Practical Wireless

The Atlantic S.W. Two

The Consort TRF Receiver
BRAND NEW AM/FM (V.H.F.) RADIOGRAM CHASSIS AT £ 13.13.0 (Carriage Paid)

A.C. ONLY. Chassis size 16 x 9 1/2 x 5 1/2 in. high. New manufacture. Dial 14 x 4 in. In 2 colours predominantly gold.

Pickup, Speaker, Am., and Dipole Sockets. Five push buttons—OFF L.W., M.W., P.M. and Gram. Aligned and tested. O.P. Transformer. Tone Control. 1,000-5,000 M. 220-500 M. 98-96 Mcs Valves 6ZB2-rect., E881, EF99, RABQOS, EL44, ECC83, Speaker and Cabinet to fit chassis (table model), £7/6 post. 9 x 5in. ELLIPTICAL SPEAKER. 40w to purchasers of this chassis.

TERMS:—(Chassis) £5 down and 4 Monthly Payments of £3, and 1 of £1.13.0.

Cheap Room Dipole for V.H.F., 12/6. Feeder 6d. yard Circuit diagram 6d. 6d.

THE "CANTATA" 6-TRANSISTOR AND DIODE PORTABLE

COMPLETE KIT FOR ONLY

£7.19.6 (post 16)


BUILD YOUR OWN RECORD PLAYER

Special summer offer, price £11.5.0.0 (dial paid). Fully built 2 valve amplifier.

B.S.R., 4-sp. autowinder, case 17/6. 13 x 9 1/2 in. Assembled. In 15 mins. Similar cabinet for tape recorder with plain board only £3, paid. Attractive colours. or with 2 valve amplifier 15/- extra.


TELEFUNKEN STEREO AMPLIFIERS. 2 ECL62—2 x 22 watts, 12 x 9 1/2 in. piano enam. £7.30. Post paid.


PUSH-PULL AMPLIFIER £5.5.0

(Inc. Carr.)

Brand new 200-240 A.C. mains. Base, treble and vol. controls. 6V6 , 6L6. Transistors-6ZB2, E881 and 2-ECL64 giving full 8w. Chassis 12 x 3 x 3 1/2in. With on-off switch. For 2-3 ohm speaker. Front panel (normally screwed to chassis) may be removed and used as "flying panel". Stereo version 2 x 2 x 4, same price.


THIS SUPERB SET FOR £10


SUPERIOR GRAMAPHONE AMPLIFIER

Valves UY95, UF100 and UF41. Mains trans. 200-240 a.c. Covered baffle 11 x 7 1/2in. (3in. speaker) or 11 x 7 1/2in. 18 in. speaker). 3 front controls—tune, treble and bass. Special summer offer 65/- (post 4/-) either type. Rexine cabinet to fit, with carrying handle, and lid (detachable) 14 in. or 12 x 8 x 4 1/2in. 15/- extra.

GRAMAPHONE AMPLIFIER with 5in. SPEAKER. (as "Cantata"") 13 x 8in. ECL72 and Rectifier. Tone and Volume. On/off switch. Two knobs. Ready to Play. Useful for stereo. Special summer offer 45/- (post 6/-).

TEST LEAD KIT. Leads, Prods, Terminals, Clips. In case, 10/- post paid.

TAPE, TOP QUALITY BOXED. 5in.—50ft. £1.00 120ft.—1.250ft. £1.25 175ft.—1.900ft. £1.65 all plus 1/6 post, 2/- for 2.

ANOTHER SPECIAL SUMMER OFFER


COLLARO STUDIO TAPE TRANSCRIBER. 3 MOTORS, 3 SPEED, 11, 31 and 7/1 E.L.P. Push buttons. £10.17.6 (0/-

carr.) incl. spool.

3-VALVE AMPLIFIER (Inc. Rect.)

21 watts. ECC83, E187 and EZ80. Controls, volume, bass and treble. On/off switch. Mains and O.P. trans. Size as for Push-Pull Amplifier. 5/- (post 2/-). Suitable for tape amplifier using picture in catalogue. Choice of colours Rexine. £5.5.0. (inc. Carr.) £5.15.0. Fixed front panel. Price includes handsome wicker finish polished cabinet. 13 x 7 1/2in. including high quality 3 ohm P.M. speaker. £6.15.0. less without cab and speaker.

BATTERY ELIMINATOR

For 4 Low Consumption Valves (86 range). 90w, 15mA and 1.4v. 120mA. 45/- 260 post. 200-250v. A.C. Also for 250mA. 1.4v. and 60mA at same price.

3-VALVE AMPLIFIER (Inc. Rect.)

4 watts. Valves ECC83, EL84 and EZ80. Controls, volume, bass and treble. On/off switch. (Chassis size 9 x 4 x 2 1/2in. 6in. round or 7 x 4in. elliptical). Special summer offer for microphone input, A.C. only (rectifier paid) 50/- (post 5/-).

CHASSIS, BATTERY RADIO. Valves DVE5, DVE7, DAF85, DE85. Two Short Wavebands 15 to 49 M. and 25 to 75 M. Size 16 x 4 x 5 1/2in. £2.15.0. Carr. paid. £4.5.5. Carr. paid. Or as kit 75/-.

TERMS AVAILABLE ON ITEMS OVER £5

Send 4d (stamps will do) for 20 page illustrated catalogue. All New Goods. Delivered by return. (C.O.D. extra)

ALL ITEMS GUARANTEED 12 MONTHS VALVES 1 MONTHS CLOSED SATURDAY

GLADSTONE RADIO "SCALA," CAMPGARD, FARNBOROUGH, Hants.

Farnborough 3371 and 347 New Road, Copnor, Portsmouth.
TECHNICAL TRAINING in radio, television and electronics

Whether you plan to have your own business, to become an electronics engineer, to take up a career in industry, or to brush-up your knowledge and study new developments, transistors, etc., 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.

EXAMINATION COURSES FOR:

C. & G. Radio and TV Servicing Certificate

British Institution of Radio Engineers, etc.

C. & G. & Telecom. Technicians’ Cert.

LEARN AS YOU BUILD

Practical Radio Servicing Course

A basic course in radio electronic and electrical theory backed by thorough practical training. You build radio receivers, signal generator and multimeter.

---

**HANDBY TWO-STATION TRANSISTORISED INTERCOM & BABY ALARM**

**FULL RANGE HIGH FIDELITY LOUD-SPEAKER MODEL AILSA**

**ALL DIRECTIONAL STUDIO CRYSTAL MICROPHONE**

**SF-20 RADIO HEADPHONES**

---

INTERNATIONAL CORRESPONDENCE SCHOOLS

(Dept. 171), Intertent House, Parkgate Road, London, S.W.11.

Please send book on

Name _______ Age _______

(Block Letters Please) ______

Address _________ _______

Occupation _______ 8.62

---

See opposite page for addresses

---

www.americanradiohistory.com
NEW! Transistorised Tape Recorder

FOR ONLY £6.19.6 P & P 4/-

Consists of three transistor amplifiers, record/play, volume control, miniature speaker, forward-stop-rewind-switch, reel or tape and spore reel, motor, attractive transparent case, Mci, and earphone sockets, pull-up coil, miniature earphone and carrying handle supplied. Standard battery operated. Simple to put together in less than one hour. Brand new and guaranteed.

REELDA METER SENSATION!!

10,000 o.p.v.
Multi-Tester in Semi-assembled KIT FORM

Only 69/6

3-WAY SLIM CRYSTAL MICROPHONE

MODEL 196C

May be held, held, stand mounted, floor stand or desk stand, or suspended by lavaliere cord. Response 60-10,000 cps. Built in on/off switch. Output level 52 db. Omni-directional head. Clips on on of standard stand adaptors etc.

LIMITED NUMBER ONLY
Don't be disappointed—Order Now

PORTABLE RADIO-PHONES

Consists of transceiver covering 7-4.9 M.Hz. Range up to 6 miles, depending upon obstruction and elevation. On test the receiver astonished us for we heard 65 short wave stations—one as far away as Russia. Complete with 5 earphones, headphones, microphone, junction box and 40' telescopic aerial. Operates from standard 120 v. and 3 v. dry batteries.

ONLY 60/- EACH

TWO FOR 66 post free (batteries 20/- per set extra.)
6733 6/8 12370T 9/- DAF91 4/6 EL83 11/-

THE MOST COMPREHENSIVE COMPETITIVE VALVE LIST IN THE COUNTRY

NEW LOW PRICES GUARANTEED 3 MONTHS

PLAYING TRANSISTOR DEVICES. All valves are new or of fully guaranteed origin. Satisfaction Money back Guarantee on Goods if returned unused within 14 days.

THE YETI MULLARD, MAZDA, CONCOR, EMITRON, EMI- SCOPE, BRAM, ECLIPSE TYPES. PROCESSED IN OUR OWN FACTORY.

GUARANTEED 6 MONTHS 12 MONTHS

12in. $2.00 3.50
14in. $2.10 3.15
15/17in. $3.50 4.10

HIGHEST QUALITY—COMPARE OUR PRICES

NEW TYPES

$2. 0/- $3. 5/- $4. 0/- $4. 5/-
$4. 10/ $5. 0/- $5. 5/-

4/6 WATTS AMPLIFIERS. Delivery of these excellent units in bonded cases with G.P. amplifiers, G.P. output, and U.V.U. rectifiers. Easily adapted into high gain unit, complete with good power. 8in. speaker in attractive two tone baffle case easily converts for guitar, record players, baby radio, home, or car. 19/-

PARK. Fitting. For gardening. 5/-, P.P. 4/-.


100 RESISTORS 6/6

100 CONDENSERS 10/-

MINIATURE CERAMIC AND SILVER MICA Condensers 2 p. to 5,000 p. LIST VALUE OVER 25.

IVORY/GOLD KNOBS 1" Diameter, half price 1/-, 5/- 1.3/.- 5/6 for 8/.

TECHNICAL TRADING CO.
STERN'S MULLARD DESIGNS

Designed by MULLARD—presented by STERN'S strictness to specification

MULLARD "5-10" MAIN AMPLIFIER

For use with the MULLARD 5-valve pre-amplifier with which un-isolated power output is so long held. We supply SPECIFIED COMPONENTS AND NEW MULLARD VALVES, including PARMEKO MAIN TRANSFORMER and choice of the latest, Ultra-Linear PARMEKO or the PARMEKO Output Transformer.

COMPLETE KIT OF PARTS £10.0.0

Alternatively we supply ASSEMBLED and TESTED £11.10.0 Incorporating Partridge Output Transformer £1.6.0 extra.

MULLARD'S PREAMPLIFIER TONE CONTROL UNIT

Empowering two EJ18 valves, and designed to operate with the MULLARD MAIN AMPLIFIERS, but also perfectly suitable for other makes.

PRICE COMPLETE £6.6.0 ASSEMBLED AND TESTED £8.0.0

KIT OF PARTS

Supplied strictly to MULLARD'S SPECIFICATION and incorporating:
- Equalisation for the latest P.L.A.A. characteristics.
- Input for Crystal Pick-ups, and variable reluctance magnetic types
- Input (a) Direct from High Imp. Tape-head, (b) From a Tape Amplifier or Pre-Amplifier.
- Sensitive Microphone Channel.
- Wide range BASS and TREBLE Controls.

THE MULLARD "510/RC" AMPLIFIER

The popular and very successful complete "5-10" Incorporating Control Unit providing up to 2 watts output. Only SPECIFIED Components and NEW MULLARD VALVES are supplied including PARMEKO MAIN TRANSFORMERS and choice of the latest PARMEKO or PARTRIDGE ULTRA-LINEAR Output Transformers.

KIT OF

PARTS £11.10.0 and TESTED £13.10.0

H.P. Dep. £2.0.0, 12 months at £2.14.10 at 19/10 above, Incorporating PARTHORDE OUTPUT TRANS. £1.6.0 extra.

STERN'S INTER-COMM BABY ALARM

A small versatile Unit employing the new MULLARD "5-10" amplifier, and designed to provide two or three way conversation up to extremely distances. Operates from A.C. mains 200 to 250 Volts.

PRICES: MASTER UNIT

KIT OF PARTS £6.17.6 ASSEMBLED AND TESTED £8.0.0

Consists of a MASTER UNIT, size only 6 X 9 X 6 in., and ONE EXTENSION (a second extension may be added to any time). The Master Unit incorporates switch and power supply and with the chassis completely isolated from the mains is operated in absolute safety. Cases covered in quality leatherette.

A BULK PURCHASE OF MARCONPHONE TAPE RECORDING EQUIPMENT ENABLES US TO OFFER THE MODEL MTR/I PORTABLE TAPE RECORDER

FOR £26.0.0.0

(Carr. & Ins. 10/- extra)

Deposit: £5.4.0, 12 months of £2.18.5. The list price of the MTR/I is £29.0.0. It is a 3-Speed Twin Track Recorder Incorporating the latest Colarlo "Mullardvite" Deck and operates at 11, 31 and 7111/2sec. Speeds. It incorporates a "Pause" Control, a safety interlock device which ensures that a recorded tape cannot be accidentally erased and a low level output socket so that any equipment may be fed into an external high fidelity amplifier for monitoring purposes or for high quality reproduction on playback.

STERN RADIO 109, FLEET ST., PREMIER RADIO 23, TOTTENHAM COURT RD., LONDON W.1.


MAIL ORDERS AND ALL POSTAL ENQUIRIES TO 7-9 TUDOR PLACE, TOTTENHAM COURT RD., LONDON W.1.

PRICE REDUCTIONS

(a) The KIT OF PARTS to build both the 5-10 MAIN AMPLIFIER and the 5-valve PRE-AMP CONTROL UNIT H.P. Dep. £2.7.0 and 12 months at £1.6.0 £15.15.0

(b) The "5-10" and 2-stage PRE-AMP both ASSEMBLED and TESTED H.P. Dep. £9.6.0 and 12 months at £1.8.0 £15.18.0. We finish with Partridge Wood trimmer £1.6.0 extra.

RECORD PLAYERS

The Latest Models are in stock many at reduced prices. Send S.A.E. For Illustrated Leaflet.

THE NEW GARRARD "AUTO-SLIM" 4-speed Autochanger £8.10.0

COLLARO "JUNIOR" 4 SPEED SINGLE RECORD PLAYER £3.15.0

GARRARD MODEL C90 4-speed Autochanger with Separate Crystal Pick-up £8.13.0

WE ALSO SUPPLY SEPARATE CRYSTAL PICK-UP £1.6.8.

SPECIAL CASH OFFER

This very attractive with CRYSTAL PICK-UP £7.19.6

B.S.R. MODEL UA4 4-speed Autochanger with Separate Crystal Pick-up £8.10.0

Available Incorporating the B.S.R. NEREG II PICK-UP and 20-L.P., 78 Records...

GARRARD MODEL RCG8, 4-speed Fitted high output Crystal Pick-up £8.10.0 £9.19.6

GARRARD MODEL RC90 Autocanger high output Crystal Pick-up £9.19.6

MIXER FOUR CHANNEL MIXER UNIT

Self powered with Cathode follower output, incorporates Two inputs (or Microphones) One for CRYSTAL PICK UP and a fourth for RADIO or Tape Complete Kit of Parts £8.8.0

Assembled and TESTED £10.0.0

TERMS: Deposit £2.0.0 and 12 months at 15/-

Alternatively Model 11.1. provides for our microphone Input matched for moving coil or Ribbon Mike £1.17.0 extra.

The TOHPHONIC TRANSISTOR BATTERY OPERATED INTERCOM

89/6 £6.2£2.17.0 P. & P. 4/-

Including 111/2 battery and 25 yards lead with plugs.

A complete Portable Intercom with 101 uses and an ideal unit for the office or even as a Baby Alarm. Since being battery operated, it is completely portable and can be plugged into any 240 volt socket or used with our own battery and volume on/off switch, the units are housed in attractive plastic cabinets (black with chrome switch) and is extremely economical operating on one 9-volt battery being power operated.
THE "STP-1" STEREO TAPE PREAMPLIFIER

BRENNELL Mk. V TAPE DECK
Incorporating similar I-TRACK MINI-FLOOD TAPE HEADS.

PUSH FULL OSCILLATOR CIRCUIT

4-SPEED EQUALISATION

ERROR CORRECTION TRANSFORMER

SENSITIVE Meter for FULL LEVEL

SEPARATE GAIN CONTROLS of 40 Choices

MULLARD VALVES INCORPORATED

THE "STP-1" PREAMPLIFIER is offered with such as the Price, as is to be sent:

a) ASSEMBLED AMPLIFIER, including CRITICAL UNIT (at least 75% completed).
   Deposit £21.0.0, 12 months at £1.10.0.

b) A complete KIT of PARTS for both units.
   Deposit £40.0.0, 12 months at £1.7.0.

We also supply the assembled MAIN AMPLIFIER only (excludes control unit) for operation with our DUAL CHANNEL Tapes. This provides for a more versatile or elaborate installation and would be essential if a low output Magnetic Pick-Up is used.

(a) THE ASSEMBLED MAIN AMPLIFIER with th
   ASSEMBLED DUAL CHANNEL PREAMPLIFIER.
   Deposit £40.0.0, 12 months at £2.0.0.

(b) A complete KIT of PARTS for both units.
   Deposit £50.0.0, 12 months at £1.9.0.

Illustrated and Descriptive Specifications Available. Please obtain S.A.E.

MULLARDS "10 PLUS 10"

STEREO AMPLIFIER

A high fidelity design based on the future of MULLARD "10". Provides up to 10 watts (per channel) mono reproduction. Frequency response flat to within 2 db at 80 db from c/s to 60 khz at 0 db.

Total Harmonic Distortion at 10 watts 0.1%.

a) ASSEMBLED AMPLIFIER, including CRITICAL UNIT (at least 75% completed).
   Deposit £21.0.0, 12 months at £1.10.0.

b) A complete KIT of PARTS for both units.
   Deposit £40.0.0, 12 months at £1.7.0.

We also supply the assembled MAIN AMPLIFIER only (excludes control unit) for operation with our DUAL CHANNEL Tapes. This provides for a more versatile or elaborate installation and would be essential if a low output Magnetic Pick-Up is used.

(a) THE ASSEMBLED MAIN AMPLIFIER with th
   ASSEMBLED DUAL CHANNEL PREAMPLIFIER.
   Deposit £40.0.0, 12 months at £2.0.0.

(b) A complete KIT of PARTS for both units.
   Deposit £50.0.0, 12 months at £1.9.0.

Illustrated and Descriptive Specifications Available. Please obtain S.A.E.

ARMSTRONG RADIOGRAM CHASSIS

FULL RANGE IN "FOOT", TELEPHONE, S.A.E. or cablage.

STEREO 12 MK. 2 £43.10.0

ILLUSTRATED

Deposit £3.10.0. 12 months at £3.10.0.

The most complete chassis ever produced, combines AM and FM Tuners, Stereo Control Unit and two High Fidelity Amplifiers in one kit.

The chassis provides a total of 18 watts for mono and stereo. Other features include: inputs for tape recording, play back, pick-ups and stereo radio. It is said this come about: separate wide range base and treble controls and balance controls.

STEREO 55 £32.15.0

A junior version of the Stereo 12 Mk. 2 providing ten watts output, five watts from each amplifier and covering the whole range.

JUBILEE Mk.2 £30.12.0

A Hi-Fi mono chassis tuning eight watts push-pull output and covering treble recording and playback inputs.

AF208 £22.18.0

An AM/FM chassis providing five watts output and covering the full VHF band and medium and long bands. Tape recording and playback inputs.

TVB VHF TUNER £21.18.0

A self-powered high-fidelity v.h.f. Mk. 2 built and powered by the standard design, incorporating features which are normally found only in the most expensive tuners. The full VHF band (67-100 MHz) is covered and a matching output control enables the output to be varied between 0 and 500 mW.

THE MULLARD "10+10" STEREO AMPLIFIER

Incorporates two Mullard 2-valve Preamps combined into a Single unit enabling it to be used for both STEREO or MONO operation. It is designed primarily to cope with our range of MULLARD MAIN AMPLIFIERS but will also operate equally well with any range of Amplifiers requiring an input of 1000 mV/10K.

COMPLETE KIT £12.10.0

ASSEMBLED AND TESTED £15.0.0

BRENNELL "TWIN THREE" AMPLIFIER

Stereo "TWIN THREE" Amplifier with specially designed PORTABLE CASE

A most compact portable design consisting of two small TWIN CHANNEL AMPLIFIERS based on the latest design by MULLARD LTD. incorporating top grade Transformer, Treble and Equaliser. The Treble-Pentode Valves Mullard E.C.L. 86. Separate base and Treble controls. Suitable for use with Crystal Pick-Ups and capable of handling genuine high quality reproduction up to 15 watts per channel. An attractive and compactly portable case in two-tone colours. The unique feature of the design is the loudspeaker mounting. Two 8 x 6 in. elliptical loudspeakers are separately hinged and mounted in the lid, which is detachable, allowing for each speaker to be individually positioned.

PRICE for the ASSEMBLED AMPLIFIER, Two £5.6.0. (16-case with CRITICAL UNIT.

"TWIN-THREE" Assembled and Tested: £18.0.0.

PORTABLE CASE CHARGED £16.0.0.

STERN RADIO PREMIER RADIO

EMAIL ORDERS and all Postal Enquiries to

www.americanradiohistory.com
BUILD A HIGH QUALITY TAPE RECORDER LIKE THIS FOR £35.00.

FOR THIS WE SUPPLY

* Complete Kit of Parts to Build the HF/TR3 Tape Amplifier.
* Parts Selection 10 x 24m. p.m.
* ACO Crystal Microphone and 1,200K Spool Tape

ALTERNATIVELY WE SUPPLY THE COMPLETELY ASSEMBLED and GUARANTEED TAPE RECORDER FOR £39.10.

The COMPLETE KIT

For Constructors with their own cabinet—WE OFFER—

(a) COMPLETE KIT to build the HF/TR3 Amplifier together with the COLLARO RTR-2 RTR-3 Deck, Deposit £5.00, 12 monthly payments of £1.18.3
(b) As above but with complete assembly and tested
   Deposit £5.18.0, 12 monthly payments of £1.17.6
(c) COMPLETE KIT to build the HF/TR3 AMPLIFIER with the BRENELL MK. V TAPE DECK...
   Deposit £5.18.0, 12 monthly payments of £1.17.6
(d) As above but with HF/TR3 supplied assembled and tested
   Deposit £5.60.0, 12 monthly payments of £1.60.0
(e) The ASSEMBLED and TESTED HF/3R AMPLIFIER with the WEARITE MODEL 4A DECK, incorporates WEARITE Head Lift Deck, Deposit £5.18.0, 12 monthly payments of £1.18.3.

HF/TR3 MKII TAPE AMPLIFIER
(Mullard Type "A" design)

A very high quality Amplifier incorporating 3-speed treble equalisation, by the latest FEROCUBE POT CORE INDUCTOR. FOR COLLARO TRUVOX-BRENELL WEARITE Deck. Price Includes Output Transformer, separate Power Supply Unit.

KIT OF PARTS £13.13.0
Deposit £2.13.0 12 months at £1.41.11

SPECIAL "COMBINED ORDER" PRICES

For Constructors with their own cabinet—WE OFFER—

(a) COMPLETE KIT to build the HF/TR3 Amplifier together with the COLLARO RTR-2 RTR-3 Deck, Deposit £5.00, 12 monthly payments of £1.18.3
(b) As above but complete and assembled and tested
   Deposit £5.18.0, 12 monthly payments of £1.17.3
(c) COMPLETE KIT to build the HF/TR3 AMPLIFIER with the BRENELL Mk. V TAPE DECK...
   Deposit £5.18.0, 12 monthly payments of £1.17.3
(d) As above but with HF/TR3 supplied assembled and tested
   Deposit £5.60.0, 12 monthly payments of £1.60.0
(e) The ASSEMBLED and TESTED HF/TR3 AMPLIFIER with the WEARITE MODEL 4A DECK, incorporates WEARITE Head Lift Deck, Deposit £5.18.0, 12 monthly payments of £1.18.3.

THE MODEL HFG/2R PORTABLE TAPE RECORDER
(Original Price £33.6.0)

FOR ONLY 22s.

H.P. Deposit £3.14.0, 12 months £13.19.0
Crystal Microphone £1.50 extra (Carr. and Ins. 10d. extra).
Incorporates the LATEST GARRARD "Magazine" Tape Deck and a Hi-Fi quality Amplifier which is entirely based on the very successful NULLARD TYPE "A" design and specifically developed to operate the GARRARD DECK.

The AMPLIFIER includes six independent channels of the GARRARD TAPE MAGAZINE and 4tn. S.V.O. of Double 4tn. S.V.O. of double Output Transformer. Each channel is driven by its own output stage, and provides up to 1.0 hour playing time. Truly "Vibrato", weighs only 12 lbs. Outstanding features are excellent performance and simplicity of operation.

THE TRUVOX "Series 80" TAPE EQUIPMENT

MODEL D82
INTEGRAL DECK

Incorporating Twin Track Heads. Deposit £5.57.0, 12 months £18.17.0

MODEL D84

With Four Track Heads and Track Switch for Mono/mono operation. Deposit £5.57.0, 12 months £18.17.0

MODEL P82

Complete Twin Track Tape Recorder-Pre-amp Unit. Deposit £5.57.0, 12 months £18.17.0

MODEL P84

Complete Twin Track Tape Recorder-Pre-amp Unit incorporated outboard for Stereo reproduction. Deposit £5.57.0, 12 months £18.17.0

The PD82 and 84 comprise four self-contained units to add tape facilities to existing sound reproducing installations (hi-fi, tape recorder or good radio receivers—no special equipment to buy). DESCRIPTIVE LEAFLETS READY AVAILABLE

ADD "HI-FI" TAPE RECORDING TO YOUR EXISTING STEREO TUBE AMPLIFIER WITH THE TRUVOX TRUVOX-BRENELL WEARITE DECK. Price Includes Output Transformer, separate Power Supply Unit. Core Push Pull Oscillator and 3-speed treble equalisation by FEROCUBE Pot Core. Priced at £39.10.

THE 'ADD-A-DECK'

Incorporating GARRARD TAPE DECK and MODEL HFG/2R PRE-AMPLIFIER

Supplied on ONE 'OFFER' (as illustrated) READY 18 Gns.

Price includes Garrard Magazine and a 4tn. Spool Tape. H.P. Deposit £3.14.0, 12 months £13.19.0. Provides complete tape recording facilities and designed to operate with the standard type of RADIO RECEIVERS, or an AMPLIFIER, from which truly first class reproduction is obtained. It consists of a Twin Track Deck connected up to the Pre-amplifier and operates at 8ips., speed providing up to 1.0 hour playing time.

THE JEMCO MODEL MT-955 MULTIMETER

3,000 ohms per volt — D.C.
5,000 ohms A.C.
A truly efficient Meter for the amateur or professional. A.C. volts 2.5-10-50-250; 1-K and 50-250-1.0-K. Resistance 4 Ranges up to 20 meg. and A.C. Current 100mA-10mA-1.0mA-0.1mA-0.01mA. 10 amps. £12.19.6. Prices, including Lead Test Kit.

SPECIAL OFFER!

WE HAVE A LIMITED QUANTITY of HMV Model 544 STEREO AMPLIFIERS at OFFER THEM FOR £18.18.0 Deposit £5.15.0 LIST PRICE £21.5.0

A complete Stereo Amplifier incorporating All Controls. Suitable for Crystal or Ceramic Stereo Pick Ups producing 4 watts peak power per channel from its separate 60 W.T. power amplifier. Operates with 15 ohm Loudspeakers and has power available for Radio Tapes.
AUDIOTRINE HI-FI TAPE RECORDER KIT

REALIZED AT INCREDIBLY LOW COST, CAN BE ASSEMBLED IN AN HOUR.
The Audiotrime High Fidelity Tape Recorder Kit. The Audiotrime High Quality Tape Amplifier with negative feedback equalisation for each of 3 speeds. High Flux P.M. Speaker, Square Wave Transformers. Best quality Tape Cabinet with latest attractive two-tone polychrome finish, size 14 x 14 x 10 in., high, and circuit. Total cost as assembled individually approximately $40. Performance equal to units in the $50-50 class. S.A.E. for leaflet.

HIGH FIDELITY 12-14 WATT AMPLIFIER TYPE A11

PUSH-PULL ULTRA LINEAR OUTPUT "BUILT-IN" TAPE CONTROL PRE-AMP STAGES
Two input sockets with associated controls allow mixing of "mixer" and "gram", as in A10. High sensitivity, includes 4 valves, ECC83, ECC83, EL84, ELA4, SV3. High Quality section-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 ± 1 db. 20-30,000 c.f.s. Six negative feedback loops. Hum level 60 D.B. down. ONLY 23 millionths INPUT required for FULL OUTPUT. Suitable for use with all makes and types of pick-ups and magnetic cartridges comparable with the best designs. For STANDARD or LONG PLAYING RECORDS. For NEW (35 RPM) 33 1/3 RPM, BOXING BASS and TREBLE LIFT and CUT. OUTPUT SOCKET with plug gives 300 v. 30 mA, and 6.6 v. 1 1/2 a. For supply of a complete 3-track tape, for 3 or 16 ohm speakers. Kit is complete to last nut. Chassis is fully punched. Full instruction wiring diagrams supplied. For S.A.E. for complete leaflet.

R.S.C. STEREO/TEN HIGH QUALITY AMPLIFIER

A complete set of parts for the construction of a stereo-phonograph amplifier giving 2 watts high quality output on each channel (total 15 watts). Sensitivity is 50 million, suitable for all crystal stereo heads. Ganged Bass and Treble Control give equal variation of "lift" and "cut". Provision made for use as straight (monaural) 10 watt amplifier. Valve line-up ECC83, EL84, ELA4, ELA4, Outputs for 2-ohm speakers. Point-to-Point wiring diagrams and instructions supplied. For S.A.E. for illustrated leaflet."Ready-to-assemble Cabinets, Speakers, Microphones, etc. with cash and credit terms.

R.S.C. BATTERY CHARGING EQUIPMENT


PAREMCO POTTED CHOKES
200 ma. 300 1200 16v. 200 ma. 120 ma. 8 H 10 ohms 16/9

SOLDERING IRONS. 200-250 v. 30 watts. First quality. For Radio work. 100 spare elements and bits available.

R.S.C. MAINS TRANSFORMERS (GUARANTEED)

FULLY SHROUDED (continued)—
425v-425v, 200ma, 6.3v. C.T., 5.4v. 4 a. c. t. for 800-1200 v.
650v-650v, 500 ma. 6.3v. 6.3v. C.T. 5.4v. 3a. 5/8

OUTPUT TRANSFORMERS

Midget Battery Pots 6/11 for 384, etc.
Small Pentode, 5000 000 to 30...
Small Pentode 78/000 to 30...
Standard 7000 to 50...
Standard 7000 to 300...
10000 to 30...
20000 to 30...
Push-Pull 8 watts, EL84 or 6s6 to 3... or matched to 100...
PUSH-PULL 10-15 watts to match 6s6 or EL84 or 3-6 or 150...
Following for 4 and 150 speakers...
PUSH-Pull 10-12 watts or EL84 or 15...
PUSH-Pull 15-18 watts, 6s6, 28/28/28/28...
PUSH-Pull for Mullard 500 Ultra...

KITS OF VARIOUS DYNAMOS
12 volt, 3a. 5/8
20 volt, 20 watts, sectionally wound, 6L6, KT66, EL84, etc...

MIDGET MAINS Primaries 200-250 v.
50 c/s, 250-300 v. 60 A.C., 5.4v. 3a...
250-300 v. 60 A.C., 5.4v.
12/11
Both above size 21 x 21 x 21...

FILAMENT TRANSFORMERS

All with 200-250 v. 50 c/s, Primaries 63 v, 1 a. 5a. 5/8: 63 v. 2 a. 7 g... 0-6-3 v. 2 a. 7/8. 63 v 3 a. 17/8. 63 v 5 a. 17/8. 12 v, 15 a. 17/8. 12 v or 15 a. 17/8.

SMOOTHING CHOKES

100 ma. 70-120 H 260 ohms...
60 ma. 60-120 H 350 ohms...
60 ma. 45-90 H 450 ohms...
60 ma. 30-60 H 750 ohms...
60 ma. 15-30 H 1500 ohms...

CHARGER TRANSFORMERS


AUTO (step up/step down) TRANS.
6-250 v. 50 c/s... 125/150/250... 250 watts...
41/4/11... 250 watts...
41/4/11... 125/150/250... 125 watts...
125 watts...
41/4/11... 250 watts...
41/4/11... 125/150/250... 125 watts...
125 watts...
41/4/11... 250 watts...
41/4/11... 125/150/250... 125 watts...
125 watts...
41/4/11... 250 watts...
41/4/11... 125/150/250... 125 watts...
125 watts...
41/4/11... 250 watts...
41/4/11... 125/150/250... 125 watts...
125 watts...
41/4/11... 250 watts...
41/4/11... 125/150/250... 125 watts...
125 watts...
41/4/11... 250 watts...
41/4/11... 125/150/250... 125 watts...
125 watts...
41/4/11... 250 watts...
41/4/11... 125/150/250... 125 watts...
125 watts...
41/4/11... 250 watts...
41/4/11... 125/150/250... 125 watts...
125 watts...
41/4/11... 250 watts...
41/4/11... 125/150/250... 125 watts...
125 watts...
41/4/11... 250 watts...
41/4/11... 125/150/250... 125 watts...
125 watts...
R.S.C. 10 WATT ULTRA LINEAR HIGH FIDELITY AMPLIFIER A10

A highly sensitive Push-Pull high output unit with self-contained negative feedback control stages. Certified performance figures compare equally with most expensive amplifiers available. Hum level 70 db. down. Frequency response 40-22,000 c. Excellent with high or low output valves. All components are chosen for reliability. Six valves were designed for EF86, ECC83, 607, 607, GZ32. Separate Bass and Treble are provided. Minimum loudspeakers required for full output is only 16 watts so that any KIND OF SPEAKERS, STEREO or THEATRE, DANCE HALLS or OUTDOOR FUNCTION can be used. No accessory electronic ORGAN, GUITAR, STRING BASS etc. For standard output, see accompanying record orchestra outputs are 31/2 watts.anagan tuned, etc. for the supply of a Radio Feeder Unit, or Tape-deck pre-amplifier. For A.C. mains input of 200-250 v. Output well balanced for Bass and Treble Controls are provided. These control full range volume, tone and pitch. The negative feedback is negligible being 70 db. down 15 db. of Negative feedback is used. H.T. of 300-350 v. and L.O.F. of 900-1200 v. Power Amplifier is of 15 watts. For all competitive prices.

R.S.C. 4 5 WATT AS-HIGH-GAIN AMPLIFIER

A highly sensitive 2-vatave quality amplifier for the home, small club, etc. Only 30 millivolt input is required for full output with the latest high fidelity pickup-heads, in addition to all other high demands. Separate Bass and Treble Controls are provided. All parts are housed in a specially designed cabinet. Separate Bass and Treble Controls are provided. These are self-limited and can be used for all loudspeakers. B.B. and Treble Controls can be used for all loudspeakers.


R.S.C. HI-FI SPEAKER SYSTEM CONSISTING of matched 12-in., Bass Reflex and 7 1/2 in. Treble. Designed primarily for all types of speaker cabinets. Bass Reflex Cabinets. Suitable Speaker systems assembled as either standard 10-in. or assembled for use with 8-in. or 6-in. speakers. Price £5.30.6. For all competitive prices.
AND MANY OTHERS IN STOCK, INCLUDING CATHODE RAY TUBES AND SPECIAL VALVES. All U.K. Orders
40/- per 100. P. & P. 2/- on orders over £5. Orders by post 10/- per item. P. & P. free. C.O.D. 2/6 extra.
Out of stock. Overseas Postage extra at costs.

BRAND NEW ORIGINAL SPARE PARTS FOR AR8 RECEIVERS.

Please write for details.

MARCONI TYPE 520/521 RECEIVERS.

When using this receiver, ensure that the

- battery charger is not overloaded.
- no interference is caused by nearby electrical equipment.
- the proper voltage is used for the battery charger and
- the receiver is not damaged by excessive current.

CATHODE RAY TUBES.

