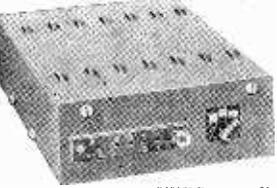
Tubular Types	8 mfd. 600 v., 2/11
8 μ F 450 v. 1/9	16 mfd. 500 v. 3/9
8 mfd. 500 v. 2/6	16 mfd. 350 v. 1/11
16 μ F 350 v. 2/3	15 μ F 450 v. 2/9
16 μ F 450 v. 2/9	32 μ F 350 v. 2/11
16 μ F 500 v. 3/9	32 mfd. 450 v. 4/9
32 μ F 350 v. 3/9	100 mfd. 450 v. 4/9
32 mfd. 500 v. 5/9	8-8 μ F 450 v. 2/9
15 μ F 25 v. 1/3	8-16 μ F 450 v. 2/11
30 μ F 12 v. 1/3	16-16 μ F 450 v. 3/11
50 μ F 25 v. 1/6	16-32 μ F 350 v. 4/9
50 μ F 50 v. 1/9	32-32 μ F 350 v. 4/9
100 mfd. 12 v. 1/9	32-32 μ F 450 v. 5/9
100 mfd. 25 v. 2/3	60-100 mfd. 6/11
6,000 mfd. 6 v. 3/9	350 v. 6/11
	64-120 mfd. 350 v. 7/9
	100-200 mfd. 6/9
	275 v. 6/3

Many others in stock.

HUNTS MOLDSEAL CONDENSERS. .005 mfd. 400 v., .01 mfd. 400 v., .04 mfd. 50 v., 5.6 doz. (one type); .1 mfd. 350 v., 8d. ea.; .25 mfd. 500 v., 1/3; .5 mfd. 500 v., 1/8 ea.

R.S.C. BATTERY TO MAINS CONVERSION UNITS

Type BM1. An all dry battery eliminator. Size 5" x 4" x 2 1/2". approx. Completely replaces batteries supplying 1.4 v. and 90 v. where A.C. mains 200-250 v. 50 c/s. is available. Suitable for all battery portable sets requiring 1.4 v. and 90 v. This includes latest low consumption types. Complete kit with diagrams, 39/9, or ready for use. 46/9.



Type BM2. Size 8 x 5 1/2 x 2 1/2 in. Supplies 120 v., 50 v., and 90 v. 40 mA. and 2 v. 0.4 to 1 amp. fully smoothed. Thereby completely replacing both H.T. batteries and L.T. 2 A. accumulators. When connected to A.C. mains supply 200-250 v. 50 c/s. **SUITABLE FOR ALL BATTERY RECEIVERS** normally using 2 v. Accumulator. Complete kit of parts with diagrams and instructions 49/9, or ready for use 59/6.

H.T. ELIMINATOR AND TRICKLE CHARGER KIT. Input 200-250 v. A.C. Output 120 v. 40 mA. Fully smoothed and rectified supply to charge 2v. accumulator. Price with louvred metal case and circuit, 29/6. Or ready for use, 8/9 extra.

EXTENSION SPEAKERS

Ready for use in walnut veneered cabinet.

- 6in. 2-3 ohms. 29/6.
- 8in. 2-3 ohms. 35/9.

Very limited number



SPECIAL OFFERS 8-8 mfd. 450 v. small can electrolytics in lots of six. 1/8 ea. Small .0005 mfd. 2 Gangs. 4/9 ea.

VOLUME CONTROLS with long (in. diam.) spindle, all valves less switch. 2/9; with S.P. switch, 3/9; with D.P. switch, 4/6.

T.V. CABINETS. Leading manufacturers surplus. Attractive design. Walnut veneered, with doors for 15, 16, or 17in. Tube. 23-19-3. Carr. 7/6.

R.S.C. A8 ULTRA LINEAR 12 WATT AMPLIFIER

NEW 1956 Model High-Fidelity Push-Pull Amplifier with "Built-in" Tone Control, Pre-amp stages. High sensitivity. Includes 5 valves (807 outputs). High Quality sectionally wound output transformer, specially designed for Ultra Linear operation, and reliable small condensers of current manufacture. **INDIVIDUAL CONTROLS FOR BASS AND TREBLE** - Lift and "Cut." Frequency response - 3 db. 30-30,000 c/s. Six negative feedback loops. Hum level 71 db. down. **ONLY 70 millivolts INPUT** required for FULL OUTPUT. Suitable for use with all makes and types of pick-ups and practically all microphones. Comparable with the very best designs. For STANDARD or LONG-PLAYING RECORDS. For MUSICAL INSTRUMENTS. Such as STRING BASS, GUITARS, etc. **OUTPUT SOCKET** with plug provides 300 v. 20 mA. and 6.3 v. 1.5 a. For supply of a **RADIO FEEDER UNIT**. Size approx. 12-9-7in. For A.C. mains 230-250 v. 50 c/s. Outputs for 3 and 15 ohm speakers. Kit is complete to fast run. Chassis is fully punched. Full instructions and point-to-point wiring diagrams supplied. Unapproachable value at £7/15-, or factory built 45/- extra. Carriage 10/-.

£7-15-0

If required louvred metal cover with 2

FOUR STAGE RADIO FEEDER UNIT. Design of a High-Fidelity Tuner Unit T.R.F. L. & M. Wave. Full decoupling. Only 250-400 v. 10-15 mA. H.T. required from a main amplifier. Three valves and low distortion Germanium diode detector. Flat-topped response characteristic. Loaded H.F. coils. Two Variable-Mu controlled H.F. stages. 3-Gang condenser tuning. Detailed wiring diagrams, parts lists and illustration. 2/3. Total building cost, £3 15-.

QUALITY SUPERHET FEEDER UNIT DESIGN. L. & M. Wave. Detailed Wiring Diagram, instructions (including simple alignment procedure), parts list and illustration. 2/6. Delayed A.V.C. Gram. position on waverange switch. Power supply required 230 v. 15 mA. 6.3 v. 1 amp. Especially suitable for use with any of our amplifiers, or any other high-quality unit. Total cost of all parts, £4 15-. Descriptive leaflet, 6d.

GARRARD 3-SPEED MIXER AUTO-CHANGER RC110. Current Model. Brand new, cartoned. Provision for taking 10 records. Fixed high-fidelity turnover pick-up head with dual sapphire point stylus for Standard or Long-playing records. Very limited number at only £8 17/6. Carr. 5/6. Or deposit 3 gns. and six fortnightly payments of 1 gn.

DEFIANT RECORD PLAYING UNITS. Turntable for standard 10in. and 12in-7 1/2 r.p.m. records (fitted auto-stop) and high impedance magnetic pick-up mounted in attractive polished walnut finish drawer-type cabinet. Exceptional value at £5 17/6, plus 7/6 carr.

B.S.R. MONARCH 3-SPEED MIXER AUTO-CHANGER. For standard 200-250 v. 50 c/s. mains. Autochanges on all 3 speeds. Plays 7in., 10in., and 12in. records. Separate sapphire stylus for L.P. and 78 r.p.m. High-fidelity type crystal pick-up. Minimum baseboard size needed 4 1/2 in. x 12 in. x 5 1/2 in. Brand new, cartoned, at £7 15 - carr. 3/6.

WALNUT VENEERED CABINETS (Ex. leading manufacturers Table Radiogram Cabinets) designed for above B.S.R. Changers. Brand new, cartoned. Only £3 19/6. Carr. 7/6.

3-4 WATT QUALITY AMPLIFIER. Designed for use with B.S.R. or Garrard Auto-changers. Features Bass and Treble controls, Vol. Control and mains-switch. Latest type B.V.A. valves used. For 200-250 v. A.C. mains. Ready for use. Only £3 10/6. Carr. 3/6.

ELLIPTICAL P.M. SPEAKER. 7 x 4in. Goodmans. Suitable for above. 19/6.

Terms: C.W.O. or C.O.D. No C.O.D. under £1. Post 1/9 extra under £2. 2/9 extra under 25. Open 9 to 5.30; Sats. until 1 p.m. Catalogue 6d. Trade List 5d. S.A.E. with all enquiries.

RADIO SUPPLY CO., 32, THE CALLS, LEEDS, 2

R.S.C. 30 WATT ULTRA LINEAR HIGH-FIDELITY AMPLIFIER A6

A highly sensitive Push-Pull, high output unit with self-contained Pre-amp, Tone Control Stages. Certified performance figures compare equally with most expensive amplifiers available. Hum level 70 db. down. Frequency response 13 db. 30-30,000 c/s. A specially designed sectionally wound ultra linear output transformer is used with 30-ohm valves. All components are chosen for reliability. Six valves are used, and separate Bass and Treble controls. Minimum input required for full output is only 30 millivolts so that **ANY KIND OF MICROPHONE OR PICK-UP IS SUITABLE.** The unit is designed for CLUBS, SCHOOLS, THEATRES, DANCE HALLS or OUTDOOR FUNCTIONS. For use with Electronic ORGAN, GUITAR, STRIP, etc. 100% standard or long-playing records. **OUTPUT SOCKET PROVIDES L.T. and H.T. for a RADIO FEEDER UNIT.** Amplifier operates on 200-250 v. 50 c/s. The amplifier can be supplied factory built with 12 months' guarantee for 50/- extra. Mains and outputs for 3 and 15 ohm speakers. Complete kit of parts with fully punched chassis and point-to-point wiring diagrams and instructions. If required cover as for A8. **ONLY** can be supplied for 17/6. An extra input with associated variable vol. control so that two separate inputs such as Gram. and Mike can be mixed, can be provided for 13/- extra.

9 GNS.

TERMS on assembled two input model: **DEPOSIT 25/6** and nine monthly payments 22/4.

TERMS on assembled two input model: **DEPOSIT 28/9** and 9 monthly payments of 28/9.

P.M. SPEAKERS. All 2-3 ohms. 5in. Goodmans, 17/9. 6in. Plessey 16/9. 8in. Plessey, 16/9. 8in. Rola, 19/9. 10in. Plessey Heavy duty, 26/9. 10in. R.A., 26/9. 12in. Plessey, 29/11. 10in. W.B. "Stentorian" 3 or 15 ohms type HP102 14/- Mains and outputs for 3 and 15 ohms recommended for use with any of our amplifiers, £4/10/9.

PLESSEY DUAL CONCENTRIC 12in. 15 ohm HIGH FIDELITY SPEAKER with built-in tweeter (completely separate elliptical speaker with choke, condensers, etc.) providing extraordinarily realistic reproduction when used with our A4 or similar amplifier. Hum level 10 watts. Price complete, only £5/17/6.

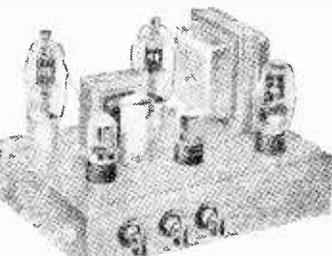
P.M. SPEAKERS 2-3 ohms. 6in. R.A. Field, 600 ohms 11/9. 10in. R.A. Field, 1,000 ohms, 23/9. 10in. R.A. Field, 1,500 ohms, 23/9.

COAXIAL CABLE 75 ohms 4in. 8d. yard. Twin Screened Feeder, 11d. yard.

SELENIUM RECTIFIERS
6/12 v. 1 a. 1/9
6/12 v. 2 a. 8/9
6/12 v. 3 a. 12/9
6/12 v. 4 a. 16/9
6/12 v. 6 a. 19/9
6/12 v. 10 a. 25/9
L.T. Types H.W. 200 v. 250 mA. 12/9

R.S.C. 3-4 WATT A7 HIGH-GAIN AMPLIFIER
For 230-250 v. 50 c/s. Mains input. Appearance and Specification with exception of output wattage, as A5. Complete kit with diagrams, £3 15-. Assembled 22/6 extra. Carr. 3/6.

THE SKYFOUR T.R.F. RECEIVER. A design of a valve 550-90 A.C. mains receiver with selenium rectifier. It consists of a variable-Mu high-gain H.F. stage followed by a low distortion anode bend detector. Power pentode output is used. Valve line up being 6K7, 8Y7, 6FG6. Selectivity and quality are well up to standard, and simplicity of construction is a special feature. Point-to-point wiring diagrams, instructions, and parts list, 1/9. This receiver can be built for a maximum of £4/19/6 including attractive Brown or Cream Bakelite or Walnut veneered wood cabinet 12 x 9 1/2 x 5 1/2 in.



carrying handles can be supplied for 17/6. Additional input socket with associated Vol. Control so that two different inputs such as Gram and Mike or Tape and Radio can be mixed, can be provided for 13/- extra.

R.S.C. 4.5 WATT A5 HIGH-GAIN AMPLIFIER

A highly sensitive 4-valve quality amplifier for the home, small club, etc. Only 50 millivolts input is required for full output so that it is suitable for use with the latest high-fidelity pick-up heads, in addition to all other types of pick-ups and practically all mikes. Separate Bass and Treble Controls are provided. These give full long-playing record equalisation. Hum level is negligible being 71 db. down. 15 db. of negative feedback is used. H.T. of 300 v. 25 mA. and L.T. of 6.3 v. 1.5 a. Fully punched chassis for the supply of a Radio Feeder Unit, or Tape Deck pre-amplifier. For A.C. mains input of 200-230-250 v. 50 c/s. Chassis is not alive. Kit is complete in every detail and includes fully punched chassis (with baseplate) with green crackle finish and point-to-point wiring diagrams and instructions. Exceptional value at only £4 15/-, or assembled ready for use 25/- extra, plus 3/6 carr.

R.S.C. TAI HIGH QUALITY TAPE DECK AMPLIFIER. For ALL Tape Decks with High Impedance, Playback and Erase Heads, such as Lane, Truvox, etc. (Unit can now be supplied for use with latest **USE ONLY Collaro Tape Transcriber**; refer to TAIC.) For A.C. Mains 230-250 v. 50 c/s. **11 GNS.**

Positive compensated identification of recording level by Magic Eye. Recording facilities for 15, 7 1/2 or 3 1/2 in. per sec. Automatic equalisation at the turn of a knob. Linear frequency response of -3 db., 50-11,000 c.p.s. Negative feedback equalisation. Minimum microphony and hum. High output with completely effective crating and distortionless reproduction. Sensitivity is 15 millivolts so that any kind of crystal microphone is suitable. Only 2 millivolts minimum output required from Recording head. Provision is made for feeding a P.A. amplifier. Unit can also be used as a gram-amplifier requiring input of 0.75v. R.M.S. Carriage 7/6. Illustrated leaflet 6d.

PICK-UPS. Collaro high-fidelity high impedance magnetic type. Only 31/6. Brand New.

www.americanradiohistory.com

MAXI-Q COIL PACKS

REGD.

CP.3/370pF and CP.3.500pF. These 3 waveband Coil Packs are available for use with either 370pF or 500pF tuning condensers. The coverages are: Long Wave 800-2,000 metres, Med. Wave 200-550 metres, Short Wave 16-50 metres. Designed for use with the Trawler Band, Aeronautical or SL.8 Spin Wheel Drive. Retail Price of each unit: 32/- plus 12.9 P.T.—Total 44/9.

CP.3/G. As above but with Gram. position, suitable for use with 500 pF tuning condense: 39/- plus 15/7 P.T.—Total 54.7.

CP.3/F. This Coil Pack is for use with a 500pF tuning condenser and covers the standard Long, Med. and Short wavebands with the addition of the band 50/160 metres. This covers the Trawler Band, Aeronautical and the 80 and 160 metre Amateur bands: 49/- plus 19.7 P.T.—Total 68.7.

CP.3F/G. As CP.3,F but with a gram. position: 57/- plus 22.9 P.T.—Total 79.9.

CP.4/L and CP.4-M. These compact 4-station Coil Packs are available for either 1 Long Wave and 3 Medium Wave stations (CP.4/L) or 4 Medium Wave stations (CP.4/M). They are fully wired and require only four connections for use with any standard frequency changer valve. 25/- plus 10/- P.T.—Total 35/-.

CP.4L,G and CP.4M/G. As CP.4/L and CP.4 M but with provision for Gram. position. 31/- plus 12/5 P.T.—Total 43/5.

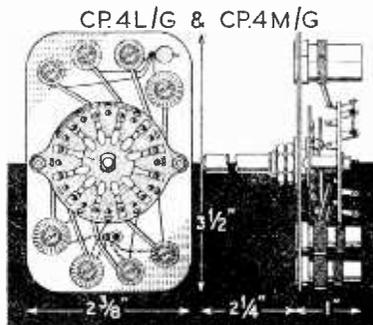
See Technical Bulletin DTB.9 for details of all Coil Packs, 1'6.

Available from all reputable stockists or direct from Works. Send 1/- in stamps for General Catalogue covering full range of components.

DENCO (CLACTON) LTD, 357/9 OLD RD., CLACTON-ON-SEA, ESSEX.

STOP PRESS: MAXI-Q F.M. TUNER UNIT assembled and valved at £9 19 6 inc. Power Pack at £3. OSRAM F.M. TUNER completely assembled and valved at £30/16/0 inc. MULLARD 3 VALVE 3 WATT HI-FI AMPLIFIER 16 swg Aluminium punched chassis. 10/6. Complete metalwork for the T.C.C. Printed Circuit version of the OSRAM 912 and MULLARD 5-10 AMPLIFIERS 15/-.

MULLARD 5-10 Type. "A" and "B" pre-amplifiers.—Chassis and Front Panel, Type "A" 8/6, Type "B" 12/6. Separate printed Gold finished Panels available, Type "A" 1/6, Type "B" 2/6.



● Every worth-while feature —for only 48 gns.



Moving
Coil
Microphone
67/6 extra.

Designed and precision engineered for long service with maximum efficiency, the "Brenell" Tape Recorder offers the High Fidelity enthusiast a first-class unit of outstanding value. Incorporating all the features necessary for High Fidelity recording—including all-purpose amplifier for record playing—the "Brenell" Tape Recorder enjoys a high reputation among enthusiasts both at home and overseas.

Three independent motors. Three speeds (3 1/2, 7 and 15 i.p.s.). Twin track recording on 7in. reels. Drop-in foolproof tape loading. Instant stop without tape spill. Simplified control with interlocked switching. Fast forward or reverse in 45 seconds. Plays all makes of pre-recorded Tapes. Convertible to stereophonic recording. Azimuth adjustment to Record/Playback head. Separate bass and treble tone controls. Magic Eye Recording level indicator. All-purpose High Quality Amplifier Unit. 4-Watts Undistorted Output.

Brenell

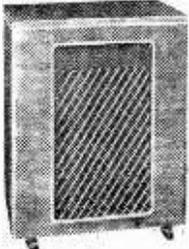
T A P E R E C O R D E R

From all good Radio Dealers—if in difficulty write to—

BRENNELL ENGINEERING CO. LTD.,

2, NORTHINGTON STREET, W.C.I.
Phone: HOLBORN 7358.

*** built to the highest standard!**



*** CABINET CAT. No. CAB 31**

A very high quality Cabinet in a modern design. Exterior veneered in a highly figured Walnut. Solid Black-board lift-up top with all interiors veneered in Syncrona. Full silk front. 27in. x 16in. x 8 1/2in. high.

CASH ONLY £8

Packing and Carriage 15/-.

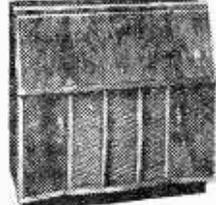


*** CABINET CAT. No. CAB 02**

A well designed Bureau-type cabinet in a medium size. Veneered in a highly figured Walnut. Outside dimensions, length 25 1/2in., depth 16in., height 32in. Sliding control panel on right-hand side approx. 13in. x 10 1/2in. Removable baseboard on right-hand side, approx. 13 1/2in. x 13in. Large record compartment inside the cabinet, located at the top on left-hand side.

CASH ONLY 12 Gns.

Packing and Carriage 20/-.

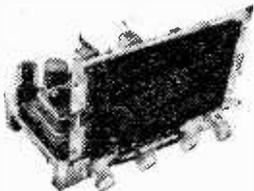


*** CABINET CAT. No. CAB 33**

A magnificent Bureau-type Cabinet of the very highest quality in specially selected Walnut veneered exterior. Light Syncrona interior with Rexine lining to match. Outside dimensions, length 34in., depth, 17 1/2in., height 33in. Sliding control panel on right-hand side approx 16in. x 10 1/2in. Removable baseboard on right side approx. 15 1/2in. x 15in. Two full-sized felt lined compartments in the lower half.

CASH 16 1/2 Gns.

or on Credit Terms. Packing and Carriage 25/-.



*** RADIO and RADIOGRAM CHASSIS**

Superhet. Chassis of Latest Design and Technique. General Specifications applicable to all models. A.C. 200/250 volts 50 cycles only. Suitably lit multi-coloured glass dial of the horizontal type. Slow motion tuning drive. Full provision of Automatic Volume Control. Negative feed-back from output transformer secondary. Sockets provided for Aerial, Earth, Gram, Pick-up and Extension speaker. Connections provided to Gram. Motor controlled by Chassis ON/OFF switch. All inductances have an exceptionally high Q value. The Audio Section is designed for first rate reproduction on Radio and Gramophone. The tone controls have been given an extra wide range to embrace all types of record sets.

CAT. No. CR A. 5-valve Superhet, 2 wavebands. 12 Gns.

CAT. No. CR AFM47. 7-valve Superhet with FM/VHF Band (1 wavebands). 23 1/2 Gns.

or on Credit Terms. Packing and Carriage 15/-.

CAT. No. CR AFM49/PP. 9-valve Superhet with FM/VHF Band (4 wavebands). Push-pull output including 26 Gns.

or on Credit Terms. Packing and Carriage 15/-.

*** F.M./V.H.F. TUNERS**

Self powered. Six valves with grounded grid R.F. stage followed by additive mixer using a FCC85 twin triode in sealed permeability tuned unit. Two I.F. stages ensure maximum gain with 6AL5 double diode as ratio detector. Frequency coverage of 85-101 megacycles allows adequate overlap. Very finest quality throughout.



CAT. No. FMT A

Complete unit in Cabinet with Magic-eye tuning. Bored, 13in. long x 6 1/2in. overall depth x 7 1/2in. high (approx.).

CASH 16 1/2 Gns.

or on Credit Terms. Packing and Carriage 12/6.

*** AUTOMATIC RECORD CHANGERS**

All automatic Record Changers are of the latest type and unused.

CAT. No. RC/A. This is the latest multi-speed changer incorporating 16 r.p.m. for "talking-books," and arrangement for manual control. Fitted with high fidelity crystal Turnover Pick-up Head. A.C. mains 200/250 volts, 50 cycles only.

CASH £9.15.0

CAT. No. RC/B. Latest Garrard RC's model, fitted with GC-2 crystal Turnover Pick-up Head. A.C. 200/250 volts, 50 cycles.

CASH £13.0.0

Packing and Carriage 12/6.



CAT. No. FMT B

Chassis only excluding Magic-eye. Un-bored, 11 1/2in. long x 5 1/2in. overall depth x 4in. high.

CASH £13.15.0

Packing and Carriage 12/6.

*** Loudspeakers * Gram Amplifiers, etc. Available at keenest prices.**

ALL FULLY GUARANTEED

Generous extended credit terms on orders exceeding £15.

Dealers supplied at full discount. Send for complete catalogue.

All enquiries (excluding Northern Area) to:

Northern enquiries only (not Scotland & N. Ireland) to:

DOMESTIC

MAYLIT LTD

DIRECT SALES LTD.
90 JUDD ST., LONDON. W.C.1. TER. 9876

3 MARLBOROUGH RD., ALTRINCHAM, CHESHIRE
Telephone enquiries: ALTRINCHAM 4045

About these Hi-g heads . . .

11 Carr Street,
Cougee,
Sydney,
Australia.

Dear Sirs,

"- will track with ease all present day records". So reads your ad. for the new Hi-g Heads. "We will soon see about that", I said. The first test for this new L.P. Head was Decca's Brahms Fourth - always very difficult to handle I found on the old head. The shock I received was enough to put me to bed for a month - where was all that distortion? Where was all that groove jumping? Having recovered my strength and secretly suspecting it was just a fluke, I tried the Swan Lake - also another jumper - and then in a determined effort to prove you wrong, on went the Symphonie Fantastique and Rite of Spring.

At this stage the neighbours and family were seriously alarmed at sundry cries issuing from my room - they need not have worried - they were cries of pure joy. I had seriously considered installing expensive magnetic Pick-ups - of which I knew very little - but this will obviously be quite pointless now.

"- will track with ease all present day records" to which I say "blessed be the name of Acos Hi-g"

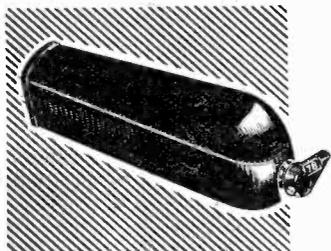
Yours with relief,
(Sgd) Cliff Davidson.

Over to you, Mr. Davidson



.. that is what Mr. Davidson has written - and we didn't go to Australia to prompt him! His letter sums up what many others have expressed. It really does pay to use ACOS Hi-g pick-ups - both from the point of view of reproduction and of longer record life.

FREE The subject of Hi-g cannot be adequately explained in an advertisement, so we have produced an interesting booklet - "The ABC of Hi-g". May we send you a copy?



always well ahead

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

COSMOCORD LTD., Eleanor Cross Road, Waltham Cross, Herts.

Telephone: Waltham Cross 5206

PRACTICAL WIRELESS

EVERY MONTH
VOL. XXXII, No. 598, OCT., 1956

EDITOR: F. J. CAMM

24th YEAR
OF ISSUE

COMMENTS OF THE MONTH

BY THE EDITOR

Editorial and Advertisement Offices:
"Practical Wireless," George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. Phone: Temple Bar 4363.
Telegrams: Newnes, Rand, London.
Registered at the G.P.O. for transmission by Canadian Magazine Post.

More V.H.F. Stations

THE Postmaster-General has approved the BBC plans for building six more V.H.F. stations—the second stage of the plan to provide nation-wide coverage on V.H.F. of its three sound programmes. These additional stations, together with the ten already authorised, are intended to provide interference-free reception on V.H.F. of the Home, Light, and Third Programmes for about 96 per cent. of the population of the United Kingdom. Each station will carry these three programmes except Corwen, which is to broadcast the Welsh Home Service only. This area, however, will receive the Light and Third Programmes from other V.H.F. stations and also on the long and medium wavelengths. The station at Sandale, near Carlisle, will carry the Scottish Home Service in addition to the North Home Service and the Light and Third programmes. It is hoped that the new V.H.F. stations at Rowridge, Kirk o' Shotts, Sandale and Corwen will be completed by the end of 1957, and the other two during 1958. Of the ten stations already authorised, Wrotham, Pontop Pike, Divis and Meldrum are already in full service. Additionally, the Welsh Home Service is carried by V.H.F. transmitters at Wenvoe and Penmon working in a temporary condition. It is hoped that the remaining stations comprising the first stage, i.e., those at Norwich, North Hessary Tor, Sutton Coldfield, Holme Moss, Blaen Plwy, and the permanent station at Wenvoe, will be completed before the end of 1956, although in the case of Blaen Plwy only the Welsh Home Service may be available by that date.

The radio industry are now producing receivers which will tune to the new V.H.F. band as well as the present medium and long waves. V.H.F. adapters for use with existing receivers are also available. For listeners within the areas served by V.H.F., this new method of broadcasting offers the opportunity for much improved reception, with better quality of sound and a most welcome reduction in interference of all kinds. It is emphasised again that the V.H.F. service will be supplementary to the existing medium and long-wave services, and listeners who are able to obtain satisfactory reception on these wavebands with their present receivers need

not make any change. Although many of the receivers designed for V.H.F. incorporate a built-in aerial, listeners who do not live near to a station are strongly recommended to use a good outside aerial in order to obtain the full benefits of V.H.F. reception.

THE RADIO SHOW

ELSEWHERE in this issue we review some of the outstanding exhibits of the recent Radio Show. There was nothing really outstanding this year, and no doubt manufacturers have not been encouraged to tool up for new designs in view of the credit squeeze. The side-shows undoubtedly provide the "draw," and, apart from trade visitors and some sightseers who do not intend to buy, the exhibition as such does not contain enough new material to attract the public. The cycle trade has already found this, and after this year it is to be held biennially. It is possible that the radio industry may find it more profitable to hold exhibitions every two years, since it gives the public time to rejuvenate its enthusiasm and it gives the trade breathing space for development. By development we mean the production of really new designs, as distinct from improved cabinet designs. Nothing really striking has been produced by the radio trade for a number of years.

There is still a continuing and growing interest, of course, in TV, and in home-built radio and TV receivers, as the circulation of this and our companion journal prove.

"AMPLIFIERS: DESIGN AND CONSTRUCTION"

THERE has been an insistent demand for a book on amplifiers for several years. Readers will therefore be glad to know that we shall shortly publish "Amplifiers: Design and Construction," which deals with all aspects of design and construction from basic, practical and design considerations to constructional details of amplifiers for tape-recorders, gramophones, P.A. and radio purposes. It will include information on D.C. amplifiers, and incorporate some of the successful designs which have been described in this journal. A further announcement will be made in the next issue.—F. J. C.

Round the World of Wireless



By "QUESTOR"

Broadcast Receiving Licences

THE following statement shows the approximate number of Broadcast Receiving Licences in force at the end of June, 1956, in respect of wireless receiving stations situated within the various Postal Regions of England, Wales, Scotland and Northern Ireland. The numbers include licences issued to blind persons without payment.

Region	Total
London Postal...	1,300,254
Home Counties ...	1,292,236
Midland ...	1,011,463
North Eastern...	1,315,080
North Western...	1,003,800
South Western...	828,916
Wales and Border Counties...	518,294
Total England and Wales ...	7,270,043
Scotland ...	934,414
Northern Ireland ...	206,379
Grand Total ...	8,410,836

New Telephone Signal

TESTS are being carried out in the U.S.A. with a new idea in telephone signalling devices. In place of the customary bell to announce an incoming call musical tones are being used. Tests are being made to find the most suitable tones and intensities, and it is claimed that it has the advantage that certain musical tones can be heard above normal room noises. A further interesting feature is that transistorised circuits are being utilised for the alarm, resulting in a great saving in power—the transistorised arrangement working on less than 1 volt.

"Reina del Mar" Sound Equipment

A COMPREHENSIVE set of G.E.C. sound equipment is being installed in the Pacific Steam Navigation Company's new 19,000 tons liner *Reina del Mar*. It will provide facilities for passengers' entertainment, announcements and crew instructions.

Radio programmes will be broadcast by a 175 w. amplifier in a 3-bay rack assembly which will be fed from a communications type of receiver mounted in the same rack. Facilities are provided for making tape recordings of transmissions received at unsuitable hours, so that they can be re-broadcast later. Music played by the ship's orchestra in the first-

class dining saloon and lounge can be picked up by special microphones and broadcast throughout the ship by a 30 w. amplifier in the main rack.

Speech communication to boat stations and officers' and crews' quarters will be effected by loud-speakers fed by a 60 w. amplifier.

Equipment for the reproduction of pre-recorded tapes and gramophone records and a compere's microphone are being provided in the music-room.

Awards for Apprentices

IN addition to the 12 Ekco apprentices who were presented with National Certificates by Mr. T. L. Morgan, Principal of the Southend-on-Sea Municipal College, recently, 20-year-old student apprentice David Everett received his B.Sc. General. The presentation took place in the Ekco Clubhouse following a tour of the factory by parents of the apprentices.

The visitors were welcomed by

Mr. F. S. Allen, Works Director of E. K. Cole Ltd., and prior to the presentation of National Certificates 13 new Ekco apprentices signed their indenture papers.

New Ekco Director

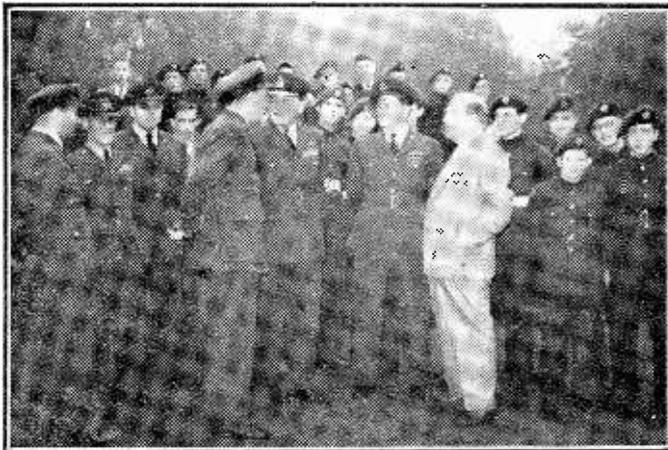
E. K. COLE, LTD., announce that Mr. W. M. York has been elected to the Board of Directors. Formerly an Executive Director of the Company, Mr. York has been appointed to the post of Commercial Director.

Mr. York joined E. K. Cole, Ltd., in 1932 from Alvis, Ltd., where he was Publicity Manager, and has been in charge of Ekco Publicity for the past 24 years. In 1951 he was appointed an Executive Director of the Company, covering Publicity and the Thermovent Heating Division, and early last year he became additionally responsible for Ekco overseas commercial activities.

"When You're Smiling"

THIS completely new Pye Radio Luxembourg programme was broadcast for the first time in June.

"When You're Smiling," which takes the form of an amateur talent contest, will be recorded at



Mr. A. H. Whiteley, of Whiteley Electrical (makers of the well-known W/D speakers, etc.) with Air Marshal Sir Bryan V. Reynolds, K.C.B., C.B.E., Air Officer Commanding-in-Chief Coastal Command, on the occasion of a Garden Party held at Mr. Whiteley's residence at Mansfield. The occasion was held to raise funds for the Mansfield Squadron of the A.T.C., of which Mr. A. H. Whiteley is Chairman, receipts for which amounted to £153.

a different Butlin's Holiday Camp each week, with Larry Cross, comper during the past year of Pye's Luxembourg show, "People Are Funny," as Master of Ceremonies.

The three best acts each week, to be selected by audience applause, will receive a radio set as a prize. In addition, listeners will be invited to write to Pye naming their favourite act to appear in an all-winners programme in August, where the winner will receive a television set.

This series, which will run for eleven weeks, is intended to support the Pye portable sales campaign by commercials over the air and by displays in Butlin's Holiday Camps and dealers' windows.

S. Africa's Largest Broadcasting Station

THE South African Broadcasting Corporation's largest broadcasting station, at Paradys in the Orange Free State, commenced tests during April and came into partial operation on July 1st. It is to be officially opened in October or November of this year.

The Paradys station represents to Britain an export order to the approximate value of £240,000 worth of radio equipment. This large order initiates high-power short wave broadcasting in South Africa.

Marconi's Wireless Telegraph Co., Ltd., have supplied nine of their Type BD.262 series of 20kW H.F. broadcasting transmitters, together with ancillary equipment. Marconi engineers are assisting with final adjustments on site but most of the installation is being carried out by S.A.B.C. personnel.

At the present initial stage of the service four transmitters are being used to radiate the English and Afrikaans service within the frequency band 2.3-15 Mc/s. A further four transmitters, operating in the 4.7-26.1 Mc/s frequency band, will come into service at a later date. Three will be used for a service to territories to the north of the Union of South Africa. The ninth transmitter has not as yet been allocated to a specific service: it is understood that it may be used as a standby.

Robby the Robot

ROBBY THE ROBOT was the central character in the film "The Forbidden Planet," which recently finished its first run at the

London Pavilion. The original in the film was made in America and required a team of 11 men to operate by remote controls.

M.G.M. decided that for publicity purposes in this country

"Robby" should be made available to audiences. The American technicians originally responsible for his creation expressed the view that this was not practicable.

"Pytram," in just under eight weeks, have created not only an exact replica, but one which can be operated by one man.

"Robby" made his first debut on television in "In Town To-night" recently, and he is to tour England, appearing on the stages of cinemas, fêtes, carnivals, etc.

His construction, apart from the electrical equipment, is mainly papier mâché and flexible rubber. He is fully electrically operated, governed by rotating loop aeriels, gyro balanced, electromagnetic speech, and animated by invisible light beams.

The electrical equipment was designed and supplied by Radio Visor (Parent), Ltd., and assembled at Pytram's works.

B.I.R.E.

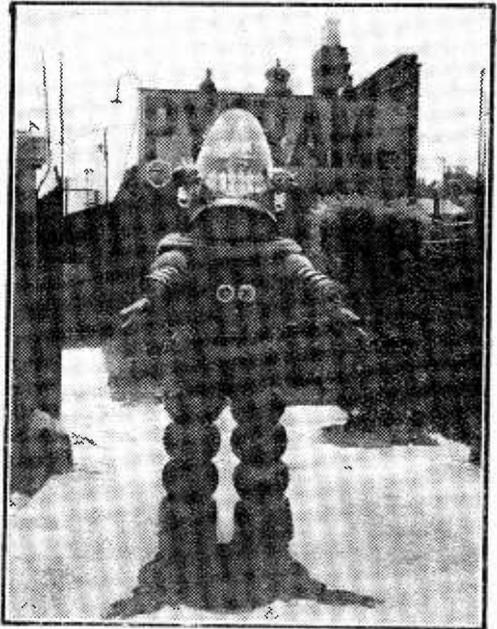
THE following meeting will be held during September, 1956: London Section.—Wednesday, 26th September, at 6.30 p.m., at the London School of Hygiene and Tropical Medicine, Keppel Street, Gower Street, London, W.C.1. "Some Aspects of Transistor Progress." A paper to be read by H. W. Loeb, Ph.D.

Iranian Oil Pipeline to be Controlled by Radio

THE National Iranian Oil Company has awarded a £300,000 contract to Marconi's Wireless Telegraph Co., Ltd., for the supply and installation of a complete V.H.F. multi-channel radio system along the length of their new

600-mile oil pipeline from Abadan to Teheran. The order was gained for Britain despite keen foreign competition.

Equipment to be supplied includes 84 Marconi V.H.F. multi-



Robby the Robot. See story on the left.

channel equipment type HM181, together with a considerable quantity of telephone carrier equipment and diesel electric power plant.

B.I.C.C. Board Appointment

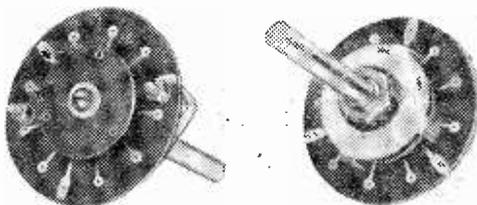
BRITISH INSULATED CABLES LTD. and Automatic Telephone & Electric Co., Ltd., announce that Sir Archibald Gill, B.Sc.(Eng.), M.I.E.E., F.I.R.E., has joined British Telecommunications Research, Ltd. as Director and General Manager. Past-President of the Institution of Electrical Engineers, Sir Archibald was largely responsible for the equipping of the first coaxial cable in this country and the post-war expansion of long distance radio and cable communications.

New British Standard

A NEW Standard was issued in July, No. B.S.419:1956. The title is Varnished cotton cloth sheet and tape for electrical purposes. This a revision of the 1931 edition.



As mentioned elsewhere on this page, we are preparing this report from information supplied by the manufacturer and consequently last minute surprises may appear. So far, however nothing unusual in the radio section has been announced. The main difference between this year's equipment and that of the last show lies in the wider employment of the printed circuit technique, and the increased use of the V.H.F. bands—even in the smaller table models. The printed circuits are now being used in some receivers for the complete circuit, as distinct from those who have only a portion of the circuit in this form. An instance is the Pam portable. Coupled with the use of this new technique is the employment of special components designed either for inclusion in a printed wiring arrangement or utilising themselves a printed scheme. Illustrated below are some T.C.C. components typifying both these aspects. On the left is shown two types of wafer switch in which the contacts are flush with the surface to avoid noise and "contact bounce." The contacts are silver or rhodium plated to provide low



Two types of printed wafer switches by T.C.C.

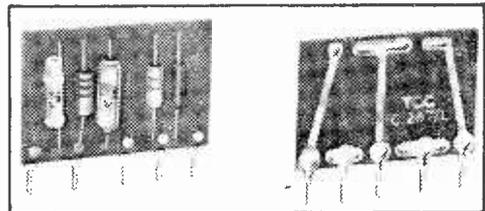
contact resistance. On the right are two views of a component tag board for inclusion in a printed circuit. In addition to these examples there are valveholders and other parts designed for this specific type of circuit.

Transistors

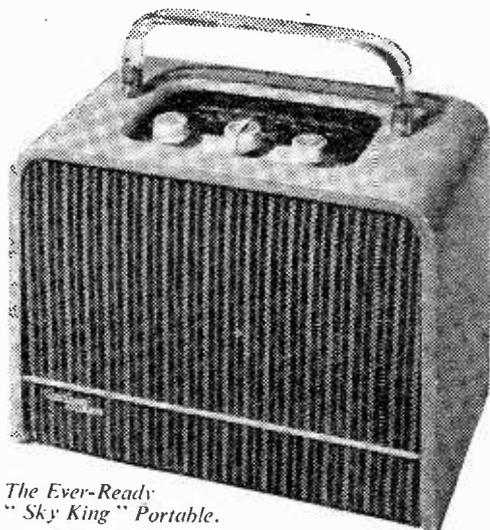
The other feature which merits mention is the use of the transistor. These do not appear, from the details we have received, to be used on such a large scale as had been anticipated. Probably this is due more to the price of the components than their efficiency, but again mention must be made of the Pam portable which apart from utilising the printed circuit is also an "all-transistor" receiver. For its power supply it needs four U2 cells (6 volts) at which the consumption is only 35 milliamps. With batteries it weighs only

SPECIAL NOTE

This report 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.



T.C.C. printed circuit tag panels for use as sub-assemblies. By using these on a printed circuit board better use can be made of the available space for a given cabinet size. The components are edge-soldered on the tag panels.



*The Ever-Ready
"Sky King" Portable.*

5 lb., and there are 8 transistors in its superhet circuit.

Whilst on the subject of portables it is interesting to note how these have been miniaturised and made much more attractive than former models. Three representative types are shown on this page the top being the Ever Ready Sky King, the centre the R.G.D. "B Fifty-Five," and the lower one the Regentone "Double Two." The Ever Ready is an all-dry 4-valve superhet, the R.G.D. is a mains-battery model, and the Regentone also uses the battery-mains circuit. Note the use of push-button wavechange switches in the two latter models, and the employment of a single tuning control offset—as distinct from the earlier forms of symmetrical control knobs. It is obviously impossible to mention in the space at our disposal all the models in the various classes which are available, but mention should be made here of the Murphy Model B229, in which the tuning scale folds over the loudspeaker fret and conceals the scale and the control knobs. When the scale is turned and raised to the operating position the carrying handle is hidden, and it may be placed on a table in the home and looks just like a small table radio. A similar model is available with the reference B228 in which two pentodes are employed in push-pull in the output stage—both models being 6-valve superhets, B228 for battery or mains working, and B229 for batteries only.

Most portables, and a large number of table model receivers, now make use of the Ferrite Rod built-in aerial. At one time it was necessary to use a large containing cabinet for a portable in order to accommodate a large frame aerial and provide

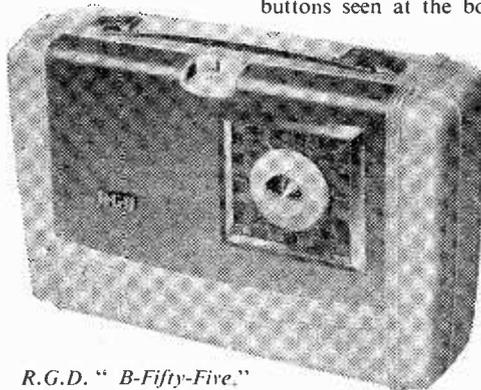
adequate signal pick-up. This was later avoided by using a flat pancake type of aerial coil, but again it had to be orientated to obtain maximum signal strength, and in addition was susceptible to stray capacity effects. The modern arrangement utilises a rod of powdered iron, very similar to the material from which tuning cores are made, and in most receivers this is about 8in. in length and carries a medium-wave coil on one end and the long-wave coil on the other. It is usually supported in rubber grommets on two brackets cut from the chassis, and apart from enabling the overall dimensions of the cabinet to be reduced, it gives improved results over the older frame winding.

