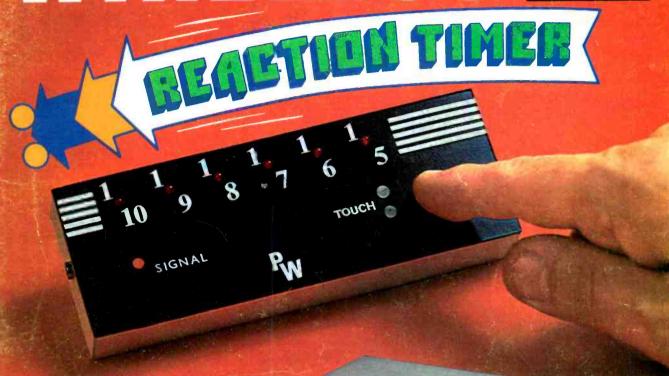
PRACTICAL WILLIAM STATEMENT OF THE SECOND SERVICE OF THE SECOND S

APRIL 1975

30p









Total Building Costs P P & Ins. 44p (Overseas Scamail P & P £2:35) £7·23

(+ 8% VAT 57p)

Completely Solderless Electronic Construction Kit Build these projects without soldering iron or solder

- * 4 Transistor Earpiece Radio
- * Signal Injector
- * Transistor Tester NPN-PNP
- 4 Transistor Push Pull Amplifier.
- ★ 5 Transistor Push Pull Amplifier.
- 7 Transistor Loudspeaker Radio MW/LW
- 5 Transistor Short Wave Radio
- + Electronic Metronome
- * Electronic Noise Generator
- * Batteryless Crystal Radio. * One Transistor Radio.
- 2 Transistor Regenerative Radio.
- 3 Transistor Regenerative Radio
- * Audible Continuity Tester.
- * Sensitive Pre-Amplifier.

F255400121622161

THE PROPERTY OF PARTY AND PARTY.

Siderlines property

Components Include: 24 Resistors ◆ 21 Capacitors ◆ 10 Transistors ◆ 3¼" Loudspeaker ◆ Earpiece ◆ Mica Baseboard ◆ 3 12-way connectors ◆ 2 Volume controls ◆ 2 Slider Switches ◆ 1 Tuning Condenser ◆ 3 Knobs ◆ Ready Wound MW/LW/SW Coils ◆ Ferrite Rod ◆ 6½ yards of wire ◆ 1 Yard of sleeving etc. ◆ Parts Price List and Plans 55p free with parts.

NEW ROAMER NINE

WITH VHE INCLUDING AIRCRAFT



Nine Transistors, 9 Tuneable was chambs as Rouner Ten, Bullt in ferrite rod aerial for MW/LW. Retractable chrome-plated telescopic aerial for VHF and SW. Pull output using 600 mW transistors, 9 Transistors and 3 diodes, tuning condenser with V.H.F. section, separate coll for sireratt, moving coil loudspeaker, volume ON/OFF and wavechange controls. Attractive all white case with red grille and carrying strap. Six 94" × 7" × 21" approx. Parts Price List and Plans free with parts.

Building Costs

£6.95

P P & Ins. 44p (Overseas Seamail P & P £2:35)

POCKET FIVE

NOW WITH 3" LOUD-SPEAKER

SPEAKER

3 Tunable wavebands, M.W.

L.W. and Trawler Band,

7 stages, 5 transistors and

2 diodes, supersensitive
ferrite rod aerial, attractive black
and gold case. Size 6½ "× 1½" ×

3½" approx. Plans and Parts

Price List '90 free with parts have

ferrite rod aerial, attractive black and gold case. Size $5^{\rm P}$ \times $1^{\rm P}$ \times $1^{\rm P}$ \times $3^{\rm P}$ approx. Plans and Parts Price List 20p free with parts. (+8% VAT 20p) (Overseas Seamail P & P £1.70)



Total Building Costs £2.75 PP & Ins. (+8% VAT 21p)

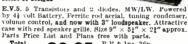
TRANSONA FIVE NOW WITH 3"

Total Building Cost

Wavehands, transistors and wavenands, transistors and speaker as Pocket Five. Larger Case with Red Speaker Grille and Tuning Dial. Plans and Parts Price List free with parts. (Overseas Seamail P&P£1-70)

NEW Everyday Series

Build this exciting New series of designs



Total Building £2.95 P & Ins. 36p (Overseas Scannail P & P & 1.70)

(+ 8% VAT 23p)

E.V.6. Case and looks as above. 6 Transistors and 3 diodes. Powered by 9 volt battery. Ferrite rod aerial, 3' loudspeaker, etc., MW/LW coverage. Push Pull output. Parts Price List and Plans free with parts.

Total Building £3-60 PP & Ins. 36p (Overseas Scannail P& P & 1.70) Total

(+ 8% VAT 29p)

E.V.7. Case and looks as above. 7 Transistors and 3 diodes. Six wavebands. MW/LW, Trawler Band, SW1. SW2, SW2, powered by 9 volt battery. Push Pull output. Telescopic aerial for short waves. 3" Loudspeaker. Parts Price List and Easy Bulld Plans free with parts.

Total Building £4.08 Prains, 28p (Overseas Seamail Papa 2.00) (+8% VAT 32p)

ROAMER EIGHT Mk I

NOW WITH VARIABLE TONE CONTROL

T Tunable Wavebands: MW1
MW2 I.W SW1, SW2, SW3
and Trawier Band. Ruit. In
Ferrite Rod Aerial for MW and LW. Chrome plated Telescopic aerial can be angled and rotated for peak short
wave listening. Push pull output using 600mW transistors.
Car aerial and Tape record sockets. Selectivity switch.
Stransistors plus 3 diodes. Latest 47 wat ferrite magnet
loudspeaker. Air spaced ganged tuning condenser. Volume]
of, off, tuning, wave change and tone controls. Attractive
case in rich chestnut shade with gold blocking. Size 9 × 7 ×
410. approx. Easy to follow instructions and discrepans 4in. approx. Easy to follow instructions and diagrams. Parts price list and plans free with parts, P P & Ins. 47p

Total building costs (Overseas Beamail P & P £2:50)

£6.98

(+ 8% VAT 56p)

TEN Mk 2 WITH VHF INCLUD-ING AIRCRAFT

ROAMER

Now with free earpiece and switched socket. and switched socket.

10 Transistors. Latest4:

2 watt Ferrite Magnet
Loudspeaker.

9 Tunable Wavebands,
MW1, MW2, LW; SW1.

SW2, SW3, Trawler
Band, VHF and Local
Stations also Airsets.

Stations also Aircraft Band

Stations also Aircraft Band. Built in Ferrite Rod Aerial for MW/LW. Chrome plated 7 section Telescopic Aerial, can be angled and rotated for peak short wave and VHF listening, Fush Pull output using 600mW Transistors. Car Aerial and Tape Record Sockets. 10 Transistors plus 3 Diodes, Ganged Tuning Condenser with VHF section. Separate coil for Aircraft Band. Volume on/off. Wave Change and tone Controls. Attractive Case in black with silver blocking, Size 9° × 7" × 4". Easy to follow instructions and diagrams. Parts price list and plans 50p free with parts.

Total building costs (Overseas Seamail P & P £2:50)

£9·50 (+ 8% VAT 76p)



Components include:

Components include:
Tuning Condenser: 2 Volume Controls: 2 Slider Switches;
Flue Tone 3" Moving Coll Speaker: Terminal Strip: Ferrite
Rod Aerial: Battery Clips: 4 Tag Boards: 10 Transistors:
4 Diodes: Resistors: Capacitors: Three 4" Knobs. Units
once constructed are detachable from Master Unit,
enabling them to be stored for future use. Ideal for
Schools, Educational Authorities and all those interested
in radio construction.
Parts price list and plans free with parts.

Total building

£5.50 + 8% VAT 44p)

PP & Ins. 40p (Overseas Scamail P & P £2.35)

EXCHANGELTO

Callers side entrance "Lavella" shop ★ Open 10-1, 2.30-4.30, Mon,-Fri. 9-12 Sat.

_ _ _ _ _ To RADIO EXCHANGE CO., 61a HIGH STREET, BEDFORD, MK40 1SA

TRANS EIGHT 8 TRANSISTORS and 8 DIODES

6 Tunable Wavebands: MW, LW, SWI, SW2, SW3 and Trawler Band. Sensitive ferrite rod aerial for M.W. and L.W. Telescopic aerial for Short Waves. 3in. Speaker. 8 Improved type transistors plus 3 diodes. Attractive black knobs with pollshed metal inserts. Size 9 × 51 × 2½in. approx. Push pull output. Battery economiser awitch for extended battery life. Ample power to drive a larger speaker. Parts price list and plans free with parts.



ROAMER SIX

CASE AND LOOKS AS TRANS-EIGHT

Trawlet band plus an extra Medium waveband for easier tuning of Lusembourg. etc. Sensitive ferrite rod aerial and telescopic aerial for 8hort Waves. 3in. Speaker 8 stages—6 transistors and 2 diodes. Attractive black case with red grille, dial and black knobs with polished metal inserts. Size 9 x 9 t x 9 1m. approx. Plans and parts price list free with parts.

(+ 8% VAT 32p) P & P £2.00)

I enclose £..... for (Dept. PW 04.)

Tel.: 0234 52367. Reg. No. 788372.

www.americanradiohistory.com

PRACTICAL WIRELESS

VOL. 50 NO. 12 ISSUE 818 APRIL 1975

BRITAIN'S PREMIER MAGAZINE FOR THE DO-IT-YOURSELF RADIO AND ELECTRONICS CONSTRUCTOR

EDITOR

Lionel E. Howes, G3AYA

ASSISTANT EDITOR

Eric Dowdeswell, G4AR

TECHNICAL EDITOR

Sam Lewis B.Sc. (Eng.)

PRODUCTION & NEWS EDITOR
Colin R. Riches

TECHNICAL SUB-EDITOR

Bill Tull

ART EDITOR Peter Metalli

TECHNICAL ARTIST

Alan Martin

SECRETARIAL Jenny Maunder Susan King

ADVERTS MANAGER

01-634 4293

Roy Smith

CLASSIFIED ADVERTS

01-634 4301 Colin R. Brown

Published by IPC Magazines Ltd., Fleetway House, Farringdon Street, London EC4A 4AD. Tel. 01-634 4444

SUBSCRIPTIONS

Publisher's Subscription Rate for one year to the UK is £3·85 and to the rest of the world £4·95 (\$13·50 USA/CAN) including postage. Enquiries to Subscription Department, IPC Magazines Ltd., Carlton House, 68 Gt. Queen Street, London, WC2 5DD. Phone 01-242 4477. International Giro facilities Account No. 5122007. Please state reason for payment "message to payee".

Binders (£1·34) and indexes 30p (inc. VAT) can be supplied by the Binders Dept at the same address.

BACK NUMBERS

We regret that we are unable to supply back numbers of Practical Wireless. Readers are recommended to enquire at a public library to see copies. Requests for specific back numbers of Practical Wireless and Television only can be published in our CQ Column.

NEWS & COMMENT

1084 AIDING AND ABETTING-Leader article

1085 NEWS . . . NEWS . . . NEWS . . .

1094 HOTLINES on recent developments by Ginsberg

1101 ON THE AIR

1101 Amateur Bands-Eric Dowdeswell, G4AR

1102 Broadcast Bands-Short Wave-Derek Bell

1103 NEXT MONTH IN PRACTICAL WIRELESS

1116 PRODUCTION LINES by Colin Riches

© CONSTRUCTIONAL

1086 P.W. 'ASCOT' STEREO CASSETTE DECK—Part 3— Keith Cummins & Tony Francis

1097 REACTION TIMER—A. Willcox

1104 P.W. 'EASYBUILD' ELECTRONIC ORGAN—Part 2— M. J. Hughes, M.A., C.Eng., MIERE

1111 IC +2 RECEIVER—R. H. Longden

1120 QUIZ MONITOR—A. Fowell

OTHER FEATURES

1125 THE UNITRON—Magnetic Field-Effect Technology— Don Reschevsky

1129 GOING BACK—Earlier days of Wireless—Colin Riches

COPYRIGHT AND QUERIES

© IPC Magazines Limited 1975. Copyright in all drawings, photographs and articles published in "Practical Wireless" Is fully protected and reproduction or imitation in whole or in part is expressly forbidden. All reasonable precautions are taken by "Practical Wireless" to ensure that the advice and data given to readers are reliable. We cannot, however, guarantee it and we cannot accept legal responsibility for it. Prices are those current as we go to press.

We regret that we cannot answer technical queries by telephone nor can we provide information or advice on manufacturers' products other than that given in the magazine. We will endeavour to assist readers who have queries relating to articles published but we cannot offer advice on modifications to our published designs. All correspondents expecting a reply should enclose a stamped addressed envelope.

CODAR

THE WORLD!





COMMUNICATION RECEIVER

*MADE ORDER !

£37·15!

VAT PAID CARR. 85p

The CODAR CR70A is an outstanding general coverage communication

The CODAR CR70A is an outstanding general coverage communication receiver, ideal for the keen S.W.L. It tunes from 540 metres medium through to 10 metres with no gaps. Covers shipping, coastguard and distress frequencies, all six amateur bands 160-10 metres, International broadcast, Met. stations etc. etc. giving world-wide reception. Exclusive features include Air-spaced CODAR-COIL Hi-"Q" Aerial input, illuminated Meter and Slide Rule Scale, Two Speed vernier tuning. Switched B.F.O. for CW/SSB signals. Separate output for Tape recorder. Ready to plug in to 200/240 volts A.C. it only needs your aerial and a 2/3 ohm loudspeaker to bring the world to your finger tips. 12 months full guarantee.

full guarantee.

★ IMPORTANT NOTE

This fine receiver is not a mass produced item, but each set is hand built to your order, individually checked and air tested. Please allow for this when ordering—your delivery date will be shown on your receipt, sent by return.



P.R.40★

CARR. 32p

R.F. PRESELECTOR

The PR40 R.F. Preselector is the solid state version of the world famous PR30 which it now supersedes. It employs Silicon "N" Channel FET (Field Effect Transistor) front end followed by silicon NPN Broad Band R.F. Amp., and will substantially improve receiver performance over the range 1-5 to 35 MHz, providing a considerable increase in gain up to an overall average of 30dB, with improved image rejection and noise ratio. Supplied complete with co-ax plug (less standard 9 volt PP6 Battery). 12 months Guarantee . . .



MULTIBAND-67

SHORT WAVE RECEIVER KIT £16.90! CARR. 43p

All transistor T.R.F. Receiver tunes 550 KHz to 30 MHz (540 to 10 metres) complete coverage—no gaps. Medium waves—Trawlers—Ship / Shore Telephone—All Six Amateur Bands 160-10 metres—International Broadcast from Australia, Far East, Russia, USA etc. using 4 miniature plug in Coils, Hi-Gain FET Regen. Det./AF/AF Module giving full loudspeaker output to any external 2/3 ohm speaker. Receives AM/CW/SSB. Separate Electrical Bandspread, Calibrated Main Tuning.

Separate Electrical Bandspread, Calibrated Main Tuning.

A Quality CODAR-KIT with 12 months Guarantee. No technical knowledge required, simple to build, printed circuit and Pictorial Instruction Manual, fully detailed step by step.

Complete Kit with 4 Coils (less standard PP6 battery).

ILLUSTRATED LEAFLETS FREE ON REQUEST



ON THE DESIGN STAFF— G3SZM G31RE G3SZM

TO COPE WITH INCREASING DEMAND - PLEASE NOTE NEW SALES OFFICE TEL No. BRIGHTON 38345 MON-THURS-9.30 a.m.-4.30 p.m.

VALCON WORKS · BURRELL BUILDINGS · CHURCHILL INDUSTRIAL ESTATE · LANCING · SUSSEX WORLD-WIDE MAIL ORDER—EXPORT QUOTES FREE. **BN15 - 8TZ**

YOUR GAREER in RADIO & **ELECTRONICS** P

Big opportunities and big money await the qualified man in every field of Electronics today—both in the U.K. and throughout the world. We offer the finest home study training for all subjects in radio, television, etc., especially for the CITY & GUILDS EXAMS (Technicians' Certificates); the Grad. Brit. I.E.R. Exam.; the RADIO AMATEUR'S LICENCE; P.M.G. Certificates; the R.T.E.B. Servicing Certificates; etc. Also courses in Television; Transistors; Radar; Computers; Servo-mechanisms: Mathematics and Practical Transistor Radio course anisms; Mathematics and Practical Transistor Radio course with equipment. We have OVER 20 YEARS' experience in teaching radio subjects and an unbroken record of exam. successes. We are the only privately run British home study College specialising in electronics subjects only. Fullest details will be gladly sent without any obligation.

To: British National Radio & Electronics School, Dept W.C.45. P.O. Box 156, Jersey, C.I. Please send FREE BROCHURE to

ADDRESS

BRITISH NATIONAL **RADIO** AND ELECTRONICS SCHOOL

12" LONG PERSISTANCE CRT. Full spec. Price £6-59 to include V.A.T. and Carriage.

MAKE YOUR SINGLE BEAM SCOPE INTO A DOUBLE WITH OUR NEW LOW PRICED SOLID STATE SWITCH. 2 Hz to 8 MHz. Hook up a 9 volt battery and connect to your scope and have two traces for ONLY 65-25, P. & P. 25p. (Not cased, not calibrated.)

WIDE RANGE WOBBULATOR.
5 MHz to 150 MHz up to 15 MHz sweep
width. Only 3 controls, preset RF
level, sweep width and frequency.
Ideal for 10-7 or TV IF alignment,
filters, receivers. Can be used with
any general purpose scope. Full
instructions supplied. Connect 6 3V
A.C. and use within minutes of
receiving. All this for ONLY && 75,
P. &P. 25p. (Not cased, not calibrated.)

20 Hz to 200 kHz WB.

20 Hz to 200 kHz WB.
SINE and SQUARE GENERATOR.
Four ranges. Independent amplitude controls, thermistor stabilised. Ready to use. 9V supply required. £8-85 each, P. & P. 25p. (Not cased, not calibrated).

GRATICULES 12cm x 14cm high quality plastic 15p each, P. & P. 5p.

Large quantity of good quality components — NO PASSING TRADE — so we offer 3lbs of ELECTRONIC GOODIES for £1-50. Post paid.

ROTARY SWITCH PACK-brand new switches (1 ceramic; 1 c 4pole 2 way etc.). 50p, P. & P. 20p.

P.C.B. PACKS S. & D. Quantity 2 sq ft—no tlny pieces. 50p plus 2 sq ft-no P. & P. 20p.

CAPACITOR PACK-50 Brand new components, only 56p, P. & P. 20p. TRIMMER PACK. 2 Twin 50/200pf ceramic 2 Twin 10/80pf ceramic; 2 min strip with 4 preset 5/20p ceramic; 2 min. strip with 4 preset 5/20p on each; 3 air spaced preset 30/100pf on ceramic base. ALL BRAND NEW. 25p the lot. P. & P. 10p.

PHOTOCELL equ. OCP71, 13p each. MULLARD OCP70—18p each.

DELIVERED TO YOUR DOOR 1 cwt of Electronic Scrap chassis, boards, etc. No rubblsh. FOR ONLY £4.00.

MODERN TELEPHONES type 706. Two-tone grey, £3 75 each. Two-tone green £3 75 each. Black £3 75 each. P. & P. 35p.

ideal EXTENSION TELEPHONES with standard GPO type dial, bell and lead coding. £1.75 each, P. & P.

HANDSETS — complete with 2 inserts and lead 75p each, P. & P. 37p. DIALS ONLY 75p each, P. & P. 25p-HIGH VALUE—PRINTED BOARD PACK. Hundreds of components, transistors, etc.—no 2 boards the same—no short leaded transistor computer boards £1-75 post paid.

Beehive Trimmer 3/30 pf Brand new. Qty. 1-913p ea. P. & P. 15p 10-99 10p ea. P. & P. 25p; 100-999 7p ea. P. & P. free.

HF Crystal Drive Unit, 19in, rack mount, Standard 240V input with superb crystal oven by Labgear (no crystals) £5 ea. Carr. £2:60

only sold in packs of 10, 30p, P. & P. 10p.

ALWAYS some CHEAP SCOPES
AVAILABLE—or build your own—
send for our tube list with a S.A.E.



PLEASE ADD V.A.T. AT 8% OPEN 9 a.m. to 6.30 p.m. ANY DAY CHILTMEAD LTD



7/9 ARTHUR ROAD, READING, BERKS. (near Tech. College) Tel.: Reading 582605/65916

1062



Units listed below (a) DISCOMASTER TWIN TURNTABLE CONSOLE with integral 100W amplifier (b) PAIR OF HI-FI HEAD (b) PAIR OF HI-FI HEAD-PHONES (c) MATCHING DYNAMIC

MIKE (attached to h'phone)
(d) PAIR 50 WATT SPEAKERS
Black Rexine covered
Cabinets Size approx.
18" × 18" × 8"
(a) (b) (c) & 1159.95
(d) Carr. 23.00

DEP. £19.95 & 18 fortnightly. payments of £9-11 (Total £183-93).

STEREO VERSION OF ABOVE SYSTEM Or DEP \$29.95 and £199.95 18 fortnightly pymts. £11-11 (Total £229-98)

1

Carr. £3.50

'POP' 100

18" 100 Watt

Dep: £3-80 and 8 nithly payments £3.80 (Total £34.20)

'POP' 25/T 12" 25W.

14,000 gauss 8/15Ω

£29.95

40 WATT SPEAKER KIT

NOW AVAILABLE I.S.E. CA 127

FOR BASS GUITAR, ELECT. ORGAN, ETC.

FANE ULTRA HIGH POWER SPEAKERS & KITS

All power ratings are R.M.S. continuous. 2 YEARS' GUARANTEE High flux ceramic magnets. ALL CARRIAGE FREE.

£16.95

Dual cone. 15 ohm Imp. (Not for Bass Guitar use)

48-95 | IWELIER | Imp 8 \Omega E5-95 | E5-95

MODEL D40 FULL RANGE £19.99

Consisting of 12" 40 watt Bass Unit HPX1 200w Cross-over and PH50 Tweeter Rating 40w R.M.S. Imp. 8 ohms. Terms: Deposit £3:99 and 8 mthly payments £2:50. (Total £23:99).

HIGH QUALITY LOUDSPEAKER UNITS

ALL TWO TONE VYNIDE AND VYNAIR FINISH L12/2 50 WATT Fitted pair of 12" 30 watt high flux speakers for conservative rating. Impedance 8-15 ohms. Carr. £1-50 Or deposit £5-11 and 8 monthly payts, of £5-11. Total £46-99

JINGLE MACHINES 1/1

'POP' 60

15" 60 Watt,

Dep. £2-17 and 8 monthly payments. £2-17 (Total £19-53)

TWEETER

14,000 gauss 8/15Ω

CES TOI DISCO CONSOLE

Incorporating twin Garrard SP25 or BSR MP60 type turntables and Sonotone or Acos Cartridges with diamond stylii. Separate Vol. condiamond stylii. Separate Vol. controls for each turntable. Also MONITORING FACILITIES, plus Treble and Bass Controls. Separate input for 'mike' with vol. control switch. Black Vynide covered Cabinet with lid, see Illustration on left. Or Dep. \$29.00 and 18 fortnightly pymts. \$4.481 (Total 291.98) Carr. £1.50

TD2S STEREO VERSION OF ABOVE SYSTEM

'POP' 50

12" 50 Watt

13,000 gauss 150 £12.95

Terms for pairs Dep £3:90 & 8 mthly pymts £3:16 Total £29:18

PAIR SUITABLE

Rating 50 Watt Imp 8 Ω

£7.95

Terms. Dep. £15.00 and 18 fortnightly payments £6.51 (Total £132.18) £115.00 Carr. £1.60

PH50 HIGH POWER

DISCOMASTER TWIN TURNTABLE POWER CONSOLE £109.95

Garrard SP25 or McDonald MP60 turntables. Sonotone or Acos cartridges with diamond styll. Facilities at TDI Console but with built-in 100 wath Power Amplifer, complete with Bid. Or Deposit \$12:95 and 16 fortnightly parments \$6:31 (Total \$128.53) Carr. £2.50

STEREO DISCOMASTER £145 or DEP. \$20 and 18 fortnightly pymts \$8:15 (Total \$186:70). Carr. £3

R.S.C. COLUMN SPEAKERS

IDEAL FOR VOCALISTS AND PUBLIC ADDRESS

TYPE C38 40-50 WATTS Incorporating three exceptionally efficient 8" speaker units. Terms: Dep. 22-95 and 8 monthly payments 42-87 (Total 225-91) (22 1-95) (8 mithly pymes 25-11 £20 OF Carr. 65p. 8 mthly pymts. 2 (Total £45-99) Carr. 85p

FANE CRESCENDU

FULL RANGE AVAILABLE AT ALL BRANCHES



INTEREST on Credit Purchases **REFUNDED** settled in 3 months

SUPER MINSTREL GUITAR AMP.

Incorporating Tremolo and 13" × 8" or 10" Speaker. Output 10 waits R.M.S. Continuous. 3 Jack Inputs for Microphone and Instrument. Mains Neon Controls: Volume, Tene, Tremolo Speed Tremolo Intensity.
Terms: Deposit £6:73 and 8 monthly payments £3:00 (Total £30:73) Carr. free

FAL MAESTRO COMBINED 30W AMP. £47.88 Carr

ALL RSC PRICES INCLUDE VAT

For Lead Guitar, Mic, Gram, Radio, Tape (Not for use with Bass instruments) Inc. 3 inputs and 2 vol controls plus Treble & Bass, TREMOLO with associated controls. Attractively finished in black with silver-finished fascia. Compact size Fitted carrying handle. Deposit \$7.88 and 8 mthly payments \$5.75 (Total \$53.88)

RSC 'PHANTOM 50' Rating 50 watts. 3 inputs, 2 vol. controls. Bass, Treble, Presence

Terms: Deposit £8:00 & 8 mthly. pynits. £8:78 (Total £62:08).



FAL PHASE 50 Mk. III AMPLIFIER 50 WATT

Solid state. 4 Separately controlled Inputs Plus master vol. control. Ind. Base and Treble Controls. Protective Circultry against serious output overloading. Output for Speaker/s 8 to 15 ohms. Size 17" × 7" × 74". 200-250v. A.C. mains. Output 80 watts music rating. Or deposit £7.88 & 8 monthly payments £5.75. Total £58.88. Carr. Free £47·88

GP30 AMPLIFIER

For Guitar, Vocal or Instr. Group, Gram, Radio or Tape. 4 inputs. 2 Vol. Controls. Current Valves. Peak o/p rating. Strong Vynide covered cabinet with carrying handles. Black/ Silver Facia. Neon Indicator. For 200-250v A.C. For 3 cr 18 Ω £29.95

eakers. Send SAE for leaflet. 25-58 & 8 mthly pymts £3-58 (Total £34-22)



REGENT '50' AMPLIFIER As supplied with Regent 50x or 50B. Terms: Dep. 25-11 & 8 mthly pymts 25-11 (Total £45.99) £39.95

Barclaycard

Carr. 75p

LIQUID WHEEL PROJECTORS £24-75

COMPLETE 199.95 PULSAR 199.95 **'SOUND TO LITE' SYSTEM**

AT A WORTHWHILE SAVING ON INDI-VIDUAL UNITS purchased separately. Terms: Deposit £11-48 and 18 fortnightly payments £5-74.

payments £5.74. (Total Credit Price £114-80). Super SL Unit. 1000 watt per channel. Manual override buttons, 2 spotbanks with 6 bulbs (3 sep. colours) 5 yd and 10 yd leads, fitted plugs. Units sold sep.

MAIL ORDERS & EXPORT ENQUIRIES TO:—
AUDIO HOUSE, HENCONNER LANE, LEEDS, 18.
Tel: Pudey (199785) 77631.
MAIL ORDERS MUST NOT BE SENT TO SHOPS
TERMS G WO. or 0,0,0, No. 0,0,0, under \$1.
POSTAGE 40P PER ORDER OR AS QUOTED,
TRADE SUPPLIED.

S.A.E. PLEASE WITH ENQUIRIES.

MANCHESTER 60A Oldham Street (Closed Wed.).
MIODLESBROUGH
106 Newport Road (Closed Wed.). Tel. 236 2778
106 Newport Road (Closed Wed.). Tel. 4796
NEWCASTLE UPON TYME 24 Newgate Shopping
Centre (Closed Wed.). Tel. 21469

Tel. 248 4158
HULL 7 Whitefriargate (Closed Thurs.). Tel. 20505
LEICESTER 32 High Street (Closed Thurs.). Tel. 26420
LEEDS 5-7 County (Mecca) Arcade, Briggate
(Closed Wed.). Tel. 2352
LIVERPOOL 73 Date St. (Closed Wed.). Tel. 235373
LONDON 238 Edgware Road, W.2. (Closed Thurs.).

Tel. 723 1629
Tel. 723 1629
Tel. 723 1629
Tel. 723 1629
Tel. 725 757

MOTTINGHAM 19/19A Market Street
RESTON (Closed Thurs.). Tel. 48068
41 Friargate Walk, St. Georges Shoppg Prec. Tel. 51979
SHEFFIELD 13 Exchange Street (Castle Mkt. Bids.)
SHOCKPORT (Closed Thurs.). Tel. 20716
SHITTEL Underbank (Closed Thurs.). Tel. 480-0775
SUNDERLAND 5 Market Sq. (Closed Wed.). Tel. 70573

REGENT 50X 50 WATT AMP.

A powerful high quality unit for lead, rhythm guitar, vocalists, gram, radio, tape. Sow Peak Off rating, Not for Bass Guitar. *Two Fane heavy duty high flux 12in. apkra. *Four Jack inputs and two Volume Controls for instant use of up to four pick-ups or "mikes". Bass and Treble controls. Send 8.A.E. for leaflet. Credit Terms: Depost £99.6. & 18 fortightly £74.95 payments of £4.16 (Total £84.65) £77.25.50

REGENT 50B for Bass Guitar and general purposes. Or Det. 210-95 & (Total 296-09). Carr. 22-50

FAL DISCO PRE-AMPLIFIER T/Table mixing in-Monitoring. Mic. Jack & Tape Inputs. Independent #18-50





and Access accepted

All items subject to availability. Prices correct at 14.2.75 E. & O.E.

BOLTON, COVENTRY

DONCASTER, PRESTON and STOCKPORT

NEW BRANCHES AT

OPEN ALL OAY SATURDAYS (5 Day Week)

BRAOFORO 10 North Parade (Closed Wed.). Tel. 25349
BOLTON 23 Deansgate. (Closed Wed.). Tel. 33512
BIRMINGHAM 30/31 Great Western Arcade.
Tel. 201-236 1279 (Closed Wed.).
COVENTRY 17 Shelton Square, The Precinct.
Tel. 25983
OERBY 97 St. Peter's Street. (Closed Wed.).
Tel. 41361
DARLINGTON 19 Northgate (Closed Wed.).
Tel. 68043

HI-FI CENTRES LTD.

DONCASTER 3 Queensgate, Waterdale Centre.
EDINBURGH
101 Lothlan Rd. (Closed Twes). Tel. 63069
101 Lothlan Rd. (Closed Wed.). Tel. 229 9501
GLASGOW 328 Argyle St. (Closed Tues.).
Tel. 248 4158
HULL 7 Whitefriargate (Closed Thurs.). Tel. 20505

NEW MULLARD & MAZDA VALVES

All individually boxed and guaranteed. Full trade discounts to bona fide companies. Price and availability lists on

EXPRESS POSTAGE

10p for 1 Valve. Each additional Valve add 2p.

6J5M 6J5G 6J6 6J7G: 6J7M 6K6GT 6K7G

6K7M 6K8G 6K8M 6K25 6L6G

0-75 6Q7G 0-80 6Q7M

U26 U191 UABC80

0.80 0.85

appli	icat	ion.		GY501	1 18	PL82	0.48	30Cl/PCF	
				GZ34	0.80	PL83	1.04		0.54
DM70	0.61	ECL83	0.66	PC86	0.95	PL84	0.68	30C15/	
DY51	0.80	ECL86	0.64	PC88	0.95	PL500	0.80	PCF800	1-01
DY86/7	0.41	EF80	0.42	PC97	0.42	PL504	0.90	30C17	1.01
DY802	0.46	EF83	0.98	PC900	0.57	PL508	1.24	30C18/	
EABC80	1.03	EF85	0.42	PCC84	0.54	PL509	1.56	PCF805	1.00
EB91	0.64	EF86	1.16	PCC85	0.80	PL802	1.40	30F5/PF8	18
EBC81	0.79	EF89	1.14	PCC88	0.88	PY33	0.65	0010,170	1.03
EBF80	0.58	EF91	1.00	PCC89	0.64	PY81/800	0.49	30FL1/	2 00
EBF83	0.59	EF92	1.37	PCC189	0.80	PY82	0.57	PCE800	1.00
EBF89	0.53	EF95	1.47	PCF80	0.54	PY88	0.56		
EC86	0.73	EF183	0.63	PCF82	1.22	PY500.\	1.02	30FL2	0.80
EC88	0.78	EF184	0.63	PCF86	0.64	PY800	0.48	30FL12	1.13
		EH90	0.85	PCF200	1.00	PY801	0.49	30FL14	1.00
EC90	0.86	EL34	0.92	PCF201	1.00	U26	0.88	30L1/PCC	
EC97		EL36	1.01	PCF801	0.64	U191	0.88		0.54
ECC81	0.47	EL81	0.85	PCF802	0.70	U193	0.54	30L15/	
ECC82	0.44	EL84	0.47	PCF806	0.64	UABC80	0.90	PCC805	1.03
ECC83	0.47	EL85	0.85	PCH200	1.15	UBC81	0.71	30L17	0.89
ECC84	9.58	EL86	0.92	PCL82	0.56	UBF89	0.58	30P4MR	1.27
ECC85	0.71	EL91	0.00	PCL83	0.64	UCC85	0.59	30P12/	
ECC88	0.84	EL95	0.72	PCL84	0.61	UCII81	1.12	PC801	1.01
ECC189	0.68	ELL80	2.50	PCL85	0.64	UCL82	0.72	30P19/	
ECF80	0.60	EM81	1.10	PCL86	0.64	UCL83	0.72	PC802	0.89
ECF82	0.86	EM84	1.19	PCL805/8		UF89	0.80	30PL1/	0 00
ECF86	0.68	EM87	1.16	1 0300001	0.84	UL84	0.92	PCL801	1.00
ECH81	1.16	EY51	0.79	PD500	1.86	UY85	0.54	30PL13/	1 00
ECH83	0.94	EY86/7	0.40	PFL200	0.83	6/30L2/	- 31	PCL800	1.15
ECH84	1.00	EY88	0.72	PL36	0.90	ECC804	0.98	30PL14/	- 10
ECL80	0.67	EZ80	0.54	PL81	0.77	6F23/EF8		PCL88	1.35
ECL82	0.84	EZ81	0.38	PLSIA	0.90	01 20/221-0	1 03	30PL15	1 13
40402	0.04	104001	0.00	2 April 13	- 50		7 20	001 1/10	T 10

NEW VALVES

Individually boxed and guaranteed but of European or other origin at $\begin{bmatrix} U14\\U25 \end{bmatrix}$ greatly reduced prices. Quotations for any valve not listed. Send UAF42

			,,,,,,	. •		UBC81	0.50	68L7GT	0.55
SAE	fo	r lists				UBF80	0.50	6BN7GT	0.55
071		11000	,.			UBF89	0.50	68Q7GT	0.40
		TI TION			1.00	UCC85	0.80	6175(1	1.50
AZ1	0.75	EF39	1.25	MU14		UCH42	0.80	6V6G	0.80
AZ31	0.60	EF80	0.35	N78	3.50	UCH81	0.50	6V6GT	0.60
CBL31	1.40	EF85	0.45	OA2	0.45	UCL82	0.40	6X4	0.45
CL33	1.50	EF86	0.50	OB2	0.45	UCL83	0.70	6X5G	0.45
CY31	0.60	EF89	0.35	PC86	0.65	UF41	0.75	6X5GT	0.55
DAF91	0.40	EF91	0.40	PC88	0-65	UF89	0.60	7B6	0.80
DAP96	0.80	EF92	0.50	PC97	0.55	UL41	0.85	7B7	0.80
DCC90	1.35	EF95	0.45	PC900	0.55	UL84	0.60		
DF91	0.40	EF98	0.80	PCC84	0.45	UY41	0.55	7C5	1.80
DF96	0.60	EF183	0.40	PCC88	0.62	UY85	0.45	7C6	1.00
DK91	0.50	EF184	0.40	PCC89	0.55		0.40	7H7	0.80
DK92	1.00	EL32	0.60	PCC189	0.65	VR150/30		7R7	0.80
DK96	0.75	EL33	2 50	PCF80	0.40	1R5	0.50	787	2.25
DL92	0.50	EL34	0.70	PCF82	0.42			7Y4	0.80
DL94	0.48	EL36	0.80	PCF86	0.85	185	0.40	12AT6	0.45
DL96	0.55	EL37	2.50	PCF801	0.60	1T4	0.40	12AT7	0.45
DY86	0.45	EL41	0.90	PCF802	0.55	384	0.80	12AU6	0.50
DY87	0.45	EL42	1.65	PCF805	0.80	3V4	0.88	12AU7	0.88
DY802	0.47	EL84	0.85	PCF806	0.80	5R4GY	1.00	12AX7	0.88
EABC80	0.88	EL95	0.60	PCF808	1.00	5U4G	0.55	12BA6	0.50
EAF42	0.70	ELL80	2.00	PCL82	0-45	5Y3GT	0.65	12BE6	0.60
E B 91	0.25	EM80	0.55	PCL83	0.70	5Z4G	0.85	30C1	0.40
EBC33	1.00	EM81	0.60	PCL84	0.50	6/3 OL 2	0.90	30C15	1.00
EBC41	0.75	EM84	0.40	PCL85	0.60	6AK5	0.45	30C17	1.00
EBC81	0.40	EM85	1.00			6AM5	1.00	30C18	0.90
EBF80	0.40	EY51	0.45	PCL86	0.50	6AQ5	0.50	30F5	1.00
EBF83	0.40	EY86	0.45	PCL805/8		6A870	1.00	30FL1	1.00
EBF89	0.32	EZ40	0.60	PD500	0.60 1.50	6AT6	0.60	30FL2	0.75
EBL31	2.00		0.75		0.85	6AU6	0.40	30FL14	1.00
ECC81	0.45	EZ41		PEN45		6BA6	0.88	30L15	0.95
ECC82	0.38	EZ80	0.80	PL36	0.68	6BE6	0.45	30L17	0.95
ECC83	0.38	EZ81	0.31	PL81	0.55	6BH6	0.75	30P4MR	1.30
ECC84	0.35	GY501	0.90	PL82	0.50	6BJ6	0.75	30P12	1.00
ECC85	0.45	GZ30	0-65	PL83	0.50	6BQ7A	0.55	30P19	0.95
ECC88	0.50	GZ32	0.65	PL84	0.50	6BR7	1.20	30PL1	0.95
ECH35	1.50	GZ34	0.75	PL500	0.85	6BS7	1.40	30PL13	1.10
ECH42	0-85	GZ37	1.25	PL504	0.85	6BW6	1.00	30PL14	1.10
ECH81	0.35	HN309	1.50	PL508	0.90	6BW7	1.00	35 W 4	0.60
ECH83	0.50	KT61	2.50	PL509	1.55	6C4	0.40	35Z4GT	0.70
ECL80	0.60	KT66	2.95	PL802	1.00	6CD6G	1.60	50CD6G	1.20
ECL82	0.42	KT81 (7C	5)	PX 25	3.50	6CH6	1.50	807	1.00
ECL83	0.75	- ,	1.30	PY33	0.68	6CW4	1.00		14.00
ECL86	0.55	KT81	1.75	PY81	0.50	6F23	0.90	813USSR	
ECLL800	3.50	KT88	3.25	PY82	0.45	6F25	1.00	866.4	1.20
EF37A	1 20	KTW61	1.50	P V 83	0.50	6F28	0.75		

TRANSISTORS-INTEGRATED CIRCUITS

EXPRESS POSTAGE

0.07 0.10 0.10 0.35 0.25 BD124 BD131 BD132 BF115

0.25

BF167 BF173

0.28

10n per order.