- Type V. E. 1195.
- Type V. E. 1195B.
- Type V. E. 1195C.
- Type V. E. 1295.
- Type V. E. 1295A.
- Type V. E. 1295B.
- Type V. E. 1295C.
- Type V. E. 1395.
- Type V. E. 1395A.
- Type V. E. 1395B.
- Type V. E. 1395C.
- Type V. E. 1495.
- Type V. E. 1495A.
- Type V. E. 1495B.
- Type V. E. 1495C.
- Type V. E. 1595.
- Type V. E. 1595A.
- Type V. E. 1595B.
- Type V. E. 1595C.
- Type V. E. 1695.
- Type V. E. 1695A.
- Type V. E. 1695B.
- Type V. E. 1695C.
- Type V. E. 1795.
- Type V. E. 1795A.
- Type V. E. 1795B.
- Type V. E. 1795C.
- Type V. E. 1895.
- Type V. E. 1895A.
- Type V. E. 1895B.
- Type V. E. 1895C.
- Type V. E. 1995.
- Type V. E. 1995A.
- Type V. E. 1995B.
- Type V. E. 1995C.
- Type V. E. 2095.
- Type V. E. 2095A.
- Type V. E. 2095B.
- Type V. E. 2095C.
- Type V. E. 2195.
- Type V. E. 2195A.
- Type V. E. 2195B.
- Type V. E. 2195C.
- Type V. E. 2295.
- Type V. E. 2295A.
- Type V. E. 2295B.
- Type V. E. 2295C.
- Type V. E. 2395.
- Type V. E. 2395A.
- Type V. E. 2395B.
- Type V. E. 2395C.
- Type V. E. 2495.
- Type V. E. 2495A.
- Type V. E. 2495B.
- Type V. E. 2495C.
- Type V. E. 2595.
- Type V. E. 2595A.
- Type V. E. 2595B.
- Type V. E. 2595C.
- Type V. E. 2695.
- Type V. E. 2695A.
- Type V. E. 2695B.
- Type V. E. 2695C.
- Type V. E. 2795.
- Type V. E. 2795A.
- Type V. E. 2795B.
- Type V. E. 2795C.
- Type V. E. 2895.
- Type V. E. 2895A.
- Type V. E. 2895B.
- Type V. E. 2895C.
- Type V. E. 2995.
- Type V. E. 2995A.
- Type V. E. 2995B.
- Type V. E. 2995C.
- Type V. E. 3095.
- Type V. E. 3095A.
- Type V. E. 3095B.
- Type V. E. 3095C.
- Type V. E. 3195.
- Type V. E. 3195A.
- Type V. E. 3195B.
- Type V. E. 3195C.
- Type V. E. 3295.
- Type V. E. 3295A.
- Type V. E. 3295B.
- Type V. E. 3295C.
- Type V. E. 3395.
- Type V. E. 3395A.
- Type V. E. 3395B.
- Type V. E. 3395C.
- Type V. E. 3495.
- Type V. E. 3495A.
- Type V. E. 3495B.
- Type V. E. 3495C.
- Type V. E. 3595.
- Type V. E. 3595A.
- Type V. E. 3595B.
- Type V. E. 3595C.
- Type V. E. 3695.
- Type V. E. 3695A.
- Type V. E. 3695B.
- Type V. E. 3695C.
- Type V. E. 3795.
- Type V. E. 3795A.
- Type V. E. 3795B.
- Type V. E. 3795C.
- Type V. E. 3895.
- Type V. E. 3895A.
- Type V. E. 3895B.
- Type V. E. 3895C.
- Type V. E. 3995.
- Type V. E. 3995A.
- Type V. E. 3995B.
- Type V. E. 3995C.
- Type V. E. 4095.
- Type V. E. 4095A.
- Type V. E. 4095B.
- Type V. E. 4095C.
- Type V. E. 4195.
- Type V. E. 4195A.
- Type V. E. 4195B.
- Type V. E. 4195C.
- Type V. E. 4295.
- Type V. E. 4295A.
- Type V. E. 4295B.
- Type V. E. 4295C.
- Type V. E. 4395.
- Type V. E. 4395A.
- Type V. E. 4395B.
- Type V. E. 4395C.
- Type V. E. 4495.
- Type V. E. 4495A.
- Type V. E. 4495B.
- Type V. E. 4495C.
- Type V. E. 4595.
- Type V. E. 4595A.
- Type V. E. 4595B.
- Type V. E. 4595C.
- Type V. E. 4695.
- Type V. E. 4695A.
- Type V. E. 4695B.
- Type V. E. 4695C.
- Type V. E. 4795.
- Type V. E. 4795A.
- Type V. E. 4795B.
- Type V. E. 4795C.
- Type V. E. 4895.
- Type V. E. 4895A.
- Type V. E. 4895B.
- Type V. E. 4895C.
- Type V. E. 4995.
- Type V. E. 4995A.
- Type V. E. 4995B.
1. TRANSISTORIZED POCKET RADIO with PRINTED CIRCUIT, MINI-
HARP STYLE, HIGH GAIN FERROX SLAB AERIAL—NO AERIAL OR
EARTH REQUIRED. This wonderful little set to build yourself gives you
completely personal listening. Luxembourg obtainable in favourable areas!
Twins coloured case 41 x 23 x 14m. 2/- p. & p. 9/- (All parts sold
separately).

2. LINE H.K. TRANSFORMERS. Built-in line width control. 14V. Beam coil
90m. detection on ferrite yokes, Frame O.P. transformer pl. 14V. Mosfet
condenser, suitable for 14m. 15m. or 25m. range. With circuit diagram. 2/6

3. OSCILLOSCOPE for D.C. and A.C. APPLICATIONS. Push-pull X amplifier.
Fly-back suppression; Internal Time-base Beam Wave form available for
external use; pulse output available for checking UV Line O.P. Transformers,
etc. Provision for external -1P and C.B.T. Brightness Modification. A.C.
maina 200/250 V., 118/15.0, p. p. 3/-, or 25.0, peak plus 15.0 p. & p.
and 12 month permanence of 25/8. FULL 12 MONTHS GUARANTEE
INCLUDING VALVES AND TUNE.

4. A.C./D.C. POCKET MULTI-METER KIT. 5m. moving coil meter, scales,
calibrated in A.C./D.C. volts, ohms and milliams. Voltage range A.C./D.C.
0-50, 0-100, 0-250, 0-500. Milliamper 0-10, 0-100, 0-1000. 24/-; p. & p.

5. CHANNEL TUNER. Will tune to all Band I and Band II stations. Complete
modified as an aerial upserter (instructions supplied), 3/2/- plus 4/- p. & p.

6. TUNER TRANSFORMER to suit above. 200/250 V., 4/- plus 7/- p. & p.

7. TRANSISTORIZED AMPLIFIER can be used with the ST 244 output.
1 watt. 43 x 21 x 14m. printed circuit, tone and volume controls. 4 transistors.
Be altering 2 resistor, 3 watt output can be obtained. Push-pull output with
5m. moving coil speaker. Built and tested. 49/6, p. & p. 9/6.

8. SIGNAL GENERATORS. Cash 49/6 or 30/- deposit and 6 monthly
payments of 11/9, p. p. 5/- Coverage 200 kHz to 250 kHz on fundamen-
tal and 100 Mc to 500 kHz on harmonics. Case in 43 x 21 x 5/4. These
minature valves and Metal Heilinger. A.C. mains 200/250 V. internal
modulation of 400 p.p.s. to a depth of 20 per cent. Modulated or un-
modulated +F.P. output continuously variable. 100 milliwatts. C.W. and mod.
switch. Variable A.F. output, Magic eye as output indicator. Accuracy
± 5 per cent.

10. SIGNAL GENERATORS. Cash 5/5.0, p. p. 5/- Coverage 120 kHz
to 84 Mca. Case 10 x 61 x 41m. Size of Scale 10 x 23m. A valves and
receiver. A.C. mains 200/250 v. Internal modulation of 400 p.p.s. to a
depth of 30 per cent, modulated or unmodulated R.F. output continuously
variable 100 milliwatts. C.W. and mod. switch, variable A.F. output and
moving coil output meter. Accuracy ± 2 per cent.

ITV ranges. Also Police, Fire and Taxis, etc. Hand built by famous maker.
15/-, p. & p. 3/-.

Rise 10/4 x 61m. 5 valves. for use with all makers and types of pickup
and mike. Negative feed back. Two inputs, mike and guitar, and controls
for same. Separate controls for Bass and Treble lift. Frequency flat from
40 cycles to 15,000, ± 2 db down to 20 kh. Output 8 watts at 5 per
cent total distortion. Noise level 60 db down all hum. Output transformer
tapped for 3 and 15 ohm speech units. For use with 2011 or L.T. receiver
metal instruments such as guitars, etc. Suitable for small halls. £2 19/6,

13. R.E.H. MONARCH GAS WITH FULL-FIT HEAD. 4-speed, plays 10 records,
100m., 100m., or 7m. at 15, 33, 45 or 78 r.p.m. Interchange 7m., 10m.
and 15m. records of the same speed. Bass manual play position; colour brown.
Dimensions: 15 x 104m. Base fixed crystal required crystal head £1 19/6. P. & p. 5/-.

14. TRANSISTOR TESTER. For both P.N.P. and N.P.N. transistors incorporat-
ing moving coil meter. Incl. case, size 43 x 21 x 14m. Scale marked in
gain and leakage. 10/-, p. & p. 3/-.

15. PUSH-PULL OUTPUT STAGE inclusive of transistors with input and
output transformers to match 3 other speaker coils, suitable for use with the
PUSKKIT RADIO. Kit of parts, including transformers. 15/-, p. & p. 2/6.
Wiring diagram 1/6, free with parts.

Size 4 x 33m. with tone and volume control. Complete with Valves: EZ 182
and EZ 80. Output 2 watts, 30/-, P. & P. 3/-.
What! A TV in a Caravan?

To operate your razor from car battery or suitable for many other uses, we offer: Mod. Generator 12v. input, 200 v. output, which must have cost at least £10 to make, for only 17s. 6d. plus 6d. post and insurance.

The J.B. Tangential Air Conditioner

The displacement caused by the new tangential fan is quite amazing, but what is most amazing is the almost complete absence of noise. The J.B. Air Conditioner on a window ledge near an open window, and you can have either the extraction of bad air, or input of clean, new air. The unit is thermostatically controlled, upon which you turn it on.

In addition to a fan for moving the air, the unit also contains a heating and control switch, wired such that 20s. 6d. or £1 or more of heating may be used.

The total building cost of this air-conditioner is £7.10s., but is offered at a specially low price during the summer months, this price namely £6.10s. plus carriage and insurance. The case is very nicely finished in hammerred enamel, and when assembled, the unit is indistinguishable from those selling at £25 and more.

Don't miss this special summer offer.

Adjustable Thermostat

Suitable for industrial or domestic purposes, such as controlling furnace temperature. Can also be used as a thermostat or fire alarm. Dimensions of these are approximately 17 long and adjustable over a range 0 to 500 F. The contacts are rated at 15 amps., 250 volts, and the adjustment spindle, which comes to the top, can be fitted with a flexible drive for remote control or just a pointer knob for local control. Listed at £3 or £4 each, these are offered at only 17s. 6d. plus 6d. postage and insurance.

Introducing the J.B. Range of Transistors

Try these, you will be very pleased—
J.B. All Wave mixer...
J.B. L.F. Amplifier...
J.B. A.F. Drive...
J.B. Output matched pair...
Special offer set of six matched for superhet...
Special offer set of four matched for Amplifier (1 watts)...

Transistor Components

Send S.A.E. for our new price list, just printed.

“Jolly fine set but deserving a better case.”

This is a comment which many constructors have made, and therefore we now offer a Deluxe version of the Pocket Companion. This uses a solid state of very pleasant red with gold lettering and the Pocket Companion now has the 15 guinea look.

The most up to date Superhet portable of its type, it uses a transistor in conjunction with Philco R.F. and Mullard output transistors. Complete building costs with plastic case £6.10s., or with solid case, £7.15s.

If you have already built and want to change your case, then return the plastic case with a postal order for £1 or if you wish to retain the plastic case then send 2s. 6d. plus 6d. post and insurance, for the hide case only.

Air & Water WAY TO BUILD OUR COMPANION PORTABLES. SEND S.A.E. FOR FULL DETAILS.

Oscillating Unit 12A

This is a precision instrument covering the range 3 to 11 MUSIC with three sets with 22, 100, and 0-50 cycles per second and variable eye and ear indicator. Unused in original transistor cases with attenuator box limited quantity only, £10 each.

Aircraft Radio Receiver, Type CW 0460 48 D

This is part of the equipment R191, American made equipment for the Navy, it is a valve receiver with a really beautiful precision tuning and a mechanism. Brand new in original packing, no useless leads in coils, Lims, etc., quantity only, £5 cash.

CLOSED CIRCUIT TV

If you feel like taking a day out and invite you to our studio here at Eastbourne and will demonstrate 30 and 82 systems, as well as under various conditions and other types of installations. We have equipment for sale or loan, and will be glad to discuss with you any proposals which you may have. You will be interested to note that a transistorized camera for working direct into a domestic TV receiver can now be purchased for little more than the cost of a camera.

The 'Good Companion' Mk.11 using Transistors

In the "de-luxe" cabinet as illustrated it costs £10.10s. 6d. but what about the set? Look at these prices and you will find nothing to compare with its specification. It uses transistors instead of L.F. transformers, has variable feedback controls and, especially, all the usual features, A.V.C., Push-pull output, F.F.E. F.E.A.R., Slow Motion Tuning, etc., etc., all powered from a 12 volt U.L. or 22 volt M.S. wave set, conservatively rated at 200w. Every component used is of the highest grade, such as American Philco M.A.T.F.R. transistors—Mullard A.F. transistors—Jackson Bros. tuning condensers—Fila-Celestion loudspeakers—Dublin—C.C. Mullard resistors and controls. Also full after-sales service available.

You will definitely be doing the right thing if you buy a Good Companion.

Yaxell Switches

All new and unused and in first class condition:
1 pole, 2 way 1/6s.
1 pole, 4 way 2/6s.
1 pole, 7 way 3/6s.
1 pole, 11 way 5/6s.
2 pole, 2 way 3/6s.
2 pole, 4 way 3/6s.
2 pole, 6 way 5/6s.
2 pole, 8 way 8/6s.
2 pole, 12 way 1/6s.
3 pole, 2 way 3/6s.
3 pole, 4 way 5/6s.
3 pole, 5 way 5/6s.
3 pole, 6 way 5/6s.
3 pole, 8 way 8/6s.
3 pole, 10 way 1/6s.
3 pole, 12 way 1/6s.
4 pole, 2 way 3/6s.
4 pole, 3 way 3/6s.
4 pole, 4 way 3/6s.
4 pole, 5 way 5/6s.
4 pole, 8 way 8/6s.
4 pole, 16 way 1/6s.
5 pole, 2 way 3/6s.
5 pole, 6 way 8/6s.
5 pole, 8 way 8/6s.
6 pole, 2 way 3/6s.
6 pole, 6 way 8/6s.
6 pole, 12 way 12/6s.
8 pole, 2 way 8/6s.
8 pole, 6 way 8/6s.
12 pole, 5 way 8/6s.
12 pole, 12 way 12/6s.
Special prices for quantities.

Philco Record Player Cabinet

Two toned, covered with high grade rexine, fitted with rubber feet. The iron plate plate is a useful source of 0-50w. of tygan with a horizontal solid bar. The two approximately 81/6 wide, 81/6 deep, 11/6 high. One is similar to an old record player or tape desk and amplifier. The case cost at least £3 each, our special price 91/6, carriage and insurance in 6s.

“Coolerast”

Works in reverse to normal—for switching lights, fuses, air conditions, anything on the Limited Pullin Company. One of the best bargains you can buy. For controlling room temperature between 35°-9°F. Switch 15 amps. Regular price over £3. We offer standard model at £2.6s. 0d. or with neon indicator at 27s. 6d. Do not miss this unparalleled bargain.

Power Unit

A useful source of D.C. for experimenting with electronic, electrical, radio, television, etc., etc. This power unit can be made in a few hours and due to the availability of the rectifier valve at a very low price, we can supply the complete kit of parts with complete A.E.C. instructions, send a small deposit of 50s. for every kit, plus 1st, post and insurance.

Building A 'Scope?

31m. oscillograph tube, American 314B, 0.6w. heater, Electrostatic deflection, brand new and guaranteed with circuit diagram ofscope, 12v. each, plus 2/6 post and insurance.

www.americanradiohistory.com
Last of these
Brayhead
Turret Tuner
(complete with
plastic housing
and 3 coils.
New but
moved from
unused equip-
ment. Least
valves 15/-
each or with valves 25/-
each. Post 2/6 (Knobs 2 6/6 extra).

MULTI-METER BARGAINS!

MODEL 200H (illus. on right). 20,000 ohms per volt, 20
ranges comprising A.C. volts, 5 ranges up to 1,000 D.C. volts,
6 ranges up to 2.5KV. C.C. current, 3 ranges up to 26 ohms,
resistance, 2 ranges up to 5 meg. capacity 2 ranges up to 0.1
decibels —30 to +22. Scale cornerwise to the equivalent
of 4 movement. is a pocket size instrument measuring 3x x
3 1/4 in. Complete with test leads, battery and operating

MODEL EPIOK. Similar in size and appearance to 200H
except that this is 10,000 ohms per volt and maximum D.C.
volts 1,200 instead of 2.5K, also no capacity range. Price
£5.19.6. Post free.

ALL METERS BRAND NEW AND
FULLY GUARANTEED

MODEL TPSS. (illus. on left). 20,000 ohms per volt, D.C.
volts, 5 ranges up to 1,000 A.C. volts, 5 ranges up to 1,000
resistance, 2 ranges up to 10 meg., capacity 2 ranges up to
0.1 decibels —20 to +16. One switch control really beautifully
make precision instrument. size only 3x x 3 1/2 x 12 in.,
price only £5.19.6. Post free.

MODEL TP10. Similar in size and appearance to TPSS, but
sensitivity 2,000 ohms per volt, price £3.19.6. Post free.

MODEL UI. A robust instrument of 1,000 ohms per volt
sensitivity, A.C./D.C. volts up to 500, resistance up to 200K, size
5x x 3 1/2 ins. Complete with test prods, single switch control,
large easily read scale, price only £1.19.6. Post free.

Building An Amplifier?

Here is a buy for you! Modulator Unit Type 20. Contin-
tains parts ideal for building a large output
amplifier and already set out in
metal case. To make a
Four high output
valves Type X744.
Driver valve Type
M41. Iron core
choke for up to 300
milli-amps.
Difhose of
wire
wound and carbon
resistors, paper and
mica condensors.

Blueprint Receiver
The International SW2
All components to make up this
receiver as described in the April
issue are available. Price £3.19.6,
plus 2/- postage and insurance.

A.C./D.C. Multimeter Kit
Ranges: D.C. volts
0-5, 0-50, 0-100,
0-500, 0-1000 A.C.
volts, 5-5, 5-0, 6-0.
0-5000 D.C., milliamperes
0-5, 0-50, 0-500
0-50000 with inter-
nal batteries. 0-500000 with
external batteries. 0-500000 D.C.,
electrolytic condensors.
External batteries of A.C. volts,
D.C. current and ohms.
Essential parts
include: meter case, 4 in.
moving coil meter, selected resistors, wire
for shunts, range selector, switches,
calibrated scale and all instructions.
Price £4.19.6, plus 2/- post and insurance.

Transistor Set Cabinets

Very modern cream cabinet, size 22 x
x 14 in. with chrome handles, tuning
knob and scale. Price 7/6, plus 2/-
postage and packing.

Special quotations for quantities.

Making An Extension
Speaker?

The cabinet illustrated,
and size and appearance
intended for use with ideal
extension speaker. Only
needs fabric on
be cut through middle to make two
stereo cabinets. Bargain at only 8/6, plus 4/- post.

Parcel of Electric Switches
and Switch Plugs
All bakelite types, suitable for nor-
mal house wiring. Parcel comprises,
50 all 1 amp. 1 switch, 50, 2 amp
2 switch. Value easily £5.7, yours for 10/10. Plus
2/- for insurance and postage.

Parcel of Mica Condensors
50 all very useful values. Total list
price over £5 and yours for 8/6. Plus
1/- post.

Lens system for direct TV
Infrared Binoculars

See in the dark for night hunting etc.
You get 2 complete optical systems
could be used for TV, camera and
part of the latest equipment. Unused,
believed in good order, but no guarantee at this silly
price of £2.19.6, plus 1/- carriage.

ELECTRONIC PRECISION
EQUIPMENT LTD.
post orders are dealt with from Eastbourne, so for prompt attention please post your orders to 66 Grove Road,
Eastbourne 7. Callers may use any of the Companies below.

John Bull
268 High Street
Haywards Heath, W.10.
Phone: E.LGar 444
Half day 11.30.

285 PRACTICAL WIRELESS
August, 1962
ARMSTRONG AF208 AM/FM RADIOGRAM CHASSIS

COMPLETE RADIO £4.19.6 post free


DE LUXE MODEL as above but with illuminated dial. Fully tunable over Medium and Long Wave. 5 inch speaker. Stock 5/- 6/- 8/- post free. Tested by us before dispatch.

MAIN TRANSFORMERS 200/250 a.C. Page 5 & 6 each transformer.

STANDARD, 250v.-250v., 60 ma., 6.3 v., 3.3 a.
Tapped 4v., 5v., rectifier 6.3 v. 3 a, 5v., 4v., 5v. Stock 22/6 or 10/-.

MINIATURE 200v.-200v., 30 ma., 6.3 v., 3 a.
Tapped 6v., 7v., 8v., 9v., 10v., Stock 15/-.

MIDNIGHT 200v.-200v., 65 ma., 6.3 v., 3 a.
Tapped 5v., 6v., 9v., Stock 13/-.

ECLAL 220v.-220v., 60 ma., 6.3 v., 3 a.
Tapped 6v., 7v., 76v., Stock 11/-.

HEATER TRANS, 6.3 v. 1 amp.
Tapped 5v., Stock 10/-.

General purpose low volt,age, 5 amp.
5v., 6v., 7v., 8v., 9v., 10v., 11v., 12v., 14v., 20v., Stock 20/-.

AUTO TRANSFORMERS, 100 w.
50, 120v., 230v., 250v., Stock 20/-.

MULLARD “O/H” Miniature Transformers Stock 30/-.

TELEVISION REPLACEMENT Line Output Transformers from 45/- each. New Stock and choice components. Most made available, S.A.E. with all enquiries.

FULL WAVE BRIDGE SILENTO RECTIFIER 2 a. or 12 v. 11 amp., 22/6 or 11/6 a. c. 1/2. 35/-.

CHARGER TRANSFORMER. Tapped input 200 v. for charging unit, 5 v. or 12 v. 15 amp., 1/6. 35/-.

1 AMP CAR BATTERY CHARGER with meter Leads, Push fitting, etc., for 6 v. or 12 v. 6/9.


THE ORIGINAL RADIO COMPONENT

Our written guarantee with every purchase.

THE ORIGINAL

CAR Audio C. R. T. BOOSTER TRANSFORMERS

For Cathode Ray Tubes having heater cathode short circuit. Suitable for Tubes with faling emission. Full instructions supplied.

Type A. Optional 20% and 50% Boost, 2V or 4V or 6.3 v. or 10.5V or 15V. Mains input. 1/66.

LOUDSPEAKERS P.M. 3 OMM. 24, 5, 6in. 19/6. 35/- and 40/-.
30, 5, 6 in. 15/6. 35/- and 40/-.
24, 5in. 10/- and 15/-.
15, 5in. 7/6.

SEPARATOR ALaskan, 15/-.

STANTON 1500, 10/-.

Baker Selhurst Loudspeakers

12m., Baker 8W, Stainton 2 or 15 ohms, 45-15,000 c.p.s.
12m., Baker Stainton, Form suspension, 15 ohms, 45-15,000 c.p.s. 6/6.
12m., Baker Stainton, Form suspension, 15, 20, 30, 40, 60, 80, 100, 150 ohms .6/6.
12m., Baker Ultra Two Twin, 8W. 45-15,000 c.p.s. 15 ohms. Stock to 20 kenos. 11/10.
15m. Auditorium, 30 ohms.

5/7.

TWIN GANG TUNING CONDENSERS, 2.55 pF.
45/- each.

45/- each.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.

25/6.
**Volume Controls**

80 ohm COAX

6 transistor radio kit

First class components to make a 6 transistor radio. Ideal for portable or table radio. All parts including BVA transformers are ferrite aerial, printed circuit.

14/6 x 2m.

Extra and excluding cabinet. Simple instructions 18/6 free with kit.

Speakers: 35 ohm, 7 x 4in., 25/6 extra, $3.50.

**TV Plug-in "V" Aerial 16/6**

Jacks: ringer open circuit, 2/6, Closed circuits, 4/6. Grindler type, 4/6, 12/6.

Jack Plugs: 12/6; T.,/t:,; 4/6, 2/6.

SLOW MOTION DRIVER, 6/1, 25/6.

**ISOLOM BORO, 280, 300W, 28/6, etc.**

**MONARCH RECORD PLAYER**

**BUILD IT YOURSELF SET**

**MONARCH AUTOCHANGER**

**BAND BUILIT AMPLIFIER, HANDSOME PORTABLE CARRY CASE, HIGH FLUX LOUDSPEAKER, FULL INSTRUCTIONS SUPPLIED.**

Carr. and Post 11/6.

**RECORD PLAYER BARGAINS**

Post 2/- each

1 Speed Autochangers:

Colaura 12/6

BSR 1/6

Garrard 1/6

2 Speed Autoplays:

Colaura 2/6

BSR 2/6

Garrard 2/6

**ARDENTE TRANSISTOR CONTROLS**

Type D245, 12/6.

Type D270, 17/6.

Type D305, 21/6.

**ARDENTE VOLUME CONTROLS**

Type VC150, 5W, with switch, 3/6, 12/6.

Dead aid ear piece stai or magnetic, 7/6.

**WAYRED**

Coils and Transformers for a 2-TUBE TRANSISTOR TRANSMITTER AND FERRITE ROD AERIAL

Long and Medium Wave Aerial—R23W. 30 in. rod. 500 ohm, $2.50; 200 ohm, $2.00. Medium Wave—R12W, 30 in. rod. 500 ohm, $2.50; 200 ohm, $2.00.

Size 12in., $1/2; 10/6.

12/6. Medium wave—R12W, 30 in. rod. 500 ohm, $2.50; 200 ohm, $2.00.

3rd size, 12/6.

**PRINTED CIRCUIT BATTERY PORTABLE KIT**


Ferrite Aerial Coils. Rexine covered toughest case cabinet. Size 12in., 8 x 4in. Batteries used D126 (12/6) and D123 (10/6) extra.

Instructions 5/6. (free with kit.)

**COMPONENT SHOP SPECIALISTS**

F. and P. charge 1/6. over 60 post free.

C.O.D. 3/11.

**337 WHITEHOUSE ROAD, WEST CROYDON**

Telephone: THO 1665

(Esprit welcome. Send remittance and extra postage.)

**MONARCH RECORD PLAYER**

**BUILD IT YOURSELF SET**

**MONARCH AUTOCHANGER**

**BAND BUILIT AMPLIFIER, HANDSOME PORTABLE CARRY CASE, HIGH FLUX LOUDSPEAKER, FULL INSTRUCTIONS SUPPLIED.**

Carr. and Post 11/6.

**RECORD PLAYER BARGAINS**

Post 2/- each

1 Speed Autochangers:

Colaura 12/6

BSR 1/6

Garrard 1/6

2 Speed Autoplays:

Colaura 2/6

BSR 2/6

Garrard 2/6

**ARDENTE TRANSISTOR CONTROLS**

Type D245, 12/6.

Type D270, 17/6.

Type D305, 21/6.

**ARDENTE VOLUME CONTROLS**

Type VC150, 5W, with switch, 3/6, 12/6.

Dead aid ear piece stai or magnetic, 7/6.

**WAYRED**

Coils and Transformers for a 2-TUBE TRANSISTOR TRANSMITTER AND FERRITE ROD AERIAL

Long and Medium Wave Aerial—R23W. 30 in. rod. 500 ohm, $2.50; 200 ohm, $2.00. Medium Wave—R12W, 30 in. rod. 500 ohm, $2.50; 200 ohm, $2.00.

Size 12in., $1/2; 10/6.

12/6. Medium wave—R12W, 30 in. rod. 500 ohm, $2.50; 200 ohm, $2.00.

3rd size, 12/6.

**PRINTED CIRCUIT BATTERY PORTABLE KIT**


Ferrite Aerial Coils. Rexine covered toughest case cabinet. Size 12in., 8 x 4in. Batteries used D126 (12/6) and D123 (10/6) extra.

Instructions 5/6. (free with kit.)

**COMPONENT SHOP SPECIALISTS**

F. and P. charge 1/6. over 60 post free.

C.O.D. 3/11.

**337 WHITEHOUSE ROAD, WEST CROYDON**

Telephone: THO 1665

(Esprit welcome. Send remittance and extra postage.)
A NEW-PRACTICAL WAY of UNDERSTANDING

Radio · Television · Electronics
Including: Transistors; VHF/FM; Hi-Fi equipment; Computers; Servo-mechs; Test Instruments; Photo-electrics; Nucleonics, etc.

FOR... Your Career... Your Own Business... An Absorbing Hobby

Radiostructor—an organisation specialising in electronic training systems offers a new self-instructional method using specially designed equipment on a "do-it-yourself" basis.

You learn by building actual equipment with the big kits of components which we send you. You advance by simple steps, performing a whole series of interesting and instructive experiments—with no complicated mathematics! Instructional manuals employ the latest techniques for showing the full story of electronics in a practical and interesting way—in fact—you really have fun whilst learning! Post the coupon below, now, for full details.—
THE RADIO SHOW

THE Radio Show this year will be held at Earls Court, London, as in previous years. The dates of the show are 22nd August to 1st September and, at the time of writing, it seems that this year's show will be one of the best yet, at least so far as attendances are concerned. However, we are of the opinion that the Radio Show could be made to have much more appeal for the amateur radio constructor, even if such enthusiasts form a minority of the visitors to Earls Court. The home constructor market is usually very poorly represented, and there seems no reason to suppose that the situation will be any different this year. As most exhibitors know, the majority of visitors to the Radio Show are mainly interested in the possibility of seeing various celebrities at the stands of the BBC and ITV companies rather than in viewing the new models in radio and TV sets brought out by manufacturers. It seems to us that there is scope for the inclusion of a small section in the Radio Show for the amateur radio enthusiast since there are many firms which cater particularly for this market.

As usual, there will be a PRACTICAL WIRELESS stand at the Radio Show and the number of this stand will be announced later. We shall be pleased to welcome readers and discuss their problems.

PRE-RECORDED TAPES

The advantages of tape recording are well known to most readers and include long life with little change in the characteristics of the recording during its life, compared with disc records which, even with the most expensive equipment on the general market, wear noticeably with each playing. From the moment when tape recorders first made their appearance, record manufacturers have been interested in the possibilities of selling tape records in the same way as disc records are sold. Naturally, this was not possible at first for several reasons; one was the small number of tape recorders in use outside laboratories and studios and similar establishments. However, the tape recorder is rapidly gaining in popularity, mainly because of the ease with which recordings may be made at home.

Another reason for the lack of tape records or pre-recorded tapes in the early days of the domestic tape recorder was the public's unfamiliarity with the machines, which it must be admitted were expensive and needed regular professional servicing to maintain their high performance—both disadvantages in the mind of the public.

There are now over one million tape recorders in this country ranging from miniature types for outdoor work to those of professional quality. The market for tape records is thus rapidly expanding and a leading manufacturer of disc records has recently announced a new range of pre-recorded tapes in addition to its present range. No doubt other concerns will follow suit and increase the number of recordings available so that it becomes worthwhile to build up a tape library. We think that in the very near future, pre-recorded tapes will achieve a much greater popularity than they have so far attained.
P R A C T I C A L  W I R E L E S S
August, 1962

NEWS AT HOME
AND ABROAD

THE following statement shows
the approximate number of
Broadcast Receiving Licences in
force at the end of April, 1962,
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.

<table>
<thead>
<tr>
<th>Region</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>London</td>
<td>647,503</td>
</tr>
<tr>
<td>Home Counties</td>
<td>595,804</td>
</tr>
<tr>
<td>Midland</td>
<td>429,979</td>
</tr>
<tr>
<td>North Eastern</td>
<td>397,951</td>
</tr>
<tr>
<td>North Western</td>
<td>367,426</td>
</tr>
<tr>
<td>South Eastern</td>
<td>311,051</td>
</tr>
<tr>
<td>Wales and Border Counties</td>
<td>293,274</td>
</tr>
<tr>
<td>Total England and Wales</td>
<td>3,086,994</td>
</tr>
<tr>
<td>Scotland</td>
<td>330,898</td>
</tr>
<tr>
<td>Northern Ireland</td>
<td>107,118</td>
</tr>
<tr>
<td>Grand Total</td>
<td>3,524,810</td>
</tr>
</tbody>
</table>

New Development for Hospital Radio

THE cost of hospital ward
radio installations may well
be cut substantially as a result of
successful experimental work
carried out for Dereham Hos-

tial, Norfolk, by Hadley Tele-
phone & Sound Systems Ltd., of
Smethwick, Staffs.

In this hospital the development of new techniques has led
to the doubling of patients' listening facilities without any
increase in the number of bed-
head units.

A method of operating two of the
stethoscope-type headsets
from each bedhead point has

been devised. This has been done
by employing a single driver
unit, mounted in and protected
by the control unit, and splitting
the acoustic outlet by means of a
special bifurcator so that two—or
even more—patients' head-
sets may be served by the same
driver unit.

More CENTO aid for Pakistan

PAKISTAN is to have further
considerable installations of
Marconi high-frequency radio
communications equipment as
CENTO aid.

At Pipri, outside Karachi, a
30kW ISB transmitter type HS51
and its associated drives (type
HD20 and HD31) are to be
supplied.

Ghaggar, the Pakistan Posts
and Telegraphs Departments
receiving station five miles from
Pipri, at which three Marconi
dual diversity H.F. receivers have
been installed, is to have a two-
channel single-path ISB receiver
type HR21.

In Karachi, at the overseas
radio trunk exchange two 2-
channel transistorised radio tele-
phone terminals with 5-band
split-privacy facilities, will be
added to the present complement
of terminals.

Rawalpindi transmitting station, where a 10kW ISB trans-
mittor is already installed, will
have a 31kW ISB transmitter
together with an amplifier to
raise the output to 30kW;
associated drive assemblies and a
coaxial feeder switching unit are
also included in the order.

Dacca, in East Pakistan, is
also to have two 2-channel radio
telephone terminals with 5-band
split-privacy facilities.

The illustration shows three Marconi HD51 drive units, part of a previous
large CENTO order for Pakistan, being inspected in July 1960 by
(right) Mr. F. M. Khan, the present Pakistan Minister of Railways and
Communications, (centre) Mr. M. M. Husain, Chief Engineer, Pakistan
P. and T. Department, and (left) Mr. M. W. Rizvi, Deputy Chief
Engineer (Construction) of the Pakistan P. and T.
VHF R/T System for Sunderland Harbour

EXISTING port services available to shipping using Sunderland Harbour are to be supplemented by a two-channel VHF radio-telephone system which will be supplied and installed by Associated Electrical Industries Ltd. The new equipment will be installed at the Pilot House and will enable ships to obtain pilotage and port information directly. The order has been placed by the River Wear Commissioners with Marine -Department of AEI Telecommunications Division, Woolwich, S.E. London.

Orion Computer

THE Swedish telecommunications group, Telefon AB L. M. Ericsson, of Stockholm, have placed an order, valued at about £400,000, with Ferranti Ltd. for an Orion data processing system. It is the third Orion to be ordered by a Swedish company and the sixth Ferranti computer sold in the Swedish market.

The equipment specified makes the Ericsson system the biggest of 15 Orion orders so far announced by Ferranti.

The work to be undertaken by Orion is, among other things, to integrate a production and stock control system. Ericsson's are one of the large companies within the telecommunication field. The highly technical nature of its activities and the physical size of the organisation—it employs more than 16,000 people at its 23 Swedish factories alone and more than 20,000 more in its foreign subsidiaries and associated companies—make the project very complex. To determine a general plan for the integration of the main routines several years' work is required.

Batteries

ARRANGEMENTS have been made by the Ever Ready Co. (G.B.) Ltd. to market the full range of Mallory batteries and cells. Stocks of all types have been delivered to Ever Ready's sales areas throughout the U.K.

Mallory batteries now handled by Ever Ready will cover the hearing aid, commercial and industrial fields.

New BBC Beckley Station

THE VHF sound transmitters at the BBC's new transmitting station at Beckley, near Oxford, were brought into service on Monday, 28th May. This station is one of several combined television and VHF sound broadcasting stations which are being built to extend and improve the coverage of the BBC's services. The television transmitter is already in operation.

As the service area of the VHF sound transmitters includes parts of the BBC's Midland and West Regions the Beckley station transmits both the Midland and West of England Home Services in addition to the Light Programme. the Third sound service to a quarter of a million people and provide improved reception for a further quarter of a million people in an area which includes Oxford, Bicester, Witney, Swindon, Wantage and Aylesbury.

Microwave Radio Links for Norway

A SUBSTANTIAL contract has been awarded to Marconi's by the Royal Norwegian Air Force for the supply and installation of two microwave radar links for incorporation into Norway's defence system as part of the N.A.T.O. Infrastructure programme.

The contract, which is to the approximate value of £500,000, was obtained in the face of intense competition. No details of the equipments or their intended locations can be given on security grounds but it can be said that they are intended to carry complex search and height-finding radar signals from the radar heads for display and processing at control centres. The radar stations themselves will be operated by remote control over the links.

This follows on the completion of previous important contracts from the Norwegian Ministry of Defence which include a £1,000,000 order in the autumn of 1958 for two high-power, long-range radar control and reporting stations and supplementary equipment.

G8KU is seen here operating one of the stations of the Scarborough Amateur Radio Society during National Field Day, June 2nd/3rd.
In this TRF receiver, a regenerative circuit is used to increase sensitivity and sharpen tuning so that the detector valve can be brought to its most sensitive operating point (the edge of oscillation) if required.

Considerable thought has been given to beginners’ requirements and they will find this set an easy and inexpensive way of tackling mains equipment—perhaps for the first time. Chassis work has been kept small deliberately and a "baffle-mounting" plan adopted partly to simplify construction and partly to obtain the desired slimness.

Valves

The valves used are: ECF80 (triode-pentode), EL84 (output valve), EZ80 (valve rectifier). Shock hazards are removed by fitting a mains isolating transformer and thus no danger to life results from handling metal parts when the receiver is switched on. Complete safety is also provided when the set is switched off due to the use of a double-pole mains switch that breaks both mains connections.

The Circuit

Referring to Fig. 1, it will be seen that a simple grid leak detector is used, signals being conveyed to L1 via TC1 and selected as required by VC1.

Provision for tuning over the medium waveband only is given in the original but other ranges can be covered by fitting extra coils and a miniature rotary wave-change switch. The extra circuitry required for incorporating a long waveband range, for example, is given in Fig. 2. Space can be obtained by repositioning, or fitting a miniature type of output transformer, etc.