Table Models

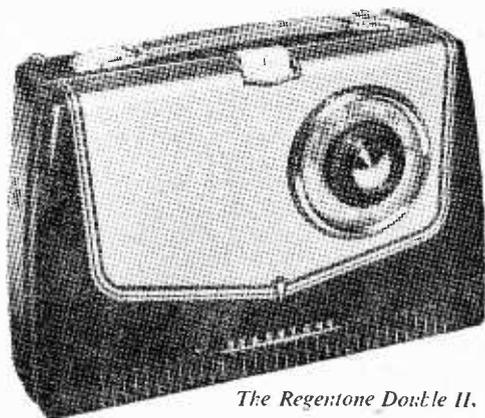
So far as the table models are concerned, again some care appears to have been taken to make models more in keeping with modern contemporary furnishings. In addition to the outward appearance, many of these now have a tuning band for the F.M. signals and in many models great care has been taken to make the speaker arrangement suitable for the reproduction of these higher fidelity signals. The model illustrated at the top of page 520 is the Bush VHF61. This is an A.C. only model with medium, long and the V.H.F. band, and has internal aerials for all bands and sockets for the use of external aerials. The push-buttons seen at the bottom of the tuning scale are

for wave-changing and provision is made for the use of a gramophone pick-up. The next is another Murphy model, the 362. This has a plastic case, and, again, has a tuning range for F.M. This is a 5-valve circuit, and for those who are interested in design the cabinet is finished in maroon and the front is in beige and gold. At the foot of the page is a K.B. receiver, a new model, the NR30. In this model no less than three speakers are used in

an arrangement which the makers have called "Tri-Fi," a very good instance of the attempt to take full advantage of the F.M. signals. The circuit is a



R.G.D. "B-Fifty-Five,"

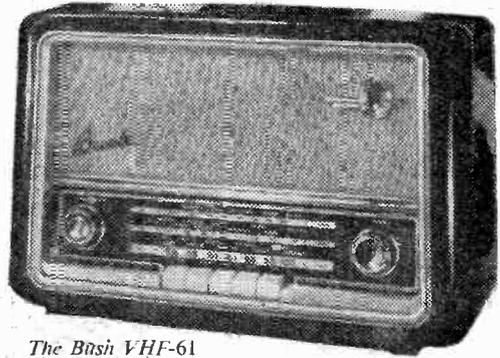


The Regentone Double II.

7-valve superhet and again internal A.M. and F.M. aerials are utilised. All three of these models, as well as the majority of other models in the show, have the magic-eye tuning device to ensure accuracy of tuning and the avoidance of distortion due to being slightly off-tune.

Console Models

Coming now to the console models, these are undoubtedly in the majority and the various designs which are available cover a very wide field. Apart from the simpler types consisting of a radio only, there are models which include elaborate auto-changers, record storage space, and even large screen television receivers. From an outward appearance point of view, i.e., general design, the Cossor models are most interesting, having got away from the usual walnut or mahogany cabinet, and in the gold and sycamore finish they present a most pleasant contemporary appearance. In addition to the radio-gram or television-plus-radiogram, there is also the gramophone reproducer only, a very good example of this being the Panatropé shown at the foot of this page. This is a three-speed set with Garrard auto-changer, and takes up to 10 records of any one size and speed. It has an output of only 2.5 watts and uses three valves, types 6SL7, 6L6 and a rectifier, EZ40. An external speaker socket is provided with a switch to silence the internal speaker if desired. This model costs 47 guineas. In the de-luxe class may be mentioned the Ferranti Model 1055. This also utilises a Garrard 3-speed record changer, but incorporates a 12-valve 4-waveband superhet for A.M. and F.M. It has tone compensated volume control and independent bass and treble controls with scratch and rumble filters for the gramophone side. The output

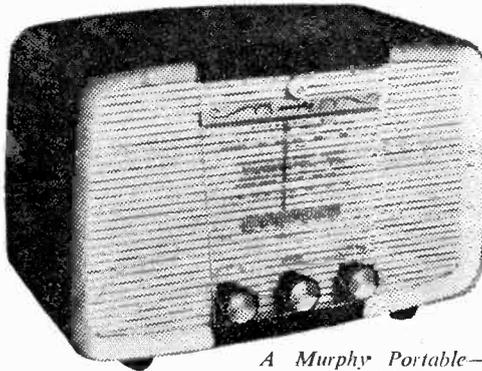


The Bush VHF-61

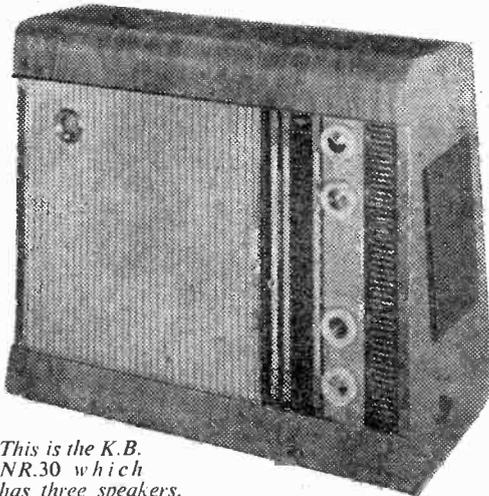
of this receiver is 14 watts, and this is fed into two speakers—a Goodman's Audiom 50 (12in.) and a 7in. elliptical model. Two separate specially-designed acoustic compartments are used to house these speakers. This model costs 120 guineas.

Record Reproducing Equipment

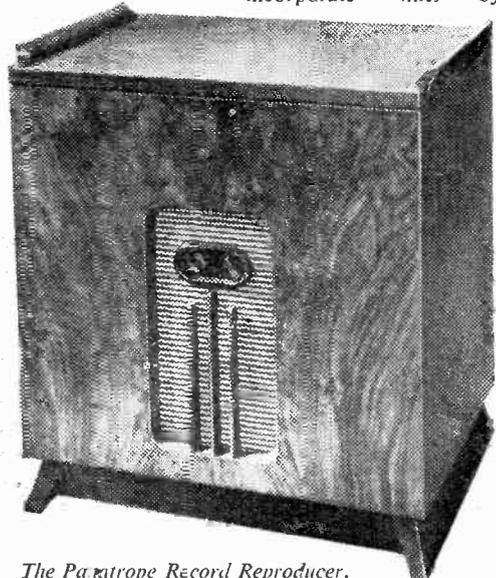
On the record reproducer side we have, in addition to the larger types of player such as that just mentioned, the small playing desks, as well as the various types of separate unit, such as pick-ups and gramophone motors. The largest makers of the latter two types of equipment are probably Collaro and Garrard, and most of the complete radio-grams incorporate units by



*A Murphy Portable—
Model 362.*



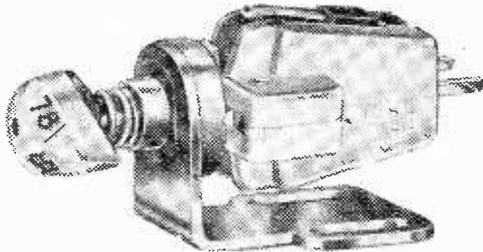
*This is the K.B.
NR.30 which
has three speakers.*



The Panatropé Record Reproducer.

these firms. The majority to-day are, of course, of the three or four speed type, although some are now available with a variable control so that any desired adjustment of speed may be obtained. Collaro have produced some models capable of 16 $\frac{1}{2}$ r.p.m. for the new "Talking book" record. All of the Collaro gramophone units, etc., are fitted with the "Studio" cartridge of which four types are available, dependent upon the requirements of the amplifier on which the pick-up is intended to be used. In the Garrard range some new changers have appeared and a control is fitted to enable the user to play records singly when desired. A special model 301 Transcription motor will interest Hi-fi enthusiasts; not only have wow and flutter been attended to, but also switch clicks are suppressed. A new pick-up arm has been introduced and is shown on the right and it will be seen that this carries its own rest, as well as having many other desirable features.

Many of the pick-ups fitted to the modern player are of the turn-over type, having in effect the two pick-ups in one housing—one for normal speeds and



An Acos Turn-over Pick-up Head.

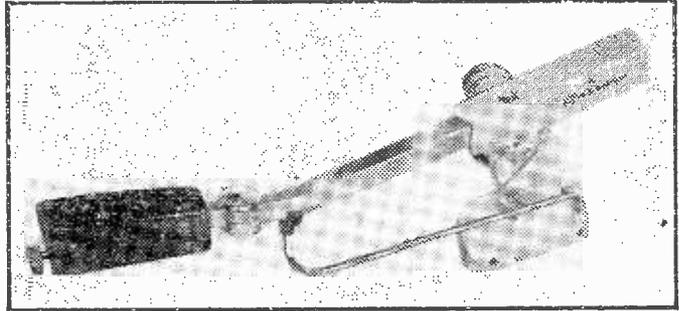
one for the slower speeds. A typical model of these is shown in the illustration above and this is an Acos product (Cosmocord Ltd.).

So far as the actual players are concerned these are found in the small portable "playing desk" as well as in the larger hi-fi units. An interesting player has been produced by Electric Audio Reproducers Ltd. (Ear) in which the amplifier which is incorporated is of the transistorised type. It is also fitted with a 4-speed mixer record changer and it is for battery operation. Fuller details will not be available until the Show opens.

Tape Recorders

Coupled with the portable record players are the tape recorders, and in fact these would appear to be taking the place of the former. They are capable of giving much better reproduction, of course, as the tape has nothing like the background which arises from worn gramophone records. Furthermore you can make your own recordings from good broadcast concerts so there is an extremely

wide field available. The modern hi-fidelity tapes supplied by H.M.V. are also an improvement on the ordinary record. Various tape recorders and parts have been announced and one of the most interesting



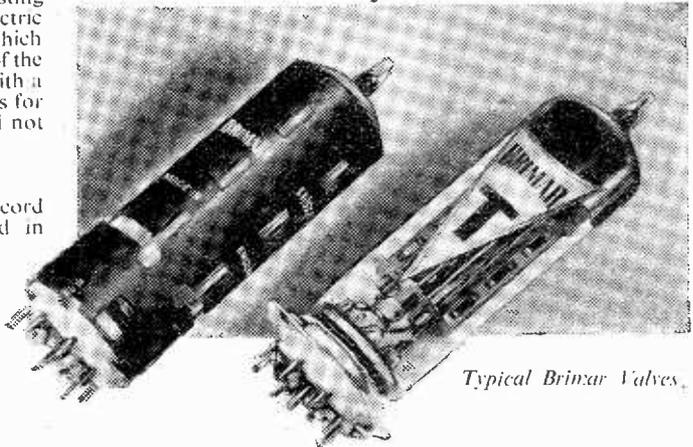
The Garrard TPA10 Transcription Pick-up Arm.

of which we have received details is shown at the foot of page 522. This is a Collaro Tape Transcriber. This is available, if so desired, complete with a pre-amplifier and power pack. The transcriber is a 3-speed model twin-track machine with four heads on two distinct levels. Both top and bottom tracks can be recorded and played back without removing the tape and the machine is instantly reversible so that the change from one track to another may be made immediately. The heads are double coil wound with a low hum level, giving up to 12,000 c.p.s. at a tape speed of 7 $\frac{1}{2}$ per second.

In the Simon range, a special Matching V.H.F. unit has been produced for their SP/2 recorder to enable high-fidelity recordings to be made from the new F.M. broadcasts, whilst they have also produced a "Library Recording Tape" for the enthusiast who wishes to build up a library of his own recordings. This has a P.V.C. base and is boxed in a book style to provide full storage protection and easy reference. Provision is also made for title change.

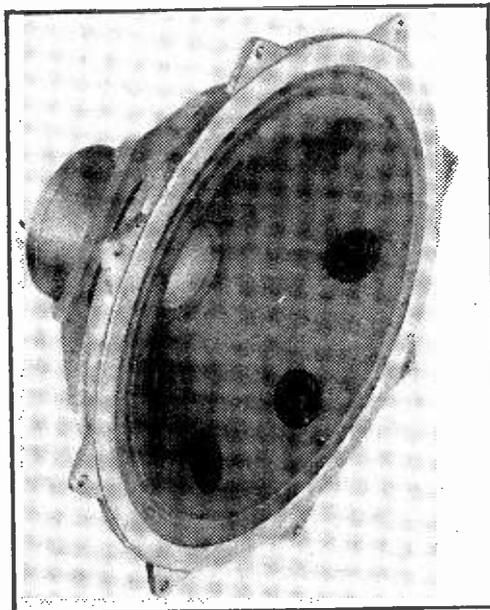
Components

On the individual component side the only announcement of anything new is in the loudspeaker



Typical Brimar Valves.

range. With the increasing use of F.M. receivers and the high quality tape recordings just mentioned there exists a need for better loudspeakers, and although a number of tweeters or high-note speakers have been announced these are not sufficient alone



The Whiteley Electrical (W/B) H.F.1514 Loudspeaker which costs £24 10s. 0d.

for obtaining the best quality. Messrs. Goodmans and W/B, to mention only two of the firms who specialise in loudspeakers, have produced cabinets designed to house their products and give high quality reproduction. Unless there is adequate baffle area the low notes suffer, but many cabinet designs provide only a boom at the lower frequencies and these properly designed cabinets attempt to eliminate these resonances and even out the response. In addition, the G.E.C. for instance, will be showing the metal cone speaker, also designed for which is a cabinet to give the proper loading and performance. In the W/B range a new design of combined dynamic and electrostatic speaker is to be released at Show time and will be heard in the W/B demonstration rooms. Certain of their loudspeaker enclosures are also available in ready-to-assemble form and include a standard bass reflex cabinet; a corner bass reflex cabinet, and a hi-fi reproducer console to house record-player, amplifier, tuner and records. All these may be obtained in polished walnut veneer or plain whitewood and are supplied packed flat complete with screws.

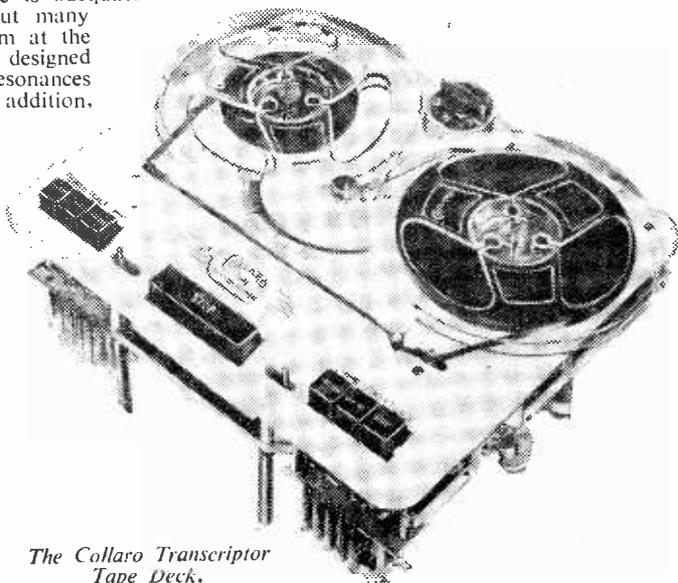
A new design is announced by

Plessey in which it is claimed that a flat frequency response is obtained with perfect transient response as there are no moving parts in the unit's construction. This is known as an Ionophone.

Among the many other individual items are valves, the majority of which are of the miniature type and of which a screened type is shown in the illustration on page 521. This is a Brimar product. In the Mullard range are the many special miniatures used in modern television receivers, as well as in the smaller types of mains receivers, and an improved version of the Mullard 3-valve 3-watt amplifier has been announced. We have already mentioned the special printed circuit components and in addition to these there are various types of transistor, metal rectifier, germanium diodes and similar items.

Power Transistors

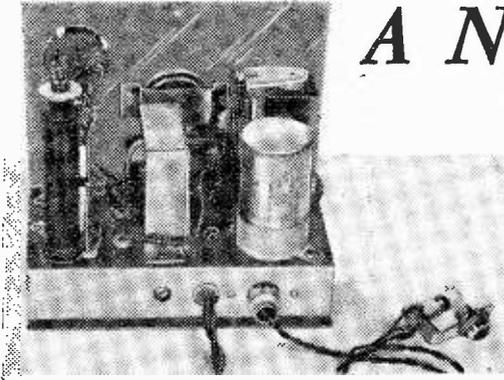
As we go to press Pye announced and demonstrated a novel Loudhailer which utilised a built-in power amplifier employing transistors only. These are of a new type, known as power transistors, giving, with two components only, an audio output of 3 watts. This interesting development will no doubt find application to radio equipment later, and the transistors, which consist in effect of three ordinary type transistors mounted on a single base have been developed in the Pye laboratories, and it is claimed that this is the first time this type of component has been used. With four Ever Ready cells (type 1839), an average consumption of 120 mA and a battery life of 12 hours (using the instrument in a duty cycle of 20 seconds on and 20 seconds off) the small amplifier gives a reasonably flat response over the speech range at a maximum of 3½ watts. The small amplifier unit, mounted on a paxolin plate measures only about 3½ in. by 2 in. but it is interesting to note that no use is made of the printed circuit technique on this particular amplifier. The amount of wiring is, however, so small that it would hardly be worth while, and the very few components are wired in the ordinary way.



The Collaro Transcriptor Tape Deck.

A Novel Baby Alarm

USING A VOICE-OPERATED RELAY IN A CIRCUIT WHICH IS ALSO SUITABLE FOR AUDIO CONTROL OF TAPE RECORDER, TRANSMITTER, ETC. By Hugh Guy



NOISE or voice operated relays have frequently been used in the past to provide semi-automatic control of one form or another. Advertising organisations, for example, have been known to install such devices in departmental store windows, where the noise or chatter of passing pedestrians has operated the device by means of which an illuminated window display is switched on. Better known to the radio constructor are its uses as an R/T transmitter switch; the operator's voice is used to switch on the H.T. to the power amplifier stages so that the transmitter radiates only when it is actually being modulated. On similar lines the voice-operated relay can be used to switch public address equipment on and off.

Such a device could readily be fitted to control the starting and stopping of a tape recorder, particularly if the latter is used for dictation purposes. A great saving in tape would thereby be effected. The

recording thus made would be far more coherent in that long silences due to pauses in the dictation would be eliminated on playback.

A further use for a sensitive relay of this description is found in the burglar alarm. Provided that its use were restricted to locations where there was normally no undue noise or disturbance, then the device would make a very reliable and foolproof alarm.

Several other uses will suggest themselves to the enterprising reader and the construction of a unit is described which will fulfil most of the above functions and others besides.

It is hoped to give further information in later issues of this journal on additional voice-operated relay designs. Meanwhile this article deals with such a relay intended for use as a baby alarm.

Function of a Baby Alarm

Quite simply an alarm of this description is used to inform the infant's parents (or baby sitters) of the child's movements or whimpering when he or she is supposed to be asleep.

As a rule the device takes the form of a simple audio amplifier which is fed by a microphone placed near the baby's cot. The audio output is taken to a

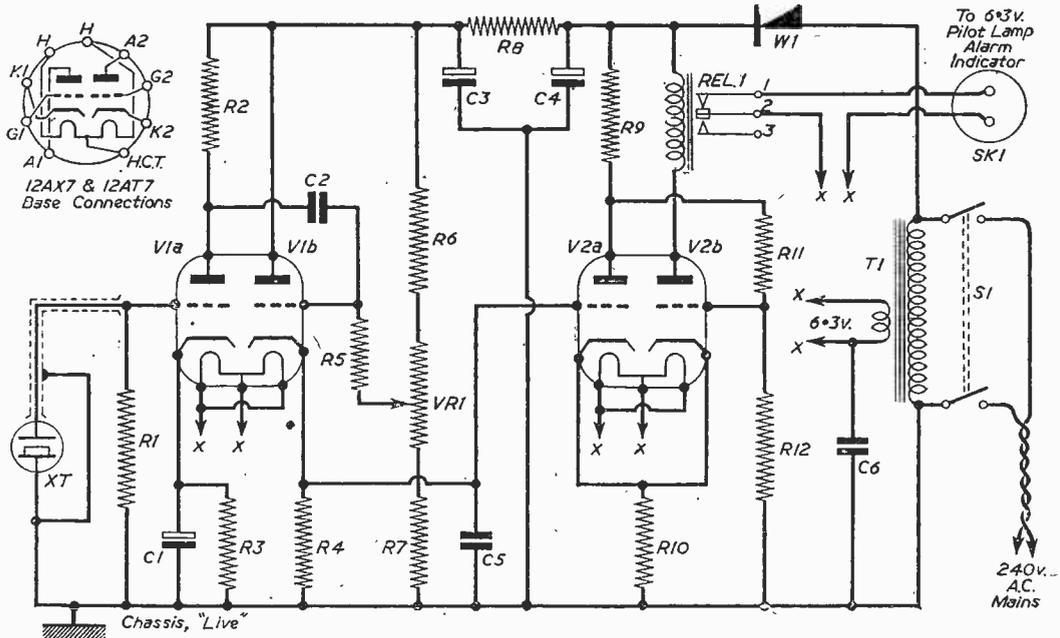
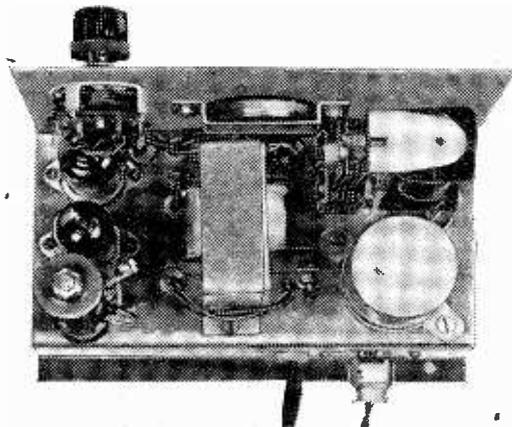


Fig. 1.—Theoretical circuit. A full list of parts appears on page 524.

loudspeaker which is installed wherever the parents are located. The one disadvantage of an arrangement of this sort is the incredible distraction the system causes. In contrast to the necessity for general quiet in the absence of an alarm due to one ear being permanently alerted for noises off, the owners of such a device are made fully aware of Junior's existence by the peculiar variety of noises that issue from the



Plan view of the finished alarm.

loudspeaker. With a reasonably sensitive amplifier even the rustle of bedclothes is reproduced as an ominous roar.

Since it is only required to register certain of the infant's "signals," some alternative indication of his or her misery is called for.

Stating the requirement an alternative way, a less alarming baby alarm is demanded.

A voice-operated relay immediately suggests itself for the task, since by restricting its sensitivity only the baby's cries will operate the switch. This in turn can be made to operate any electrical indicating device required. For example it may switch on a small warning pilot lamp; it may ring a bell; it could even switch off the television or radio set, if either of the latter is in use at the time. The form that the warning takes is entirely the choice of the user.

Circuit Operation

Fig. 1 shows that the circuit uses two valves, both double triodes.

The first stage V1a is a voltage amplifier having a gain of about 85. This is used to amplify the output from the microphone XT. The amplified signals are then rectified in the second half of the valve, V1b, which is an infinite impedance detector of high efficiency.

A direct voltage proportional to the signal received by the microphone is thus produced across the load resistor R4 and determines the potential of the grid of V2a. The two sections of V2 are seen to be connected in the form of a long-tailed pair circuit. Normally, in the absence of any input signal, the valves V2a and V2b are so biased that only V2b conducts. The anode current to the latter valve energises the coil of the relay in its anode circuit, holding the relay in.

When a signal is received at the microphone the amplified and rectified output appearing at V2a grid increases the potential sufficiently to permit anode current to flow in this valve also.

Due to the design of the V2 stages, which many readers will recognise as a "Schmitt Trigger" circuit, the current which was formerly flowing in V2b is diverted to V1a, de-energising the relay.

To understand this process a little more clearly a step-by-step analysis of the circuit will help.

In the absence of any signal the grid potential of V2b is about 57 volts, due to the voltage dividing chain R9, R11, R12. V2a grid meanwhile is set to a voltage well below this level. This arrangement ensures that only current from V2b flows in the cathode resistor R10. Under these conditions the common cathode potential is about 59 volts. Valve data for V2 show that to ensure that no current is drawn by V2a its grid potential must be at or less than 50 volts.

If the grid voltage is set at this critical level, then the slightest increase in potential at this point will cause anode current to flow in this valve, too. Further, the flow of anode current will cause a voltage drop across the load resistor R9. This voltage drop will be conveyed to V2b grid by the direct connection afforded by R11, R12 and the grid level reduced. This connection from the anode to the following grid forms a positive feedback path, and consequently the action of slightly increasing the potential of V2a grid is highly regenerative. Formerly the common cathode potential was dependent solely on the grid potential of V2b. When the latter decreases, then the cathode voltage will follow suit. This fall increases the relative grid-to-cathode voltage of V2a. As a result this valve's anode current is further increased causing an even bigger voltage drop at the following grid.

COMPONENTS LIST

RESISTORS

R1—2.2 M Ω $\frac{1}{2}$ w. (Erie).
 R2—1.2 M Ω $\frac{1}{2}$ w. (Erie).
 R3—15 K $\frac{1}{2}$ w. (Erie).
 R4—4.7 M Ω $\frac{1}{2}$ w. (Erie).
 R5—10 M Ω $\frac{1}{2}$ w. (Erie).
 R6—1 M Ω $\frac{1}{2}$ w. (Erie).
 R7—220 K $\frac{1}{2}$ w. (Erie).
 R8—68 K $\frac{1}{2}$ w. (Erie).
 R9—5.6 K $\frac{1}{2}$ w. (Erie).
 R10—10 K $\frac{1}{2}$ w. (Erie).
 R11—1 M Ω $\frac{1}{2}$ w. (Erie).
 R12—270 K $\frac{1}{2}$ w. (Erie).
 VR1—100 K carbon pot. (midget).

CONDENSERS

C1—25 μ F 12 v.w. electrolytic (Hunts J114PH).
 C2—0.001 μ F (Hunts W99 or W97 series).
 C3, C4—16 + 16 μ F 350 v.w. electrolytic.
 C5, C6—0.1 μ F (paper).

VALVES

V1—12AX7 (Brimar).
 V2—12AT7 (Brimar).

ACCESSORIES

XT—Crystal microphone (see text).
 Relay 1—6,000 Ω P.O. relay (see text).
 T1—240 : 6.3v. heater transformer.
 W1—240v. 10 mA (min.) half-wave rectifier.
 SK1—2-pin miniature battery socket and plug.
 S1—2-pole rotary mains on-off switch (Plessey type B).
 Screened wire, connecting wire, 6BA and 4BA nuts and screws, and solder tags, two 5-way tag strips, grommets.

This whole switching of anode current from one valve to the other happens instantaneously, and this type of circuit permits quite large currents to be switched by means of very small signal or "trigger" voltages.

Its function might be described as a means of making a magnetic relay super-sensitive.

We thus have a means of operating the contacts of a relay by means of an audible signal. Let us consider the purpose of the apparatus for a moment to decide exactly what function we require of it.

Performance Required

As it stands the device will respond to noises above a certain level. Obviously, it would be extremely difficult to get the relay to differentiate between crying and other sounds. A circuit which merely opened the relay for signals above a certain threshold and held it open thereafter would have many practical disadvantages as a baby alarm. One cough from the infant, for example, would "trigger" the indicating lamp or bell, etc., which, since it would remain in the "alarm" state, would give no real clue to the listener as to the urgency of the warning.

A better system is to arrange that the warning lasts only as long as Junior's "signal." In other words, the relay must open only when the grid potential of V2a rises above its normal critical level of 50 volts. This is accomplished by careful arrangement of the Schmitt trigger circuit values.

This type of performance is obviously the only one that would be suitable for the tape recorder, transmitter and P.A. applications mentioned earlier.

For a burglar alarm, however, any noise or disturbance should set the warning device going, and therefore the relay must be operated once only, being held in this new state until reset manually.

A third type of performance that might be required would specify that the warning device—a lamp, for example—should be switched on and off intermittently once the relay has been triggered. This arrangement would give a more compelling type of warning.

Slight circuit modifications enable any one of these types of alarm to be achieved and are given later.

Circuit Details

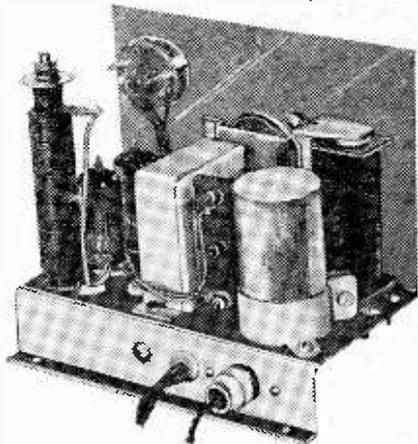
To set the critical voltage level at V2a grid the carbon potentiometer VR1 is included in the bias chain of the detector. Adjustment of this preset control determines the cathode potential of V1b and hence that of the following grid, to which it is directly coupled.

Condenser C5 is part of the detector smoothing circuit and its value will fix the time for which the relay is switched off after the audio signal has ceased. Its present value of 0.1 μ F gives the circuit a time constant of approximately half a second. This is sufficient to ensure that the relay does not "chatter" when the audio signal is of a warbling nature. Longer hold-off times can be achieved by increasing this value and by connecting a similar condenser across resistor R12. This method is recommended if the device is to be used for controlling a tape recorder.

The microphone used was purchased for 5s. and is one of the small crystal inserts currently being sold as ex-Government stock. If the microphone is being built into the unit, then the crystal type is recommended by its small size. In some instances, however,

there are advantages in mounting the microphone externally, in which circumstances any reasonably sensitive instrument may be used. Some readers may even prefer to use a small loudspeaker with its output transformer matching it to the input grid. Provided that the input lead is screened the type of microphone is not critical.

The relay was again an ex-Government purchase, and in the prototype unit had 12 contacts comprising four changeover switches. Actually, only two contacts were used. These were connected, as shown, in the circuit of Fig. 1, so that when the relay opens two



A three-quarter rear view of the unit.

contacts make to connect the heater voltage supply to the output socket SK1. It is to this socket that a length of twin flex is connected to convey the alarm signal to a warning lamp. The connections made to the relay are a matter for individual choice, being determined by the type of warning it is intended that the unit shall give. It should be remembered, however, that the relay opens or is de-energised when the alarm is triggered. This means that while the unit is warming up the alarm will be operating. This is no drawback if the alarm is an indicating lamp as it is in the circuit, but could be annoying if a bell were being used. Two contacts that are normally made should be used if the alarm is of the form shown in the circuit.

The power supply to the circuit is provided by a half-wave metal rectifier feeding a 16 + 16 μ F electrolytic combination (C3, C4 in the circuit). V2 requires no smoothing and hence is connected directly after the rectifier. The total current drain should not exceed 7 mA, not including the current drawn by the electrolytic condensers, and as a result the H.T. voltage is reasonably high at about 270 volts.

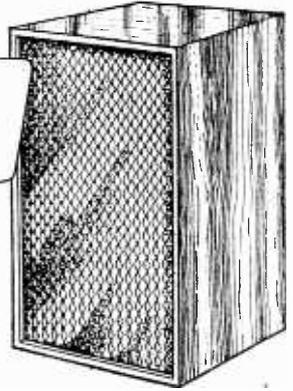
The valve heaters can be wired either as 12.6 volts or as 6.3 volt combinations. The latter connection is chosen if a heater transformer is to be used. Alternatively, for an A.C./D.C. baby alarm the heaters may be wired in series and connected to the mains supply via a 0.15 amp mains dropper of resistance 1,390 ohms. The latter mode of connection makes the provision of an alarm supply more involved, but a satisfactory arrangement will be given for A.C./D.C. connections next month.

(To be continued.)

a new— SPEAKER ENCLOSURE

A VALUABLE AID IN THE SEARCH FOR HIGH FIDELITY

By Arthur Adams



THE introduction of the long-playing record, with its extended frequency range, gave a much-needed fillip in the search for high fidelity reproduction. A further spur in this respect is the vastly superior quality of reproduction which is obtainable from the new frequency modulation transmissions of the BBC.

After a quarter of a century in the field of acoustics and a continuous striving for improvements in reproduction, the writer feels that his experiences (and mistakes) may be of assistance to others.

Although the loudspeaker is perhaps the weakest link in the chain, modern magnets with improved flux density and more precise tooling have given us excellent range and linearity; but where the manufacturers have failed, however, is that their backroom boys have not provided or designed suitable cabinets or enclosures to house these splendid units.

Hitherto, in order to encompass the lower frequencies, we have had to resort to reflexing with

its resonances, or the cumbersome corner enclosure with its booming and muddled bass. The large exponential horn is far too out of place for domestic purposes. It seems crazy to the writer that after producing *ultra linear amplifiers* we pass the resultant output through loudspeaker enclosures that boom and resonate in order to provide a spurious bass.

The position and size of the vent in the reflex cabinet determine its resonant frequency and if the music modulates its harmony to a point with its fundamental just off this frequency a discord will be produced. This is why the real student of harmony just laughs at our "canned music." It sounds to him like a bass player striking a wrong note.

The big enclosures and the craze for increased "cubic capacity" also ruin the crispness of the bass response of the best loudspeakers. The bass notes re-echo and resonate around the walls of these large enclosures so that the transients in the bass are entirely lost in a muddled boom.

A Reversal

In this new design we adopt a complete reversal of this policy of large cubic capacity and place the loudspeaker in a compartment only just large enough to contain it. The necessary baffling being effected by an extended air column at the back of the diaphragm. This air column is expanded exponentially in order to avoid any resonances. In this way the diaphragm is made to behave in exactly the same manner as when exponentially horn-loaded at the front.

It will be at once appreciated that the exponential expansion of this air column really necessitates a curved structure, but straight material is used in this new design and the exponential factors are closely adhered to. The small plus and minus tolerances are carefully balanced out and have no effect on the resultant reproduction. If the measurements in the design are precisely adhered to, none of the cells will set up a resonant frequency or peak.

(Continued on page 529)

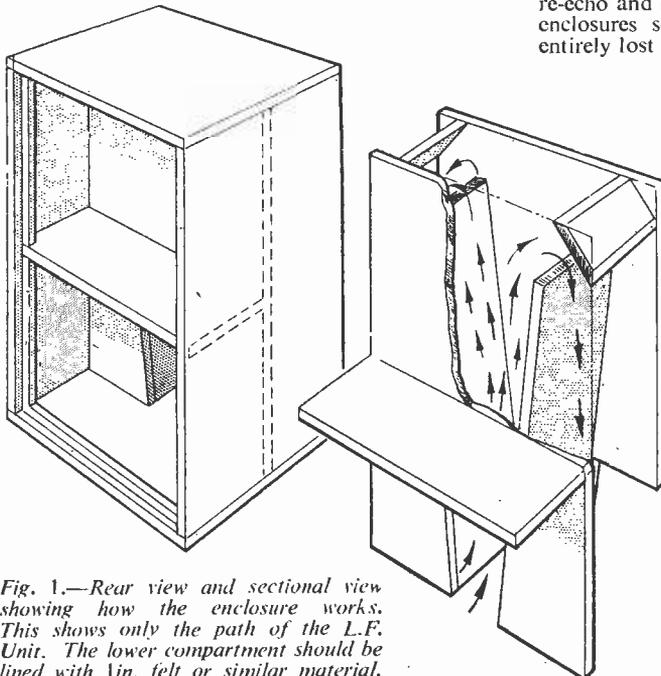


Fig. 1.—Rear view and sectional view showing how the enclosure works. This shows only the path of the L.F. Unit. The lower compartment should be lined with *Vin. felt* or similar material.

Great Britain's Valve Mail-Order House - RADIO BULLS VALVES



ANNOUNCING REDUCED PRICES

Table listing various electronic components and valves with their respective part numbers, descriptions, and prices. Includes categories like BRIMAR and FERRANTI valves, vacuum tubes, and other electronic parts.

Plus Postage 1/-

Subject to stock and price changes

NOTE LOW and LOWER PRICES





'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.

Size: 4 1/2 ins. x 3 3/8 ins. x 1 1/2 ins.
Nett weight: 18 ozs.

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

List Price: £12 : 0 : 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 milliamps, 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
List Price: £5 : 5 : 0

MODEL 1
D.C. VOLTAGE: 0 to 500 volts.
A.C. VOLTAGE: 0 to 500 volts.
D.C. CURRENT: 0 to 500 mA.
RESISTANCE: 0 to 20,000 Ω.
Total resistance of meter: 200,000 Ω.
SENSITIVITY: 400 Ω/V.

MODEL 2
D.C. VOLTAGE: 0 to 1,000 volts.
A.C. VOLTAGE: 0 to 1,000 volts.
D.C. CURRENT: 0 to 500 mA.
RESISTANCE: 0 to 200,000 Ω.
Total resistance of meter: 4 MΩ.
SENSITIVITY: 4,000 Ω/V.

RADIO SHOW
Stand No.

3

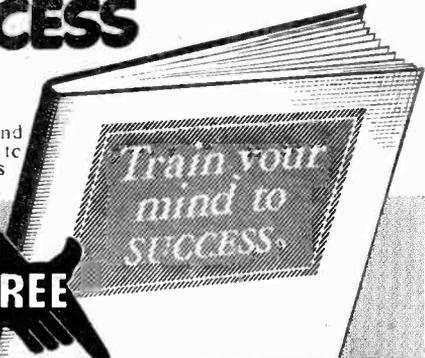
Write for a free copy of the latest Comprehensive Guide to "Avo" Instruments.

Sole Proprietors and Manufacturers —
AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO., LTD.
Avocet House, 92/96, Vauxhall Bridge Rd., London, S.W.1. VICTORIA 3404 (9 lines)

THE *AVO* BENNETT COLLEGE can train your mind to SUCCESS

THROUGH PERSONAL POSTAL TUITION
A FREE book vital to your career!

Read how the famous Bennett College can help you to success! Send now for this recently published FREE book, "Train your mind to SUCCESS," which tells you about The Bennett College proven success in postal tuition... and how it can help you to success in your career.



WHAT CAREER DO YOU WANT?

Architecture
Building
Carpentry
Chemistry
Commercial Arith.
Diesel Engines
Draughtsmanship
Electrical
Engineering
Electric Wiring

Forestry
Locomotive
Engineering
Machine Design
Mechanical
Engineering
Motor Engineering
Plumbing
Power Station Eng.
Quantity Surveying

Radio Engineering
Sanitary Science
Surveying
Telecommunications
Television

Accountancy Exams
Book-keeping
Civil Service
Commercial Arith.
English
General Education
Geography
Journalism
Languages

Mathematics
Modern Business
Methods
Police Subjects
Salesmanship
Secretarial Exams
Shorthand
Short Story Writing
and many others

GENERAL CERTIFICATE OF EDUCATION

FREE

TO THE BENNETT COLLEGE
(DEPT. J.104-N), SHEFFIELD

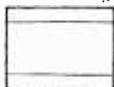
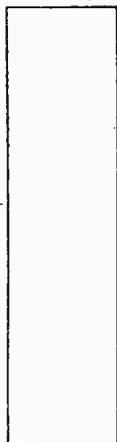
Please send me, without obligation, a free copy of "Train your mind to SUCCESS" and the College Prospectus on:

SUBJECT.....
NAME.....
ADDRESS.....
AGE (if under 21)..... Please write in block letters

**THIS COUPON
COULD BE YOUR
PERSONAL PASSPORT
TO SUCCESS.
Send it NOW!**

Construction

The enclosure is made throughout in $\frac{3}{4}$ in. composition board (Weyroc) and all joints must be firmly fixed and glued. This is particularly needed where the inner back meets the side panels. If this joint is not firmly made the side panels will "boom."



It will be observed that the front half of the enclosure is divided by a shelf, forming two compartments; the lower one accommodates the bass speaker and utilizes the cellular-back baffle. This compartment must be lined with felt or soft material $\frac{1}{2}$ in. thick in order to avoid any initial resonances being set up. It is not necessary to line the front panel which carries the loud-speakers. The front

be noted here that an elliptical speaker gives a better horizontal diffusion when mounted vertically.

The main speaker lead from the amplifier enters the enclosure through a $\frac{1}{4}$ in. hole, which should be drilled in the back panel 10 in. from the base. The lead should be provided with a collar or knot on the inside to prevent its being pulled away from the connections.

The back vents should be covered with muslin or light material in order to prevent the ingress of the domestic cat, toys, etc. The front panel is entirely covered with decorative material to taste.

The construction should be quite clear from the drawings and although rather complicated will be found well worth while; the crisp reproduction of the lower frequencies is a revelation, whilst the extended upper range assists in the reproduction of real high fidelity.

It should be understood that this design forms the basis of a patent application and cannot be manufactured for sale without arrangement with the designer.

Assembly Order

The peculiar construction of this new form of cabinet at first presented a problem, as the speakers had to be fitted from the front instead of being inserted from the back. In this case the speakers and crossover unit are all attached to the front panel, which is fastened in from the front; the panel screws being hidden by a $\frac{3}{4}$ in. quarter-round moulding which is mitred to a "push-in" fit. (It may, of course, be pinned or glued.)

The best method of assembly is found to be as follows:

After all the necessary sections have been prepared, the precise positions of the gussets and partitions should be marked on both backs so that nails or screws may be driven through when being glued and

Fig. 2.—On the left the partition, in the centre the shelf, and on the right the gussets.

edge of the shelf must fit closely to the front panel when assembled and a small channel cut or filed in its front edge for the speaker leads. The leads can be located on the panel with sticky tape so that they fit into this channel on assembly.

The treble speaker (6 in. elliptical) and crossover unit are fitted in the upper compartment. It should

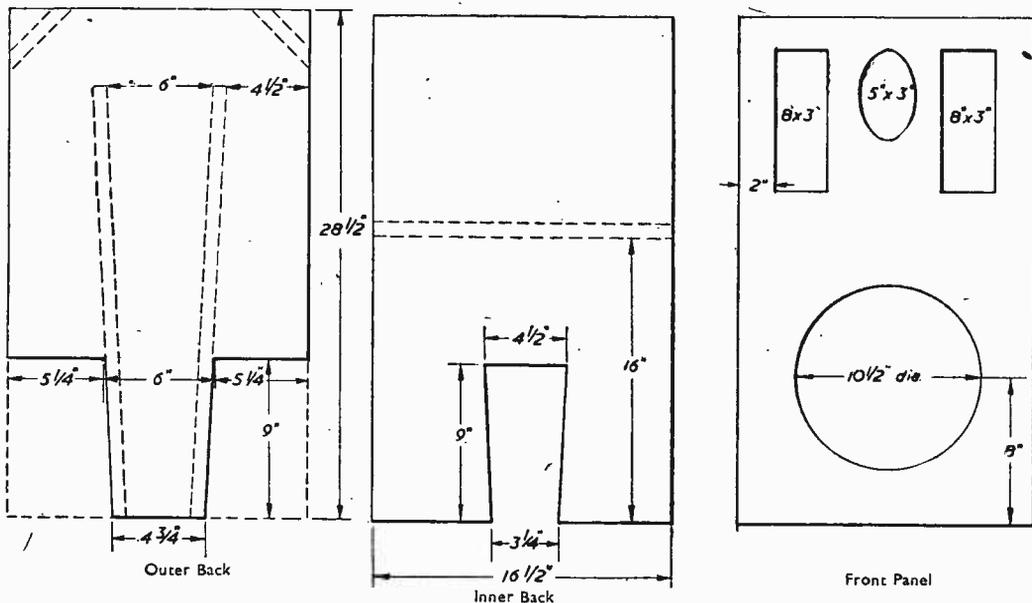


Fig. 3.—The front and back indicating the position of the partitions, gussets and shelf.

assembled. (This marking is necessary because the inner pieces are out of sight.)

First lay the outer back flat and apply the sides, top and the bottom, the back being inside and flush with the back edge of the panels. Glue and screw (or nail) all the joints.

The gussets and partitions are now fitted and glued. It will help in securing the correct location if small holes for the nails are drilled through the inner and outer backs. The inner back may now be laid in and firmly glued and pinned to the inner pieces and to the side panels. Securing the inner back all round is the most important, as if this is not done the sides will resonate.

