

CONVERTING THE 'COMMAND' RECEIVER

PRACTICAL ^{1/3}

NOVEMBER
1957

EDITOR: F.J. CAMM

WIRELESS



Contents

A BEGINNER'S CONSTRUCTIONAL
COURSE

TRANSISTORS IN PRACTICE

AUTOMATIC FREQUENCY CORRECTION

Etc. Etc. Etc.

DO IT YOURSELF—IT'S SO EASY!

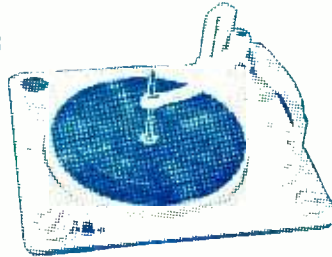


47/6

Build this exceptionally sensitive double 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 6in. x 5in. x 3in. Covers all Medium and Long waves—uses only one all-dry battery. H.T. consumption only 1 to 1.5 mA. Uses personal phone. Ideal for Bedroom, Garden, Holiday, 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. BUILD THE "SKYPOCKET" NOW!* Total building cost—everything down to last nut and bolt—47/6 (Postage, etc., 2/-) with full set of clear, easy-to-follow plans. (Parts sold separately. Priced Parts Lists, etc., 1/6.)

BRAND NEW CHANGERS £9-8-6!



LIMITED QUANTITY ONLY! In maker's sealed cartons. List price £13.17.0. The famous "Collaro" 4-speed autochange unit, Model 456. Incorporates Studio "O" high-fidelity turn-over crystal pick-up, the new manual and fully automatic control on all four speeds. Constant speed change cycle on all records. Designed so that there is a gentle lowering of the stack of the records on to the step of the spindle to avoid damage and wear to the centre holes of records. Size only 12in. x 13in., clearance required above base-board only 5in., clearance below only 2 1/2in. **RUSH YOUR ORDER NOW!** ONLY £9-8-6. plus 4/6 Post and Packing.

LOOK!



BUILD THIS POCKET RADIO FOR ONLY 37/6

AT LAST! In response to many requests we now present the **DOUBLE TRIODE "SKYPOCKET,"** a beautifully designed precision **POCKET RADIO.** No radio knowledge needed—**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. Covers all medium waves 200 to 550 Metres. Size only 5 1/2in. x 3in. x 2in. in Strong, Transparent case with panel, cover and ivoryine dial. A really personal-phone, pocket-radio. WITH **DETACHABLE ROD AERIAL.** Self-contained all-dry battery operation. Average building time 1 hour. **Total Building Cost—including Case, Double Triode Valves, etc., in fact, everything down to the last nut and bolt—ONLY 37/6 with plans.** Postage, etc., 2/-, C.O.D. 1/6 extra. (Parts sold separately. Priced Parts List, etc., 1/6.) Demand is certain to be heavy—**SO SEND TO-DAY!**

Build This TRANSISTOR POCKET SET For Only 47/6!



ONLY £8-12-6

BRAND NEW—NOT SURPLUS! In maker's sealed cartons. Latest UAR "Monarch" 4-speed record-player complete with High-fidelity turnover head. Type HGP 37—capacity of 10 Records, plays 12in., 10in. and 7in. intermixed in any order. 78, 45, 33 and 16 r.p.m. For A.C. mains 100 to 250 volts. Exclusive magnetic selector gives quietest and quietest change ever. With full instructions and fixing plans. **Limited Quantity at £8-12-6, plus 4/6 Post, Packing, etc. WHY PAY MORE! SEND NOW WHILE STOCKS LAST!** —modernise your radiogram and increase its value

WE'VE DONE IT AGAIN! Our design department in response to a great many requests have designed this **"SKYPOCKET" VEST-POCKET TRANSISTOR RADIO** which gives a good performance. Size only 4in. x 3in. x 1in., the weight under 7 ozs.—yet it is a **TWO-STAGE** receiver covering all medium waves, working entirely off a tiny "pen-light" battery, which costs 6d.—fits inside the case—and lasts many months. Uses personal phone and has push-button **LUMINOUS** On/Off Switch. Every part tested before despatch! **SPECIAL STEP-BY-STEP PLANS FOR ABSOLUTE BEGINNERS.** Total building cost including case, transistors, etc.—everything down to the last nut and bolt—**ONLY 47/6 with plans.** Postage, etc., 2/-, C.O.D. 1/6 extra. (Parts sold separately. Priced parts list, etc., 1/6.) As the building cost is absolutely rockbottom (it might increase later) **DEMAND WILL BE VERY HEAVY—VERY SIMPLE TO BUILD!**



FEW ONLY AT 95/-!

NEW in maker's sealed cartons!—limited quantity of the famous 3-speed record player units, exceptionally easy to fix, with lightweight pick-up, incorporating "Acos" crystal turnover head and separate sapphire stylus for Standard and Long-Playing. With full instructions and fixing plans **Unbeatable price 95/-**, plus 3/6 Post, Packing, etc. C.O.D. 2/- extra. **RUSH YOUR ORDER NOW—BEFORE IT'S TOO LATE!**

BUILD THIS TRANSISTOR SET FOR ONLY 35/-
VERY SPECIAL OFFER WHILE STOCK OF PARTS LASTS!—The "Sky-Scout" Pocket, two-stage transistor set, size only 4in. x 3 1/2in. x 4 1/2in. Covers all medium waves and works entirely off tiny "pen-light" battery which costs 6d. and fits inside case. All parts tested before despatch. Can be built for 35/- plus 2/- post and packing, including Case, Transistor, **STEP-BY-STEP PLANS FOR ABSOLUTE BEGINNERS,** nuts, bolts, etc. (C.O.D. 1/6 extra.) Parts sold separately, priced parts list, etc., 1/6 **VERY SIMPLE TO BUILD.**

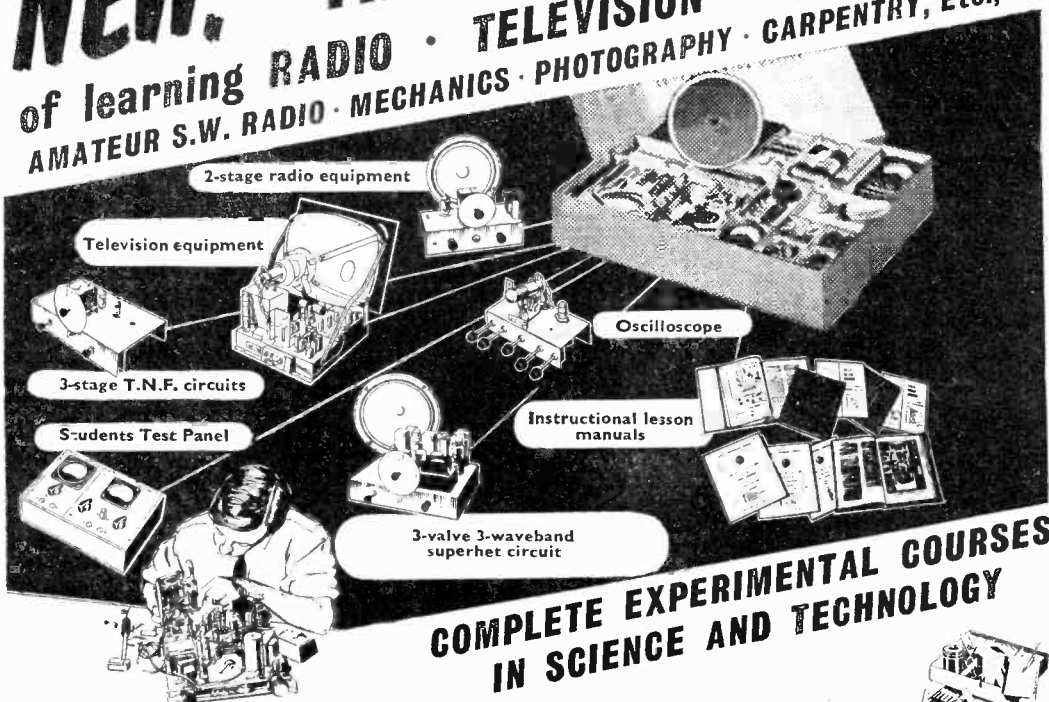
CONCORD ELECTRONICS

69, PRESTON STREET, BRIGHTON. Dept. PWO

Orders receive prompt attention. Cheques accepted. Cash on delivery 1/6 extra. Please print name and address in block letters. Component suppliers to Schools, Universities, Government Research Establishments. Complete range of components stocked. **CALLERS WELCOME.** Shop Hours: 9 a.m. to 6 p.m. (1 p.m. Thursday). Regret no Goods sent abroad.

NEW! THE PRACTICAL WAY

of learning **RADIO · TELEVISION · ELECTRONICS**
AMATEUR S.W. RADIO · MECHANICS · PHOTOGRAPHY · CARPENTRY, Etc., Etc.



COMPLETE EXPERIMENTAL COURSES IN SCIENCE AND TECHNOLOGY

NEW... Completely up-to-date method of giving instruction in a wide range of technical subjects specially designed and arranged for self-study at home under the skilled guidance of our teachers.

NEW... Experimental outfits and lesson manuals sent on enrolment remain the student's property. Tutor allotted to each student for personal and individual tuition throughout the course. Radio and television courses, with which specially prepared components are supplied, teach the basic electronic circuits (amplifiers, oscillators, detectors, etc.) and lead, by easy stages, to the complete design and servicing of modern radio and T.V. receivers. If you are studying for an examination, wanting a new hobby, commencing a career in industry or running your own part-time business, these practical courses are ideal and may be yours for moderate cost. Fill in the coupon to-day for a free Brochure. There is no obligation whatsoever.

The only Home Study
College run by
a world-wide
Industrial
organisation



E.M.I.
Factories
at Hayes,
England

EMI INSTITUTES

- Part of "His Master's Voice", Marconiophone, etc., etc.

SUBJECTS

INCLUDE:—

- RADIO · SHORT WAVE RADIO**
- TELEVISION · MECHANICS · CHEMISTRY**
- PHOTOGRAPHY · ELECTRICITY · CARPENTRY**
- ELECTRICAL WIRING · DRAUGHTSMANSHIP**
- ART, ETC.**



COURSES FROM
15/- PER MONTH

FILL IN COUPON
FOR
FREE
PROSPECTUS



E.M.I. INSTITUTES, DEPT. 32X,
LONDON, W. 4

NAME AGE) BLOCK
(If under 21)) CAPS
ADDRESS) PLEASE

I am interested in the following subject(s) with/without equipment

NOV. 57 (We shall not worry you with personal visits)

1C.83

R.S.C. BATTERY CHARGING EQUIPMENT

ASSEMBLED CHARGERS
 6 v. 1 amp. 19/9
 6 v. or 12 v. 1 amp. 27/9
 6 v. 2 amps. 29/9
 6 v. or 12 v. 2 amps. 38/9
 6 v. or 12 v. 4 amps. 59/9
 Above ready for use. Carr. 3/6. With mains and output leads.

SELENIUM RECTIFIERS
 6/12 v. 1 a. 4/11 **L.T. Types H.W.**
 6/12 v. 2 a. 8/9 6-12 v. 1a. H.W. 2/9
 6/12 v. 3 a. 11/9 **H.T. Types H.W.**
 6/12 v. 4 a. 14/9 150 v. 40 mA. 3/9
 6/12 v. 6 a. 19/9 250 v. 50 mA. 5/9
 6/12 v. 10 a. 25/9 250 v. 80 mA. 7/9
 6/12 v. 15 a. 35/9 250 v. 150 mA. 9/9
 6/12 v. 20 a. 35/9 250 v. 250 mA. 11/9

BATTERY CHARGER KITS
 Consisting of Mains Transformer, F.W. Bridge, Metal Rectifier, well ventilated steel case. Fuses, Fuse-holders, Grommets, panels and circuit. Carr. 2/9 extra.
 6 v. or 12 v. 1 amp. 22/9
 6 v. or 12 v. 2 amps. 25/9
 6 v. or 12 v. 4 amps. 31/9
 6 v. or 12 v. 4 amps. 53/9

BATTERY CHARGER KIT
 Consisting of F.W. Bridge Rectifier, 6/12 v. 5 a. Mains Trans., 0-9-15 v. 6 a. output and Ammeter, 49/9. Post 3/-.

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 Carr. 3/6. **47/9**

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 rate selector. Also selector plug for 6 v. or 12 v. charging. Double fused. Louvred steel case with stoved blue hammer finish. **75/-**

Ready for use with mains and output leads. Carr. 3/6.

R.S.C. MAINS TRANSFORMERS (FULLY GUARANTEED)

Interleaved and Impregnated. Primaries 200-230-250 v. 50 c/s. Screened. **TOP SHROUDED DROP THROUGH**
 250-0-250 v. 70 mA. 6.3 v. 2 a. 5 v. 2 a. 18/9
 350-0-350 v. 80 mA. 6.3 v. 2 a. 5 v. 2 a. 18/9
 250-0-250 v. 100 mA. 6.3 v. 4 a. 5 v. 3 a. 22/9
 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 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
 250-0-250 v. 60 mA. 6.3 v. 2 a. 5 v. 2 a. Midjet type 21-3-3in. 17/6
 350-0-350 v. 70 mA. 6.3 v. 2 a. 5 v. 2 a. 19/9
 250-0-250 v. 100 mA. 6.3 v. 4 a. 5 v. 4 a. C.T. 0-4-5 v. 3 a. 26/9
 250-0-250 v. 100 mA. 6.3 v. 6 a. 5 v. 3 a. for R1355 conversion 31/-
 300-0-300 v. 100 mA. 6.3 v. 4 a. 5 v. 3 a. 23/9
 300-0-300 v. 100 mA. 6.3 v. 4 v. 4 a. C.T. 0-4-5 v. 3 a. 26/9
 350-0-350 v. 100 mA. 6.3 v. 4 a. 5 v. 3 a. 23/9
 350-0-350 v. 100 mA. 6.3 v. 4 v. 4 a. C.T. 0-4-5 v. 3 a. 27/9
 300-0-300 v. 130 mA. 6.3 v. 4 a. 6.3 v. 1 a. for Mullard 510 Amplifier 35/9
 350-0-350 v. 150 mA. 6.3 v. 4 a. 5 v. 3 a. 33/9
 350-0-350 v. 150 mA. 6.3 v. 2 a. 6.3 v. 2 a. 5 v. 3 a. 35/9
 425-0-425 v. 200 mA. 6.3 v. 4 a. C.T. 6.3 v. 4 a. C.T., 5 v. 3 a. Suitable Williamson Amplifier, etc. 49/9
 450-0-450 v. 250 mA. 6.3 v. 6 a. 6.3 v. 6 a. 5 v. 3 a. 69/9

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; 1.2 v. 1 a. 7/11; 6.3 v. 3 a. 8/11; 6.3 v. 6 a. 17/6; 12 v. 3 a. or 24 v. 1.5 a. 17/6.

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 2 v. accumulator. Price with louvred metal case and circuit, 29/6, or ready for use, 8/9 extra.

ELIMINATOR TRANSFORMERS
 Primaries 200-250 v. 50 c/s
 120 v. 40 mA, 5-0-5 v. 1 a. 15/9
 90 v. 15 mA, 4-0-4 v. 500 mA 9/9

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; 0-9-15 v. 5 a. 19/9;
 0-9-15 v. 6 a. 23/9.

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

OUTPUT TRANSFORMERS
 Midget Battery Pentode 66L1 for 3S4, etc. 3/9
 Small Pentode, 5,000 Ω to 3 Ω 3/9
 Small Pentode, 7,8,000 Ω to 3 Ω 3/9
 Standard Pentode, 5,000 Ω to 3 Ω 4/9
 Standard Pentode, 7,8,000 Ω to 3 Ω 4/9
 10,000 Ω to 3 Ω 4/9
 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 18/9
 Push-Pull EL84 to 3 Ω or 15 Ω 22/9
 Push-Pull 15-18 watts, 6L5, KT66 25/9
 Push-Pull 20 watts, sectionally wound 6L6, KT66, etc., to 3 or 15 Ω 47/9

SMALL MAINS TRANSFORMERS
 21-3-2in. approx. Primary 200-250 v. 50 c/s. 250-0-250 v. 70 mA. 6.3 v. 2.5 a. Store soiled but unused, guaranteed, 11/9.

SPECIAL OFFERS: Electrolytics. 32-32 mfd. 250 v. Dubilier small can, 2/9 ea. 150 mfd. 450 v., 3/9. Small .0005 mfd. 2-rang. 4/9 ea. Westinghouse Rectifiers 250 v. 250 mA. 7/9. **CO-AXIAL CABLE.** 75 ohm. 1in. 8d. yd. Twin-Screened Feeder 11d. yd.

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
 120 mA, 12 H 100 ohms 9/9
 100 mA, 5 H 100 ohms 3/11

EX-GOVT. E.H.T. SMOOTHING CONDENSERS. .02 mfd. 5,000 v. Cans, 2/9; 1 mfd. 2,500 v. Bakelite Tubulars, 3/3.

THE SKYFOUR T.R.F. RECEIVER. A design of a 3-valve Long and Medium wave 230-250 v. A.C. Mains receiver with selenium rectifier. It consists of a variable-Mu high-gain H.F. stage followed by a low distortion audio bend detector. Power pentode output is used. Valve line-up being 6KT, SP61, 6V6G. Selectivity and quality are well up to standard, and simplicity of construction is a special feature. Point-to-point wiring diagrams, instructions and parts lists, 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 6 1/2 x 5 1/2 in.

EX-GOVT. DOUBLE WOUND STEP UP/STEP DOWN TRANSFORMERS. 10-0-100-200-230-240 v. to 5-0-75-115-135 v. or REVERSE. 30-100 watts. Only 11/9, plus 2/9 post. 10-0-100-200-230-240 v. to 8-0-110-122-136-148 v. or REVERSE. 200 watts, 35/9, plus 7/6 carr. Both for 50 c.p.s.

EX. GOV. MAINS TRANSFORMER. Primary 0-110-120-200-210-220-230-240-250 v. 50 c.p.s. Secs. 275-0-275 v. 100 mA, 6.3 v., 7a. 5 v. 3 a. Only 18/9.

EX-GOVT. CASES. Size 14-10-8 1/2 in. High. Well ventilated, black crackle finished, undrilled cover. IDEAL FOR BATTERY, CHARGER OR INSTRUMENT CASE. OR COVER COULD BE USED FOR AMPLIFIER. Only 9/9, plus 2/9 post. Size 8 1/2 x 3 1/2 x 6 1/2 in. with undrilled well ventilated cover, finished in stoved grey enamel. Suitable for charger or instrument case, 7/9, plus 2/9 post.

EX-GOVT. VALVES (NEW)

174	7/9	EP39	5/9	EF30	7/9
185	9/9	6V6G	7/9	EB91	8/9
384	8/9	6X4	8/9	EF36	4/9
5Y3G	8/9	6X5GT	7/9	EL32	3/9
5Y4G	8/9	6L6G	11/9	EL91	5/9
5Z4G	8/9	807	7/9	KT4	8/9
6BE6	9/9	12A6	9/9	EZ90	8/9
6SJ6GT	8/9	152D	4/9	EL84	10/6
6SLGT	8/9	35Z4GT	9/9	EP	2/9
6SN7GT	8/9	MH4	4/9	SP61	2/9
6AT6	7/9	EC33	9/9	35Z4	8/9

ELECTROLYTICS (current production) NOT EX-GOVT.

Tubular Types		Can Types	
8µF 450 v.	1/9	16 mfd. 350 v.	1.11
8 mfd. 500 v.	2/6	16 mfd. 500 v.	2/9
16µF 350 v.	2/3	16µF 450 v.	2/9
16µF 450 v.	2/9	32µF 350 v.	2.11
16µF 500 v.	3/9	32 mfd. 450 v.	3/9
32µF 350 v.	3/9	100 mfd. 450 v.	4/9
20µF 25 v.	1/3	8-8µF 450 v.	2/9
30µF 12 v.	1/3	2-16µF 450 v.	3.11
50 mfd. 25 v.	1/6	16-16µF 450 v.	3.11
50µF 50 v.	1/9	32-32µF 350 v.	3/9
100 mfd. 12 v.	1/9	32-32µF 450 v.	5/9
100 mfd. 25 v.	2/3	100-100 mfd. 350v. 4.9	
1 500 mfd. 6 v. 1/6		64-120 mfd. 350v. 7.9	
3 000 mfd. 8 v. 3/9		100-200 mfd.	
6 000 mfd. 8 v. 8/9		.....	6/9

Many others in stock.

HEADPHONES. Brand new. Low resistance, 8/9 pr. High Resistance, 15/9 pr.

R.S.C. BATTERY TO MAINS CONVERSION UNITS

Type BM1. An all-dry battery eliminator. Size 5 1/2 x 4 1/2 x 2 1/2 in. 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 receivers requiring 1.4 v. and 90 v. This includes latest low consumption types. Complete kit with diagrams, 39/9, or ready to use, 46/9.



Type BM2. Size 8 x 5 1/2 x 2 1/2 in. Supplies 120 v. 90 v. and 60 v., 40 mA. and 2 v. 0.4 a to 1 amp. fully smoothed. Thereby replacing both H.T. batteries and L.T. 2 v. accumulators. When connected to A.C. mains supply 200-250 v. 50 c/s.

JUNCTION TRANSISTORS. Red Spot Audio Type only 7/6 each. R.F. Type, 17/6.

VOLUME CONTROLS with long (1in. diam.) spindle, all values less switch, 2/9; with S.P. switch, 3/9; with D.P. switch, 4/6.

T.V. CABINETS. Leading manufacturer's surplus. Attractive designs. Walnut veneered with doors, for 15, 10 or 17in. Tube, £3.19/6. Carr. 7/6.

MINIATURE MOTORS. 24 28 v. D.C. or A.C. made by Hoover Ltd., Canada. Size only 2 1/2 x 1 1/2 in. Spindle 1 1/2 in. long, 1in. diam. Brand New, 9/9.

VERS normally using 2 v. accumulator. Complete kit of parts with diagrams and instructions, 49/9, or ready for use, 59/6.

EXTENSION SPEAKERS

Ready for use in walnut veneered cabinet.
 8in. 2-3 ohms, 35/9.
 Very limited number

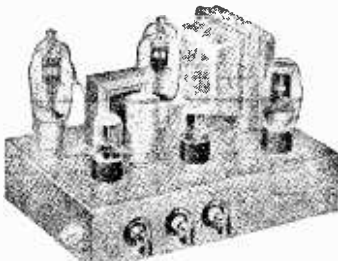


EX-GOVT. METAL BLOCK (PAPER) CONDENSERS
 4 mfd. 500 v., 2/9; 4 mfd. 1,000 v., 4/9;
 8 mfd. 500 v., 4/9; 10 mfd. 500 v., 3/9.

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

High-Fidelity Push Pull Amplifier with Built-in Tune Control, Pre-amp stages, High sensitivity. Includes 5 valves (307 tubes). 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 30-30,000 c/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" x 7". For A.C. mains 200-230-250 v. 50 c/c.s. Outputs for 3 and 15 ohm speakers. Kit is complete to last nut. 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



carrying handles can be supplied for 17/8. Additional input socket with associate 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. Guaranteed 12 months. TERMS on assembled two input model: DEPOSIT 25/6 and nine monthly payments 23/4. HIGH-FIDELITY MICROPHONES and SPEAKERS in stock. Keep cash prices or Credit Sale terms if supplied with amplifier.

If required louvred metal cover with 2

COLLARO RC54 3-SPEED AUTO-CHANGERS Studio Pick-up, Brand New. For 110 v. 50 c.p.s. A.C. mains. Price with 110 v. to 200-250 v. Auto Trans. only 7 Gns. Carr. 5/6.

COLLARO RC457 4-SPEED AUTO-CHANGERS with high fidelity Studio Pick-up. Latest model. Brand new, Cartoned. For 200-250 v. 50 c.p.s. A.C. mains. Our price £9/19/6, carr. 5/6.

163 MINATURE 3-WATT GRAM AMPLIFIER. For use with above or any other single or auto-change units. Output for 2-3 ohm speaker. For 200-250 v. 50 c.p.s. A.C. mains. Overall size 6 1/4 x 4 1/2 x 2 1/2 in. Controls: Vol. and Tone with switch. Guaranteed 12 months. Only 49/9.

PORTABLE CABINETS. Exceptionally attractive appearance. Size inside 17 1/2 x 12 1/2 x 8 1/2 in. Will take above amplifier and any modern 3 or 4 speed auto-change or single player. 59/6. Carr. 3/6.

SPECIAL OFFER. Cabinet, Amplifier, 6 1/2 in. speaker, and RC457. 14 Gns. Carr. 10/-.

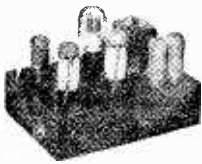
SUPERHETERODYNE UNIT. Design of a high quality Radio Tuner Unit (specially suitable for use with any of our Amplifiers). Delayed A.V.C. employed. The W.Ch. Sw. incorporates Gram position. Controls are Tuning, W.Ch. and Vol. Only 250 v. 50 mA. H.T. and L.T. of 6.3 v. 1 amp. required from amplifier. Size of unit approx. 9-6-7 in. high. Simple alignment procedure. Point-to-point wiring diagrams. Instruction and priced parts list with illustration. 2/6. Total building cost, £4/15/-. For descriptive leaflet send S.A.E.

LINEAR L45 MINATURE 4 1/2 WATT QUALITY AMPLIFIER. Suitable for use with Collaro, B.S.R. or any other record-playing unit, and most microphones. Negative feedback 12 db. Separate Bass and Treble Controls. For A.C. mains input of 200-250 v. 50 c/c.s. Output for 23 ohm speaker. Three miniature Mullard valves used. Size of unit only 6-5-1/2 in. high. Output for 2-3 ohm speaker. Guaranteed for 12 months. Only £5/19/6. Illustrated leaflet 3d.

LINEAR "DIATONIC" 10 WATT HIGH FIDELITY PUSH-PULL ULTRA LINEAR AMPLIFIER. For 200-230-250 v. 50 c/c.s. A.C. mains. Valve line-up ECC83, ECC83, EL84, EL84, EZ81 miniature Mullard. The unit has self-contained Pre-amplifier/Tone Control stages and separate Bass and Treble Controls Independent 'Mike' and Gram input sockets are provided. Size is only 10-6-6 in. Output Mullard for 3 and 15 ohm speakers. Only 12 GNS. or Deposit 26/9 plus 10/- carr. and 9 monthly payments of 26/9. Leaflet 3d.

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. is available 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/c.s. Output for 2-3 ohm speaker. Chassis is not alive. Kit is complete in every detail and includes fully punched chassis (with baseplate) with Blue Hammer 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. or Deposit 22/6 and 5 monthly payments of 22/6 for assembled unit.



B.S.C. TA1 HIGH QUALITY TAPE DECK AMPLIFIER. For Tape Decks with High or Low Impedance, Playback and Erase Heads, suitable for Lane, Truvox, Asden. Use ONLY Collaro, Brenell, etc. 11 GNS. 50 c/s.

Positive compensated identification for 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 1/3 db. 50-11,000 c/s. Negative feedback equalisation. Minimum microphony and hum. High output with completely effective erasure 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. Carriage 7/6. Illustrated leaflet 6d. Special price can be quoted for Amplifier and a Deck. When ordering please state make of Deck to be used.

R.S.C. 30 WATT ULTRA LINEAR HIGH-FIDELITY AMPLIFIER A10

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 ± 3 db. 30-30,000 c.c.s. A specially designed sectionally wound ultra linear output transformer is used with 807 output valves. All components are chosen for reliability. Six valves are used. EF86, EF89, ECC83, 807, 807, GZ33. Separate Bass and Treble Controls are provided. Minimum input required for full output is only 12 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, etc. For use with Electronic ORGAN, GUITAR, STRING BASS, etc. For standard or long-playing records, INPUT SOCKET PROVIDES L.T. and H.T. for a RADIO FEEDER UNIT. An extra input with associated vol. control is provided so that two separate inputs such as Gram and 'Mike' can be mixed. Amplifier operates on 200-250 v. 50 c/c.s. A.C. Mains and has outputs for 3 and 15 ohm speakers. Complete kit of parts with fully punched ONLY chassis and point-to-point wiring diagrams and instructions. If required cover as for A8 can be supplied for 17/8. The Carr. 10/- amplifier can be supplied, factory built with 12 months' guarantee for £12/19/6. TERMS: DEPOSIT 35/9 and 9 monthly payments of 25/11.

10 GNS.

R.C.A. 20 WATT RE-ENTRANT SPEAKERS. 15 ohms or 600 ohms matching. For Outdoor work. Only 2 GNS. P.M. SPEAKERS. All 2-3 ohms, 5in. Goodmans, 17/9. 6in. Goodmans, 17/9. 8in. Rola, 19/9. 10in. Goodmans, 27/9. 10 x 6in. Elliptical Goodmans, 27/9. 12in. Plessey, 29/11. 10in. W.B. "Sternton" 3 or 15 ohms type HF1012 10 watts, hi-fidelity type. Recommended for use with our A8 Amplifier. £4/10/9. 12in. Plessey 5 ohms 10 watts (12,000 lines), 59/6.

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 A8 or similar amplifier. Rated 10 watts. Price complete, only £5/17/6.

M.E. SPEAKERS 2-3 ohms, Bin. R.A. Field, 600 ohms, 11/9.

P.M. SPEAKERS, 2-3 ohms. Suitable for use with L45, A5 or A7 amplifiers. Elec 7 x 4in. elliptical, 19/9. Celestion 6in. with high flux density magnet, 19/9. 12in. Plessey, 29/11.

R.S.C. 3-4 WATT A7 HIGH-GAIN AMPLIFIER

For 230-250 v. 50 c/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.



AM/FM RADIOGRAM CHASSIS HIGH QUALITY 6-8 WATT PUSH-PULL OUTPUT

For 200-250 v. Mains. Long wave, Medium, F.M. and Gram. Complete with 8 B.V.A. valves. Guaranteed 12 months. Only 22 GNS. Or Deposit £2/12/- and 9 monthly payments of £2/12/-.

Terms: C.W.O. or C.O.D. NO C.O.D. under £1. Post 1/9 extra under £2: 2/9 extra under £5. Open 9 to 5.30: Sat., until 1 p.m. Catalogue 6d. Trade List 5d. S.A.L. with all enquiries.

RADIO SUPPLY CO. 32, THE CALLS LEEDS, 2 (LEDS) LTD.

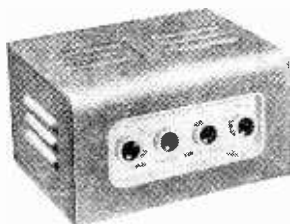
HOME RADIO OF MITCHAM

187 LONDON ROAD, MITCHAM, SURREY

MIT. 3282

HARDWARE KITS

Comprehensive kit of 2, 4, and 6 B.A. brass nuts, bolts and washers. USUALLY 6/9. OUR PRICE ONLY 4/6, plus 9d. post.



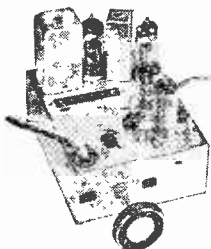
NEW E.A.R. "TRIPLE FOUR" AMPLIFIER

Four-stage, 6 watt, ultra linear push-pull output. Independent bass, treble, and equalisation controls. **PRICE £11/11/-.**

NEW E.A.R. "TRIO CONSOLE" SPEAKER

12in. Bass Unit and two Treble Units in handsome modern acoustic cabinet.

PRICE £15/15/-.



NEW E.A.R. SWITCHED F.M. TUNER WITH A.F.C.

Automatic frequency control obviates all drift. Spot-on Home, Third, Light or Gram. **Ready built, 15 gns.** (Kit ready soon.)

Appointed stockists for TELETRON and REPANCO coils, I.F. Transformers, Transistor Components, etc. Leaflets on request.



MAGNETIC RECORDING TAPES

A by-return service for all makes of recording tape. Standard and Long play in all sizes. C.O.D. or C.W.O. Lists on request.

TRANSISTORS

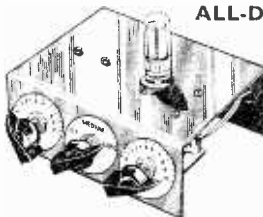
Red Spot	...	...	...	8/-
OC71	...	...	...	10/6
White Spot	...	...	...	17/6
Yellow/Red R.F.	...	...	...	21/-



THE HIWAYMAN

All-dry battery portable. 4 valves and high efficiency Ferrite rod aerial. Medium and Long Waves. Full constructional details and price list. **PRICE 1/6.** Total building cost approx. **£7/10/-.**

I VALVE ALL-DRY BATTERY SET



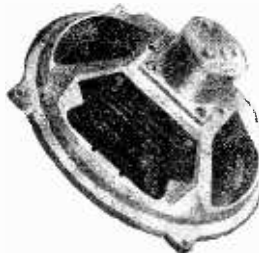
Complete kit of parts including valve, **33/6.** H.T. and L.T. battery, **8/3.** Headphones **14/-** pair. Full constructional details and price list, price **9d.** post paid.

SPECIAL OFFERS

- * Low-loss semi-airspaced, 75/80 ohms, coaxial cable. **ONLY 9d.** yard (plus 1/4 post).
- * High-grade single-screened microphone or audio cable. Black PVC covering. Brand new and perfect. **ONLY 6d.** yard (plus 1/- post).
- * T.C.C. condensers, printed circuits, special valveholders, etc., for Commercial T.V. converter for VIEWMASTER. Listed at £2/3/- . **OUR PRICE ONLY 27/6,** complete with data and price list.

NEWNES 7th Edition of "Short Wave Manual." **PRICE 6/6** (post paid).

"Hi-Fi Year Book." **PRICE 10/6** (6d. postage).



WB HF1012

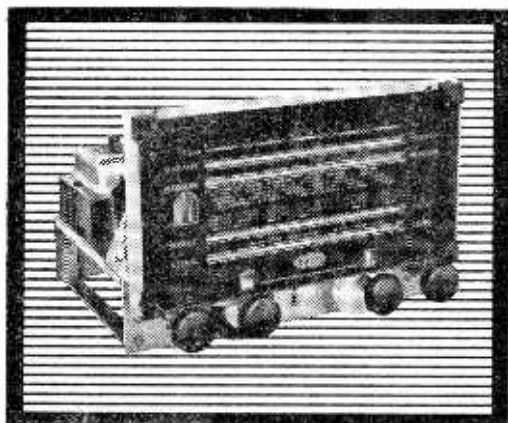
High fidelity at realistic cost. 10in. die-cast unit, 12,000 gauss magnet. Response 30 c.p.s. to 14,000. 10 watts. Universal speech coil, 3, 7 and 15 ohms. **£4/19/9** (plus 2/- post).

JACKSON type "00" midget twin gang designed for use in transistor sets. From stock, **9/6.**

We are officially appointed agents for :-

**EDDYSTONE COMMUNICATION RECEIVERS
PANDA TRANSMITTERS, ARMSTRONG CHASSIS
DULCI CHASSIS and AMPLIFIERS, etc.**

Overseas enquiries for these items invited.



DULCI MODEL H4 AM/FM 'Gram Chassis'

Here is high sensitivity giving bell-clear reproduction with the widest range of tone control. 4 wave-bands (including VHF), 7 valves with magic eye tuning indicator. Sockets to connect speaker (3 and 15 ohm). Pick-up, Aerial, Earth and F.M. Dipole. Dial size 11½" x 5¾".

£24·6·6 inc. tax.

To delight your ear...



HI-FI EQUIPMENT

H 3 A three waveband model (including V.H.F.) 6 valves, for 3 ohm. speaker. The chassis is immensely sensitive and stable, giving highest quality reproduction. It includes wide range Tone Control. Complete with pick-up, extension speaker and Gram Motor Sockets.

£20·17·0 inc. tax.







DPA 10 (10-14 watts) Ultra Linear Power Amplifier. £12·12·0

DP 4 4-watt high fidelity amplifier, produced with every refinement of technical skill for superb reproduction. £7·10·0

distinctly  ... pricewise products

THE DULCI COMPANY LTD., 97-99 Villiers Road, London, N.W.2. Telephone: WILLESDEN 6678/9

data for AUDIOPHILES

 EF86	 ECC83
 EL34	 GZ34
 EL84	 EZ81

Audiophiles all over the world are demanding Mullard audio valves for their high quality sound equipment. And who can blame them when they know that the Mullard World Series of Audio Valves is the finest in the world. Fill in the coupon below for free data on Mullard World Series Audio Valves.

* *Audiophile—Enthusiast for high quality sound reproduction who is satisfied with nothing but the best.*

This popular book is available now from most dealers, price 3'6d. It contains designs and full constructional details of the new Mullard EL34 High Quality 20 Watt Amplifier, a Mullard Band II F.M. Tuner, pre-amplifiers for the Mullard EI.34 Amplifier and for the popular Mullard 5 Valve 10 Watt Amplifier, together with other useful technical information.



Mullard
WORLD SERIES
AUDIO VALVES



Mullard Ltd., Publicity Division,
Mullard House, Torrington Place,
London, W.C.1.

COUPON
To Mullard Ltd., Publicity Division
Please send me, free of charge, leaflets on the Mullard World Series of Audio Valves, and details of "High Quality Sound Reproduction".

NAME

ADDRESS

.....

MVM 249

W.D. CIRCUIT DETAILS

Diagrams and other information extracted from official manuals. All 1/6 per copy. 12 for 15/-.
 American Service R.109
 Sheets 73 receiver
 A.1134 75 receiver
 BC.348 R28 ARC5
 BC.312 R1116 A
 R.103A RA-1B
 B.C.342 AR80D
 RA-1B AN/PA-1
 R-208 78
 R-1155 78
 R-1124A R.T.18
 R-1132A/R-1481 RADAR
 R-1147S CAY-96-AAM-
 R-1224A A.S.B.-3
 R-1082 Indicator 62A
 R-1355 Indicator A.S.B.3
 B.C.1206-A/B Indicator 62
 B-455-A (or -B) Indicator 6K
 B-454-A (or -B) R.F. unit 24
 B-453-A (or -B) R.F. unit 25
 Transmitter R.F. unit 25
 T154/B.D.J.N. R.F. unit 27
 Fifty-eight Wireless set No.
 walkie-talkie 13
 Frequency meter Demobed' valves
 B.C.221.

FLUORESCENT LIGHTS



These are complete fluorescent lighting fittings. Built-in ballast and starters—stove enamelled white and ready to work. Ideal for the kitchen, over the work-bench and in similar locations.
Single 40. 4ft. 3in. long, uses a 40t watt tube. **Twin 20.** Uses 2 20-watt standard tubes. Price for both of these is 39/6 complete with tubes. Carriage and insurance up to 150 miles 6/6, up to 250 miles 8/6.

THE CLEVELAND ORGANTONE

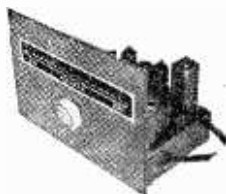


5 valve 3 waveband superhet covering Long, Medium and Short waves. Osram miniature valves—low loss iron coils—permeability—tuned L.F.S.—full A.V.C.—variable negative feed-back—gram. position—4 watts output—particularly fine tone. Chassis size 7in. x 7in. x 7in. approx. Tested in difficult areas, where exceptional results have been obtained. Price £11/10/0 or £2/0/0 deposit, plus 7 payments of £1 10/0. Carriage and ins. 10/-.
VARIABLE RHEOSTAT
 This is a heavy duty slider resistor rated at 25 amps, but easily capable of twice this load. Basis resistance is 4 ohms but by the removal of one wire this becomes 3 ohms, alternatively it can be rewired to suit individual requirements. Adjustment is by rotating a Bakelite knob which couples to a heavy duty slider, ideal for dimmer circuit. Price 8/6. post and ins. 3/6.



F.M. TUNER

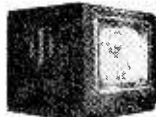
This is a high fidelity unit which although moderately priced has a performance equal to the highest priced. Its stability is very good and extremely good results have been received with the simplest of aerials as far away as Eastbourne. The unit is made up ready to work and has its own power supply for A.C. mains. Demonstration at all our branches. Price 12 gu.-, or £12.0 down and 6 payments of £2. Post plus insurance 5/-.



THIS MONTH'S SNIP

6ft. UNBREAKABLE MAINS LEAD. This is the type of lead which is fitted to electric razors and similar appliances, makes fine lead for test-meters and any other devices where the flex is subject to continuous bending and kinking. Twin figure eight construction, soft cream P.V.C. covered. Normally costs 2/- per yard—we offer three leads for 3/- post free; special quotes for large quantities.

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, bookcase, etc., etc. Price 15/-. Carriage 3/6.

MULLARD AMPLIFIER "510"

YOURS FOR 30/- DOWN



A Quality Amplifier designed by Mullard. Power output exceeds 10 watts. Frequency response almost flat from 10 to 20,000 C.F.S. For use with the Acos "Hi G" and other good pick-ups. Made up and ready to work is £42/10/0 or £1/10/0 down and 8 payments of £1/10/0, plus 10/- carriage and insurance.

MULLARD PRE-AMPLIFIER

For extra gain and fidelity this unit gives ideal results. It is arranged to plug into the amplifier and has two switches to provide compensation for radio, microphone, L.P. and 78 records. Complete with valve, made up ready to work, £4. Post and insurance 3/6, or 10/- deposit and eight monthly payments of 10/-.

DO-IT-YOURSELF

Hundreds of people have already fitted our T.V. converter and now enjoy BBC & ITA programmes—you can do the same. Our outfit contains: ITA Converter—ITA Aerial—35ft. Co-ax Down Lead—Interference Suppressor—illustrated detailed instructions, nothing else to buy, all for £8 10/0, carriage and insurance 4/6 or 10/- deposit and 9 monthly payments of £1.

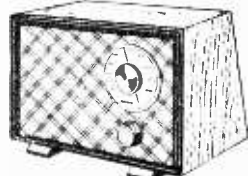


Record Players

All fitted with 4-speed auto-changers of latest type and hi-fi pick-ups. Cabinets in latest fabrics. Special month the "Finsbury" £17.17.0 cash or £3 deposit and 8 monthly payments of £2. (Carriage and insurance 7/6.)



OUR 19/6 COLUMN



THE SKYSEARCHER

This is a 2-valve plus-metal receiver 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. 3-valve battery version also available at the same price.

ALL-MAINS AMPLIFIER



Powerful three-valve Mains amplifier ideal for dances, parties, etc. Complete less chassis cabinet and speaker (available if required)—data 1/6 (free with parts). Price 19/6, plus 2/6 post and insurance.

"CHIMELITE" 19/6



It is a hall light, as well as a double chime and you can make it in a couple of evenings for the total cost of only 19/6 including instructions, post 2/-—data available separately price 2/-.

Simplex Transistor Kit



Makes ideal bedroom radio, uses one transistor and one crystal diode. Complete less case 19/6, case 5/- extra, post and ins. 1/6.

A.C./D.C. Multimeter Kit



Measures A.C./D.C. volts and ohms. All the essential parts including 2in. moving coil meter, selected resistors, wire for shunts, range selector, switches, calibrated scale and full instructions, price 19/6 plus 1/3 post and insurance.

BAND III CONVERTER

Suitable London, Midlands, North, Scotland, etc. All the parts including 2 valves, coils, fine tuner, contrast control, condensers and resistors. (Metal case available as an extra), plus 2/6 post and insurance. Data free with parts or available separately 1/6.

BARGAINS TO CLEAR

A.C./D.C. Superhet Chassis, Long, Medium and Short wave, modern 5-valve circuit unused, but may be slightly storage soiled. Only 29/6 (coil pack worth more). Non-callers add 6/6 carriage and ins.

A.C. Superhet 5-Valve Chassis, Medium and two short, unused, but less valves and mains transformer. Uses standard Octal range. 27/6. (Again, coil pack worth much more.) Non-callers add 6/6.

A.C. Superhet 7 v. 5-Waveband Chassis, H.F. stage. Unused. Less valves and power pack. Slightly soiled. Coil pack worth twice as much. Circuit diagram supplied. 22/15/0. carriage and insurance 7/6.

A.C. 4-Valve Superhet, complete with valves, but less scale and pointer, unused. Circuit diagram supplied. 39/6 plus.

Note that the above four chassis, although unused, will need checking. On account of low price no guarantee is given. Nor, we regret, can technical assistance be given.

1 mfd. 350 v. Small Tubular Metal cased Condensers. Made by Dulliber. 2/6 per dozen.

Germanium Diodes, B.T.H. with wire ends. 10d. each or 9/- dozen. Midget I.F. Coils. Dust cored, size 11 x 1in., 465 Kc s. 4/6 pair.

Standard Size I.F. Coil. Dust cored, 465 Kc s. 4/6 pair.

Coil Pack for Superhet, 465 Kc s. I.F. Medium and 2 short waves, 9/6.

Cathode-Ray Tube, VCR97, Instrument type. New 7/6 each, carriage 3/6.

Bakelite 5 Amp. Electric Wall Switch, "Hircraft," 9d. each, or 8/- per dozen.

Series, parallel and off-electric wall switch made by Crabtree. Price 1/3 each, or 13/6 per doz.

NOTE: Additional Technical Data is not available on these bargain items.

Amplifier, ex-Government unit 1134 contains one double triode and one triode. 6/6. post and ins. 2/6.

Connecting Wire, P.V.C. covered 24 s.w.g. copper. 2/6 per 100ft., or 5 coils, different colours, for 10/-.

Scanning coils by very good maker. New and unused. 4/6 complete.

Choke, 200 mA, first class. Made 10 v Services. New 6/6. post 1/6.

1 or Superhet, 11 metre, Ex-Govt., but unused. Complete with valves. Easily converted for Band III. 39/6 carriage and packing 7/6.

Mains Transformer, 250-0-250, 60-80 mA, 6.3 v. standard mains input. Half shrouded. 12/6. post and insurance 2/6.

R.F.25 Tuning Unit. New, unused and complete with valves. 9/6. post 2/6.

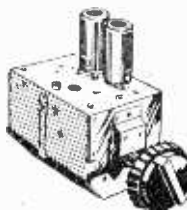
Cathode-Ray Tube, VCR517. 8/6 each, carriage 2/6.

Mains Lead. Metal screened to stop interference. 9d. yard.

Thermocouple mounted on valve base. Useful for experiments and schools. 6/6 each.

Midget Push-pull Input Transformer and push-pull output transformer to match. 8/- the pair.

NOTE: Orders for small components over £2 are post free, otherwise please add sufficient.



TURRET TUNER

Brand new stock, not surplus, with coils for Band I and III, complete with valves PCC84 and PCF80-I.F. Output 33.33 Mc s with circuit diagram 79/6. Knobs 3/6 extra, post and ins. 2/6.

The "CRISPIAN" Portable Radio



or 35/- down and 7 payments of £19/0. post and ins. 3/6. ready-built chassis 30/- extra. Instruction booklet free with parts or available separately, price 1/6.

Yours for £1.10.0 Down



The latest most up-to-date Record Player made by the famous B.S.R. company. Using Hi-Fi Crystal Pick-Up and fitted with every modern device. Definitely a record changer which will give years of truly free music. Not surplus but the current model. Price 28/10/0 or £1/10/0 deposit and 6 monthly payments of £1 carriage and insurance 5/-.

DON'T BE CAUGHT LIKE THIS



CAR STARTER CHARGER KIT

All parts to build 6- and 12-volt charger which can be connected to a "Bar" battery and will enable the car to be started instantly. Kit comprising the following:

Mains transformer	22/6
5-amp. rectifier	17/6
Regulator Stud Switch	2/6
Resistance Wire	2/6
Resistance Former	2/6
Mains on off Switch	2/6
0.5 amp. Moving Coil Meter	12/6
Construction Data	1/6

or if bought all together price is 52/6. plus 2/6 post and packing.

TRANSFORMERS SNIP

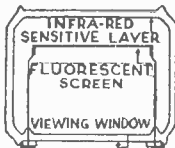
Standard tapped mains input. Output 6.3 at 3 amp. 5 v. at 2 amp. and 250-0-250 at 80 milliamps. Ex-equipment but guaranteed perfect. 9/6 plus 2/6 post and packing. (Note this transformer is a half shrouded drop-through type.) Similar voltage but 259 mA. 27/6. Post 3/6.



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.



"SNIPER-SCOPE"

"Cats eye" used for seeing in the dark. Will work burglar alarms, counting circuits, smoke detectors and the hundred and one other devices as will the simpler type of photo cell. Price 5/- each. Post and ins. 1/-. Data will be supplied with cells if required.

SAVE £2. 10s.



The Cleveland Band 3 converter is one of the best on the market and literally thousands are in use all over Britain. Original price £7/10/0. Sale price £4/19/6. carriage and ins. 5/-.

HUGE MINISTRY PURCHASE



R.1155—yours for £2 down

Frequently 75 Kc s. to 13 Mc s.—10 valve—metal case—robust receiver—cost over £60 to make—will give years of service. Very little used. Price £10 of 6 payments of £2. Cash & best case 15/- extra.

ELECTRONIC PRECISION EQUIPMENT, LTD.

Post orders to E.P.E., LTD., Dept. 5, 66, Grove Road, Eastbourne.

266, London Road, Croydon, Surrey. Phone: CRO. 6558. Half day, Wednesday.

42-46, Windmill Hill, Ruislip, Middx. Phone: RUISLIP 5780. Half day, Wednesday.

152-3, Fleet Street, E.C.4. Phone: FLEET 2533. Half day, Saturday.

29 Strand Green Rd., Finsbury Park, N.4. Phone: ARCHWAY 1048. Half day, Thursday.

249, Kilburn High Road, Kilburn, Maida Vale 4921.

Presenting the new HOMELAB range of SIGNAL GENERATORS

TYPE 2

100 kc/s. to 100 Mc/s CW or 400~ modulation. Audio signal for amplifier tests PRICE : £4.10.0d., p. & p. 5/-

TYPE 12

100 kc/s. to 130 Mc/s. Sine and square wave modulation at 1,000~. Sine or square wave signal for amplifier tests PRICE £8.10.0d., p. & p. 5/-

TYPE 20

An AM/FM signal generator covering all modern radio and TV requirements up to 240 Mc/s PRICE £15.15.0d., p. & p. 5/-

Send stamp for full details of above, and also our Mullard FM Tuner complete with power supply PRICE : £12.0.0d.

HOMELAB INSTRUMENTS LIMITED

615-617, HIGH ROAD, LEYTON, LONDON, E.10

Telephone : LEYtonstone 6851

Modernise Your Radiogram with an *Armstrong* chassis

The effect of substituting a good quality Receiver/Amplifier for your ordinary commercial unit will astonish and delight you. Only in this way can the full benefits of the improved modern recordings and the superb quality of the VHF/FM transmissions be obtained. Armstrong have been making replacement chassis for nearly 25 years and have concentrated exclusively on the requirements of those who want the best. This is your guarantee of first-class performance and reliability.

MODEL PB 409 (illustrated) 28 Gns.

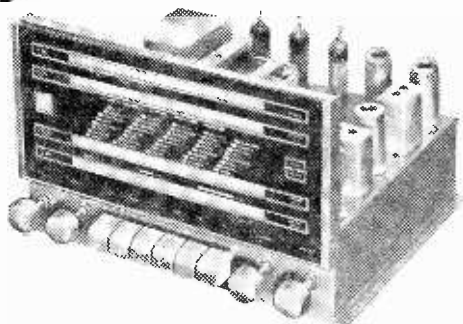
A high quality Radiogram Replacement Unit

- ★ 9 valves ★ 6 watts VHF ★ Quick action Piano
- Push-Pull output Key selectors ★ Separate
- ★ Negative Feedback Bass and Treble controls
- ★ 4 wavebands including ★ Magic Eye.

MODEL AF 105 £37

AM and FM Tuners and High Fidelity Amplifier on one compact chassis

- ★ 10 valves ★ 10 watts ★ Independent wide range
- Push-Pull output ★ 20 dB Bass and Treble controls
- Negative Feedback ★ 5 with visual indicators
- wavebands including VHF ★ Magic Eye.



Post this coupon or write for descriptive literature and details of Home Trial facilities, Credit terms and Guarantee to Armstrong Wireless and Television Co. Ltd., Warblers Rd., Holloway, N.7. Tel: NOR 3213. BLOCK CAPITALS PLEASE.

NAME

ADDRESS

Demonstrations at our Holloway Showroom 9-6 Weekdays and Saturdays. PWN

ONLY BENTLEY OFFER

**A WRITTEN GUARANTEE
TOP QUALITY BRANDS
PEAK PERFORMANCE WITH LONG LIFE**

**EXPRESS SERVICE !!!
C.O.D. ORDERS RECEIVED BY 3.30 P.M. EITHER
BY LETTER, PHONE OR WIRE, DESPATCHED
THE SAME AFTERNOON.**

**FOR ONLY 6d. EXTRA PER ORDER WE WILL
INSURE YOUR VALVES AGAINST DAMAGE IN
TRANSIT. ALL UNINSURED PARCELS AT
CUSTOMERS' RISK.**

0Z4	6/-	6AQ5	7/6	6L6G	9/-	12AH7	8/-	31	7/6	CV63	10/6	ECC32	10/6	EZ80	8/6	PCF82	11/6	UBF80	9/5
1A3	3/-	6AT6	8/6	6L7M	8/-	12AH8	10/6	33A/158M		CV85	12/6	ECC33	8/6	EZ81	10/-	PCL82	12/6	UBF89	10/6
1A5	6/-	6B4G	6/-	6L18	13/-	12AT6	10/6		30/-	CV271	10/6	ECC35	8/6	GZ30	10/-	PCL83	12/6	UCC85	10/5
1A7	15/-	6B7	10/6	6N7	8/-	12AT7	8/6	35/51	12/6	CV428	30/-	ECC40	15/-	GZ32	12/6	PEN40DD		UCH42	10/-
1D6	10/6	6B8G	4/-	6Q7G	8/6	12AU7	7/6	35A5	11/-	DI	3/-	ECC81	8/6	GZ34	14/-		25/-	UCH81	11/6
1H5	11/-	6B8M	4/6	6Q7GT	9/-	12AX7	9/-	35L6GT	9/6	D42	10/6	ECC82	7/6	H30	5/-	PEN45	19/6	UCL82	13/6
1L4	6/6	6BA6	7/6	6R7G	8/6	12BA6	9/-	35W4	8/6	D63	5/-	ECC83	9/-	H63	12/6	PEN46	6/6	UF41	9/-
1LD5	5/-	6BE6	7/6	6SA7GT	8/6	12BE6	10/-	35Z3	10/6	D77	6/6	ECC84	10/-	HABC80		PL81	15/-	UF80	10/6
1LN5	5/-	6BJ6	8/-	6S7GT	7/6	12E1	30/-	35Z4GT	8/-	DAC32	11/-	ECC85	9/6			PL82	9/-	UF85	10/6
1N5	11/-	6BR7	11/6	6SH7	6/-	12H6M	3/-	35Z5GT	9/-	DAF91	8/-	ECC91	5/6	HK90	10/-	PL83	11/6	UF89	10/6
1R5	8/6	6BW6	8/6	6S7	8/6	12IS7	4/6	41MTL	7/6	DAF96	9/6	ECF80	12/6	HL23	10/6	PM2B	12/6	UL41	10/-
1S5	8/-	6BW7	9/-	6SK7GT	6/-	12J7GT	10/6	50C5	12/6	DCC90	7/-	ECF82	12/6	HL41	12/6	PM12	4/-	UL46	15/-
1T4	7/-	6BX6	8/6	6SL7GT	8/-	12K7GT		50L6GT	8/6	DF33	11/-	ECC35	9/6	HL133DD		PM12M	6/6	UL84	11/6
1U5	7/-	6C4	7/-	6SN7GT	7/6		8/6	61B7	12/6	DF91	7/-	ECH42	10/-			PY80	9/-	UY41	8/6
2A3	12/6	6C5	6/6	6S57	7/6	12K8GT	14/-	61SPT	15/-	DF96	9/6	ECH81	8/6	HVR2	20/-	PY81	9/-	UY85	10/6
2A7	10/6	6C6	6/6	6U4GT	14/-	12Q7GT	8/6	72	4/6	DH63	8/6	ECL80	9/-	HLR2A	6/6	PY82	7/6	V1507	5/6
2C26	4/-	6C8	8/-	6U5G	7/6	12SA7	8/6	77	4/6	DH76	8/6	EF36	6/6	KL35	8/6	PY83	9/6	VLS492A	£3
2D13C	7/6	6C9	12/6	6U7	8/6	12SC7	7/6	80	8/6	DH77	8/6	EF37A	9/-	KT2	5/-	QP21	7/-	VMP4G	15/-
2X2	4/6	6C10	12/6	6V6G	7/6	12SH7	5/6	83	8/6	DK32	15/-	EF39	6/-	KT33C	10/-	QP25	15/-	VP2(7)	12/6
3A4	7/-	6CH6	7/6	6V6GT	7/6	12S17	6/-	85A2	15/-	DK91	8/6	EF40	12/6	KT44	7/6	QS150/15	10/6	VP4(7)	15/-
3A5	7/-	6D6	6/6	6X4	7/6	12S17	6/-	85A2	15/-	DK92	10/-	EF41	9/6	KT63	6/6		10/6	VP13C	7/6
3B7	8/6	6E5	12/6	6XSQT	6/6	12SK7	6/-	150B2	15/-	DK96	9/6	EF42	12/6	KTW61	6/6	QVO4,7	15/-	VP23	6/6
3D6	5/-	6F1	15/-	6Z4/84	12/6	12SQ7	8/6	807	6/6	DL2	15/-	EF50(A)	5/-	KTW62	8/-		14/-	VP41	7,5
3O4	9/-	6F6G	6/6	6Z5	12/6	12SR7	8/6	866A	12/6	DL33	9/6	EF50(E)	7/-	KTW63	8/-		14/-	VR105/30	
3Q5GT	9/6	6F6GT	8/-	6J30L2	12/6	12USG	7/6	956	3/-	DL92	8/-	EF54	5/-	KTZ41	6/-	SD6	12/7		9/-
3S4	8/-	6F8	10/6	7A7	12/6	12Y4	10/6	1203	7/-	DL94	9/-	EF73	10/6	KTZ63	10/6	SP4(7)	15/-	VR150/30	
3V4	9/-	6F12	9/-	7B7	8/-	14R7	10/6	4033L	12/6	DL96	9/6	EF80	8/6	L63	6/-	SP41	3/6		9/-
5U4	8/-	6F13	13/-	7C5	8/-	14S7	14/-	5763	12/6	DL510	10/6	EF85	7/6	MH4	7/-	SP42	12/6	VT61A	5/-
5V4	12/6	6F16	9/6	7C6	8/-	19AQ5	11/-	7193	5/6	DM70	8/6	EF86	12/6	MHL4	7/6	SP61	3/6	VT501	5/-
5X4	10/6	6F17	12/6	7H7	8/6	19H1	10/-	7475	7/6	EA50	2/-	EF89	10/6	MHLD6	12/6	TF22	15/-	W76	8/6
5Y3	7/6	6F32	10/6	7Q7	9/-	20D1	16/-	9002	5/6	EA76	9/6	EF91	9/-	ML4	12/6	U16	12/6	X61	12/6
5Y4	10/6	6F33	7/6	7V7	8/6	20L1	13/6	9003	5/6	EABC80	7/6	EF92	6/6	ML6	6/6	U22	8/6	X65	12/6
5Z3	12/6	6G6	6/6	7Y4	8/-	25L6GT	9/-	9006	6/-	EAC91	7/6	EL32	5/6	MU14	8/6	U25	13/6	X66	12/6
5Z4G	10/6	6H6M	3/6	8D2	3/-	25Z4G	9/-	AC6PEN	6/6	EAF42	10/6	EL41	10/6	N78	12/6	U31	9/-	X79	12/6
6A8	10/6	6J5G	5/-	8D3	9/-	25Z5	10/6	AC/HL/		EB34	2/-	EL42	11/-	OA10	12/6	U50	7/6	XD(1.5)	4/6
6AB7	8/-	6J5GTG	5/6	9D2	3/6	25Z6G	9/6	DDD	15/-	EB41	8/6	EL81	15/-	OA70	5/-	U52	8/6	XFW10	6/6
6AB8	9/-	6J5GTM	6/-	10C1	15/-	28D7	7/6	AC/P4	8/-	EB91	6/6	EL84	10/6	OA71	5/-	U76	8/6	XFY12	6/6
6AC7	6/6	6I6	5/6	10C2	13/-	30	7/6	AP4	7/6	EBC33	7/6	EL91	5/-	OC72	30/-	U78	7/6	XH(1.5)	4/-
6AG5	6/6	6I7G	6/-	10F1	15/-	30C1	12/6	ATP4	3/6	EBC41	10/-	EM34	10/6	P61	3/6	U251	15/-	XSG(1.5)	4/-
6AG7	12/6	6J7GT	10/6	10F9	11/6	30F5	12/6	AZ31	12/6	EBF80	9/6	EM80	10/6	PABC80		U404	10/6	Y63	7/6
6AJ8	8/-	6K7G	5/-	10F18	12/6	30FL1	12/6	B329	10/6	EBF89	9/6	EY51	10/6		15/-	UABC60		Z63	10/5
6AK5	5/-	6K7GT	6/-	10LD3	8/6	30L1	12/6	BL63	7/6	EC52	5/6	EY86	10/6					Z66	20/-
6AK8	7/6	6K8G	8/-	10P13	17/6	30P4	15/-	CK505	6/6	EC54	6/-	EZ35	6/6	PCC84	8/-	UAF42	10/6	Z77	9/-
6AL5	6/6	6K8GT	11/-	11E3	15/-	30P12	13/6	CK506	6/6	EC70	12/6	EZ40	8/6	PCC85	12/6	UB41	12/7	Z719	12/6
6AM6	9/-	6LD3	10/-	12A6	6/6	30P16	10/6	CK523	6/6	ECC31	15/-	EZ41	10/6	PCF80	8/6	UBC41	8/6	Z729	12/6

**TERMS OF BUSINESS —CASH WITH ORDER OR
C.O.D. ONLY. ORDERS VALUE £3 OR MORE SENT
POST/PACKING FREE. ORDERS BELOW £3 PLEASE
ADD 6d. PER VALVE. C.O.D. ORDERS —MINIMUM
FEE, INCLUDING POST AND PACKING, 3/-. WE
ARE OPEN FOR PERSONAL SHOPPERS. MON.-
FRI. 8.30-5.30. SATS. 8.30-1 p.m.**

**ALL VALVES NEW, BOXED, TAX PAID, AND
SUBJECT TO MAKERS' GUARANTEE. FIRST
GRADE GOODS ONLY, NO SECONDS OR RE-
JECTS. ALL ORDERS RECEIVED BY FIRST POST
DESPATCHED SAME DAY. S.A.E. FOR FREE
COMPLETE LIST, WITH FULL TERMS OF BUSI-
NESS.**

Every valve we despatch is first carefully tested in our laboratories, for maximum functioning characteristics, right in a radio or T.V. set—under actual operating conditions! That's why we guarantee every Bentley valve in accordance with the Standard Guarantee. Full replacement within ninety days of purchase, excepting only burnouts and breakages.