Detection

The cathode and grid of V1A perform the demodulating process, R1 acting as the diode load—the two electrodes perform effectively as a diode valve. The resultant audio signal, together with unfiltered R.F., pass to the anode via the screen and suppressor grids, the latter being connected internally to the cathode of V1A.

The positive potential required for the screen grid is obtained from a potential divider connected across the power supply.

A view of the interior of the completed set.
Fig. 2 (right)—A modification to the circuit of Fig. 1 to include long waves.

and reaches the grid via a winding on L1. The R.F. accompanying the audio signal thereby circulates in this winding which if correctly phased can cause positive feedback and oscillation. By making the screen feed voltage variable, the feedback can be controlled and made to increase sensitivity. Potentiometer VR1 performs this service and allows the detector to be brought to the threshold of oscillation without seriously affecting the setting of VC1.

R.F. also appears at the anode of V1B where it is not wanted, but a filter comprising capacitors C3 and C4 in association with an R.F. choke prevents it from reaching the grid of V1A where only audio signals are required. Omission of this choke would seriously affect operation.

The pentode section of V1 also amplifies the audio signals and thus performs two operations simultaneously. The triode section of V1 operates as a conventional A.F. voltage amplifier before presenting the signals to the output valve, V2.

The anode of V2 is fed with relatively unsmoothed H.T. and permits use of a low wattage resistor for R9. The reservoir capacitor, C9 is large enough (32µF) to ensure that hum from the mains is removed. The value of C10 can actually be increased to 50µF with the particular type of rectifier valve specified.

The Power Supply

The full-wave rectification adopted is considerably more efficient than the half-wave type usually fitted to simple receivers. The cost is approximately equal for both types and space differences are negligible. Half-wave rectification is not recommended for use here.

A fuse may be fitted if desired by connecting the secondary centre tap of T2 to chassis via a 0.15A torch bulb instead of direct as shown in the diagram. This will provide safety should a fault such as a heater/cathode short circuit develop in V3 which would cause a heavy flow of destructive current.
Mechanical Details

As may be seen from Fig. 3, the "chassis" consists of a simple rectangle of aluminium (5in. + 4in.) and this carries the tuning capacitor, the potentiometer VR1, with integral on/off switch, the R.F. choke and the tuning coil together with a narrow aluminium shelf (top surface 5in. x 2in.) which carries the three valves. This valve shelf is bolted to the rectangle where shown by means of 6BA nuts and bolts. The weight is negligible and supporting stays are not required.

The tuning capacitor is air-spaced being a miniature type intended primarily for transistor applications (Jackson "O" type—208pF+176pF). It has lower maximum capacitance values than are usually required for valve receiver tuning circuits. Here, the two sections are connected together (in parallel) to provide sufficient capacitance to cover most of the medium waveband. There is some restriction at the low frequency end of the band but this is not important. A conventional air dielectric single gang capacitor (nominal value 500pF) or even a solid dielectric type could be used instead provided it is not too large physically.

An iron cored type of tuning coil is desirable due to the reduced value of tuning capacitance used. The specified coils are used instead provided it is not too large physically.

Location of Parts

The miniature mains transformer is mounted directly on to the inside of the front panel as are also the output transformer, reservoir and smoothing capacitors and elliptical loudspeaker. Prior to fixing these items, a sheet of metal foil is glued to the inside of the panel, but if this is omitted care should be taken to ensure that all metal component casings are connected to the chassis.

![Fig. 3: The main drilling details of the chassis.](image-url)
A Phase-Shift OSCILLATOR

By A. Foord

A SMALL inexpensive audio oscillator is always useful in the home constructor's workshop, whether it is used for experimental work, a Morse practice oscillator, or for modulating an R.F. signal generator. The oscillator to be described has been used at one time or another for all the above applications, and also as a signal source for a resistance/capacity bridge. The oscillator uses a single transistor in a phase-shift network, and gives an excellent sine wave output.

The Circuit

As can be seen from Fig. 1, a fairly conventional arrangement is used. The collector of Tr1 is coupled into a phase-shift network C1, C2, C3, C4, and their associated resistors. The network feeds back into the transistor base. The circuit will oscillate at a frequency for which the phase-shift network shifts the signal phase by 180°. The values in the phase-shift network were experimentally determined to give a nominal frequency of 1kc/s. The output of the oscillator was taken directly from the collector of the transistor via a capacitor C5. Deriving the output voltage in this manner results in a small change in frequency as the output load resistance is varied. Greater frequency stability could be given by making R1 a potential divider and tapping the output as shown in Fig. 2. This method, although giving greater frequency stability, would give a much reduced output; and it was felt that the high output given by coupling directly to the collector more than outweighs the small loss in frequency stability.

An improvement in long-term stability may also be achieved by connecting a 25µF capacitor between the positive and negative rails, as shown in Fig. 2. This prevents frequency shift due to increasing internal resistance in the battery as it ages. Again, such alterations in frequency are small. Nevertheless, the constructor who requires high frequency stability and only a low output can use Fig. 2. For all normal uses the circuit of Fig. 1 is recommended.

In the circuit of Fig. 1 the transistor takes 5mA at 9V, and it was thought that this current justified the use of the stabilising components R2, R3, R4, C6.

Fig. 1—The phase-shift oscillator circuit.

Fig. 2 (above)—A low output circuit with high frequency stability.

The components required for the oscillator of Fig. 1 are:

- **R1**: 1k
- **R2**: 39k (see text)
- **R3**: 4.7k
- **R4**: 150k
- **C1**: 0.02µF
- **C2**: 0.02µF
- **C3**: 0.02µF
- **C4**: 0.02µF
- **C5**: 0.01µF 350V
- **C6**: 10µF 6V elec.
- **Tr1**: OC72
- **SI**: On/off switch
- **9V battery**

www.americanradiohistory.com
Setting up the Oscillator

When the oscillator has been wired up it is necessary to make sure that R2 has a value which causes the transistor to give maximum output—R2 brings the transistor to the correct operating point. Its value is not critical but varies from transistor to transistor.

To find the “best” value of R2 it should temporarily be replaced by a 50k potentiometer in series with a 12k limiting resistor. Initially set the potentiometer to its maximum value and connect the oscillator to an amplifier or a pair of high resistance headphones. The potentiometer should slowly be reduced in value until oscillation commences. It should then be adjusted until the output is at maximum. The value of the potentiometer and series resistor can be measured and replaced by the nearest standard value. The writer found that this value varied between 27k and 47k for the transistors he tried, while 39k suited the transistor he finally used.

Since all the components used are only accurate to 20% in the case of resistors, and 25% for the capacitors, the circuit may run at frequencies removed from the nominal 1kc/s. If this occurs, the frequency may be adjusted by altering the value of R5, R6 or R7. Increasing these will lower the frequency and vice versa.

Performance

The oscillator gave a reliable output with supply voltages of 6V to 9V. It is not recommended that the supply voltage is increased much above 9V in case the maximum limiting collector voltage for the transistor is exceeded. Oscillation begins immediately the supply is connected. If used for Morse practice, the oscillator could be switched by inserting a key in series with the battery.

For output loads of 10M to 18k there was little change in output. As was to be expected, below 18k the output dropped. Nevertheless, the unit still oscillated right down to a 100Ω load.

The writer used the circuit of Fig. 1 and the layout of Fig. 3. By working on both sides of a 1/8in. thick piece of paxolin the author made his unit 2in. x 2in. Turret lugs were used to hold the components, while the transistor was mounted in a grommet. Care should be taken when wiring-in the transistor not to overheat it when soldering is carried out or bend its leads nearer to the base than 2mm.

<table>
<thead>
<tr>
<th>COMPONENTS REQUIRED FOR THE OSCILLATOR OF FIG. 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1A 100Ω (see text)</td>
</tr>
<tr>
<td>R1B 98Ω (see text)</td>
</tr>
<tr>
<td>R2 39k (see text)</td>
</tr>
<tr>
<td>R3 4.7k</td>
</tr>
<tr>
<td>C1 0.02µF</td>
</tr>
<tr>
<td>C2 0.02µF</td>
</tr>
<tr>
<td>C3 0.02µF</td>
</tr>
<tr>
<td>C4 0.02µF</td>
</tr>
<tr>
<td>Tr1 OC72</td>
</tr>
<tr>
<td>S1 On/off switch</td>
</tr>
<tr>
<td>9V battery</td>
</tr>
</tbody>
</table>

Fig. 3—The wiring diagram of the oscillator shown in Fig. 1.
AN AUDIO DISTRIBUTION SYSTEM

by M. L. Michaelis

This article discusses some practical factors arising during the planning of a multiplex radio/audio installation for several rooms of a flat, using the installation built by the author into his own home as a typical illustration. The reader will be able to design his own installations as far as details are concerned, and thus, as no two constructors are likely to have exactly the same wishes and requirements in this respect, no hard-and-fast building plans will be given here.

Radio and Amplifier Units for the Sub-Stations

Virtually any home-built or purchased units may be used, if necessary with minor modifications which will become apparent in the course of reading further. Sufficient excellent articles have appeared and are appearing in this journal regarding radio units, feeders, amplifiers, etc., and the constructor can take his pick out of these.

It is advisable to make sure that all units feeding the "distribution line" have sufficient audio power output, at least the power of a single EL84 output valve (about 6W). This is because many loudspeakers can be switched in parallel on to the "line", in various rooms.

Output Transformers

A study of the circuit-sketches of the author's installation shows that an arbitrary number of loudspeakers and output transformer secondaries of feeder units can be switched in parallel on to the distribution line, according to the particular combination of sub-stations in the various rooms listening or supplying a programme at any time. This may seem to be taking matters very liberally with impedance-matching, which theoretically is true, but practice shows the matter to be far less critical than might be expected, and the author found absolutely no need for any complicated multiplex-matching system.

It is merely necessary to see that all feeder-units are fitted with output transformers which have secondaries for 15Ω tapped at as many lower impedances as possible. The best combination of tappings for all units is then found by trial and error in the completed installation. If already-existing equipment is to be included into an installation of the type discussed in this article, but such equipment already has only a 15Ω output transformer, then do not change it before trying it in the finished installation, for it may prove perfectly satisfactory. Only if purchasing new transformers for new equipment should ones with multi-tap secondaries be obtained. As already mentioned, this question of matching will be found to be surprisingly non-critical, provided the output power of the feeder units is adequate.

Distribution Cable

The central feature of the type of installation under discussion is the elegant solution to the problem of connecting cables. A single 3-core mains power cable, and nothing else whatsoever, is used to connect the units in the various rooms. This cable carries mains, audio and aerial and earth connections. No screened leads whatsoever are used on the long-distance runs.

The cable can be chosen of the flat white plastic insulation type, used sometimes for modern power-wiring. This can be installed very neatly and unobtrusively on walls or skirtings, and thus removes one of the major objections which may otherwise be raised against other forms of versatile music installation—namely, that bunches of unsightly cables so often accumulate. For reasons to be explained below, the current rating of the 3-core cable used should not be less than 15A. In other words, lighting cable is likely to be unsatisfactory, and proper power-cable must be used. A cable of too small a current rating will introduce undue hum in some or all of the speakers installed, and it is thus a question of how far the constructor is willing to compromise in this direction, if he wishes to save on possible cable expenses.

Compromises Involved

The installation discussed in this article is definitely not recommended for the hi-fi specialist who always desires to take tone quality to perfection. This is because of the two necessary
compromises made: (a) the introduction of slight background hum on account of the simple type of wiring used and (b) the slight increase of distortion (only noticeable on very-low-distortion amplifiers, as it nevertheless remains less than the inherent distortion of normal output stages) on account of the free-and-easy matching arrangement of the several units on to the one distribution line.

However, the performance of the author’s installation illustrating this article is so good that many uninitiated laymen have pronounced it as “real hi-fi”, and praised it warmly. This is because such important corrections which can be made with reasonable expense have been made, for example, the bass-reflex loudspeaker unit at the living room station is fitted with a variable hum-bucking control (see Fig. 4). It is just here, where really good bass response is present, that even slight residual hum can be most irritating. The circuit in Fig. 4 is very effective in reducing it.

corrected by means of lengths of resistance wire connected in series with the stronger loudspeakers, but do not take this too far, as it wastes audio power available, and causes loss of bass response. Regarding design for the bass-reflex cabinet for the living-room unit, the author refers readers to the article on this subject by J. B. Dance, which began in the January 1962 issue.

Built-in loudspeakers of units used may certainly be used as loudspeakers for sub-stations concerned, provided modifications are undertaken to install such switching as S5/S6 and S9/S10.

**Distribution-Line Outlet Plugs**

It is advisable to fit a non-interchangeable 3-pin mains plug and socket at each sub-station, for connection on to the line. The three wires from each sub-station, as shown in the diagrams, are wired on to the corresponding plug. Use a plug and socket of different type or size from other power-points installed in the rooms for normal use, to avoid any accidental wrong connections.

The distribution cable and the outlet plugs must be considered as mains wiring, which must be carried out with the usual care and attention to proper insulation and installation in compliance with local regulations. If necessary, an electrician should be consulted.

**The Author's Workshop Terminus**

Fig. 1 shows the author’s arrangement at the one terminal end of the installation, which is situated in his experimental workshop. It is seen that the mains is fed into the whole installation here, and a master switch and master fuse are also situated here.

A 1:1 ratio mains-isolation transformer feeds mains power on to the distribution line. The expense of the isolation transformer is an unfortunate but a necessary item and it must not be omitted under any circumstances. The expense can be reduced by designing the installation so that the wattage rating of this transformer need be no higher than really necessary. This is the reason why the author feeds his installation at the workshop-end with the mains-input. Here, the equipment having the highest consumption of any of the sub-stations was intended to be installed, and could thus be fed prior to the isolation transformer, as shown in Fig. 1. This reduces the necessary rating of the isolation transformer, and also reduces the mains-supply currents on the line itself to a minimum, which reduces background hum. The constructor should feed his mains input with master switch and fuse into the line at the particular sub-station which is to receive the

---

*Fig. 1—The main terminal station—in the author's installation, the equipment shown above was in his laboratory or workshop.*

The hum-bucking control is variable, as the degree of compensation required will depend slightly upon the exact switch-function positions set at all other stations in the other rooms.

**Loudspeakers**

The choice of loudspeakers is not critical. Any moving-coil speakers may be used. The author uses various 3Ω to 5Ω units, though there is nothing against using 15Ω units. It is desirable, however, not to mix loudspeaker impedances, i.e. keep either to all 5Ω units, or all 15Ω units. Different sizes may be used, but not too greatly different. Slight differences in loudness may be
equipment of highest total consumption.

It is seen that the mains feed on to the line, subsequent to the isolation transformer, is via an R.F. Choke. This is because the same line wire is used for aerial feed, and otherwise the R.F. would be unnecessarily shunted. The capacity of the distribution line cable is of course high, and thus the R.F. losses are necessarily high. This is a necessary compromise in this installation, and is minimised in its disadvantageous effects by means of feeding on to the line from the aerial proper via a step-down R.F. Transformer (Fig. 4), and using a type of coupling known as "bottom-end capacitive" for the input tuned circuits of the radio units at the sub-stations. This type of coupling is inherently highly capacitive and low-impedance, which largely matches the characteristics of the line as aerial feeder. If already existing radio units are to be used, the input tuned circuits must be modified for this form of aerial connection. L2 and VC1 and L4 and VC2 are the coil and tuning capacitors present. C2 in Fig. 1 and C4 in Fig. 2 are inserted, various values being tried for best results. Take care to use really high-insulation capacitors of 1,000V rating for C1 (Fig. 1) and C3 (Fig. 2), to block the mains voltage safely.

The rest of the installation in Fig. 1 is self-explanatory. Note the arrangement of the loudspeaker switching, to enable independent local use of all units in the workshop, independent of and without affecting the rest of the installation in other rooms, or to enable a programme fed from another sub-station to be listened to in the workshop, or to feed a programme from the workshop radio or signal tracer on to the line and out to the other rooms, with or without the workshop speaker running. An identical arrangement of switching, with the same functions, is used at the study sub-station, in Fig. 2.

The Author's Study Sub-station

This is largely self-explanatory in Fig. 2, details being more a function of the author's particular wishes than of general importance. It is seen that mains is drawn from the line via an R.F. choke, again to avoid shorting R.F. on the line. Remember that these mains R.F. chokes have to carry mains current at mains voltage and proper insulation and wire of adequate diameter must be used. The sub-station here contains a small neon lamp to show whether power is on at the master switch in the workshop. The same form of input coupling is used on the radio unit as on the workshop radio. Note R2 here and R1 in Fig. 1. These are to prevent modulation hum and exact values needed should be found by experiment. Incidentally, the type of installation discussed in this article is prone to severe modulation hum if the normal precautions are not taken as mains and aerial feed go on one and the same wire. Thus all H.T. rectifiers in all units throughout the installation must be shunted with capacitors of 0.01µF to 0.1µF and suitable voltage rating. Such modifications need to be incorporated in all existing equipment if not already present. All new equipment should be built with mains transformers having an earthed electrostatic screen between primary and secondary.

Kitchen and Bedroom

It is undesirable to install any ordinary type of loudspeaker in the tropical atmosphere of a kitchen or the cold and damp atmosphere of many bedrooms. Both loudspeakers should be of the "tropicalised" type, especially the kitchen unit.

The master switch in the workshop can be fitted with a time-switch so that any programme can be switched into the bedroom and listened to in bed, the installation being...
switched off automatically at the pre-set time. Alternatively, two-way switching can be installed the same as for passage lights.

The Living-room Unit

Nothing but a good amplifier in a bass-reflex cabinet and a few ancillary items shown in Fig. 4 are installed in the living-room. VR1 introduces a compensating voltage at mains frequency to cancel hum due to the voltage drop along the green wire of the line due to mains current and loudspeaker wiring being common on this wire. The hum to be cancelled is kept to a small value from the start by keeping the voltage drop on “green”, low —i.e., using substantial 15A cable, as already specified. Hum due to running mains and audio in the same cable unscreened is fully negligible as the impedance is far too low in this installation for this form of capacitive pick-up. Thus, screened cable is not needed.

R3 serves two important purposes. It ensures that the audio line is not completely unloaded when all loudspeakers are off, which could otherwise cause peak voltages in feeder units which may be switched on. Also it keeps the impedance low even if nothing but the living-room unit is receiving audio. Otherwise capacitive hum starts up as soon as the last of all other loudspeakers is switched off.

The aerial connection is fed on to the line in the living-room simply because the outlet from the communal aerial of the block of flats is situated in this room. The author uses an ordinary long and medium wave coil as the R.F. transformer. The long-wave section forms the primary, with many turns, connected to the aerial. The medium-wave section forms the secondary feeding the line. The two sections are slid about on the former to give the optimum coupling by experiment. This arrangement of aerial coupling is also the most effective in ensuring that mains voltage is kept off the aerial proper, especially if C5 is made of really good insulation quality, as it should be.

Intercommunication in Coventry Cathedral

Unobtrusive intercommunication for Coventry Cathedral has been installed by AEI Ltd. Four “Silent Call” AEI Centenary Telephone instruments, in which the bell is replaced by a lamp fitted inside the translucent handset, have been provided for the Precinct, the Provost and the organist in the chancel and for the electricians’ platform at the main entrance. They will enable calls to be made or received during a service without distracting the congregation. The four “Silent Call” telephones are extensions from a ten-line private automatic exchange installed by AEI in the cathedral.

Conventional telephones have been supplied for other extensions in the organ blower chamber, choir vestry, Provost’s vestry and assembly area and in the roof for use by television and radio outside broadcasting crews. A special direct communication link has also been provided by AEI to assist in tuning the organ. It provides contact between an operator at the keyboard and the tuner as he makes adjustments to the pipes.

Fig. 4—The second terminal station—in the author’s installation, the equipment shown above was in the living room of his flat. The connections to the winding AB of the heater transformer must be reversed if minimum hum is obtained when the slider of VR1 is at the chassis end of the element. Resistor R4 must be increased in value if minimum hum is obtained with the slider of VR1 at the top or near the top. Conversely, R4 must be increased in value if minimum hum is obtained too near the bottom position of the slider of VR1.
AMERICAN MILITARY RECEIVERS. Fresh release of these renowned sets, incorporating every possible refinement and have internal A.C. mains pack for nominal 115/230 volts. Thoroughly reconditioned, immaculate in appearance, and in perfect working order. Only £35 (ad carriage 30/-, and deposit on returnable transit case. S.A.E. brings illustrated leaflet.

MARCONI CR. 100/8 COMMUNICATION RECEIVERS. Covers 60 Kcs to 30 Mks. Complete with all valves, makes instruction manual, and internal A.C. power unit for 200/250 volts. BRAND NEW IN ORIGINAL TRANSIT CASES. Aerial tested before despatch, ONLY 25/- (Carr. etc. 40/-). S.A.E. for full details.

AMERICAN DYNAMOTORS. Deliver 220 volts at 250 volts 6 V. for 200/250 volts. BRAND NEW & UNUSED. ONLY 25/- (Carr. etc. 40/-).

AMERICAN BAYCRAFTERS 6 Volt VIBRATION PACK. Output 300 volts D.C. at 170mA. Designed to run Communications Receivers from 6 volts car battery. Size 6in. x 6in. x 7in. Complete with 5 valves 6X5, and instructions. In makers cartons. BRANDE NEW & UNUSED. ONLY 3/6.

PCB COMMUNICATION RECEIVERS. Manufactured by Fye & Phillips, One of the Army's most versatile and sensitive sets, RF stage and 2 of F.E. using a British I.G. Type valves. Large 100 degrees Illuminated Display and Dial, Tuning with locking device. Aerial Trimmer. Tone and Vol. Controls. Band Switch from phone to microphone. Quality built to operate or phones. In black metal case, 12in. x 8in. x 6in. D. Model PCB covers 6-18 Mks. 250-550 metres and 400-6000 metres and has internal 6V battery. In excellent condition, ONLY 5/- (Carr. etc. 6/-). Model PCB9 has similar L & M waveband coverage. Short wave 6-22 Mks. for owners used but excellent condition £3.15.0. Every receiver aerial tested before despatch. Add 6/- for car aerial. All models delivered from bulky EXTERNAL power unit. Aerials are fitted but any set can be fitted with BRAND NEW COMPONENTS INTERNAL PACK for 200/250 volts. A.C. at extra cost of £2.

S.A.E. FOR ILLUSTRATED LEAFLET.

THE "GOOD COMPANION" Mk. II.

Using transistors, the latest manufacturing technique to save alignment difficulty.

THE FINEST COMBINED PORTABLE and CAR RADIO YET DESIGNED FOR THE HOME CONSTRUCTOR.

* 750mW output.
* 6 transistors and 2 diodes.
* Full Medium and Long Wave coverage.
* Quality Speaker.
* Brilliantly styled 2-tone cabinet size 11 x 8 x 3 in.
* Very fine tuning with calibrated dial.
* Latest printed circuit. Internal high gain aerial with car aerial socket. Easy to follow construction data (available separately 3/-). All parts sold separately and full illustrated details will be sent on request.

Total Cost: £9.19.6

With alternative luxury cabinet using 7 x 4in. speaker. £10.19.6. Either type, plus 5/- post and ins. (Battery 4/- extra).

"POCKET 4" TRANSISTOR RECEIVER.

Uses miniature speaker, proper tuning condenser, and volume control. Built-in aerial makes unit efficient and portable. Ideal for the beginner. Full medium wave coverage. All components and case for only 42/6 (p. & p. 2/-). Ten-page constructional book free with parts or separately ½/- S.A.E. for parts price list.

HARRIS ELECTRONICS (LONDON) LTD

138 Gray's Inn Road, London, W.C.I

(Phone 1TEminus 7937)

Please include carriage costs on all items.

Open until 1 p.m. (Saturday). We are 3 mins. from High Holborn (Chancery Lane Station) and 5 mins. by bus from King's Cross.

August, 1962
The new **NOMBREX**

**TRANSISTORISED WIDE-RANGE SIGNAL GENERATOR 27**

220 kc/s to 220 Mc/s.

**CHECK THESE FEATURES!**

- **COMPACT!** Only 9½ x 4½ x 3½
- **PORTABLE!** Weight 2 lbs.
- **ACCURACY!** Under 2%
- **ECONOMY!** 9½, Battery
- **DIRECT CALIBRATION**
- **S.A.E. for full technical leaflet.**

**RETAIL £7.10.0** Post and Ins. 3½d

Cash with order. Regret no C.O.D. Now in quantity production. All orders in strict rotation.

Trade and Export Enquiries Invited

NOMBREX LTD. Instruments Division 33

ESTUARY HOUSE, CAMPERDOWN TERRACE, EXMOUTH, DEVON. Phone: 3515.

---

**GIVE YOUR RADIO A PROFESSIONAL FINISH**

**SET OF LUSTRE CRYSTAL PLASTIC KNOBS, PUSH-ON TYPE, SUITABLE FOR ANY RADIO OR RADIOGRAM.**

Diameters: Large 3½in., Small 1½in.

**LIST**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>41R</td>
<td>Case handle brackets, red plastic, to suit fit. flexible handle. 4 SA x 1½in. fixing</td>
<td>8/3</td>
</tr>
<tr>
<td>41G</td>
<td>Brackets as above, but brilliant lustre. finish pair</td>
<td>8/6</td>
</tr>
<tr>
<td>32R</td>
<td>Speaker escutcheon grille, red plastic, 5in. x 3½in.</td>
<td>7½</td>
</tr>
<tr>
<td>32G</td>
<td>Grille as above, but attractive lustre finish</td>
<td>4½</td>
</tr>
<tr>
<td>59</td>
<td>Feet for case, black plastic, 4½in. x 1½in. supplement</td>
<td>7/6</td>
</tr>
<tr>
<td>503</td>
<td>Personal set escutcheon, 4½in. x 1½in. brilliant lustre finish</td>
<td>9/6</td>
</tr>
<tr>
<td>54</td>
<td>Tuning knob for above, edge control, 200-500M and long</td>
<td>9/1</td>
</tr>
<tr>
<td>30/57</td>
<td>Set of 4 miniature Oscillators, Transistor Transformers. High gain. High Q, 6½lin. diam.</td>
<td>29½</td>
</tr>
<tr>
<td>30/40</td>
<td>Pair of Matched Driver and Output Transformers.</td>
<td>18¾</td>
</tr>
<tr>
<td>316</td>
<td>8x transistors Basic components, as previously advertised, still available, 5½-, Circuit diagrams and manuals. £5.40. Send S.A.E. for full list of transistor components.</td>
<td>6/8</td>
</tr>
</tbody>
</table>

---

**The least expensive way to high fidelity is an **Armstrong** chassis**

An Armstrong chassis is more than just a radio-gram chassis. It is a carefully designed combination of tuner, control unit and amplifier in one compact unit which can be used as the basis of a complete high fidelity system. A system which can include tape recording and playback as well as radio and record reproduction.

ARMSTRONG WIRELESS & TELEVISION CO. LTD. WARTERS RD. LONDON N.7. NORTH 3213
A COMPACT CONVERTER for short waves

A. Sydenham

S OONER or later newcomers to the radio hobby experiment with the short wavebands and this may be done either by (a) constructing a separate short wave receiver, or (b) building a converter that will change the signals and make them suitable for feeding into an existing receiver via the aerial socket. Of these, method (b) is the one considered here.

Operation

A popular short waveband is that covering 5-15Mc/s (20m-60m). By converting the signal frequencies to say 1.5Mc/s (200m) and feeding them to a standard broadcast receiver not equipped for short wave reception it is possible to increase one’s listening horizon as the short wave transmissions will be heard via the receiver’s loudspeaker. If the broadcast receiver used is a superhet, two changes of frequency occur and the “double superhet” principle is in use.

Not all enthusiasts have access to the mains supply, however, but fortunately, a useful converter can be constructed and operated successfully from dry batteries. A practical circuit incorporating suitable components is presented here and depicts a recently constructed S.W. unit that is entirely independent of the mains supply. It is small physically and the chassis top plate measures only 6in. x 3in.

Aerial Connection

Switching is incorporated to make the aerial by-pass the unit immediately it is switched off; it is reconnected when the unit is switched on the next time. This means that the converter and receiver may be left permanently connected once set up, the latter performing normally when the former is not in use.

The converter may be used to feed a mains receiver provided it is fitted with aerial and earth sockets and is not of the A.C./D.C. variety. It has not been tested in conjunction with transistorised or TRF receivers for, as might be expected, the sensitivity is considerably lower than that obtainable from a mains driven set. Suggested modifications to help improve sensitivity are included.
The Circuit

This is illustrated in Fig. 1. When S1/S2/S3 is set to position 1, the aerial is connected to V1 via L1 which is tuned by one section of a twin gang capacitor, VC1. The selected signal appears again at pin 2 of V1 and is fed to the frequency changer, V2. The signal grid circuit of V2 is untuned in the interests of simplicity and to permit the use of a twin gang capacitor. Nevertheless sufficient signal is developed across R2.

Valve V2 is oscillator and mixer and 1.5 Mc/s signals appear at the anode of the valve where they are developed across L3 which is tuned precisely to this frequency. To enable a suitable match to be made to the aerial coil of the subsequent receiver with which the converter is used, the low impedance winding associated with L3 is employed and the coil is in fact a standard medium wave coil used in reverse.

R.F. Amplifier

Although the above represents the working of the basic circuit, several finer points of interest exist. It might be argued that V1 could be omitted and the aerial coil connected direct to the signal grid of V2, and although this is true, benefits of slight extra gain would be lost and, furthermore, a sensitivity adjustment would scarcely be practicable. Here, the R.F. amplifier can be used beneficially as a variable gain device by feeding its screen grid from a potentiometer connected across the H.T. supply.

The oscillator circuit is of interest, too, since variable trimming is provided and consists of VC3 arranged as a panel control. This permits manual control of oscillator frequency within limits and also acts as a fine tuner giving a bandspread effect. Any small air-spaced type of variable trimmer

![Diagram of the converter circuit](image-url)
may be used, and a plentiful supply is often present in surplus apparatus. The total number of vanes should not exceed four, unwanted ones being removed, since a large capacitance value is undesirable. The control spindle should being removed, of vanes should present.

Grid Wiring

Connecting g2 and g4 of V2 together was found empirically the most reliable method of operation; sometimes g4 is separately fed via a 33k resistor and decoupled in the usual fashion.

The signal and oscillator coils are not screened but it is desirable that L3 should be screened to prevent unwanted self pick-up at 1.5Mc/s. Note that a fixed capacitor is connected across the main winding of L3 instead of a trimmer, this being quite satisfactory since the coil can be brought to resonance by means of its core, and the capacitor may thus be contained within the coil can. The coils are supplied individually packed in round aluminium screw lid containers which may be used for screening.

The inclusion of C7 is particularly beneficial when the H.T. battery exhibits considerable inherent resistance such as occurs towards the end of its life; it is important that it should be connected as shown in the diagram on the converter side of S3, otherwise the H.T. battery will discharge even when the unit is not in use.

Rotating S1/S2/S3 to position "2" switches off the converter and breaks both H.T. and L.T. feeds, and allows C7 to discharge via R1 and VR1. Simultaneously, the aerial is disconnected from L1 and reconnected to tag 8 on L3 so that the broadcast receiver can function normally. In the prototype, a 4-pole, 2-way miniature rotary switch is utilised for S1, S2 and S3, the spare tags being ignored.

Switching of the earth lead is unnecessary when coaxial cable is used between the converter and receiver, the two chassis being automatically inter-connected via the outer braiding. For this reason A.C./D.C. apparatus must not be used with the converter.

The prototype covers the 5-15Mc/s band, but alternatives are possible by changing L1 and L2 for coils from another range. The value of padder capacitor will also require alteration. Suitable coils can be chosen from the Denco range as shown in Table 1.

The coils are wound on colour-coded formers, and for L1, Blue is required, with White for L2.

(Continued on page 319)
POWER Rectifier Circuits

A SURVEY OF PRINCIPLES OF PRACTICAL IMPORTANCE, AND USES OF THESE CIRCUITS

By L. N. Nash

(Continued from page 258 of the July issue)

The centre tap of a full-wave voltage-doubler circuit serves merely to feed the mid-point voltage D.C. output. If the centre tap on the transformer is omitted altogether, the circuit degenerates to the familiar full-wave bridge circuit. Fig. 16a shows the circuit of Fig. 15 (last month) with the centre tap of the transformer omitted. In Fig. 16b, the circuit of Fig. 16a has been rearranged into the conventional full-wave bridge circuit.

The full-wave bridge circuit has the advantage over the conventional full-wave H.T. rectifier circuit that it does not need a centre-tapped transformer winding.

![Diagram of full-wave bridge circuit](image)

**Fig. 16a—**The circuit of Fig. 15 (last month) with the centre tap of the transformer omitted.

**Fig. 16b—**The circuit of Fig. 16a rearranged to show that it is in fact equivalent to the full-wave bridge rectifier circuit.

The important new point to be stressed here concerning the bridge rectifier circuit, of which probably only few constructors are aware, is that any conventional bridge rectifier circuit necessarily embodies the availability of a second D.C. output at half of the main output voltage, directly from a centre-tap of the transformer winding, without any further alteration of the circuit. This second output is already D.C., without the addition of any further rectifiers, as the circuit has returned to the full-wave voltage-doubler arrangement as soon as the centre-tap is present. The two outputs are inherently well decoupled from each other, i.e., loading of the one affects the other far less than if the half-voltage were obtained from the full output by means of an external resistance-bleeder across the output.

However, voltages other than exactly half of the main output of the Bridge cannot be obtained from the bridge circuit by appropriate choice of a different position for the transformer winding tapping, as such measures would amount to unequal voltages for the two sections of each component fundamental full-wave circuit, which the previous discussion under that heading has shown to lead to unequal current sharing, and consequent possible destruction, of the individual rectifiers. Nevertheless, it is of course perfectly admissible to feed a rectifier circuit of either polarity and any desired voltage whatsoever through a separate rectifier from a suitable tapping in the transformer winding, quite regardless of what rectifier circuitry may or may not be already connected, provided that no conflicting chassis-connections arise, and provided that the total loading of all circuits connected does not overload the transformer. Fig. 18 shows a hypothetical example of a multiplex circuit of this nature, representing just one of numerous possibilities.

Once the constructor is familiar with the basic principles involved, and the important practical points to watch, he will easily be in a position to devise his own peculiar rectifier circuits to meet his particular requirements from occasion to occasion.

**Uses of Television Booster Diodes in New Fields**

Fig. 19 shows a very interesting and instructive rectifier circuit used by the author for feeding a Geiger-Counter apparatus, supplying positive H.T. for valve amplifiers and positive EHT for the Geiger Tube. The same circuit is usable for feeding H.T. to amplifiers and EHT to the CRT of an oscilloscope, for which purpose constructors could use this circuit directly in most cases, without any modification except in minor details.

It is seen that the basic circuit is the full-wave voltage doubler of Fig. 17, but with the very un-
usual feature that the negative fundamental full-wave-circuit is used for the H.T. section, giving nevertheless a positive output voltage w.r.t. (with respect to) chassis. This results in the very unconventional circuit appearance that the main H.T. output is taken via the smoothing-choke direct from the transformer centre-tap, whereas the commoned H.T. rectifier anodes are taken to chassis. This measure is necessary in order to ensure that the positive fundamental full-wave section is of correct polarity to supplement the H.T. output to give the desired positive EHT voltage w.r.t. chassis.

Transformer
A perfectly conventional ordinary mains transformer winding of 400-0-400V is used, and any good mains transformer of reputable make is usable for this circuit. The basic requirement for the transformer is simply that its H.T. winding can tolerate earthing at other than its effective centre-tap without breakdown, and this condition has, in the author's experience, been satisfied by all mains transformers of reputable manufacture. A transformer of doubtful origin should preferably not be used for this circuit, but at least it should first be tested by connection to the mains via a 100W lamp or low fuse in series with the primary, and simultaneous earthing of the core and one end of the H.T. winding. All secondaries should be left open-circuit. If the lamp does not light and the fuse does not blow within 24 to 48 hours of continuous subjecting to this test, the transformer may be deemed satisfactory for the circuit of Fig. 19. This time may be considered as sufficient for any corona or glow discharge within the transformer windings to effect a final breakdown, if this is due to take place, and thus at least other components will be saved compared to the same breakdown in a final circuit after up to 50 operating hours.

It must be stressed, that with a good transformer of reputable manufacture no serious danger exists, and the author's circuit is in periods of non-stop operation of a week or more at a time, with perfect reliability.

The constructor should avoid the use of miniaturised transformers for this circuit, as insula-
tion is there not as generous as in mains transformers of conventional size, and it is advisable (if it can be identified) to use the end of the H.T. winding which is innermost, i.e. closest to the primary, for earthing in the above described soak-test for a doubtful transformer. In all these experiments it should be remembered that one is dealing with very high peak voltages at low impedance, which could prove immediately lethal if passed through the human body. It is thus essential to make all connections and disconnections only when voltage stability without special refinements, and even they could easily give a lethal shock so that the same precautions mentioned above are still needed.

Returning to the circuit of Fig. 19, the unusual choice of rectifiers merits some discussion. It is seen that a pair of PY81 television booster-diodes are used as H.T. rectifiers. Here we have high current and high peak inverse voltage requirements, which previous discussion in this article has shown to be best met by the use of valves. The choice of valve for the author's circuit then fell on a booster diode type because of the high heater-cathode voltage rating of these valves compared to conventional H.T. rectifier valve types. The PY81 booster diode is rated at 5kV peak between heater and cathode, a very useful value in unusual rectifier circuits, and the mean anode current is well in excess of 100mA peak rating, enabling at least 200mA D.C. to be drawn from a full-wave pair, a value comparable to the larger full-wave rectifier valves of conventional type. The PY81 is thus already a great favourite in the author's special designs. The heater-cathode voltage rating is so high that all valves in even the most complex circuits may be run from a single heater winding, even for circuits of moderate EHT in the region of 1kV to 2kV D.C. output! Furthermore, one side of this heater supply may be earthed if desired. A disadvantage is the unusual heater voltage of 17V, which the author normally obtains from a couple of 6-3V windings and a 4V winding all in series.