AA119 AAZ13 AAZ15 AC107

AC126 AC127

All transistors, I.C's offered are new and branded. Manufactured by Mullard, Texas, RCA, Fer-ITT, ranti, Motorola, Fairchild, Lucas, etc. Quantity discounts on application. Send SAE for full lists.

AC127	0.25	BF173 0-28	101 10		1363.			
AC128	0.20	BF179 0.38						
AC176	0.25	BF180 0.35	OA200	0.08	ZTX500	0.15	2N2904	0.20
AC187	0.20	BF181 0-35	OA202	9.10	ZT X 501	0.15	2N2904A	0.25
AC188	0.20	BF194 0·18	OC16	1.00	ZTX 503	0.16	2N2905	0.82
ACY21	0.22	BF195 0-18	OC20	2.00	ZTX531	0.25	2N2905A	0.25
ACY39	0.65	BF197 0-15	OC23	1.25	ZTX550	0.18	2N2906	0.20
AD140	0.50	BF200 0.82	OC25	0.40	1N914	0.06	2N2926	0.10
AD149	0.60	BFS61 0-25	OC28	0.70	IN4001	0.08	2N3053	0.20
AD161	0.39	BF698 0-25	OC35	0.55	IN4002	0.07	2N 3055	0.60
	0.39	BFW10 0.61	OC36	0.65	IN4003	0.08	2N 3525	0.80
AD162		BFX29 0.28	OC42	0.40	IN4004	0.08	2N3614	0.59
AF115	0.25	BFX 88 0.22	OC44	0.18	IN4005	0.10	2N3615	0.65
AF116	0.25	BFY50 0.20	OC45	0.18	IN4006	0.12	2N3702	0.11
AF117	0.20	BFY51 0.20	OC71	0.15	IN4007	0.12	2N3703	0.12
AF186	0.40	BFY52 0.20	OC72	0.25	1N4009	0.08	2N3704	0.14
AF239	0.44	BY100 0-15	OC76	0.80	1N4148	0.08	2N3705	0.15
ABY27	0.80	BY126 0-14	OC77	0.55	18921	0.07	2N3706	0.11
ASY28	0.25	BY127 0-16	OC81	0.28	182033	0.20	2N3707	0.18
BA102	0.25	BZX61 series	OC81D	0.28	182051A	0.20	2N3708	0.07
BA115	0.10	0.20	OC817.	0.45	1821004	0.20	2N3709	0.10
BC107	0.12	BZY88 series	OC83	0.25	183010	0.25	2N3710	0.11
BC108	0.12	0.10	OC140	1.00	2N696	0.15	2N3711	0.11
BC109	0.12	CR81-05 0:40	OC170	0.25	2N697	0.15	2N3819	0.85
BC113	0.16	CR81-40 0-45	OC171	0.80	2N706	0.10	2N3820	0.50
BC117	0.21	CR63-05 0-40	OC200	0.55	2N706A	0.12	2N3823	0.50
BC143	0.80	CR83-40 0.75	OC201	1.00	2N1131	0.25	2N3903	0.15
BC147	0.12	MJE340 0.50	OC202	0.90	2N 1132	0.25	2N3904	0.20
BC148	0.10	MJE370 0.68	OC203	0.55	2N1302	0.18	2N3905	0.25
BC169C	0.14	MJE520 0.65	OCP71	1.00	2N1303	0.18	2N3906	0.25
BC182	0.12	MJE2955 1:10	ORP12	0.55	2N1304	0.29	2N4058	0.15
BC182L	0.12	MJE3055 0.75	ORP60	0.45	2N1305	0.22	2N4059	0.10
BC184L	0.18	MPF102 0-40	T1005	0.20	2N1306	0.28	2N4060	0.13
BC338	0.15	MPF103 0-86	TIC44	0.29	2N1307	0.28	2N4061	0.13
BCY33	1.20	MPF104 0-85	T1C226D	1.50	2N1308	0.28	2N4062	0.14
BCY33	0.88	MPF105 0-46	T1L209	0.25	2N1809	0.80	2N4289	0.30
BCY34	0.45	NET404 0:60	ZTX 107	0.12	2N1613	9.20	3N 125	1.75
BCY70	0.15	OA5 0.60	ZTX 108	0.10	2N1614	0.45	3N141	
BCY71	0.20	OA10 0-40	ZTX300	0 14	2N2147	0.75	40360	0.81
	0.15	OA79 0-10	ZTX 301	0.14	2N2160	1.00		0.40
BCY72			ZTX302	0.20	2N2160 2N2369A		40361	0.45
BCZ11	0.85		ZTX304	0.24		0.16	40362	0.40
BD121	1.00	OA91 0-07	ZIA304	0.24	2N2646	0.50	40430	0.85
BN7400	0.20	BN7425 0-87	BN7473	0.44	BN74107	0.51	BN74157	1.09
6N7401	0.80	BN7427 0-87	BN7474	0.48	6N74110	0.57	BN74170	2-88
BN7402	0.20	BN7428 0-48	8N7475	0.59	BN74111	0.86	BN74174	
BN7403	0.20	6N7430 0-80	BN7476	0.45	BN74118	1.00	BN74175	1.80 1.29
8N7404	0.80	BN7432 0-87	8N7480	0.80	BN74119	1.92		
BN7405	0.80	BN7488 0-48	8N7482	0.87	BN74121		8N74176	1.44
BN7408	0.40	BN7437 0-48	BN7488	1.20	BN74121	0 57	BN74190	2-80
						0.80	BN74191	2.80
BN7407	0.40	BN7438 0-48 BN7440 0-20	BN7484 BN7486	1.00 0.50	BN74128 BN74141	1.44	BN74192	2.80
BN7408	0.25		BN7490	0.75		1.00	BN74198	2.80
BN7409	0.88	BN7441AN 0-85	BN7491A1		BN74145	1.44	BN74194	1.78
BN7410	0.20		DIALERIA		BN74150	2.80	BN74195	1.44
6N7411	0.88	BN7442 0.85	6N7400	1.10	BN74151	1.15	BN74196	1.58
BN7412	0.28	BN7450 0:20	BN7493	0.75	BN74154	2.80	BN74197	1.58
BN7413	0.80	BN7451 0-90	BN7493	0.75	BN74155	1.15	BN74198	8.16
BN7416	0.80	BN7453 0-20	BN7494	0.85	BN74156	1.15	BN74199	2.88
BN7417	0.80	BN7454 0-20	8N7495	0.85	D.11	-	14	
BN7420	0.80	BN7460 0-20	BN7496	1.00	DIL		14 pin	i5p
8N7422	0.28	SN7470 0-83	SN7497	4-82	SOCKET	27	16 pin	
8N7423	0.40	SN7472 0.38	BN74100	2.16	JOCKE	9	ro pili	17P

8% to be added to all orders including **POSTAGE!**

THIS MONTH'S

OSCILLOSCOPE TUBES

Types CV 1526, DG 7-5, VCR 139A

All at £8:00 each, +p & p 25p.

SPECIAL OFFER

TERMS OF BUSINESS: C.W.O. A/c's available to approved companies on application. Telephone and telex orders accepted. Export and trade enquiries welcomed. Lists, etc. on application. Open daily to callers 9 a.m.-5 p.m. Mon.-Sat. Closed Sat. 1-3 p.m. Prices correct when going to press.

VALVE MAIL ORDER CO. 16a Wellfield Rd., London, SW16 2BS Tel: 01-677 2424 Telex: 946 708.



TMK 200 MULTIMETER KIT

Build yourself a quality 20000 opv multimeter and save money. Complete kit with rotary range selector ready mounted in cabinet. All parts.

cabinet. All parts, batteries, test prods and instructions. Ranges: 0/0.6/6.30, 120,000/1200V D.C.0.6/30/120.600/1200V A.C. Current: 0.0.8/6/60/600mA. Resistance: 0.10.100K/110.0 Meg ohms. Decibels: -20 to +63db. Size. 90 x 150 x

OUR PRICE £7.95 P&P 30p AUDIOTRONIC Model ATM1

AUDIUI HUNIC II Top value 1,000 opv pocket multi-meter. Ranges: — 0/10/50/250/1,000 volt AC and DC. DC current 0-1mA/ 100mA. Resistence: 0/150k ohms. 022dB. Size 90 x 50 x 28mm. Complete with test leads. **OUR PRICE £3.25**



P&P 15p

0

MODEL C1092

Jewel movement, attractively moulded case with edgwise case with edgwise ohms adjustment Ranges: 0.3/15/150/300/1200V AC (2500 opv). 0.6/30/300/600V DC (5000 opv). 0.300 uA/0.300mA DC. Resistance: x 10 & x 100. —10 to +16dB. Supplied with battery test leads and data procedure.



OUR PRICE £3.95 P & P 20p HIOKI 720X VOM

accurate measuring instrument. 20,000 opv. 0/ 5/25/100/500/ 1000V DC. 0/10, 50/250/1000V AC. 0-50uA/ 250mA. 0-20k/ OUR PRICE



MODEL C7202EN

20,000 o.p.v. DC. 10,000 o.p.v. AC Mirror Scale. 5/25/50/250/500/ 5/25/50/250/500/ 1000/2500 V. DC. 10/50/100/500/1000 V. AC. DC Resistanc × 10, × 1000 (30Ω



OUR PRICE £6.95 P&P30p

MODEL PL436 20,000 opv DC. 8000 opv AC. 6/3/12/30/120



OUR PRICE £6.97 P&P 30p

HIOKI 730X

30,000 opv. Dver-load protection. 6/30/60/300/600/ 1200V DC. 12/60 120/600/1200V AC 120/660, -60/μΑ/ 30mA/300mA. 30mA/300mA. 2K/200K/ 2 Meg Ohm. -10 to 63 dB. DUR PRICE £7.50



U4323 MULTIMETER 20,000pv. Simple unit with audio/IF oscillator. Suitable for general receiver tuning. Ranges: 0.5/2.5/10/50/250/500/1000V DC. 2.5/10/15/250/500/1000V AC. 0.05/

2.5/10/15/250/3500/1000/ AC. 0.39. 0.5/5/50/500mA DC. Resistance κ 10. κ 10.0, κ 1,000, κ 10,000 (50Ω 500Ω, 5kΩ, 50kΩ centre scale) Battery operated. Size: 160 x 97 κ 40mm, Supplied in carrying case compete with test leads.

OUR PRICE £8.00

U435 MULTIMETER 20,000opv. Ranges

Z0,000;09: Hanses:
75mV12-51:012:51
100/250/500/10000
100,250/100/250/500/10000
100,250/100/250/500/10000
100,250/10000
100,50/251000mA/
105/12-5A AC. Resistance: 0.3/3/30/3000
hms. Size: 205 x 110 x 84mm. Supplied complete with leads, crocodie
clips and steel carrying case.
41D 9010F 5R 76
P8R 300

OUR PRICE £8.75

MODEL C7208FM

30.000 opv DC 15 000 npv AC 15,000 opv AC.
6/3/15/60/300/6001200 V. DC. 6/30/
120/600/1200 V. AC.
DC Resistance x1,
x10, x100, x1000
(50\(\) centre scale\)
DC Current 30uA/
2/30/6000A 20 to 3/30/600mA



OUR PRICE £8.95 P&F30p

114324 MILL TIMETER

U43/24 MUL I IME High sensitivity, over-load protected. 20,000opv. Ranges: 0.6/1,2/3/12/30/ 60/120/600/1200V OC. 3/6/15/60/150/ 300/600/900V AC. Current: 0.06/0.6/ 6/60/600mA/3A DC. 0.3/3/30/300mA/ 3A AC. Resistence:

OUR PRICE £9.85

U91 Clamp VOLT

AMMETER ARVIVE LEM For measuring AC voltage and current without breaking circuit. Ranges: 300/600V AC, Current: 10/25/100/250/500A, Accuracy 4%, Size 283 x 94 x 35mm. Complete with carrying case, leads and fuses. **OUR PRICE £14.00**



HIOKI MODEL 700X

HIOKI MODEL 7001)
100,0000pv, Overload
protection, Mirror vale.
0,3/0,6/1,2/1,5/3/6/
12/30/60/120/300/
600/1200V DC.
1,5/3/6/12/30/60/150/
300/600/1200V AC.
15/30u A/3/6/30/60/
150/500m A/6/12A DC.
2k/200k/2M/20MOhms.
—20 to 683dB.

U4312 MULTIMETER

04312 MIQL TIME extremely sturdy instrument for general electrical use. 667opv. 0/0.3/1.5/7.5/30/60/150/300/600/900V DC & 75mV. 0/0.3/1.5/7.5/30/60/150/300/600/900V AC. 0/300u A/1.5/6/15/150/60/60/800m A/1/1.5/60

1.5/6/15/150/60/ 600mA/1/1.5/6A DC. 0/1.5/6/15/ 60/150/600mA/ 1.5/6A AC. 0/200/3k/30k accuracy 1%. AC 1.5%. It pointer, mirror scale. Com sturdy metal carrying case, instructions

OUR PRICE \$10.75 PRESON

HIOKI 750X VOLT-OHM-MILLIAMETER



DUR PRICE 611.95

TMK MODEL TW50K

TMK MODEL TW50K
d6 ranges, mirror
scale, 50k/V DC
50k/V AC.
DC Volts: 0.125
0.251,252,255/510/
25/50/1725/250/
500/1000. AC Volts:
1.5/3/5/10/25/50/
152/50/50w/ AC 5-15/3/25/
10A. Resistence
10k/100k/1 Meg/
10 Meg ohms. -20 to +81.5d8.

OUR PRICE £12.50 P&P 20p

MODEL C7080EN

MUDEL L/1000 Giant 6" mirror scale. 20,000 opp. 0/0.25/1/2.5/10/ 50/250/1000/ 5000V DC. 0/2.5/10/50/250/ 1000/5000V AC. 0/50µ.4/1/10 1000/5000V AC. 0/50uA/1/10/ 100/500mA/10A DC. 0/2k/200k/ 20 Meg. -20 to +5

OUR PRICE £19.95

MODEL 500 MODEL 500 30,000 opv with overload protect-tion. Mirror scale. 0/0.5/2.5/10/25/ 100/250/500/ 1000V DC. 0/2.5/10/25/100/ 250/500/1000V AC. 0/50uA/5/50/ 500mA. 12A DC. 0/60k/6 meg/60

DUR PRICE £13.95

OUR PRICE £14.95

MODEL AS. 100D VOM

100,000 opv. Mirror scale. Built-in meter protection. 0/3 12/60/120/300/ 600/1200V DC. 0/6/30/120/300 600V AC. 0/10µA 6/60/300mA 12 Amp. 0/2K/ 200K/2 M/200 Meg Ohm = 20 to 17 de

OUR PRICE £17.50 PEP 30p.

KAMOOEN HM720B FET VOM

Input impedence 10 Megohms. Ranges: — 0/.25/1/2.5/10/50/ 1000V DC. 0/2.5/10 50/250/1000V AC. 0/25uA/2.5/25/250 mA DC. 0/5k/50k/500k/5 M 500 Megohms OUR PRICE

A F21.00 P& P40p KAMODEN 360 MULTIMETER

High sensitivity. DC 100kohm/V AC 10kohm/V 5" mirror scale 5" mirror scale, overload protect-ed. Ranges: 0.5/ 25/10/50/250/ 1000V DC. 5/10/ 50/250/1000V AC. Current: 0.01m A/0.5/5/50/ 500m A/10A. Resistance: 0.1/ 1/10/100 ohms/ 1/0/100M ohms. Deribelis —20 10 20 0.00

10/100M ohms.
Decibels – 20 to
+62dB. Battery operated. Size: 180 x
140 x 80mm. Supplied complete with,
test leads etc.

1.5

OUR PRICE £17.50 P& P40p

Model HT100B4 MULTIMETER

Model HT10084 MULTIMETER
Overload protected, shock proof circuits
9.5uA Meter with
mirror scale. Sensitivity
100k. V. Polarity change
switch. Ranges: 0.5/2.5/
1.50/250/500/1.000
Volts DC. 2.5/10/50/
250/1.000 Volts AC.
DC resistence 0.–200.
AC. Current: —0.10A.—20
to +65280 Operates from 2 x 1.5V
batteries. Size: 180 x 134 x 79mm.

OUR PRICE £17.50 P&P 40p

370WTR MULTIMETER

37JW1 H MU L I IME I Features AC current ranges 20,000epv 0/0.5/2.5/10/50/ 250/500/1000V DC 0/2.5/10/50/250/ 500/1000V AC 0/50u.A/1/10/100 mA/1/10A DC 0/100mA/1/10A AC 0/5k/50k/500k/ 5 Mag/50 Meg. Decibels: -20 to +62dB.

DUR PRICE £19 95 P&P 30p

U4317 MULTIMETER

High sensitivity

High sensitivity instrument for fiseld instrument fiseld ins

OUR PRICE £17.00 P&P 40p KAMODEN 72.200 Multitester

High sensitivity tester. 200,000 opy Overload protected Overload protected. Mirror scale. Ranges: -07.06/.3 3/30/120/600/ 1200V DC. 0/3 12/60/300/11220 V AC. 0/6uA/ 1.2mA/120mA/ 600mA/12A DC 0/12A AC. -20 to +63dB. 0/2k/200k/ 2 Meg/200 Megohm

OUR PRICE £22.50 P&P 30p

MODEL AF. 105 VOM 50,000 opv. Mirror scale. Meter protection. 0/ 3 3/12/60/120/ 300/600/1200V DC. T 0/6/30/120/ 300/600/1200V DC 300/600/1200 V DC. 0/30μA/6/ 60/300 mA/ 12 Amp. 0/10 K/ 1m/10m/100 Meg Dhms. – 20 to 17 dB

OUR PRICE £12.50 PEP 30p

TMK MODEL 117 FET **ELECTRONIC VOLTMETER**

Battery operated.
11 Meg input, 26: ranges, Large 46: 149 x 117 x 60 mm.
0.3 - 12000 V CC.
3-300V RMS AC.
8-800V P. D. Courrent 0.12DC current 0.12DC to the course of the course of

OUR PRICE £18.50 TMK 100K LAB TESTER

100,000opv. 6½" scale. Buzzer short circuit check. Sensitivity 100,000 opv DC. 5k/V AC DC Volts: 0.5/2.5/ 10/50/250/1000V DC. 3/10/50/250/ 500/1000V DC.



P&P 20p

500/1000V DC. current 10/100uA/ 10/100/2.5/10A, Resistence: 1k/10k/10k/10 Meg/100 Meg ohms. Decibels: -10 to 449dB. Plastic case with carrying handle. Size: 190 x 172 x 99mm

OUR PRICE £19.95

LB4 TRANSISTOR TESTER

Tests PNP or NPN transistors. Audio transistors. Audio indication. Dperates on two 1.5V batteries. Complete with instructions etc. OUR PRICE P&P 20p



KAMOOEN TT35 TRANSISTOR TESTER

HANDISTUM
High quality
instrument to
test reversa leak
current and DC
current. Amplification factor of
NPN, PNP, diodes,
transistors, SCR's
etc. 4" square
clear scale meter.
Operates from
internal batteries.
Complete with Complete with instructions, leads



OUR PRICE £17.50 . P& P 40p

U4341 Multimeter & Transistor Tester Transistor Tester
27 ranges 16,700cpv
Overload protected
Ranges 0,311,556/
30/60/150/330/900V
DC 1,5/7,5/30/150/
300/750V AC.
Current: 0,60/0.6/
6/60/600mA DC.
0,3/3/30/300mA AC.
6/2/6/2/60/200k ohms/2 Mohms.
Battley: operated. Supplied complete

Battery operated. Supplied complete with probes, leads and steel carrying case. Size: 115 x 215 x 90mm.

OUR PRICE £11.00 S100TR MULTIMETER

TRANSISTOR TESTER TRANSISTUH 11
100,0000pv. Mirror
scale. Overload
protection. 0/0.12/
0.6/3/12/30/120/
600V OC. 0/6/30/
120/600V AC.
0/12/600V AC.
0/12/600V AC.
0/10/61/12/
000 Meg.
—20 to +50dB.
0.01—0.2 MFD
Transistor tester meg
and ICO. Complete

ransistor tester measures Alpha, Beta nd ICO. Complete with instructions, atteries and leads.

OUR PRICE £19.95 SWR METER Model SWR3

Handy SWR meter for transmitter antenna align ment, with built-in field strength meter. Accuracy 5%, Impedence 52' Indic ator 100uA DC. Full scale 5 section collapsible antenna, Size 145 x 50 x 60mm.



OUR PRICE £4.25 P&P 30p

CI5 PULSE OSCILLOSCOPE

CIS PULSE OSCILLOSCOPE
For display of pulsed
and periodic wave
forms in electronic
circuits. VERT. AMP.
Bandwidth. 10MHz.
Sensitivity at 100kHz
VRMS/mm: 0.1–25;
HOR. AMP. Bandwidth. 500kHz
VRMS/mm: 2–25
Preset triggered tweep
1–3000usec. Free running 20–206
kHz in nine ranges. Calibrator pips.
220 x 360 x 430mm. 115–230V AC.
HIR PRICE F 444 NO.

OUR PRICE £44.00 Carr. paid **ALL PRICES**



SINCLAIR DM2 OIGITAL MULTIMETER



measure AC and DC volts, AC and DC current, and resistance in a and DU. Cliffent, and resistance in a total of 20 ranges. The large light emitting diode display will read up to 1999 and automatically indicate polarity. Indication of positive and negative overload is also provided. The instrument is fitted with a combiner for exercise handle and combined carrying handle and bench stand and sockets are provided for the connection of an external power supply RANGES

RANGES
DC VOLTS. 1v.10,100v.1000v
AC VOLTS 1v.10v 100v.1000v.
DC CURRENT 1mA,10mA,
100mA,1000mA
AC CURRENT 1mA,10mA,

100mA, 1000mA

RESISTANCE 1k, 10k, 100k, 1000k OUR PRICE £59.95 P&P 50p

RUSSIAN CI16 Oouble Beam

OSCILLOSCOPE
5 MHz pass band.
Separate Y1 and Y2
amplifiers. Rectangular 5" x 4" CRT.
Calibrated triggered
sweep from 0.2 usec.
to 100 milli-sec/cm.
Free runing time. Free running time base, 50Hz – 1MHz. Built-in time base



Calibrator and amplitude Calibrator

OUR PRICE £87.00

GRID DIP METER

Transistorised, Operates as Grid Opp. Oscillator, Absorbtion Wave Meter and Oscillating Detector. Frequency range 440kHz—280MHz is ix coils. 500-2 in six coils, 500u/ meter, 9V battery operation, Size 180 x 80 x 40mm



OUR PRICE £17.50

TRANSISTORISED L.C.R A C **BR/8 MEASURING BRIDGE**



excellent range and accuracy at low cost Resistance

6 ranges 01
megohm ± 1% Inductanges. 1 microhenry-111 ohm:11 I megohm : 1% Induct-ance: 6 ranges. 1 murcohenry:111 henries : 2% Capacity: 6 ranges. 10pt-1110 mfd : 2% Turns Ratio: 6 ranges: 11/1000-1.11100 : 11% Bridge Voltage at1.000cps: Opera-ted from 9-volt battery:100 micro-amp meter indication. Size 7½" x 5" x 2" OUR PRICE £27.50 P&P 30p

TE16A TRANSISTORISEO SIGNAL GENERATOR

5 ranges, 400kHz to 30 MHz. An inexpensive instrument for the handy-man, Operates on 9V battery. Wide



lation. 149 x 149 x 92mi 32mm. 1 leads **OUR PRICE £8.97**

TE-20D RF SIGNAL GENERATOR Accurate wide range

covering 120 kHz-500 MHz on 6 bands Directly calibrated

3 - 35 Variable R F attenuator audio output. Xtal socket for calibration 220 240V Brand new with instruction Size 140mm x 215mm x OUR PRICE £19.95 P&P 50p

ARF 300 AF/RF SIGNAL GENERATOR

All transistorised compact fully portable. AF sine-wave 18Hz to 220 kHz. AF square wave 18Hz to 100k Hz. Output Square/Sine wave 10V. P-P RF 100kHz to 200MHz. Dutput 1V maximum.



1V maximum, 220/240V AC operation, Complete with instructions and leads. OUR PRICE £37.50 P&P 50n

MODEL TE20 RF SIGNAL

GENERATOR SENERATOR
Six bands, 120kHz –
260MHz, Dual output
RF terminals, Separate
variable audio output.
Accuracy ± 2%. Audio
output to 8V. Power requiremen
105—125V, 220—240V AC. Size. 1
x 265 x 150mm, Complete with ti

OUR PRICE £18.95

TE22 SINE SQUARE WAVE **AUDIO GENERATOR**

Sine 20cps to 200kHz on 4 bands. Square 20 cps to 30 kHz. Output impedence 5000 Ohms 200/250V

AC operation. Supplied brand new guaranteed, with instruction manual and leads

OUR PRICE £24.95 P&P 50p

MODEL U4311 Sub-standard

MODEL U4311 Sub-standard Multi-range Volt-Ammeter Sensitivity 330 Ohms/Volt AC and DC. Accuracy 0.5% Cale length: 165mm. 0/300/750uA/1.5/37.5/15/300/750uA/1.5/37.5/15/300/750mb/1.5/3/7.5/15/300/750mb/1.5/3/7.5/15/300/750mb/1.5/3/7.5/15/300/750mb/1.5/3/7.5/15/300/750mb/1.5/3/7.5/15/300/750mb/1.5/3/7.5/15/300/750mb/1.5/3/7.5/15/300/750mb/1.5/3/7.5/15/300/750mb/1.5/3/7.5/15/300/750mb/1.5/3/7.5/15/300/750mb/1.5/3/7.5/15/300/750mb/1.5/3/7.5/15/30/75/15/30/75/15/30/300/750mb/1.5/3/7.5/15/30/75/15/30

OUR PRICE £52.00 P&P 500

35 DT 124 POWER UNIT 220 240V AC Input Output 6, 7 5 or 9V DC 400 mA OUR PRICE \$2,20 P&P 50p

PS200 Regulated POWER SUPPLY UNIT

SOIR State. Variable output 5-20V DC up to 2 Amp. Independent meters to monitor voltage and current. Output 220/240V AC. Size: 190 x 136 x

OUR PRICE £19.95

BATTERY/LEVEL PANEL INDICATOR

250 uA 18mm 18mm Panel mounting OUR



Discounts for quantity

NEW GOLDRING G102 KIT

Belt-drive 2-speed turntable in kit form complete with pick up arm



VU METER TYPE 3 Size 33mm 20mm £1.25 P&P 15p

SOH8V MONO/STEREO HEADPHONES Volume control for each channel, 4/16 oh each channel. 4/10 online impedence, Frequency response 20Hz – 18kHz, Complete with 10ft, coiled lead and jack plui coiled lead and jack plug.
OUR PRICE £4,97 P&P 30p BH001 HEADSET and Boom

Microphone Moving coil. Ideal for language teaching, communi-cations etc. Headphone imped rophone impedence

edence 200 ahms OUR PRICE £5.95

P&P 30p

T.T.C. SPRITE STEREO HEAOPHONES € Feather weight

(5 oz) Dynamic stereo headphones providing high quality reproduction at a budget price Softremovable ear pads and adjustable headband Speaker size 28mm Impedance: 8 of ncvresponse 30 13000 Hz OUR PRICE £1.95 P&P 30p

NT100A 15



a compact portable transistorised PA amplifier. This versatile unit has a maximum output of 10 watts RMS and operates on any 10-16V DC source, negative or positive ground and uses only 1 5A at rated output Supplied complete with mounting brackets etc. plus full installation and operating OUR PRICE £21.75 P&P 50p

EA41 REVERBERATION AMPLIFIER

Self contained transistorised, battery operated.
Simply plug in
microphone, guitar etc. and output to
your amplifier. Volume control and your amplifier. Volume control depth of reverberation control. Beau walnut cabinet. 184 x 77 x 108mm.



RA 2107 STEREO AMPLIFIER 7) 7) watts rms. Inputs for magnetic phono, tuner, tape and Separate base, treble balance and volume co Headphone socket Teak case Unrepeatable offer OUR PRICE £17.50 P&P 50p

VHF 105 This unit will give instant recention

instant reception of the ground-toair, air-to-ground waveband Simply place beside any AM or FM Radio, covering 535 1605 kHz, 88 108 MHz, no conversion or connection required. The properties of the properties tion required. This converter self powered by one 9-valt (PP3 Type) battery and comes complete with a full set of instructions and

OUR PRICE £3.50 P&P 50p



SPECIAL OFFER! CONVERT YOUR STEREO SYSTEM TO 40 SOUND

P& P 50c

FANTASTIC VALUE!



This clever unit enables you to add This clever unit enables you to add 4D sound to your existing system Complete with simple connection details. Use this converter (together with 2 extra speakers) to achieve the faithastic 4D quadro-phonic sound 1 The effect of being pages and within the prise. immersed within the music becomes a thrilling new guarantee). OUR PRICE £3.95 P&P 50p

FM TUNER CHASSIS

FM TUNEH 6 transistor high quality tuner, Size only 153 x 101 x 63mm 3 IF stages. Double tuned discriminator. Ample output



T.

Saled State

0

discriminator.

Ample output to feed most amplif
Operates on 9V battery. Covers
108MHz. Ready built, ready for
Fantastic value for money. **OUR PRICE £8.95**

Stereo Multiplex Adeator E5 95 oxtra

WALKIE TALKIES

SKYFON NV7 Super low cost transmittei receivers 100MW with call buzzer and on off vol control 7 transistors Telescopic rod

OUR PRICE £31.50 per PAIR P & P 50g NOTLICENSABLE INTHEUK

ELECTRONIC CALCULATORS



We carry a tremendous range of we carry a tremendous range of both pocket and desk calculators from as little as £8.90. Owing to the demand it is not possible to include them in this advertisement, so send for our latest price list or call into any branch

MINIATURE ORGAN MUSIC MASTER AM100 Spanning



tones This instrument will give nours of enjoyment to all the family. Beautifully for all the family. Beautifully finished. The Keyboard range can be adjusted to be in tune with any instrument. Operates from internal 9V battery. Fitted with on off switch, vibrato switch.

OUR PRICE £7.95 P&P 50p.

earphone socket and external 9V D C socket

BINATONE DIGITAL CLOCK Attractive vory case Large clear numbers for hours, minutes and seconds A C 240V operation Size approx 61 x 3 x 31 inches 2 00

OUR PRICE £4.50 P&P 50p

SINCLAIR ICI2 INTEGRATEO CIRCILL AMPLIFIER ALVIN .

complete with

printed circuit OUR PRICE £1.50

SINCLAIR Project 80 Modules 240 Power Amp 260 Power Amp Stereo 80 Pre-Amp Active Filter Unit FM Tuner Stereo Decoder PZ5 Power Supply PZ6 Power Supply C5 95 P & P | Sp C7 95 P & P | Sp C7 95 P & P | Sp C13 95 P & P | Sp C13 95 P & P | Sp C13 95 P & P | Sp £8 95 P & P | Sp £8 95 P & P | Sp £8 95 P & P | Sp PZ6 Power Supply PZ8 Power Supply Transformer for PZ8

SINCLAIR Project 80 Packages 2xZ40 Stereo 80 PZ5 £25 44 | P & P 35p 2xZ40 Stereo 80 PZ6 £27 84 | P & P 35p 2xZ60 Stereo 80 PZ8 £29 84 | each

£8 45 £4 05

TE1021 Stereo Listening Station

For balancing and gain selection of loudspeakers with additional with additional facility for stereo headphone switching. Two gain controls, spi switch, stereo hea speakers on-off slide **OUR PRICE £2.25** P&P 15p

AUDIOTRONIC LOW NOISE CASSETTES TYPE 5 £1 57 10 £3.00 £4.25 £5.17 P&P 3p each 10 and over Post Free

MP7 MIXER-PREAMPLIFIER

MP7 MIXEN-PREARIFELITE.

5 Microphone
Inputs each with
individual gann
controls enabling
complete mixing
facilities. Battery operated. Size: 235
x127 x 76mm. Inputs: Mics. 3 x 3mV
50k; 2x 3mV 600 ohms. Phono. Mag.
4mV 50k; Phono Cerame: 100mV 1
Meg. Output 250mV 100k.

P&P 20p

AUDIOTRONIC AHA101 Stereo Headphone Amplifier

OUR PRICE £8.97

All silicon, transistor 1 C inouts with

twin stereo headphone outputs and separate volume controls for each channel. Operates from 9V battery. INPUTS: 5mV and 100mV. OUTPUT: 50mV per channel. **DUR PRICE £8.50** P&P 30p

HIGH DUALITY G-Wh CONSTRUCTION

JOSTYKIT

KITS STOCKISTS AT Oxford Street, 42 &

257 Tottenham Court Road.
34 Lisle Street. 152, Fleet Street.
311 Edgware Road. CROYDON
BIRMINGHAM KINGSTON
LEICESTER NORTHAMPTON
SOUTHEND TUNBRIDGE WELLS WOLVERHAMPTON branches, p. by Mail Order

All kits are complete with comprehensive easy to follow instructions and covered by full guarantee. Post and Packing 15p per kit.

AF 20 Mono amplifier £5 61
AF25 Mixer £3 29
AF30 Mono pre amplifier £3 20
A E 2 E Emisson amplifier
AF80 0 5W mic amplifier £4 86
AF305 Intercom 1767
AF310 2 Mono Amplifier £7.55
M160 Multi vibrator £2 18
M1302 Transistor tester £8 33
M191 VU Meter £5 37
M192 Stereo balance meter £5 93
LF380 Quadraphonic device. £ 8 42
ATS Automatic light control . £3.75
AT30 Photo cell switch unit . £ 6 68
AT50 400W triac light
dimmer/speed control . £5 18
AT56 2,200W treac light
dimmer/speed control £6.75 AT60 1 channel light control £10.82
AT65 3 channel light control £ 16 52
GU330 Tremolo unit £810
HF61 Diode detector £3 87
HF65 FM transmitter £3 21
HF75 FM receiver £3 66
HF310 FM tuner £16.32
HF325 Deluxe FM tuner £26 33
HF330 Decoder (HF310/325) €10 55
GP310 Stereo pre amplifier
for use with 2 x AF310 £22 98
GP312 Circuit board £10 02
GP304 Circuit board £5 33 HF380 (w/vhf aerial amplifier £6 02
HF395 broadband aerial amp. £210
NT10 Stabilised power supply
100mA, 9V £6 27
NT300 Stabilised p. supply . £1316
NT310 Power Supply 240 V AC
or 2 × 18 V D C at 2 amps f 5 64
NT305 Voltage converter . £ 5 64
NT315 Power supply 240V AC
104.5/15V DC. 500mA £12 06

Amateur Electronics by Josty-Kit, the professional book for the amateur covers the subject from basic principals to advanced electronic techniques. Complete with circuit board for AE1 to AE10 listed below.

OUR PRICE £3.30 (No VAT) P&P 25p plus VA1

AE1 100mW output stage .	f 1 5
AE2 Pre amplifier	
AE3 Diode receiver	£ 20
AE4 Flasher	
AE5 Astable multi vibrator	
AE6 Monostable multi vibrator	
AE7 RC generator	£10
AE8 Bass filter	€10
AE9 Treble filter	
AE10 CCIR filter	£.10

Also see previous page **ALL PRICES** EXCLUDE VAT

1066

SEW PANEL METERS ARE STOCKED AT OUR 3 LISLE ST., 311 EDGWARE RO., & 152 FLEET ST., BRANCHES or order by post.

USED EXTENSIVELY BY INDUSTRY, GOVERNMENT DEPARTMENTS, EDUCATIONAL AUTHORITIES ETC.

Over 200 ranges in stock-other ranges to order. Quantity discounts available. Send for fully illustrated brochure.

CLEAR PLASTIC MODEL SD640 Size: 85 x 64mm

50uA	 £3 90			
100u A	 £3 85	-	_	-
	 £3 B0	100		
500u A	 £3 75			
50-0-50u A	 £3 85	100		
100-0-100uA	 £3 80	1	-	
1mA	 £3 75		-	
5mA	 £3 75			1 mg h mg
10mA	 £3 75			-
50m A	 £3 75	10V DC		£3 75
100mA	 £3 75	20V DC		. £3 75
500mA	 £3 75	50V DC		£3 75
1A DC	 £3 75	300V DC		€3 75
EA DC	 £3 75	15V AC		£385
10A DC	 £3 75	300V AC		. £385
5V DC	 £375	VU Meter		£4 00

CLEAR PLASTIC MODEL SW100

Size: 100 :	(8	Umm			
50u A			£4	70	
100u A			£4	60	
500u A			£4	40	
50-0-50u A			£4	60	
100-0-100	uΑ		£4	55	
1mA			£4	40	
1 A DC			£4	40	
5A DC			£4	40	
20V DC			€4	40	•
			£4	40	;
300V DC			£4	40	1



EDGWISE MODEL PE70 Size: 90 x 34mm

50uA			£4 25
100u A			€4 20
200uA			£4 15
			£4 00
50-0-50u			£4 2C
100-0-10	Ou A	۸	€4 15
1mA			€3 95
300V AC	:		£4.05
VU Mete	r		£4.40



MODEL ED107 EDUCATIONAL METER Size: 100 x 90 x 150mm including terminals

A range of high quality moving coil instruments ideal for school experi-ments and other bench applications. 3" mirror scale. The meter move-ment is easily accessible to demonstrate internal working.