BENTLEY ACOUSTIC CORPORATION LTD. THE VALVE SPECIALISTS

38 CHALCOT ROAD, LONDON, N.W.1

PRImrose 9090

PLEASE ENQUIRE FOR ANY VALVE NOT LISTED. 3d. STAMP, PLEASE.



Stern's "fidelity" TAPE RECORDER

IT HAS EVERYTHING—EXCEPT A HIGH PRICE

TESTED AND APPROVED AT THE TRUVOX LABORATORIES

IT INCORPORATES: The NEW TRUVOX Mk. IV TAPE DECK together with the "fidelity" MODEL HF/TR2 TAPE AMPLIFIER (both illustrated on this page), and a Rola 10in. x 6in. P.M. SPEAKER.

PRICE... Including CRYSTAL MIKE and 1,200ft. reel of PLASTIC TAPE.

£49.10.0.

(OR £3 EXTRA WITH REV. COUNTER)

(Plus £1 10/- carriage and Insurance, of which £1 is refunded on return of Packing case.)

● BEFORE CHOOSING YOUR TAPE RECORDER YOU SHOULD HEAR THIS MODEL—TRULY "HI-FI" RECORDINGS ARE OBTAINABLE and it is comparable to much higher priced Recorders.
Alternatively send S.A.E. for ILLUSTRATED LEAFLET.

CREDIT SALE: Deposit £12/8/- and 9 monthly payments of £4/10/8.
HIRE PURCHASE: Deposit £24/15/- and 12 monthly payments of £2/5/11.

The "fidelity" TAPE AMPLIFIER Model HF/TR2 WITH POWER SUPPLY UNIT

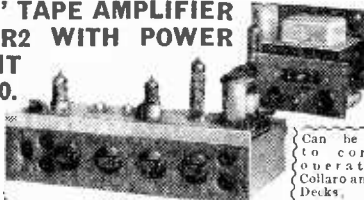
PRICE **£16.0.0.**

(Carr. and ins. 6/-)

H.P. TERMS: Deposit £3 and 9 months of £1.

CREDIT TERMS: Deposit £4 and 9 monthly payments of £1/9/4.

When ordering, please advise make of deck in use. Send S.A.E. for full details.



(Can be supplied to correctly operate with Collaro and Truvox Decks)

HOME CONSTRUCTORS We can supply a COMPLETE KIT OF PARTS to build this TAPE AMPLIFIER for £12 (plus 5/- carr. and ins.). The Assembly Manual, Practical Diagrams, etc., are available for 2/6. WE MAKE SPECIAL PRICES TO PURCHASERS OF TAPE EQUIPMENT (i.e., buyers of Deck and Amplifier together, etc., etc.) SEND YOUR ENQUIRY TO US... H.P. and CREDIT SALE TERMS ARE AVAILABLE.

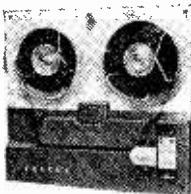
The NEW TRUVOX MkIV TAPE DECK ONE OF THE BEST DECKS ON THE MARKET.

PRICE **£27.6.0.** (Plus 10/- carr. and ins.)

CREDIT TERMS: Deposit £8/17/- and 9 monthly payments of £2/10/-.

H.P. TERMS: Deposit £13/13/- and 12 monthly payments of £1/5/4.

WE ALSO HAVE A FEW DECKS WITH REV. COUNTERS. Price £30/9/- Send S.A.E. for details.



A TAPE PRE-AMPLIFIER and ERASE UNIT



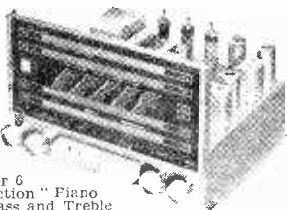
STERN'S MODEL HF/TR1—A completely assembled Pre-amplifier with

own Power Supply. Can be supplied correctly matched for use with Truvox or Collaro Decks and incorporates Recording Level Indicator and Monitoring facilities. Please send S.A.E. with any enquiry. (Plus 5/- carr. and ins.)
PRICE **£11.10.0.**
SPECIAL PRICE REDUCTION WHEN PURCHASED WITH TAPE DECK.

MODERNIZE YOUR OLD RADIOGRAM

The NEW ARMSTRONG PB. 409 A.M./F.M. Radiogram Chassis

"A chassis for those who want the highest quality." ● A 9-valve line up employing the latest MULLARD preferred-type valves. ● Provides complete coverage of the V.H.F./P.M. Transmissions plus the Short, Medium and Long Wavebands. ● Has Push-Pull Output with Negative Feedback for 6 watts peak Output. ● Quick Action "Firmo Key" Selectors and separate Bass and Treble Controls. ● Has "Magic Eye" Tuning Indicator. ● Dimensions 13in. x 9 1/2in. x 8in. High. Dial size 11 1/2in. x 5 1/2in.



PRICE **£29.8.0.** TERMS: (Plus 6/- carr. & ins.) H.P. £14/14/0 and 9 monthly payments of £2/14/0. SEND S.A.E. FOR ILLUSTRATED LEAFLET.

STERN'S "F.M." TUNING UNIT

A 5-valve Tuner incorporating the latest Mullard Permeability Tuning Heart and a "Magic Eye" Tuning Indicator. PRICE ASSEMBLED **£14.10.0.**

READY FOR USE: (Plus 7/6 carriage and insurance.) TERMS: (a) Hire Purchase: Deposit £7/5/0 and 9 monthly payments of 18/4. (b) Credit: Deposit £3/12/6 and 9 monthly payments of £1/6/7.



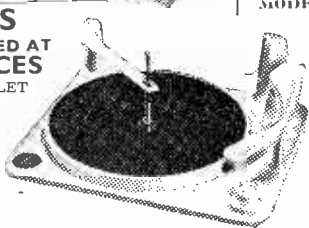
RECORD PLAYERS THE VERY LATEST MODELS OFFERED AT GREATLY REDUCED PRICES

Send S.A.E. for ILLUSTRATED LEAFLET

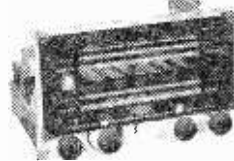
"CASH ONLY" **£8.7.6.**

(Plus 5/- carr. & ins.) THE NEW 4-SPEED B.S.R. MONARCH

- A "MIXER" Autochanger complete with High Fidelity Crystal "Turn-over" head.
- Incorporates the Manual Control position.



WE HAVE THE FULL RANGE OF DULCI CHASSIS IN STOCK



THE MODEL H.4. is illustrated but all Chassis and Tuners are similar—send S.A.E. for leaflets. H.P. and CREDIT SALE TERMS are available. Send S.A.E. for details.

RADIOGRAM CHASSIS These two Chassis are really well designed and reproduce most excellent quality on both Radio and Gram.

MODEL D.3. A 3 Waveband AM/FM CHASSIS **£20.17.0.**
MODEL H.4. A 4 Waveband AM/FM CHASSIS **£24.6.6.**

TUNER UNIT CHASSIS THE FM/IF TUNER CHASSIS with self-contained Power Supply **£17.10.3.**

MODEL H4T. A 4 Waveband AM/FM TUNER with self-contained POWER SUPPLY **£20.17.0.**

MODEL H.I.I. A combined 4 Waveband AM-FM Tuner incorporating a "HI-FI" Control Unit—Audio Pre-amplifier, which has switching and connections for Tape Replay, Gram equalising, Bass and Treble Controls, etc. **£29.3.10.**

"HI-FI" AUDIO AMPLIFIERS

MODEL G.A.4. A self-contained 4 watt Amplifier with adjustable Tone Control Box **£9.9.0.**

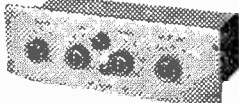
MODEL D.P.A.10. A 10 watt Amplifier with separate Tone Pre-amplifier Unit incorporating Bass and Treble Controls and Gram equalising... **£19.19.0.**

STERN RADIO LIMITED

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

STERN'S REMOTE CONTROL UNIT

Designed in particular for use with the MULLARD 5-10 Main Amplifier



Ideally suited for simple domestic installation as an alternative to the more elaborate Pre-amplifier (shown and described opposite). Tone Control facilities are really excellent and in conjunction with the "5-10" Main Amplifier reproduction is of very high quality. Perfectly suitable for use with all the popular Record Players (B.S.R., Collaro, Garrard) and the modern Radio Tuner Units. Front Panel contains: (a) Coloured Indicator, (b) Separate BASS and TREBLE CONTROLS, (c) 3 position Selector Switch, (d) Volume control. Inputs on back for Radio and Gram. and Gram equalising is incorporated. FULL DATA is contained in the 5-10 MAIN AMPLIFIER MANUAL at 1.6.

The MULLARD "5-10" MAIN AMPLIFIER

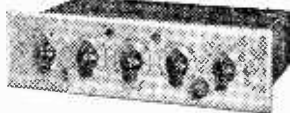


Probably the most popular and successful Amplifier yet designed and certainly needs no recommendation from us. Our kit is complete to MULLARD'S specification including the latest ULTRA LINEAR OUTPUT TRANSFORMER and the recommended Mullard Valve line-up. All specified Components are supplied and Power Supply is available to drive a Radio Tuner Unit.

PRICE OF COMPLETE KIT OF PARTS (Plus 5/- carr. & Ins.) **£9.10.0**
or alternatively we supply-- FULLY ASSEMBLED and TESTED FOR **£11.10.0** (Plus 5/- carr. & ins.)
THE ASSEMBLY MANUAL containing FULL SPECIFICATION is available for 1.6. It also includes full data on the REMOTE CONTROL UNIT.

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

"A design for the Music Lover"



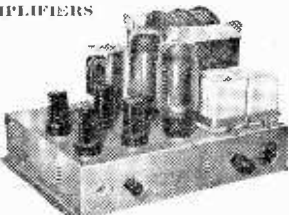
This unit can be used with any Main Amplifier. Briefly it has inputs for all types of MICROPHONES, HIGH and LOW GAIN PICK-UPS and a RADIO TUNING UNIT. It incorporates (a) GRAM EQUALISING CONTROL, (b) STEEPCUT FILTER, (c) Continuously variable BASS and TREBLE CONTROLS, a variable OUTPUT CONTROL which enables its use with any type of Amplifier, and Jack Sockets on Front Panel for TAPE RECORD and TAPE PLAYBACK.

Used with the "5-10" the reproduction is comparable to that normally associated only with the very expensive commercially made High Fidelity Amplifiers. PRICE OF COMPLETE KIT OF PARTS **£6.6.0**
WE ALSO OFFER IT ASSEMBLED READY FOR USE. **£8** (plus 5/- carr. & ins.)
THE ASSEMBLY MANUAL contains full specification and is available for 1.6.

BRITAIN'S FINEST "Hi-Fi" AMPLIFIER

THE GENUINE WILLIAMSON

STILL SETS THE STANDARD FOR ALL AMPLIFIERS



Many versions of the Williamson have been offered to the public at various low prices, but the "only Williamson" is the Amplifier built to the designer's specification and employing only the very high grade Components, i.e. PARTRIDGE TRANSFORMERS, CHOKES, etc. that he specifies. It is only in doing this that the exceptionally high standard that has made this Amplifier so famous, particularly in America, is obtained. . . WE HAVE DONE THIS! . . . and we offer these KITS OF PARTS including Partridge and other high grade Components as follows:

- (a) To build the MAIN AMPLIFIER ONLY (Illustrated above). **£14.10.0**
 - (b) To build the TWIN POWER SUPPLY UNIT ONLY (insufficient space to illustrate this). **£13.10.0**
 - (c) COMPLETE KIT to build both above. **£27.0.0**
- We will also supply both COMPLETELY ASSEMBLED and will be pleased to quote. Credit and H.P. Terms are available. The complete SPECIFICATION and general ASSEMBLY INSTRUCTIONS are available for 3.6.

Our "fidelity" PREAMPLIFIER illustrated and described above (or alternatively the R.C.A. Pre-amplifier at £16.5.0) is recommended for use with the Williamson.

CALLERS ONLY

We have in stock various designs for HOME CONSTRUCTORS including F.M. Tuners, A.M. F.M. Tuners, Midget Battery Portable, Mains Units, etc., etc.

(Dept. P.W.)

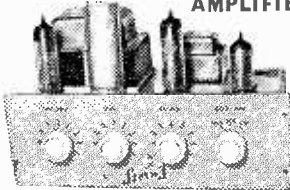
109 & 115 FLEET ST., LONDON, E.C.4.

Telephone: FL Eet 5812/3/4.

SPECIAL PRICE REDUCTIONS . . . WE WILL SUPPLY

- (a) The COMPLETE KIT OF PARTS to build both the MULLARD 5-10 and the REMOTE CONTROL UNIT for..... **£11.11.0**
 - (b) The COMPLETE KIT OF PARTS to build both the MULLARD 5-10 and the "Fidelity" PREAMPLIFIER TONE CONTROL UNIT for..... **£15.15.0**
 - ALTERNATIVELY WE WILL SUPPLY ASSEMBLED and FULLY TESTED. **£14.0.0**
 - (a) The MULLARD 5-10 and the REMOTE CONTROL UNIT for.....
CREDIT SALE TERMS, £3.10.0 Deposit and 9 monthly payments of £1.5.8. H.P. TERMS, £7 Deposit and 9 monthly payments of 17.9.
 - (b) The MULLARD 5-10 and the "Fidelity" PREAMPLIFIER-TONE CONTROL UNIT for..... **£18.18.0**
 - CREDIT SALE TERMS, £4.15.0 Deposit and 9 monthly payments of £1.14.7. H.P. TERMS, £9.0.0 Deposit and 12 monthly payments of 17.6.
- WHEN ORDERING PLEASE INCLUDE 7.6 to cover cost of Carriage and Insurance.

THE MULLARD "3-3" QUALITY AMPLIFIER



A small compact Amplifier capable of HIGH QUALITY REPRODUCTION on both RADIO and GRAM.

PRICE FOR COMPLETE KIT OF PARTS, **£6.19.6** (plus 6.6 carr. & ins.)
Alternatively supplied ASSEMBLED and READY FOR USE **£8.12.6** (plus 6.6 carr. & ins.)
The Complete SPECIFICATION and ASSEMBLY DIAGRAMS are available for 1.6.

Developed from the very popular 3 valve 3 watt Amplifier designed in the MULLARD LABORATORIES. We strictly adhere to the specification list; in addition we have added switched equalising for L.P. and 78 Records and a position for Radio Inputs, plus additional power to feed a Radio Tuning Unit. Extremely simple to assemble and ideally suitable to incorporate with an F.M. Tuner or Record Player in a small installation.

STERN'S "HIGH QUALITY" 8-10 WATT AMPLIFIER



Has power supply for Radio Tuning Unit

PRICE OF COMPLETE KIT OF PARTS (Plus 5/- carr. & ins.) **£7.10.0**
SUPPLIED ASSEMBLED and READY FOR USE **£9.10.0**

Proved one of the most popular models yet offered to the HOME CONSTRUCTOR. Provides excellent reproduction up to 8 watts, employing 6V6's in push-pull, incorporating negative feedback. Provides for use of both 3 and 15 ohm speakers.

SPECIAL CASH ONLY OFFER !!

This very attractive PORTABLE AMPLIFIER CASE together with a good quality GRAM AMPLIFIER and a matched 6" i.n. P.M. SPEAKER, ALL FOR ONLY **£8.7.6** (plus 7.6 carr. & ins.).



The Amplifier consists of a 2 Stage design incorporating the modern B.V.A. valves types ECC83, EL84 plus E/20 Rectifier and has separate BASS and TREBLE CONTROLS. The Portable Case will also accommodate almost any make of Autochanger and is attractively finished in Maroon and Grey colour Resine.

WE ALSO SUPPLY SEPARATELY--
(a) The 2-stage (plus Rectifier) AMPLIFIER..... **£4.2.6**
(b) THE PORTABLE CARRYING CASE..... **£3.17.6**
(c) 6" i.n. P.M. SPEAKER..... **16.9**
Carriage and insurance, 3/- extra.
We also have a smaller PORTABLE CASE Ideal for Record Players. PRICE ONLY **£3.0.0** (plus 3/- carr. & ins.).

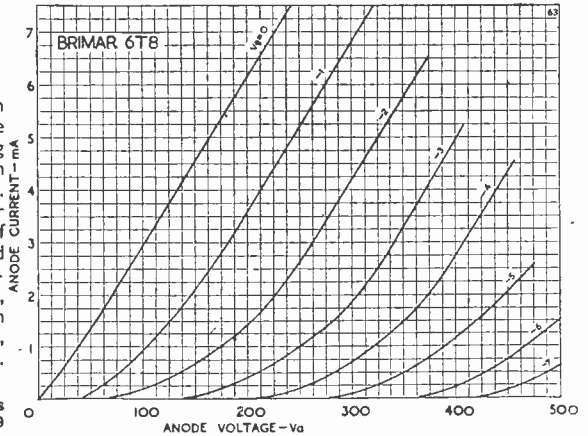
BRIMAR 6T8

The Brimar 6T8 is a triple-diode triode in which one diode has a separate cathode. The triode section has a high amplification factor making the valve suitable for use in AM/FM receivers in the demodulation and first stage audio circuits. The diodes may be used in series shunt limiter circuits, for example, in the audio sections of



television and communications receivers, followed again by the triode, section for A.F. amplification.

Near Equivalents
EABC80 DH719
6AK8



Typical Triode Operating Characteristics as an R.C. coupled amplifier.

Anode Supply Voltage	...	...	...	250	250 volts
Anode Load Resistor	...	...	...	0.25	0.25 megohms
Grid Resistor	...	...	...	1.0	10 megohms
Cathode Bias Resistor	...	...	...	3	0 kilohms
Peak Output Voltage	...	...	...	43	40 volts
Stage Gain (for 24 V peak to peak output)	...	...	...	42	42
Distortion (for 24 V peak to peak output)	...	...	...	1	5%

Keep this for further reference or write to the Publicity Department for a data sheet.

Standard Telephones and Cables Limited FOOTSCRAY, SIDCUP, KENT Footscray 3333

WEYRAD

"H" TYPE COILS— FOR MANUFACTURERS, SERVICE ENGINEERS AND INDIVIDUAL CONSTRUCTORS

A low-priced, soundly-designed Range of Coils, providing continuous coverage from 12 to 2,000 metres in 6 Bands.

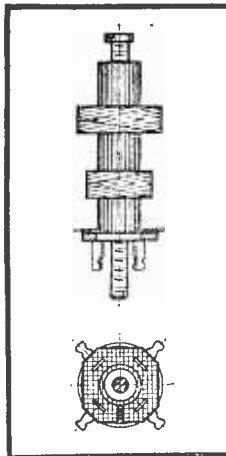
The coils are supplied in individual aerial, H.F. transformer and oscillator versions for each band. Iron dust cores are adjusted by means of a threaded brass stem with a screwdriver slot which permits fine adjustment of inductance without the danger of damage to cores. Circuit connections are made to 4 tags at the end of the former. Single 6 B.A. mounting.

"H" type coils are recommended for many popular circuits including the "Practical Wireless" AC/DC 3-valve Superhet and are widely used for servicing and conversion purposes.

RETAIL PRICE.....3/9 EACH

ILLUSTRATED FOLDER.....3d.

A.M./F.M. RECEIVER BOOKLET 2/6.



RANGES:

- Band 1—800-2,000 mtrs.
- Band 2—250-800 mtrs.
- Band 3—190-550 mtrs.
- Band 4— 90-250 mtrs.
- Band 5— 33-100 mtrs.
- Band 6— 16- 50 mtrs.
- Band 7— 12- 37 mtrs.

Coils are coded according to type and range :
HA 1 = Band 1 aerial
HO 3 = Band 3 oscillator

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

Perth

SETS THE HIGHEST STANDARD

**COMPLETE RADIOGRAMS
and RECORD PLAYERS**



**FREQUENCY MODULATED VHF
and STANDARD AM RADIO
RECEIVER and TUNER CHASSIS**



**CABINETS IN THE LATEST
CONTINENTAL and BUREAU
TYPE STYLING**



**HIGH FIDELITY and STANDARD
SPEAKER UNITS**



AUTOMATIC RECORD CHANGERS



DISC PLAYERS



AMPLIFIERS



LOUDSPEAKERS

*... for enthusiasts and those
who appreciate the finer
qualities of perfect
sound reproduction,
Perth Radios, manufacturers
of electronic equipment, provide
the complete answer with their
fully guaranteed components at
the keenest prices, plus a
generous extended credit plan.*



**SEND
FOR
ILLUSTRATED
CATALOGUE
AND
PRICE LIST**

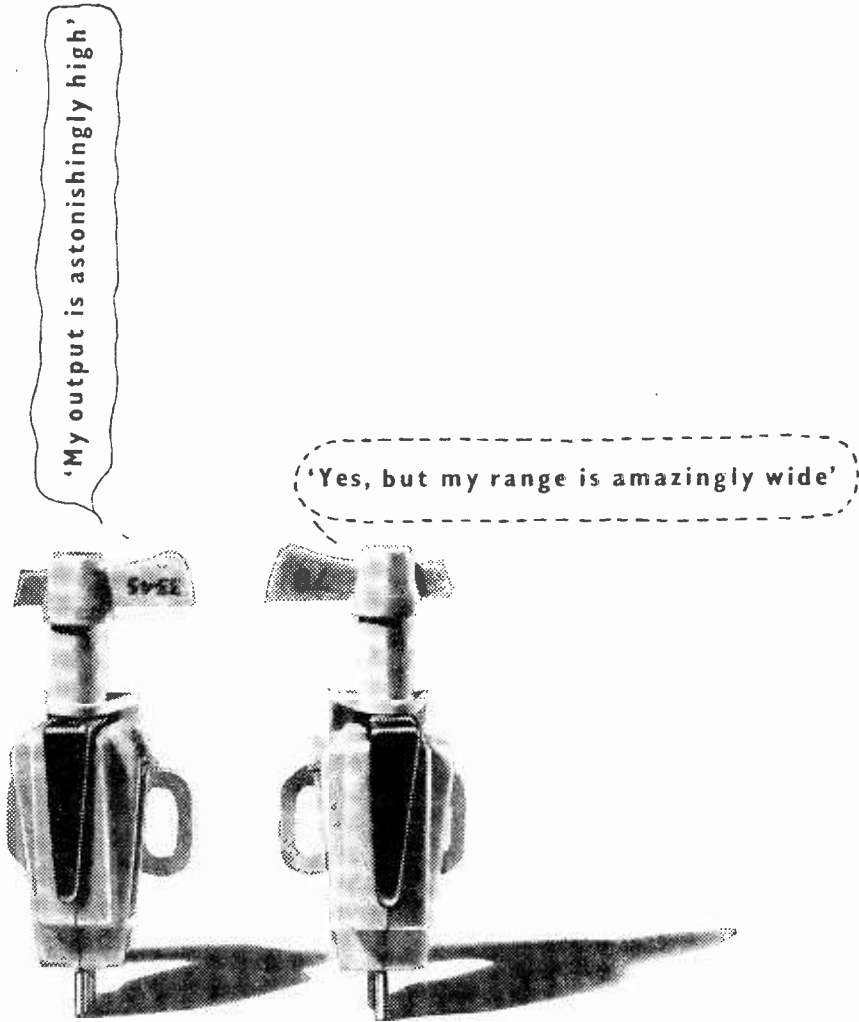
Perth

RADIO'S LTD

COMPONENTS DIVISION

MARTEN HOUSE
37-47 EAST ROAD, LONDON, N.1
Telephone : CLERKENWELL 2413,4





On the left is Acos Cartridge Type 65-3. Its output is as high as 1.0 V* (but its compliance is very good, for all that). On the right is Cartridge 65-1, whose frequency range extends to 12 kc/s. This one is particularly hi-fi, hi-g, high-quality (but its output is 0.15 V*, for all that). Both have x500 individually tested styli, in slip-in fittings. The length and breadth of the matter is that you'll not find a range of cartridges better than this Acos Series 65.

* At 1 cm/sec velocity, 1,000 c/s.

acos

ARE DOING THINGS IN STYL!

COSMOCORD LTD. WALTHAM CROSS HERTS. TEL: WALTHAM CROSS 5206 (London subscribers please dial WA4 5206)

PRACTICAL WIRELESS

EVERY MONTH

VOL. XXXIII, No. 611, NOVEMBER 1957

EDITOR : F. J. GAMM

25th YEAR
OF ISSUE

COMMENTS OF THE MONTH

BY THE EDITOR

SOUND v. TV IN FRANCE

VISITORS to this year's Radio Show will undoubtedly have formed the impression that the main emphasis was on TV, and the continuing increase in TV licences supports the view that the trade is now mainly TV minded. This is not the position, however, in France, for at the recent Radio Salon in Paris it was obvious that French manufacturers still consider radio their main market.

For the first time there was a separate gramophone record section, and it is significant that the 10,000,000th sound radio licence coincided with the opening of the exhibition. At present there are just over 10,000,000 licences in France. In this country the reverse is the case. During the past year the number of radio licences in France has increased by no less than 800,000 and the organisers of the exhibition stated that the output of sound sets this year will reach 1,500,000.

Yet in Great Britain, judging from the number of licences issued, the listening as distinct from the viewing public is on the wane.

Whereas British manufacturers tend to produce hideous futuristic designs of cabinets, garnished with ugly brass fittings, more reminiscent of the over-elaborate decoration of the Victorian era, as symbolised in the Albert Memorial, the French manufacturers are producing cabinet designs of more sober appearance. They are using lighter-coloured woods such as oak.

The decline in British sound broadcasting cannot entirely be ascribed, as we have commented before, to the competition of TV. The tendency to make programmes in this country parlour games interspersed with other inane programmes of the American style is no doubt a contributory factor. Our sound programmes have become stereotyped, which would indicate that producers are growing stale, and that a change in personnel is necessary. Of course, France is not so advanced in the sphere of TV as we are, and the relative high cost of a TV set in France may have engendered a reluctance on the part of the French public to buy TV sets. The position may, therefore, be merely a reflection of the French economic position rather than an indication of public taste. The position may change, however, during the next few years.

"PRACTICAL HOME MONEY MAKER"

OUR new companion journal the PRACTICAL HOME MONEY MAKER is now assured of a long and successful career, as indicated by the enormous demand for the first issue.

This new journal teaches you how profitably to employ your spare time in a very wide range of interesting hobbies. It tells you how to make and market and deals with Leather Work, Lampshades, Jewellery Making, Rugs, Pottery, Clock Repairing, Poultry Breeding, Small Scale Market Gardening, to mention only a few of the home-industry fields which it covers. It costs 1s. 3d. each month. It is bound to interest all members of the family. Have you ordered your copy?—F. J. C.

Our next issue, dated December, will be published on November 7th.

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 trans-
mission by Canadian Magazine Post.

SUBSCRIPTION RATES

including postage for one year

Inland - - - 19s. per annum.
Abroad - - - 17s. 6d. per annum.
Canada - - - 16s. per annum.

CONTENTS :

	Page
Editorial	599
Round the World of Wireless	600
A Beginner's Course of Con- struction	602
Converting the Command Receiver	605
On Your Wavelength ...	611
A Single-valve Transmitter	612
Transistors in Practice ...	614
A Neon Delay Switch ...	619
Marconi Doppler Navigator	621
Tape-recorder Dictation Switch	623
Auto Frequency Correction	628
The Radio Show, 1957 ...	635
Circuits for Two Transistors	639
Transmitting Topics ...	643
Tetrodes as Triodes ...	651
Programme Pointers ...	652
Open to Discussion... ..	655

The Editor will be pleased to consider articles of a practical nature. 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 to: The Editor PRACTICAL WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. Owing to the rapid progress in the design of wireless apparatus and to our efforts to keep our readers in touch with the latest developments, we give no warranty that apparatus described in our columns is not the subject of letters patent.

Copyright in all drawings, photographs and articles published in PRACTICAL WIRELESS is specifically reserved throughout the countries signatory to the Berne Convention and the U.S.A. Reproductions or imitations of any of these are therefore expressly forbidden. PRACTICAL WIRELESS incorporates "Amateur Wireless."

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 July, 1957, 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	1,143,188
Home Counties	1,152,273
Midland	877,607
North Eastern	1,149,055
North Western	847,295
South Western	726,152
Wales and Border Counties	458,743
Total England and Wales	6,354,313
Scotland	828,029
Northern Ireland	192,523
Grand Total	7,374,865

Radio-controlled Models

THE Post Office announced that 2,000 licences have now been issued in the United Kingdom for radio-controlled models such as aircraft, boats and cars, etc. These licences, which cost £1, remain in force for a period of 5 years.

This type of licence came into force on June 1, 1954, under The Wireless Telegraphy Act, 1949. One of the purposes of licensing is to prevent radio interference by controlling all uses of radio frequencies.

BBC Transmitters in the Isle of Man

THE BBC announces that a VHF transmitter to carry the Northern Home Service is to be installed on the same site as the permanent television station at Carnane in the Isle of Man. It is hoped that the transmitter will be ready for service early next year, thus giving many listeners in the Isle of Man, who provide themselves with VHF receivers and suitable aerials, the means of obtaining greatly improved reception free from interference from foreign stations. It is intended to add VHF transmitters for the Light and Third Programmes at a later stage and the building has been designed with this in mind.

Good progress is being made

on the permanent BBC television station at Carnane, which is now being built to replace the existing temporary station. It is expected to be ready for service by the end of this year, and will provide a substantial improvement in reception for all viewers who now receive the temporary station.

The combined television and VHF sound broadcasting station will be known as the Douglas Transmitting Station.

GATAC and Sea Slug

IT is now possible to reveal that GATAC—believed to be the largest analogue computer in Europe in the hands of a private firm—has been in use for many months for an intensive study of the performance of the naval guided weapon Sea Slug.

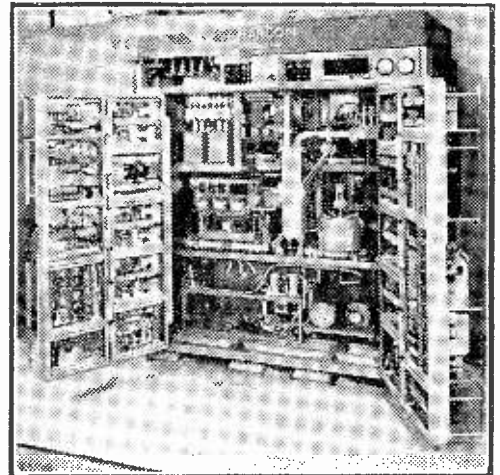
GATAC was designed and built by E.M.I. Electronics Ltd. to a Ministry of Supply order, primarily for the purpose of studying the complex non-linear three-dimensional control problems associated with guided weapons. It incorporates specially developed computing techniques which make it capable of simulating the control, guidance and propulsion systems of any existing British guided weapon together with its aerodynamic performance during

its flight—using for the first time, it is believed, purely electronic techniques to achieve this end.

In connection with the Sea Slug project, GATAC can be used to provide complete electronic simulation of every feature governing the controllability of the weapon in flight, and it is thus possible to obtain data on its performance which would otherwise require many hundreds of costly actual firings.

Radio/TV Sales Recovery

THE monthly retail survey issued by the British Radio Equipment Manufacturers' Association from the National Radio and Television Exhibition, Earl's Court, shows that sales for the first seven months were higher all round than in the first seven months of 1956 and are now



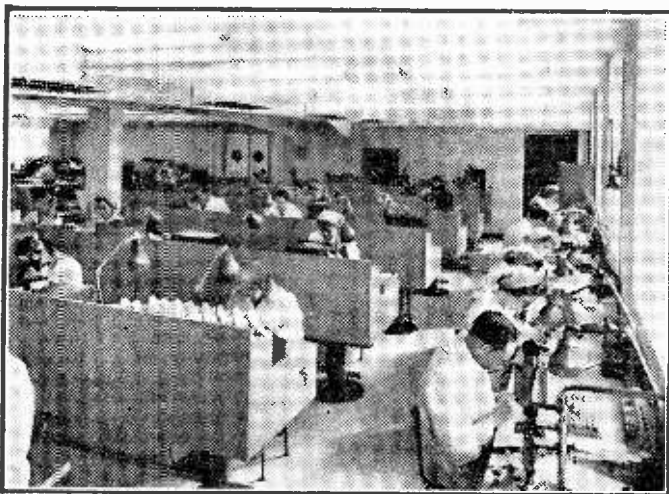
On public view for the first time at the 1957 S.B.A.C. Exhibition was the new Marconi Type SR1000 high-power transmitter/receiver. This is a 10 centimeter equipment with an actual output of 3 megawatts and incorporates many revolutionary features in its design. The single compact cabinet housing the equipment has built-in power supplies, cabling system, air and water cooling plant and a comprehensive waveform and performance monitoring system; the SR1000 is thus completely self-contained, requiring only connection to a three phase A.C. supply. The hinged gate frames which hold the small electronic units are shown in the open position, revealing the R.F. system situated at the rear of the cabinet.

beginning to compare with those for 1955.

Sales of radio sets, 610,000, compare with 502,000 for the first seven months of last year, and 604,000 in 1955; sales of television sets, 555,000, compare with 492,000 last year and 537,000 for the first seven months of 1955; and of radio-

Miniature Vibrating Crystal Experiments

HUNGARY'S electronic measuring instruments factory is experimenting with the production of a miniature vibrating crystal for use in frequency modulation radios, states the newspaper *Népakarat*. It is now



To improve the reliability of their products even further, AVO Ltd. have introduced a dust-free, air-conditioned zone within which instruments are built, calibrated, and tested, under ideal working conditions. All personnel entering the zone must comply with exacting standards of cleanliness, and even visitors must observe the regulations. These superior manufacturing conditions, as good as can be found in any similar plant abroad, help to keep English-made "AVO" products well ahead in the race for world business.

grams, 124,000, against 94,000 last year and 150,000 in 1955.

In July, retailers' sales of radio sets, 110,000, were 25 per cent. above those for June, 33 per cent. above those for July, 1956, and the highest since December last. Television sales, 75,000, were an increase of 39 per cent. on June, a decrease of 5 per cent. on July, 1956, but the highest since March last. Radiogram sales, 13,000, were 18 per cent. above those for June and 8 per cent. above those for July, 1956.

Direct Radiotelephone Service

CABLE AND WIRELESS, LTD. announce that a direct radiotelephone service has been inaugurated between Jamaica and Puerto Rico.

The service is available between 14.30 and 19.30 G.M.T. daily and costs £2 3s. for three minutes.

being tested under temperature conditions ranging from -40 to +60 degrees Centigrade, and it is expected that it will be possible to begin mass production next year.

New R.I.C. President

LORD BRABAZON OF TARA has been elected President of the Radio Industry Council in succession to Sir Edward Appleton.

His connections with the radio industry include a directorship of one of the leading manufacturing companies, the presidency for a time before the war of the now defunct Radio Manufacturers' Association and, of course, a close interest in aircraft in which radio and electronics become of increasing importance as speed, height and range increase.

H-tests May Cut Radio

IT was recently suggested by a senior U.S. meteorologist, Professor H. R. Byers, that any increase in radiation resulting from H-tests might eventually prevent world-wide radio. At present the ionosphere is mainly responsible for conducting radio waves and permitting world-wide communications. Fall-outs from H-bomb explosions are electrifying the atmosphere above the earth and this electrification may extend into the air, which, says Professor Byers, due to movement may result in the prevention of long distance radio waves.

Radio in France

AT the recent Salon in Paris radio sets formed the majority of exhibits, and it appears from licence figures and sales that, contrary to the trend in this country, radio is on the increase.

A REALLY "PRACTICAL" CHRISTMAS GIFT

Give your friends who are radio enthusiasts a really "different" and acceptable Christmas present . . . send them a year's subscription for PRACTICAL WIRELESS. All through the year they'll thank you as each new issue brings a fresh reminder of your good wishes.

So simple to arrange too! Just send your friends' names and addresses, together with your own, and remittance* to cover each subscription to Subscription Manager (G.I.), George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. We will despatch first copies to arrive in time for Christmas, and send an attractive Christmas Greetings Card in your name to announce each gift.

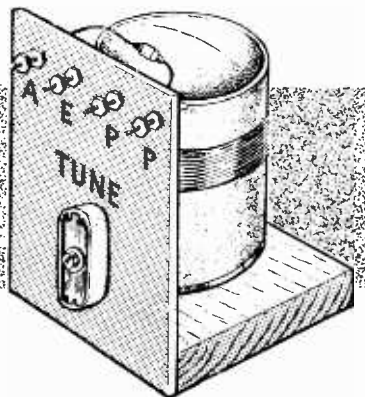
* RATES (INCLUDING POSTAGE) FOR ONE YEAR (12 ISSUES): U.K. 19s. 0d., OVERSEAS 17s. 6d., CANADA 16s. 0d., U.S. \$2.50.

A BEGINNER'S CONSTRUCTIONAL COURSE

AS DISTINCT FROM A THEORETICAL COURSE, THIS SERIES STARTED WITH A SIMPLE CRYSTAL SET, WHICH IS GRADUALLY MODIFIED IN STAGES, UNTIL IT BECOMES A CRYSTAL AND TWO TRANSISTOR LOUDSPEAKER SET

By E. V. King

(Continued from page 544, October issue.)



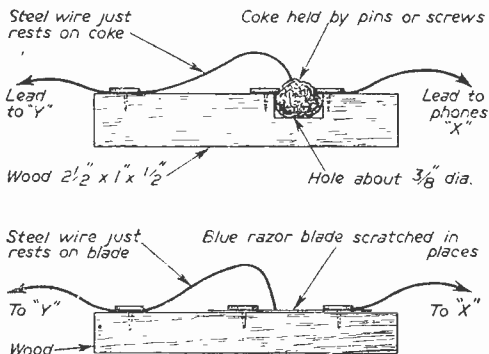
WHEN the trimmer is screwed up it is equivalent to putting turns on a coil and vice versa. Thus, if you are tuning in the Light Programme and you cannot undo the trimmer far enough to "peak" it, take off a turn of coil wire and try again. If you are careful you will get the Home with the trimmer screwed in and the Light with it out in the London area.

It is not suggested at this stage that this set is selective but for the beginner it is simple and is a certain successful start. Some interesting experiments using this receiver will now be given, together with modifications to improve the set's performance.

Crystal Experiments

By using the simple set just described the learner can perform some interesting and instructive experiments which will give him confidence and a better understanding of the working of the radio. Remember the remarks made about the fact that the aerial and earth must be first class.

When the set is working and has been tested, carry out the following experiments, remembering to make good soldered connections, and to scrape enamelled wire first. If any particular experiment is not successful revert to the original circuit to make sure the A., E., and phones are still all right.



Experiment 1

Try fitting the carton with coils with twice or half as many turns and retune the trimmer for the optimum position on one station. This experiment is best carried out in the evening when the medium-wave band is better received.

Experiment 2

Try a similar experiment, but this time pile the coil wires on top of one another instead of having them side by side.

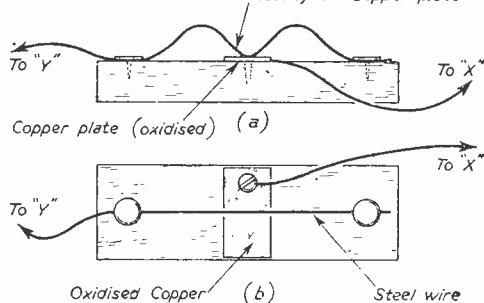
Experiment 3

Try introducing large iron and brass objects into the coil and retune the trimmer.

Experiment 4

Disconnect the diode (crystal) and in its place solder two leads about a foot long (X and Y, Figs. 4, 5 and 18). The diode crystal is not now used, and various "Prisoner of War" detectors are tried out. Take a piece of wood about 2 1/2 in. x 1 in. and 1/2 in. thick. Take a piece of dry coke as big as a pea and arrange it (Fig. 9) in a hole in the wood. Fix it with drawing pins or screws and attach a wire to one of these. Now a piece of steel wire from a wire brush or army "Don 5" telephone cable is arranged as shown, held by a

Steel wire rests heavily on Copper plate



Figs. 9, 10 and 11.—Four experimental crystal detectors.

pin at one end and resting extremely lightly on the coke at the other. The two leads fixed to the radio are now connected to this detector. Careful adjustment will get quite good reception. Some pieces of coke work better than others. Other crystalline substances may be used, i.e., galena, hertzite, zincite, graphite, silicon, various pyrites and molybdenite. Some work better with a copper wire in place of the steel one.

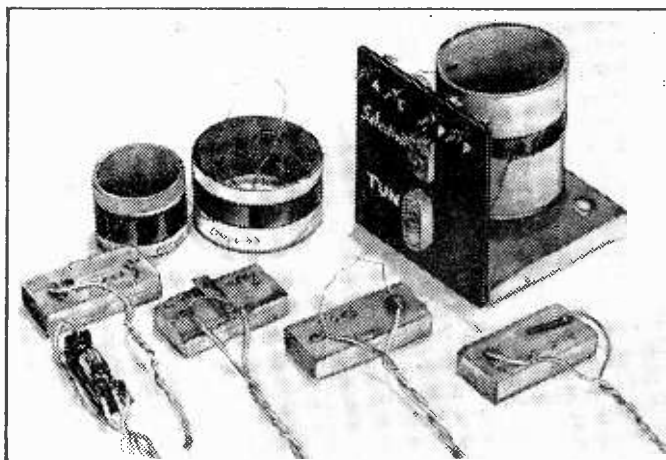
Experiment 5

Fix up the "blue steel" detector shown in Fig. 10. The author found the best results were obtained with a piece of corset steel with the celluloid cover removed. Blue razor blades or clock springs also work quite well. The surface of the steel should be scratched with a gramophone needle or glass cutter. The steel wire which rests on the blue steel must be carefully adjusted by trial and error, only the lightest contact is required. This detector is, of course, wired in place of the "coke detector" of experiment 4.

Experiment 6

If you have patience you may like to make a copper oxide rectifier (detector). This is more difficult, but once working it is more permanent than the previous types. The author, after many experiments, found it best to take a small, clean

piece of copper, heat it until it goes black, place it in weak ammonia solution for ten minutes, dry slowly and fix to the wood without fingering. The copper is thus coated with a reddish layer of oxide. Best results are obtained with the steel wire resting quite heavily on the oxide layer; the author found this pressure was best obtained by fixing the steel wire at each end, see Fig. 11.



The components used in this month's experiments.

Experiment 7

From a government surplus dealer obtain a thermionic diode such as a VR92 (EA50), this will cost about 1s. 6d. including the holder. Fix this up as a detector by reference to Fig. 12 (a), (b), (c) or (d).

The filament is connected directly to a 6v. battery but 4 volts will do, or you could use two cycle lamp batteries (Ever Ready 800) wired in series as shown in Fig. 12 (c). The filament will be

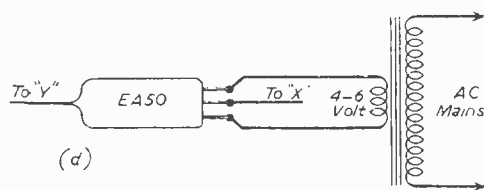
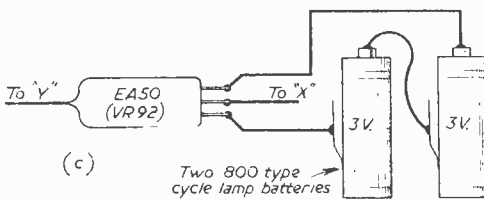
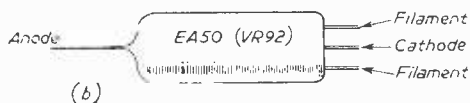
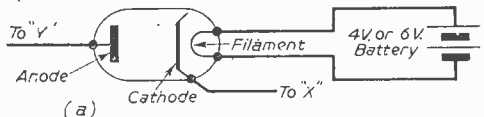


Fig. 12.—The thermionic diode detector.

LIST OF COMPONENTS

- (For Variable Selectivity and Experiments.)
- One 500 pF trimmer.
- Wood, steel, screws, pins, etc.
- VR92 (EA50) or similar diode.
- Torch batteries.
- Coke, Galena, Hertzite, Graphite, Silicon, etc.
- 26 s.w.g. enamelled copper wire.

seen to glow. Connect the anode and cathode to the leads X and Y as in experiments 4, 5 and 6. The results will be excellent and, of course, the detector will stand rough usage and vibration. In future if you suspect that your detector is faulty you can easily wire in this thermionic diode as a test.

Experiment 8

Put various small condensers or a trimmer (500 or 300pF) in the aerial lead as shown in Fig. 13. Always readjust the trimmer on the front panel. This aerial series condenser affects both volume and the ability to select stations (selectivity).

Experiment 9

Scrape off a little enamel in the middle of the coil and solder on a lead. The aerial is now disconnected from the terminal on the front panel and is connected to this centre tap. Try using an aerial series condenser as well. See Fig. 14.

Experiment 10

If you have some spare aerial wire around put

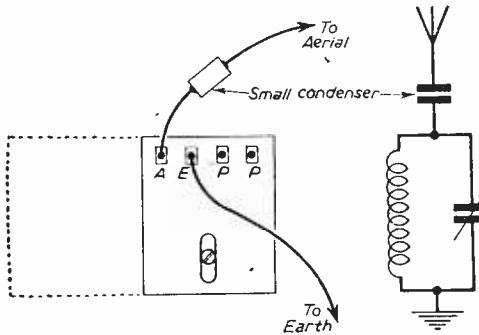


Fig. 13.—Experiment with aerial series condenser.

up another aerial parallel to and about a yard underneath the main one. It must be insulated from earth in the same way but is connected to the earth terminal in lieu of a proper earth. This can be used where the ground is very dry; it is known as a counterpoise system.

Experiment 11

If you have some spare enamelled or cotton covered copper wire between 26 and 40 s.w.g. try

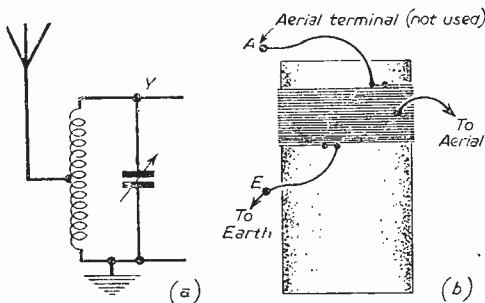


Fig. 14.—Experimental aerial input to centre tap.

to wind another coil to receive Droitwich on 1,500 metres (200 Kc/s). You will need between 100 and 150 turns. Even Moscow has been received on a crystal set in this country using the Long Waveband.

Experiment 12

Put the original coil back in and test the set. Now wind another carton with 24 turns of 26 s.w.g. enamelled wire. Refer to Fig. 15. Disconnect the aerial and connect it to the new coil, the other end of the coil going to earth. The coil is now placed directly over the top of the tuning coil and the trimmer readjusted. This is known as inductive coupling. You may also try

sticking some matchsticks on the tuning coil with Durafix so that you can wind the aerial coil on top but spaced away from the tuning coil. Note that the new coil must be close up to the original.

Experiment 13

This is a somewhat more advanced experiment. Obtain another round non-metal box 1/2 in. smaller in diameter than the original coil. Wind on about 30 turns of 26 s.w.g. enamelled wire and connect

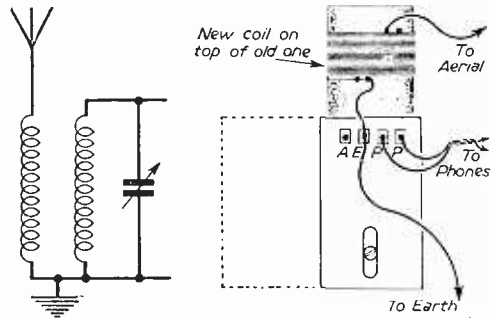


Fig. 15.—Inductive aerial coupling experiments.

up as shown in Fig. 16. Unscrew the trimmer and tune by moving one coil in and out of the other. Try turning one coil over so that the turns go in the opposite direction. This is known as variometer tuning.

Experiment 14

You may care to try to wind a coil to receive the Rugby G.P.O. transmitter on 16 Kc/s! Another Rugby transmitter works on 60 Kc/s (10.30 to 11.30 G.M.T.).

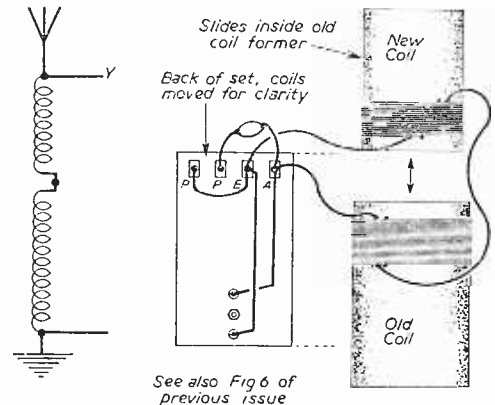


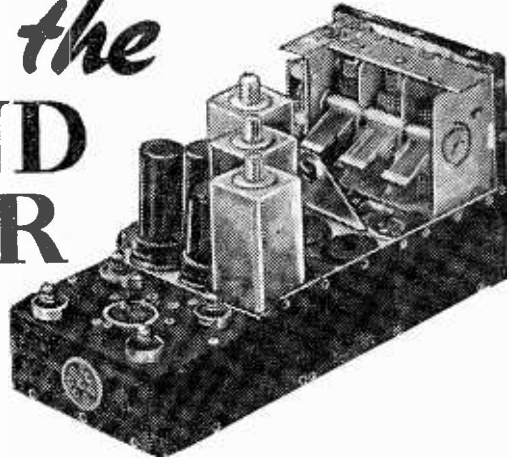
Fig. 16.—Experimental variometer tuning.

Modifications to the Basic Receiver

You may feel that after these experiments you can make some improvements on this set with your own ideas. Later some modifications will be given including the use of one transistor and widening the waveband coverage.

(To be continued)

Converting the COMMAND RECEIVER



MODIFICATIONS OF THE BC455 FOR
DX USE By R. E. S. Coulson

As these receivers cover from 6 to 9 Mc/s, they may be used as they are on 40 metres, or the coils may be rewound to cover the 10-metre band, but the bandspread obtained is not great. A better plan is to modify the set by the addition of another piece of cheap surplus, the RF24 converter: the resulting double superhet may then be used on 10 and 15 metres as well as on 40 metres. With a set so modified and costing less than £2. I have heard amateur stations all over Europe, including Greece, Yugoslavia and Latvia, and in New Zealand, U.S.A., Canada, Brazil, Ecuador, Puerto Rico, Iceland, S. Africa, Mozambique, Morocco, Israel and Macao.

The BC455 is one of a series (SCR 274) of receivers intended for use in aircraft. The valve line-up is 12SK7(R.F.), 12K8(F.C.), 12SK7(1F₂), 12SK7(1F₃), 12SR7(B.F.O., Det.), 12A6(Output). In addition, there are two neons, one across the aerial coil, the other across the output transformer.

The BC455 was intended for rack mounting and remote control. Because of this it has no controls, and all inputs and outputs are taken through plugs and sockets.

BC455 : Description

As may be seen from the circuit diagram (Fig. 2a, b, c, d), the BC455 is a six-valve superhet, covering 6 to 9 Mc/s, with an I.F. of 2.83 Mc/s. The first stage is an R.F. stage, using a 12SK7 pentode in a conventional circuit. For ease of alignment the aerial-coil trimmer is brought out to the front panel. A neon

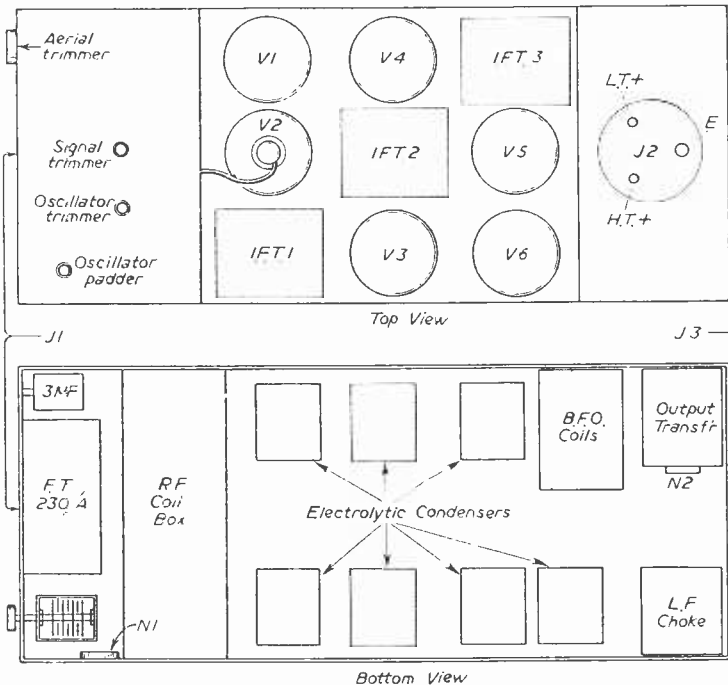
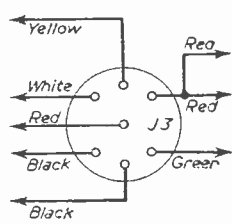
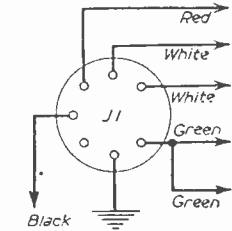


Fig. 1.—Top and bottom views of the receiver.

is connected across the aerial coil. A neon



lamp (which strikes at about 80 volts) is connected across the aerial coil to prevent overloading of V1.