CUTTING SIZES

(All of $\frac{3}{4}$ in. Weyroc)

Front, inner and outer back—all 28 $\frac{1}{2}$ in. by 16 $\frac{1}{2}$ in.

Partitions (2 off) 24 $\frac{1}{2}$ in. by 6 in.

Gussets (2 off) cut to fill corners as shown in Fig. 3, long sides being bevelled to 45 degrees.

Shelf 16 $\frac{1}{2}$ in. by 8 in.

Top and bottom, 18 in. by 17 in.

Side panels (2 off) 28 $\frac{1}{2}$ in. by 17 in.

The shelf is now fitted 16 in. from the bottom and securely fixed to the side panels and inner back by nails driven obliquely or by small battens fixed to the sides and back. A $\frac{3}{4}$ in. fillet is now fixed all round the inside of the outer panels, 1 $\frac{1}{2}$ in. from the front edge and in line with the front edge of the shelf. This is for fixing the front panel. File or cut a $\frac{1}{4}$ in. vertical groove in the precise centre of the front edge of the shelf for the speaker leads, as previously mentioned. The compartment with the back aperture is now lined with 1 in. felt or similar soft material. All screws or nails should be driven below the surface and a good filler used to level up. The cabinet may then be painted or veneered and polished.

New Organ Tuning System

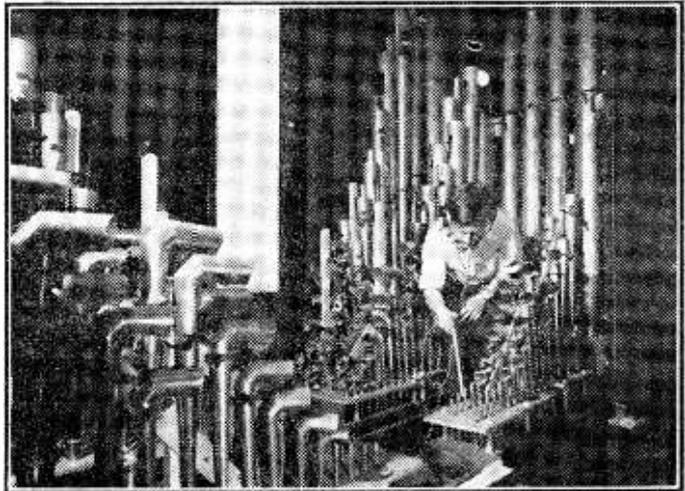
ON each occasion that the organ at the Colston Hall, Bristol, is to be used, the instrument is tuned. This tuning is necessary because of the extreme sensitivity of this great instrument to even slight variations of temperature and humidity in the vast organ chamber. It is no mean task, for the new organ, which took five years to build, has 5,372 pipes, 14 wind chests, mostly in halves of the slider type; 18 wind chests of the unit type and 17 reservoirs. Just under 4,000 electromagnets in the organ have windings requiring 300 miles of copper wire. Insulated multi-core cable takes 800 wires from the console to the various mechanisms operating the organ, which was built by Harrison and Harrison Ltd., of Durham.

Further, the all-electric console is detached from the organ itself so that the player can hear the instrument in correct balance and be in a better position for contact with conductors and for view by the audience. There is, therefore, an appreciable distance between the tuner and the console. Again the "Principal" is the stop from which all others are tuned, yet it is quite a distance from other sections of the organ. Apart from distance the sound from the pipes when the tuner is on top of them is deafening.

The tuner's problems, however, have now been met by a sound system devised by The General Electric Co., Ltd., which permits two-way communication between the tuner and the player; the tuner using a specially constructed extraneous noise cancelling microphone. It also picks up, via two moving coil microphones, the note from the "Principal" stop and relays it to wherever the tuner is working, the tuner receiving it through a moving-coil headphone. Obviously for correct tuning the

equipment chosen is of extreme sensitivity, and in the words of Mr. K. N. James, the tuner, "is the best yet devised for the purpose that I know of anywhere in the country."

The 8-10 watt amplifier employed has been designed for three fader-connected inputs, "Microphone," "Music 1" and "Music 2." It has a bass attenuator control connected in series with the microphone stage to enable maximum clarity of speech and music reproduction to be obtained under various acoustic conditions. The microphone sensitivity is such that at high volume a low output microphone of the ribbon type will fully load the amplifier; an important point when an extraneous noise cancelling microphone is being used in addition to moving-coil microphones. The amplifier works under constant working or instant operation conditions. The headphones have a total weight of only eight ounces each and can be worn for long periods without fatigue.



Wearing M.C. 'phones with padded earpieces, the tuner hears the note picked up by the mike. The organist also wears 'phones and the tuner can instruct him which note to play.



On Your Wavelength

BY THERMION

Those Organs

MR. F. THORNTON, of Stoke-on-Trent, writes to me concerning my note in the August issue concerning the organ programmes broadcast by the BBC. I was, of course, referring not to church services, but to those organ items which play a pot-pourri of "parbular toons." My reader tells me, what I already knew, that organ recitals as such and which play serious music are ordinary pipe organs, although they are electrically blown. I am well aware that they do not make use of valves and loudspeakers. My reader, however, thinks, as I do, that the organ is used far too often, and that organists cannot hope to have sufficient practice in order to exploit fully the resources of the instrument. There are very few cinema organists to-day, and their ranks are diminishing. The O.B.s of Joseph Seal, John Howlett, John Madin, and Douglas Reeve are worthwhile programmes, and they are evidently fine musicians. However, as I have said, I do not like organ music and it should be confined to the miserable religious atmosphere of the church. Perhaps the organist in Sullivan's beautiful melody, the Lost Chord, was feeling weary and ill at ease because the instrument made him miserable, and that is why, I suppose, his fingers, like some of the cinema organ instrumentalists wandered idly over the noisy keys. Nearly always the melody is killed by the organist wishing to demonstrate his digital dexterity, and his ability to operate all of the stops. Another reader, J. E. Wright, who hails from the salubrious district of Trumpington, says that my remarks caused him amusement "because they are not without justification." He disagrees, however, with me when I say that organ music is not sweet. Warming to his subject, he says that the interpretation of most music demands a tremendous range of dynamic and tonal resources of the organ. That sounds very good, but I dislike interpretations also. I like to hear the music played as the composer intended it to be played, and it is sheer impertinence for some organists to "interpret" the music in a different way. It is a gross liberty and usually results in murdering the melody. He tells me that there are no electronic organs at present broadcasting from cinemas but that some of the organs are rather old and in need of repair. A few have electronic solo attachments. He longs for the playing of Quentin Maclean, Reginald Foort, Sidney Torch, Felton Rapley, and others. He says that he often listens to Sandy Macpherson, without recognising the tune, and he thinks he is a good musician for a self-taught player, although he agrees that he is far too heavy in the bass.

The fact has to be faced that the organ is an obsolete instrument, like the virginal, the spinet, the clavichord, and all the other odd instruments with which compilers of crossword puzzles like to bewilder solutionists. The organ is definitely not an instrument which lends itself to

radio broadcasts, although I can see that it may entertain such people as parsons and sad-looking church-goers who know no other instrument. There are many people who *like* to be made miserable, just as there are pathological cases who like to go to the cinema or the theatre and have a good cry. Perhaps the cryers have discovered this fact and have adjusted their voices accordingly.

Crying for Cash

MENTION of cryers reminds me of the fact that we are having far too much of it. What is the advantage of children being trained to sing and passing their examinations when some half-baked and unintelligent person can earn hundreds of pounds a week just crying into the microphone and has never had a music lesson in his life? The BBC is performing a disservice to the music profession in encouraging people to believe that you can become a musician without knowing one thing about music. Some of these crooners cannot even read a note of music. Take the case of the late Felix Mendelssohn, who often was heard on the air and from the stage. He had his own orchestra, conducted it, made gramophone records; yet on his own admission he did not understand one note of music, had no training as a musician, and could not play any instrument, not even a Jew's harp. To divert attention, however, from his musical ignorance, he circulated a story to the press that he was a direct descendant of the great Felix Bartholdy Mendelssohn! I knew this could not be so, and I tackled him on it. It is true that his christian names were Felix Bartholdy and that his patronymic was Mendelssohn, but apart from that he was not related in any way to Mendelssohn, and readily admitted it. He was exposed in one of the musical papers, but did this deter Felix, or the BBC from employing him? Not a bit of it. The BBC couldn't care less. I maintain that the BBC has a moral responsibility to enquire into the training and background of the musicians they engage.

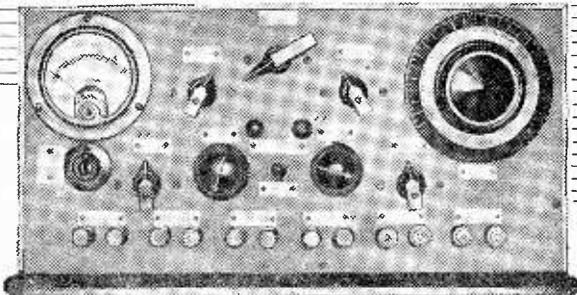
Bands go on increasing and multiplying, like germs, each has its own crooner and only very few of them can claim to be trained musicians. Most members of bands have their own aspirations to break away and form their own bands, and, indeed, that is what has happened since Jack Payne, Jack Hylton and Henry Hall pioneered this form of musical cacophony. Now there are literally dozens of bands and more and more are being formed each year—all nibbling away at the same market and reducing the possibilities of any of them ever making real money or staying the course. If they have not made real money in five years they have, to use a common phrase, "had it." Indeed, it is unthinkable that any one band, however good, should continue beyond this period. The public to-day wants change. A sort of musical metamorphosis. My advice, therefore, to those who are thinking or cashing in on the jazz noise racket is: Don't. The novelty soon wears off.

An Experimental Power Pack

PRINCIPLES OF DESIGN
AND SOME PRACTICAL
CONSTRUCTIONAL DETAILS

By T. S. Skeet

(Continued from page 449 Sept. issue)



THIS type of switch has four contact segments at its centre and eight contacts on the outer rim, with four equally disposed insulation strips or blanks; thus the facility originally provided was that of a four-pole, two-way and off-switch. To convert, to provide switch C, for example, involves strapping (or commoning) each two adjacent centre contact segments; thus providing a two-pole five-way switch, but one of each of the five-ways is a blank, and it will be observed that the "ways" of switch C in the wiring diagram, shows a blank space between contacts 2 and 3 on both arcs. Switch D is similarly arranged; whilst switch B is wired in a somewhat similar manner, except that all four of the centre contact segments are "commoned," and this provides a one-pole double contact switch with five "ways"; giving a "one" or "two," or "both" facility, still with gaps between 2 and 3.

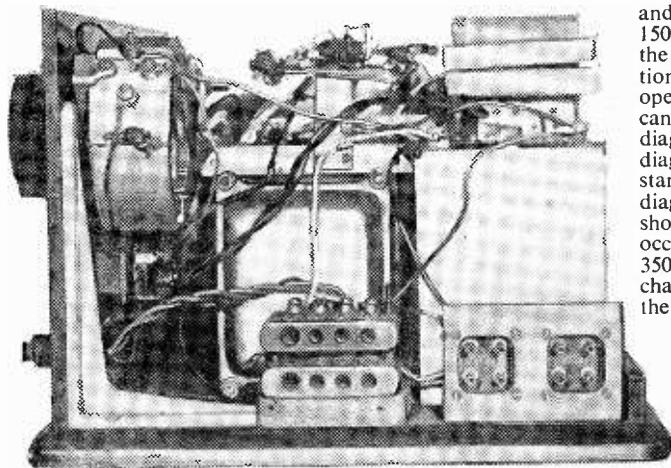
The indicating marks for the switch pointers on the outside of the front panel are spaced, of course, to coincide with the position of the switch pointer. All of these switches have very definite "click operation"; i.e., they cannot be left in mid position between contacts, even if the operator really tries to put them there. The indicating points on the panel are radially spaced holes, drilled into the ebonite and filled in with coloured (or white) sealing wax.

For example, the potentiometer switch would have for *position 1* one small hole, for *position 2* one large hole, both filled white, the next position is filled blue and the fourth position has one large and one small hole arranged radially and both filled white. The transformer switch is similarly arranged. The markings indicate: "*position 1*" small potentiometer (or transformer); "*position 2*" large potentiometer (or transformer); "*position 3*" neither potentiometer nor transformer; and "*position 4*" both potentiometers or transformers. This "small, large, neither, or both" arrangement was not optional, i.e., it was not specifically desired; but was necessary for the reason mentioned earlier, i.e., the switches have two contacts adjacent and then a gap in each of the four sections.

Switch E, which is the voltmeter range switch, has all of its (4) centre contacts joined together, but three of the four rotating contacts were removed, whereas switches B, C and D each had two diametrically opposite wipers (or rotating contacts) removed. Switch A is the outstanding item in the switching system; it has 18 fixed contacts and six moving ones, and is a two-position switch. It is thus a six-pole two-way switch and 16 of the fixed contacts are in use. This switch, as previously explained, is used to change over the (nominal) 350 volt circuit to a "voltage doubler"

and also to connect it in series with the 150 volt supply and as explained earlier, the open circuit voltage of the combination is over 1,000 volts. The method of operation of the voltage doubler circuit cannot readily be traced on the wiring diagram and reference to the schematic diagram will be essential for a clear understanding of the principle. On the circuit diagram the five A-switch contacts are shown in the position which they would occupy when the rectifier is feeding the 350 volt circuit. All five moving contacts change over to contacts marked B when the insulation test circuit is in use and at

the same time contact A6 connects the negative side of the 800 volt supply to the positive side of the 150 volt supply; providing a 950 volt supply between the positive wire of the 800 volt circuit and the negative wire of the 150 volt circuit. When switch D is in the B position (see



Side view of the complete unit.

schematic diagram), the two "insulation test" terminals will have, connected between them, the 940 volt supply in series with the micro-ammeter.

The two-pin power intake plug carries two quarter-amp-rating fuses and this protection is considered very desirable.

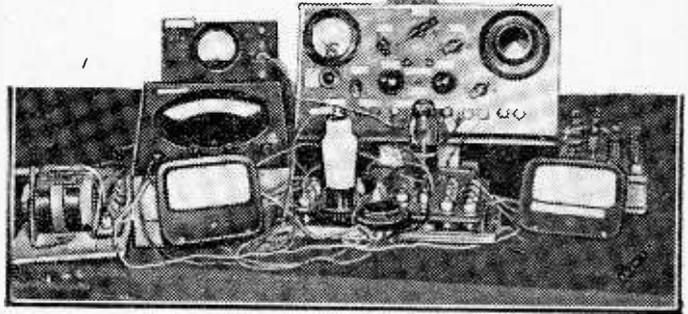
Auxiliary Panel

A further look-over of the unit with its "lid off," shows that the base area of the unit was not large enough to accommodate all the apparatus, and some of the voltage-doubling apparatus and 150 volt circuit smoothing equipment was of necessity mounted on an auxiliary panel fixed perpendicularly to the base. The untidy looking tag block with twelve tags (which block can be seen on the centre-line of the unit in the plan view) carries all the series resistors for the seven voltmeter ranges. The total resistance is 10 megohms. One end of the tag block is supported by the main choke and the other, by the securing clamp of a 10 μ F capacitor, and this is typical of the methods for putting "a quart in a pint pot."

The four "jacks," or connectors, are fixed at the right-hand end of the base and, of course, the aluminium cover has "cut-aways" giving access to them. The jacks which make available 350 volts and 150 volts D.C. and 4.0 volts and 6.3 volts A.C. are not essential, as all the supplies are brought out to terminals on the front panel; but nevertheless if the most frequently used pieces of apparatus requiring these supplies are fitted with the appropriate plugs, much time is saved as, in some instances, the apparatus may be in use for a shorter time than it takes to make the four wire connections.

The transformer which supplies the 350 volt circuit and the 4.0 volt and 6.3 volt heater supplies was a skeleton type Services disposals without terminals or case; which items were added by the author. The transformer for the negative supply was originally

an audio-frequency interval transformer and was rewound by the author to provide 150 volts and 2 volts for the green indicator lamp. The choke for the 150 volt smoothing circuit was likewise made up from disposals oddments; i.e., two ready-wound bobbins and tag block and stampings which were



A bench test set-up showing the test unit in use.

designed for quite a different type of unit.

One of the photographs, i.e., that depicting the left-hand end of the unit, shows three bars of selenium rectifier discs and it may not be clear how they are used. When purchased (disposals again), they were all alike, that is to say, they each had thirty-six discs, all facing in one direction (like those indicated at the top-left corner of the circuit diagram). These two have not been altered in any way, and when switched as indicated in the diagram the two bars form a "full-wave" bridge type rectifier, delivering 350 volts D.C. to the smoothing circuit for anode supplies.

Reference to the diagram of the single-bar rectifier will show that it has been taken apart at its centre and that one half has been reversed and also that two additional connections have been provided. This modification makes the rectifier a full-wave bridge rectifier, like the other one at the top of the diagram; except that the modified bar has only one half the

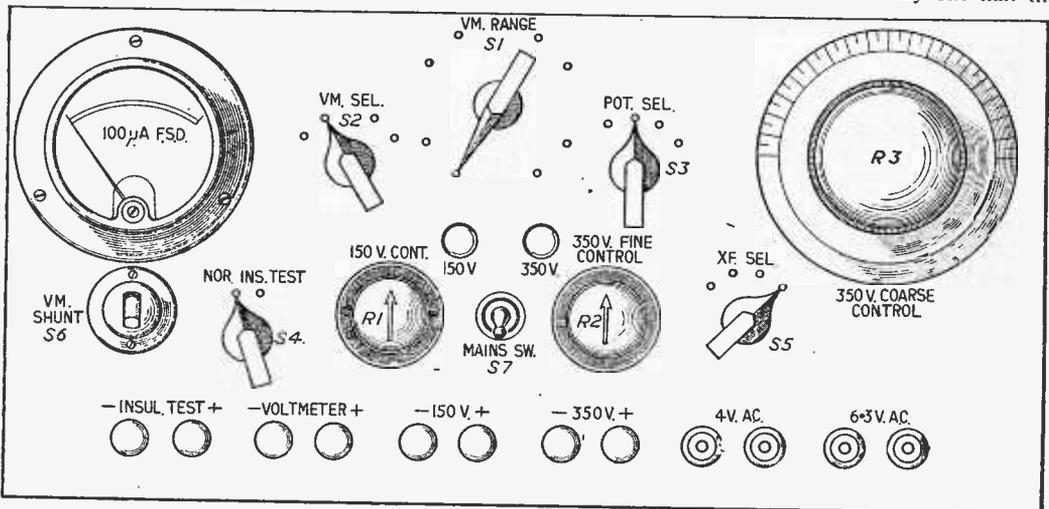


Fig. 3. — Details of the panel controls and markings.

number of discs between a pair of electrodes, which implies that a section will withstand only one-half of the reverse voltage. This, in fact, is all that is required of it, as the output of "circuit two" is 160 volts.

This is all that can be written on the construction and design of the power pack; but it is, perhaps, desirable to mention that the power pack is not the complete answer to the serious experimenter's work. This point was brought home to the author rather strongly quite recently. He desired to know the characteristics of two H.F. pentode valves and by the time he was in a position to make all the necessary simultaneous measurements his rather small workbench was almost full of apparatus. Had batteries of low internal resistance been available for the test, of course, the apparatus would not have been so complicated, because the battery voltage would be constant; whereas any and every alteration of one value, i.e., say the grid volts, did in fact cause a change in every other circuit.

The meter in the power pack was used for adjustment of the anode voltage and four other meters

were used for the following measurements: grid volts, screen volts, anode current and screen current. The screen current is of no consequence so far as the characteristic curve of the valve is concerned; but it does form one component of the total cathode current, and as the valve was to have auto-bias it was essential to know the screen current.

Another essential component added was a potentiometer of about 8,000 ohms. The 100,000 ohm potentiometer in the 150 volt circuit of the power pack is O.K. for the 0 to 150 range; but its adjustment near zero was not nearly fine enough for use over the few volts range of the H.F. pentode; hence the 8,000 ohm potentiometer was connected in series with the 100,000 ohm potentiometer of the power pack which was adjusted until the voltage across the 8,000 ohm potentiometer was just a little more than the bias range of the valve. This arrangement permitted of the use of the whole range of the added potentiometer, with consequent ease of adjustment of the grid volts.

News from the Clubs

EAST KENT RADIO SOCIETY

Hon. Sec.: D. Williams, Llandogo, Bridge, Nr. Canterbury. THE above society still meets at the basement of The Technical College, Longport Street, Canterbury and continues to enrol new members. The main activity at the club has been Direction Finding; two sets have been operative and three more are about to take the field. Two teams have been organised by G3JES and G3KNR and the transmitter was operated by G3EMU and Mr. R. Luff. New members and visitors are welcome. The society hopes the Thanet Society are going ahead with Direction Finding apparatus.

THE WARRINGTON AND DISTRICT RADIO SOCIETY

Hon. Sec.: R. Dyke, 22, Stetchworth Road, Walton, Warrington, Lancs.

A RECENT Field Day held to test the club's newly acquired equipment was favoured by good weather, and a very pleasant day was spent at an almost ideal location on high ground at Appleton, overlooking Warrington and the Mersey Valley.

Meetings are now held at 7.30 p.m. on the third Thursday in each month at 13, Sandy Lane West, Longford, near Warrington. Visitors and new members will always be welcome.

THE BOURNEMOUTH AMATEUR RADIO SOCIETY

Hon. Sec.: John Ashford, A.R.I.C.S., G3KYU, 119, Petersfield Road, Boscombe East, Bournemouth.

THIS Society is organising a Mobile/Portable Rally to take place on Sunday, 16th September, at Stoney Cross Aerodrome, 7½ miles West of Southampton on A.31 (NGR 41/250118). Three Control Stations will be operating from 10.30 BST onwards, G2HIF on 2 metres, G3GYK on 80 metres and G3KYU on 160 metres. Anyone interested is welcome to attend and should bring picnic lunch and/or tea with them. Mobile participants are asked to contact control as soon as possible on their way to the site and to report progress periodically. Any further details may be obtained from the Honorary Secretary and it is hoped that the Rally will be well supported by hams from a wide area.

The Society meets on the first Friday of each month at The Cricketers' Arms Hotel, Windham Road, Bournemouth, at 7.45 p.m. when visitors will be welcomed.

CRAY VALLEY

Hon. Sec.: S. W. Coursey (G3JJC), 49, Dulverton Road, New Eltham, S.E.9.

THE September meeting of the Cray Valley Radio Club will be held at the Station Hotel, Sidcup, Kent, on Tuesday, 25th September, 1956, at 8 p.m. A talk will be given by Mr. R. G. Shears (G8KW), on V.H.F. mobile radio communication with particular reference to the "Hamobile," and various types of mobile equipment will be demonstrated.

New members are cordially invited and all visitors are welcome.

THE BRADFORD AMATEUR RADIO SOCIETY

Hon. Sec.: F. J. Davies, 39, Pullen Avenue, Eccleshill, Bradford 2

DURING the coming Winter Session classes for candidates for the Radio Amateurs' Examination will again be held

at the Bradford Technical College. Particulars can be had from the College, Great Horton Road, Bradford.

THE LEEDS AMATEUR RADIO SOCIETY

Hon. Sec.: Mr. A. Chapman, 9, Cockshott Close, Leeds 12.

AT the annual general meeting the following officers were appointed for the coming season which commences on September 26th, 1956:—

President—Mr. G. W. Ringley (GBAHU); Chairman—Mr. N. B. Bridges (BR513409); Hon. Treasurer—Mr. W. Ripley (G4AD); Hon. Secretary—Mr. A. Chapman; Assist. Sec.—Mr. J. R. Hey; Committee—Mr. R. Henderson, Mr. E. Sollitt, Mr. B. Payne, Mr. M. Gale (G3JMG).

BRIGHTON AND DISTRICT RADIO CLUB

Hon. Sec.: Mr. J. Trangmar, 33, Lennox Street, Brighton, Sussex.

THE annual general meeting of the above club will be held at the club headquarters, "The Eagle Inn," Gloucester Road, Brighton, on Tuesday, September 25th, 1956, at 8.15 p.m. Home and overseas visitors are always welcome at the club, which is open every Tuesday evening at 7.30 p.m. The latest visitor to add his name to the ever growing list was EA4EO from Madrid.

PLYMOUTH RADIO CLUB

Hon. Sec.: Cyril Teale, G3JYB, 3, Berrow Park Road, Peveler, Plymouth.

THIS Club meets on alternate Tuesdays at the Virginia House Settlement at 7.30 p.m. Slow Morse classes are held.

Next meetings, September 18th, October 2nd, 16th and 30th.

RAVENSBORNE AMATEUR RADIO CLUB

MEETINGS resume on Wednesday, September 5th at 8 p.m. at the Science Room, Downham Men's Institute, Durham Hill School, Downham (near Catford, S.E.6 and Grove Park, S.E.12), when the club transmitter G3HEV will be operationally on all bands. It is hoped to have a good building schedule this term on equipment to improve the station. Last term Field Day and Exhibition was a success. New members welcomed every Wednesday evening.

SPEN VALLEY AND DISTRICT RADIO AND TELEVISION SOCIETY

THE new Hon. Sec. of this society is now: Mr. J. Stubbs, 5, Manor Street, Heartshead Moor, Cleckheaton.

CLIFTON AMATEUR RADIO SOCIETY

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

THE Transmitting Field Day, held in what can only be described as foul weather, produced five contestants. The winner of this event was again C. Hatfull, G3HZI, in second place was J. Lambert, G3FNZ, and in third place E. Godsmark, G3IWL. Programme for September: 7th and 21st—Constructional evening and ragchew; 14th—Annual General Meeting; 28th—Junk sale.

Meetings are held every Friday at 7.30 p.m. at the clubrooms, 225, New Cross Road, London, S.E.14. Details of membership can be had upon application to the hon. secretary.

G.R.T. ISOLATION TRANSFORMER
 Type A. Low leakage windings. Ratio 1:1.25 giving a 25% boost on secondary. 2 v., 10/8; 4 v., 10/6; 6 v., 10/6; 10.5 v., 10/6; 13.5 v., 10/6.
 Ditto with main primaries, 12/8 each.
 Type B. Mains Input 220/240 volts. Multi Output 2, 4, 6.3, 7.5, 10 and 13 volts. Input has two taps which increase output volts by 25% and 50% respectively. Low capacity, suitable for most Cathode Ray Tubes. With Tag Panel, 21/- each.
 Type C. Low capacity wound transformer for use with 2 volt Tubes with falling emission. Input 220/240 volts. Output 2-21-21-23 volts at 2 amps. With Tag Panel, 17/6 each.
NOTE.—It is essential to use mains primary types with T.V. receivers having series-connected heaters.

TRIMMERS, Ceramic. 30, 50, 70 pf., 9d. 100 pf. 150 pf., 1/3; 250 pf., 1/6; 500 pf., 2/0 pf., 1/9.
RESISTORS, All values. 10 ohms to 10 meg., 1/2 w., 4d.; 1/4 w., 6d.; 1 w., 8d.; 2 w., 1/-.
HIGH STABILITY, 1/2 w., 1%, 2/-. Preferred values 100 ohms to 10 meg.
WIRE-WOUND RESISTORS 1/3 5 watt; 25 ohms—10,000 ohms..... 1/6 15 watt; 25 ohms—10,000 ohms..... 2/- 15,000 ohms—50,000 ohms, 5 w., 1/9; 10 w., 2/8.
KNOBBS, GOLD ENGRAVED.—Walnut or Ivory, 1 1/4 in. diam., 1/6 each. Not engraved, 1/- each.

12/6 PURETONE RECORDING TAPE
 1,200 ft. on standard fitting 7" Plastic reels. Brand new, boxed, 12/6.
 Spools 5" metal, 1/6, 7" plastic, 4/3.

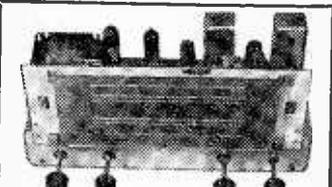
UP TRANSFORMERS, Heavy Duty 5/0, 4/6. Multiratio, push-pull, 6/8. Tapped small period, 3/8.
L.F. CHOKES 15/10 H. 60/65 mA., 5/-; 10 H. 120 mA., 10/8; 15 H. 150 mA., 12/6.
MAINS TRANS. 350-0-350, 80 mA., 6.3 v. tapped 4 v., 4.5 v., 5 v. 2 a., ditto 250-0-250, 21/-.
HEATER TRANS. Tapped 250/250 v., 6.3 v., 1 1/2 amp., 7/6; tapped sec. 2, 4, 6.3 v., 1 1/2 amp., 3/6.
VCR97 TESTED FULL PICTURE, 22.
COPPER PLATED AERIAL RODS, 1/4 x 12 in. push fitting, 3/- doz. p. & p. 1/-.
ALADDIN FORMERS and core, 1 in., 8d.; 1 1/4 in., 10d. 1 in. FORMERS with Gans and Core, 1 in. sq. x 1 1/2 in. and 1 in. sq. x 2 1/2 in., 2/- ea.
TYANA—Midget Soldering Iron. 200/230 v. or 230/230 v., 18/9. Solon Midget Iron, 24/-.
MIXER TRANS. Ratio 50:1, 1/3 9 ea.
MAINS DROPPERS, 3 x 1 1/4 in. Adl. Sliders, 3 amp. 750 ohms, 4/3. 2 amp., 1,000 ohms, 4/3. **LINE COORD.** 3 amp., 60 ohms per foot, 2 amp., 100 ohms per foot, 2 way, 6d. per foot, 3 way, 7d. per foot.
LOUDSPEAKERS P.M. 3 OHM.
 5 in. Goodmans, 17/6. 7 in. x 4 in. Goodmans, 21/-.
 3 1/4 in. square, Elac, 21/-; 8 in. x 4 in., 22/6.
 4 in. Goodmans, 18/6. 10 in. R. & A., 30/-.
 4 in. ditto w/Trans., 21/-, 12 in. Plessey, 30/6.
MIN. A.E. 2.5 k. or 2 k. field, tapped 0 P. transi., 24/6.
CRYSTAL DIODE, G.E.C., 2/-. Crystal Book, 1/-.
GEX34, 4/- Circuits for Germanium Diodes, 3/6.
HIGH RESISTANCE PHONES, 4,000 ohms, 17/6 pr.

CRYSTAL MIKE INSERT by Acos, precision engineered. Size only 1 1/4 x 3/16 in. Bargain Price 6/8. No transformer required.

SWITCH CLEANER Fluid, squirt spout, 4/3 tin.
TWIN GANG TUNING CONDENSERS, .0005 mid. midget with trimmers, 5/6; .375 pf. midget less trimmers, 4/6; .0005 Standard size with trimmers and feet, 9/6; less trimmers, 8/-; ditto, solid, 2/6.
SPEAKER FEET, Woven Plastic TYGAN. Walnut tone. 1 1/4 in. wide, 2/- per foot.
Expanded metal, Silver, 15 in. x 9 in., 2/- each.

VALVES
 A SMALL SELECTION FROM OUR STOCKS
 All Boxed

	1/6	New & Guaranteed		10/6
8/6	5/8	EA50	8/8	10/6
1R5	6B8	954	6A15	5Z4
1T4	9D2	2/6	6J5	12A7
185	EF90	2X2	6K6	EBC41
884	Equip.	E1148	6K7G	EF80
3V4	8P8	K85	6X5	ECB35
5U4	8P41	EB34	HVR2	EC180
6AM6	EF92	3/8	(near)	EC42
6AT6		5D6		EF41
6B7		6H6M		EF90
6K8	7/6		7/6	EL41
6SL7	6BE6	7/8	EL32	EZ40
6N7	6BW6	6X4	HVR2A	K733C
6V6GT	6F6	6X5	PEN25	MU14
8BC93	6K7GT	807	1/22	FL81
EF90	6K7M	EF39	VP23	EV51
8rte Red				6C7
EF91	All B.V.A. Valves at reduced list prices			
				EC82



ALL WAVE RADIOGRAM CHASSIS
 THREE WAVEBANDS FIVE VALVES
 S.W. 16 m.—50 m. LATEST MULLARD
 M.W. 200 m.—550 m. ECH42, EF41, EB41, L.W. 800 m.—2,000 m. EL41, EZ40.
 12 month Guarantee.

A.C. 200/250 v. 4-way Switch; Short-Medium-Long-Gran. A.V.C. and Negative feedback. 4.2 watts. Chassis 13 1/2 x 5 1/2 x 2 1/2 in. Glass Dial 10 x 4 1/4 in. horizontal or vertical available. 2 Pilot Lamps, Four Knobs, Walnut or Ivory. Aligned and calibrated. Chassis isolated from mains. T.B.L. Tweeter Supplied Free!

10 gns. Carr. & Ins. 4/6.
 TERMS: Deposit £5.50 and six monthly payments of 21.
MATCHED SPEAKERS FOR ABOVE CHASSIS
 8 in., 19/8; 10 in., 25/-; 12 in., 30/-.

R.C.S. SCOOP
 Coltaro Auto-changer RC531 for 78 r.p.m. 10 in. and 12 in. records. Brand new in maker's boxes! High impedance lightweight Pick-up with sapphire needle, will match any Amplifier or Radio. Less than half price.
£5.19.6. Carr. and ins. 5/6.



£7-19-6 Post Free.
 Terms: Deposit £4 and six monthly payments of 15/-.
 Brand new Plessey 3-speed Autochanger Mixer Unit for 7, 10 and 12 in. Records. Twin Hi-Fi Xtal Head with Diopoint sapphire stylus. Plays 4,000 records. Spring mounting, Base-board required 15/- x 12 in. Height 5 1/2 in. Depth 2 in. Super Quality, 200/250 v. A.C.
 Walnut Veneered Playing Desk out out ready for Plessey, only sold complete with Changer 10/6 extra.

ALLDAY UNIT POWER PACK. Replaces Battery B114, etc. 69 v. plus 1 1/2 v. Size 4 1/2 in. x 3 1/2 in. x 1 1/2 in. 4-pin socket. Same as battery. ONLY 1/- a year to run on A.C. 200/250 v.
FAMOUS MAKE. LIST PRICE, 65/-. OUR PRICE, 39/8. Ready for use.

B.S.R. MONARCH, 3-speed Motor and Tunable with selecting switch for 33, 45 and 78 r.p.m. records. 100-120 v. and 200-250 v. A.C. Pick-up with Acos Xtal turnover head, separate Sapphire stylus for L.P. and Standard records.
SPECIAL OFFER, THE TWO: £4.15.6, post 2/6.
T.V. PRE-AMP (MICHAEL). Tunable Channels 1 to 5. (Will Amplify Output of your Band 3 Converter.) Midget size. High Gain. Fringe Model, B.V.A. Valve. Full instructions. Ready for use. (H.T. 250 v., 3 amp. required.) BRAND NEW, 25/- each.
SPECIAL MAINS POWER PACK for above, 25/- extra.
SUPERHET COIL PACK 27/8. Miniature size 2 1/2 in. x 2 1/2 in. High "Q" Dust Core Coils. Short, Medium, Long, Gram Switching. Single hole fixing. Complete with connection diagram, and circuit.

TELETRON BAND III CONVERTER
 For London, Midland and Northern Transmissions

Suitable all T.V. makes. T.R.F. or Superhet. Ready wound coils, two EF80 valves, all components, punched chassis, circuit-diagram, wiring plans. COMPLETE KIT for mains operation 200-250 v. A.C. £3.10.0.

As ABOVE less POWER PACK. Requires 200 v. 20 mA. H.T. 6.3 v. 5 a. L.T. £2.5.0.
 Mains Transformers to above spec. ... 10/6
 Min. Westinghouse Rect. ditto ... 8/6
 B.B.C./L.T.A. Aerial crossover unit ... 7/6
 Punched and drilled chassis ... 2/9
 Larger chassis for Mains Model ... 6/-
 Teletron Coilset with plans ... 16/-
 Full plans and circuit details... .. 6d.

Volume Controls 80 ohm CABLE COAX Semi-air spaced Poly-test 1 year. Midget. these insulated. 1 in. dia. 10,000 ohms to 2 Meg. No Sw. S.P.S.W. D.P.S.W. 3 WATT. Pre-set. Mtu. T.V. Type. All valves 25 ohms to 30 K., 3/- ea. 50 K., 4/- (Carbon 50 K. to 2 m., 3/-).
WIRE-WOUND 4 WATT. Pots. 2 1/2 in. Spindle. 100 ohms, 100 ohms to 50 K., 5/6; 100 K., 8/6.
CONDENSERS. 500 p.f. 500 p.f. 100 p.f. 100 p.f. T.T.C., 5/6. Ditto, 20 kv., 9/8; 100 p.f. to 500 p.f. .055, 6d.; Tubular 500 v. .001 to .01 mfd., 9d.; .01, 1/-; .25, 1/6; .5, 1/9; 1/350 v. 9d.; 1/600 v., 1/3; 1 mfd., 2,000 volts, 4/-.
CERAMIC CONDENSERS, 100 p.f. to .01 mfd., 10d. **SILVER MIKE CONDENSERS**, 25-32/450 v., 5/6 1 p.f.; 600 pf. to 3,000 pf., 1/3. **DITTO** 150 p.f. to 500 p.f., 1/9; 515 pf. to 1,000 pf., 2/6.

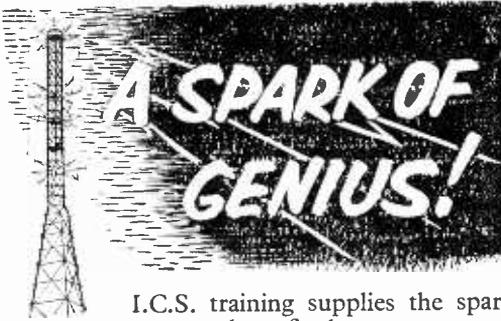
I.F. TRANSFORMERS 7/6 pair
 485 Kofs Shug tuning Miniature Can., 2 1/2 in. x 3 in. x 1 in. High Q and good bandwidth. By Pye Radio. Data sheet supplied.

NEW ELECTROLYTICS. FAMOUS MAKES
 TUBULAR TUBULAR CAN TYPES
 1275 v. 2/- 100/25 v. 2/- 8+18/500 v. 5/6
 2450 v. 2/3 8+8/500 v. 4/6 16+16/500 v. 6/6
 4450 v. 2/6 16+16/500 v. 8/- 20+20/450 v. 5/6
 8450 v. 2/3 32+32/350 v. 4/3 32+32/350 v. 4/6
 16450 v. 3/6 32+32/450 v. 5/6 50+50/350 v. 7/6
 16450 v. 4/- 16/450 v. 3/6 64+120/350 v. 11/6
 32350 v. 5/6 32/350 v. 4/- 100+200/275 v. 12/6
 50/25 v. 1/9 30/12 v. 5/8 1,000+1,000/6 v. 12/6
 50/30 v. 2/- 8+16/450 v. 5/- 1,000+1,000/6 v. 4/6
 Screw Base Type 512. 8/500 v. 3/- 1,650/50 v. 8/-
SENTERCEL RECTIFIERS. E.H.T. TYPE FLY.
CAN VOLTAGES K3/25 2 kv., 4/3; K3/40 3.2 kv., 6/-; K3/45 3.6 kv., 6/6; K3/50 4 kv., 7/3; K3/100 8 kv., 12/6; MAINS TYPE: RM1, 125 v., 60 mA., 4/-; RM2, 100 mA., 4/9; RM3, 120 mA., 5/9; RM4, 250 v., 275 mA., 16/-.
G.E.C. Neon Oscilin. M.B.C. 180 v. 5 mA., 2/6.
ACID HYDROMETER. New Ev. Weights, all ranges. "Q" type adj. dust core 4/-; "E" type, 5/-.
TELETRON L. & Met. with reaction, 3/6.
H.F. CHOKES, iron corel., 14 M.H., 3/- each.

ALUMINIUM CHASSIS, 18 s.w.g. un drilled. With 4 sides, riveted corners and lattice fixing holes, 2 1/2 in. sides, 7 x 4 in., 4/6; 9 x 6 in., 5/9; 11 x 7 in., 6/9; 13 x 9 in., 8/6; 14 x 11 in., 10/6; 15 x 14 in., 12/8; 18 x 16 x 3 in., 16/6.

FULL WAVE BRIDGE SELENIUM RECTIFIERS, 2, 6 or 12 v. 1 1/2 amp., 2/9; 2 a., 11/3; 4 a., 17/6.
CHARGER TRANSFORMERS, Tapped input 200/250 v. A.C. for charging at 2, 6 or 12 v., 1 1/2 amp., 18/6; 4 amp., 21/6.
ALL BERNARDS books in stock. List 3d.
VALVE AND TV TUBE equivalents book, 5/-.
ACID HYDROMETER, New Ev. Govt. Unbreakable. Packed in metal case 7 x 1 1/2 in. dia., 4/6.
WECHANGE SWITCHES.
 5 p. 4-way 2 water, long spindle ... 4/8
 2 p. 2-way, 3 p. 2-way, short spindle ... 2/6
 3 p. 6-way, 4 p. 2-way, 4 p. 3-way, long spindle 3/6
 3 p. 6-way, 1 p. 2-way, long spindle ... 2/8
VALVEHOLDERS, Fax. Int. Oct. 4d., EF50, EA50, 6d. B12A, CRT, 1/3. Eng. and Amer. 4d., EF50, EA50, 9 pin, 1/-.
MOULDED Mazda and Int. Oct. 6d. BTG, B8A, BGC, B9A, 9d., BTG with can 1/8.
TELETRON, 2B, B8A with can 2/6.
CERAMIC, EF50, BTG, B9A, Int. Oct. 1/-, BTG with can 1/9.
BLACK CRACKLE PAINT, air drying, 3/- tin.

We have no connection with any other firm. Please address all Mail Orders correctly, as below.
RADIO COMPONENT SPECIALISTS 307 WHITEHORSE RD., WEST CROYDON
 OPEN ALL DAY—(Wed. 1 p.m.) 10 page list 3d.
 Tel. THO 1665, Buses 133 or 68 pass door. 48-hour postal Service. P. & P., 1/- £2 orders post free. (Export Extra.) C.O.D. Service 1/6



I.C.S. training supplies the spark you need to further your career.

The Courses I.C.S. offer are practical and up-to-date, they recognise the present emphasis on Frequency Modulation, and can help you attain one of the many well-paid posts that exist today in the radio world. Prepare yourself now, at home and in your own time, with the expert help of I.C.S. tutors. The cost of an I.C.S. Course is moderate and includes all books.

Among the I.C.S. Courses available are:

- FREQUENCY MODULATION ENGINEERING
- T/V ENGINEERING
- RADIO SERVICING
- RADIO ENGINEERING
- RADAR ENGINEERING
- BASIC ELECTRONICS
- INDUSTRIAL ELECTRONICS
- ELECTRONIC ENGINEERING

Complete the coupon below and post it to us today for further details of the Course which interests you. Write to: Dept. 170E, I.C.S., 71 Kingsway, W.C.2.

INTERNATIONAL CORRESPONDENCE SCHOOLS

DEPT. 170E, INTERNATIONAL BUILDINGS, KINGSWAY, LONDON, W.C.2.

Please send FREE book on

NAME..... AGE.....
(Block letters please)

ADDRESS

OCCUPATION

**INTERNATIONAL
CORRESPONDENCE SCHOOLS**

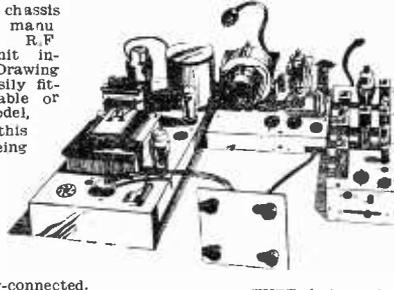
T.V. TUBES 12" £5
GUARANTEED

17" RECTANGULAR	...	...	...	£7.10.0
14" RECTANGULAR	...	...	...	£5.10.0
12" ROUND TYPE	...	...	...	£5. 0. 0
15" ROUND TYPE	...	...	...	£5. 0. 0

15/8 Ins./Carr. on all Tubes.
Mullard 6 months' guarantee. All makes stocked. Owing to demand, some delay on 12in. 2-volt. Please enquire. Many good working tubes from 12/6.