Feeding Other Valves

On account of the permissibility of earthing one side of the heater supply, other valves may be fed from the same heater supply or tappings thereon. In such cases one side must be earthed, as otherwise the EHT voltage could be impressed across the heater-cathode path of the amplifier valves as well, causing immediate breakdown. Earth one side of the heater supply also removes the EHT voltage strain from the heater winding on the transformer; thus it is advisable to earth one side of the PY81 heaters as a matter of course in all cases, as shown in Fig. 19.

The EHT supplement, in the form of a conventional fundamental positive full-wave circuit of positive output w.r.t. the centre-tap of the transformer windings, is fitted with a pair of high-voltage metal rectifiers in Fig. 18. These form the simplest solution here, and are of reasonable price on account of the low current-drain required on the EHT output.

The Cascade Voltage Doubler

Fig. 20 shows another form of full-wave voltage doubler, which is used far less frequently. This circuit is included here on account of one advantage, namely the fact that one pole of the A.C. input and the D.C. output are common, which is not the case for the conventional voltage doubler. Thus, the cascade voltage-doubler is the only practicable circuit for doubling the mains voltage direct without a transformer, keeping a common neutral/earth line.

(To be continued)
MAILPLAN OFFERS

Immediate Despatch Service!  
Best Value for Money!  
All items advertised have been approved by our technical team of qualified engineers.

TWO SENSATIONAL TRANSISTORISED INTERCOMS

HANDBY INTERPHONE

For Home, Workshop, Office, two-way calling. Consumes current only when calling or talking. Housed in attractive plastic cabinets with chrome stands. Completely portable. Master and substation. Replacement battery only 26p

MAILPLAN PRICE 89/6 P. & P. 9/- incl. P.P.3 battery, and 25 yrs. lead with plugs.

7 Station De Luxe

Transistorised Intercom

The very latest in Office and Factory communication. Calling is audio and visual. Battery operated but consumes current only when calling or talking. Neat compact attractive units. up to 7 extensions supplied separately. Battery life 300 hours.

Master 14 GNS. P. & P. 4/6

HALF THE PRICE OF OTHER MAKES

Construct your own Record Player, Intercom, Tape Recorder, etc., with the

PK.543 SUBMINIATURE 4 TRANSISTOR

PUSH-PULL 52/6

AUDIO AMPLIFIER P.&P.1/6

An assembled and wired miniature amplifier incorporating output transformer. 4-4 transistors. Class B. All connections for battery, speaker and volume control. The quality is amazing. Complete with instructions and circuit diagram. 8 ohm speaker 21 flux density, 7,000 gauss. Power, 200 mw. 16/6 p.

MI78 CRYSTAL LAPEL MIKE 17/6

100-9,000 cps. 14mm. diam. 5ft. lead.

SLIM CRYSTAL MICROPHONE  — 3 WAY  —

Hand held, Stand mounted or suspended by lavallier cord.

MODEL 100C 39/6

Post Free

PORTABLE SOLDERING IRON Model SPI

30 Watt—230 Volts

(size 10in. ¾in., when not in use)

Designed on an entirely new principle for light-weight applications. High heat characteristics ensures long life. Removable handle permits iron to be carried safely even while hot. Supplied complete with Vinyl bag, lead and plug. Spare available.


18/9 P. & P. ½-

TUBULAR BAFFLE EXTENSION SPEAKER

Most adaptable of all speakers. Mount: vertically, horizontally, or sits on desk.

Another Mailplan

Top Value offer ... 54/6 P. & P.

The T.B. 30. Frequency Response; 85-7,000 cps. Rated at 1.5watts. Cabinet, beige finish with contemporary gold baffles. Size 94 x 3in. diam.

CALNAD MODEL CR-12AE

12m. coaxial Hi-Fi loudspeaker. This is the Hi-Fi Speaker you have been waiting for to fit into your custom-built equipment. Frequency Response; 30-16,000 cps. Sensitivity: 102 dB/W. Voice coil Impedance: 16 ohms. Mechanical Cross Over Frequency: 1,800 cps. Total Flux: 85,000 Maxwell. Rigid Glass Voice Coil. Diecast Frame.

MODEL CR12AE 8 GNS. P. & P. 7/6.

MINIATURE CLEAR PLASTIC PANEL METERS

"S" METER MODEL SR. 1P. Standard "Ham" Signal strength indicator. Calibrated in "S" units from 0-40 with scale terminating in +10 to +30 db calibrations. Additional full scale calibrations of 0-4-0-10 in linear scale divisions. 38/-

VU METER MODEL VR. 1P. Calibrated and dumped in accordance with the standard VU Meter Practice. Upper scale reads —20 to +39VU. Lower scale 0-100% modulation. Uses precision carbon film multiplier resistor and full wave rectifier. 42/6.

FOR YOUR HOME BUILT TEST EQUIPMENT

DC MICROAMMETER Model: MLR 0 to 10 ma. 39/6

Model MI200 0 to 500 mA. ... 39/6

DC MILLIAMMETER Model: MK.21 0 to 1 mA ... 27/6

All models individually boxed and fully guaranteed.

P. & P. 2/6 each.

SKANTTEST THE L.O.P.T. TESTER

Tests TV Windings for shorting turns by unique pulse method. This compact instrument can save you pounds. It detects a single shorting turn in a line output transformer, deflector coil or other Windings. The pulses provided by the instrument detect intermittent faults. In position one, the continuity of the Windings is checked; in position two, high impedance coils, and in position three, low impedance coils. Once you have used the Skanttest you will regard it as must in TV Servicing. Exclusive Mailplan offer 99/6 P. & P. 2/9

High resistance Standard type TWIN HEADPHONES 13/6

2,000 ohm Model SP20. Complete with headband.

WATCH FOR MAILPLAN EACH MONTH!

When placing your first order ask for your name to be entered on the Mailplan Special Small Quantity Bargain Mailing List.

www.americanradiohistory.com
"CODAR CLIPPER" ALL BAND RECEIVERS 10-2000 METRES
LISTEN TO AMATEURS, AIRCRAFT, SHIPPING, SHORT, MEDIUM, LONG WAVE BROADCAST STATIONS THROUGHOUT THE WORLD.

THE MINI-CLIPPER

THE SUPER CLIPPER '88/6
This world-famous hybrid receiver has achieved remarkable success. Tremendous performance with Hi-gain valve detector PLUS two Ediswan transistor amplifiers which are supplied assembled, only 3 wires to connect. Large precision dial, 7 x 4", with 2 pointers, bandsets and bandspread, dual slow-motion drivers, air spaced variables. Punched chassis 8 x 5"in. Batteries last months. Covers 10-2000 metres (5 Coils). Total building cost including chassis, valve, 2 transistor stages, 2 coils 20-60 and 55-190 metres. Step-by-step pictorial plans, nuts, bolts, wire 88/6, P. & P. 2/6. Plans only, 2/6.

THE CLIPPER. As above but one transistor stage, 79/6, P. & P. 2/6. Optional Front Panel, Silver Hammer finish, all holes, 6/9.

THE NEW CR45 ★ NEW STYLING TOP PERFORMANCE
Previously produced exclusively for Export, the de-luxe version of this famous ALL BAND receiver is now also available for the home market. Superb new styling, satin silver front panel, frequency calibrated scales, grey and silver trim knobs, perspex disc cursors. High gain circuit with ECC81 duotriode, EL84 output, E280 full wave rectifiers. Power output 31 watts for 2/3 ohm speaker. 3 Planetary vernier slow motion drives, separate electrical bandspread. Covers 10-2000 meters (5 Coils). World wide reception. For A.C. supply 200-250 volts (Export version 105-120 volts). Total building cost all parts, valves, front panel, ready punched chassis, 2 coils, 20-60 and 55-190 meters, wire, solder, instruction manual, P. & P. 3/6. Optional extra. CR45 Cabinet 12 x 5 x 7in., slide flap for easy coil changing. Silver grey finish, 2/6.

£6.19/6

No technical knowledge required to build these fine receivers. Send 3d. stamp for illustrated leaflets, testimonials, etc. Now available the NEW 1962 CR 66 A.C. SUPERHET COMMUNICATION RECEIVER.

CODAR RADIO COMPANY, 24 CHAPEL ROAD, FISHERGATE, PORTSLADE, BRIGHTON

G31RE
Canadian Distributors: JAYCO ELECTRONICS, TWEED, ONTARIO.

G31PA

NEW! DO-IT-YOURSELF TRAINING TECHNIQUE in RADIO & ELECTRONICS

You LEARN while you BUILD...

ANNOUNCING—after many years of highly successful operation in the U.S.A. and in Europe—the latest system in home training in electronics is now introduced by an entirely new British training organisation. AT LAST—a comprehensive and simple way of learning—by practical means—the basic principles of radio and electronics, with a minimum of theory. YOU LEARN BY BUILDING actual equipment with the components and parts which we send you. You advance by simple steps using high quality equipment and performing the whole series of interesting and instructive experiments. No mathematical! INSTRUCTION MANUALS and our teaching staff employ the latest techniques for showing clearly how radio works in a practical and interesting manner. You really have fun whilst learning! And you end by possessing a first rate piece of home equipment with the full knowledge of how it operates and—very important—how to service and maintain it afterwards. A full library of magnificent Illustrated textbooks are included with the Courses. IN FACT for the 'Do-It-Yourself' enthusiast, the hobbyist, or those wanting help with their radio career training, or to set up their own full or part time servicing business—then this new, and exciting instructional system is exactly what is needed and it can all be provided at very moderate cost. Easy payments available. Post the coupon bow, for full details. There is no obligation.

BUILD YOUR OWN ◆ RADIO EQUIPMENT ◆ TEST GEAR ◆ HI-FI INSTALLATION—AND LEARN AS YOU DO IT

RADIOSTRUCTR
BRITAIN'S LEADING RADIO TRAINING ORGANISATION

FREE TODAY

To: RADIOSTRUCTR (Dept. G107), Reading, Berks.

Name ........................................... BLOCK CAPS PLEASE

Address ........................................

(821) We do not employ representatives 8-62
Those Electronic Games

Those Electronic Games

My recent comments on the apparent lack of interest in this branch of our hobby had failed to produce any material comment from readers and I was beginning to think that there must be some big snag in the subject when I received a letter from Cpl./Tech. White of the R.A.F. who has summed up the position very clearly, I think. He suggests that the expense of making this type of equipment is probably the biggest snag, but makes the point that the majority of our readers are more interested in making normal radio sets and experimenting with improvements and "gadgets", and that only very advanced students dabble in the electronic games aspect, or conditioned reflex "robots"—and that these enthusiasts are few and far between, and are probably not interested in ordinary radio and as a result are not numbered among our readers. I must agree that I think this is true, but it would be very interesting to know that it is not, and to hear from some ordinary type of reader (as distinct from an advanced student) who has managed to make some progress in this field and I am sure that his activities and results would interest others.

To those who wrote, many thanks.

Artificial Troposphere

I have received a very interesting letter following on my comments in the December issue on the effects of various activities in space carried out in the name of "research". The letter comes from one of our readers in Germany who says:

"Regarding radiations emitted from atomic explosions remaining and accumulating in space, this is in principle not to be disputed. If not complete, then at least partial continuous accumulation is scientifically established. That such an accumulation could disturb ordinary wireless communications, if it reaches sufficient intensity, is also quite true. The question thus boils down to asking whether this sufficient intensity is likely to be reached, and here the answer seems to be a pretty definite "No". The following reasoning should make this point of view clear. The sun itself is simply nothing else but one colossal atomic hydrogen bomb, and has used exactly the same energy-producing processes for countless centuries, as man has only learned to produce on earth in recent years. The nuclear intensity of the sun corresponds to the explosion of many thousands of atomic bombs per second, of the largest size man has yet made. Yet all this radiation from the sun has succeeded in producing through the ages, as regards radio-communication, is our well-known ionosphere, and its well-known effects on shortwave radio, etc. Admittedly, the sun is about ninety million miles distant, but nevertheless, the discrepancy between the rate of release of atomic energy of the sun and from man-made devices is so great that the man-made contribution to a radiation-belt screening the earth is vastly smaller than that present due to the sun anyway. Furthermore, space itself is so vast, that colossal amounts of radiation can accumulate in it without any appreciable rise of local intensity. The dangers of atomic-bomb fallout are of a different nature. Here we have unstable atoms of debris thrown into the atmosphere, which drift with the weather, to be washed down later in rain somewhere. The unstable atoms in this rain will then explode later, giving new production of local radiation. But this unstable atomic debris in the air will not disturb radio-communication any more than an ordinary fog does to which this debris is analogous."

Any comments?

Remote Controls

The increasing use of remote controls for television receivers brings to mind the complete absence of any devices of this nature for ordinary radio. I think I have mentioned before, there was at one time on the market an extremely simple, but very efficient little device which enabled one to switch a radio (battery or mains operated) on or off from any room in the house, and the only power required to operate it was a small torch battery. It consisted of a small solenoid, the plunger of which operated a star wheel which alternately opened and closed a simple "on/off" switch contact mechanism, and this was inserted between the power supply and the set, with extension leads from the actual control to a simple push (bell type) switch. The device was quite cheap, and I had a switch in each room in my house and used it for a considerable period, but I cannot now remember why it was discarded. I am sure it did not go wrong or breakdown, and I am sure many listeners would be glad to see some device of this nature now on the market.

Yet another book by G. A. Briggs makes its appearance. This time Mr. Briggs writes about almost every aspect of cabinet design and construction. The presentation follows the author's usual inimitable style in which a wealth of technical information is presented in an easily readable form which includes numerous detailed explanations. The descriptions are enlivened in many instances by humorous references which add to the appeal of the work and not as might be thought detract from it. For instance, the author recounts how when testing a guitar and amplifier in the open air, scores of people were entertained in the village of Idle "as the guitar could be heard half a mile away."

As well as dealing with the acoustic design and performances of cabinets, the author also describes the actual construction and the following list of chapter headings will give some idea of the coverage of the book:—Material; Plywood; Adhesives; Veneering; Machines; Assembly; Polishing; Mesh; Resonance; Absorbents; Home Equipment; Cabinet Design; Treble Enclosures; Electric Guitars; and Room Treatment. This is a book which can be recommended to all hi-fi enthusiasts.

RADIO CONTROLLED MODELS—by R. H. Warring. 134 pages. Published by Museum Press Ltd. Price 16s.

ENTHUSIASTS of radio controlled model building must combine knowledge of electronics and mechanics to pursue their hobby, as apart from the problem of transmitting a signal to a suitable receiver on the model, some mechanical method must be used to change the electrical action in the receiver to a physical movement of the controls of the model. Therefore, a large part of the interior of the model must be devoted to batteries, receiver and actuator (the device for converting the action of the receiver relay into mechanical movement) and in most cases this means designing both the mechanical and electrical equipment on a very small scale to fit into the limited space available.

It is here that the constructor is given no previous knowledge of this kind of work usually comes unstuck and it is at this point also that this book will prove invaluable in making unnecessary the time-wasting, and often heart-breaking experiences of experimenting with various control systems which the enthusiast will have to make when no such guidance is at hand. The disposition of the equipment about the model is of great importance (especially in model aircraft), the correct use of the batteries to run the controls also; these and all the other finer points, which would only occur to the average constructor after a good deal of trial and error, are dealt with in detail in this publication and it will save a great amount of wasted effort if referred to before any building begins.

The fundamental facts of radio control are dealt with but the author quickly moves out of theory after the first chapter, into descriptions of practical equipment. Transmitters, receivers and actuators each have a separate chapter devoted to them and then various refinements of the basic systems (such as multi-channel equipment etc.) are dealt with.

FUN WITH ELECTRONICS—by Gilbert Davey. 64 pages. Published by Edmund Ward Limited. Price 12s. 6d.

The definition of the word "fun" must, of course, depend largely on the fun-maker, as one person's way of amusing himself would not suit a thousand others. But to the young beginners in amateur radio and electronics in general—for whom this latest work of Gilbert Davey has been published—this book will, at first sight, prove a disappointment. Mr. Davey has secured the admiration of thousands of boys through his series on television and his articles and books dealing with the world of amateur radio, but in this book many will find that the practical side of electronics has been neglected rather and too much space has been devoted to descriptions of commercial equipment, which combined with the frequent reference to manufacturers' data, detracts from the idea that is suggested by the title, which is to have "fun with electronics".

However, the book includes several designs suitable for young radio enthusiasts, with clear and concise descriptions of the construction of receivers, amplifiers, etc. In chapters of a practical nature, the author ensures that the reader does not simply put the components together without knowing why or how they work—all constructional detail is preceded by an explanation of the theory involved. This is what makes Gilbert Davey so popular—his ability to explain "what makes it tick" without baffling his pupils with scientific jargon.

As stated before, there are several chapters which describe commercial equipment, such as tape recorders, car radios, amplifiers etc., and to some—especially to those beginning to take an interest in hi-fi—this information will prove very useful, as much of the field of electronics, by virtue of the complexity of the circuits involved and the expense of components, is outside the knowledge and the pocket of the amateur constructor, who must then, necessarily, turn to manufacturers' equipment. Therefore, the chapter describing tape recorders, for example, will prove valuable to anyone contemplating buying one as these instruments are difficult to make for the amateur without much experience of construction to make the same applies to the chapters on record players and on loudspeaker enclosures.

The book ends with an interesting chapter describing the uses of electronics in industry, the services, science and education.
LEt us recapitulate a little and have another look at the diagrams on pages 52 and 53 of the May, 1962, issue. Fig. 6 showed how a constant current recording is made so that the magnetic induction on the tape is equal over the audio spectrum. Fig. 7(b) showed how the output on replay would rise with frequency to a peak due to the tape signal passing through a replay amplifier with a flat frequency response, as in Fig. 7(a).

The article last month made clear why the output rises at a constant rate of 6dB/octave to a maximum and why the output falls as the frequency is further increased. The whole point in question, therefore, is how to achieve an output which is flat over the greater part of the A.F. spectrum. A typical frequency response characteristic is shown again in Fig. 16.

From a study of this, it becomes obvious that two things must happen. Firstly, the lower frequencies up to the peak (often known as the 'turnover point') must be boosted, and the higher frequencies after the turnover point must also be boosted. These things are carried out partly during the recording process and partly during the replay operations. For example, on 'record', a considerable treble boost or lift is applied to the amplifier at a frequency and magnitude depending on the tape speed and the exact characteristics of the heads.

The curve in Fig. 17 shows such treble lift on a recording amplifier, while the curve in Fig. 18 shows what the replay response would be like by using treble boost on record and zero bass lift on playback. At around 3,000c/s, the bass falls as before (Fig. 16) at the rate of 6dB/octave, but there is a definite indication of treble lift and the response is approximately flat from about 3,000c/s to 10kc/s. It is still far from perfect, of course, and would sound thin and lacking in lower frequencies.

Fig. 16—A typical frequency response characteristic with the bass falling at the rate of 6dB/octave.

Fig. 17 (above)—How the record amplifier response is given a boost at the high-frequency end to avoid the treble falling too rapidly after the turnover point. (see Fig. 16).

Fig. 18—The replay characteristics on a flat amplifier from a tape which has been recorded with treble boost, as at Fig. 17.
signal, but when the signal is applied to the "radio" jack, attenuation occurs due to the potential-divider network R2 and R3. This constitutes a form of "level" equalisation, as distinct from frequency equalisation, which is the prime subject of this article.

The amplified A.F. is developed across the anode load resistor R4, and from here it is fed through C2, R5 and R6 to the resonant circuit L1/C1. Now, at frequencies away from resonance, the signal level applied to the voltage amplifier is dependent on the ratio of R5 to R6. The network C1/L1 as far as the signal is concerned is low impedance, meaning that the bottom end of R6 can be considered almost as connected to chassis. Let us suppose that R5 and R6 are of equal value and that C2 is sufficiently high to avoid low frequency attenuation. Then, off resonance, half the signal at the anode of V1 will be fed to the voltage amplifier.

What happens at resonance? Since the circuit is parallel-tuned, the impedance across its terminals (A-B) rises sharply at resonance to a value governed by the "goodness value" (i.e., "Q") of the tuned elements. Let us suppose that L1/C1 is tuned to 8kc/s and that at that frequency the impedance across A-B in series with R6 causes the ratio R5:R6 to rise from half to three-quarters. In this event, then, the voltage applied to the amplifier would also rise from half to three-quarters—but only at resonance. In this way, therefore, the boost is applied in the recording response at the required frequency.

**Correction for Different Speeds**

As shown by the curves at Fig. 20, top boost has to come in at frequencies to suit the tape speed (and also the characteristics of the head), and
therefore, on multi-speed recorders, some means of switching the recording equalisation is required. This is simply accomplished on the resonant type of circuit by switching in the appropriate parallel capacitor, as shown in Fig. 23. The values given are taken from the Mullard Ferroxcube pot core, Type WF816. This gives high efficiency (Q) and excellent equalisation at the lower tape speeds. The frequency of resonance of any tuned circuit is equal to

\[ \frac{1}{2\pi \sqrt{L\cdot C}} \]

where \( C \) is in microfarads and \( L \) in Henrys.

**Fig. 23**—How the capacitive element of the resonant circuit is switched to give treble boost at the frequency to suit the tape speed.

### Bass Boost for Playback

Now is the time to look at the bass boost circuitry used in the playback channel. Such a circuit is given in Fig. 24 and, as with the recording channel, the bass equalisation follows the pre-amplifier — in this case, the replay head amplifier. Instead of an inductor, a capacitor is used in the coupling network, which is \( C1 \) in the circuit. What happens is that the capacitor has a low impedance at high frequencies and an increasing impedance as the frequency is decreased. Thus, a potential divider is formed by \( R1 \) in one arm and by \( R2 \) and \( Xc \) in series in the other arm, and the output voltage (that applied to the voltage amplifier) is that which occurs across \( R2 \) and \( Xc \) in series. Now, at the high-frequency end of the A.F. spectrum, \( Xc \) contributes but little to the bottom arm of the potential divider, and the output voltage is almost proportional to the ratio of \( R1 \) to \( R2 \). However, at decreasing frequencies \( Xc \) adds to \( R2 \) progressively, thereby producing an alteration in the overall ratio. (To be continued)

---

**Fig. 24**—How the bass boost is applied to the replay pre-amplifier coupling network.
HIS is a very simple receiver, and thus suitable for beginners. If used as a single-range receiver, it will cover approximately 15m to 40m, and this includes those bands most generally used for long distance reception. The set also works well on other wavebands, over the range 9m to 200m, and can easily be wired to take plug-in coils.

Circuit

The circuit is shown in Fig. 1, and none of the component values is critical. The tuning capacitor, VC1, is shown as 160pF, but 100pF to 200pF may be fitted, with some change in band coverage. Current is obtained from a mains power pack, and the phones are isolated from H.T. and mains voltages. The receiver will be safe, if the power pack is arranged as described. Consumption is quite low, and it may be possible to take supplies from an amplifier or receiver. If so, the safety precautions mentioned for the power pack should be observed.

Regeneration in the detector is controlled by VR1 and this gives high sensitivity. Reaction is obtained by a cathode tap on the coil, and this is an effective and very satisfactory method. The second valve acts as an audio amplifier, with bias developed across R5, which is 10M. C3 should be a mica condenser, to avoid upsetting working conditions.

Coil Windings

For a single, fixed coil, a waveband of about 15-40m is most generally satisfactory, as mentioned. This coil is thus recommended. But if it is wished to tune other wavebands, it is quite easy to wind further coils for these. Ribbed plug-in coils, with a chassis mounting holder to suit, may be easily obtained, and as many coils can then be wound as wanted.

For the 15-40m coil, a ribbed former about 1in. to 1½in. in diameter, and at least 2in. long, will be required. The windings are shown in Fig. 2. There is no need to adhere to the exact wire gauges, turns spacing, or other details. Changes in these, or in the coil diameter, will modify the band coverage, but results should be just as good.

The grid winding of the 15-40m coil consists of 9 turns of 22swg tinned copper wire, turns being spaced to occupy about 1in. The cathode tap is soldered on one-half turn from the earthed end of the winding. For aerial coupling, 4 turns of 26swg wire are used, this winding being about 1½in. from the grid winding, as in Fig. 2. The ends of both windings are
joined, as indicated, this lead going to the receiver chassis.

Other Ranges

If required, other coils can be wound to give approximate bands as follows:

- 9-15m 4 turns 20s.w.g. occupying 1in. space; tap at ¾ turn; aerial coupling, 2 turns.
- 30-60m 16 turns 24s.w.g. occupying 1¼in.; tap at ¾ turn; aerial coupling, 6 turns.
- 60-110m 32 turns 24s.w.g. occupying 1¼in.; tap at 1 turn; aerial coupling, 8 turns.
- 100-200m 55 turns 24s.w.g. occupying 1¼in.; tap at 1½ turns; aerial coupling, 12 turns.

Aerial coupling windings of coils covering 30 to 200m can be of 28s.w.g. or similar enamelled wire, with turns side by side, to save space.

Chassis and Panel

Fig. 3 shows the layout, the chassis being 7in. x 4in. and 2in. or 2¼in. deep. The panel is 7in. x 6in. and is secured to the front runner of the chassis by means of two 6B.A. bolts. Fig. 3 will allow the valveholder holes to be suitably placed, and indicates the positions for valves.

Further details of the tuning drive will be seen in Fig. 5. The dial is slightly clear of the panel, some form of reduction drive is essential, and a small ball-drive of this kind is easy to fit. The projecting lug on the drive must be prevented from rotating, and this is arranged by passing a bolt through the panel, as in Fig. 3 or Fig. 5. A slotted bracket will allow the tuning capacitor to be mounted at the correct height, so that the whole turns smoothly.

The moving plates tag of the tuning capacitor is connected to a tag bolted to the chassis. Lead 1 from the coil is left long...
Fig. 4 (right) — The underchassis wiring diagram.

enough to reach the fixed plates, as in Fig. 3. An insulated lead also passes from this point, through the chassis, to R1 and C1.

Lead 4 of the coil is long enough to reach the aerial socket, and is covered with sleeving. The cathode tap goes to pin 2, as indicated. The remaining coil lead passes directly through the chassis to a tag.

Three leads are taken from the 50k potentiometer; all these may be passed through a single hole, provided they are correctly identified, or the lead marked 'M.C.' may be earthed to the panel at the potentiometer bush.

Wiring and parts underneath will be seen from Fig. 4. A tag is placed on each bolt holding the valveholders, and also on the bolt near the earth socket E. These points, marked M.C., are in good contact with the chassis. If the valveholders are of the type with a centre metal spigot, this is joined to the nearest M.C. tag.

A single tag, on a small tag strip, and insulated from the chassis, forms the H.T. positive junction point, for R2, R4 and R6. The three supply leads emerge through a grommet in the rear runner, and should be identified to make sure there is no error in connecting the receiver to its power pack. A lead from the chassis forms the H.T. negative connection, and is also the return for the heater circuit. Pins 3 on both holders.
are joined, and the lead from this point is for the 6.3V supply. The remaining lead is for H.T. positive, as described.

The wires from R1 and C1 to pin 1 should be short, to avoid hum. For the same reason, the wires from C3 to R5, to pin 1 of the second holder, should be short, direct, and clear of the heater lead.

Power Supply

If a mains unit is to be constructed for the receiver, the circuit in Fig. 6 will be satisfactory, and can provide current for larger equipment, at a later date. The 6X5 requires 0.6A for its heater. Added to the 0.6A of the two receiver heaters, the total consumption is 1.2A, so a 1.5A winding will easily provide this current, and also current for a 6-3V, 0-3A indicator lamp, if wanted. A 6-3V heater winding with a higher current rating is also suitable.

The receiver requires a very small H.T. current, at 150V to 250V or so. For the receiver only, the smoothing choke may be replaced by a 5k resistor. However, the power pack is more useful for other purposes when a choke is used. The H.T. voltage will rise somewhat, with little or no current drawn, so a 47k bleeder resistor is fitted. The H.T. voltage can be reduced, if wished, by wiring a resistor series with it, at the receiver. A 25pF pre-set trimmer is suitable, or the lead-in can be twisted for a few inches round another insulator wire, to form a small capacity.

Tuning will be very sharp and critical, especially with weak stations, and with loose aerial coupling. Reaction is also very critical, with weak distant stations. Powerful stations will be heard easily, and the exact setting of the reaction control will not then be very important, but, for weak stations, this control must be operated very carefully. It is slowly turned clockwise, from zero, until the set is just on the point of oscillation. Sensitivity is then extremely high, and very long distance reception is possible. The reaction control should be carefully adjusted, as necessary, while tuning. It must not be rotated too far, or the receiver will oscillate and sensitivity will be reduced.

A COMPACT CONVERTER (Continued from page 305)

Waveband switching could be fitted but would necessitate a larger chassis with consequently lengthened leads. Separate trimmers, TC1 and TC2, were used in the original, but these might well be an integral part of an existing twin gang capacitor. Use of a 500pF (nominal) type is possible for tuning, but high grade mica 1000pF fixed capacitors must be connected in series with each section to reduce the maximum capacitance value.

Constructional Notes

The dimensions of the small chassis with all necessary cutting and drilling details are shown in Fig. 2. The front panel carries all the variable controls, and the dimensions of this are shown in Fig. 3. Hardboard or plywood may be used provided aluminium foil is glued firmly to the back to eliminate hand capacity effects later. Quadrant—pin, or pin—should be cut and mitred to provide rigidity and also improve the appearance. The chassis and front panel may be fixed together by whatever is considered the simplest method. Coils L1 and L2 should be mounted direct and locked thumb tight only by means of the polystyrene locking nuts provided, but, for L3, the lid of the metal container supplied should be drilled and the coil mounted through it. The body of the tin can be screwed into position later. (To be continued)
Faults in Transistor Output Stages

HOW TO DEAL WITH DEFECTS IN THE AUDIO AMPLIFIER

INCORRECT operation of the audio amplifier, or output stages of a transistor receiver, will most probably cause unsatisfactory results. Reproduction may be distorted, or there may be lack of volume, or current consumption may be too high, so that the battery fitted in a miniature receiver has only a short working life.

Any of these defects can make the receiver disappointing, but fortunately troubles of this kind are among the easiest to cure. In many cases the fault may arise from nothing more serious than the use of resistors of incorrect value.

Audio Check

It is fairly easy to check the audio signal which is being obtained from the earlier stages of the receiver. If this signal is strong, clear, and free from any objectionable distortion, then distorted reproduction from the loudspeaker is arising in the audio or output stages.

Previous stages, and the quality to be expected, can be checked by listening to the signal available from the diode detector with medium impedance headphones. To avoid upsetting the AVC action, and the direct-current working conditions, an isolating condenser of about 0.25µF to 0.5µF should be included in one headphone lead. The phones are then wired from the slider of the volume control to the battery positive line. Speech and music should sound free from distortion, and really loud.

It is also possible to listen to the signal with an audio probe or tester, or amplifier. The usual care should be taken to avoid introducing hum, instability, or external voltages into the transistor circuit.

Driver Stage

Most circuits use a driver, followed by push-pull output stage. A typical driver stage, with values for an OC71 transistor, is shown in Fig. 1.

The phones and isolating condenser already mentioned form an easy means of checking this stage. Volume should be reduced, and the headphone lead transferred, with isolating capacitor, from the volume control slider to the driver collector. This should bring about a great increase in volume, and the quality of reproduction should still be satisfactory.

Distortion in this stage can be caused by incorrect base and emitter resistor values. If the stage is very noisy, and consumes more than about 1.5mA to 2mA, the 10k resistor value is probably too high, or the 33k resistor value too low. An error in reading the colour code could be suspected. Current may be checked with a meter between driver transformer primary and battery negative line.

If reproduction is distorted, the base voltage is probably too positive. A low value in the 10k position, or a high value in the 33k
position, could be responsible. Here, 47k and 10k values are often employed with a 1k emitter resistor.

It is relatively easy to check the values of the two base resistors, and the emitter resistor in this stage. Lack of volume may also be caused by a defective 50µF condenser. This may be checked, if necessary, by temporarily wiring a further condenser in parallel with the one already fitted. The exact value is not critical.

If these points are in order, the transistor must be suspected. Surplus or alternative transistors may need different resistor values, or have a high noise level, or introduce distortion when volume is attempted.

**Class A Output Stage**

A few receivers have Class A output stages, employing a single transistor. This transistor is often driven by an audio stage similar to that in Fig. 1, though resistance coupling is probable.

If the driver stage is giving satisfactory results, as already described, the same tests can be applied to the Class A output stage. That is, base and emitter resistor values should be checked, and the emitter bypass condenser can be tested.

Fig. 3(a) illustrates the operation of a Class A stage, either driver or output. The transistor is conducting during the whole of the audio cycle, and there is little difference between the current with no signal, and the average current with a signal. Such stages thus pass a fairly high, steady current, even with no signal. If the base voltage is too negative, the waveform moves upwards, so that the shaded area representing current flow increases. This result is in excess over the current previously described. If the base voltage is too positive, the waveform moves downwards, so that the current almost or completely ceases in the dips, causing the distortion mentioned.

**Class B Output**

Fig. 2 shows a popular type of Class B or push-pull output stage. The resistor values must suit the transistors. For OC72's, R1 might be 6.8k, R2 might be 2200, and R3 might be 470. If other transistors are used it is almost certain that one or more of these resistor values will have to be changed for proper results.

The low value of R2 makes the transistor base voltage near positive, so that each transistor is passing only a small current, with no signal. The current taken by the pair may be about 2mA to 7mA, with no signal.

When a signal is present, each transistor is driven by its own half of the transformer secondary. Ideally, each of the pair conducts similarly on different half-cycles, as in Fig. 3(b), combining to operate the speaker through the centre-tapped output transformer. (The ideal conditions shown are not wholly attained in practice.) With signal peaks, the pair will be drawing about 15mA to 25mA, the current depending directly on the volume.

If the base voltage is too positive, the pair will pass very little current, with no signal. When a signal is present, the output may be similar to that in Fig. 3(c). This cross-over distortion (lack of linearity) is very unpleasant, and sounds in some ways like a defective loudspeaker. The cure is to increase R2, or reduce R1 (see Fig. 2).

If the base voltage is too negative, each of the pair will work in a similar manner to a Class A amplifier. The way in which the signals combine may be represented by "D." The overall output is much reduced, and the no-signal current of the
This resistor can help to maintain approximately voltages. They may really require slightly different transistors of maker, and boxed together. If a matched pair, which have been selected by the tics.

The emitter resistor R3 is sometimes omitted. This resistor can help to maintain operating conditions during changes of temperature. A typical fault of this kind arises when the receiver is left in a cold room, so that the drop in transistor temperature brings the transistors nearer the cut-off conditions shown in Fig. 3(c). If this happens, reproduction may sound distorted, but this may cease after a time, when the transistors have slightly increased their temperature.

Fig. 4—A push-pull output stage without an output transformer.

Matched Pair
Both transistors are supplied by the same resistors R1, R2 and R3. They should thus have as nearly as possible the same operating characteristics.

For best results, it is thus wise to employ a matched pair, which have been selected by the maker, and boxed together. If two individual transistors of the same type are purchased, they may work together satisfactorily. Alternatively, they may really require slightly different base voltages. If so, the output from the pair will approximately resemble that obtained by adding the top of Fig. 3(c) to the bottom of Fig. 3(c), or the top of Fig. 3(b) to the bottom of Fig. 3(d).

Transformers
For best results, the resistance and ratio of both driver and output transformer should suit the driver and output transistors. This means that transformers intended for a particular driver and output pair will not usually give best results with alternative transistors, unless they are of very similar type indeed.

If transistors such as the OC71 and OC72 are merely replaced by larger power transistors, such as OC81D and OC81, this will only cause a worsening of results, unless operating conditions are changed to suit.

Single-Ended Push-Pull
Circuits of this kind are also used in miniature sets, and one, with values for the OC71 and OC72's, is shown in Fig. 4. If this is examined, it will be seen that each transistor operates on half the supply voltage. Each transistor may be regarded as a separate amplifier, with its own base and emitter resistors. Output is obtained from collector and emitter, and the loudspeaker is coupled by the 100µF condenser.

For correct working, resistor values have to be provided as already explained. It is also necessary that the two separate halves of the driver transformer are connected in the correct phase. This is automatically assured with the centre-tapped transformer in Fig. 2, unless actual wiring is incorrect.

Fig. 4 also shows a typical negative feedback circuit. This is from the junction of the loudspeaker and 100µF condenser, through the 2.7k resistor, the feedback being developed across the 1Ω resistor. Note that the 100µF OC71 emitter condenser is in parallel with the 1k resistor, not from emitter to battery positive, which would short out the feedback circuit.

With all feedback circuits, the wrong phase will cause the amplifier to oscillate. Wrong phase may arise from connecting any transformer winding the wrong way round. With circuits like that in Fig. 2, feedback is often taken from the output transformer secondary. Reversed connections here may thus cause oscillation.

Most amplifiers of this type will remain stable with the feedback circuit disconnected. An easy test can thus be made to see if any oscillation is caused by this circuit.

Resistor Tolerances
If correct working is to be assured, without any experiment, the base voltage must be within close limits, for the reasons described. This means that close tolerance resistors should be used. For example, the 100Ω and 2.7k resistors in Fig. 4 should be within 5% of the specified value.