Coupling to the second stage, the frequency changer (12K8) is by dust-cored coil L2, L3. The frequency

standard practice: the A.V.C. voltage for the set is not obtained from the D.D.T. stage, but from the diode action of the first grid and cathode of V4, the second I.F. amplifier valve. This is tapped via

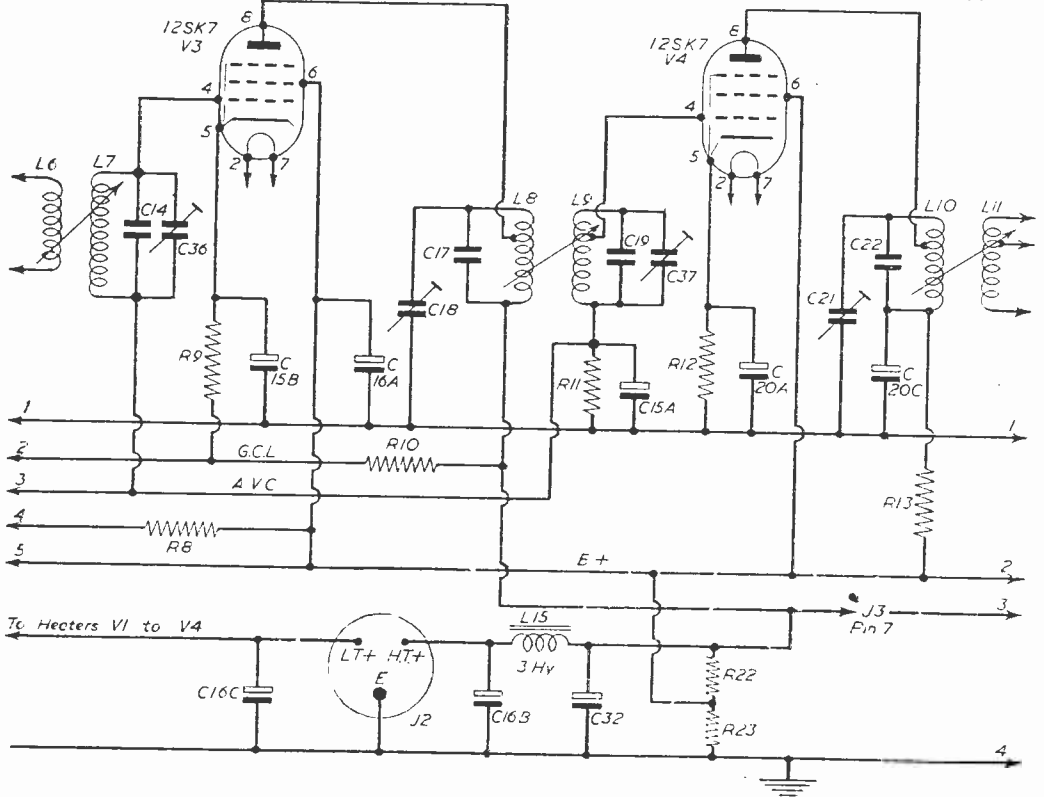


Fig. 2 (c).—The BC455/B I.F. amplifier. A list of parts appears on page 608.

changer is also standard, except that the oscillator triode is tuned in the anode circuit. The output from the F.C. is passed by L6, L7 (I.F.T.) to the I.F. amplifier. This is a two-stage job, having two 12SK7s coupled in the "middle" by L8, L9 (I.F.T.). The A.V.C. system departs from the

R11 and C15 and applied via R5 and C7C to V1 via R2, and directly to V3. The cathode return to V1, V2, V3 is made through the gain control line and by way of that down to earth through a 50 K

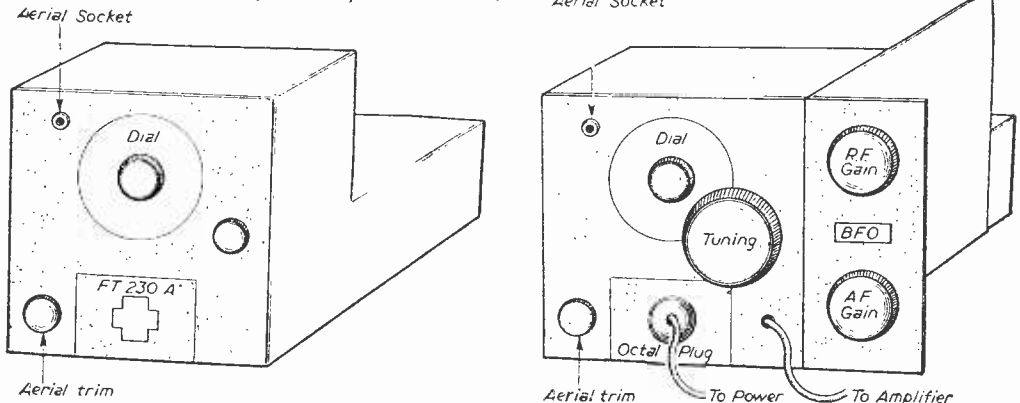


Fig. 5.—On the left the BC455/B before conversion, and on the right, after conversion.

potentiometer. This acts as a volume control. Detection is by one of the diodes of the 12SR7. The triode section of this valve is used as a B.F.O., with L12 and L13. Tuning is adjusted by means of a hole in the side of the chassis, through which C28 may be reached. This varies the B.F.O. pitch. The cut-off of the B.F.O. is accomplished by shorting down to earth the junction of R15 and R17. The A.F. signal is tapped from the bottom of L11 and passed via R18, 19, to C28, and the grid of the 12A6. The anode circuit of this valve carries a 'phone transformer giving outputs for 300-ohm or 4,000-ohm 'phones. It is shown in the 4,000-ohm position.

RF24: Description

The RF24 (Fig. 3) consists of an R.F. stage, VR65(SP61), feeding via a R.C. coupling to the grid coil of a mixer valve, VR65, which is cathode-coupled to a separate oscillator, VR65. The unit is switch-tuned and covers 20-30 Mc/s with an I.F. output in the region of 7-9 Mc/s. It has an output band-width of about 2 Mc/s, centred on 8 Mc/s.

Conversion

First, the heater circuit. Twenty-four-volt dynamos are in very short supply, and it is therefore advisable to re-wire the valve heaters to 12-volt

supply, so that they may be used either with a dynamotor or with a filament transformer.

The heater connections to all valves except the 12SR7 are to pins 2 and 7. On the 12SR7 pin 2 bears the grid, and the heater connections are to pins 7 and 8. The heaters are originally connected in series

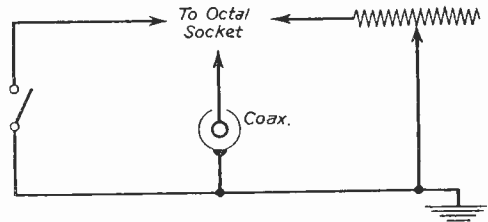


Fig. 6.—Connection to J1 or octal socket.

parallel, and must be converted to parallel in the manner shown in Fig. 4. The R.F.C. in the white lead, which goes from J1 to J3 is removed, the two white wires soldered together and wired to the H.T. + connection on J2, so that a connection is made between J1 and J2. This carries H.T. + input to the receiver.

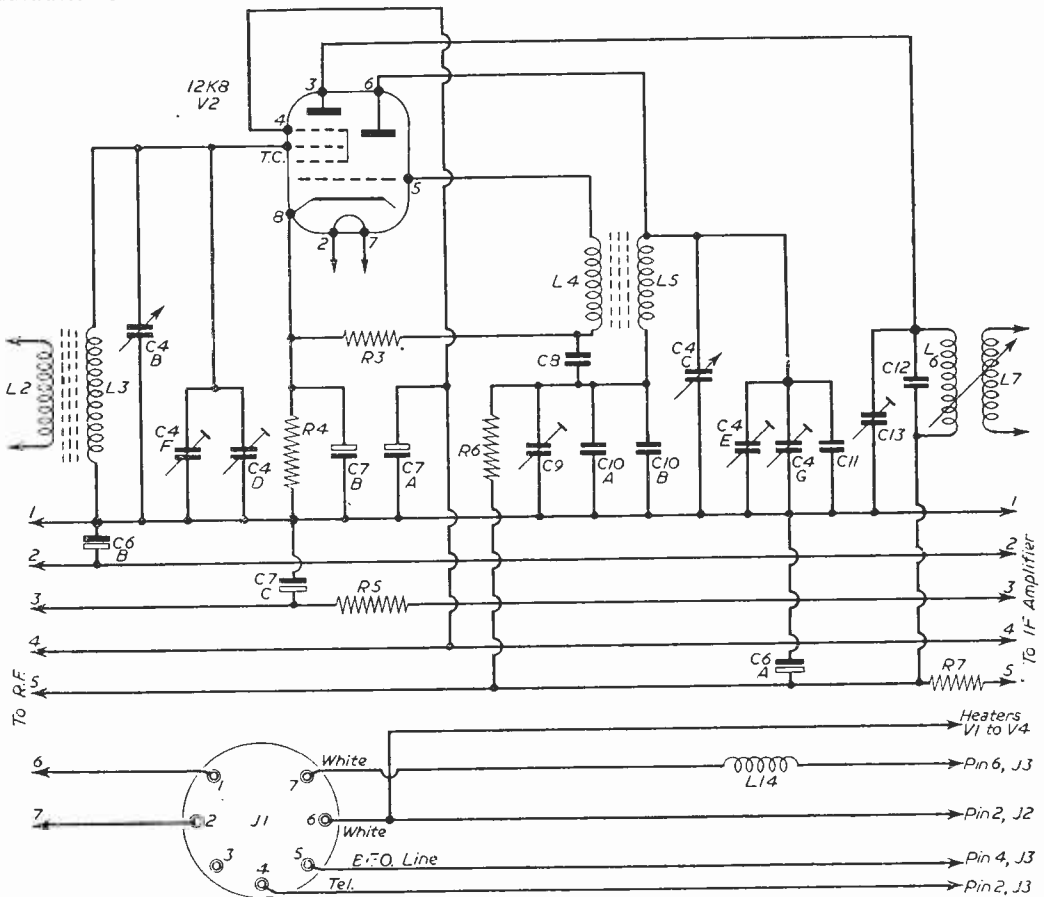


Fig. 2 (b).—The frequency-changer circuit. A list of parts appears on page 608.

Power Socket

Between the front panel and the coil-box will be found adaptor FT230A, which carries J1. It is entirely removed, complete with J1, and a piece of aluminium sheet is bolted in its place. This carries an octal socket, to which the connections of J1 are taken. An octal plug carrying the three input power leads is plugged into this socket.

Controls

These need some additional chassis space, which is obtained by bolting an L-shaped piece of aluminium sheeting to the right-hand side of the receiver (Fig. 5).

(a) *B.F.O.* This is a switch from the red wire of the

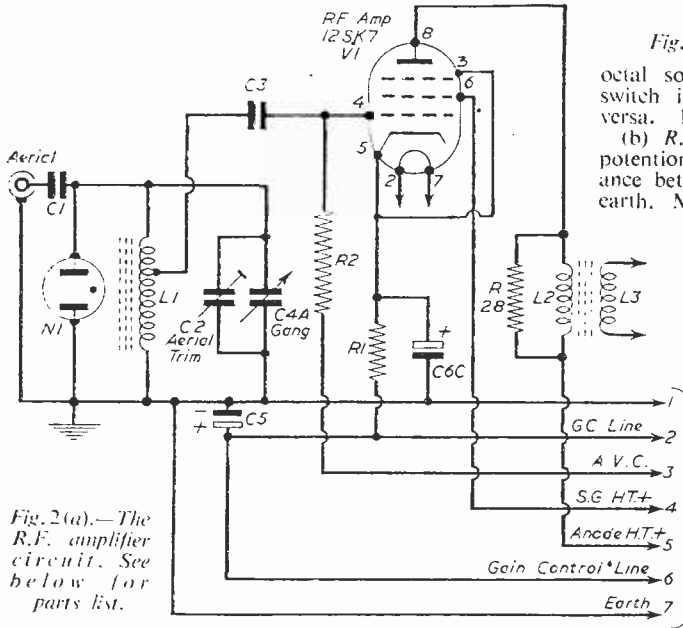


Fig. 2(a).—The R.F. amplifier circuit. See below for parts list.

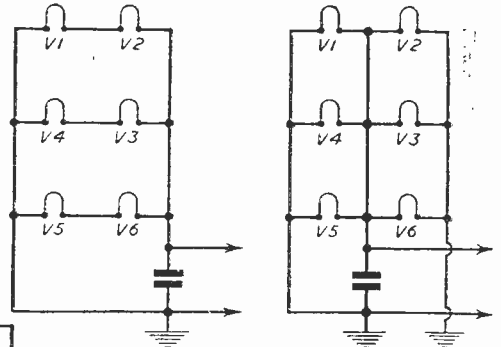


Fig. 4.—Heater circuit connections.

octal socket down to chassis. When the switch is on, the B.F.O. is off, and vice versa. Mount in middle of side panel.

(b) *R.F. Gain Control.* This is a 50 K potentiometer connected as a variable resistance between the green octal plug wire and earth. Mount as top control on side panel.

(c) *A.F. Gain Control.* This is a .1 megohm potentiometer connected in place of R18 and R19.

(d) *Tuning Control.* Force a tube of 1/4 in. inside diameter over the spindle in the tuning aperture and into this tube force a 1/4 in. spindle. A knob may then be fixed on it: no slow-motion drive is needed.

A.F. Output

The black wire from the octal plug is fixed to the centre connection of coaxial cable, and the outer braiding is earthed. Take the cable to H.R. phones or to an amplifier.

(To be continued)

COMPONENTS LIST

PARTS FOR FIG. 2 (a)

- R1—620 Ω
- R2—2 M Ω
- R28—51 K Ω
- C1—11 pF
- C2—15 pF trimmer
- C3—100 pF
- C4a—346 pF
- C5—3 pF
- C6C—.05 μF

PARTS FOR FIG. 2 (c)

- C14—180 pF
- C36—17 pF
- C15B—.05 μF
- C16A—.22 μF
- C16C—.22 μF
- C17—180 pF
- C18—17 pF
- R8—200 Ω
- R9—620 Ω
- R10—360 K Ω
- C15A—.05 μF
- C19—180 pF
- C37—17 pF trimmer
- C20A—.05 μF
- C20C—.05 μF
- C16B—.22 μF
- C32—5 μF 300 v.w.
- C21—17 pF trimmer
- C22—180 pF
- R11—100 K Ω
- R12—510 Ω
- R13—200 Ω
- R12—7 K Ω
- R23—7 K Ω
- L15—L.F. choke
3 henrys

PARTS FOR FIG. 2 (d)

- C23—180 pF
- C38—17 pF
- C24—200 pF
- C15C—.05 μF
- C26—100 pF
- C27—335 pF
- C28—34 pF
- C29—.006 pF
- C30—.15 μF
- C20B—.01 μF
- C35—750 pF
- R14—100 K Ω
- R15—20 K Ω
- R16—100 K Ω
- R17—100 K Ω
- R18—510 K Ω
- R19—100 K Ω
- R20—2 M Ω
- R21—1.5 K Ω

PARTS FOR FIG. 2 (b)

- C4 B, C—gang 346 pF
- C4 F, D, E, G—
50 pF trimmer
- C6B—.05 μF
- C7C—.05 μF
- C7B—.05 μF
- C7A—.05 μF
- C8—200 pF
- C9—40 pF trimmer
- R3—51 K Ω
- R4—620 Ω
- R5—150 K Ω
- C6A—.05 μF
- C10 A, B—670 pF total
- C11—3 pF
- C12—180 pF
- C13—17 pF
- R6—300 K Ω
- R7—200 Ω
- L14—RFC—112 μH

Constructors

at last a show for you

RADIO SOCIETY OF GREAT BRITAIN

RADIO HOBBIES EXHIBITION

ROYAL HORTICULTURAL OLD HALL

VINCENT SQUARE, LONDON, S.W.1

WEDNESDAY, OCTOBER 23 to SATURDAY, OCTOBER 26, 1957

11 a.m. to 9 p.m. Admission 2/-

Official opening by

SIR HAROLD BISHOP, C.B.E.

Director of Engineering, B.B.C.

Show will feature

HOME CONSTRUCTION—DO IT YOURSELF KITS OF PARTS FOR BUILDING—RECEIVERS, TRANSMITTERS, TELEVISION, TEST GEAR, HI-FI AMPLIFIERS, CONVERTERS, TRANSISTOR EQUIPMENT, TAPE RECORDERS, AERIALS.

HOMEBUILT LIVE AMATEUR TELEVISION STATION ON BAND 4.
HOMEBUILT LIVE AMATEUR RADIO STATION TALKING TO THE WORLD. TECHNICAL BOOKSHOP DISPLAY.

**PRIZES FOR HOME CONSTRUCTED EQUIPMENT SHOWN
WIN A COMMUNICATION RECEIVER**

Show this advertisement at
the door for your entry form

Details from P. A. THOROGOOD, G4KD
35, Gibbs Green, Edgware, Middx.
Telephone : MUSeum 3450

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 (carriage, etc., 15/-).

WIRELESS SET NO. 19 Mk.II.—The famous Army Tank Transmitter-Receiver. Incorporates "A" Set (TX/RX covering 2.0-8.0 Mc/s, i.e. 37.5-150 metres), "B" Set (VHF TX/RX covering 230-240 Mc/s, i.e. 1.2-1.3 metres) and Intercommunication Amplifier. Complete with 15 valves as follows: 6 of 6K7G, 2 of 6K8G, 2 of 6V6G, and 1 ea. 6BB6, 6H6, E1148, EF50, 807, and booklet giving circuits, notes, etc. Size 17 1/2 in. x 8 1/2 in. x 12 1/2 in. Magnificently made by famous American firms. IN NEW CONDITION. ONLY £4.19.6 (carriage, etc., 10/6). OR with 12 volt Power Unit, £5.10.0 (carriage, etc., 15/-).

AMERICAN COMMAND RECEIVERS. A few still available. Top band model (1.5-3.0 Mc/s.). Used, good condition, 65/-, OR BRAND NEW IN CARTONS, 75/-.

MARCONI SIGNAL GENERATORS TF-390G. Frequency coverage 16-150 Mc/s. BRAND NEW IN MAKER'S ORIGINAL TRANSIT CASES, with instruction manual. For normal A.C. mains operation. A unique opportunity to acquire Laboratory Equipment at a fraction of original cost. ONLY £27/10/-.

MARCONI BAND III CRYSTAL CALIBRATORS. Frequency range 170-240 Mc/s. Incorporates 5 Mc/s crystal for better than .001 per cent. accuracy. Directly calibrated dial, internal A.C. mains pack. Complete with spare set of valves and instruction manual in maker's transit cases. BRAND NEW. ONLY £4/19/6.

POWER UNIT TYPE 3. Primary 200/250 v. 50 cycles. Outputs of 250 v. 100 mA. and 6.3 v. 4 amps. Fitted with H.T. current meter and voltmeter. For normal rack mounting and has grey front panel size 19 in. x 7 in. ONLY 70/- (carriage, etc., 7/6).

6 v. VIBRATOR PACKS. Output approx. 130 v. at 30 mA., fully filtered and smoothed. Complete. ONLY 12/6.

RIISS SUPER SLOW-MOTION TUNING ASSEMBLY. As used on all late model RI55s. Easily fitted to "A" sets, etc. ONLY 12/6.

RF UNITS TYPE 26. Similar in all respects to RF UNIT 27 required for "Practical Wireless" FM FEEDER UNIT, with exception of Frequency Range. Covers 65-50 Mc/s (5-6 metres). Complete with valves, and BRAND NEW IN MAKER'S CARTONS. ONLY 25/- 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 1.9-8.0 Mc/s, and is complete with 100/1,000 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.

EHT TRANSFORMERS. 5.5 kV. (Rect.) with 2 v. 1 a., 79/6. 7 kV. (Rect.) with 2 v. 1 a., 89/6. 2.5 kV. (Rect.) with 2-0-2 v. 1.1 a., 2-0-2 v. 2 a. (for VCR 97 tube, etc.), 42/6 (postage 2/- per trans.).

L.T. HEAVY DUTY TRANSFORMERS. Ex-Admiralty, with 230 v. 50 cycles primary. Secondaries 5, 10, 15, 20, 25, 30 volts at 5 amps. ONLY 29/6. (Postage 2/9.)

INSULATION TESTERS (MEGGERs). Read up to 20 megohms at 500 volts pressure. Overhauled and in perfect order. ONLY £8.10.0.

A.C./D.C. BLOWERS, 220-250 volts 300 watts. Complete with filter pads, branch for dividing outlet, flexible hoses, etc. BRAND NEW. ONLY £4.19.6.

POCKET VOLTMETERS.—Read 0-15 volts and 0-300 volts A.C. or D.C. BRAND NEW and UNUSED. ONLY 18/6.

WALKIE TALKIE TYPE 18. Covers 6.0-9.0 Mc/s. Transmitting and receiving units in metal case, complete with valves. In excellent condition. ONLY 79/6.

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

U.E.I. CORPORATION

138, Gray's Inn Road, London, W.C.1 (Phone: TERminus 7937)

Please include carriage costs on ALL items.

(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.)

ADCOLA

(Regd. Trade Mark)

SOLDERING EQUIPMENT



ILLUSTRATED

3 1/2" Detachable bit type (List No. 64)

Protective Shield (List No. 68)

Catalogues sent FREE

Telephones: MACaulay 4272 & 3101

British and Foreign Patns.

Reg. Designs, etc.

Head Office, Sales:

ADCOLA PRODUCTS LTD.

Gauden Road, Clapham High St., London, S.W.4

EDDY'S (Nottm.) LTD.

(DEPT. P.W.)

172, ALFRETON ROAD, NOTTINGHAM

THIS MONTH'S SPECIAL OFFERS

RECORDING TAPE: 1,200ft. reels, 9/11 each. Postage, etc., 1/- extra.

5 INCH SPEAKERS. New and Guaranteed, 16/11 each. 2/- extra Post and Packing.

GERMANIUM DIODES, 1/- each. Post 3d.

Any parcel insured against damage in transit 6d. EXTRA

NEW AND GUARANTEED VALVES

Post, etc., 6d. per valve. Over £2 FREE.

AZI 12/11	PY81 8/11	5Z4G 9/6	7H7 8/6
CY31 12/11	PY82 8/3	5Y3GT 7/3	757 9/6
DM70 7/11	UBF80 9/6	6BA6 6/6	7Y4 7/11
EABC80 7/6	UCH42 9/11	6B6 7/11	10F9 11/6
EB91 6/11	UF41 8/11	6B8G 3/6	14S7 12/11
ECC84 10/11	UY41 7/11	6F1 13/6	25A6G
ECC85 9/-	1A7G 12/11	6F15 13/11	12/11
ECH35 10/6	1CSG 10/6	6K7G 2/11	25Z4G 8/11
ECH42 9/6	1NSG 10/6	6Q7G 7/11	25L6G 10/6
ECL80 8/6	1RS 7/11	6Q7GT 8/3	35L6GT 9/11
EF80 8/-	1S5 7/3	6U4GT	35A5 10/6
EF41 9/3	1T4 7/3		35W4 8/11
EF86 12/11	3Q4 8/11	6V6GT 5/11	954 1/6
EF89 9/6	3Q5 9/11	7B7 8/6	955 3/11
EL84 9/11	3S4 8/6	7C5 8/6	956 2/11
EY51 9/11	3V4 8/6	7C6 8/6	958 3/11



On Your Wavelength

BY THERMION

I.P.R.E. Comes of Age

THE Incorporated Practical Radio Engineers was founded 21 years ago, and it celebrated its coming of age with a dinner and dance at the Café Royal in August. The chief guest was the Marquess of Donegall. This Institute during its 21 years of continued progress has played an important part in providing the pool from which the industry draws its technicians, and notwithstanding the difficulties of the war years its energetic secretary, Mr. W. Edwardes, has with the aid of his Council, carried on this important work.

Twenty-one years ago the industry was staffed by the early radio amateurs and transmitters who were the only technicians then available. They were quite unequal in numbers to the demand, and the I.P.R.E. realising the necessity for providing service engineers with the qualifications the Institute provides commenced its work of removing the deficiency.

The exchanging of technical information and the provision of lectures are two of the services contributing to this end. All of these points were dealt with by Mr. D. M. Hall when he proposed the toast of the Institute, and Mr. F. J. Camm, Hon. Member, in reply said that it was time that the work of the Institute, hitherto somewhat hidden under a bushel should have the limelight of publicity directed towards it, and as a birthday gift donated space in this journal so that the story can be properly told. As a further birthday gift he donated the sum of £25 to the funds of the Institute.

The President, that enthusiastic radio and television expert Mr. C. H. Gardner, announced that the Marquess of Donegall had accepted Hon. Membership of the I.P.R.E.

Particular tributes were paid to the work of Mr. Edwardes, the Gen. Sec., and to Mrs. Edwardes, and presentations were made to each. Donations had been received from members from almost every part of the world, as a result of which Mr. Edwardes was handed Premium Bonds to the value of £200 and Mrs. Edwardes a suitably engraved watch.

There must be many readers of this journal who ought to be members of this old-established Institute, and I suggest that they add impetus to its work by joining it.

Radio in Schools

I HAVE received many letters from schoolmasters on the subject of teaching radio in schools and criticising the master whose letter I quoted last month, and who thought that radio taught very little.

I will quote only one of these letters from a schoolmaster who for obvious reasons wishes to remain anonymous. He not only feels that radio

should be taught in the schools since it is so much a part of our everyday life but that it should become, what it is not at present, a standard part of the school curriculum. He also very much agrees with my views on "Music and Movement." He thinks that like radio programmes, lessons have now become a matter of parlour games. He says that children do not want to *learn*, they want to *know*, but they want to do so without having to make the effort to learn. No doubt information can be picked up the play-way, but it is only superficial information.

The cursory and somewhat casual education received by scholars to-day, even at universities, is well known to employers, some of whom did not have the advantage when they were young of the educational opportunities available to-day.

Applicants for posts cannot answer the most elementary questions regarding English, mathematics and geography. Some of them cannot construct a reasonably grammatical letter. Many of them, however, are experts on jazz and are accomplished dancers! Some of the teenagers now entering the labour force for the first time can rock their bodies in rhythm with a barrel organ, no doubt as a result of musical movement, but they cannot spell.

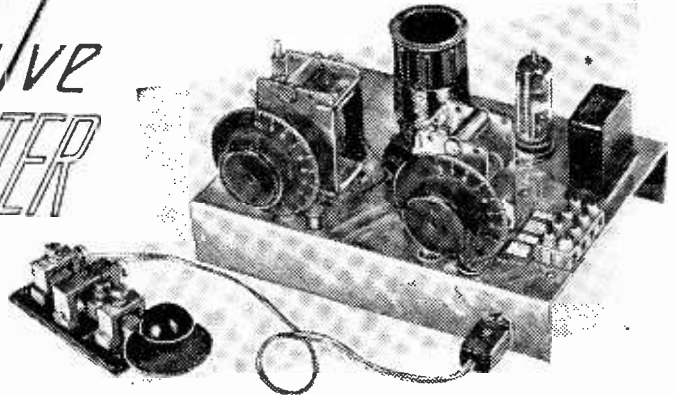
The influence of radio as a teacher and the new psychological approach to education, has produced a nation of juvenile half-witted prigs, who do not wish to work but want the highest possible pay for being there. The few critics who wish to eviscerate me because I want "Music and Movement" stopped should remember these incontrovertible facts. The BBC is performing a great disservice by allowing it to continue—apart from its continued interference with standard pronunciation. These are really matters which the Minister of Education should take up at once, for the BBC is doing great national harm in teaching education as if it were a joke. Educational standards are undoubtedly falling very seriously, and so is school discipline as a result. Give a boy the cane and the father is round the following morning threatening action.

This master started a radio club some years ago and it has 20 keen members. They run lectures by experts and by members. One afternoon a week the science labs are open for constructional work. The club runs exhibitions with prizes. If it is found that this absorbing hobby interferes with the lad's education in other directions he is threatened with expulsion from the club unless he improves and this usually has the desired effect. Many of the lads who have left have obtained important posts. Whilst I have not been able to reply to all the letters I have received individually, may I in closing this topic express my thanks to all those who have written to me.

A Single Valve TRANSMITTER

MODULATING THE ONE VALVE,
TWO STAGE TRANSMITTER

By R. H. Wright



MODULATING this transmitter (originally described in the September issue) for R.T. use involves slight alteration to the original circuit and little additional expense, while the few extra components can probably be accommodated on the transmitter chassis.

One advantage of using a pentode in the power amplifier stage of a low power transmitter such as this, is that modulation can be carried out quite efficiently by applying the modulating voltages to the suppressor grid. In this way it is possible to obtain up to 100 per cent. modulation with negligible distortion.

With such a system of modulation the D.C. screen current—and hence the screen grid losses—tend to be somewhat higher. This arises from the fact that since the total D.C. space current undergoes little change with suppressor grid modulation (this current being mainly controlled by the potentials applied to the control grid and screen grid) as the current to the anode is reduced the screen current must become correspondingly larger. This tendency to increase the screen losses usually limits the output power in suppressor grid modulators.

The Modulator Circuit

From Fig. 2, which shows the circuit of the modulator unit, it will be seen that a single valve is used. This is an EL91, triode connected.

The audio output from the microphone is passed through the microphone transformer to the grid of the modulator valve and the output from this valve is transformer coupled and applied between suppressor grid and cathode and the pentode section of the ECL80. A negative bias of about 6 volts is applied to the suppressor grid from a 9-volt grid bias battery to prevent suppressor grid current during positive half cycles of modulation. This bias, as well as the energising voltage for the microphone, can be taken from the same battery. The actual bias to the suppressor grid may need some final adjustment for good modulation.

In the original transmitter, the microphone transformer was from a scrap T1154. However, suitable microphone transformers are frequently advertised in these pages.

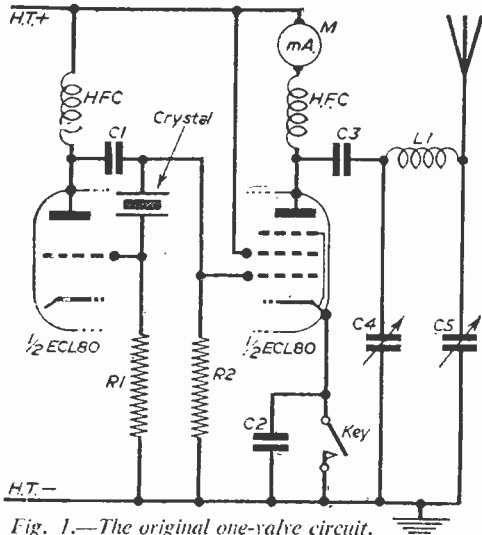


Fig. 1.—The original one-valve circuit.

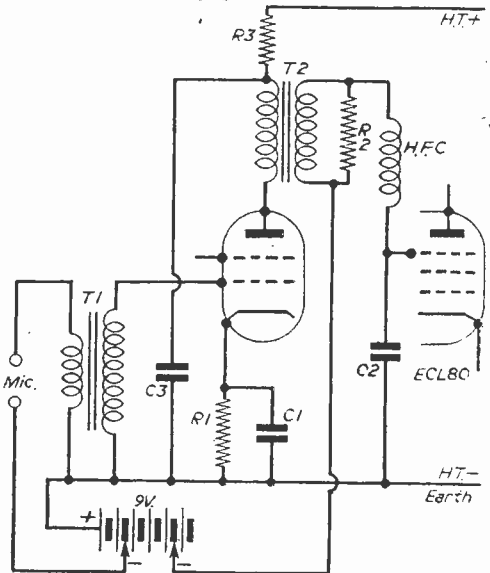


Fig. 2.—The modulating stage.

Circuit Changes

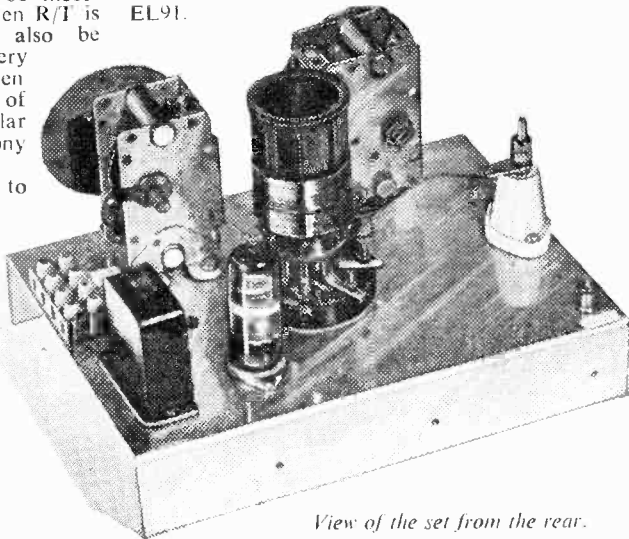
Comparison with the original circuit will show that it is only necessary to disconnect the suppressor grid-cathode link at the valveholder and connect the suppressor tag to the junction of the H.F. choke and C2 in the modulator unit. This unit can draw its supplies from the transmitter power unit, requiring 250 volts H.T. and 6.3 volts for the heater.

If the transmitter is to be used for both CW and R/T transmissions, a switch may be incorporated to earth the suppressor grid when R/T is not required. This switch should also be arranged to disconnect the bias battery and so prevent it from discharging when not actually required. One word of warning: if you wish to remain popular with other "hams" do not use telephony on the CW sections of the bands!

For use on the top band (1.8 to

2.0 Mc/s). L1 in the transmitter should have 43 turns, close wound, of 22 s.w.g. on a standard 1½ in. diameter former.

If the 6V6 amplifier stage has been added (as described in the October issue), suppressor grid modulation of the P.A. is not possible. In this case, screen modulation may be employed. The circuit of the modulator remains almost the same except that the intervalle coupling transformer, T2, is now replaced by an audio choke and the screen of the 6V6 connected to the anode of the EL91.



View of the set from the rear.

ADDITIONAL COMPONENTS REQUIRED

- R1—470 ohm 1 watt resistor.
- R2—22,000 ohm ½ watt resistor.
- R3—4,700 ohm 1 watt resistor.
- C1—25 µF, 25 volt electrolytic capacitor.
- C2—200 pF, mica capacitor.
- C3—1 µF (350 v. D.C.) capacitor.
- H.F.C. Eddystone H.F. choke, type 1010.
- T1—Microphone transformer.
- T2—Intervalle coupling transformer (5 : 1 step-up).
- EL91 or equivalent.
- B7G valveholder.
- P.O. type carbon microphone.

No. 2

OUT OCT. 17TH

FIRST NATIONAL MAGAZINE EVER FOR

SPARE TIME

MONEY MAKING

Practical HOME MONEY MAKER is planned to help you add welcome pounds to your income . . . surely, quickly, enjoyably . . . in the comfort of your own home. It's packed with fascinating, earn-as-you-learn ideas which show you how to use your spare time for profit . . . how you and your family can make money in dozens of new ways . . . how to market what you make.

Some of the profitable hobbies covered in the early issues

LEATHER HANDBAGS, PURSES AND WALLETS . RUG-MAKING . SOFT AND MECHANICAL TOYS . PLASTIC WARE . LAMP SHADES . JEWELLERY . POTTERY . ORNAMENTS . PHOTOGRAPHY . WEAVING . HOME KNITTING MACHINES . PICTURE-FRAMING . TICKET-WRITING . STAMP COLLECTING . RABBIT BREEDING . POULTRY BREEDING . AQUARIA . WOODWORK . BASKET WORK

Practical HOME

MONEY MAKER

MORE PLEASURE FROM YOUR LEISURE — MORE MONEY IN YOUR POCKET!

1/3

MONTHLY

TRANSISTORS *in Practice*

IN THIS ARTICLE FURTHER NOTES AND CIRCUITS ARE GIVEN

(Continued from page 539, October issue)

Common Emitter Circuit

THIS mode of operation is most generally used now that junction transistors have ousted the point contact variety for normal use. The current gain available from a common emitter circuit is an obvious advantage, permitting the cascading of circuits as successive amplifying stages coupled by resistances and capacitances only, so avoiding the need for interstage transformers. The input and output impedances being less diverse in the case of common emitter connection also eases the problem of interstage coupling.

The common emitter connection is inferior to the common base connection in one respect. Transistors are limited in the upper frequency at which they will work usefully and the current gain figures quoted in the data refer to audio signals. As frequency increases α decreases and manufacturers quote an α cut-off frequency. This indicates the order of frequency up to which the transistor is likely to work (actually it is the frequency at which gain drops by 3db, compared with its value at low frequency). Until recently transistors freely available in this country have had a comparatively low cut-off frequency, but now transistors with cut-off as high as 7 Mc/s have been made generally available. A higher operating frequency is practicable, however, with common base than with common emitter connection. The OC71, for instance, has a cut-off with grounded base connection at 500 Kc/s, whereas with grounded emitter it is falling off at 10 Kc/s.

The basic common emitter circuit is given in Fig. 4. The battery E_b is connected to bias the emitter positively with regard to base and E_c makes the collector negative with regard to base. The two batteries, so far as the collector/base circuit are concerned, are in series but in opposi-

tion, so that the effective collector voltage is the difference between those of the two batteries— E_c must obviously be the greater. It would be more convenient, in practice, to tap the base into the battery, as in Fig. 5, which will be seen to give exactly the same circuit slightly rearranged. Taps can be something of a nuisance, however, and a convenient and simple way to avoid them is to use a resistor between base and battery negative, as in Fig. 6. This resistor and the internal resistance of the transistor between base and emitter can be considered as providing a potentiometer across the battery providing the base with its proper

Many readers experience difficulty in understanding how the modern transistor operates, and therefore a short series of articles has been prepared to explain their action—in theory and practice. Later articles will give practical circuits.

voltage, much as though it was trapped into the battery as in Fig. 5. Cascading such stages to give successive amplification, still retaining the single battery technique, produces the circuit in Fig. 7. The load resistors R_2 and R_4 will have smaller values than in the case of valve circuits—actually of the order of 3.3 K Ω where the purpose is to drive a succeeding stage of a similar type. In view of the lower impedances involved the coupling capacitances for a given frequency range have to be much higher in value than in the case of the familiar valve circuitry.

It will be remembered, perhaps, from the explanation given in the series of articles dealing with valve amplifiers that the criterion is the ratio of resistance to capacitive reactance. A value of .05 μ F to .1 μ F is generally specified for coupling valves—2 μ F is about the lowest value suitable for these transistor circuits. Clearly, one of the virtues of transistors is their small size, but little benefit would be derived from this if coupling capacitors of large physical size had to be used. Fortunately for this purpose miniature

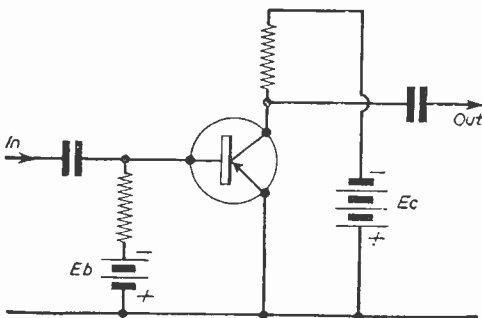
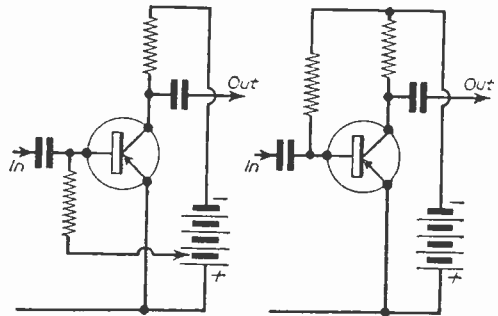


Fig. 4.—A common emitter amplifier.



Figs. 5 and 6.—Avoiding the use of two separate batteries by a tapping (left) and (right) by means of a base resistor.

electrolytics of low voltage working have been developed. As with all electrolytics, these must be connected in accordance with their polarity—the positive side generally going to base.

Input Conditions

It will be appreciated by now that the input conditions of a transistor circuit are vastly different from those of a valve. Its input impedance is finite, and its effect on the circuit feeding it cannot be ignored as with the common valve circuits at audio frequencies. This follows from the fact that the transistor is current driven. Now if the input were purely resistive it would not be necessary to stress this distinction because in a resistance the current waveform is identical with the voltage waveform. Just consider Ohm's Law if there is any doubt about this. Unfortunately,

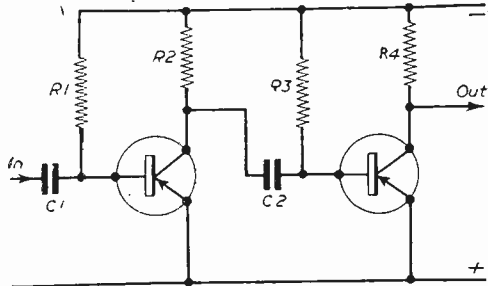


Fig. 7.—Common emitter amplifiers in cascade.

the input characteristic of a transistor does not exhibit a linear voltage/current characteristic, and it is the current waveform that is reproduced with a minimum of distortion at the output. Where the signal source is in the form of a voltage it is necessary to ensure that the source resistance is high compared with the input impedance of the transistor. When this is done the source resistance predominates in determining the current that will flow. The curvature of the transistor voltage/current curve is then swamped by the source resistance and distortion due to the transistor input characteristic is avoided. Often, therefore, there will be a resistor in series with the transistor input as in Fig. 8 which, at first glance, is doing nothing but waste valuable input signal but which, in fact, is supplementing the internal source resistance in order to ensure that the current flowing into the transistor is proportional to the voltage signal from the source. The well-equipped constructor who uses an oscilloscope to check his amplifiers will run into difficulties if he adopts the usual technique of feeding the transistor amplifier input signal to his oscilloscope amplifier, which is voltage operated. He must insert a resistor in series with the transistor input circuit, small enough not to affect the working of the input circuit, and take the voltage signal generated across this resistor into his oscilloscope.

D.C. Stabilisation

The collector and base of a transistor form a diode with reverse bias, and, as has been stated, the reverse resistance is far from being infinite. Consequently a current, called the leakage current, flows even when there is no current in the emitter/base circuit. The manufacturing spread allowed, even for transistors sold through the manufac-

turers' normal channels, is greater than with valves, and consequently the characteristics of transistors nominally similar in type are likely to be appreciably different. Those sold through the surplus market will have even wider spread. This will affect the leakage currents of various specimens. The leakage current is also a function of junction temperature, which is affected both by atmospheric temperature and by the working conditions of the transistor, and so is sensitive to any changes in operation. In the case of the common base connection this current is but a few microamps. It is not, therefore, an appreciable part of the total current and consequently variations due to this cause are not serious. This

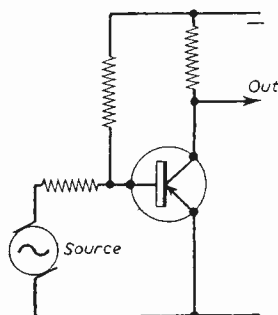


Fig. 8.—Series resistance to ensure current drive.

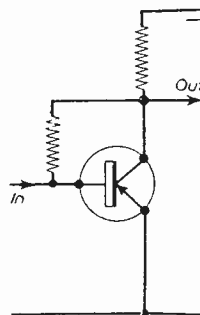


Fig. 9.—D.C. stabilisation by collector feedback.

method of connection is therefore relatively stable from the D.C. point of view.

Common emitter circuits are less satisfactory in this respect. Leakage current is subject to amplification by transistor action in this method of connection, and variations due to manufacturing spread and temperature variation are much more important. Indeed, leakage current in the output circuit can attain serious proportions, running the transistor into the extreme of its characteristic, causing clipping that prevents it from dealing with the signal applied or, in the case of power transistors, may even induce "thermal runaway" by cumulatively feeding back the effect of temperature increase until the transistor destroys itself.

Some measure of D.C. stabilisation has to be included in the common emitter circuit, therefore. The simplest method is to feed the base from the collector instead of from the battery negative terminal. This is shown in Fig. 9. This method is economical in that no additional components are needed but some signal feedback takes place along the D.C. feedback line, reducing the overall gain. The amount of signal feedback depends on the ratio of the feedback resistor to the base-emitter impedance and with normal values will not be very great. It can be avoided by decoupling the feedback so far as signal frequencies are concerned. This is just like decoupling used in valve circuits, using an additional resistor and capacitor, the two resistors having together the value of the single resistor used to feed back in the previous case so as to obtain the same D.C. conditions. This is given in Fig. 10.

The principle of this form of D.C. feedback is that a change in collector current, say, due to a

change in temperature, causes a change in voltage drop across the load resistor. This change is communicated to the base and so the base current is changed. This changes the collector current in a direction to oppose the initiating change, so providing negative feedback and stabilising the circuit.

Unfortunately, the size of the feedback resistor in this arrangement is determined by the value of the bias current needed to operate the transistor at the chosen point, and it is unlikely that this would prove right from the feedback point of view. It is better than no stabilisation at all, but an alternative method is preferred. In this method the base is fed from a potentiometer across the supply voltage. A resistor is included in the emitter circuit which provides feedback as does a cathode resistor in a valve circuit. In order to avoid signal feedback, which would reduce gain, this resistor is bypassed so far as the signal is concerned by a capacitor. The circuit is given in Fig. 11. A change in collector current is accompanied by a change in emitter voltage and this is effectively in the base/emitter circuit, changing the voltage between these two electrodes in such a way that the resulting change in current flow in the base circuit tends to cause a change in collector current in opposition to the initiating change. Thus D.C. negative feedback is achieved without loss of gain by signal negative feedback, and the cathode resistor can be adjusted to the value needed for the degree of feedback required for D.C. stabilisation. The method of stabilisation just described is made even more effective than it seems at first glance by virtue of the input characteristic of the transistor. The effect of the feedback is to produce a voltage across the emitter resistor which is fed back. The transistor being current operated is stabilised by virtue of the current in the base circuit produced by this voltage. It has already been said that the input characteristic is not purely resistive and consequently the current fed back is not in proportion to the voltage. In fact, the curvature of the input characteristic has the effect of accentuating the feedback. Stages using this circuit can easily be cascaded to give cumulative amplification and the resultant circuit using three stages appears in Fig. 12.

Practical designs will be given utilising the principles here explained and from which further

practical points of design will arise, but before proceeding it would be as well to take stock and see what can be expected from transistors. They are not the answer to all electronic problems, as has often been represented, nor are they expected to replace the more conventional valve in all applications. Their great virtues are small size and modest power requirements. Wherever miniaturisation is looked for, therefore, they are likely to be applied. Frequency range, however,

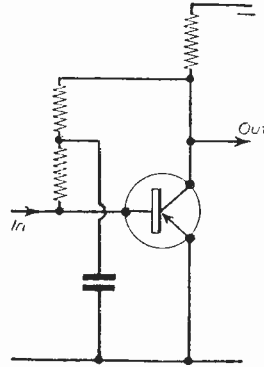


Fig. 10.—D.C. feedback without signal feedback.

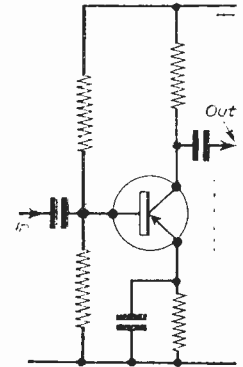


Fig. 11.—Preferred method of D.C. stabilisation.

is still severely limited compared with the valve, and power output transistors are still rare and expensive. For the ordinary domestic receiver undoubtedly valves are still more suitable, particularly if power is to be drawn from the mains. Miniature amplifiers of the kind used for deaf aids provide an obvious application. For battery receivers, of course, and particularly if they are needed to be portable, as most battery receivers are these days, they are very attractive because they need only a low voltage supply and they draw very little current. Here it is desirable to put the craze for high power output in perspective. It is quite likely that shortly transistors giving outputs up in the region of watts will be available and the thought is attractive. Nothing is free in this world, however, and all this power has to be supplied from the driving battery. Now if 6 volts supply is used

and an output of 3 watts audio is needed, assuming rather optimistically that the output stage has a 100 per cent. conversion efficiency, half an amp. will be drawn from the battery on that account alone. Actually, conversion efficiency will be much less than 100 per cent. and so an amp. or so of power will be needed. What sort of battery is going to provide this kind of power? Of course, class B operation is likely to be used so that the average power drawn would be much less than peak. (To be continued)

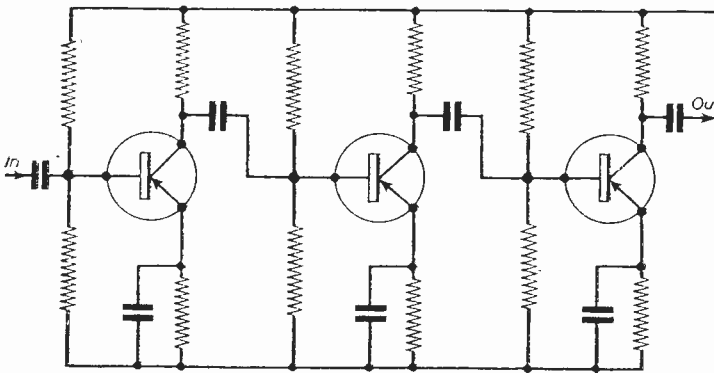


Fig. 12.—Three-stage stabilised common emitter amplifier.

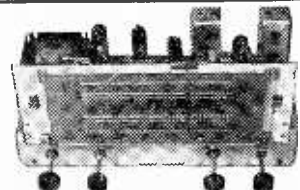
C.R.T. ISOLATION TRANSFORMER

Type A. Low leakage windings. Ratio 1:1.25 giving a 25% boost on secondary. 2 v., 10/6; 4 v., 10/6; 6.3 v., 10/6; 10.8 v., 10/6; 15.3 v., 10/6. Ditto with mains primaries, 12.8 each. Type B. Mains input 220/240 volts. Multi Output 2, 4, 6.3, 7.5, 10 and 15 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 2.5-121-21-23 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., 15p. 1/3; 250 pf., 1/6; 500 pf., 75p. 1/3. RESISTORS. All values. 10 ohms to 10 meg. 1/2 w., 4d.; 1/4 w., 6d.; 1/8 w., 8d.; 2/5 w., 1/-.

12.6 PURETONE RECORDING TAPE 1,200 ft. on standard 7" Plastic reels. Spools 5" metal, 1/6, 7" metal, 2/3. FERROVICOE 1,200 ft. Plastic Tape 25/-

O/P TRANSFORMERS. Heavy Duty 50 ma., 4/6. Multitap, push-pull, 6/6. Miniature, 35s. etc., 4/6. L.F. CHOKES 15 to 10 H. 40p. 1/2; 10 to 10 H. 80 ma., 8/6; 10 H. 150 ma., 12/6. MAINS TRANS. 350-0-350, 80 ma., 5/-; 3 v. tapped 4 v. 4 a., 5 v. tapped 4 v. 2 a., ditto 250-0-250, 22/6. Bargain 300-0-300 65 ma., 8 v. 4 a., 1 v. 2 a., 15/-.



1957 RADIOGRAM CHASSIS THREE WAVEBANDS FIVE VALVES

M.V. 20 m.—30 m. LATEST MULLARD M.V. 20 m.—350 m. LCH42, EF41, EC841, L.W. 800 m.—2,900 m. EL41, EZ40. 12 month guarantee.

10 gns. Carr. & Ins. 4/6. TERMS: Deposit £5.5.0 and six monthly payments of £1.

RECOMMENDED FOR ABOVE CHASSIS * COLLAR * HIGH-FIDELITY AUTOCHANGER 1957 Model RC453 7in., 10in., 12in. Records 16, 33, 45, 78 R.P.M. 4 SPEEDS—10 RECORDS With Studio "O" pick-up BRAND NEW IN MAKER'S BOXES

OUR PRICE £9.15.0 post free TERMS: Deposit £5.5.0 and six monthly payments of £1. SPARE required 14in. x 12in. 5in. above and 3in. below. Cut out board, 6/-

GARRARD 4-SPEED RECORD CHANGERS RC120/4H 1957 Models Brand new and fully guaranteed 12 months. AUDIO PERFECTION

Desired to play 16, 33, 45, 78 r.p.m. Records. 7in., 10in., 12in. Lightweight Xtal pick-up, turnover head, two separate sapphires sth. for Standard and L.P., each plays 2,000 records. Voltage 200/250 A.C.

OUR PRICE £10.15.0 each. Post Free. Terms: Deposit £8 and 6 monthly payments of £1. Spare required 14in. x 12in. 5in. above and 3in. below. Cut out board, 6/-

AMPLIFIER—RECORD PLAYER CABINETS. Cabinet size 18 1/2 in. x 13 1/2 in. H. 8 1/2 in. with motor board 14 in. x 12 1/2 in., £3.3.0, post 3/-

ALUMINIUM CHASSIS. 18 x 6 w.g. milled. With 4 sides, flanged corners and battery fixing holes. 2 1/2 in. side, 7 x 4 in., 4/6; 2 1/2 x 6 in., 5/9; 1 1/2 x 7 in., 6/9; 1 1/2 x 9 in., 9/8; 1 1/2 x 11 in., 10/6; 1 1/2 x 14 in., 12/6; 1 1/2 x 16 in., 16/6.

TRANSISTORS. Audio, 10/-; R.F. 2.6 Mers. 21/-; Mullard OC71, 20/-

SUPERHEAT COIL PACK. 27.6. Miniature size 2 1/2 in. x 2 1/2 in. HIGH "Q" Dust coated Coils. Short, Medium, Long, Grain switching. Single hole fixing with connection diagram and circuit, 6s. 6d. L.P.

FAMOUS MAKE 4-speed Motor and Turntable with selecting switch for 16, 33, 45, 78 r.p.m. records, 200-250 v. A.C. 50 cps. Also HIGH FIDELITY Lightweight Pick-up Aco Xtal turnover head, separate Sapphire sth. for L.P. and Standard records. SPECIAL OFFER, THE TWO, £4.12.6, post 2/6. 14 x 12 in. Cut Out Board, 6/-

SUITABLE AMPLIFIER-PLAYER CABINET. Ready cut out for above, 45/-

CRYSTAL MIKE INSERT by Aco. precision engineered. Size only 1 1/2 x 3/16 in. Bargain Price 6/6 No transformer required.

CHAMPION VHF (FM) TUNER, 88-96 mc/s.

5 Mullard valves and superb tuning heart. Maroon and cream receiver style cabinet 12 x 6 x 6 in. Features: This is self-powered 200-250 v. A.C. VHF (FM) adaptor with operating and servicing data and a screened lead for connection to pickup sockets of any radio, radio-gram, or amplifier. Brand new with 12 months' guarantee. List price, 16 gas. Our price, 10 gns., carr 4/6.

Volume Controls 80 ohm CABLE COAX

Long spindles. Guaranteed 1 year. Midget 10,000 ohms to 2 Meg. Losses cut 50%. 3/4, 4, 4/9. 1/4 in. or Log Tracks. 1/4 in. Coax. 8d. yd.

COAX SOCKETS ... 1/4" DOUBLE SOCKET ... 1/3 SOCKET ... 1/4" DOUBLE SOCKET ... 4/8 BALANCED TWIN FEEDER, yd. 6d., 80 or 300 ohms. DITTO SCREENED per yd. 1/-, 80 ohms only. WIRE-WOUND POTS. 3 WATT. Pre-Set Min. T.V. Type. All values 25 ohms to 30 K, 3/- ea. 100 K, 4/-; Carbon 50 v. 300 to 2 m., 3/-.

I.F. TRANSFORMERS 7/6 pair 465 Kcs/Sig tuning Miniature Can. 2 1/2 in. x 1 in. x 1 in. High Q and good bandwidth. By Pre Radio. Data sheet supplied.

NEW ELECTROLYTICS. FAMOUS MAKES TUBULAR TUBULAR CAN TYPES 1250 v. 2/-; 100/25 v. 2/-; 8-16/500 v. 5/6; 2450 v. 2/-; 16-16/500 v. 6/-; 4-5 v. 2/-; 16-16/500 v. 25-20/450 v. 5/6; 8/450 v. 2/3; 6-32-32/550 v. 4/8; 8/500 v. 2/8; CAN TYPES 22-22/450 v. 6/8; 16/450 v. 3/3 Clips; 30-50-50/450 v. 7/-; 16/500 v. 4-16/450 v. 3/6; 60-60-60/450 v. 11/3; 32/450 v. 5/6; 32/250 v. 5/6; 30/25 v. 1/5; 500/12 v. 1-1,000 + 1,000/6 12/8; 30/50 v. 2/8-16/450 v. 5/-

SCRAY Brite Type 512, 8500 v., 3/-; 16/500 v., 4/-; SENTERCEL RECTIFIERS. E.H.T. TYPE FLY-BACK VOLTAGES. K3/25 2 kV., 5/-; K3/40 3.2 kV., 7/-; K3/45 3.6 kV., 7/6; K3/50 4 kV., 8/-; K3/100 8 kV., 14/6. MAINS TYPE CONTACT COOLED 250 v., 50 ma., 8/6; 250 v., 85 ma., 9/8. COILS Weirite, "P" type, 3/- each. Osmer Midget "Q" type, 4/-; dust core, from 4/-.

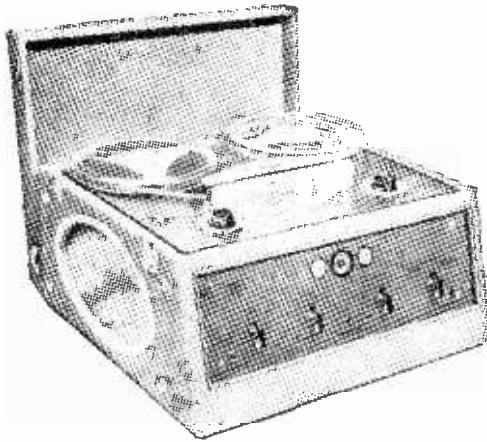
JASON F.M. TUNER COIL SET. 26/-. H.F. coil, aerial coil, oscillator coil, two I.F. transformers 10.7 Mc/s. Detector transformer and heater choke. Circuit book using four 6AM6, 2/-; J.R. Chassis and Dial, 19/6. Complete Jason F.M. Kit, £5.18.6. With Jason superior calibrated dial. £6.15.0.