Company of the last of	
20V DC	£7 80
	£7 80
	£7 80
	€8 80
	£8 80
	£8.80
	£8 80
1/5A DC	L D D
	20V DC 50V DC 300V DC 500mA/5A DC 5V/50V DC 5V/15V DC

CLEAR PLASTIC MODEL MR 85P

Size: 120			nm
50u A			€5 6
100uA			€5.5
200u A			£65
500u A			€5.4
50-0-50u	Α		£5 5
100-0-100	Du A	١ ١	£5.5
500-0-500	Du A	۱	£5.3
1mA			€5 3
1-0-1mA			£5 3
5mA			£5 3
10mA			£5 3
50mA			£5.3
100m A			€5 3
500m A			€5.3
1A DC			£5 3
SA DC			£5 3
15A DC			£5 3
30A DC			£5 5
JUM DL	••		LDD



19990	MA.		100
300V DC			€5 40
15V AC			£5 45
300V AC			. £5 45
S Meter 1		۱	£5 35
VU Meter			£5 70
1A AC			* - €5 35
5A AC			* £5 35
10A AC			* £5 35
20A AC			° £5 35
30A AC			° £5 35

dilling	- SA		
300V DC			€5 40
15V AC			£5 45
300V AC	:		.£5 45
S Meter 1	lm/	۱	£5 35
VU Meter	۲		£5 70
1A AC			* - €5 35
5A AC			* £5 35
10A AC			* £5 35
20A AC			° £5 35
30A AC			° £5 35

*Litems with asterisk are Moving Iron type, all others are Moving Coil

CLEAR Size. 110	PL x 8	AS 3m	TIC MO	DEL SD830	
50u A			£4 40		
100u A			€4 35		
200u A			€4 30	4	
500uA			£4 25		
50-0-50u			£4 35		
100-0-10	Ou A	١	€4 30	Avenue	
1mA			£4 20	1	
5mA			€4 20		
10mA			£4 20		
50mA			£4 20	10V DC	
100mA			£4 20	20V DC	
500mA			£4 20	50V DC	
1A DC			£4 20	300V DC	
5A DC			£4 20	15V AC	
10A DC			£4 20	300V AC	
5V DC			£4 20	VU Meter	

4	
A	- 1
****	100
10V DC	£4 20
20V DC	£4 20
50V DC	£4 20
300V DC	£4 20
15V AC	£4 30
300V AC	£4 30
	C4 60

CLEAR PLASTIC MODEL MR 45P

3126. 30 A		*****	
50uA			£33
100u A			£3 Z
200u A			E3 2
500u A			£31
50-0 50u			€32
100-0-100			£32
500-0-50	Ou A		€30
			£30
			£30
			£30
50mA			£30
100mA			£30

1A DC 5A DC 10V DC 20V DC 50V DC

300V DC

15V AC



S Meter 1m A., £3 05	
VU Meter £3 50	
1A AC * £3 05 5A AC * £3 06	
10A AC * £3 05	
20 A AC * £3 05 30 A AC * £3 05	

CLEAR PLASTIC MODEL MR 38P

Nu A	 £3 20	
10uA	 £3 15	Commercial
10uA	 £3 10	1 (Catha 17)
10uA	 £290	TITAL
)-0-50u A	£315	A O
20-0-100u A	£310	
00-0-500u A	 €2 85	0
πA	 £2 85	Residence of the last
0-1mA	 €2 85	10000
nΑ	 £2 85	HIIII CONTRACTOR
nΑ .,	 £2 86	60000
)mA	 £2 85	
)mA	 £286	

CLEAR PLAST Size: 42 x 42mm	IC MO	DEL MR 38P	
50uA	£3 20		
100	£3 15	A	
200 4	£3 10	Harman and	- 1
500 4	£2 90	TT III	100
FO O FOLA	£3 15	1 2 P	100
	£310	100	0
	£2 85		
500-0-500u A			4
1mA	£2 85	8.000	
1-0-1mA	€2 85	0.000	
2mA	£2 85	0.1110	
5mA	£2 86	CHILI	
10mA	€2 85		
20mA	£286		
50mA	£ 2 85	20V DC	£285
100mA	£2 85	50V DC	£2.85
150mA	£2 85	100V DC	£2 85
200mA	£2 85	150V DC	£2 90
300mA	£2 85 £2 85	300V DC	€2 90
500mA		500V DC	£2 95
750mA	£2.85	750V DC	£2 95
1A DC	£2 85	15V AC	€2 95
2A DC	£2 85	50V AC	£2 95
5A DC	£2 85	150V AC	£2 95
10A DC	£2 85	300V AC	£2 95
3V DC	£2 85	500V AC	£3 10
10V DC .,	£2.85	S Meter 1mA	£2 85
15V DC	£2 85	VU Meter	€3 30
CLEAR DLAS	TIC MC	DEL SDAGO	

CLEAR PLASTIC MODEL SD460

Size: 59 x	46	mm	
50uA			£3 60
100u A			£3 55
			£3 50
			£3 45
50-0-50u			£355
100-0-100	Ou A	١	€3 50
1mA			£3 40
5mA			f 3 40
10mA			£3 40
50mA			£3 40
100mA			£3 40
500m A			£3 40
1 A DC			£3 40



CLEAR PLASTIC MODEL MR 65P

50u A	£4 05	1000
100uA	£3 95	
200uA	£3 90	K This
500u A	£3 85	A 3
50-0-50uA	£3 95	A.L
100-0-100uA	£3 90	
500-0-500uA	£380	THE PARTY NAMED IN COLUMN
1mA	£3 80	111111
1-0-1mA	£3 B0	11 日本の大学の 大学会長
5mA	€3 80	South the same
10mA	£3 80	300V DC £3 80
50mA	£3 80	15V AC £3 90
100mA	£3 80	50V AC £3 90
500mA	€3 80	150V AC £3 90
1A DC	€3 80	300V AC E3 90
5A DC	£3 80	500V AC £4 00
104 DC	£3 80	S Meter 1mA., £3 90
15A DC	£3 80	VU Meter £4 20
20 A D.C	£3 90	1A AC * E3 80
204 DC	£3 95	5A AC * £3 80
504 DC	£4 15	104 AC # £3 90
EM DO	£3 80	204 40 * 63 80
101/ DC	£3 B0	204 40 + 63 90
	£3 80	E0 4 AC # 62 90
15V DC	£3 80	100-A AC # C2 80
20V DC	£3 80	200 4 40 # 52 80
50V DC	£380	
15DV DC	£ 3 80	500mA AC * £3 80

BAKELITE MODEL S80 Enlarged Window

50u A		£46
100uA		£45
	 	£4 3
50-0-50u		£4 5
100-0-100		£4 5
1mA	 	£4 3
		£43
5A DC		£43
20V DC		£43
50V DC		£43
300V DC		£4 3
300V AC		£44
V/1 / BActor		



CLEAR PLASTIC MODEL MR 52P

50u A	£3 80	
100u A	£3 60	
500u A	€3 45	1000
50-0-50uA	£3 60	2/8
100-0-100uA	£3 45	MA
1mA	€3 40	
5mA	£3 40	
10mA	£3 40	511117
50mA	£3 40	10000
100mA	£3 40	0.000
500m A	£3 40	CHILDRE
1A DC	£3 40	
5A DC	£340	S Meter 1mA
10V DC	£340	VU Meter
20V DC	£3 40	1A AC
50V DC	£3 40	5A AC
300V DC	£3 40	10A AC
15V AC	£3 50	20A AC
300V AC	£3 50	30A AC

, T	- 3
MA.	>
1000	122
W	飌
S Meter 1mA	£3 4

BAKELITE MODEL MR 65 Size: 80 x 80mm

25uA			£5 40	-		
50uA			£4 10	-		-
100u A			£4 05	4.		-
500u A			£3 75	198		. 1
50-0-50u			£4 05		-	
100-0-10			. £4 00		++	
500-0-50	Ou A	١	€3 70			
1mA			£3 70			
1-0-1mA			£3 70			
5mA			€3 70	200		
10mA			£3 70	-	—	-
50m A			£3 70	300V DC	••	
100mA			£3 70	30V AC		
500mA			£3 70	50V AC		

·U·IMIA	 	E3 /U		
mA	 	€3 70	0.000	
0mA	 	£3 70	-	
i0m A	 	£3 70	300V DC	. [639
O0mA	 	£3 70	30V AC	. * £37
Am00	 	£3 70		. * £37
A DC	 	£3 70	150V AC	
A DC	 	£370	300V AC	. ° £3.7
A DC	 	£3 70	500V AC	. °£37
OA DC		€3 70	VU Meter	
5A DC	 	£3 70	1A AC	. ° £37
DA DC	 	£3 70	5A AC	. * £37
OA DC	 	£3.90	10A AC	. ° €37
V DC	 	£3 70	20A AC	. * £37
OV DC	 ٠.	£3 70	30A AC	. ° £37
5V DC	 •	£3 70	50A AC	. ° £37
20V DC	 	£3 70	500mA AC .	. • £37
OV DC	 	£370	50mV DC	£3.8

(inc. P&P and VAT)

00uA			£4 05	14:	
O0uA			£3 75	1985	\
0-0-50u			£4 05		.
00-0-100	u A	٠.	. £4 00	44	
00-0-500	λuΑ		£3 70	State of the last	
mA			£3 70	CHIEF DYS IN	
-0-1mA			£3 70		
mA			€3 70	CONTRACTOR OF THE PARTY OF THE	
0mA			£3 70		
0m A			£3 70	300V DC	. €:
Am00			€3 70	30V AC	* £3
00mA			£3 70	50V AC	* £:
A DC			£3 70	150V AC	* €3
A DC			€3.70	300V AC	. 67

300V DC	
30V AC	* £3 70
50V AC	* £3 70
150V AC	
300V AC	
500V AC	
VU Mater	
1A AC	
5A AC	, *£370
10A AC	
20A AC	
30A AC	° £3 70
50A AC	° £3 70

32 Page TICK

HI-FI

PRICE

LIST

PW4

10V DC 20V DC 50V DC 150V DC POSTAGE & PACKING 15p

240° Wide Angle

1mA METERS MW1-6 60 x 60 mm £6.50 P & P 15p MW1-8 80 × 80 mm P&P 15p £6-90



YAMABISHI VARIABLE VOLTAGE TRANSFORMERS Excellent quality at low cost, input: 230V 50/60Hz. Output 0-260V, MODEL S260 BENCH MOUNTING





ALL PRICES EXCLUDE VAT

FOR MAIL

We offer a speedy and efficient service by mail order Remember to add 8% VAT to total value of goods including post and packing

ORDER

TO LASKYS CUSTOMER SERVICES DIVISION

Audiotronic House, The Hyde, London NW9 6JJ Tel 01-200 1321

Please send me the following items

TOTAL PURCHASE PRICE cheque postal order

I wish to pay by Barclaycard/Access and my number is
NAME

ADDRESS

Signature

Registered in England No. 347947 at 12 Lower Grosvenor Place. Lundon SW1 UE

KENT 53/57 CAMOEN RD., TUNBRIDGE WELLS

LEICESTERSHIRE

ESSEX

205/206 CHURCHILL WEST, VICTORIA CIRCUS, SOUTHEND 0702 612241

GLOUCESTERSHIRE

16/20, PENN ST. BRISTOL 0272-20421

CALL INTO YOUR NEAREST

CENTRAL LONDON

01-493 864

01-437 8204 01-437 9155 01-723 9789

01-723 6211

01-262 0387 01-723 4453 01-723 4194 01-353 5812

01-353 2833

01-637 2232 01-636 3715 01-636 2605

01-636 0845

01-580 0670

LASKYS BRANCH OR

481 OXFORD ST

3 LISLE ST. WC2 34 LISLE ST. WC2 118 EDGWARE RD. W2 193 EDGWARE RD. W2 207 EDGWARE RD. W2

207 EDGWARE RD. W2 311 EDGWARE RD. W2 346 EDGWARE RD. W2 382 EDGWARE RD. W2 109 FLEET ST. EC4 152/3 FLEET ST. EC4

10 TOTTENHAM CT. RD. 27 TOTTENHAM CT. RD. 33 TOTTENHAM CT. RD.

42/45 TOTTENHAM CT. RD.

257/8 TOTTENHAM CT. RD.

86 SOUTH ST. ROMFORD

SEND COUPON BELOW **FOR NEW 32 PAGE** HI-FI PRICE LIST

45 MARKET PLACE, LEICESTER

0533-537678

NORTHAMPTONSHIRE

73 ABINGTON STREET, NORTHAMPTON 0604-35753

NOTTINGHAMSHIRE

5-7 LOWER PARLIAMENT STREET, NOTTINGHAM

OXFORDSHIRE.

6 WESTGATE SHOPPING CENTRE, OXFOR

STAFFORDSHIRE WULFRUM WAY, WOLVERHAMPTON

0902-23384

SURREY

046 WHITGIFT CENTRE, CROYDON

01-681 3027 .38/40 EDEN ST., KINGSTON 01-546 1271 32 HILL ST. RICHMOND 01-948 1441

WARWICKSHIRE 116 CORPORATION ST., BIRMINGHAM

ALL BRANCHES OPEN FROM Part to 6pm MON, 10 SAT

OUR CUSTOMER SERVICES DIVISION at head office will answer all your onqu just ring 01-200 1321

EXPORT Personal exports arranged for overseas visitors. Goods specially packed, insured and despatched to all parts of the world at minimum parts of the world VAT. Payment by bank frankler certified cheque, postal or or money order in any



BARCLAYCARD & ACCESS

Phone your order to 01-200 0037 or call into any bran-

NO DEPOSIT TERMS available on most goods for personal callers

CHOUSE TO THE VALUE DE FLOS
ACCEPTED FROM PERSONAL SHOPPERS
WITH BANKERS CARD. IN OTHER CASES
AND FOR AMOUNTS IN EXCESS OF 23D.
PLEASE ALLOW TIME FOR CLEARMCE.
BANKERS DARFS ACCEPTED.
All prices correct at 13/1/75 but
subject to change without notice E &O.E.

1067

"I have used Rhombics, 4 haif waves in phase, centre fed dipoles etc., but the success I have had with the Joystick (V.F.A.) has been amazing . . . only 20' high on 2" pipe in front of my mobile home, i never receive less then R7 and mostly R9 on CW DX working."—Bob Green, SU1KG/G3APH, W.B.E., W.A.C., Phone & C.W.

it's the antenna system that counts! However good your equipment, if a PART-RIDGE SYSTEM cannot improve your signals with the VFA at same height, return it (in re-saleable condition) for a cash refund.

PARTRIDGE have a complete VFA SYSTEM, correctly terminated for your equipment ranging from modern communications gear to a modest solid state radio. Don't be satisfied with anything less than the PARTRIDGE WORLD RECORD ANTENNA SYSTEM! Make your selection from the list below:-

(Each SYSTEM consists of the elegant gold stove enamelled 7' 6" VFA and a matching finish JOYMATCH A.T.U., despatched direct by parcel post—our risk). (All prices delivered—our risk)

desparence direct by parcer post—our risk). (An prices delivered—our risk)	
SYSTEM 'A' for modern Communications Receivers	£28 · 43
SYSTEM 'D' for other S.W. and M.W. receivers, all types	£20 ·84
SYSTEM 'J' for TXs and TCVRs up to 500w PEP 160 thru 10m (pa Inpt)	£33.59
JOYMATCH A.T.U. kit (1.6 continuous to 30 mHz)	€6.24
JOYMATCH A.T.U. kit (500 kHz continuous to 30 mHz)	£6 · 24
Either kit fully assembled	£7 55
JOYMATCH "Aerial Bandswitch" tuned aerial. MW & SW	£6 24
SUPER SENSITIVE general coverage DX-CRYSTAL SET that REALLY WORKS, not a toy, complete with Aerial	2.0 24
and a considius matching Farmings	
and a sensitive matching Earpiece.	£3 92
COMMUNICATIONS HEADPHONES, 8 ohms, matches most modern Comm. Rxs.	£3 · 99
VFA Stack Lashing (Massive VFA support on chimney stack)	£2·51
JOYMATCH Artificial Earth (ground) switch tuned	£6 24
A.G.T.U. Artificial Earth D.I.Y. add on unit for your A.T.U.	£0.60
Radials for the A.G.T.U. cut to required band, each	€0 . 60
"INVISIBLE AERIAL" wire, tough PVC covered tinned copper 22swg per 10m	£0 · 60
A.G.T.U. supplied flitted to JOYMATCH A.T.U.'s (less radials)	£0·80
AERIAL WIRE, heavy duty 16swg enamelled aluminium, per 10 metres.	£0 · 59
VALVES, complete set for 9R59DS & 9R59DE, including OA2 stabiliser	£5 · 25
	Ei

PARTRIDGE SUPER PACKAGE

COMPLETE RADIO STATION FOR ANY LOCATION Comprising:—Trio QR666 Gen. Cov. RX, Headphones, V.F.A., System 'A', all connecting cables, del. (our risk)

Send 41p stamp for details and expert advice.

AOSTAIRS WENT ENGLAND

Phone 0843 62535

or 62839 (after office hours) **G3CED G3VFA**







ing long medium short and Stereo FM wavebands. Separate Base and Treble controls. 30 watts total power output (frequency response 25-20,00 Hz) Tape record and playback facilities. Dimensions $18'' \times 8\frac{1}{2}'' \times 3\frac{1}{4}''$. The very latest BSR automatic record deck with cue and pause control Two matching elliptical speaker units

Order early limited stocks available cash price £49.95. Credit Sale £5:00 deposit 9 monthly payments of £5:75 (Total Credit price £56.75). P. & P. £3.00. Send £8.00 today.

Chassis only available for cash at £35.00.

Full 12 months Guarantee.

CALLERS WELCOME

Stereo headphones supplied with every complete order

PW/4/75 100 CHASE SIDE SOUTHGATE LEWIS radio LONDON N14 SPL Telephones: 01-882-1644



PRACTICAL WIRELESS

ELECTRONIC IGNITION SYSTEM

This Capacitor-Discharge Electronic Ignition System was described in Practical Wireless, and has proved extremely

The kit is supplied with a ready-drilled roller-tinned printedcircuit board and fully machined die-cast case with AMP Electrical Spade Connector Block together with a custom wound transformer, first grade components and full constructional details.

The original circuit employed Germanium Power Transistors for the negative earth version. WE OFFER SILICON P.N.P. POWER DEVICES AT NO EXTRA COSTI All components are available separately. Case size 4\frac{1}{2}" x 3\frac{1}{2}" x 2". Complete assembly and construction manual free with kit, available separately 25p.

SUITABLE FOR 12V SYSTEMS WITH NEG. OR POS. EARTH.

PRICE: £9.50 U.K. ORDERS PLEASE ADD VAT

Quantity Discounts:

Trade and Overseas 1-5 Nett 6-9 less 10% Enquiries Invited 10-49 less 15% 50-99 less 20%

Mail Order Only. 100-999 less 25% 1000 up less 30%

PLEASE STATE POS. OR NEG. EARTH WHEN ORDERING DABAR ELECTRONIC PRODUCTS

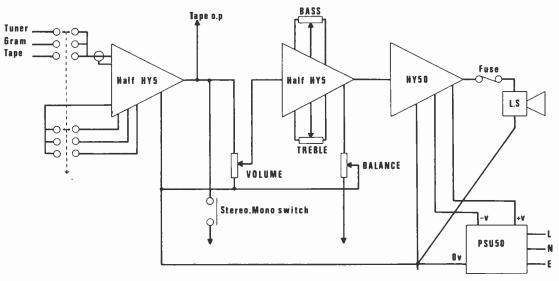


98 LICHFIELD STREET WALSALL, Staffs WSI IUZ

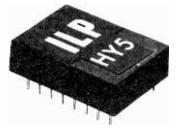


I.L.P. (Electronics) Ltd

SHEER SIMPLICITY!



MONO ELECTRICAL CIRCUIT DIAGRAM WITH INTERCONNECTIONS FOR STEREO SHOWN



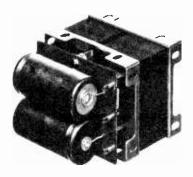
The HYS is a complete mono hybrid preamplifier, ideally sulted for both mono and stereo applications. Internally the device consists of two high quality amplifiers—the first contains frequency equalisation and gain correction, while the second caters for tone control and balance.

TECHNICAL SPECIFICATION
Inputs: Magnetic Pick-up 3mV RIAA: Ceramic Pick-up 3mV: Microphone 10mV: Tuner 100mV; Auxillary 3-100mV; Input/Impedance 47kΩ at 1kHz. Outputs: Tape 100mV; Main output dob (0·775V RMS). Active Tone Controls: Treble ± 12db at 10kHz; Bass ± 12db at 100Hz. Distortion: 0·5% at 1kHz. Signal/Noise Ratio: 88db. Overload Capability: 40db on most sensitive input. Supply Voltage: ± 16-25V.

The HY50 is a complete solid state hybrid HI-FI amplifier incorporating its own high conductivity heatsink hermetically sealed in black epoxy resin. Only five connections are provided, input, output, power lines and earth.

TECHNICAL SPECIFICATION
Output Power: 25W RMS into 80. Load Impedance: 4-160. Input Sensitivity 0db (0·775V RMS). Input Impedance: 47k0. Distortion: Less than 0·1% at 25W typically 0·05%. Signal/Moise Ratio: Better than 75db Frequency Response: 10Hz-50kHz ± 3db. Supply Voltage: ± 25V. Size: 105 x 50 x 25mm.

PRICE £5.98 + 48p VAT P. & P. free



The PSU50 incorporates a specially designed transformer and can be used for either mono or stereo systems.

TECHNICAL SPECIFICATIONS
Output voltage: 50V (25-0-25V). input Voltage: 210-240V.
Size: L.70. D.90. H.60mm.

PRICE £6 + 48p VAT

PRICE £4.50 + 36p VAT P. & P free TWO YEARS' GUARANTEE ON ALL OUR PRODUCTS

I.L.P. Electronics Ltd. Crossland House, Nackington, Canterbury Kent CT4 7AD Tel (0227) 63218

Please supply,	
Total Purchase price	
I Enclose, Cheque Dostal Orders	☐ Money Order ☐
Please debit my Access account	Barclaycard account
Account number	
Name & Address	
	Signature

POWER UNIT Type A126

In moulded case forming a 2 pin 5A mains plug.

2 metre output lead with 4-way mutiplug giving 2·1 and 2·5 mm ockets and 3.5 mm plugs.

Price £2.30. Post 10p

2" and 4" PANEL METERS

_		7	
812E: 60mm	Wide	81ZE: 110mt	
x 45mm H	Igh x	× 82mm H	igh ×
40mm Deep.		43mm Deep.	
Movement	I.R.	Movement	LR.
	Ohms		Ohms
0-50 micro A	1250	0-50 micro A	
0-100 micro A	. 580	0-100 micro 2	4. 730
0-500 micro /	1. 170	0-500 micro	۸. 200
0-1 m A	170	0-1 m A 0-5 m A	200
0-5 mA	170	0-5 m.A	200
0-1 m A 0-5 m A 0-10 m A	6	0-10 mA	6
0-50 mA	0.5	0-50 mA	0.5
0-100 mA	0.5	0-100 mA	0.5
0-500 mA	0.5	0-500 mA	0.5
0-1 AMP	0.8	0-1 AMP	0.5
0-2 AMP	0.5	0-2 AMP	0.5
0-25 Volt	15K		15K
0-50 Volt	50K	0-50 Volt	50K
0-300 Volt			300 K
"g" Meter	170		200
VIJ Meter	5250	VU Meter	5250
VU Meters a	re com	plete with de	tectors.
Modern wide	view.		
Price 2" #8-1	5 Post	10p. Price 4'	44-15
Post 10p. Lan	ps 75p	per set.	
		(63)	

watt CARBON FILM RESISTORS

watt at 70°C E 12 range 10Ω — $1 M \Omega$ 5% tol above 470 K Ω 10% tol at 95p per 100.

C1000 MULTIMETER

Special Offer

Compact General Pur-pose Mini Multimeter. Input Resistance 1000

Onins po.
Ranges:

▲C Volts 0-15, 50, 250.
1000 V 0-10, 50, 250, 1000 V DC Volts

DC Current 0-1 mA 0-100m A Resistance 0-150K ohms Size 60 × 24 × 90 mm

Complete with Batteries, Test Prods, Instructions. Special price £3:25 Post 20p.

CIOOI MULTIMETER

Input Resistance 20,000 ohms per volt Overload protection 150 µA movement, clear scale Ranges-AC Volts 0-10, 50, 250, 1000 V DC Volts 0-5, 25, 125, 500, 2500V DC Current 0-50 mA

Resistance 0-60 Kohms, 0-6 Mohms Decibels -20 to +22 dB.

Carrying Case, Test Prods and Batteries included. Size: 11.5 × 8.3 × 2.7 cm Price 29.85. Post 20p.

TRANSFORMERS

CASED TRANSFORMERS

MOBEL INAMPONITIES
Housed in smart resin-coated steel cases, with 3-core power cable and outlet socket, fused primary winding. Isolation types are fitted with 3-pin outlet sockets, and are available with 110 volt or 240 volt output. (Please state). Auto types are fitted with 2-pin flat style sockets up to 500 VA. 3-pin sockets from 750 to 3000 VA. See Auto and Isolation sections for prices.

SAFETY ISOLATING

VA	Ref	Price	Price	Price	
(watts)	No.	Cased	Plugs	Open	Post
		£	2 Pin +	£	£
			1 Earth		
60	149	7.35	0.80	4.00	0.38
100	150	8.22	0.80	4-60	0.52
200	151	10.20	0.80	7.40	0.52
250	152	11-68	0.80	8.88	0.65
350	153	14-10	0-80	10.80	0.80
500	154	15-68	0-80	12.38	1.00
750	155	24.63	1.00	18.72	1.20
1000	156	82-19	1.00	26-50	1.20
1500	157	88-18	1.00	30-34	O.A.
2000	158	45-20	2.40	34-68	O.A.
3000	159	66-50	2-40	53 35	O.A

	12 &	24 V	olts Prim.	200-240V.	
	Amps		Ref.	Price	Pos
	12V	24 V	No.	4	£
	0.3	0.15	242	1.84	0.25
	0.5	0.25	111	1.88	0.25
	1	0.5	213	1.58	0.2
1	1 2	1	71	2.09	0.25
	4	2	16	2.58	0-38
l	6	3	70	8.80	0-45
ı	8	4	108	4.20	0.5
1	10	5	72	4.80	0.5
	12	6	116	5.01	0.5
	16	8	17	6.22	0.55
į	20	10	115	9-47	0.69
i	30	15	187	11.95	0.97
ı	40	20	232	18-26	1.06
ı	50	30	226	15.20	1.10

30 V	olts		
Prim.	200-240V.	Sec. 12, 15,	20. 24. 80V
Amps	Ref.	Price	Post
-	No,	2	2
0.5	112	1.72	0.22
]	79	2:21	0.38
2	3	8-26	0.38
3	26	4-10	0.42
4	21	4-68	0.52
5	51	5-80	0.52
6	117	€-50	0.52
8	88	8-50	0.67
10	89	8-97	0.67

AUTO TRANSFORMERS

V A	Ref.	Cased	Plugs	Open	Post
Watts	No.	£	2 & 3 pin	£	£
Tapped	at 115,	220, 240 V	olts		
20	113	3.00	0.15	1.55	0.30
Tapped	at 115,	200, 220, 3	240 Volts		
150	4	5.80	0.15	3.98	0.39
200	65	6.40	0.15	4.50	0.40
300	66	7.27	0.15	5.28	0.52
500	67	9-99	0.15	8.29	0.67
750	83	12.56	0.75	9-76	0.82
1000	84	15-70	0.75	12-40	0.82
1500	93	19-88	0.75	16.58	1.50
2000	95	30-10	1.44	22-05	1.50
3000	73	43.58	1.90	32.00	1.90

50 Volts

Prim. 200-240V. Sec. 19, 25, 33, 40, 50V. Ampr Price 2.33 103 2.00 0.38 4-57 105 5.20 0.52

60 Volts Prim. 230-240V. Sec. 24, 30, 40, 48, 60V. Price Amps Ref. Post

2.96 4.63 6.84 7.94 8.86 10.15 106 0.52 107 11-17 0.67 1.00 1.00 1.10 121 118 0.97 0.97

MINIATURE AND EQUIPMENT

LIMINIONE	MILD FA	DIT PILIT				
Prim. 240V wir Volta	1		Histops	Ref.	Price	Post
Sec. 1	Sec. 2	Sec.	Sec. 2	No.	4	4
3-0-3		200		238	1.23	0.10
0-6	136	500	500	234	1-30	0.10
0-6	0-6	1000	1000	212	1.98	0.22
9-0-9		100		13	1.23	0.10
0-9	0-9	330	330	235	1-48	0.10
0-8-1	0-8-9	500	500	207	1.75	0.22
0-8-9	()-8- V	1000	1000	208	2.30	0.30
15-0-1ü		40		240	1.28	0-10
0-15	0-15	200	200	236	1.30	0-10
20-0-20		30		241	1.23	0.10
0-20	0-20	150	150	237	1.80	0.10
0-15-20	0-15-20	500	500	205	2.47	0.38
0-20	0-20	300	300	214	1.72	0.22
0-20			O SCREEN	1116	3-00	0-40
20-12-0-12-20		700 (D/C		221	2.81	0.30
0-15-20	0-15-20	1000	1000	206	3.22	0.38
0-15-27	0-15-27	500	500	203	2.73	0-38
0-15-27	0-15-27	1000	1000	204	3 52	0.38

PLASTIC CASED SILICON BRIDGE RECTIFIERS

One Amp	Two Amp	Four Amp	Six Amp
50 P.I.V. 25p	50 P.I.V. 35p	100 P.I.V. 55p	50 P.I.V. 65p
100 P.I.V. 25p	100 P.I.V. 40p	200 P.I.V. 59p	100 P.I.V. 70p
200 P.I.V. 28p	200 P.I.V. 45p	400 P.I.V. 65p	200 P.I.V. 80p
600 P.I.V. 80p	400 P.I.V. 50p	600 P.I.V. 75p	400 P.I.V. 90p

ADD 10p P & P PER ORDER

PLEASE ADD 8%

FOR VAT

POWER UNIT Type CC 12-05

Output switched 3, 4.5, 6, 7.5 9 and 12 volts at 500 mA D.C, Operates from 240 V mains, suitable for Radios, Tape Recorders, Record Players etc Size 7.5 × 5.0 × 14.0cm. Price £3.95. Post 25p.



MINIATURE NEONS

6mm dia., 12mm length leads length approx. 20mm. Recommended ballast resistor 150K ohms for 240 Volt operation Price: Packet of 10 for 55p. Postage 10p.

DEPT PW2. SIMMONDS ROAD, WINCHEAP, CANTERBURY, KENT. Tel: (0227) 52436

INVERTORS

INVERTORS

240v—50Mz. from your 12v car battery.

25 watt—£3·90 + 30p p & p.

40 watt—£6·80 + 55p p & p.

30 watt (12v)—£28·80 + £1.05 p & p.

30 watt (12v)—£28·80 + £1.05 p & p.

30 watt (12v)—£28·80 + £1.05 p & p.

30 watt (24v)—£22·70 + £1.05 p & p.

All above invertors are in kit form but may be purchased built up & ready for use. Price list sent on receipt of stamped addressed envelope.

P.W. AUTOMATIC EMERGENCY SUPPLY

250v—50Hz—150 watt invertor with built in battery charging to invertor operation. Cct. as appeared in Dec. 73 P.W. Complete kit of parts (excluding meter) £22·50 + £1·10 p & p.

COMPLETE FLUORES CENT LIGHT INVERTOR KIT

8 watt—12v—Fluorescent light, sultable for tents, caravans, houses, boats and secondary lighting for, factories, hotels etc. 12"—8 watt £2·90 + 25p p & p. 21"—13 watt. £3·30 + 30p p & p.

TRANSFORMERS & COILS

Both high volume & small order capacity available for Mains, R.F., & I.F.
Transformers. Before you buy elsewhere let us quote you and see what you save

you save. V.A.T. at 8% included.

TRADE & EXPORT ENQUIRIES WELCOMED ASTRO ELECTRONICS, 10A SPRINGBANK RD., CHESTERFIELD, DERBYSHIRE

educational kits of exceptional quality"
(AUDIO mag. Dec. 1974)

BUILD AND REBUILD ANY NUMBER OF TIMES:

Radios, microphones, burglar alarms, inter-comms, ferrite detectors, solar cell, photoelectric cell, voice relay, electronic cats, birds, guns, organs, Illuminometers, voltmeters, meters of all types, etc., etc., plus your own circuit designs.

COMPLETELY SAFE—suitable for all, from beginners on. 30 different projects £20-45, over 150 £33-95. Add-on kits, spares, available too.

Prices include Manuals, Battery, p & p, VAT, etc. Cheque/PO (or 7p for catalogues) to DEPT. PW:

Satisfaction guaranteed

ELECTRONI-KIT LTD, 408 St. John's Street, London, EC1. [01-278 4579]

Uuality **G**omponents rescent

BARGAIN CAPACITOR 2,200MFD at 63v. DC wkg.

Size = 2" × 1\frac{1}{2}" diameter. Tag ended. All new and unused. Our price 35p.

S. G. BROWN HEADSET

Finest quality British made Lightweight Headphones. Incorporates ceramic piezo electric transducers. Specification:--

Bpecification:—
Frequency—20-17,500 CPS
Impedance—Predominantly
capacitive, at '001MFD per
earpiece can be regarded as
150K at 1kcs. Weight—3.5oz. (98 grams). A bargain at \$1.25 each set

LIGHT EMITTING DIODES
Till 209 (Red) With Clip
Till 209 (Green) With Clip
Till 209 (Yellow) With Clip
Mied 500 1092 Type
LED READOUTS
Littonix
DL707 .3 Character 14 Pin Dil.
DL701 as above but ± 1
DL747 -6 Character
Minitron

Minitron 3015 7 Segment 16 Pin Dil 3015G as above but ± 1

WAFER SWITCHES

12 Way 2 Way 3 Way 4 Way 6 Way 4 Way 3 Way

POTENTIOMETERS
All types 1" and less diameter
Singles
5K Log or
10K Lin Less
25K Switch

15p each

Double

Pole Switch 30p each

MAINS TRANSFORMERS

WAFE 1 Pole 2 Pole 2 Pole 2 Pole 2 Pole 3 Pole 4 Pole

22p each

50K

100K 250K

5K 10K

25 K

50K

100K

250K 500K

2M 30p each 2M PRE SETS Sub Miniature Skeleton Type 0-1 Watt Horizontal Mounting 100, 250 and 500 ohm, 1k, 2-5k, 5k, 10k 25k, 50k, 100k, 250k, 500k, and 1M ohm 6p each

MAIRS TRANSFORMERS
Open Type Double Wound Continuously Rated, two
hole flying clamp with colour coded flying leads, varnish
inpregnated. Approx. size: 1½" × 1½" × 1½" high
Fixing centres: 2½½".
TR1 20-0-20v 100 m/a
TR2 12-0-12 v 100 m/a
TR3 9-0-9 v 100 m/a
TR4 6-0-6 v 100 m/a
TR4 6-0-6 v 100 m/a
TR5 3-0-3 v 100 m/a
Our Price £1-23 each

200/250v MAINS RELAY Heavy duty contacts 2:500 ohm coil. All new and unused D.P.D.T. mains relays 50p, Carr. Free. Special quantity 440 per 100 off.

\$40 per 100 off.

MINIATURE RELAYS

Brand new range of British made Relays, 81ze 1½" × 1" × 1" × 1 two changeovers with 250v 1-5A contacts and suitable for fitting on -1m Veroboard.

Type Volts Current Observed Courses of the Course of the

Less Switch 45p each

JELIO STEREO
JUNCTION BOX
The most spopular
stereo junction box.
Facility for two pairs
of headphones and
two speakers. 3 position switch selects
headphones, loudspeakers or both.
A bargain at \$2.50

MONO/STEREO MICROPHONE MIXER
9 volt. High impedance input. Gold finish with four black plastic chrome tipped level control knobs. On/Off switch and stereo/mono switch. 4 Input sockets.

SPECIFICATIONS:

For XTAL Mics etc.

Gain For XTAL Mics etc.

Approx 3.DB.

Max Output Sig. 1 volt

Max Output Sig. 1-3 volt

Noise Ratio — 60DB

Supply 9 volt

OUR PRICE — 25.05cn

OUR PRICE = 25.25p

POWER PACKS
PP1 Switched 3 - 6 - 7 i - 9 volt 400M/A Transistor and
Zener Stabilised On/Off Switch and Polarity Reversal
Switch, in a black metal case
\$25.25 each,
PP2 Switched 6 - 7 i - 9 volt Battery Eliminator. Approx.
size 2½" × 2½" × 3½". Ideal for cassette recorders \$2.25
PP3 Car converter. From 12 v Pos. or Neg. to = 6 - 7 i - 9
volt. Easy to fit and transistor regulated
\$2.90



£2:00

VEROBOAR	D		
	-1	-15	Plain ·15
21 × 32	82p	24p	15p
21 × 5	84p	84p	18p
21 × 32 21 × 5 32 × 32	84 p	34p	
31 × 5	89p	45p	
17×21	1.06p	77p	60p
17 × 31	1-45p	1·18p	75p
17 × 5	1.85p		1·10p
Pin insertion	tool		3
Spot face cu	tter		4
Pkt. 36 pins	(state ·1 or ·	15)	2

LOUDSPEAKERS	
24″8 ohm	50p
21" 40 ohm	50p
2į̃" 80 ohm	50p
5#8 ohm	ceramic £1.25
51" 8 ohm dual cone	ceramic £2.50
io" 8 ohm dual cone	ceramic #8.75
7" × 4"8 ohm	ceramic £1.60
8" × 5" 8 obni Perman'	t Magnet £1 60

10 inch DUAL CONE L/S
Manufactured by "ELAC" to a
very high standard these loudspeakers are a real bargain
SPEC:—8ize=10" Dual Cone.
Power=10 Watta
Frequency = 40-12000 Hz
Our Price — 23-75p each

MAINS KEYNECTOR Keynector connects any Electrical Equipment to the mains supply in seconds. Ideal for bench, garage demonstrations, etc. Multi connections can be made (max. load 13A fused). £8.25p.



ALUMINIUM BOXES

Metal	project	poxes	give your	work a pr	Olessions: 117	IBL
		T.	w	н		
AB7		21	5 2	14		54 <u>r</u>
AB8		4	4	14		68 p
AB9		4	2#	14		54 r
AB10		4	δĨ	1		68;
AB11		4	21	2	1	54 <u>r</u>
AB12		3	2	1		45
AB13		6	4	2		691
AB14		7	5	21		841
AB15		Ŕ	6	3		991
AB16		10	7	3	£	1.8
AB17		îŏ	41	3	£	L · 02
AB18		12	5	3	£	1.20
AB19		12	š	š		1.5

ABS PLASTIC BOXES
Handy boxes for construction projects. Moulded extrusion rails for P.C. or chassis panels. Fitted with 1mm front

1905 = 105mm × 73mm × 45mm = 51p 1906 = 150mm × 75mm × 47mm = 66p 1907 = 184mm × 124mm × 60mm = 96p 1921 = 196mm × 74mm × 45mm (eleping front) = 50p

BARGAIN BOARDS

EARCHAIN BOAKUS Components galore for the experimenter Ex Computer boards with Resistors, Capacitors and useful Transistors— at least 4 transistors per board. Five boards £1.00.

CLEAR PLASTIC PANEL METERS

CLEAR PLASTIC PANEL METERS
Size 59mm × 46mm × 35mm these meters require a
38mm hole for mounting.
ME6 = 0 to 50 micro amp Full Scale
ME7 = 0 to 100 micro amp Full Scale
ME8 = 0 to 500 micro amp Full Scale
ME9 = 0 to 1 m/a Full Scale
ME10 = 0 to 5 m/a Full Scale
ME11 = 0 to 10 m/a Full
Scale
ME12 = 0 to 50 m/a Full
Scale
ME12 = 0 to 50 m/a Full
Scale

Scale ME13 = 0 to 100 m/a Full

ME14 =0 to 500 m/a Full Scale ME15 =0 to 1 amp Full

ME16 Scale

ME16 -0 to 50 volts

ME17 -0 to 300 volts

A.C. Full Scale

ME18 -"S" Meter

ME19 -"VU" Meter



OUR PRICE 23:00

ADD LUXURY TO YOUR CAR

with a motor driven car serial

SPEC:- 🛨 5 section * extended length 100cm

★Length under fender 40cm ★ Cable length 120cm

Supplied complete with fixing bracket and con-trol switch 27.50

DECON DALO ETCH RESIST The Decon Dalo 33PC is a unique instrument for the professional and amateur electronics engineer, enabling him to

prepare in minutes a perfect printed circuit OUR PRICE 800

WIRE WOUND
VOLUME CONTROL
250ohm Only 259 EACH.
Approx 1" Diameter.
Long standard spindle.

CABLE LESS SOLDERING IRON
WAHL. "ISO—TIP"

* Completely Portable

* Heats in 5 seconds

* Solders up to 150 joints or more per charge

* Recharges automatically in its own stand

* No AC leakage or induced current to damage delicate

components

Heats to 700 deg. F

Fine Tip for delicate and general purpose soldering

Only 8" long and weighs just 6 ozs.