T.V. 12in. CHASSIS, 97/6

Complete chassis by famous manufacturer. R.F. E.H.T. Unit included. Drawing FREE. Easily fitted to Table or Console model, owing to this chassis being in three separate units (Power, Sound and Vision. Time-base) Inter-connected.



THIS CHASSIS IS LESS VALVES AND TUBE, but see our catalogue for cheap valves. Our 45 Tube fits this Chassis. List of valves by request. Carr. 5/- London, 10/- Provinces. Channels 1-5 clients have converted to 14in. and 17in. successfully. Easily converted to I.T.V. Channel. Please PRINT name and address. Regret no C.O.D. on tubes. Remember SATURDAY open all day.

MONEY BACK GUARANTEE **DUKE ECo** Tel: GRA 6677 CWO or COD
621 ROMFORD RD. LONDON, E.12.

COMMUNICATIONS RECEIVER R.1155—The famous Bomber Command Set. Covers 18.5-7.5 Mc/s. 7.5-3.0 Mc/s. 1,500-600 kc/s. 500-200 kc/s. 200-75 kc/s. "B" Model with super slow motion tuning. ONLY £10.18.6, tested working before despatch and supplied with 14-page booklet which gives technical information, circuits, etc. (available separately 1/3).

A.C. MAINS POWER PACK OUTPUT STAGE, in black metal case. Enables receiver to be operated immediately by just plugging in. Supplied WITH built-in speaker £5.5.0 or LESS speaker, £4.10.0.

DEDUCT 10/- IF PURCHASING RECEIVER & POWER PACK TOGETHER. Add carriage costs of 10/6 for receiver. 5/- for power pack.

AMERICAN "COMMAND" RECEIVERS.—Huge purchase from the Air Ministry. These famous compact receivers which can be used for a variety of purposes are offered at ridiculously low prices while stocks last. Complete with 6 metal type valves. 1 each of 12K8, 12SR7, 12A6, and 3 of 12SJ7, in aluminium case size 11" x 5 1/2" x 5". Used, but in very good condition, although cases may be somewhat dented. Circuits supplied. First come first served. Choice of models. BC455 (6-9 mc/s). 25/-; BC454 (3-6 mc/s). 27/6. BC453 (190-550 kc/s, the renowned "Q-Fiver"). 59/6, and a few of the 1.5-3.0 mc/s. model 65/- (Carriage, etc., 3/-).

COLLINS TCS TRANSMITTERS.—Special offer of these famous American Transmitters. Frequency range 1.5-12.0 mc/s. in 3 bands. Employs 7 valves, 2 of 1625 in P.A. Stage, 1625 buffer and 1625 modulator Stage, 3 of 12A6 in oscillator stage. Radio telephone or radio telegraph. Provision for VFO or Crystal Control. 4 crystal positions. Has plate and aerial current meters. In BRAND NEW CONDITION, ONLY £12.10.0. Matching receivers available £8.10.0. or THE PAIR £20. (Carriage 10/- each.)

CLASS D WAVEMETER
Another purchase of this famous crystal-controlled wavemeter which has been repeatedly reviewed and recommended in the "R.S.G.B." Bulletin as being suitable for amateur transmitters. Covers 1.9-9.0 Mc/s, and is complete with 100,000 kc/s crystal, 2 valves ECH35, two 6-volt vibrators and instruction manual. Designed for 6 v. D.C. operation, but simple mod. data for A.C. supplied. BRAND NEW IN MAKER'S TRANSIT CASES. ONLY £5/19/6. Transformer for A.C. modification, 7/6.

U.E.I. CORPORATION 138, Gray's Inn Road, London, W.C.1. (Phone: TERminus 7937)
Open until 1 p.m. Saturdays. We are 2 mins. from High Holborn (Chancery Lane Station), and 5 mins. by bus from King's Cross.

Adding Another Transistor Stage

VARIOUS ALTERNATIVES FOR FURTHER AMPLIFICATION WITH TRANSISTORS

By Capt. R. F. Graham

(Continued from page 482 September issue.)

THE loop coil described last month measures 182 μ H. But a single-strand tinned copper wire 1/.036 Polythene insulated Henley equipment type will suffice for a 12in. loop with fewer turns. For short waves, try 4 turns spaced $\frac{1}{4}$ in. apart 11in. to 12in. dia. Some foreigners fade in, overload, and fade out, without an aerial and earth.

Circuit No. 6A has been used over six months; it is superior to the first four and is definitely recommended.

Improved Direct Coupling (Fig. 6A)

This is for two transistors in parallel which are not a perfectly matched pair. It is not easy to find two to match even out of a dozen. Fig. 6 is actually for one OC72 as output.

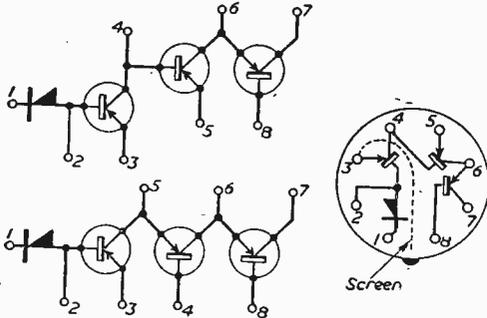


Fig. 8.—Details of the mount and connections.

The 10-ohm variable resistor produces an additional bias for the weaker transistor, so that both meters, M2 and M3, can be made to give the same reading.

Adjustments are made with no aerial, loop coil shorted. With the 10- and 100-ohm resistors set at

minimum, namely, shorted, and the 100,000-ohm at maximum resistance, batteries are switched on, the 100 K potentiometer is reduced from maximum for a reading of 1.6 mA on M1 and then the 10- and 100-ohm resistors are adjusted for M2 and M3 to read exactly 3 mA. Finally, the 100 K potentiometer is adjusted to reduce M2 and M3 readings to about 1.6 to 1.8 mA without touching the 10- and 100-ohm resistors, which may be of the pre-set type adjustable by a screwdriver. After a few hours' use readjust only the 100 K potentiometer. Use meters only for tuning and adjustments, short them for listening-in to save pivot wear; use switches for this (not shown in this circuit).

Note: The .001 capacitor has been moved from GD3 and OC70 coupling and is now shown between the collectors and battery (—). This stabilises the very sensitive region around GD3 and OC70. If the .001 is removed, as in Fig. 6, the receiver will produce a shrill sound if a finger is brought near this sensitive region, but when connected as shown, the diode may be touched and only mains hum will be heard in the L.S. To explain this adequately will require an expert on transistors. Suffice it to say, it works.

Cascade (Fig. 8)

This is to draw your attention to the direct coupling used in the last three circuits. Transistors could be put into one glass tube, like a valve with eight pins, and a portion screened off as shown in the round diagram.

Or it might be a futuristic type of multi-layer assembly as shown in another circle, where the black sections are negative and white ones positive type of semi-conductors.

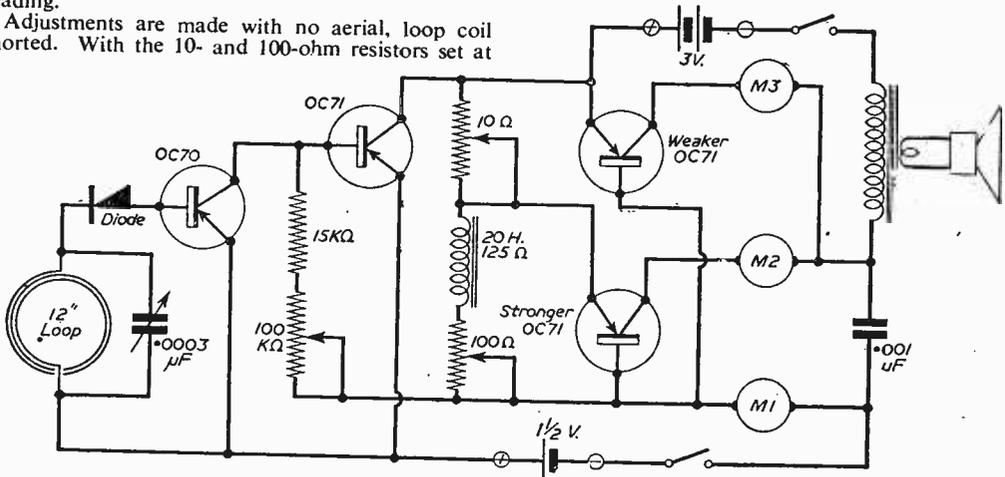


Fig. 6 (A).—An improved direct-coupled circuit.

That is by the way. The fact remains that there is no stabilisation, no feedback, no perfect matching, no other refinements in some of the circuits shown. These were omitted deliberately, without apologies, so that anyone can build the very simple circuits and actually get very good results. These are not stunt circuits, but have been tried and do work well, except Fig. 4.

Since the resistances in inputs and outputs are low, stabilisation is not essential and can be omit-

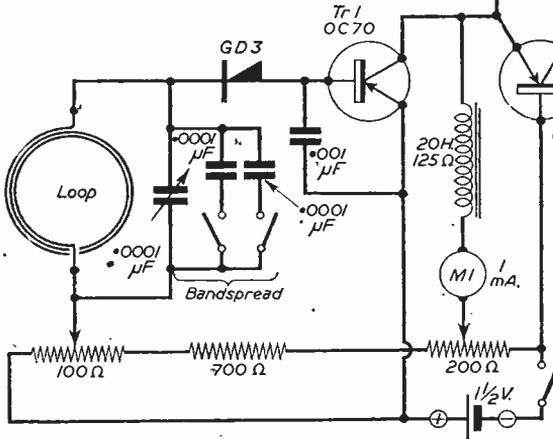


Fig. 7. — A further direct-coupled circuit.

ted, but if desired, try one for the first transistor with high resistors by connecting a 1,000-ohm potentiometer between the OC70 emitter and battery positive. Vary resistance and note results.

Of course, it would be better if the choke in Fig. 6 had a tap to match up output from OC71 to input for one OC72. Likewise, such a choke may be used instead of the 15 K and 100 K resistors, but this necessitates modifying bias arrangements, except in Fig. 7.

There is an unusual feedback in Fig. 6A where .001 μF was simple to add and should be used in Fig. 6.

This cascade is a D.C. amplifier with very good fidelity, and apart from wireless it can be used for many other purposes.

As already explained, the Fig. 5 is the best circuit, with automatic gain-control which comes into operation only after a certain amount of input, so it is safe to use and will give excellent results. T2 with primary windings of 120 ohms D.C. will also act as a current limiting device for the OC72 transistors, maximum output, with 4 1/2-volt battery.

Final Notes

When OC72 transistors are available, care in use is very necessary. Data sheets and maker's curves will, at first sight, appear wonderful but, in fact, one OC72 is better than two perfectly-matched OC71 in parallel and not three. The most important data to note carefully is the Limiting Values which will be referred to as max.

The max. wattage curve is shown dotted in up to 120 mA. The highest curve I_c 114 mA is when V_c is only 0.4 volts and not battery 6 volts. This I_b -3 mA curve is outside the permissible working range of 0 to 0.4 volts. It is one extreme.

The longest range is shown in the bottom curve at

4.5 to 5 mA when V_c varies from 0.4 to -9 volts and is extended to -13 volts. I_b -0.1 mA curve is another extreme. No one will use less than 5 mA when class A output calls for at least 5 mA bias alone.

The two smaller curves I_c (mA) - I_b (mA) and I_b (mA) - V_b (volts) are complementary. From these two, bias voltage and bias current can be ascertained for any I_c reading, but not under practical working

conditions because both curves are labelled V_c -1V, and not the recommended 6 volts, battery.

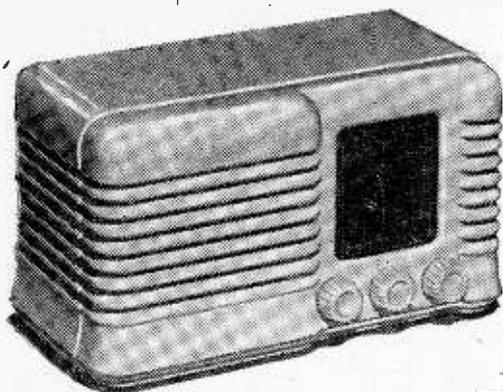
When I_c is 50 mA, I_b is -0.98 mA and this reading on the other curve shows V_b is then -0.24 volts bias.

Practical D.C. tests described in December are obviously called for. One new OC72 was tested accordingly for plotting two curves I_c - V_b and I_b - V_b . There was no indication of any I_c and I_b until V_b reached -0.15 volts; a 5.14 volt battery was used and R_c load was 100 ohms. Then a circular curve took shape up to 4 mA at -0.24 volts bias for one transistor and 5 mA at same bias for another new OC72, both supposedly matched. Finally, the curve was straight up to 20 mA at -3.7 Vb for the first transistor and -3.35 Vb for the second one. Matching is not particularly good.

If anyone attempts using a 6-volt battery and allows a peak of 100 mA to take place, even one half a cycle of such a peak at what works out to be about 600 milli-watts, will completely destroy OC72 transistor. The limiting value is : i.e. (pk) max. 45 mW. So we must use discretion and abandon all ideas of 100 mA and 6 volts.

If a 3-volt battery is used with a transformer of 100 ohms D.C. and taking max. 45 mW, then I_c peak current must not exceed 15 mA. But since there will be a voltage drop in the load, V_c will be less than -3 volts (actually about -2.6 volts at 15 mA) so max. is about 18 mA. And this is so, because during tests it was noted that meter began to creep up in less than one second after reaching a steady reading at 20 mA I_c . After all the OC72 is only slightly larger than OC71 and the only difference is probably that the junction surfaces are also slightly larger and a cooling fin is provided.

When making D.C. tests for curves, it is very important to critically watch the meter for I_c each (Concluded on page 570)



An AC Straight 3/4

By F. W. Austin

ALTHOUGH the T.R.F. receiver has become somewhat outmoded of recent years, there still remain a large number of home-constructors either requiring a handy stand-by receiver which can be used in any room, or other readers who have not yet had sufficient practical experience to make a really sound job of a superhet. The beginner is in no position to embark upon a superhet unless proper alignment procedure is thoroughly understood; even then some trifling fault of wiring is likely seriously to discourage and upset him.

This receiver should prove interesting to both old hands and beginners alike. All parts are easily obtainable and the cabinet, chassis, tuning condenser, scale and pointer are of a type universally stocked and sold separately by almost every radio dealer. Very slight modification to the chassis only is necessary (to accommodate the modern small valves used—6BA6, Z77 and ECL80).

Performance

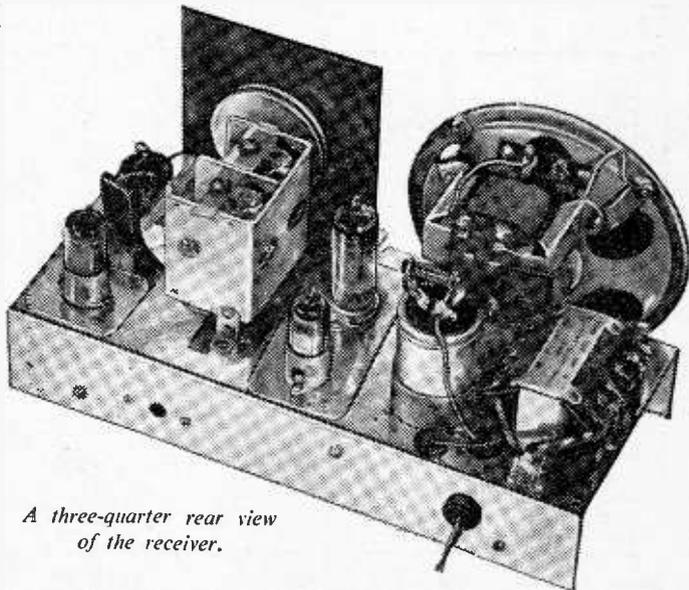
It was designed primarily from the point of view of sensitivity and on local stations (on full volume) the receiver is overloaded. We know this is undesirable, but no reader is likely to need full volume and the set therefore has power in reserve for the time when valve emission begins to deteriorate. The quality is no more than can be expected from a small speaker in a small cabinet, but is quite tolerable and not unpleasant. For local reception no more than a yard of throw-out aerial is necessary, whilst the recommended length for best overall results (long and medium waveband) is approximately six yards.

Circuit Details

The full circuit diagram is shown in Fig. 1. The aerial feeds the control grid of V1 (6BA6) in conventional manner, but the grid bias of this valve is fixed by R3 (100 ohms) and volume control is by means of varying the screen potential via R1 (2 megohm potentiometer), and R2 (47 K).

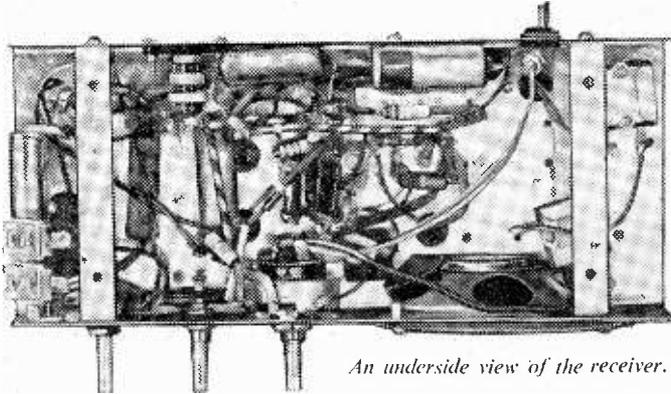
V2 (Z77) is H.F. transformer-coupled to V1 and is operated as an anode-bend detector. In this arrangement a low anode and screen voltage are necessary for correct operation. R4 (2.2 Meg) and R5 (470 K), shunted by C6 (.1 μ F), regulate the screen, whilst R6 (680 K) and C7 (.1 μ F) help to smooth and by-pass unwanted responses from the main H.T. line. R7 (1 Meg) is the anode load and C9 (250 pF) is for the purpose of by-passing the residual R.F. components to chassis.

V3 (ECL80) is used as a two-stage L.F. amplifier and the signal is passed to the triode control grid via C10 (.01 μ F coupling condenser). The lower end of R9 (680 K grid leak) is taken to a tapping point (two separate resistors) between cathode of ECL80 and chassis. As this valve has a "common" cathode for both triode and pentode sections, the



A three-quarter rear view of the receiver.

path along R12 provides bias for the triode section whilst the path R12+R13 provides bias for the pentode output section. The cathode by-pass condenser C12 (500 μ F 12 v.w.), is unusually large, but is highly desirable from the point of view of stability. The anode of the triode section is fed from R10 (220 K) and the signal passed by C11 to the



An underside view of the receiver.

control grid of the pentode. Grid continuity to chassis is via R14 (470. K).

It will be noted that the anode of the pentode is fed directly from the junction with the metal rectifier. A resistor R11 (680 K) between the two anodes of the ECL80 provides a mild form of negative feedback. Smoothing is effected by means of C15 and C14 (32-32 μ F) in conjunction with R15 (2.7 K). R16 (100 ohms) is a surge limiter which safeguards the receiver in the event of a short-circuit developing in C14-C15, or elsewhere along the main H.T. line. C16 (.01 μ F 1,000 volts test) is to safeguard against modulation hum, which might otherwise be experienced on loud signals.

PARTS LIST

(Resistors—all half-watt types.)

- R1—2 Megohm volume control with 2-pole on/off switch.
- R2—47 K.
- R3—100 ohms.
- R4—2.2 Meg.
- R5—470 K.
- R6—680 K.
- R7—1 Meg.
- R8—10 K.
- R9—680 K.
- R10—220 K.
- R11—680 K.
- R12—220 ohms.
- R13—270 ohms.
- R14—470 K.
- R15—2.7 K.
- R16—100 ohms.

(Condensers—350 v.w. unless stated otherwise.)

- C1—.001 μ F (mica).
- C2 & C5—.0005 μ F twin gang (with trimmers).
- C3—.1 μ F.
- C4—.1 μ F.
- C6—.1 μ F.
- C7—.1 μ F.
- C8—25 μ F (12 v.w.).
- C9—.00025 μ F.
- C10—.01 μ F.
- C11—.01 μ F.
- C12—500 μ F (12 v.w.) with clip.
- C13—.01 μ F.
- C14 and C15—32-32 μ F. Elect. 1 clip (for same).
- C16—.01 μ F mica (1,000 volts tested).
- Tr2—50 μ F+50 pF trimmers.

Construction

Immediately beneath the circuit diagram (Fig. 1) will be seen coil diagrams and valve base connections. These are placed in correct juxtaposition and tally with the circuit at their respective situations. It should not, therefore, be difficult for the veriest novice to interpret connections from this diagram and by consulting Fig. 2 which gives complete component positioning, both above and below the chassis.

A small sheet of aluminium will be needed for cutting to shape and drill to suit the three valves. This has been made quite clear in Fig. 2, but some retailers sell small metal "adaptors" to take these

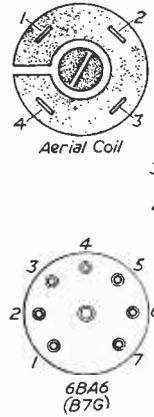


Fig. 4.—Valve

smaller valves over existing I.O. cutouts, and this may be preferred by some readers.

Certain small holes will have to be drilled in the chassis apart from those already provided, but no difficulty should be encountered. A hole of about $\frac{1}{4}$ in. diameter should be drilled in the rear of the chassis where the H.F. coil is mounted horizontally. This should be made central to the coil mounting for adjusting the iron core of the coil later on during alignment.

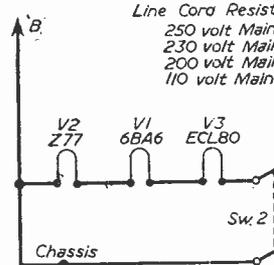


Fig. 3.—Modification fo

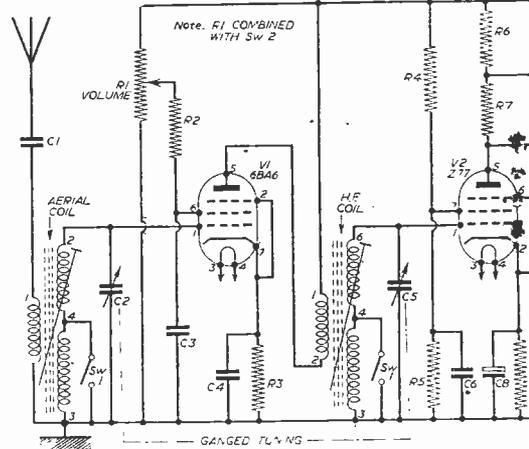
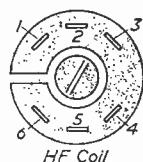
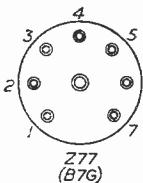


Fig. 1.—Theoretical circuit

The best type of alignment tool for small iron-cored tuning coils is a broken plastic knitting needle which has been sharpened, cut or filed at one end to screwdriver (wedge) shape.



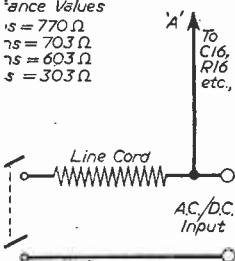
HF Coil



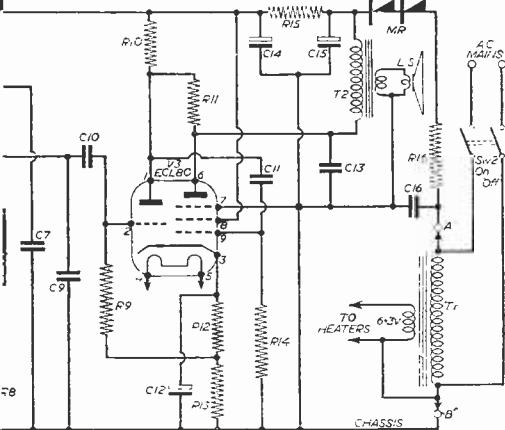
Z77 (B7G)

base data.

Resistance Values
 R5 = 770 Ω
 R5 = 703 Ω
 R5 = 603 Ω
 R5 = 303 Ω



for A.C. D.C. working.



of the A.C. Straight 3/4.

Photographs may show two metal rectifiers under the chassis, but a single rectifier of 250 v.w. at 50 mA will be quite adequate and only one is shown in the component layout and the parts list.

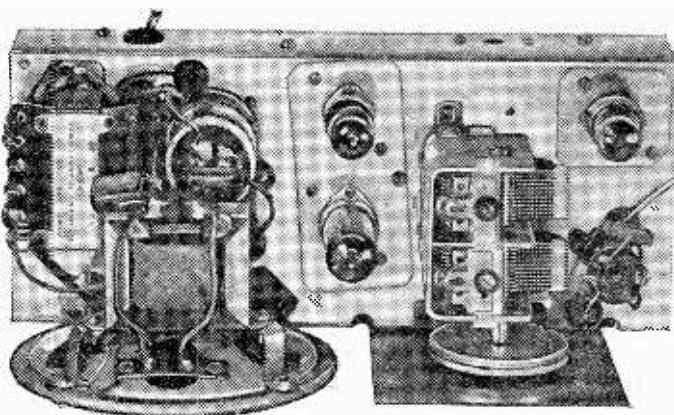
The valves have been so chosen that certain readers who may be on D.C. mains can still make up the receiver in appropriate form: Fig. 3 shows alterations necessary in such cases. Apart

from the wiring shown, all other arrangements remain as in Fig. 1 and the points at which the circuit varies are marked 'A' and 'B' in both Fig. 1 and Fig. 3.

When operating from D.C. mains supplies it must be realised that the receiver will only work with the mains lead connected in correct polarity. If the receiver will not work, either reverse the mains plug in the socket, or change the wires over in the mains plug to conform.

In the original A.C. version

one side of each valve heater is taken directly to chassis, likewise one side of the filament transformer secondary (6.3 volt) winding and one side of the primary winding (mains input end). The beginner will have to be careful here, as it is very easy to omit this



Top view of the receiver.

wiring. It will be realised that unless one side of the mains input is taken to chassis there will be no reference point from which the rectifier can derive the necessary high tension voltage.

In the D.C. (or Universal) arrangement all the heaters are series connected in the order shown in Fig. 3 and in wiring up the receiver it is wise policy to start on the heater wiring at the outset, with the valve biasing arrangements following. In this way we not only have room above these components for mounting other parts but safeguard the valves from faulty operating conditions. It is a good plan to take time in assembly and wire one stage completely at a time, say, from the mains input through the valves from V3 to V1 and aerial, leaving such things as the speaker, ganged condenser and tuning coils

(Miscellaneous)

- MR—250 v. 50 mA. contact-cooled metal rectifier (Selenium).
- T1—Filament Transformer (Secondary, 6.3 volts 1.5 amps.).
- T2—L/S Output trans. (10,000 ohms/3 ohms).
- 2 Valveholders B7G.
- 1 Valveholder B9A.
- 1 Valve 6BA6.
- 1 Valve Z77.
- 1 Valve ECL80.
- 1 Pair dual range coils type Teletron A/HF (200/2,000 metres).
- 1 Cabinet, T.R.F. chassis, dial, backplate, pointer, drum drive, drive spindle and cord.
- Screws, flex, etc.
- 1 Wavechange switch (2 pole/2 way).
- 1 Loudspeaker 5in. (Goodmans).

NOTE: For "Universal" version omit filament transformer from above and substitute line cord in accordance with Fig. 3.

unmounted until later, as these are components most vulnerable and liable to damage.

Trimmers

Although the trimmers for the coils are not shown in the circuit diagram they appear in Fig. 2. The medium-wave trimmers are combined with and will be found surmounting the twin-gang tuning condenser. The long-wave trimmers are mounted on the underside of chassis at an angle and by means of a single screw through the front plate. These are labelled Tr 2. In order to help the beginner a diagram

is included showing the disposition of the long wave trimmers together with Sw. 1 (wavechange switch) and associated wiring (Fig. 4).

Alignment

When the receiver has been completely wired we can proceed with alignment, but beginners must be warned against switching on and touching the chassis until they have determined and made certain that the neutral lead from the mains supply is in contact with the chassis at that time.

(Continued on page 545)

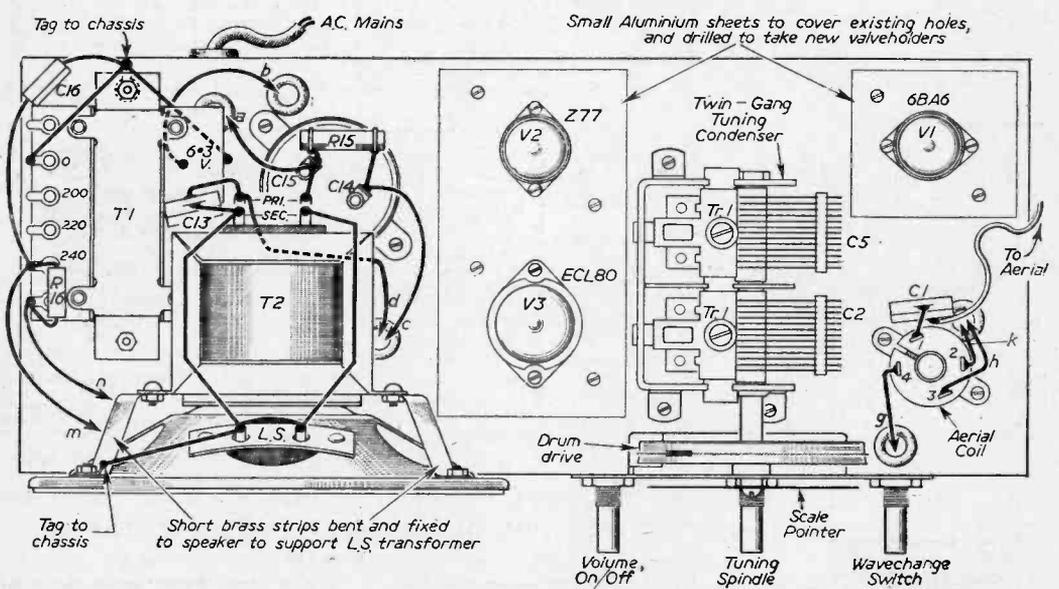
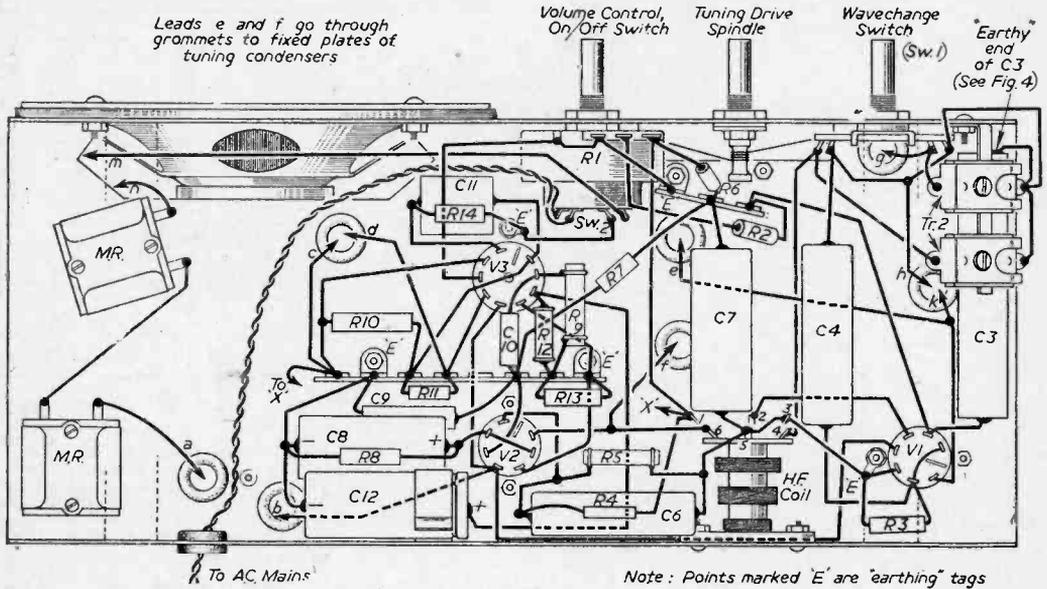


Fig. 2.—Top and underside wiring diagrams.

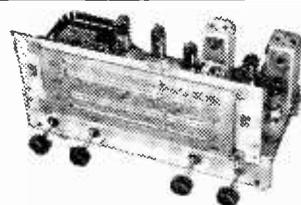
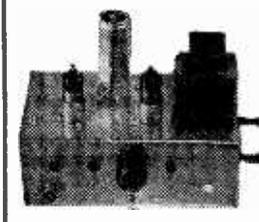
BAND 3 T/V CONVERTER—183 Mc/s-196 Mc/s

Suitable for London, Birmingham and Northern Transmission

£2-5-0 post free.

A highly successful unit (W'World circuit), incorporating variable oscillator tuning, Midget BVA valves, etc. Chassis size 7 x 4 x 2 1/2 in. Thousands already in use. Suitable for most types of T.V. sets. TRF or Superhet. Kit of parts 45/-, Blueprint 1/6, Power pack kit 30/-, Switch kit (Band 1—Band 3 Ae switching),

6/6—all Post Free. Wiring and aligning of above 20/- extra. Full range of Band 3 aerials in stock. Adaptors from 7/6 per set. Indoor dipoles, 6/6. Outdoor with cables, 13/9. Band 1—Band 3 cross-over filter unit, 7/6. Variable attenuators 6 ab—36 ab, 7/6. BBC Break-through Filter, suitable for BBC pattern rejector, 8/6.



Volume Controls

Log. ratios, 10,000 ohms — 2 Megohms. Long symbols, 1 year guarantee. Midget Elliott type. No. Sw. S.P. Sw. D.P. Sw. 3/- 4/- 4/6 Linear Ratio, 10,000 ohms — 2 Megohms. Less switch, 4/- each. Coax plugs, 1/2. Coax sockets, 1/-. Couplers 1/3. Outlet boxes, 4/6.

80 ohm COAX CABLE

STANDARD 1/4 in. diam. Polythene insulated. GRADE "A" ONLY 8d. yd. SPECIAL — Semi-air spaced polythene. 80 ohm Coax 1/4 in. diam. Stranded core. Losses cut 50%.

TWIN FEEDER, 80 ohms, 6d. yd.; 300 ohms, 8d. yd. TWIN SCREEN FEEDER, 80 ohms, 1/3 yd. 50 OHM COAX CABLE 8d. per yd., 1 1/2 in. dia. TRIMMERS, Ceramic, 4 pf.—70 pf., 9d. 100 pf., 150 pf., 1/3; 230 pf., 1/6; 600 pf., 1/9. PHILIPS Receiving Type—2 to 8 pf. or 3 to 30 pf., 1/3 each. RESISTORS—Pref. values 10 ohms 10 megohms.

9d. yd. ALL WAVE RADIOGRAM CHASSIS 3 WAVEBANDS, 5 VALVES S.W. 16 in. x 5 1/2 in. LATEST MIDGET M.W. 200 mm.—350 mm. B.V.A. L.W. 800 mm.—2,000 mm. SERIES Brand new and guar. A.C. 200-250 v. 4 pos. W/C sw. short-medium-Long-gram. P.U. socket. High Q. dust core coils. Latest circuit technique, delayed AVC and neg. feedback. 0 P 4 watts. Chassis size, 13 1/2 x 5 1/2 x 2 1/2 in. Dial 10 in. x 4 1/2 in. Hor. or vert. station names. Metal or ivory knobs to choice. Aligned and calibrated ready for use. Sensitivity and Quality at Low Cost.

CARBON WIRE-WOUND 20% Type, 1 w., 3d.; 1 w., 5d.; 1 w., 6d.; 2 w., 9d. 10% Type, 1 w., 9d.; 5% Type, 1 w., 1/-; 1% Hi-Stab., 1 w., 2/-.

WIRE-WOUND POTS. Pre-Set Min. T.V. Type. Knurled Mottled Knob. All values 25 ohms to 30 K., 3/- ea. 50 K., 4/-. Ditto Carbon Track 50 K. to 2 Meg., 3/-.

CONDENSERS—Mica or 8. Mica. All pref. values. 3 pf. to 680 pf., 6d. ea. Ceramic types, 2.2 pf.—5,000 pf. as available, 9d. each. Tubulars, 450 v., Hunts and T.C.C., 0.005, .001, .002, .01 and 1.500 v., 9d., .02, .05, 1.500 v. Hunts Molded, 1/2, .25 Hunts, 1/6. .5 Hunts, 1/9. 1.1, 1.500 v. T.C.C. (Simplex), 3/6. .001, 6 kV., T.C.C., 5/6. .001 12.5 kV. T.C.C., 9/6.

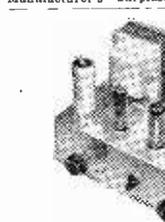
3w. LAB COLVERN, etc. Standard Size Pots, 2 1/2 in. Spindle. High Grade. All Values. 100 ohms to 50 K., 5/6; 100 K., 6/6. W/W EXT. SPEAKER CONTROL, 10 G., 3/-.

SILVER MICA CONDENSERS.— 10%, 1.5 pf. to 500 pf., 1/3. 600 pf. to 3,000 pf., 1/3. 1%, 1.5 pf. to 500 pf., 1/3. 315 pf. to 5,000 pf., 2/-.

STANDARD 3 WAVEBAND COIL PACK. Size 2 1/2 in. x 2 1/2 in. x 1 1/2 in. depth. 4 pos. Switching. Long. Med. Short. Gram. Dust-core coils prealigned for 465 Kc/s I.F. Complete with trimmer, ready to use. A very sensitive and efficient Coil Pack. Manufacturer's Surplus. Bargain Offer, 30/-.

3 VALVE AMPLIFIER With variable Tone and Volume controls. 3 Midget B.V.A. valves, 4 watts output. Neg. feedback. Chassis isolated from Mains. A.C. 200-250 v. A quality amplifier at an economical price. PRICE £3.19.6. Carr. 2/6. Wired and tested, 15/- extra. Blueprint, circuit and instr., 1/6 (free with kit).

QUALITY FLUORESCENT FITTINGS Ideal for home or workshop. 4ft., 220-250 v's, complete with tube, ballast unit, etc., ready for use. Famous manufacturer's surplus offered at approx. half price. Starter switch type, 42/-. Quick start type, 47/6. Carr. and ins., 7/6 extra.



NEW BOXED VALVES ALL GUARANTEED 1N5, 1P4 7/6 DAP96 9/- ECH81 12/6 1E240 10/- 1S7, 1A4 7/6 DP96 9/- ECH80 12/6 1E280 11/- 2S4, 3V4 8/- DK96 9/- 1P411 10/6 1C14 6/6 3Z 1/6 6 DL96 9/- PF50 10/- PC94 12/6 8A4 6/6 EA50 2/- EF50 10/- PCF80 12/6 6CH6 10/6 EB91 7/6 Equip. 5/6 PCF82 12/6 6H5M 3/6 EB94 10/6 EF80 10/6 P/LE3 12/6 6K7 6/6 EB33 8/6 EF85 10/6 1P181 12/6 6K8 9/- EF82 12/6 EF86 12/6 1P182 10/6 6Q7 8/6 EC84 13/6 EF89 10/6 1P183 12/6 6N7 9/- EC85 13/6 EF91 8/6 PY80 11/6 6V9 7/6 PCF80 12/6 EL41 11/6 PY81 12/6 6X4 8/6 1P182 13/6 EL84 12/6 1P182 10/6 6X5 8/- 1P182 10/6 PY51 12/6 1P183 12/6 and hundreds of others at Bargain Prices.

3 SPECIAL PRICE PER SET. 1N5, 1P4, 1S5, and 3S4 or 3V4 27/6 6K8, 6K7, 6Q7, 6V6, 3Z4 or 6X5 35/- SPEAKER FRET.—Expanded Bronze anodised metal. 4 in. x 5 in., 2/3; 12 in. x 5 in., 3/-; 12 in. x 12 in., 4/3; 12 in. x 16 in., 6/-; 24 in. x 12 in., 8/6, etc.

SCOTCH BOY. EMITAPE, etc., 30/-, long playing, 1,800ft. reels, 45/-. Paper tape, good quality, 1,200 ft., 12/6.



TRS RADIO COMPONENT SPECIALISTS (Est. 1946)

70 BRIGSTOCK ROAD, THORNTON HEATH, SURREY (THO 2188)

50 yards Thornton Heath Station. Buses 130A, 133, 159, 166 & 190

Listed above are only a few items from our very large stock. Send 3d. stamp today for Complete Bargain list Hours: 9 a.m.—6 p.m. 1 p.m. Wed. OPEN ALL DAY SAT.

Terms C.W.O. or C.O.D. Kindly make cheques, P.O.s, etc., payable to TRS. Post/Packing up to 1/6. 7d., 11b. 1/1, 3b. 1/3, 5b 2/-, 10b. 2/9.

PREMIER RADIO COMPANY

B. H. MORRIS & CO. (RADIO) LTD.

OPEN TILL
6 P.M. SATURDAYS

(Dept. P.W.) 207, EDGWARE ROAD, LONDON, W.2

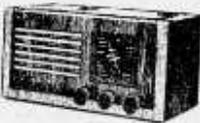
Telephone :
AMBASSADOR 4033
PADDDINGTON 3271-2

BUILD THESE NEW PREMIER DESIGNS

3-BAND SUPERHET RECEIVER

MAY BE BUILT FOR **£7.19.6** Plus 3/- Pkg. & Carr.

3 Band T.R.F. Receiver may be built for £5.15.0 plus packing & post 3/-. These two receivers use the latest type circuitry and are fitted into attractive cabinets 12in. x 6in. x 5in. in either walnut or ivory bakelite or wood. Individual instruction books 1/- each, post free.



ALL-DRY BATTERY PORTABLE RADIO RECEIVER

MAY BE BUILT FOR **£7.8.0**

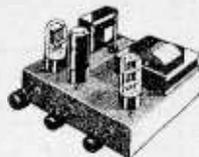
Plus 3/- Pkg. & Postage
4 Miniature valves in a superhet circuit covering medium and long waves. Rex-line covered cabinets 11in. x 10in. x 5in. in contrasting colours, wine with grey panel. Instruction book 1/6 post free, which includes full constructional details and list of priced components.



4-WATT AMPLIFIER

MAY BE BUILT FOR **£4.10.0** Plus 2/6 Pkg. & Carr.

Valve line-up 6SL7, 6V6 and 6X5. FOR A.C. MAINS 200/250 VOLTS. Suitable for either 3-ohm or 15-ohm Speakers. Negative feedback. Any type of pick-up may be used. Overall size 9in. x 7in. x 5in. Price of Amplifier complete, tested and ready for use, £5.5.0 plus 3/6 pkg. and carr.



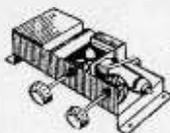
A STEEL CASE IS NOW AVAILABLE, COMPLETE WITH ENGRAVED PANEL, 15/6 EXTRA.

MULLARD AMPLIFIER KIT

Why not make the Best!

All the components for model 510, PLUS preamplifier on one chassis (total six valves) may be purchased for £12.12.0, plus pkg. & post 7/6, or preamplifier and tone control in a separate unit, £14.14.0 plus pkg. & post 7/6.

COMPACT GRAM AMPLIFIER



Suitable for any type of Pick-up. Volume and tone control fitted with knobs. Overall size 7in. long x 3in. wide x 2in. high. Complete and ready for use.

£2.19.6

Plus packing & postage 2/6.

A NEW TAPE RECORDER

CREDIT TERMS DEPOSIT **£5**

and 8 monthly payments of £4.18.6

H.P. TERMS 1 DEPOSIT **£20**

and 12 monthly payments of £1.17.1

Cash price £40 plus packing and carriage 21/-. Case finished in Brown and Antique Fawn. Size 15in. x 12in. x 7in. with the very latest type Continental fittings. For A.C. mains 200-250 volts. 50 cycles.

SEND FOR LEAFLET

Send for the Premier WIDE ANGLE TELEVISOR booklet, 3/6 post free.