FULL WAVE BRIDGE SLENIUM RECTIFIERS 6/6 or 12 v., 11 amp, 8/9; 2-4, 11.3; 4-4, 17/6. CHARGER TRANSFORMERS. Tapped input 200/250 v. for charging at 2, 6 or 12 v., 11 amp, 15/6; 2 amp, 17/6; 3 amp, 22/6.

TOGGLE SWITCHES. S.P. 2T, D.P. 3.6. D.P. 2.1-V. WAVECHANGING SWITCHES. 5 p. 4-way 2 water, long spindle ... 6/8 2 p. 2-way, 3 p. 2-way, short spindle ... 2/6 2 p. 4-way, 4 p. 2-way, 4 p. 2-way, long spindle 2/8 2 p. 4-way, 1 p. 12-way, long spindle ... 3/8 VALVEHOLDERS. Pax. Int. Oct., 4d. EF50, EA50, 6d. B1A, CRT, 1/3. Eng. and Amer. 4, 5, 6, 7, and 9 pin, 1/-; MOLDED Masts and Int. Oct., 6d. B7G, B5A, B5B, B5A, 9d., 3/6 with cap, 1/6. VCO9, 2/6; B5A with cap, 2/6; CERAMIC RF50, B7G, B9A, Int. Oct., 1/-; B7G with cap, 1/9. BLACK CRACKLE PAINT, air drying, 3/- 1 tin.

Table with 4 columns: Item ID, Description, Price, and Notes. Includes items like 165, 185, 194, 2X2, 3V4, 354, 384, 3U1, 3Y3, 5Z4, 6AN1, 6B8, 6BE9, 6BE14, 6BE15, 6BE16, 6BE17, 6BE18, 6BE19, 6BE20, 6BE21, 6BE22, 6BE23, 6BE24, 6BE25, 6BE26, 6BE27, 6BE28, 6BE29, 6BE30, 6BE31, 6BE32, 6BE33, 6BE34, 6BE35, 6BE36, 6BE37, 6BE38, 6BE39, 6BE40, 6BE41, 6BE42, 6BE43, 6BE44, 6BE45, 6BE46, 6BE47, 6BE48, 6BE49, 6BE50, 6BE51, 6BE52, 6BE53, 6BE54, 6BE55, 6BE56, 6BE57, 6BE58, 6BE59, 6BE60, 6BE61, 6BE62, 6BE63, 6BE64, 6BE65, 6BE66, 6BE67, 6BE68, 6BE69, 6BE70, 6BE71, 6BE72, 6BE73, 6BE74, 6BE75, 6BE76, 6BE77, 6BE78, 6BE79, 6BE80, 6BE81, 6BE82, 6BE83, 6BE84, 6BE85, 6BE86, 6BE87, 6BE88, 6BE89, 6BE90, 6BE91, 6BE92, 6BE93, 6BE94, 6BE95, 6BE96, 6BE97, 6BE98, 6BE99, 6BE00.

NEW AND ENLARGED SHOWROOMS NOW OPEN OUR WRITTEN GUARANTEE WITH EVERY PURCHASE. Please address all Mail Orders correctly as below. RADIO COMPONENT SPECIALISTS 337 WHITEHORSE RD., WEST CROYDON OPEN ALL DAY—(Wed. 1 p.m.) Catalogue 6d. Tel. THO 1665. Buses 133 or 68 pass door. 48-hour postal service. P. & P. 1/2, £2 orders post free. (Export extra.) C.O.D. Service 1/6.



Brenell

—for the man who wants
most for his money

THE big feature that attracts everyone to Brenell is its magnificent workmanship and the astonishing simplicity of its mechanism. By clever engineering methods, production costs have been cut and performance standards raised to new levels. This is why Brenell can offer you so much more for your money—a Tape Recorder that will enable you to make recordings from microphone, radio or disc of excellent quality in your own home. Send for the literature and get the facts about the many Brenell exclusive features without delay. Available from all Hi-Fi and Tape Recording specialists:

BRENNELL FEATURES

- Heavy Duralumin Baseplate
- Three independent motors
- Three speeds: 3½, 7½ and 15 i.p.s.
- Takes 8½ inch Reels
- Foolproof drop-in tape loading
- Instant stop without tape spill
- 2-knob interlocked control
- Magic Eye Recording Indicator
- Fast re-wind in 45 seconds
- Azimuth sound-head adjustment
- Digital Rev. Counter (optional extra)

Brenell Mark IV Tape Recorder (including 1200 ft. of Tape) complete in cabinet as shown 53 gns.

Brenell Tape Deck only 22 gns.
Brenell Pre-Amp Unit 16½ gns.
Brenell Power Pack £4.18.0d.
Rev. Counter (if required) 30,-

In case of difficulty write to Sole Manufacturers:

Brenell Engineering Co. Ltd.

1A DOUGHTY ST., LONDON, W.C.1. Phone: HOLborn 7358

Taylor

JUNIOR UNIVERSAL METER

Model 120A

A small 21-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.



Size: 4½" x 3½" x 1½"
Weight: 14 ozs.

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.

ALL TAYLOR instruments available on HIRE PURCHASE and 7 DAYS' APPROVAL.
UNIQUE OFFER: You can part-exchange an old Taylor Instrument for a new one—write for details and catalogue.

TAYLOR ELECTRICAL INSTRUMENTS LTD.
Montrose Avenue, Slough, Bucks.
Telephone: Slough 21381. Cables: Taylins, Slough



PERSONAL POSTAL TUITION

WHAT CAREER DO YOU WANT?

- Architecture
- Building
- Carpentry
- Commercial Art
- Diesel Engines
- Draftsmanship
- Electrical Eng.
- Electric Wiring
- Forestry
- Locomotive Eng.
- Machine Design
- Mechanical Eng.
- Motor Engineering
- Plumbing
- Quantity Surveying
- Radio Engineering
- Sanitary Science
- Surveying
- Telecommunications
- Television
- Book-keeping
- English
- Geography
- Journalism
- Languages
- Mathematics
- Modern Business Methods
- Police Subjects
- Salesmanship
- Shorthand
- Short Story Writing
- and many others

OR WHY NOT OBTAIN A QUALIFICATION?
A.M.I.C.E. A.M.I. Mun. E. A.C.I.S.
A.M.J. Mech. E. A.M.S.E. A.C.C.S.
A.R.I.B.A. A.A.C.C.A. A.R.I.C.S.
A.M.I. Street. E. A.C.W.A. A.J.I.
GEN. CERT. of EDUCATION & R.S.A. Exams.

Every Bennett College student enjoys this friendly, intimate coaching right through his Course. A few of the Courses are listed opposite. Tell us your subject. We will send you The Bennett College Prospectus and the famous "FREE" book "Train your mind to SUCCESS." This will show you how you can advance to a better, brighter future by Personal Postal Tuition. Fill in and post the coupon today.

BENNETT COLLEGE
DEPT. K, 104 PT. SHEFFIELD

Please send me the Prospectus of _____
and if I wish, your mind to SUCCESS.

Name _____
Address _____
Town _____
Post Office _____

Please write in BLOCK letters

Post this coupon NOW!

A NEON DELAY SWITCH

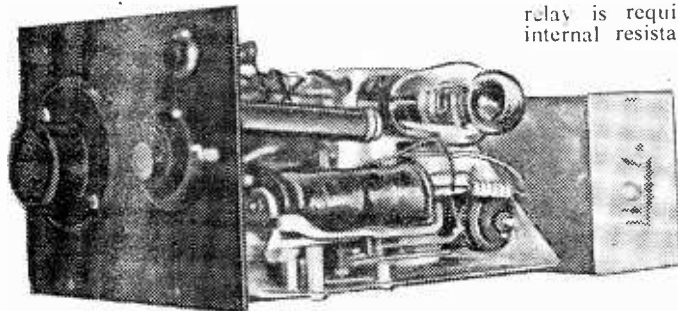
MAKING A TIME DELAY SWITCH, AND A PULSATOR OR REPEATER SWITCH

By P. Mansfield

THE author recently had need of a delay switch, which when switched on would remain on for a given time, and also a pulsator or interval repeater switch.

Of course, both of the above needs could be filled by a purely mechanical switch, involving cams, gears, etc.: but mechanical switches usually suffer the disadvantage of being non-variable. Thus it was decided to do both jobs electronically, utilising readily available surplus equipment.

Both the delay switch and the pulsator (which may be regarded as a very slow non-sinusoidal oscillator) rely on the time constant of a C.R. circuit.

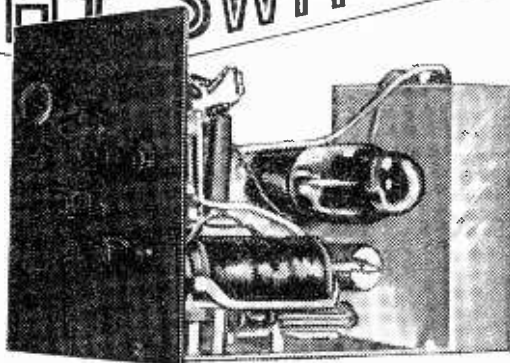


A view of the unit.

Two-thirds of the mains A.C. supply is tapped off and rectified through the half-wave metal rectifier. The only smoothing found necessary was the $16\mu\text{F}$ electrolytic C1. The rectified direct current is then fed through suitable resistors to the charging condenser C2. In view of the long periods of charging (as much as 20 minutes) this condenser must have a very low leak. It was found that electrolytics could not fill this rôle, though for shorter intervals, in the order of 30 seconds, they could be employed.

During the charging process, up to the neon striking voltage, the neon (V1) remains non-conducting; at the striking voltage the neon tube discharges through the sensitive relay (RL1), and continues to discharge down to about 100 volts (due to residual ionisation); at this point the valve reaches the cut-off potential when the neon tube once more becomes non-conducting.

The charging process then repeats itself at regular intervals.



The contacts of the relay in the discharge circuit can thus be made to operate an external circuit intermittently.

For the circuit to function correctly, a sensitive relay is required: the one employed had an internal resistance of $6.5\text{K}\Omega$, and an operating current of 2mA .

A reset switch S1 was provided, allowing the D.C. supply to be connected directly to the neon.

With the given values of charging resistance, the periods were:—

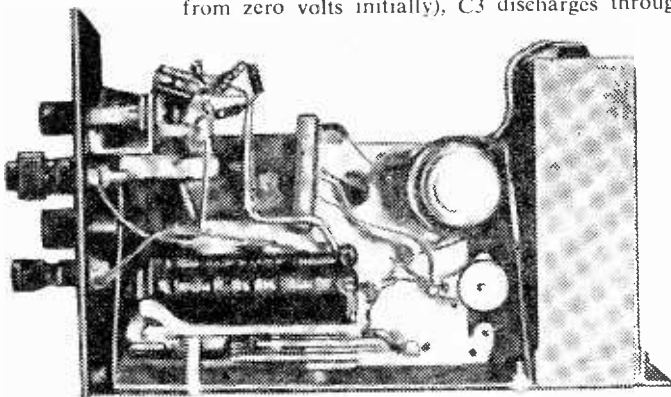
Position 1. — 4-25 seconds (using the variable $5\text{M}\Omega$ pot.).

Position 2.—3 minutes
Position 3.—4 minutes
Position 4.—6 minutes
Position 5.— $9\frac{1}{2}$ minutes
Position 6.—17 minutes

(The latter 5, potentiometer set at zero.)

Operation

Depressing Switch S1 causes the relay RL1 to be energised, the relay is arranged to hold itself in by shorting S1 through the contacts. A direct current is now applied through R3 to the oil-filled condenser C3. At the striking voltage (which in this case is reached after 10 minutes from zero volts initially), C3 discharges through



Another view of the delay switch.

the sensitive relay RL2, causing its closed contacts to open, thereby opening RL1 and thus switching off the whole circuit.

As the neon tube discharges only to 100 volts, C3 will still hold a charge when switched off. This will, of course, discharge slowly through R3, but if the switch is to be used again directly after, it is essential to start the charging process at zero volts on C3, if reproducible time periods are required. Hence a second press switch S2 is included as a reset switch, resetting the voltage on C3 to zero before the commencement of a timing.

The resistor R1 is included to allow the condensers C1 and C2 to discharge during the neon discharge interval, for it was found that they held enough charge to draw RL1 in again, after the neon had triggered, thereby switching the circuit on again.

The relay RL2 was arranged to hold in as long as possible, by including a series 2.2 K Ω

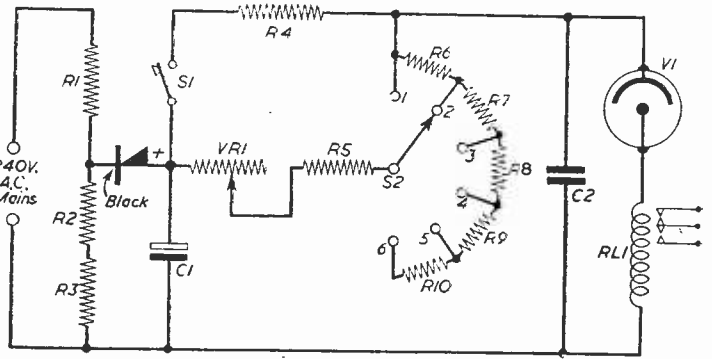


Fig. 1.—Circuit of the delay switch.

LIST OF COMPONENTS

RESISTORS

- R1—
- R2—3.3 K Ω 10 watt
- R3—ceramic
- R4—10 K Ω 1/2 watt
- R5—1 M Ω 1/2 watt
- R6—43 M Ω 1/2 watt
- R7—10 M Ω 1/2 watt
- R8—22 M Ω 1/2 watt
- R9—32 M Ω 1/2 watt
- R10—66 M Ω 1/2 watt
- VR1—5 M Ω variable

CONDENSERS

- C1—16 μ F 500 v.w. D.C. electrolytic
- C2—8 μ F 400 v.w. D.C. (oil filled)
- VI—VR105 neon tube
- RL1—Sensitive relay 6,500 Ω 2 mA working current (Obtainable on surplus market as U.S. Navy relay Model AN/APN-1 Cont. NX5a-22421.)

- S1—Panel press switch (Bulgin)
- S2—2-pole 6-way (180 deg. swing) (Yaxley)

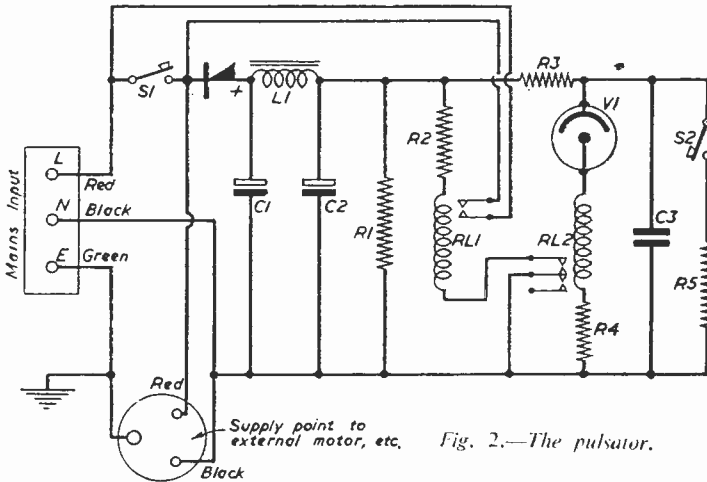


Fig. 2.—The pulsator.

LIST OF COMPONENTS

- RESISTORS
- R1—15 K Ω 10 watt (20%)
- R2—2.5 K Ω 25 watt ceramic (5%)
- R3—110 M Ω 1/2 watt (10%)
- R4—2.2 K Ω 1/2 watt (20%)
- R5—72 K Ω 1/2 watt (20%)

- CONDENSERS
- C1—16 μ F 450 v.w. D.C. electrolytic
- C2—16 μ F 450 v.w. D.C. electrolytic
- C3—6 μ F 750 v.w. D.C. (oil filled)
- L1—6 H 120 mA I.F. choke

- Half-wave metal rectifier, 250 volts, 120 mA
- RL1—6-volt relay 40 Ω internal resistance; 100 mA operating current; heavy external contacts to close when energised
- RL2—6,500 Ω internal resistance, 2 mA operating current
- VI—VR105 neon tube

resistor (R4). By experiment, R1 was found to be about 15 K Ω .

It would, of course, be impossible to list the uses to which either of these pieces of apparatus could be put. Usually, after we publish an article of this nature, we are asked if it may be used in such and such a manner, and we should like to forestall such inquiries by stating that in the majority of cases it is not possible to give this information. Each case must be taken on its merits, and when it is remembered just what the unit is intended to do, it is usually possible to ascertain whether or not it should work, and then in all probability some experimental hook-ups are indicated. In other words, provided it does not seem likely that any risk is involved, a bench-test is the only way to say for certain whether a definite arrangement will work. Bearing in mind the features underlying the design, and after a study of the times of operation given on the preceding page, it should be possible to make modifications for a specific purpose.

The Marconi Doppler Navigator

THIS apparatus has hitherto been on the secret list, and has been in quantity production for the Royal Air Force for the past three years.

Briefly, the AD2000 is a completely self-contained airborne equipment which provides an automatic and continuous flow of navigational information such as immediate position in latitude and longitude, track guidance, distance run or distance to go, estimated time of arrival and wind velocity. The equipment is virtually unaffected by weather conditions.

The overwhelming advantages of such an airborne navigational aid for military operations are obvious. It is the only system in full production to-day which does not depend upon the co-operation of ground-based stations and therefore the only one (apart from the use of astro-navigation) which is capable of independent global operation.

Aircraft using the Marconi AD2000 equipment are able to conform to their planned flight track much more closely than was possible hitherto; the aircraft can give its position and estimated time of arrival much more accurately, while, by virtue of the instantaneous and continuous information upon wind direction and speed, correlated with weather forecasts, the course of the aircraft can be altered immediately to avoid headwinds and take advantage of favourable ones, thus making a valuable contribution towards flying the shortest time track.

In the September issue on p. 473 we mentioned the Doppler Effect and navigation. Here are some further details of the apparatus.

The device measures the ground speed and drift angle of an aircraft in flight by making use of the well-known "Doppler Effect." Electro-magnetic waves transmitted from the aircraft strike the ground and are deflected in various directions, a small portion of the energy returning to the aircraft. Due to the relative motion of the aircraft to the ground the frequency of the return signal differs slightly from the transmitted one. This difference in frequency bears a direct relationship to the ground speed of the aircraft.

In the AD2000 the aerial system radiates two beams, one forward and the other backward, both beams being depressed at an angle towards the ground. The ground speed is found by measuring the beat frequency produced when the return signals from the forward beam are mixed with those from the backward-looking beam. (This procedure avoids the necessity for

the ultrastabilisation of the transmitter, which would be imperative if it was used as a comparison-source.)

Additionally, one beam is displaced to starboard and the other to port, the positions being switched twice a second. The drift angle is found by com-

paring the doppler frequency obtained when the forward beam is displaced to starboard and the backward beam to port with the frequency when the beam positions are reversed.

In a recent issue we gave some details of the "Doppler Effect," and in response to a number of queries we give below some further details of the apparatus, which incorporates some most interesting circuits and devices.

The aerial is then automatically rotated until the two frequencies are equal. It is then aligned along the aircraft track.

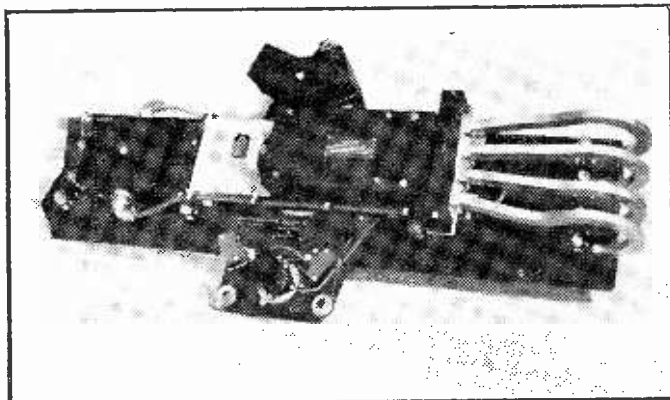
A pulsed system is used at a p.r.f. of 50 kc/s. with a pulse width of 0.45 micro-seconds. The pulses are generated by a magnetron which operates in bursts of 40 milli-seconds duration, twice a second. The peak power is 8kW (mean power, approximately 12 watts). The operating frequency is within the band 8,750-8,850 Mc/s.

Aerial System

The aerial, which is unpressurised, consists of four slotted linear arrays lying parallel to each other in a directional horn assembly, the axes of the arrays being horizontal. An arrangement of phased and anti-phased pairs, with a common feed at one end, provides the forward- and backward-looking beams. The beam width at the half-power points is 2½ degrees.

The two pairs of aeriels are energised alternately by a special Y-section of waveguide which oscillates about a vertical hinged joint to form a waveguide switch. The horn assembly deflects one pair of beams to a mean angle of 20 degrees to port and the other pair 20 degrees to starboard.

The waveguide switch is driven at a rate of one cycle/sec. from a small gearbox. Cam-operated



The unusual aerial system of the Doppler Navigator.

switches on the driving shaft provide sense and timing pulses to the remainder of the equipment.

To determine drift the aeriads can be rotated 20 degrees either side of the fore-and-aft line of the aircraft. The azimuth gearbox carries a synchro transmitter which repeats the aerial position to the indicating unit.

Transmitter/Receiver

This consists of two pressurised containers. Housed in one of these are the magnetron, the modulator circuits, the receiver klystron and the first IF amplifier and AFC circuits.

The second container houses the main H.T. and EHT circuits, an associated delay circuit and relays. A pressurised duct connects the two units beneath the base castings so that EHT (8kV) leads are unbroken and remain within the pressurised containers.

The microwave circuits consist of a duplexer labyrinth connecting the magnetron and klystron to the aerial via a double-directional coupler which provides monitoring facilities for the forward- and backward-looking beams.

The modulator is controlled by a crystal oscillator which maintains the p.r.f. at 50 kc/s. As stated, the pulses are fed to the magnetron in bursts of 40 milli-seconds duration, repeated at half-second intervals in synchronism with the movement of the waveguide switch in the aerial system.

The I.F. amplifier, tuned to 45 Mc/s, is divided between the transmitter/receiver and the tracking unit. The first I.F. amplifier (contained in the transmitter/receiver) is rendered inoperative dur-

ing the transmitted pulse by the application of a short blanking pulse from the modulator.

The integrator controls the speed of the motor driving the phonic wheels; this speed is a measurement of the aircraft ground speed.

The azimuth drive circuit controls the movement of the azimuth drive motor situated in the aerial system and rotates the aerial for drift angle measurement. The resultant ground speed and drift information is fed by synchros to an indicating unit.

Ground Position Indicator. The G.P.I. provides automatic and continuous information of the aircraft's position either in latitude and longitude, as a grid (nautical miles gone N or S and E or W) or as an A/A set track (along and across a set-in track). Choice of presentation is afforded by a switch.

The instrument is primarily a mechanical type of computer employing a conventional disc-ball-roller resolving gear set by the track drive to split incoming ground mileage into two components at right angles. The component outputs from the resolving gear drive the cyclometer-type counters at the front of the instrument; these show the ground position of the aircraft.

In order that information shall not be lost while setting the counters in flight, a fixing and storing device is incorporated. When obtaining a "fix" the two output drives from the resolving mechanism are switched from the counters to two sets of storage drums. After adjustment to the counters the switch is turned back to its normal position. The stored mileage is then automatically driven back into the counters, together with the normal incoming mileage.

News from the Clubs

THE AMATEUR RADIO CLUB OF NOTTINGHAM (G3EKW)

Hon. Sec. : F. V. Farnsworth, 32, Harrow Road, West Bridgford, Nottingham.

THE club continues to meet at 7.15 p.m. every Tuesday at Woodthorpe House, Mansfield Road and new members will be very welcome. The club's rebuilt transmitter is now operating on Top band and work is now in process for the rebuilding of transmitter to cover 40 and 80 metres.

Members recently visited Newark Club for a talk on D.F. by Mr. John Clayton.

BURY RADIO SOCIETY

Hon. Sec. : Mr. L. Robinson, 56, Avondale Avenue, Bury, Lancs.

THE society holds its monthly meetings on the second Tuesday of each month at 8 p.m. at the George Hotel, Kay Gardens, Bury.

October 8th. Mr. R. Hammans (G2IG) will talk on "Matching Matters."

November 12th. Mr. T. C. Platt (G2GA) reminisces under the title, "An Old-timer Looks Back."

LEEDS AMATEUR RADIO SOCIETY (G3BEW)

Hon. Sec. : J. R. Hey, 40, Richmond Ave., Headingley, Leeds, 6. PROGRAMMES are now being printed and should be available shortly. Anyone wishing to become a member should either contact the Hon. Sec. or come along to any of the meetings, which will be almost every Friday at Swarthmore Educational Centre, 4, Woodhouse Square, Leeds, 3.

The club caters for all interests in radio, and many interesting visits have been arranged.

Programme for the first two months :

- October 11th. Discussion to rebuild the club T.X.
- October 18th. Talk, "Army communication equipment."
- October 23rd. Visit to Skelton Grange Power Station.
- November 1st. Simple gram amplifier.
- November 8th. Transmitting evening.
- November 15th. Talk, "War-time radar."
- November 22nd. Visit to be arranged.

CRAY VALLEY

Hon. Sec. : S. W. Coursey, G3JJC, 49, Dulverton Road, London, S.E.9.

THE meeting of the Cray Valley Radio Club to be held on Tuesday, October 22nd, 1957, at 8 p.m. at the Station Hotel, Sidcup, Kent, will be devoted to an exhibition of members' home-constructed gear. A cordial welcome is extended to visitors.

THE WEST LANCASHIRE RADIO SOCIETY

Hon. Sec. : K. Wright (G3KVE), 24, Stuart Road, Liverpool, 20.

MEETINGS continue to be held every Tuesday evening at 8 p.m. Morse classes are held every week at the club room under G3KKU. The club Tx is once again on the air on Top band and 80 metres.

Plans for N.F.D. 1958 are also under way, following the dummy run we had this year operating under N.F.D. conditions, but not actually taking part in the contest. Any information regarding the club and its activities will gladly be supplied by the Hon. Sec.

WORKSHOP CALCULATIONS TABLES AND FORMULÆ

Tenth Edition

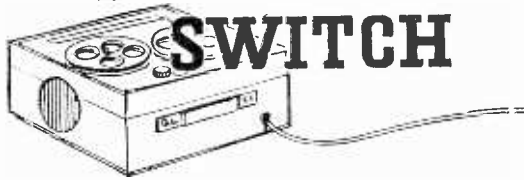
F. J. CAMM

A handbook dealing with methods of calculation, solutions to workshop problems, and the rules and formulæ necessary in various workshop processes. It contains all the information a mechanic normally requires.

From all booksellers, 7/6 net,
by post 7/10 from the publisher,

GEORGE NEWNES, LTD. (Book Dept.),
Tower House, Southampton Street, W.C.2.

A TAPE RECORDER DICTATION SWITCH



A SPEECH-OPERATED MOTOR CONTROL
TO CONSERVE TAPE

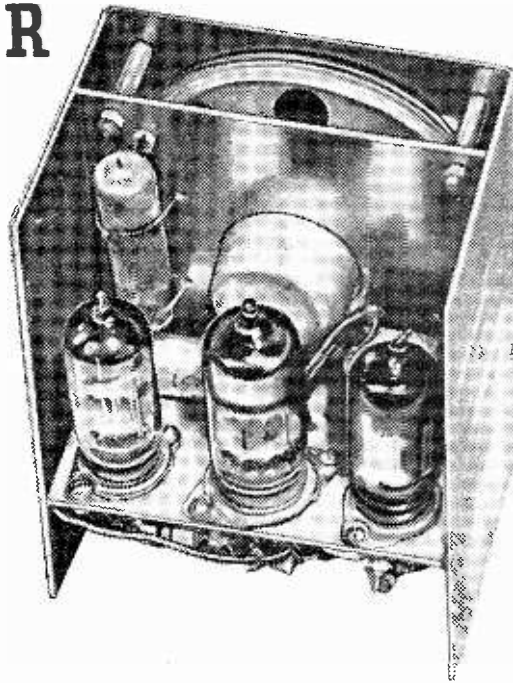
By Hugh Guy

A SIMPLE addition to a tape recorder whose prime function is recording dictation can produce a useful device for starting and stopping the deck driving motors in synchronism with the voice.

Not only does this achieve a considerable saving of tape but results in a much more coherent playback; all the embarrassing gaps between sentences while the speaker struggles for the next phrase are eliminated.

Such a device is not restricted to tape recorder applications alone but can be used in conjunction with R/T rigs for transmission only when speech modulated, and the same design can be applied equally well to both baby and burglar alarms.

In this article the layout which is detailed is one to which the reader is by no means restricted. There is no reason for example why the device should not be built into an existing tape recorder when used for motor switching, instead of constructing it as a separate unit round a small loudspeaker as described here.



Modifications of this kind are up to the individual as the circuit is quite adaptable.

Circuit Details

On page 626 it will be seen that the circuit comprises three stages. The first is a high gain pentode stage, V1, into which the output from a loudspeaker, used as a microphone, is coupled by a step-up transformer, T1. The amplified output is then fed to V2a, which serves as a low impedance cathode follower output stage for coupling into the appropriate tape recorder input

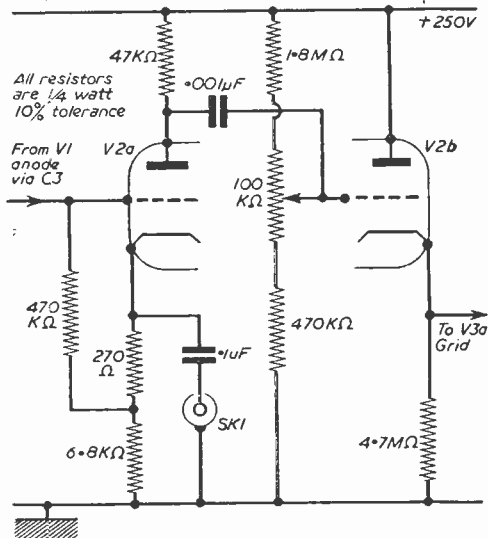


Fig. 1.—Modification to Fig. 3, for increased sensitivity.

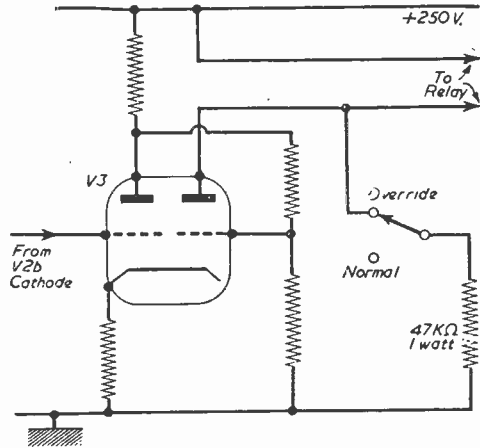


Fig. 2.—One of the positions in which an override switch may be connected.

socket. This part of the circuit constitutes the conventional microphone pre-amplifier. The output from the cathode follower is directly coupled to the grid of the V2b. This latter stage is a detector of the infinite impedance type, and the

cathode. The capacitor C6 smooths out the variations in these amplified signals and maintains this increase in potential for upwards of about a second after the signals have ceased. Being directly coupled to C6, V3a grid is also modulated

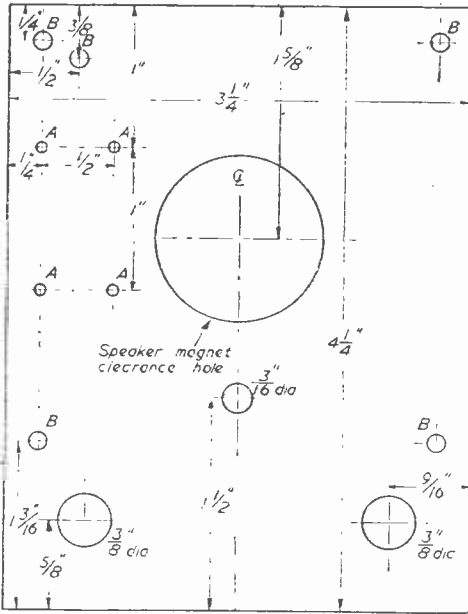


Fig. 6.—Drilling details for support panel.

potential at its cathode rises when an audio signal is fed to its grid. Hence amplified speech signals increase the cathode potential at V2b

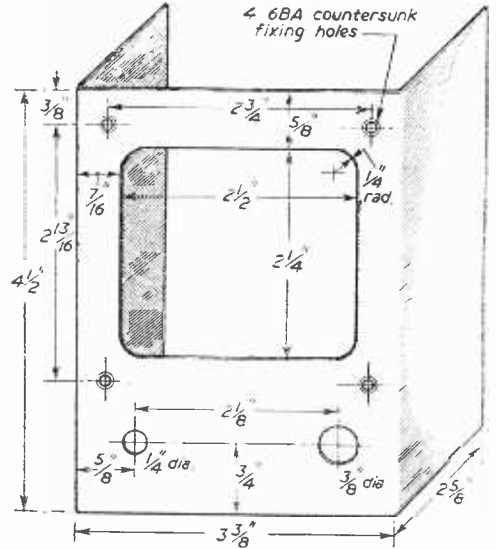


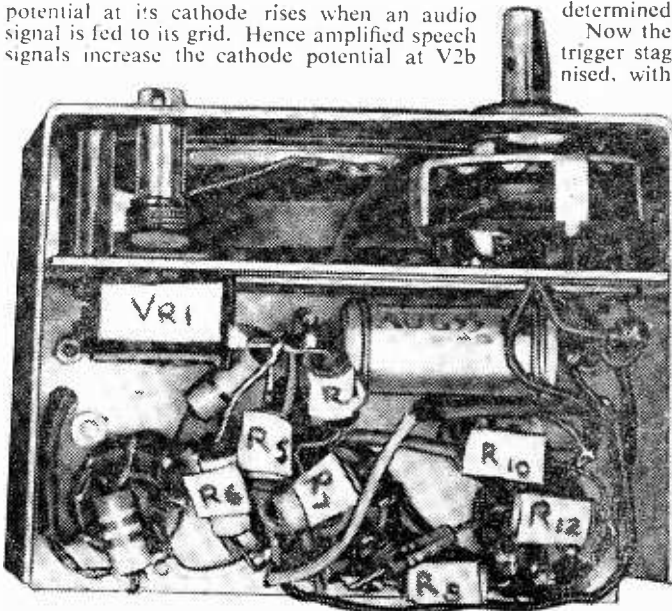
Fig. 7.—Cover for unit.

by this smooth voltage. Each time the loud-speaker receives the spoken word the voltage level at V3a grid smoothly rises to a mean value determined by the volume of the speech.

Now the double triode V3 is connected as a trigger stage, as many readers will have recognised, with the result that an increase in the potential of V3a grid will switch the valve current from V3b (which normally conducts about 5 milliamps) to V3a. The net change de-energises relay REL, mounted in the tape recorder, by means of which the deck motors are switched on.

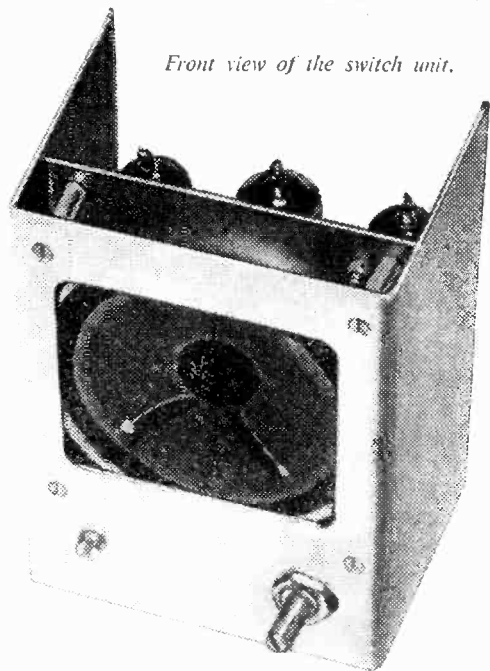
As soon as the mean level of V3a grid has fallen—that is, when the user of the device ceases his commentary—the valve current is once again diverted to the right-hand valve, and the relay is re-energised, opening the motor switching contacts and stopping the tape receiver.

Used intelligently the inevitable start and stop times of the recorder as the motor runs up to speed and slows to a stop when switched on and off by speech, will not mar any of the recorded dialogue. For example, a slight cough or the figure of speech



Underside view with components identified.

Front view of the switch unit.



circuit to increase the unit's sensitivity. Here it will be seen that the audio gain remains unchanged for the tape recorder input but that the gain is increased for operation of the trigger stage. The output to the infinite impedance detector V2b is taken from an anode load in V2a via a coupling condenser at an increased amplitude by virtue of the gain provided by the amplifier V2a. Such a circuit now renders the unit suitable for use with one of the small, comparatively insensitive crystal microphones available for about 5s. from several of the radio component suppliers.

Override Switch

Some conditions of use will obviously require that the tape recorder is not voice-controlled; for example, when the speaker wishes to record intermittent dialogue of a conversational type. In these circumstances it is convenient to have a switch mounted on the unit to override the action of the voice controlled relay. Of the several ways in which this can be connected Fig. 2 shows one which will switch the relay into circuit regardless of the audio conditions associated with the device. Another equally simple way is to arrange that the relay contacts controlling the motor operate in parallel rather than in series with the existing deck on/off switch. With this arrangement, when the deck switch is in the "off" position, the device will be voice operated, and when in the "on" position the voice operated relay will not control the motors.

"Er." is sufficient to start the machine, and none of the conversation will be lost at the beginning of each sequence.

General Arrangement

Chassis drawings, discussed in detail later in the text, give sufficient information for the constructor to build the unit either as a separate self-contained box housing the loudspeaker in addition to the circuitry, or as an extra chassis to be accommodated within the tape recorder itself and operated from the usual desk-type microphone.

A small 3in. loudspeaker was used in this design principally because the sensitivity of the device is proportional to the size of the diaphragm of the device used as a microphone. By the same token a 5in. loudspeaker of the type sometimes used in office intercommunication equipment is even more sensitive. It may be, however, that the constructor wishes to use a less sensitive microphone, in which case it is suggested that the modification shown in Fig. 3 be incorporated in the

Points marked 'E' are connections to chassis

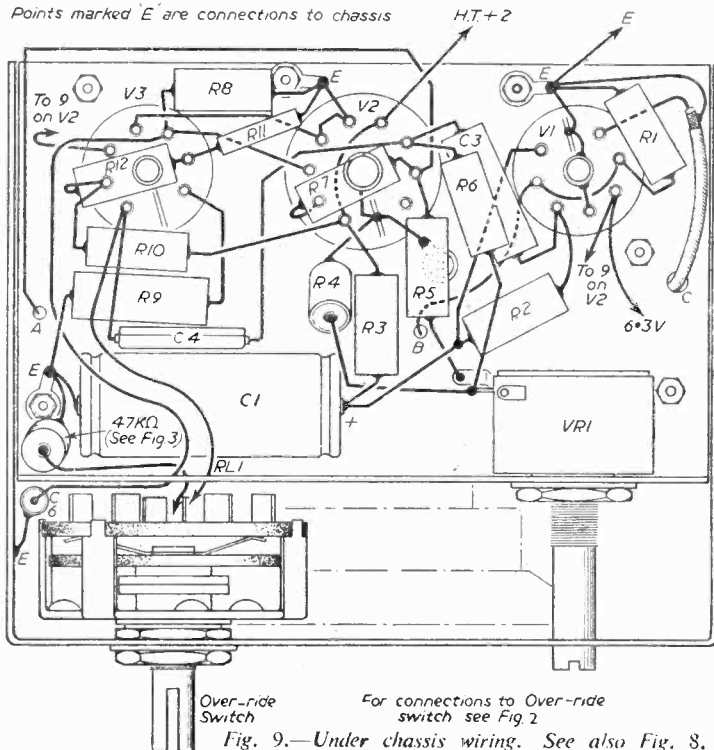


Fig. 9.—Under chassis wiring. See also Fig. 8.

Motor Relay Connections

Here again several arrangements may suggest themselves to the reader: one simple mode of connection is shown in Fig. 4. In any event, it is assumed that the relay, which is a 6,000 ohm Post Office type with at least one pair of normally closed contacts, will be mounted in the tape recorder itself. One very good reason for doing this, apart from the elimination of extra leads, is

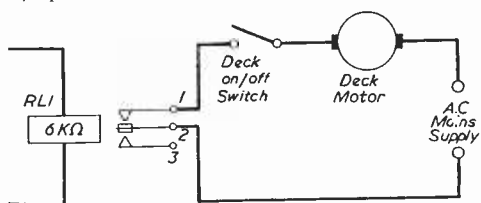


Fig. 4.—Relay connections for motor switching.

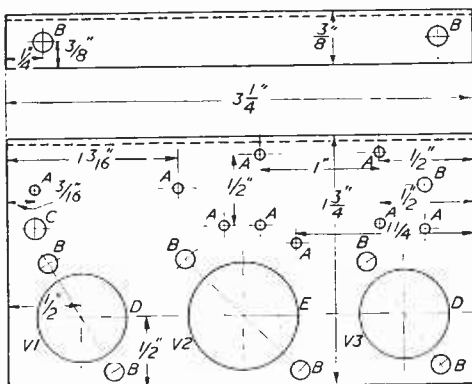
to prevent the noise made by the relay when it is actuated from operating the device itself. With a sensitive arrangement the click of the relay pulling in is amplified by the circuit which promptly causes the relay to fall out again. The net effect is for a continual making and breaking of the relay at a rate determined by the timing combination C6 R8, about which more will be said later.

Constructional Details

The photographs show that the chassis consists of three main parts, the cover part of which (Fig. 7) is optional.

Figs. 5 and 6 show the chassis marking-out details. The material used is 18 s.w.g. aluminium. In Fig. 6 the details for fixing a loudspeaker are

left to the constructor, since the design of these small speakers varies considerably one from another. The front cover, too, is made of 18 s.w.g. aluminium and has a large cut-out for the loudspeaker in the front. It is suggested that a



Hole drilling table

A = .093"	BBA 42 Drill
B = .12"	6BA 31 Drill
C = .193"	2BA 10 Drill
D = 5/8"	B7G Holder
E = 3/4"	B9A Holder

Fig. 5.—Drilling template for chassis.

suitable vent is provided for this by the use of a piece of expanded metal.

The method of assembly of the three basic parts is indicated in the photographs from which

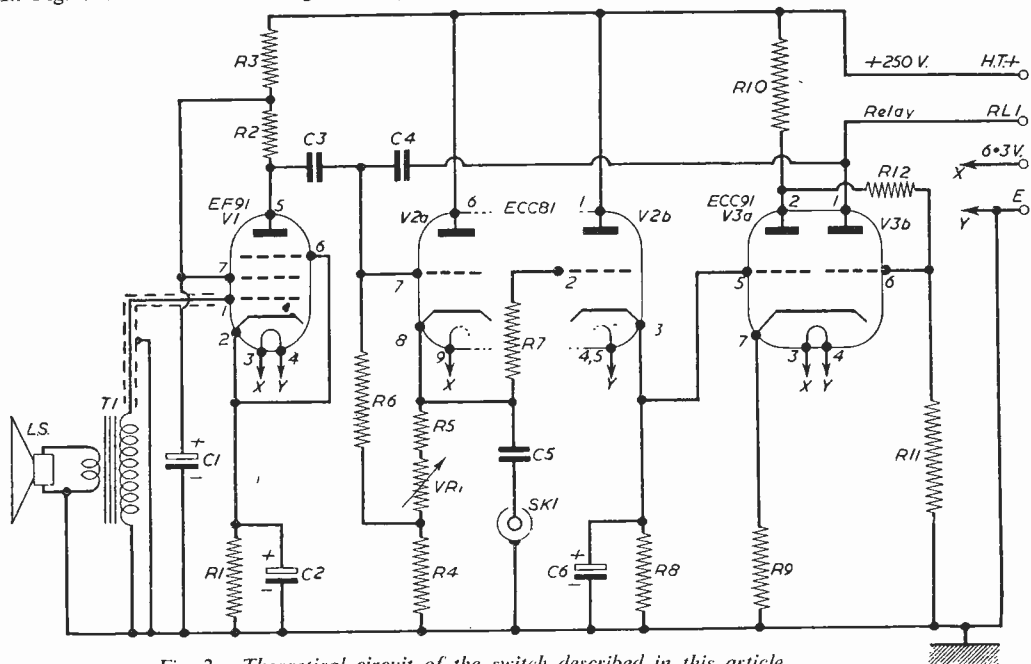


Fig. 3.—Theoretical circuit of the switch described in this article.

it will be seen that the small chassis (Fig. 5) is mounted at right angles to the support panel (Fig. 6) by means of two of four 1-in. 6 BA countersunk screws. These four screws fit through four $\frac{3}{4}$ -in. long tubes—salvaged in the

Connections from C2 to the screen and cathode of V1 can now be made via the adjacent hole in the chassis and the screen connection made to C1. A screened lead should connect the secondary of the transformer T1 to the grid via its

LIST OF COMPONENTS

R1—10 k. $\frac{1}{4}$ w. 10%
 R2—470 k. $\frac{1}{4}$ w. 10%
 R3—150 k. $\frac{1}{4}$ w. 10%
 R4—18 k. $\frac{1}{4}$ w. 10%
 R5—1 k. $\frac{1}{4}$ w. 10%
 R6—470 k. $\frac{1}{4}$ w. 10%
 R7—470 Ω . $\frac{1}{4}$ w. 10%
 R8—4.7 m. $\frac{1}{4}$ w. 10%
 R9—10 k. $\frac{1}{2}$ w. 10%
 R10—5.6 k. $\frac{1}{2}$ w. 10%
 R11—330 k. $\frac{1}{4}$ w. 5%
 R12—1.2 m. $\frac{1}{4}$ w. 5%

VR1—1k. pre-set pot'r.

C1—1 μ F 350 vw. Electrolytic.
 C2—25 μ F 25 vw. Electrolytic.
 C3—1,000 pF 350 vw. Paper Tub.
 C4—100 pF 350 vw. Mica.
 C5—0.1 μ F 150 vw. Paper Tub.
 C6—1 μ F 200 vw. Electrolytic.
 V1—Mullard EF91 or equiv. (e.g. Z77).

V2—Mullard ECC81 or Brimar 12AT7.
 V3—Mullard ECC91 or Cossor 616.

T1—Midget 60: 1 Speaker Transformer used as step-up mike transformer.

SK1—Pre-amp. outlet Jack socket.

Cable A—4-way flexible lead attached to unit, terminated in 4-pin Carr-Fastener battery plug to mate with corresponding socket on Tape Recorder.

LS—3-in. Moving Coil Loudspeaker (see text).

RI.1—6 k. Relay with at least one pair "normally-closed" contacts.

2—B7G valveholders.

1—B9A valveholder.

Sundry 6 BA x 3.16in. R.H. screws, nuts and solder tags. Flexible screened wire, connecting wire, etc.

case of the unit described from an old rotary switch assembly—which separate the support panel and its chassis from the cover, at the same time allowing mounting space for the loudspeaker, which is fixed on the opposite side of the support face from the chassis. The $\frac{3}{4}$ -in. hole on the cover is used to mount the override switch mentioned earlier, while the $\frac{1}{2}$ -in. diameter hole allows access to the pre-set control VR1, which is used in setting up the trigger circuit.

A simple U-shaped piece of metal with ventilation holes and a cable access hole drilled in it completes the assembly by providing a back cover to the unit. The drawing of this latter piece is not shown.

Painted white, the complete assembly needs no extra finish, and makes quite an attractive unit.

Wiring Details

In commencing wiring the heater leads should be the first to be attempted. A tightly twisted pair of wires connects the heater pins on the valve bases in parallel. The earth side of the heaters should be connected to an earthing tag screwed to the chassis at V1. Multiple earthing connections should be avoided as these can sometimes complicate the hum problem. Throughout this process and those immediately following, wiring is carried out easily prior to assembling the chassis to the support panel. Next, secure condensers C1 and C2 on adjacent sides of the chassis by means of two tightly looped copper wires, C1 being on the underside of the chassis. With a suitable midget transformer T1 in position wiring can now proceed.

appropriate chassis hole. The screened braid of this lead should be soldered to the earth tag, to which the heater chain is returned. Next connect the cathode of V2b to the grid of V3a. The lead from C6, which will be mounted on the loudspeaker side of the support panel by copper wire loops, can now be taken through the $\frac{3}{4}$ -in. diameter hole in the support panel from V3a grid. On the opposite face of the support panel, secured by the same clamping wires as C6, condenser C5 is mounted. The one remaining wire connection to be made under the chassis prior to mounting interval resistors, is that connecting the anodes of V2a and V2b.

(To be concluded next month.)

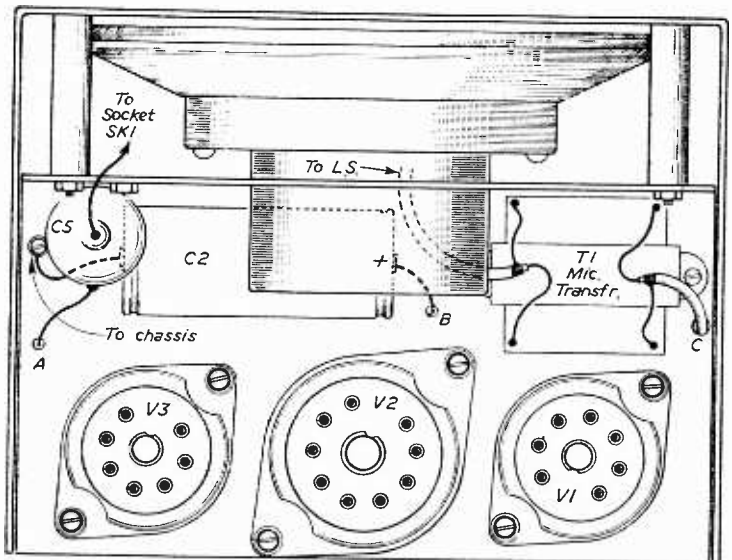


Fig. 8.—Above chassis view and wiring. See also Fig. 9.

AUTOMATIC FREQUENCY CORRECTION

OVERCOMING FREQUENCY DRIFT. SOME INTERESTING CIRCUITS

By Gordon J. King, Assoc. Brit. I.R.E.

THERE are two essential requirements for any system of automatic frequency correction (usually known as A.F.C.), and these are: (1) an electronic device whose magnitude of reactance can be altered by the application of a control voltage, and (2) a device for the production of a control voltage that will alter both in magnitude and polarity depending upon the extent and direction of the frequency drift in the system it is desired to correct.

In this article we are concerned with the application of A.F.C. to broadcast receivers (with special reference to V.H.F.-F.M. receivers, tuners and adaptors) so as to correct automatically any tuning error which may arise due to value drift of critical components or even due to mistuning of the receiver initially. It is interesting to note that during the early days of the superhet receiver, when push-button station selection and mechanical press-button systems (using electric motors) were popular, A.F.C. was often featured in the more expensive receiver as a means of combating the accurate-tuning limitations of these systems.

applied to it is zero or nearly so) contributes to one of the critical reactance elements in the oscillator circuit.

Thus, since this additional reactance in the oscillator circuit can be altered about its nominal value by the application of a control voltage, it clearly follows that alteration of the control voltage above and below an arbitrary zero reference point will result in a frequency swing of the oscillator above or below the frequency to which it is tuned. In other words, within a small limit, the oscillator frequency will come under the control of the voltage applied to the electronic reactance, and if one so desired it would be possible remotely to control accurately the tuning of a receiver, say, from an armchair by means of a potentiometer and a battery. There is little future in this, however; the idea is to get the control to work automatically so as to bring the receiver back into tune as the circuits drift. We will see later that a control voltage which is suit-

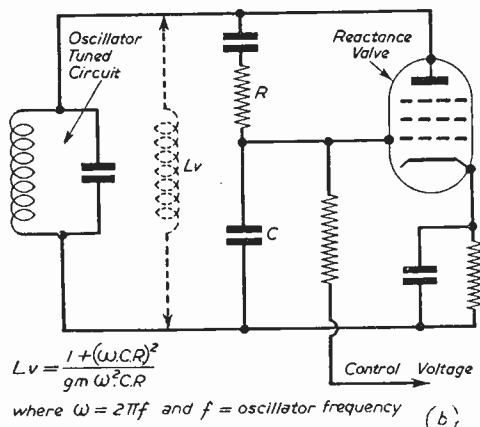
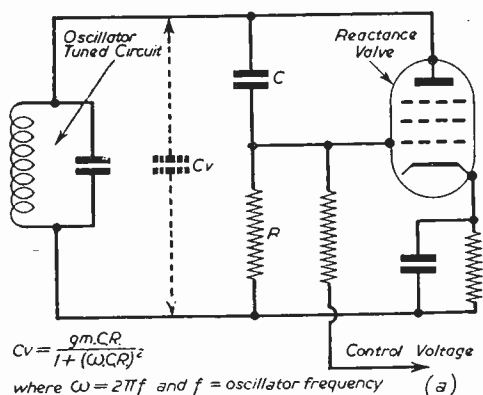


Fig. 1.—Two popular electronic reactance circuits, an oscillator tuning an effective capacitance, and at (b) a circuit which is effectively inductive in nature.

The idea progressively lost favour, however, but with the introduction of the V.H.F.-F.M. system of broadcasting and the need of very accurate tuning to avoid unnecessary A.F. distortion, coupled with the possibility of even greater frequency drift due to the very much higher operating frequency, A.F.C. as applied to tuners and adaptors is undergoing a revival.

The Electronic Reactance

Let us first examine the requirement as detailed at (1) above. The electronic reactance must be closely associated with the tuner's local oscillator and applied in such a way that its nominal reactance (i.e., that which it presents to the oscillator tuned circuit when the control potential

able for this purpose can be obtained from the receiver itself.

The Reactance Valve

The electronic reactance takes the form of a pentode valve in which the anode circuit is in parallel with the tuned circuit of the oscillator, basic circuits being shown in Figs. 1 (a) and (b). From Fig. 1 (a) it will be seen that also across the oscillator circuit is introduced a series-connected resistor-capacitor combination whose junction is connected to the valve's control grid. The purpose of this is to supply the control grid with a portion of oscillator voltage that falls 90 deg. out

(Continued on page 631)

LASKY'S PAGE OF MONEY-SAVING OFFERS



COLLARO 4-SPEED MIXER AUTO-CHANGER

Latest model RC 156 incorporating auto and manual control enabling records to be played -hizy or automatically. Complete with Studio crystal p.u. and 5-aphire stylus. List £13 17/- LASKY'S PRICE **£8/19/6** Post 3/6.

R.S.T. 4-speed with t.o. crystal pick up. **£8 15/-**. Post 5/-.

SINGLE PLAYERS

Collaro 3554. 3-spd. Single Record Player with Studio T p.u., crystal cartridge and styl. **£8 19/6**. Post 3/6.
Collaro 4564. 4-spd. Single Player. **£7 19/6**. Post 3/6.

TRANSCRIPTION TURNTABLE BARGAIN!

Special Offer of the well-known Collaro 2101 3-speed Transcription Turntable complete with transcription p.u., including PX cartridge, price **£16/16/0** Carr 5/-
Price without pickup. **£12 12/0**.

Telletron "Companion"

3 - TRANSISTOR POCKET RADIO. T.R.F. circuit covering medium and long waves, with balanced armature output. Price aerial. Note small size: 4 1/2 x 3 1/2 in. You can build this novel transistorised **89/6** pocket receiver for only Full instructions and price list, 9d. post free. All components available separately.

LASKY'S F.M. TUNER

PRINTED CIRCUIT VERSION OF G.E.C. 912 "F.M. PLUS" TUNER FOR HOME CONSTRUCTION



TRANSISTORS

at a reasonable price

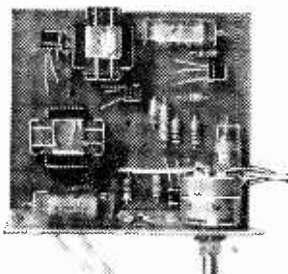
Hermetically sealed and unaffected by temperature variations. Tested and guaranteed efficient.
R.F. P.N.P. Junction Type, suitable for medium and low freq. oscillators, freq. changers and I.F. amplifiers (1.5 to 8 Mc/s). **21/-**
(Double spot—yellow and red.)
AUDIO P.N.P. Junction Type, suitable for high gain and low freq. amplifiers, and for output stages up to 250 milliwatts. **10/-**
(Double spot—yellow and green.)
Post Free.



Special prices for 6 and over.

Full operating data and circuit diagrams for receivers, oscillators, amplifiers, etc., supplied with each Transistor.

LASKY'S TRANSISTOR AMPLIFIER KIT

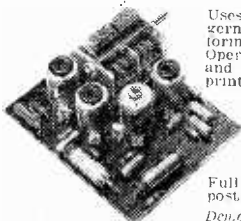


(200 milliwatts) FOR CONSTRUCTION ON PRINTED CIRCUIT

Miniature size: 3 1/2 in. x 3 1/2 in. Height can be under 1 in. Uses our hermetically sealed Transistors and operates from 6-volt battery. Output impedance 5 ohms. FULL DETAILS, circuit diagram and shopping list, 1/- post free. All components available separately.

COMPLETE KIT including 4 Transistors, all brand new components, latest T.C.C. miniature condensers, PRINTED CIRCUIT and full instructions. **86/6**, Post Free.

LASKY'S TRANSISTOR SUPERHET TUNER FOR HOME CONSTRUCTION ON PRINTED CIRCUIT



Uses 3 R.F. Transistors and 1 germanium diode, 3 I.F. transformers, Ferrite rod aerial. Operates from one 6 v. battery and one 1.5 v. cell. Size of printed circuit, 3 1/2 in. x 3 1/2 in.

CAN BE BUILT FOR ONLY **£5/12/9**

Full details and illustrations post free on request. Demonstrations at both addresses.

Note.—This Tuner in conjunction with our Transistor Amplifier (as above) makes an excellent Transistorised radio. Cabinets available.