If resistors of wide tolerance are used, the values may be correct, or they may be too far from the specified value, so that results are poor. Resistors of 5% tolerance have a gold marking. A silver marking indicates 10% tolerance, and such resistors may be used elsewhere. Resistors with no

(Continued on page 333)
SINGLE SIDEBAND ADAPTOR, Model SB-10U. May be used with most AM transmitters. Less than 3 w. R.F. input power required for 10 w. output. Operation on 80, 40, 20, 15 and 10 m bands on USB, LSB or DSB ... ... ... £37.6.0

AMATEUR TRANSMITTER. Model DX-40U. Self-contained. 80-10 m. Power input 75 w. C.W., 60 w. peak, C.C. phone. Output 40 w. to aerial. Provision for V.F.O. ... ... ... £32.10.0

VAR. FREQ. OSCILLATOR. Model VF-1U. Calibrated 160-10 m. fundamentals 160 and 40 m. Ideal DX-40U and similar transmitters ... ... ... £11.2.0

R.F. SIGNAL GENERATOR. Model RF-1U. Gives accurate source of R.F. up to 100 Mc/s on fundamentals and 200 Mc/s on harmonics. Up to 100 mV output on all bands ... ... ... £11.8.0

AUDIO SIGNAL GENERATOR. Model AG-9U. 10 C/s-100 Kc/s switch selected. D.C. output less than 0.1 %. 10 v. sine wave output metered in volts and db's ... ... ... ... £19.15.6

VALVE VOLTOMETER, Model V-1A. Measures volts to 1,500 (C.C. and R.M.S.) and 4,000 pk to pk. Res. 0.121-1,000 M£. D.C. Input impeded. 11 M£. With test prods, leads and standardising batteries, £13.0.0

PORTABLE SERVICE OSCILLOSCOPE. Model OS-1. Compact portable scope ideal for servicing and general work, operation of amplifier, sensitivity 10 mV/cm, response 3 dB 10 c/s-2.5 Mc/s. Time base 15 c/s-150 kcs, Printed circuits. Case 7½ x 4 x 12½ in. long, Wt. only 10½ lb. ... £19.10.0

SiN. OSCILLOSCOPE. Model O-12U. Wide-band amplifiers essential for TV servicing, F.M. alignment etc. Vertical free, response 3 c/s-50 Mc/s without extra switching. T/B covers 10 c/s-150 kcs in 5 ranges ... ... ... ... £6.10.0

RES. CAP. BRIDGE. Model C-3U. Measures capacity, 10 pf-1,000 µF, resistance 100 M£, and power factor. 5-450 V, test voltages. Safety switch, £8.6.6

SINGLE CHANNEL AMPLIFIER, Model MA-1U. 10-12 watt Hi-Fi amplifier. Extremely low distortion and wide frequency range ... ... ... ... £10.19.6

HI-FI EQUIPMENT CABINETS. Range available to meet various needs. (MALVERN equipment cabinet illustrated bottom left) from £11.12.6 to £18.10.0

GRID-DIP METER, Model GD-1U. Coverage from 1.8 Mc/s to 250 Mc/s. Complete set of plug-in coils provided ... ... ... ... ... £10.9.6

TAPE RECORDING/PLAYBACK AMPLIFIER. Model TA-1, Monaural (TA-M) £18.2.6

 Conversion unit to Stereo ... ... £6.10.0

Stereo (TA-5) £23.6.0

“PACKAGED DEALS” of HI-FI equipment including TAPE RECORD PLAYERS and DECCA fss PICK-UPS.

STEREO HEAD PREAMPLIFIER USP-1. Ideal for boosting tape-head output and low output pick-ups (e.g. Decca fss) £16.7.6

Full details of model(s) ... ... ... £6.0.0

Please send me FREE CATALOGUE (Yes/No) ... ... ... ... ... £6.0.0

Deferred Terms available on orders over £10 Prices include free delivery UK

DAYSSTROM LTD.
Dept. P.W.8, GLOUCESTER, ENGLAND
A member of the Daysstrom Group, manufacturers of the WORLD'S LARGEST-SELLING ELECTRONIC KITS

www.americanradiohistory.com
THE LINEAR L1/10
A 10-WATT HIGH FIDELITY ULTRA LINEAR AMPLIFIER WITH INTEGRAL PRE-AMP

Full advantage has been taken of latest component miniaturisation developments to produce a 10-watt Hi-Fi push-pull amplifier incorporating tone control pre-amplifier stages within the measurements of 9 x 7 x 5ins.

In addition two high impedance input sockets are provided for microphone and gram., etc. With selector switch and vol. control, five B.V.A. valves are employed ECC83, ECC81, EL84, EB61, HT and L.T. power supply point is included for a radio tuner.

FREQUENCY RESPONSE
± 1 db. 30-20,000 c.p.s.

MAXIMUM POWER OUTPUT
in excess of 14 watts.

SENSITIVITY
L.P. 220 m.v. for 10 watts, 78 r.p.m. 220 m.v. for 10 watts. Radio/Microphone 40 m.v. for 10 watts.

TREBLE LIFT CONTROL
+ 10 db. to -22 db. at 12,000 c.p.s.

BASS CONTROL
+ 14 db. to -10 db. at 50 c.p.s.

HUM LEVEL
Referred to maximum output and including integral pre-amplifier -70 db.

NEGATIVE FEEDBACK
21 db. in main loop.

HARMONIC DISTORTION
Less than 0.1% measured at 8 watts at 1000 c.p.s.


HIGHEST QUALITY
Retail Price
MAXIMUM RELIABILITY
AT A PRICE YOU CAN AFFORD
GNS.

Also Available—THE L45-A compact High Quality 4-5 watt amplifier. Size approx. 7.5 x 5.4in. High Sensitivity is 28 millivolts so that the input socket can be used for either microphone or gram., tape, radio tuner etc. B.V.A. valves used are ECC83 EL84, EZ80. Controls are: Vol. Treble and Bass with mains switch. The Tone controls provide full compensation for long playing records. Output matching for 3 ohm loudspeaker. Retail price £5.19.6.

THE LT45 TAPE DECK AMPLIFIER. A complete unit (power pack and oscillator incorporated) ready for connection to A.C. mains, 3 ohm loudspeaker and practically any make of deck.

Negative feedback equalisation adjustment by multi-position switch for 1", 3", and 7"in.

Trade enquiries to ELECTRON WORKS, ARMLEY, LEEDS.

SENSATIONAL NEW 1962 DESIGNS — BY CONCORD

LOW PRICES ★ PICTORIAL STEP-BY-STEP PLANS ★ EASY AS A.B.C.

THE NEW "LISBON"

TRANISTOR SET

This is a pocket 2-stage transistor set not much larger than a matchbox. Excellent clear reception covering all medium waves, works for months on a tiny 1½ or 3 volt battery costing only 3d. Easy to build and an excellent introduction to transistor assembly. Everything can be supplied down to the last nut and bolt incl. SIMPLE PICTORIAL STEP-BY-STEP PLANS FOR ONLY 1/6d., plus post and packing 1/8. (C.O.D. 2½d. extra). Parts sold separately, priced parts list 1/1.

OUR NEW 4-Stage "MINUETTE"

Build this newly-designed "MINUETTE" 4-stage transistor set in very easy ready written ULTRA-MODERN CASK, size only 6 x 4 x 1½ in. Use three transistors and diode and SELF-OPTIMISED LOUDSPEAKER. Ideal for bedroom, bathroom, etc. Easy to build giving a very sensitive, ideal for office, bedroom, bathroom, etc. Months and months of listening off an old battery. Can be built for ONLY 3/6d., including PROPER CASE, miniature speaker, etc. SIMPLE AS A.B.C. PICTORIAL STEP-BY-STEP PLANS, etc., plus post and packing ½d. (C.O.D. 1½d. extra). Parts sold separately, priced parts list 1/1.

THE NEW "VOLKSRADIO" ONLY 19/6

TAKE-OVER BID MAKES THIS PASTICAN OFFER POSSIBLE—the beautifully compact "HI-STAR VOLKSRADIO"

measuring 4½ x 2½ x 1½in, receives perfectly—in the Bedroom, Office, Garden—over all medium waves. Under 1½ hour running cost. ANYONE can assemble it in one or two hours using our simple A.B.C. Plan. Complete set and parts ONLY 18/6, plus 2½d. & ½p. C.O.D. extra. (Parts can be bought separately). Money Back Guarantee.

THE NEW "SAN REMO" 5 STAR 29/6

This All Transistor Speaker Radio—the "San Remo" 5 star covers all medium waves including "Home," "Lights," etc. Reliable and lightweight—suits easily into the Pocket or Handbag—size only 4½ x 2½ x 1½in. Works for Months off 6d. Battery! Ideal for holidays, Camping, Bedroom, etc. Anyone can assemble it in an hour or two with our simple A-B-C PLAN! Complete set of parts including miniature speaker—everything only 29/6d., plus 2½p. & ½p. (C.O.D. 2½d. extra). Parts can be bought separately.

CONCORD ELECTRONICS Dept. 14/6
210, Church Road, Hove, Sussex.
A USEFUL AND ACCURATE REPEITIVE TIMING UNIT

By E. McLoughlin

LAST month it was established that the exact value of $R_2$ depended on the relay used and should therefore be found by experiment.

It is suggested that the constructor remove both valves and insert a variable resistor for $R_2$ temporarily. $R_2$ is then reduced until the relay energises, and is then slowly increased again until the relay just falls off again. Its value is then measured, and a fixed resistor 5 to 10% larger selected for $R_2$. If, after the end of a period, the bell rings but does not stop again, then $R_2$ is too small in value. If successive runs are all appreciably shorter than the first, then $R_2$ is too high in value.

Power Supply

It is best not to use a mains transformer larger than necessary, as its low internal resistance would then cause unnecessarily high anode currents if $S_4$ is held pushed-in too long. Constructors who have a larger transformer and wish to use it rather than purchase a new one, must protect the circuit by inserting a resistance between the cathode of $V_1$ and the junction of $R_4$, $R_5$, $R_6$ until a meter in series with $R_{y1}$ does not read more than 40mA when $S_4$ is depressed and held depressed. About 100Ω will be roughly the value of this resistance; it will depend on the transformer and components used. It is highly advisable to check this point anyway.

When using the apparatus, do not depress $S_4$ longer than necessary; once the bell rings or the relay has operated, release $S_4$ at once. Do not use larger values for $C_2$ and $C_3$ than specified, as this very poor smoothing is fully deliberate. Firstly, it prevents excessive anode currents if $S_4$ is depressed too long, and secondly it causes considerable hum to be amplified by $V_2$ when the avalanche in $V_2$ starts, thus gently shaking the Relay $R_{y1}$ and preventing it sticking. The improvement in accuracy thereby is very noticeable.

The H.T. rectification is of normal voltage-doubler type with two metal rectifiers, with the centre connected to earth. This gives 350V H.T. and ($-350$) V as bias for $V_2$. Check that the rectifiers are connected the proper way round. Remember that the voltage difference between the positive end of $M_{R1}$ and the negative end of $M_{R2}$ is 700 or more, and take appropriate precautions against shock or flashover. Use adequately insulated wire and good soldering. This is not only for safety, but also to prevent leakages which could
disturb such a long-period charge circuit. Take great care to connect the power plug correctly. Make absolutely certain that the earth-lead from the mains plug goes without interruption to the earth-pin on the power socket on the front panel, and that the same earth lead goes to the mains transformer core. It would be very dangerous if the mains live lead were connected to the power-plug earth socket in error, as then the casing of any switched apparatus to be connected would be live at full mains voltage.

**Critical Components**

Two components in the circuit may cause difficulty in selection or supply. The first is C1. It is not necessary that the capacity value have any close tolerance, but the insulation must be really first class. Even a small leakage in C1 will cause erratic performance of the whole circuit. Thus, an electrolytic condenser is quite unsuitable for C1. A good modern metallised-paper condenser, preferably in a sealed, tropicalised, metal can, is ideal. Smaller ones may be connected in parallel, and, within limits, VR1 and R8 may be increased by the same factor as C1 is decreased, if only a smaller capacity-value is available for C1, or vice versa. Check the condenser to be used for C1 by charging it to its rated voltage. If it fails to give a good healthy spark upon shorting it some hours later, its leakage is very probably too high.

The second component likely to cause some difficulty in supply is the trip-relay Rly2. This is a type often used in automatic corridor and staircase lighting in blocks of flats, and such a relay is used by the author. It has an energising coil for about 6V A.C., and each time the current is switched on in this coil the main contacts switch alternately on and off. This trip-relay is normally designed for its magnet to be operated from the bell-transformer circuit, and its contacts to switch mains lamps up to about 4A.

Regarding the main relay Rly2, any more or less equivalent type is suitable. The resistance is by no means critical, but the energising, current-value of 20mA should be maintained, otherwise the whole circuit requires drastic modification. If no 20mA relay is available, then any more sensitive relay can be used if it is fitted with an appropriate shunt to bring it to 20mA. The procedure for this is exactly the same as shunting a meter.

When adjusting the circuit, connect a voltmeter across R5 and a milliammeter in series with the anode connection of V2. Adjust R3 with series or parallel resistors (or by fitting one as a

(Continued on page 330)
NEW! NEW! "AIR KING"
A New Six transistor luxury portable with the new "SLIM LINE" look. To build yourself, with printed circuit, chassis for reliability and simplicity in construction. May be used as Car Radio, complete Medium and Long Wave coverage. Full assembly instructions. Outstanding Value at 57/6. Plus 2/6 & P. & P.

NEW! NEW! The "CRUSADER"
Our new four transistor plus diode portable with big set quality.

- Full Medium Wave coverage.
- Completely self-contained.
- Five inch P.M. Speaker.
- Genuine high grade Mullard or Ediswan Transistors.
- New components throughout.
- Attractive two-tone blue/grey vinyl-covered cabinet size 8 x 9 x 3in. with comfortable carrying handle.
- Eyelleted chassis simplifies construction.
- Longer life with larger size P.P.T. battery.

SPECIAL FEATURES! ★
SUPPLIED WITH JACK SOCKET FOR DIRECT CONNECTION TO CRYSTAL MICROPHONE FOR USE AS BABY ALARM WITHOUT ANY MODIFICATION! ALSO FOR DIRECT CONNECTION TO CRYSTAL MICROPHONE FOR USE AS A CHAMPION AMPLIFIER! SUPPLIED COMPLETE WITH RECEIVED SOCKET FOR DIRECT CONNECTION TO CAR AERIAL!★
All required components including full instructions, solder, battery, etc. at special price of ONLY 95/- plus 2/6. Free post. Also available separately 79/- plus P. & P.

THE "BABYCALL"
At last! A Baby Alarm without untidy connecting wires. Can be used anywhere and transferred from room to room at will.

THE "HIGHWAYMAN"
At last a quality Car Radio to build yourself, at an economical price. Look at these features— ★ Attractive styling. ★ Push-pull output. ★ Latest Mullard transistors plus valued type 6FB 63 & 6CL 83. ★ No Buzz, High Output and sensitivity. ★ Printed circuit (newest type), 7 x 4" High flux p.m. speaker. ★ Medium and Long Waves. ★ Push buttons for fingertip control. ★ Extremely low Battery consumption (less than 1 amp). ★ Easy to fit any make car (Positive earth only). ★ 12 volt operation. ★ Complete size measures only 9 x 8 x 7" deep. ★ Easy assembly, supplied with dial and drive already mounted.

THE "CLYMAX"
At last Star transistor pocket size portable for Medium and Long Wave coverage at a pride you can afford. All required components.

Inexpensive Test Gear
Two ideal Pocket Instruments for Amateur or Student

Model TH
Size only 3½ x 4½ x 3½. Meter: Six 1½ x 1½ x 1½. Our new transistor. 310 micro-amps —1000 o.m.p.e.s.v. volt. AC/DC Current 1.20, 250 ma. DC and AC volts 10, 50, 100, 200. Resistance 50 ohms—100 K. Battery 1 1/2-volt. Complete with tests, battery and full instructions. Outstanding Value at 57/6. Plus 2/6 & P. & P.

Model TK
Size 5½ x 4½ x 3½. Latest transistor. 1,200 ohms per volt. AC/DC Current 100 ma DC and 10, 250, 500 and 1000 volts. Resistance 0-100, 0-100K. Complete with tests, battery and full instructions. Outstanding buy at 63/- Plus 2/6 & P. & P.

All parts available separately, itemised parts list and full assembly instructions 1/6 post free.

N.B. This is a non-repealable offer. Limited quantity only. Purchased complete from manufacturer. Worth Double !
AKWAZD SPOT?
MINIATURE COMPONENTS?
Soldering is easier with the
NEW 15 WATT
SOLON
electric soldering iron
- Ideal for transistorised and printed circuitry.
- In. diam. bit In. diam. stem will reach normally inaccessible connections and components.
- Just the right amount of heat. Melted resin-coated solder in 14 minutes from cold.
- Spare parts easily replaceable—readily obtainable.
- Designed and made by the team responsible for the highly successful 25-watt Solon.
- 200-220v or 220-240v.
LIST PRICE 23/4d Obtainable from your usual electrical stockist, or electrical counter of your hardware store.

AN AEI PRODUCT
For further details, write to the local AEI Stock Depot, or to:
Associated Electrical Industries Limited
Distribution Equipment Sales Dept.
145 Charing Cross Rd.
London WC2

ANOTHER QUALITY 4-TRACK
MARTIN 'RECORDAKIT'
FOR THE KEEN CONSTRUCTOR
To an outstanding successful range of kits is now added Recordakit '4', designed for use with the Collins 4-speed Hi-fidelity Studio Deck. Like all Martin Recordakits, it is on a printed circuit board and complete with valves, controls, transformer, leads, etc., down to the last screw. Even the wire supplied is cut to length.
Amplifiers 'D' as above, 12v. Speaker and Case assembly £5.00. With Deck, Case, Speaker and Amplifier £4.00.

NEW MARTIN RECORDAKIT TAPE PRE-AMP KIT
For Collins Deck—
2 Track, 8 gua. 4 Track, 8 gua.
From radio and audio outlets. In case of difficulty send direct. For Free Leaflet, cut out this ad, and send it with your name and address.

MARTIN ELECTRONICS LTD
15 High Street, Bidden.
Middlesex.

EXPRESS ELECTRONICS
ROSENDENE LABORATORIES
KINGSWOOD WAY, SELSDON, SURREY
VALVES NEW TESTED AND GUARANTEED FOR THREE MONTHS

<table>
<thead>
<tr>
<th>VALVE</th>
<th>TESTED</th>
<th>GUARANTEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICF1</td>
<td>50-57</td>
<td>50-57</td>
</tr>
<tr>
<td>ICF2</td>
<td>50-57</td>
<td>50-57</td>
</tr>
<tr>
<td>ICF3</td>
<td>50-57</td>
<td>50-57</td>
</tr>
<tr>
<td>ICF4</td>
<td>50-57</td>
<td>50-57</td>
</tr>
<tr>
<td>ICF5</td>
<td>50-57</td>
<td>50-57</td>
</tr>
<tr>
<td>ICF6</td>
<td>50-57</td>
<td>50-57</td>
</tr>
<tr>
<td>ICF7</td>
<td>50-57</td>
<td>50-57</td>
</tr>
<tr>
<td>ICF8</td>
<td>50-57</td>
<td>50-57</td>
</tr>
<tr>
<td>ICF9</td>
<td>50-57</td>
<td>50-57</td>
</tr>
<tr>
<td>ICF10</td>
<td>50-57</td>
<td>50-57</td>
</tr>
<tr>
<td>ICF11</td>
<td>50-57</td>
<td>50-57</td>
</tr>
<tr>
<td>ICF12</td>
<td>50-57</td>
<td>50-57</td>
</tr>
<tr>
<td>ICF13</td>
<td>50-57</td>
<td>50-57</td>
</tr>
<tr>
<td>ICF14</td>
<td>50-57</td>
<td>50-57</td>
</tr>
<tr>
<td>ICF15</td>
<td>50-57</td>
<td>50-57</td>
</tr>
<tr>
<td>ICF16</td>
<td>50-57</td>
<td>50-57</td>
</tr>
<tr>
<td>ICF17</td>
<td>50-57</td>
<td>50-57</td>
</tr>
<tr>
<td>ICF18</td>
<td>50-57</td>
<td>50-57</td>
</tr>
<tr>
<td>ICF19</td>
<td>50-57</td>
<td>50-57</td>
</tr>
<tr>
<td>ICF20</td>
<td>50-57</td>
<td>50-57</td>
</tr>
</tbody>
</table>


NEW TRANSISTORS BY MULLARD. OX8, OX28, OX56, 25/-; OX44, OX48, 4/-; OX72, 6/-; OX73, 7/8; OX74 matched in pairs. Baked's "Bathurst" Twin, 15 0 15W, 6/6. 125m, Stereo Model, 87.70.

VALVES MATCHED IN PAIRS
EL84 17/8, NTE87 17/8, 8W6G 17/8, 6BKW 12/6, 6P6G 12/6 per pair. Post Paid £.p.

SETS OF VALVES
DA91, DAF91, DPA91, DPA93 or DA94, 18/6, £5.00.
DPA94, DA95, DTA94, DPA96, £5.00.
DA92, 18F1, 1PF1, 1PF1, £5.00.
513, 19F1, 1PF1, 1PF1, £5.00.
162, 174, 18F1, 18F1, 18F1, 18F1, 18F1, 18F1, 18F1, £5.00.

www.americanradiohistory.com
The P.W.

Alpha 3

PERSONAL TRANSISTOR SUPERHET

(Continued from page 206 of the July issue)

AFTER the oscillator coil and I.F. transformers have been mounted on to the panel (as described in last month's issue) the transistors are soldered into position.

The mixer and I.F. transistors must be of appropriate type, such as an OC44 for mixer and OC45 for the I.F. stage. A wide range of audio transistors will be satisfactory in the A.F. position. The OC71 is suitable and a red/yellow spot transistor was found satisfactory. Pieces of 1mm sleeving are cut about #in. long and one piece is placed on each transistor lead. This will avoid short-circuits and hold the transistors at a convenient height. The emitter, base and collector leads must, of course, be passed through the correct holes, as shown by e, b and c in Figs. 3 and 4.

Wiring Up

Some 26s.w.g. tinned copper wire will be convenient for connections and 1mm sleeving is placed on all leads and the wire ends of components. Fig. 4 shows the underside of the panel (the tuning condenser and potentiometer are left until last).

The transistor leads are all left reasonably long and the soldered joints should be made quickly.

The same care to avoid overheating is also taken with the diode.

Lead "A" on the aerial is long enough to pass through a small hole to the earth line. Lead "B" passes through a second hole from the 0.05µF condenser to the aerial tapping. Lead "C" passes to the 50pF trimmer TCI, as in Fig. 3, a short lead subsequently passing to the front section of the gang condenser.

The collector lead of the A.F. transistor emerges through a second hole and one headphone lead is soldered to it, as in Fig. 3. The second headphone lead, through hole 'x' in Fig. 3 is soldered to a lead which is wired to the battery negative side of the circuit. A miniature 2-pin plug and socket could be used but is not really necessary when the earpiece can be accommodated in the case.

When all the wiring in Fig. 4 has been finished the tuning condenser and potentiometer can be connected. One switch tag is wired to battery positive; the other tag to the earth line, potentiometer slider and the frame of the tuning condenser. One outer tag of the potentiometer, shown in Fig. 3, is wired to the 0.25µF condenser at pin 5 of the I.F. transformer. One lead is then taken from each trimmer to the sections of the tuning condenser, as in Fig. 3.

After wiring has been checked the controls can be secured to the end of the case. Very small knobs are best avoided. The #in. 4B.A. bolt is then inserted in the hole in the case and a nut is tightened to hold it firmly. A further nut is then run on to leave about #in. clearance between panel and case. The panel is then dropped into position and held with a third nut.
The battery connections can be taken to suitable clips or they may be soldered. A meter may be added in circuit, when first trying the set, to ensure there are no short-circuits or to check the current flowing. This will be in the region of about 3mA to 5mA, depending on the actual battery voltage and transistors.

Alignment

This is similar to that of usual superhet circuits, though there are fewer adjustments. If a signal generator is available set it to 470kc/s, with modulation and place the output lead near the mixer transistor. The two I.F. transformer cores are then adjusted for maximum volume. If a generator is not available, simply adjust the I.F. transformers for best results.

As the sensitivity control is turned up from zero there will be a considerable increase in volume. At some point around the halfway position the I.F. amplifier will commence to oscillate. This is intended, as sensitivity is then very great. The two I.F. cores are finally peaked up for maximum volume, when the sensitivity control is just below the oscillation point. This should be carried out while listening to a weak, distant station.

"To align the aerial and oscillator circuits adjust the trimmers at a low wavelength and the oscillator coil core at a high wavelength. It is important that the trimmers have a reasonably low minimum capacity. If trimmers with three plates are used it may be necessary to remove the screws and bend up the middle plate slightly to obtain a reasonably low capacity.

With the oscillator trimmer set at nearly minimum capacity a weak station should be tuned in. Adjustment of the aerial trimmer should then bring this station up to maximum volume, and the aerial trimmer should not be either fully screwed down or fully open. If best volume is obtained with the aerial trimmer fully open, screw down the oscillator trimmer slightly, readjust the tuning knob to obtain the station again, then try setting the aerial trimmer.

Alignment at the high wavelength end of the band can be achieved by adjusting the oscillator coil core in conjunction with the tuning condenser for best volume, or by sliding the aerial winding along the slab, leaving the tuning condenser untouched. Hand-wound coils vary somewhat in inductance, but moving the winding on the slab will compensate for this.

If sensitivity improves as the oscillator core is unscrewed and it is too far out, this shows that the aerial inductance is too low. Moving the winding nearer the centre of the slab will compensate for this. On the other hand, if the oscillator coil core is too far in, move the aerial winding nearer the end of the slab.

Alignment is usually fairly easy and has a very great effect on the results obtained. If the aerial and oscillator alignment is much in error it may only be possible to hear the local station. If so, search for a station a little lower in wavelength and then adjust the trimmers to bring this up to best volume. Then find a station a little higher in wavelength and make small adjustments to the aerial winding or oscillator core. Results should then begin to improve until full sensitivity is obtained throughout the whole tuning range.

---

**Electronic Process Timer**

(Continued from page 326)

trimmer) until anode-current of V2 commences when the voltage across R5 has risen to just under 50. In most cases, the specified value of 2.2M for R3 should prove correct, but check this. If anode current in V2 starts too early, then R3 is too large, and vice versa.

No chassis is used. A stout wooden cabinet, the exact carpentry details of which are left to the constructor's taste, is indicated in its rough proportions, as used by the author, in Fig. 3. This wiring diagram represents a suggested layout, as used successfully by the author. The exact layout is relatively unimportant in this circuit. What is important is meticulously good insulation throughout. If any trace of instability is observed, try connecting a grid stopper (10k 1W) at the grid-cap of V2, or, as an addition to R9, a similar grid stopper (10k 1W) direct on to pin 6 of V1. Both grid stoppers may be required in some cases.
MULLARD 3-3 HI-FI AMPLIFIER

COLLARO STYLE TAPE RECORDER KIT

SPECIAL BARGAIN OFFER

BARRENS 4-SPEED PLAYER UNITS


SPEAKER FRET - Expanded bronze amounged metal, 2 in. square, 10 ft. Multiples of 5 in. cut to size.

BARGAINS

RECORD PLAYER CABIENETS

VALVES

New Box

EAT.

TRACER AMPLIFIER

COAX 4 OHM CABLE

TRU-TONE CABS

EPRIS Multicore Solder 0/4d. per yard. Hb. 2/6 etc.

MULLARD'S 3-3 HI-FI AMPLIFIER

DIESEL Meters Type 360 P. P. 4/11.5.

12 RMS 3-3 Hi-Fi Amplifier

Itemised mfrs., surplus offer—Listed 42 items. A Quality Tape Recorder Kit based on Mullards' latest design 42536. RCA Coax. and Rectifier. Specially designed Kit for Collaro latest STUDIO DECK. Freq. response - 35Hz. 55,000 sec. Amp. HUM and Noise. Inter., 1 kHz only required. Ceratitis size: 1 x 13 x 21, finished in combined tone blue with gilt Side Escutcheon and gilt Finish. Hi/Book, supplied free with kit. Send 2/8 now for full details of today's outstanding Tape Recorder bargain.

£12 19s. 6d. P. P. D. 5.

JASON FM TUNE UNITS

60, 120, 180, 240 ft. 12 kg. Meters. 6/6. 12/6. 21/6.

BARGAINS

4-SPEED PLAYER UNITS

Single Players Car. 36s.

Garrard 4 3/4. £38. 9

Garrard 7 A M/C £37. 6

Collaro "Junior" £26. 6

B.S.R. Latest T.T.D. 7/-

E.M.I. Junior £9. 6

Auto-Changers Car. 56s.

Collaro "C60" £7. 12

B.S.R. (GAR) £10. 3

Garrard "Auto-alarm"

Garrard Model ROC

£2. 12

£28. 12

£3. 3

£20. 13

£5. 18. 6

£1. 10. 5

£1. 12. 3

£23. 12. 6

£1. 4. 5

£1. 1. 3

£1. 12. 6

£4. 1. 4

£1. 16. 4

£1. 10. 9

£1. 10. 9

£1. 6. 7

£1. 12. 6

£1. 1. 3

£1. 12. 6

£4. 1. 4

£1. 10. 9

£1. 10. 9

£1. 6. 7

£1. 12. 6

£4. 1. 4

£1. 12. 6

£1. 1. 3

£1. 12. 6

£4. 1. 4

£1. 10. 9

£1. 10. 9

£1. 6. 7

£1. 12. 6

£4. 1. 4

£1. 10. 9

£1. 10. 9

£1. 6. 7

£1. 12. 6

£4. 1. 4

£1. 12. 6

£1. 1. 3

£1. 12. 6

£4. 1. 4

£1. 10. 9

£1. 10. 9

£1. 6. 7

£1. 12. 6

£4. 1. 4

£1. 12. 6

£1. 1. 3

£1. 12. 6

£4. 1. 4

£1. 10. 9

£1. 10. 9

£1. 6. 7

£1. 12. 6

£4. 1. 4

£1. 12. 6

£1. 1. 3

£1. 12. 6

£4. 1. 4

£1. 10. 9

£1. 10. 9

£1. 6. 7

£1. 12. 6

£4. 1. 4

£1. 12. 6

£1. 1. 3

£1. 12. 6

£4. 1. 4

£1. 10. 9

£1. 10. 9

£1. 6. 7

£1. 12. 6

£4. 1. 4

£1. 12. 6

£1. 1. 3

£1. 12. 6

£4. 1. 4

£1. 10. 9

£1. 10. 9

£1. 6. 7

£1. 12. 6

£4. 1. 4

£1. 12. 6

£1. 1. 3

£1. 12. 6

£4. 1. 4

£1. 10. 9

£1. 10. 9

£1. 6. 7

£1. 12. 6

£4. 1. 4

£1. 12. 6

£1. 1. 3

£1. 12. 6

£4. 1. 4

£1. 10. 9

£1. 10. 9

£1. 6. 7
MINISETS LTD. Hatherley Mews London E17

6-STAGE PORTABLE TRANSISTOR RADIO
- All parts including transistors direct from manufacturers
- Pre-assembled circuit board ensuring ease of construction
- Full medium-wave coverage
- After-sales service
- Attractive swivelling case 9 x 6 x 4in.
- Push-pull output, 350 milliwatts
- 5in. high flux speaker
- Built-in Ferrite Rod aerial
- No external aerial or earth required.
- High performance, many stations received on test

Can be built for £5.40 P.P.
- Or with long-wave £1. extra.
- Full instructions 1/6 (Free with order).

3-TRANSISTOR RADIO (plus 2 diodes)
- Total building 70/- P.P. 2/6
- Pre-assembled circuit board, ensuring easy construction
- Full medium-wave coverage
- Attractive case 5½ x 3 x 1.25in.
- All components including transistors are brand new and direct from manufacturers
- Ferrite Rod aerial, no external aerial or earth required
- 2in. high flux speaker direct from manufacturer
- After-sales service

Send 1/6 for instructions, circuit and price list

2-TRANSISTOR RADIO (plus 2 diodes)
- Ideal for personal listening
- Built-in Ferrite aerial
- Sensitive earpiece.
- All parts including transistors direct from manufacturers
- Pre-assembled circuit board and easy-to-follow instructions
- After-sales service
- Can be built for 50/- P.P.
- Full instructions, etc., 1/6 (Free with order).

RECONDITIONED TV SETS!
- ALL MAKES ★ ALL FULLY SERVICED ★ ALL GUARANTEED ★ ALL GENUINE 13 CHANNEL SETS—NOT CONVERTED EARLY MODELS
- Completely self contained
- No aerial or earth required
- Push-pull output, 250 milliwatts
- 3in. high flux speaker
- Pre-assembled circuit board with simple instructions ensuring easy construction
- High Q Ferrite Rod Aerial
- After-sales service

Can be supplied with long-wave £6 extra.
- Full instructions, price list 1/6 (Free with order).

14" from £5 to £8.10.0
Examples: G.E.C. 14" £5: McMICHAEL PORTABLE £8.10.0
17" with 12 months’ guarantee on tube, and 3 months’ guarantee on valves and components.
from £11.10.0 to £19
Examples: Phillips 17" £11.10.0: Stella Semi-Slim £19

The examples given above are only intended to act as a guide. All sets vary in price between the prices given according to the make and model. As our stock continually fluctuates please send S.A.E. for our price list of quality sets available.

BUY WITH CONFIDENCE!
- Carriage and insurance 25/- extra.

REBUILT TV TUBES

All our TV Tubes are reprocessed to a high standard and are covered by a 12 MONTHS’ GUARANTEE. Each tube is fitted with a new, top-grade electron gun, which is identical with the original, ensuring exact plug-in replacement.
- 17", £5.10.0.
- 12", 14" and 15", £4.10.0.
- Each plus 10/- Carriage.
- £1 refunded from the above price if you return your old tube.

PARK LANE RADIO LTD.
548 ROMFORD ROAD, MANOR PARK, LONDON E.12
- Telephone: ILFORD 6044

1962 EDITION

RADIO AMATEUR'S HANDBOOK
36/- by The A.R.R.L. Post 2/6

ELECTRONIC ORGAN HANDBOOK, by H. Emerson Anderson, 40/- Postage 1/-

HANDBOOK OF ELECTRONIC TABLES & FORMULAS, by D. Herrington & S. Meacham, 12/- Postage 9d.

SOLUTION OF PROBLEMS IN TELE-COMMUNICATIONS & ELECTRONICS, by C. S. Henson, 2/76. Postage 9d.

RADIO COMMUNICATION, by J. H. Reayner & P. J. Reayner, 5/- Postage 1/-.

CABINET HANDBOOK, by G. A. Briggs, 7/6. Postage 9d.

RADIO VALVE DATA, 7th Ed. Compiled by "WW", 6/- Postage 10d.

VALVE & TELETUBE MANUAL No. 9, by Brimar, 6/- Postage 1/-.

COMPLETE CATALOGUE 1/-

THE MODERN BOOK CO.
- BRITAIN'S LARGEST STOCKISTS of British and American Technical Books
- 19-21 PRAED STREET LONDON, W.2
- Phone: PADeveloping 4185
- Open 6 days 9-6 p.m.

www.americanradiohistory.com
Short-wave Listeners' Log

SEVERAL types of signals are used by amateur transmitters on the amateur bands, and the receiver needs to be operated accordingly, to obtain best reception. The systems most generally used are A.M. (amplitude modulation), C.W. (continuous wave), SSB (single sideband) and F.M. (frequency modulation). These signals can be heard with a communications receiver, or a receiver to which a beat frequency oscillator has been added.

Amplitude Modulation

This is most used, being the same as employed by medium wave and other broadcast stations. Any ordinary receiver will pick up A.M. signals. For such reception, no BFO is needed, and this is therefore switched off, if fitted in the receiver. Some short-wave operators may listen exclusively to A.M. signals. This type of signal is, however, susceptible to interference, and may be useless during conditions when C.W. and SSB come through well. A.M. can give world wide results when conditions are reasonably good.

Continuous Wave

This method is used for Morse, the actual radiated wave being interrupted by keying. C.W. cannot be resolved with an ordinary superhet, as a BFO is required. For C.W. reception the BFO is thus switched on. The signal is tuned in as well as possible with the ordinary tuning control, and the BFO tuning knob is adjusted for best readability. Adjustment of the BFO tuning will change the audio pitch of the signal, and the BFO may be tuned above or below the carrier frequency, as required for least interference. C.W. can be radiated by a very simple transmitter, and can get through interference better than A.M. C.W. may be heard with a TRF type set if reaction is adjusted until the set is oscillating.

Single Sideband

This method provides voice signals which have great ability to be heard through interference. SSB can be used when A.M. would be impossible, due to conditions. An A.M. signal is a carrier with two sidebands, which carry the "voice" or audio part of the transmission. With SSB, the carrier and one sideband are eliminated at the transmitter, and only the other sideband is radiated. To make SSB intelligible, the carrier has to be re-inserted at the receiver. This can be done with a BFO.

When a SSB station is tuned in, there will be little or no carrier, and the signal will be quite unintelligible. After tuning for best volume, the R.F. gain must be reduced, so that the signal is weak, volume being restored by turning up the audio gain. The BFO is then switched on, and tuned so that its carrier occupies the frequency which would be taken up by the station carrier, if that were present. The sound then becomes intelligible as speech.

If no adjustment of the BFO seems to produce speech, the BFO carrier is probably on the wrong side of the SSB signal. To correct this, tune the BFO through zero, then adjust it as before. If the receiver has an AVC in/out switch, the automatic volume control circuit may be switched off. If the signal is distorted, the SSB may be too strong at the second detector, so the R.F. gain should be reduced even more. The aim is to match the SSB signal to the carrier level produced by the BFO.

Expensive communications receivers have special detector circuits for SSB reception. A BFO is a one-valve oscillator, tunable over the receiver intermediate frequency.