OUR PRICE 49.75 (spare bits are available)

8TOP PRESS BHA0002 NE555 MC1310P 15 watt Amp Module Timer I.C. Stereo Decoder I.C. Regulator

108 109				
J		14	4	80
æ	œ	Œ	W	\mathcal{J}

THITTE

7805 TIP 29A TIP 30A

BC107

BC

IC SOCKETS D.I.L. 8 pin 14 pin

14p

22:50 78p 22:00 21:49 55p 63p 10p

10p 10p

BARGAIN TRANSFORMERS 12-0-12 volt 500m/a

240 voit primary transformer bargain. approx size = 60mm x 40mm x 50mm fixing centres = 75mm

=£1 20. Our Price

18 volt 500m/a

240 volt primary

approx size = 60mm x 40mm x 50mm fixing centres = 75mm

Our Price =£1 00.

LOW NOISE LOW PRICE CASSETTES
Good quality tape in well made screw type cassettes.
Presented in single plastic cases.

C00 = 42p C120 = 53p 10% Discount on ten or more cassettes of one type.

CRESCENT RADIO LTD.P.W.

All mail to 11 MAYES ROAD, WOOD GREEN, LONDON N22 6TL Phone: 01-888 3206

Callers Welcome at 15 Mayes Road & 13 South Mall, Edmonton N9. If you construct You should own one.

> CRESCENT CATALOGUE Price 30p.

U.K. POSTAGE 15p UNLESS OTHERWISE STATED

V.A.T. Please add 8% to all Totals

FOR AUDIO AT A BUDGET

COMPLETE STEREO SYSTEM



System 1. £59.00

40 Watt Amplitier, Viscount III - R102 now 20 watts per channel.

Viscount III amplifier – volume, bass, treble and balance controls, plus switches for mono/ stereo on/off function and bass and treble filters. Plus headphone socket. Specification

20 watts per channel into 8 ohms. Total distortion or 10W or 1kHz 0 1%. P.U.1 (br ceramic cartridges) 150MV into 3 Meg. P.U.2 (for magnetic cartridges) 4 MV @ 1kHz into 47K. equalised within ± 1dB R.I.A.A. Radio 150MV into 220K. (Sensitivities given at full power). Tape out facilities: headphone socket, power out 250MW per channel. Tone controls and filter characteristics. Bass: + 12dB to -17dB & 60Hz. Bass filter: 6dB per octave out. Treble control: treble + 12dB to -12dB & 15kHz. Treble filter: 12dB per octave. Signal to noise ratio: (all controls at max.) - 5dB. Crosstalk better than 35dB on all inputs. Overload characteristics better than 26dB on all inputs. Size approx. 13 2" x 9" x 3".

Garrard SP 25 Mk III deck with magnetic cartridge, de luxe plinth and hinged cover. Two Duo Type II matched speakers — Enclosure size approx. $17\frac{1}{4} \times 10\frac{3}{4} \times 6^{\prime\prime\prime}$ in simulated teak. Drive unit $13^{\prime\prime} \times 8^{\prime\prime\prime}$ with parasitic tweeter. 10 watts handling.

Complete System £59.00

System 2. £82.00

Viscount III amplifier (As System I) Garrard SP 25 Mk III deck (As System I) Two Duo Type III matched speakers — Enclosure size approx.] 27° x 13° x $11\frac{1}{2}^{\circ}$ Finished in teak veneer. Drive units 13° x 8° bass driver, and two 3° (approx.) tweeters. 20 watts R.M.S., 8 ohms frequency range — 20 Hz to 18,000 Hz.

Complete System £89-00

PRICES: SYSTEM I

Viscount III R102 amplifier £27·00 + £1·60 p & p

2 Duo Type II speakers £I4·00 + £3·50 p & p

Garrard SP25 with Mag. cartridge de luxe plinth and hinged cover

£21.00 + £2.80 p & p total: £62.00

Available complete for only: £59.00 + £5.50 p & p

PRICES: SYSTEM 2

Viscount III R102 amplifier £27·00 + £1·60 p & p

2 Duo Type III speakers £39.00 + £6.40 p & p

Garrard SP25 with Mag. cartridge de luxe plinth and hinged cover £21.00 + £2.80 p & p

21.00 + £2.80 p &

total: £87.00

Available complete for only: £82·00 + £6·50 p & p



STEREO

Two speakers with cabinets

*QUALITY SOUND FOR LESS THAN £20·00

Stereo 21, easy to assemble audio system kit. No soldering required. The unit is finished in white P.V.C. and the acrylic top presents an unusually interesting variation on the modern deck plinth. Includes:—I BSR 3 speed deck, automatic, manual facilities together with stereo cartridge.

Amplifier module . Ready built with control panel, speaker leads and full, easy to follow assembly instructions.

Specifications: For the technically minded:—

Input sensitivity 600mV. Aux. input sensitivity 120mV. Power output 2.7 watts per channel. Output impedance 8–15 ohms. Stereo headphone socket with automatic speaker cutout. Provision for auxiliary inputs – radio, tape, etc., and outputs for taping discs. **Overalt Dimensions**. Speakers approx. $15\frac{1}{2}'' \times 8'' \times 4''$. Complete deck and cover in closed position approx. $15\frac{1}{2}' \times 12'' \times 6''$

Complete only £19.95 + 201.200 e a p. Extras if required. Optional Diamond Styli £1.37.

Specially selected pair of stereo headphones with individual level controls and padded earpieces to give optimum performance. £3.85.



BUILD YOUR OWN * STEREO AMPLIFIER

8TRACK HOME CARTRIDGE PLAYER



Elegant self selector push button player for use with your stereo system. Compatible with Viscount III system, Unisound module and the Stereo 21. Technical specification Mains input, 240V, Output sensitivity 125mV Comparable unit sold eleswhere at £24.00 approx. Yours for only

£11.95 + £1 · 45p. p & p.

PUSH BUTTON CAR RADIO KIT * The Tourist II



NO SOLDERING REQUIRED!

NOW BUILD YOUR OWN PUSH BUTTON CAR RADIO

Easy to assemble construction kit comprising fully completed and tested printed circuit board on which no soldering is required. All connections are simple push fit type making for easy assembly. Fine tuning push button mechanism is fully built and tested to mate with printed circuit board.

Technical specification: (1) Output 4 watts R.M.S. output. For 12 volt operation on negative or positive earth. (2) Integrated circuit output stage, pre-built three stage IF Module. Controls volume manual tuning and five push buttons for station selection, illuminated tuning scale covering full, medium and long wave bands.

Size chassis 7" wide, 2" high and $4\frac{3}{4}$ " deep approx £7.70

Speaker including baffle and fixing strip £1.65+37p P&p Car Aerial Recommended—fully retractable £1.37+30pp&p

The Tourist I Kit For the experienced constructor. If you can solder on a printed circuit board you can build this model. Price £6 · 60 + 90p p & p Same technical specification as Tourist II

EMI SPEAKERS AT FANTASTIC REDUCTIONS 20 WATTS **EASY BUILD** SPEAKER SYSTEM SPEAKER KITS



£18.95 pair + £6.40 p & p

System consists of a $13'' \times 8''$ (approx) eliptical woofer unit with a $8'' \times 5''$ (approx.) mid range unit incorporating perasitic tweeter and crossover components. Circuit Diagram Technical Specification:

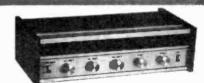
Ross Unit Flux density-100 K, speech coil-14", Cone, Triple laminated paper with P.V.C. surround. Mid Range Unit

Flux density-33K, speech coil-1" with

parasitic tweeter.
Power Handling
20 watts R.M.S., impedance -- 8 ohms, frequency response — 20 Hz to 18,000 Hz.

OUR PRICE £7.50. Complete

+90p p & p.

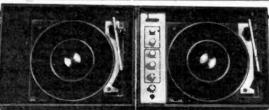


Reliant Mk IV Mono Amplifier, ideal for the small disco or house parties Outputs 20 watts R.M.S. into 8 ohms (suitable for 15 ohms). Inputs *4 electrically mixed inputs. *3 individual mixing controls.

*Separate bass and treble controls common to all 4 inputs *Mixer employing F.E.T. (Field Effect Transistors) *Solid State circuitry.

*Attractive styling. INPUT SENSITIVITIES -Input - 1.) Crystal mic. guitar or moving coil mic, 2 and 10mV. (Selector switch for desired sensitivity). -Inputs - 2), 3), 4). Medium output equipment - ceramic cartridge, tuner, tape recorder, organs, etc. - all 250mV sensitivity. AC Mains, 240V operation. Size approx: 12½"×6"×3½"£17.00- £1.15. p & p





INCORPORATES: Pre-Amp with full mixing facilities, including switched input for mic with volume control, switched input for auxiliary with volume control, bass and treble controls. volume control and blend control for turntables

Two B.S.R. single play professional series decks, fitted with crystal cartridges. The turntables are designed and precision engineered. They combine clean modern styling with superb reproduction. Their many special features include square section aluminium tonearms, (high precision low mass design fully counterbalanced, with calibrated stylus pressure control for perfect tracking), and conveniently grouped easy to read linear controls. The turntables have viscous cueing devices which allows the tonearms to be placed or lifted at any point on the record.

The two lightweight cartridge shells have slide-in-holders to facilitate easy inspection of needles and cartridges.

TECHNICAL SPECIFICATION:

Pre-amp - Output - 200mV.

Auxiliary inputs - 200mV and 750mV into 1 meg. Mic input - 6mV into 100K. 240 volt operation. Turntables capacity - 7", 10" or 12" records. Rumble, wow and flutter

Rumble Better than -35dB. Wow Better than 0.2%. Flutter Better than 0.06% (Gaumont kales meter). Finish - Satin black mainplate with black turntable mat inlaid with brushed aluminium trim. Tonearm and controls in black and brushed aluminium.

Console size -

Unit Closed - $17\frac{3}{4}$ × $13\frac{3}{4}$ × $8\frac{3}{4}$ (approx.) Unit Open - 35 3" × 13 3" × 4 3" (approx.)

This disco console is ideally matched for the Reliant IV and Disco 50 or any other quality amplifier.

The unit is finished in black PVC with contrasting simulated teak edging diamond spun control knobs with matching control panel.

Yours for only £45.00+£5.60 p & p.





DO NOT SEND CARD

Just write your order giving your credit card number

Mail orders to Acton, Terms C.W.O. All enquiries stamped addressed envelope. Goods not despatched outside U.K. Leaflets available for all items listed thus * send stamped addressed envelope. All items subject to availability. Prices correct at 1st Feb. 1975 and subject to change without notice All prices include V.A.T. at 8% rate.



Radio and TV Components (Acton) Ltd.

21c High Street, Acton, London W3 6NG 323 Edgware Road, London W2

Personal Shoppers Edgware Rd 9a.m.-5.30p.m. Half day Thurs. Acton 9.30a.m.-5.30p.m. Closed Wed.

How to order the cassette unit for your Kempton or Ascot player.

As a reader of Practical Wireless, you can get the cassette mechanism for your car stereo player direct from Goldring

The units for both the PW Kempton and Ascot are made by Lenco and based on the famous STAAR design, with wow and flutter reduced to 0.3% max

All you have to do is send the coupon to us, with a cheque or PO made out to Goldring Ltd. Be sure to state which unit you need. For the Kempton, it's Lenco FFR at £18.90; for the Ascot, it's Lenco CRV at £19.98. Prices include packing, carriage and VAT.

The units are also available from selected distributors.

Lenco FFR for the Kempton, Robust and precision engineered, it's widely used in industry and by Europe's largest car stereo manufacturer.

Lenco CRV for the Ascot A record/replay unit made to hi-fi standards Features of the Ascot Player include dynamic noise reduction, auto-stop and cassette ejection at end of play



To: Goldring Ltd, 10	Bayford Street, Hackney, London E8 3SE
Please send me:	Lenco FFR at £18.90
	Lenco CRV at £19.98
Lanclosa PO cha	aug for S

ADDRESS

Goldring



"I MADE IT MYSEL

Imagine the thrill you'll feel! Imagine how impressed people will be when they're hearing a programme on a modern radio you made yourself.

Now! Learn the secrets of radio and electronics by building your own modern transistor radio!

Practical lessons teach you sooner than you would dream possible.

What a wonderful way to learn—and pave the way to a new, better-paid career! No dreary ploughing through page after page of dull facts and figures. With this fascinating Technatron Course, you learn by building!

You build a modern Transistor Radio . . . a Burglar Alarm. You learn Radio and Electronics by doing actual projects you enjoy-making things with your own hands that you'll be proud to own! No wonder it's so fast and easy to learn this way. Because learning becomes a hobby!
And what a profitable hobby. Because opportunities in the field of Radio and Electronics are growing faster than they can find people to fill the jobs!

No soldering-yet you learn faster than you ever dreamed possible.

Yes! Faster than you can imagine, you pick up the technical know how you need. Specially prepared stepby-step lessons show you how to: read circuits-assemble components -build things-experiment. enjoy every minute of it!

You get everything you need. Tools. Components. Even a versatile Multimeter that we teach you how to use. All included in the course. AT NO EXTRA CHARGE! And this is a course anyone can afford. (You can even pay for it by easy instalments).

So fast, so easy, this personalised course will teach you even if you don't know a thing today!

No matter how little you know now, no matter what your background or education, we'll teach you. Step by step, in simple easy-to-understand language, you pick up the secrets of radio and electronics.

radio and electronics.

You become a man who makes things, not just another of the millions, who don't understand. And you could pave the way to a great new career, to add to the thrill and pride you receive when you look at what you have achieved. Within weeks you could hold in your hand your own transistor radio. And after the course you can go on to acquire highpowered technical qualifications, because our famous courses go because our famous courses right up to City & Guilds levels.

Send now for FREE 76 page book-see how easy it is-read what others say!

Find out more now! This is the gateway to a thrilling new career, or a wonderful hobby you'll enjoy for years. Send the coupon now. There's no obligation.

POST	ĺ
TODAY FOR	ı
FREE BOOK	ı
No. of Concession,	

To: ALDERMASTON COLLEGE **READING RG7 4PF**

Yes, I'd like to know more about your course. Please send me free details—plus your big, 76-page book that tells about all your courses.

Address

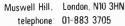


CPW04

OF BRITISH INSTITUTE OF ENGINEERING TECHNOLOG

enromasonic electronics

Dept.1 56, Fortis Green Road, Muswell Hill, London, N10 3HN





ERSIN 5 CORE SOLDER

for fast easy reliable soldering EASY TO USE DISPENSERS AND REELS IDEAL FOR HOME CONSTRUCTORS

Ersin Multicore Solder contains 5 cores of non-corrosive flux, instantly cleaning heavily exidised surfaces. No extra flux is required.

SAVBIT handy solder dispenser



A coil of Frsin Multicore Savbit Solder in a dispenser 7ft 6 in of 18 s.w.g. (2.2 metres of 1.22mm). The Solder that reduces the wear of soldering iron

Size 5 32p

SAVBIT solder for general purpose work

handy plastic reel of SAVBIT alloy. 63ft of 18 s.w.g. (19.2 metres of 1.22mm)

Size 12 £1.72



ALU-SOL for soldering aluminium

New Multicore Alu-sol flux-cored solder in 16 s w n. No extra flux needed. Plastic reel holds 36ft Supplied with full instructions. Also available in solder dispenser.

Size 4 £2.32



Fine gauge solder for soldering small components

Fine gauge solder for soldering small components 138ft of 22 s.w.a. (42.0 metres of 0.71mm) Ersin Multicore 5 core solder wound on a plastic real Suitable for intricate work and small components

Size 10 £1.44



For soldering fine joints



Dispensers of Ersin Multicore Solder make those small iobs easier. 21ft of 22 s.w.g. (6.4 metres of 0.71mm) solder, specially suitable for soldering tine wires emall components and for repairing printed circuite

Size 15 36p

Or size 19A for kit wiring or Radio and T.V. repairs 7ft (2.1 metres) of 18 s.w.g. (1.22mm) Ersin Multicore Solder.

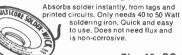
Size 19A 34p



Fitted with unique 8 gauge selector with handle locking device and easy grip handles. Spring incorporated for automatic opening. Strips insulation from flex and cables in seconds and can also be used as a cutter.

Model 8B:80p

NEW



SOLDER WICK

Size 18 90p

Bib Hi-Fi Accessories Limited,

Sole U.K. Sales Concessionaires, P.O. Box 78 Hemel Hempstead, Herts. HP2 7EP

Prices shown are recommonded retail excluding V.A.T. From Electrical and Hardward Shops. If unobtainable, send JSp.P&P. Prices and specifications subject to change without notice

BUN YOUR TRANSISTOR RADIO OR CASSETTE RECORDER FROM YOUR CAR BATTERY (Similar to illustration)

This unit enables you to run your cassette to run your cassette tape recorder from the car whilst travelling. It is easily fitted and comes complete with fitting instructions. Please state make of cassette, voltage and type of plug required.



ONLY **£2'86**

RUN YOUR TAPE RECORDER OFF AC MATES

Mains unit supplied complete and ready to plug into your cassette recorder. (State voltage, make and (State voltage, make and type of plug required, if in doubt send diagram of recorder socket.)



ONLY £3.40

RUN YOUR TRANSISTOR RADIO OFF AC MAINS

For single outputs, 6v, 9v £2.86 For two separate outputs, 6v + 6v,

9v + 9v £3.52 per unit. (Please

state outputs required.)
All units are completely isolated from mains by double wound transformer ensuring 100% safety. All British Made, All Prices inc. V.A.T. and P. & P. R.C.S. PRODUCTS (RADIO) LTD.
(Dept. PWA)
31 Oliver Road, Walthamstow, London, E17

Full refund if not completely satisfied.



NEW IMPROVED HI NO BATTERIES NO WIRES ONLY £21.99 per pair Safety & 4 VAT 61.76 Telecom. Standards. Supplied with 3-core wire. Just plug into power socket. Ready for use. Crystalclear communication from room to room. Operates over a 2-mile range. On/Off switch, Vol. control. Useful as office intercom, baby alarm, invalids, No G.P.O. licence read. Full price ref. if returned in 10 days. 12 months service guarantee, P. & P. 60p-AMERICAN CRADLE ELEPHONE AMPLIFIER



Latest transistorised Telephone Amplifier with detached plug-in speaker. Placing the receiver on to the cradle activates a switch for immediate two-way conversation without holding the handset. Many people can listen at a time. Increase efficiency in office, shop, workshop. Perfect for "conference" calls: leaves the user's hands free to make notes. consult files. No long waiting, saves time with long-distance calls. On/Off switch, volume. Direct tape recording model at £12.95 + VAT £1.04 P. & P. 48p. 10-day price refund guarantee

WEST LONDON DIRECT SUPPLIES (PW11)
169 KENSINGTON HIGH STREET, LONDON, W.8

Dresent

a price-stabilizing policy for

new revised catalogue · attractive discounts · free postage & packing (U.K.)

A 100 OF THE BEST

out of our latest catalogue

2N1307	47p	AF200U	70 p	BD135	37p
2N2646	51 p	AF239	60p	BD136	30 p
2N3053	30p	B1906	36p	BDY20	83p
2N3054	60p	BA138	31p	BF194	15p
2 N 3 0 5 5	70 p	BB103	24p	BFR39	23p
2N3702	11 p	BB105	34p	BFR79	23p
2N3703	10p	BB109	18p	BFX29	33p
2N3704	11 p	BC10/A	16p	BFX84	27 p
2N3705	10p	BC107B	16p	BFY51	23p
2N3794	18p	BC108B	15p	BRY39	50p
2N3619	28p	BC108C	15p	BY164	51 p
2N4062	11p	BC109B	18p	C106B1	42p
2N4443	93p	BC109C	18p	C106D1	47p
2N5052	42 p	BC147A	12p	C1406	78p
2N5163	20 p	BC147B	13p	MJ481	£1 · 20
2N5459	32p	BC148B	12p	MJ491	£1:35
40361	48p	BC149C	14p	MJ2955	80 p
40362	44p	BC158B	15p	MJE371	89p
40602	46p	BC159	15p	MJE521	81 p
40636	£1 36	BC167B	13p	MJE2955	£1 12
40669	£1 · 10	BC168B BC169B	12p 12p	MJ E3055	68p
AC128	17p	BC169C	12p	OA91 SD4	6p
A C151 R	35p	BC179B	28p	TIP31A	8p 70p
A C153 A C153K	27p 37p	BC182L	12p		
AC176	24p	BC184L	10p	TIP32A	80p
AC176K	38p	BC212L	12p	TIP41A	80 p
AC187K	31 p	BC214L	14D	TIP42A	£1-09
A C188K	29 p	BC257A	14p	W02	30p
A D133	£1 92	BC259B	14p	ZTX300	14p
AD136	£1 -11	BCY58	30p	ZTX304	
AD149SL	650	BD130	70 p		23 p
AD161	42p	BD131	43p	ZTX500	14p
AD162	40p	BD132	52p	ZTX504	45 p

ELECTROLYTIC CAPACITORS

Axlal	Lead							
qF	3V	6 · 3V	10V	16V	25 V	40V	63V	100V
0.47	_	_		_			11p	8p
1-C		_	_		_	11 p	_	8p
2.2	where		-	_	11p		8p	9p
4.7	_	_	_	11p		8p	9p	8p
10	_	11			8p	9p	8p	\$ p
22		_	8p	_	9p	8p	8p	10p
47	₽ p		9p	8p	8p	8р	10p	13p
100	9p	8p	8p	8p	9p	10p	12p	19p
220	8p	8p	9p	10p	10p	11p	17p	28p
470	9p	10 p	10p	11p	13p	17p	24p	45p
1,000	11 p	13p	13p	17p	20 p	25p	41 p	_
2,200	15p	_	-	26 p	37p	41p	_	
4,700	-	_	39 p	44p	58p		_	_
10,000	42p	46p	_			-	_	_

1975 is the year of challenge. Rather than sit back and wait for things to happen, we have produced our own policy to help stabilize price structure and maintain the services for which ELECTROVALUE are pre-eminent.

PRICES as shown in our latest catalogue (No. 7, issue 3) will be maintained at least until March 31st next (except in cases of severe market fluctuation) and then held after review for further

three-month periods instead of making day to day price change.

CATALOGUE 7 ISSUE 3 is now ready with 108 pages of bargains and information. Price— 30p post paid including 25p refund voucher for use on orders list value for £5 or more

DISCOUNTS

apply on all items except the few where prices are shown NETT. 5% on orders from £5 to £14 99; 10% on orders value £15 or more.

FREE POSTAGE & PACKING in U.K. for pre-paid mail orders over £2 (except Baxandall cabinets). If under, there is an additional handling charge of 10p.

QUALITY GUARANTEE

All goods are sold on the understanding that they conform to makers specifications. No rejects, seconds or sub-standard merchan-

V.A.T. @ 8% must be added to total value of orders. Every effort is made to ensure correctness of information at time of preparing and putting this advertisement to press.

RESISTORS

Code	Watts	Ohms	1 to 9		99 100 up
0000				(see no	te below)
С	1/3	4 · 7 - 470K	1 · 3	1.1	0 · 9 nett
č	1/2	4 7-10M	1.3	1-1	0 · 9 nett
	3/4	4:7-10M	1 - 5	1 · 2	0 · 97 nett
č	1	4 · 7-10M	3 · 2	2 · 5	1 · 92 nett
мо	1/2	10-1M	4	3 · 3	2 · 3 nett
ww	1	0-22-0-47Ω	16	14	11 nett
ww	i	0.56-3.9 Q	12	10	8 nett
ww	3	1-10K	9		6 nett
14/14/	ž	1-10K	11	10	8 nett

Codes:

Codes:
C=carbon film, high stability, low noise.
MO=metal oxide. Electrosil TR5 ultra low noise.
WW=wire wound, Plessey.
Values: All E12 except C_fW, C_fW and MO_fW.
E12: 10, 12, 15, 18, 22, 27, 33, 39, 47, 56, 68, 82, and their decades.

decades. E24: as E12 plus 11, 13, 16, 20, 24, 30, 36, 43, 51, 62, 75, 91

and their decades.

Tolerances: 5% except WW 10% = 0.05 Ω below 10 Ω and $\frac{1}{4}W$ MO 2%

Prices are in pence each for quantities of the same ohmic value and power rating. NOT mixed values. (Ignore fractions of one penny on total value of resistor order.) Prices for 100 up in units of 100 only.

WAYECHÂNGE 3 VY II GIRES 1 pole 12 way; 2 pole 6 way; 3 pole 4 way; each 33p 4 pole 3 way TAG STRIP 28 way

NUTS, SCREWS, etc.

in lots of 100 each
4BA NUTS 31p:
4"4B Screws 30p
4"6BA S
Threaded pillars 6BA, 4" hexagonal
Plain spacers 4" round
Other sizes available 6BA NUTS 28p 1" 6BA Screws 24p exagonal £1:35 £1:32

CAPACITORS	
DALY ELECTROLYTIC	in cans, plastic sleeved
1000mF/25V 34p	2200/100 £1 · 91
5000/100 £3 · 56	1000/50 50p
5000/25V 75p	2000/50 70p
2000/50 70p	5000/50 £1 · 44

2000/50 70p 5000/50 £1·44

1000/100 £1·00 POLYESTER TYPE C.280, Radial leads for P.C.B.

POLYESTER TYPE C.280, Radial leads for P.C.B.

rounting, Working voltage 250V d.c.

0·01, 0·015, 0·022, 0·033, 0·047 ea. 3p

0·085, 0·1, 0·15

0·22 5p; 0·33 7p; 0·47 8p; 0·68 11p; 1·0 14p; 1·5 21p;

2·2 24p

SILVERED MICA. Working voltage 500V d.c. Tolerance
1% or 0·56F

1% or 0.5pF Values in PFs—2.2 to 250 in 26, stages ea. **8p** 270-820 in 9 stages, ea. 7p 1000, 1500, 1800 **9p**; 2200 **10p**; 2703, 3800, 4700, 5000 **18p**; 8800, 8200, **1**0,000 25p

1000, 1500, 1800 9p.; 2200 10p.; 2703, 3600, 4700, 5000 10p.; 6800, 3200, 10,000 25p.

TANTALUM BEAD
0-1, 0:20, 0:47, 1:0 mF/35V, 1:5/20V, 3:5/16V ea. 16p.
2:2/16V, 2:2/35V, 4:7/16V, 10:6:3V ea. 21p.
10/25V, 22/16V, 2/16:3V, 100/3V, 6:8/25V, 15/25V ea. 23p.
POLYCARBONATE
Type B42540 Working Voltage—250V Values In mF.
0-047; 0:0068; 0:01; 0:15; 0:22 ea. 4p.
0:18; 0:027; 0:033; 0:039; 0:047; 0:068; 0:082; 0:1; 100//01.
0-18; 0:22 7p; 0:27, 0:33 9p; 0:39, 0:47 11p; 0:56, 0:68.

16p CERAMIC PLATE Working voltage 50V. d.c. In 26 values from 22pf to 6800pF,

ea. 2p

POTENTIOMETERS

POTENTIUME I ENG ROTARY, CARBON TRACK, Double wipers for good contact and long working life P.20 SINGLE linear 100 chms to 4.7 meg ohms, each 14p P.20 SINGLE log. 4.7 Kohms to 2.2 megohms, each 14p JP.20 DUAL GANG 1in. 4.7 Kohms to 2.2 megohms, JP.20 DUAL GANG 1in. 4.7 Kohms to 2.2 megohms,

J.P20 DUAL GANG log. 4·7 Kohms to 2·2 megohms, each 48p JP.20 DUAL GANG Log/antilog 10K, 22K, 47K, 1

SLIDER

SLIDER
Linear or log mono 4-7K to 1 meg. in all popular values
STEREO, matched tracks, lin. or log in all popular values from 4-7K to 1 meg.
September plates, mono, black or grey,
Control knobs, blk/wht/red/yel/grn/blue/dk, grey/t.
grey,

MINITRON DIGITAL INDICATORS
3015F Seven segment filament compatible
standard logic modules. 0-9 and decimal
9mm characters in 16 lead DIL
Suitable BCD decoder driver 7447
3015G showing + or — &1 & dec. pt. point: £1 · 20 £1 · 15 £1 · 20 LEDS (Light Emitting Diodes)
Photo Cells, cadmium sulphide each

ANTEX Soldering Irons C240 CCN240 £2·25 £2·65 Spare bits Spare bits

All postal communications, mail orders etc. to Head Office at Egham address, Dept. PW 4, S.A.E. with enquiries requiring answers.

28,ST. JUDES ROAD, ENGLEFIELD GREEN, EGHAM, SURREY TW20 0HB Telephone Egham 3603 Telex 264475 Shop hours 9-5.30 daily: Sat. 9-1 p.m.

NORTHERN BRANCH: 680, Burnage Lane, Burnage, Manchester M19 1NA Telephone (061) 432 4945 Shop hours 9-5.30 daily: Sat. 9-1 p.m.

U.S.A. CUSTOMERS are invited to contact ELECTROVALUE AMERICA, P.O. Box 27, Swarthmore PA 19081.

TRANSFORMERS

SAFETY MAINS ISOLATING TRANSFORMERS
Prr. 120/240 V Sec. 120/240 V Centre Tapped and Screen

Ref. VA Weight Size cm.	P&P
No. (Watts) Ib or	£ b
07 20 18 7.0 x 6.0 x 6.0 149 60 3 12 9.9 x 7.7 x 8.6 150 100 5 8 9.9 x 8.9 x 8.6	2.80 38 4.37 45
	4.89 45
15 200 8 0 12 1 x 9 3 x 10 2	8·13 53 9·83 73
153 350 15 0 14.0 x 10.8 x 11.8	11-88 73
154 500 19 8 14·0 x 13·4 x 11·8 155 750 29 0 17·2 x 14·0 x 14·0	13.65 91 20.51 *
156 1000 38 0 17·2 x 16·6 x 14·0	29·15 * 33·23 *
157 1500 46 0 21 6 × 13 4 × 18 1 158 2000 60 0 21 6 × 15 3 × 18 1	33 23 • 37 07 •
Ref. VA Weight Size cm. Auto Taps No. (Watts) Ib oz	P & P € p
113 20 1 0 5.8 x 5.1 x 4.5 0-115-210-240	1 67 30
113 20 1 0 5.8 x 5.1 x 4.5 0-115-210-240 64 75 2 4 7.4 x 6.7 x 6.1 0-115-210-240 4 150 3 4 8.9 x 7.7 x 7.7 0-115-200-220-240	2.90 38
66 300 6 4 9.9 x 9.6 x 8.6	5.82 53
67 500 12 8 12·1 x 11·2 x 10·2 ,, ,, 84 1000 19 8 14·0 x 13·4 x 14·3	3 4·12 45 5·82 53 8·82 67 13·68 91
67 500 12 8 12·1 x 11·2 x 10·2 " " " " " " " " " " " " " " " " " " "	18:31 *
	18·31 * 24·20 * 35·09 *
93 1500 30 4 14 0 x 15 9 x 14 3 " " " 95 2000 32 0 17 2 x 16 6 x 14 0 " " " 73 3000 40 0 21 6 x 13 4 x 18 1 CASED AUTO TRANSFORMERS CASED AUTO TRANSFORMERS	
CASED AUTO TRANSFORMERS 115V mains lead input and U.S.A. 2-pin outlets. 20VA £3 500VA £10:45 pp 80p 1000VA £17:51 via B.R.S.	3·23 pp 38p
TRANSFORMERS	
PRIMARY 240-250 VOLTS 12 AND OR 24 VOLT	RANGE
Ref. Amps. Weight Size cm. Secondary Windir No. 12V 24V 1b oz	
Ref. Amps. Weight Size cm. Secondary Windir No. 12V 24V 1b oz 111 0·5 0·25 8 4·8 x 2·9 x 3·5 0·12V at 0·25A x 213 1·0 0·5 1 4 6·1 x 5·8 x 4·8 0·12V at 0·5A x 3·5 0·12	2 47 23
2 3 10 05 4 6 x 5 8 x 4 8 0 2 Vat0 5A x 7 2	2 1-74 30 2-29 38 2-86 38
71 2 1 12 70 × 6 4 × 6 · 1 0 · 12 V at 1 A × 2 18 4 2 2 12 8·3 × 7·7 × 7·0 0 · 12 V at 2 A × 2 70 6 3 3 8 8·9 × 8·0 × 7·7 0 · 12 V at 3 A × 2	2·86 38 4·12 45
70 6 3 3 8 8.9 x 8.0 x 7.7 0.12V at 3A x 2 108 8 4 5 8 9.9 x 8.9 x 8.6 0.12V at 4A x 2 72 10 5 6 4 9.9 x 9.6 x 8.6 0.12V at 5A x 2	4·12 45 4·56 45 5·14 53
72 10 5 6 4 9.9 × 9.6 × 8.6 0.12V at 5A × 2 116 12 6 6 12 9.9 × 10.2 × 8.6 0.12V at 5A × 2 17 16 8 8 12 12.1 × 9.9 × 10.2 0.12V at 5A × 2 115 20 10 11 8 14.0 × 9.6 × 11.8 0.12V at 10A × 2	5·14 53 5·52 53
116 12 6 6 12 9 9 x 10 2 x 8 6 0 12 V at 5A x 2 17 16 8 8 12 12 1 x 9 9 x 10 2 0 12 V at 8A x 2 115 20 10 11 8 14 0 x 9 6 x 11 8 0 12 V at 10A x 2	5.52 53 7.28 60 10.39 73
17 16 8 8 12 12 1 x 9 9 x 10 2 0 12V at 8A x 2 115 20 10 11 8 14 0 x 9 6 x 11 8 0 12V at 10A x 2 187 30 15 15 8 14 0 x 12 1 x 11 8 0 12V at 15A x 2 226 60 30 32 0 17 2 x 15 3 x 14 0 0 12V at 30A x 2	10·39 73 13·59 85
No. 12V 24V 1b oz 11 0 0 5 25 8 4 8 x 2 9 x 3 5 0 12V at 0 25 A x 213 1 0 0 5 4 6 1 x 5 8 x 4 8 0 12V at 0 5 A x 1 1 2 1 1 2 7 0 x 6 4 x 6 1 0 12V at 1 0 5 A x 1 8 1 2 1 4 x 2 1 2 8 3 x 7 7 x 7 0 0 12V at 1 A x 2 1 8 4 2 2 12 8 3 x 7 7 x 7 0 0 12V at 2 A x 2 108 8 4 5 8 9 9 x 8 8 0 x 7 7 0 12V at 2 A x 2 108 8 4 5 8 9 9 x 8 9 x 8 6 0 12V at 4 A x 2 1 5 6 4 9 9 x 9 6 x 8 6 0 12V at 5 A x 2 1 6 12 6 6 12 9 9 x 10 2 x 8 6 0 12V at 5 A x 2 1 7 16 8 8 12 12 1 x 9 9 x 10 2 x 8 6 0 12V at 5 A x 2 1 7 16 8 8 12 12 1 x 9 9 x 10 2 0 12V at 1 6 A x 2 1 8 1 2 0 1 2 1 3 1 3 1 5 1 8 1 4 0 x 9 6 x 11 8 0 12V at 1 6 A x 2 1 8 7 3 3 1 5 1 5 8 1 4 0 x 1 2 1 x 11 8 0 12V at 1 6 A x 2 1 8 0 1 2 V at 3 A x 2 1 8 0 1 2 V at 3 A x 2 1 8 0 1 2 V at 1 6 A x 2 1 8 0 1 2 V a	16.83
	P & P
Ref. Amps. Weight Size cm. Secondary Taps No. Ib oz	£b
No. 16 oz 112 0.5 1 4 6.1 x 5.8 x 4.8 0-12-15-20-24-30V 79 1.0 2 4 7.0 x 6.7 x 6.1	1.81 30 2.40 38
	3.49 38
20 3·0 4 8 9·9 x 8·8 x 8·6 21 4·0 6 4 9·9 x 9·6 x 8·6 3 x 8·6 51 5·0 6 12 12·1 x 8·6 x 10·2 3 1	4·53 45 5·13 53
51 5:0 6 12 12:1 v R:6 v 10:2	6:41 53 7:16 60
80 BV 12 U 12 X 11 8 X 10 2	9.90 67
89 10·0 13 12 14·0 × 10·2 × 11·8 ;; 50 VOLT RANG	
Ref. Amps. Weight Size cm. Secondary Taps	PRP
No. 1b oz	6 h
102 0.5 1 12 7.0 x 6.4 x 6.1 0-19-25-33-40-50V 103 1.0 2.12 8.3 x 7.4 x 7.0	3.30 30
103 1 0 2 12 8 3 x 7 4 x 7 0 , , , , , , , , , , , , , , , , , ,	3.38 38 4.68 45 5.81 53 7.60 67 12.10 67 12.98 85
105 3·0 6·12 9·9×10·2×8·6 106 4·0 10 0 12·1×10·5×10·2 110 10 10 12·1×10·5×10·2 110 10 10 10 10 10 10 10 10 10 10 10 10	7 60 67
106 4-0 10 0 12-1 × 10-5 × 10-2	12.10 67
	16.99
Ref. Amps, Weight Size cm. Secondary Taps	PRP
No. 1b oz	2.33 38
124 0.5 2 4 7.0 x 6.7 x 6.1 0.24-30-40-48-60 126 1.0 3 4 8.9 x 7.7 x 7.7 127 2.0 6 4 9.9 x 9.6 x 8.6 " " 125 3.0 8 12 12.1 x 9.9 x 10.2 " "	3.41 38
127 2.0 6 4 9.9 2 9.6 2 8.6	5.08 45 7.52 60
125 3 0 8 12 12 1 x 9 9 x 10 2 " " " 123 4 0 13 12 12 1 x 11 8 x 10 2 " " "	8 75 67
40 5.0 12.00 14.0×10.2×11.8 ,, ,, 120 6.0 15.8 14.0×12.1×11.8 ,, ,,	9·75 73 11·30 8 5
121 8 0 25 00 14 0 x 14 7 x 11 8 122 10 0 25 00 17 2 x 12 7 x 14 0	15.00
122 10 0 25 00 17 2 x 12 7 x 14 0	
MINIATURE TRANSFORMERS WITH SCREE	ENDIOL
Ref. MA. Weight Size cm VOLTS 238 200 2 2 8x2 6x2 0 3-0-3 212 1A IA I 4 6 1x5 8x4 8 0-6 0-6	£ p 1.54 10 1.84 30 1.41 13
212 IA IA	1-84 30 1-41 13
235 330,330 4 4 8x2 9x3 5 0-9,0-9 207 500,500 1 00 6 1x5 4x4 8 0-8-9,0-8-9	1.56 19
207 500, 500	3 30 38
208 IA, IA I I2 7.0x6.4x6 I 0-8-9,0-8-9 236 200, 200 4 4.8x2.9x3.5 0-15, 0-15 214 300, 300 I 4 6.1x5.8x4.8 0-20, 0-20	1.43 IQ
214 300, 300 1 4 6 1x5 8x4 8 0-20, 0-20 221 700 (D.C.) 1 8 7 0x6 1x6 1 20-12-0-12-20	2.17 38
207 500, 500 1 00 6 - 1x5 - 4x4 - 8 0 - 8-9 , 0 - 8-9 208 1A, 1A 12 7 - 0x6 - 4x6 - 1 0 - 8-9 , 0 - 8-9 216 200, 200 4 4 - 8x2 9x3 - 5 0 - 15, 0 - 15 211 300, 300 4 6 - 1x5 - 8x4 - 8 0 - 20, 0 - 20 221 700 (D.C.) 8 7 - 0x6 - 1x6 - 1 20 - 12 - 01 - 20 206 1A, 1A 21 2 8 - 3x7 - 7x7 - 0 0 - 15 - 20, 0 - 15 - 20 203 500, 500 2 4 8 - 3x7 - 0x7 - 0 0 - 15 - 20, 0 - 15 - 27 204 1A, 1A 3 4 8 - 9x7 - 7x7 - 7 0 - 15 - 27, 0 - 15 - 27 205 7 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	3·46 38 3·00 38 3·85 38
Ref. MA. Weight Size cm VOLTS 238 200	
Carrio	ge via BRS
PLEASE ADD 8% FOR V.A.	Т.