CAN BE BUILT FOR 8 GNS. APPROX.

Uses 5 valves, 2 germanium diodes and brand new T.C.C. condensers. The PRINTED CIRCUIT ensures that the I.F. and R.F. amplifiers are extremely stable at maximum gain and results are consistent on all tuners. G.E.C. FM TUNER BOOK plus our full data and Shopping List, 2/6 post free. All parts available separately. ALIGNMENT SERVICE is available.

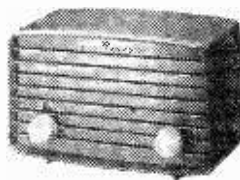
LASKY'S (HARROW ROAD) LTD.

42, TOTTENHAM COURT ROAD, W.1.
Telephone: MUSeum 2605.

370, HARROW ROAD, PADDINGTON, W.9.
LADbroke 4075 and CUNningham 1979.

Open all day Saturday, early closing Thursday.

LASKY'S NEW MIDGET T.R.F.

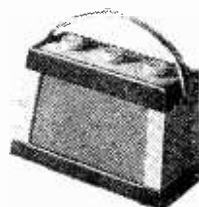


CAN BE BUILT FOR ONLY 99/6

Post & Pkg. 5/-

Handsome contemporary design case, overall size 8 1/2 in. wide, 4 1/2 in. deep, 5 in. high. 2 latest double-purpose valves (EBF9 and ECL30, contact cooled rectifier. For A.C. mains 200-250 v. Med. and long wave, 5 in. P.M. speaker. Plastic cabinet in cream, pastel green, pink, blue. FULL DATA, instructions, circuit diagram and shopping list, 1/6 post free. All components available separately. CABINET only, as illus. 12/- plus 4/6 post and pkg.

LASKY'S BATTERY PORTABLE



CAN BE BUILT FOR ONLY 7 GNS.

or as a mains battery job with 200-250 v. A.C. Power Unit for only 9 GNS., Carr. and pkg. 3/6. Performance of this 4-valve, 3-wave superhet equals ready-built Portables costing pounds more. The PRINTED CIRCUIT supplied makes construction amazingly easy. Circuit diagram, full data, etc., 1/6 post free.

MULLARD 510 AMPLIFIER KIT WITH T.C.C. PRINTED CIRCUIT

All specified components used and you have your choice of transformers and chokes by Partridge, Haddon, W.B. Ellison or Gilson. Demonstrations given any time.

COMPLETE KIT

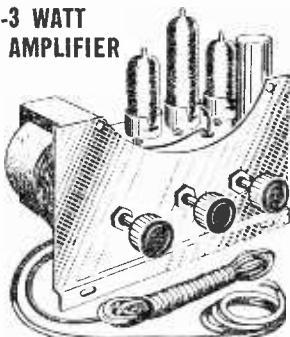
All parts and printed circuit for building the Mullard 510 from **10 GNS.**

Full details on request. Book, 3/6. post free. All components available separately. Also available built ready for use. Price according to transformers used.

LASKY'S RADIO

ALL MAIL ORDERS TO HARROW ROAD PLEASE

**2-3 WATT
AMPLIFIER**



THREE VALVE TYPE (ECC83, EL94, E280). A high quality amplifier designed to satisfy the requirements of the more discriminating record enthusiast. Three controls give a very wide variation of tone. Output approx. 2 watts. Fully isolated chassis. Overall size approx. 6½ in. x 5 in. x 2½ in.

PRICE 79/6 Plus 2/6 P.P.

**THE SUPEREX "55"
BATTERY
PORTABLE**



**BUILDING COST
£7 - 15 - 0**
Plus 4/- P.P.

Cabinet size,
10½ in. x 8½ in. x 4½ in.

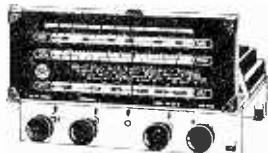
- ★ 4-VALVE SUPERHET.
- ★ LONG/MEDIUM WAVES.
- ★ 7 in. x 4 in. SPEAKER.
- ★ 87G 1.4 v. VALVES.
- ★ SIMPLE CONSTRUCTION.

SEND 1/6 FOR BOOKLET.

SUPERIOR BUREAU



An elegant cabinet in richly figured walnut veneer, internal panels in polished sycamore. A drop front lid covers a sloping, uncut control panel (16 in. long x 10½ in. high) alongside which is an uncut base-board (15½ in. long x 13½ in. back to front). The inside of the drop front lid is panelled in beige leatherette. In the lower part of the cabinet are two large storage cupboards (13½ in. high, 7½ in. wide, 16 in. deep). The lid and cupboard handles are in chased Florentine bronze. Overall dimensions (33 in. high, 34 in. long, 16½ in. deep). **PRICE 161/2** Plus 25/- carriage.



CHASSIS ASSEMBLY

CONTAINING :

- ★ Punched chassis, Backplate, etc. Size : 12 in. x 7 in. x 8 in.
- ★ Multi-colour Glass Dial L.M.S.G.
- ★ Drive Drum and Spindle.
- ★ Continental Control Knobs.

PRICE 22/6 Plus 2/6 P.P.

SUPERIOR RADIO SUPPLIES,

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

Phone : ELGor 3644

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).

High "Q" Coils



4/- EACH
Iron dust cores. Clip in fixing. EXTREMELY SMALL. AMAZING EFFICIENCY For Superhet T.R.F. or Transistor operation.

**OSMOR (Frequency Controlled) F.M.
Switch-tuned Feeder**

With special quick-build chassis

A completely stable drift-free unit for adding to existing radio or Hi-Fi amplifier.

EASY TO BUILD
Size 4½ in. x 5½ in.

Wiring diagram & circuit on request.

STOP!
T.V. Patterning
10/6



An easily fitted—
Simple Remedy

OSMOR COILS & COMPONENTS AVAILABLE FOR THE FOLLOWING PUBLISHED CIRCUITS

- "Wireless World"
- F.M. Tuner (Amos).
- Economical Rx.
- Reflex Push-pull Rx.
- 2-v. Superhet.
- Car Radio.
- Transistor Portable (Amos).
- Bedside Rx.
- Sensitive TRF Rx.

- "P. Wireless"
- High Quality B'cast Rx.
- Alternative S'het.
- Modern Battery S'het.
- 7-5 Push-pull S'het.
- Car Radio.
- Crystal Tuner.
- Autoradiogram.

- "R. Constructor"
- TRF Tuner.
- 3 plus 1 S'het.
- Hi Q Pre-set push-pull.
- Transistor etc.
- Progressive Rx.
- Whistle Filter.
- S.W. Rx.
- Band III Converter.

WE HAVE A FULL RANGE OF COILS FOR TRANSISTOR CIRCUITS

**OSMOR COILS
FOR HIGH "Q"**

Selectivity & Performance

FREE!

Send 10d. (stamps) for fully descriptive literature including OSMOR DESIGNS—5-Valve S'Het. Miniature ditto, Battery and Battery/Mains Receiver, Mains T.R.F. S'Het and T.R.F. Feeders. Band 3 Converters, Wiring Diagrams, Chassis Templates, Coil & Coilpack information and price lists and information on circuits in "Wireless World," "Practical Wireless," "Radio Constructor." Full Circuits included. See also Classified Adverts. on page 658.



(Dept. PW16) 418 BRIGHTON ROAD,
SOUTH CROYDON, SURREY
CROYDON 5148/9

of phase with the oscillator voltage acting in the anode circuit—the phase shift being achieved by the function of capacitor C.

How this remarkable arrangement acts as a reactance can be realised when it is considered that the amplified grid voltage acting in the anode circuit draws from the oscillator a current which is almost 90 deg. out of phase with the voltage across the tuned circuit of the oscillator. This effect is, of course, precisely the same as that which would occur if an additional capacitor or

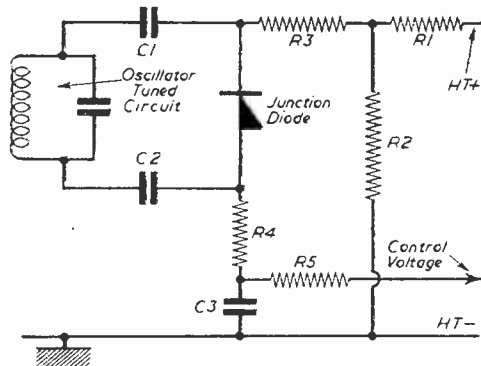


Fig. 2.—A junction diode A.F.C. circuit.

inductor were connected across the tuned circuit in place of the electronic reactance.

In the circuit at Fig. 1 (a) a capacitive reactance is presented to the oscillator circuit because the oscillator current in the reactance valve anode circuit leads the oscillator voltage by 90 deg. The actual magnitude of capacitance C so created depends upon the amplification of the valve and the values selected for C and R . Since the amplification of the valve depends on its mutual conductance, gm , it follows, therefore, that an alteration of grid bias, which effectively alters the value of gm , will modify the value of the capacitance reflected across the tuned circuit and also the tuned frequency of the oscillator. A method is thus available of altering the oscillator frequency by means of a control voltage.

There are several other ways of connecting a reactance valve so as to provide either a capacitive or inductive reactance across the oscillator circuit. Fig. 1 (b) shows an arrangement which gives an inductive reactance. Here the positions of C and R are reversed—the capacitor in series with the anode of the valve and R simply serves to block H.T. from the control grid circuit. There are also two other versions in which inductors are used instead of capacitors to give both inductive and capacitive reactance effects in relation to the oscillator circuit, but the circuits shown in Fig. 1 are the most commonly used in practical A.F.C. systems.

The Use of a Junction Diode

With the introduction of the junction diode, another method of altering the frequency of an oscillator by adjustment of a control voltage has been made available. The principle of operation relies upon the fact that the capacitance between the two elements of such diodes varies as an

applied bias voltage is varied, provided the diode is biased into the non-conducting region.

Tests have shown that the G.E.C. SX641 and Mullard OA10 diodes exhibit this effect and are suitable for controlling frequency drift, even in V.H.F.-F.M. receivers where the frequency involved is in the region of 100 Mc/s.

The diode capacitance decreases with increase in bias voltage, and with the bias judiciously

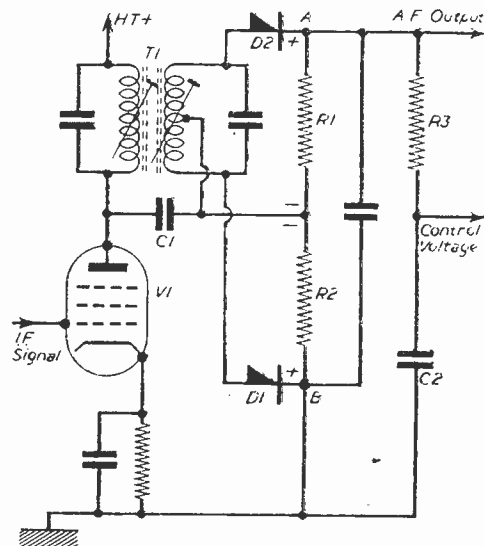


Fig. 3.—Basic circuit of phase discriminator.

arranged so that the diode is operated on the most linear portion of its characteristic curve a frequency deviation of approximately plus and minus 350 kc/s can be secured with a conventional capacitor-tuned oscillator working in the region of 100 Mc/s for a bias change of approximately plus and minus 5 volts. The frequency bias characteristic so achieved is not wholly linear, and at low and high bias levels it tends to flatten out, but the tests reveal that a maximum slope of approximately 100 kc/s per volt can be obtained without undue difficulty over the workable portion of the curve.

A circuit illustrating the principles involved is shown in Fig. 2. From this it can be seen that the junction diode is effectively connected in parallel with the oscillator circuit; capacitors $C1$ and $C2$ serve to isolate the diode from the circuit from the D.C. point of view, but have little disturbance value from the aspect of the oscillator signal.

Resistor $R3$ holds the oscillator circuit away from the relatively low impedance of the bias source which is obtained by way of the potential-divider comprising $R1$ and $R2$ across the H.T. circuit. Resistors $R4$ and $R5$, along with capacitor $C3$, decouple the control voltage circuit and prevent the oscillator signal gaining admittance to other sections of the receiver.

As with reactance valve circuits, the presence of the diode across the oscillatory circuit tends to decrease the amplitude of the oscillator signal due to resistive damping, and this alters slightly

as the control voltage is altered. Both this resistive factor and the factor concerning the additional nominal capacitance of the control circuits must be taken into account during the design of the oscillator section.

The Production of a Control Voltage

As intimated by requirement (2), at frequencies above and below the oscillator frequency required

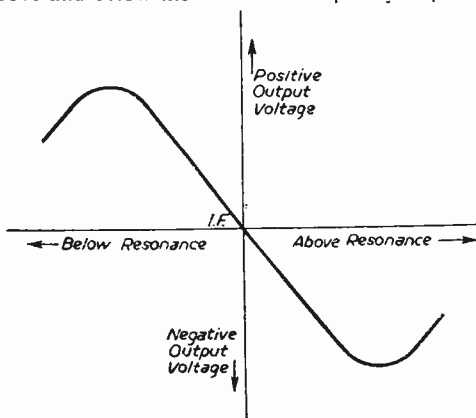


Fig. 4.—Discriminator characteristic. Illustrating how the output voltage will vary as the signal frequency alters below and above resonance of the discriminator transformer.

to give the correct intermediate-frequency the control voltage should be approximately positive or negative with respect to a reference voltage which may be present when the tuning is exact. Since this reference voltage is usually zero, the control voltage swings positive or negative depending upon the direction of the tuning error.

Provided the control voltage applied to the electronic reactance or junction diode is of a polarity which alters the reactance across the oscillator tuning in such a way that the oscillator frequency is altered to decrease the error of deviation of the intermediate frequency, the tuning error of the receiver or tuner will be automatically corrected. If the polarity is incorrect, however, the receiver will be permanently held off tune, and even by careful operation of the tuning control correct tuning will not be possible.

The Phase Discriminator

The control voltage is obtained from a phase discriminator, which is illustrated in basic form at Fig. 3. Valve V1 might well represent the final I.F. amplifier or limiter of a V.H.F.-F.M. receiver. It thus has applied to it an intermediate-frequency signal, which is re-developed in amplified form across the primary of the discriminator transformer T1 in the normal manner.

Because the secondary has a centre-tap, each diode (D1 and D2) will receive a signal of equal voltage from the secondary, but displaced in phase by 180 deg. Each diode will also receive a signal direct from the primary by way of capacitor C1, and as long as the incoming signal coincides in frequency with that to which T1 is tuned, there will exist a phase displacement of 90 deg. between the voltages across the primary and secondary.

This is a normal characteristic of tuned and coupled circuits, and under this condition of exact tune the signal voltage arriving through C1 will add equally to the two diode circuits.

Since the two resistors R1 and R2 are of equal value, there will be equal current in the diodes and equal voltage across the resistors, with polarities as indicated on the circuit. The overall voltage between points marked A and B on the circuit will thus be equal to the sum of the voltages across R1 and R2, and under this condition will resolve to zero because the voltages have to be added in opposition.

Phase Change

When the frequency of the incoming signal differs from that to which the transformer is tuned, however, the phase between the voltages across the primary and secondary changes either below or above the 90 deg. reference depending on which way the coils are off tune in relation to the signal. When this happens the signal voltage arriving through C1 is no longer added equally to the two diode circuits. It adds to one and subtracts from the other due to the phase change. Thus, the current increases in one diode and decreases in the other and, similarly, the voltage increases across one resistor and decreases across the other. To illustrate this point: when the tuning is correct 10 volts may develop in opposition across each resistor, giving zero output between A and B, while in a mistuned condition the voltage across R1 may fall to 5 and rise to 15 volts across R2, giving an output of 10 volts positive at B with respect to A.

The magnitude of voltage so obtained due to tuning error will depend on the deviation of phase, with respect to the 90 deg. reference, between the voltages across the primary and secondary windings, remembering that the phase can change either above or below 90 deg. according to whether the intermediate-frequency is above or below resonance. The curve at Fig. 4 illustrates the manner in which the output voltage will vary as the frequency alters below and above resonance of the discriminator transformer.

The control voltage is taken from point A with respect to chassis, and passed through the filter comprising R3 and C2 for connection to the control grid of a reactance valve or to a junction diode.

Readers who are familiar with V.H.F.-F.M. receivers will recognise the circuit at Fig. 3 as the Foster-Seely phase discriminator. It is interesting to note that this circuit was originally developed for A.F.C. applications before the war, before its use as an F.M. "detector" was fully realised. One should not get the idea that a separate discriminator is necessary for A.F.C. applications; the existing F.M. discriminator is perfectly capable of performing the dual function of demodulating the F.M. signal and supplying a control voltage for an A.F.C. system. The A.F. output is taken from the discriminator in the usual manner.

It should be mentioned that a suitable control voltage can also be obtained from a balanced ratio detector circuit, from the A.F. take-off point with respect to chassis, which is invariably connected to the junction of the matched load resistors.



FOR VALVES —GUARANTEED NEW AND BOXED

023	5 6	18S7	8	DAE96	10 6	PS2	8	VR65A	
143	6	18A7	9 3	18S9	10 6	PS4	12	SP41	3
143GT	6	18A7	14	18S5M	9	SP24	2 6	VR65B	15 11
1A7	12 6	6X36	8 6	OK95	10 6	R19	13 6	VR90	3 9
1A2	9 6	6A3	8 6	0126	10 6	SP220	3 11	VR91	
01501	10 6	6X70	8 6	0M70	8 6	110	10	VR99	4
0147	6 6	6A6E	7 6	1A10	10	122	8	VR91	
1145	3 6	6A6E	7 6	1A10	10	125	13 6	VR92	7
1NS	10 6	6X5-M	8 6	1A101	7 6	145	15	VR92	
1NS	8	6X4	7 6	1A12	12 6	140	12 6	LA50	1 6
184	10 6	6X30	7 6	1B11	9	1A142	11 6	VR95	
185	7 6	6X30-P	7 6	1B11	41 10	1B11	9 6	VR16	6 6
1P4	7 6	6X42	12 6	1B28	11	VR11	10	VR16	4
2A2	4 6	2B5	8 6	1Q1	9 6	VR12	11	VR16	6
2A3	7 6	2C5	8	1Q84	12 6	1B80	12 6	VR17	5 6
2B6	5	2C5	8	1Q85	10	1CH42	12 6	VR19	
2D4	9 6	2I7	9	1Q90	1 6	1CH81	12 6		8
2G5	8 6	2Q7	9 6	1R10	14 6	1F11	10	VR3	6 6
2H4	8 6	2Q7	9 6	1R12	15 6	1F11	12 6	VR4	7 6
2V4	9	2V4	8 6	1R15	11 6	1R14	12 6	VR5	5
4D1	3	2V4	11 6	1R42	10 6	1Y4	10	VR6	
42	8	2V4	8	1R41	11	1Y5	10 6	VR23	6 6
GR4V	9 6	50	8 6	1R10	10 6	VR21	2 9	VR51	5
GR41	8	50	6 6	1R12	13 6	VR3	5	VR51	5
5V24	8	5D2	2 9	1F10	10	VR29	6 6	VR12	14
5V24T	8	5D2	3 9	1F22	8 6	VR4			8 9
5V24T	10 6	5D1	5 6	1F10	12 6	VR11	2	VR11	12
6A7	13	6D2	5 6	1F41	11	VR5			9
6A8	10 6	6D2	5 6	1F25	12 6	VR10	3 7 6	VR11	2 6
6A7	6 6	6D4	5 6	1F26	11 6	VR6		VR20	5 6
6A5	5 6	6D6	5 6	1F29	12 6	VR6		VR20	5 6
6A7	6 6	6D4	2	1F32	8 6	VR6		VR20	5 6
6A7	6 6	6D4	4 9	1F32	6 6	VR29	8	VR20	11 6
6A5	6 6	6D4	3 6	1F32	14 6	VR29	8	VR20	11 6
6A6	6 6	6D4	12 6	1F34	10 6	VR5		VR20	14
6A6	7 6	6D6	6 6	1F34	11 6	VR5		VR20	11 6
6A7	6 6	6D4	11 6	1M30	10	VR5		VR20	11 6
6A6	10 6	6D4	10 6	1M30	11	VR5		VR20	11 6
6B4	5	6B4	5	1Y4	11 6	VR5		VR20	11 6
6B6	4	6B4	9 6	1Y6	12	VR5		VR20	11 6
6B4	7 6	6A7	10	1Y4	6	VR5		VR20	11 6
6B5	8	6B4	9	1Z40	10	VR5		VR20	11 6
6B6	11 6	6B4	7	1Z90	9	VR5		VR20	11 6
6B7	13	6B6	3	1Z18	2	VR5		VR20	11 6
6B6	8 6	6B6	4 6	6Z2	12 6	VR5		VR20	11 6
6B7	10	6B7	10	R40	5	VR5		VR20	11 6
6B4	7	6K7	9	1H20	11	VR5		VR20	11 6
6A3GT	6 6	6K8	13	6N5	8 6	VR5		VR20	11 6
6N5	5	1207	9 8	HL2	12 6	VR5		VR20	11 6
6A36	7 6	12N7	2 6	HN509	13 6	VR5		VR20	11 6
6D6	5	12N7	7 6	K40N	9	VR5		VR20	11 6
6E1	13 6	12N7	5 6	K40	32	8		VR20	11 6
6D6	7 6	12N7	8	K124	4 6	VR5		VR20	11 6
6D6	6 6	12N7	8	K12	5	VR5		VR20	11 6
6C13	14	12N7	8	K126	10	VR5		VR20	11 6
6E3	5 6	12N7	8 6	K156	15	VR5		VR20	11 6
6E15	14	12N7	7 6	K156	8 6	VR5		VR20	11 6
6E94	4 6	12N7	13 6	K1541	6	VR5		VR20	11 6
6D6	2 6	1512	7 9	1R290	5	VR5		VR20	11 6
650	6	20D1	10 6	MR4	7 6	VR5		VR20	11 6
650GT	5 6	20D1	13 6	MR41	7 9	VR5		VR20	11 6
65M	6 6	20D5	13 6	N5	12 6	VR5		VR20	11 6
646	6	20D5	11 6	PH	5 9	VR5		VR20	11 6
647	6	20E18T	9 6	PH5	3 11	VR5		VR20	11 6
6K6GT	7	25A	9	PH4A	15	VR5		VR20	11 6
6K7GT	7	25A	9	PH25	5	VR5		VR20	11 6
6K7	5 9	25Z5	9	PH16	7	VR5		VR20	11 6
6K7M	6 9	25Z6T	9 6	PH20A		VR5		VR20	11 6
6K8	8 9	20E	12 6			VR5		VR20	11 6
6K5GT	9 6	30F41	12 6	PH44	10	VR5		VR20	11 6
6L6	9	30F4	15	PH10	11	VR5		VR20	11 6
6L7	7 6	35L4GT	9 6	PH92	12 6	VR5		VR20	11 6
6L7	11 6	35V4	8 6	PH12	12 6	VR5		VR20	11 6
6N7	7	35Z7	8 6	PH1	13 6	VR5		VR20	11 6
6E25	13 6	35Z7	9	PH1	13 6	VR5		VR20	11 6
6D7GT	9	30L6GT	8 6	PH2	10	VR5		VR20	11 6
6A7A	8	1421F	3 6	PH2	12	VR5		VR20	11 6
6N7	7 6	20D1	13 6	PH25	3 11	VR5		VR20	11 6
6N7	6 6	20E18T	9 6	PH5	12 6	VR5		VR20	11 6
6K7	6	PH5	6 6	PH50	10	VR5		VR20	11 6
6N5	8	AP4	3 6	PH1	10	VR5		VR20	11 6

ACOS MICROPHONES

MIC 36 SERIES
A good quality omni-directional microphone with flat response from 50 to 7000 cycles.
MIC 36-1 Table Model without switch.
MIC 36-2 Table Model with switch.
MIC 36-3 Without switch, with stand for floor stand.
MIC 36-6 With switch and adaptor for a floor stand. The adaptor incorporates both a zinc and tin 20 A.P.P. 110 etc.
Without switch, £3.3.0.
With switch, £3.8.0.

MIC 33-1 WITHOUT SWITCH

A crystal hand-held desk microphone designed for the high quality public address and tape-recording field, incorporating a specially designed acoustic filter giving a response flat from 50 to 7000 cycles. The microphone is omni-directional and housed in an attractive plastic case.
Without switch, £2.10.0

MIC 33-2 WITH SWITCH

With switch, £2.15.0.

MIC 35-1

A general-purpose hand microphone of robust construction with substantially flat response from 50 to 5000 cycles. Suitable for use in recording apparatus, public address equipment, etc.
£1.5.0.

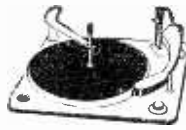
MIC 35-2

The same as MIC 35-1, but fitted with a small desk stand. £1.6.6.

APEX BAND III CONVERTER (Mark II)

- ★ B.B.O. or I.P.A. at the touch of a switch.
 - ★ Built-in power supply for 200/250 V. A.C.
 - ★ Variable fine tuner and gain control.
 - ★ Separate mains on/off switch.
 - ★ Robust construction for mounting on top of side of cabinet.
 - ★ Size only 5 1/2" x 4 1/2" x 2 1/2".
- Retail Price £5.15.0 complete.

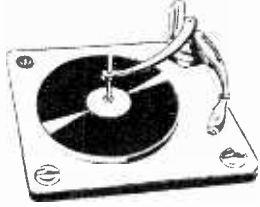
RECORD PLAYER UNITS



B.S.R. MONARCH
Four speed automatic record change unit. Plays 7 in. 10 in. and 12 in. records automatically with 'WALL-DRIVE' Selector. Turnover. Price on C.O.D. £19.10.0 to £10.0.0.



COLLARA Model 3644
Three speed single player. 4 speed auto start fitted with 'Stator' 1000 Hz. 10000 rpm. Price £19.6.0.



COLLARA
Four speed automatic record change unit. A fully automatic 4 speed motor with many advanced features. Unit price £19.10.0 to £19.15.0.
Complete on above units, 4.6.

8in. P.M. SPEAKER UNITS

Without transformer. Removed from units in present working order. Special Price 11 6 each. Postage 1/6.

WESTINGHOUSE RECTIFIERS

18R1-1-16-1	...	9	each
18R1-1-16-1	...	6 6	each
18R1-1-16-1	...	4	each
18R1-1-25-3	...	25	each
18A-8	...	13 9	each
11A-97	...	13 6	each
14A-100	...	15	each
14A-124	...	27 6	each
11B-130	...	31 6	each
1A-7	...	23 9	each
W-6	...	2 6	each

OUR 1957-1958 CATALOGUE IS NOW AVAILABLE TO ALL READERS OF THIS MAGAZINE. 48 PAGES OF COMPONENTS AND EQUIPMENT OF INTEREST TO ALL RADIO ENTHUSIASTS. SEND 1/- IN STAMPS FOR YOUR COPY NOW.

LOUDSPEAKER UNITS

Make	Type	Size	Price
Elac	Square	7 in.	19 6 each
Electro, Plessey	Round	7 in.	17 6 each
Goodmans, Plessey	Round	7 in.	18 6 each
Goodmans, R. & A. Ltd.	Round	7 in.	16 6 each
Plessey, R. & A. Ltd.	Round	7 in.	25 6 each
Plessey	Round	7 in.	25 6 each
Rola	Elliptical	7 in. x 4 in.	19 6 each
Elac	Elliptical	7 in. x 4 in.	25 6 each

All the above are P.M. units with 2 to 3 ohm speaker coils.
RD 12 in. Heavy Duty 20 watts model. Unit, 8 ohms. Special offer, £5.5.0.
Unit, Mains Enclosed Speaker, 41 ohms. Mains Enclosed for 400/17/6
Sole, Mains Enclosed Speaker, £11.0.
All have built-in or approx. 100 ohms.

SPECIAL OFFER
Just a few 8 in. units for consideration by those fitted with standard output transformers. £11.6 each.

HEADPHONES-MICROPHONES

EX-GOVERNMENT HEADPHONES AND MICROPHONES

CLR Low resistance type 120 ohms, 7 6 pair.
Throat Microphones. American type complete with strap, lead and plug type 120B, 3/- set.
High Resistance Phones, 4000 ohms, 12 6 pair.
High Resistance H.R. Phones, 16 ohms, 12 6 pair.
E.R.A.F. Microphone, Type 8N with Switch, 3 6 each.



ALPHA

-RADIO SUPPLY CO.

103 LEEDS TERRACE
WINTON STREET
LEEDS 7

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. Personal Shoppers Monday-Friday 9 a.m. to 5 p.m. Saturday 10 a.m. to 1 p.m.

www.americanradiohistory.com

TRANSISTORS

JUNCTION TYPE P-N-P
(British Manufacture)

RED-SPOT 800 Kc/s Audio Frequency.....	10/-
BLUE-SPOT 1.6 Mc/s Mixer and Frequency Changer...	15/-
WHITE-SPOT 2.5 Mc/s R.F. and I.F. Amp.....	20/-

All Transistors are Tested and Guaranteed.
N.B. The Red-Spot is similar to Mullard OC71.

The New "TRANSISTOR-8"

Push-Pull Portable Superhet £11/10/-
Can be built for

This Portable 8 Transistor Superhet is tunable for both Medium and Long Waves and is comparable in performance to any equivalent Commercial Transistor Set. Simplified construction enables this set to be built easily and quickly into an attractive lightweight cabinet supplied.

TEN STAR FEATURES

- * 8 Specially Selected Transistors
- * 250 Milliwatts Output Push-Pull
- * Medium and Long Waves
- * Internal Ferrite Rod Aerial
- * 7 x 4 Elliptical High Resistance Speaker
- * Drilled Plastic Chassis 9 1/2 x 2 1/2 in.
- * Point to Point wiring and practical layout
- * Economical. Powered by 7 1/2 v. battery
- * Highly sensitive
- * Attractive lightweight contemporary case

N.B. Pair of Matched Mazda N1101's supplied at additional cost of 40/-.

Call and hear demonstration model.

We can supply all these items including Cabinet for £11-10/-.
All parts sold separately.

Send for circuit diagrams, assembly data, illustrations and instructions, and full shopping list, 1/6.

"EAVESDROPPER"

THREE TRANSISTOR POCKET RADIO
(No Aerial or Earth required)

Pre-selected to receive the Light and Home Stations. Total cost, as specified including Transistors, Transformers, Coils, Condensers and Battery, etc., with circuit and plastic case.

All items sold separately. 77/6 POST FREE
With single phone, 82/6. With Min. Hearing Aid, 92/6.

THE TELETRON "COMPANION"

THREE TRANSISTOR POCKET RECEIVER
MEDIUM AND LONG WAVES. NO AERIAL OR EARTH
Tuned R.F. Circuit. Ardent Transformers. 3 Transistors.
Drilled Plastic Chassis and Cabinet size 4 1/2 x 3 x 1 1/2 in., and all
Components. Balanced Armature Output. Batteries, Knobs
and Transistor Holders. Total cost

89/6

ALL PARTS SOLD SEPARATELY

TRANSISTOR SIGNAL TRACER

Complete Kit with 2 Transistors, Components. Phones with circuit and plastic case, 42/6.

THE "MINI-TWO"

Smallest Transistor Set Marketed.
Size 3in. x 2in. x 1in. No Aerial or Earth.
2 Transistors. Variable Tuning. Med. Wave. Complete with Hearing Aid. All Components. Plastic Case. 1 1/2 v. Battery. Practical Layout.
TOTAL COST 49 6 COMPLETE.
(All Items sold separately).

"HOMELIGHT" TWO TRANSISTOR PERSONAL PORTABLE

No Aerial or Earth Required
We can supply all components including 2 Transistors, Diode, Resistors, Condensers and Miniature Hearing Aid and Plastic Case size 4 1/2 x 2 1/2 x 1 1/2 and 1 1/2 v. Battery. FOR 52/6.
All items sold separately.

6 V. VIBRATOR PACKS

Output 120 v. 36 mA., 12/6. Brand new.

TRANSISTOR SQUARE WAVE GENERATOR

Complete Kit with 2 Transistors. Components, Circuit and plastic case, 25/-.



The SUMMERFIELD

PORTABLE RECORD PLAYER. High Fidelity reproduction of all sizes and types of records. 2 1/2 W. High Quality Output. Automatic Record Changer. Turn-over crystal pick-up head. A.C. Mains 200-250 v. 50 cycles. Price 19 1/2 guineas. Packing and Carriage 15/-.

RADIO INSTRUMENTS SUPPLY FACTORY
STATION ROAD, HAROLDWOOD, ESSEX.

Ingrebourne 2935.



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:—

ONLY
★ 32/6
COMPLETE

PIFCO LTD., WATLING ST., MANCHESTER, 4
36-37, UPPER THAMES ST., LONDON, E.C.4

SEND STAMPS FOR NEW 1957 28-PAGE CATALOGUE
OPEN MONDAY to SAT. 9-5. THURS. 1 o'clock.

HENRY'S RADIO LTD.

5 HARROW RD., EDGWARE RD., LONDON, W.2.
TEL.: PADDINGTON 1008-9

The Radio Show, 1957

OUR CORRESPONDENT REVIEWS SOME OF THIS YEAR'S EXHIBITS

By the Marquis of Donegall

THE television features of this year's Earls Court Show are dealt with in our companion paper "Practical Television," so we shall confine ourselves here to sound radio and other aspects of the exhibition.

Many of my remarks on the general trend of the show apply, however, as much to radio as to television. For instance, the general tendency towards Continental styling—gloss finish and "gold" metal trim and the growing of streamline legs on to console models. It was, in fact, obvious that the manufacturers had made an all-out effort to make the radio set fit in with the furnishings most likely to prevail in the modern home.

In the case of television, this year's show celebrated a definite 21st birthday. To fix anything quite as marked as that in the case of radio is more difficult. But if we look back 30 years—as I have done in my journalistic files—it would seem that radio as we know it was first put before the public on a big scale at the Olympia Exhibition of 1927. Previous exhibitions at the White City and at the Albert Hall had been chiefly devoted to the home-construction of sets—mostly crystal sets at that—the multi-valve set being decidedly the exception. Anyway, 1927 saw the end of Donegall's faithful cat's-whisker contraption and, as far as the show was concerned, it marked the end of knob-studded panels with trailing wires and unsightly batteries. The novelties introduced were the all-mains set, the superheterodyne and the gramophone pick-up.

At one jump I plunged from the ridiculous to the sublime and bought myself a portable—at least it had a handle for those of Samsonic strength—that got Schenectady, Pittsburgh and most of South America quite regularly from my flat in Westminster. And that, youngsters, is more than any of your 1957 portable sets will do!

Apart from the improved styling of cabinets and the "leg" display, practically every manufacturer had concentrated on smaller, more efficient and more colourful portable sets. Starting with the giants, there were the larger TV, V.H.F. radiograms, with special loudspeakers and other features for improved sound. A good example was the model 1628 H.M.V. at 57 guineas. This stands on legs and includes storage space for records, but has no TV.

As no separate radio chassis is involved there were more TV radiograms than ever before. Nearly all the familiar makes had them but I noticed particularly attractive examples by Ultra, G.E.C., Decca, Ekco and Pye.

Continental ideas have certainly elongated the radiogram. Very compact models for flats were shown by Invicta and K.B., but the vertical design is becoming rare. The trend is for low models with lids and wide models with sliding doors. The "new look" is horizontal with metal trim.

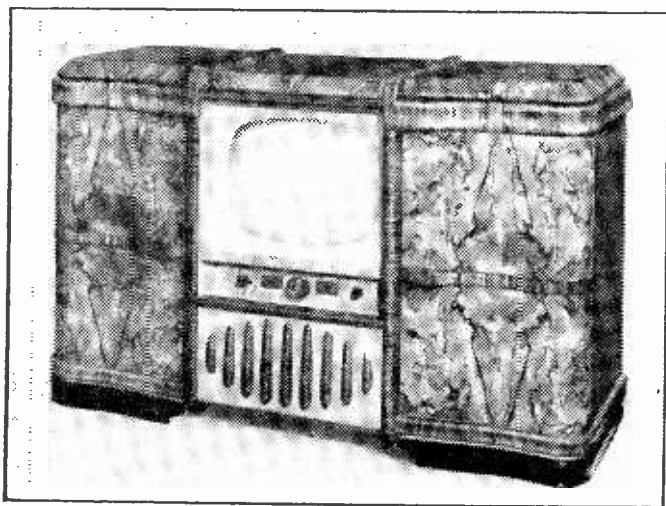
Hi-Fi

Horizontality has the advantage of allowing ample space for record storage and gives room for several loudspeakers. R.G.D. and Regentone had no less than five, and arrangements up to four loudspeakers were quite frequent. By this means sound acquires a 3-D effect and the frequency response is smoothed and extended—a development necessitated by the V.H.F. radio and included in nearly all radiogram chassis, as well as for the purpose of doing justice to hi-fidelity records.

Acoustic chambers, cross-over filters (ensuring that each speaker receives only the frequencies it can handle) and high-grade pick-ups (including the variable-reluctance type), were other features to ensure the radiogram competing with unit hi-fi equipments. Prices ranged from £50 to 80 guineas for the de luxe designs.

Printed Circuits

Printed circuits and tremendously increased use of transistors have resulted in



A luxury TV-Radio, Tape Recorder and 4-speed Record Player, by Sobell.

every manufacturer producing a mains-battery portable and/or a midget A.M. radio. H.M.V.'s model 1410 at 13 guineas is a battery receiver weighing only 2½lb. Typically, a printed circuit is used throughout, three low-consumption valves and two transistors. Similarly, but with the tuner on top for L. and M. wavebands, the 12½ guinea Cossor is rather like a 10in. wide box-type lady's handbag. It comes in black and white or tweed green and dark green with a polythene protective wrapper and weighs 6lb. with batteries.

At 19 guineas Cossor have an all-transistor pocket radio about the same size as my American Zenith seven transistor job. Cossor's is a four transistor set for medium waveband reception finished in red, buff or grey artificial lizard skin (6in. × 3½in. × 1½in., weight 17oz.).

Actually, the smallest set in the show was the Perdio with dimensions of 5½in. × 3¼in. × 1in., also a transistor pocket set.

Portables

Transistor battery sets are still too expensive to menace the little 4-valve portables retailing at about 11 guineas, of which good examples were shown by Murphy, Philips and Stella, the average being about half the price of transistor models. But several new transistor sets have been developed by, for instance, Cossor, G.E.C., K.B., Pam and Peto-Scott, with the advantage of very low running costs—perhaps a ¼d. a day or less. (I have been running my Zenith for nine months and have not yet had to buy a new midget Ever Ready battery for it!)

Development now continues in reducing the number of transistors in an average set from 8 to 6 while at the same time striving for improved sensitivity and increased volume.

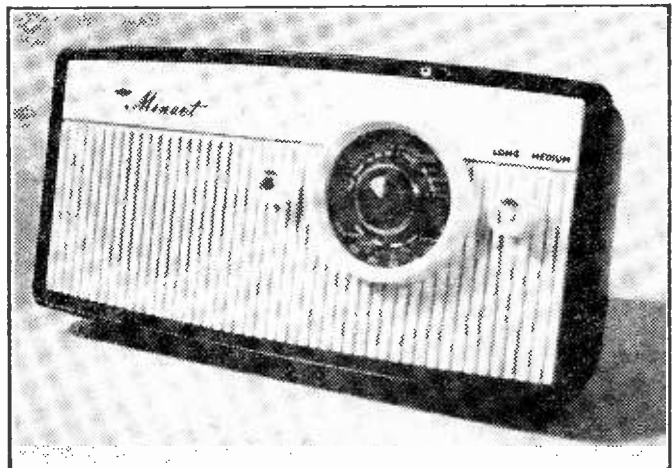
There were two items that do not seem to fit into any particular category. The first was a TV radiogram recorder by Pye, which, it should be mentioned, uses not tape but magnetic disc. It is called the Pye "Trio" and costs £167 5s. 6d. complete with the necessary accessories.

Having been asked by several American record companies whether my Donegall Sound Studios are prepared to supply stereophonic tapes—and having answered in the affirmative—I was naturally interested in G.E.C.'s demonstration of their latest stereophonic technique which incorporates what they call their Periphonic loudspeaker system. For the benefit of those who have not yet ventured into the labyrinth of stereophony, the object is, of course, to create the impression of depth and width in sound so that each ear receives sounds that are similar in nature to those that each ear receives at a live orchestral or other performance. (To put it at its simplest, it is the same idea as the old stereoscope of our childhood that you looked through and two photographs merged into 3-D.)

G.E.C.'s problem has been to find a method for correcting the destruction of balance so far inherent when the listener moved away from a central point between the strategically placed loudspeakers. Such correction has been found possible for time differences up to a maximum of about one-five-thousandth of a second by differences of sound intensity. After this, the position of the apparent sound source becomes less well defined.

Planned Furniture

To continue for a moment with displays that fitted into no particular category, I was impressed with Pamphonic's "Hi-Fi in G-Plan" furniture. The idea is to eliminate cluttering-up the living-room with a monstrous radiogram and an equally incongruous television set that completely wreck any pretensions that the room may have towards artistically planned furnishing. The way to avoid this terrible state of affairs, says my friend Pamphonic's Victor Weake, is to call in one of his experts who will proceed to incorporate any amount of Hi-Fi into your dwelling so that its outward and visible signs are hardly noticeable at all. Towards this end he showed me a piece of furniture which I would call a sideboard but he chooses to call a G-Plan Librenza. Be this as it may, the Thing goes along quite a bit of a sitting-room wall or can be used as a dividing unit between living-room and dining-cubicle. On the Thing (or should I say in it?) Mr. Weake will be delighted to put you an F.M. radio unit, a record-player, a pre-amplifier, an amplifier, record storage and a loudspeaker. Doubtless, if suitably remunerated, he would also find space on or in the Thing for a television, a tape-recorder, acetate disc-cutter and an infra-red cooker—with ample space on the shelves remaining for books, the collection of jade, a bit of Dresden china and that crystal with a snowstorm round the Eiffel Tower that you have been wondering what the devil to do with since you brought it back from Paris two years ago.



A new K.B. receiver—the Minuet, a five-valve mains transportable.

RETURN-OF-POST SERVICE

PLEASE NOTE NEW ADDRESS

The items listed below are from our range of components and accessories usually held in stock. Cash orders are normally dealt with on the day they are received. Orders for goods on Credit Sale are subject to slight delay, but this is kept to an absolute minimum.

MULLARD TAPE AMPLIFIERS

All components for these Amplifiers as described in the Mullard Publications are always carried in stock.
AMPLIFIERS TYPES A & B.—See our Advert. in P.W. October issue for installed prices or send for free price list.
AMPLIFIER TYPE C.—This is the new version of the Type B Amplifier. Send for free price list and details.

TELETRON COMPANION

We can supply complete kits for this popular Transistor set for **£2 6** post free. All parts available separately. Send for list. Instruction Leaflet, **64**.

JASON FM TUNERS

We can wholeheartedly recommend this tuner as being one of the most satisfactory of all FM Kits. Construction is easy and results first class.

Our kits are really complete, the Instruction Book, all components, valves and small items such as nuts, bolts, wire and solder all being included. Definitely nothing else to buy.

COMPLETE KIT, £6.19.6 post free. Credit Terms, Deposit **19.6** and seven monthly payments of **£1.0.0**. All parts available separately and our fully detailed list is available free upon request. Instruction Book **2.3** post free.

MULLARD 510 and GEC 912 PLUS AMPLIFIERS

We carry full stocks for all versions of these popular Amplifiers and our price lists are available free.

TEST INSTRUMENTS

AVO METER MODEL 8.—This finest of all Test Meters is always in stock. Cash Price, **£23.10.0**. Credit Terms, Deposit **£3.9.0** and seven monthly payments of **£3.3.0**.

RECORDING TAPE

All sizes of tape and empty spools by the following makes are stocked. BASF, Erntape, Ferrograph, MMS and Scotch Boy. We have a list of these available which includes details of many Tape Accessories which we also carry.

GRAMOPHONE STYLE

Full range of replacements always available. In every case we supply only Stylus by the actual Pick-up manufacturer concerned. Full list available. A range of Gramophone Accessories also available.

GRAMOPHONE EQUIPMENT

BSR MONARCH RECORD CHANGERS.—The latest four-speed model with turn-over crystal pick-up, **£2.2.6**. Credit Terms, Deposit **£1.5.0** and seven monthly payments of **£1.2.6**.

RECORD CHANGERS AND PLAYERS.—We have a selection of these by various makers with some at special prices. Write for our latest list of offers.

TRANSISTORS

SURPLUS TYPES
 Special offer of the famous Red Spot. **7.6** each. Four for **27.6**.
 RF Junction Type. Red Yellow Spot, **21.-**.
 AF Junction Type. Red Green Spot. Pair in push-pull give **250 mW**. **10.-** each.

MULLARD TYPES
 OC71, 24.-. OC72 Matched Pairs, **60.-**.
 All transistors post free.

TRANSISTOR COMPONENTS

We have many types of miniature and sub-miniature condensers and other components. Fully detailed list available free.

CREDIT TERMS

Any of the above items can be supplied on Credit Terms. Details are as follows:—

SEVEN MONTHLY PAYMENTS. Deposit 3.- in the £ and balance plus a small service charge (10% of balance, but minimum charge 1.) payable in seven monthly payments.

THREE MONTHLY PAYMENTS. Deposit 6.- in the £ and balance plus a small service charge (5% of balance, but minimum charge 10.-) payable in three monthly payments.

TERMS OF BUSINESS.—Cash with order or C.O.D. Postage extra under £3. We charge C.O.D. orders as follows. Up to £3 postage and C.O.D. fee, minimum 2/5. Over £3 and under £5, C.O.D. fee only 1/6. Over £5 no charge.

WATTS RADIO (MAIL ORDER) LTD.

54 CHURCH STREET, WEYBRIDGE, SURREY

Telephone: Weybridge 4556

PLEASE NOTE. POSTAL BUSINESS ONLY FROM THIS ADDRESS.

GOODMANS SPEAKERS

ANIM 150 MK. II. This most popular of all 12in. speakers is available for immediate delivery. Frequency range is 30 to 15,000 cycles. Handles 15 watts. 15 ohms Speech Coil. **£11.5.9**.
AUDION 60 BASS.—Ideal bass unit in multi speaker systems. Bass resonance 35 cycles. Handles 15 watts. 15 ohm Speech Coil. **£9.12.6**.

ANETTE.—A line speaker for use where size is important. Fin. diam. Frequency range 40-15,000 cycles. Handles 6 watts. Available with 3 or 15 ohm speech coil. **£9.16.6**.

TREBAX.—Pressure type tweeter. Frequency range is 2.5 to 16 K c/s. Impedance 15 ohms. **£5.4.0**.

CROSS OVER UNIT X05000.—For use with Trebax. Cross over frequency is 5,000 cycles. **39.-**.

WHITELEY SPEAKERS

The famous WB range of quality speakers. HF1012, 10in., **£9.9**. HF912, 9in., **£8.6**. HF812, 8in., **£3.6**. HF816, 8in., **£6.17.0**. T816 Treble Speaker, **£6.10.0**. T19 Tweeter, **£4.4.0**. Crossover Units. X03000 for T19, **30.-**. X01500 for T816, **38.6**.

WHITELEY CABINETS

All these cabinets are packed flat for home assembly.

Junior Bass Reflex Corner Console, **£9.9.0**.

Bass Reflex Console, **£10.10.0**.

Bass Reflex Console Cabinet, **£11.11.0**.

Other types available. Fully illustrated leaflet available free.

TSL LPH65 TWEETER SPEAKER

A very popular Tweeter which can be used in many installations to give much improved top response. Simply connect in parallel with main speaker via a 2 mfd. Paper Condenser. Price **39.6**. Suitable 2 mfd. Condenser, **2.6**.

CRYSTAL SET COMPONENTS

CHASSIS with tuning dial and Aerial, Earth and Phone sockets, **2.9**. Plugs to fit sockets, **4d**. each.

TUNING CONDENSER, 3.10. **KNOB, 1/-**.

COIL.—HAX Coil specially made for Crystal Diodes, **3/-**.

CRYSTAL DIODES, 1/-.

TRIPLE-TONE HI-FI AMPLIFIER

The latest Triple Tone Hi-Fi Amplifier is now available. Twelve watts output from a pair of 6V6 valves. **£15.18.9**. Credit Terms, **£2.8.3** and seven monthly payments of **£2.2.6**. Detailed literature available.

TRIPLE TONE MINOR AMPLIFIER

The Popular Minor Amplifier is always available. 4 watts output from a single 6V6 valve. Three tone controls. Full AC design. Not a live chassis. **£9.19.6**. Credit Terms, Deposit **19.6** and seven monthly payments of **£1.0.0**.

NEW MULLARD CIRCUITS

Details are just to hand at the time of writing this advertisement of three new Mullard Circuits. They are:—

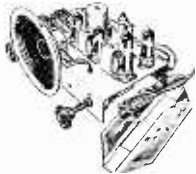
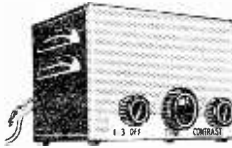
1. AC DC Amplifier. 7 watt.

2. Two Valve Pre-Amplifier for 510 Amplifier.

3. Mixer Unit.

It is hoped by the time of publication to have details of these to send to those interested. Please write for details of the circuit which interest you.

I.T.A. CONVERTER. All I.T.A. stations, wired ready for use, complete with power pack, fine tuner, etc., £4/7/6, as illus. Metal cabinet, stove enamel grey hammer finish. Walnut cab., £4/17/6. Lizard rexins, £4/12/6. Chassis (less cab.), 77/6. All with two ECC81. All plus 3/- p. & p. (C.O.D. 2/- extra). Clip on I.T.A. aerial to existing mast, or mount in loft. 3 element, 27/-; 5E., 35/-; B.E., 55/-; low loss coaxial, 8d. yd. Terms on complete converters one-third down and balance, plus 5/-, payable in 4 equal monthly instalments. Postage with first payment.



RADIO SET. 4 valves. UY41, UAF42, UL41, UCH42. Covers 4 selected stations; aerial included. 200-250 v. A.C./D.C. mains. Chassis 9in. x 5in. x 2in. high (5½in. over speaker). 5in. P.M. speaker. On-off/vol. 35/- down and 3 monthly payments of £1. Walnut cabinet to fit, 20/-

Reduced price due to new purchase £4/10/0 (3/- p. & p.; 2/- C.O.D.)

AUTOMATIC RECORD CHANGERS are in short supply. Collaro RC456 Studio "T" turnover crystal pick-up. 4-speed mixer. A.C. mains 200-250 v., see illus. ALSO Collaro single player AC3/554. 3-speed, turnover crystal pick-up with "T" head. £6/16/6 (3/6 p. & p.).



£8/16/6 (5/- p. & p.)

GLADSTONE RADIO

HIGHLY SUCCESSFUL 13-CHANNEL CONVERTER.

Designed and made by a world-famous organisation regardless of expense. Tunable over the whole of Band I and Band III to give one Band I and two Band III stations at the turn of the switch. Acts as Two-valve Pre-amplifier on Band I. Valves PCC84 and PCF80. No drift. In Moulded Bakelite Cabinet, 8½in. x 4½in. x 6in. high. With full operating instructions. Built-in Power Pack added by us. Separate gain controls for I.T.A. and B.B.C. (P. & p. 3/-, C.O.D. 2/-)



£5-5-0

CONVERTER available for Philips receivers to above specification complete with built-in power pack, at £5/5/- (p. & p. 3/-)

ELECTROLYTICS. 25 mf. 25 v. tub. wires, 9d.; 12-12 mf. 275 v. tub. wires, 2/3; 32-32 mf. 350 v., 1½in. can, 3/-; 200 mf. 6 v. ½in. can, 9d.; 16-24-8 mf. 350 v., 1½in. can, 3/-; 60-120 mf. 350 v., 9/-.

MAINS TRANSFORMER. 290-0-290 v. 60 m.a., 6.3 v. 2½ A. and 6.3 v. ½ A., 12/6 (p. & p. 3/-).

BATTERY ELIMINATOR. 90 v. 15 m.a. and 1.4 v. 125 m.a. for 4 low consumption valves; 5½in. x 3½in. x 2in. for 200-250 v. input. 35/- (p. & p. 2/6).

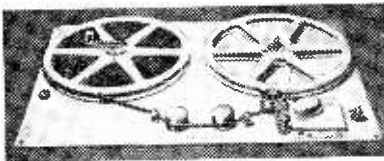
SMALL QUANTITY I.T.A. converter chassis by one of our largest manufacturers for London and Winner Hill areas only, valve rect. & ECC81 & PCC84; with power pack, and direct switching I.T.A. to B.B.C. Chassis size 8in. x 5½in. x 4½in. ONLY 70/-; Walnut cab. 10/- extra.

Ex-W.D. PERISCOPES, fixed, giving rise of 10in. Price 4/6 (p. & p. 3/-).

ALL NEW GOODS; POSTED ORDERS TO CAMBERLEY, PLEASE.

3 CHURCH RD., REDFIELD, BRISTOL AND 82b HIGH STREET, CAMBERLEY, SURREY

"ASPEN" TAPE RECORDER KITS



TAPE DECKS, 2-speed, twin track, easy to assemble kits with finest motor, Ferroxcube heads and full instructions.

MODEL 521 for 5in. spools, kit £8.5.0.

MODEL 721 for 7in. spools, kit £9.5.0.

Either model assembled and tested, 30/- ex ra.

AMPLIFIER kit, 2½ watt. record replay, 2 recording positions, neon indicator, etc., £5.18.0. Power pack kit for above, £2.18.6 (both without valves). Carr. and packing extra.

YOU CAN BUILD A QUALITY TAPE RECORDER

M.G. from Baghdad writes :-

"...really nice to have this amazing tap deck."

D. B., Malaya, writes :-

"The recorder is now working as well as a commercial mode and I am very pleased with it."

This tape deck and amplifier s being used in the Antarctic by an Expedition member.

Send stamp for full particulars to:-

W. S. ASPDEN Stanley Works, Back Clevedon Rd., BLACKPOOL, Lancs.

REPANCO HIGH GAIN TRANSISTOR COMPONENTS

STANDARD RANGE

Ferrite Slab Aerial Type FS2. Designed for Long and Medium Wave reception with transistor portable superhet receivers.

Slab size 5½in. x ½in. x 5/32in. Complete with fixing brackets, 13/6.

Combined Oscillator and 1st I.F. transformer Type OT1. 13/16in. sq. x 1½in. I.F. Frequency 315 kc/s., 11/6.

2nd I.F. Transformer (315 Kc/s.), Type TT2., 5/-.

3rd I.F. Transformer (315 Kc/s.), Type TT3., 5/-.

I.F. Transformers enclosed in iron dust pots with slug tuning.

Push Pull Interstage Transformer Type TT4. Ratio 1 : 1 C.T. Stack size 1½in. x 1 1/16in. x 7/16in., 8/6.

Push Pull Output Transformer, Type TT5. Ratio 15 : 1 C.T. (Size as TT4.) Matched to 3 ohm speaker, 8/-.

MINIATURE RANGE.—For pocket receivers.

Ferrite Slab Aerial Type FS3. Medium Wave only. With fixing grommets. Size 3in. x ½in. x 5/32in., 7/6.

Oscillator Coil Type XO8. Medium Wave only. Overall size ½in. dia. x 1in. Enclosed in Ferrite pots, 5/-.

I.F. Transformer Type XT6. Suitable for 1st and 2nd I.F. 455 Kc/s. Size ½in. sq. x 11/16in., 10/-.

I.F. Transformer Type XT7. Designed for 3rd I.F.T. or detector I.F.T. 455 Kc/s. Size as XT6, 10/-.

Push Pull Interstage Transformer Type TT9. Ratio 1 : 1 C.T. Radiometal Core. Size ½in. x ½in. x 13/32in., 12/6.

Push Pull Output Transformer Type TT10. Ratio 8 : 1 C.T. Matched to 3 ohm speaker. Size as TT9, 12/6.

Practical and Theoretical circuits enclosed with each Repanco Transistor Component.

Send S.A.E. for complete list of Repanco Quality Components.

Mail Order and Trade :

RADIO EXPERIMENTAL PRODUCTS, LTD.,
33, Much Park St.,
COVENTRY
Tel. : 62572

Wholesale Enquiries and Export :

REPANCO, LTD.,
O'Brien's Buildings,
203-269, Foleshill Rd.,
COVENTRY
Tel. : 40594

Circuits for 2 Transistors

TWO-STAGE RECEIVERS ARE VERY POPULAR, AND IN THIS ARTICLE SUITABLE CIRCUITS ARE GIVEN

By F. G. Rayer

MANY transistor circuits require special coupling transformers, or are rather difficult to set up initially. Both these

satisfactory with a small battery-operated receiver is likely to be suitable. A transistor output transformer is not essential, and this component may be of the type intended for triode output valves, and preferably of reasonably large proportions. With a multi-ratio transformer, the taps found to give best volume are used. A high ratio is not required.

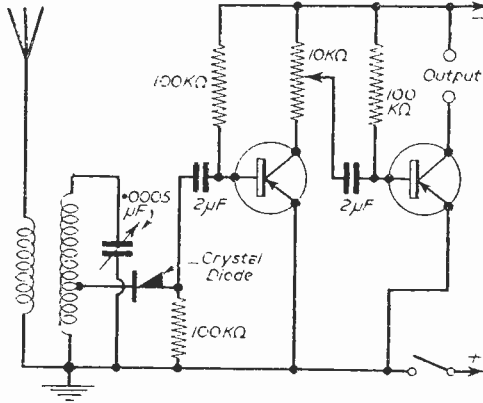


Fig. 2.—R.C. coupling.

Direct Coupling

A circuit of this kind is shown in Fig. 1, and requires two separate batteries, but no coupling components. It is best suited to low voltages, and only a small potential is applied to the first transistor—1½ v. in this case. A double-pole switch is necessary. The output points are connected to phones or speaker transformer.

In Fig. 1, the first transistor acts as detector also, with base input, and this is quite effective. Transistors suitable for A.F. amplification only can be fed from a crystal diode detector, the circuit otherwise remaining unchanged.