Frequency Modulation

Narrow band F.M. is occasionally used. With A.M. the voice or audio signal changes the amplitude of the carrier. With F.M. the audio signal is made to vary the frequency of the carrier. The usual type of receiver will not have an F.M. detector, but it is possible to resolve F.M. signals by tuning the receiver to one side of the station. This is known as slope detection. No BFO is needed, but high selectivity is helpful.

Faults in Transistor Output Stages

(Continued from page 322)
tolerance marking have a 20% tolerance, and are not recommended.

Loudspeakers

Distorted results are more likely to be caused by wrong working conditions, than an actual speaker defect. If gentle pressure on the speaker cone moves it in and out, without any noise caused by the speech coil touching the magnet assembly, the loudspeaker is probably in order. Obvious defects, such as a loose cone, should be seen easily. A 2Ω to 3Ω loudspeaker will frequently be used in circuits like that in Fig. 2. For the circuit in Fig. 4, a 35Ω or 75Ω unit will generally be employed.

If the speaker is suspected, the output may temporarily be taken to an external 2Ω or similar permanent magnet speaker. If distortion is still present, the receiver speaker is probably in order. But if distortion clears with the external speaker, the receiver unit must be suspected.

In making this test, it should be remembered that 24in. or similar midget speakers, in a very small cabinet, cannot be expected to give quite such good reproduction as a large, external speaker, possibly with a much bigger cabinet. But the comparison is useful, despite this fact.
Letters to the Editor

The Editor does not necessarily agree with the opinions expressed by his correspondents

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 the cover.

THE IDEAL FUTURE TRANS-RECEIVER?

SIR,—I know that it's going to be a very long time before some such apparatus become prevalent on the scene, but this "bug" of microwaves propagation not being suitable for transatlantic communication for example, due to the earth's curvature, has forced me into thinking that the only perfect way of overcoming this defect in our technical forum is to seriously consider "two-stage transmission". Not utilising wave propagation as we know it, but by producing, instead of oscillators, reservoirs, which can suitably build up and amplify a system of potentials to a pitch, whereby they would escape in the form of a flow of high energy "photons"—I mean similar types of packets of energy which Quantum visualised; in fact substitute in practice the quantum theory for the wave theory of electromagnetic propagation. These emitted photons must then, somehow, be controlled and measured after their emission, so as to cause them to "explode" at a preselected distance, and thus create secondary wave-radiation which, it is foreseen, will greatly increase the range of intelligible communication through the "ether". — K. R. CRASKE (Lincoln).

SERVICING TAPE RECORDERS

SIR,—As I am engaged almost wholly in the servicing of tape recorders I should like to comment on a point raised by Mr. T. S. Smith in his article in the June issue about this subject.

Mr. Smith states that "residual magnetism is a very real danger so far as tape recorders are concerned" and goes on to advocate the use of non-magnetic tools. This is quite unnecessary in practice, since any competent service engineer would automatically use a defluxer on all relevant parts (heads, guide posts, etc.) on completion of service.

It is also quite in order to check the D.C. resistance of a head winding so long as the head is de-fluxed afterwards. Magnetism can do no harm to a tape recorder's performance so long as it is removed before a tape is loaded. — J. POCOCK (Wolverhampton).

LOCAL STATION PICK-UP

SIR,—I found R. Ferguson's letter (June issue), most interesting. Experiencing the same problem with my recorder I was relieved to know that I did not in fact own a "freak" instrument. However I would be happy to hear of any information and ideas from fellow sufferers in the hope that this most annoying problem could be solved.

I personally have tried all types of screening, earthing, coaxial leads, aerial trimmers, etc., all to no avail. I'm quite unable to rid my machine of the "three-in-one" programme reception which insists on dubbing itself on to my tapes.—B. J. CLAXTON (Bridlington).

TEST TRANSMISSIONS

SIR,—I often receive signals on my short wave set from New York, Rome, Vienna, Berne, Tel-Aviv, Moscow etc., which are announced as "Test transmissions for receiver adjustment purposes", or something similar. Some of these transmissions are SSB, and I generally hear them between 8 and 16 Mc/s. I wonder if anyone could tell me what the purpose of these transmissions is, and who they are intended for.—A. J. RICHARDS (Abermule, Montgomery).

A STRANGE FAULT

SIR,—I recently experienced a strange fault which might be of interest to other experimenters. It was in some experimental equipment I was using, and during the experiments I had reason to connect a resistor across another one in order to arrive at a different value. I then experienced trouble with the equipment under test, and could not find any logical reason for it. I changed the two resistors in parallel for one of equivalent value, and the trouble ceased. I then replaced the paralleled resistors by two others of the same value, and got the same trouble. Eventually it was found that the two resistors in parallel acted as a closed circuit which was being shocked into oscillation. I think it worth while now never to use this arrangement but always to make sure of using a single component to avoid this risk.—L. MENCE (Birmingham).

COPY OF P.W. WANTED

SIR,—I should like to know of any reader who would let me buy or borrow a copy of February 1954 PRACTICAL WIRELESS. I need this issue for the article on an electronic organ.—J. WATSON (227 Cemetery Road, Lidget Green, Bradford 7, Yorkshire).
UNIVERSAL AVOMETERS
Guaranteed perfect working order, supplied complete with leads, batteries and instructions.
Model "A" 14 range £5.19.6 each
Model "B" 50 range £11.5.0 each
Model "P" 25,000 ohm/volt model. £11.19.6. Registered post 5/- extra.

R.C.A. AR.88 RECEIVERS
Model AR.88 D. Frequency coverage on 6 bands, 550 kcs to 30 Mcs, 22/- each.
Model AR.88 I.F. Frequency coverage on 6 bands, 550 kcs to 500 kcs and 1.5 Mcs to 30 Mcs, 2310.10/- each.
Both models operate on 110/200/250 volt A.C. Supplied fully tested and checked and in excellent condition. Carriage 30/- extra.

AMERICAN C.B.S. TAPES
5in. std. £6.00 each. 13/-
5in. L.P. £6.00 each. 26/-
6in. D.P. £6.00 each. 32/-
5in. H.P. £6.00 each. 10/-
5in. L.H. £6.00 each. 10/-
5in. D.P. £6.00 each. 32/-
7in. L.P. £5.10 each. 37/-
7in. D.P. £5.10 each. 37/-
7in. L.H. £5.10 each. 56/-
7in. D.P. £4.00 each. 47/-
Brand new and guaranteed.
Please add postage. S.A.E. for full list.

MINE DETECTORS No. 4A

FIELD TELEPHONES TYPE "H"
Ideal for all inter-com systems, house, garage, office, building sites, etc. Equipped with bell ringer, 2-line connection. Supplied complete with batteries and wooden carrying case, fully tested. £4.19.6 each pair. Carr. 5/-.

COLLINS TCS RECEIVERS
BRAND NEW: Superb short wave receiver, covering 1.5 to 12 Mics on 3 bands. Circuit incorporates 71, and a.f, path controls, B.C.O., etc. Power requirements 220v, R.H.T. and TV. R.H.T. Supplied brand new with circuit. £21.19.6 each. Carriage 7/-.

P.C.R. COMMUNICATION RECEIVERS
6 valves. Frequency coverage on 3 bands: 600-2,000 metres, 300-500 metres and 5-16 Mics. 7/22 for motion drive. AR trimmer, tone control, built in speaker. As New £8.19.6 each. Carr. 7/6.
P.C.R. x 4 NEW VIVAS 350-600, 1,200-2,000 metres, 300-500, 5-22 Mcs. Output for phones or 2 ohm speaker. As NEW £6.19.6. Carr. 7/6. Both above models can be supplied with internal power unit to operate on 220/250 v, A.C. at 30/- extra of alternatively plug-in external power units are 35/-.
Circuit and details are supplied with each receiver.

NATIONAL H.R.O. RECEIVERS
BRAND NEW! Senior model, table mounting. Complete with a full set of 3 coils covering 50 kcs to 30 Mcs. Supplied in original transit cases. £25. Carr. 50/- Power units to operate direct from 200/250 volt A.C. 6/-6 extra.

I.K.V. ISOLATION TRANSFORMERS

JEMCO 20,000 OHM/VOLT TEST METER
D.C. and A.C. volts up to 1,000v. Current up to 500 ma.
Resistance up to 5 megohms. Decibels from 00 to +38 db.
Supplied complete with instructions, leads and battery. £5.9.6 each. P. & P. 2/6.

230/250 VOLT A.C. MOTORS
Stre 4in. x 3in. dia., 90 watt rating, 1,000 r.p.m. In new, boxed. £15. Carriage 10/-.

CT-31 SIGNAL GENERATORS
Precision instruments covering 0.9 to 15.6 Mcs and 20 to 500 Mcs on 6 bands. Variable attenuator from 1 microvolt to 100 millivolts. Operation 110/200/250 volt A.C. Supplied in perfect working order complete with calibration charts. £39.19.6 each. 10/- extra. Carr. 10/6.

PRECISION A.C. & D.C. VOLTMETERS
Two ranges, 0-150 and 300 volts. 6in. mirror scale with knife edge pointer. Housed in polished wooden case. Ideal for schools, labs., etc. Supplied brand new. £5.19.6 each. P. & P. 3/6.

7.5kv.A. AUTO TRANSFORMERS
0-115-230 volts. Brand new, boxed. 6/-6. Carriage 30/-.

COLLARO STUDIO TAPE TRANSCRIBERS
Brand new 1962 model, 3 speeds, 3 motors, digital counter, etc. Fitted with latest Bradmatic heads and interlock button. Supplied with spare spool, instructions and fixings. 10/- extra each. Carriage paid.

CLASS "D" WAVE METERS Mk. II
Hetrondyne crystal controlled frequency meters covering 1.5 to 300 Mcs. 4 volt D.C. operation. Supplied complete with crystal, valves, spare vibrator, heads and detailed instruction manual. 5/-6 each. P. & P. 3/6.
I.F. TRANSFORMERS

IFT, 11/465 Kc/s and 1.6 Mc/s.
Miniature IF Transformers for 465 Kc/s or 1.6 Mc/s giving excellent performance at low cost. Coils are litz wound and permeability tuned with high-grade iron dust cores and silver mica condensers. Screening can 11/4 in. sq. PRICE 6/6.

IFT, 11/10.7 Mc/s.
Nominal frequency 10.7 Mc/s. For IF stages of F.M. receivers and converters. The Q of each winding is 90 and the coupling critical. Construction and dimensions as above. PRICE 6/6.

IFT, 11/10.7/L
As above but with secondary tap for limiter input circuits. PRICE 6/6.

IFT, 12/85 Kc/s.
A narrow band 85 Kc/s IF Transformer for use in double superhet communications receivers. The overall response of one transformer is approx. 3.5 Kc/s at — 6db. Dynamic resistance 500,000 ohms. Wound on a polystyrene former with iron dust core tuning and silver mica condensers. Screening can 21/4 in. x 11/4 in. square. PRICE 16/6.

ALL IF. TRANSFORMERS ARE ALIGNED BEFORE LEAVING THE WORKS

GENERAL CATALOGUE covering full range of components, send 1/6 in stamps. PLEASE SEND S.A.E. WITH ALL ENQUIRIES.

DENCO (CLACTON) LTD. Dept. (P.W.) 357/9 Old Rd., Clacton-on-Sea, Essex

Stop Press: MULLARD “TWIN THREE-THREE” STEREO AMPLIFIER. Punched Aluminium Chassis and Hammered Gold printed front Panel 3/6d.

ATTENDING COURSE

(A) Full-time One Year Course in Radio and Television. College course in basic principles for prospective servicing engineers. Next course commences 4th September, 1962.

This course is recognised by the Radio Trades Examination Board (R.T.E.B.) for the Radio and Television Servicing Certificate examinations.

Provides excellent practical experience on valve and transistor radio receivers and all well-known makes of television receivers.

HOME-STUDY COURSES

(B) Courses in Radio, Telecommunications and Mathematics for the City and Guilds Telecommunication Technicians' Certificates.

To: The Pembridge College of Electronics.
(Dept. P1I), 34a Hereford Road, London, W.2.
Please send, without obligation, details of

A. B. (Please tick)

Name

Address
A 7,500V A.C. high-potential tester has been added to Raytheon Company's Sorensen range of products. Designed to test and measure cable and equipment breakdown limits, the Sorensen 800 Series high-potential testers feature a direct-reading kilovolt meter and a continuous variable voltage over their entire output range of zero to 3,000 or zero to 7,500V A.C. A "breakdown" current indicator lamp, precisely calibrated by a potentiometer for a predetermined load current, shows that point when the 10mA current is at or above the selected load, or flashes at breakdown, pinpointing the minimal limit of the tested object.

Incorporating an internal overvoltage protection circuit, the Sorensen air-cooled testers operate from a nominal input of 117V A.C., single phase, and are $6\frac{1}{4}$in. wide, $8\frac{1}{4}$in. high and $10\frac{1}{4}$in. deep. Full particulars on the Sorensen 800 Series portable A.C. high-potential testers may be obtained in Europe from Sorensen-Ard, A. G., Eichstrasse 29, Zurich 3, Switzerland. Inquiries from all other areas outside the U.S.A. should be addressed to Raytheon Company International Sales and Services, Spring Street, Lexington 73, Massachusetts, U.S.A.

NEW POCKET INTERCOM AMPLIFIER

Recently introduced by Amplivox is the Ampliphone Pocket Intercommunications Amplifier for multi-way communications over 2-wire lines, using boom microphone headsets. Special features have been included in this fully transistorised pocket or belt set to achieve superior speech intelligibility in high noise areas. Transmit and receive gain controls are provided and the amplifier is completely self-contained, operating from a 6V internal battery or, if necessary, from a central power supply. It is designed to work with ordinary magnetic, noise-cancelling magnetic or throat microphones.

Amplivox Limited, Beresford Avenue, Wembley, Middlesex.

NEW NECK MICROPHONE

A new Lavalier (neck) microphone, Model 4112, is to be introduced by Standard Telephones and Cables Limited. The first model was shown at the London Audio Festival recently. The model 4112 is a small tubular omni-directional moving coil microphone of high quality, designed for use in broadcasting, commentaries and in public address systems. It weighs only 5oz and is provided with a light neck halter. Attachments are available enabling it to be used from a stand or as a table microphone.

The frequency response of the new microphone is substantially uniform between 100c/s and 14kc/s and it has a sensitivity of $-82\text{dB}$ referred to $1\text{V/dyne/cm}^2$ (0.1mV approximately).

The case is of strong alloy, with a perforated chrome plated steel front. It has a durable plastic diaphragm.


NEW RECORD PLAYER

A NEW inexpensive record player has recently been introduced by Pam Radio and Television Ltd.

The record player—model 5200—features a four speed auto changer and costs only 17 guineas. The two tone cabinet houses a 7in. x 4in. loudspeaker. There is a choice of colour schemes for the cabinet—navy blue and grey or red and grey.

The record player is manufactured by Pam Radio and Television Ltd., 295 Regent Street, London, W.1.

NEW AUDIOMETER TO BRITAIN

RECENTLY introduced by the Zenith Radio Corporation of Chicago, U.S.A., is a portable transistorised model of a diagnostic audiometer which can carry out major hearing tests.

This new model is now available in Britain for immediate use by specialists, nurses, industrial and safety personnel, as well as by hospitals, schools, and hearing and speech centres.

Battery-powered, the audiometer measures 10$\frac{1}{2}$in. wide by 7in. high by 6$\frac{1}{2}$in. deep. It weighs only 81lb including batteries, and the price is £150.

Known as the ZA-100-T, it is housed in a black vinyl and clear anodised aluminium cabinet. Battery-power also provides performance stability in both tone and volume output, a distinct advantage over vacuum tube models that are affected by even the small variations of electric line current that frequently occur.

The audiometer is capable of measuring frequencies from 125 to 8,000c/s for air conduction and from 250 to 4,000c/s for bone conduction.

It has temperature compensated circuitry which includes a transistorised thermistor stabilised Wien bridge oscillator. Also featured is a masking control calibrated in levels of total sound intensity above 0.0002 dyne/cm$^2$, a continuously rotating frequency selector dial, and frequency accuracy within $\pm 3\%$.

Supplied with the new Zenith portable audiometer are two headphones with cushions, a headband, yokes and cord; a bone conduction receiver and a clear plastic dust cover. Further versatility of the ZA-100-T can be achieved through accessories consisting of a magnetic microphone for communication with the test subject, and a shoulder carrying strap as a replacement for the normal carrying handle, both available at a slight extra cost.

U.K. distributors for Zenith audiometers and hearing aids are the United Mercantile Company Limited, 13-14 Queen Street, Mayfair, London, W.1.
F.M. TUNERS

ARMSTRONG RADIO CHASSIS

TAB VHT Tuner, self powered ........................................ $21.10
Deposit $6.50 and 12 monthly ........................................ $14.60
ST/G Mcx AM/FM Tuner, powered ................................. $27.10
Deposit $4.15 and 12 monthly ........................................ $12.95
APAMS AM/FM Radio chassis, bastr and treble controls, P.C. inputs ................................. $26.15
Deposit $4.15 and 12 monthly ........................................ $12.95
Joblins Mk.2 AM/FM Radio chassis with push-pull output stage ................................. $30.10
Deposit $6.50 and 12 monthly ........................................ $14.60
Stereo 55 AM/FM Radio chassis, single ended output stage, on both channels. Separate tone and volume ........................................ $28.10
Deposit $6.50 and 12 monthly ........................................ $14.60
Stereo 10 Mk.2 AM/FM Radio chassis. Push-pull on both channels, separate controls ........................................ $43.10
Deposit $8.50 and 12 monthly ........................................ $21.25
Individual leads giving full description and technical specification available ........................................ $5.00

MARTIN RECORDAKITS

TAPE RECORDER: Complete with instruction book, etc., $44.10
Marriott 2 Track Type D/R/R/R only, with bracket for studio deck. Ideal 3rd head ........................................ $1.75
M/S & 8.1: 2 Track Type D/R and D/R/R/R and Erase, set only ........................................ $1.75 pair.

SRTALON PARK RADIO LTD

for POST HASTE—POST FREE SERVICE

MARTIN RECORDAKITS

GRAMOPHONE EQUIPMENT

D.S.R. UA14 T/O/H cartridge ........................................ $7.10
Hire purchase deposit $11.10 and 6 monthly ........................ $2.85
Garrard "Analog" cartridge ........................................ $14.10
Hire purchase deposit $11.10 and 6 monthly ........................ $2.85
Phillips AU1015 New semi-auto player ............................... $13.10
Hire purchase deposit $11.10 and 6 monthly ........................ $2.85

REGENCY

Transistor Cabinet, in two tone “Vynile” 10 x 6 x 3/4. for 7 1/2 inch speaker ........................................ $2.40
Ideal for REGENCY and WEYMOUTH transistor radio etc. ........................................ $1.15.

TRANSISTORS

MULLARD HAVE REDUCED THE PRICE OF MANY TYPES TO OCT 6/8, OCT 7/0, OCT 6/7, OCT 6/5, OCT 6/6, OCT 6/1, OCT 8/6, OCT 9/6, OCT 8/1, OCT 9/1. ABOVE ARE THEIR NEW LIST PRICES. WHY BUY SOMETIMES? MATCHED PAIRS ONLY. Mullard OCT 7/0-10/- pair ........................................ $1.75.

P.W. "POCKET SUPERHERT"
OSMOR PRINTED CIRCUIT VERSION


ALL THE ABOVE COMPONENTS IF PURCHASED AT ONE TIME .......................... $16.10
Osmor undertake to align this receiver for 10/-.

"WEYRAD"


48 SURBITON ROAD, KINGSTON-UPON-THAMES, SURREY

Established over 30 Years

Telephone KIN 5549

We pay all postage and insurance. All orders despatched same day. Money refund guarantee.

Hours: 9 a.m. - 6 p.m. (1 p.m. Wednesday). We do not close for lunch. Open all day Saturday.

www.americanradiohistory.com
RETURN-OF-POST SERVICE

P.W. BLUEPRINTS
Kits and components for Reohey, Mercury, Troubadour, Everest, Britannic Two, Short Wave Two, Citizen, Mini-amp and other. Full lists available. Printed Circuit Panels for Mercury now available.

LOUDSPEAKERS
100O-WATT: New Axion £35.5.1; New Axion £35.5.18.5.
Axion HI £101.5.4, £14.0; Axion SI £101.5.4, £19.5.0.
WHITELEY: HF £101.5.4, £17.5.0; HF £101.5.4, £24.5.0.
All Goodmans and Whiteley units supplied. H.P. available.

STEREO COMPONENTS
Morganei gated potentiometers as specified for the Mullard circuits. • Log/Amp—Low £20.0; £5, £2 per unit. Log/Amp—Mod. 2909, 1.5m., £12.0; 2m., £20.0. All 10/6 each.

TRANSISTORS
MULLARD. Reduced prices. Current production types, not rejects. All in makers' boxes. Postage 5d. on each transistor.
OC44, 9g; OC45, 9h; OC70 and OC71, 9j; OC72, 9k; OC72 Matched Pairs £17.5.0; OC76, 9l; OC78, 9m; OC78, 9n; OC71, 10/6.

AMPLIFIER KITS
We have full stocks of all components for the Mullard 510, Mullard 3, Mullard 2 and 3 Valve Pre-amp, Mullard Stereo, G512 Plus. Detailed list on any of these sent upon request. Instructional Manuals: All Mullard Audio Circuits in “Circuits for Audio Amplifiers”, 9th. GEORGE, 4th. All post free.

GRAMOPHONE EQUIPMENT
ALL LATEST MODELS
ALL POST FREE
Cash Price Deposit Mithly/Pmts.

GARRARD AUTOSLIM
GARRARD AUTOSLIM REFERENCE (G.C.R. PU. £17.14.6 £11.12.8 12 of 12/3
GARRARD AUTOSLIM RE-LUXE (G.C.R. PU. £12.14.8 £8.11.8 12 of 12/3
B.S.R. UA14 (28C PU. £7.13.6 £5.11.8 12 of 12/3
B.S.R. UA14 Monarch
C.C.R. Stereo (£17/9) £8.17.6 £6.18.8 12 of 12/3
SINGLE RECORD PLAYERS
GARRARD TA (G.C.R. PU. £8.19.6 £6.18.8 12 of 12/3
B.S.R. TUA (28C PU. £5.5.0 £5.15.0 12 of 12/3
TRANSCRIPTION UNITS
GARRARD HIF (G.C.R. PU. £17.14.8 £11.12.8 12 of 12/3
PHILIPS AG101 £21.15.0 £15.12.0 12 of 12/3
Most of the above can be supplied for stereo working. See our Gramophone Equipment List for details.

“BRAND FIVE” RECORDING TAPE
Standard Play: 1000'. (£5) £15.0; 1,500. (£7.5) £25.0
Long Play: 1000'. (£5) £18.0; 1500'. (£8) £30.0; 20001. (£7) £42.0
Double Play: 1200'. (£5) £22.0; 2400'. (£7) £46.0 (All Post Free.)

LATEST TEST METERS
Hire Purchase
Cash Price Deposit Mithly/Pmts.
AVO Model 8 Mark II £24.0 £16.0 12 of 11.15.8
AVO Model 7 Mark II £21.0 £14.0 12 of 11.15.8
AVO Multimeter £9.10.0 £6.12.0 12 of 14/4
TAU-SMOKER Model £12.0.0 £9.9.0 12 of 16/8
CABY A-8 £12.15.0 £9.7.9 3 of 18/8
CABY B-9 £12.10.0 £9.9.9 3 of 18/8
CABY W-1 £2.14.0 £2.14.0 12 of 18/8
Full details of any of the above supplied free on request. The AVO Models 7 and 8 are both latest models from current production—not to be confused with Government Surplus.

TAPE RECORDING EQUIPMENT
Tape, Decks
Hire Purchase
ALL CARRIAGE FREE
Cash Price Deposit Mithly/Pmts.
B.A. £15.0 £15.0 12 of 18/7
Latest COLLARO studio £12.19.6 £22.12.6 12 of 18/7
TAPE AMPLIFIERS

MARTIN RECORER KITS, 8MIX for Collaro Studio Deck, 11 gns. 331/2M for B.S.R. Deck, 8 gns. Carrying cases available. H.P. Terms on Decks, Amplifiers and Cases, send for quote.

JASON F.M. TUNER KITS
We stock complete kits for F.M.T. FMT2, FMT3, Mercury 2, and JTV2 at competitive prices. Send for list.

ILLUSTRATED LISTS are available on LOUDSPEAKERS
TAPE DECKS, TEST GEAR, RECORDING TAPE, GRAMOPHONE EQUIPMENT AMPLIFIERS. Any will be sent free upon request.

TERMS OF BUSINESS
Cash with order or C.O.D. We charge C.O.D. orders as follows. Up to £3, minimum of 2/6. Over £3 and under £5, 1/6. Over £5 and under £10, 1/6. Over £10, no charge. Postage extra on overseas orders irrespective of price.

WATTS RADIO (MAIL ORDER) LTD.
54 CHURCH STREET, WEYBRIDGE, SURREY
Telephone: Weybridge 4556
Please note: Postal business only from this address.
CLOSING FOR ANNUAL HOLIDAYS AUGUST 11th to 25th

SPECIAL FOR THE “HAMS” RADIO STATION
Illustrated

£1 inch detachable bit soldering instrument
List No. 70

Combined Protective Unit with Wiper/Abrasion Pad and Solder Reel
List No. 700

Apply SALES & SERVICE

ADCOLA HOUSE
GAUDEN ROAD
LONDON, S.W.4

ADCOLA HOUSE
SALES & SERVICE

British & Foreign Patents, Registered
Designs, etc.

NEW DIAL ASSEMBLY ‘MERCURY SIX’
For PLASTIC CASE and many other
Transistor Receivers

with Instructions
14/6 (Postage 3/6)
IN PRESENTATION PACK

OSMOR RADIO
418 BRIGHTON ROAD, S. CROYDON

PLEASE SEND A-Z FREE INFORMATION

NAME ..................................................
ADDRESS ...........................................

www.americanradiohistory.com
HOW often does a receiver come in for repair with the complaint that every movement of the volume control causes severe scratching and crackling! This is probably one of the most frequent faults in receivers, and thus it is felt that this article will throw some useful light on this subject.

It is probably not generally realised that the symptom of noisy operation is in very many cases not due to the volume control itself, which is often perfectly in order. Cleaning or greasing of the carbon track, or even replacement of the volume control, will thus effect a very temporary cure, and sometimes no cure at all, to the exasperation of the experimenter. It is thus necessary to understand clearly the factors involved, to be able to distinguish between faults originating in the volume control itself and faults from causes outside the volume control.

Faulty Volume Control

If a volume control is faulty in the true sense (i.e., if the slider or the track-ends make insecure connections at some or all positions), various forms of crackling and fizzing are likely. But these will be accompanied by similar simultaneous fluctuations of the programme material actually being amplified, and it is this latter observation which is indicative of the fact that the volume control itself need
cleaning or replacement. When no audio input is applied to a defective volume control of this kind, and all else is in order, crackling should be very weak or absent in most cases—unless, of course, the volume control defect interrupts a negative-feedback chain or other auxiliary circuit-refinement. Thus a study of the circuit of the particular receiver is a necessary preliminary in all cases.

**D.C. Leakage**

If a volume control is situated at the input to a sensitive audio amplifier, or even one or two stages of audio amplification, as in a simple domestic receiver, then any movement of its knob is likely to produce severe crackling if there is a direct current flowing in the carbon track. This current can be, and usually will be, far too small to damage the volume control, and the volume control will usually be completely faultless.

The reason why D.C. in the track causes "movement-crackling" is very simple indeed; D.C. in the track causes a standing D.C. voltage drop across it. In the circuit of Fig. 1 this would give V2 incorrect bias anyway, which would cause distortion, the degree of distortion being dependent on the volume level set, because the portion of this incorrect bias reaching the valve depends on the position of the slider of the volume control VR1. Thus a receiver with the arrangement of Fig. 1, having D.C. on the track of VR1, due to leakage of C1, would also give severe distortion under some or all conditions of normal operation.

But supposing the actual arrangement is that of Fig. 2, which differs from Fig. 1 only in that the blocking condenser C2 and grid leak R2 are present subsequent to the volume control, then the valve V2 receives no incorrect bias, even if C1 is leaking, and causes D.C. in the track of VR1. Thus distortion will certainly not take place. But every movement of the slider of VR1 is identical to an A.C. signal, because the momentary value of the D.C. voltage presented to C2 changes thereby and is passed on to V2, etc., for amplification. The effective frequency of this "artificial signal" depends on the speed at which the operator twists the knob of VR1 and, more particularly, on very slight irregularities of the track of VR1.

**Track Irregularities**

It must be emphasised that the slight track-irregularities just mentioned are entirely normal and virtually unavoidable in anything but the newest and smoothest of volume controls. They may represent random fluctuations of, say, ±4% of the resistance in rapid succession above and below the supposed value as the slider is moved. These fluctuations are not to be considered a fault and will produce no noticeable effects whatsoever under normal conditions and as long as no D.C. is flowing in the track.

But now suppose that, in Fig. 2 again, C1 is leaking such that 1V is dropped across the track of VR1. This will happen if the leak on C1 has some 300 times the resistance of VR1—i.e., about 150M, which can easily happen in practice!

**Frequency**

Suppose we have, for the sake of argument, one "irregularity cycle" of the magnitude (4%) taken as example above per degree of twist of the knob. Suppose the operator turns the knob at the rate (Continued on page 345)
### NEW TransonA-6

<table>
<thead>
<tr>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>400 Mw Mullard push-pull output Transistors, powerful magnet 3in. high grade speaker</td>
<td>£4.19.6</td>
</tr>
<tr>
<td>Total building cost</td>
<td>£4.19.6</td>
</tr>
</tbody>
</table>

**PARTS PRICE LIST AND EASY BUILD PLANS 1/6**

### BElGInErs POCkEt 5

<table>
<thead>
<tr>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designed round supersensitive Ferrite Rod Aerial and 3in. Moving coil speaker: Attractive case in black with speaker grille in red. On test Home, Light, Radio Luxembourg and many Continental stations were received.</td>
<td>£2.19.6</td>
</tr>
</tbody>
</table>

**Total cost of all parts £2.19.6 P.P. 3/-**

**EASY BUILD PLANS AND PARTS PRICE LIST 1/6**

### THE MELODY SIX

<table>
<thead>
<tr>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferrite rod aerial</td>
<td>£3.19.6</td>
</tr>
<tr>
<td>New type transistors and top quality components. Attractive case in blue and red with gold trim and carrying strap.</td>
<td></td>
</tr>
<tr>
<td>3in. Speaker</td>
<td></td>
</tr>
<tr>
<td>M/W/L.W.</td>
<td></td>
</tr>
</tbody>
</table>

**£3.19.6 P.P. 3/-**

**Components price list and plans, 2/-**

### BEGINNERS PUSH-PULL FIVE

<table>
<thead>
<tr>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>M/C Speaker, 2in.</td>
<td></td>
</tr>
<tr>
<td>Ferrite rod aerial</td>
<td></td>
</tr>
<tr>
<td>Tuning condenser</td>
<td></td>
</tr>
<tr>
<td>Volume/oscillator control</td>
<td></td>
</tr>
<tr>
<td>Case with speaker grille in red</td>
<td></td>
</tr>
<tr>
<td>Fully tunable over med/long waves</td>
<td></td>
</tr>
<tr>
<td>Simple assembly diagrams</td>
<td></td>
</tr>
<tr>
<td>250 Milliwatts output stage</td>
<td></td>
</tr>
<tr>
<td>Can be built for 5916 P.P. 3/-, or with 3in. speaker 681</td>
<td></td>
</tr>
</tbody>
</table>

**£2.19.6 P.P. 3/-, or with 3in. speaker 681**

**PARTS PRICE LIST, etc. 2/-**
LASKY'S RADIO

The "REALISTIC" SEVEN

**STAR FEATURES**

- 7 Transistor Superhet.
- 300 Milliwatt output into 4-inch high flux speaker.
- All components mounted on a single printed circuit board, size 5½ x 5½ in. in one complete assembly.
- Plastic cabinet, with carrying handle, size 7 x 10 x 9½ in. in choice of colours:
  - Red/Grey, Blue/Grey, all Grey.
- Easy to read Dial.
- External Socket for car aerial.
- I.F. frequency 470 Kcs.
- Ferrite Rod Internal aerial.
- Operates from PIP or similar battery.
- Full comprehensive data supplied with each Receiver.
- All coils and 1½'s, etc., fully wound ready for immediate assembly.

★ REBUILDING CLEARANCE SALE

at 42 Tottenham Court Rd., W.I.
LAST SIX WEEKS!
HUNDREDS OF BARGAINS!!

207 EDGWARE ROAD, LONDON, W.2.
Near Praed St. PADDINGTON 3276

33 TOTTENHAM COURT ROAD, W.1.
Near Nearest Sub. Goodge St. MUSEUM 2605

BOTH OPEN ALL DAY SAT. EARLY CLOSING THURS. MAIL ORDERS TO DEPT. P.W., EDGWARE ROAD.

HOME RADIO OF MITCHAM

NOMBREX SIGNAL GENERATOR

Completely portable transister signal generator covering 200 Kc.s. to 220 mcs. in 8 ranges. Built to highest standards and the finest value in instruments available in the world. Accuracy better than 2% on all ranges. R.F. output modulated or unmodulated. Audio output at 1 Kc. Weights under 5 lb. and size only 6½ x 4½ ins. An essential instrument for all engineers and constructors. PRICE £7.12.0, complete with battery. Post and packing £6.

ELECTROVOICE

Mains and Output Transformers

CABY MODEL M.I.


Dartronic 381 Oscilloscope

A modern professional standard general purpose oscilloscope. 3" display tube completely enclosed in metal sheet. Completely self contained with power unit, time base, vertical and horizontal amplifiers, sync unit, etc. Many applications in industry, research, schools, servicing, etc. Send £1 for full specification and leaflet. PRICE £23.10.0, plus part carriage 3/6.

Stockists for HEATH KITS

HOLIDAYS AHEAD

Invest in this easy modern way of electric shaving. The UNICO shaver operates from a single U2 battery and will give you a quick, close shave anywhere. Ideal for holidays, camping, car rallies, etc. PRICE 22-19-6 complete.

HI-FI ENTHUSIASTS

Have you tried CARALINE? This is the new super sound-absorptive material with self adhesive backing for lining speaker cabinets. Really wonderful results. PRICE £1/4 sq. ft., plus 1/6 postage on order.

The New "ALBERTA 5" Mk. II


CAN BE 59/6 Post 3/6

All components available separately. Full details, circuit diagram. 1/6 post free.

THE "TORONTO 3"

Size 5½ x 3 x 1½ in. Uses 3 transistors, plus general purpose ferrite rod aerial. Tunable over medium and long waves. Can be built for 32/6 Post 3/6

All components available separately.
of 250° in a second. The result is easily seen to be a spurious signal of about 250c/s fundamental, with harmonics, and some 2.5mV peak amplitude. This will be amplified by V2 and the following stages, giving a scratch or crackle, and may even produce this at great intensity if the gain following C2 is high.

Clearly this scratching noise will be independent of the position of the slider and will still be present undiminished even when no audio-signal proper is being applied. Furthermore, as no faulty contacts on the volume control are present, the audio-programme signals will not be in any way affected—i.e., although severe crackling takes place as the volume control is moved, the proper audio signals will nevertheless increase and decrease smoothly and as expected. All these symptoms, in contrast to those given above for a true faulty volume control, indicate D.C. leakage on to the track of the volume control. The source of this leakage must then be traced and removed.

Operating Conditions

An audio-volume control used in the conventional potentiometer arrangement dividing the actual audio signal voltage must not have D.C. passing through its track under any circumstances. This is an important fact which is probably not sufficiently realised. Failure to observe this condition produces noisy operation of the volume control at once or very soon after construction of the piece of apparatus in question.

Commercial Circuits or Proved Amateur Designs

If we are dealing with a commercial instrument, or with a properly designed amateur device, where no D.C. flows in the track of the volume control under normal conditions when all components used are faultless, then the cure for complaints of the nature here under discussion will amount to looking for a source of D.C. leakage. The first step is to measure the D.C. voltage across the volume control's track, using a voltmeter. If this is not zero, as it should otherwise be under faultless conditions, the fault is confirmed. The magnitude of the measured fault-voltage will give some idea of where it might be coming from. In simple circuits the possibilities are very limited anyway; the fault is most likely a leak in the coupling condenser from the anode of the previous valve. In the case of modern receivers, with all sorts of series-parallel equalisers and tone-equalisers, possibilities are more numerous, but a study of the circuit and a knowledge of the total leakage voltage across the track of the volume control, together with a knowledge of any deviations of voltages at nearby points in the circuit (valve-voltmeter), will usually reveal pretty clearly which coupling condenser is leaking. This should then be unsoldered and replaced. Note that, as in the numerical example given above, quite small leakages can produce severe faults of the type under discussion if the following gain is high.

Faulty Design in Amateur Circuits

Figs. 3, 4 and 5 give three typical examples of commonly-made errors in the design of amateur apparatus. Section "a" of each diagram shows the incorrect circuit in each case, leading to D.C. in the track of the volume control, giving noisiness sooner or later, and section "b" of each diagram shows the correct arrangement for the particular circuit in each case.

Fig. 3 shows a conventional double-diode-triode stage of a normal superhet. The diode load necessarily carries the rectified R.F. current, and if it is simultaneously used as the volume control, as in Fig. 3a, there is bound to be D.C. in the track. Thus, the arrangement of Fig. 3b should be used.

(To be continued)
AMATEUR RADIO SOCIETY OF CHESHAM AND DISTRICT
Hon. Sec.: C. G. Stephenson, G3CLJ, 21 Lynton Road, Chesham, Buckinghamshire.