PLEASE ADD 8% FOR

3. THE MINORIES, LONDON EC3N 1BJ

RRIE electronics

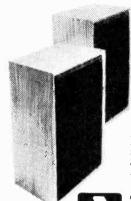
TELEPHONE: 01-488 3316/8

NEAREST TUBE STATIONS: ALDGATE & LIVERPOOL ST.

Loudspeakers at **Manufacturers Prices**

£15.50 per pair

as supplied by us to the trade less than half retail price.
Cabinets in teak size 18" x 11" x 7" deep 15 watts RMS (30 watts music power) output into 8 ohms.



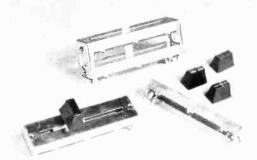
GOODMANS/EMI 6½" bass plus 3½" tweeter. Frequency response 35 hz. to 19,000 hz. Leads connectors supplied accoustically damped speakers.
HI FIDELITY

QUALITY AT ONLY £15.50 per pair plus £1.00 post, packing and insurance.

Please send cash cheque or ACCESS order to Ben Ford (Hi Fi Cabinets) Limited, 58 Somers Road Industrial Estate, Rugby, Warwickshire. Telephone 78213.

For Access orders just quote Access number and address. Immediate despatch for all orders.

CARBON SLIDE POTENTIOMETERS



60mm Single Track including Black Knob 50p (inc. V.A.T.), 60mm Twin Track including Black Knob 60p (inc. V.A.T.), 60mm Quad Slide Potentiometers— Prices upon application. 1K, 5K, 10K, 25K, 50K, 100K, 500K ohms Log, Lin, Antilog. Metal Case. 3-2db Matched Track. 15mV Nominal Noise (B.S. 2122). Life Exceeds 20,000 cycles. Fixing Holes 2 x M3 on 80mm Centres.

Designed, Manufactured and Supplied by:-

DOMAN ROAD, CAMBERLEY, SURREY GU15 3DJ

Send cash with order to above address. Postage and packing 15p per order. Trade enquiries invited.

no extrus

all prices inc VAT FREE delivery



ALL ITEMS SUBJECT TO MANUFACTURERS INCREASE AND AVAILABILITY

Personal Callers are Welcome!



AMELIFIERS Rotel RA211 (43-95 RA311 (43-95 RA311 (43-95 RA311 (43-95 RA311 (43-95 RA311 (43-95 RA311 (43-95) RA311 (43-95 RA311 (43-95) RA311				
Rotel RA211	AMPLIFIERS	Adastra 'Top 20' 12:n	G800 3 95 1 95	CALCULATORS
RA311		25 watt 8 or 15 ohm	G800H 3 95 1 95	
RAGII 686 95 Sansui AUI01			G800E 6.99 3.95	
Sansui AUJ05	RA611 £86-95	10 watt 8 or 15 ohm £3.70	SHURE	
AUS05	Sansui AU101 £48 · 25	Also 5in 8 ohm speaker £0.95	1111	SINCLAIR PROJECT 80
Sinclair 2000	AU505 £74 · 95	21/in 8 or 64 ohm		
TUNERS & RECEIVERS Lask Delta AH/FH Lask			M/5ED Type 2 11.75 8.25	
Table Tabl	Linton Mk. II £59 · 95		MISEJ Type 2 9.75 6.25	
TUNERS & RECEIVERS Leak Delta AM/PH Rotel RX150A Tunery Life 95 RX150A T			VI5 Type 3 32 · 25 —	
Cast Deta AM/PM Cast Deta AM/PM Cast Deta Am/PM Cast Deta Am/PM Cast Rich Deta Am/PM Cast Rich Deta Am/PM Cast Cast Deta Am/PM Cast Rich Deta Am			MICROPHONES	
Sinchiar 2000) 4000 Tuner 43-95 Sinchiar 2000) 4000 Tuner 43-95 Sinchiar 2000) 4000 Tuner 43-95 Sinchiar 2000 44-95 Sinchiar 2000				P26 Power Supply for 240 £8:45
Rote M. 17.5 1.2	Sinclair 2000/4000 Tuner £34.95			P28 Power Supply for 260 £8 25
Kingsdale 3 ea. 644 *95 Amp.				FM Tuner £!2.95
Rotel 152			Condenser Mic. 600 ohm	
Cap Section Cap			uni-dir £9·50	
Sanuiu 210 AM PM PM PM		DOTTOLINE D CE.	Cassette Stick Mic. with	
Case		KITS		7220 Power Kit 25:25
310 AH/FH/MPX	210 AM/FM/MPX £75 · 50	Linton 2 pr. £20 95	Cass. Stiek Mic. with	
### A AM/FM ### A 1000		Glendale 3 pr. £35 · 95	K. control (Philips type) £2.00	PORTABLE RADIOS
Howland West DA 1000T	441 AM/FM/MPX £91 95	Dovedale £55 · 50		
RECORD DECKS Garrard S275 MkIV Garrard S275 MkIV & C (16 25 5) BSR Invicta P & C/5C7M Garrard S275 MkIV P & C G/800 £25 795 Goldring GL78 P & C/7 Rank Domus 13D 2000/ Rex P99 Cart. Goldring GL78 P & C/7 Rex P99 Ca	Howland West DA 1000T		AKAI ADPIZO £7.50	
RECORD DECKS Garrard SP25 MkIV 61 235 45 25 68 25 Mkg 68		SPEAKER CABINETS IN	HEADPHONES	Vega Sapphire £7-25
RECORD DECKS Garrard SP25 MkIV b BSR MP60 BSR Invicta P & C/SC7M GSP25 MkIV P & C(3800 C15 9 5) GSP26 MkIV P & C(3800 C15 9		KIT FORM (Teak Veneer)	Rotel	Vega VEF206 £13-95
Garrard SP25 MkIV		12in x 8in x 6in	RH430 £4·75	Micado LM/MW/FM/5SW £18 95
BSR RM960 BSR Invictar P & C/SC/M GSR C Grard MIVP P & C G/800 (25.95) Garrard MIVP P & C G/800 (25		(8 x 5 or 7 x 4 cutout) £2 ⋅ 90	RH 630 £7·75	Murphy
SPZ5 MIKIV P & C G/800 225-95 SPZ5 MIKIV P & C G/800 SPZ5 MIKIV P & C G/800 SPZ5 MIKIV P & C G/800		14in x 12in x 9in		
SP25 MkIV P & C G/800 215 9 5 50 Goldring G/T3 P & C) 250 College G/T3 P &		(10", 8 × 5, 8", 6½" & 3½") £3·95	Koss	BA838 LVV/MVV/VHF
Goldring GL78 P & C/ G8002 Rank Domus 13D 2000/ Rex 999 Cart. 559 - 95 Connoisseur 6D Kirc San	COS MULV D & C C/900 ASE DE	IBIN X I I IN X 9 IN		
G800E Rank Domus [3D 2000] Rex 999 Cart. Connoissur BD2 Chassis/SAU2	Goldsing GL78 P & C/	(8" X 2" or 13 X 8) £5 '25		
Rax Pop Gart.	G800F #50.05	(12" & 1" or 12 v 8) \$4.7E		Bush
Rex 999 Cart. Connoiseur BDI Kit Connoiseur BDI Kit Garding and Connoiseur BDI Kit Garding and Connoiseur Garding and Connoiseur BDI Kit Garding and Connoiseur		(12 0.7 O. 13 X O) E0 73		VTR165 LW/MW/VHF £22 ⋅00
Connoisseur BDI Kit BD2 Chassis/SAU2	Rex 999 Cart. £50.00	TWEETERS & CROSSOVERS		VTR 127 LW/MW/VHF £15.50
BDI Kit	Connoisseur		HVI €21-95	VTR 175 LW/MW/VHF £13·95
BD2 Chassis/SAU2	BDI Kit £13⋅50		PRO4AA £29 · 25	VTR188 LW/MW/VHF/
SAU Arm SCIU Cartriage Fineer PLI2D Fineer P	BD2 Chassis/SAU2 £32 50		PRO54 £29 ⋅95	2SW M/Batt £31 95
SCUI Cartridge £5.95 Pioneer PLI2D TAPE DECKS (Insurance 2:00) Akai 4000DS Reel to Reel 4000DS Reel to Reel 4000DB Reel to Reel Dolby GXC36D £149.50 GXC36D £149.50 GXC38D £103.95 CX33D £103.95 CX33	SAU Arm £14-25	8 or 15 ohm (K2006) £2·70	K6LCQ £26.00	
Figure F	SCUI Cartridge £5.95	Cone Tweeter 3 watt	Sansui SSIO £16.75	
TAPE DECKS (Insurance 2-00) Akai	Pioneer PLI2D £43·50	8 ohm (K2003) £1 · 55	*Headphone adaptor	CLOCK PADIOS
TAPE DECKS (Insurance 2-00) Akai 4000DS Reel to Reel 4000DB Reel 4000DB Reel to Reel 4000B Reel to Reel 40	-ABC	Horn Tweeter 8 ohm		
4000DS Reel to Reel 4000DB Reel to Reel to Reel 4000DB Reel to		(K2007) £6⋅50	extension lead Lit curly £1.50	
4000DB Reel to Reel 4000DB Reel to Reel 4000DB Reel to Reel 400DB Reel to Reel 40DB Reel to Reel 400DB Reel to Reel 419-50 400B Reel to Reel 419-50 400DB Reel to Reel 419-50 410 B Reel 419-50 416-95		Dome I weeter 8 ohm	CASSETTES	Murphy MV5600
Dolby 6149-50 CN28, CN216 CN28, CN28, CN28, CN216 CN28, CN216 CN28, CN216 CN28, CN216 CN28, CN216 CN28,		(K2011) £5.73	C40 C60 C90 C120	MW/VHF £22 95
GXC36D £103-95 CS38D £103-95 CS33D £79-95 CARTRIDGES & STYLII Ammorex £73-95 GXC82D £73-95 GXC82D £73-95 GXC82D £79-95 CARTRIDGES & STYLII Ammorex £73-95 GXC82D £79-95 CARTRIDGES & STYLII D/D Ampex (360) 45p-55p-75p-99p Ampex (360) 45p-55p-75p-99p-75p-14p-14p-14p-14p-14p-14p-14p-14p-14p-14		CN28 CN214) 41.46	Low Noise — 35p 45p 55p	
GXC38D			Philips — 55p 75p 110p	CACCETTE DECORDES
CS33D	GXC38D £103-95	- 11a, 0.033010. (01100) Ez 03	Memorex 65p 79p 110p 155p	
Akai CR81D 8-track Rec. player GXC82D	CS33D £79 · 95	CARTRIDGES & STYLII	Ampex (360) 45p 55p 75p 99p	
SPEAKERS Chassis Speakers Chromium Chasser Speaker Chromium Chasser Speakers Chromium Chasser Speakers Chromium Chasser Speaker Chromium Chromi	Akai CR81D 8-track Rec.	D/D	Ampex	
SPEAKERS		Cart. Styli		
SPEAKERS GP91/2SC or 3CS (ster. comp) Grown of the comp of t	GXC82D £93.95	ACOS £ £		
Chassis Speakers EMI (Plain) 13in x 8in, 3, 8 or 15 ohm Bass unit £2·30 with Single Tweeter (only 8 ohm) with Twin Tweeter only 8 ohm or 15 ohm 8 ohm or 15 ohm 8 ohm or 15 ohm 8 in x 8in Bass unit 15 watt Dualcone 8 ohm £2·55 Bills Stereo Test Cassette £2·15 Cassette Racks (hold 2) 6 cassette Racks (hold 8) 6 casse				20100, 0000.
Ster. cryst. Stereo Test Cassette Cassette (21-15) Stereo Test Cassette Rotating Racks (hold 20) Stereo Test Cassette				BABIO 64465
Cassette Rotak (hold 6) Cassette Rotating Racks Cassette Rotatin			BIB Stereo Test Cassette #2.15	
Ster. ceram. 1-75 1-25 Cassette Rotating Racks Chold 20 Cassette Carrying Case Ca	3 8 on 15 ohm Barr in 43.30			(Mains/Batt.)
(only 80hm)			Cassette Rotating Racks	Murphy BA209 MVV/VHF £33-50
Vish Twin Tweeter only 8 ohm Vish Twin Twin Tweeter only 8 ohm Vish Twin Twin Tweeter only 8 ohm Vish Twin Twin Twin Tweeter only 8 ohm Vish Twin Twin Twin Twin Twin Twin Twin Twin	(only 8ohm) £2.45	GPIOI cryst.	(hold 20) £3·50	
only 8 ohm Type 350 Kit 15 watt 8 ohm £4:25 13 in x 8 in Bass unit 15 watt 8 ohm or 15 ohm 8 in x 5 in 10 watt Dualcone 8 ohm £1:60 8 in x 5 in 10 watt 8 ohm £2:70 6 in 0 watt 8 ohm £1:00 care wath[6:00 watt 8 ohm £1:00 care w	with Twin Tweeter	comp. 90 —	Cassette Carrying Case	
Type 350 Kit 15 watt 8 ohm £8.25	only 8 ohm £4 · 25	GP104 ster.	(hold 18) £1.95	& SYSTEM
13 in x 8 in Bass unit 15 watt 8 sR X5M or X5H Cryst. comp. 1-75 1-25 8 charack H/Cleaner Demagnetiser 8-track Carrying Cases 61-60 SCSM ster.'ceram. 2-75 1-25 SCSM ster.'ceram. 2-75 SCSM ster.'	Type 350 Kit 15 watt 8 ohm £8 · 25	ceram. I · 75 I · 25	8-Track Cartridge Blanks	
8 ohm or 15 ohm 8 in x Sin 10 watt 8 ohm 6 in 0 watt 8 ohm 6 in 0 watt 8 ohm 6 in 10 watt	13in x 8in Bass unit 15 watt			Hanimex HIOI £39 · 95
15 ohm	8 ohm or 15 ohm £4·95		Strack H/Cleaner	Hanimex HKC5060 8-track
Sin x Sin 0 watt Dualcone 8 ohm 61/2 70 Cryst. ster. 2 · 00 1 · 25 SCSM ster. ceram. 2 · 75 1 · 25 SCSM ster. ceram. 2 · 75 1 · 25 SCSM ster. ceram. 2 · 75 1 · 25 SCSM ster. ceram. 2 · 75 1 · 25 SCSM ster. ceram. 2 · 75 1 · 25 SCSM ster. ceram. 2 · 75 1 · 25 SCSM ster. ceram. 2 · 75 1 · 25 SCSM ster. ceram. 2 · 75 1 · 25 SCSM ster. ceram. 2 · 75 1 · 25 SCSM ster. ceram. 2 · 75 1 · 25 SCSM ster. ceram. 2 · 75 1 · 25 SCSM ster. ceram. 2 · 75 1 · 25 SCSM ster. ceram. 2 · 75 SCSM ster. ceram.				Anitrilling + Speaker £110.32
Dualcone 8 ohm	Sin v Sin 10 wass		8-track Carrying Cases	
Dualte 8 ohm \$\frac{6}{4}^* \ 10 \text{ watt 8 ohm \$\frac{6}{4}^* \ 10 \text{ watt 8 ohm \$\frac{6}{4}^* \ 10 \text{ watt 8 ohm \$\frac{6}{4}^* \ 12 \text{ on } \text{ watt 8 ohm \$\frac{6}{4}^* \ 50 watt 8 ohm \$	Dualcone 8 chm 42.70		(BIB) £1.65	
Sin 10 watt 8 ohm 24 · 50 9TAHC or 12 in 20 watt 8 ohm 26 · 50 9TAHC or 12 in 20 watt 8 ohm 26 · 50 9TAHC or 12 in 20 watt 8 ohm 27 · 25 12 in x 4 in 3 or 8 ohm 27 · 25 27 in x 4 in 3 or 8 ohm 27 · 25 27 in x 4 in 3 or 8 ohm 28 · 27 in x 4 in		SONOTONE	` '	Hitachi Car Radio
12in 20 watt 8 ohm	8in 10 watt 8 ohm £4-50	9TAHC or	TAPES & CASSETTES	
8in 4 or 15 ohm	12in 20 watt 8 ohm £6 · 95	9TAHC/G	Stnd LP DP Cases	
7 in x 4in 3 or 8 ohm	8in 4 or 15 ohm €2 · 25	(Diam.) I 85 I 25	5" 55p 65p 1.00 20p	
Elac 8in 8 ohm Dualcone £2.70 AT55 I .95 — High frequencyAmpex CSW £57.00 Elac 10in 8 ohm Dualcone £3.75 EMPIRE 999 REX 3.95 — 5" — I .40p I .55p Baker Group 25 I 2in 8 or I .95 GBSG 2 95 I .95 AKAI Metal Reel 7" £1 99 6.7.5 or 9 volt output £2.95	7 in x 4 in 3 or 8 ohm £1 · 20		7" 90p 110p 1.95 30p	
Elac 10in 8 ohm Dualcone Elac 10in 8 ohm Dualcone Baker Group 25 12in 8 or 15 GOLDRING GOLDRING 15 AKAI Metal Reel 7" 61 40p 1 55p 7" — 1 40p 1 55p 7" — 1 90p 2 95p Battery Eliminators 240 in 62 95	Elac 6½ "8 ohm 10 watt £2.65	AUDIO TECNICA	High frequencyAmpex	CSW £57.00
Baker Group 25 12in 8 or GOLDRING 7" — 1-90p 2-95p Battery Eliminators 240 in 15 ohm 67 95 G850 2 95 1 95 AKAI Metal Reel 7" £1 99 6.7-5 or 9 volt output £2-95		EMPIRE 999 REX 1.05	5" — I-40p I-55p	
15 ohm 67 95 G850 2 95 1 95 AKAI Metal Reel 7" £1 99 6. 7 5 or 9 volt output £2 95		GOLDRING	7" — I-90p 2-95p	Battery Eliminators 240 in
13 011111			AKAI Metal Reel 7" £1 99	6, 7 · 5 or 9 valt output €2 · 95
ALL MERCHANDISE FULLY GUARANTEEU	15 01111			A PROPERTY OF THE PERSON NAMED IN
		ALL MERCHANDISE	FULLI GUARANT CCD	

NEWMAR LECTRONICS

Mail Order Dept PW4
Belmont St, Monton,
Eccles, Manchester,
Tel: 061-789 5268

Manchester 30-32 Shudehill, tel 061/832 7710 Leeds 4 New Market St tel 0532 42708 Liverpool 15 Whitechapel tel 051-236 0738



Electronics Ltd.

WINDSOR BERKS. 58/60 GROVE RD:

MOMEY BACK IF NOT SATISFIED. LARGE STOCKS. LOW PRICES, ALL BRAND NEW TOP CRADE FULL SPEC DEVICES, CALLERS WELCOME, CATALOGUE/LIST PREE SEND SAE. BARCLAYCARD & ACCESS & POST. SEND C.W.O. ADD VAT TO ALL PRICES IN U.K.Pap 15p. EXPORTS SOP

Dicital Displays



SLA7 RED LED 0.3 DIGIT 0-9DP 89p ea GREEN&YELLOW £1.40 JUMBO LED 0.6" 747 DISPLAY £2.25 ea. 3015F 0-9DP £1 ea. ZENON FLASH TUBE .Data 15p.

LEDS red 13P

LEDS 209 STYLE ONLY 13p ea TIL 209 WITH CLIP RED 15p ea TIL 211 & CLIP GREEN 29p ea LARGE 0.2" & CLIP RED 17p ea LARGE 0.2" CLIP GREEN 30p ea 209 STYLE OR .2"0RANGE 39p ea INFRA RED LED 11.2N5777 33p.

PHOTO IC 81P TEC12 PHOTO AMP/SCMITT/RELAY DRIVER or LED TTL INTERFACE 81p



FLUORESCENT LIGHTS 12V MADE IN UK 8 WATT 13" £3. 13W 22" £3.50

OIGITAL CLOCK

IC AY51224 4 DIGIT CLOCK £3.75 MM5311/4 6 DIGIT CLOCK £7

CASSETTE £13-75

NEW 8tk CARTRIDGE MECHANISM CR STEREO CASSETTE MECHANISM f13.75 Suitable for 'PW ASCOT' recorder with heads etc.SEND 15p for DATA

7400 GATES 13p 7404 INVERT 17p 7401/2/10etc14p 7413 SCMITT 31p

INTEGRATED CIRCUITS

CIM N	0113
709 Didi 1 20m	LM377 2x2W£2.87
555 TIMER 54p	LM380 2W AF 89
703 RF/IF 28p /	LM381 2xPre £2
709 T099 23p	LM3900 4xOPA69p
709 DIL 14 28p	MC1303 £1.20
710 DIL 14 34p	MC1306 49p
723 Reg. 54p	MC1310&LED£2.65
741 DIL 8 27p	MC1312 SQ £2.10
741 DIL 14 29p	MC1330 69p
741 TO99 29p	MC1339 2xPre £1
747 2x741 70p	MC1350 55p
748 DIL 8 🛶 33p	NE536 fetOPA £2
	NE540 Driver £1
7812 & 15 £1.40	NE550 2vRef 79p
76013 6W AF £1	NE555 Timer 55p
8038 SIG GEN £3	NE559 2x" £1,20
CA3028 £1	NESSO PLL £3.15
CA3046 55p	NE661 PLL £3.15
CA3048 £2	NE562 PLL £3.19
CA3052 £1.50	NE565 PLL £2.69
CA3054 £1	🚜N72709 709 28p 🌓
LM300 2-20V £2	SN72741 741 26
LM301 OP/ 45p	SN72748 748 33p
LM304 0-40V £3	SN76660 IF £1
LM307 OPA 49p	SN76611 IF£1.25
	TAD110 &IF £2
LM309K 5V £1.48	
LM372 IF £1.80	ZN414 RX £1.09

SPECIAL OFFERS

2N3055 FULL HIGH PPEC 115W 37p 741C 8PIN DIL 27B.MFC4000B 33p NE555 TIMER 55p, N414 RX £1.09 BC109 9p.2N3819e 16p.BFY51 15p

79N TTL 7473/74/76 7475

45p 7490 52 7491/2/3/4 59 74100 74175 £1 52p 59p 7440 BUFFER 14p 7447 DRIVER 89p 7470 & 7472 29p 74121 32p 74123 59p 74141(&7441)73p

TRANSISTORS & DIODES

r	Price each		WARREN END	
	AC127 & 128	16p	MATCHING	16p
p	AC187 & 188	19p	INS. BUSH SE	710p
	AD149	43p	TIP 41	70p
	AD161 & 162	33p	TIP 42	88p
	BC107 & 108	9p	TIP 2955	90p
	BC109	10p.	TIP 3055	55p
			TIS43 see2N	
	BC147/8/9	10p	ZTX109&301	
	BC157/8/9	12p	184001	13p
	BC167/8/9	12p		MAN THE
	BC177/8/9	18p	1N4004 & 7	7p
	BC182/3/4A41		N4148 # 91	
	BC212/3/44 & I		2N697	14p
	BCY70/1/2	17p_	2N706&8	11p
	BD131 & 132	39p	2N2646 UJT	32p
	BFR51	-	2N2904 & 5	20p
	BFR50/51	23p	2N2926royg	9p
	BFR50/51	23p	2N3053	17p
,	BFR88 250V	29p	2N3055 115W	37p
	BFY50/1/2	15p	2N3563 & 64	16p
		1 op	2N3614	49p
á	BSX19/20/21	16p	2N3702 & 3	9p
r	MJE2955	90p	2N3704 & 5	10p
	MJE3055	65p	2N3706 & 7	9 p
	MPU131 PUT	49p	2N3708 & 9	8p
	OA91 OA81	6p	2N3710 & 11	10p
	OA81 & OA91	6p	2N3819E FET	16p
	TIP 29 & 30	52p	2N3823E FET	17p
	TIP 31 & 32	69p	2N3904/5/6	15p
	FULL SELECT	TOU TA	OUR FREE L1	
	LODD DEPECT	TOH TH	OUN THEE PT	010,

NEW TRAMPUS FULL SPEC PAKS 10 RED LEDS our choice £1 PAK C 4 2N3055 £1 D 12 BC109 £1 PAK E 10 BC182 £1 F 11 2N3704 £1 PAK G 8 BFY51 £1.H 9 2N3819££1 PAK J 9 2N3053 £1.K 40 1N914 £1

BZY88 400mW ZENER DIODES 9p 1A/50V SCR 36p TAG1/400 55p C106 & 7 SCR D1 4A/400V 53p SC146D TRIAC 10A 400V 75p BRIDGE RECT 20p BR100 DIAC 25p

VERO PINSX36 28p. COPPER CLAD VEROBOARD 0.1

21"x5" 29p 21x3?" 26p,37x3?"31p. 3?"x5" 31p 32x 17" £1,50 DIL IC's BOARDS 6x41" £1.50 24 way edge connector 6Op. 36 way 90p. PLAIN 3†"x17" fl. FACE CUTTER 45p.FEC ETCH PAK 5Op

DALOPEN69p DECON NO MESS ETCH PAK NEW 69p DECON DESOLDER BRAID REEL 59p

HEATSINKS 5F/T05 & 18F/T018 5p ea.TV4 15p, TV3/T03 16p.EXTRUDED 4" 4Y1 29p.

TGS308 GAS DETECTOR £1.80 ea. LOGIC PROBE TTL TESTER PEN £5

CAPACITORS

CERAMIC 22pf to 0.1uf 50v 5p. ELECTROLYTIC:10/50/100 uf in 10v 5p.25v 6p.50v 8p.2uf/10v 5p 1000 uf/25v 18p.200/500 25v 9p POTENTIOMETERS (POTS) AB or EGIN

LIN or LOG ROTARY 13p.SWITCH 14p DUAL 45p.SLIDERS 29p.STEREO 57p KNOBS 7p.PRESETS 6PRESISTORS 11p SWITCHES: SPST 18p. DPDT 25p.

DIN PLUGS ALL 12p. SOCKETS 10p. ALI CASES AB5/AB7 50p.AB13 65p TRANSFORMERS 1A 6v6v or 12v12v Only f1,34.100mA type CT 75p.

Oll sockets TEXAS GOLD LOW PROFILE 8.14.& 16 PIN 13p SOLDERCON STRIPS 100 PINS 50p.1K £3.

THE NEW NELSON-JONES FM TUNER



PUSH-BUTTON VARICAP DIODE TUNING (6 Position)

('WW' JUNE '73)

Exclusive Designer Approved Kits

What are the important features to look for in an FM tuner kit? Naturally it must have an attractive appearance when built, but it must also embody the latest and best in circuit design such as:-

MOSFET front end for excellent cross modulation performance and low noise.

MOSPET from the for excellent cross modulation performance and low libise 3 GANG funing for high selectivity.

VARICAP tuning dlodes in back to back configuration for low distortion.

CERAMIC filters for defined IF response.

INTEGRATED circuit IF amplifiers for reliability and excellent limiting/AM rejection.

PHASE LOCKED Stereo decoder with Stereo mute, see below LED fine tuning indicators.
PUSH BUTTON tuning (with AFC disable) over the FM band (88-104) IC STABILISED and S/C protected power supply.
CABINET double veneered against warp.

The Nelson-Jones Tuner has all of these features and many more, and more importantly the design is fully proven not just with a few prototypes but with many thousands of working tuners spread across the world. Typ. Specn: 20 dB guleting 0.75uV, Image rejection -70dB.I.F. Rejection -85 dB

Basic tuner module prices start as low as £12.96, with complete kits starting at £26.95 (mono) + P.P. 65p, and of course all components are available separately.

Our low cost alignment service is available to customers without access to a signal generator Please send large SAE for our latest price lists which details all of the many options and special low prices for complete kits. All our other products remain available.

PORTUS AND HAYWOOD PHASE LOCKED DECODER (W.W. Sept. '70). Still the lowest distortion P.L. decoder available. THD typically 0·05% (at Nelson-Jones Tuner O/P level)! Supplied complete with Red LED.
Price £7:02 when bought with a complete N-J tuner kit or £8:29 if bought separately (P.P. 21p)

PLEASE NOTE. Existing tuners are readily convertible and kits/parts are available for this purpose

TEXAN AMPLIFIER. We have designed the tuner case and metalwork to match the Texan amplifier (see photograph). Complete designer approved Texan kits are available at £33-48 plus P.P. Sop including Teak Sleevs.



NEW LOW COST STEREO TUNER Available as basic or complete kits

INTEGREX LIMITED, P.O. Box 45, Derby, DEI 1TW Phone Swadlincote (028387) 5432 Telex 377106

Basic stereo tuner £15 post free. Basic mono tuner £12 post free. 6 position push button units with Integral pots £3-24.

TYP. SPECIFICATION 24V for 30dB S/N Image rejection 40dB



No alignment required. Mullard LPt186 front end module used with Ceramic IF and IC amplifler. Push button tuning (6 position) with Interstation Mute, restricted range AFC, single LED tuning indicator, phase locked IC decoder, and complete metalwork and veneered cabinat. Complete with IC regulated PSU and full assembly instructions. (Mechanically identical to N-J Tuner.) Access

PRICE Complete stereo kit £28-42 Complete mono kit £24 19 P. & P. 65p

VAT at 8% is included in all prices



SOUND TO LIGHT UNIT

Add colour or white light to your amplifier. Will operate 1, 2 or 3 lamps (maximum 450w) Unit in all ready to work. plus 95p VAT and 27'95 plus



PORTABLE CABINET OFFER

nicely made portable abinet, soft padded black cabinet, soit padded black finish intended for portable stereo system. Dimensions as sketch. With motor board cut out for Garrard SP 25. This was obviously a very costly cabinet originally made for a de-luxe record player.



iginally made for solution record player.
Hered at 21.95 plus 21 carriage, free sith the Garrard or BSR record decks. free if bought

LIGHT DIMMER KIT

For dimming up to 250w without heat sink or 750w with heat sink. This comprises, quadrac. variable control potentiometer, condenser, resistors, tag strip for mounting and data. Price 21-30. 5 amp Industrial Model 23-30.

RELAY BARGAIN

Type 600 relay, 2 changeover one open and one closed contact. Twin 500 ohm colls make this suitable for closing off DC 6v, DC 2v, DC 2v or AC mains using resistor and rectifier, 33p each. Resistor and rectifier 25p extra.



MAINS MOTOR

MAINS MOTOK
Precision made—as used in
record decks and tape recorders—ideal also for extractor
fans, blower, heaters, etc. New
and perfect. Snip at 75p.
Postage 20p for first one then
10p for each one ordered.
1" stackmotor \$1.04.
12" stackmotor \$1.20. stackmotor £1.20.

ISA ELECTRICAL PROGRAMMER



learn in your sleep:
Have radio playing and kettle boiling as you waske — switch on lights to ward off intuders have a warn house to come home to.

All these and many other things you can do if you invest in an electrical programmer. Clock by famous maker with 15 amp. on/off switch. Switch-on time can be set anywhere to stay on up to 6 hours. Independent 60 minute memory jogger. A beautiful unit. Price \$2.30 + 20p p. & p. 20p p. d. p. logger. A beautiful unit. Price 22:30 + 20p p. or with glass front, chrome bezel. 21:00 extra

WINDSCREEN WIPER CONTROL

Vary speed of your wiper to suit conditions. All parts and instructions to make, \$2.75.



6 DIGIT COUNTER

BIGIT COUNTEL
Resettable. 440 ohm coil up
to 25 impulses per second.
Ex-equipment but guaranteed
perfect, £2.85 cach.
4 digit counter as specified for
telephone charge calculator 93p.

PRESSURE SWITCH

PRESSURE SWITCH
Containing a 15 amp change over switch opered by a disaphragm which opered by a lisaphragm which opered by a lisaphragm which operated by all which are through a small metal tube. The operating pressure is adjustable but is set to operate in approx. 10 in. of water. These are quite low pressure devices and can in fact be operated simply by blowing into the linlet tube. Original use was for washing machines to turn off water when tub has reached correct level but no doubt has many other applications \$1.72, each.

NUMICATOR TUBES

for digital instruments, counters, timers clocks, etc. Hi-vac XN.3. Price 99p each, 0 for 29.

MULLARD AUDIO AMPLIFIERS

All in module form, each ready built complete with heat sinks and connection tags, data supplied.

Model 1153 500mW power output 90 Model 1172 750mW power output 41-07 Model EP9000 4 watt Dower output 42-04 Model EP9000 4 watt

Send postage where quoted—other items, post free if order for these items is £6.00, otherwise add 30p.



TERMS:-ADD 8% V.A.T. power output 22:00 EP 9001 twin channel or stereo

CENTRIFUGAL BLOWER
Ministure mains driven blower centrifugal type blower
unit by Woods. Powerful but specially built for quick
running—driven by cushioned induction motor with
specially built low noise bearings. Overall size 44" 44"
** When mounted by fiange, air is blown into the
equipment but to suck air out, mount it from centre
using clamp. Ideal for cooling electrical equipment or
fitting into a cooker hood, film drying cabinet or for
removing flux snioke when soldering, etc. etc. \ real
bargain at 42.50p.

TANGENTIAL HEATER UNIT

This heater unit is the very latest type, most efficient, and quiet running. Is as fitted in Hoover and blower heaters. Comprises motor, impeller. 2kW element allowing switching 1, 2kW, and with thermal safety cut-out. Can be fitted into any metal lined case or cabinet. Only needs control switch, 22°75. Don't miss this. Control Switch, 55p. P. & P. 30p.



SHORTWAVE CRYSTAL SET

Although this uses no battery it gives really amazing results. You will receive an amazing assortment of stations over the 19.25.31.39 metre bands—Kit contains chassis front panel and all the parts. £1.25—crystal car-

DRILL CONTROLLER NEW IKW MODEL

RELY INV MODEL Electronically changes speed from approximately 10 revs. to maximum. Full power at all speeds by finger-tip control. Kit includes all parts, case everything and full instructions. £2.25 plus 25p post and linearance. Made up model also available. £3.25 plus 30p post & p.



RADIO STETHOSCOPE
Easiest way to fault find traces-signal from aerial to
speaker, when signal stops you've found the fault.
Use it on Radio, TV, amplifier, anything. Complete
kit comprises two special transistors
and all parts including probe tube and
crystal earpiece, \$2:20 twin stetho-set
instead of earpiece \$3p extra post and
ins. 20p.



STEREO RADIO CABINET

Long, Low and Modern. Teak veneered with sliding front and tapered legs. Speaker spaces each end. Size approx. 4ft. 2in × 15in × 16in. Probably cost over \$20 to make. Our Price \$8:10 each.



In metal case with carrying handle, heavy fly wheel and capstan drive. Tape speed 3!. Mains operated on metal platform with tape head and guide. Not new but guaranteed good working order. Price \$1.95 plus \$1 post and insurance.



GENERAL PURPOSE SWITCH
Responds to moisture, heat, light, touch, time delays, etc. etc. Basic kit comprising relay, transistors, diodes. condensers, resistors, etc. and data—only 21-50 + 30p post.



AMMETERS

-moving iron so AC/DC-ideal for chargers etc. 2" sq. full visio 0-8 amp 95p. 14" round 0-2 amp 55p, 0-3 amp 65p, 0-4 amp 75p.



Just what you need for work bench or lab.
standard 15 amp fused pluge and on/off switch with neon warning light. Supplied
complete with 6 feet of flex cable. Wired up ready to work. 42.75 plue 25 p P. & P.

7 WATT STEREO AMPLIFIER

Again made by the famous GEC company. This has exceptionally good tone quality and is complete with rectifiers and smoothing, so requires only a mains transformer. Treble, Bass, Volume and balance controls. 15 ohn output. Inputs for tuner, ceramic pickup, etc. Price 26 plus 30p post and insurance.

SPIT MOTOR

6



200-250V induction motor, driving a Carter gearbox with a 14" output drive shaft running at 5 revs p.m. Intended for roasting chickens, also for driving models—windmills, coloured disc lighting effects, etc. 22:50 plus 20p post and ins.

EXTRACTOR FAN

Cleans the air at the rate of 10,000 cubic ft. per hour. Suitable for kitchens, bathrooms, factories, changing rooms, etc., it's so quiet it can harrily be heard. Compact, 5½" casing with 5½" fan blades. Kit comprises motor, fan blades, sheet steel casing, pull switch, mains connector, and fixing brackets. \$2.75 + 20p P. & P.



6v and 12v 6v and 12v

J. BULL (ELEGTRICAL) LTD.

(Dept. PW), 102/3 TAMWORTH ROAD, CROYDON CRO IXX

NEW ITEMS THIS MONTH

The bargains in this column are just some of the items which appeared in the January supplement to our catalogue. You can receive the next 12 our catalogue. You can receive the next 12 applements and catalogue when published Maech

Room Thermostat, Mercury Switch type with thermometer for low voltage gas central heating systems etc. Made by a famous American Company, these are of very neat appearance, in plastic case, easily mounted but the most important feature is that they cut in and out quickly, thus maintaining a very steady temperature. Price \$2.85

crature. Price 41.85

"Tature hast You have probably from time to fime wanted to warm something by actually winding the heater around it. You can do this now for we have in stock flexible elements comprising quasifier tape approx. 4" wide, approx. 4" thick. 15 ft. long. The element is embedded into this. and fully insulated from the outside. The ends can be taken directly into a 13 amp plug or plastic junction box which we can supply at 24p extra. These are rated at 100 watts but you can reduce this if you wish by joining two in series. Price of element is \$1.05. no extra for postage if ordered with other items totaling £5 or over.

Self-adhesive paper discs 2", ideal for marking leads as you take them off, or for providing quick insulation of soldered or twisted joints. 50p per 1,000 or 28 per box of 5,000.

insulation of soldered or twisted joints. 50p per 1,000 or \$2 per box of 5,000.

Pick-up cartridges. We have two extra special bargains this mooth—"Sure" magnetic type number 77DB for \$2.50 and "Ronette" turnover mono cartridge standard replacement for DC400 series price \$1.50.

series price 21-50.
Again available—two items which have been held up through supply difficulties: the domestic light dimmer kit at 21-50 and the industrial 5 amp dimmer at 23-50 are once again available for immediate despatch.
Multi-core cable, 7 cores each pvc insulated and colour coded, screened overall then with pvc outer covering. A miniature cable diameter approx.² price 20p per metre available in lengths up to 15 metres.

15 metres. Pluorescent control trays made for Philips so therefore obviously firstclass. These are for two 40 watt 4 ft. tubes and contain quick start transformer, condensers all wired tube ends and provided with Terry clips to hold the tubes. A real bargain at \$2.75 each + 30p each post.

Break before make wafer switch, We are sometimes asked for these but we do not normally keep a range. However, we have some 2 pole way with 13 wafer, a substantially well-made switch which we can offer for 45p each.

Universal switch described in a recent edition of

switch which we can offer for 45p each.
Universal switch described in a recent edition of
Everyday Electronics. This switch can be made to
respond to many types of variables, for instance
emperature changes through a thermister,
humidity changes through a vapour sensing device,
or just a piece of veriboard put out to each the
rain or immersed in the flowerpot, light level
changes through a photo-resistive cell and many
others. This is basically a relay operated by a
sensitive transistor circuit. We can supply relay,
transistor and all the ancillary parts for £1-50.

Foot switches. We are producing a range of fool

transistor and all the ancillary parts for \$1.50. Foot switches We are producing a range of foot switches of robust construction and suitable for making and breaking circuits of up to 10 amps at mains voltage. Model A operates single changeover switch and the price is \$1.75. Model C B operates two changeover switches and is \$2.25. Model C has three changeover switches and is \$2.25. Model C has three changeover switches and is \$2.75. All are fully assembled ready for connection.

are tuly assembler ready for connection.