As maximum volume from local stations is in view, a fairly tight aerial coupling is used, and is particularly satisfactory with fairly short aerials. With long aerials, a condenser of .0001μF to .0003μF may be included in the lead-in. Alternatively, the aerial may be taken to a tapping on the coil, or to a coupling winding. Any of these methods will increase selectivity.

Resistance Capacity Coupling

R.C.C. is useful as the components are easily obtainable, and only one battery is required. Fig. 2 illus-

difficulties may be overcome by using suitable arrangements which can be expected to work satisfactorily at once, without adjustment, and two transistors can be employed in this way in the circuits given here. Multi-transistor circuits tend to grow rather complex and costly, while a single transistor is insufficient for speaker reproduction, except in favourable circumstances. With two transistors, however, relatively low components are required, and adequate volume for loudspeaker reception can be anticipated.

The volume from two transistors does not approach that obtainable from two valves. Nor is sensitivity equal to that of a 2-valve receiver. A reasonably good indoor or outdoor aerial is thus required, and an earth is desirable. Two transistors can then give sufficient volume for comfortable speaker reception of the local stations. As running costs are extremely low, such an arrangement is very useful.

It is worth noting that a midget speaker is not recommended, unless small size is definitely required. For normal use, a 5in. to 6in. model, of good manufacture, is satisfactory. Some very good 3½in. speakers also exist, but smaller types, especially if of low cost, are best avoided, as volume will be reduced. However, any sensitive permanent-magnet speaker which has proved

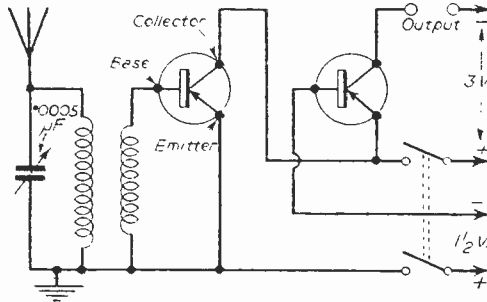


Fig. 1.—Direct coupled amplifier.

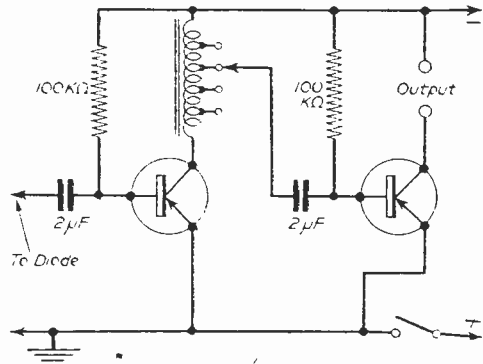


Fig. 3.—Auto-transformer coupling.

trates a circuit of this type consisting of a 2-stage transistor amplifier fed from a diode detector. The 10K potentiometer acts as A.F. volume control. The component values are not very critical, but the coupling condensers *must* be of large capacity, preferably not under 1 μ F.

Such a circuit may quite easily be overloaded. The simplest method of avoiding heavy currents, under such conditions, is to limit the battery voltage, and reasonable speaker reproduction is obtainable with a 3v. battery. If an increased volume is desired, to obtain greater volume, then operating conditions should be checked with a meter.

Such a circuit can give a very useful degree of amplification. If instability develops with the volume control near maximum, the battery may need replacing, as back coupling can arise with a discharged battery having appreciable internal resistance. A large capacity condenser in parallel with the battery will help to avoid this.

It is not essential to use a tapping on the coil, for the diode. Any ordinary crystal set can thus be used to provide an input for the amplifier. But if maximum volume is to be achieved, the tapping (or a diode coupling winding) becomes necessary.

Transformer Coupling

A transformer with a step-down ratio of around 7:1 to 12:1 can be employed for inter-stage coupling. The primary is wired from first transistor collector to battery negative, and the secondary from battery positive to second transistor base. As a transistor is current operated, care is necessary that the transformer is not connected so that it provides a step-up ratio, or results will be extremely poor. Ex-service and other transformers of high inductance and moderate or low D.C. resistance will function satisfactorily in this way.

An auto-transformer can also be used, as

shown in Fig. 3. This gives greater volume than R.C.C., and a multi-ratio output transformer is satisfactory. Most of the winding will require to be employed as collector circuit load, with only a small portion feeding the second transistor. The best tags to employ can be found by trial. The circuit otherwise remains the same as in Fig. 2. A fairly large transformer can give very good results, in this way.

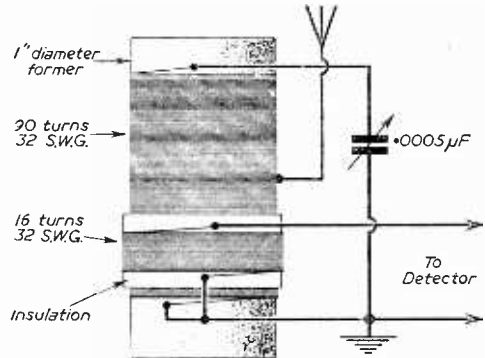


Fig. 6.—Transistor tuning coil.

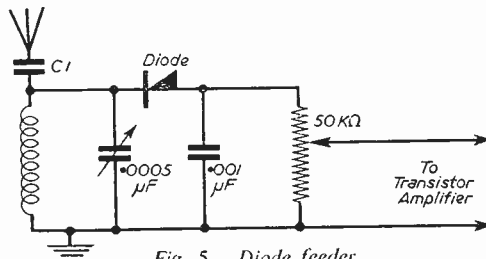


Fig. 5.—Diode feeder.

A similar form of coupling can also be used with the first transistor acting as detector, as shown in Fig. 4. This requires fewer components, and will operate efficiently with most present-day transistors. Assuming that a multi-ratio transformer is fitted, the best tappings are found by trial, as explained. In all cases the transformer secondary is left wholly disconnected.

Diode Tuner

A diode tuner, with volume control, can be made employing the circuit in Fig. 5, and used to feed any transistor amplifier. When condenser coupling is employed between diode and first stage, the polarity of the diode is unimportant. But if forms of direct-coupling are employed here the negative end of the diode should be taken to the tuner output circuit. As with the other circuits, selectivity and input can be controlled by modification of the aerial condenser C1. With long, high, outdoor aerials, quite a small value is suitable. But with poor aerials, or short, indoor wires, the condenser must be fairly large (say up to .0005 μ F), or it may be omitted. This circuit is suitable for use in conjunction with the amplifier in Fig. 3. In favourable circumstances sufficient volume will be obtainable with only one transistor stage. However, the use of two stages leaves a little in hand, but overloading of the output stage (causing distortion) should be avoided. This can be done by reducing the capacity of C1, or adjusting the volume control. As already explained, volume may be improved

(Concluded on page 648)

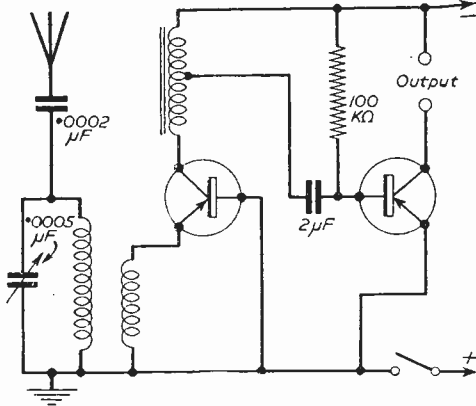


Fig. 4.—Emitter detection circuit.

Wanted!

QUALIFIED MEN AND WOMEN

Industry & Commerce offer their best posts to those with the necessary qualifications—such posts that will bring personal satisfaction, happiness, good money and security. As part of a modern industrial organisation, we have skilled knowledge of what is required in industry to-day and the best means of training personnel for its present day and future requirements. We specialise also in teaching for hobbies, new interests or part-time occupations in any of the subjects listed below. Make your own choice and write to us to-day for further information. There is no obligation of any kind.

PERSONAL & INDIVIDUAL TRAINING IN—

- | | | | |
|---------------------------------------|-------------------|------------------------------|---------------------|
| Accountancy | Customs Officer | Languages | Refrigeration |
| Advertising | Draughtsmanship | Management | Sales Management |
| Aeronautical Eng. | Economics | Maintenance Eng. | Sanitary |
| A.R.B. Licences | Electrical Eng. | Mathematics | Engineering |
| Art (Fashion, Illustrating, Humorous) | Electrical | M.C.A. Licences | Salesmanship |
| Automobile Eng. | Installations | Mechanical Eng. | Secretaryship |
| Banking | Electronics | Metallurgy | Shorthand & Typing |
| Book-keeping | Electronic | Motor Eng. | Short Story Writing |
| Building | Draughtsmanship | Painting & | Short Wave Radio |
| Business | Eng. Drawing | Decorating | Sound Recording |
| Management | Export | P.M.G. Certs. | & Reproduction |
| Carpentry | Heating & | Police | Telecommunications |
| Chemistry | Ventilation Eng. | Production Eng. | Television |
| City & Guilds | High Speed | Production | Time & Motion |
| Exams | Oil Engines | Planning | Study |
| Civil Service | Industrial Admin. | Radar | Tracing |
| Commercial | Jig & Tool Design | Radio Amateurs | Welding |
| Subjects | Journalism | (C&G) Licence | Workshop Practice |
| Commercial | Art & Drawing | Radio & Television Servicing | Works M'gement |
| | | | and many others |



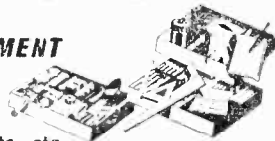
The E.M.I. Factories at Hayes, England.

The only Home Study College operated by a world-wide manufacturing organisation

EMI INSTITUTES

NEW! Courses with PRACTICAL EQUIPMENT

in RADIO · TELEVISION · MECHANICS
CHEMISTRY · ELECTRICITY
DRAUGHTSMANSHIP · PHOTOGRAPHY etc., etc.



COURSES FROM 15/- PER MONTH

POST THIS TODAY

FREE

E.M.I. INSTITUTES, Dept. 32K, London, W.4.

NAME _____ AGE _____
(if under 21)

ADDRESS _____

Subject(s) with/without equipment _____

NOV. 57 _____ We shall not worry you with personal visits

BLOCK CAPS PLEASE

—Part of "His Master's Voice," Marconiophone, etc. etc.

CASH OR TERMS

**12 MONTHS' GUARANTEE!!!
RECTANGULAR T.V. TUBES !!
17" £7.10.0 14" £5.10.0**

Owing to the wonderful high quality of these tubes, we can offer you with great confidence a 12 months' guarantee, 6 months' full replacement and 6 months' progressive. As supplied for the last seven years!! Ins. Carr. 15/6. Also 12" T.V. tubes 26 and T.V. tubes with burns from 15". State type and size required. Carr. Ins. extra. As a special offer we can supply 14", 15", 16" round type tubes at £5. Ins. Carr. 15/6. Convert your 9", 10", 12" to above sizes. **T.V. AERIALS 25/6.** For all I.T.A. & F.M. channels. 3 element type for outdoor or loft at half their original price. P. & P. 2/6.

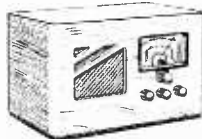
BEAUTIFUL EXTENSION SPEAKERS 29/9

Complete, fitted with 8" P.M. speaker "W.B." or "Goodmans" of the highest quality. Standard matching to any receiver (2.5 ohms). Flex and switch included. Size: 11" x 13 1/2" x 6 1/2". Unrepeatable at this price. Money refunded if not completely satisfied. Carr. Ins. 3/-.



HOME RADIO 79/6

5 valve (octal) superhet. 3 wave-band receiver. A.C. P.U. sockets and gram. In wooden cabinet. 13 1/2" x 11 1/2" x 8 1/2". Ins. Carr. 7/6.



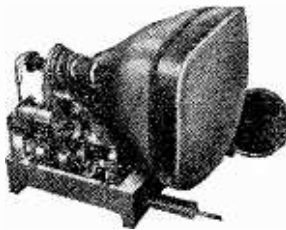
CAR RADIO AERIALS 6/9. Whip antennae, 50in. long, collapsing to 11in. One hole fixing. Post 1/3.
CO-AX CABLE. 6d. yard. Good quality. Cut to any length. 1/6 post on 20 yds.; 45/- per 100 yds., post 3/6.

Open **SATURDAY** all day.
Send for **FREE** Catalogue.

Liverpool' Street Station—Manor Park—10 mins.

T.V. CHASSIS BARGAIN £19.19.6

Latest improved circuits. Higher E.H.T. (brilliant picture). Improved sensitivity (for greater range). Chassis easily adapted to any cabinet. As supplied to many well known Retail and Hire Co's. 17" Rectangular Tube on Adapted chassis. All channels. **TURRET TUNER 50/- extra.** Valve line-up (5 valves) 6SN7G, 6V6, KY51, 2-6D2's. Others 6L8, 6L3, 7-6F1's. Chassis size 11 1/2" x 14 1/2" x 11". 12 MONTHS' GUARANTEE on tube. 3 months' guarantee on valves and chassis. Complete and working on any channel 1-5. Less valves. With 5 valves. £21.19.6. With all valves. £25.19.6. Ins. Carr. 25/- (inc. tube). Drawings 3/6 or FREE with order. State BBC channel (and I.T.A. if turret required).



14" T.V. CHASSIS, TUBE & SPEAKER £13. 19. 6.

As above with 14" round tube. Modified ready working. Less valves. 3 months' guarantee. With 5 valves £15.19.6. With all valves £19.19.6. Ins. Carr. 25/- (inc. Tube). **TURRET TUNER 50/- extra.**

ELECTRIC CONVECTOR HEATERS 99/6

Buy now before winter catches you on the hop!! Hotter and cheaper than oil. A.C./D.C. Switched for 1 or 2 kwatts. Illuminated grille. Ins. Carr. 10/6.



COIL PACK SETS 3/9. This bargain includes 3 band coil pack, pair 465 L.F.s set.; 2-gram condenser. Printed dial. P. & P. 2/3.
H.A. OPERATORS 1/9. Single earphone and headband. C-LR type. Ideal for crystal sets. extension on radio, etc. P. & P. 1/3.

DUKE & CO. (Dept. 4), 621/3, ROMFORD ROAD, MANOR PARK, E.12.
Tel: ILford 6001-3. (NOTE New Phone No.)

HANNEY

offers

Components for

- OSRAM 912 PLUS AMPLIFIER
- OSRAM 912 PASSIVE UNIT
- OSRAM 912 PRE-AMPLIFIER
- OSRAM F.M. PLUS TUNER

- MULLARD 510 AMPLIFIER
- MULLARD 510 "A" PRE-AMPLIFIER
- MULLARD 510 "B" PRE-AMPLIFIER
- MULLARD 3/3 AMPLIFIER
- MULLARD F.M. TUNER UNIT

**"WIRELESS WORLD" F.M. TUNER UNIT
DENCO MAXI-Q F.M. TUNER UNIT**

Manuals available:

912 PLUS AMPLIFIER—4/-; OSRAM F.M. PLUS TUNER—2/6; MULLARD HIGH QUALITY AMPLIFIER MANUAL (contains F.M. details)—3/6; DENCO F.M. TUNER—1/6.

Send 3d. postage, stating lists required. General Components list also available.

L. F. HANNEY

77, Lower Bristol Road Bath

RST

MAIL ORDER DEPARTMENT
211 Streatham Road, Mitcham, Surrey.
ALL VALVES LISTED ARE NEW STOCK. CASH WITH ORDER AND POST FREE. MITCHAM 6201

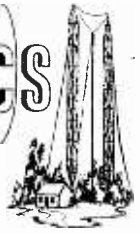
AZ1 11/3	BF9 21/-	MKT45 14/-	UC181 10/6	6F12 7/-
BE5 12/4	EP22 16/-	MSP4 12/6	UC183 15/6	6F13 21/-
D41 8/-	EP37A 10/-	MU11 10/-	UC41 11/-	6J5G 5/-
DAC22 9/6	EP40 15/-	N37 15/9	UP89 12/6	6J7GT 9/-
DAF50 9/6	EP41 11/6	N78 11/6	UC41 10/-	6K7 6/-
DAF56 9/6	EP42 12/6	N142 10/-	UC84 11/-	6K8GT 12/-
DF97 9/-	EP50 8/6	N133 11/4	UC8 24/6	6L1 12/6
DD620 8/-	EP85 9/6	N154 11/4	UY41 7/6	6L6 12/6
DF91 8/9	EP86 12/6	N727 8/-	UY85 7/6	6L8 12/6
DF96 9/6	EP89 11/6	OZ4 5/9	VP2B 13/6	6L9 15/-
DF179 9/6	EP91 7/6	OZ4 5/9	W17 7/-	6N7G 7/-
DK32 9/6	EP92 9/6	PC891 9/-	W77 12/-	6N7GT 7/6
DK91 9/-	EP95 14/-	PC890 8/9	W81M 15/-	6N7GT 8/-
DK92 9/-	EL38 24/6	PC892 11/-	W112 11/-	6U4GT 11/6
DK95 10/-	EL41 10/-	PC893 15/6	W19 9/6	6X4 8/-
DL32 9/6	EL42 9/-	PL23 15/-	W27 8/6	6X5GT 8/-
DL82 9/-	EL43 12/6	PL28 24/6	X18 8/3	6Y7 13/-
DL92 8/-	EL44 9/-	PL81 12/6	X78 19/6	787 14/-
DL94 8/9	EL50 8/-	PL82 10/-	X79 11/6	Y14 9/6
DM86 8/9	EM80 10/-	PL83 11/4	Z21 10/6	8D3 7/6
DW4500 11/6	EM81 11/6	PL85 11/4	Z27 7/-	10C1 15/10
EAB080 9/6	EM82 11/6	PY80 8/3	Z32 8/6	10C2 18/-
EAC91 10/9	EM83 11/6	PY81 9/6	Z19 9/6	10F1 24/6
EAF42 10/3	EM84 13/-	PY82 8/-	Z195 9/-	10L11 14/9
EB41 10/6	EM85 10/-	PY83 9/-	1C2 8/3	10P3 17/6
EB61 5/9	EM86 9/6	PZ20 17/6	1E5 7/-	12A18 11/4
EBR41 10/6	EM87 9/6	R30 22/-	1R5 8/6	12A16 8/6
EBR42 10/6	EM88 9/6	R19 13/-	1T4 8/9	12A17 9/-
EBR43 10/6	EM89 9/6	SP41 11/6	5T4C 10/6	12A17 9/9
EBR44 10/6	EM90 9/6	SP41 3/8	5Y3GT 10/6	12A7 10/-
EBR45 10/6	EM91 9/6	T1D4 17/6	5Z4C 8/6	12A7 10/-
EBR46 10/6	EM92 8/-	T222 10/3	6A8GT 14/-	12B4 8/6
EBR47 10/6	EM93 7/6	U145 7/8	6A5 5/9	12B47 11/-
EBR48 10/6	EM94 14/6	U147 9/8	6A6 7/6	12J7 9/6
EBR49 10/6	EM95 13/-	U25 13/6	6A7 5/9	12K7GT 10/6
EBR50 10/6	EM96 13/-	U78 7/6	6A9 5/-	12K8GT 10/6
EBR51 10/6	EM97 11/6	U147 7/8	6AT6 8/3	12L7 10/6
EBR52 10/6	EM98 11/6	U145 7/8	6B8 4/-	12Q7 10/6
EBR53 10/6	EM99 10/-	U147 9/8	6BAC 8/6	12Q7GT 10/6
EBR54 10/9	EM100 8/6	U153 8/6	6B6 8/6	
EBR55 9/9	EM102 11/6	U405 8/6	6B3 7/6	
EBR56 12/6	EM103 11/6	U404 8/-	6B7 14/-	
EBR57 14/6	EM104 11/6	U501 26/6	6BAC 8/4	
EBR58 21/-	EM105 7/-	CAB39 10/-	6B7 8/6	
EBR59 12/6	EM106 10/-	UAF42 10/-	6B6 8/6	
ECH42 9/-	EM107 12/6	UAF42 10/-	6C19G 8/6	
ECH43 9/-	EM108 17/6	UAF41 8/-	6C2 27/-	
ECH44 9/6	EM109 8/9	UAF42 10/6	6C2 5/9	
ECH45 12/6	EM110 8/9	UAF42 10/6	6F1 15/-	

Quotation given for all types not listed. Obsolete and old types a speciality, send for lists.

TRANSMITTING TOPICS

GETTING STARTED—ADVICE TO THE WOULD-BE TRANSMITTER

By O. J. Russell, B.Sc., A.Inst.P. (G3BHI)



At regular intervals a fresh assignment of amateurs gets ready to take the air. Some of the new hands already have gear and aerial systems ready, while others are spending agonised thought on the construction of gear and the erection of aerial systems. Whatever stage the neophyte amateur is in at the instant of

thrilled at the fact that he can be heard at all, that for a shorter or longer period he is quite happy to stick in with local ragchewing plus an occasional stab at Topband DX. Sooner or later, however, even if Topband has been the starting point, vaulting ambition lightly turns to thoughts of other bands and DX.

Here, of course, it is easy enough to lament the fact that the beginner is free to operate with 150 watts and telephony straight away. While the old restriction to a year on C.W. was perhaps too much of a good thing, a preliminary six months period on C.W. might be good. The writer, incidentally, has no personal axe to grind as he himself obtained a "full ticket" at the start. From observations on the air, however, it is felt that some mild persuasion to encourage C.W. operating is advisable.

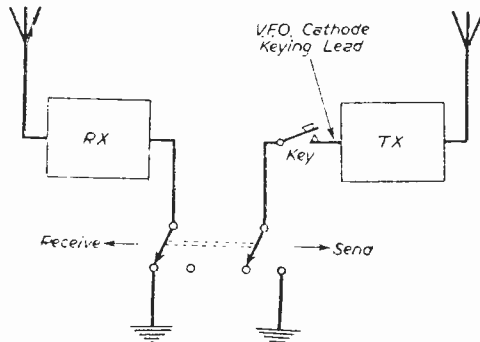


Fig. 1.—A simple two-pole double throw toggle switch can perform the function of a send-receive switch. The switch breaks the receiver H.T. transformer centre tap connection, and makes the transmitter VFO cathode connection for sending. Separate aerials or a manual changeover switch may be used for the transmitter and receiver aerial connections.

obtaining his licence, sooner or later he is ready to make his first essay on the air. He may, of course, be like a recent amateur who, the morning after receiving his ticket, was working American stations on Topband for his first QSOs! Whatever happens, there is usually a period in which much has to be learnt before the newcomer is a good operator or a good ham. We can examine some of these aspects, in the hope that they may be of help to some newcomers.

Assuming that gear capable of operation on some band is in existence, the usual first QSO or so is made with a local, usually on schedule, Topband, for example, is one of the favourite starting points, and the local ragchew net "stands by" for the new G3, and give him a report or two. Usually the new hand is so

Procedure

Whatever the gear, and whatever the situation, the amateur plunges into the rough and tumble of the competitive amateur bands sooner or later. Procedure, especially on C.W., may cause some uncertainty. The question of CQ calling, for example, Nothing is more irritating than a string of interminable CQs, especially when the signal fades right out just as the operator does decide to sign his call briefly. Moreover, when searching round the C.W. bands a station pumping out interminable CQs is passed over for more snappy operators. The too snappy CQ call is perhaps even worse. However, if no reply is received to a snappy CQ it can be repeated! Notice

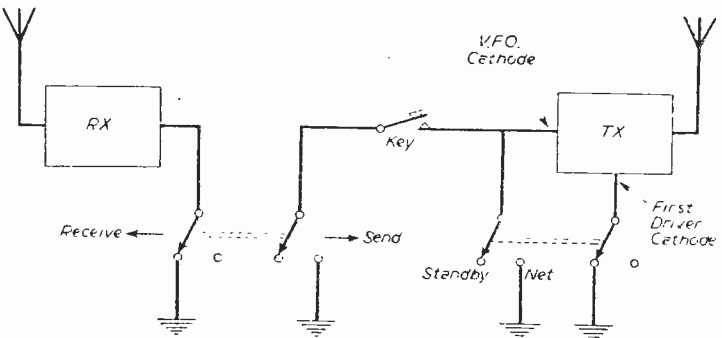


Fig. 3.—A "netting control switch" may be added to the simple control circuit of Fig. 1. In the "standby" position the transmitter is ready to operate when the other switch is thrown to "send." When the second switch is thrown to "net," the VFO only is tuned on when the receiver is on, so that the VFO may be zero-beat with an incoming signal for netting purposes.

moreover that nowadays most calls are on the frequency on which a station has called CQ, at any rate on C.W. Generally five CQ signals signing once or twice plus five more CQs plus the callsign three times and signing is useful when conditions are slack. When things are busy the "three plus three" formula: three CQs and signing three times is sufficient. The sequence "CQ CQ CQ de G3... G3... G3... AR K" is generally used, therefore, when the band is lively and activity is high. Not that the "de" sign (meaning roughly "from") is mandatory. It is poor practice to omit the "de." Even worse is the practice of sending "de" twice. This is the absolute hall-mark of the "lid," and is to be avoided at all costs. This is obvious on reflection. Suppose an operator picks up a DX CQ, which is fading in and out. He is—after VFOing to frequency—waiting alert and eager to register the callsign when it comes. The cue signal is the "de," which triggers him to register the callsign which should immediately follow.

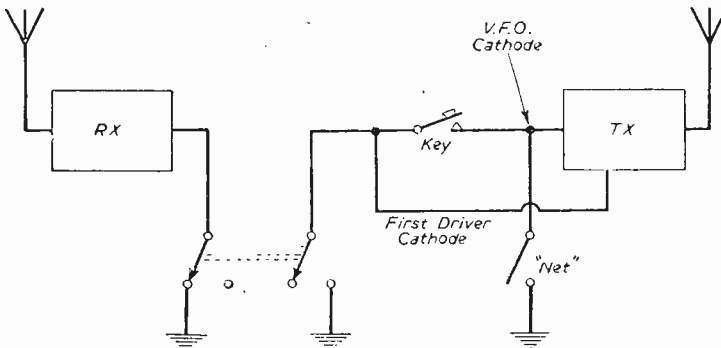


Fig. 2.—A simple "on-off" switch may be used for the "net" switch in the alternative circuit shown above. This enables a simple push button switch to be used for netting if desired.

When he fetches up with a mental jerk to find he is not writing the callsign but the second "de" the distant operator is blessed in no uncertain terms. Moreover, a station with a prefix such as 4X4 or 5A5 might be misread under QRM conditions as DE4XHT or DE5AH and thus lead to confusion, annoyance and much energy expenditure in calling a non-existent station. All double "ders" are requested to "de" once and no more before their callsigns. About the "AR" there is more freedom; while the "AR" indicates end of message it seems a little pointless to use it, particularly as the CQ and the repetition of callsigns lead to the inevitable result that the station is signing, and will be looking for calls. The "K" signal indicates, of course, an invitation for any station to call that wishes to do so. The signal "KN" on the other hand is used with the sense of "all others keep out." Thus usually "KN" is used when two stations are in QSO and do not want other stations to interrupt. When one is working rare DX with half Europe waiting on the sidelines, the injunction "KN" is certainly needed. Note, however, that the signal "KN" may also be used legitimately by a station making a

directional or selective CQ call. Thus "CQ CQ CQ VK de G3BHH G3BHH G3BHH KN" means (if one is foolhardy enough to do it) that one is looking for VK stations only, and that replies are wanted from VK stations only and that all others keep out. However, one so often hears stations putting out a "CQ ASIA" . . . and then promptly working a local European station, that (presumably) a station signing "KN" after a directional CQ really does mean business.

Generally, of course, a QSO starts with a CQ. However, on the DX bands it is true to say that a G station is unlikely to work much DX by calling CQ. In fact, by creating masses of QRM by prolonged CQ calling, G stations may create a barrage of interference when conditions are good. Generally, one is more likely to work DX by tuning around for DX stations that are calling CQ. When one locates a DX station calling CQ, it is necessary to put the VFO close to the DX frequency. It is essential to have a "netting" position, so that a weak

beat from the VFO may be heard in the receiver. Depending on circumstances, it may also be necessary for the driver stages to be off as well, in order to get a comfortable intensity of beat note. With a well-screened TX it may be necessary to have the drivers on in order to hear the VFO, but with the drivers temporarily switched to another band. With the drivers on and tuned to the frequency band of operation, too much energy leaks out unless the receiver gains are turned down so as to lose the DX signal while netting. The ideal to

aim at is a just comfortably audible beat from the VFO, so that one may "net" comfortably while still listening to the DX. The thing not to do is to swing the VFO with drivers and PA active across the band, thus radiating vicious squeals to all and sundry!

When "netting" to call DX, it is not a good idea to zerobeat with the DX. In a ragchewing local net, all stations should be zerobeat of course, but when calling DX if everybody else were to zerobeat, the mutual QRM would wipe out any sense in dreadful cacophony. In any case, when the calling stations are clustered within a kilocycle or so of the DX frequency, the resulting "pile-up" is again very difficult to decipher at the DX end. It then becomes a question of deciding just how far off frequency one should call the DX station. This must be done by both trial and error, and by estimating the spread of the pile-up. When and how long to call is also another point of importance. Listen carefully, in any case, to the DX station. Many DX stations wisely assume control of the pile-up by sending "10 U" or "10 D," for example, to indicate that they will be tuning for replies ten kilocycles up (U) or down

(Continued on page 647)

BAND 3 T/V CONVERTER—185 Mc/s - 199 Mc/s

Suitable for London, Birmingham, Northern and Scottish ITA Transmissions.

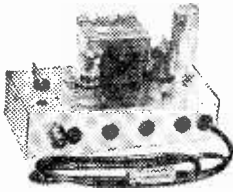
Mk. 2 Model as illustrated. Latest Cascade circuit using E.C.V.'s and I.F. S.F. valves giving maximum sensitivity. Built-in Power supply AC-200 250v. Dimensions only 4 1/2 in. x 3 in. Ht. 4 in. Simple and easy to fit—only external plug-in connections. Wired, aligned and tested ready for use. State Channel required. Quar. Bargain Offer—good results or full refund, only £3.19.6. Carr. & P. 2/6.

Mk. 1 Model using 2 4D4's or EF80's. Full construction kit of Parts including drilled chassis 7 in. x 4 in. x 2 1/2 in.

diagram, valves and all components, etc., excluding Power supplies to modified V/W design. Bargain Offer only 2 gas. P. & P. 2/6. Power Supply Kit. Complete 20/-, P. & P. 1/6. Band 1-Band III Switch Kit. 6/6.

CONVERTER ACCESSORIES

Band I-Band III Cross-over Unit. 7/6. Var. Attenuators. 4/6-5/6. B.B.C. Pattern Filter. 5/6. Band III Adjustable Single Dipole with 4 J.C. Coax. etc., 13/9. 3 Element Band 2/6. 5 Element. 35/-, etc.



Volume Controls

Log. ratios, 10,000 ohms—2 Megohms. Long spindles. 1 year guarantee. Midget Edison type. No Sw. S.P.S. etc. D.P.Sw. 3/- 4/- 4/9
Linear Ratio, 10,000 ohms—2 Megohms. Less switch 3/- each. Coax plugs, 1/2. Coax sockets, 1/-. Compens. 1/3. Outlet boxes, 4/6.

TWIN-FEEDERS, 80 ohms, 6d. yd.; 300 ohms, 6d. yd.
TWIN SCREEN FEEDER, 80 ohms, 1/3 yd.
TRIMMERS, Ceramic, 4 pf.—70 pf., 9d.; 100 pf., 150 pf., 1/3; 250 pf., 1/6; 600 pf., 1/9. PHILIPS Reel-type—2 to 8 pf. or 2 to 30 pf., 1/- each.
RESISTORS. Pref. values 10 ohms to 10 megohms.

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 Slotted 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 S. Mica. All pref. values 3 pf. to 650 pf., 6d. ea. Ceramic types, 2 to 25 pf., 3,000 pf., 9d. each. Tubulars, 450 v., Hints and T.C.C., .0005, .001, .005, .01 and 1.50 v., 9d., .02, .05, 1.50 v. Hints T.C.C., 1/-; .25 Hints, 1/6; .5 Hints, 1/9; 1.2 kV., T.C.C., 1/6; 2 kV., 3/6; .001 20 kV., T.C.C., 9/6.

SCOTCH BOY EMITAPE, etc., 1,200 ft., 27/-; long playing 1,800 ft., reels, 40/-. Paper tape, good quality 1,200 ft., 12/6. Reels only, 3/6; 3/-; 5/6; 3/3; 5/16; 4/-; 7/6; 4/3.

80 ohm CABLE COAX

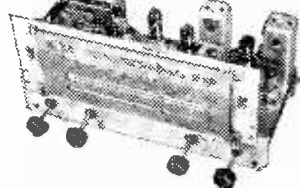
STANDARD Fin. Diam. Polythene insulated. GRADE "A" ONLY

8d. yd.

SPECIAL—Semi-air spaced polythene, 80 ohm Coax fin. diam. Standard core. Losses cut 50%.

9d. yd.

Ideal Band 3.



ALL-WAVE RADIOGRAM CHASSIS

3 WAVEBANDS S.W. 16 m.—50 m. LATEST MIDGET M.W. 200 m.—500 m. B.V.A. S.F. BEST I.F.W. 800 m.—2,000 m.
Standard and quiet A.C. 200/250 v., 4 pos. W/C sw. Short-Medium-Long-Gran. P.U. socket. High Q dust core coils. Latest circuit technique, delayed AVC and neg. feedback. O/P 4 watts. Chassis size 1 1/2 x 5 1/2 x 2 1/2 in. Dial 160 m. x 4 1/2 in. Hor. or Vert. sectioning. Walnut or ivory knobs to choice. Aligned and calibrated ready or use. Sensitivity and Quality at Low Cost. BARGAIN 9/6 gns. Carr. & ins., 4/6. PRICE 25/- and 25/-
7 v. Valve De Luxe, push-pull EL41 version, 7 watt output, with H Duty Output Transformer, £12.10.0. Carr. & ins., 5/6.

RECORD PLAYER BARGAINS

SINGLE PLAYERS—3 sp. BSR (TCV), 92/6. 4 sp. BSR (latest model, TP19), 99/6. 4 sp. COLLARO, 5 cns., 4 sp. GARRARD (4 S.F.), £7.10.0. Carr. & ins. 2/6.
AUTO CHANGERS—3 sp. COLLARO (RC34), £7.19.6. 4 sp. BSR (IAS), £8.15.0. 4 sp. COLLARO (RC35), £9.15.0. 4 sp. GARRARD (RC42), 10 cns., Carr. & ins., 4/6.
All above models, Brand New and Guar. Fitted latest style Weight Xtal. P.U. with turnover head and twin sapphire stylus.
SPECIAL OFFER—GARRARD 4 sp. Player (latest single 4 sp. model) Record Player with Weight Xtal. P.U. Ideal unit for battery portable use.
BARGAIN £5.19.6. Carr. & ins., 3/6.

ELECTROLYTICS ALL TYPES NEW STOCK

Tubular Wire Ends	32-32 500 v. B.E.C. 5/6
25 25 v., 50 12 v.	1/9
30 50 v., 4 500 v.	2/-
100 25 v., 2 450 v.	2/-
8 450 v. B.E.C.	2/3
8 500 v. Dub.	2/9
8 8 500 v. Dub.	4/6
8 16 450 v. T.C.C.	5/6
8 32 500 v. Dub.	4/-
8 16 450 v. T.C.C.	5/6
16 450 v. B.E.C.	3/6
16 500 v. Dub.	4/-
16 16 450 v. T.C.C.	5/6
32 350 v. Dub.	4/-
32 500 v. Dub.	5/-
50 150 350 v. B.E.C.	6/6

Many other types in stock.

TRANSISTOR.—Midget Electrolytics.

2 mfd., 4 mfd., 8 mfd., 6 v. ... 3/6
6 mfd., 10 mfd., 16 mfd., 3 v., 32 mfd., 13 v. ... 3/6
SENTERCEL RECTIFIERS, E.H.T. Type Fly-Back Voltages. K325 2 kV., 5/-; K340 3.2 kV., 6/9; K345 3.6 kV., 7/3; K360 4 kV., 7/9; K3100 8 kV., 13/6. **MAINS TYPES**—RM1, 125 v. 60 mA., 4/9; RM2, 125 v. 100 mA., 5/6; RM3, 125 v. 120 mA., 7/6; RM4, 250 v. 250 mA., 10/-; RM4H type 270 mA., 17/6; RM5, 250 v. 300 mA., 21/-

I.F. TRANSFORMER—465 kc/s

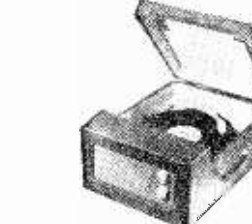
Brand new even manufacturer's model. I.F.T., size 2 1/2 in. x 1 1/2 in. dust core tuning. Litz wound coils, High Q. Bargain offer, 7/6 pair.

MAINS TRANSFORMERS.—Made in our own

Workshops to Top Grade spec. Fully interleaved and impregnated. **RADIO AND AMPLIFIER TYPE**—250 v. 60 mA. F.W. sec. 5 v. or 6.3 v. 1 a. rect. 6.3 v. 2.5 a. set Htrs. 22/6, etc. **C.R.T. HTR ISOLATION TYPE**—Low leakage with or without 25% sec. boost voltage. Ratio 1:1 or 1:1.25. 2 v. 4 v. 6 v. or 10 v., 10/6 ea. 11/10 with mains primaries 200/250 v., 12/6. **SPECIALS** to order.
I.F. CHOKES—10 H. 65 mA., 2/-; 15 H. 100 mA. 10/6; 10 H. 120 mA., 10/8; 20 H. 150 mA., 15/6.
OUTPUT TRANSF.—Standard pentode, 4/6. push-pull 12 watt, 15/6. Small pentode, 3/6. Midget battery pentode (1S4, etc.), 4/6.
SPEAKERS—PM-3 ohm, 2 1/2 in. Elec., 16/6. 3 in. Goodman, 18/6; 5 in. R. & A., 17/6; 6 in. Celestion, 18/6; 7 1/2 in. Goodman, 18/6; 8 in. Rols, 20/-; 8 in. Special tone 60 mms, 21/6; 10 in. R. & A., 25/-

6 in. P.M. SPEAKER (3 ohm)

Ex-Mfrs' units, Rols, W.B. Celestion, etc. All reconditioned and guaranteed. Ideal ext. unit, only 7/6. P. & P. 1/6. Ditto with G.P. Trans. 9/6.



RECORD PLAYER CABINETS

Contemporary style vintage covered cabinet in mottled red with cream interior. Size 18 1/2 x 14 1/2 x 8 1/2 in. Fitted with all accessories, including speaker handle beat 1 and plastic feet. Space available for all modern amplifiers and autochangers, etc. Uncut record player mounting board 14 x 12 in.

Cabinet Price, **£3.3.0.** Carr. & ins., 3/6.

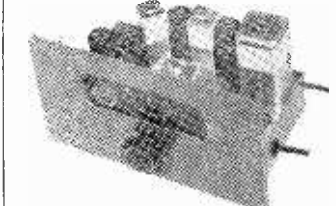
2 VALVE AMPLIFIER (to fit above cabinet), modern circuit with EL84 output, ready built, with 6 in. speaker and output transformer, £3.12.6. carr. & ins., 2/6.

NEW VALVES GUARANTEED

1R5, 1A7 6 DAF96	9/-	ECL80	10/6	PCF82	10/6
1R5, 1R17 6 DF96	9/-	EF41	10/6	PC83	12/6
384, 3V4 8 DK96	9/-	EF80	10/6	PL81	11/6
5Z1	8/6	EL26	9/6	EF86	12/6
6AV6	8/6	EL34	12/6	EP20	11/6
6K7	8/6	EAB80	9/6	EM-3	11/6
6K8	8/6	EB91	6/6	EL11	10/6
6Q7	8/6	EB41	10/6	EL84	11/6
6N7	8/6	EC83	9/6	EV51	10/6
6X5	7/6	EV84	12/6	EL20	8/6
6X4	7/6	EF80	12/6	EL26	8/6
6X3	7/6	ECT82	12/6	MT14	9/6
7C5	9/6	ECH42	10/6	PC84	10/6
7Y4	8/6	ECH81	10/6	PCF80	10/6

SPECIAL PRICE PER SET

1R5, 1T4, 1R5, 1A4 or 384, or 3V4 ... 27/6
DK96, DF96, DAF96, DL96 ... 35/-
6K8, 6K7, 6Q7, 6V6, 3Z1 or 6X3 ... 35/-
SPEAKER FRET—Expanded Bronze finished metal 8 in. x 8 in., 2/3; 12 in. x 8 in., 3/-; 12 in. x 12 in., 4/3; 12 in. x 16 in., 6/-; 24 in. x 12 in., 8/6, etc.
TYGAN FRET (Murphy pattern)—12 in. x 12 in., 2/-; 12 in. x 18 in., 3/-; 12 in. x 24 in., 4/-, etc.



P.M. TUNER UNIT (97 mc/s—105 mc/s) by Jasson

As described in Radio Constructor. Designer Approved Kit of parts to build this modern highly successful unit, drilled chassis and superior type III glass dial, coils, cans and all quality components, etc., for only 6 Gns., post free. Set of 4 specified min. valves, 30/- post free. Illustrated handbook with full details, 2/- post free. 2-day alignment service now available.

TRS RADIO COMPONENT SPECIALISTS (Est. 1946)

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

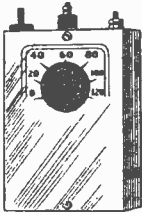
50 yards Thornton Heath Station.
Listed above are only a few items from our very large stock.
Hours: 9 a.m.—5 p.m., 1 p.m. Wed.
Send 3d. stamp today for Complete Bargain List. OPEN ALL DAY SAT.



Buses 130A, 133, 159, 166 & 190.
TRANSFORMER & COIL WINDING CAPACITY AVAILABLE FOR PROTOTYPES & SMALL RUNS.

YOU can build any of these at Low Cost!

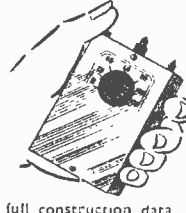
R.C.S. VALVELESS "ALLTIME" RADIO



REALLY WORKS FOR LIFE!

Works without valves or batteries. Will never run down or burn out. Utilises sensational new Loopstick tuner. Will receive local stations any time. Permanent crystal diode in attractive case **17/6**
Full construction data, point-to-point circuit and price list of components. 1/6.

TRANSISTOR POCKET RADIO



The ideal low cost transistor pocket radio for the beginner. The Two-Stage circuit utilises the new R.C.S. VARILoopstick transistor coil. A specially designed miniature .0005 tuning condenser permits the receiver to be in a case which fits in the palm of your hand. Works for months off small battery costing **30/-**
7d. Can be built in 30 minutes. PRICE
All components are sold separately, full construction data, including plan to parts for 2/-.

1v. WORLD WIDE SHORT-WAVE RADIO

EXPLORE THE WORLD ON SHORT WAVES!

Can be built for **30/-** from our list of components which can all be purchased separately, covers 10-100 metres and is capable of receiving speech and music from all over the world. Price includes the famous 954 acorn valve and one coil covering 40-100 metres. Provision is made to increase to two or three valves and all components are colour coded. Send 2/- for point to point wiring diagram, layout and price list



PERSONAL PORTABLE RADIO

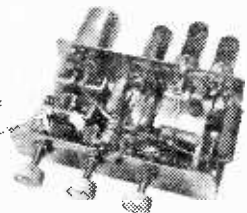
THE SET FOR PERSONAL LISTENING

This little set was designed to give you a real personal portable radio that you can listen to anywhere without disturbing others. Use it on camping trips, in bed, in your office. Supplied with detachable rod aerial, it covers all the medium waves 200-500 metres. Average building time one hour. PRICE **30/-**
Send 2/- for specification, point to point circuit and parts price list.



Post and packing: Under 10/- add 9d.; under 40/- add 1/6; over POST FREE.

R.C.S. PRODUCTS (RADIO) LTD., 11, OLIVER ROAD, LONDON, E.17. (Mail Order only)



AC/DC QUALITY 4-WATT AMPLIFIER

3-Valves
NEGATIVE FEED-BACK SEPARATE BASS AND TREBLE CONTROLS
giving HI-FI quality.
Valve line-up:
UBF90, UL41, UY41.
Complete with Speaker-Transformer and Knobs.
Factory-built and tested and fully guaranteed.
Overall response 40/15K CPS

£5.5.0 Post Paid.

Radiogram Chassis

4 Valves, AC/DC, L.V., M.W.

Complete with Glass Dial and Knobs, AVC and Negative Feed-back. Highest quality components. Factory-built and tested. Aligned and calibrated ready for use.

Brand New and Guaranteed.
£8.15.0 Post Paid.

6"—8"—10" MATCHED SPEAKERS AVAILABLE.

Latest-type Collaro 4-Speed

RECORD PLAYERS

Turn-over Crystal Head.
Boxed as received.
Fully guaranteed.

£8. 19. 6

VALVES • SAME DAY SERVICE

All Guaranteed New and Boxed

1.4v. midget, 1R5, 1S5, 1T4, 354, DAF91, DF91, DK91, DL92, DK92, DL94; ANY 1 for 2/6.

1A7GT	12/6	6L1R	12/6	D1	3/-	EF41	9/6	PCL82	12/6
1C5GT	15/6	6G7GT	9/6	D7	6/-	EF42	10/6	PCL83	9/6
1H5GT	11/-	6SN7GT	9/6	DAC32	11/-	EF50		PEN46	6/6
1N5GT	11/-	6U4GT	12/6	DAF96	8/6	SYL	6/6	PL38	22/-
1R5	8/-	6V6G	7/-	DF33	11/-	EF55	9/6	PL81	11/9
1S5	7/6	6V8GT	7/6	DF96	8/6	EF90	9/6	PL82	9/-
1T4	7/3	6X4	7/-	DF86	8/6	EP83	7/6	PL841	10/6
3Q4	9/-	6X5GT	6/6	DH77	3/-	EF86	11/6	PY80	9/-
3Q5GT	9/6	7B6	9/9	DK32	12/6	EF89	10/-	PY81	8/-
3S4	7/6	7B7	9/-	DK92	8/-	EF91	6/-	PY82	7/-
3V4	8/-	7C5	8/-	DK96	9/6	EF92	5/6	PY83	9/6
5U4	9/-	7C8	8/-	DL33	9/6	EL32	5/6	PZ30	13/-
5Y3GT	7/6	7H7	8/-	DL95	15/6	EL38	22/-	R19	13/6
5Z4G	9/6	7S7	9/-	DL96	8/6	EL41	9/-	SP41	3/6
6AB8	7/6	7Y4	9/-	DM70	8/-	EL42	10/6	SP61	3/6
6AK5	4/8	12AHR	9/-	FABC80	7/9	EL84	8/-	U25	12/6
6AL5	6/-	12AT7	10/6	EA42	10/6	EN30	10/-	U26	12/6
6AM5	5/-	12AU7	7/6	EB91	6/-	EM80	10/-	U50	7/6
6AM6	6/-	12AX7	8/-	EBC33	7/6	EY51	9/9	U76	3/-
6AQ5	7/6	12J7GT	11/-	EBC41	9/6	EY86	10/-	U78	7/-
6AT6	8/-	12K7GT	7/6	EBF80	8/6	EZ40	7/9	UABC80	11/6
6BA6	7/6	12K9GT	14/-	EBF89	9/6	EZ41	9/6	UAF42	10/6
6BE6	7/6	12Q7GT	7/6	EC76	8/-	EZ80	7/9	U70	8/-
6BJ6	7/-	12Z3	7/6	ECC42	7/6	EZ81	9/6	UBF90	9/6
6BR7	8/6	25L6GT	9/-	ECC83	8/-	FW4.500		UCH42	8/-
6BW6	7/6	25Z4G	9/6	ECC84	10/6	GZ32	12/-	UF41	8/-
6BW7	9/6	25Z6GT	9/6	ECC85	9/6	GZ33	12/6	UF89	10/6
6CH6	7/-	35L6GT	9/6	ECC89	10/6	KT33C	8/6	UL41	9/-
6F1	15/-	35Z3	10/-	ECCF2	11/-	KT44	6/6	UL84	9/6
6F8G	6/-	35Z4GT	8/-	ECH21	14/9	KT61	14/6	UY21	15/6
6F12	6/-	35Z5GT	9/-	ECH35	9/6	KT63	6/6	UY41	7/9
6F13	13/-	43	13/6	ECH42	9/-	KTW61	6/-	UY85	10/6
6F15	14/9	50L6GT	8/6	ECH81	8/-	MU14	8/6	VP41	7/-
6J6	5/6	80	8/6	ECL80	8/6	N78	12/6	W76	8/6
6K7G	4/6	AC TP	20/-	EF37A	8/-	PCB84	8/-	W77	5/6
6K7CT	6/-	B36	20/-	EF30	6/-	PCF80	8/9	X79	11/6
6K8C	7/9	CL3	16/9	EF40	12/6	PCF82	11/6	Y63	6/-
6K8GT	9/6					Z77		Z77	6/-

Any Parcel Insured Against Damage In Transit 6d. Extra.

READERS RADIO

24, COLBERG PLACE, STAMFORD HILL, LONDON, N.16 STA. 4587

CHARLES WILSON
18 UPPER GEORGE STREET, LUTON

Phone 1722

(D) from their own frequency. Indications of this sort should be carefully watched, especially as a rare DX station working contacts at one a minute, streamlines procedure considerably. Thus, for example, an exchange of call signs plus a single "QRZ" signal may be the only indication that the DX has finished one QSO, and is looking for other calls. On C.W., especially when there may be QRM and difficult conditions, failure to grasp exactly what is going on may lead to trouble.

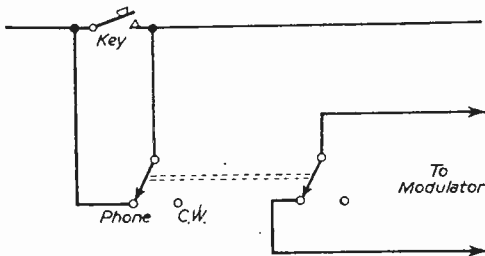


Fig. 4.—A switch shorting out the key provides for "phone-CW" switching. A second pole on the switch enables the modulator to be switched on and off at the same time.

Thus a DX station sending "QRM" and struggling to pull in signals from a station in QSO with him, may unwittingly cause a pile-up. This because the listening hordes awaiting a "QRZ" signal, under poor conditions, have convinced themselves that the final letter had two extra dots, or indeed that they missed the two dots due to conditions. Not to be backward in loosing off a call, they rapidly call the DX, and the other characters, figuring that as the DX is being called they had better not waste time either, also fire away. By this time the DX may have concluded that all the stations concerned are indulging in deliberate bad manners to break up his QSO. Usually such apparent bad manners may be due to misunderstandings at both ends. The type of "sharp practice" noted nowadays is the transparent trick of calling "CQ DX" on full power, just off the DX station's frequency. This is intended to create the impression that the calling station is unaware that a DX session is in progress, and has innocently put out a CQ. So far I cannot recollect any of such artful characters ever succeeding in getting the DX to call them!

Just what one is to do under all circumstances is a matter for personal decision. Thus in a well-conducted DX session, the procedure may consist of calling stations giving their own calls and nothing else when calling the DX. Thus when the DX has indicated—by a QRZ signal

or otherwise—that he will now listen for calling stations, it is clear that all the DX needs to know is who is calling him! In other cases the technique of giving a call long enough to enable most of the pile-up to subside is used. From comments made by rare DX operators, it is clear that there is no clear cut preference for behaviour by the calling stations, so long as it is ethical. Moreover, apparently "unethical" behaviour may arise through misunderstanding. Thus one popular piece of rare DX used the simple procedure of concluding with "over" to indicate he was still in QSO, and of concluding with "tuning" to indicate he was now tuning for calls from other stations. Some observers not appreciating the subtle distinction between "over" and "tuning" were under the impression that half Europe was guilty of unethical behaviour. Confusion was increased by the fact that many stations having given a call to the DX, and hearing no reply after listening for a short period, proceeded to call further, thus being "on" while the DX station was transmitting in QSO. Such items, plus poor conditions, may easily complicate "rare DX" pile-up sessions.

Station Arrangements

Enough for the moment about operating procedure, and a little about station arrangements for operating. Clearly in the quick calling and listening sequences for DX operating, some facility is required in changeover. For local rag-chewing, the operation of a number of switches in sequence is awkward. Despite this, some operators gain an uncanny agility in flipping

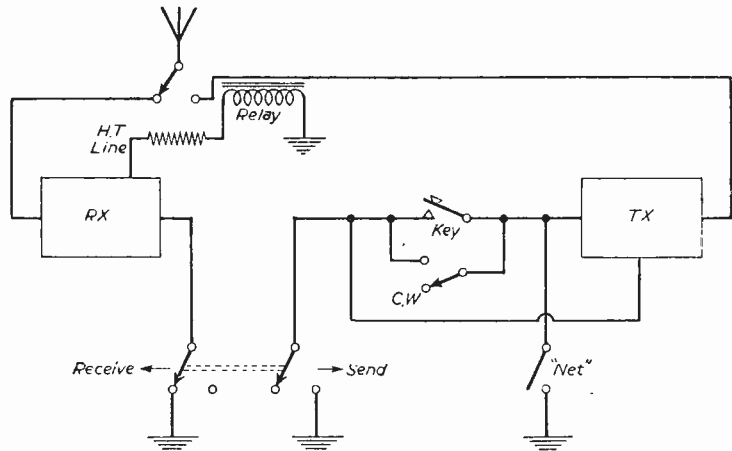


Fig. 5.—Where an H.T. line is switched, this may be used to provide for operating a relay. By this means, the aerial changeover relay may be operated. If necessary, additional relays to perform other switching functions may be employed as well. In this diagram switching the receiver H.T. line operates the aerial changeover relay.

numbers of switches, twiddling receiver gain controls and so forth every time they make a changeover. A station has even been known to put the signal on and off the air by plugging the I.T. rectifier in and out of its socket! Relay and switching operations may be carried to a line degree of complexity. However, remember that a relay is after all only a switch, and that a multiple

contact key switch for example may have three positions for the operating lever. This can give "receive," "net" and "transmit" by suitable connection, and a low powered rig might be easily operated effectively by a keyswitch. Receiver muting, for example, could be handled by one position of the switch. If the PA is battery biased, a simple toggle switch can mute the receiver by breaking the centre-tap connection of the receiver power transformer, and put the transmitter on by making the VFO cathode connection, as in Fig. 1. For keying, the key may be in series with the VFO cathode keying lead. For "netting," an auxiliary switch is needed to shut off the driver stage when "netting," and this may be done by a cathode jack inserted in the first driver stage cathode, with the lead terminated in a switch (Fig. 2). If a two-pole toggle switch is used for the netting switch, operation of the net switch may cut off the driver stage and simultaneously turn on the VFO for netting (Fig. 3). This is simple enough, and at a pinch the aerial system may be manually switched, even using the good old-fashioned double-pole double-throw knife switches popular at one time as "earthing switches" for the domestic radio.

A further development of simple changeover systems incorporates relays. Where the transmitter H.T. supply is switched on and off, the H.T. line may be used—via a large dropping resistor—to operate the aerial changeover relay. A genuine aerial changeover relay suitable for such use is available from various suppliers. However, for switching the link side of the aerial tuner, an ordinary PO type of relay may be used if desired, while relays specifically designed for switching coaxial cable are available both as surplus and as new items. Generally, if an antenna tuner with link coupled output is used for the transmitter, the link connection may be switched to the receiver on reception. Using the main aerial and antenna tuner in this way gives a useful improvement in efficiency of transfer of energy to the receiver, the aerial tuner gives a little extra image frequency rejection, and the directive properties of the aerial will be exploited. Note that if a few milliamps can be "borrowed" from a switched H.T. line, this obviates the provision of a separate D.C. relay supply. However, high

resistance relays are advised. The relay contacts may also be used to switch the VFO and driver stages on, with also an auxiliary "netting" switch for turning the VFO on only. With the H.T. line switched, therefore, a relay may perform the aerial changeover, receiver muting a transmitter switch or function with only the H.T. line switch manipulated. A switch breaking the H.T. transformer

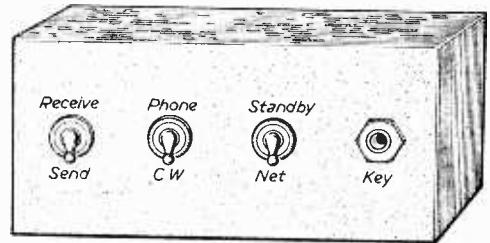


Fig. 6.—The transmitter control position after utilising the above ideas may be accommodated in a small box conveniently placed upon the operating table. A single switch serves for the changeover from sending to receiving, while "phone-CW" and "net" function switches are conveniently to hand. If a closed circuit keying jack is used, the phone CW switch might be omitted, and the withdrawal of the key will give the "Phone" position. Relays operated from receiver H.T. or the TX H.T. line will handle aerial change-over and other functions.

centre-tap thus performs the functions in a medium power pack. In higher power packs, a high voltage rating ceramic switch is advised, or alternatively in a high power pack, the filaments may be lit from separate transformers, and the H.T. transformer switched by a switch in the A.C. supply to the H.T. transformer. However you perform the functions, remember that careful listening is the important part of operating. Even when you are in QSO, you only transmit some 50 per cent. of the time, and the actual percentage of "shack time" spent in actual transmission is quite low. Careful listening will ensure that when you do transmit, you will make most effective use of your transmitter, and not expend effort in extended and fruitless calling!

CIRCUITS FOR 2 TRANSISTORS

(Concluded from page 640)

by using a tapped coil, or coupling winding, for the diode. If a tapping is employed it can be about one-fifth the total number of turns from the earthed end of the coil. Small, dust-cored coils are satisfactory, if of efficient design.

An air-cored coil, with diode coupling winding, can be made as shown in Fig. 6. The former is 1 in. to 1½ in. in diameter, and at least 2 in. long. For tuning purposes, 90 turns of 32 s.w.g. enamelled wire are wound on, side by side, and tapped at about one-half the total number of turns to provide a point for the aerial connection. A layer of insulating tape is then wound over this coil, as indicated, and the coupling section added, leads from it passing to diode and earth.