A front page with map and photograph in the local newspaper was the result of a visit from the press to the society's meeting on May 12th. While work still goes on for a two-metre local link, the society held a Jumble sale on June 30th to raise funds for a second transmitter site.

CLIFTON AMATEUR RADIO SOCIETY
Hon. Sec.: C. Godsmark, G3WLU, 211 Manwood Road, London, S.E.6.
The club has planned five direction finding contests—two of them at night—for the summer months. Also two portable transmitting contests have been arranged for members.

CRAY VALLEY RADIO CLUB
The club met on every fourth Tuesday in the month at the Station Hotel, Sidcup, Kent and the meetings begin at 8 p.m.
The general meeting on May 22nd was followed by a film show. On June 26th Geoff Stone (G3FZL) talked about “VHF.”

DERBY AND DISTRICT AMATEUR RADIO SOCIETY
Hon. Sec.: F. C. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby.
The first two-metre field day was held on May 6th. The direction finding event, held on May 16th, was a fixture in the D.F. League Table formed to the society this year to encourage members to take part regularly in these contests.

At the meeting on May 23rd, G3FUR gave a talk on “Receivers.” A new trophy has recently been added to the society's collection, and will be awarded for the best piece of home constructed equipment exhibited at the Constructors' Night.

Future Events:
August 19th—Mobile rally.

DUDLEY AMATEUR RADIO CLUB
Hon. Sec.: D. Pratt, G3MHS, 13 Kent Street, Upper Gornal, Dudley, Worcestershire.
The membership of the club after being in existence for only 9 months has risen to 41.

On June 6th members attended a lecture by G8RF, and on 22nd June a Treasure Hunt was held.

EXETER AMATEUR RADIO SOCIETY
Hon. Sec.: S. Line, 46 Roseland Crescent, Heathfield, Exeter, Devon.
At the May meeting the result of the Short Wave Listeners' contest was announced, the winner being Clive Vicary with 616 points, followed by Barry Marshall with 377 points.

HALIFAX AND DISTRICT AMATEUR RADIO SOCIETY
Hon. Sec.: G. Sunter, 24 Booth Fold, Luddendenfoot, Halifax, Yorkshire.
After the single sideband debate on July 3rd, members had a chance to examine a 160m. SSB rig brought along by G3NBI.

As usual, the second meeting of the month—July 17th—will be a ragchew night.

Future Event:
August 7th—Amateur television by G3EKE.

MORECAMBE AMATEUR RADIO SOCIETY
Hon. Sec.: K. J. Singleton, G3NLM, 8 Westmoor Grove, Morecambe, Lancashire.
Meetings are held on the first Wednesday of each month at the Liberal Club, Balmoral Road, Morecambe. Visitors to the meetings are always welcome.

At the June meeting, a number of items of home-built equipment were shown, including an R/C Bridge built to the design in P.W. (January 1962 issue) and giving very accurate results, a multimeter, and a transistor power pack for mobile transmitters and receivers, a 12V top-band converter using ECH83's and an induction wave-meter and modulation monitor.

Future Events:
On one Sunday in July, the Society will be operating on top band under the calls G3FLA and G3PHM.
August 19th—Ragchew.
September 5th—Junk sale.

REPORTS OF CURRENT ACTIVITIES

NORTHERN HEIGHTS AMATEUR RADIO SOCIETY
Hon. Sec.: A. Robinson, G3MDW, Candy Cabin, Ogden, Halifax, Yorkshire.
At the AGM all the retiring officials were re-elected. More recently members had a chance to show-off their equipment at the display of gear held on July 4th.

PLYMOUTH RADIO CLUB
Hon. Sec.: R. Hooper, 2 Chestnut Road, Peverell, Plymouth, Devon.
At the Annual General Meeting H. Jones was elected president; E. Diggle and L. J. N. Kirkby were elected vice-presidents; A. Baker chairman; R. Hooper secretary and N. Stoneham treasurer.

PRESTON AMATEUR RADIO SOCIETY
Hon. Sec.: W. K. Beazley, 9 Thorngate, Penwortham, Preston, Lancashire.
The club station is now active under the call sign G3KUE.

On May 22nd, Norman Lowe gave a talk on "DX working with indoor antennas." An illustrated tape lecture on semi-conductors was given on June 26th and on July 4th members visited the television transmitter at Winter Hill.

PURLEY AND DISTRICT RADIO CLUB
Hon. Sec.: E. R. Hewwood, G3GFK, 105 Whycliffe Road, Purley, Surrey.
The Annual General Meeting was held on May 18th when M. Niblett was elected chairman; M. Hubbard treasurer and E. R. Hewwood secretary.
The club operated two stations on June 2nd and 3rd as their part in N.F.D.

On July 6th Ian Wade, G3NRW talks about his trip to Moscow.
Future Event:
July 20th—R.S.G.B. tape recorded lecture.

READING AMATEUR RADIO
Hon. Sec.: R. G. Nash, G3EJA, 9 Holybrook Road, Reading, Berkshire.
The subject of the lecture given at the May meeting was "How to become a radio amateur." The following month's subject was "Transistors" and the talk was given by GBSC.

SLADE RADIO SOCIETY
Hon. Sec.: C. N. Smart, 110 Woolmore Road, Erdington, Birmingham 33.
Future Events:
July 13th—R.S.G.B. Tape Recordings: "Experiments in Sound", "VHF Propagation".

WESSEX AMATEUR RADIO GROUP
Hon. Sec.: G. J. Fowie, 138 Surrey Road, Branksome, Poole, Dorset.
The "Bournemouth Amateur Radio Society" has recently been dissolved and reformed as the "Wessex Amateur Radio Group". Meetings continue to be held at the old society's headquarters, i.e. Cricketers Arms, Windham Road, Bournemouth, Hampshire, on the first Monday of each month, commencing at 7.45 p.m.

On June 6th, "Railway signalling and communications" was the subject of the lecture. On June 9th, members visited Hurn aerodrome. Members visited the BBC transmitting station at Ramsham Down on June 24th and on 2nd July heard a talk given by GBVB on "Transmitters".

Future Event:
July 22nd—Visit to the Science Museum, London.

YORK AMATEUR RADIO SOCIETY
Hon. Sec.: N. Spivey, G3GWJ, 80 Melton Avenue, Clifton, York.
Two club meetings per week are to be held in future. Tuesday evenings, instruction will be given in Morse and other matters related to obtaining an Amateur Transmitting Licence. On Thursday evenings the club's top band station, G3HHW, will be on the air, and once per month a special function will be arranged.

* (We were pleased to note in the report from the Plymouth Radio Club, that when asked how they came to learn of the society, new members invariably replied that they had seen it mentioned on the Club News page of Pactical Wireless. The result of this publicity has been to double the membership of the club during the past year.—Ed.)
EDDY'S (NOTTM.) LTD.
116 ALFRETON ROAD
NOTTINGHAM

NEW VALVES

Guaranteed and Tested by Return Post
AC/2: EZ80 6/11 EZ18 6/1
PENDD 6/1 H13DD 6/6 6F33 6/6
CY19 6/1 KT63 6/7 6J7G 6/1
DAF91 4/14 MUL14 7/1 6K7G 1/11
DF96 6/11 PC682 8/6 6KG 6/16
DP96 3/6 PCL32 1/6 6FZP 7/6
DP96 6/6 PCL38 1/6 6ZP8 9/6
DK91 1/6 PCL84 9/6 6G7Q 5/11
DL96 6/11 PCL85 9/6 6ZAPM 2/9
EB41 4/11 PLC6 18/6 6J57M 5/9
EB91 3/6 PDS3 7/6 6Q7M 4/9
EBF80 3/6 PBY3 9/6 6XLTG 6/6
EAC91 4/9 PBY0 6/1 6SN7GT 4/3
EKC41 7/6 PBY3 7/6 6U4GT 12/6
ECC35 5/11 PEN35C 6/6
ECC85 6/11 PZ30 7/1 6X4 4/6
ECC82 7/1 T904 7/6 7C5 4/6
EF39 5/11 PZ40 4/3 7D6 7/1
EF40 12/3 ZZ7 3/6 10F1 5/1
EF41 10/3 IDS 7/6 10P13 9/6
EF42 7/6 IFG 5/4 1AA 5/1
EF50 1/9 I5S 4/9 12A6T 7/6
EF91 5/6 I4T 3/6 12DI 8/6
EF91 3/6 IT4 3/6 20DI 8/6
EF92 4/6 3AA 4/1 20PI 9/6
EF94 7/6 6KC7 4/3 20P3 9/6
EF95 6/11 6AG5 3/6 2S5GT 7/1
EF127 1/6 6BW7 5/1 30FS 6/1
EF134 12/6 6BG7 2/1 35SLGT 7/6
EL32 6/11 6BIG 6/1 6XKG 4/9
EL91 4/6 6AU6 7/6 954 1/6
EZ41 5/11 6CH6 8/1 6KG9 6/1
EZ41 6/9 6CH6 8/1 6KG9 6/1
EZ61 5/11 6FI 5/4 1B5ST 15/6

NIFE ACCUMULATORS.
1.25v. 
Size 3 x 2 1/2 x in. Weight 13 ozs. 2/1 each.
P, & P. 2/4, one only add 9d. per cell.

THROAT MIKES.
2 1/4 inch. Post 10d. 
Could be used for electriying musical instruments.

VIBRATORS.
12 volt, 4 pin, 5/11.

NEON MAINS TESTERS
combined screwdriver, 3 1/2. Post 9d.

MORSE TAPPERS
plated contacts. Adequate for heavy duty, good quality.
2/11 each. Post 1/3.

LUXEMBOURG AERIALS.

V.H.F. AERIALS.
6/11. Post 10d., easy to fit. No technical knowledge required.

SPEAKER GOLD GRILLE.
6 1/2 x 4 in. 1 1/4 each, 2 for 9 1/2. Post 6d.

VARIABLE CONTENDERS.
.0005 small twin gang. Built-in slow motion drive.

ALL ABOVE ARE NEW & GUARANTEED

VALVES EX. EQUIPMENT
EF80 9d. each, 5 for 2/6; 10F1 9d. each, 5 for 2/6; 6EB11 9d. each, 3 for 1/4; 6F11 9d. each, 3 for 1/4; 6E6C 9d. each, 3 for 1/4; 6F37 1/4 each, 3 for 2/3; 6EF7A 1/3 each, 3 for 2/11.

Any parcel insured against damage in transit for only 6d. extra per order. All uninsured parcels at customer's risk. Out and Packing 6d. extra per valve, extra. C.W.O. or C.O.D. only. C.O.D. charge 3/- extra. S.A.E. with enquiries.

RADIO CLEARANCE LTD.
27 TOTTENHAM COURT RD., LONDON, W.1.
The oldest Component Specialists in the Trade
Telephone: MUSEUM 0938
EST. 30 yrs.

TRADE ENQUIRIES INVITED

INTRODUCING THE NEW

"CONTESSA"

 Mk III

THE BEST IS NOW EVEN BETTER!

A brilliant conception of the finest 2-band 6-transistor radio available.

★ Ultra-modern styling with a magnificent twin-tone cabinet fitted with fully metal front panel and a slide-rule type wave dial.

GREATLY OUTPERFOMING the latest high-efficiency Mullard Transistors and Diodes, incorporating an improved design, featuring different circuit constants.

MORE punch—MORE gain—MORE stations—SUPERB appearance—the NEW "Contessa" scores again!!

SEE IT—HEAR IT—you will BUY IT!

• Waveband coverage of 500 kc/s to 1,500 kc/s and 100 kc/s to 250 kc/s.

• Assured reception of at least a dozen stations in daylight!

• Large electro-valved station named dial.

• Internal high-gain Ferrite aerial.

• 1:1 ratio slow motion tuning.

• Fitted with the latest 12.000-line high-flux loudspeaker.

• Power of 20 milliwatts from the single-ended push-pull final stage.

• Specially designed, dual matching coil for use in a CAR.

• Only first-grade Mullard fully-guaranteed matched transistors and diodes are used.

• Tape recorder socket provided.

• Drilled tuned IF transformers for maximum gain and knife-edged selectivity.

• Fully printed circuit panel marked with component numbers.

• The two-tone case outer measurements are 10 1/8 x 7 1/2 in. and weighs approx. 4 lbs, when assembled.

• Battery lasts 4 months with normal usage.

• Book supplied with detailed assembly instructions, diagrams and circuitry.

• Anyone can build this set—everything supplied, just a soldering iron required.

• Cabinets available in two tone farnce and two tone blue.

You can hold Europe in the palm of your hand with—

THE "CAPRI"

A miniature socket transistor radio that REALLY works, retaining all the most attractive features of the famous "Contessa." Six first-grade Mullard transistor plus diode are employed in a highly sensitive superhet MW and pre-set I.W circuit embodying the latest modern design practices. A special 2½" high gloass loudspeaker provides surprising volume and a personal earpiece socket is also available.

An attractive 1½" plastic case is supplied in two colours—ivory or ivory blue, the full constructional details being furnished with each set of parts. The total measurements of the Capri are 4 1/4 x 2 1/4 x 1 1/4 in.

See and hear a working model today.

Inclusive price for all associated components, cabinet and battery, complete In detail. Or our BUY AS YOU BUILD SCHEMES, any parts sold separately.

SEND FOR OUR EXTENSIVE DESCRIPTIVE MANUAL AND PARTS LIST. 2/10 post free.

Contract for all components.

£10.19.6

(Plus 2½ F. & Pkg.)

STAMPED AND ADDRESSED ENVELOPE with any enquiry please. But regret we cannot supply any lists or catalogue—our stocks may be subject to sudden cut-off. PLEASE ALLOW FULL POSTAGE AND PACKING CHARGES.

Terms of Business:

CASH WITH ORDER OR C.O.D. ON ORDERS OVER 1/.

www.americanradiohistory.com
TO BE CLEARED
NEW WIRE ENDED ELECTROLYTIC CONDENSERS
20 for 3/- Post Free.


New and Surplus Valves, guaranteed, from 3/- Also hasaimed Transistors, perfect. From R. B., Mary bargains. B.A.E. for complete list. LEWIS, 46 Woodford Avenue, Ilford, Essex.

RATES: 6/- per line or part thereof, average five words to line, minimum 2 lines. Box No. 47 extra. Advertisements must be prepaid and addressed to Advertising Manager, “Practical Wireless,” Tower House, St. Martin’s Court, London W.1.

RECEIVERS & COMPONENTS (continued)

A1 POST FREE BARGAINS, First grade Siemens, White spots 3/-.
Red spots 3/-, OC44 9/-, OC45 7/3, OC71 5/-, OC76, OC200 8/-.
Matched pairs, OC81, and OC181 21/-, two OC44 and OC45 23/6.
Reclaimed Valves all tested: ED91, ED91D, EF91 8d., 10F1 1/-, 6F1 2/-, LE3, 20D1 3/-, EL80.
Transistor, P50, P300, P320, 4FL, GF300, PL622, P11, KT338 4/6, PL38, N37, KT365 5/-, PCL63 6/-, PY32, 6K5 7/-, 5E2, 10E9 9/-.
Reduction on six, 25% on 12.
Commercial: 6n x 4in. 5/6. 6in. x 4in. 6/-.
20% reduction on all. Pots, S.P. switch 4/- each. A.1.

Radio Components 14 The Borough, Canterbury, Kent.

Electronic Music?
Then about making yourself an electronic organ? Here’s a start. You can get all the data available—in full, circuits, drawings and notes. It has 9 octaves—2 manuals, a melodeon and pedals with 24 stops—uses 41 valves. With its variable attack you can play Classics and Swing.

Write NOW for free leaflet and further details to C. & N., 29 Maude Street, Darlington, Durham. Send 2d. stamp.

MISCELLANEOUS

100 BAYS of brand new adjustable Steel Shelving, 73in. high by 50in. wide by 12in. deep, stove enamelled dark grey. Sent unassembled. Six-shelf bay £35/15/-. Sample delivered free. Mail Order Only. Discounts N. C. BROWN LTD. Eagle Steelworks, Lancs. Tel.: 69018.

Bumper parcel
100 resistors, 100 condensers, 100 cartridge tubes, 225 valve 드그스, 250 small knobs, 250 perspex panels, 5 poster hinges, 5 metal Apprentices, 200 100 g. Postage. 1st class 5/-, 2nd class 3d. per oz.


HEATHKITS” can now be seen in London and purchased on easy terms. Free brochure. DIRECT TV REPLACEMENT PARTS LTD, 138 Lewisham Way, SE14. Tideway 6666.

COMPONENTS, VALVES, Tubes, etc. Write or phone for free list. ARION TELEVISION, 4 Maxted Road, Peckham, SE15 (New X 7152).

Wee 369 MEANWOOD ROAD, LEEDS 7

J. T. SUPPLY


BRIAN E. HAMPSHEIR (R & T) LTD.
Dept. PWA, 23 NORTH CROSS ROAD, S.E.22.

6F13 EF80 EF91 6P25 10F1 Z77 25LG7T
EB91 6P28 6F1 EF50 L63 6F12
Salvaged. Guaranteed 100% All at one Price.

For sale

Electronic Tape—the best tape value

Special offer


Single Record Players, BSR TUB. £7.50. Complete Kits. Autophone Record Player, Amplifier, Cabinet, Speaker, etc. £10.00. Single Player, Kit £10.00. Autophone Record Kit, £10.18/6d.

Printed Circuit Board. Any size 1d. per sq. inch. Exciting Solution, 3d. per sq. ft. Portable Cabinets, Transistor Radio, 11 x 8 Has, complete with kit. £45/6d. Autophone Record Player, £45/6d. Single Record Player, £45/6d.

Amplifiers, 3 valve, 3 watt, tone and Voil. 49/6d. Transistorised, 1 watt, 3000 output. 45/6d.

Mains Transformers, 25w at 50 ma, 6/3v at 1.5 amp, 10/6d.

Money Back Guarantee if not satisfied.

FREE POSTAGE

Contact for larger discount.

W. G. BLYTHMAN (RADIO)
WHITBY, N. YORKS.
MEATWORK

FOR SALE


AMATEUR LICENCE Morse Course. The new Rhythm Method of teaching takes the drudgery out of learning Morse and is as simple as knowing the alphabet! For full explanatory booklet: S.A.E. GC5HS, 45 Green Lane, Purley, Surrey.

WANTED


WANTED: TRANISTORS. 25 wanted. 200 popular models. S.A.E. Inquiries HAMILTON RADIO, Western Road, St. Leonards, Sussex.

WHY TOLERATE DELAY when we can supply your Radio or TV Service Sheet by return of post at 4/- each, plus postage List 1/-. Also Manuals for sale and hire. List 1/-. S.A.E. with inquiries, please. Mail orders only to S.P. DISTRIBUTORS, 44 Old Bond Street, London W1.

WANTED:

NEW VALVES bought, state price. A.D.A. MANUFACTURING CO., 172 Alfredton Road, Nottingham.

A PROMPT CASH OFFER for your Superlux Brand New Valves and Transistors. R.H.S. Beverley House, Manville Terrace, Bradford 5.

WANTED VALVES

All types for prompt cash. Must be new. State quantity.

WILLIAM CARVIS LTD.

103 North Street, Leeds 7

WANTED:


WANTED:

T.C.S. Transmitters, Receivers, Connectors. Loading Cells, etc. GILLILLAN, 98 Dominion Road, Worthing, Sussex. Tel: Worthing 8719.

NEW VALVES WANTED

Any type, any quantity

CASH PAID

R.S.T. 211 Stratham Road, Mitcham, Surrey.

Phone: MITCHAM 6202

METAL WORK

METALWORK. All types cabinets, chassis, racks, etc. to your specifications. PAULFIGHTER The quickworks ltd., Chapman St., Loughborough.

SERVICE SHEETS


SERVICE SHEETS for all makes of radio and TV, 1930-1962. Prices from 1/-. with free fault-finding guide. Catalogue of 6,000 models 1/6. 12% discount on orders over 100 popular models 2/-. S.A.E. Inquiries HAMILTON RADIO, Western Road, St. Leonards, Sussex.

WANTED:

R.S.T. WILLIAM CAMPBELL Everland Road, Hungerford, Berkshire.

SERVICE SHEETS: also Current and Obsolete Valves for sale—JOHN GILBERT TELEVISION, 1b Shepherds Bush Road, London W.12. Phone SHE 8441.

SITUATIONS VACANT


HIGH GATE ACOUSTICS require improver and apprentice for transistors, tape recorders, grams, etc.; also for hearing aids. Good salary to right man. MUS 2961, ext. 19.

TV 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. For details of exams and courses including practical training in all branches of Radio, TV and Electronics, write for 148-page handbook, free. B.I.E.T. (Dept. 242 D), 29 Wright's Lane, London W8.

SITUATIONS VACANT (continued)

ENGINEERS REQUIRED, experienced and inexperienced, for design and relay circuitry. For work on public address systems. Also V.H.F. test engineer for television equipment. Write, giving details to CLARKE & SMITH MFG CO., LTD, Hanworth Air Park, Feltham, Middx.

CENTRAL ELECTRICITY GENERATING BOARD

SOUTH THAMES DIVISION

VACANCY NO. 269

ELECTRICIAN (TELEPHONES)

BRIGHTON DISTRICT

Duties consist of installation and maintenance of communications and remote control apparatus together with V.H.F. radio equipment. Applicants must have basic knowledge and experience of automatic telephone exchange equipment and either be employed by the G.P.O. or a telephone equipment manufacturer. A knowledge of radio work would be an advantage but is not essential.

Rate of pay 36/-, 5/- per hour for a 48-hour week. Good condition with generous holidays and sick pay schemes. Optional Superannuation Scheme.

Applications stating age, training, experience etc., should be sent to the District Communications Engineer, Brighton 'B' Power Station, Portsdown-by-Sea, Sussex.

CITY AND GDULDS (Electrical, etc.) on "No base—no fee" terms. Over 95% successes. For details of Electrical Engineering, Applied Electronics, Automation, etc. send for our 148-page handbook, free and post free. B.I.E.T. (Dept. 442 A), 29 Wright's Lane, London W8.

UNITED KINGDOM

ATOMIC ENERGY AUTHORITY

ATOMIC ENERGY

ESTABLISHMENT, WINFRITH

ELECTRONIC INSTRUMENT MECHANICS

Opportunities exist for men possessing a good basic knowledge of valve and transistor electronics to carry out fault diagnosis, repair, test and calibration in the advancing field of nuclear electronic instrumentation.

Applicants should have several years experience of electronic equipment servicing but a good basic knowledge, enthusiasm and ability to learn new techniques are equally important.

Much of the equipment is of new design and where appropriate, training will be given to successful applicants.

Married men living beyond daily travelling distance may be eligible for housing and this will be determined at time of interview. A lodging allowance is payable whilst waiting for housing. Conditions are good and include sick pay and pension schemes.

An application form may be obtained by letter, and should be addressed and the reference EL/INST/NAT to the Labour Department, A.E.E., Winfrith, Dorchester, Dorset.

(Continued on next page)
COUNTY BOROUGH OF SOUTHAMPTON EDUCATION COMMITTEE

SOUTHAMPTON TECHNICAL COLLEGE


Department of Electrical Engineering

Head of Department:


Places are now being allocated in the following full-time courses in the Department of Electrical Engineering from September 1962:

Communication Engineering of Electronics:

Three-year course leading to College Diploma which exempts from Graduateship Examination of British Institution of Radio Engineers. Minimum age 17 years.

Marine Radio and Radar:


Further details and forms of application may be obtained from the Registrar, Southampton Technical College, St. Mary Street, Southampton.

COURSES

EDUCATIONAL

LEARN RADIO AND ELECTRONICS the new and practical way! Host of absorbing experiments carried out at home under expert guidance to teach you Radio in a new, enjoyable and interesting way. Construction, servicing and fault-finding on equipment made easy for the first time! No previous experience needed. No mathematics used. Free brochure from: Dept. 11, P.W. RADIO-STRUCTOR, Reading.

\[ X = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \]

DONT’ FUMBLE with Formulæ. Master Mathematics quickly and easily the Understandable Way.

The Dryden School of UNDERSTANDABLE MATHEMATICS

IFS Dryden Chambers, Oxford St.


Name.

Address.


Radio, Television & Electronics

Learn at home with the world’s largest home study organisation: Brit.I.R.E.; City & Guilds; P.M.G.’s cert., etc. Also Practical Courses with equipment. No books to buy. Write for FREE prospectus stating subject to I.C.S.

(Department 541), Intertext House, Parkgate Road, London, S.W.11


SOUND RECORDINGS

RECORDING TAPE: save up to 30% send for list: also 50 second-hand recorders in stock. E. C. KINGSLEY, 44 CO. 132 Totfenham Court Road, London W1. EUS 6500.

www.americanradiohistory.com
The 'NORPAK'
MAINS POWER PACK KIT
FOR TRANSISTOR RADIOS
Saves battery costs, boosts and greatly extends life of old batteries.
Miniature Size - 4 x 2 x 1in.
in attractive two-tone plastic case. Assembled in an hour.
Normal output 9 volt, 100mA. (Adjustable) Full Mains Transformer. Full wave germanium diodes.
Cartridge fuse.
Complete Kit with Plans 35/- Plus 1/6 P.P.
(Ready assembled 45/-.)

P.W. 6 OWNERS!!
Convert your set to 7 transistors in TWO MINUTES!!
with our preassembled extra stage.
Complete Kit Plus 6d. P.P.
17/6

ANNOUNCING!
P.W. "MERCURY" 6 PRINTED CIRCUIT VERSION

LATEST VERSION !!
P.W. 6-TRANSISTOR
Medium and Long Wave Pocket Superhet
THE CONTINUED POPULARITY OF THIS FAMOUS
SET IS PROOF OF ITS VERY HIGH QUALITY AND
FINE PERFORMANCE

- 350 mW Push-Pull
Output on 24in.
P.M. Speaker.
- Printed Circuit.
- Guaranteed first grade Miniature Components.
- High Q Internal Ferrite Rod Aerial.

£9.17.6
Plus 2/- P.P.
All parts required.

This exciting new Transistor Superhet gives superb performance on a 7 x 4in.
speaker housed in attractive two-tone cabinets with ferrite aerial. New extras.

For both of these fine kits every item down to the last nut and bolt is supplied together with detailed
building plans. All parts sold separately.

PAY AS YOU BUILD SCHEME
AT NO EXTRA COST
By post from GRANGE NEWS LTD. Power House, Southampton, London, W.C.12

ALIGNMENT SERVICE
WE GUARANTEE TO MAKE YOUR SET WORK
We offer a very comprehensive service for both the above versions, including Fault
Finding, at reasonable charges (write for details).

147 LONDON RD., YORKTOWN,
CAMBERLEY, SURREY
Phone: CAMBERLEY 22760

VALVES
SAME DAY SERVICE
NEW! TESTED! GUARANTEED!

RES/CAP. BRIDGE 38/-
p. & p. 216

Check all types of resistors, condensers
6 RANGES
Built in 1 hour.
Direct reading, READY CALIBRATED
Stamp for details of this and other kits.

RES/CAP. BRIDGE (DEPT. PA)
Raleigh News, Raleigh Street, Nottingham

TRANSISTOR PORTABLE RADIO KIT 45.17.6
plus post 3/- Covers medium and long waves
no aerial or earth required. No difficult alignments
necessary. Ideal for your holidays now.
Red spot Transistors, 605; White Spots, 621;
Yellowlines, 350; O.C71, 400; C707. 7-8;
O.C44, 7-6; O.C45, 9-6; Mullard Electrolytics
3, 6. 11, 10, 20, 50, 100, 220, 330, 470;
Send 10d. Stamps for Notes.

MOORE'S EXPERIMENTAL SUPPLIES Dept.P
8 & 10 Granville Street, Sheffield 3 Phone 278483

READERS RADIO
24 COLBERRY PLACE, STAMFORD HILL
LONDON, N.16
STA. 4587

POST 8d. per vale
Any Parcel insured
Against Damage in Transit 8d.
Any C.O.D. Parcel 8d.

www.americanradiohistory.com
D. & B. TELEVISION
Phone: Cherrywood 3955
Dept. A 6
131 & 131A KINGS ROAD
SOUTH WIMBLEDON, S.W.19

Open Mon.—Sat. 10 a.m.—7 p.m. (Except Wed. 1 p.m.)
Nearest Tube Station South Wimbledon (Northern Line).

"COMPARE OUR PRICES"

FOR THE FINEST, FASTEST SERVICE IN THE COUNTRY
Your problems are our business.

LOOK! TRANSISTOR PRICES DOWN AGAIN.

MULLARD. OC40 6/, OC5S 8/, OC71 8/, OC72 6/, OC76 7/, OC77 7/, OC81 7/, OC91 6/
Complete set of 6 Mullard Transistors only 35/- Comprising OC41, two OC585's, OC312, two OC117's. Matched Pair.

MULLARD-BOHMEN GARI 2/10, OASIS 2/10, UC91 8/-


GET15 7/-, GET11 6/8.


COMPLETE SELL'S D.T.C. Transistors. Only 5/-.

Available in matched pairs. 1/4 extra.

COMPLETE NEW RANGE OF TRANSISTOR COMPONENTS IN STOCK

THREE BRAND NEW * STAR * BARGAINS

Designed for quality and outstanding value.

* NEW * R.T.D. 6 Watt Monaural Amplifier, using heavy duty, double-sided printed mains Transformer. With separate rectangular wind- ing: Valve: Rectifier, Driver and Output. 5 Controls: Switch, Volume, Base, Treble, Middle. Heavy duty output Transformer, METAL CHASSIS. All components brand new. Ready built... ONLY £5.50.

COMPLETE or all parts in kit form. ONLY £6.15. G. P. & P. 3/6.

* NEW * FOUR VALVE, INC. RECTIFIER, A.C. ONLY


Supplied with slow motion tuning (50 mm). All parts in kit form, ONLY £8.50, G. P. & P. 7/6.

EASY TO BUILD. All parts sold separately.


Send 1d. for list of transistor components, Speakers, Transformer s, etc.

ALL VALVES ARE SOLD SUBJECT TO FULL GUARANTEE.

CURREN VALVE LIST

<table>
<thead>
<tr>
<th>Valve</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>6P8</td>
<td>6/6</td>
</tr>
<tr>
<td>6SC7</td>
<td>8/-</td>
</tr>
<tr>
<td>6V6</td>
<td>6/-</td>
</tr>
<tr>
<td>6V6S</td>
<td>6/-</td>
</tr>
<tr>
<td>6V6X</td>
<td>6/-</td>
</tr>
<tr>
<td>6V6SS</td>
<td>6/-</td>
</tr>
<tr>
<td>6V8</td>
<td>6/-</td>
</tr>
<tr>
<td>6V8A</td>
<td>6/-</td>
</tr>
<tr>
<td>6V8B</td>
<td>6/-</td>
</tr>
<tr>
<td>6V8C</td>
<td>6/-</td>
</tr>
<tr>
<td>6V8D</td>
<td>6/-</td>
</tr>
<tr>
<td>6V8E</td>
<td>6/-</td>
</tr>
<tr>
<td>6V8F</td>
<td>6/-</td>
</tr>
<tr>
<td>6V8G</td>
<td>6/-</td>
</tr>
<tr>
<td>6V8H</td>
<td>6/-</td>
</tr>
<tr>
<td>6V8I</td>
<td>6/-</td>
</tr>
<tr>
<td>6V8J</td>
<td>6/-</td>
</tr>
<tr>
<td>6V8K</td>
<td>6/-</td>
</tr>
<tr>
<td>6V8L</td>
<td>6/-</td>
</tr>
<tr>
<td>6V8M</td>
<td>6/-</td>
</tr>
<tr>
<td>6V8N</td>
<td>6/-</td>
</tr>
<tr>
<td>6V8O</td>
<td>6/-</td>
</tr>
<tr>
<td>6V8P</td>
<td>6/-</td>
</tr>
<tr>
<td>6V8Q</td>
<td>6/-</td>
</tr>
<tr>
<td>6V8R</td>
<td>6/-</td>
</tr>
<tr>
<td>6V8S</td>
<td>6/-</td>
</tr>
<tr>
<td>6V8T</td>
<td>6/-</td>
</tr>
<tr>
<td>6V8U</td>
<td>6/-</td>
</tr>
<tr>
<td>6V8V</td>
<td>6/-</td>
</tr>
<tr>
<td>6V8W</td>
<td>6/-</td>
</tr>
<tr>
<td>6V8X</td>
<td>6/-</td>
</tr>
<tr>
<td>6V8Y</td>
<td>6/-</td>
</tr>
<tr>
<td>6V8Z</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9A</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9B</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9C</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9D</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9E</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9F</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9G</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9H</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9I</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9J</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9K</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9L</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9M</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9N</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9O</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9P</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9Q</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9R</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9S</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9T</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9U</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9V</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9W</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9X</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9Y</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9Z</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9AA</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9AB</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9AC</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9AD</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9AE</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9AF</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9AG</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9AH</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9AI</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9AJ</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9AK</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9AL</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9AM</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9AN</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9AO</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9AP</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9AQ</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9AR</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9AS</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9AT</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9AU</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9AV</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9AW</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9AX</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9AY</td>
<td>6/-</td>
</tr>
<tr>
<td>6V9AZ</td>
<td>6/-</td>
</tr>
</tbody>
</table>

SOLDERING EQUIPMENT
by

PRECISION SOLDERING
for the

ELECTRONICS INDUSTRY

Comprehensive range. Robust & Reliable
- Light weight - Rapid heating - Bit sizes
3/32" to 3/8" - 'Permabit' or Copper bits
All voltage ranges 6/7v. to 230/250v. - Prices from 21/-.

Also
- Plastic Cable Strippers
- Miniature Solder Pots
- Heat Guards
- Long Life Bits

Illustrated is the 25w. 3/16in. replaceable bit model with safety shield.

ADAMIN - new range of precision micro-soldering instruments—Have you had details?

Brochure No. S10 sent free on request.

Sole proprietors and manufacturers:

LIGHT SOLDERING DEVELOPMENTS LTD.
28 Sydenham Road, Croydon, Surrey

Phone: CRoydon 8589 Grams: Litesold Croydon

SUPER 5 POCKET RADIO

INCORPORATING
Printed Circuit — Miniature earpiece
Completely portable
No Aerial or Earth is required

Size 4x3x1x1in.
Output 200mW
5 First quality transistors
Push-pull output
Fitted 24in. high-flux moving coil speaker

ONLY 59/6

3/6 P. & P.

Complete with internal high-gain ferroox aerial and twin tone case in Red and Black. Bed/Medium/Low wave. Earpiece has sub-min jack and socket with 3ft. fine cable. Almost invisible in use. All parts available separately.

Circuit diagram 1/- Free with parts.

RADIO & TV LTD. (Dept. 5T)
21B HIGH STREET, ACTON, LONDON, W.3.
WEYRAD

IMPROVED COMPONENTS FOR THE 6-TRANSISTOR
2-WAVE SUPERHET RECEIVER

NEW ROD AERIAL AND DRIVER TRANSFORMER FOR SIMPLER ASSEMBLY
AND HIGHER PERFORMANCE

ROD AERIAL—RA2W
6 in. long. 13/8 in. diameter, connections to tags
on Coils. For 208 pf tuning capacity ... ... 12/6
Car Aerial coupling Coil ... ... ... 1/—

OSCILLATOR COIL—P50/1AC
M.W. covered with 176 pf tuning capacity.
L.W. by extra paddler ... ... ... 5/4

I.F. TRANSFORMERS
1st and 2nd Stage—P50/2CC ... ... ... 5/7
(2 required)
3rd Stage—P50/3CC ... ... ... 6/—

DRIVER TRANSFORMER—LFDT4
redesigned to reduce size and improve performance. Six spils for mounting and connections ... ... ... 9/8

PRINTED CIRCUIT—PCA1
CONSTRUCTOR'S BOOKLET WITH FULL DETAILS AND FREE SCALE 2/—

TRANSISTOR A.F. AMPLIFIER TYPE A.F.1—LOW IMPEDANCE INPUT, 500 mW OUTPUT.
MATCHING 3 OHM SPEAKER. FULLY ASSEMBLED WITH VOLUME CONTROL ... ... ... 63/6

WEYMOUTH RADIO MANUFACTURING CO., LTD.
REGENT FACTORY, SCHOOL STREET,
WEYMOUTH, DORSET

FREE TO AMBITIOUS ENGINEERS
— THE LATEST EDITION OF ENGINEERING OPPORTUNITIES

Have you sent for your copy?
ENGINEERING OPPORTUNITIES
is a highly informative 156-page guide to the best paid engineering posts. It tells you how you can quickly prepare at home for a recognised engineering qualification and outlines a wonderful range of modern Home Study Courses in all branches of Engineering. This unique book also gives full details of the Practical Radio & Electronics Courses, administered by our Specialist Electronics Training Division—the B.I.E.T. School of Electronics, explains the benefits of our Employment Dept. and shows you how to qualify for five years promotion in one year.

We definitely Guarantee
"NO PASS — NO FEE".
Whatever your age or experience, you cannot afford to miss reading this famous book. If you are earning less than £25 a week, send for your copy of "ENGINEERING OPPORTUNITIES"—today—FREE.

BRITISH INSTITUTE OF ENGINEERING TECHNOLOGY (Incorporating E.M.I. Institutes)
(Dept. SE/21), 29 Wright's Lane, London, W.8

THE B.I.E.T. IS THE LEADING ORGANISATION OF ITS KIND IN THE WORLD
Home Constructors LOOK!

TRANSISTOR KITS

TRANSPONDER RADIO

NEW SUPPLIED COMPLETE WITH PRINTED CIRCUIT BOARD AND FREE PARTS KIT (MINIATURE EAR PIECE). An easy "first step" set for the young constructor. This miniature radio, with ultra performance has an internal Ferrite rod aerial, 6 transistors and 1 diode—separate medium and long waveband control. 200 milliwatt push-pull output. Full moving coil speaker—unbreakable plastic case with carrying handle. Complete with full instructions. Circuits diagram 1/6, free if all parts bought. All parts sold separately.