A useful power pack giving 250v DC and 6.3v AC mounted on chassis size 9½" × 5" × 5" high comprising double wound fully impregnated mas in transformer and full wave rectifier with adequate smoothing condensers. Used but guaranteed in good order. Price only \$1.50 + 75p post.

good order. Price only \$1.50 + 75p post.

Mains Transformers. We have a good range of
mains transformers covering most requirements
and we can still supply at reasonable prices.

Many are available in large quantities and we will
be glad to supply at our usual quantity cash
discounts which are as follows:-10-49 10%;
50-99 15%; 100-499 20%; 500 up 25%. Prices
as list below. We have not included auything for
postage, but you should allow for this when
overleader. All standard 230-250 volt primaries.

ordering.	All	standard	230-2	50 volt p	rimarie	S.
or dering.				• • • • • •		£ p
lv				l amp (special)	1.75
2-4v				5 amp		-85
6-3v				2 amp		1.00
6-3v				3 amp		1.50
9v				1 amp		-95
9v				3.5 amp		1.95
12v				500 mA		1.00
12v				1 amp		1.00
6.5v-0.6	5 v			Lamp		1.85
18v				1 amp		1.25
20 v				anip		1.00
24v				lamp		1.50
24v				3 amp		3-50
12-0-12v				50 m A		1.20
6-0-6v				ŏ0mA		1.20
8-0-8v				1 amp		1.25
18-0-18v				2 amps		8.50
25v				li amp		1.95
50v 2 an	ıp &	: 6·3 v 1 a	mp			5.50
60v 5 an	np &	ov lam	p ¯			7.50
27v				8 amp		4.50
				37 amp		22.00
80v tapp	ed 7	75 v & 70 v	7	4 amp		5.50
230v-601	nA o	& 6·3v		1.5 amj	P8	1.75
275-0-27	5v a	t 90mA	k 6∙4v	3 amps		2.25
EHT Tr	ansf	ormer 500)0 v			
at 23n	n A			(interm	ittent)	5.50
Charger	Tra:	nsformera	1			1 05

1081

he largest selection

EX-COMPUTER STABILISED POWER MODULES

Complete with circuit diagrams etc. 99p each plus 22p p. & p.

LOW COST CAPACITORS

-01μF 400v. 500μF 50v. Elect.

FIBRE-GLASS PRINTED CIRCUIT BOARDS 165 × 4" approx. 2 for 55p

DECON-DALO 33PC Marker Etch resistant printed circuit marker pen

VEROBOARDS

Packs containing approx., 50sq. ins. various sizes, all 1 matric 55p

REPANCO CHOKES & COILS

RF Chokes
CH1. 2-5mH 29p
CH3. 7-5mH 31p
CH4. 10mH 33p
CH5. 1-5mH 28p

DRX1 Crystal set 81p DRR2 Dual range 45p

COIL FORMERS & CORES

NORMAN 1" Cores & Formers 8p

SWITCHES

DP/DT Toggle 36p SP/ST Toggle 30p

14" and 20mm. 100mA. 200mA, 250mA, 500mA, 1A, 1-5A, 2A QUICK-BLOW 5p ea.

EARPHONES

Crystal 2-5mm plug 42p Crystal 3-5mm plug 42p 8 ohms 2-5mm plug 22p 8 ohms 3-5mm plug 22p

DYNAMIC MICROPHONES

B1223. 200 ohms plus on/off switch and 2.5mm and 3.5mm plugs £1.85

3-WAY STEREO HEAD-PHONE JUNCTION BOX

2-WAY CROSSOVER NETWORK

K 4007, 80 ohn:s Imp. Insertion loss 3d B 41-21

CAR STEREO SPEAKERS

BI-PAK

CATALOGUE AND LISTS Send S.A.E. and 10p.

INSTRUMENT CASES



Dino			1100)			
No. I.	ength	W	idth	He	ight	Price
BVI	8"	×	51"	×	2"	£1 85
BV2	11"	X	6"	>.	3"	#1.75
ALL	MIN	IUN	BO	KES		
BA1	51"	×	21"	×	11"	49p
BA2	4"	×	4"	×	11 "	49p
BA3	4"	×	2#"	×	11"	49p
BA4	51"	×	4"	×	11"	58p
BA5	4"	×	21"	×	2"	49p
BA6	3"	×	2"	×	1"	42p
BA7	7"	×	5"	×	21"	85p
BAB	8"	×	6"	×	3"	£1.10
BA9	6"	×	4"	>	2"	70p
P &r	P 15p	on e	ach box	k .		

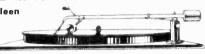
VISIT OUR COMPONENT SHOP

18 BALDOCK ST., WARE, Herts. (A10)

*Open Mon.-Sat. 9-5,30 p.m. Tel. 61593

BIB HI-FI ACCESSORIES

De Luxe Groov-Kleen Model 42 £1 -95 Chrome Finish Model 60 £1:50



Ref. R Stylus & Turntable Cleaning Kit 34p Ref. 36A. Record/Stylus Cleaning Kit 33p Ref. 43. Record Care Kit \$2.42

Ref. 31. Cassette Head Cleaner 58p Ref. 32. Tape editing Kit 21-68 Model 9. Wire Stripper/Cutter 83p

Ref. 46. Spirit level 62p Ref. P. Hi-Fi Cleaner 31p Ref. 32 A Stylus Balance #1-87 Ref. J. Tape Head Cleaning Kit 62p Ref. 56. Hi-Fi Stereo Hints & Tips 42p Ref. 45. Auto changer groove cleaner 21-08

ANTEX SOLDERING IRONS PLUGS AND SOCKETS

X25 25 watt #2:05 CCN 240. 15 watt £2.48 Model G. 18 watt £2.26 SK2. Soldering Kit \$3.25 STANDS: ST3, Suitable for all models £1 SOLDER: 188WG Multicore 70z \$1.61 228WG 70z \$1.61. 188WG 22ft 51p 228WG Tube 33n

ANTEX BITS and ELEMENTS

Bits No. 102 For model CN240 3/32" 104 For model CN240 3/16' 42p 1100 For model CCN240 3/32" 42p 1101 For model CCN240 3/R 1102 For model CCN240 1' 1020 For model G240 3/32" 42p 1021 For model G240 1/8" 42p 1022 For model G240 3/16" 42p 50 For model X25 3/32" 48p 51 For model X25 1/8" 48n 52 For model X25 3/16" 48p ELEMENTS. ECCN 240 41-82 ECN 240 41-30 EX 25 #1-16 EG 240 £1:07

ANTEX HEAT SINKS 10p

V.A.T. included in all prices. Please add f0p P. & P. (U.K. only). Overseas orders—please add extra for postage.

NEW COMPONENT PAK BARGAINS

ı	No.	Qty.	Description :	Price
	CI	200	Resistors mixed values appropriately weight	0.54
	C5	150	Capacitors mixed values apprount by weight	0.54
	C3	50	Precision Resistors 1%, mixed values	2% 0.84
	C4	75	ith W Resistors mixed preferr	eđ 0 54
ı	C5	5	Pleces assorted Ferrite Rods	0.54
ı	C6	2	Tuning Gangs, MW/LW VHF	0.54
	C7	ι	Pack Wire 50 metres associated	orted 0.54
Ì	C 8	10	Reed Switches	0.54
i	C 9	3	Micro Switches	0.54
İ	CIO	15	Assorted Pots & Pre-Scts	0.54
	C11	5	Jack Sockets 3 × 3.5m 2 Standard Switch Type	0.54
	C12	30	Paper Condensers preferred types mixed values	0.54
ı	CI3	20	Electrolytics Trans. types	9.54
	C14	}	Pack assorted Hardware Nuts/Bolts, Grommets etc.	0.54
ı	C15	5	Mains Slide Switches	0.54
١	C16	20	Assorted Tag strips & Panels	0.54
	C17	10	Assorted Control Knobs	0.64
	C18	4	Rotary Wave Change Switches	0.54
1	CI9	2	Relays 6-24V Operating	0.54
	C20	1	Pack sheets of Copper Lamina 20 sq. ins	0.54
-		_		_

1	P8 1	D.I.N. 2 Pin (Speaker)	0.1
1	PB 2	D.I.N. 3 Pin	0.1
ĺ	PB 3	D.I.N. 4 Pin	0.1
1	P8 4	D.I.N. 5 Pin 180°	0.1
1	P8 5	D.I.N. 5 Pin 240°	0.1
Ì	P8 6	D.I.N. 6 Pin	0.1
ì	PB 7	8.I.N. 7 Pin	0.1
Į	PB 8	Jack 2-5mm Screened	0.1
ì	PB 9	Jack 3-5mm Plastic	0.1
1	PB 10	Jack 3.5mm Screened	0.1
	PS 11	Jack 1" Plastic	0.1
	PB 12	Jack 1" Screened	0.2
	PS 13	Jack Stereo Screened	0.3
	PS 14	Phono	0.1
1	PS 15		0.2
	PS 16	Co-Axial	0.1
1	-		
		E SOCKETS	
	PR 21	D.I.N. 2 Pin (Speaker)	0.1

INLINE	SOCKETS
PB 21	D.I.N. 2 Pin (Speaker)
PS 22	D.I.N. 3 Pin
PS 23	D.I.N. 5 Pin 180°
PS 24	D.I.N. 5 Pin 240°
PS 25	Jack 2-5mm Plastic
PB 26	Jack 3-5mm Plastic
P8 27	Jack 1" Plastic
PB 28	Jack 1" Screened
PB 29	Jack Stereo Plastic
PS 30	Jack Stereo Screened
PS 31	Phono Screened
PB 32	Car Aerial
	0-1-1-1

BOOMERS
PS 35 D.I.N. 2 Pin (Speaker)
PS 36 D.I.N. 3 Pin
PS 37 D.1.N. 5 Pin 180°
PS 38 D.1.N. 5 Pin 240°
PS 39 Jack 2-5mm Switched
PS 40 Jack 3-5mm Switched
PS 41 Jack 1" Switched
PS 42 Jack Stereo Switched
PS 43 Phono Single
PS 44 Phono Double
PS 46 Co-Axial Surface
PS 47 Co-Arial Flush

LEADS

LS 1 Speaker lead 2 pin D.I.N. plug to open ends approx. 3 metres long (coded) 0.20

C	AΒ	LES	
CP	1	Single Lapped Screen	0.01
CP	2	Twin Common Screen	0.1
CP	3	Sterco Screened	0.15
CP	4	Four Core Common Screen	0.2
CP	5	Four Core Individually Screened	0.80
CP	6	Microphone Fully Braided Cable	0.10
CP	7	Three Core Mains Cable	0.0
CP	8	Twin Oval Mains Cable	0.0
CP	Ð	Speaker Cable	0.0
CP	10	Low Loss Co-Axial	0.1
=	==		

CARBON POTENTIOMETERS

١	rog and run	
ł	4.7K, 10K, 22K, 47K, 100K, 220K.	470K,
ı	1M, 2M	
Į	VC 1 Single less Switch	0.15
l	VC 2 Single D.P. Switch	0.28
l	VC 3 Tandem Less Switch	0.46
Ì	Log and Lin 47K, 19K, 22K, 47K, 190K, 229K, 1M, 2M VC 1 Single less Switch VC 2 Single D.P. Switch VC 3 Tandem Less Switch VC 4 1K Lin Less Switch	0.15

HORIZONTAL CARBON

VC 5 100K Log anti-Log

PRESETS
0-1 watt 0-06 each
100, 220, 470, 1K, 2-2K, 4-7K, 10K, 22K, 4K7, 100K, 220K, 470K, 1M, 2M, 4-7M

SOLVE THOSE STICKY PROBLEMS!

with SERES P

CYANOACRYLATE C2 ADHESIVE

The wonder bond which works in seconds-bond plastic, rubber. metals, transistors, components permanently immediately!

OUR PRICE ONLY 54p for 2gm phial.

BATTERY HOLDER

Takes 4, HP7's complete with terminal, clip and lead. 34p.

WORLD SCOOP

JUMBO SEMICONDUCTOR PACK

Transistors - Germ. and Silicon Rectifiers
Diodes - Triacs - Thyristors - I.C's ar
Zeners ALL NEW AND CODED. I.C's and

APPROX 100 PIECES

Offering the amateur a fantastic bargain Pak and an enormous saving—identification and data sheet in every Pak.

Only £2 p. & p. 20p

RECORD STORAGE CARRY CASES 7" EP. 18½" x 7" x 8", (50 records) 42:10 12" LP. 13½" x 7½" x 12½", (50 records) 22:95

CASSETTE CASES

Holds 12. 10" x 34" x 5", Lock & Handle

8-TRACK CARTRIDGE CASES

0.90

0.20

0.16

0.30

0.30

0.18

0.22 0.22

0.08

0.11

0.12

0.20

0.30

0.08 0.10 0.20

0.48

Holds 14, $13'' \times 5'' \times 6''$ £1.95 Holds 24, $13\frac{3}{4}'' \times 8'' \times 5\frac{5}{4}''$ £2.70. Both with lock and handle.

SPECIAL PURCHASE

2N2055. Billion Power Transistors NPN Famous manufacturers out-of-spec devices free from open and short defects—every one able 1 115w. T03. Metal Case.

OUR SPECIAL PRICE 8 for \$1

REPANCO TRANSFORMERS

240v. Primary. Becondary voltages available from selected tappings 4v, 7v, 8v, 10v, 14v, 15v, 17v, 19v, 21v, 25v, 31v, 33v, 40, 80 and 28v-0-25v.

Type MT50/1 MT50/1	Amps.	Price £1.98 £2.49	P & P 45p 48p
dT50/2	2	£8·80	60p

CARTRIDGES

ACO8	
GP91-18C 200mV at 1-2cm/sec	\$1.35
GP93-1 280mV at 1cm/sec	£1.85
GP96-1 100mV at 1cm/sec	£2-80
TTC	
J-2005 Crystal/Hi Output	£1-05
J-2010C Compatible	\$1.20
J-20068 Stereo/Hi Output	81.75
J-2105 Ceramic/Med Output	£1.95
J-2203 Magnetic 5m V/5cm/scc.	
including stylus	24-95
J-22038 Replacement stylus for above	£3.00
AT-55 Audio-technica magnetic	
cartridge 4mV/5cm/sec	\$8-80

CARBON FILM RESISTORS The E12 Range of Carbon Film Resistors 1/8th watt available in PAKS of 50 pieces

assorted into the following groups:-	_
R1 50 Mixed 100 ohms-820 ohms	50;
R2 50 Mixed 1K ohms-8.2K ohms	50;
R3 50 Mixed 10K ohms-82K ohms	501
R4 50 Mixed 100K ohms-1 Meg. ohme	50;
THESE ARE UNBEATABLE PRIC JUST 1p EACH INCL. V.A.T.	ES-

BI-PAK SUPERIOR QUALITY LOW - NOISE CASSETTES

C60, 86p C90, 48p C120, 60p

-the lowest prices

BI-PAK QUALITY COMES TO AUDIO!

AL10/AL20/AL30 AUDIO | NOW WE GIVE YOU **AMPLIFIER MODULES**



The AL10, AL20 and AL30 units are similar in their appearance and in their general specification. However, careful selection of the plastic power devices has resulted in a range of output powers from 3 to 10 watts R.M.S.
The versatility of their design makes them ideal for use in record players, tape recorders, stereo amplifiers and casestie and cartridge tape players in the car and at home.

Parameter	Conditions	Performance
HARMONIC DISTORTION	Po = 3 WATTS f=1KHz	0.25%
LOAD IMPEDANCE	_	8 – 16 Ω
INPUT IMPEDANCE	f=1KHz	100 k Ω
FREQUENCY RESPONSE ± 3dB	Po = 2 WATTS	50 Hz - 25KHz
SENSITIVITY for RATED O/P	$V_8 = 25V$. $Rl = 8\Omega$ $f = 1KHz$	75mV. RMS
DIMENSIONS		3" × 21" × 1"

The above table relates to the AL10, AL20 and AL30 modules. The following table outlines the differences in their working conditions.

Parameter	AL10	AL20	AL80
Maximum Supply Voltage	25	30	30
Power output for 2% T.H.D. (RL = 8 \Omega f = 1 KHz)	3 watts RMS Min.	5 watts RMS Min.	10 watts RMS Min.

AUDIO AMPLIFIER

MODULES		1
AL 10. 3 watts	RMS	£2·50
AL 20. 5 watts	RM8	£2·85
AL 30. 10 watts	RMS	£3-20

POWER SUPPLIES

PS 12. (Use with AL10, AL20, AL30) 85p SPM 80. (Use with AL60) 23-25 FRONT PANELS F.P. 12 with Knobs

PRE-AMPLIFIERS

PA 12.	(Use with AL10, Al	L20 & AL30) 44.85
PA 100.	(Use with AL60)	£18·15

TRANSFORMERS

0) 95p \$3.25 53.25 55 56 57 58 (Use with AL20, AL30) 58 (22.30 P & P 22p E2.30 P & P 22p BMT80 (Use with AL60) \$2.75 P & P 37p

PA 12. PRE-AMPLIFIER SPECIFICATION

The PA 12 pre-amplifier has been designed to match into | Frequency response—most budget stereo systems. It is compatible with the | 20Hz-50KHz(-3dB) AL 10, AL 20 and AL 30 audio power amplifiers and it can be supplied from their associated power supplies. There are two stereo inputs, one has been designed for use with *Ceramic cartridges while the auxiliary input will suit most †Magnetic cartridges. Full details are given in the specification table. The four controls are, from left to right: Volume and on/off switch, balance, bass and treble. Size 152mm × 84mm × 35mm.

20Hz - 50K Hz (- 3db)
Bass control—
± 12dB at 60Hz
Treble control—
*Input 1. Impedance
1 Meg. ohm
Sensitivity 300mV

*Input 2. Impedance

†Input 2. Impedance 30 K ohms Sensitivity 4mV

Look for our

SEMICONDUCTOR ADVERTISEMENTS in Wireless World Radio Constructor Practical Wireless

ALL PRICES INCLUDE V.A.T.

The **STEREO 20**

The 'Stereo 20' ampiliter is mounted, ready wired and tested on a one-piece chassis measuring 20 cm × 14 cm × 5·5 cm. This compact unit comes complete with on/off switch volume control, balance, bass and treble controls, Transformer, Power supply and Power amps. Attractively printed front panel and matching control knobs. The 'Stereo 20' has been designed to fit into most turntable plinths without intertering with the mechanism or atternatively, into a separate cabinet. Output power 20w peak. Input 1 (Cer.) 300mV into 1M. Freq. res. 25Hz-25kHz. Input 2 (Aux.) 4mV into 30K. Harmonic distortion. Bass control ±12dB at 60Hz typically 0:25% at 1 watt.

Treble con. ±14dB at 14kHz.



TC20 TEAK VENEERED CABINET

For Stereo 20 (front board undrilled) size $10\frac{1}{4}$ " x $8\frac{1}{4}$ " x 3", £8.95, plus 45p postage

SHP80 STEREO HEADPHONES

4-16 ohms impedance. Frequency response 20 to 20,000Hz Stereo/mono switch and volume controls 24.95

50w PEAK (25w R.M.S.) **PLUS THERMAL PROTECTION!** The NEW AL60 Hi-Fi Audio Amplifier FOR ONLY £4.25

- Max Heat Sink temp. 90°c.
 Frequency Response 20Hz to
- Distortion better than 0.1% at
- Supply voltage 15-50 volts
- Thermal Feedback
- Latest Design Improvements
- Load—3, 4, 8 or 16 ohms Signal to noise ratio 80dB
- Overall size 63mm × 105mm × 13mm

Especially designed to a strict specification. Only the finest components have been used and the latest solid state circuitry incorporated in this powerful little amplifier which should satisfy the most critical A.F. enthusiast.

STABILISED POWER **MODULE SPM80**

SPM80 is especially designed to power 2 of the AL60 Amplifiers, up to 15 watt (r.m.s.) per channel simultaneously. This module embodies the latest components taneously. This module embodies the latest components and circuit techniques incorporating complete short circuit protection. With the addition of the Mains Transformer BMT80, the unit will provide outputs of up to 1-5 amps at 35 volts. Size: 63mm × 105mm × 30mm. These units enable you to build Audio Systems of the highest quality at a hitherto unobtainable price. Also ideal for many other applications including:—Disco Systems, Public Address Intercom Units, etc. Handbook available 10p PRICE £3-25

TRANSFORMER BMT80 £2:15 p. & p. 40p

STEREO PRE-AMPLIFIER TYPE PA100 Built to a specification and NOT a price, and yet atill the greatest value on the market, the PA100 stereo pre-amplifier has been conceived from the latest circuit techniques. Designed for use with the AL50 power amplifier system, this quality made untitnorporates no less than eight silicon planar transistors, two of these are specially selected low noise NPM devices for use in the input stages.

Three switched stereo inputs, and rumble and scratch filters are features of the PA100 which also has a STEREO/MONO switch, volume, balance and continuously variable bass and treble controls.

SPECIFICATION

reo inputs.

SPECIFICATIOH
Frequency Response
Harmonic Distortion
Inputs: 1. Tape Head
2. Radio, Tuner
3. Magnetic P.U.
All input voltages are for an output of 250mV. Tape and P.U. inputs equalised to RIAA curve within ± 1dB. from 20Hz to 20KHz.

Bass Control
Treble Control
Scratch (Low Pass)
Bignal/Noise Ratio
Input overload
Supply
Nimensions

20Hz - 20KHz ± 1dB
better than 0.1%
3.72 mV into 50KΩ
3 mV into 50KΩ
3 mV into 50KΩ
2 mV into 50KΩ
3 mV into 50KΩ
4 mV into 50KΩ
4 mV into 50KΩ
5 mV into

MK 60 AUDIO KIT

Comprising: 2 x AL50, 1 x SPM80, 1 x BTM80, 1 x PA 100, 1 front panel, 1 kit of parts to include on-off switch, neon indicator, stereo headphone sockets plus instruction booklets. Complete Friee: 229 75 plus 45p postage

TEAK 60 AUDIO KIT

Comprising: Teak veneered cabinet size 16½" x 11½" x 3½", other parts include aluminlum chassis, heatsink and front panel bracket, plus back panel and appropriate sockets etc. Kit price: 29.95 plus 45° postage

Giro No. 388-7006 Please send all orders direct to warshouse and despatch department P.O. BOX 6, WARE · HERTS
Postage and packing add 11p. Overseas add extra for airmail. Minimum order 55p. Cash with order please. Guaranteed Satisfaction or Money Back

Aiding and Abetting

PERSON who aids, abets, counsels or procures the commission by another person of a summary offence is guilty of that same offence and may be tried for that offence, whether or not he is charged as a principal...

As a follow-up to our comments last month on the reception of priveleged transmissions, evidence exists which indicates that members of the public are quite openly being encouraged to break the law!

We refer of course, to advertisements that offer "walkie talkie radios" and "bugging devices" for which a licence is not available in the U.K.

These devices are currently being offered to members of the public and are often described for "fun and entertainment use". To invite members of the public to purchase these illegal devices is, in our opinion, a subliminal attempt to encourage the purchaser to break the law.

Purchasers of these devices could find themselves before the courts. Organisations or individuals that encourage others to break the law are aiding and abetting. Where does the responsibility lay? Is it the manufacturer, advertiser, publisher or retailer. Certainly, the purchaser will suffer if he breaks the law.

Heavy fines and the confiscation of equipment could result in conviction. What would the purchaser do then? Ask the supplier for his money back and reimbursement of fines and costs? Who is kidding who in these games that people are playing?

It is true that the small print invariably includes a statement to the effect that "a licence not available in the UK" or "a licence not generally available to members of the public".

Do not blame the Home Office if the equipment you purchase is not licensable in the UK—check first! Regulations exist on the allocation of frequencies to licensable equipment.

Our advice is simple: watch out for the small print in those advertisements. It could be the most important line in that advert! If in doubt, check with the Home Office Radio Regulatory Department, Waterloo House, Waterloo Road, London, SE1 8UA. You have been warned!

LIONEL E. HOWES-Editor.

We regret that due to pressure on Editorial space this month, Part 2 of "2 VHF Converters" has had to be held over. We hope to include this article in our May issue.

NEWS...

Eurovolts

HE International Union of Producers and Distributors of electricity has agreed a 230V standard for electrical supplies throughout Europe. This standard has a $\pm 10\%$ tolerance so the Continent can continue to operate on 220V and the U.K. on 240V.

This decision will now be made known to the International Electro-Technical Commission which hopes to produce a world standard voltage.

U.S. calculators

THE San Francisco based group National Semiconductors have launched a range of pocket calculators under the "Novus" brand-name. Prices range from £8 to £100.

Conference

THE Institute of Physics will hold a two day Conference on On-line Computers in Laboratory Use at Imperial College on 11-12 September, 1975. Residential accommodation will be available in Halls of Residence.

Papers will be presented under the following headings: General principals and techniques, Why use small computers?, Interfacing, Software, Systems Building and Data Presentation. Surveys of on-line computing applications in various branches of experimental physics. High energy physics, Plasma physics, crystallography, stress analysis, Space and atmospheric physics, Materials and Atomic and Nuclear Testing Physics, Low cost laboratory automation.

Specific examples of applications: Short contributions to come under the last heading are invited. Titles and short abstracts (200-300 words) should be sent to Dr. B. K. Penney, Department of Computing & Control, Imperial College, 48 Princess Gardens, London SW7 1LU by 21 June 1975.

Further details and application forms from The Meetings Officer, The Institute of Physics, 47 Belgrave Square, London SW1X 8QX.

NEWS...

NEWS...

NEWS...

Good service

HAT is believed to be a unique service has just been launched by SCS Components with the publication of two new catalogues. These catalogues, produced after a period of market research, list on the one hand the semiconductors of interest to the professional TV service sector and on the other hand those whose main interest will lie with the amateur small-order market.

The catalogues contain only a representative sample of the vast range of branded and guaranteed semiconductors offered by SCS Components at manufacturer's list prices. The only additional charge is 20p for post and packing and data sheets are free on request.

SCS Components is owned by one of the largest and most experienced distributors of semiconductors whose franchise agreements include the leading manufacturers. Thus SCS Components are able to make available a broad and deep stocking level backed by technical expertise that has not hitherto been available.

The range includes all discrete and integrated semiconductors from Mullard, Motorola, Signetics, General Instrument (Microelectronics), G.I. (UK), Ferranti, RCA, Monsanto and Mostek. In the near future passive components from Mullard, Seatronics and Centralab will be added to the range.

David Jackson (previously of RS Components) has been brought in as sales manager and he reports to Albert Shipton, marketing manager of Semicomps Ltd.

The catalogue is available, free of charge, from David Jackson, SCS Components, 5c Northfield Industrial Estate, Beresford Avenue, Wembley, Middlesex, HAO 1SD. Telephone 01-903-3168.

R.F. Power Meter

NEW r.f. Power Meter, TF2512, from Marconi Instruments Limited is aimed directly at the mobile radio manufacturing and servicing industries, where a reasonable accuracy of measurement is sufficient. (The meter costs about half as much as MI's range of high-accuracy d.c. to 1GHz power meters.) It is a robust and light instrument (2.75kg), entirely self-contained, needing no mains/battery supply.

High-power BBC

BC Radio London's mediumwave service on 206 metres (1457kHz) is now transmitted from a new high-power transmitter at Brookmans Park, near Potters Bar.

Throughout the service area, reception should be improved and the area of good reception is expected to be extended southward to include Guildford, Godalming, Cranleigh, Horsham, Cuckfield, and Haywards Heath.

The v.h.f./f.m. transmissions of BBC Radio London on 94.9MHz continue unchanged.

Audio-Visual Show

XTENSIVE car parking facilities, expansive exhibition areas and potentially high attendance feature in the first Midland Audio/Visual Show to be held on 11th, 12th 13th April 1975. The exhibition is already attracting some of the largest manufacturers of audio and audio visual systems and will include one Press/Trade day and two weekend days to enable members of the public from the highly populated Midlands area attend.

Site of this exhibition will be the conference and exhibition complex at the National Agricultural Centre, Kenilworth, Warwickshire. Over seven million people are said to live within easy reach of this area.

Exhibitors products at the Midland Audio/Visual Show will encompass video tape equipment, video lighting effects, educational aids for schools, sales training work and business aids. In addition there will be the consumer items including cassette, radio, cartridge and record equipment.

Lind-Air-Henry's

TENRY'S Home Entertainment Centres Ltd., a mem-L ber of the Henry's Group of Companies, has now merged with Lind-Air Holdings Ltd. which trades as Lind-Air and Discount Audio. The new group has over 20 outlets in the United Kingdom and has recently opened its first European venture in Brussels with a 22,000 square foot showroom. The principal members of the board of the new group will be Henry French, chairman, David J. French, deputy chairman, Lionel G. Astor and Rafael Hyams, joint managing directors. The founder of Lind-Air, Mr. Bennie Linden still retains a material shareholding.

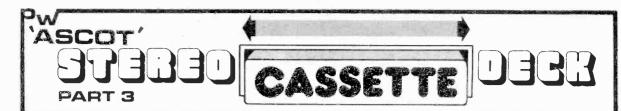
Henry's founded by Henry French over 30 years ago, and Lind-Air, both famous for their hi-fi centres which dominate the major London hi-fi areas of Tottenham Court Road and Edgware Road, now form a sizeable retail group of hi-fi specialised outlets.

South West transmitter

THE BBC brought a new transmitter into service at Redruth recently to broadcast the Radio 4 South West medium-wave service including 'Morning Sou' West', local news and weather reports. The new transmitter is located at the existing Redruth medium-wave transmitter site and transmits on 397 metres (755kHz). The daytime coverage extends to St Ives, Penzance, Helston, Falmouth, Truro, Newquay, Cambourne and Redruth.

The existing Radio 4 service from Redruth on 330 metres (908kHz) continues as will the v.h.f. service on Radio 4 South West.

Barnstaple, Plymouth and Torquay already have transmitters radiating the local Radio 4 programmes in the medium-wave band, Others are planned for Exeter and Taunton.



KEITH CUMMINS & TONY FRANCIS*

GENERAL CONSTRUCTION

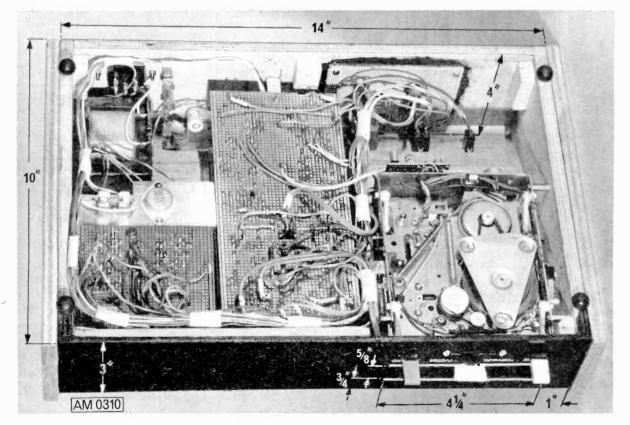
The machine is built into a wooden cabinet, designed as shown in Fig. 9. Once the cabinet has been built up the deck and electronics can be fitted. It should be stressed that accuracy in construction is essential if the parts are to fit together correctly and if the equipment is going to operate properly electronically.

The illustrations show the layout of every part but mistakes can still be made and every care should be taken to avoid errors in construction. It is always much simpler to take care initially and so eliminate time-consuming, and possibly expensive, trouble-shooting later.

The main sections of the machine can be listed as follows:— cabinet, deck mechanism, power supply, recording and playback amplifiers. The power supply and amplifiers are built and fitted into the cabinet, along with the deck mechanism. The parts are then



wired together as shown in Fig. 10. It is possible to lift out the circuit panels while the machine is operating. Wired connections are mostly made to the printed side of the panels so setting-up and service work is thereby simplified.



* Hamilton Electronics Ltd

Fig. 9: Constructional information for the Ascot cabinet and cassette loading slot.

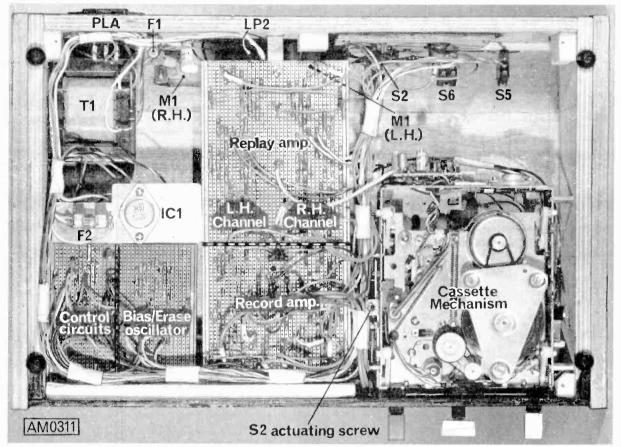


Fig. 10: Wiring guide between the circuit boards, deck mechanism and individual components.

We suggest that the following sequence of construction be followed, with careful reference to the diagrams at each stage:—

- 1. Build cabinet.
- Fit slider controls, VU meters, lamps and switches.
- 3. Make up and fit supporting metalwork and transformer etc. to inside of cabinet.
- Attach leads to heads, switch, control unit etc.
 of deck mechanism and mount deck mechanism
 in cabinet. The leads will be terminated later.
- Build up electronic panels, Figs. 11 and 12, being particularly careful to check for accuracy of construction.
- Fit panels to metalwork and observe that all parts fit accurately mechanically.
- Connect panels to the remaining parts of the machine as shown in the wiring diagram, Fig. 10.
 Once the machine has been completely construc-

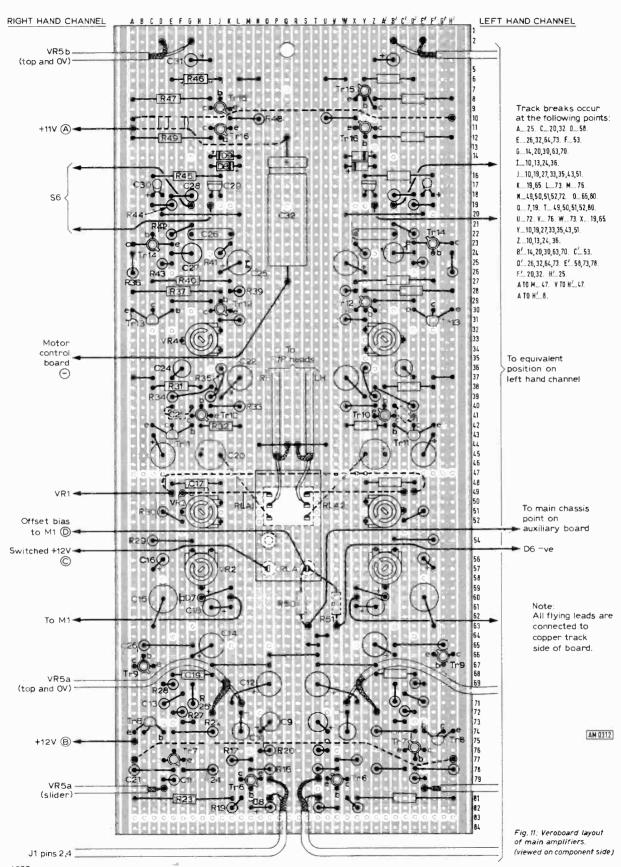
ted, RESIST THE TEMPTATION TO PLUG IN AND SWITCH ON STRAIGHT AWAY!

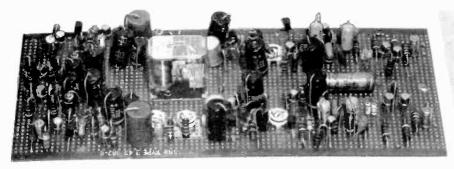
TESTING

Using a meter, check that no short-circuits are present on any of the supply rails A, B or C, Fig. 2. Likewise, check the supply line to the motor control circuit, which is taken off prior to the solid-state regulator. Having checked these points, fuses F1 and F2 may remain in while F3 is removed.

Power can now be applied to the deck mechanism. The motor should run when a cassette is inserted and +12V should be available at the supply side of F3 fuseholder. This being so, F3 can be inserted. Using a cassette which does not have any important material recorded on it, the machine can be switched on when the cassette compartment lamp should light. On pressing the record button the record lamp should light and the relay will operate. Releasing the cassette and re-inserting it should restore the machine to the play mode. Voltages on the supply rail A, B and C may now be checked. In the play mode, rail A should read just under 11V. When pressing the "check record" button, rail B should assume +12V. When "record" button is pressed, rail A should move to zero, while rail C assumes nearly 12V with rail B at about 11.5V.

When all the supply rail switching has been proved to be operating correctly the machine may be connected to an amplifier, and a preliminary check made, using a recorded cassette, to prove that the playback amplifiers are working. The pots VR4 for left and right channels, should be set to the half-way position for this test. If everything is working out well, results on playback at this stage should be quite acceptable, although the threshold level of the noise-limiting circuit will need to be finally adjusted. As the dual sliders of the slide controls double up as record level and variable line out potentiometers, they will have to be set correctly to provide the appropriate input level for the amplifier used. This approach has obviated the need for special arrangements to cope with the DIN and phono standards.





Main circult board and relay, shown in detail at left. Note that connecting leads are taken from the printed rail side of the board.

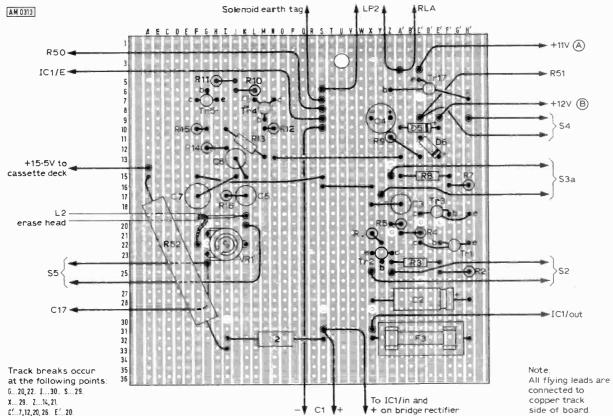
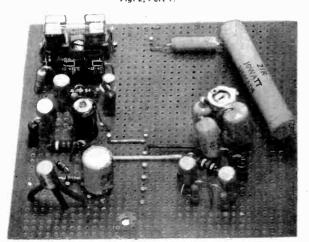


Fig. 12: Auxillary component board layout. The finished board is shown below. R52 and L1 are reversed for convenience, compared to Fig. 2, Part 1.



FINAL ADJUSTMENTS

There now follows the complete setting-up procedure. If any part of the setting-up cannot be achieved correctly a fault must exist in the machine which should be rectified before going any further. The first paragraph of the setting-up procedure repeats instructions already given. It is included to ensure that the overall instructions are complete.

- Playback check. Switch to play, use pre-recorded tape if test tape not available, and with noise limiter off, adjust VR4 to minimum position (i.e. all track in circuit) and VR5 (slider control) to set satisfactory LINE out level for amplifier.
- 2. Adjust head position with azimuth screw to provide crispest top response.
- 3. Switch on noise limiter and turn up VR4 on each channel until best top response, consistent with minimum distortion, is obtained. Too much gain will overload the output stages.

- 4. Switch to record, and with no signal input, check that machine erases a previously recorded tape. If an oscilloscope is available, a 50V peak-to-peak sinewave should appear across the erase head.
- 5. Insert chromium dioxide (CrO₂) cassette, and by making repeated recordings at low input level, adjust pots VR3 for best quality of recording. If oscilloscope is available, adjust for 25V peak-to-peak signal (which corresponds to approximately 9V RMS).
- 6. Switch to standard tape (it does not matter if CrO₂ cassette is left in at this stage) and adjust VR1 for a 20 per cent reduction of bias voltage across record/play head. The oscilloscope or a multimeter can be used for this test.
- Check recording quality on standard tape. An improvement may be achieved by repeated tests using different settings of VR1.
- 8. Make recordings using progressively greater inputs until distortion sets in. Back off to satisfactory position, then adjust pots VR2 until meters show peak readings at level 10. If oscilloscope and signal generator are available, inject 1kHz signal, adjust for 3V peak-to-peak at emitter of Tr9, then adjust VR2 for level 10 reading on VU meter.