Such a coil is suitable for the medium wave band and also for circuits of the type shown in

Figs. 1 and 4. If the aerial is poor, so that volume is low, the tapping can be omitted. Or a condenser may be employed instead, as in Fig. 5. As aerial-coupling is loosened (smaller value for C1, or tapping nearer earth on the coil) selectivity will increase, but volume will fall. Optimum results thus depend upon individual adjustment, to suit the aerial and local conditions. The coupling employed is not critical, but if selectivity is inadequate with a good aerial, it should be remembered that this can be overcome by loosening aerial coupling. Selectivity is usually greater with a transistor detector than when a diode is employed.

The cheap junction-type of transistor, easily obtainable, will be found satisfactory in these circuits, though their performance naturally varies somewhat. Connections to emitter, base and collector must always be correct, and on no account must the battery be connected in the wrong polarity.

SOUTHERN RADIO'S WIRELESS BARGAINS

TRANSRECEIVERS. Type "38" Mark II. Just arrived, new purchase. New condition, 5 valves, in case, less attachments. 37/6.

ATTACHMENTS for Type "38" Transreceivers. ALL BRAND NEW. Headphones, 15/6; Throat Microphones, 4/6; Junction Boxes, 2/6; Aerials No. 1, 2/6; No. 2, 5/-; Webbing, 4/-; Haversacks, 5/-; Valves—A.R.P.12, 4/6; A.T.P.4, 3/6. Set of FIVE VALVES, 19/- the set.

TRANSRECEIVERS. Type "18" Mark III. Two Units (Receiver & Sender). Six Valves, Microammeter, etc., in Metal Carrying Case. Untested, without guarantee but COMPLETE. £2.18.6.

ATTACHMENTS for "18" Transreceivers. ALL BRAND NEW. Phones, 15/6; Microphone, 12/6; Aerials, 5/- . Set of SIX VALVES, 30/-.

RECEIVERS R109. S.W. Receiver in Case. 8 valves. Speaker and 6-v. Vibrator Pack. Untested. No guarantee but COMPLETE. £2.18.6.

RESISTANCES. 100 Assorted useful values. New wire end, 12/6.

CONDENSERS. 100 Assorted. Mica, Tubular, etc., 15/-.

BOMBSIGHT COMPUTERS. Ex-R.A.F. NEW. Hundreds of Components, Gears, etc. Ideal for Experimenters. £3.

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

QUARTZ CRYSTALS. Types F.T.241 and F.T.243. 2-pin, 1/2 in. Spacing. Frequencies between 5 675 kcs. and 8 650 kcs. (F.T.243.) 20 Mc/s and 38.8 Mc/s (F.T.241, 54th Harmonic), 4/- each. ALL BRAND NEW. TWELVE ASSORTED CRYSTALS, 45/- . Holders for both types, 1/- each. Customers ordering 12 crystals can be supplied with lists of frequencies available for their choice.

MORSE TAPPERS. Standard type, 3/6; Extra Heavy on Base, 5/6; Midget, 2/9.

TRANSARENT MAP CASES. Plastic, 14 in. x 10 1/2 in. Ideal for Maps, Display, etc., 5/6.

DINGHY AERIALS. Ex-U.S.A. Reflector Type, 4/6.

STAR IDENTIFIERS. Type I A-N covers both Hemispheres, 5/6.

CONTACTOR TIME SWITCHES. 2 Impulses per sec., in case, 11/6.

Postage or Carriage extra. Full List of RADIO BOOKS, 3d.

SOUTHERN RADIO SUPPLY LTD.

11 LITTLE NEWPORT ST., LONDON, W.C.2. GERrard 6653

REPANCO HIGH GAIN COILS

Dual Range Crystal Set Coil, Type DRX1	...	2/6	
Dual Range Coil with Reaction, Type DRR2	...	4/-	
Matched Pair Dual Range T.R.F. Coils, Type DRM3	... pair	8/-	
Pair Dual Range Superhet Coils, Type SH4	... pair	8/-	
Miniature Iron Dust Cored Coils, Type "R" —			
Range	Aerial	H.F.	
		Osc.	
800-2,000m.	RA1	RHF1	RO1
190-550m.	RA2	RHF2	RO2
70-230m.	RA3	RHF3	RO3
15-50m.	RA4	RHF4	RO4
			each 3/3
Ferrite Rod Aerial, Dual Range Type FR1	...	12/6	
Miniature I.F. Transformers, Type MSE	...	12/6	
(465 Kc/s)	... pair		
Standard I.F. Transformers, Type TCG	...	13/6	
(465 Kc/s)	... pair		
Three Waveband Superhet Coil Pack, Type			
LMS	...	36/-	
F.M. Coil Set	...	29/6	

(All components boxed complete with circuits.)
Send S.A.E. for complete list of Repanco components.

EASY-TO-BUILD TRANSISTOR RECEIVERS

Repanco "Three Dec."—A new dual range radio with band pass tuning using a crystal diode and 3 transistors. Easy wiring plans and instructions. 1/- (post free).

Repanco "Transeven."—Latest portable superhet 7 transistor receiver with preset tuning for 4 stations. Easy wiring plans and instructions. 1,9 (post free).

RADIO EXPERIMENTAL PRODUCTS LTD.

33 MUCH PARK ST., COVENTRY.

Tel. 62572.

62A INDICATOR UNIT

Complete with VCR97 with mu-metal screen. 12 EF50, 4 SP61, 3 EA50, 2 EB34. Plus pots., switches, H.V. Cond., Resistors, Double deck chassis and crystal. Less drive 50/-, carr. 7/6.

ORIGINAL AR88 MAINS TRANSFORMERS. Input 110 v.—240 v. Output 345-0-345 at 150 ma. 5 v. at 2 amps. and 6.4 v. at 4.5 amps. Fully shrouded. Size 5 1/2 in. x 4 in. x 4 1/2 in. Brand new, 50/- p.p. 3/-.

INDICATOR UNIT SLC NO. 5. Ideal for conversion into an Oscilloscope using a 139A or ACR 10 tube. Unit consists of 2 VR65, 1 VR66, various resistors, condensers and pots. Size 1 1/2 in. x 6 in. x 3 in. Brand new, complete with modification circuit, 20/-, p.p. 3/-.

RCAF. AMPLIFIER UNIT. 12 v. input, complete with vibrator pack, 250 v. output. OZ4, microphone transformer into 6K6GT output valve, with negative feed back, size 8 in. x 5 1/2 in. x 8 1/2 in. Brand new, 35/-, p.p. 3/-.

R.109 RECEIVERS. 8 valves: 5 ARP12, 3 AR8, covering 1.8-8.5 Mc/s on 2 frequency bands. Contains 6 v. vibrator pack and built-in 3/4 in. Goodmans Speaker, operates from 6 v. battery, consumption 1 1/2 amps. Housed in metal case, 13 in. x 12 in. x 1 1/2 in. Designed for mobile or ground station. Operates with any normal aerial. Complete and tested, including circuit. Very good condition. Only 80/-, carriage 7/6.

BENDIX RECEIVER MN 26.C. Covering 150-1,500 Kc/s in 3 bands. Valves used: 5 6K7, 2 6N7, 2 6J5, 1 6F6, 1 6L7. Complete with switching motor and dynamotor. This superb unit has been modified for 12 v. operation. Only 80/-, carr. 8/6.

AMERICAN ROTARY CONVERTER.—With detachable cooling fan 12 v. input, 250 v. output at 90 mA. Completely suppressed, 19/-, p.p. 3/-.

HIGH RESISTANCE HEADPHONES.—Type Mk. IV 4,000 ohms, with cord and plug, brand new, 11/- each, p.p. 1/6.

R.F. UNITS.—R.F.24 20-30 Mc/s, 8/6 each. R.F.25, 30-40 Mc/s, 8/6 each. R.F.26, 50-65 Mc/s, 25/- each. All valved. Postage 3/- on each.

373 MINIATURE 9.72 I.F. STRIPS.—Supplied complete with 3 EF91, 2 EF92, 1 EB91. Ideal for modification to F.M. Tuner as described on page 107 of the April "Practical Wireless." Price 45/-.

COMMAND TRANSMITTERS.—2.1-3 Mc/s, valved, with Crystal, 25/- . 3-4 Mc/s, valved, with Crystal, 25/- . 4-5.3 Mc/s, valved, less Crystal, 17/- . S.3-7 Mc/s, valved, less Crystal, 17/- . P. and P. 3/- on each.

WESTINGHOUSE PENCIL RECTIFIER.—Type J.50. Output 500 v. at 5 mA. 5/- post paid.

VIBRATOR PACK.—6 v. input, 230 v. output at 100 ma., complete 4 pin vibrator, OZ4 rectifier. Fully smoothed. 25/6 each, p.p. 2/6.

Relda Radio Ltd.

(Dept. "P") 32A, Coptic Street, London, W.C.1. Phone: MUSEum 9607.

SEE THESE FINE BARGAINS AT *The Walk-around Shop*

BEACON RECEIVER BCI206A

Covering 200-400 kc/s. Valve line-up: 6K7 RF; 6SA7 frequency changer; 6SK7 I.F. amplifier; 6SQ7 det.; 28D7 O.P. This was designed to run on 24 2R 5v. D.C. H.T. L.T. Excellent bas's for car radio; size 6in. x 5in. x 4in. Good working order. £35.0 each, plus 5/- carr.

RECEIVER UNIT Ex II43A

10.72 Mc/s I.F.s. Frequency 100-120 Mc/s, suitable for conversion to 2 metres and Wrotham. Owing to a large purchase we can offer these units fully valved, with circuit diagram, at 25/- each, plus 3/- post/packing. Valve line-up: (4) EF50, (1) EL32, (2) EF39, (1) EBC33, (1) EA50.

RI155 RECEIVERS

Good used condition. Working order. £65.0, plus 10/- carr.

OSCILLOSCOPE UNIT

With internal 12 v. Vibrator Power Pack. Suitable for Modulator Indicator or conversion to Oscilloscope unit. Containing VCR139A, 2-VR56, 1-VR54, 2-EF50. Size 1ft. 6in. x 9 1/2in. x 8in. Price £30.0, plus 10/- carriage.

SIGNAL GENERATOR AND WAVEMETER

Type W.1649. Frequency of signal generator: 140 to 240 Mc/s. Accuracy ± 0.5 Mc/s. Frequency of Heterodyne Wavemeter: 155 to 255 Mc/s. Accuracy ± 0.2 Mc/s. Containing VR135 and 4-VR91. 5 meg. crystal. Retractable aerial. Power requirements: 6.3 volts and 120 volts. Unit housed in copper lined wooden case. Size: 15 1/2in. x 13in. x 14 1/2in. In good condition. £2.10.0, plus 10/- packing and carriage.

GYRO UNIT AND INVERTER

Inverter: 12 volt D.C. input. 3-phase 190 cycle output. (These inverters can be used successfully as 12 v. D.C. Motors for Models.)

Gyro Unit: Operates on 3-phase output from Inverter. Peak speed 11,400 r.p.m. Caged. Precision-made equipment. These units are ideal for experimenting and demonstration purposes. Size: Inverter, 4in. x 3in. x 3in.; Gyro, 4in. dia., including cage. Price 12/6 pair, plus 3/- p. and p.

PROOPS Bros. Ltd.

Dept. P, 52 Tottenham Court Road, London, W.1. LAngham 0141.

Hours 9-6 p.m.

Thursday to 1 p.m.

Open all day Saturday

ABSORPTION WAVEMETER

Easily converted to 2 metres or 70 cm. In Copper-plated metal case 3 1/2 x 4 1/2 x 5 1/2in., with dial calibrated 0-100 and 80 v. Neon tube. Coverage approx. 190-210 Mc/s. New 6/6 each, post paid.

TS.205 3 Cm. TEST SET, £15.0.0

DESYNN TYPE ANTENNA

or Beam Position Indication System

This comprises a transmitter unit and Indicator which will operate on 12 or 24 volts D.C. and will indicate with instantaneous and smooth pointer movement. The Transmitter is a specially designed potentiometer and will operate the Receiver on a simple three-wire system, and the receiver in this instance is calibrated in Gallons, but dial could be easily altered to indicate a 360 deg. sweep. Transmitter and Receiver with full instructions. Price 12/6, plus 2/- p. and p.

R.F. UNITS

R.F. 25 40-50 Mc/s. Switched tuning. Valved	...	9 6 each
R.F. 26 50-65 Mc/s. Variable tuning. Valved	...	20 - each
Damaged dials	...	25/- each
Perfect dials	...	...

Packing and postage 3/- each type.

MAINS CHANGING TRANSFORMER

(Admiralty Pattern) 230/100-110-130 v. Separate primary and secondary with earthed screen winding between. Totally enclosed in 7in. x 6in. x 8in black steel case with detachable lid exposing terminal block and tapping link. Secondary very conservatively rated at 0.44 amps (core size 3 sq. in.). Tested to 2,000 v. Weight 19 lb. Price £1 each, including p. and p.

VALVES

2D21, 7/6; 1L4, 7/-; 6SH7, 3/3; 6V6M, 8/6; VR56, 5/-; VT501, 2/6; 12H6, 2/-; 6L7, 5/6; 12A6, 5/-; 12SC7, 6/-; OZ4, 5/-; 3Q5, 6/6; 6AC7, 6/-; VR54, 2/-; 6H6, 2/-; 12SH7, 2/9; VT52, 2/6; 6CQ6, 6/-; 6SN7, 6/6; 6K7GT, 4/6; 6K7G, 4/6; VU111, 2/- . Please Add Postage.

FIRST-CLASS RADIO COURSES...

GET A CERTIFICATE!

QUALIFY AT HOME—IN SPARE TIME

After brief, intensely interesting study—undertaken at home in your spare time—YOU can secure your professional qualification. Prepare for YOUR share in the post-war boom in Radio. Let us show you how!

FREE GUIDE

The New Free Guide contains 132 pages of information of the greatest importance to those seeking such success-compelling qualifications as A.M. Brit. I.R.E., City and Guilds Final Radio, P.M.G. Radio Amateurs, Exams., Gen. Cert. of Educ., London B.Sc. (Eng.), A.M.I.P.E., A.M.I.Mech.E., Draughtsmanship (all branches), etc., together with particulars of our remarkable Guarantee of **SUCCESS OR NO FEE**

Write now for your copy of this invaluable publication. It may well prove to be the turning point in your career.

FOUNDED 1885—OVER

150,000 SUCCESSSES

NATIONAL INSTITUTE OF ENGINEERING

(Dept. 461), 148, HOLBORN, LONDON, E.C.1.

UNIVERSAL TYPE SHUNTS for use in multimeters. 1% accuracy for any 1 mA. or 500 mA. meter. Only one simple adjustment to make, no calibrating meter required. With instructions. Guaranteed one year. S505 (1 mA.) covers 1, 5, 25, 100 and 500 mA. S51 (1 mA.) covers 2, 10, 50, 200 mA. and 1 amp. Price 15/6.

SHUNT for 1 mA., 100 ohm METER. Ranges 10, 100, 1,000 mA., 1% accuracy, 7/6.

SHUNT for 1 mA., 500 ohm METER. Ranges 5, 50, 500 mA., 1% accuracy, 7/6. Westinghouse Meter Rectifier, 1 mA., 14-1 pole 18-way meter switch, 8/-.

SWITCHED DECADE UNITS. Yaxley type switch, 0 to 100 ohms 1%, in ten 10 ohm 1% steps, 17/6; ditto but 1,000 ohm max. 17/6; ditto but 10,000 ohm max. 20/-; 0-10,000 pF in ten 1,000 pF 2% steps, 17/6; 0-0.1 μ F in ten 0.01 μ F 2% steps, 20/-.

PRECISION CONDENSERS. 1 μ F 2%, 0.01 2%, 100 pF 1%, 6/6 per set. 100 ohms 1%, 10 K 1%, 1 Meg. 1%, 5/9 per set.

PRECISION WIREWOUND RESISTORS Eureka wound on strip, 1 to 1,000 ohms, 0.5%, 3/-; 0.2%, 4/3; 1 K to 5 K, 0.5%, 3/6; 0.2%, 4/9; 5 K to 20 K, 0.5%, 4/3; 0.2%, 6/-. Your value wound to order.

RESISTANCE BOX STANDARDS. 12 Wirewound Resistors 1, 2, 2, 5, 10, 20, 20, 50, 100, 200, 200, 500 ohms to give any value between 1 and 1,110 ohms in 1 ohm steps 0.5%, 33/-; 0.2%, +0.01 ohm, 48/-; ditto but 10 to 11,110 in 10 ohm steps, 0.5%, 34/-; 0.2%, 49/6. Ditto but 1 to 11,110 in 1 ohm steps (16 resistors), 0.5%, 45/-; 0.2%, 0.01 ohm, 65/-. Ratio Arm Resistors, 10 90, 900 ohms (ratios 100, 10, 1, 0.1, 0.01 to 1), per set of six, 0.5%, 16/6; 0.2%, 24/-.

Wirewound Potentiometers with hand-calibrated scale. Suitable for Workshop Resistance Capacity Bridge, 12/6.

S.A.E. with enquiries, please. Post extra.

PLANET INSTRUMENT CO.

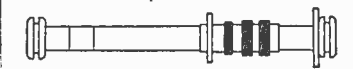
25 DOMINION AVE., LEEDS 7

TELETRON TYPE FX, 25



Self-tuned, Dual-wave Ferrite Rod Aerial, 15/- each.

Designed for use in pocket Transistor receivers. Descriptive folder with circuit-component layout, and wiring instructions for a three-Transistor regenerative receiver. Price 6d. NO aerial, earth or tuning condenser required. Operates speaker from 3 Penlight cells. All parts, including cabinet and chassis, available from component stockists.



Miniature Transistor IFTs & Osc coil for 315 kc/s, 6/6 ea. FRM/2 Transistor Ferrite Rod Aerial, 10/-. Available from component stockists. Stamp for complete lists and circuits.

THE TELETRON Co. Ltd.

266 Nightingale Rd., London N.9

HOW 2527

TETRODES as TRIODES

IMPROVING THE OUTPUT STAGE BY MODIFYING THE VALVE CONNECTIONS

THE reduced harmonic distortion of the triode, compared with tetrode or pentode, is well known, but it is not always realised that output tetrodes and pentodes may readily be employed as triodes. When the circuit does not employ negative feedback, the improvement in quality will generally be at once audible. Triode operation results in reduced gain and power-handling capacity, so that the modification is best suited to equipment where the full output previously obtained with the tetrode working is not really required.

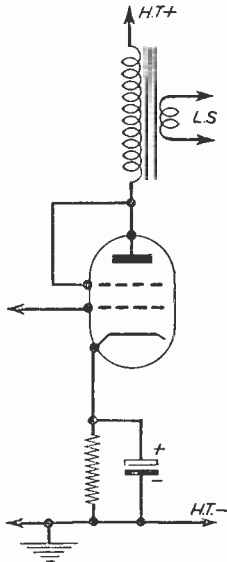


Fig. 1.—Single valve triode circuit.

When the output stage employs a single valve, the screen grid is wired directly to the anode, as in Fig. 1. Even with no other modification, an improvement should be noted. But for optimum results, the anode load should be reduced to approximately one-half its previous figure. For example, valves such as the 6V6 or 6BW6, with 250 volt H.T. supply, will normally require a load of 5,000 ohms for tetrode operation, but only about 2,000 ohms for triode working. With a 2/3 ohm speaker, the transformer ratio would thus need changing from about 45:1 to approximately 27:1. With a 15 ohm speaker the ratio would be reduced from 18:1 to 12:1. Fortunately triodes are less influenced by mismatching than are tetrodes, so that an improvement is possible even with the original output transformer.

Bias and other circuit details remain unchanged. However, if a top-cut condenser is present, either from anode to earth line, or in parallel with the speaker transformer primary, it should be removed or much reduced in value. Values of .01 μ F or even larger may be found with tetrodes and pentodes, and are fitted to reduce the harmonic emphasis with these valves, which is usually given as about 6 per cent. to 12 per cent., according to valve type. Such condensers are not required with triodes, and their removal will increase the realism of the upper register.

Push-pull

An improvement is also obtainable with a push-

pull stage, though harmonic distortion is already much lower than with a single valve. Typical ratings for the 6V6 show over 3 per cent. harmonic distortion for tetrode working, falling to only 0.5 per cent. for triode operation.

If an output stage employing two such valves is to be built, the values shown in Fig. 2 will be found satisfactory. The 100 ohm resistors are oscillation stoppers, and will not always be required. They also tend to equalise performance. The optimum load is about 4,500 ohms, requiring a transformer of about 42:1, centre-tapped, for 2/3 ohm speaker.

If an existing circuit is to be modified, it is only necessary to change the screen grid connections and to reduce the anode load, if possible. With a multi-ratio output transformer, alternative tapings suitable for triodes will usually be present. Any top-cut or "tone correction" condensers should also be removed, or reduced in value.

No difficulty should arise in modifying any mains or battery receiver or amplifier output stage in this way. It is important to remember that the screen grids are not left disconnected, but must be wired to the anode. With some valves it is necessary to check that the maximum screen grid voltage will not be exceeded with the new form of connection.

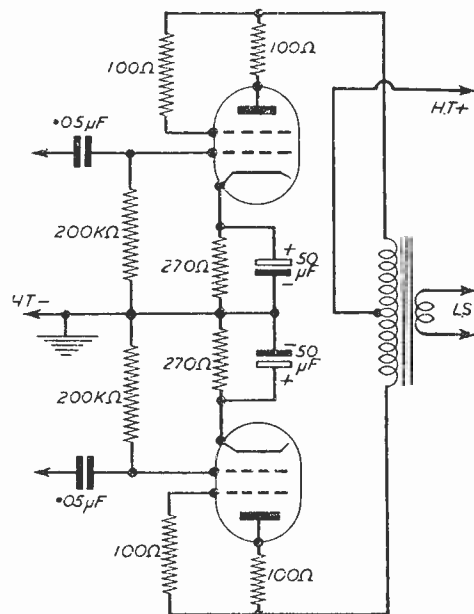


Fig. 2.—Push-pull with oscillation stoppers.

Programme Pointers



A SECOND hearing of "These Foolish Things" prompts one to wonder whether a synonym and an antonym can be found combined into one word. Conducted by Roy Plomley and based on an idea of Nancy Spain's, it is certainly foolish and inconsequential, yet leaving a feeling behind of a certain amount of brains and thought having gone to the devising and producing of it. It has reasonable entertainment value, and, within limits, is a likeable half hour. Kay Hammond, Charlotte Mitchell, René Cutforth, Monia Banishevsky, Geoffrey Grigson and Ivan Staff reminisced when I last heard it. What would Frank Muir and Dennis Norden do with it? (Producer, please note.)

A series of problems in detection by John P. Wynn, entitled "Inspector Scott Investigates," is now running. Reminding one of the competitions promoted by many commercial firms, in which the errors purposely put into a picture have to be spotted and the competitor detecting the most wins a four-figure cheque (providing his or her entry is accompanied by a stated number of wrappers off the article advertised), listeners are asked to guess how many mistakes have been interpolated into the unfolding of the story. A minute, filled with sweet music, is given for this purpose at the end of each episode. Inspector Scott is played by Deryck Guyler and the series produced by Vernon Harris.

Musical Quiz

The musical quiz, "Off the Cuff," run by Antony Hopkins, is as different from Joseph Cooper's "Call the Tune" as any two things presumably of the same genre can well be. "Off the Cuff" is very funny, light-hearted and irresponsible, most enjoyable, and excellent entertainment. The questions are set by Spike Hughes and the panel, on the evening I heard it, was made up of Carole Carr, Dick Bentley, Eric Sykes and Denis Matthews. To make sure that the proceedings didn't plumb too serious depths, "Flotsam" gave an amusing and clever sketch illustrating the evolution of one of his own tunes from Sullivan's "Lost Chord." May I bring to his notice the first notes of both "Delia" and "The Merry Widow" waltzes and that of the "Maid of the Mountains"? There are, of course, hundreds of tunes built on the same foundation. The series is admirably produced by Roy Spear.

Music

Music in the bulk occupies more radio time and programme space than any other "line." On the technicality of programme hours I stand open to correction: it seems that there is a vast corpus of sound at all times and in all seasons—symphony and promenade concerts, operas, recitals on every

Our Critic, Maurice
Reeve, Reviews Some
Recent Programmes

imaginable instrument and combination of instruments as well as light music in all its garishness and noisiness. Yet "The Critics" have never been known to tackle it. Would it not be a welcome change if they co-opted, from time to time, a musical colleague? A man of perception and objectivity should have wide, open spaces to wander in!

Plays

Young wife with good but stern, unromantic husband meets romance and flashy admiration at the hands of a young Frenchman and runs off with him to have her thrill while it lasts. This is more or less the theme of Caryl Brahms' "Away Went Polly," dramatised by herself from her own novel. But it has been done, of course, hundreds of times before. Here it was fashioned quite attractively and charmingly played by Yvonne Mitchell, Brewster Mason, Betty Hardy, Simon Lack, David Peel and Marianne Deeming.

Another rather corny piece based on an age-old theme—but not without entertainment value—was Bill Naughton's "My Flesh, My Blood." The ruthless stickler over dogma, caring only for the letter of the Law, ruins his family with his tyranny and religious megalomania, until his poor, wretched wife tries to end her miseries, albeit unsuccessfully, when the old man melts like an ice-cream in a child's possession; all is transformed and forgiven in the last few minutes of the piece, and Edward Chapman, Noel Dyson, Nan Marriott-Watson, Alan Rothwell, Valerie Miller, Brian Peck, Shirley King and Brian Trueman all live happily ever after.

The Third

A very good piece on the Third was Wyndham Lewis's "The Revenge for Love." Dealing with the comings and goings from the Spanish Civil War of various characters, including Communists, it was full of meaty lines and excellently acted. I remember one line of the narrator's in particular. Percy Hardcaster loses a leg in that war. Back in London he has been making love to Gillian on the sofa and having a rare old time generally, when suddenly we are told "he jumped to his feet. . . ." Wonderful things happen on the Third! But, joking apart, it was very good. Cast: Stephan Murray—narrator, J. Phillips, C. Leno, J. Richmond, Bettina Dickson, R. Napier, Isla Cameron, A. McClelland, O. Pooley and R. Snowdon. Producer, D. G. Bridson.

PREMIER RADIO COMPANY

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

OPEN TILL
6 P.M. SATURDAYS

(Dept. P.W.10) 207, EDGWARE ROAD, LONDON, W.2

Telephone :
AMIRASSAID 4033
PADDINGTON 3271-2



The "Petite" PORTABLE

A completely new design with the all star feature from the firm with 45 years of experience in the supply of designs for the home constructor.

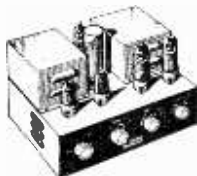
MAY BE BUILT FOR

£7.7.0

Plus p. & p. 3/-.

Batteries Extra. H.T. 10/- (type B126) or equivalent. L.T. 1/6 (type AD35) or equivalent.

8-WATT AMPLIFIER



This design includes 5 miniature Valves of the latest types, an Ultralinear Output Transformer suitable for Speakers of 3 and 15 ohms and a very attractive Perspex front panel with gold lettering, complete set of parts.

£8.8.0

Postage & packing 5/- extra.

The New De-Luxe TAPE RECORDER TR3

for

£5.18.0

Deposit & 8 monthly payments of £5.16.3

or Cash 45 gns. Plus 21/- post & packing.

Case finished in Red and Cream with gilt styling and fittings. Size 18in. x 15in. x 9in. for A.C. Mains 230/250 v. 50 cycles.



TRADE ENQUIRIES WELCOMED.

NEW F.M. TUNER for the Home Constructor

A new design using the latest circuit techniques. Includes 4 valves plus magic eye tuning indicator, permeability tuning and an integral power supply. Two controls only, a gear driven slow motion tuning control and an output volume control with on/off switch. Suitable for fringe area reception. All components may be purchased for £8.15.0 plus packing & postage 3/6. OR Less Mains Transformer & Rectifier 27.12.6 plus packing & postage 3/-. Power requirements HT 230 v. 50 mA. LT 6.3 v. 1.5 A. Dial size 3 1/2" x 1 1/2". overall size 11 1/2" long, 5 1/2" deep, 4 1/2" high.

NEW CATALOGUE

"60 Pages of Spares"

Price 1/- Post Free.

It includes 118 exact replacement Potentiometers and Mains Droppers, Line Output Transformers, Tools, Servicing Aids, Etc., Etc. For example.

MAINS DROPPERS. For Ultra Twin—SMD.6, 1,690 ohms, 1,450 ohms, 5/3; SMD.7. 175 ohms, 340 ohms, 410 ohms, 5/3, Etc., Etc.

OUTPUT TRANSFORMERS. For Ultra Twin, 11/9. Philips 290 U., 12/9, Etc., Etc.

ELSTONE TRANSFORMER RANGE. CRT Isolation. Mains Primary, 2 v., 4 v., 6.3 v., 10.8 v., 13.3 v., optional 20 per cent. boost. 22/-. State CRT voltage required. Etc., Etc.

Minimum Postage 6d.

M. FOY

6, Wykebeck Gardens, Leeds, 9.

DO IT AT HOME

It is so easy with the RODEING HOME CONSTRUCTOR'S HANDBOOK

Our latest issue is beautifully printed with a full colour cover! Packed with technical data, set building and servicing hints, facts and formulae, resistance colour code, soldering hints, descriptions, full parts lists and circuits of modern receivers, tape recorder, feeder units, communications, set, etc. Send 2/6 (plus 4d. post). "Easy-as-A.B.C." FULL SIZE Construction sheets for any of these units are available FREE with orders enabling even the beginner to get professional results first time! This claim is confirmed by hundreds of testimonials received.

NEVER BEFORE HAS THERE BEEN A BOOK SO VALUABLE TO NOVICE AND EXPERT ALIKE!

RODING LABORATORIES

Hurn Airport, Christchurch, Hants

GUARANTEED VALVES

CV6	1/-	EL32	6/6	PZ30	16/-	6A88	9/-	6P28	20/-
DF91	7/6	EL33	15/-	RK34	3/6	6AC7	6/6	6Q7	8/6
DET19	1/6	EL38	22/-	RL37	5/6	6AJ8	9/-	6R7	7/6
DET25	5/-	EL41	10/-	SP61	5/-	6AK6	8/6	6SA7	8/-
DF92	7/6	EL42	10/-	TT11	4/-	6AC5	6/6	6SH7	5/-
DL62	7/6	EL43	7/-	U801	20/-	6AK5	6/6	6SJT	7/6
DL93	7/6	EL91	8/6	UBC41	10/-	6AL5	6/6	6SK7	7/6
DL95	7/6	EN31	7/6	UB41	10/-	6AM6	7/6	6SL7	6/6
EA50	1/-	EY51	11/6	UCH42	10/-	6AQ5	7/-	6SN7	7/6
EABC80	9/-	EZ35	8/-	UP41	10/-	6AT6	8/-	6ST7	7/6
EB34	2/6	EZ40	8/-	UP42	10/-	6AU6	7/-	6V6	7/6
EB91	6/-	EZ80	8/6	UL41	10/-	6BA6	8/6	6X4	7/6
EBC33	10/-	EZ90	7/6	U8	20/-	6BD6	8/-	6X5	7/6
EBC41	10/-	FC13C	7/6	UY41	8/-	6BP6	8/6	6D2	4/6
EBC91	8/-	KT33C	8/6	VP13C	4/6	6BR6	7/6	6I2A6	7/6
EBP80	9/-	KT44	7/6	VR16	6/-	6BS7	8/6	6IAH8	10/-
ECC81	9/-	KTW63	7/6	VR150/30	7/6	6BW6	7/6	6IAT7	8/-
ECC82	9/-	PL38	22/-	VU111	2/-	6B8	5/-	6IAU7	9/-
ECC83	9/-	PL81	10/6	X65	10/6	6C4	6/-	6IAX7	9/-
ECC84	11/-	PL82	10/6	IL4	7/6	6CH6	8/6	6IBH7	8/6
ECC91	7/-	PL83	10/6	IT4	7/6	6P32	5/-	6IC8	5/-
ECH35	10/-	PY30	9/-	IQ5	7/6	6F33	7/6	6I2H8	2/6
ECH42	10/-	PY81	8/6	IU5	7/6	6C6	5/-	6I2J5	5/-
ECH81	9/-	PY82	8/6	2C34	3/6	6H6	2/6	6I2J7	7/6
ECP82	11/-	PCF80	10/-	2D21	7/6	6J5	5/-	6I2K7	7/6
ECL80	9/-	PCF82	10/-	2X2	4/-	6J6	7/-	6I2L8	17/-
ECS2	8/6	PC84	1/6	3A4	2/6	6K7	5/6	6I2M7	7/6
EC54	5/-	PCL82	10/-	3Q4	7/6	6K8	9/6	6I2SC7	7/6
EC90	6/-	Pen46	8/6	5D1	4/6	6L6	10/-	6I2SH7	5/-
EF26	6/-	PCL83	10/-	5U4	6/-	6N7	7/6	6I2SHT	5/-
EF37A	10/-	P61	5/-	5Z4	10/6	6N8	9/-	6I2SK7	5/-
EP41	10/-							35Z4	8/6
EP42	10/-								45
EP50	5/-								58
EF51	7/6								5-
EF8	8/6								85A2
EF85	10/6								10-
EF91	7/6								90C1
EF92	5/6								8/-
EF93	8/6								807
EF94	7/-								832
EF95	6/6								40/-
EP96	6/6								354
EP90	8/-								5-

MEGGER TYPE OHMMETERS, with scale 0 to 10 K., hand generator and Brand new. £4 ea., or with new leather carrying case, £4.10. Post 1/6.

19" SETS. Still available at 85 with power unit and brand new. 12.6 C. and P.

40-VIAL CABLE. Standard 75 ohm. 3d. yd. Airt spaced at 9d. yd. Cheaper quality at 6d. yd.

Post & Packing 6d. Free over £1. C.O.D. 2/6 extra.

LAWRENCE ELECTRONICS

15B, CHIPSTEAD VALLEY ROAD, COULSDON, SURREY. UPLANDS 9075. Open to personal callers on Saturdays only.

FREE TO AMBITIOUS ENGINEERS!

This 148-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 £18 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 148-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.
Building, Plastics,
Draughtsmanship,
Television, etc.

GET SOME LETTERS AFTER YOUR NAME!

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

BIET

BUILD THIS AUTHENTIC



JASON F.M. KIT

4 VALVES
●
STABLE
●
EASY CONSTRUCTION

When built this famous Jason F.M. Tuner provides good sensitivity with freedom from drift and highest quality reproduction. Output 0.5 v. Chassis supplied ready punched, together with genuine exclusive Jason coil and dial assemblies, etc. Useful range—60 miles; fringe area version available. Book of the Jason F.M. Tuner (Data Publications), 2/- or 2/3 post free. Detailed price list on application.

Complete kit of quality components (less valves) £5.5.0. Fringe-area version (less valves) £6.0.0. Power-pack kit, £2.1.9.

Ⓢ JASON "ARGONAUT" A.M.-F.M. KITS
For building as a tuning unit or complete self-powered receiver. Book by Data Publications, 2/- (2/3 post free).

FROM LEADING STOCKISTS, or in case of difficulty :
JASON MOTOR & ELECTRONIC CO. Phone SPE 7050
328 Cricklewood Lane, London, N.W.2.

Great Britain's Valve Mail Order House



REPAIR any WATCH or CLOCK. COMPLETE OUTFIT

for cleaning and repairing. Includes illustrated explanatory booklet, eye-glass, tweezers, screwdrivers, oil dusting powder, oilers, luminous compounds, jewellers' rouge, dial brush and jewels. Cash 21/- or 6/- down and 3 monthly payments of 6/-.



SERVICE SHEETS

The one you require enclosed if in a dozen assorted 10/6 or in our best choice



PIFCO
All-in-one Radiometer A.C./D.C.

* Circuit Test.
* L.T. and H.T. Tests.
* M.A. Test.
* Valve Test.
Continuity and Resistance Tests. Complete with 32/6 Test Leads. Post 1/-.

6/-



.001-1" MICROMETER
BRAND NEW PRECISION INSTRUMENT
BARGAIN 10/-

This NEW Blowlamp

is 5 1/2 in. high, weighs only 7 ozs. and is sturdily made from solid brass tube. No working parts to go wrong. Ideal for tinning and sweating, silver soldering, paint stripping, glass bending and drawing. Uses methylated spirits only. 14/7

SALE

AC/SG 15/-	U22	8/-	7B3	5/-
APP4G	VP2	5/-	7V7	5/-
10/-	VR18	5/-	8D2	8/-
ARP3 7/-	VR65	2/-	12A	1/-
ARP12 5/-	VR65A	1/-	12AG	7/-
CY32 10/-	VR150.30	10/-	12AH7	10/-
DET25 5/-	10/-	12ATT	9/-	
ECC34 10/-	VU39A	1/-	12H6	4/-
ECC85 11/-	W21	7/-	12J5	6/-
EF36 5/-	O1A	1/-	12SK7	10/-
EF80 9/-	O2A	5/-	12SP5	5/-
EK32 7/6	1B4	2/-	12SH7	6/-
EL2 9/-	1B5	3/-	12SJ7	6/-
EL50 7/6	1D8	10/-	12SKT	6/-
EM4 10/-	1E5	5/-	12SL7	9/-
FC13 10/-	1F4	5/-	12Z5	11/-
H63 7/-	1F5	5/-	13B6	8/-
HL13C 5/-	1F6	5/-	13PA	8/-
HP210 5/-	1G1	7/6	17	7/-
HP211C5/-	1H4	5/-	18	12/-
HP1018 7/6	1H9	5/-	25	1/-
HP4101 2/6	1J6	5/-	31	2/-
KT32 7/6	1L.N.5	3/-	32	3/-
KTZ41 8/-	2A3	10/-	34	2/-
LP220 5/-	2A6	2/-	35L5	10/-
MSPEN	2A7	2/-	43	12/-
4/-	2D4A	2/-	45	10/-
NSP1 15/-	2D4B	2/-	46	8/-
O1A 1/-	6A6	6/-	3AX6	8/-
OZ1 5/-	6AC5	7/-	57	8/-
PD220 11/-	6AG5	6/-	58	4/-
PENDD	6AG7	15/-	75	15/-
2530 10/-	6AK5	8/-	81	8/-
QP230 5/-	6AK6	7/-	24GQ7	8/-
R1 9/-	6AK7	15/-	951	3/-
RL18 15/-	6AQ5	11/-	956	2/-
SP2 4/-	6C1	6/-	1299A	5/-
T21 4/-	6C8	9/-	1301	1/-
TDD13C	6F5	6/-	2051	15/-
11/-	6F32	6/-	9001	15/-
TP23 12/-	6F33	7/-	9004	6/-
TP26 12/-	6H6	3/-	5006	6/-
TT1 8/-	6N7	7/-		
UF11 11/-	6SK7	6/-	POST 1/-	

VALVES

RADIO VALVES

DEMOBBED VALVES MANUAL 2/6

Giving equivalents of British and American Service and Cross Reference of Commercial Types with an Appendix of B.V.A. Equivalents, and Comprehensive Price List. We have still some Valves left at very old Budget Rates (33%) which are actually sold at the old price (1951). Also ready our new comprehensive BVA List.

SALE

of VALVES both RADIO and TV Types.

Not listed on left. Please cut out coupon below and post to us. From

1/- to 15/-



NAME
ADDRESS
TYPE OF VALVE REQUIRED

Open to Discussion



The Editor does not necessarily agree with opinions expressed by his correspondents

Music and Movement

SIR,—May I thank Thermion and say how whole-heartedly I agree with him in his criticism of "Music and Movement"? I am not yet a qualified teacher—I am still training at the City of Worcester Training College—but even in my short contact with education I must say that I am whole-heartedly of his opinion with regard to "Music and Movement."

It seems to me that the majority of the teaching profession are unwilling to voice their criticisms of it whereas the minority—probably teachers(?) of it—are in fear that their positions in the schools will not be justified.—T. MOORE (Yorks).

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 iii of cover.

High-cycle Transformers

SIR.—I was interested in the article on using high-cycle transformers printed in the June issue of PRACTICAL WIRELESS.

For the interest of readers who possess a "high-cycle" transformer or items of equipment containing one, I would like to point out that I have for some time now been running a small television from one of these transformers.

The only modification required turned out to be a 10 μ F condenser in series with the supply lead.

After testing the set-up it was found that all three heater windings, H.T. winding, and E.H.T. winding were at the required voltage and that there was negligible difference in voltage under different loads.

The condenser used was a large ex-W.D. 10 μ F with a 250K Ω resistor across it to discharge the condenser when the mains was disconnected.

In this way the unit used (a type P25 receiver) was almost unmodified, where changing the transformer would have been economically out of the question.—J. ROSS (Falkland).

Earliest Tape Recorder?

SIR,—In recent editions of PRACTICAL WIRELESS there have been articles on early tape recording. The earliest type of recording known is supposed, as mentioned by W. A. Steele, to be around 1913.

I have, however, an old book by Charles R. Gibson in which he describes "a telephone with a memory." The book was published in 1905. To quote the author:

"If one pictures for a moment a telephone transmitter sending out a varying current to the

distant magnet, and if one recalls how the magnet acted upon a diaphragm, then we have only to replace the stationary disc by an iron wire passing in front of and slightly touching the magnet, the wire thus being magnetised by the influence of the electro-magnet which is varying under control of the speaker's voice."

He then goes on to explain how, if in turn the magnetised wire is passed again in front of the electro-magnet it will impart its magnetism to the electro-magnet which will in turn produce sound in a telephone receiver.

The purpose is that if "A" calls up "B" on his telephone and "B" is not at home the instrument described above will take the message and impart it to "B" when he comes

home. Whether it works or not I do not know. Perhaps some reader would like to give it a try.—J. TAYLOR (Londonderry).

An Aerial Idea

SIR.—During some recent investigations into aerial design I discovered that a quarter wave aerial, the ends of which were placed in the aerial and earth sockets of an ordinary domestic receiver will greatly increase the sensitivity to such an extent as to enable amateur transmissions from most parts of the world to be received with good readability and signal strength. The aerial system has high directional properties but care should be taken in making sure that the spacing between the two major sides is not less than .025 λ , and the total length one quarter of the required wavelength. It is also advisable to give a word of caution with respect to the working conditions of this system. These may be classified as follows:

(a) Reception is limited to a narrow band of frequencies, i.e., a quarter wave aerial for 20 metres will not be responsive on fractions or multiples of this frequency and will therefore be useless for work on 40 and 80 metres, etc.

(b) The system is unresponsive when used in conjunction with receivers using regenerative principles in the form of reaction control.

(c) Since the aerial is highly directional, it is worth spending some time in arranging the position of the system.

Before the introduction of this aerial I was continually troubled by the high noise level on the 20 metre band, but since its introduction I have received some very remarkable transmissions

which were unreceivable by local amateurs using their communications equipment. Amongst these were signals of QRK5/QSA7-9 from the following countries. North and South America, Alaska, Greenland, USSR, Greece, North and South Africa, and the Far East. All these transmissions were amateur, and not commercial stations.—J. C. BROGAN (Ayr).

Resonant Smoothing Circuit

SIR.—Mr. M. E. Kerwood's "Resonant Smoothing Circuit" (PRACTICAL WIRELESS, September, 1957), whilst well known, must be used with discretion and for practical purposes cannot be calculated with any accuracy from nominal component values. The latter have normally wide tolerances and to obtain resonance, experiment is usually necessary. Furthermore, having obtained some degree of resonance, undesirable oscillations can be induced into the H.F. line which may seriously affect the performance of the equipment.—Edward A. STOTT (Harlow).

Tape Recorder Maintenance

SIR.—Your contributor's reference to the cleaning method of erase and record/playback heads by use of carbon tetrachloride should be corrected. Where the head housing or case is made of thermo-plastic materials, this and any similar acetone fluids can cause damage. Pure alcohol (obtainable in small quantities from usual chemist shop) is a safer medium where heavy oxide deposit is noticed. Much of the deposit, however, can be cleared by use of an orange stick or alternative the free end of an ordinary match.—A. J. HOWARTH (Worcester).

The R1155

SIR.—I'm sure I am one of hundreds who own an R1155A, and curse the day when we bought it. The reason being that it leaves out the 1.8 Mc/s Ham Band.

We all need a low-cost high-performance converter which is in the reach of all of us. Therefore I would like to see an article on this. Can any reader help us?

I have followed all your modifications to the 1155.—ALAN BEAZLEY (Wilts).

Queer Faults

SIR.—I think it would be very interesting if readers—especially those who are engaged permanently on servicing—would give us some of their experiences in the way of queer faults. It is all very well being told that, for instance, if anode current is low, try the valve, etc., but there are times when everything tests O.K. according to the book. It is then that we have to search for something which is not in the book and that takes not only time, but all the patience which we possess. By listing some of the queer things which have been experienced one gets an idea of the lines which might have to be followed and, apart from the experience gained, much time is saved. As a matter of interest I would mention a fault which comes within this category, and although it occurred some years

ago it is vouched for by one of the largest manufacturers in the country and was experienced by their service department. A customer reported that the set he had purchased was useless. When asked why he stated that it only picked up yesterday's programmes. A serviceman was sent round and the customer demonstrated with the aid of the published programme and the set that this was apparently a fact. He was ridiculed, but the set was asked for and on first testing in the service department it apparently was only picking up direct, the programme radiated the day before. There was a fairly simple solution, but for the time being everyone was completely mystified, as this was something which couldn't happen, yet apparently could be demonstrated. What do you think was wrong? I am sure mysterious faults like these will interest other readers.—H. G. TRAIL (Edgware).

Circuits and/or Wiring Diagrams?

SIR.—Your leading article in the September issue of PRACTICAL WIRELESS is very interesting to me, as I had been hoping for some time that the subject of circuit and wiring diagrams would be raised.

In July of last year I achieved a long-awaited ambition by attempting a small portable design contained in previous issues of PRACTICAL WIRELESS, and had a certain amount of success. The circuit diagram, however, at the time, was just "Greek"; the wiring diagram being the only understandable feature.

Other PRACTICAL WIRELESS designs followed, and were only completed by following the same procedure. However, in January of this year I tried (which was, for me) something a little more ambitious, a four valve portable battery superhet. Not a sound issued from the speaker! I tried for a week to trace my mistake, without success, and eventually realised that to be able to read a circuit diagram like a book was the only remedy, so I bought your "Beginners' Guide to Radio." What a revelation this publication proved to be! I learned how a valve was drawn, what the symbols meant and how components were connected.

Having gone through most of the early frustrations of someone new to the hobby I can now achieve reasonable success, but I find that the most useful forms of equipment dealt with in your columns are those (1) with a circuit diagram, (2) with comments by your contributor on alternative valves and components and (3) a chassis layout.

In conclusion, may I take the liberty of suggesting a new feature for PRACTICAL WIRELESS? Many beginners, such as myself, attempt to make up various pieces of equipment (invariably amplifiers) from valves and components that we have to hand. A recent attempt on my part provided me with ear-rending distortion—and only negative feed-back, stolen from an issue of PRACTICAL WIRELESS, helped to diminish the noise.

If you allowed readers to send these circuits to you for publication and you pulled them to pieces, explaining electrically why you suggest certain modifications, I am sure we would all benefit accordingly.—A. R. MARTIN (Sutton).

Let I.C.S. Train YOU!

● **COURSES ON :-**

RADIO and TELEVISION SERVICING · ELECTRONICS

● **EXAMINATION COURSES FOR :-**

P.M.G.'s CERTIFICATE (Marine Radio Operators)

C. & G. RADIO AMATEURS' EXAM.
(Amateurs' Transmitting Licence)

C. & G. RADIO SERVICING CERTIFICATE (RTEB)

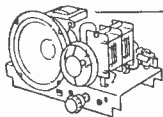
BRITISH INSTITUTE OF RADIO ENGRS., etc.

Whether you plan to have your own business, to become an electronics engineer or to take up a career in industry, an I.C.S. Course will help you to success. You learn at home in your own time, under expert tuition. Moderate fees include all books.

● **LEARN - AS - YOU - BUILD**
Practical Radio Course

A basic course in radio, electronic and electrical theory backed by thorough practical training. You build a T.R.F. and a 5-valve superhet radio receiver, signal generator and multi-tester.

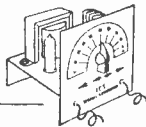
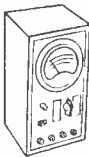
Other Learn-as-you-Build radio courses are available



5-VALVE SUPERHET RECEIVER

MULTI-TESTER

(sensitivity
1,000 ohms per volt)



RF/AF SIGNAL GENERATOR

● **POST THIS COUPON TODAY** for FREE book on careers in Radio, etc., and full details of I.C.S. Courses.

INTERNATIONAL CORRESPONDENCE SCHOOLS

Dept. 170H, International Buildings, Kingsway, London, W.C.2.

Name..... Age.....
(Block Letters please)

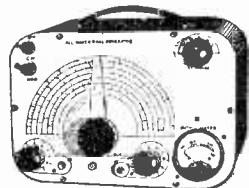
Address.....

Occupation..... 11.57

INTERNATIONAL CORRESPONDENCE SCHOOLS

SIGNAL GENERATOR

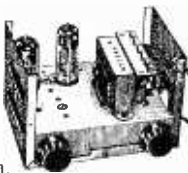
Coverage 120 kc.s. 84 Mc.s. Metal case 10in. x 6in. x 4in. Size of scale, 6in. x 3in. 2 valves and rectifier. A.C. mains 230-250 v. Internal modulation of 400 c.p.s. to a depth of 30 per cent.. R.F. output continuous variable 100 milli-volts. C.W. and mod. switch, variable A.F. output and moving coil output meter. Grey hammer finished case and white panel. Accuracy plus or minus 2%. £4/19/6 or 34/- deposit and 3m'thly payments 25 - P. & P. 4.6 extra.



COMMERCIAL TELEVISION CONVERTER SUITABLE ANY TV. (except Philips) ALL CHANNELS NO ALTERATIONS TO SET

Complete with built-in power supply 230-250 v. A.C. mains. Crackle finish case 5in. long, 3in. wide, 4in. high, incorporating gain control and band switch. Illus. with cover removed.

£3.19.6 Plus P. & P. 2/6. Hire purchase available. 3 element folded dipole I.T.A. LOFT AERIAL 15"- P. & P. 2/- Coax cable 8d. yd.



AC/DC MULTI-METER KIT



Comprising 2in. moving coil meter, scale calibrated in A.C./D.C. 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 grey hammer-finish case.

19/6 Plus P. & P. 1/6. Point to point wiring diagram 1/- free with kit.

4 VALVE ALL-DRY SUPERHET PORTABLE KIT

incorporating Ferrite rod aerial Medium and long waves. In grey leatherette. Size 9in. x 7in. x 6in. Valve line-up: 1T4, 1R5, 1S5, 3V4. Complete kit of parts (less batteries).

£5.19.6 Plus Post & Packing 3/6



COMPLETELY BUILT PORTABLE AMPLIFIER

approx. size 6in. x 2in. incorporating 2 valves, contact-cooled metal rectifier, bass and treble lift controls - **39/6** Plus P. & P. 3/6 and double wound mains transformer 230-250 v. **P.M. SPEAKER & O.P. TRANSFORMER**, if purchased with the above, 19/6. Plus P. & P. 1/6.

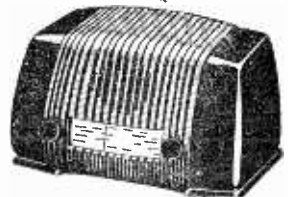
COLLARO 4-SPEED AUTOMATIC CHANGER

Model 456 (suitable for use with above amplifier). A.C. mains, 200-250 v., turnover crystal head. Brand new, fully guaranteed. **£8.19.6** Plus P. & P. 5/- or £3 deposit, plus P. & P. 5/- and 6 monthly payments of £1-4-0.

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 line-up: 2 VY65s and VT52. Size 15in. long by 9in. high by 7in. deep. **£3.19.6** Plus P. & P. 7/6.

Point to point wiring diagram 1/6. Free with kit.



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

23 HIGH STREET, ACTON, LONDON, W.3
GOODS NOT DISPATCHED OUTSIDE U.K.

RECEIVERS & COMPONENTS

FOR IMMEDIATE DISPOSAL!
Collaro R.C.54. 3 speed auto-mixer Radiogram units. 110 volts. A.C. mains. £5, new.

Electrostatic "Tweeter" Speakers. type STHB7, with circuit diagram, etc. 5/- each.

12in. P.M. Loudspeakers. 3/5 ohms (closed field). 20/- each.

Roll Films. Ensign 620, fine grain panchromatic (outdated), 1/- tin.

"Hornet" electric (battery operated) Cycle Hooters. 2/6, fully complete. 1,000 uscs.

MAZEL RADIO SERVICE STATION.

Dept. P.W., 122/138, London Rd.

M.C. 1. (Tel.: ARD 3505, ARD 3565.)

ONE COMPLETE ex-R.A.F. airfield G.E.C. speech Broadcasting Unit. total output 1,080 watts from 6 180-watt output units; complete with priority relay panel and emergency equipment; all in good condition, but less valves; price £200, ex-works, o.n.o. **WHITETRADE LIMITED.** Maidstone Rd., Rochester. (Chatham 4638.)

Elstone Transformers from M. FOY.

NEW and used Valves and Components at low prices; all guaranteed; s.a.e. list. Service Sheets, s.a.e. enquiries. **J. PALMER (PW).** 32, Neasden Lane, London. N.W.10.

ATTENTION! The famous Sonomag "Adaptatape" pre-amplifier is now fitted to the Collaro MK. IV Tape deck and now incorporates push-pull oscillator, complete with power pack, 38 gns. Easy terms and full specification on request. **SOUND TAPE VISION.** The Tape Recorder and Hi-Fi Specialists, 71, Praed Street, London, W.2. (PAD 2807.)

TAPESPONDING. Exchange tape recorded messages home/overseas. Details **EWART.** 87, Terrace, Torquay.

SERVICE MANUALS/SHEETS. Tel./Radio for hire, sale and wanted. S.A.E. enquiries. **W. J. GILBERT (F.W.).** 24, Frithville Gardens, London, W.12.

Replacement Components from M. FOY.

T.V. TUBES. 30/-, with cathode heater shorts; 15/- with burn; carr. extra. Ideal for testing; good picture; all types and sizes. Please enquire. **DUKE & CO.** 623, Romford Rd., Manor Park, E.12. (GRA 6677.)

"OSMOR NEWS."—Components lists for "P.W." Consul Car Radio and "R. Constructor" Beginner's S.W. 1-valver on request. **OSMOR.** 418, Brighton Road, S. Croydon. (CRO 5148.)

MIDDLESBROUGH. Largest stocks on N-East coast. Radio, TV components. **FM Kits.** Gram. Cabinets. Tape Decks, Leak Amplifiers, Valves, etc. Callers only. **PALMERS.** 106, Newport Road. (Phone: 3096.)

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.

SERVICE SHEETS FROM M. FOY.

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," Tever House, Southampton St., Strand, London, W.C.2.

LOUDSPEAKERS repaired promptly. **MODEL LOUDSPEAKER SERVICE.** Bullingdon Rd., Oxford.

FOR SALE

TELEVISIONS NEEDING ATTENTION. 9in.-10in. models £4/10/- each. 12in. models £6/6/- each. 15in. models £11/10/- each; immediate despatch; carriage paid. **BARKERS.** 325, Brockley Road, S.E.4. (TID 6752.)

100 APPROXIMATELY good second-hand 3/5 watt moving coil Loud Speakers with output transformers in individual wooden box baffles; price 11/- each, post and packing extra. **WHITETRADE LIMITED.** Maidstone Rd., Rochester. (Chatham 4638.)

FIELD STRENGTH METERS. T.S. 509/UR. U.S.A.; brand new, boxed; frequency 100/400 M/c, instructions, etc., £8. 302 Power Units, 230v., A.C. input, fully smoothed output; 700v., 120 M.A., 2 rectifier valves; brand new, but fuses on front may be damaged; 55/-, carriage paid; s.a.e. for list. **H. JAMES.** 175, Battenham Road, Walthamstow, E.17.

NEON INDICATOR LAMPS. AM10E6, striking voltage 70/90. 10/- per dozen. Exposure Meter Photo-cells. 49 x 22mm., 7/6 each. **G. R. PRODUCTIONS.** 22, Runnymede Avenue, Bristol, 4.

AERIALS direct from manufacturers. **F.M.** Indoor Dipole with mast and base. 12/6; **H.** ditto. 22/6; **Outdoor Dipole** with chimney lashings. 37/6; **H.** ditto. £3/5/-, **F.V.** 5 Element, band 3, channels 8-10, finest quality, with 3ft. cranked mast and universal clip. 45/-; with lashings. 57/6. Best value in England. Trade supplied. Coaxial Cable, best only. 9d. yd. Aerial list for s.a.e. Illustrated parts list with all technical data, etc. 1/-; all goods post free. Write for details. **SKYLINE WORKS.** Burnall Rd., Coventry. (Tel.: 60418.)

POWER IN PACKETS.—Large volts, small volts, long volts and short volts—in fact in all shapes and sizes. In spite of an unprecedented demand, we still hold good stocks of many sizes. Still at the right price. Stamp for list. Hts. suitable model control. radio, etc. Ex. 105 x 1.3v., 8 for 6/9; 120v. small, 6 for 8/6, 12 for 13/6; B101 (671v.), 4/6 ea., 3 for 12/-; 87 x 64 x 4 1/2v., 10/6; 162 x 12 x 3v., 10/6; 90 x 54 x 3 x 1 1/2v., 6/6, etc. All inc. p. & p. You cannot buy better! **DIGGINS.** 129/131, Radnar St., Manchester. 15.

GUARANTEED TELEVISION. 12in. 5-Channel models, first-class picture. £26 each, carriage paid. **THE GRAMOPHONE SHOP.** 19-21, Brockley Rise, London, S.E.23.

UNREPEATABLE OFFER.—12in., 5 Channel T.V., £15; 14in., £22, good working order. **C. EDWARDS.** 1070, Harrow Rd., London, N.W.10. (Phone: LADbroke 1734.)

HI-FI TEST TAPE. Check your recorder with the B.R. Test Tape Frequency response check. 50-10,000 cycles; transit and quality test 600ft. reel recorded at 7 1/2 or 3 1/2 in. per sec.; 20/-, post free. **BISPHAM RADIO LTD.** 153, Red Bank Rd., Blackpool.