GRAM UNITS

B.S.R. 4-Speed Autochanger.
£9.15.0 plus 5/- pkg. & post.
B.S.R. T1:8 3-Speed
£4.12.6 plus 2/6 pkg. & post.

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"

NAME

ADDRESS

Subject or Exam that interests me

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

WHICH IS YOUR PET SUBJECT!

Mechanical Eng.
Electrical Eng.
Civil Engineering
Radio Engineering
Automobile Eng.
Aeronautical Eng.
Production Eng.
Druing, 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.

SOUTHERN RADIO'S WIRELESS BARGAINS

TRANSRECEIVERS. Type "38" (Walkie-Talkie). Complete with 5 Valves. In Metal Carrying Case. Ready for use. Less external attachments, 30/- per set. ATTACHMENTS for use with "38" TRANSRECEIVER: HEADPHONES, 15/6; THROAT MICROPHONE with Lead & Plug, 4/6; JUNCTION BOX, 2/6; AERIAL, 2/6.

TRANSRECEIVERS. Type "18" Mark III. TWO UNITS (Receiver & Sender) contained in Metal Case. Complete with Six Valves, Microammeter, etc. LESS EXTERNAL ATTACHMENTS, £4/10/-.

TRANSMITTERS.—T.1154—Complete all valves, etc., etc. Perfect order. 3 frequencies. £2/7/6 in transit case. Delivered U.K.

RECEIVERS. Type "109." 8-Valve S.W. Receiver with VIBRATOR PACK for 6 Volts. Built-in Speaker, METAL CASE, £5.

BOMBSIGHT COMPUTERS. Ex-R.A.F. BRAND NEW. A Wealth of Components. GYRO MOTORS, REV. COUNTERS, GEAR WHEELS, etc., etc. Ideal for Model Makers, Experimenters, etc., £3.

LUBBRA HOLE CUTTERS. Adjustable 1/4in. to 3/4in. For Metal, Wood, Plastic, etc., 7/-.

RESISTANCES. 100 ASSORTED USEFUL VALUES. Wire Ended, 12/6 per 100.

CONDENSERS. 100 ASSORTED. Mica, Metal Tubular, etc., 15/- per 100.

PLASTIC CASES. 14in. x 10 1/2in. Transparent. Ideal for Maps, Display, etc., 5/6.

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

CONTACTOR TIME SWITCHES. In Sound-proof Case, Clockwork Movement. 2 Impulses per sec. Thermostatic Control, 11/6.

REMOTE CONTACTORS for use with above, 7/6.

MORSE PRACTICE SET with Buzzer on Base, 6/9. Complete with Battery, 9/6. **MORSE TAPPERS.** Std. 3/6; Midget, 2/9.

METERS & AIRCRAFT INSTRUMENTS. Only need Adjustment or with broken Cases. TWELVE INSTRUMENTS, including 3 brand new Aircraft Instruments. 35/- for 12.

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

Postage or Carriage extra. Full List of RADIO BOOKS, 2/6.

SOUTHERN RADIO SUPPLY LTD.,
11, LITTLE NEWPORT ST., LONDON, W.C.2. GERrard 6653

BIET

The best means I can recommend is for the amateur to purchase one of the excellent screwdriver-cum-neon testers advertised in these pages. If the chassis is alive the neon will light; in such cases either reverse the plug or reverse the wires to conform.

Although coils are obtained as "matched pairs" it will be realised that two separate coils on a single former can hardly be accurately matched over two wavebands when tuned by a single iron core. Therefore some slight compromise is necessary in order to accommodate the long waveband and yield a satisfactory overall performance.

The receiver should be switched on and tuned in to the local station (in the Home Counties—the Light Programme). Adjust trimmers above the ganged tuning condenser until the tuning pointer is approximately at the correct location in respect to the dial. Now swing the tuning condenser to the top end of the waveband and tune in the Third Programme. Adjust the iron cores on both coils until the programme comes through at good strength. Return again to the station first tuned and further adjust the trimmers on the gang for best results. Switch to long waveband (clockwise direction) and tune in the Light Programme. Adjust the iron cores on both coils for maximum signal. Turn tuning to approximate position of Radio Luxembourg (Continental Programme) and adjust the two trimmers Tr 2 on underside of chassis for maximum signal. Return tuning to Light Programme and re-adjust iron cores. Tune in Radio Allouis and further adjust cores for maximum signal.

This is only intended as a rough guide to alignment and any finer adjustments should be made in the order set down above. Final adjustments will, of course, be made on Continental stations at the lower end of the medium waveband with the volume control well advanced.

Microphony

It is not unusual for constructors of straight receivers to experience microphony in the detector valve. This is, in effect, a physical and electrical phenomenon, wherein actual vibration of the valve sets up oscillation within the valve and an increasingly loud "howl" or "ringing" comes from the loud-

speaker. If the valve is lightly tapped the speaker appears to "echo" the generated note. In such cases it is usual either to change the valve for one less susceptible or mount the valveholder in the chassis with small rubber grommets to give a "floating" or shock-absorbing action to the valve suspension. This damps down the vibration and usually cures the trouble.

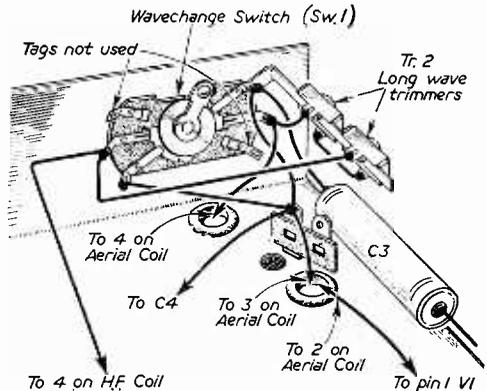


Fig. 4.—Further wiring details. See also Fig. 2.

Modifications

There are two points at which useful modifications can be made. Should a set suffer from microphony in V2 (Z77) a reduction in the screen voltage of this valve may effect a cure. This can be done by changing R5 (470 K) to one of lower resistance. A suggested value is 220 K which has been tried in the original model. The resistance quoted in the parts list gave maximum sensitivity without microphony occurring (optimum results).

Another change which can be made (should the set be considered 100 sensitive) is in R15 (2.7 K). This can be satisfactorily increased to as much as 10 K with perhaps a slight improvement in quality. A resistor of 1 watt rating here will keep quite cool.

Ceramic Valves

VALVES of this design are to-day becoming popular, and will no doubt supersede their glass counterparts within the very near future. They are preferred in equipments designed for use at the higher frequencies, but are at present outside the range of the amateur's pocket: nevertheless, as and when they come within that range, they will be ideal for the constructor of V.H.F. equipment.

The advantages of such valves over those of glass are that of higher permissible operating temperature and much better dielectric properties. Such valves, however, utilise a ceramic envelope or bulb in place of the conventional glass one, the vacuum tight seal being made by coating the ceramic with a thin metal film which in turn is sintered or fired on as the case may be, and to this metal film which becomes an integral part of the ceramic the metal seal is brazed.

Disc seal or planar-type of valve is best suited

for this type of construction and provides such advantages as low interelectrode capacities, low lead inductance and electrode insulation.

Valves of this category are most suitable for use in cavity or parallel line circuitry and are also to be found in power amplifier, oscillator and frequency multiplier circuits. They operate at temperatures in the order of 200 deg. C. and at frequencies from 1,000 to 3,000 Mc/s.

One will therefore appreciate that such valves will undoubtedly play an important part in all future V.H.F. development.

E. G. BULLLEY.

THE SUPERHET MANUAL

5th Impression

By F. J. CANN

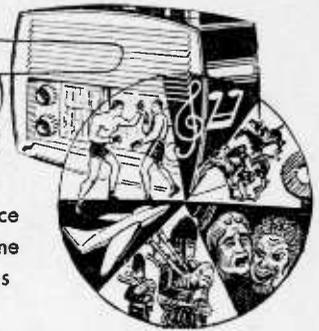
7/6, by post 7/10

From

GEORGE NEWNES, LTD.,

Tower House, Southampton Street, Strand, W.C.2.

Programme Pointers



Scrapbook 1934

"SCRAPBOOK for 1934" seemed an improvement on recent efforts. There was not nearly so much insistence on the raucously sung music-hall ditties, blaring dance tunes or street barrel-organs as in some other volumes making them alike, painful to listen to, and ashamed to recall. We had plenty of it, of course, but what there was seemed much more properly in focus and proportion to the things that really mattered. Probably among these must rank the 21st birthday of that most lovable and ubiquitous character, Donald Duck, whose voice was specially transmitted from America. Point was properly made of the great development in road transport, but none of the 7,000 who, at that time, were killed annually.

This series is not without interest, but like many other features of long standing, badly needs its windows opened to let in some fresh air.

Burgundian Songs and Dances

A wholly delightful programme of Burgundian Songs and Dances Royales restored our faith in the matters of broadcasting and showed us that if we glean the programmes thoroughly, gold can be found here and there. Given by The Well-tempered Singers with treble recorder, and the London Consort of Viols, with medieval drums, we were transported back for 45 minutes to the world of the troubadour and the minnesinger with the rare privilege of being able to think and imagine for ourselves.

Northampton Rep. Company

The Northampton Repertory Company gave us the charming play of Cedric Wallis, built round an episode in "Pride, and Prejudice," "The Heiress of Rosings." Containing some of the most wierd and wonderful music lessons ever held—as romantic and delightful as they were unpractical and useless musically, the Northampton people played with the greatest sense of period and general accomplishment. Josephine Martin was delightful as Anne and Tenniel Evans as Mr. Barcy and Alan Brown as the Marquis of Chippenham.

Two honest-to-goodness, forthright and down to earth pieces were Farquhar's Restoration "The Recruiting Officer" and Bekker's contemporary with Shakespeare "The Honest Whore." The latter was divided over two evenings. In those days when women, not exactly "all they should be," formed the theme of discussion, a thesaurus of adjectives, nouns and various other expletives poured forth of a directness, an uninhibitedness, a luscious descriptiveness and in an unending quantity and variety such as seems to be unknown to-day in any subject. The mind boggles at such richness, diversity and salacity. Yet neither saturation point nor satiety are ever reached. On they go, out they come. It is all vastly amusing and entertaining.

Our Critic, Maurice Reeve, Reviews Some Recent Programmes

Not all the 35 players, plus supers, in these two pieces struck quite the right period note, but one remembers Howieson Cullif, Mary Wimbush, Charles Leno, Michael Turner in "The Bekker," and of the Queen's Repertory Players, Hornchurch, in "The Farquhar." Mary Savidge, James Maxwell, Diana Fairfax and Bernard Cribbins.

Lenin's Journey

"Lenin's Journey," from exile in Germany back to Russia under German auspices and protection, and with the avowed hope that by stirring up revolution there it would take Russia out of the war and thus assure the defeat of England in the First World War, formed the theme of a major documentary. Written by David Woodwood, narrated by Carleton Hobbs and Edward Ward, and produced by Marjorie Ward. That it resulted in probably the most far-reaching event in history few will deny; whether Germany was hoist with her own petard has perhaps not yet been established: the programme was interesting and at times dramatic, rather through the events described than any virtues of production or script. These strictly adhered to the age-old pattern long since formulated for such programmes.

Rain

I wonder if there will ever be a cricket commentary in which, as soon as the first drops of rain begin to fall, we shall *not* be told "that everyone is standing up putting on their mackintoshes"!

Saturday Night Theatre

"The Comfort of the Signora" (suggested subtitle, "There's Always a Woman"), in Saturday Night Theatre, entertainingly told of turpitude in Tunisia, adultery in Algeria and, if you care for metaphors, flirtations in French North Africa. The French, however, were non-participants. One has met Brigadiers, if you have been in the Army, like Brigadier Polgrim, excellently played by Howard Marion Crawford, as well as women, if you have been anywhere beyond the front gate, like Sheila Saxley—brought to life by Violet Loxley. But Major Grail, a town major—well played by Edward Jewesbury—was, to one listener, rather a new type. The story of a woman so bad that she won't let the guileless major ruin himself by marrying her (he seems to find quick and ample consolation with the signora at the curtain) was well told and made good entertainment.

EXPAND AND

Laboratory Balanced. The TSL LORENZ LP312-2 is a main bass 12in. diaxial speaker combined with two LPH65 electro-magnetic high frequency TREBLE units permanently mounted coaxially across the front of the main bass speaker at such an angle to give full spherical binaural response. All are laboratory balanced and matched for perfect tone with a frequency range of 20 cycles to 22,500 cycles essentially level output. To ensure level frequency response the voice coils of the two treble speakers are fed through a specially designed crossover net-work which balances the frequency response of the three speakers as a combined unit.

IMPROVE ANY

The TSL LORENZ LPH65 is the basic treble speaker used in the TSL LORENZ Sound System. Round in shape to ensure smooth melodious sound the plastic cone is fully tropicalised. Special features are the super high flux density magnet of 17,500 gauss and non-perforated back plate.

SOUND SYSTEM

SPECIFICATION LP312-2

IMPEDANCE 15 ohms; **FREQUENCY RANGE** 20-22,500 c/s; **POWER RATING** 25 w.; **PEAK POWER RATING** 40 w.; **DIAMETER** Bass 12½ inches Treble 2½ inches; **DEPTH** Bass 7½ inches Treble 2 inches; **BAFFLE OPENING** 10¼ inches; **SPEECH COIL DIAMETER** Bass 1.5 inches Treble ½ inch; **FUNDAMENTAL RESONANCE** Bass 20 c/s Treble 1,600 c/s; **FLUX DENSITY** Bass 17,500 gauss Treble 17,500 gauss; **IN-TERMODULATION PRODUCTS** under 0.5%; **CROSSOVER FREQUENCY** 2,000 c/s; **FINISH**, Grey and blue vitreous anti-corrosion stove enamel. **RETAIL PRICE, £14.19.6.** (Not subject to Purchase Tax.)

Exclusively distributed to the Radio Trade & Industry throughout Great Britain and the Commonwealth by:—

TECHNICAL SUPPLIERS LTD., HUDSON HOUSE, 63, GOLDHAWK RD., LONDON, W.12. Tel: SHE 2581, 4794

SUPER HIGH FIDELITY THIS YEAR

Let your ears be your judge. . . . crisp, clear, natural reproduction without coloration with TSL LORENZ speaker units. Ten years ahead in engineering and design this speaker unit will enable you to design and build up a sound system in your own home which will truly add the miracle of LIFE to the magic of music . . .

No Extra Cost. You get these extra features at no extra cost with every TSL LORENZ Sound System . . . Greater output and more sensitivity . . . heavy duty oversize speech coil . . . Super high flux magnet . . . Permanently flexible self-damped cone . . . Multi-parameter cone fully tropicalised . . . Sealed in air gaps . . . built-in centralising device for perfect gap alignment.

Improve your own H.F. Sound System. For those devotees of high fidelity who possess bass speakers fitting one or more LPH65 treble units will greatly extend your range of super fidelity reproduction. They are, without a doubt, the most sensitive and efficient treble reproducers research has revealed to date. The non-perforated back plate ensures that the LPH65 can be used with any other speakers irrespective of make or type without interaction taking place.

SPECIFICATION LPH65

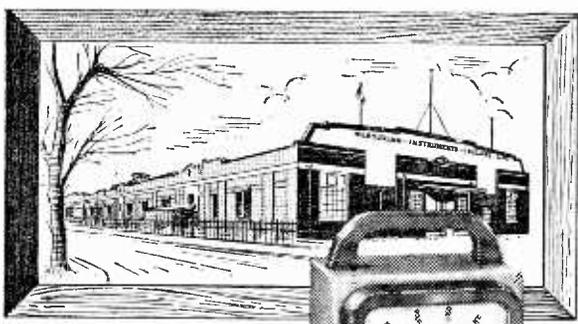
HIGH FREQUENCY CONE-HORN TYPE TREBLE UNIT

IMPEDANCE 5.5 ohms; **FREQUENCY RANGE WITH SUITABLE HIGH PASS FILTER** CONDENSER 2,000-22,500 c/s;

POWER RATING AS A SINGLE UNIT 3 w.; **PEAK POWER RATING AS A SINGLE UNIT** 5 w.; **DIAMETER** 2½ inches; **DEPTH** 2 inches; **BAFFLE OPENING** 2½ inches. **PRICE, 39/6.** (Including Purchase Tax.)



Ask your local retailer for full details, including Bass Reflex enclosures.



Background to Reliability

Behind the world-wide popularity and reliability of the Pullin Series 100 Multi-Range Test Set, with its 21 ranges from 100 microamps to 1,000 volts and sensitivity of 10,000 ohms per volt, are the considerable research, manufacturing, development and service resources of M.I.P., one of the great Pullin Group of Companies.



MEASURING INSTRUMENTS (PULLIN) LIMITED
 Electric Works, Winchester Street, Acton, London, W.3.
 Tel: ACOn 4651 & 8801 (5 lines)

Get your Pullin Series 100 Multi-range Test Set ON EASY TERMS

Here's a grand opportunity for the amateur radio-man or the service engineer. We will send your Pullin Test Set by return of post, post free, on receipt of £2.10.0 deposit. Thereafter, you pay nine monthly payments of £14.6. The cash price is £12.7.6. **WRITE TO-DAY!**

TICK HERE

Please send descriptive leaflet.

Please supply 1 Pullin Series 100 Test Set. I enclose 50/- deposit and promise to pay 9 further monthly payments of 24/6.

SIGNED

ADDRESS :

IF OVER 21.....**OCCUPATION**.....

FRITH RADIOCRAFT LTD
 69-71 CHURCH GATE LEICESTER
 & 28 HIGH ST NEWPORT PAGNELL Bucks



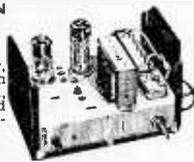
COMPLETELY BUILT SIGNAL GENERATOR

Coverage 120 Kc/s-230 Kc/s, 300 Kc/s-900 Kc/s, 900 Kc/s-2.75 Mc/s, 2.75 Mc/s-8.5 Mc/s, 8 Mc/s-28 Mc/s, 16 Mc/s-56 Mc/s, 24 Mc/s-84 Mc/s. Metal case 10in. x 6 1/2in. x 4 1/2in. Size of scale, 6 1/2in. x 3 1/2in. 2 valves and rectifier. A.C. mains 230-250 v. Internal modulation of 400 c.p.s. to a depth of 30 per cent., modulated or unmodulated R.F. output continuously variable 100 milli-volts. C.W. and mod. switch. Variable A.F. output and moving coil output meter. Black crackle finished case and white panel. Accuracy plus or minus 2%. £4/19/6 or 34/- deposit and 3 monthly payments 25/-. P. & P. 4/6 extra.

COMMERCIAL TELEVISION CONVERTER

SUITABLE ANY T.V. NO ALTERATIONS TO SET Complete with built-in power supply, 230-250 v. A.C. mains. Crackle finish case 5 1/2in. long, 3 1/2in. wide, 4 1/2in. high, incorporating gain control and band switch. Illustrated with cover removed.

£3.19.6 Plus P. & P. 2/6
Less Power supply £2/19/6. P. & P. 2/6.



Heater Transformer. Pri. 230-250 v. 6 v. 1 1/2 amp. 6/-.
Extension Speaker cabinet in polished walnut, complete with 8in. P.M. P. & P. 3-. 24/6.
8in. P.M. Speakers, removed from chassis, fully guaranteed. All by famous manufacturers. P. & P. 1/6. 12/6.
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, 1/2, 1, and 2 meg., 4/- each. 10 K. and 50 K., 3/6 each. 1/2 and 1 meg., long spindle, double pole switch, miniature, 5/-.
Standard Wave-change Switches. 4-pole 3-way, 1/9; 5-pole 3-way, 1/9. Miniature 3-pole 4-way, 4-pole 3-way, 2/6. 2-pole 11-way twin wafer, 5/-; 1-pole 12-way single wafer, 4/-.
1,200 ft. High Impedance recording tape on aluminium spool 12/6 post paid.
Polishing attachment for electric drills, Quarter-inch spindle, chromium-plated, 5in. brush, 3 polishing cloths and one sheep-skin mop, mounted on a 3in. rubber cup, 12/6. P. & P., 1/6. Spare sheep-skin mops, 2/6 each.

COLLARO RC54

3-speed automatic changer, will take 10 records mixed. Studio 'O' pick-up. £7.9.6 P. & P. 5/-.
A.C. mains 200/250v.

GARRARD RC/110

3-SPEED AUTOMATIC CHANGER



Will take 10 records, 7in., 10in. or 12in. mixed, turnover crystal head, brand new, current model. A.C. mains 200/250 v. (List price £14/10/-.)

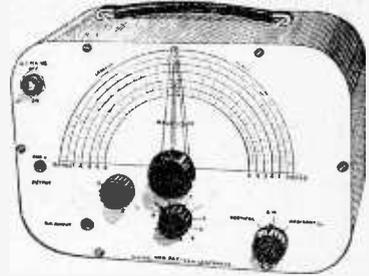
£7.19.6
P. & P. 3/6.

RADIO & T.V. COMPONENTS (Acton) LTD.

23, HIGH STREET, ACTON, LONDON, W.3

SIGNAL & PATTERN GENERATOR

Coverage 7.6 Mc/s-210 Mc/s. In five bands, all on fundamentals, slow-motion tuning, audio output, 8 vertical and horizontal bars, logging scale. In grey hammer finished case with carrying handle. Accuracy ± 1%. A.C. mains 200-250 v.



£6.19.6

Or £3 deposit and 3 payments of 30/-.

P. & P. 5/6.

3-speed TRANSCRIPTION MOTOR BY FAMOUS MANUFACTURER

Complete Kit of parts comprising accurately balanced precision made heavy turntable with rubber mat, large constant speed condenser, starting motor, base plate. Can be assembled in half-an-hour. A.C. Mains 200/250 v. Fully guaranteed. Parts sold separately.



£6.19.6

Post paid.

P. M. SPEAKERS, 6in., closed field, 18/6. 8in. closed field, 20/6. 10in. closed field, 25/-, 12in., 25/-, 3 1/2in., 16/6. P. & P. on each 2/-.

Valveholders. Paxolin octal, 4d. Moulded octal, 7d. EF50, 7d. Moulded B7G, 7d. Loctal amphenol, 7d. Loctal pax., 7d. Mazda Amph., 7d. Mazda pax., 4d. B8A, B9A amphenol, 7d. B7G with screening can, 1/6. Duodecal paxolin, 9d.

Twin-gang .0005 Tuning Condensers, 5/- With trimmers, 6/6-

AC/DC MULTI-METER KIT

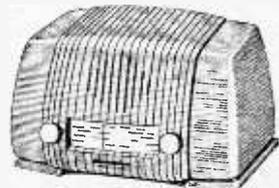
Comprising 2in. moving coil meter, scale calibrated in AC/DC volts, ohms and milli-amps. Voltage range AC/DC 0-10, 0-100 and 0-500. Milli-amps 0-10, 0-100. Ohms 0-1,000 and 0-10,000. Front panel, range switch, wire wound pot. (for ohms zero setting) two toggle switches, resistors and meter rectifier. In metal box. Plus P. & P. 1/6.

19/6

Potato & Vegetable Peeler, by famous manufacturer, capacity 4 1/2 lbs., complete with water pump. All aluminium construction, white stove-enamelled finish. Originally intended for adaptation on an electrical food-mixer, can easily be converted for hand operation. 39/6. P. & P. 3/-.

T.R.F. KIT in PLASTIC CABINET

3 valve plus metal rectifier, A.C. mains 200-250 v. Medium and Long waves. In pastel blue or brown. Valve life-up: 2 VR65s and VT52. Size 15 1/2in. long by 9in. high by 7in. deep.

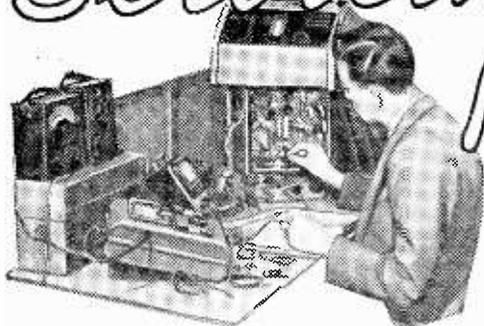


£3.19.6

P. & P. 4/6.

Where post and packing charge is not stated, please add 1/6 up to 10/-, 2/- up to £1 and 2/6 up to £2. All enquiries S.A.E. Lists 5d' each.

Servicing Radio Receivers



THE FERGUSON 203U

By Gordon J. King, A.M.I.P.R.E.

THIS semi-transportable receiver is housed in a moulded two-section cabinet. It features five valves (including the rectifier) in a two-band superhet circuit. Powered either by A.C. or D.C. mains, it can be used almost anywhere in the house; no elaborate aerial is generally required as adequate pick up of most stations is possible on approximately 4ft. of insulated wire.

The Frequency Changer Stage

The complete circuit of the receiver is shown at Fig. 1. The signals in the aerial are passed through the 250 pF isolating capacitor to the aerial coils L1 and L2. On L.W. both coils are used, while on M.W. section L2 is shorted out by S1A section of the wave-change switch. The signals are coupled to the R.F. coils L3 (L.W.) and L4 (M.W.). T1 is the L.W. aerial trimmer and T2 the M.W. aerial trimmer. Tuning of this section of the circuit is performed by C1, which forms part of the tuning gang.

The R.F. coils are selected by S1B section of the wave-change switch and the tuned signal appears on the signal grid of the mixer section of the frequency changer valve V1 (12K8GT).

The triode section of V1 functions as the local oscillator, oscillator coupling taking place inside the valve. Coils L6 and L7 are the M.W. and L.W. oscillator grid coils respectively. Feed-back on both bands is achieved by winding L5. T3 and T4 are the M.W. and L.W. oscillator trimmers, while T5 and T6 are the M.W. and L.W. padders. Main tuning of the oscillator section is performed by C2 section of the tuning gang.

An intermediate frequency of 455 kc/s is employed and these signals are developed in the first I.F. transformer (I.F.T.1) in the anode circuit of V1.

The wave-change switch in this receiver sometimes becomes intermittent in operation and demands careful positioning to obtain reception on either band. When this happens a few drops of proprietary switch cleaner instilled between the switch contacts and the spring brushes frequently clears the trouble. If the switch is still noisy after this operation it may be necessary to install a new switch (two position four pole), but before doing this it often pays to remove the fibre contact disc, by carefully bending out one or two of the retaining lugs and then cleaning the contact surfaces and bending the spring brushes so that greater

pressure on the contacts is secured when the switch is reassembled. This operation can be performed without taking the wires from the switch tags.

Instability is sometimes caused by the 0.02 μ F V1 screen capacitor losing value or becoming open-circuit. Lack of signals on both bands should lead to investigation of the 100 pF oscillator grid coupling capacitor and valve V1.

The I.F. Stage

The signals in I.F.T.1 are carried to the control grid of the I.F. amplifier valve V2 (12K7GT), and they are redeveloped in amplified form across the I.F. coil (I.F.T.2) in the anode circuit, which is permeability tuned.

Several cases of low sensitivity have been traced to an alteration in the value of the 100 pF capacitor serving to fix-tune the I.F. coil. This should be suspected, particularly if the tuning of T9 appears very flat. No standing bias is given to V2 and the screen is fed direct from the H.T. line. The 0.02 μ F capacitor, shown connected between the screen and chassis, serves to clear R.F. from the H.T. line; the 4 μ F electrolytic is an H.T. smoother.

The Detector, A.V.C. and A.F. Amplifier Stage

The signals in the I.F. coil are coupled to the signal diode of V3 through a 100 pF capacitor. The detector load comprises the 100 K resistor and the 500 K volume control in series. I.F. filtering is performed by the 100 pF shunt capacitor. Since the voltage appearing at the top end of the volume control has a magnitude depending on the strength of the I.F. signal, and is negative relative to chassis, it is used as an A.V.C. bias and is fed to valves V1 and V2. As this makes the A.V.C. diode in V3 redundant, this electrode is put at chassis potential.

The A.F. signals across the volume control are carried through the 0.05 μ F A.F. coupling capacitor to the grid of the triode section, where they are amplified and re-appear across the 680 K resistor in the anode circuit. The 100 pF capacitor, between anode and chassis, serves to filter any I.F. which may be present at this point.

The loss of bass, accompanied by distortion on strong signals, is often attributable to the anode load resistor going high in value. A delayed action when the volume control is rotated, should lead one to suspect the 6.8 megohm grid resistor for a value increase. If the I.F. coupling capacitor becomes leaky,

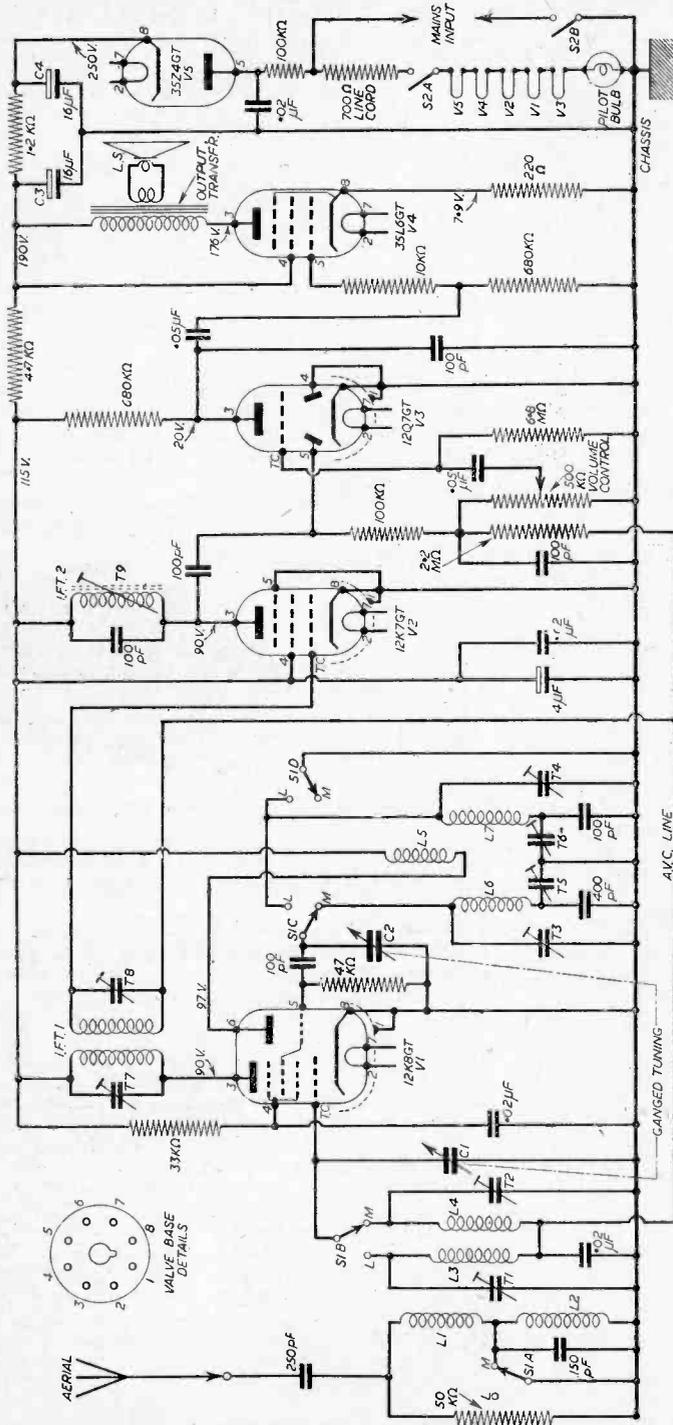


Fig. 1.—Theoretical Circuit of the Ferguson 203 U.

a positive voltage is reflected on the control grids of V1 and V2, and the detector circuit is also severely disturbed. This may cut-off reception altogether; though if the leak is only slight, clipping will be noticed on the weaker stations.

The Output Stage and Power Circuits

The A.F. signals in V3 anode circuit are taken by way of the 0.05 μ F coupling capacitor and a resistive potential divider to the control grid of the output valve V4 (35L6GT). Negative feedback is given to this stage by the undecoupled 220 ohm cathode resistor.

If distortion is suspected, the cathode voltage should be metered with the volume turned right down; the coupling capacitor should then be disconnected from the grid circuit of V4, and if this causes a reduction in cathode voltage, the coupling capacitor should be replaced.

The valve heaters and pilot bulb are connected in series, together with a 700 ohm resistor which forms a section of a three-core 0.15 amp. line cord, across the mains supply. Mains is also connected, through a 100 ohm surge limiting resistor, to the anode of the rectifier valve V5 (35Z4GT). The rectified voltage at the cathode is smoothed and filtered by C3, C4 and the associated 1.2 K resistor. Additional filtering for the first three valves is provided by the 4.7 K resistor in the H.T. line.

Should investigation for complete failure reveal the 100 ohm surge limiter resistor burnt out, a check should be made for short-circuits on the H.T. line, a short in V5, and for a short-circuit in the 0.02 μ F capacitor connected between the anode of V5 and chassis. If the 1.2 K filter resistor is burnt out, check C3 for leakage.

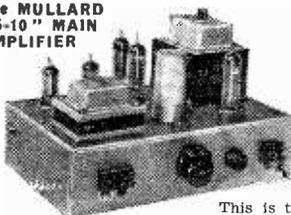
If the valves fail to light when the receiver is switched on, check the valve heaters, pilot bulb and line cord resistance for continuity. The on-off switch (ganged to the volume control) might have failed, of course, but this rarely happens.

Circuit Alignment

Connect an output meter across the loudspeaker speech
(Continued on page 553)

COMPLETE KITS of PARTS for the "Hi-Fi" ENTHUSIAST

The MULLARD "5-10" MAIN AMPLIFIER



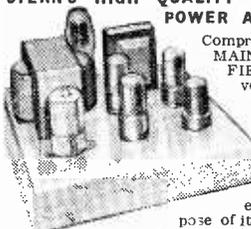
This is the very latest design and needs no recommendation from us. Our Kit is complete to Mullard's specification, including the latest GILSON ULTRA LINEAR OUTPUT TRANSFORMER and the entire MULLARD Valve line up. ALL SPECIFIED COMPONENTS are supplied. **PRICE OF COMPLETE KIT OF PARTS £11.11.0.** (Plus 5/- carr. and ins.)

STERN'S "fidelity" PRE-AMPLIFIER-TONE CONTROL UNIT



Briefly it has inputs for all types of MICROPHONES, HIGH and LOW GAIN PICK UPS and a RADIO TUNING UNIT. It incorporates (a) GRAM EQUALISING CONTROL. (b) STEEPCUT FILTER. (c) Continuously variable BASS and TREBLE CONTROLS and a variable OUTPUT CONTROL which enables its use with any type of Amplifier. **PRICE OF COMPLETE KIT OF PARTS (Plus 5/- carr. and ins.) £6.6.0.** WE ALSO OFFER IT ASSEMBLED, READY FOR USE. £8. (Plus 5/- carr. & ins.)

STERN'S HIGH QUALITY 10 WATT POWER AMPLIFIER



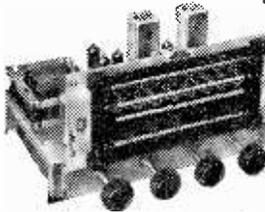
Comprises the MAIN AMPLIFIER of our very popular 8-10 watt design, which we have modified with the express purpose of its use with the "fidelity" PRE-AMPLIFIER illustrated alongside. TWO 6V6's are used in push-pull and the resultant reproduction is genuinely in the HIGH fidelity class, yet the total cost is ridiculously low. **PRICE OF COMPLETE KIT OF PARTS £7.7.0.** (Main Amplifier only). (Plus 5/- carr. & ins.)

THE full SPECIFICATION and BUILDING INSTRUCTIONS for these three Units are available for 1/6 each. THEY include COMPONENT PRICE LISTS and simple "wire-to-wire" PRACTICAL DIAGRAMS. WE MAKE SPECIAL PRICE REDUCTIONS FOR PURCHASERS OF A COMPLETE "Hi-Fi" AMPLIFIER i.e., THE MULLARD 5-10 and STERN'S PRE-AMPLIFIER, Etc. Send S.A.E. FOR DETAILS

MODERNISE YOUR OLD RADIOGRAM

AUTOCHANGERS with modern A.M. and A.M./F.M. RADIOGRAM CHASSIS and matched P.M. SPEAKERS at REDUCED PRICES. (H.P. Terms available). A good varied selection is available. SEND S.A.E. for ILLUSTRATED and DESCRIPTIVE LEAFLET.

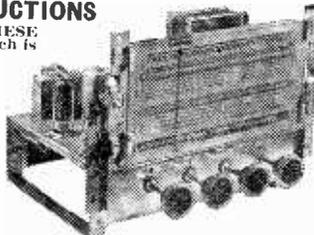
TWO REALLY GENUINE PRICE REDUCTIONS



A BULK PURCHASE ENABLES US TO OFFER THESE RECEIVER CHASSIS AT SUCH LOW PRICES. Each is BRAND NEW and FULLY GUARANTEED.

The MODEL AW3-7 A 7-valve 3 waveband Superhet Chassis having a push-pull stage for approximately 6 watts output. **PRICE £12.19.6.** Plus 7/6 carr. & ins. H.P. TERMS: Deposit £6/9/9 and 8 monthly payments of 18/9.

The MODEL B.3 5-valve 3-waveband Superhet employing Negative Feedback over entire Audio Stages and having a single valve type 6BW6 output for approximately 4 watts. **PRICE £11.11.0.** Plus 7/6 carr. & ins. H.P. TERMS: Deposit £5 15/6 and 7 monthly payments of 19/4.



THESE CHASSIS HAVE "GRAM" POSITION and are IDEAL REPLACEMENT CHASSIS FOR THAT "OLD RADIOGRAM"—Send S.A.E. for details.

RECORD PLAYERS THE VERY LATEST MODELS ARE OFFERED AT GREATLY REDUCED PRICES

★ TRANSCRIPTION UNITS ★ 3 and 4 SPEED AUTOCHANGER ★ AUTOCHANGERS with MANUAL CONTROL POSITION. Send S.A.E. for ILLUSTRATED and DESCRIPTIVE LEAFLET. This Leaflet also contains data of a PORTABLE TYPE GRAM AMPLIFIER which has separate BASS and TREBLE CONTROLS. (PRICE £4.12.6. INCLUDING 6" P.M. SPEAKER) and an attractive PORTABLE CARRYING CASE. £3.17.6

DESIGNS FOR THE HOME CONSTRUCTOR

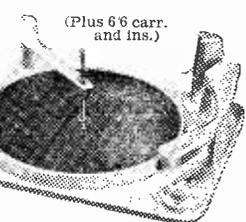
THE COMPLETE SPECIFICATIONS OF THE FOLLOWING UNITS ARE AVAILABLE FOR 1/6 EACH. THESE MANUALS ALSO INCLUDE THEORETICAL and simple PRACTICAL WIRING DIAGRAMS, AND A COMPLETE COMPONENT PRICE LIST. ALL OF WHICH ARE AVAILABLE FOR SALE SEPARATELY.

- STERN'S F.M. TUNING UNIT... A 5-valve Tuner incorporating the latest Mullard Permeability Tuning Heart and a "Magic Eye" Tuning Indicator and can be completely built for £10.-/-
- STERN'S COMBINED A.M./F.M. TUNING UNIT... Precisely similar to the F.M. Tuner, but also incorporates the MEDIUM WAVEBAND. It can be completely built for £13.10.0.
- STERN'S HIGH QUALITY 8-10 WATT AMPLIFIER... Designed for High Quality reproduction up to an output level of 10 watts, having 6V6's in Push-Pull and incorporating negative feedback. It is one of the most successful Amplifiers (in the lower price range) yet offered to the Home Constructor. WE can supply the complete Kit ex-stock for £7.10.0.

AN EXCEPTIONAL OFFER FOR CASH ONLY £7.7.0.

The B.S.R. MONARCH 3-SPEED AUTOCHANGER. NORMAL PRICE £13/10/-.

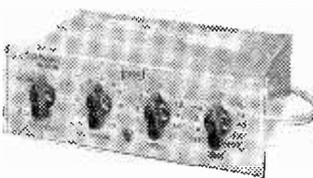
- Complete with High Fidelity Crystal "Turn-over" Head which incorporates separate stylus for L.P. and 78 r.p.m. records. ● A "MIXER" Unit that will autochange on 7in., 10in. and 12in. records.
- Brand New in Maker's Cartons, complete with mounting instructions.



(a) The "COMPACT 5-2" A Two-stage high sensitivity Amplifier having SEPARATE BASS and TREBLE CONTROLS and designed to give up to approx. 5 watts with very pleasing quality. PRICE £5 15/- (plus 5/- carr. and ins.).

(b) The "COMPACT 5-3" A Three-stage version of the "5-2" model, but in this case having an additional stage and incorporating Negative Feedback. PRICE £6 18/- (plus 5/- carr. and insurance).

STERN'S "COMPACT 5" AMPLIFIERS



The Amplifiers are compact and very attractively designed, having a Bronze Gold finish with a fully engraved front panel by which the entire Amplifier is conveniently mounted into a Cabinet, thus occupying no more space than a conventional Tone Control Unit.

Expressly developed for very high quality reproduction of Gram. Records and particularly suitable for high quality reproductions of the F.M. transmissions. Two models are available: A separate POWER SUPPLY UNIT to operate with these amplifiers is available for £2/10/- (plus 2/- carr. & ins.). Has additional supply available for Radio Tuner, etc.

STERN RADIO LTD. 109 & 115 FLEET STREET, LONDON, E.C.4.

Telephone: FLEET 5812/3/4

LASKY'S RADIO

GREATEST TAPE RECORDER BARGAIN EVER OFFERED!



The famous "CONCERTONE"

Limited number only. A tape recorder that will give you the ultimate listening pleasure that comes from High Fidelity recording. Simple, absolutely reliable, compact and lightweight. Study this short technical specification:—

- Tape Speeds: 7½ and 3½ in. per sec.
- Heads: Twin track, by Wearite.
- Power Outputs: 3-4 watts.
- Freq. res. 7½ in./sec., 50-12,000 cps.
- Freq. res. 3½ in./sec., 50-6,000 cps.
- Fast forward and fast rewind.
- Size, closed: 16½ x 12 x 7 in. approx.
- Gross weight: 26 lbs. approx.



LISTED AT £50. 8. 0.

LASKY'S PRICE, complete with 1,200ft. reel of Emitape, take-up Spool and Microphone, Carriage and insurance, 21/-.

33 GNS

Demonstrations at both our addresses.

NEW BATTERY PORTABLE FOR HOME CONSTRUCTION ON PRINTED CIRCUIT

CAN BE BUILT FOR **£7. 7. 0**

Uses all latest innovations, giving simplicity of construction with fine quality. See our page advert. in September issue or send for full details. CIRCUIT DIAGRAM, assembly data, all instructions and shopping list, 1/6 post free.

GARRARD RC.110 3-SPD. MIXER AUTO-CHANGER FURTHER REDUCED. Brand new in maker's cartons. Complete with t.o. crystal p.u. Cream & brown enamel finish. Limited number only. List £14.13.0. **LASKY'S PRICE £7.19.6.** DCarr. 3/6.

Open all day
SAT.
Half day Thurs.

LASKY'S (HARROW ROAD) LTD.,
42, TOTTENHAM COURT ROAD, W.1.
Telephone: MUSEUM 2805.
370, HARROW ROAD, PADDINGTON, W.9.
LADBroke 4075 and CUNningham 1979-7214.

All Mail Orders to Harrow Road, please.

TAI2G TX

Bendix Transmitter. New. Complete. Valved.

£4. 10. 0

RF24 UNITS

Brand new. Less valves. 9/- in maker's cartons.

RT40 APNIX U.S.A. ALTIMETER

less valves and motor but has transducer assembly,

£1

DINGHY TX HAND GENERATORS. X U.S.A., 15/- Throat Mic., 5/6. Heater Transformers, 4 and 6.3 volt 1.5 amp., 7/6. Output Trans. for 6V6, 5/-, 200 Kc Crystal, 8/6. Londex A.C. Relays, 230 V.A.C., 8/6. L.R. Earphones (New), 7/6. Relay G.P.O. type 6,000 Ω 8/6. Silicon Diode, 2/- Germanium Diode, 2/- Packard Bell Amplifier, complete, new, 12/6. Gun Sight Lens, in case, £1. 16 Bank Switchbox, 8/6. R.A.F. Heavy Duty Switch, 1/6. P.V.C. 22 s.w.g., eight colours, 2d. per yd.