Having set up the machine according to the foregoing instructions, it should be possible to record and play back. It is important to realise however, that the machine can be overloaded by excessive input. Ideally, the input level at LINE should be such that the slider level controls need to be set half way in order to obtain a peak level indication.

It is possible for the input stage itself to be overloaded by excessive signal, so that the input to the level control potentiometers is itself distorted. Obviously, the only adjustment possible under these conditions is the setting of the optimum level of an already distorted signal!

USING HEADPHONES

Should headphones be thought to be necessary then the circuit shown in Fig. 13 could be incorporated. This is one channel only, of course, but both channels could be built up on a small piece of veroboard and attached to the inside of the cabinet.

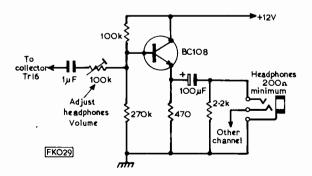


Fig. 13: Optional circuit to permit the use of headphones, one channel only being shown here.

The circuit as shown will operate on replay only although it might be possible to utilise the unused contacts on the relay to switch the input from the

replay to the record amplifier so that both functions can be monitored on headphones.

MORE ON DISTORTION

After completing the setting-up procedure it was found that some distortion was evident on certain commercial pre-recorded tapes and this was traced to the noise limiter circuitry, Tr15/16. The circuit was modified by splitting R48 and adding a pre-set potentiometer as shown in Fig. 14. Adjustment of the pot allows additional emitter feedback to be applied without altering any DC condition.

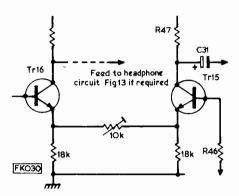


Fig. 14: Suggested modification to the noise limiter circuit, discussed in the text. Again, only one channel is shown.

Careful setting of the new pot and VR4 will enable optimum noise suppression to be obtained consistent with no overload condition. With the new pot set at mid position the gain of the stage approximates to unity while the noise should be down about 12dB, in theory.

NOTES

It has been the purpose of this series to provide details for constructing a tape recorder which will compare favourably with commercial models. The design approach was made bearing in mind the requirements, capabilities and facilities of the home constructor. As a result the machine does not represent an attempt to mimic commercially available apparatus.

Again we stress that care is needed at all stages. Impetuosity invariabily leads to regrets and construction should be undertaken steadily and methodically. A couple of extra days spent on construction could well avoid a week's effort to rectify mistakes, besides avoiding expensive "blow-ups".

Every effort has been made in the design to ensure "repeatability" of the circuits. The frequent use of complementary transistor stages with heavy negative feedback is the most significant factor which guarantees that all the circuits will yield the same performance. If the setting-up procedures are accurately followed the performance specification attained will be:— Overall response 50Hz to 9kHz on standard tape, 50Hz to 11kHz on chrome tape. Typical signal to noise ratio 46dB although these are all conservative figures.

Standard tape is, of course cheaper, but chrome dioxide (CrO₂) tape will yield the best signal-to-noise ratio. It will be found that the top response of the chrome tape is higher than the standard tape,

Complete the coupon and we'll send you our new catalogue. Completely free.



The new Heathkit catalogue is now out. Full as ever with exciting, new models. To make building a Heathkit even more interesting and satisfying.

Ånd, naturally, being Heathkit, every kit is absolutely complete. Right down to the last nut and bolt. So you won't find yourself embarrassingly short of a vital component on a Saturday evening-when the shops are shut.

You'll also get a very easy to understand instruction manual that takes you step by step through the assembly. Clip the coupon now and we'll send you your free copy

to browse through.

With the world's largest range of electronic kits to choose from, there really is something for everyone.

Including our full range of test equipment, amateur radio gear, hi-fi equipment and many general interest kits.

So, when you receive your

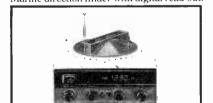
catalogue you should have hours of pleasant reading. And, if you happen to be in London or Gloucester, call in and see us. The London Heathkit Centre is at 233 Tottenham Court Road. The Gloucester showroom is next to our factory in Bristol Road.

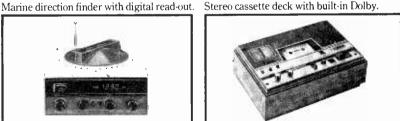
At either one you'll be able to see for yourself the one thing the catalogue can't show you.

Namely, how well a completed Heathkit performs. Heath (Gloucester) Limited, Dept. PW-45, Bristol Road, Gloucester, GL2 6EE, Tel; Gloucester (0452) 29451.

A new oscilloscope from the Heathkit range.





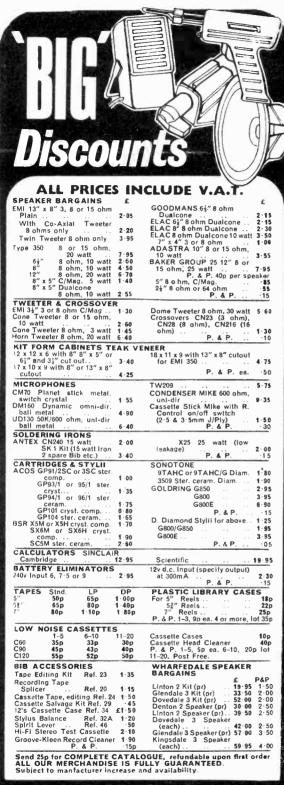


The new Heathkit catalogue. Out now. FREE.

	To: Heath (Gloucester)	Limited Dept. PW-45.	Gloucester	,GL2 6EE. Please send me m	y free Heathkit catalogue.
--	------------------------	----------------------	------------	----------------------------	----------------------------

Address. Name

Remember easy terms are available with the Heathkit Monthly Budget Plan.



versdale Electron

Mail Order Department PW4 P.O. Box 470, Manchester M60 4BU.



Countless uses in industry and offices

*OUICK AND EASY TO APPLY -**EVEN IN AWKWARD PLACES** *SAVES DAMAGE TO WOOD AND PAINTWORK *STICKS ON INSTANTLY: HOLDS WIRE FIRMLY

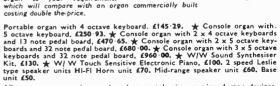
You'll save enormous time and trouble with the new Brandauer adhesive staple. Just peel off the backing strip and press staple into place. Then bend clips over to hold wire firmly in position. No messing with pins, tacks, soldering or drilling. No damage to woodwork, e.g. skirting boards. Use the Brandauer Staple for any wall. frame or cabinet wiring jobs — it's wonderfully easy for fitting in those awkward corners.

Send now for details to:

SPECIAL PRODUCTS DISTRIBUTORS LTD. 81 Piccadilly, London W1V OHL. Tel: 01-629 9556.

- **★** ELECTRONIC PIANO KIT
- **★** SYNTHESISER KIT
- **★** ELECTRONIC ORGAN KITS

There are five superb Electronic There are the superb Electronic
Organ kits specially designed
for the D-I-Y- enthusiast. With
the extreme flexibility ollowed
in design, you can build an
organ to your requirements
which will compare with an organ commercially built



All components can be purchased separately, i.e., semiconductor devices, M.O.S. master oscillators, coils, keyboards, pedal boards, stop tabs, draw bars, key-contacts, etc.

Send 50p for catalogue which includes $5\times10p$ vouchers or send your own parts list, enclosing S.A.E. for quotation.

12, Brett Rd., Hackney, London E8 IJP. Tel. 01-986-8455. 8, Putney Bridge Rd., London SW18 IHU. Tel. 01-870-4949. 40a/42a, Dalston Lane, Dalston Junction, London E8. Tel 01-249-5624.

Business Hours:- Open 10am-7pm Monday to Saturday Closed all day Thursday Open 10am-1pm Sunday



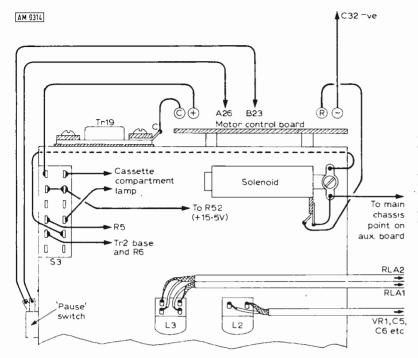


Fig. 15: The cassette deck mechanism used by the author was supplied to him complete with the motor control board etc. wired in. This diagram shows how the board of Fig. 8 and Tr19 are connected to the bare deck as now supplied. Microswitch S2 is mounted on a metal bracket fixed to the deck and cabinet. It is operated by the head of a 14in. 6BA screw attached to the drilled bracket on the 'Record' switch slide mechanism.

so that an improvement in signal-to-noise ratio is achieved by turning down the treble control on the amplifier when chrome tape is being used. The difference in performance is generally very noticeable. Use of the noise limiter circuit will depend upon the discretion of the user at any time, and will obviously be affected by the type of tape in use and the recorded programme material.

MAINTENANCE

No machine will run perfectly without occasional maintenance. The usual cause of trouble with cassette machines is dirty heads, which cause poor recording and playback, with weak top response. A non-uniform deposit on the heads will cause one channel to be affected more than the other. Once the head has suffered wear, it has to be replaced, so good quality tape should always be used as cheap tape usually has a rough surface which wears away the head besides depositing oxide on the heads, pinch roller and guides. Deposits are cleaned off using soft tissue paper soaked in methylated spirits.

Sometimes a defective cassette can cause difficulty. The take-up hub can jam, so allowing tape to spill over the pinch roller and capstan. A loop of tape can then wrap itself around the pinch roller or capstan shaft so that the tape winds off both parts of the cassette on to the roller or shaft until the machine jams completely. The only way to release the tape then is by careful removal and unwinding, cutting with a razor blade if necessary. The cassette itself is generally a write-off.

Jamming cassettes can sometimes be eased by giving them a healthy slap on one side against a fairly solid surface. This causes the tape to settle evenly. Uneven winding can cause the tape to jam against the sides of the cassette casing.

MOTOR QUERIES

Goldring-Lenco report that some readers constructing the Kempton or Ascot projects have complained to them that the motor in the cassette deck mechanism is marked 3-5V believing that it ought to be 12V. Some readers have even returned decks to Goldring-Lenco demanding correct replacements.

The motor as supplied is CORRECT! The motor control board, fed from a 12V line, ensures that the correct voltage, nominally 4 to 4·1V, is applied to the motor.

This inconvenience to Goldring-Lenco could have been avoided if readers had directed their queries to *Practical Wireless* in the normal manner.

Note:—

Fig.4 Part 1. Resistor R23 should be shown between C12 and R21 and not between R21 and the collector of Tr8. The circuit board of Fig.11 is correct.

Fig.5 Part 2. Resistor R36 should be shown between collector of Tr13 and C32. The circuit board of Fig.11 is correct.

Fig. 5 Part 2. The noise reduction switch marked S5 should be marked S6.

In the components list S5 should be given as a SPST miniature toggle switch and not as DPDT. Add to the components list:—S6 DPST miniature toggle switch. Fig.7 Part 2. The 'Pause' switch is part of the cassette deck mechanism and is wired, via a $15 \mathrm{k}\Omega$ resistor, between the left-hand contact of the commutating switch and the positive line. Connect the resistor between points A26 and C26, Fig.8, connect pause switch wires to A26 and positive line B1/B23.

ON RECENT DEVELOPMENTS

DIGI-WATCH

READERS of this page will doubtless remember my urging them not to be too eager to buy a digital watch, but to wait a while because I thought prices would come tumbling. I note that already, one company in the UK is offering a digital wrist watch with liquid crystal display (LCD) for less than £60. I still think prices will be lower before the end of this year so don't burgle those piggy banks yet.

MINI TV CAMERA

Fairchild has been kind enough to send me a photograph of the latest television camera. Difference is that it is entirely solid state (those charge-coupled devices again). Not only that, but it measures only 3in. in diameter and is just 1\(\frac{1}{6} \) in. deep. Power consumption is a miserly 1.5W. Whatever is coming next in tiny TV cameras?

Well, I'll tell you-there really is a smaller one, very much smaller! I've just heard of a TV device which can be safely slid along arteries and other internal organs allowing physicians to take a front seat look at the inside of humans. The lens part is a mere 4mm. in size and inside that is a tiny motor which drives a rotating mirror system. Information is scant at this time but more should be in by the time the next "Ginsberg" page comes round. Before departing, one thing that all this super-miniaturisation raises is; how on earth do you service it?

1A SOLAR CELL

I note with some satisfaction that North sea oil will be happily squelching ashore later this year—all part of beating the energy crisis. From the US comes news that one company has managed to manufacture a 3in. solar cell which can supply one amp (1A) of current. Could be interesting and I'll keep you posted as and when details are obtained.

ULTRASONICS

I've often thought that more use could be made of ultrasonic control. It isn't all that new in the realms of television since one or two companies already have ultrasonic channel changing; others also

include volume, brightness, etc. control also.

Semiconductors recently released details of two new ICs which are specifically intended for ultrasonics. Good thing is that ITT isn't doing things by halves, it's launched one chip which is a receiver and another for the transmitter. The first pair cater for fifteen channels. The transmitter chip requires only a fairly simple diode matrix, a few Rs and Cs plus, of course, the transducer and runs off 9V. The external crystal suggested is a 4.433MHz job and, obviously, these ICs have the TV market very much in mind. However, the Amateur constructor may well see a superb chance to do some ultrasonic control



Fairchild solid-state camera

for models which are, say, only used indoors or in a limited space where range isn't too great. Another pair (transmitter and receiver) of ultrasonic ICs from the same company caters for 30 channel usage.

For those still not enamoured with ultrasonics, let it be known that a great deal of research is being carried out in a number of areas. In the medical field alone a number of ideas are in the pipe line. One such application is to use ultrasonics to detect and measure hardened arteries but without puncturing the skin. The National Heart and Lung Institute of America recently gave publicity to this multi-million dollar idea and experimental ultrasonic scanners are well to the forefront in this scheme.

Nearer to home, the Plessey Company is known to be "getting its feet wet" in a scheme involving the Government to ultrasonically monitor the flow of water in tidal basins and, of course, in rivers.

BODY-END-SPOT

Remember those large 1W resistors where, instead of an all-band colour code it was body-tip-spot? Then came bands only for the vast majority But resistors are always getting smaller. Ever tried to read the colour code on a &W or even a 1/16W in a hurry? Now take it a stage further and think of the poor old manufacturers of tiny "chip" capacitors. These are minute little blocks with a tiny conductive strip at each end by means of which they are bonded directly into the circuit. It's all very well you ordering 500 chip capacitors of a certain value, especially if they all come together in a small polythene pack. But can you imagine these little items getting mixed up?-after all, some of them measure barely 0.05in2.

Not so for chip capacitor manufacturer Vitramon Inc. This company actually prints a letter of the alphabet in one of several colours on the chip capacitor itself. The letter plus colour forms a unique code which tells the capacitance of the chip in question. Please note all school teachers—A no longer stands for apple, it can mean 40pF 3V wkg.

FLOPPY DISCS!

I note that a number of US giants are now firmly into the CCD technology and not only at the drawing board stage either. Intel has just announced a 16,384-bit memory using this technique. It is thought by many that the CCD-type memories will replace the current "floppy disc" types. These are just what their name implies. A thin disc (about 0.005in. thick) is just under 8in. in diameter with a large (about 1.5in.) hole in the middle. The whole disc is housed in a plastic envelope, usually square and about \$-3/16in. thick. The plastic case is filled with some form of very soft material which permits the disc to revolve-at about 360 r.p.m. This disc might hold over 3 million bits of information.



SUPERSOUND 13 HI-FI MONO

A superb solid state audio ampligperb solid state audio ampirer. Brand new components throughout. 5 silfcon transistors plus 2 power output. Transistors in push-pull. Full wave rectification. Output approx. watts r.m.s. in ohm. Frequency into

ohm. Frequency response 12Hz-30KHz = 3dB. Fully integrated pre-amplifier stage with separate Volume. Bass hoost and Treble cut controls. Nuitable and Treble cut controls. Nuitable ceramic or crystal cartridge. Sensitivity approx. 40mV for full output. Supplied ready built and tested, with knobs. escutcheon panel, input and output ugo. Overall size 3° high > 6° wide > 71° deep. AC 200/256V. PRICE 512-50. P. A. P. 50p.

DE LUXE STEREO AMPLIFIER



A.C. mains 200-240 Using heavy duty fully isola-ted mains transform er with full wave recti-fication

giving ade-q u a t e ath negligible hum-entodes. 1 × EZ80 monothing with negligible ham. Valve line up: 2 x ECL86 Triole Pentodes. 1 x EZS0 as rectifier. Two dual potentioneters are provided for bass and treble control, giving bass and treble boost and cut. A dual volume control is used. Balance of the left and right hand channels can be adjusted by means of a separate Balance control fitted at the rear of the chassical lingua tensitivity is approximately 300m/c for full peak output of 4 watts per channel (8 watts mono), into 3 other speakers. Full negative freelback in a carefully calculated circuit, allows high volume levels to be used with negligible distortion. Supplied complete with knobs, chassis size 11 w x 4 d. Overall height including valves 5 ". Reads to the chassis size 11 w x 4 d. Overall height including valves 5 ". Reads built & tested to a high standard. 210 75. P. Stp. FOWER SUPPLY UNIT 200/240v. A.C. input. Four Fitted included D.C. outputs giving 8 c. and 7½v. and 9v. and 12v. at 1 amp on load. Pitted included output terminals and pitol tamp indicator. Hammer finish metal case overall size 6 " x 3½" x 2½". Sultable for Translstor Radios, Tape Recorders, Ampliters etc. etc. Ready PRICE 45-20 P. & P. Stp. VNAIR & REXINE SPEAKER & GABINET FABRICS

YYNAIR & REXINE SPEAKER, & CABINET FABRICS app. 54 in. wide. Our price 21:30 yd. length, P. & P. 15p per yd. (min. 1 yd.). S.A.E. for samples.

HARVERSON'S SUPER MONO AMPLIFIER

HARVERSON'S SUPER MONO AMPLIFIER
A super quality gram amplifier using a double wound fully
isolated mains transformer, rectifier and ECL82 triode
pentode valve as audio amplifier and power output
stage. Impedance 3 ohms. Output approx. 3-5 watta.
Volume and tone controls. Chassis size only 7in, wide
x 3in, deep x 6in, high overall. AC mains 200f/240v.
Supplied absolutely Brand New completely wired and
teated with good quality output transformer.
P. & P. 40p. BARGAIN PRICE.

FEWONLY.

FEW ONLY

FEW OALY: High grade mains transformer with grain orientated lamination. Primary 200/240 Secondary 18.5 volts at 0.6 amps and 4.6 volts at 0.3 amps. Size 2'' h $\times 2_1'''$ w $\times 2''$ d overall. £1.35 plus 25p P. & P.

BRAND NEW MULT-RATIO MAINS TRANSFORMERS, Giving 13 alternatives, Primary: 0-210-240v. Secondary combinations 0-5-10-15-20-25-30-35-40-40v. half wave at 1 sinp. or 10-0-10, 20-0-20, 30-0-30v. at 2 amps full wave. Size 3in, long > 3\frac{1}{2}in, wide > 3in, deep. Price 22-80 P. & P. 40p.

Price 22-60 P. & P. 40p.

MAINS TRANSFORMER, For transistor power supplies.

Pri. 200/240v. Sec. 9.0 9 at 500 mA, 21.25. P. & P. 25p.

Pri. 200/240v. Sec. 12-0 12 at 1 anp. 21.40. P. & P. 25p.

Pri. 200/240v. Sec. 10-0 10 at 2 anp. 22.00. P. & P. 35p.

VOLT RELAY 100 m/A single pole normally closed, 2 for 60p+15p P.& F

GENERAL PURPOSE HIGH STABILITY

GENERAL PURPOSE HIGH STABILITY TRANSISTOR PRE-AMPLIFIER

P.U. Tape, Mike, Guitar, etc. and suitable for use with valve or transistor equipment. 9.18v. battery or from H.T. line 200/300v. Prequency response 151tz 25KHz. Gain 26dB. Solid encapsulation size 1½" x 1½" x 1½". Brand new complete with instructions. Price 1 20p. P. & P. 15p.

HANDBOOK OF TRANSISTOR EQUIVALENTS AND SUBSTITUTES

A must for servicemen and home constructors. Including many 1000's of British, U.S.A. European and Japanese transistors. ONLY 40p. Post 5p.

8 Reference Encyclopedias for Electronic Engineers and Designers, covering between them transistor character-istics, diode and transistor equivalents. Many thousands

of up to date European types listed.

Diode Equivalents, 90p: Transistor Equivalents, £1 00;

Transistor Characteristics, £1 30; POST FREE All three ogether, £3.00

NEW ISSUE Thyristor, Triac. Diac etc. encyclopedias \$1.00, Post Free 8 pole 3 way 2 bank low loss Yaxley type switches 11" sections. Standard spindle. 2 switches 64p + 10p P. & P.

HARVERSONIC MAINS OPERATED SOLID STATE STEREO FM TUNER



Enioy fabulous stereo radio at this fabulous low introductory price!

Designed and styled to match our 10 + 10 amplifier but Designed and styled to match our 10 + 10 amplifier but will suit any other standard stereo amplifier. The design incorporates the very latest circuitry techniques with high-gain, low noise IP stages. Automatic frequency control to "lock-on" station and prevent drift. IC stereo decoder for maximum stereo separation. 1.E.D. for stereo beacon indicator. Nominal output of tuner 100mV. Approximate size 12" wide × 8" deep to 24" high. Supplied ready built, fully tested and fully guaranteed not available in kit form).

Price £23 00 Post and Packing 50p

STEREO-DECODER

STEREO-DECODER

SIZE 2" x 3" x 4" ready built. Pre-aligned and tested, Sens. 20-560 mV for 9-16V neg. earth operation. Can be fitted to almost any FM VHF radio or tuner. Stereo beacon light can be fitted if required. Full details and instructions (inclusive of hints and tips) supplied. 25-40 plus 10p. P. & P. Stereo beacon light if required 40p extra.



SPECIAL BARGAIN OFFER! Limited number of BSR C123 Auto Changer D with lightweight tubular arm and stereo cartridge Brand new. ONLY 28:00 + p. & p. 80p.

LATEST H) Sensitivity Uni-directional slim-line condenser microphone as used by many professionals. Very low acoustic feedback. Available hi impedance or low impedance. State which required. £13 50 plus 25p P. & P.

LATEST ACOS GP91/18C mono compatible cartridge with the stylus for LP/EP/78. Universal mounting bracket. £1-46, P. & P. 15p.

21-46, P. & P. 10p. CERAMIC STEREO CARTRIDGE. Universal Mounting brackets and turnover stylus. 70mV per channel output. ONLY 21-75 + 15p.P. and P.

ONLY 21.75 + 16p P. and P. SCNOTONE 97ARC COMPATIBLE STEREO CARTRIDGE T/O stylus Diamond Stereo LP and Sapphire 78.

ONLY 22.27 P. & P. 10p. Also available fitted with twin Diamond T/O stylus for Stereo LP. 22.78, P. & P. 15p. LATEST RONETTE T/O STEREO/COMPATIBLE CARTRIDGE for EP/LP/Stereo/FA. 21.60 P. & P. 15p. LATEST T/O MONO COMPATIBLE CARTRIDGE for playing EP/LP/78 mono or stereo records on equipment. Only \$1.47, P. & P. 15p.

equipment. Only \$1.47, P. of P. 19p.

QUALITY RECORD PLAYER AMPLIFIER MK. II
A top quality record player amplifier employing heavy
duty double wound mains transformer. ECC93, ELSe
and rectifier. Reparate Bass, Treble and Volume controls.

Complete with output transformer matched for 3 ohm
speaker. Size 7im, wide x 3in. deep x 6in. bigh. Ready
built and tested. PRICE \$5.50, P. & P. 50p.

ALSO AVALLABLE mounted on board with output
transformer and speaker. PRICE \$6.70, P. & P. 60p.

HI-FI LOUDSPEAKER SYSTEM MK II

Beautifully made, simulated teak finish enclosure with attractive slatted front. Size 16½" high × 10½" who = 9" deep (approx.). Pitted with E.M. Ceranic Magnet 13" × 8" bass unit, H.F. tweeter unit and crossover. AVALLABLE IN NOMINAL 4. Ohm. 8 Ohm or 16 Ohm impedance (state which).

OUR PRICE 49.50 each Carr. 90p Cabinet Available Separately 25-00, Carr. 90p Also available in 8 obins with EMI 13" × 8" bass speaker with parasitic tweeter 28 00, Carr. 90p.

LOUDSPEAKER BARGAINS

5in. 3 ohm £1-25, P. & P. 15p. 7×4in. 3 ohm £1-40, P. & P. 20p. 10 × 6in. 3 or 15 ohm £2 10, P. & P. 30p. E.M.I. 8 × 5in. 3 ohm with high flux magnet £1-70, P. & P. 20p. E.M.I. 13\[\] × 8in. 3 or 15 ohm £1 flux ceramic magnet with parasitic tweeter 3, 8 or 15 ohm £8-50, P. & P. 30p. E.M.I. 13 × 8in. 3, 8 or 15 ohm with inbullt tweeter and crossover network £4-65, P. & P. 30p. E.M.I. tweeter, Approx. 3\[\] Available 3 or 8 or 15 ohms. E.M.1. tweeter, Approx. 33' £1.80 20p. P. & P.

BRAND NEW. Bakers Loudsneakers at substantial dis-BRAD NEW Locality Country 22in. Iow. 14/10 Speakers, 3, 8 or 15 ohms. State which. Current production by well-known British maker. Now with Hilbux ceramic ferrobar ranguet assembly 27-50. Guitar models: 25w 27-50, 35w, 28-50, P.&P. 45p.

"POLY PLANAR" WAFER-TYPE, WIDE RANGE ELECTRO-DYNAMIC SPEAKER
Size 11?" × 14 \(\frac{1}{2}\)" × 14 \(\frac{1}{2}\)" × 14 \(\frac{1}{2}\)" × 10 \(\frac{1}{2}\) model (deep. Weight 190z. Power handling 20W r.ms. (40W peak). Impedance 8 ohm only. Hesponse 40Hz-20k Hz. Can be mounted on ceilings, walls, doors, under tables, etc., and used with or without baffle, Send 8.A.E. for full details. Only 26 60 each.

P. & P. 34p. NOW ALSO AVAILABLE: 8". 10 watts, r.m.s. 20 watt peak 40Hz-20,000Hz. Overall depth 1". Ideal for Hi-Fi or for use in cars. £4:32 + 25p P. and P.

HARVERSONIC SUPER SOUND 10 + 10 STEREO AMPLIFIER KIT



A really first-class Hi-Fi Stereo Amplifier Kit. Uses 14 transistors including Silicon Transistors in the first five stages on each channel resulting in even lower noise, level with Improved sensitivity. Integrated pre-amp with Bass Treble and two Volume Controls Suitable for use with Ceranic or Crystal cartridge—instructions included. Output stage for any speakers from 8 to 15 ohms. Compact design, all parts supplied including drilled metalwork high quality ready drilled printed circuit hoard with component identification clearly marked, smart brushed anodised aluminium front panel with matching knobs, wire, solder, nuts, bolts—no extras to buy. Simple step ley step instructions enable any constructor to build an amplifier to be proud of. Brief specification; Power output: 14 watts r.ms. per channel into 5 ohms. Frequency response ±34B 12-30,000 Hz. Sensitivity: better than 80mV into 1MΩ. Pull power bandwidth: ±34B 12-15,000 Hz. Bass boost approx. to ±124B. Treble cut approx, to −154B. Negative feedback 184B over main amp. Power requirements 35v. at 1-0 amp. Overall Size 12"w. × 3"d. × 21"h.
Fully detailed 7 page construction manual and parts list free with kit or send 18n bulls large 8 A.E.

Fully detailed 7 page construction manual and parts list free with kit or send 18p plus large S.A.E.

AMPLIFIER KIT £12 96 P. & P. 30p (Magnetic input components 33p extra)

£4-32 £4-32 POWER PACK KIT . CABINET

(Post Free if all units purchased at same time) Full after sales service

Also available ready built and tested \$28.08. Post Free.

Note: The above amplifier is suitable for feeding two mono sources into inputs (e.g. mike, radio, twin record decks, etc. and will then provide mixing and fading facilities for medium powered Hi-Fi Disachhque use, etc.



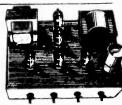
3-VALVE AUDIO AMPLIFIER HASS M

AMPLIFIER HA34 MK II
Designed for Hi-Fi reproduction of records. A.C. Mains operation. Ready built on plated heavy gauge metal thaseis, size 74' w. x. 4"d. x. 44"h. Incorporates. ECC83.
LA84, E280 valves. Heavy duty, double wound mains speaker. Separate volume control and now with improved wide range tone control and now with improved out. Negative feedback line. Output 44 wats. Front panel can be detached and leads extended for remote mounting of controls. Complete with knobs. valves, etc., wired and tested for only \$6.50. 1'. & P. 45p.

HSL "FOUR" AMPLIFIER KIT. Similar in appearance to HA34 above but employs entirely different and to HA34 above but employs entirely different and advanced circuitry. Complete set of parts, etc. \$5.50 P. & P. 45p.

10/14 WATT HI-FI AMPLIFIER KIT

A stylishly finished naural amplifier with an output of 14 watts from 2 14 watts from 2 EL84s in push-pull. Super reproduction of both music and speech, with negli-gible hum. Separate inputs for mike and gram allow records and announcements



Fully shrouded section wound output transformer to match 3–15 Ω speaker and 2 independent volume controls, and separate base and treble controls are provided giving good lift and cut. Valve line-up 2 ELB4s, ECC83, EF88 and EZ80 rectifier. Simple instruction booklet 15p + 8AE (Free with parts) All parts sold separately. ONLY 410 25 P. & P. 60p. Also available ready built and tested \$14.00 P. & P. 70p.

HI-FI STEREO HEADPHONES

Adjustable headland with confortable flexiform ear-muffs. Wirel and fitted with standard stereo in Jack plug. Frequency response 30-15,000Hz. Matching impedance 8-16 ohms. Easily converted for Mono. PRICE 25.50. P. & P. 259.

PRICES INCLUDE VAT

Open 9,30-5.30 Monday to HARVERSON SURPLUS CO. LTD. Friday. 9.30-5 Saturday Closed Wednesday.

(Dept. P.W.) 170 HIGH ST., MERTON, LONDON, S.W.19 Tel.: 01-540 3985 All prices and specifications correct at time of press and subject to alteration without notice.

A few minutes from South Wimbledon Tube Station.
SEND STAMPED ADDRESSED ENVELOPE WITH ALL ENQUIRIES

(Please write clearly)

PLEASE NOTE: P. & P. CHARGES QUOTED APPLY TO U.K. ONLY. P. & P. ON OVERSEAS ORDERS CHARGED EXTRA.

Fully guaranteed Individually packed

	, ,,	_ , .				
A1065 £1.25		5p GZ34	70p	PY80	40p	
AR8 55p	ECL82 3	5p GZ37	£1.00	PY81	40p	ĺ
ATP4 50p		Op KT66	£2·50	PY82	40p	
B12H 23 00	ECL86 50	Op KT88	£3.00	PY83	40p	
CY31 50p	EF36 64	D MH4	75p	PY88	45p	J
DAF96 55p	EF37A	ML6	65p		£1.00	J
DF96 55p	£1.5	OA2	45p	PY800		J
DK96 70p	EF40 78		45p	PY801	50p	1
DL92 40p		PABC	80 40p	QQV03	1-10	Į
DL96 60p	EF80 30	P PC97	50p		£1.40	J
DY86/87	EF83 £1.5	PC900	50p	QQ V06		J
40p	EF85 38	P PCC84	40p		£8-00	ı
DY802 45p		PCC85	40p	QV03-1		J
E88CC/01	EF89 30	P PCC88	60p		£1-10	ĺ
£1·20	EF91 45	PCC89	50p	R19	60p	ı
E180CC 70p	EF92 50	P PCC18	9 60p	SC1/400	0	١
E182CC	EF95 40	P PCF80	40p		00·8£	ŀ
£1·25	EF183 85	P PCF82	40p	SC1/600	0	١
EA50 40p	EF184 85	P PCF84	60p		£5.00	ı
EABC80 40p	EFL200 75	P PCF86	60p	8P61	75p	ı
EAF42 75p	EL33 #2-5	0 PCF20	0 75p		£5.00	ĺ
EB91 80p	EL34 70	P PCF20	1 75p	U25	85p	١
EBC33 #1 00	EL36 60	P PCF80	1 55p	U26	75p	l
EBC41 75p	EL37 £1.8	0 PCF80	2 50p	U27	65p	í
EBF80 40p	EL41 80	P PCF80	5 90p	U191	75p	ĺ
EBF83 50p	EL81 60	P PCF80	6 75p	U801	75p	l
EBF89 40p	EL82 55	PCF808	8 90p	UABC8	0	ĺ
EC52 85p	EL84 80	PCH20	0 80p		40p	١
ECC81 40p	EL85 60	PCL81	55p	UAF42	65p	Į.
ECC82 85p	EL86 45	PCL82	40p	UBC41	60p	١
ECC83 35p	EL90 45	PCL83		UBF80	40p	ſ
ECC84 35p	EL504 80	PCL84	45p	UBF89	40p	ı
ECC85 40p	EM31 60	PCL86	50p	UBL1 4	£1.00	ŀ
ECC86 90p	EM80 55	PCL80	60p	UBL21	70p	1
ECC88 50p	EM84 40	PFL200	0 70p	UCC85	45p	ŀ
ECC189 70p	EM87 21 0	D PL36	60p	UCF80	75p	ŀ
ECF80 40p	EY51 45		50p	UCH42	75p	1
ECF82 40p	EY81 4	5 PL82	45p	UCH81	45p	ľ
	EY86 401		45p	UCL82	45p	١
ECH35	EY88 501	PL84	45p	UCL83	65p	ľ
	EZ40 70	PL504	80p 1	UF41	70p	ľ
	EZ41 751		£1 00 t	UF80	35p	ľ
	EZ80 301	PL509 4	21-35		-	
	EZ81 301	PL802	95p		M	
ECH84 45p	GY501 751	PY33	60p	MAI	NY O	7

A lot of these valves are imported and prices vary for each delivery, so we reserve the right to change prices for new stock when unavoidable.

TRANSISTORS, DIODES etc.

Ор Ор Ор	AC 113 AC 126 AC 127 AC 128 AC 176 ACY 18	AF 139 AF 178 AF 186 AFZ 12 ASY 26 ASY 27	BSY 27 BSY 38 BSY 95A BYZ 16 CRS 1/10 CRS 1/20	OA 202 OAZ 200 OC 22 OC 25 OC 26 OC 28	OC 200 OC 206 SX 754 ZR 11 ZR 21 IN 23 A	2N 3053 2N 3054 2N 3055 2N 3390 2N 3391 2N 3730
0р	ACY 19	ASY 28	CRS 1/30	OC 29	1N 25	2N 3731
5p 00	ACY 20	BC 108	CRS 1/40	OC 35	1N 32A	2N 3819
5p	ACY 28	BC 118	CRS 3/10	OC 36	1N 38A	2N 4038
0p	ACY 39	BC 119	CRS 3/20	OC 42	1N 43	2N 4058
υp	ACY 40	BC 136	CRS 3/30	OC 44	1N 70	2N 4061
40	AD 149	BC 137	CRS 3/40	0 45	1N 277	2N 4785
A	AD 161	BC 148A	CRS 25/C25	OC 70	1N 415C	2N 5295
00	AD 162 ADZ 11	BC 172 BC 172A	GET 115	OC 73	1N 4148	3N 128
•	ADZ 11	BC 212A	GET 116	OC 78	2N 456A	3N 154
10	AF 114	BCY 31	GEX 66 NKT 222	OC 78D	2N 708	3N 159
Οp	AF 115	BCY 33	OA 5	OC 81	2N 918	28 303
-	AF 116	BCY 72	OA 47	OC 82 OC 82D	2N 1304	404
00 l	AF 117	BF 115	OA 70	OC 82DM	2N 1305	2082
	AF 118	BF 167	OA 71	OC 821720 OC 83	2N 1307 2N 1309	40250
00	AF 124	BF 185	OA 73	OC 139	2N 1309 2N 2062	40251
Sp	AF 125	BFY 51	OA 79	OC 140	2N 2147	0668
)Ö	AF 126	BFY 52	OA 91	OC 170	2N 2411	
iρ	AF 127	BFY 90	OA 200	OC 172	2N 2989	
p (

	UF85	45p	1R5	40p		V.Z	1 T -		6BG6G	- 00-	16H6	85p
ì	UF89	50p	184	30p							6J4WA	aop
ı	UL41	70p	1T4	30p	rlea	se	add 8	3 %	6BQ7A			£1 25
ı	UL84	40p	1X2A	60p	to	all.	arda.			£1 20		65p
į	UY41	45p	1X28	75p		DE 11	oruer	2			6J5GT	50p
İ	UY85		2D21		5Y3GT	55p	6AQ5	45p		£1.00		30p
İ	VR105		2K25	£9.00	5Z3	80p	6AQ5W		6C4		6J7	60p
١			3A4		5Z4		6A86		6C6		6J7G	40p
ı	VR150		3D6				6AT6	45p	6CB6	50p	6K6GT	80p
			384			60p	6AU6	40p		£1.45		55p
	X61M	£1 ·40	3V4	85p		60p	6AV6	45p	6CL6	75p	6K7G	80p
Į	X 66	65p	58/254		6AH6		6AX4G	T	6D6	55p	6K8GT	50p
	Z800U			£4·00					6EA8	85p	6K25	£1.00
			5B2551		6AK8		6AX5G		6F7	£1·10	6L6	£1.25
	Z801U				6A L5				6F8G		6L6G	40p
			5R4GY		6AL5W		687			90p	6L7G	40p
			5U4G		6AM6		6BA6		6F32	75p	68A7	50n
I	11.4	25p	5V4G	55ัก	6AN8	45p	6BE6	40p	6F33	£8·50	68A7G	T 40p

MINIMUM POSTAL ORDER \$1. PERSONAL CALLERS WELCOME. OTHERS IN STOCK include Cathode Ray Tubes and Special Values. Postage Up to \$2 12p, \$2-\$3 22p. Over \$3 post free. C.O.D. 25p extra.

29/41FT. AERIALS each consisting of ten 3ft., in dia. tubular acrew-in sections. 11ft. (6-section) whip aerial with adaptor to fit the 7 in. rod, insulated base, stay plate and stay assemblies, pegs, reamer, hammer, etc. Absolutely brand new and complete ready to erect, in canvas bag. £7:59 new £4:59 slightly used. Carriage £1:50.