THE SUPER "SONIC SIXTY" TRANSISTOR RADIO KIT

6 Mullard transistors, 1 diode, internal ferrite rod aerial, 7 x 4 inch speaker quality, printed circuit, 500mW push-pull output, MW and LW calibrated direct electronic assembly. Highly polished handsome walnut cabinet. Inst. Book 200 Component kit. Battery. All parts sold separately.

THE PETIT FULMITER A.C. ELIMINATOR AND 6V BATTERY CHARGER

Complete with 3in. MOVING COIL SPEAKER P & P 1/-


Wirecomp's Finest Ever Value Offer—

THE 'REALISTIC' 7'

FULLY TRANSISTORIZED PORTABLE RECEIVER

This super set—made to the highest professional standards—is now available to the home constructor. Comprises 7 Mullard Trans. OC4, OC0C, OC01, OC01D, and 2 OC81's, plus OA70 Crystal Diode. Delivers 600 milliwatt output to 4 Ohm. High flux speaker—1F frequency 450 Kc/s. Fully tunable over medium and long wave bands. All components provided on single printed circuit board, size 5 x 4.4 in. Attractive two-tone plastic cabinet with carrying handle—size 17 x 9 x 3 in. With easy to read dial and socket for ear set. Choice of Red/Grey, Blue/Grey or all Grey. Complete with full instructions. All parts sold separately.

Wirecomp's Price £6.19.6 including Free P.P. Battery—Value 3/9

P & P 4/6 extra. (Circuit diagram 2/6, free if all parts bought.)

Wirecomp Electronics

378 Harrow Road, London, W9.

Tel: Cunningham 9530

Hours of business: 9 a.m. to 6 p.m. Open all day Saturday. Opposite Paddington General Hospital. Buses 18B and 36 pass the door.

TRANSISTORS AND DIODES

A set of Transistors comprising 1 OC44, OC45, 1 OC81D, 2 OC81, 37/6, sec.

OC73 16/-OC75 8/-OC71 25/-OC79 39/- Red 3/6

OC70 6/-OC74 12/-OC72 31/6

Transistors OC77 12/-Matched Pr. OA81 5/- Sp. 4/-

OA81 6/-OA91 3/9

OC35 18/-OC78 8/-2xOC72 16/-OA35 3/-

OC36 21/-OC81 8/-2xOC78 16/-OA91 3/- White 3/-

OC77 12/-OC71 10/-OA10 8/- Red 3/6

OC70 6/-OA81 12/-OA95 3/- Red 5/-

OA85 4/-OA95 3/- Grey 3/-

OC71 12/-OA10 8/- Red 5/-

OC70 6/-OA81 12/-OA95 3/- Grey 3/-

OC72 8/-OC202 26/-OA73 3/- Audio 3/6/201 1/-

Automatic Record Changers

BRS Monarch UA14 £6.19.6.

Collar C60 Studio £7.19.6.


Vehicle Player Cases

Baseboard cut out for a BRS UA14, available in red, turquoise, grey, black or yellow, 63/- each. Amplifier and Loudspeaker to suit above, 45/-.

Pilco All-in-One Radio Meter, 3/6.

Test Master Model 200H. 20,000 ohms per volt, £6.19.6.

Caby Model A10, £4.17.6.

Taylor Model 127A, £10.10.0.

MULTI-RANGE TEST METRES

Caby Model B20, £4.17.6.

Taylor Model 127A, £10.10.0.

MICROPHONES

Acos Mic. 39/1; Stick Type 32/6. Table Stand for above, 12/6. Floor Stand Adaptor, 12/6. YS Type MI Dual Impedance Microphone with High (50,000 ohms) or Low (500 ohms) output, Matching, 84/6. TSL Stick Microphone £13. 25/6. Acoss Aln. 40/1, 19/6. Acoss Mic. 45, 29/6. Microphone Model £43, 65/- Table Stand to suit above, 12/6.

Alpha Radio Supply Co.

103 Leeds Terrace, Winton Street, Leeds 7

Our new 1962/63 48-page catalogue profusely illustrated is now available. Please send 1/- in stamps for your copy.

Trade Catalogue also available for which please attach your Business Letter Heading.

Fulmiter

A.G. Eliminator and 6V Battery Charger

18/6 P & P 1/6

Converts any 25 Transistor Set to a mains for the home and charges your battery for summer use outdoors; for use with all 9V. Amplifiers (approx. same size as P & P Battery). Complete with flex.
SUMMER SALE OF RECORDING TAPE
ALL BRAND NEW BOXED & GUARANTEED

**GEE'S**
SUPER QUALITY 3/5" P.Y.C. TAPE
5in. Std. 600ft. 10/-
5in. Std. 1,200ft. 17/-
5in. L.P. 800ft. 15/-
5in. L.P. 1,200ft. 17/-
7in. L.P. 800ft. 24/-
7in. L.P. 1,200ft. 31/-
8in. D.P. 1,400ft. 38/-
8in. D.P. 2,400ft. 0/-

AMERICAN "GEE" TAPE
5in. Std. 600ft. (CIP-2) 12/-
5in. Std. 900ft. (CIP-2) 18/-
7in. Std. 1,200ft. (CIP-12) 21/-
5in. L.P. 800ft. (L-60) 17/-
5in. L.P. 1,200ft. (L-12) 19/-
7in. L.P. 800ft. (L-12) 29/-
7in. L.P. 1,200ft. (CMXP-12) 32/-
8in. L.P. 1,300ft. (CMXP-130) 37/-
7in. D.P. 2,400ft. (CMXP-240) 57/-
8in. D.P. 2,400ft. (CMXP-240) 97/-

GEE BROS. RADIO LTD
15 LITTLE NEWPORT STREET, LONDON, W.C.2.
Telephone: GERR/act 8794/1453

ADJOINING LEICESTER SQUARE TUBE STATION
Open 9-6 Mon.-Fri. 9-1 Sat.

**BARGAIN OF THE YEAR!**
TELEFUNKEN HI-FI STEREO AMPLIFIER—LATEST MODEL
582 With Balance Control
110/230 V. A.C. 6 watts undistorted output (10 watts combined) size 12 x 7 x 2, incl. 9½, with complete spec.

**MINI-COM**
TRANSISTORISED INTERCOM
Ideal for Nursery, Office, Factory, etc. Complete Master Station and Sub-Station with 100ft. of twin connecting wire fitted with plug. Complete with battery and ready to use. Size 2 x 2 x 1½. Each unit. Attractive matching ivory cases with gold trim. MLA. P. & P. 10/.

**H.R.O. COILS**
Set of a different frequency, 87, post paid or individual frequencies, 90/- each; 10/ P. & P. 1/6.

**TELESCOPIC MICROPHONE FLOOR STAND**
HEAVY 9½ ft. chrome (chrome base and screw top). Extends to approx. 6 ft. 2£. 15/6. CARR. 6/6.

**AVO MODEL 7**
This walk-in test instrument, supplied 50 ranges of current, voltage and resistance tests. Complete with leads and batteries. Ready for use. Price £11.5.0, P. & P. 6/.

**AVO VALVE TESTER**
Outstanding offer of this fine test instrument. Supplied in good condition. Equipment in two parts valve panel with selector switches—and meter with voltage adjustment controls etc. 12 valve bases and 3 blanks. Very simple to operate. OLYMPUS model 10, CARR. 7/6. (Adaptors available for testing valves not listed). Data manual 40/- extra. Also complete instrument with data manual and latest type panels with 92, 98A and 98A bases, 32/6. CARR. 7/6.

**NEW REPANCO TRANSISTOR COMPONENTS**
Push Pull Driver Transformer Type TT45 ... 5/-
Push Pull Output Transformer Type TT46... 5/-
Interstage Transformer Type TT49 ... 5/-
Dual Range Ferrite Aerial Type FR2 ... 12/6
2.5 millihenry Choke Type CHI ... 2/6

RADIO EXPERIMENTAL PRODUCTS LTD.
33 MUCH PARK STREET, COVENTRY

AN INSTRUCTIVE BOOK FOR BOYS FROM EDMUND WARD PUBLISHERS
Fun With Electronics

By Gilbert Davey, edited by Jack Cox. This book is a successor to Fun With Radio and Fun With Short Waves, in the "Learning with Fun" series for children. It goes into the practical uses of electronics and gives designs to make and buy as well as dealing with the wider aspects of electronics in industry, etc. Many illustrations and diagrams. 96 pages, many illustrations, 12s. 6d.

NEW POCKET TEST METER
MODEL TK.60
4.000 o.v.p.
FOR ONLY
24/- Post
Free

Pocket-size individual circuit tester with twin line panel and metal cabinet, complete with test leads and ready to use. Ranges: D.C. Volt: 10/00-500/0, 1000. A.C. Volt: 10/00-250/0, 1000. A.C. Current: 20/0 to 250/0, 0.1 to 250/0. Resistance: 0-10 K ohms to 1 M ohms, (0-3 V internal battery). Supplied: -20 to +220V (0.15A - 0.775v) 8-900 ohms.

Also available: MODEL TK.50
1000 o.v.p. Range: D.C. max. 2-500; A.C. max. 1-500 V; A.C. Volt: 10/00-500/0, 1000 V; Ohm: 0-10k ohms, 0-10k ohms.

www.americanradiohistory.com
EXPLORE THE WORLD ON THIS 1-VALVE SHORT-WAVE RADIO

Total Building Costs

35/-
P. & P. 2/-

and music from all over the world.

Construction price includes valve and a coil covering 40-100 metres.

Can be extended to cover 10-1000 metres.

PUT YOUR FAVOURITE PROGRAMME ON TAPE with the

R.C.S. TAPE TUNER

Will operate on all types of Receivers. High

impedance output. Variable Microphone ex-

tuning. Triple wound super H.f. coils.

Construction price includes valve and ail

constructed from full instruction data and

tuning diagrams. Size 3 x 1 1/2 in.

Total Building Costs

30/-

P. & P. 1/-

AMAZING RESULTS FROM the

"OLIVER"

S-Stage Transistor Receiver

A highly sensitive receiver using transistors and com-

ponents fully tunable over medium and long waves.

Can be built in 1 hour.

High flux moving coil speaker.

Built in femto faradic aerial.

Especially designed code for maximum

lightning strength.

Variable control panel.

Eyeletted circuit board.

Send for FREE layout plans and price list.

The "BOBETTE"

S-STAGE SUPER SENSITIVE TRANSISTOR PORTABLE

Plunge to Build. All First Grade Components.

A truly portable transistor radio giving full

medium wave reception. Incorporates Sin.

High Flux Speaker. Push pull output. First

grade transistors.

High-t 8 Wort

aerial socket for

ear. Aerial pre-tau-

circuit board for

antenna.

Attractive two-tone case.

R.C.S. for MINI-SETS

All parts available separately.

Constructional details on one of our

Mini-sets, 1/- each. (Supplied free with orders)

"PERSONAL TWO"

For Private Listening.

An amazing little set, with built-in femto faradic

aerial for reception in medium

wave at wonderful volume. R trout on

Only 1 1/2 x 1 1/2 in.

illed, miniature speaker colour coded for

easy assembly. Two transistors plus diode.

Total Building Costs

35/-

P. & P. 1/-

Expires 7/6 extra if required.

Send for FREE layout plans and price list.

"THE REVIGO"

S-Stage Pocket Transistor Portable

Two-tone contemporary case, with gold

plated speaker grill and attractive dial.

5 Mc x 14 in. No aerial or earth required—

completely self contained. Gesture Sin.

High flux PM speaker. First grade transistors.

Push-pull output—500 milliwatts. Volume

control with on/off switch. Condenser tuning

key assembly on eyeletted circuit board.

Total Building Costs

£ 4.19.6

Socket for personal

Jewellery.

R.C.S. PRODUCTS (RADIO) LTD. 11 OLIVER RD., LONDON, E.17 Mail Order only

SOUTHERN RADIO'S WIRELESS BARGAINS

PORTABLE TEST METERS. (As featured in March 1961, issue, pages 1010 to 1016);

0.5 Mc, 0.5 V, 0.500 ohms to 0.5 M. 6/- each.

TRANSMITTER RECEIVERS. "Type 38" with 5 valves. New

but untested. No guarantee. 25/- each. Post paid.

ATTACHMENTS FOR "18" TRANSMITTER-RECEIVER;

Headphones 15/-; Throat Microphones 4/6; Junction

Boxes, 2/6; Aerials, No. 1, 2/9, No. 2, 5/3, 2/16, Webbing, 4/-;

Hawseacks, 5/-; Valves—A.R.P.4, 4/6, A.T.P.A. 3/6, A.R.B. 7/6; Set

of six valves, 25/-.

"18" RECEIVING PORTION ONLY with 4 valves.

S.W., 6-W.C. 35/- each.

ATTACHMENTS FOR "18" TRANSMITTER-RECEIVER. Headphones,

15/-; Microphone 4a, 12/6; Aerials, 5/-; Morse

Key, 6/-; Valves—A.R.P.12, 4/6, A.T.P.A. 3/6, A.R.B. 7/6; Set

of six valves, 25/-.

Official booklet "19" T.R. Circuits, etc., 6/-

post paid. Postage extra (excess valves) 1/6 each item.

QUARTZ CRYSTALS. Types F.T. 241/243 2-pin 1/2 in. spaced.

FREQUENCIES: (F.T.243) 5076 kc to 8625 kc.

FUNDAMENTAL (F.T.241) 20 Mc to 38 Mc.

(54th and 72nd Harmonics 1/- each. Limits available of frequencies stocked.

CRYSTAL BASES. F.T.241, F.T.243, 1/6 each.

CRYSTAL CASES. F.T.241/243. 10/- per dozen.

DYNAMOTORS for attaching to EC SERIES COMMAND

receivers. 28c. D.C. to 250v, D.C. 17/6 each.

VARIOMETERS for "19" Sets, NEW, 21/- each.

RECORDING BLANKS. New 13/-, 6/- each or 15 complete in

Tin, 4/-.

BOMBSIGHT COMPUTERS. Ex-R.A.F. Wealth of gears

motors, blowers, etc. Ideal for use in experiments.

Detailed Plans. 0.12/-, card, paid.

RESISTANCES. 100 Asst. Useful values, new, 12/- per 100.

CONDENSERS. 100 Ass. Mica Elee, Tub, etc. New 15/- per 100.

LUMBAR HOE CUTTERS. Send, 1/-, to 1/-, 7/9.

VISUAL INDICATORS (1064). Type 3 with 1-meter movement.

2 roosts. New 12/-.

MAGNETS. Strong Bar, 2in. x 1in., 1/6 each.

POST OR CARRIAGE EXTRA, FULL LIST OF RADIO BOOKS, ETC., 3d.

SOUTHERN RADIO SUPPLY LTD.

11 LITTLE NEWPORT ST., LONDON W.C. 6653

GLAH: This Month's Bargains

★ SHADIED POLE MOTORS

230v. or 110v. operation. Ideal for fans, blowers or models.

One only, 12/6, plus 2/- p. & p. Or pair, £1, plus 2/6 p. & p.

★ AERIAL EQUIPMENT

TWIN FEEDER. 300 ohm twin ribbon feeder, similar K25,

6/ per yard, K250 Telecon (round) 1/6 per yard. Post on above feeder and cable 1/6 any length.

COPPER WIRE. 14 G., H./D. 140t. 17/6; 70t. 8/-, P. & P. 2/-.

Other lengths pro ratio.

RIBBED GLASS. 3in. aerial insulators, 1/9 each. Shell ins 2/6.

9d. each, P. & P. 1/6. Up to 12.

CERAMIC FEEDER SPREADERS. 6in. type F.S. 10/- each.

P. & P. 2/-.

CERAMIC PIECES. Type A.T. for centre of dipoles,

6d. each, P. & P. 1/.-

2 METRE BEAM'S ELEMENT W. S. YAGI. Complete

in box with 1-2in. mast head bracket. PRICE 49/-.


SUPER AERIAL CABLE. 75 ohm, 300 watts, very low loss,

1/6 per yard. P. & P. 2/-, 50 ohm, 300 watt coax, very low loss, 1/6d. P. & P. 2/-.

ABSORPTION WAVEMETERS. 3.00 to 35.00 Mc/s in 3


2/6 post free.

VARIABLE CONDENSERS. All brass with ceramic end

plates and ball race bearings. 50 p.f, 59/10, 100 p.f. 6/-, 160 p.f, 7/-, 240 p.f, 8/-, and 300 p.f, 9/-.

All fitted with rear extension for ganging. P. & P. 1/-.

Also Flexible Couplers, 1/- each.

B.I. 8 MFD. 1,000 v. D.C. Wkgs. Capacitors, 12/6 each. P. & P. 2/-.

CHAS. H. YOUNG LTD.

THE COMPONENT SPECIALISTS

Dept. "P", 110 Dale Road, Birmingham 4, (CEN 1635)

(No C.O.D. under £1 please).

(Year service)
PRACTICAL WIRELESS
August, 1962

FIRST-CLASS RADIO COURSES...
GET A CERTIFICATE!
QUALIFY AT HOME—IN SPARE TIME
After brief, intensely interesting study—you can earn your professional certification or learn Servicing and Theory. Let us show you how.

FREE GUIDE

Write now for your copy of this invaluable publication. It may well prove to be the turning point in your career.

Founds-1985—OVER 150,000 SUCCESSES.

NATIONAL INSTITUTE OF ENGINEERING
(Dept. 461), 148 HOBORN LONDON, E.C.1
S. Africa: P.O. Box 8417, J'burg, Australia: P.O. Box 4570, Melbourne.

TWO NEW LEWIS CATALOGUES
Designed to assist your choice of cabinet and equipment. The New Lewis Radio Catalogue—
the most comprehensive ever prepared.
The unique 44 page equipment catalogue.
Please send your two new catalogues enclosed in P.O. for 2/6, which will be credited against any purchase I make.

The Lowboy
Price 24 gns.

This cabinet can accommodate every type, size and model of Hi-Fi equipment. The Lowboy is supplied in Walnut (as illustrated), or Stripped in Push and polished satin finish.

THE LARGEST RANGE OF CABINETS IN THE COUNTRY.

LEWIS radio

2 METRES!
The thrills of 14G Mc/s can now be yours for only 39/6, complete kit. Tunable tubes 150-100 Mos, simplified construction, etc., write today for descriptive literature, also if a newcomer-beginner to Amateur Radio, our famous "Globe-Kit" Kits and receivers—stamps to cover postage costs appreciated. Write now to makers:

JOHNSONS (Radio)
St. Martins Gate, Worcester

RADIO BOOKS

A BRILLIANT NEW Pictorial approach to understanding BASIC ELECTRICITY

BASIC ELECTRICITY
In Simple straight-forward words and clear explanatory Pictures. The reader is taken step by step from Picture to Picture.

LEARN WHILE YOU PAY
Hourly rates every week.
Write for FREE Illustrated Prospectus giving details of each. F.8

BUMPER BOOK OF TRANSISTOR CIRCUITS FOR BOYS, 6/6. ELECTRONIC NOVELTIES. Bradley 5/6.

SERVICING TRANSISTOR RECEIVERS
New and improved 35p.

SELERY BOOK CO.
60 HAYES HILL, HAYES, BROMLEY KENT.
Tel. Hurstway 118

MICROAMMETER 0-50 µA, 3 1/2' Brand new Weston, scaled 0-5, 20, 50, 100, 300, 1000, 3000. Multimeter circuit and scale 9d. FREE with meter. Shunt for imm. 800 ohm meter. Ranges 10, 100, 1000mA. 1% accuracy, 9/6, post 9d.
Shunt for 300/1 500 ohm meter. Ranges 10, 50, 200mA. 1% accuracy, 9/6, post 9d. Shunt resistors wound to order. Please state requirements.

Precision Waveform Resistors, 1W. 1 ohm to 10K, 1W. from 10K to 100K 4 1/2, add 3d. Your value wound to order. Please state requirements.

Planet Instrument Co.
25 Dominion Ave., Leeds 7

www.americanradiohistory.com
AVO METERS

MODEL 7 $11.10.0, MODEL 1 Mark H $12.10.0. Guaranteed perfect. Complete with leads and batteries. Registered post mark and including 5/- extra.

“ERECON” PANEL METERS. Rectangular 4½ x 4½ in. (3½ in. barrel), 0-500mA. BRAND NEW (Japanese), 5/-/6.

PANEL METERS. 0-500mA. (Surplus). Circular 2½ in. scale, 0-6, Guaranteed good quality, 1½.

SILICON RECTIFIERS. A modern marvel. Type 1EA2 (4 x 4in.) will handle 250 volts at up to 500 ma. Replaces any TV metal rectifier, 10/9.

H.R.A. RECEIVERS—SENIOR MODEL H.M. Complete with 9 coils from 100 Kc.—30 Mc/s. A superb communications receiver. Guaranteed in brand new condition, 25/-, carr. 30/-.

POWER UNIT 15/- extra carr. 7/-.

4197 RECEIVERS, 1.2 Mots—17.5 Mols continuously. 3 wave bands, Completely self-contained with speaker and power unit for A.C. mains and 12 v. battery operation. Guaranteed perfect. 11/10.0. Carr. 30/12.

PCR COMMUNICATIONS RECEIVER

Type PCL. Has self-contained speaker. Covers 850-2900, 2900-6600 and 16-50 metres.


USED (Good condition). $5.10.0. Carry any type 10A. Full details. $2.10.0. A model fitted with BROAD NEW INTERNAL POWER SUPPLY, guaranteed ready for use on A.C. mains, 2 extra.

Moving Coil Phones. Finest quality Canadian, with Channals ears muff and leather-covered headband, with lead and plug. Noise excluding, supremely comfortable. 10/6, post 1/-.

We now stock The Pocket 4, a neat little job which can be made for 42/- (Printed Circuit Version 52/6), and The Good Receiver, a special job equal to the best. Easily constructed for only 8/-10/6. Gladly demonstrated to callers.

CHARLES BRITAIN (RADIO) LTD.
11 Upper Saint Martins Lane, London, W.C.2
T.2Mple Bar 0645.

Shop Hours 9-6 P.m. (9-1 P.m. Thursday)
Open all day Saturday.

REGUN TUBES

Guaranteed VALVES Salvage

179d. Each
6H1, 6L1, 6F20, 6FZ5, 636, E841, E129, E1790, E1791, E1792, E1794, E1795, U24, U25, U26, U27, W76, W77.

279d. Each
6L18, 7C6, 10P1, 10P2, 10P11, 20P7, ECL86, ECL70, EFP2, K702, K714, N140, N152, 021.

5/- Each

Postage
1-7d., 7-12.9/6.

DUKE & CO. (London Ltd)
621/3 ROMFORD RD, MANOR PARK, E.12
(If Ford 6001/3)
Stamp for FREE list.

COMPLETE TELEVISIONS

14 INCH 17 INCH
£7.10.0 £11.10.0

GUARANTEED 12 MONTHS.

* Ex Rental and repropossessed televisions.

** Two such modelled into one.

H.P. Terms—London area.

Demonstrations daily.

Self exchange policy.

Part exchange allowance on Radios, TV's, etc.

Personal collection advised, special delivery by arrangement, B.R.S. (Int., Carr., 30/-).

LOOK!

TRANSISTORS FROM 1/6 EACH

GREEN SPOT A.F. TRANSISTORS

3 volt type. Only 1½.

YELLOW SPOT A.F. 6 volt 2½ each.

RED SPOT down to 1½ each.

WHITE SPOTS down to 2½ each.

YELLOW SPOT BROWN now only 3½ each.

RED/YELLOW R.F. type 4½ each.

MINIATURE DIODES 3 for 2½, 7½ doz.

MULLARD TRANSISTORS

OC4 9/6, OC5 9/6, OC171 10/6, OC170 9/6, AF114 11/6, AF115 16/6, AF116 16/6, OC171 16/6, OC76 8½, OC72 8½.

Matched pairs OC72 or OC81 1½ pair.

DIODES OA70, OA79, OA81, OA90, OA96 all 2/-.

TRANSISTOR TRANSFORMERS by REPANCO.

Interstage Type TT49 4.5 : 1 3½, Driver Type TT45, 5½, Output Type TT46, 8½ each.

TRANSISTOR HOLDERS 1½ each.

J.B. DILECON CONNECTORS. .0001, .0002, .0003 or .0005 all 4½ each.

REACTION CONNECTORS. .0001 3½, .0003 7½, .0005 4½.

DRX1 Crystal Set Coils 2½.

Repance DRR2 Coils 4½.

ALL SENT POST FREE in U.K. by

PETHERICK'S RADIO SUPPLIES
22 High Street, Bideford, N. Devon
Tel.: Bideford 1217
S.A.E. WITH ALL INQUIRIES PLEASE

THE AMATEUR RADIO HANDBOOK 1962


The Radio Handbook by Editors and Engineers, 6/-, Single Channel Radio Control, by Waring, 26/-, postage 6d.

The Cabinet Handbook, new edition by Brazil, 7/-, postage 1/-.

The Radio Amateur Examination Manual by R.S.G.B., 6/-, postage 6d.

Amateur Radio Call Book 1962 by R.S.G.B., 4/-, postage 6d.

World Radio Directory by Johansen, 14/-, postage 1/-.

The Receiving 27310 Receiver Receivers, a new edition by Pattie, 7/6, postage 6d.


The Home Electrician, a new edition by Cameron, 12/-, postage 6d.

UNIVERSAL BOOK CO.
12 Little Newport Street, London, W.C.2
(Adjoining Lisle Street)

H.A.C. SHORT-WAVE EQUIPMENT AND
SHORT-WAVE KITS

Famous for over 25 years for...

S.W. Receivers...

H.A.C. are the original suppliers of SHORT-WAVE RECEIVER KITS for the amateur constructor. Over 10,000 satisfied customers—including Technological Colleges, Hospitals, Public Schools, Banks, etc...

Improved designs with Denco coils: One-wave Kit, Model "E", Price 25/-, Two-wave Kit, Model "E", Price 50/-, New Addition: Modon "S", Super sensitive "All Day" Receiver, Special inc. price, Complete Kit, 77/-.

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

POST THIS COUPON NOW!

"H.A.C." SHORT-WAVE PRODUCTS

(Dept. TH), 41 Old Bond Street, London, W.1

Please send me FREE and without obligation our 1962 literature.

NAME:___________________________
ADDRESS:__________________________

August, 1962
PRACTICAL WIRELESS
359
ALL-TRANSISTOR

TIME SAVER

OFFICE OR HOME TELEPHONE PICKUP AMPLIFIER

No more "holding on" wasting time waiting for your call to come through.
When it does the amplifier can be switched off if required.
No connections, just press the pick-up coil to back of phone as below.
Fully Guaranteed. Housed in attractive Gold Finish Cabinet.

1. 4-Transistor 2-way Intercomm.
2. Transistor IS watt Solder Iron. ½ bit.
Ideal for all printed circuit work, P.P. 3/6, P.P. 1/6.
3. New Model Control Book with 60 pages of transistor circuits, 7/6, P.P. 6d.
5. Telephone Recording Coil to record conversations. For all amplifiers and
recorders, 14/-, P.P. 9d.
6. Printed Circuit Kit, to etch your own circuits.
7. Complete with boards and details, 19/6, P.P. 1/2.
7. Miniature 850 ohm Record/Playback Head, with mounting block, 12/6, P.P. 9d.
8. 4,000 ohm lightweight Headphones with leads. Very sensitive, 12/6, P.P. 1/-.
9. Transistor Pocket RF, IF Generator for Radio, TV etc. Fault finding, 52/6, P.P. 1/2.
10. 8-Range All Transistor Signal Generator, 200 kc range. Methods: AF, IF, HF, etc. £7.10.0, P.P. 3/6.
11. GS12C (Dekatron) Bi-directional 12-way indicator tube, Brand new. 25/-,
12. 4-9 volt Tape Recorder Motor, governed.
13. 30 watt Pocket Solder Iron, with pocket pouch and mains plug, 18/6, P.P. 1/-.
14. 931A Photo Multiplier. Brand new, 60/-.
15. 1 Kc/s Transistor Audio Test oscc., variable output, 39/6, P.P. 6d.
17. Practical Transistor Circuits to build, 3/6.
18. Personal Earphones with leads, jack plug and sockets: 40 ohm, 10/6, 1000 ohm 12/6; Crystal 9/6; 8/10 ohm 9/6.
19. W/W Erase Head, FET, 7/6, P.P. 6d.
Ideal for car use, 57/6, P.P. 1/6.

22. 7-Section Telescopic Aerial, 12/6.
23. L1A Ferrite Pot Core, 12/6, P.P. 6d.
24. PF3/11 Miniature Ferrite Pot Core, 5/6, P.P. 6d.
25. Miniature Jack and Socket, 3/6, P.P. 6d.
26. No. 19 Set Crystal Calibrator with Handbook, 7/6, P.P. 2/-.
27. New 2-way Intercomm with 2-way calling. Supplied with cable, battery, etc. Housed in moulded cabinets.
28. 9 volt 80 mA battery eliminator kit for large portables, 35/-, P.P. 1/6.
29. Transistor Pocket Radio with speaker output. Complete in moulded cabinet with battery, earphone, carry case
telescopic aerial etc., 99/6, P.P. 1/6.

LATEST ILLUSTRATED CATALOGUES NOW AVAILABLE 1/-.

Henry's Radio Ltd
PADINGTON 1008/9
5 HARROW ROAD, LONDON W2
Open Monday to Sat. 9.6. Thurs. 1 o'clock
TRADE SUPPLIED

HELP! TO BACK PAGE

TRANSISTOR PORTABLE TAPE RECORDER

FOR OFFICE, HOME OR TRAVEL

Play/record up to 30 mins. Built-in speaker, volume control batteries
and phone/record/rewind. Quality reproduction. Sturdy case 6 x 2½ x 2½in.

£10.10.0

Fully guaranteed

Supplied complete with microphone, tape, batteries and personal phone, (For monitoring), and full instructions. Built and tested.

BATTERY RECORD PLAYER

6½-7½ volt Garrard

with crystal pickup. Plays 45 r.p.m. Ideal for above amplifier.

65/- P.P. 1/6.

BATTERY ELIMINATOR AND CHARGER

Substitutes PP3 or T6003 9 volt batteries to run transistor radios from mains. Also charges to give 3 times normal
battery life. Fitted neon indicator and supplied with full details. 29/6, P.P. 1/6.

TRANSISTORS

We can supply from stock first grade transistors, diodes, rectifiers, silicon or germanium. Matched sets at special reduced prices. Complete list on request.
ALL OF these blueprints are drawn full-size and although the issues containing descriptions of these sets are now out of print, constructional details are available free with each blueprint except for the PW Monophonic Electronic Organ and the PW Roadfarer.

The Index letters which precede the Blueprint Number indicate the periodical in which the description appeared. Thus PW refers to PRACTICAL WIRELESS; AW to Amateur Wireless and WM to Wireless Magazine.

Send (preferably) a postal order to cover the cost of the Blueprint (stamps over 6d. unacceptable) to


SPECIAL NOTE

THE following blueprints include some pre-war designs and are kept in circulation for those constructors who wish to make use of old components which they may have in their spares box. The majority of the components for these receivers are no longer stocked by retailers.

<table>
<thead>
<tr>
<th>Title</th>
<th>Number</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.C. Fury Four</td>
<td>PW20</td>
<td>2/6</td>
</tr>
<tr>
<td>Experimenter's Short Wave</td>
<td>PW30a</td>
<td>2/6</td>
</tr>
<tr>
<td>Midget Short Wave Two</td>
<td>PW38a</td>
<td>2/6</td>
</tr>
<tr>
<td>Band-Spread Three (Battery)</td>
<td>PW68</td>
<td>2/6</td>
</tr>
<tr>
<td>Crystal Receiver</td>
<td>PW71</td>
<td>2/-</td>
</tr>
<tr>
<td>Signet Two (Battery)</td>
<td>PW76</td>
<td>2/6</td>
</tr>
<tr>
<td>Simple S.W. One-valver</td>
<td>PW88</td>
<td>2/6</td>
</tr>
<tr>
<td>Pyramid One-valver</td>
<td>PW93</td>
<td>2/6</td>
</tr>
<tr>
<td>BBC Special One-valver</td>
<td>AW387</td>
<td>2/6</td>
</tr>
<tr>
<td>A One-Valver for America</td>
<td>AW429</td>
<td>2/6</td>
</tr>
<tr>
<td>Short-Wave World Beater</td>
<td>AW436</td>
<td>3/6</td>
</tr>
<tr>
<td>Standard Four Valve S.W.</td>
<td>WM383</td>
<td>3/6</td>
</tr>
<tr>
<td>Enthusiast's Power Amplifier</td>
<td>WM387</td>
<td>3/6</td>
</tr>
<tr>
<td>Standard Four Valve</td>
<td>WM391</td>
<td>3/6</td>
</tr>
<tr>
<td>Listener's 5-Watt Amplifier</td>
<td>WM392</td>
<td>3/6</td>
</tr>
</tbody>
</table>

Published on the 7th of each month by GEORGE NEWNES, LIMITED, Tower House, Southampton Street, London, W.C.2, and printed in England by WATMOUGHS LIMITED, Idle, Bradford; and London. Sole Agents for Australia and New Zealand: GORDON & GUTCH (Afric.) Ltd., South Africa and Rhodesia; CENTRAL NEWS AGENCY, LTD, East Africa; EAST AFRICAN STANDARD LTD, East Africa; and EAST AFRICAN STANDARD LTD, East Africa; and EAST AFRICAN STANDARD LTD, East Africa; and EAST AFRICAN STANDARD LTD, East Africa; and EAST AFRICAN STANDARD LTD, East Africa.

Subscription rate including postage for one year: Inland £1.9.0. Abroad £1.7.6 (Canada £1.5.0.). Registered at the General Post Office for the Canadian Magazine Post.
Redesigned **Confessa’ Mk. III**

★ combined portable and car radio ★

NOW WITH 600 mW MELLOWTONE OUTPUT ON MEDIUM AND LONG WAVES.

NOW FITTED HORIZONTAL TUNING SCALE WITH ALL STATIONS CLEARLY MARKED.

NOW SUPPLIED WITH SIX MULLARD TRANSISTORS AND TWO DIODES

NOW FITTED RECORDING SOCKET AND CAR AERIAL SOCKET

NOW SUPPLIED WITH TWO-TONE BEIGE OR TWO-TONE BLUE CABINET WITH GOLD FITTINGS.

GUARANTEED THE VERY BEST OBTAINABLE

- All parts sold separately

The New "CONTESSA" 6 Transistor Portable Superhet Radio features simple printed circuit construction and fully illustrated building instructions, with all parts clearly marked and identified. Fitted with 8 inch Ferrite Aerial. Double I.F.'s and the latest in components and design. Full tuning of both Medium and Long Wave Bands with unbeatable Selectivity and Sensitivity. Clearly marked station identification and room filling "MELLOWTONE" push-pull output are standard features.

**ALL THESE EXTRA FEATURES AT NO EXTRA COST**

"**QUINTET**" MEDIUM AND LONG WAVE POCKET RADIO

Push-Pull Speaker Output

Size: 5½ x 3 x 1½ in.

Red or Blue with Gold trim

Total Cost: £5.10.0 P.P. 2½

A Five Transistor and Diode medium and long wave printed circuit loudspeaker radio. Features Mullard transistors and plainly marked printed circuit with carded components. Excellent results with full station separation guaranteed. Including Radio Luxembourg. Push-pull output up to 200 mW. Fitted 'Phone' Record socket and Car aerial socket. Full after sales service and guarantee.

"**CAPRI**" POCKET SIX, 6-TRANSISTOR MEDIUM AND LONG WAVE POCKET SUPERHET RADIO

- SIZE 4½ x 2½ x 1½ in. REALLY POCKET SIZE.

The most compact 6-transistor and diode radio with speaker available to the home constructor. Features the latest in miniature components and circuitry. Supplied with Mullard transistors and two-tone moulded cabinets in red/white or Blue/white with gold fittings. All components are supplied in packets and clearly identified. A printed circuit is used with fully illustrated building instructions. Push-pull output coupled with a sensitive and selective circuit make the "CAPRI" hard to beat. Fitted Earphone/Record socket.

- FULL AFTER SALES SERVICE AND GUARANTEE

- ALL PARTS SOLD SEPARATELY—DETAILED LEAFLET ON REQUEST

**DESIGNED BY EXPERTS FOR THE HOME CONSTRUCTOR**

**TOTAL COST** £7.10.0 P.P. 2½. (Battery 2½)

"**RANGER 3**" PORTABLE RADIO

Size: 4½ x 3 x 1⅛ in.

Medium and Long Wave Portable

8¼ x 6½ x 3⅜ in.

Total Cost: £6.19.6 P.P. 2½


"**CARVERTER**" MOBILE TRANSISTOR SHORT WAVE CONVERTER.

As featured in the May Edition of Radio Constructor. Just plugs into the aerial socket of your car radio. Crystal controlled—covers amateur and short wave broadcast bands from 5 to 16 Mc/s.

- SUpplied complete with long life battery and 39/40 metreband crystal. Send ½ stamp for full booklet.
- No modifications to car radio at all.

**TOTAL COST** £8.10.0 P.P. 2½


**"P.W.-6" SUPERHET RADIO**

Medium and Long Wave Radio

Size: 5½ x 3 x 2½ in.

**OVERALL SIZE** 10½ x 7½ x 3⅞ in.

- Detailed Leaflet on Request

**PRACTICAL WIRELESS**

August, 1962

Henry's Radio Ltd

5 HARROW ROAD, LONDON W2

Open Monday to Sat. 9½-6½ Thurs. 1 o'clock

Send ½ Stamp for Latest Illustrated Price Lists.

PLEASE TURN PAGE