VALVE LIST

6AG7 9/-	SP41 2/6	VU111 3/-
6J6 5/-	955 5/-	6N7 8/6
D1 2/-	6J7 7/6	3S4 8/6
6V6 8/6	EF39 7/-	1R5 8/6
6K8 11/-	CV66 5/-	DAF96
6SL7 8/-	6SK7 4/6	DL96 11/-
6SN7 9/-	Pen46 4/6	DL96 11/-
6K7 6/-	6AG5 7/6	DK96 11/-
5Z4 8/6	1S5 8/6	EY51 13/6
VU120 5/-	1L4 7/-	U25 15/6
VU39 8/6	3V4 9/-	EF80 10/6
SU4G 8/6	R19 12/6	ECL8011/-
6X5 7/6	RK34 2/6	PL81 11/6
6X4 7/6	CV201 8/6	PL82 10/6
6J5 5/-	105/30 7/-	PY81 10/6
EF36 4/6	12SH7 7/6	PY82 10/6
EL32 5/6	12SJ7 7/6	ECC81
EF54 5/-	12Q7 9/6	10/6
6B4 4/-	12K7 9/6	ECC82
6SA7 8/-	12SA7 9/6	10/6
6C4 7/-	Pen25 6/-	ECC83
1T4 7/-	S130 6/-	10/6
1A3 7/-	UCH42	EZ80 9/6
UAF42	10/6	UY41 9/6
11/-	6A5 7/6	PCF80
6AM6 8/6	SP61 2/6	10/6
EF50 4/-	EA50 2/-	7H7 8/6

CONDENSERS

Assorted, 100 Mixed
15/-

RESISTORS
Assorted, 100, ½, 1, 2w.,
12/6

RESISTORS CARBON

½ watt, 4/6 doz. 1 watt, 5/6 doz. 2 watt, 7/6 doz. Welwyn Wire Wound Vitreous 1/- each. Electrolytic Condensers, all 450 volts, w.k.g., 8 mfd., 2/6. 8 + 8 mfd., 3/9. 16 mfd., 3/3. 8 + 16 mfd., 4/- 16 + 16, 4/6. 20 mfd., 3/- 32 + 32 mfd., 6/- 25 mfd. 25 volt, 50 mfd. 50 volt, 2/- each. Potentiometers, values to 2 meg., 2/6 each. 100 K, ½, 1, 2 meg. w/switch, 4/- R.E.P. Crystal Coil (with circuit), 2/6. Dual Range T.R.F. Coils, 4/-

VALVEHOLDERS

1 Octal, M Octal, 6d. each. B7G, 10d. 807, 1/- RF34 Type, 1/6. B9A, 1/3. B9G, 9d.

MULTI METER

U.S.A. manufacture
Brand **£7. 10. 0** New.
Ranges A.C.-D.C. to 6,000 volts.
Resistance to 5 megohm. Output Meter and Decibel range.

VINERS

(MIDDLESBROUGH)
26, EAST ST., MIDDLESBROUGH
TEL: MID 3418

coil, or an A.C. voltmeter, via suitable isolating capacitors, between the anode of V4 and chassis. As this set has a "live" chassis, the signal generator should be connected through 0.005 1,000 volt isolating capacitors. When making tests it is advisable to ensure that the chassis is in connection with mains neutral.

I.F. Alignment

Tune the set to the low-frequency end of the L.W. band and set volume control at maximum. Remove the existing connector to the top cap of V1 (signal grid) and connect a 100 K resistor between grid and chassis. Apply a 455 modulated signal to the top cap and adjust T9, T8 and T7 (Fig. 3) for maximum output.

R.F. and Oscillator Alignment

Check that the dial pointer coincides with the dividing lines between the M.W. and L.W. calibration scales when the tuning gang is fully closed. Adjust if necessary.

Medium Wave

Tune the receiver to 214 metres, inject a 1,420 kc/s modulated signal, via a dummy aerial, to the receiver

aerial terminal. Adjust T3 and T2 (Fig. 3) for maximum output. Tune the receiver to 500 metres and the generator to 600 kc/s. Adjust T5 (Fig. 3) for maximum output. Repeat at 214 metres and at 500 metres for maximum accuracy.

Long Wave

Tune the receiver to 750 metres and the generator to 400 kc/s. Adjust T4 and T1 for maximum output. Tune the receiver to 2,000 metres and the generator to 150 kc/s. Adjust T6 for maximum output. Repeat at 750 metres and 2,000 metres for maximum accuracy.

Radio Sales Up

RETAIL sales of radio and television receivers improved in June as compared with May, according to the monthly retail survey published, as we go to press, by the British Radio Equipment Manufacturers' Association, and were higher than in June last year. Radiogram sales were the same as in May and lower than in June, 1955.

Sales for the first half-year of 1956, compared with 1955, were down, however, by 19 per cent. for radio receivers and 40 per cent. for radiograms.

Receivers

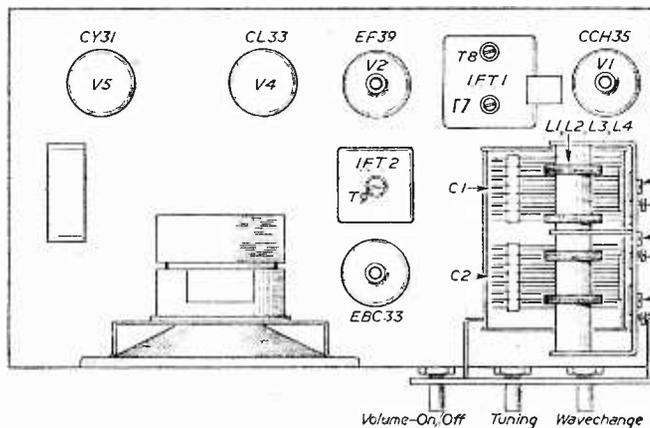
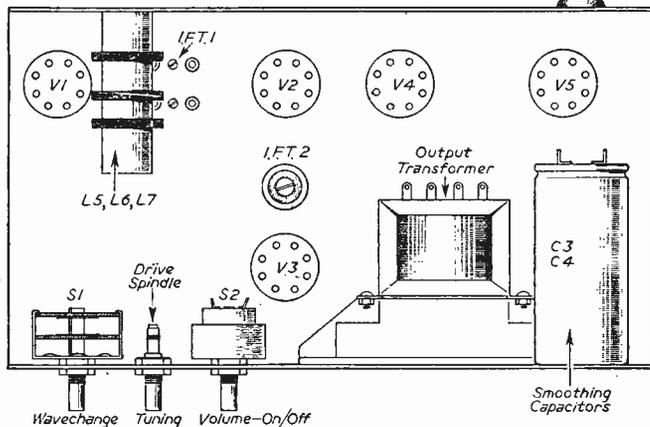
Sales of 80,000 radio receivers in June showed an increase on May of 14 per cent. and 8 per cent. on June, 1955. During the first and second quarters of 1956 sales were down by 30 per cent. and 6 per cent., respectively, compared with 1955. For the half-year, January/June, 1956 retail sales of radios were 19 per cent. less than for the corresponding period in 1955.

Radiograms

Radiogram sales continued to show a relatively greater fall as between 1956 and 1955 than either radio or television receivers. June sales at 11,000 were the same as in May, but 15 per cent. less than in June, 1955. During the first quarter of this year radiogram sales were half those for the first quarter of 1955, but recovered during the second quarter to 18 per cent. below those for the last year. The resulting percentage fall for the half-year was 40 per cent. compared with 1955.

Radio and Television

The proportion of total radio and television receiver sales on hire-purchase or credit terms showed increases of 3 per cent. in June compared with May. Nevertheless, as between June, 1955, and 1956, the proportion fell from 40 per cent. to 34 per cent. for radio. For radiograms the proportion remained in June at 58 per cent., compared with 67 per cent. in June, 1955.



Figs. 2 & 3.—Top and bottom chassis views.

The R.1155 Communications Receiver

MODIFICATIONS TO THIS POPULAR EX-GOVERNMENT UNIT

By K. A. Brook

(Continued from page 466 September Issue)

Noise

This receiver has achieved a certain amount of notoriety as being a "noisy" receiver. The noise is apparent even, to a certain extent, on quite powerful medium wave stations. The noise is mainly due to the R.F. stage (V1), and this can be reduced by substituting a resistor of about 68 K in the screen circuit of V1 in place of the 27 K already fitted. However, it so reduces the sensitivity of the set that this modification would be impracticable, bearing in mind weak stations.

Various means have been devised to combat this noise, but a fairly easy and effective method can be based on the idea in the previous paragraph, but instead of a fixed resistor, a potentiometer is fitted. The circuit is shown in Fig. 9.

This entails removing the 27 K screen dropper resistor already fitted and replacing with one of 120 K. This value is not critical, but should not be less than 100 K. The potentiometer may be fitted in the place previously occupied by the "Meter Balance" control. This potentiometer will, of course, vary the screen voltage of the valve, which affects three things:

1. The sensitivity of the circuit.
2. The mutual conductance of the valve.
3. The signal-to-noise ratio.

If the control is moved in the direction of the arrow, the screen voltage is increased, the mutual conductance of the valve is increased at the cost of a lower signal-to-noise ratio, i.e., the circuit becomes more noisy.

The screen voltage for the 6K7 with an anode voltage of 250 volts is 125 volts, and it is this which decides the value of R76. It was not thought desirable to increase the screen voltage above 125 volts.

If the slider is moved in the opposite direction, the signal-to-noise ratio is improved accompanied by a reduction in gain and sensitivity. This control could then be labelled "R.F. gain" or "sensitivity." It should be adjusted in conjunction with the volume-control for adequate volume with minimum noise.

Crash Limiter

This refinement is designed to clip peaky pulses which exceed the 100 per cent. modulation level. It usually accomplishes this by rendering the set inoperative for the duration of the

pulse, either by passing the signal to earth or by a series device which is made non-conducting by the pulse. This is not noticeable in the reproducing device, as the ear is not sensitive to breaks of such short duration.

The author considers this to be an essential modification if 'phones are to be used, as he himself has suffered some extremely uncomfortable moments with large amplitude interference pulses.

Some limiters are of a fixed variety whilst others are variable, the adjustment being made by means of a potentiometer. This varies the level at which the limiter comes into operation, and should be adjusted so that it limits at just over 100 per cent. modulation. If turned too far it will clip off parts of the signal, thus causing distortion.

In the author's experience the only really useful crash limiter is the circuit included in the famous R.C.A. AR88 receivers, and it was decided, therefore, to employ this circuit which uses a double diode valve (6H6).

Unfortunately, this modification involves rather drastic alterations to the detector circuit. Firstly, we must forgo ourselves the rather doubtful pleasure of the filter which was designed to filter out various forms of interference generated by aircraft electrical equipment, but the writer found it to be of no value for ground use. It is a high-pass filter having a cut-off frequency of 300 c/s. It consists of C8, C9, C10 and the inductor, L29 (see Fig. 10). The inductor is

(Continued on page 557)

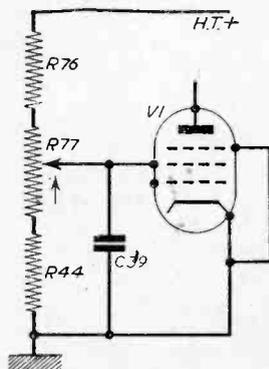


Fig. 9.—Modified screen circuit of R.F. amplifier.

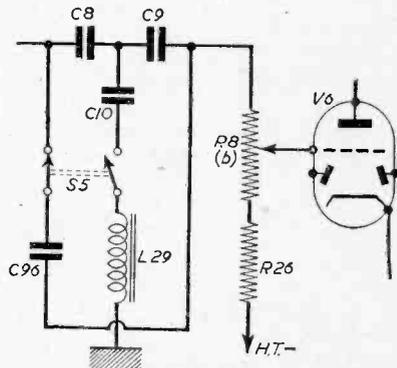


Fig. 10.—Filter circuit.

COMPONENTS (Fig. 9)

V1—6K7.
C39—0.1 μ F 350 v.
R44—22 K 20% Erie Type 8.
R76—120 K 20% Erie Type 8.
R77—100 K Potentiometer linear.
Note.—The arrow denotes clockwise rotation of control.

COMPONENTS (Fig. 10)

C8—0.001 μ F.
C9—0.001 μ F.
C10—0.004 μ F.
C96—0.02 μ F.
R8 (b)—500 K Potentiometer.
(Ganged with R8 (a)).
R26—100 K.
V6—EBC33.

NEW! THE PRACTICAL WAY

of learning **RADIO • TELEVISION • ELECTRONICS**
AMATEUR S.W. RADIO • MECHANICS • PHOTOGRAPHY • CARPENTRY • ETC.



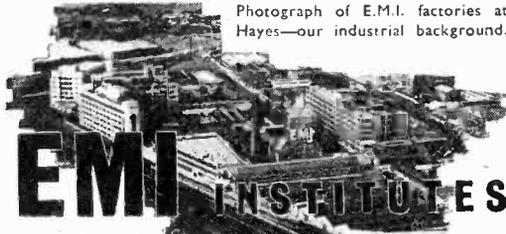
DO IT YOURSELF!
IN YOUR OWN HOME — IN YOUR OWN TIME

An entirely new series of courses designed to teach Radio, Television and Electronics more quickly and thoroughly than any other method. Specially prepared sets of radio parts are supplied and with these 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 receivers, etc.

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 ideal and may be yours at very moderate cost.

With these outfits, which you receive upon enrolment and which remain your property, you are instructed how to build basic Electronic Circuits (Amplifiers, Oscillators, Power Units, etc.) leading to designing, testing and servicing of complete Radio and Television Receivers.

Photograph of E.M.I. factories at Hayes—our industrial background.



An Educational Organisation associated with the E.M.I. group of Companies including: 'HIS MASTER'S VOICE', COLUMBIA, etc.

OTHER COURSES WITH PRACTICAL EQUIPMENT INCLUDE : RADIO (Elementary and Advanced) • TELEVISION MECHANICS • ELECTRICITY • CHEMISTRY • PHOTOGRAPHY • CARPENTRY. Also Draftsmanship • Commercial Art • Amateur S.W. Radio • Languages • Simple Electrical Repairs in the Home • Painting and Decorating • Etc. • Etc.

With these outfits, you are given instructions that teach you the basic principles in the subject concerned.

NEW TELEVISION COURSE

including a complete set of equipment dealing with the design, construction and servicing of a high quality television receiver.

COURSES

(with equipment) also available in many other Engineering subjects.

COURSES FROM 15/- PER MONTH



To E.M.I. INSTITUTES,
 Dept. 32, 43 Grove Park Road,
 London, W.4.

NAME _____

ADDRESS _____

SUBJECT(S) OF INTEREST _____

O.C.T. (We shall not worry you with personal visits)

HOME RADIO OF MITCHAM

Ex Govt. Morse Keys	...	...	...	...	3/6
50pf Trimmers, 3 bank	...	...	...	...	9d.
50pf Trimmers, 5 bank	...	...	...	...	1/-
220 x 220pf Trimmers	...	...	...	...	1/-
300 x 1,000pf Trimmers	...	...	...	...	1/-
Suppressor Chokes f5A	...	...	...	...	9d

ROTARY CONVERTORS

12 v. D.C. input. 250 v. or 300 v. 300 mA D.C. output.
Size 9in. x 4 1/2 in. dia. PRICE 35/-, plus 3/- post.

.001 mfd. 350 v. mica	...	...	...	...	2d
.005 mfd. 500 v. mica	...	...	...	...	2d.
.05 mfd. 500 v. tubular	...	...	...	...	6d.
.1 mfd. 350 v. tubular	...	...	...	...	9d.
.2 mfd. 500 v. tubular	...	...	...	...	6d
.25 mfd. 350 v. tubular	...	...	...	...	9d.
.5 mfd. 500 v. tubular	...	...	...	...	1/-
1 mfd. 350 v. tubular	...	...	...	...	1/-

MODULATION TRANSFORMERS

Brand new high grade, by famous maker. 45 watts.
Ratio 1 : 1.3 for parallel EL37's. PRICE 10/-

Valveholders B9G (EF50)	...	...	...	...	6d.
" 5 pin Brit	...	...	...	...	6d.
" UX4 and UX5	...	...	...	...	3d.

TRANSISTORS TYPE P.N.P.

Brand new units, ideal for A.F. and I.F. amplification.
10/6 ea.

Speakers, 7in. x 4in., elliptical	...	...	...	...	15/-
Output Transformers. Tapped	...	...	...	...	5/-
PVC Sleeving, 1 or 2mm., per yd.	...	...	...	...	2d.
PVC Sleeving, 5mm.	...	...	...	...	3d.

Ex GOVT. VALVES at 2/6 ea.

All tested			
EL32	EF39	PEN25	TT11
EB34	EF36	VP23	SI30P

16 mfd. 450 v miniature can	...	...	...	...	2/-
16 mfd. 375 v. 1 1/2 in. dia. can	...	...	...	...	2/-
32 mfd. 350 v.	...	...	...	...	2/6
16 x 16 mfd. 450 v. can	...	...	...	...	3/6
16 x 32 mfd. 350 v. can	...	...	...	...	3/6
32 x 32 mfd. 350 v. can	...	...	...	...	5/-

RELAYS

Special very sensitive light-weight unit for radio control models. PRICE 15/-

10K volume control's less sw	...	...	...	...	1 3
50K "	...	...	...	...	1/3
1/2 meg. miniature "	...	...	...	...	1/6
1 meg "	...	...	...	...	1/6

HIGH GRADE PAPER BLOCK CONDENSERS

1 mfd. 500 v. 2/6	4 mfd. 400 v. 2/6
4 mfd. 1,500 v. 3/6	8 mfd. 400 v. 3/6

Chrome equipment handles. Latest style. 4in. x 1in.
PRICE 4/6 pair

PLEASE ADD POSTAGE ON ALL ORDERS UNDER £1. BLOCK LETTERS PLEASE.

HOME RADIO (Mitcham) LTD.

187, LONDON ROAD, MITCHAM, SURREY. MIT 3282

IT'S NEW!

**BUILD THIS
FRYING-PAN
RADIO FOR**

**NO RADIO KNOWLEDGE
WHATEVER NEEDED!**

Can be built by anyone in an evening using our step-by-step, easy-to-follow plans. Total building cost including mirror finish frying-pan and everything down to the last nut and bolt only 79/6, Post Free. It is a REAL ALL-ELECTRIC RADIO with normal size speaker, etc. Exceptionally sensitive circuit covering all Medium and Long Wavebands receives "HOME," "LIGHT," "LUXEMBOURG," "A.F.N." Etc., Etc., really beautiful tone due to "wall-baffle" effect. Size only 9in. Diameter, 2in. Deep, and handle 7in. Long. Hangs anywhere—IDEAL FOR KITCHEN, BEDROOM, ETC. (Mains lead passes unnoticed through the hollow handle.) AMPLE VOLUME. RUNNING COSTS ONLY 1d. FOR 75 HOURS! Weight only 3 1/2 lbs. For A.C. Mains 200 to 250 Volts. Robust design and should last a lifetime. EACH PART TESTED BEFORE DESPATCH, AND YOU CAN'T FAIL BECAUSE OUR EASY-TO-FOLLOW PLANS. TAKE YOU STEP-BY-STEP. BUILD ONE OF THESE AMAZING LOW-PRICED SETS—NOW! Total building cost including full set of plans 79/6 Post Free. (Parts may be bought separately, Parts Lists 2/6.) LIMITED QUANTITY. Send Cheque or Postal Order Today! Please cross Postal Orders. (C.O.D. 2/- extra.)



ONLY
79/6
POST
FREE

Eastbourne Radio Co. (Dept. PW4) 30, OCKLYNGE RD., EASTBOURNE, SUSSEX

Best Buy at Britain's

TWO-WAY MORSE TRAINING SETS. W/T Mk. 3. Consists of two valve oscillators (AR12's) (one with pitch control), for one or two operators. Has provision for creating "Atmospherics." In polished oak case 12 1/2 in. x 10 in. x 8 in. Wt. 16 lbs. Complete with valves, leads, 2 keys, 7-way terminal board, circuit and instructions, but less batteries and phones. Ideal for Cadets, Scouts, etc. SNIP. 19/6.
RESISTORS. Latest miniature insulated Dubilier 1 watt type BTS. Wire ends. Useful values. ONLY 10/- for 100 assorted! 1 and 1/2 watt. Erie, etc. 1 gross assorted, 10/-.
FIELD TELEPHONES. Army type D. Mk. 5. Buzzer calling. Ideal for building sites, farm, workshops, etc. Complete with handset and batteries. Tested before despatch. 39/6 each.
SOUND-POWERED HANDSETS.—Similar to telephone. Balanced armature microphone and earpiece. No batteries required. 10/6 each. Breast mike and pr. headphones, as above. 12/6 set.

RT37/PPN2 BEACON TRANSMITTER-RECEIVER. 214-224 Mc/s. Size 13in. x 10in. x 5in. Contains 5 3A5, 3 1R5, 1 1R5, and 2 2v. synchronous vibrators. Operates from 2 v. accumulator via 2 built-in vibrators. Complete with telescopic mast antenna system (9ft.), lightweight headphones, Technical Manual, super quality carrying haversack, cords, co-ax. cables, plugs, etc. Total wt. 28lb. BRAND NEW, boxed, American equipment. 72/6.

THREE-CORE CABLE. 23/6, rubber ins., circular, padded, cotton covered, margin 12 yds. 9/- or 100 yds. 59/6.
RCA SPEAKER.—An 8in. P.M. unit contained in beautiful black crackle cabinet, suitable for AR88, etc. BRAND NEW. Price only 45/-.

DUAL VOLTAGE BLOWERS.—12 and 24 v. Ideal for hair dryers, car heaters, etc.. 25/- plus 2/6 postage.
INSTRUMENT TRANSFORMERS. ParmerCo.—230 v. A.C. input. 0-65-130-195 v. 85 mA. 6.3 v. 5 Amp. 6.3 v. .3 Amp output. Shrouded. 3 1/2 in. x 3 1/2 in. x 3 1/2 in. high. 15/-.
HEAVY DUTY L.T. TRANSFORMERS.—200-250 v. A.C. input. 30 v. tapped at 10 v. 36 Amps output. 5 1/2 in. x 6 in. x 7 in. high. wt. 24 lbs. 55/-.
MINIATURE MODEL MOTORS.—2in. long x 1 1/2 in. diam. x 3/16 in. diam. spindle, weight 5 ozs. Will work from 6-volt dry battery and are reversible. Ball bearings. Price 8/6.

PLEASE ADD POSTAGE OR CARRIAGE ON ALL ITEMS
CHARLES BRITAIN (RADIO) LTD.
11, Upper Saint Martin's Lane, London, W.C.2.
TEMPle Bar 0545

Shop hours 9-6 p.m. (9-1 p.m., Thursday) Open All Day Saturday

situated on the rear of the front panel between the volume-control and the handle on the left-hand side as seen from the front. From this the relevant capacitors and the switch can be located and removed. It should be noted that C96 is still in circuit and this should be checked when the switch S5 is removed.

The crash limiter as it fits into the R1155 circuit is shown in Fig. 11.

The valveholder used is that which was occupied by DF3 in Fig. 2.

Difficulty may be experienced in obtaining a 66 K potentiometer. The values are not critical, although the ratio of resistors should be maintained. Thus, if a 50 K potentiometer is used, R79 should be reduced to 25 K, and if a 100 K potentiometer is used, R79 should be made 50 K.

It is recommended that this circuit be built in first and the original detector circuit modified afterwards.

A Morganite potentiometer is recommended. Type LHNAR as this type is physically small and can be fitted in the "Meter Amplitude" control space without difficulty, although any midget type would do as well. A normal-sized control is too large to fit in this space.

When the limiter circuit has been built in, it can now be connected into the main circuit. On the tag strip under the output transformer (chassis inverted) will be found the components which it is necessary to

remove. One of the leads from IFT3 will be found to terminate at a 56 KΩ resistor on the above-mentioned tag strip. This resistor along with a 470 KΩ resistor on the same tag panel are removed. The other two components which are no longer required are a 100 pF capacitor which is connected between one end of the

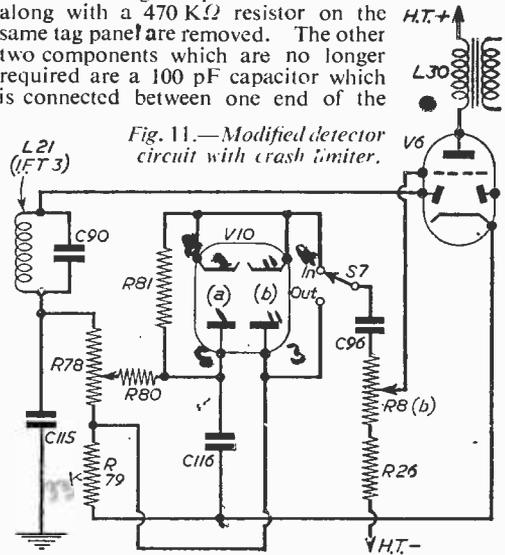


Fig. 11.—Modified detector circuit with crash limiter.

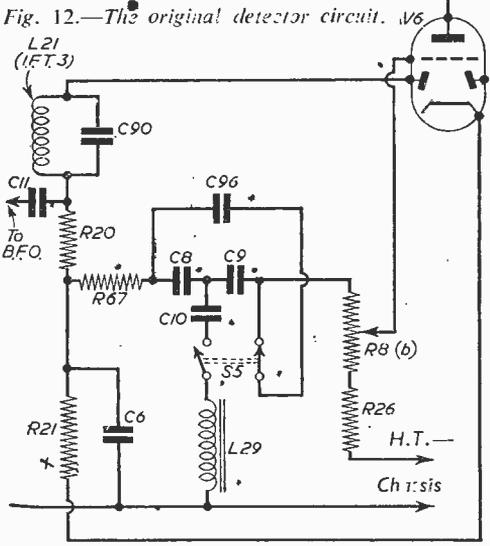


Fig. 12.—The original detector circuit.

- COMPONENTS (Fig. 12)**
 Components to be removed are underlined, except for those in the Filter Circuit, which will already have been dealt with but is included here for completeness.
- | | |
|-------------------------------|--------------------------------|
| <u>R8 (b)</u> —500 K. Volume. | L30—Phone Transformer. |
| <u>R20</u> —56 K. | C96—0.02 μF. |
| <u>R21</u> —470 K. | L29—Filter Inductor. |
| <u>R67</u> —22 K. | C8, C9, C10—Filter components. |
| <u>R26</u> —100 K. | |
| C6—100 pF. | |
| C11—100 pF. | |

- ADDITIONAL COMPONENTS (Fig. 11)**
 R78—66 K Potentiometer Carbon.
 R79—33 K 10% Erie Type 9.
 R80—680 K 20% Erie Type 9.
 R81—560 K 20% Erie Type 9.
 C115—100 pF Mica 20%.
 C116—0.1 μF 350 v. 20%.
 S6—S.P.D.T. Toggle Switch.
 V10—6H6.
 Note.—All other components are already included.

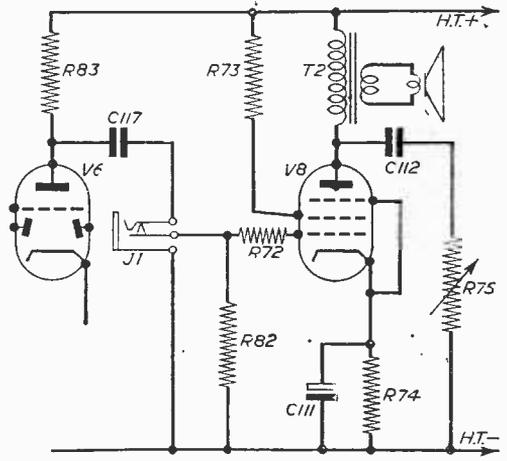


Fig. 13.—R.C. coupled output stage.

- ADDITIONAL COMPONENTS (Fig. 13)**
 R82—470 K 20% Erie Type 9.
 R83—100 K 20% Erie Type 9.
 C117—0.1 μF 350 volt working.
 Note.—R82 replaces R71 in Fig. 5. All other components as in Fig. 5.

56 K Ω resistor and chassis, and a 22 K Ω resistor which is in series with the volume control R8(b) and a 0.02 μ F capacitor C96, which was originally on the filter tag panel. This will leave a black wire which should be traced through the grommet hole and cut off at the tag panel underneath the output transformer. The original detector circuit is reproduced in Fig. 12. Components underlined are those which are to be removed. Do not remove any components connected to the cathode (pin 8) of the double diode triode

and off frequency when using the B.F.O., the adjusting capacitor C13 on the front panel should be trimmed as follows:—

1. Tune in a steady strong station, using the magic eye.
2. Switch on the "Het. Osc." and adjust C13 for note of about 1,000 c/s, without moving the main tuning knob.
3. Should there be insufficient adjustment the B.F.O. coil (L22) will require adjustment. Remove

TABLE I. Valve voltages and currents.

Valve	Electrode	Voltage	Voltage	Current	Current
		Volume control Max.	Volume control Min.	Vol. Cont. Max.	Vol. Cont. Min.
V1	Anode	174	200	6.6	0.9
	Screen	57	78	—	—
V2	Hexode An.	184	202	1.0	0
	Screen	54	81	—	—
	Triode An.	63	68	—	—
V3	Anode	174	202	5.7	0.1
	Screen	59	78	—	—
V4	Anode	174	192	6.9	5.0
	Screen	57	70	—	—
V5	Anode	124	134	4.4	4.8
	Cathode	6.8	7.5	—	—
V6	Anode	182	198	9.3	9.6
	Cathode	--34	--23	—	—

(V6). They are not shown in Fig. 11 and Fig. 12, but this is merely for simplicity. The limiter should now be tested.

This circuit, unfortunately, results in a loss of A.F. gain due to the 66 K Ω and 33 K Ω "potentiometer" chain, and if this loss is considered too much, a separate diode should be used for the detector with its cathode connected to H.T.— A miniature type of valve would be suitable, e.g., an EA50. Then the remaining triode section should be replaced by a pentode, for which suitable types are 6J7, EF36, EF37 and EF37A, and this should compensate for the loss in gain.

Should it be decided to let the circuit of V6 stand, an improvement may be brought about by removal of the phone output transformer (L30 in Fig. 10 and Fig. 11). This could be replaced by a resistance capacitance coupling. This affects mainly Fig. 5 and the output stage with its modified coupling appears in Fig. 13.

This brings to an end the modifications which the author incorporated in his own receiver, but other readers may wish to take things further such as the fitting of an "S" meter. However, it must be borne in mind that the receiver was intended for use on commercial speech, and because of this the bandwidth of the receiver is limited to 5 Kc/s maximum, and is in no way a "quality" receiver.

General Notes on the Receiver

The original receiver was run from a machine in the aircraft which delivered 220 volts at 140 mA for H.T. and this should be noted when the following table of valve voltages and currents is consulted. These readings may, of course, be subject to some variation.

Notes on the Heterodyne Oscillator

If it is noticed that the heterodyne note is weak

top cover of the box and put C13 half-way in mesh. Check the core of L22 moves easily. If not, release the locking compound by careful application of heat. Replace lid. Repeat (1), switch on "Het. Osc.", and adjust the core of L22 until a position of zero beat is obtained.

4. Rotate C13 clockwise until a note of 1,000 c/s is obtained.

Some fault-finding tests

NO SIGNALS.

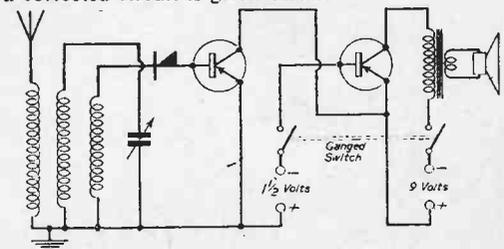
(i) Magic eye glows red.

This means that H.T. is off the receiver. Check F1, and if open circuit, check C113 and C114, for short circuit.

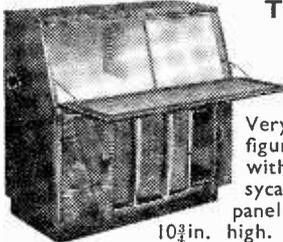
(To be continued)

The Simplicity Transistor Two

A NUMBER of readers have queried the circuit which was given last month on page 450. The positive side of the two batteries was shown in Fig. 2 as being joined together, under which condition, of course, the first transistor will not work. The connection between the batteries should be removed and a corrected circuit is given below.



Corrected Circuit of the Simplicity Transistor Two.



THE SUPERIOR BUREAU
PRICE £17.0.0

Plus 25/- carriage

Very elegant in highly figured walnut veneer with internal panels in sycamore. Sloping radio panel size 16in. long x 10 $\frac{3}{4}$ in. high. Uncut motorboard size 15 $\frac{1}{2}$ in. long x 13 $\frac{3}{4}$ in. back to front. Lid panelled in beige leatherette. Two large storage cupboards. Speaker chamber large enough for 12in. speaker, overall cabinet size 35in. high, 34in. long, 16 $\frac{1}{2}$ in. deep.



SUPEREX "55"
BATTERY PORTABLE

A first class receiver, equal in appearance and performance to any commercial model. Cabinet size 10 $\frac{3}{4}$ in. x 8 $\frac{3}{4}$ in. x 4 $\frac{1}{2}$ in. All parts are available separately.

- 4 Valve Superhet
- Long, med. Wave
- Large Speaker
- 87C 1.4V Valves
- Simple construction

BUILDING COST plus 4/- postage
£7.15s.

SEND 1/6 FOR CONSTRUCTION BOOKLET

RADIO AND RADIOGRAM CHASSIS

SUPERHET CHASSIS OF LATEST DESIGN (Fully Guaranteed)

General Specification applicable to all models.

MAINS : A.C. 200/250 volts 50 cycles only.

DIAL : Suitably lit multi-coloured glass dial of the horizontal type

A.V.C. : Full provision of Automatic Volume Control.

SOCKETS : Sockets provided for Aerial, Earth, Gram, Pick-up and Extension Speaker. Connections provided to Gram.

AUDIO SECTION : The Audio Section is designed for first rate reproduction on Radio and Gramophone.

TYPE AMS : 5 valve Superhet (3 waveband)	... ..	12 gns.
TYPE AM7 : 7 valve Superhet with push-pull output (3 waveband)	... ..	16 gns.
TYPE AM/FM47 : 7 valve Superhet with FM/VHF Band (4 waveband)	... ..	23 $\frac{1}{2}$ gns.
TYPE AFM49 : 9 valve Superhet with FM/VHF Band (4 waveband). Push-pull output including two speakers	... ..	26 gns.

Carriage and Packing 12/6 extra.

RADIO COMPONENTS

We carry a wide range of Radio and Television components, also AM/FM Radio Chassis, Tuners and HF Amplifiers. Quality Speakers always in stock—send for lists !
SHOP OPEN : 9 a.m. to 6 p.m. Monday to Saturday ; 1 p.m. Thursday.
TERMS : Cash with order or C.O.D. (U.K. and N. Ireland only).

Superior
Radio supplies

37 HILLSIDE, (HARROW ROAD)
STONEBRIDGE, N.W.10. Elgar 3644

Still only 5 connections
Smaller in size
many plus features

The New
AMAZINGLY ROBUST

Qpack FROM 42/-

FREE

CIRCUITS & WIRING DIAGRAMS

OSMOR NEW STATION SEPARATOR

This improved type incorporates a special coil which has a peak performance on the station for which it is designed. As the inductance at maximum "Q" is only variable by a small degree, please state precisely the Station you wish to receive clearly. It will only operate on one Station. Price 10/6.



BAND 1 FILTER

Rejects B.B.C. from I.T.A. aerial and improves picture. Suitable for all makes.

10/- inc. instructions. Fitted in 2 minutes.

OSMOR HIGH 'Q' POTTED COILS

FOR MW or LW SELECTIVITY 5/- EACH. IDEAL FOR MODERNISING YOUR FAVOURITE SET.

NEW OSMOR Battery/Mains S'het. Employing Ferrite Rod Aerial. Complete Kit £9.9.0. With Full Constructional Information.



CHASSIS, WIRING DIAGRAM & ALL COMPONENTS AVAILABLE FOR P.W. "SEVEN-FIVE S'Het. RECEIVER."

We keep right up to date in building the latest circuits published in "Practical Wireless" "Wireless World," and "Radio Constructor," and we stock the components specified. Send 7 $\frac{1}{2}$ d. in stamps for circuits, wiring diagrams, fully descriptive literature together with coil and coil-pack leaflets, components lists, chassis drawings and templates.

OSMOR RADIO PRODUCTS LTD. P.W.³ 418 Brighton Road, South Croydon Surrey. Telephone Croydon 5148 9.

BUILD AN INEXPENSIVE QUALITY RADIO!



107/6

Total building cost including choice of beautiful walnut veneered cabinet or Ivory or brown bakelite. This is the lowest possible price consistent with high quality. No radio knowledge whatever needed... can be built by anyone in 2-3 hours, using our very simple easy-to-follow diagrams. This terrific new circuit covers all medium and long waves with optional negative feedback, has razor-edge selectivity, and exceptionally good tone. Price also includes ready drilled and punched chassis, set of simple easy-to-follow plans—in fact, everything! All parts sparkling brand new—no junk! Every single part tested before despatching. Uses standard octal-base valves: 6K7G high-frequency pentode feeding into 6J5G anode-bend detector triode, coupled to 6V6G powerful output beam-power tetrode, fed by robust rectifier. For A.C. Mains, 200-250 Volts (low running costs—approximately 18 Watts!). Size 12in. x 6in. x 5in. Build this long range powerful midget NOW. All parts and set of plans, £5.7.6. (Post and packing 3.6.) Priced Parts Lists, 2s.

AT LAST! — A POCKET RADIO

THAT CAN BE BUILT FOR ONLY **37/6**

In response to many requests we now present the "SKYPOCKET" — a beautifully designed precision POCKET RADIO. Can be built by anyone without any radio knowledge whatever—EVERY SINGLE PART TESTED BEFORE DESPATCH; our simple, pictorial plans take you step-by-step. This set has a remarkable sensitivity due to painstaking design and careful choice of component values. Covers all medium waves 200 to 550 Metres, including "Home," "Light," Luxor, etc. Size only 5 1/2in. x 3 1/2in. x 2 1/2in. in Strong, Transparent case with panel, cover and special station-printed Ivorine dial. A really personal pocket-radio WITH OWN DETACHABLE ROD ANTENNA, ideal for Bedroom, Garden, Holidays, Second-set, etc. Completely all-dry battery operation with special low consumption. Specially chosen high-efficiency coil. Average building time 1 hour. Total Building Cost—including Case, Valve, etc., in fact, everything down to the last nut and bolt — ONLY 37/6, with plans, Postage, etc., 2s. C.O.D. 1/6 extra. (Parts sold separately. Priced Parts Lists, etc., 1/6.) Demand is certain to be heavy—so SEND TODAY!



47/6

Build this exceptionally sensitive twin-triode radio. Uses unique assembly system and can be built by anyone without any radio knowledge whatever in 45 minutes. Handsome black-crackle steel case with specially made black and gold dial with stations printed. Size of radio only 6 1/2in. x 5 1/2in. x 3 1/2in. Covers all Medium and Long waves—use one only all-dry battery. H.T. consumption only 1 to 1.5 mA. Ideal for Bedroom, Garden, Holidays, etc. 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. Total building cost—Everything down to last nut and bolt—47/6 (Postage, etc., 2s.)—with full set of clear, easy-to-follow plans. (For Headphone Reception). Cost of Extra Valve, Speaker, Parts, etc., 38s. 6d. All these fit inside Case or parts sold separately. Priced Parts Lists, 2s."

CONCORD ELECTRONICS (Dept. PWB), 69, PRESTON STREET, BRIGHTON, 1

Orders despatched by return of post. Cheques accepted. Cash on delivery 1/6 extra. Suppliers to Schools, Universities, Government and Research Establishments. Complete range of components and valves stocked.

ENTHUSIASTS WHO KNOW SPECIFY

Dulci FULLY GUARANTEED ASSEMBLED CHASSIS...

FOR BUILDING RADIO/RADIOGRAM USE THIS QUALITY EQUIPMENT AM/FM (Model H4) CHASSIS

4 wave bands including F.M. 7 valves of latest B.V.A. glass seal miniatures and cathode ray tuning indicator.

£24.6.6. Tax paid

Our chassis may be easily built into any cabinet or can be mounted into the Dulci WALNUT VENEERED ESCUTCHEON (as illustrated) which is specially designed for any Dulci chassis. Outside panel size 19 1/2in., it may be cut to suit own requirement and is ideal for building into bookcases, cupboards, room corners, etc. Complete with mounting brackets **27/6**

EXTRAS AVAILABLE include matched speakers, Goodman's Bin. or 10in. B.S.R. latest 4-speed autochanger.

Note: All parts are plug in, no soldering necessary.

THE DULCI RECORD PLAYER
Modify any radio into a radiogram with the B.S.R. LATEST model 4-speed autochanger with crystal pickup. Spring mounted on metal plinth. Operated through any radio with pickup sockets. **£10.10.0. Tax paid**

FULL TRADE FACILITIES.

THE DULCI COMPANY LTD.
95 Villiers Road, London N.W.1 WILlesden 6678

TECHNICAL TRADING Co.

SPECIAL BARGAIN 12 V. 4 AMP RECTS. 9/6 EA. 25 Doz. Iron Melenium. Full Wave, heavy, compact. DST100 COMM. RECEIVERS 218.

BES (CR100) COMMUNICATION RECEIVERS. 10-4,000 metres, Xtal. Complete 11 valves, good condition, untested, £12.10, carr. 12/6.

TAPE RECORDER CASES. Blue rexine, hinged lid, ditto locks, carrying handle, size 10in. w. x 12in. d. x 9 in. h., carr. 3/6. Double beige, de luxe, surplus famous make, 45s., carr. 4s. No. 18 SETS, 65/-.

"TECHTRAD" SUPERHET COILS.—Consisting Met. and Long (both aerial and osc.) Wave Coils with full instructions. 8s. Pair Quality Midget 10s. 3/3. (or both items 18s.). No. 22 SETS, 16 valves, 24.15/6.

ALUMINIUM CHASSIS.—6in. x 4in. x 1 1/2in. 8s.; 8in. x 5in. x 1 1/2in. 3/6; 8in. x 6in. x 2 1/2in. 4/0; 8in. x 10in. x 2in. 5/9. Post 9d.

Bin. P.M. SPEAKERS. Top Makes, 12/6. Ditto, tested ex. eqpt., 8/6. 7 x 4 Ellipticals, 18s. W. Trans., 21/6. Post 1/3. **CHOKES,** 1511, 150 mA., 9/6.

RECORDING TAPE. Well known make, 1,200ft. Reels. Big Purchase enables us to sell at 16/- reel, Post 9d. **AVO VALVE TESTERS, 29.**

TEST SETS, TYPE 5E2. For receiver testing, incorporating 6 valves, oscillator, noise generator, sensitivity test 500 mA. meter, 200-250 v. A.C. Power Pack in transit case unseal, 33.15, carr. 7/6.

F.M. RECEIVERS.—Involving 9 valve sensitive chassis, late 1 miniature valves, 7 x 4 Elliptical speaker, beautiful cabinet. Listed £20, our price £11 complete, carr. paid. **COSSOR D.B. SCOPES,** very good condition, £18.

RESPONDER RECEIVERS. Ideal T.V. use, all new. Type 7—9 valves, V.H.F., V.R188, 4/91. E.A.V. 39s., carr. 4s. Type 725—10 valves, V.U.29, 5/4, 8/84, 8/81, 8/52, E.A.30, 5/3, carr. 6/6. Type 5—15 valves, Magic Eye, 5/4, 6/91, V.R135, V.R127, E.A.30, P61, beautiful 200-250 v. A.C. Power Pack, 24.15, carr. 7/6.