AERIALITE CONVERTIBLES (McMichael). Band 3 converters. Channels 6 to 13, in-built beautiful walnut tables; original price £18/18/-, now £6/15/-; carriage paid; maker's guarantee. **TOMLINS.** 127, Brockley Rise, Forest Hill, S.E.23. (FOR 5497.)

TELEVISIONS. 9in. models £7/10/-, 12in. models £13/10/-, 12in. 5-channel models £19/10/- each; all working; carriage paid. Send for list. **TOMLINS.** 127, Brockley Rise, Forest Hill, S.E.23. (FOR 5497.)

TAN IN 24 HOURS.—Super-tonic Sunray Lamps. Ultra-violet infra-red combined; automatic exposure; controlled emission; all mains. Listed £7/10. Our price, 80/-, S.A.E. illustrated brochure. Dept. 100, **SCIENTIFIC PRODUCTS,** Cleveleys, Lancs.

PANL, recognised for many years as the unique one-coat black crackle finish; brush applied; no baking. Available by post in 1/4 pint cans at 3/6 from: **G. A. MILLER.** 255, Nether St., London, N.3.

New, Larger Catalogue from M. FOY.

SERVICE SHEETS

DO YOU EVER repair Radios and T.V.s? Then you require a Service Sheet. We have 1,000s and 1,000s of the actual ones used by the trade, for sale or hire; s.a.e. with enquiry. You also require our new, larger Catalogue, packed with exact replacement and servicing components, price 1/-, **M. FOY.** 6, Wykebeck Gardens, Leeds, 9.

The "NEW WAVEMASTER"

Transistor M/L Wave Superhet Portable No Aerial or Earth required. Matched "PERMACO" set of Superhet Transistor Cols.

Three I.F. Stages, double-wound potted I.F. S. 470 kc/s. Push-pull output, Hi-Flux Elliptical Speaker.

Easily assembled on pre-fabricated Chassis. Designed around the Ediswan range of TOP HAT Transistors.

A Portable that is new with a startling performance.

All components available separately. Circuit and Assembly Data with Component List, 1/6.

THE NEW TRANSISTORISED**PUSH-PULL AMPLIFIER**

300 milliwatts, for use with Pick-up.

Mic., Baby Alarm, etc., powered from 6-volt dry battery.

Complete Kit of Parts, including pre-fabricated panel for ease of assembly. 4 Transistors, with new Miniaturised Components, Circuit and Assembly Data (less speaker and battery).

75s. 0d.

Comprehensive range of components available. List, Stamp, please.

Trade and Mail Order.

OSMABET, LTD.

14, Hill-side Rd., Tottenham, London, N.15.

Wholesale and Export:

Olympic Radio Components, Ltd.,

224, Hornsey Rd., London, N.7.

WANTED

ALL TYPES of Valves required for cash. State quantity and condition. **RADIO FACILITIES LTD.**, 38, Chalcut Road, N.W.1. (PR1mrose 9090.)

WANTED—Valves EY51, 6CH6, 10F1, PL81, KT61, 6P1, PW4/500, 20D2, 20P2, 10P14. Prompt cash. **WM. CARVIS LTD.**, 103, North St., Leeds, 7.

GLASGOW. Cameras bought for cash or taken part exchange for Tape Recorders, Players, or Amplifiers. **VICTOR MORRIS**, 406, Argyle St., Glasgow, C.2.

WANTED.—Transmitters BC191, Receivers BC312, Transmitter/Receivers types. 1934, 1935 and 1936. Receivers type 100. Teletype equipment, Tele. Sets. "F" high-power. **R. GILFILLAN & CO. LTD.**, 7, High Street, Worthing. (Tel: Worthing 30181.)

EDUCATIONAL

CITY AND GUILDS (Electrical, etc.) on "no pass—no fee" terms. Over 95% successes. For full details of modern courses in all branches of Electrical Technology send for our 144-page handbook—free and post free. **B.I.E.T.** (Dept. 242A), 29, Wright's Lane, London, W.8.

FREE! Brochure giving details of Home Study Training in Radio, Television, and all branches of Electronics. Courses for the Hobby Enthusiast, or for those aiming at the A.M.Brit.I.R.E., City and Guilds R.T.E.E., and other Professional examinations. Train with the college operated by Britain's largest Electronics organisation. Moderate fees. Write to **E.M.I. INSTITUTES**, Dept. PW28, London, W.4.

A.M.I. Mech.E., A.M.Brit.I.R.E., City and Guilds, etc. on "no pass—no fee" terms; over 95% successes. For details of exams, and courses in all branches of engineering, building, etc., write for 144-page handbook, free. **B.I.E.T.** (Dept. 242B), 29, Wright's Lane, London, W.8.

GUARANTEED CAPACITORS

Hi-K Disc. : 500 v. d.c. wkg., 470 pF, .001 μ F, .002 μ F, .003 μ F, .005 μ F, 9d. each. Tubular : 500 v. d.c. wkg., 1.5, 2, 3 pF, 1/- each; 5, 7.5, 10, 15, 20, 25, 30, 40, 47, 50, 60, 75, 100 pF, 10/- each; 150, 200, 250, 300, 350, 400, 500 pF, 1/2 each. Hi-K midget tubular, 500 v. d.c. wkg. : 500 pF, .001 μ F, .002 μ F, .003 μ F 10/- each; .005 μ F, .01 μ F, 1/- each.

Close Tolerance Silver Mica. Plus or minus 1 pF : 1.5, 2, 2.2, 3.9, 4.7, 5, 5.6, 8.2, 10, 15, 20, 25, 30, 40 pF, 11d. each. 1% : 47, 50, 56, 60, 68, 75, 80, 100 pF, 1/- each.

Minimum postage 6d. on orders under £3. Please note we do not supply overseas except to H.M. Forces.

SOUTHERN RADIO & ELECTRICAL SUPPLIES
SORAD WORKS
REDLYNCH, SALISBURY

THERE IS a national shortage of Mercantile Radio Officers. Why not make Communications your career? You can be assured of a sea-going appointment after qualifying at The School of Marine Radio and Radar (A.S.T.), Hamble, Southampton. For details, apply Commandant, quoting A.12.

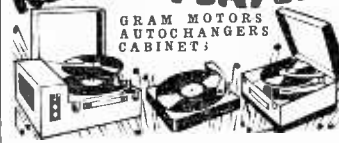
BEGINNERS MORSE RECORDS (LP. 33's). Complete course with booklet, designed to pass G.P.O. test at 12 w.p.m. easily. Only 45/-. Send P.O. now, course by return. 45 Green Lane, Purley, Surrey. (UPL 2896.)

T/V and RADIO.—A.M.Brit.I.R.E., City and Guilds, R.T.E.B. Cert., etc., on "no pass—no fee" terms. Over 95% successes. Details of exams, and home training courses in all branches of radio and T.V. write for 144-page handbook free. **B.I.E.T.** (Dept. 242G), 29, Wright's Lane, London, W.8.

WIRELESS.—Day and Evening Class instruction for P.M.G. Certificate of Proficiency and Amateur Wireless Licence. Morse instruction only if required, also postal courses. Apply **BST. LTD.**, 179, Clapham Rd., London, S.W.9.

LEARN IT as you do it—we provide practical equipment combined with instruction in Radio, Television, Electricity, Mechanics, Chemistry, Photography, etc. Write for full details to **E.M.I. INSTITUTES**, Dept. PW47, London, W.4.

INCORPORATED Practical Radio Engineers home study courses of Radio and TV Engineering are recognised by the trade as outstanding and authoritative. Moderate fees to a limited number of students only. Syllabus of Instructional Text is free. "The Practical Radio Engineer" journal, sample copy 2/-. 6,000 Alignment Peaks for Superhets. 5/9. Membership and Entry Conditions booklet. 1/-. All post free from the **SECRETARY, I.P.R.E.**, 20, Fairfield Road, London, N.8.

RECORD PLAYERS

GRAM MOTORS
AUTOCHANGERS
CABINET

COLLARO AC.3/554. Three-speed, single player of A.C. mains 200/250 v., cream finish, complete with turnover crystal pick-up. "T" type head. Strictly limited quantity at £6/19/6, plus 5/6 carr.

CRYSTAL PICK-UPS fitted Acos-HG47 cartridge. Ultra lightweight. Our price 37/6, plus 2/4 carr.

3-SPEED RECORD PLAYERS, fitted with Acos turnover HG59 pick-ups with twin sapphire styl, resin case with lid, fitted clasp and handle. Worth 10 gu. Our price £7/15/6, plus 2/6 carr.

3-SPEED GRAM MOTORS, by well-known maker. Our price 59/6, plus 2/6 carr.

RESINE COVERED CABINETS, single player size, suitable most low-cost units, including transcription motors. (Motor board inc.) Our price 46/8.

PORTABLE RECORD PLAYER CABINETS to house Monarch, Collaro or Garrard 120 Changers, with space for Amplifier and speaker. Resine finish in attractive colours, fitted catches and handles. Our price £3/5/0.

Send stamp for complete bargain lists.

RONALD WILSON & CO.
(DEPT. P.W.), 12 BRIDGE STREET, WORCESTER.

SITUATIONS VACANT

MINISTRY OF TRANSPORT AND CIVIL AVIATION: Trainee Communications Officers. Applications invited from men and women age at least 18. Candidates must have an elementary knowledge of radio communication principles, be able to send and receive morse signals at 20 words a minute; type or teleprint at 30 groups a minute; transmit and receive telephone messages. Weekly rates of pay whilst under training from £6/1/9 at age 18 to £8/17/6 (men) and £8/13/- (women), at age 25 or over, plus free meals and accommodation. On successful completion of training course, annual salary will be £347 at age 18; £568 at age 25 or over, rising to £706 for men; £349 at age 18; £536 at age 25 or over, rising to £637 for women. Slightly lower rates, at certain stations. Women's pay being improved under equal pay scheme. Application form and further particulars from Ministry of Transport and Civil Aviation (ESB/Comm), Berkeley Square House, London, W.1.

THERE IS a national shortage of Mercantile Radio Officers. Why not make Communications your career? You can be assured of a sea-going appointment after qualifying at The School of Marine Radio and Radar (A.S.T.), Hamble, Southampton. For details, apply Commandant, quoting A.12.

ELECTRICAL

ASBESTOS RESISTANCE WIRE, 10, 30, 40, 65, 220 ohm. Per yard, 1/3, p.p. **SEMPLE**, The Mount, Heaswall, Cheshire.

ENTHUSIAST'S CHOICE**EMPRESS**

De Luxe 9 Valve A.M./F.M. Chassis

De-Luxe high fidelity chassis covers F.M. band, Short, Medium and Long Wave. Miniature cathode ray indicator gives accurate tuning. Internal ferrite rod aerial gives perfect station selectivity; extension speaker and pick-up sockets, 200/250 volts a.c. £27.6.0 including two loudspeakers

R.T.C. 12" SPEAKER

Loudspeaker designed to give cone air loading to reduce harmonic and intermodulation distortion—one of the most compact full range systems within its power capacity. Price £5/5.0.

THE NEW 4 SPEED B.S.R.

Now in your home enjoy recording studio fidelity and play 78, 45, 33. Also the sensational new 16 R.P.M. long playing records. Only £8.15.0.

We supply all units and will make any cabinet to your own specifications. Send for comprehensive illustrated catalogue of cabinets, chassis, autochangers, speakers, etc., all available on easy I.P. terms.

LEWIS RADIO COMPANY
(DEPT. PW8) 120, GREEN LANES, LONDON, N.13 BOWes Park 1155/6

The "TYANA"
Standard Soldering Iron



- Adjustable Bit.
- Weight approx. 4 oz.
- Heating Time 3 m.in.
- 40 Watt economy Consumption.
- Standard Voltage Ranges. 16/9

Replacement Elements and Bits always available.

"DIPLOMA" HEADPHONES



Light weight
High Resistance
(4,000 ohms). Complete with cord. 17/6

Ideal for CRYSTAL SETS and also for use with TAPE RECORDERS.

KENROY LIMITED
152/297 UPPER ST., ISLINGTON, LONDON, N.1.
Telephone: Canonbury 4905-4663

VALVES—Guaranteed

DAF91 8/6	VR65A 2/6	6BH8 5/-	6V6 6/-
EA50 2/-	VT20 2/6	6BW6 6/6	6X4 6/6
EBC33 7/6	VU111 2/6	6C5 6/-	6X5 7/6
ECC33 8/6	W77 5/-	6D2 7/-	7D8 4/6
EF38 5/6	OZ4 5/-	6F1 11/-	8D2 4/6
EF39 5/6	1S5 6/6	6F12 8/-	8D3 8/-
EF50 5/-	1U5 6/6	6J5 6/-	8D2 8/-
EF91 8/-	3D6 4/6	6K7G 4/6	9D6 5/-
EL32 5/-	4D1 4/-	6K7M 5/6	12BA6 7/6
PCC84	6A8 7/6	6SA7 8/-	12BE6 7/6
	6AR6 7/6	6SN7GT 12BH7 7/6	
PCF82	6AL5 7/-	8/6	12K7 8/6
	10/-	6AM6 8/-	6U5 7/6
	10/-	6AQ5 2/6	6U5(UX) 15D2 6/-
		TT11 3/6	8B8 8/6
		VR65A 3/6	6BE6 8/6

Postage 6d. extra. (Also all component.)
TV Tubes, Perfect Condition (callers out).
CRM92, CRM92A, MV22/16, MW22/18, £4.0.0 each.

TELEKIT SUPPLY
104 High Street, Beckenham, Kent.
Phone: BEC 3720

MAKE YOUR OWN PRINTED CIRCUITS

It is now practical for the Home Constructor to make his own PRINTED CIRCUITS without elaborate or expensive equipment. The VISIBELL kit contains all the necessary materials and instructions to enable you to produce, in the home workshop, PRINTED CIRCUITS of your own design.

The VISIBELL standard kit makes 3 panels: 9 x 4 1/2, 6 x 3 and 4 x 2 ins. (approx.). PRICE 18/9, post paid. C.W.O. C.O.D. add 2/6.

Please give name and address in BLOCK letters. A free descriptive leaflet is available on request. S.A.E. please.

VISIBELL LIMITED
Printed Circuits Division,
5, ALDERMOOR LANE,
COVENTRY
(Mail Office Only)

ALFRED PADGETT
40, MEADOW LANE, LEEDS II
Tel.: CLECKHEATON 99

SPECIAL OFFER.—Brand New in cases the following five sets. Frequency Meter BC-906—D. Range Callibrator BC-949-A. Indicator BC-936-A. Radio Receiver BC-1066-B. Signal Generator 1-996-B. All the lot for £4/5 0. Carr. 15/-.

TUBE UNIT.—BC 920A complete with good 3HP1 3in. Tube, less valves and motor. £1 5/-, carr. 7/6.

1154 MODEL N.—Complete with Valves and Meters. Clean condition, 17.6 Carr. 12/6.

RDP1 SETS.—Less valves and power pack, 5/6. Post 3/-.

SPECIAL OFFER.—Red Spot Transistors, 7.6 each. Crystal Diodes, 10d. each. Post 21d. each.

MIXED U.S.A. NUTS AND BOLTS.—Hal a pound box 1.8. Post 1/6.

SELENIUM METAL RECTIFIERS.—250 volts, 100 mills., 5/-, 120 volts, 60 mills., 2/-, J50, 1/6. All 12 months guarantee Post 1/6 each.

COAXIAL PLUGS AND SOCKETS.—6d. complete. Post 7d. 4/6 per doz., post free.

BOTTLES OF SWITCH CLEANER.—9d. Post 1/-.

RADIO VALVES.—With 90 days' guarantee. Post 9d. per valve; doz. lots less 5% post free. 12S/7M, 4/-; 12SG7M, 4/-; 12SH7M, 3/-; 12H6M, 1/3; 12CM8, 4/-; 12A6M, 4/6; 9004, 6d.; 8D2, 1/-; 807 (BHT), 4/-; VR150/30, 4/-; FEN46, 2/6; 894, 1/3; EF50, 3/-; VR136, 4/-; VR87, 1/3; EF36, 4/-; 6K7, 2/-; 6SH7, 2/6; 6C8, 3/6; 6H6G, 9d.; VR54, 9d.; 6D6, 3/-; 6C6, 3/-; 6J5M, 4/6; 6C4, 4/-; 6AG5, 4/-; 6B8, 2/-; VR92, 9d.; VR65, 1/6; VR93, 1/-; KT2, 3/6; QP22, 3/6; 210L, 1/6; DLS10, 2/6; 5U3C, 6/6; CV63, 1/-; 2X2, 1/6; VU111, 1/6; VU133, 1/6; AC6 PIN, 2/6; 7193, 1/6; VS110, 1/6; 6J6, 3/6; 6SH7, 6/-.

THROAT MIKE.—New and boxed, 1/6. Post 8d.

SWITCH BOX AND KNOB.—6-way 2-Dole, 1/-, Post 8d.

VALVE HOLDERS. (Moulded).—Mazda and 1.0. Removed from new ep. 6 for 1/3. Post 6d.

COPPER WIRE

ENAMELLED, TINNED, LITZ, COTTON AND SILK COVERED. RESISTANCE WIRES, 1 oz., 2 oz. & 4 oz. REELS All gauges available.

B.A. SCREWS, NUTS, WASHERS, SOLDERING TAGS, EYELETS AND RIVETS. EBONITE AND BAKELITE PANELS. TUFNOL FORD, PAXOLIN TYPE COIL FORMERS AND TUBES. ALL DIAMETERS.

Latest Radio Publications. SEND STAMP FOR LISTS

SPECIAL OFFER
G.E.C., B.T.H. & WESTINGHOUSE
GERMANIUM CRYSTAL DIODES
1/- each. Postage 21d.

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

NEW! NEW! NEW!

THE "WAVEMASTER"
TRANSISTORISED SUPERHET
PORTABLE

ULTRA-MODERN DESIGN
INCORPORATING Highly Efficient Frequency Changer

Double Tuned I.F.T.s 470 Kc/s. MATCHED "PERMACO" COILS FOR HIGHEST STAGE GAIN.
Transistor Detection and A.V.C. Built-in Ferrite Aerial M.L. Wave. Tin x 4in. Hi-Flux Elliptical Speaker. Negative Feedback.
Push-Pull Output 250 Milliwatts. Negligible Running Costs.

OPERATES ANYWHERE ANYTIME
A Receiver for the Home Constructor in Advance of Present-day Design.
All Items including Cabinet available. All Components sold separately. Comprehensive Assembly Data and Components List, 1/6.

OLYMPIC RADIO COMPONENTS LTD.
224 Hornsey Rd., Holloway, London, N.7.

H.A.C. SHORT-WAVE EQUIPMENT

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

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

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

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

A really small RADIO RECEIVER

This radio receiver, although small enough to fit inside a matchbox, gives loud, clear reception of the BBC Home, Light and Third Programmes on the medium waveband, about 180-550 metres. No catwhiskers, valves or batteries are required, and the receiver works off a short indoor aerial in most districts. Many unsolicited testimonials.

PRICE **9/-** POSTAGE AND PACKING 6d. EXTRA

This offer applies only to Gt. Britain and Northern Ireland.

RADIO COMPONENT SERVICE,
No. 1, SUMMER'S ROAD,
BRISTOL, 2.

G2AK This Month's Bargains

CRYSTAL HAND MIKES in silver hammer case with polished grille and handle, complete with 4ft. screened lead, 22/6 post free.

100 kc/s CRYSTALS, by famous American makers in 3-pin based holder. New condition. Worth £3/10/0. ONLY 25/- post free.

HI-FI EQUIPMENT. Amplifiers, speakers, pick-ups by Gramplan, Leak, Quad, Rogers, R.C.A., Spectone. W.B. Wharfedale, etc., available for immediate delivery.

HEADPHONES. H.R. Type 4,000 ohms, very sensitive. Only 12/6 pr. Post 1/6. C.L.R. type (low res.) 8/6 Post 1/6.

AMERICAN BREAST MIKES. Swivel head, push to talk and lock-on switch. Excellent job. Only 12/6. Post 1/6.

SEMI-MIDGET COMBINED I.F. TRANSFORMERS, 10.7 Mc/s and 465 kc/s (can be used on 10.7 Mc/s or 465 kc/s only). 9/11 per pair, postage 9d.

AERIAL WIRE. Copper, 7-25 stranded: 140ft., 10/-, 70ft., 5/-; Hard Drawn 14g.: 140ft., 17/-; 70ft., 8/6. P. & P. 2/-.

RIBBED GLASS 3in. AERIAL INSULATORS, 1/6 ea., or 6 for 7/6, 12 or more post free. Small shell porcelain, 4½d. each or 4/- doz.

CONDENSERS. 8 µF 600 v. Trop. 750 v. normal condensers. NEW, ex W.D. stocks, 5/6. P. & P. 1/6.

ABSORPTION WAVEMETERS, 3 to 35 Mc/s in 3 switched bands. Complete with indicator bulb. 17/6 post free

No C.O.D. on orders under £1.

Please Print Your Name and Address.

CHAS. H. YOUNG LTD.

Dept. 'P', 110 Dale End, Birmingham 4. (CEN. 1635)

Important Announcement GENERAL RADIO Company

has pleasure in announcing the

OPENING

of their

LONDON SHOWROOM AND WAREHOUSE COUNTER

at 9-10 Noel Street, W.1.

Tel.: GERrard 0266

as from the 5th October, 1957

Our tremendous stocks of American Radio, Radar, electrical and aviation equipment are offered for disposal to **Callers, Home & Overseas Buyers** during the forthcoming months. A vast variety of new components of interest to home constructors, laboratories, manufacturers, etc., will be offered at bargain prices.

Open from 11 a.m. to 3 p.m. and all day Saturday.

SCOTCH BOY TAPE AT THE NEW LOW PRICES

11A Standard
650ft. on 5in. spool, 16/-; 850ft. on 5½in. spool, 22/-.
1,200ft. on 7in. spool, 27/-.
150 Extra Play
900ft. on 5in. spool, 28/-; 1,275ft. on 5½in. spool, 35/-.
1,800ft. on 7in. spool, 50/-.
Empty Spools.
5in., 3/6; 5½in., 3/9; 7in., 4/3.
Polyester Leader Tape,
4in. x 150ft. Green or White, 3/6.
No. 41 Splicing Tape,
7/32in. x 60ft., 3/-.
Bib Tape Splice, 18/6
Remploy Soldering Iron, 230/250 v., 22/6.
Aerialite T.C.D. (Converter), Ch. 2, 9 & 10, £10.10/-.
Low loss co-ax cable, 9d. per yard.
Co-ax Plugs, 1/1 ea. Co-ax Sockets, 1/- ea.
Outlet boxes, 4/6 ea. Dipolexers, 14/- ea.
Send 6d. in stamps for our catalogue of valves, resistors, components, books by Bernards and Norman Price, Actials, Speakers, etc. etc.

RADIO HAM SHACK LTD.

1155 SWAN ARCADE, BRADFORD, 1, YORKSHIRE.

TECHNICAL TRADING CO.

All advertised last month available except L.F. Transistors, 14-F. Transistors (Latest White Spot), Guaranteed, 11-Cosor Ganking Oscillators, £9.10, 3in. Speakers, 9/6, 12 v. 4 Amp. Bridge Rectifiers, 9/6; £5 doz. Germanium Crystal Diodes, 10d., p. & p. 3d.; 8/6 doz.

13 CHANNEL CONVERTERS

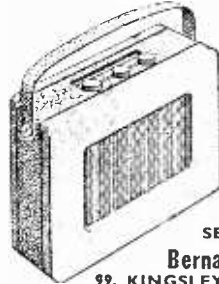
For T.R.F. or Superhet Receivers. Famous Make. 3 position Switch, Fine Tuner, and 9 Quick Set Trimmers. Give any 3 required Channels. T.R.F. Band I, Superhet Band III. Output direct to Aerial Socket. Beautiful Bakelite Case, with PCC 24, PCF 30, £3.15.0.

SU4G 6/8 6J5G 2/6 6V6GT 6/- ECL80 8/6 EF80 8/-
6C4 3/9 6SN7GT 5/9 25L6GT 8/6 EF50 2/6 EF91 7/-

FOR FULL VALVE LIST AND CLEARANCE BARGAIN DETAILS
SEND SAE FOR SPECIAL LIST.

Postage 1/- in £1 (1/9 in £1 Speakers/Trans.) Min. 6d. No C.O.D. 10,000 OTHER BARGAINS TO CALLERS AT:-
350/352 FRATTON ROAD, PORTSMOUTH

BERNARDS OFFER:-4 VALVE SUPERHET BATTERY PORTABLE RECEIVER



CAN BE OBTAINED COMPLETE WITH BATTERIES

£8. 19. 6

IN KIT FORM LESS BATTERIES

£7. 7. 0

Including Postage

BATTERIES CAN BE SUPPLIED SEPARATELY AT 11/6

● LONG AND MEDIUM WAVE

● LARGE ELLIPTICAL SPEAKER

● LATEST TYPE LOW-CONSUMPTION MINIATURE VALVES

SEND TO:-

Bernards Electrical Industries Ltd.

99, KINGSLEY RD., HOUNSLOW, MIDD.

COVENTRY RADIO

Component Specialists since 1925

We have now trebled the size of our premises in order to supply a larger range of Components, Amplifiers and Hi-Fi Equipment.

Send your enquiries to:-

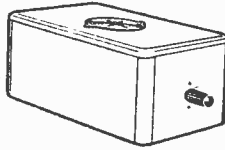
189-191 Dunstable Road, Luton, Beds.

New Telephone No.: LUTON 7388-9

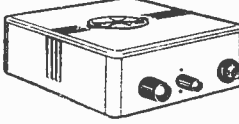
TRANSISTORWISE

"RECO" ONE TRANSISTOR KIT

A low cost beginner's radio. Kit includes all parts, transistor, diode, and super sensitive Bell-Phone for private listening. Neat plastic case and 1.5 v. battery for months of dependable listening. Only 29/6.

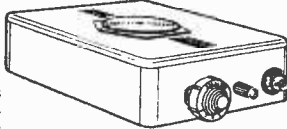


"RECO" TRANSISTOR 2 PORTABLE; receives home and continental stations. Ferrite rod aerial. Attractive plastic case, balanced armature output unit and all parts. 55/- inc. battery.



"RECO" PORTABLE TRANSISTOR 3

Similar specification to the "Reco" 2, but uses high gain frame aerial mounted on metal chassis. Has variable gain control. 65/- buys all parts, case, and battery.



All parts sold separately. Wiring circuit parts price list, 9d. each. S.A.E.

RADIO EXCHANGE CO.

(Dept. W)

NEWPORT PLACE, LONDON, W.C.2.

Best Buy at Britain's

HRO COMMUNICATIONS RECEIVERS. 50 Kc/s to 30 Mc/s. S meter, etc., 18 Gns. Send S.A.E. for full details.
R109A RECEIVERS. 8 valve superhet using 5 x ARPI2's and 3 x AR8's covering 2-12 Mc/s. Contains vibrator pack and 3" speaker and operates from 6 volt battery, consumption 11 amps. Housed in metal case 13in. x 12in. x 1 1/2in. Complete with valves and circuit. Aerial tested and in very good condition. £47.6/- Carr. paid.
SPECIAL BARGAIN—R.F.24 UNITS.—20-30 Mc/s. Brand new. Boxed. 7/6, plus 2/6 postage.
TUNING DRIVES. Modernise your R1155 with this latest drive as fitted to the model "N." Complete. Easily fitted. 12/6.
VIBRATOR PACKS. Input 6 v. D.C. Output approx. 100 v. at 30 mAmps. D.C. fully smoothed and R.F. filtered. Size 6 1/2in. x 5in. x 2in. Fitted with Mallory 629C Vibrator. BRAND NEW. 12/6.

RCA OUTPUT TRANSFORMERS. Pri. push-pull 6L6's. Sec. 600 ohms, tapped at 15, 7.5 and 5 ohms. Tertiary winding for negative feedback. Handles 20 watts. Potted. Circuit of RCA amplifier supplied FREE. Brand new. 27/6.

MAINS TRANSFORMERS. Input 200 to 250 v. 50 c/s. Outputs 275-0-275 v. 100 mA. ; 6.3 v. 7 a. ; 1.5 v. 3 a. (Govt. ratings). 4 x 4 1/2 x 4 in. high. Upright Mtr. Brand new, 32/6, postage 2/6.
MAINS DIMMERS. 300 ohms, 300 watts, 1 amp. BERCO. Brand new. 15/-, post. 1/6.

JACK BOXES. 9 miniature insulated. Irganic jack sockets, fitted in metal box 3 x 3 1/2 x 6 in. Brand new. SNIP. 12/6, postage 1/6.
TWO-WAY Morse TRAINING SETS. W/T Mk. 3. Consists of two valve oscillators (ARPI2's) (one with pitch control), for one or two operators. Has provision for creating "Atmospherics." In polished oak case, 12 1/2in. x 10in. x 8in., wt. 16 lbs. Complete with valves, leads, 2 keys, 7-wire terminal board, circuit and instructions but less batteries and phones. Ideal for Cadets, Scouts, etc. SNIP. 19/6, plus 7/6 carriage. Headphones for above, 10/6 pair.
RESISTORS. Latest miniature insulated Dubilier 1 watt type BTS. Wire ends. Useful values. GNL 10' for 100 assorted! 1 and 1 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.
METAL RECTIFIERS. 230 v. 60 mamps. 3/6; 230 v. 100 mamps. 5/-.
AVOLMINOR LEAD-ACID BATTERIES. New, with strap, 7/6.
CAR AMMETERS. 30-0-30 amps. 5/-.
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

A SIX RANGE RES/CAP BRIDGE AT 35/- ONLY

Checks all types resistors and condensers. Complete instructions and diagrams for easy assembly. Ready calibrated for immediate use. Stamp for details.

RADIO MAIL, Dept. Q
 RALEIGH MEWS
 RALEIGH STREET, NOTTINGHAM

TELEVISION

The advance of Radio Technique will offer unlimited opportunities of high pay and secure posts for those Radio Engineers who have had the foresight to become technically qualified. How you can do this quickly and easily in your spare time is fully explained in our unique handbook.

Full details are given of A.M.Brit.I.R.E., City & Guilds Exams., and particulars of up-to-date courses in Wireless Engineering, Radio Servicing, Short Waves, Television, Mathematics, etc., etc. We guarantee "NO PASS—NO FEE." Prepare for to-morrow's opportunities and future competition by sending for this very informative 144-page guide NOW—FREE and without obligation.

BRITISH INSTITUTE OF ENGINEERING TECHNOLOGY (Dept. 242), COLLEGE HOUSE, 29-31, Wright's Lane, Kensington, W.8

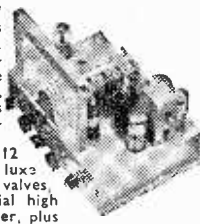
1-Finger Pianists

Build your own electronic keyboard and play everything! Send for free leaflet. Guitar, cello, flute and trumpet are all easy. Write now...

C & S, 10 Duke St., Darlington, Co. Durham

Fidelia HAND BUILT

All Fidelia AM/FM models have VHF-M&L bands plus 20-20,000 cycle audio response, separate bass and treble controls, etc. Major AM/FM 12 valves, £44. De Luxe AM/FM 11 valves £33/12. Imperial high fidelity amplifier, plus VHF reception, £37/10. Data sheets free.



ELECTRO ACOUSTIC DEVELOPMENTS
 2, Amhurst Road, Telscombe Cliffs, Sussex.

Principles of Telecommunication Engineering, Vol. 1. By Harbottle and Hanman. 17.6. Postage 1/3.

The A.R.I.L. Handbook, 1957. 32.6. Postage 1/6.

Transistor Circuits for the Constructor, No. 1. By Bradley. 3.6, postage 6d.

Basic Maths. for Radio and Electronics. By Colebrook. 17.6, postage 1/-.

Amplifiers, Design and Construction. By Camm. 17.6, postage 1/-.

Television Explained. By Spreadbury. 12.6, postage 1/-.

A Beginner's Guide to Radio. By Camm. 7.6, postage 8d.

UNIVERSAL BOOK CO.

12 Little Newport Street, London, W.C.2 (adjoining Lisie Street)

FM and Hi-Fi Components

- DENCO F.M. TUNER circuits 1s. 6d.
- RADIO CONST'N. F.M. " 2s. 0d.
- MULLARD AMPLIFIERS " 3s. 6d.
- G.E.C. 912 PLUS AMPLIFIER " 4s. 0d.
- G.E.C. F.M PLUS TUNER " 2s. 6d.

Separate price lists available on request to

J. T. FILMER 82, DARTFORD RD., DARTFORD, KENT.

Tel. Dartford 4057.

THIS TINY PATENT AURIPHONE



Speaks loud and clear into your Ear. from any Crystal—or pocket Transistor or Valve Set. It holds firmly in any Ear without attachment of any kind. No plastic earmould. No earpiece. A high-precision miniature Earphone, 1 inch diameter x 1 inch long. Flesh-coloured, fitted with 4ft. thin connecting cord. AURIPHONES of 20, 50, 100 or 1,000 Ohms resistance, are in stock. Price, each, 32s., 6d., registered post free.

CPFA INSTRUMENTS
 36, Montpelier Crescent, Brighton, Sussex

ASTRAL RADIO PRODUCTS

"HOME RADIO," 32-page illustrated booklet. Simple wiring, instructions for Crystal Set, 1, 2, 3 Valves, 2/-, post 3d.
TRF COILS. Specified for 'Bedside Push-button 4', 'All Dry 3 Band, 3' Push-button 4', etc., 6.6 pr., post 6d. Push-button Unit with modification data 7/-.
DI'AL WAVE 10' Coil. Specified for 'Summer All Dry Portable', 'Modern 1 Valve', 'Modern 2 Valve', 'A.C. Double Triode 1', etc., 4.3, post 3d.
IF's Miniature, 1 x 1 1/2 x 2 1/2 in cans. Extra high 'Q', Special offer, 6.6 pr., post 6d.
COILS. 'AC, B' pass 3, 3/3 each, post 6d.
FRAME AERIALS. M.W., 5/-, post 4d.
COIL PACKS. 1 1/2 M/S, 36/-, post 1/-.
Crystal Set Coils. L. & M.W., 2/6, post 3d.
82 Centurion Road, Brighton

EXPRESS ELECTRONICS

11, MEADWAY, WARLINGHAM, SURREY.

VALVES NEW, TESTED AND GUARANTEED

IAC6	8/6	6BE6	8/-	I2AX7	8/6	ECC81	8/6	N19	7/6
IC1	7/6	6BR7	10/6	I2K7GT	8/-	ECC82	6/9	PCB4	9/-
IC2	8/6	6BW6	7/6	I2K8GT	10/6	ECC83	8/6	PCF80	10/6
IC3	9/-	6BW7	8/-	I2Q7GT	8/-	ECC84	10/6	PCF82	10/6
IF1	8/6	6CH6	7/-	135LGT	8/6	ECC80	10/6	PL81	11/6
IF3	7/6	6C10	9/-	35W4	8/6	ECH82	10/6	PY81	8/-
IFD1	8/6	6D1	1/6	35Z4GT	8/6	EC42	10/-	PZ30	17/6
IFD9	7/6	6D2	6/9	5763	10/6	ECL80	8/6	U52	8/6
IP1	9/-	6F12	6/-	D77	6/9	EF37A	8/6	U76	8/6
IP10	7/6	6J5G	5/6	DAF91	7/6	EF39	5/-	U78	7/-
IP11	7/6	6K7G	5/6	DF91	7/6	EF41	9/-	UBC41	8/6
IR5	7/6	6K8GT	9/6	DF96	8/6	EF80	8/6	UCH42	8/6
IT4	7/6	6L6G	10/6	DH76	8/-	EF91	6/-	UF41	8/6
IS5	7/6	6Q7GT	9/-	DH77	7/6	EF92	5/6	UL41	8/6
IU5	7/6	6S17GT	7/6	DH142	8/6	EL37	19/6	UL741	7/6
3Q3	7/6	6SN7GT	8/6	DH150	10/-	EL38	20/-	W76	8/6
354	7/6	6V6G	7/6	DK91	7/6	EL41	10/-	W77	5/6
3V4	7/6	6V6GT	7/6	DK92	8/6	EY51	9/6	W142	8/6
5U4G	8/6	6X4	7/-	EA50	9/-	EZ35	6/6	X17	7/6
5Y4G	7/6	6X5GT	6/6	EAB80	8/6	EZ80	8/-	X18	8/6
5Z4G	9/6	8D3	6/-	E8B1	6/9	KT33C	9/-	X142	8/6
6A15	6/9	I2AH8	10/6	EBC41	10/-	KT66	11/-	X150	10/-
6AM6	6/-	I2AT6	8/6	EBF80	9/6	N17	7/6	Z77	6/-
6AT6	7/6	I2AT7	8/6	ECC35	7/6	N18	7/6	ZD17	7/6
6BA6	7/6	I2AU7	6/9						

MATCHED PAIRS

KT66 27/6, 6V6G and GT 17/-, 6BV6 18/- per pair.

SETS OF VALVES

DK91, DF91, DAF91, DL92 or DL94, 27/6.
 1R5, IT4, IS5, 354 or 3V4, 27/6.
 6K8, 6K7, 6Q7, 6V6, 5Z4G, 35/-.
 12K8, 12K7, 12Q7, 35L6, 35Z4, 35/-.

Postage and packing, 6d. Over £1 post free. C.O.D. 2/6.

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 6d. average joints.

HOME CONSTRUCTORS 2/6 PACK

In addition to the well-known Home Constructors Pack (containing 19fl. of 18 s.w.g. 60/40 alloy) a similar pack is now available containing 40fl. of 22 s.w.g. 60/40 alloy especially suitable for printed circuits.



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.



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 3636)

RECORD PLAYER



Playtime Twin
with 2 speakers

CASH PRICE

17 gns. including tax

Yours for only 15/- deposit

8 monthly payments of 42/9

NO INTEREST CHARGES

Superb quality reproduction made possible by a specially designed amplifier with two MATCHED loudspeakers.

We can supply all makes of record players and tape recorders. Ask for your requirements.

MAIL ORDER SUPPLY CO.
 33, Tottenham Court Road, London, W.1

GRAM-PAK AMPLIFIERS

Complete £3.19.6 P. & P. 2/6

This midjet 4-watt amplifier fits neatly into any record player leaving ample room for speaker. Suitable with any speaker and all modern crystal 3-speed pick-ups. Dimensions 7" x 2 1/2" x 1 1/2". Pressed steel plated chassis. Perfect, distortionless quality guaranteed. For 200-250 v. A.C.

ACCESSORIES:

ACOS crystal turnover pickup. £1.14.6.
 7" x 4" elliptical speakers. 19s. 6d.
 BSR 3-speed player unit with above pickup, £4.12s. 6d.

THE COMPLETE OUTFIT READY FOR YOUR CABINET £9.10.0. post free.

6d. stamp brings details by return.

ELECTRO-ACOUSTIC LABS. 60 ACADEMY STREET, INVERNESS

ANNAKIN

Oscillator-Wavemeter. C.R.I. only. £7.
 Oscillator No. 231. New, boxed, 13/-.
 R1428. I.F. Strip (similar 135s). 14/-.
 Station Box. Bendix. New, boxed, 8/6.
 Carbon Mike, table stand, used, 7/-.
 M.C. Meter, 2 1/2 in. 2mA. F.S.D. Insmart case. Calibrated 0-100 v. Couple, 1.5/-.
 Blowers, 230 v. 50 c. suppressed, 37/-.
 Cells, 1.5 v. Large type, 5 for 10/6.
 Motor Generator, 12 v. In. 250 v. 65 mA., 6.5 v. 2.5 A. New, boxed, 13/6.
 Vibrator Transformers, 12 v. In. 120 v. 60 mA. Only 4/9. Vibrator to suit, 3/1.
 Eliminator, 200-250 v. In. 120 v. 40 mA. Out. Set. Rect. VS110 Regulator. Slight soiled. £1.
 Recr. R28-ARC 5. New. £2.10.0.
 Res-stance Unit type 231. New, boxed, 30/-.
 Tuning Condensers, 2-gang 250 pf. New, 3/3.
 Post or carriage Free. Mainland only. S.A.E. for Lists or enquiries please.

25 ASHFIELD PLACE, OTLEY YORKS.

BENSON'S BETTER ARGAINS

TEST SET. 74. Basis for Oscilloscope; 10 valves; V1 BR9A & 50 cycle power pack. Fair cond., 50/- (carr. 7/6). WAVEMETERS 5B, new, 35/-; Type W1158B 160/220 mcs. 2 valves & 1 mA meter, grey crackle case, new, 40/-; Type W1648 155/255 mcs. 3 valves, 3 mcs. crystal, incorporates signal gen. With handbook. Fair cond., 40/- (carr. each 5/-). Receivers BC1066 VHF. Valves: 2/577, 1ND8GT, new, 15/- (post 3/6). VIBRA-PACKS: HRO. 6 v. D.C. to 180 v. 50 mA. smoothed, case, 22/6; Masteralloy 6 v. to 230 v. 100 mA. smoothed, case, 25/-; UT.S.A. 12 v. to 150 v. 30 mA. smoothed, case, 12/6 (carr. each 3/6). RECTIFIER UNITS. Input 220 v. A.C. Output 12 v. D.C. 2 A., grey case, 22/6 (post 3/6). CAR RADIO (Unimand Receiver. Medium wave), circuit and modification data, 1/6. COMMAND RECEIVERS, brand new, with 6 valves BC434, 3-6 mcs., 45/-, Med. wave 0.52-1.5 mcs., 97/6, used 82/6 (post 3/-). Accumulators, Varley 12 v. 15 AH, 12/8, vet 14 AH, 7/8. INDICATOR UNITS, new, with V.C.B. 31V81, 25CV18, 31VR34, 24/- (carr. 7/-). RESPONDER ZC8931, 100.190 mcs., with valves, 15/- (carr. 7/6). VIBRATORS. Mallory G629C 12 v. 4 pin, 7/8. THROAT MICS, new, 2/6. SMALL MIC. TRANS. 2.0. BRAND NEW RE. 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100. METAL RECTIFIERS: 240 v. 100 mA., 4/-; 200 v. 50 mA., 19/-; 240 v. 30 mA., 3/6; 1,000 v. 30 mA., 7/6; 120 v. 2 A., Bridge, 30/-; R1155 S.M. Tuning DRIVES "N" type, brand new, 10/6. CHOKES, L.F., 16H, 120 mA., screened, 7/8. 10H, 200 mA., 8/6; 5H, 200 mA., 4/6. TRANSFORMERS: "C" core, 220 v. in; outputs: 310-0-315 v. 60 mA., 40 v. 2 A., 6.3 v. 1.5 A., 25/- (pp. 3/6). 215/315 v. 350 mA., and 750-50 v. 480 mA., 40 v. 2 A., Bridge, 7/6. Transmitter Receivers, No. 18, with valves, 50/-; new attachments (carr. 7/6). LISTS AND ENQUIRIES, S.A.E. please! Terms, C.W.O. Postage extra. Immediate despatch.

Callers and post: W. A. BENSON (P.W.)
 136, Rathbone Road, Liverpool, 15. 812 P. 653.
 Callers, SUPERADIO (W'chapel) LTD.,
 110, Whitechapel, Liverpool, 2. LOP 1120.

TRANSISTOR CIRCUITS FOR THE CONSTRUCTOR

by E. N. Bradley

Vol. 1

All information strictly practical. Covers the construction of small loudspeaker bedside receivers. A highly sensitive pocket superhet (easily-wound aerial, coils and I.F. transformers). Novel super-regenerative short wave receiver and test oscillator.

Vol. 2.

Instruments described include radio microphone or record player. A Wein Bridge Oscillator. Two stage match-box receiver. Novel signal tracer and wide range communicator. 3/6 each. Postage 4d.

A BEGINNER'S GUIDE TO RADIO. By F. J. Camm. 7/6. Postage 6d.

BRIMAR RADIO VALVE & TELE-TUBE MANUAL. No. 7. 6/-. Postage 6d.

RADIO VALVE DATA. 5/-. Postage 6d.

GUIDE TO BROADCASTING STATIONS. 1957-58. 2/6. Postage 4d.

THE MODERN BOOK CO.

BRITAIN'S LARGEST STOCKISTS of British and American Technical Books

Write or call for our catalogue.

19-23 PRAED STREET, LONDON, W.2

Phone: PADdington 4185. Open 6 days 9-6 p.m.

LYONS RADIO LTD.

Dept. M.P., 3 GOLDHAWK ROAD, SHEPHERDS BUSH, LONDON, W.12
Telephone: SHEPherds Bush 1729

RECEPTION SETS R.109B. Ex-Army superhet receivers employing 8 valves (1-AR136, 4-AR12's and 3-AR8's). Fitted with a miniature loudspeaker, B.F.O., vibrator type power pack for operation from a 6-volt motor cycle or car battery (no other power supply required). Frequency range 3 to 12 Mc/s. (25 to 100 metres) in 2 switched bands. Housed in waterproof metal cases with canvas cover over front panel. Overall size 13 x 11 x 12in. deep. Front panel fitted with all controls including 2 jack sockets for alternative headphone reception. In good condition and working order, supplied with circuit diagram and input plug. PRICE ONLY, with valves, 85/-, or less valves, 45/-. Carriage 8/6.

HEADPHONES. Low impedance type, with headband and cord which terminates with the appropriate jack plug to fit above Rx. PRICE 6/9, post free with Rx. or 1-separately.

TWIN FLEX P.V.C. insulated (Transparent) conductor 14/36 tinned copper, for radio and electrical work, extension speakers, bells, telephones, etc. PRICE ONLY: 25 yards 6/9, 50 yards 12/-. 100 yards 21/-. Post paid.

L.T. TRANSFORMERS. Primary 200-250 v. 50 cps. Secondary—30 v. at 2 A, tapped at 3, 4, 5, 6, 8, 9, 10, 12, 15, 18, 20 and 21 v. Stand new and guaranteed. All connections clearly marked. PRICE 2/-, post 1/8.

THROAT MICROPHONES. American made, carbon type with neck band. As new in maker's carton. PRICE 2/9, post 6d.

CHASSIS

Let us supply the chassis for your set. We are specialists in this field and actual makers of aluminium chassis. Supplied either plain or with the large and awkward holes already drilled. We can also supply covers and cabinets in metal, clips for rectangular shaped condensers, and mumetal screens of all types.

UNDRILLED

ALUMINIUM CHASSIS

4 sides, welded corners.

7in. x 4in. x 1 1/2in. deep	... 4/3 ea.
9in. x 6in. x 1 1/2in. deep	... 5/6 ea.
11in. x 7in. x 1 1/2in. deep	... 6/6 ea.
10in. x 8in. x 2 1/2in. deep	... 7/- ea.
15 1/2in. x 8 1/2in. x 2 1/2in. deep	... 9/- ea.

2 sides only.

7in. x 4in. x 2in. deep	... 3/- ea.
9in. x 6in. x 2in. deep	... 4/- ea.
10in. x 8in. x 2in. deep	... 4/9 ea.
16 1/2in. x 9 1/2in. x 2 1/2in. deep	... 6/9 ea.

Prices are subject to postage being charged extra.

Send sketch of your requirements for prices by return to:—

Oliver & Randall LIMITED

53 Perry Hill, London S.E.6

SPARKS' DATA SHEETS presents

THE "331"

A.G. SHORT WAVE 4-VALVE T.R.F. Rx.

Outstanding in Design and Performance

Incorporates "Cathode-coupled" Regeneration which ensures Highest Efficiency Selectivity, perfect Stability plus amazing EASE of operation. Coverage 10 to 220 metres. Switched Coils. Separate Power Pack. 4-5 watts Output.

To show every detail of construction and point-to-point wiring in simplified form, the Data Sheet is 27" x 27". This together with generous Instructions and Operational Notes costs 3/6 Post Free.

All Components and chassis available. **L. ORMOND SPARKS (P)** Valley Road, Corfe Castle, Dorset.

AMAZING OPPORTUNITY



to instal your own I.T.V. 3 element folded dipole array for loft or gutter board mounting, especially made to our own specification by well known manufacturer.

State channel when ordering.

24/- Postage and packing 2/-, 75ft co-axial cable 8d. yd.

Also BBC/ITA "Panorama" room aerial, converts your set to a transportable. 12/9. Postage and packing 1/-.

Trade enquiries inv.ted

K.V.A. ELECTRONICS

189, Kent House Road, Beckenham, Kent. SYD 2488.

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 8539.

RADIO AND TELEVISION COMPONENTS

All parts in stock for: Viewmaster, Soundmaster, Teleging, etc. Easy Terms available. 24d. stamp (only) for Catalogue.

JAMES H. MARTIN & CO.
118 HATHWAITE, NEWBY BRIDGE, ULVERSTON, LANCs.

WIRING ACCESSORIES

Return of Post Service. Lowest possible prices consistent with high quality. Money back guarantee.

PVC Cable Flat Twin Twin with E. 3 Core

1.044	£2.8.1.	£3. 2. 0	£3. 9. 3
3.020	£3.4.8	£3.14. 4	£4.13. 0
3.036	£4.7.6	£4.17. 6	£6. 6. 7
7.029	£5.9.3	£6.16.11	£8. 2.11

TWS CABLE

1.044	£2.13.5	£3. 6. 8	£3.15. 4
3.029	£3. 9.3	£4. 3. 1	£5. 3. 5
3.036	£4.11.4	£5. 6. 1	£6.15. 0
7.029	£5.11.0	£6.18.10	£8. 4. 0

Prices per 100 yds. All sizes stocked. Supplied in 25, 50, 75 or 100 yd. lengths. 7.029 and above cut to length—no cutting charge. Full range of accessories available. Send for complete lists.

F. HUNT & CO.

STEPCOTE HILL, EXETER
Phone: Exeter 56687

Morse Code operating . . .

. . . as a PROFESSION

45 years of teaching Morse Code is proof of the efficiency of the Candler system. Send 3d. stamp for Pupil's Plans and Full Details of all Courses.

CANDLER SYSTEM CO. Dept. 51.0 52b, Abingdon Road, London, W.8. Candler System Co., Denver, Colorado, U.S.A.

Practical Wireless

BLUEPRINT SERVICE

PRACTICAL WIRELESS

No. of
Blueprint

CRYSTAL SETS

2/- each		
1937 Crystal Receiver	PW71*	
The "Junior" Crystal Set	PW94*	
2/6 each		
Dual - Wave "Crystal Diode"	PW95*	

STRAIGHT SETS

Battery Operated

One-valve : 2/6 each		
The "Pyramid" One-valver (HF Pen)	PW93*	
The Modern One-valver	PW96*	
Two-valve : 2/6 each		
The Signet Two (D & LF)	PW76*	

3/6 each		
Modern Two-valver (two band receiver)	PW98*	

Three-valve : 2/6 each		
Summit Three (HF Pen, D Pen)	PW37*	

The "Rapide" Straight 3 (D, 2 LF (RC & Trans))	PW82*	
--	-------	--

F. J. Camm's "Sprite" Three (HF, Pen, D, Tct)	PW87*	
---	-------	--

3/6 each		
The All-dry Three	PW97*	
Four-valve : 2/6 each		

Fury Four Super (SG, SG, D, Pen)	PW34C*	
----------------------------------	--------	--

Mains Operated

Two-valve : 2/6 each		
Selectone A.C. Radiogram Two (D, Pow)	PW19*	

Three-valve : 4/- each		
A.C. Band-Pass 3	PW99*	

Four-valve : 2/6 each		
A.C. Fury Four (SG, SG, D, Pen)	PW20*	

A.C. Hall-Mark (HF Pen, D, Push Pull)	PW45*	
---------------------------------------	-------	--

SUPERHETS

Battery Sets : 2/6 each		
F. J. Camm's 2-valve Superhet	PW52*	

Mains Operated : 4/- each		
"Coronet" A.C.4	PW100*	
AC/DC "Coronet" Four	PW101*	

No. of
Blueprint

SHORT-WAVE SETS

Battery Operated

One-valve : 2/6 each		
Simple S.W. One-valver	PW88*	

Two-valve : 2/6 each		
Midget Short-wave Two (D, Pen)	PW38A*	

Three-valve : 2/6 each		
Experimenter's Short-wave Three (SG, D, Pow)	PW30A*	

The Prefect 3 (D, 2 LF (RC and Trans))	PW63*	
--	-------	--

The Band-spread S.W. Three (HF, Pen, D, (Pen), Pen)	PW68*	
---	-------	--

PORTABLES

2/-		
The "Mini-Four" All-dry (4-valve superhet)		

MISCELLANEOUS

2/6 each		
S.W. Converter-Adapter (1 valve)	PW48A*	

The P.W. 3-speed Autogram	(2 sheets), 8/-*	
---------------------------	------------------	--

The P.W. Monophonic Electronic Organ	(2 sheets), 8/-*	
--------------------------------------	------------------	--

TELEVISION

The "Argus" (6in. C.R. Tube), 3/-*		
------------------------------------	--	--

The "Super-Visor" (3 sheets), 8/-*		
------------------------------------	--	--

The "Simplex"	3/6*	
---------------	------	--

The P.T. Band III Converter	1/6*	
-----------------------------	------	--

All the following blueprints, as well as the PRACTICAL WIRELESS numbers below '94 are pre-war designs, kept in circulation for those amateurs who wish to utilise 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 : 2/6		
B.B.C. Special One-valver	AW387*	

Mains Operated

Two-valve : 2/6 each		
Consoelectric 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 : 2/6 each		
S.W. One-valver for American	AW429*	

Two-valve : 2/6 each		
Ultra-short Battery Two (SG, det Pen)	WM402*	

Four-valve : 3/6 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 : 3/6		
Standard Four-valve A.C. Short-waver (SG, D, RC, Trans)	WM391*	

MISCELLANEOUS

Enthusiast's Power Amplifier (10 Watts) (3/6)	WM387*	
---	--------	--

Listener's 5-watt A.C. Amplifier (3/6)	WM392*	
--	--------	--

De Luxe Concert A.C. Electrogram (2/6)	WM403*	
--	--------	--

QUERY COUPON

This coupon is available until Nov. 6th, 1957, and must accompany all Queries sent in accord with the notice on our "Open to Discussion" page. PRACTICAL WIRELESS, Nov. 1957.

BUILD IN A BJ ARM

AND add fidelity to your installation

PRACTICAL WIRELESS says:—

Test records appeared to sound even better than with our hitherto standard equipment, "rumble" which was previously audible on an organ test record, appeared non-existent. Every serious "hi-fi" enthusiast should try to make this part of his installation.

TEST YOUR TRACKING!

BJ INTRODUCES THE FIRST **ALIGNMENT PROTRACTOR** IN PLASTIC IVORINE FOR MEASURING THE TRACKING ACCURACY OF ALL PICKUP ASSEMBLIES.

Send P.O. for 7/- today!

ONLY BJ ARMS OVERCOME TRACKING ERROR

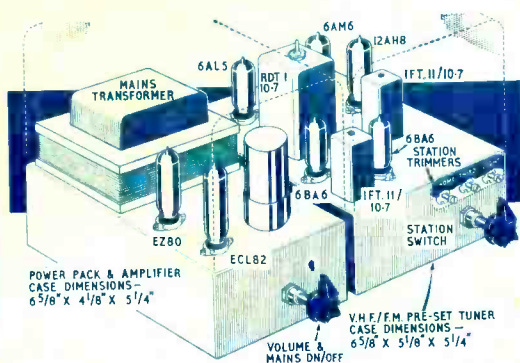
Ask your local dealer for full details or write to:

(Dept. D) BURNE-JONES, SUNNINGDALE ROAD, CHEAM, SURREY



BJ ARM	...	£2.4.17
P.T.	...	18/-
BJ PLUG-IN SHELL	17/3	
P.T.	...	6/11
BJ SUPER 90 ARM		
(Studio Model) 11 gns.		
P.T.	...	£4.12.5

INTRODUCING THE COMBINED POWER PACK AND AMPLIFIER FOR THE 'MAXI-Q' PRE-SET OR VARIABLE F.M. TUNER WHICH NOW OFFERS YOU A COMPLETE RECEIVER



Full constructional details, point-to-point wiring diagrams and alignment instructions for building the "MAXI-Q" COMBINED POWER PACK AND AMPLIFIER, PRE-SET F.M. TUNER and also the VARIABLE TUNED version are given in Technical Bulletin DTB.8, 1/6.

POWER PACK AND AMPLIFIER. This unit consists of Mains Transformer, E280 and ECL82 valves, Volume Control complete with mains on/off switch and is housed in a gold-finished case. Power supplies available for any tuner—Heater 1.5 amps at 6.3V. H.T. from 220V. at 50 mA to 265V. at 20 mA. The unit is available completely wired and ready for use at £5 10/-, plus 2/6 carriage or available in kit form at £5.

PRE-SET F.M. TUNER. Completely punched chassis, screens and bronze-finished cover, 19/-, Station Indicator Plate, 1/1. Three-position switch, 4/3. Station Condenser Trimmers, 3-9 pF, 2/-.

RATIO DISCRIMINATOR TRANSFORMER. RDT 11/10.7 Mc/s. Secondary winding of bifilar construction, iron dust core tuning, polystyrene former, silver mica condensers. Can size 1 1/2 in. sq. x 2 1/2 in. high, 12/6.

I.F. TRANSFORMER. IFT 11/10.7 Mc/s. Miniature I.F. of nominal frequency 10.7 Mc/s. The "Q" of each winding is 90 and the coupling critical. Can size 13/16 in. sq. x 1 1/4 in. high, 6/6.

COILS. TYPE L1, T1 and T2. Specially designed for use in this unit, are wound on polystyrene formers complete with iron dust core tuning, 3/11 each.

THE "MAXI-Q" PRE-SET F.M. TUNER is available completely wired, assembled, valved and housed in a sturdily made gold-finished cover at £8 11/5, plus £3 8/7 P.T. = £12.

VARIABLE F.M. TUNER completely assembled at £7 17/2, plus £3 2/10 P.T. = £11 (carriage 3/-, terms c.w.o.).

GENERAL CATALOGUE covering technical information on full range of components, 1/-, post free.

TRADING TERMS for direct postal orders, c.w.o., plus appropriate postal charge.

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