V.H.F. RECEIVERS, TYPE P40.—Size 10in. x 4in. x 5in., 10 valves, 6V6, BPS4, EP30, 6J5, E.52, Superhet. Crackle finish, 55s., 200-250 v. A.C. Power Packs, same size, giving 170 v. 0.0 mA., 12 v. 25 mA., 40-, 24.10 both units. **Standard 3 Gang 0005 COND'S,** 1in. sq. hinged, 3/4.

V.H.F. TRANSMITTERS, 12in. x 5in. x 6in., matching above, 6 valves, 2-EC52, 6V6, 3-RK43, beautiful finish, 55s., 200-250 v. A.C. Power Packs to match same size, giving 300 v. 200 mA., 12 v. 25 mA., 25.5.0 both units.

ALDIS SIGNAL LAMPS, w. case, ex. stock, 25s. **CONDENSERS.**—Latest ceramic, 10, 20, 30, 50, 1,000, 2,000 p.f., 5s. doz., post 9d. **LATEST ELEC. TROLTYLITS.**—100 mfd., 6 v.w., 1-2s. mfd., 250 v.w., 1/3; 16 in. 350 v.w., 3s. **RESISTANCES.**—4 w.-2 w. ceramic, 470-100, 2s. doz., 10-100. **AMPHENOL VALVEHOLDER.** Octal, BSA, BT, BPA, BPL, 6s. doz. BPA w. screen, 1/3, 12s. doz. **W.W. PRESET POTS.** 5000, 1K, 2K, 2.5K, 5K, 10K, 20K, 25K, 2s. doz.

GEBESCOPE 16 mm. TALKIE PROJECTORS. Built in amplifier, soundable 12in. speaker, special for music operation, tested. Bargain price while they last. 229.

EBR1, 2-; SPT1, 8/210, 3/6; G341, 4-; G170, P192, P191, 4/6; G182, 5-; G405, G191, 5/6; G673, V1510, 6-; G183, H1, P194, 13/3; G16, 6/6; 12A.7, 14/3; 12A.5, 8-; G152, 12/6; E80, 6/6.

350/352, FRATTON ROAD, PORTSMOUTH PORTSMOUTH'S RADIO, TV AND TOOL SHOP

A Noiseless Organ Control

AN INGENIOUS VOLUME OR SWELL CONTROL FOR AN ELECTRONIC ORGAN

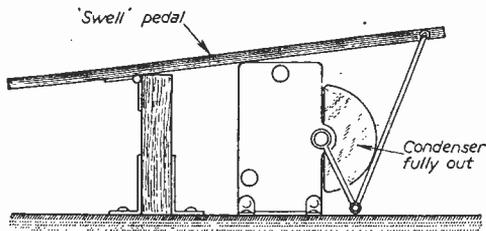
By J. Holden

THE following is the result of many experiments conducted on an electronic organ to find a swell control which did not require constant attention. The basis of this control is to provide a completely frictionless, and therefore non-wearing, control.

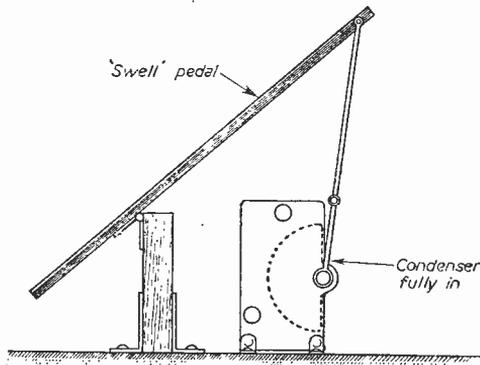
In this circuit a variable condenser is connected between anode and grid of the pre-amplifier stage; this provides feedback which tends to cancel the incoming signal. It is essential that this stage should be a pentode so as to keep the capacity of the variable condenser within reasonable limits. A great asset of this circuit is that it provides a progressive "top" cut very similar to the shutters of an organ swell-

economy in space could be effected by using miniaturised condensers (variable). The possibility of using variable condensers with paxolin dielectric should not be ruled out.

No originality is claimed for the above as a similar idea is used on the Novachord, but the writer has-



The control in "Maximum" or loudest position.



The Control "Off" or in the position of minimum volume.

COMPONENTS REQUIRED

- 2—Three-gang .0005 variable condensers.
- 1—Valve (SP61, EF36, EF50, etc.). Any equivalent.
- 1— $\frac{1}{2}$ Meg. anode load resistance.
- 2—.01 μ F condenser.
- 1—1,000 ohm resistance.
- 1—50 μ F bias condenser.
- 1— $1\frac{1}{2}$ Meg. resistance.
- 1—.1 μ F condenser.
- 1—1 Meg. resistance.

box, and has been found to be effective with diapason tone down to 16ft.

The essential components are a pair of three-gang variable condensers with the shafts coupled together. I am using two very old J.B. components, but

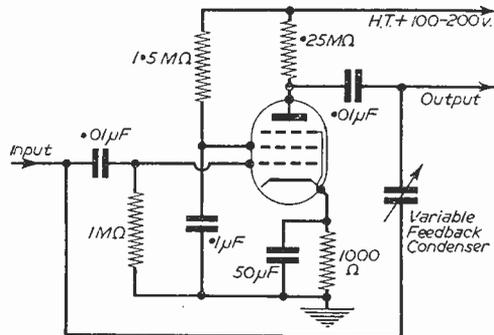
never seen any constructional details concerning this type of control; and after having made up every type to be found in any publication, has found the above to be perfect.

PRACTICAL TELEVISION SEPT. ISSUE NOW ON SALE PRICE 1/3d.

The current edition of our companion paper *PRACTICAL TELEVISION* which is now on sale describes the construction of a TV Wobbulator built round a single valve—an EF91. It is intended for use primarily with the TV oscilloscope recently described in "Practical Television," but may, of course, be used in conjunction with any scope.

The other main feature is a detailed report of the various receivers to be seen at the Radio Show, but, of course, as with the radio receivers mentioned in this issue, due to the fact that Press date is in advance of the opening of the Show, nothing can be said about the surprises which may appear this year. The Servicing article deals with the Cossor 927, whilst there is a very comprehensive article on Aerials in Flats. Amongst the other constructional features is a short article on the making of a Simple Aerial Attenuator, a Compact Band III Converter using a pair of EF50's and more about the improved method of I.F. conversion which was described in the August issue.

The usual features, Problems Solved, Underneath the Dipole and Telenews, complete this latest issue.



Theoretical circuit of the control.

Push-pull Amplification

AN EXPLANATION AND A PRACTICAL AMPLIFIER EMPLOYING THE CIRCUIT

By R. Hindle

(Continued from page 454, September issue)

THE third harmonic is kept down to a reasonably low figure and the even harmonic distortion is cancelled out in the transformer. In order still further to reduce the harmonic content of the output, however, the second new feature is introduced. A part of the signal from the secondary of the output transformer is fed back to the input of the first valve. This is done by introducing a small resistor, R15, into the cathode circuit of the first half of V1. This resistor, together with R14, forms a potentiometer across the secondary of the transformer and so has across it a part of the output signal which is thus included in series with the incoming signal from the coaxial socket as the input to V1. This feedback must be negative, i.e., it must oppose the incoming signal; if it is connected positively the amplifier will tend to be unstable. The nature of feedback, whether positive or negative, depends on which way round the output transformer is connected and if when the amplifier is tested it is found that the feedback is positive the connections to the secondary only of the transformer should be reversed. If the output transformer is of poor quality instability will be experienced either way the transformer secondary is connected due to the phase-shift introduced at some frequencies by the component itself and in this case the only measure, apart from obtaining a more suitable transformer, is to reduce the amount of

feedback by increasing the size of R14. The specified transformer has the appropriate taps for the screens and will permit a high degree of feedback without difficulty.

The third feature is the use of D.C. coupling between the two halves of V1. In the ordinary way a capacitor would be used to couple the first anode to the second grid, but such a component causes phase shift which, like phase shift in the output transformer, can bring to naught one's attempts to improve fidelity by means of feedback. The only purpose of a coupling capacitor is to isolate the following grid from H.T. present at the anode. It so happens, however, in this circuit that the cathode of the second half of V1 is at a potential well above earth due to R5 through which the anode current has to flow and the grid has also to be at a potential above earth by almost an equal amount because the standing bias between grid and cathode has to be only a few volts at most. If, therefore, the anode of V1 first half can be made to be at the same voltage as the cathode of the second half (less sufficient for the standing bias) a direct connection can be made between the two electrodes.

Now the two halves of the double triode have similar characteristics and as both are to work linearly it is reasonable to assume that both halves

(Continued on page 565)

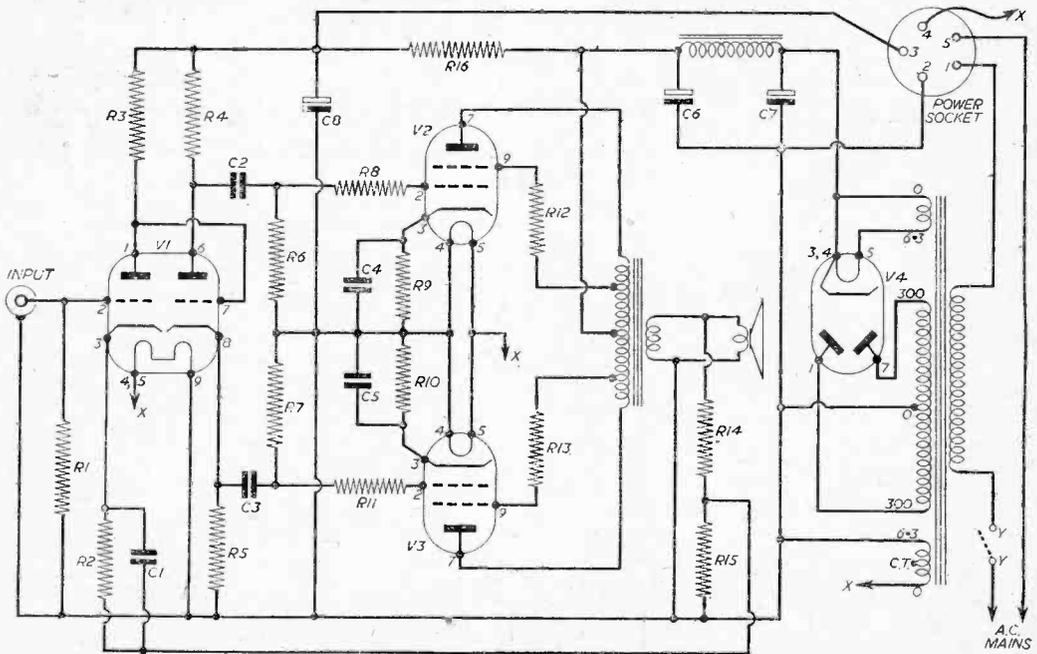
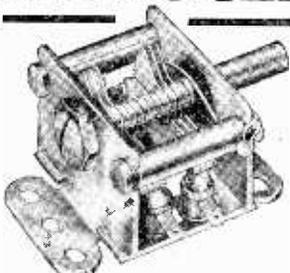


Fig. 5.—The amplifier described here. A list of parts appears on the page 565.

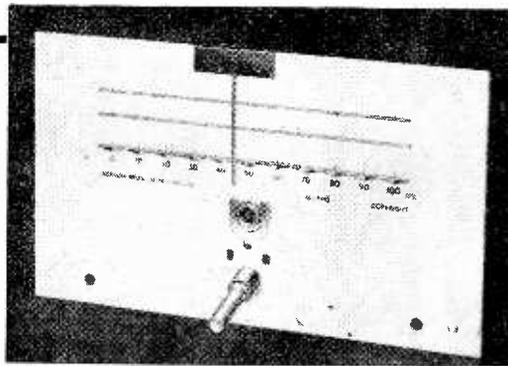
JACKSON



TYPE U.101/S.S.

Cat. No. 5095

Chassis Mounting Gang Condenser with Split-Stators, Ceramic Insulation. Cadmium Plated Chassis. Silver Plated Brass Rotor and Stator. Rotor earthed to Frame. Capacities available each half.—3-10 pf., 3.8-27 pf., 4-35 pf. or 4.43 pf. Price 10/9 each.



S.L.16 DRIVE

RETAIL PRICE 11/6

A general purpose slide rule Drive for F.M./V.H.F. Units, short-wave converters, etc. Printed in three colours on aluminium, with a 0-100 scale and provision is made for individual calibrations. Travel of pointer 4 3/4 in. Scale Plate 7 in. x 4 1/4 in. Scale aperture 5 1/2 in. x 1 1/2 in.

S.L.15 DRIVE

RETAIL PRICE 25/6

A complete kit of parts for the construction of the Jackson. S.L.15 Drive, scale calibrated for the F.M./V.H.F. Band.



Write for further details:

JACKSON BROS. (London) LTD. KINGSWAY · WADDON · SURREY

Telephone: CROydon 2754-5

Telegrams: Walfico, Souphone, London.

U.S.A. TEST METER
25 ranges—1000V, volt. A.C. and D.C. Readings 10-6,000 volt. Milliamps 1 mA-600 mA. Ohms 0-5 megohms. Decibels -10 to +70 DB. Complete with internal batteries, leads and instruction book. 26/19/6.

MINIATURE I.F. STRIP TYPE "373" 9-72 MEG.
Brand new miniature I.F. Strip size 10 1/2 in. x 3 1/2 in. high. Valve line-up: 2-EP92, 3-EP91 and EB91. With circuit. Price (less valves) 7/6. P. & P. 1/6. This I.F. Strip is part of above equipment.

U.S.A. INDICATOR UNIT RC 929A
Complete with 3BP1 C/R tube and screen. 7 valves—2-6SN7GT, 2-6H6GT, 6G6, 2X2, 6X5G, volume controls, condensers, etc. Ideal for portable scope. In black crackle case size 15 1/2 in. x 9 1/2 in. BRAND NEW. 65/-, carr. FREE.

TR 1196 RECEIVER
Complete with 6 valves: 2-EP36, 2-EP39, 1-EK32, 1-EBC23, 465 I.F.T., ideal for conversion. In absolute new condition. 27/6. P.P. 2/6, with circuit.

TR 1196 TRANSMITTER
Transmitter section complete with EL32, EF50, VT501, Relay, etc. 12/6. P.P. 2/6.
COMPLETE TRANSMITTER RECEIVER with 24 v. power-pack in original transit case. 57/6. P.P. 5/-.

TRANSISTORS

JUNCTION TYPE (Red Spot)
OFFERED AT LESS THAN HALF-PRICE

Designed for A.F. application up to 800 Kc's and suitable for use in Radio Control, Signal Tracers, Local Station Receivers, Oscillators, Transistor Voltmeters, Microphone Pre-Amplifiers, etc.

10/-

(Tested and complete with Data and Circuits)

N.B.—These Transistors may be used in place of Mullard OCT1 or similar Transistors.

R.F. TRANSISTORS (Blue-Spot), 1.6 Mc's, 15/- each.

BUILD THE "TELETRON" TRANSMITTER SUPERHERT
Complete Kit of Parts with 4 Transistors and 3in. Speaker. I.F.T.'s 2-gang miniature cond. V.C. Ferrite Rod. Cond. and Res. 26/10/0

"TELETRON" Transistor Superhet with Push-Pull Output, 6 Transistors, 6 x 4 Elliptical Speaker, I.F.T.'s, 2-gang miniature cond. V.C. Ferrite Rod, Cond. and Res. 29/0/0

(Call and hear Demonstration Models working.)

MINIATURE COMPONENTS FOR TRANSISTOR CIRCUITS

Portiphone sub-miniature inter-valve P.P. each Trans.	12/6
Portiphone miniature inter-valve push-pull Trans.	15/-
Portiphone miniature output push-pull Trans.	15/-
J.E. 2-gang 375 P.F. miniature condenser	11/-
Miniature W.W. 1K V/ Controls	2/6
On/Off Slide Switch	1/6
Ferrite Rod, double wound	10/-
Teletron miniature oscillator coils	6/6

CRYSTAL MICROPHONE INSERTS

Ideal for Tape Recording, Gramophone Amplifier, etc. Very sensitive. Guaranteed and Tested. 5/- (ex-units), or 8/6 Brand new and boxed.



62A INDICATOR UNIT

Containing VCR97 with Mu-Metal Screen. 21 Valves: 12-EP50, 4-SP61, 3-EA50, 2-EB34, Plus Pots, Switches, H.V. Cond., Resistors, Muirhead S/M. Dial. Double Deck Chassis and Crystal. BRAND NEW ORIGINAL CASES, 67/6. Carr. 7/6.

INDICATOR UNIT TYPE 182A

Unit contains VCR517 Cathode Ray 6in. tube, complete with Mu-Metal screen. 3-EF50, 4-SP61 and 1-5U4G valves. 9 wirewound volume controls and quantity of resistors and condensers. Offered BRAND NEW (less relay) at 67/6. Plus 7/6 carr. "Radio-Constructor" scope circuit included.

GARRARD 3-SPEED MIXER AUTO-CHANGER Model RC110

A.C. 200/250. List price £14/13/-. Brand New. 28/18/6. P. & P. 5/-.

HENRY'S

(RADIO LTD.)

5, HARROW ROAD, PADDINGTON, LONDON, W.2. TEL.: PADDINGTON 1008-9, C401



FOR ALL RADIO COMPONENTS . . .



ALPHA 3 VALVE T.R.F. KIT

£5.10.0

- ★ Easy to Build.
- ★ Valves 6J7, 6K7, 6V6GT plus metal rectifier.
- ★ Walnut cabinet.

Full instructions, point to point wiring diagram. Circuit diagram, and full shopping list 1/-. All components may be purchased separately.

CONDENSERS

100 100 MFD 25 v.	1/9
100 500 MFD 12 v.	1/8
10 25 MFD 25 v.	1/3
10 100 100 MFD 12 v.	1/9
10 50 MFD 50 v.	2/-
10 25 MFD 50 v.	1/9
10 25 MFD 25 v.	1/9
10 250 MFD 25 v.	1/3
10 12 MFD 50 v.	1/-
10 25 MFD 12 v.	1/9
10 250 250 MFD 6 v.	1/8
10 100 50 12 MFD 12 v.	1/9

VOLUME CONTROL
Type with Single Pole Switch.
5K ohms; 10K ohms; 20K ohms;
50K ohms; 100K ohms; 1 meg.;
2 meg.; 1 meg.; 2 meg. All
3/3 each.

DUAL VOLUME CONTROL
With Double Pole Switch 500K ohms
and 200K ohms. Price 6/9 each.

TYANA SOLDERING IRON
Lightweight 40-watt iron, with
easily replaceable elements and bits.
250 250 v., price 16/9 each.

CHOKES

20H, 250 ohms, 60 M.A. Clamp construction, each	6
10H, 200 ohms, 30 M.A. Clamp construction, each	0/3
10H, 200 ohms, 150 M.A. Clamp construction, each	1/3
10H, 200 ohms, 40 M.A. Midget Clamp construction, each	5/3

**TRANSFORMERS FOR BATTERY
CHARGERS**

250 v. Input tapped 6-12 v. 1 amp, each	13/3
250 v. Input tapped 6-12 v. 3 amp, each	18/-

HEATER AUTO TRANSFORMERS
Designed to adapt common low-
tension voltages 4 v., 5 v., 6.3 v. at
3 amps., centre tapped and inter-
changeable. Each 7/9.

TRANSFORMER MTS
Small twin transformer suitable
for TV converters, etc. Primary
250 v., Secondary 250 v., 40 M/A
and 6.0 v., 15 amp. Price 15/6 each,
postage 1/6.

WESTINGHOUSE RECTIFIER
Type 14A86. 13/6 each.

**TURNOVER CRYSTAL PICK-UP
CARTRIDGES**

Acos Type HG37-52. Long-playing
and standard with shell as used in
latest radiograms. Price 18/9 each.

PURETONE TAPE
1.200ft. Reels, Plastic Spool. 17/6
each.

VIBRATOR UNIT
12 volt Vibrator Unit by Mallory,
complete with vibrator. 17/6 each.

HEATER TRANSFORMER All 250
v. Input

2 volt 5 amp. each	5/-
2 volt 3.0 amp. each	8/3
4 volt 1.5 amp. each	5/6
4 volt 3.0 amp. each	10/6
5 volt 2.0 amp. each	10/6
6.3 volt 1.5 amp. each	5/8
6.3 volt 3.0 amp. each	9/3
12 volt 1.5 amp. each	5/6

PUBLICATIONS

No. 134 Bernard's Radio Manual "AT A GLANCE EQUIVALENTS"
★ More than 8,000 Valves listed ★ All Equivalents shown
on one line ★ Army, Air Force, Navy types ★ Complete
C V to Commercial Listing 5/- each

No. 134 - F.M. TUNER CONSTRUCTION by W. J. May
★ Easy to Build, Point to Point Wiring ★ Super High
Fidelity Response ★ 32 Pages ★ All Components for this
Circuit available ex stock 2/6 each

No. 138 - HOW TO MAKE AERIALS FOR TV (Band 1 and 3) and V.H.F.
(Band 2)
Data for all Channels. Ten different designs for local and
fringe areas 2/3 each

No. 135 - ALL DRY BATTERY PORTABLE CONSTRUCTION
★ Simple and cheap to build ★ Point to point wiring ★ Dual
Fenite aerial for high sensitivity 2/6 each

No. 100 - A COMPREHENSIVE VALVE GUIDE, Book No. 1
No. 121 - A COMPREHENSIVE VALVE GUIDE, Book No. 2
(Characteristics and Base Connections) 5/- each

No. 103 - RADIOFOLDER "A"
The Master Colour Code Index for Radio and Television 1/6 each

No. 114 - RADIOFOLDER "E"
An Inexpensive Tape Recorder 2/6 each
Please include 4d. postage per copy.

Mail Order only. For terms see our advertisement on Page No. 533



5/6 VINCES CHAMBERS
VICTORIA SQUARE
LEEDS I.

**CONSTRUCTORS build these at
DOWN-TO-EARTH PRICES**

**PERSONAL
PORTABLE
RADIO**

30/-

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 Components Price List.



1v SHORT-WAVE RADIO

30/-

- ★ Covers 10-100 metres.
- ★ World-wide reception.
- ★ Low drain valve.
- ★ Picture diagram and instructions for beginners.
- ★ Assembling time 1 hr.

This 1 valve S.W. receiver can be built from our list of components for 30/-, including valve and 1 coil covering 20-40 metres. Provision is made to increase to 2 or 3 valves if required. All components can be purchased separately and are colour-coded so that the beginner can build this set quite easily.

Post and Packing: Under 10/- add 9d.; under 40/- add 1/6; over POST FREE.

Send 2/- for specification, wiring diagram, layout and price list to —
R.C.S. PRODUCTS (RADIO) LTD
11 OLIVER ROAD, LONDON, E.17. Mail order only.

GZAK This Month's Bargains

Don't miss this one!

**CRYSTAL HAND
MICROPHONES**

As illustrated, in silver hammer case with polished grille, handle and 4 feet screened lead. ONLY 21/-.



ABSORPTION WAVEMETERS

3.00 to 35.00 Mc/s in 29 switched bands. 3.5, 7, 14, 21 and 28 Mc/s Ham bands marked on scale. Complete with indicator bulb. A MUST for any Ham Shack. ONLY 15/- each, p. & p. 1/-.

AERIAL WIRE. Copper, 7/25 stranded; 140ft., 10/- 70ft., 5/-; Hard Drawn 14g; 140ft., 17/-; 70ft., 8/6. P. & p. 2/-.

GLASS INSULATORS. 1/6 each. Small shell ditto, 41d, each or 4/- doz. plus postage.

CONDENSERS. 8yF 600 v. Trop. 750 v. normal condensers. NEW, ex W.D. stock, 5/6, p. & p. 1/6.

New TCC Type III. 8 mid. 1,000 v. D.C. wk'g. (List over £3). OUR PRICE 10/6. p. & p. 1/9.

FLASH!!! EDDYSTONE 888.

New Ham Band only Receiver.

JUST OUT! Send s.a.e. for details.

No C.O.D. on orders under £1.
PLEASE PRINT YOUR NAME AND ADDRESS.
CHAS. H. YOUNG LTD.

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

Mail Orders to Dept. "P"
102, Holloway Head,
Birmingham 1 (MID 3254)

will work with the same load, i.e., R3 will equal R4 plus R5. Supposing R3 is chosen to drop two-thirds of the total H.T., leaving one-third across the valve itself. Then R5, carrying the same current but being only a half of R3, will drop a third of the H.T. also and so will make the voltage required at the grid of this half about a third of the total H.T., and so this grid can be directly connected to the previous anode as desired. In this simple calculation the standing grid bias required can be ignored because it is so small compared with the H.T. and the second half of V1 being in the nature of a cathode follower it will tend to pull itself into step when conditions are made approximately correct. The design procedure is, therefore, to examine the valve curves to see

conditions well clear of the grid current zone and which is chosen for the present case. The stage gain is then about 12 for the first half and, as already mentioned, about 1.8 for the second half. The output valves are Mullard EL84, giving 11 watts output and requiring 20 volts input signal peak grid to grid.

LIST OF COMPONENTS FOR FIG. 6

- C1—8 μ F 350 v. Dubilier BR
 - C2—1 μ F 250 v. Dubilier 410
 - C3—50 μ F 50 v. Dubilier BR
 - C4—8 μ F 350 v. Dubilier BR
 - C5—50 pF Dubilier ceramic
 - C6—1,000 pF Dubilier 400
 - C7—300 pF Dubilier 400
 - C8—3,000 pF Dubilier 400
 - V—Brimar 6BR7
 - R1—1 M Ω
 - R2—220 K Ω
 - R3—2.2 K Ω
 - R4—10 K Ω
 - R5—1 M Ω
 - R6—100 K Ω
 - VR1— $\frac{1}{2}$ M Ω (with s.p. sw.)
 - VR2—2 M Ω
 - VR3—2 M Ω
- } Dubilier $\frac{1}{2}$ watt
- } Dubilier type C.

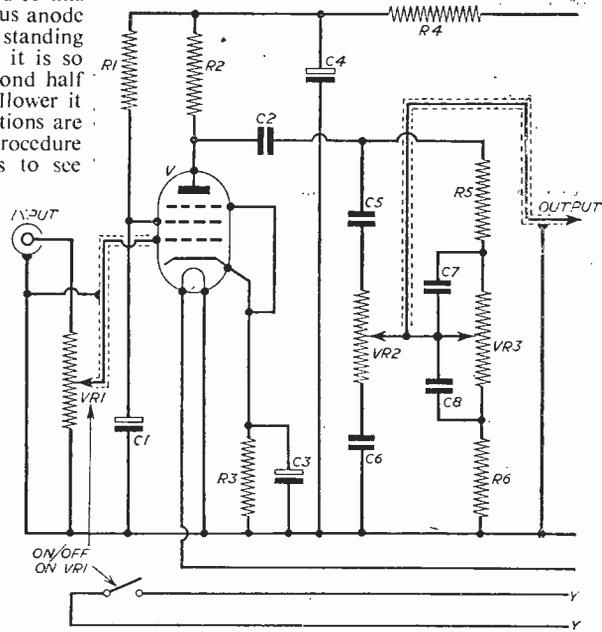


Fig. 6.—The Pre-amplifier.

if a suitably linear part exists satisfying the stipulation that two-thirds of the H.T. should be dropped across the load and if this is so and there is some doubt about the conditions of working when the amplifier is built it is only necessary to insert a meter to check the current flowing through the second half to see if it conforms to the design figure decided upon, adjusting R3 if necessary to obtain correct conditions.

The input to the first half of V1 is this figure divided by the gain in each previous stage, i.e.,

$$\frac{20}{12 \times 1.8} \text{ i.e., about 1 volt peak,}$$

but the signal actually to be fed into the input socket is this voltage plus that fed back from the output transformer. The speaker for which this amplifier was primarily designed is the G.E.C. metal coned unit, about which more later, but of interest now is the speech coil impedance, to which the secondary of the transformer matches, of 4 ohms. At peak conditions 11 watts is available which, in a 4 ohm load represents a voltage of $6\frac{1}{2}$ and the feedback potentiometer selects about a third of this, say 2 volts, to feed back. The input needed is of the order of 3 volts. A stage of amplification is normally used before a circuit of this kind, but in the present design this is made a separate unit including gain and tone controls, so that it can be put in a place convenient for controls so that the bulk of the amplifier can be

COMPONENT LIST FOR FIG. 5

- | | | | |
|--------------------------------------|--------------------------|-------------------------------------|---------------------------------|
| R1—4.7 M Ω | R9—270 Ω | C1—50 μ F 12 v. Dubilier BR | V1—Brimar 6AU7 |
| R2—4.7 K Ω | R10—270 Ω | C2—1 μ F 350 v. Dubilier 410 | V2, V3—Mullard EL84 |
| R3—100 K Ω | R11—6.8 K Ω | C3—1 μ F 350 v. Dubilier 410 | V4—Osram U709 |
| R4—47 K Ω | R12—47 Ω | C4—50 μ F 50 v. Dubilier BR | 1 choke, smoothing, WB 30/45D |
| R5—47 K Ω | R13—47 Ω | C5—50 μ F 50 v. Dubilier BR | 1 mains transformer WB 28/45D |
| R6—220 K Ω | R14—180 Ω | C6, C7—16-8 μ F 500 v. Dubilier | 300-0-300 v. 110 mA, 6.3 v., |
| R7—220 K Ω | R15—68 Ω | CT | 6.3 v. |
| R8—6.8 K Ω $\frac{1}{2}$ watt | R16—10 K Ω 1 watt | C8—16 μ F Dubilier BR | 1 output transformer, Partridge |
| Dubilier | Dubilier | | P2629 |

stowed away in the depths of the cabinet; this is much better than the common way of mounting it all on one chassis so that space at the control point in the cabinet has to be found for the whole of the bulky part of the amplifier. This amplifier, along with the preamplifier, makes an ideal unit for playing records with high quality. The main amplifier provides sufficient power for the preamplifier, which is led out via a socket similar to that used for the single-ended output stages described earlier in the series.

This amplifier was tested out using the G.E.C. metal cone speaker unit, as previously mentioned. This is a very exceptional unit for high quality reproduction which should be used, preferably in one of the enclosures specially designed for it. A separate cabinet would then be needed for the amplifier and playing desk. Quite often such an arrangement is impracticable and a single cabinet has to house both speaker and amplifier equipment. Excellent results have also been obtained in this way also using the metal cone speaker. The speaker chamber should preferably be of a volume similar to that of the specially designed enclosure and should be of the solid backed type with a vent, again following the lines of the special design. The G.E.C. is not really suitable unless the cabinet is such as to permit the reproduction of bass because its response extends so far into the higher audio frequencies and it is generally agreed that if bass is to be limited the treble should be similarly limited; the balance between upper and lower frequency range is more important from an audio point of view than the lop-sided extension of the frequency range. The G.E.C. unit, without the bass of which it is capable, sounds too high-pitched for comfort and there is little point in using the unit if its response is to be clipped at the upper as well as the lower end. The same remarks apply where extended range is sought by means of a tweeter; a separate high note reproducer

should never be used unless the bass reproduction of the main speaker is sufficient to balance it.

There are other high-fidelity speakers, of course, and many cheaper ones that are still capable of providing quite good quality. If an alternative is used, however, its speech coil impedance may not be the same. A transformer of suitable ratio and with the necessary taps on the primary for the screen grid connections which should be at a position as to include 43 per cent. of each half-primary between the H.T. centre-tap and the screen tap.

Control Preamplifier

The circuit of the preamplifier unit containing the controls for the whole equipment is given in Fig. 6. It will be seen that a **Brimar 6BR7** is used in a normal pentode circuit for audio amplification. The method of design of this part of the circuit was illustrated previously when a single-valve amplifier chassis was designed, though in this case a higher value of anode resistor has been used because the amplifier is feeding into a circuit of higher resistance than previously. The amount of gain overall is less in the present case than was required for the single-valve unit previously mentioned, which was intended to feed directly into an output valve requiring 12 volts peak signal, but the valve in the present case is still required to provide a high gain, because there is a signal loss in the tone control circuits to follow.

The signal output from the valve anode is divided into two paths, through the leg containing VR2 and the leg containing VR3, being combined again by connecting the sliders of the two potentiometers together to give the output signal for the main amplifier. When VR2 is moved to its lower end C6 is in parallel with the signal, attenuating the higher audio frequencies giving treble cut.

(To be continued)

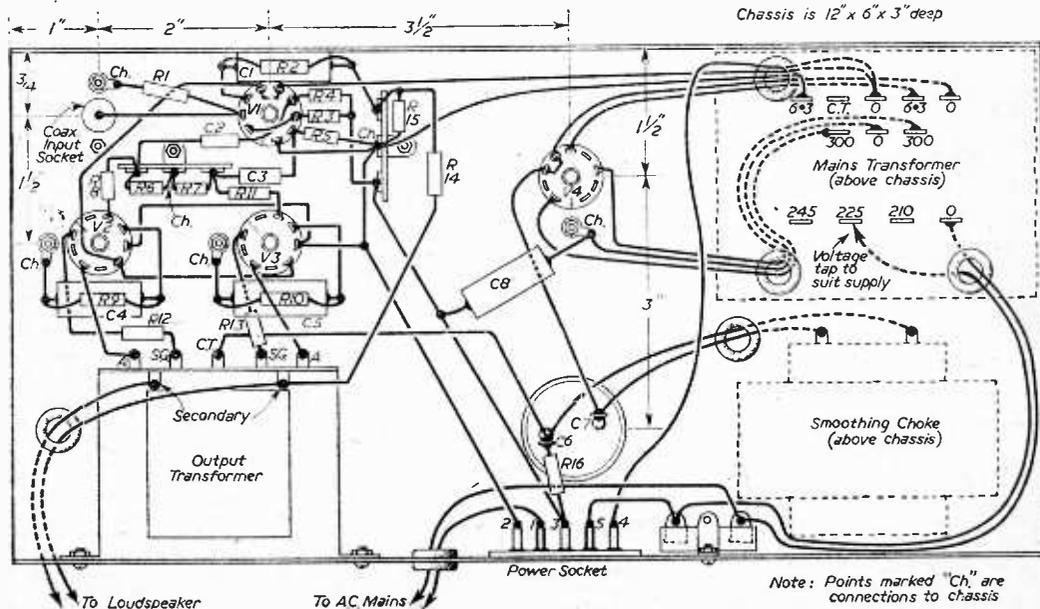
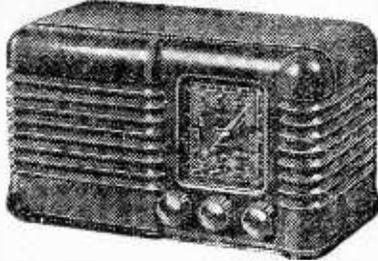


Fig. 7.—Layout and wiring of the amplifier.

A REALLY SELECTIVE 5-VALVE SUPERHET



139/6
Plus 2/8 f.r.
Postage & Packing

Our "know-how" shows you the easy way to surprise friends with this Superb Superhet. **NO RADIO KNOWLEDGE NECESSARY.** Easy to read step-by-step instructions and Diagrams. We guarantee it to work. Only tools needed are Pliers, Screwdriver and Soldering Iron.

IDEAL FOR BEGINNERS . . . A TRF.

... Let us show you how simple a 3 Valve TRF Receiver can be to make our way and how amazed you will be. Easy-to-Follow instructions take the headaches out of construction. Hundreds already working all over the country. 109/6, plus 2/8 post and packing.

A PROFESSIONAL JOB MADE SIMPLE

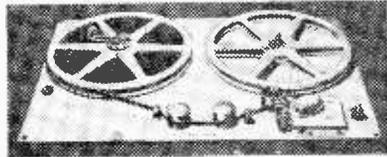
Nothing to lose—Our MONEY-BACK guarantee covers you. Complete parts available for the above receivers in Cream or Brown cabinets. . . . Write to-day and get started on the fascinating Hobby of Electronics.

EASY INSTRUCTIONS WITH OUR "KNOW-HOW" DIAGRAMS, 1/- POST FREE. SEND TO-DAY.

NORMAN H. FIELD, Electronics
Dept. PW, 68, HURST STREET, BIRMINGHAM, 5
Birmingham's Largest Constructors' Store

BUILD YOUR OWN TAPE RECORDER NOW

with the
"ASPDEN"
Tape Deck and Amplifier Kits



TAPE DECKS

Compact model 521. 5in. reels £7/10/-.
Standard Model 721. 7in. reels, kit. £8 10/-.
Two speed, twin track, precision machined parts, easy to assemble, full assembly drawings and instructions, finest motor. High quality Ferroxcube Heads. Either deck fully built and tested, 27/6 extra.

AMPLIFIER :

Record/replay, 2 1/2 watts, neon indicator. 2 recording positions, kit, £5/18/-.
Power pack for above kit, £2/18/6 (both without valves).

Carr. & packing extra.

"Congratulations on this excellent Tape Deck at such a low price."—GD3UB," I.O.M.

Send stamp for full details to:—

W. S. ASPDEN 10, Market St., Washam, KIRKHAM, LANCs.

NEW!

1956 EDITION of
Our Supra-Handbook
"The Home Constructor"
JUST OUT! incorporating

★**B.F.O. UNIT.**—For converting your receiver to "Communications." (Circuit and full constructional details).

★**I.F. STAGE.**—Add an I.F. stage to increase your set's gain and selectivity.

★**MAGIC EYE.**—Details for incorporating a Tuning Indicator for accurate tuning.

★**23 CIRCUITS.**—Superhets, T.R.F. Sets, Amplifiers, Feeder Units, Test Equipment, etc.

★**SUPPERHETS.**—Full constructional details, supra-simplified layout and point-to-point wiring diagrams for building a variety of superhets.

★**COIL PACK.**—Full constructional details for building a superhet coil pack.

★**CAR RADIO.**—Full constructional details.

★**BATTERY CHARGER.**—Details for building a CHEAP charger for your car battery.

★**RADIOGEN.**—Pages of information, Formulae, and "know-how."

★**CATALOGUE.**—Profusely illustrated price list of components. All for 2/6 (plus 3d. post). Send for your copy to-day!

SUPACOILS (Dept. P.10.)
21, Markhouse Road, London, E.17
Telephone: KEY 6809

Solder with



"PERMATIP"

AND

"PERMABIT"
INSTRUMENTS

FOR

**GREATER
SOLDERING
EFFICIENCY**

The soldering bit which maintains its face indefinitely without attention. 25 models available for mains or low voltage supply. Bit sizes 3/32 to 3/8 inch. Full details in booklet S.P.10 from sole manufacturers—

**LIGHT SOLDERING
DEVELOPMENTS LTD.,**
106, GEORGE STREET, CROYDON,
SURREY. Tel. CR0ydon 8589.

F M and H-I-F Components

DENCO F.M. TUNER circuits 1s. 6d.
RADIO CONST'R. F.M. " 2s. 0d.
MULLARD AMPLIFIERS " 3s. 6d.
OSRAM 912 PLU; " 4s. 0d.

Separate price lists available on request to
J. T. FILMER MAYPOLE ESTATE,
BEXLEY, KENT.
Tel. Baxleyheath 7267.

VALVES • SAME DAY SERVICE

All Guaranteed New and Boxed

14V. midget,	1R5, 1S5, 1T4, 1U5, 3S4, DAF91, DF91, DK91, DL92, DL94: any 4 for 27/6.
1A7GT12/6	6SN7GT 9/6 EM34 10/6
1C6GT11/1-	6U4CT14 8/6 DH77 8/6 EY51 10/6
1H6GT 11/6	6U4CT14 8/6 DK32 12/6 EZ40 8/6
1H6GT 11/6	6V6GT 7/6 DK92 8/6 EZ41 9/-
1H6GT 11/6	6V6GT 7/6 DK96 9/6 EZ80 9/-
1R5 8/6	6X4 7/6 DL33 11/6 FW4.500 10/-
1S5 7/3	7B7 8/6 DL96 9/6 6AM5 5/-
1T4 7/3	7C5 8/6 EAF4211/6 GZ32 12/6
1U5 7/3	7C6 8/6 EB91 8/6 KT33C10/6
3A5 7/6	7H7 8/6 EBC33 7/6 KT93 7/6
3Q5GT 7/6	787 9/6 EBC4110/- MU14 9/-
3S4 7/6	10C1 12/6 ECC40 PCF80 8/6
3V4 8/6	10C2 10/- 12/6 PCF82
5U4G 8/6	10F1 10/- ECC81 10/-
5Y3GT 7/9	10LD11 10/6 ECC810/6 PEN38C 16/-
5Z4G 9/-	6AL5 12A7 8/6 ECF80 PEN45 7/-
6AL5 9/-	12A7 8/6 ECF81 13/6 PEN46 16/-
6AM6 7/6	12J7GT ECF8214/6 PL81 11/9
6AQ5 7/6	12K7GT 9/6 ECH35 11/- PL82 9/6
6AT8 8/6	12K8GT 9/6 ECH42 PL83 12/6
6BA6 7/6	12K8GT 10/6 PY80 9/-
6BE6 7/6	12Q7GT ECL80 10/- PY82 7/6
6BW6 7/9	14S7 9/6 EFP7A PZ30 18/-
6F1 13/-	2011 10/9 EFP39 10/6 U25 12/6
6F6G 7/6	251A6T8 6/6 EFP40 12/- U78 7/6
6F13 13/-	25Z4G 9/6 EFP41 10/- UBCH41 9/9
6F15 12/-	35L8GT 9/6 EFP42 12/6 UBCH42
6G6 6/-	35Z4GT 6/6 EFP50 7/6
6J7C 7/6	50LGT 6/6 EFP90 9/6 UF41 9/6
6K7G 6/-	AZ1 11/6 EFP85 9/6 UL41 10/9
6K7GT 9/6	CH35 16/- EFP86 12/6 UUT 11/6
6K8G 8/6	D15 7/- EFP91 7/6 UY41 8/6
6K8CT 9/6	DAC3211 6/6 EFP92 6/6 W77 6/6
6L1B 10/6	DAF9G 9/6 EBL32 6/6 X79 12/6
6LD20 9/6	DC80 7/6 EL41 10/6 Y63 7/6
6Q7GT 9/6	DF33 11/6 EL84 10/6 Z77 7/3

Postage 5d. per valve extra.
READERS RADIO
24, COLBERG PLACE, STAMFORD
HILL, LONDON, N.16 STA. 4587

Open to Discussion



The Editor does not necessarily agree with opinions expressed by his correspondents

A 3½ in. Oscilloscope

SIR,—I am afraid that Mr. Tring, writing in "Open to Discussion," September issue, seems to be labouring under a misapprehension concerning the paraphase amplifiers in Mr. Couvela's oscilloscope.

These "Schmitt PPAs" or "Long-tailed Pairs," as they are often called, do manage to achieve a very good balance in practice and are often used in radar indicators.

It seems that the main mistake Mr. Tring and others make when considering this circuit is the failure to consider the valve current of the second half also having to flow through the common cathode load. This very fact modifies the "cathode follower action" of the first half of the circuit.

V2 (second half) certainly could not have a greater signal input than the first half, because it is this part of the circuit which drives the second half, via the common cathode coupling and under no conditions could V1 cathode output exceed the value of the input to its grid.

As for disconnecting R2 and R5 and applying them to a positive potential from a potential divider there is no earthly reason, as the present bias system used by Mr. Couvela is perfectly satisfactory (and standard).

The only criticism that could be mentioned concerning the article in the July issue is the misprint of C2 which should go to earth, of course.—K. SMITH G3JIX (Yakesbury).

F.M. Results

SIR,—In reply to G. Prentis (Elstree), may I say that F.M. reception on my set is very good indeed. The radio incorporates "push button" wave change. As an experiment I have, just before writing, compared the F.M. with the M.W. and a slight, high-pitched hum or whistle background reproduced on the M.W. is eliminated on the F.M. band. Just a touch of more volume is required on the F.M. for similar M.W. audibility. When the tone control is adjusted there is no doubt whatsoever that the reproduction on the F.M. (apart from cutting out interference) really brings out the lifelike quality of transmission—especially is this so as regards stringed instruments. My experience is that the M.W. fails to reach this standard.

However, I am not quite trouble-free! A dry battery door bell in the house "sparks" through the F.M.

There is a built-in dipole in my radio—outdoor dipole aerial has not been fitted. For what it is worth, I have an indoor aerial, and to the best of my knowledge there is no passing car interference on the F.M. band.

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 commercial or 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 vii of cover.

Even if I had the technical knowledge, which I have not, I rather think, from the information available, that it would be difficult to specify what is the fault factor on Mr. Prentis' F.M. band. But I would venture to say that radio without F.M. is obsolete. Incidentally, my own set incorporating L.W., M.W., S.W., A.M./F.M. and gram and extension connections, cost less than £35.

However, one perhaps should not expect perfection from V.H.F. and if in a locality there are consumers utilising works and household appliances etc. etc., emitting ultra short waves then radio reception is in for a rough time.—F. SEDGWALL (S.W.4).

1939 Portable

SIR,—I agree with Mr. Shatwell in his letter (August issue), about the design of a compact pocket receiver. I myself constructed the 6K7 (July, 1948, edition PRACTICAL WIRELESS) and the 4½-volt battery which powered this set (no H.T. supply was needed) soon had to be discarded as "flat". This particular set measured ½ in. smaller than Mr. Shatwell's, measuring only 4 in. x 3½ in. x 2 in.

I am quite interested in this side of radio and would be pleased if Mr. Shatwell or one of your readers could supply me with circuit diagrams or, indeed, any other midget or portable receivers.

I still possess a copy of the 6K7 circuit if anybody is interested. I am 13 years old.—D. OWENS, 6, Station Road, Melling, Nr. Liverpool.

Amateur Tracking of "Mouse"

SIR,—Readers of your magazine will have read, with interest, of the scheme for launching the artificial satellites Mouse in connection with the forthcoming Geophysical Year. Many of them, like myself, are probably hoping that you will devote an article or a series of articles to this experiment and give us fuller information than can be gleaned from the newspapers, about the satellites themselves, the course they will be likely to follow, and the electronic gear they will carry.

The apparatus which will be required for automatic tracking is probably outside the scope of amateur construction, but it should not be impossible for amateurs living on or near the course of the satellites to receive their transmissions as they pass overhead. And since presumably each will take a different course, depending on the date and time of day when it is released, a great many of us will sooner or later be correctly situated. Although there will be many official tracking stations in many countries, it may be that a mass of subsidiary reports from amateurs will be of value to those controlling the experiment.

If the signals are receivable by amateurs, they could be recorded on tape; details of the receiving gear and type of aerial in use, as well as exact geographical location, and an accurate time signal could be recorded on the same tape and these recordings might be more valuable than written reports since the experts would be able to compare such things as signal-to-noise ratio, rapidity and degree of fading, etc., in widely separated locations.

Even if it is considered that such amateur reports would not be of value, and maybe I have been presumptuous in suggesting it, I am sure many readers will want to make the experiment purely for their own satisfaction and as a matter of interest. I hope, therefore, that you will be able to give us some guidance on the type of signal which the satellites will transmit, the frequency or frequencies to be used, and on the kind of receiver and aerial which will be necessary.—A. P. BUCHANAN (Ayr).

Mail Order Correspondence

SIR.—We have, for many years, through the medium of your magazines, conducted a successful Mail Order Service, but during this summer, when our staff are having their well-earned holidays, and we expected the usual lull of orders, we have received demands far in excess of anything we imagined.

Having returned urgently from our holidays my wife and I have with extra, but untrained labour, done our best to cope. We are succeeding but not yet back to our 24-hour service.

May we ask you to assist us, and I feel that all mail order companies will agree that the readers who reply to advertisements, should *print their name and address in full*, as every week our file of dead letters continues to grow, many contain money, some with the address missing, or incomplete, others unreadable.

Summertime as with Christmas is a difficult period for the National Transport people and occasions delays, that we have no control over, but they are doing their best.

ADDING ANOTHER TRANSISTOR STAGE

(Concluded from page 538)

time the switch is pressed for a higher reading. If after one second of steady reading the meter begins to creep up to a higher reading, switch off and do not attempt any test at any higher reading. This applies to any transistor.

This creeping meter effect is a sure sign of overload and the commencement of the breakdown of a transistor, because the base begins to lose control for a steady reading, and diffusion of impurities has started. There is no remedy for such damage. Max. mW is reduced and the life of a transistor is shortened.

But how can one be sure of not overloading any type of transistor when used in a receiver? The answer is the meter will flutter, and fidelity will not be perfect, at loud peaks. The output meter will also show whether the taps ratio for a speaker is suitable. If too many turns, are connected to a speaker, meter will jerk up to a higher reading at each peak sound.

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 Newman, 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."

We have recently doubled our retail shop premises, taking in No. 623. This should ease the Saturday queues, that have been a worry to us in the past.

Our new factory will be in full production soon, and it is with confidence that we claim "OUR NORMAL SERVICE WILL BE RESUMED."—F. PHILBEY, DUKE & Co. (E.12.)

Sensitive Two-valver

SIR.—I've just crashed out your sensitive two-valver (August, '55) and I feel I must write and tell you it took two hours to make. I felt sure that some part would be wired wrong, but on switching on the set burst out in oscillation, but it wouldn't give any volume on a 1ft. aerial. After a few trials I find 19ft. of P.V.C. bell wire gives more volume than one can call comfortable and has to be controlled by moving off-station. I can get Home and Light with good separation. One snag, any Hams within one mile transmitting on 80 metres will load the set so that all other signals are crowded out. I'm using a 8in. speaker.—P. L. KNIGHT (Heywood).

An F.M. Tuner Unit

SIR.—The following further notes are given on the tuner in the August issue:

(a) Inductances L1 and L2 should be wound on standard ½in. formers, with dust cores removed. Spacing should be roughly the same as the wire diameter.

(b) Inductance L3 should, when wound on the 68 KΩ resistor, have its ends soldered to the resistor fixing wires.

(c) Transformer L4, L5 should, when wound on the old I.F. transformer core, be replaced in the original screening can. In order to make a neater job, the germanium diodes may also be mounted inside the can, being soldered directly to the ends of L5.

(d) R.F.C. 1 and R.F.C. 2 consist of standard R.F. chokes.—J. KELLS (Yorks).

If too few turns meter will dip towards zero. When properly matched up, the meter will remain at a steady reading due to bias; it does not show A.C. audio, except when the transistor is being overloaded and then it flutters up and down. This flutter should not exceed 0.2 mA for OC72 and 0.1 mA for OC71. If tuned coils are moved farther apart so that there is a reasonably steady reading, transistors are not overloaded and the receiver is working quite safely, at loud volume without distortion; especially so if meter readings are reduced as much as possible, but not so much as to spoil fidelity. The various bias meter readings in the above circuits are shown as max. and in most cases can be reduced.

After tuning in a station and completing all adjustments the meter should be shorted because OC72 may go up to 18 mA peaks, not shown but taken through the 5 mA meter which is thus overloaded.

Part I.—A Correction

It should be noted that the captions for Figs. 1 and 2 in last month's issue were transposed.

COPPER WIRE

ENAMELLED, TINNED, LITZ, COTTON AND SILK COVERED. RESISTANCE WIRES, 1oz., 2 oz. & 4 oz. REELS. All gauges available.

B.A. SCREWS, NUTS, WASHERS, soldering tags, eyelets and rivets. EBONITE AND BAKELITE PANELS, TUFNOL ROD, PAXOLIN TYPE COIL FORMERS AND TUBES. ALL DIAMETERS.

Latest Radio Publications. SEND STAMP FOR LISTS

SPECIAL OFFER

G.E.C. & B.T.H. GERMANIUM CRYSTAL DIODES

1/- each. Postage 2½d.

Diagrams and three Crystal Set Circuits Free with each diode.

A large purchase of these fully GUARANTEED diodes from the manufacturers enables us to make this attractive offer.

CRYSTAL SET

INCORPORATING THE SILICON CRYSTAL VALVE

Adjustable Iron Cored Coil.

RECEPTION GUARANTEED

Polished wood cabinet, 15/-, post 1/3 A REAL CRYSTAL SET, NOT A TOY

POST RADIO SUPPLIES

33 Bourne Gardens, London, E.4

TO BE SURE



GET THE RODING HOME



"If you want to save time and money!"

CONSTRUCTOR'S HANDBOOK

Our latest issue is beautifully printed on glossy art paper with a full colour cover! Packed with technical data, set building and servicing hints, facts and formulae, resistance colour code, soldering hints, etc., together with descriptions, full parts list, and circuits of 22 famous outfits-as listed below. Send 2/8 (plus 4d. post).

- ★3-valve superhet Feeder Unit.
- ★3-valve superhet Feeder Unit (R.F. stage), with hi-fi and gram, switching.
- ★Amplifier/Power pack for both above.
- ★5-valve Superhet A.C. with gram.
- ★5-valve Superhet A.C./D.C.
- ★5-valve Superhet A.C. (R.F. stage).
- ★5-valve Superhet A.C. D.C. (R.F. stage).
- ★Simple Continuity Tester.
- ★Magic Eye unit.
- ★Modified 40 Feeder Unit Circuit.
- ★"P.W." Coronet AC4 Superhet.
- ★"P.W." Coronet A.C./D.C. 4 Superhet.
- ★"P.W." Coronet Battery 4 Superhet.
- ★Tape Recorder.
- ★3in. Oscilloscope.
- ★8-valve Communications Receiver.
- ★Signal Tracer.
- ★5-watt quality Amplifier.
- ★10-watt high-fidelity push-pull Amplifier.
- ★Signal Generator.
- ★Crystal Set.
- ★Local station high-fidelity T.R.F. Feeder unit.

Our renowned "Easy-as-A.B.C." FULL SIZE Construction Sheets are available FREE with orders enabling even the beginner to get professional results first time!

Coil packs and I.F.T.s pre-aligned. We supply ALL parts for ALL circuits. NEVER BEFORE HAS THERE BEEN A BOOK SO VALUABLE TO NOVICE AND EXPERT ALIKE!

RODING LABORATORIES

(Dept. TC10) Bournemouth Airport, Christchurch, Hants

REPANCO HIGH-GAIN COILS

DUAL-RANGE MINIATURE CRYSTAL SET COIL with circuit. Type DRX1. 2/6.

DUAL-RANGE COIL with Reaction. With 2 mains, 2 battery and transistor circuits. Type DRR2. 4/-.

MATCHED PAIR DUAL-RANGE T.R.F. COILS with Reaction. With battery, mains and feeder unit circuits. Type DRM3. 8/- pair.

PAIR DUAL-RANGE SUPERHET COILS with mains and battery circuits. Type SH4. 8/- pair.

FERRITE ROD AERIAL. Long and Medium wave. Complete with fixing brackets. Type FRI. 12/6.

MINIATURE I.F. TRANSFORMERS. Pre-aligned 465 kc/s. 13/16in. x 13/16in. x 1 1/4in. For battery or mains receivers. Type MSE. 12/6 pair.

"R" COILS. Miniature Iron Dust Cored.

Range	Aerial	H.F.	Osc.	Price
800-2,000 m.	RA1	RHF1	RO1	3/3 each
190-550 m.	RA2	RHF2	RO2	3/3 each
70-230 m.	RA3	RHF3	RO3	3/3 each
15-50 m.	RA4	RHF4	RO4	3/3 each

(Trade Supplied.) Post 3d. on all orders.

RADIO EXPERIMENTAL PRODUCTS LTD.
33, Much Park Street, Coventry
Telephone : 62572



JUNIOR UNIVERSAL METER



Model 120A

A small 19-range instrument ideal for the enthusiastic amateur. Sensitivity is 1,000 o.p.v. A.C. and D.C. Accuracy: 2% D.C.; 3% A.C.

RANGES

Volts D.C.: 0-25-10-50-250-500-1,000-2,500
Volts A.C.: 0-10-50-250-500-1,000-2,500.
Milliamps D.C.: 0-1-10-50-500-5,000.
Resistance: 0-2,000 ohms, 0-200,000 ohms. Can be extended to 20 megohms. Automatic overload protection fitted to meter movement.

PRICE £9.15.0. PROMPT DELIVERY

CREDIT TERMS: Nine monthly payments of £1.4.4.

TAYLOR ELECTRICAL INSTRUMENTS LTD.

Montrose Avenue, Slough, Bucks.
Telephone: Slough 21381. Cables: Taylins, Slough

RECEIVERS & COMPONENTS

MAKING YOUR OWN? Telescopes, Enlargers, Projectors, or in fact anything using lenses. Then get our booklets "How to use Ex-Gov. Lenses & Prisms," price 2/6 ea. Comprehensive lists of optical, radio and scientific equipment free for s.a.e. **H. W. ENGLISH, Rayleigh Rd., Hutton, Brentwood, Essex.**

AMERICAN RADIO Plans and Devices. Now available. Hundreds of new and startling devices you can make. Only designs of this type available in UK. Receivers, walkie-talkies, amplifiers, recorders, magic eye alarms, etc., etc. Full lists, data, illustrations. Free for stamp. Send to-day—A.P.S. (P.W.), Sedgeford, King's Lynn.

MIDDLESBROUGH. Largest stocks on N-East coast. Radio, T.V. components, P.M. Kits, Gram Cabinets, Tape Decks, Leak Amplifiers, Valves, etc. Callers only. **PALMERS, 106, Newport Road.** (Phone: 3096.)

OSMOR would like you to have Free Practical Wiring Diagrams of the latest published circuits with full lists of components required. Send 7d. (stamps) to **OSMOR RADIO PRODUCTS LTD., 418, Brighton Rd., Stan. Croydon, (Croydon 5148).** (See advert., page 559.)

THE HIWYMAN. A new super Portable Radio for the home constructor; all-dry 4-valve superhet with Ferrite rod aerial, easy wiring diagrams and instructions, 1/6 (post 3d.). **RADIO EXPERIMENTAL PRODUCTS LTD., 33, Much Park St., Coventry.**

GUARANTEED TELEVISION, 13in. models, first-class picture, 5-channel, £30 each; carriage paid. **THE GRAMOPHONE SHOP, 19-21, Brockley Rise, Forest Hill, S.E.23.**

ENGRAVING. Amateurs and trade surplus can be undertaken by getting in touch with **A. G. ENGRAVING, now at 292, Earlsfield Rd., London, S.W.18.** (BAT 9897.) (Engravers to well-known makers of Electronic Equipment used by the Aircraft Industry, A.W.R.E., etc.)

EX. AIR MINISTRY Identification Units, type RDP No. 1. ZC.13312, all as new. 32/6 each unit; carr. fwd. All steel chassis in steel case, with controls on front panel only, measurements. 11in. x 7in. x 12in., weight 25lbs. Each unit contains many useful components and the following valves: 1 5Z4G, 1 VR54, 1 VR65, 2 VR66, 3 VR92, 1 CV63, and 1 VR137. From: **J. A. B. JACOBSEN LIMITED, 22, Ritherdon Rd., Balham, London, S.W.17.**

B.S.R. Monarch 3-speed Autochange Units, new, in maker's sealed carton, guarantee, complete with instructions, template, suspension springs. £9 15/-; carriage paid; immediate delivery. **TOMLINS, 127, Brockley Rise, Forest Hill, S.E.23.**

TELEVISION, 9in. Models, £6/10/-; 12in. Models, £15; all makes working; carriage paid. **TOMLINS, 127, Brockley Rise, Forest Hill, S.E.23.**

SEVERAL EARLY MODELS 9in. Television, complete and mostly working. £5/5/- each; carriage paid. **TOMLINS, 127, Brockley Rise, Forest Hill, S.E.23.** (FOR 5497.)

CR6, FM/AM with 4w output and AFC £26. BEL, Marlborough Yard, London, N.19. (ARC 5078.)

SEND TO-DAY for our stock list of T.V. and Radio Bargains. C.R.T.s, Valves, Speakers and all Components. We are the cheapest people in the trade. All goods sold by us are guaranteed. **VIDEO ELECTRONICS (LONDON) LTD., Dept. P.W., 16 22, Bacon Street, London, E.1.**

RATES: 5/6 per line or part thereof, average five words to line, minimum 2 lines, Box No. 1 - extra. Advertisements must be prepaid and addressed to Advertisement Manager, "Practical Wireless," Tower House, Southampton St., Strand, London, W.C.2.

ELECTROLYTICS, capacity, voltage, size, type of mounting, price post paid. 1,000 + 1,000. 6v. 1 x 3. clip. 3/3; 1,000 + 2,000. 6v. 1 x 3. 3/9; 100, 12v. 1/2 x 1 1/2, tag, 1/9; 500, 12v. 1/2 x 1 1/2, W/E. 2/-; 2,000, 12v. 1/2 x 2. W.E. 1/6; 10, 25v. 1/2 x 1 1/2, W.E. 1/3; 25, 25v. 1/2 x 1 1/2, W/E. 1/3; 50, 25v. 1/2 x 1 1/2, W.E. 1/9; 100, 25v. 1/2 x 1 1/2, W.E. 2/-; 1,000, 25v. 1/2 x 3, clip. 4/4; 3,000, 25v. 1/2 x 4 1/2, 5/6; 5,000, 25v. 1/2 x 4 1/2, clip. 6/6; 500, 50v. 1 x 3, clip. 3/9; 2,500, 50v. 1 1/2 x 4 1/2, clip. 6/6; 5, 150v. 1 x 1 1/2, W/E. 1/3; 8, 150v. 1 x 1 1/2, tag. 1/3; 40 + 40, 1 x 2, clip. 2/9; 200, 250v. 1 1/2 x 3, clip. 3/6; 100, 275-350v. 1 1/2 x 3, clip. 3/-; 16 + 16, 275v. 1 x 2, clip. 3/-; 32 + 32 + 8, 1 1/2 x 2, clip. 4/3; 16 + 8 + 4, 1 x 2, lug. 3/-; 200 + 250 + 250, 275v. 1 x 4 1/2, clip. 8/6; 60 + 250, 275/350v. 1 1/2 x 4 1/2, clip. 6/3; 16, 4/6; 32 + 350/425v. 1 1/2 x 2, lug. 4/6; 32 + 32 + 8, 350/425v. 1 1/2 x 3, clip. 5/-; 16 + 16, 350v. 1 x 2, clip. 3/6; 32 + 32, 350v. 1 1/2 x 2, clip. 4/-; 2, 350v. 1 x 2, tag. 1/-; 100, 350 425v. 1 1/2 x 3, clip. 4/-; 50 + 50, 350 425v. 1 1/2 x 3, clip. 4/6; 100 + 200, 350v. 1 1/2 x 4 1/2, clip. 7/6; 8, 450v. 1 x 2, clip. 1/9; 20 + 10, 450v. 1 x 3, clip. 4/- + 8 + 8, 500v. 1 1/2 x 2, clip. 4/-; Photoflash Types, 1,000 mf. 200v. 1 1/2 x 4 1/2, clip. 12/6; 1,500 mf. 275v. 2 1/2 x 4 1/2, clip. 19/6; all all cans, some with sleeves, all voltages, wkg. surge where marked, new stock guaranteed.

Television Chassis, cadmium plated steel, size 13 x 13 x 2 1/2in., complete with 13 valveholders (9-B9A Pax. 1-B9A Cer., 2-B7G Cer., 1-Int. Oct. Amph.). 20 various tag strips, cut away for metal rec., line trans., etc. 5/11 each, post paid; front and rear tube mounts to fit above chassis, 3/- pair, post paid. P.M. focus Magnets, wide angle, tetraode tube, fully adjustable, 9/11, post paid. Scanning Coils, wide angle, with mounting lugs. 19/6, post paid. Vision I.F.s (2nd, 3rd and 4th), freq. 34 mc/s, slug tuned, size 13/16 x 13/16 x 2 1/2in. can. set, of 3, 5/6, post paid. Mains Trans. 340-220-0, 220-340v. 220mA. 4v. 6.5A. 4v. 3A. 4v. 1.5A. 2v. 1.5A. 4v. 6.5A. Pri. 0-205-225-245v. 30/-, postage paid. Mains Trans. 250-0-250v. 120mA. 6.3v. 2.5A. 6.3v. 0.6A. Pri. 0-110-125-150-205-225-245v. 17/-, post paid. **RADIO CLEARANCE LIMITED, 27, Tottenham Court Road, London, W.1.** (Telephone: Museum 9188.)

THE CORPORATION OF DUNDEE invite offers for the following discarded police radio equipment which may be seen at Police Headquarters, West Bell Street, Dundee: Second-hand 11.5 volt input Rotary Generators: 9 only 300 volt, 300 m/a output; 8 only 300 volt, 100 m/a output; 3 only 400 volt, 200 m/a output. 8 second-hand G.E.C. contractor boxes with 12 volt relays. Offers marked "Radio Equipment" to be lodged with the Subscriber on or before 1st September, 1956. **ROBERT LYLE, Town Clerk, City Chambers, Dundee.**

LOUDSPEAKERS repaired promptly. **MODEL LOUDSPEAKER SERVICE, Bullington Rd., Oxford.**

HUGE PURCHASE of all types of Condensers, manufacturer's surplus, not ex-Govt., enables us to offer them at extremely low prices. Send for our free list which includes the above and other money saving bargains. Dept. P.W., R.S.T., 211, Streatham Rd., Mitcham, Surrey.

PANL, the air-drying black crackle paint, 3/6 per 1/8lb pt. can. **G. A. MILLER, 8, Kenton Park Cres., Kenton, Middx.**

SPEAKERS, 8/9. 8in. P.M. guaranteed; Std.; 2.5 ohms, bargain offer. Post 1/9. These are genuine, cannot be repeated. Coil Packs, 3/9. 3 x wave band, including pr., 465 I.F.s, 2 gang cond., and dial, similar drawing free. Post 1/9. Metal Rectifiers, 3/9. 250v. 120ma. tested, guaranteed. Post 1/3. O.P. Transformers, 1/3, unrepeatable price; std., 2.5 ohms, post 9d. Line Transformers, 7/6. Ultra, Ferguson type. Not E.H.T. type. Post 1/6. **DUKE & CO., 621, Romford Rd., Manor Park, London, E.12.** (GRA 6677.)

SERVICE SHEETS, T.V. and Radio, over 2,000 models, sale or hire; Valves and Components, S.A.E. with enquiries. **W. J. GILBERT, 24, Prithville Gardens, London, W.12.**

EX. A.M. HIGH TENSION BATTERIES, all perfect and fully guaranteed, 90 x 7 1/4 x 5/6, 150v 2/3, 60 x 1 1/2 2/-. Special offer, large stock to go at: Midget 120v. 2/3 ea., 6 for 11/-, 20/- doz.; 22 1/2v. 4/6 for 10/-, 18/- doz.; 67 1/2v. 4/6 ea., 6 for 20/-, 12 for 30/-; 30v. 1/9 ea., 6 for 8/-, 12 for 14/-; all incl. p. and p. S.A.E. for full list. **DIGGINS, 129, Radnor St., Hulme, Manchester, 15.**

FM, 2 I.F. 10.7 MC/S Transformers and Ratio Det. Transformer, set of three with receiver circuit. 12/6; I.F. Transformers, 465 Kc/s, high Q miniature, 5/6 pair; 5in. P.M. Speakers, 14/6. All goods previously advertised still available; p. and p. extra. Stamp for lists. **OLIVERS, 55, Havelock Road, Torquay.**

SELLING-OUT. Radio Gear. £15. 8, Stocksbank Rd., Mirfield, Yorks.

AMERICAN MAGAZINES, One year's "Audio," 35/-; "High Fidelity," 50/-; Specialists 4/- and 5/- respectively. Full list from **WILLEN LTD., Dept. 40, 9, Drapers' Gardens, London, E.C.2.**

VALVES

WANTED, Valves, EY51, ECL80, KT61, 6U4GT, PL81, 352A, etc., etc., prompt cash. **WM. CARVIS LTD., 103, North Street, Leeds, 7.**

ALL TYPES of Valves required for cash. State quantity and condition. **RADIO FACILITIES LTD., 38, Chalcot Road, N.W.1.** (PRIMROSE 9090.)

FOR SALE

THE NEW AUTOMATIC twin-track, 3-speed Collaro Tape Deck (no amplifier) is available at **PHOTO-OPTIX (LONDON) LTD.** The TAP Recorder Specialists, at 19 gns., 73-75, Praed St., London, W.2. (PAD 2891.)

1,000s of SERVICE SHEETS, sale or hire. Stamp with enquiries. New 60-page Catalogue of Radio and T.V. Spares now in preparation. Demand may exceed supply. Reserve your copy at once! **P. O. M. FOY, 6, Wykebeck Gardens, Leeds, 9.**

SALE, Radio/Television Components, Valves, Equipment, Transformers. Stamp for list. Box No. 277, c/o PRACTICAL WIRELESS.

SUPER-TONIC SUN-RAY LAMPS. Ultra-Violet. Infra-Red. Combined. Superb therapeutic quality, controlled output, automatic exposure. All mains. Listed £7/10/-; our price 60/-, S.A.E. Illustrated brochure, Dept. 14, SCIENTIFIC PRODUCTS, Cleveleys, Lancs.

CAR CIGARETTE LIGHTERS, 6 or 12 volt, 7/6, post free. **WHITSAM ELECTRICAL PRODUCTS, 18, Woodrow Close, Perivale, Middlesex.**

C.W. SMITH & CO
(RADIO) LIMITED
3-34 LISLE STREET, LONDON, W.C.2
TELEPHONE: GERRARD 8204/9155

BENDIX COMMAND RECEIVERS
Brand new and boxed, complete with all valves and circuit. BC453, 190/550 kc/s, 69/6. BC.XXX, 1.5/3 mc/s, 75/-.

COMMAND TRANSMITTERS.
Complete with valves and crystal. 4/5.3 mc/s, 22/6; new and boxed, 29/6; 2-1/3 mc/s, 29/6.

BUZZERS. Brand new and boxed, 3/6 volt operation, 2/6.

AERIAL WIRE. 300ft. reel bare copper aerial wire, 3/6.

CRYSTAL MICROPHONE INSERTS. Ideal for amplifiers, etc., 4/6 each.

AMERICAN ROTARY TRANSFORMERS. Brand new and boxed. Type 1. Input 12 volt D.C. Output 250 volt 80 m/a, 22/6. Type 2. Input 6 volt D.C. Output 250 volt 80 m/a, 22/6.

SLIDER RHEOSTATS. 14 ohm, 1-4 amp, 7/6. 1 ohm 12 amp, 6/6. 1 ohm 12 amp less slider, 4/6.

AR.88 SWITCH ASSEMBLIES. Ceramic wavechange. Brand new and boxed, 17/6 each.

JACK PLUG LEADS. 6ft. screened lead fitted with 2 standard P.O. jack plugs, 3/- each.

GRAM MOTOR BARGAIN. Garrard 200/250 volt A.C. gram motors complete with turntable. Adjustable speed 0-45 r.p.m. Ideal for L.P. records. Only 22/6 each.

MODULATION TRANSFORMERS. Brand new Collins type, 6,000 ohm-6,000 ohm, 20 watt, 12/6 each.

TRANSFORMER BARGAINS

1. Input 230 volt 50 cycle. Output 5, 10, 15, 20, 25 or 30 volt 5 amp, 29/6.
2. Input 230 volt 50 cycle. Output 7, 14, 21 or 25 volt 12 amp, 42/6.

FIELD TELEPHONES. Type Don Mk. 5. Ideal for inter-office or house communication. Supplied complete with all equipment and two 1.5 v. cells ready to operate, 39/6 each.

HEADPHONE ADAPTORS. High to low impedance matching, 1/3 each.

METER SWITCHES. Yaxley type. 1 pole, 12 way, 8 bank, 7/6 each.

TRANSISTOR TRANSFORMERS. Inter stage or output, 20-1, 2/6. Multi ratio, 1-1 to 30-1, 4/6 each.

DEAF AIDS. Brand new chassis complete with 3 sub-miniature valves, crystal mike, tone and volume controls, etc., less only outside bakelite case, 19/6 each. Clip in batteries, 2/9 pr. earpieces, 3/6. Leads, 1/- Spare valves, CK505, 2/6. Spare 1 meg pots w/switch, 1/-.

HOURS OF BUSINESS: 9 a.m.—6 p.m., Thursday, 1 p.m. Open all day Saturday.

Please print name and address clearly and include postage or carriage on all items.

NEW 5th Edition "Wireless World" RADIO VALVE DATA

Characteristics of over 2,500 Valves, Transistors and C.R. Tubes
Price 4/6 Post 6d.

SERVICING RECORD CHANGERS. By Harry Mileaf. 23s. 0d. Postage 1s. 0d.

MAINTAINING HI-FI EQUIPMENT. By J. Marshall. 23s. 0d. Postage 1s. 0d.

THE RADIO AMATEUR'S HANDBOOK. By A.R.R.L. 35s. 0d. Postage 1s. 6d.

HIGH-FIDELITY: THE WHY AND HOW FOR AMATEURS. By G. A. Briggs. 12s. 6d. Postage 9d.

SWEET AND MARKER GENERATORS FOR TELEVISION AND RADIO. By R. G. Middleton. 20s. 0d. Postage 1s. 0d.

TELE-COMMUNICATIONS PRINCIPLES. By R. N. Renton. 45s. 0d. Postage 1s. 6d.

INTERNATIONAL TUBE HANDBOOK (MK Buizen). 15s. 0d Postage 9d.

The MODERN BOOK CO.

BRITAIN'S LARGEST STOCKISTS
of British and American Technical Books
Write or call for our catalogue.

19-23, PRAED ST., LONDON, W.2

Phone: PADdington 4185

Open 6 days 9-6 p.m.

YOU WILL NEVER SEE PRICES LIKE THESE AGAIN!

Offered at give away prices to clear before closing our surplus goods dept.

BRAND NEW VALVES (Mostly U.S.A.) Maker's cartons. 6SK7, 6SH7 (R.F. pentodes), 2/9, 6KX4 (Output), similar to 6V6), 3/9. **Platino cutouts:** 80 (5 v. rectifier, 125 mA at 350 v.), 4/9. **PR31, 12/6 (Dble. diodes), 1/-.** **SPECIAL OFFER:** 6 valves as above for 18/9 (1/6 post, etc.).

NEW SURPLUS MICAS. Wire-ended, 7.5, 2,000, 5,000 p.f. One doz. each value for 3/9 (post 9d.).

ELECTROLYTICS. 40 mfd 250 v., 2/9. 32, 32 mfd, 350 v., 4/6. 32, 16 mfd, 350 v., 3/9.

NEW CARBON RESISTORS. Assortment of 20 different 1 watt, 2/9. 12 different 2 watt and 3 watt, 2/9. Both selections post 6d.

ROTARY SWITCHES. 250 v., 15 a. double pole. Attractive knob with chrome insert, 1/6.

VALUE FOR MONEY STOCK LINES.

500 v. WIRE-ENDED CERAMICS. At the lowest prices on the market for current manufacturing. 1, 2, 3, 4, 7, 7.5, 10, 15, 22, 27, 33, 39, 47, 56, 75, 100, 150, 200, 270, 330, 390, 470, 1,000, 2,000, 3,000 p.f., 8d. 7/6 doz. 5,000, 10,000 p.f., 10d. 9/6 doz.

WIRE WOUND RESISTORS (silicone coated), 25, 50, 100, 150, 200, 250, 300, 350, 1,000, 1.5K, 2K, 2.5K, 3.5K, 5K, 6.5K, 10K, 5 w., 1/3; 10 w., 1/6; 15 w., 1/9; 15K, 1.5K, 20K, 25K, 35K, 5 w., 1/9; 10 w., 2/3; 47K, 5 w., 2/8; 10 w., 2/6.

EXPANDED POLYTHENE COAX. Latest type, outside for Band 1 or 11, 9d. yd.

COAX FITTINGS. Phono, Mate 1/3; Female, 2/-; Socket, 1/6; Coupler, (Dble. socket), 1/6; Line connector (permanent join), 1/3; Outlet Box, 4/6.

LATEST "GEN" BOOKS

PRACTICAL TRANSISTORS & TRANSISTOR CIRCUITS. Build these new circuits now using 1000 new home made transistors, 3/6. Post 8d.

HOME-MADE AERIALS FOR TV AND F.M. 10 designs and variable data, 2/6. Post 3d.

RADIO-CONTROLLED MODELS FOR AMATEURS. Theory and construction, various systems, both simple and advanced designs, 5/-. Post 4d.

PRACTICAL F.M.: F.M. fully explained with 104 circuits for home construction, 5/-. Post 4d.

VALVE EQUIVALENTS. (Genuinely at-scales), 5/- (Mail order only)

SEND FOR FULL CATALOGUE LIST 3d. Please allow post & packing on orders under 22.

REED & FORD 39, BURNLEY RD., INSDALE, SOUTHPORT.

WHAT is a "COMMUNICATIONS" RECEIVER?

This description is often loosely applied to various forms of short-wave sets, and the "Communications" Receiver is certainly primarily concerned with short waves, BUT truly to merit the title, the "Communications" Receiver must be a good deal more than just a short-waver. ITS specifications must cover

- High Sensitivity—
- Selectivity—
- Accurate Dial Calibration
- Easy, Effortless Tuning—
- Morse or Telephony—
- Plus Utmost Reliability and Consistency of Reception.

THE EDDYSTONE "840A"

IS A TRUE "Communications" Receiver designed and built to fulfil the exacting requirements of the professional and the discerning amateur who must have

**CONSISTENT
WORLD-WIDE
RECEPTION**

THE
EDDYSTONE "840A"
COSTS £55.0.0, and is available from stock at WEBB'S RADIO

Fully detailed brochure post free on request.



14 SOHO ST., OXFORD ST., LONDON, W.1
Telephone: GERRARD 2089.

Shop Hours: Mon., Tues., Wed. and Fri. 9 a.m.-5.30 p.m. Thursday, 9 a.m. to 7 p.m. Saturday, 9 a.m. to 1 p.m.

ADCOLA

REGISTERED TRADE MARK
(Regd. Trade Mark)

SOLDERING EQUIPMENT

ILLUSTRATED

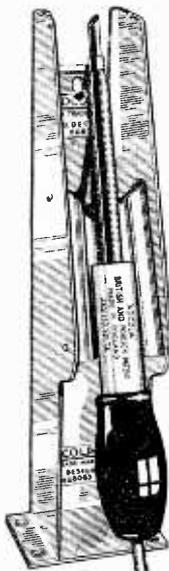
$\frac{3}{16}$ " Detachable bit type (List No. 64)

Protective Shield (List No. 68)

Catalogues sent FREE

Telephones:

MACaulay 4272 & 3101



British and Foreign Pats.

Reg. Designs, etc.

Head Office, Sales:

ADCOLA PRODUCTS LTD.

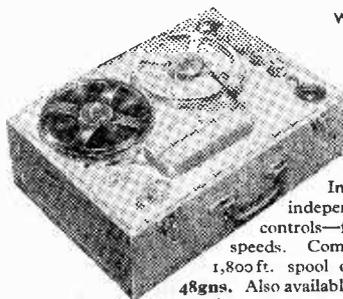
Gauden Road, Clapham High St., London, S.W.4

Three hours'

RECORDING & PLAYBACK with the

EDITOR

TAPE RECORDERS



Increased sensitivity — independent Bass and Treble controls—fully automatic—two speeds. Complete with mic. and 1,800ft. spool of Long Play Tape, 48gns. Also available Editor Super Hi-Fi, with additional roin. speaker in lid, 62 gns.

THE M.O.S. PERSONAL CREDIT PLAN

Used by all discerning and careful buyers, the M.O.S. Personal Credit Plan provides easy repayment terms coupled with low service charges. For example, you can buy the above tape recorder in this way, the deposit being 50%. Please let us know your requirement and we will quote details by return. Send your deposit with your order, allowing sufficient for carriage and packing extra, in order to secure your needs. Please specify over what period (up to a maximum of 18 months) you wish to repay and the necessary forms will be sent to you immediately. CREDIT SALE TERMS are also available if you prefer these. Repayment by 9 equal monthly instalments. Send for details.

M.O.S. Personal Credit Plan facilities are available on all equipment sold by us.

E. & G. MAIL ORDER SUPPLY CO. The Radio Centre, MUSEUM 6667.
33, Tottenham Court Road, London, W.1.

A Selection of fine Bargains at The Walk-around Shop

Command Receivers. BC-453-B, 190-500 Kc/s., £2/17/6 each; BC-454-B, 3-6 Mc/s., £1/5/- each; BC-455-B, 6-9.1 Mc/s., £1/5/- each. Fully valved, less dynamotors (not new). Plus 3/- p.p.

Command Transmitters. BC-458-A, 5.3-7 Mc/s., BC-459-A, 7-9.1 Mc/s., £2 each. Fully valved, less dynamotors (not new). Plus 3/- p.p.

AN/APNI TRANSDUCER. This unit consists of Magnet and Coil which is attached to an aluminum diaphragm suspended freely and air perforated to prevent air damping. Mounted on a ceramic cover which sits over the diaphragm is a form of 2-gang capacitor which has a swing from 10-50 pF. The above unit is used as part of Wobblulator described on page 252 of the June Wireless World. Price 7/6, post paid.

I.F. Amplifier Unic. 460 Kc/s. with IT4 Brand New and Boxed. Fully screened in plug in Box. Size 2½" x 1" x 4½". Price 10/- ea. with circuit. Plus 1/- p.p.

R.F. Units. R.F.24 20-30 Mc/s, switched tuning, valved, 9/6 ea.; R.F.25 40-50 Mc/s, switched tuning, valved, 9/6 ea. Packing and postage 3/- ea

Vibrator Packs (Mallory). 12V input 150V 40 mA, size 5½" x 5½" x 3", 17/6 each; 12V input 275V 80mA, size 5½" x 5½" x 3", 25/- each; 6V input 275V 80mA, size 4½" x 6" x 4½" with harness, 35/- each. All plus 2/6 p.p.

Miniature I.F. Strips. Size 10½" x 2½" x 3" frequency 9.72 Mc/s. Line-up: 2 EF92's and 1 EF.91 I.F. Amps. EB.91 DET/AGC., EF.91 AGC Amp. and EF.91 limiter. Circuit supplied. Price, less valves, 8/- each, post paid.

Make a Miniature Pocket Radio. Incorporating high "Q" technique using the new Ferrite rod. Made possible by simple conversion of an ex-Govt. hearing aid, £24.00, post paid, with circuit diagram, kit of components and full instructions. Batteries er-ra: 1.5V l.t. (type D18), 8d.; 30V h.t. (type B119), 4/3.

NOTE: ORDERS AND ENQUIRIES TO DEPT. 'P'

PROOPS BROS. LTD. Telephone LANgham 0141
52 Tottenham Court Road, London, W.1.
Shop Hours: 9-6 p.m. Thursday: 9-1 p.m. Open all day Saturdays

S. & R. ELECTRONIC PRODUCTS LTD.

"MULLARD" 3 WATT AMPLIFIER. A very low distortion of only 1½%. High efficiency 3 ohms output Transformer. Wired and tested at £5.5.0. De luxe Model £6.6.0.

"MULLARD" 10 WATT AMPLIFIER at competitive price now being completed. Write for details as below.
S. & R. 3½ WATT AMPLIFIER. Similar to 3 watt amplifier but with twin triode mixer preamp stage allowing mixing of inputs, each separately controlled. Negative feedback. High efficiency output transformer for 3 ohms speaker. Separate variable tone control. Wired and tested at £5.5.0. Wonderful value.

S. & R. 8.9 WATT PUSH PULL AMPLIFIER. Twin input for records or F.M. unit. Switched and compensated for long playing and standard records. Large type S. & R. output transformer of very high efficiency. 2 twin triodes plus 2 latest all glass output pentodes and heavy negative feed back. Completely wired and concert tested. £15.15.0.

"QUALITAPE" 2 SPEED RECORDING TAPE DECK. All metal. No push buttons. Mechanical brakes. No belt drives or clutches. Switch controlled speed change from top of deck plate. Price £17.17.0.

300 V.H.T. POWER PACK. 6.3 volts. 2½ amps C.T.Lt complete with rectifier valve. - 60 mills. Price £3.10.0

Demonstrations given at Works on request.

NO EX W.D. VALVES USED.

These fine electronic products are detailed in our new illustrated list. Write for copy, enclosing 3d. postage stamp.

Sole manufacturers:—

S. & R. ELECTRONIC PRODUCTS LIMITED
15 OTLEY ROAD, BRADFORD 3, YORKSHIRE. Tel.: Bradford 31782

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 "Rapid" 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*
The P.W. 3-speed Autogram (2 sheets), 7s. 6d.*	
The P.W. Monophonic Electronic Organ (2 sheets), 7s. 6d.	

TELEVISION

The "Argus" (6in. C.R. Tube) 2 6*	
The "Super-Visor" (3 sheets), 7 6*	
The "Simplex" 3 -*	
The P.T. Band III Converter 1 -*	

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 utilize old components which they may have in their spares 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.B.C. Special One-valver	AW387*

Mains Operated

Two-valve : 2s. each.	
Consocietric Two (D, Pen), A.C.	AW403

SPECIAL NOTE

THESE blueprints are drawn full size. The issues containing descriptions of these sets are now 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 Amateur 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, 1956 and must accompany all queries, sent in accord with the notice on our "Open to Discussion" page. PRACTICAL WIRELESS, Oct. 1956.

2 'musts' for the home constructor

Two highly informative publications



◀ THE G.E.C. 'nine-one-two PLUS'

This publication contains step-by-step wiring instructions for this high quality Amplifier together with many additional features of exceptional interest to the Home Constructor.

PRICE **4/-** from your dealer or by post — 5d. extra — from the G.E.C. Valve and Electronics Dept.

◀ THE "FM PLUS" TUNER

The "FM PLUS" Tuner is ideal for use with the 'nine-one-two PLUS' Amplifier and the publication gives constructional details and suggested circuits for inter-station noise suppression and a "magic eye" tuning indicator.

PRICE **2/6** from your dealer or by post — 5d. extra — from the G.E.C. Valve and Electronics Dept.

THE GENERAL ELECTRIC CO. LTD. MAGNET HOUSE KINGSWAY LONDON W.C.2

Trace the Trouble in a Trice



PIFCO
ALL-IN-ONE
RADIOMETER

- ★ Circuit Test
- ★ L.T. & H.T. Tests
- ★ mA Test
- ★ Valve Test

Use the PIFCO All-in-One Radiometer for the practical testing of all types of radio and electrical apparatus. You can carry out continuity and resistance tests, check H.T., L.T., and G.B. voltages, also Household Appliances, Car Lighting Systems, Bell Circuits, etc. May be used on A.C. or D.C. mains.

Obtainable from your local dealers.
Write for informative folder to:—

PIFCO LTD., WATLING ST., MANCHESTER 4
and 36-37, UPPER THAMES ST., LONDON, E.C.4

ONLY **32/6**
COMPLETE

MAKE SOUND JOINTS SIMPLY BY USING Multicore

ERSIN MULTICORE

Contains 5 cores of extra-active, non-corrosive Ersin Flux. Prevents oxidation and cleans surface oxides.

SIZE 1 CARTON
5/-

HANDYMAN'S
CARTON
Suitable for 200
average joints. **6d.**



Wherever precision soldering is essential, manufacturers, engineers and handymen rely on MULTICORE. There's a MULTICORE SOLDER just made for the job you have in hand. Here are some of them.

ARAX MULTICORE

FOR METAL FABRICATION

(Not wire-to-tag joints)
Contains 2 cores of Arax flux. Flux residue is easily removed with water.

SIZE 8 CARTON
5/-

Handymans Carton 6d.



HOME CONSTRUCTORS 2/8 PACK

In addition to the well-known Home Constructors Pack (containing 19ft. of 18 s.w.g. 60/40 alloy) a similar pack is now available containing 40ft. of 22 s.w.g. 60/40 alloy especially suitable for printed circuits.



BIB WIRE STRIPPER AND CUTTER

Strips insulation without nicking wire, cuts wire cleanly, splits extruded flex 3/6 each



MULTICORE SOLDERS LTD.,

MULTICORE WORKS, HEMEL HEMPSTEAD, HERTS. (BOXMOOR 3635)