ALL valves guaranteed

				9 -		LUUU
	68C7G	T 40p	120P4	£1·10	6060	70p
	68G7	50p	25T.60	3T 70p	6064	600
	68J7	55p		£1.00		£1.00
	68J7G	T 35p	30C17		6067	
	68K7	55p	30C18		6080	70p
	68L7G	T 50-			0080	£2·30
				£1-00		\$2.25
	68N7G	T 50p	30FL	£1.00		
	68Q7	55p	30FL		8020	£5.00
	6V6G	15p		£1.10		£5.00
	6V6G7	50p	30FL			50p
	6X4	40p	30L15	95p	9003	70p
	6X5G	40p	30L17	95p		85p
1	6X5G7	50p	30P12			85p
	6Y6G	90p	30P19			оор
	624	65p				
	6-30L2	90p	30PL		C.R. T	ubes
	7B7	80p	OUL D.	£1-10		
	7Y4	80p	30P14			812-00
	9D6	40p				ers.oo
	11 E2					
1		£6.00		50p		£18 00
1	12A6	55p			M W 13	
1	12AT6	45p	50C5	60p		E35-00
ı	12AT7	40p	50CD6		VCR13	
1	12AU7			£1·10	1	£8.00
_,	12AV6		75	£1.00	3BP1	£4.50
1	12AX7	35p	75C1	75p	88D	£9.00
,	12BA6	45p	76	75p	88J	£8.00
1	12BE6	50p	78	70p	88L	£9.00
н	12BH7	50p		75p		
П	12C8	55p		75p		
П	12E1	£8.50	723a/b	48.00	Special	
П		£1.10		£6-00	Valves	
1	12K7G			£14.00	CV239	
1	12K8G		807	65p		45-00
1	12Q7G		813	\$6.50	M503-2	
1	128A70		866A	£1-20		42.00
1	120A/		931A	£6.00	K301	
1	128G7	70p				£7.00
1	128J7		954	50р	KRN2	
1			955	50p		£6.00
1	12¥4		956	50p	OY4-2	
			957	50p		19-00
	19AQ5		1305	20p	TY4-50	
1			1629	70p		80.00
ı			2051		725A £	23.00
1	19H5 ₤	14.00	5933		2J/192	
1	20P3	60p	6057	75p	21	40-00
'	VALV		UD TE	1000		-

VALVES AND TRANSISTORS
Telephone enquiries for vaives, transistors, etc., retall 749 3934; trade and export 743 0899.

Colomor (Electronics) Ltd. 170 GOLDHAWK ROAD, LONDON W12. Open 9-12.30 31.3 5.30 p.m. Thursday 9-1 p.m.

SPECIAL OFFER OF MOTOROLA CAR RADIO CHASSIS BRITISH MADE.

RADIO CHASSIS BRITISH MADE.
PRICE £1'59 each postipacking 30p. (Motrola 84841509H34) Chassis built on PC board contains / Resistors / Capacitors / trimmer capacitor double tuned if cans / 3 small cans / two push-button wave switch / input choke 3 Transistor PA STAGE mounted on heat sink / M424 M331 M351 / other transistor and electronic components. Note these chassis are not 100 per cent complete but of recent manufacture. Condition of purchase, to be sold for spares, also components may vary depending on demand.

BULK PURCHASE 12 VOLT MINIATURE RELAYS. 50p each post paid. This is an un-repeatable offer, 4 pole 4 made 4 break contacts. As new ex equipment. Plastic casing, 1" x 1" x ½" approx. Plug in type (185Ω) approx.

CLEARANCE LINE. PYE WESTMINSTER CLEARANCE LINE. PYE WESTMINSTER 6 Volt to 12 Volt Convertor in maker's carton (mint condition). IDEAL FOR VW CAR OWNERS. 55:00 each plus 50p post/packing. (Well below manufacturer's retail price). Invertor circuit contains Motorola Transistors 2N3614(two) BY118(two) transformer/choke/etc.

STAR-RA-ONE TRANSISTOR RADIO KIT £1.75 p & p 20p s.a.e. details

STAR-RA-TWO MORSE OSCILLATOR KIT 80p 10p p & p s.a.e. Details.

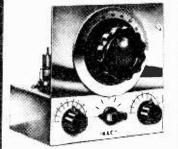
STARRA-THREE, 700 WATT SOUND TO LIGHT MODULE (Single Channel) Ready built on PC Board, British Made. Fused sup-pressed circuit. 2 to 20 watts variable Input. Simple fitting instructions £4·50 p & p 30p.

JUST ARRIVED . . . V.H.F. AERIAL CHANGE OVER RELAY LOW VOLTAGE MOBILE TYPE £1:00 each, p & p 40p each. Actual relay size approx. 2½" x ½" x ½" housed In metal case for mobile mount with tuning assembly in excellent condition (similar to Pye Cambridge type).

When in Leeds pop in at our walk round showroom. Many clearance lines, many bargains, well worth a visit.

M& B Components LEEDS LTD 88 Bishopgate Street, LEEDS 1, Yorkshire, Nr City Square. PHONE LEEDS 35649, ALL PRICES INCLUDE VAT. Postage as indicated

SHORT-WAVE KITS **WORLD-WIDE RECEPTION**



Famous for over 35 years for Short-Wave Equipment of quality, "H.A.C." were the Original suppliers of Short-Wave Receiver Kits for the amateur constructor. Over 10,000 satisfied customers—including Technical Colleges, Hospitals, Public Schools, R.A.F., Army, Hams, etc.

pitals, Public Schools, R.A.F., Army, Ĥams, etc. 1874 "DX" RECEIVER
Complete kit—Price \$4.60 (incl. p. & p. & V.A.T.). Customer writes: "Australia, India and America at loud volume"—"I have now heard over 300 stations including many Amateurs. I have received 32 Q.S.L. verified reports—from all continents. An amazing one-valver."
This kit contains all genuine short-wave components, drilled chassis, valve, accessories and full instructions. Ready to assemble, and of course, as all our products—fully guaranteed. Full range of other S.W. kits, including the famous nodel "K plus" (illustrated above). All orders despatched by return. Send now for free descriptive catalogue of kits and components.
Send stamped envelope for details.

Send stamped envelope for details.

"H.A.C." SHORT-WAVE PRODUCTS P.O. BOX No. 16, EAST GRINSTEAD, SUSSEX RHIP 3SN

TELEVISION CAMERA KITS

Complete kits are available for both "Mullard" and "P.E." design, Each kit includes a comprehensive construction manual, and a completely FREE technical back up service to ensure your success. VHF and UHF Modulator kits also available to allow standard domestic T.V. to be used as monitor.

All parts available separately, including a wide range of lenses, vidicon tubes and focus/scan coil assemblies. Ready built cameras also available. Complete kits available for P.W. tele-tennis game. Send 5" x 7" S.A.E. for full details, or come along for a demonstration and a chat with our technical

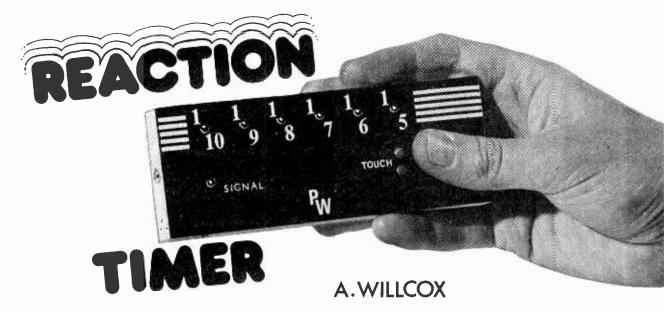
CROFTON ELECTRONICS

124 Colne Road, Twickenham, Middlesex, TW2 6QS

Tele: 01-898 1569 Telex 934642 Cadanac LDN







ARIOUS designs have been presented in the past for devices which measure the time taken for a person to react to a signal of some kind. Often a moving coil meter is used to display the individual's reaction time, usually by measuring the charge accumulated on a capacitor during the interval between the occurrence of the signal and the person's responding by purpose a switch.

THE DISPLAY ARRANGEMENT

In the present circuit the display takes the form of a series of six light emitting diodes (LED's), the illumination of each representing some discrete interval of time after the signal has been given.

A pair of contacts is provided which, when touched, halts the passage of light along the LED display, leaving one LED illuminated to give the reaction time.

The signal is provided by the switching off of another LED which is normally on. The LED's in the display then come on one after another. If no reaction is made before the last light goes off the signal light comes on again, and the cycle repeats automatically.

If, however, the contacts are touched in time the cycle is suspended, and the LED which indicates the reaction time remains illuminated until contact is broken.

ADVANTAGES

Obviously some accuracy is sacrificed by indicating time in discrete steps, but there are advantages in using this type of display.

First, the time interval measured by the display can be adjusted to cover the reaction times most likely to be encountered, whereas with a meter movement, if f.s.d. is arranged to indicate a suitable maximum time—say, 1/5 second—then the first half of the scale from zero to 1/10 second is redundant, because it would represent times which would not normally be achieved.

Also, with the LED display the light is stopped immediately contact is made. With a meter movement, however, there is a time lag before the meter pointer comes to rest. This is caused by the mass of the movement plus any damping, which prevents the meter from following faithfully the charge on the timing capacitor; a factor which would perhaps give the uninitiated a lack of confidence in the time indicated.

These points, together with the fact that a more robust and slimline construction was possible, seemed to justify the extra complications involved. The cost of a sensitive meter movement is certainly greater than that of the LED's and associated components, and so the choice is justified also on economic grounds.

CIRCUIT DESCRIPTION

The complete circuit is given in Fig. 1. Upon switchon Tr3 conducts forward bias being provided by R3. Resistors R2 and R5 limit the collector current to 20mA. This current flows through the signal light LED D3 which is therefore illuminated.

About 3.6 volts are developed across R5, biasing on Tr6, and so providing a path for current which would otherwise be charging C2.

It is the charge accumulated on this capacitor that is later monitored to indicate the time interval. R2 has 2.4 volts developed across it, forward biasing Tr7 which in turn removes the bias for Tr8. Thus, the supply to the LED display via Tr8 is removed.

Resistor R2 is also the emitter resistor for Tr1, and so the 2-4 volts developed across it keeps Tr1 cut off while C1 charges via R1.

The time constant here is long, and only after six or seven seconds does the base of Trl become sufficiently negative for it to start to conduct. As it does so some of the bias current to Tr3 now passes to Trl, and so the collector current of Tr3 starts to fall, reducing the voltage across R2 as it does so.

This further assists conduction of Trl, and the net result is that Trl is turned fully on and Tr3 is switched off rapidly.

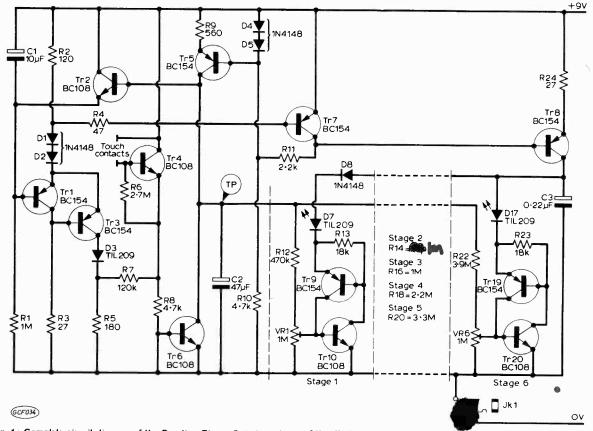


Fig. 1: Complete circuit diagram of the Reaction Timer. Only two stages of the display are shown, all being identical except for the resistor in series with the pre-set potentiometer. Values for the resistor are given.

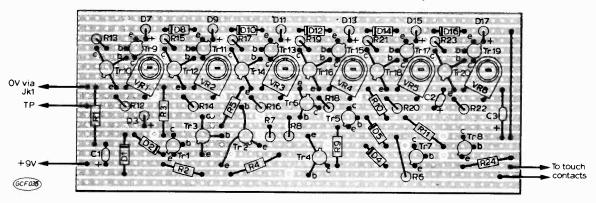


Fig. 2: Layout of the Veroboard with breaks in copper rails indicated.
The cathode (+) of the TIL 209 is the longer lead.

LED D3 now extinguishes, providing the signal, and the bias for Tr6 is removed, so allowing the capacitor C2 to charge.

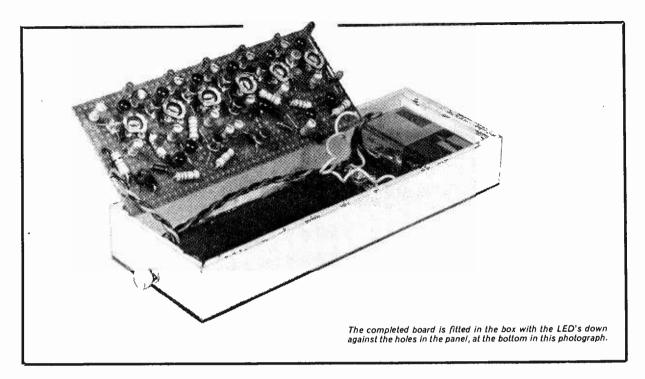
A constant charging current is provided by Tr5, its emitter voltage being fixed by the constant voltage (1·2V) across the diodes D4 and D5, and the value of R9 determining the current through the transistor; in this case 1mA.

By supplying the capacitor C2 with a constant current the voltage across it is a function of time, unaffected by any change in battery voltage. Also, the charge increases in a linear fashion, simplifying the calibration calculations.

DISPLAY DIODES

The voltage across R2 at this time is at a very low level because the current through it is now limited to 300 microamps by R3, and so Tr7 is turned off. Tr8, which supplies current to the display diodes, now receives bias from the forward voltage drop across D4 and D5 in common with Tr5. The current to the LED's is thus fixed by R24, whose value is chosen to provide 20mA.

Each LED in the display is driven by an n.p.n. and a p.n.p. transistor arranged so that they function as a sensitive thyristor. When the voltage on the base of the n.p.n. transistor exceeds 0.5V conduction starts. Each transistor then provides a bias path for the other, forming a rapid switch requiring only a minute current to activate it.



After a time interval of 1/10 second from LED D3 turning off, the voltage on C2 has reached 2·1 volts. If the slider of VR1 is in a position such that 0·5 volts appear on Tr1's base when 2·1 volts are present on C2, LED D7 will come on 1/10 second after D3 goes off, a path being provided through the diodes and Tr8.

When the time interval extends to 1/9 second the voltage on C2 has increased to $2\cdot 4$ volts, and if the slider of VR2 is adjusted so that $0\cdot 5$ volts appear on it when $2\cdot 4$ volts are present at the top of R14, then LED D9 would come on and represent a time interval of 1/9 second. LED D7 is switched off in the process because the voltage at the junction of D8 and D9 is equal to the forward voltage of D9 only (typically $1\cdot 6$ volts), and this is, of course, insufficient to cause D7 and D8 to conduct.

The process continues thus along the line, the illumination of each LED causing the cut-off of the one preceding it until the last LED, representing 1/5 second, is on.

TOUCH SWITCH

If in the meantime the contacts are touched a small current flows into the base of Tr4, and is amplified sufficiently to turn on Tr6 again and short out the timing capacitor C2.

Although the voltage to all of the presets is in this way removed, whichever of the LED's was on at the time the contacts were touched remains on due to the self-maintaining action of the thyristor configuration of the lamp drivers.

The LED remaining illuminated represents the resonse time. For instance, the 1/8 lamp would indicate a response time between 1/8 and 1/7 second.

When contact is removed the capacitor is allowed to charge again, and once the voltage across it exceeds its previous value, the remaining LED's go through their normal sequence until the last LED comes on.

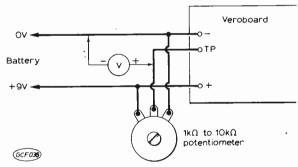


Fig. 3: Calibration circuit using a voltmeter and potentiometer.

RESET

Once the last LED is on, some means must be provided to turn it off and switch the signal light back on. This is done in the following way: When the charge on C2 reaches the battery voltage minus 1·2 volts—corresponding to a duration of 1/3 second—Tr2 is brought into conduction (the emitter voltage is reduced by the forward voltage drop of D1 and D2 to achieve this) reducing the charge on C1 and thereby turning off Tr1, so allowing Tr3 to turn back on.

We are now back where we started with the signal light back on. So, as described above, the supply to the display LED's is now removed by the action of Tr7, and the last remaining lamp is extinguished.

CONSTRUCTION

A suitable Veroboard layout is given in Fig. 2. The LEDs are best mounted last, as they are arranged

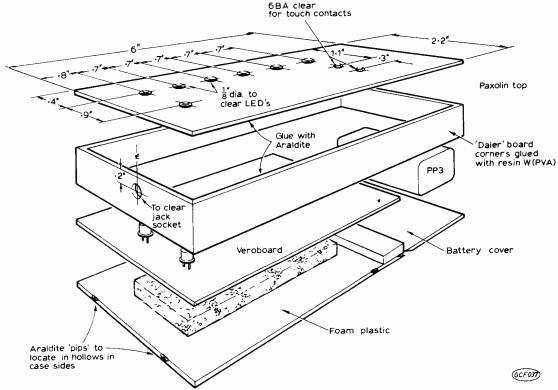


Fig. 4: Construction of the case, the sides and bottom being made from Daler board and the panel from paxolin.

★ components list

Resist		Bun' 401 C
R1	1ΜΩ	R13 18kΩ
R2		R14 1MΩ
	27kΩ	R15 18kΩ
	47kΩ	R16 1MΩ
	180Ω	R17 18kΩ
	2·7MΩ	R18 2·2MΩ (All ½ or
	120kΩ	R19 18kΩ ½W ±10%)
	4·7kΩ	R20 3·3MΩ
	560Ω	R21 18kΩ
	4·7kΩ	R22 3·9MΩ
	2·2kΩ	R23 18kΩ
	470kΩ	R24 27Ω
(6 of	ູto VR6 1MΩ	2 miniature horizontal preset
(0 01	'	
Capac	itors	
C1	10µF 6⋅3V tant	talum
C2	47μF 6·3V tant	talum
C3	0 ⋅ 22 μF 35 V tar	ntalum
Comic	onductors	
		Tr8, Tr9, Tr11, Tr13, Tr15, Tr17,
	BC154 (11 off	
		, Tr12, Tr14, Tr16, Tr18, Tr20,
	114, 110, 1110 08 (9 off)	, 1112, 1114, 1110, 1110, 1120,
		8, D10, D12, D14, D16 1N4148
(9 of		5, DIO, DIZ, DI4, DIO 1144140
		13, D15, D17 TIL209 (7 off)
υο, :	51, D3, D11, D	10, 510, 517 112203 (7 011)
Misce	laneous	,
Misce		
		jack socket and plug

to sit above the other components so that they protrude through the front panel.

The circuitry associated with each LED in the display is identical, with the exception of the value of the feed resistors to the presets. These are chosen to bring the presets to mid-range for the times allocated to them.

The sides and removable base of the case were constructed from "Daler Board," which is available from art dealers. This material has a good finish and is easily cut.

The top of the case was cut from paxolin and fixed with Araldite to the case sides. Two 6BA screws, with their heads filed flat, were used for the touch contacts. Fig. 3 gives details.

Because of its small size, a sub-miniature jack socket was used for an on/off switch, a jack plug being inserted to switch the unit off. This socket could also be used to plug in an external power supply, although the total current consumption of only 22 mA is easily supplied by a PP3 battery.

CALIBRATION

Calibration is a simple matter, only a $1k\Omega$ potentiometer and a voltmeter being required; the set-up is shown in Fig. 4.

All the presets are first turned fully anti-clockwise. The calibration potentiometer is also turned anti-clockwise. The unit is switched on and the signal light allowed to go off. It will now remain off because the voltage on C2 is kept down by the calibration potentiometer.

The next step is to turn up the calibration control until the voltmeter indicates 2:1 volts. VR1 is now advanced slowly until D7 switches on. Now the calicontinued on page 1130

Daler Board for case

1k to 10k potentiometer for calibration



by Eric Dowdeswell G4AR

It is good to report that letters are still coming in on the subject of running a competition in this column. Unfortunately no-one has yet come up with a method of confirming the reception of a station other than by the virtually impossible method of getting a QSL card, difficult often for the transmitting amateur himself, let alone the SWL! A tape recording was frequently suggested but then not everyone has a recorder, although one must admit that they are remarkably cheap these days. However I have concluded that this is possibly the only way out and I am in the process of formulating some rules based on recordings.

It is a pity that the log itself cannot be accepted but it is a fact of life today that it is all too easy to log stations as worked by, say, a local DX'er. Looking at the pile of logs I get, I'm afraid that this does happen, the listener not having actually heard the DX station involved. As I have said before, it is no use running any competition unless the competitors can be assured that the winners have indeed heard the stations submitted in logs.

John Porter (Baslow, Derby) lost half his long wire in the gales but managed to copy VQ9HCS in the Seychelles on 15m for a fairly rare one. C. P. Bennett (Slough, Berks) joins our ranks with a Codar CR70A and ditto preselector fed from a 10ft vertical or 100ft long wire. He lacks signals on the 10m band which is not an unusual moan, only to be expected at the bottom of the sunspot cycle. Nevertheless some of our SWL's do quite well and so the receiving set-up ought to be suspect. Receiver alignment or rather, misalignment, can be a contributory factor and an aerial designed for the band will help no end, as will bringing any existing aerial to resonance on 10m.

Roger Trett (Norwich) swears he will try to get up much earlier in the mornings to get some of that exotic DX that the lie-a-beds never hear! More from John Porter who is all agog at hearing a W8 and a W0 on CW on TWO METRES! Yes, very likely, now that amateur satellite Oscar 7 is in orbit, following its launching on November 15 last. The 432MHz to 144MHz repeater has already provided many trans-Atlantic QSO's, Strong signals from telemetry beacons on 435·1 and 145·98MHz are being heard. A second repeater from the 2m to the 10m band is also opera-

tional plus a telemetry beacon on 29.5MHz. All this should be an incentive for some of you to try your hand at 2m and down. John uses a Microwave Modules converter into his FR50B and an indoor dipole on 2m.

Regular Alan Doherty (Portrush) wanted some QTH's for the stations he had heard but generally I am unable to help in this respect. Can only suggest keeping an eye on the DX news in Short Wave Magazine or Radio Communication where the QTH's of the rarer DX stations are generally given. Stephen Lawrence (Market Harborough) had some blush-making comments to make on the column plus ideas for a contest involving a short contest period so that logs could be checked against each other. This would penalise the really good operator who might hear the odd weak DX station that nobody else hears, and this does happen. This is where the tape recording would prove invaluable.

Malcolm Sole (Lancaster) would like times quoted on reception reports but I'm afraid that the delay before the information gets into print makes such information useless. All we can hope to do is to indicate the unusual stations that have been active in recent times and leave it to the SWL to deduce from experience when he is most likely to be able to hear them on the particular band indicated. Malcolm has an AR88 and 300ft of wire in the loft . . . some loft! or too many zeros! I've asked Malcolm to elucidate.

Steve Cottis and Nick Hunt of the same street in Harrogate have very sensibly combined their energies and borrowed a receiver in order to get started in our exciting hobby. The set is fairly good but nevertheless they would like to get a set of their own, but as they say 'money is very important as we have not got much of it', and since they are aged but 13 this is very understandable. Congratulations chaps, and let's hope your initiative will be rewarded.

Tim Charles (Colchester) was still waiting for his new CR70A when he wrote from hospital where he was visiting his Mum. He managed to note VP1FF on 40 m SSB and VR6AF on the same band on CW plus KS6AZ on 20m CW all worthwhile goodies by any standards. Gary Edge (Warrington) must have been laying down the law to his 9R59DS which came up with HZ1TA, VU2BX and FP8SPM on 80m SSB. Following my February compliments to 16-year-old John Martin I received an unsigned letter from an unknown address in Plymouth pointing out that Phillip Askey of the Plymouth Radio Club had passed his RAE at 1412! I gather that he is no less than G8JNN and I hope these startling revelations will not prove to be too much of an embarrassment! Outstanding entry from the log of Max France (Warrington) was VS6FB at 1543z towards the end of December on 80m. Round about our sunset I suppose, without looking up the tables, which would make the path ideal at the time.

Eric Carling (Lymington) persists with his request for a band/countries table each month but we again run into the problem of substantiating claims. Alan Rae (Glasgow) got money in lieu of goods at Christmas time and so is now looking for a receiver. Preference runs to Drake 2A, FR50 or 100 or the Trio series Jr310,500 or 160. Stanley Sharred's brother David A8312 has decided to join the act by sharing the equipment and submitting his own log. David likes 160m where he has heard no less than 33 countries in little over a year. He, like several other readers, sent me info on ST2AY which is much appreciated but so far nil QSO! Hoped to make it in the CQ WW 160m contest but in spite of working 20 countries the ST2 eluded me.

On getting QSL cards, Bernard Hughes BRS25901 (Worcester) reports a QSL card from Fiji as costing him 10p plus two IRC's plus an SAE! Which explains why we cannot demand cards as evidence in competitions! John Burgess (Birmingham) joins us with his Codar TRF receiver and 25ft outdoor wire and so far has concentrated on 20 and 80m. Graham Wilson (Blackpool) stuck with SSTV with his JR310 into a Spacemark monitor on 14230kHz to list nearly 100 stations. Paul Barker (Sunderland) is also happy on this mode plus some SSB catches. Paul comments on the excellent work done by VK6WC who acted as relay station in the first critical hours of the Darwin disaster.

Newcomer Michael Adams A8520 (Gosport) has a CR70A and finds it a delight to use. The 132ft of wire, preselector and ATU must help quite a lot too. A Microwave Modules converter puts him on 2m as an additional interest.

Keith Rawlings A8569 (Broxbourne, Herts) has begun his listening on 2m and 70cm, with converters into a PR40 fed from a 5 element job on 2m and a 46 element on 70cm rotated by an AR22. He has made up a preselector for the 70cm band which netted him F1AVG for a start. Michael Green (Northwich) has also been listening in to Oscar 7 with a converter into his HF arrangement of a QP166 front-end into a CR100 as an IF strip. As he says, further info on the Oscars can be heard on the RSGB broadcasts on about 3600kHz starting at 0930 on Sundays as well as on some VHF channels. The Oscar Net is on 3780kHz Sundays at 1015z. John Martin A8781 (Kingsbridge, Devon) joins us with a general log but is very concerned at the general noise on 80m. We all learn to live with it, in time! An enlarged log from Tim Charles, previously mentioned above, confirms reception of his new CR70A at long last! Andrew Darragh (Wetherby) is also gloating, this time over a FR50B, which he actually had to buy!

Log extracts

B. Hughes:—80m HZ1KE UA9VH/JT1 KG4DS XU1DX ZD7FT 20m VQ9HCS VK8CE 4W1GM

M. Bennett:—80m HM5LV TG9YN 20m FP8IZ VQ9B 5B4AV 15m HC1AD 9Y5GA

- D. Sharred:—160m EP2BQ OJ0MA PY1RO VS6DO 9G1AR 80m FM7AB OY7K VP1FF ZL2BT 8P6ES 40m HP1IW ZD7FT ZL2AMJ
- A. Rae:—80m HI8LC HK3KT JY9GR KZ5EQ W7AZG 6W8AF 9Y4CP
 - E. Carling:—20m A2CCV (Botswana) BV2B

ZS1ANT (Antarctica) 15m CO2PZ HR3JJR TG9YN YN1GV 10m A2CCY ZD7FT 9G1AR

S. Budd:—80m CP2BD H18HA HK4BTY JA8LQ KG4DS PJ2CW SU1MA TR8AC 20m VP2AYL XU1DX 8R1X (POB 164 Georgetown)

M. France:—80m FG7GF KG4OS VP1FF ZF1RD 3E1KC (Panama) 9X5PT

M. Sole:—40m F2JD/P/5U7 20m BV2B HM1AQ KG6SW VP8NP YJ8CS

- J. Porter: 20m HI3XMV M1C VP8NP 15m FY7AS HS4AFD KZ5DK 2m A W8 and W0 heard on CW via Occar 7
- R. Trett:—20m VP2VPK (Tortola) 15m A2CCY CT3AA PJ2VD
- G. Wilson:—20m(SSTV) CT1EQ EA5IO HA6VK HB9NL JA7FS K2ONE OD5HC SV1CG VE3FCN VU2AIC VQ9R

M. Adams:—80m FP8FU VE7EL VP5BT ZL3GS 15m KP4DLA 5T5AC

A. Doherty:—80m EP2VJ HI8XRG YN2DX 40m JA1DSL TG9PW VP9CW 20m TJ1TAF 5U7BA

M. Green:—80m XE3LK VP2SG 10m (from 2m via Oscar 7) DC8BB G8AWS G8BCL 2m (from 70cm via Oscar 7) DJ9DL F6CH G8AWS HB9RG I0SVS LX1DB LX1SI VE2BYG

T. Charles:—160m K8CCV WB8AJH 80m A4XVB HP1SW PZ5FB TI2JX VP2EEB (Anguilla) 15m JY9CR PJ8AJA PZ1DR VQ9FCS

P. Barker:—20m (SSTV) HB9IT I2LOV OE1SF OK30ZAS SV1CD

A. Darragh:—80m FP8SPM HI8XRG 20m DU1XKE HP1ZV 8R1X 15m JY9CR PZ1DR TU2DV

All stations are SSB except those in bold which are CW.



SHORT WAVE BROADCASTS by Derek Bell

N these days of the ever rising price it does my old bones good to be able to relate the story recently sent to me by Andrew Toms of Coventry. He wandered into a jumble sale in that neck of the woods and saw reposing there an old eight-band portable receiver, priced at ten pence. Bearing this home he found that it gave him:—

6055 at 2100 Radio Sweden from Horby 6065 at 1924 V.O.A. from Morocco 9540 at 1700 Radio Australia from Perth

All this when coupled to an ex W.D. tank aerial mounted ten feet in the air. Andrew asks for details of communications receivers suitable for general short wave listening. Well, OM, these would fill a book, but you seem well set up so I think it would be perhaps best to stay as you are.

CQ, CQ, Rex Cooper, you asked for details recently of FEBA from the Seychelles. In a recent band survey by the World DX Club (to whom my thanks for the gen) this station was reported on 11855 at 1800. While on the subject of band sweeping, acting on a recent letter reporting no traffic on 5MHz I did a bit of band surveying myself and came up with Ecos del Torbes, San Cristobal, Venezuela

-continued on page 1130

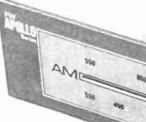


PRACTICAL WIRELESS

WAPOLO-SERIES

TRIPLE VARICAP' MEDIUM WAVE TUNER/RECEIVER

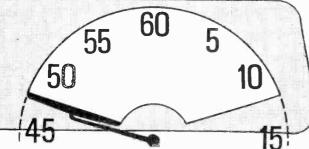




The very latest multiple Varicap is used in the Apollo series permitting the simultaneous tuning of several circuits at almost any distance by means of a simple potentiometer. The possibilities are tremendous! Protect your car radio by putting it in the boot and

tuning it from the front seat! Comfortable armchair operation of your domestic radio . . . and remember, full tuning coverage is available in addition to the usual push-button facilities!

also:CAR WIPER DELAY UNIT



Clip this unit across your windscreen wiper switch and get single stroke operation at various controlled intervals to suit weather conditions.

MODEL TRAIN CONTROLLER

Simulate precisely the movements of real trains! Based on the cheap 555 IC the unit includes a mains power supply.

MANY OTHER CONSTRUCTIONAL ARTICLES, SPECIAL FEATURES AND REGULAR COLUMNS.

ON SALE IN APRIL



HE internal amplifier circuit shown in Fig. 5 uses the LM380 (IC17) in its simplest possible configuration. SK1 is a switched jack socket that allows a phono output to be taken before the internal amplifier and is so wired that the internal amplification system is disconnected when used with an outside amplifier. The output from IC17 is taken to both the internal speaker and to a headphone socket. This socket, when used, automatically cuts out the internal speaker. Should these jack sockets not be wanted the printed circuit board has two pairs of pins (A & A1 and B & B1) which can be shorted together and the jack sockets omitted. Maximum output power from IC17 is developed across an 8Ω loudspeaker but in practice it has been found that sheer power is not too important from the internal unit, consequently any medium impedance loud-

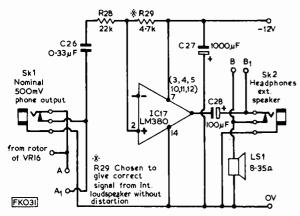


Fig. 5: Circuit of the simple audio amplifier incorporated in the organ-

speaker $(8\Omega\text{-}35\Omega)$ of suitable dimensions can be used. Apart from the keyboard resistors and the power supply, all circuitry is housed on one board. This includes all the manual controls and thus greatly simplifies the normal problems of interconnections. The second board houses the power supply, Fig. 6, and, as with the rest of the organ, it contains only essential components. A fairly reliable -12V rail is required, hence the zener D7 and the series regulator transistor Tr4.

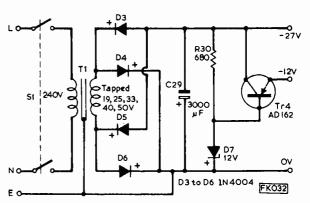


Fig. 6: Circuit of the power supply. Constructed on a PCB separately from the main organ PCB.

All smoothing and decoupling capacitors are mounted on the main board, with the exception of C29 which serves to provide a satisfactory -27V rail to feed the MOS devices.

NOTE

It is most important, before continuing any further, that the following points are read **before** even unwrapping the MOS integrated circuits (ICl to ICl3)!

In order to check the workings of the main board it is suggested that the power supply be assembled first. This board, Fig. 7, should be fabricated from fibreglass laminate as it will be used to support the mains transformer. Plenty of space has been allowed for transformers other than the MT50/12 but if using an unspecified transformer it is as well to check that it will fit before continuing. Using a pair of long-nose pliers form the component leads to exactly fit the hole spacing on the board, Fig. 8, ensuring that the diodes and the capacitor are inserted with correct polarity.

The tappings on the transformer should give an RMS output voltage of 18 or 19V, so if using the specified device it is suggested the supply be taken from the terminals marked 0V and 19V. On rectification this should give an off-load DC voltage of 26.6V across C29. Do not expect an exact voltage at this



MIERE

PART 2

point as it will be dependent on the loading of R30 and any eventual loading from the rest of the circuitry. Although the circuitry calls for a nominal -27V rail it has been found in practice that the circuits function adequately with this rail as low as -22V. On the other hand the -27V rail should not exceed -30V as damage to the IC's might result.

POWER SUPPLY TESTING

When the power supply board is assembled, connect up a temporary mains lead to the primary of the transformer (not forgetting the earth wire to the board) and then wind a few layers of insulating tape around the terminals for protection.

It is suggested that a power supply test be carried out before any of the circuitry is assembled into the cabinet. Connect up to the mains, and check the off-load output voltages. Relative to the OV (positive) rail should be something between -25 and -27V at the negative end of C30. If voltages wildly different from this are found check that the diodes are the right way round. If the voltage is just outside the above limits alter the output tapping of the mains transformer accordingly.

Having established a proper value for the nominal $-27\mathrm{V}$ rail go on to check that there is $-12\mathrm{V}$ at the emitter of Tr4. With the correct zener diode this should automatically fall within the range of $11\cdot5$ to $12\cdot5\mathrm{V}$. If very different from this suspect the zener and replace it

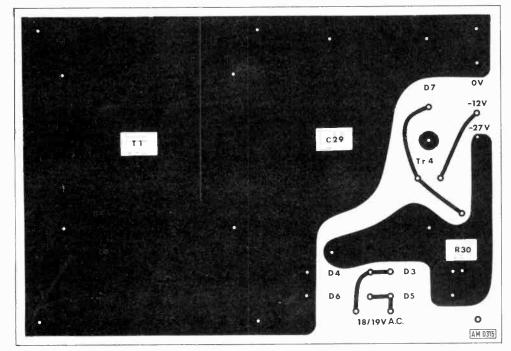


Fig. 7: Actual size layout for the PCB on which the power supply is built.

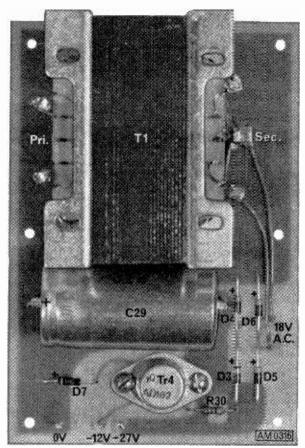


Fig. 8: Location of components on power supply PCB. Observe correct polarity of diodes and capacitors.

MAIN PCB

By any standards this is a large circuit board (Fig. 9) and it has to carry a number of manual controls which rely on their soldered connections for mechanical rigidity. For this reason fibreglass laminate must be used. It is large because we have removed most of a conventional organ's complexity from the hands of the constructor and put it into the board. Whether the board is home-made or bought it must be thoroughly checked for quality. Make a test for possible hair-line cracks in the very fine conductors that run between the tone generator IC's and the lead-out lands on the edge of the board. At the same time check that none of these fine conductors are shorting to their neighbours, either from under-etching or a "smear" from the roller tinning process.

If the board is ready-made there should, of course, be no problem but it saves an awful lot of bother later to devote five minutes to this test. Should any discontinuity be found in any of these conductors "home in" on the break with testmeter probes and then carefully solder a single strand of wire (taken from some fine flex) across the offending area. Do not try to bridge the gap with solder, at best it will make a messy job and at worst it will introduce a doubtful connection which could cause trouble later. Short circuits can easily be cleared by running a sharp knife between the conductors until the "bridge" is felt when it can then be scraped clear.

MAIN BOARD ASSEMBLY

Start assembly with the nine slider potentiometers. The type specified will fit the lands on the circuit board exactly and will be self supporting. It is not recommended to use other types, but if it is unavoidable the contact positions may not coincide with those on the board. As a make-shift remedy carefully drill three holes in the correct position (without interfering with any of the printed wiring in that area) and attach the potentiometers in place on the top side of the board with Araldite. Connections to the lands can then be made on the underside of the board with insulated wire. This is an exceedingly messy job and should be avoided because it will be almost impossible to replace these components at a later date.

Make sure that all the tracks of the sliders are parallel with each other, a small latitude in positioning is afforded by the slight flexibility of their solder tags. When they are correctly positioned make sure that they are rigidly fixed with a generous amount of solder on each land.

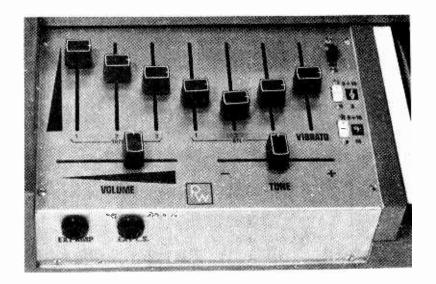
Now insert and solder-in the inductor, L1 and L2, after which the board can be turned upside down for subsequent soldering. The components already in place will act as legs to hold the board clear of the working surface. Because of the high density of printed wiring, little metal is left on the board for soldering lands necessitating extreme care with the soldering iron. A miniature iron must be used for this and all subsequent operations, one with a 3/32in. diameter bit or, at most, 18in. diameter. Ideally, the iron should be equipped with an earthing lead, for reasons which will be explained later, but if it has no earth connection do not worry unduly; it is certainly not worth rushing out to buy one specially! Use the minimum amount of solder for each joint and make sure that each connection is clean and bright before moving on to the next. Dry joints can be a great headache in this project!

OSCILLATOR AND VIBRATO STAGES

Now wire in all the topside conductor jumpers. These are cut from 22SWG tinned copper wire that has been work hardened to keep it straight. It is a useful tip to know how to harden wire for this, and other projects. First of all cut off about a yard of wire from the reel; it will, of course, have a tendency to curl. Firmly grip each end in a couple of pairs of pliers, a couple of twists around the jaws of the pliers helps maintain the grip, and then slightly stretch the wire by pulling apart on the pliers. Allow the wire to stretch for about 2 or 3 inches and when the pliers are removed the wire will remain straight.

Now cut off straight lengths, form the ends to fit the holes for the jumpers and solder them into position. Make absolutely sure that they are the right length so that there is no chance of them bowing and shorting together. Apart from the jumpers in the vicinity of IC2 to IC13 do not forget the two short links near IC15. Next insert and solder all the board pins into their correct locations.

Start assembly of the rest of the circuitry in the following sequence after which one can carry out a few tests to check progress. Begin with the master oscillator and vibrato stages by soldering in the resistors R1 to R11 (R5 and R6 are located near the slider pot VR2). Proceed with capacitors C1 to C7.



Close-up of the organ control panel and outlets for external amplifier or speaker. The first three vertical sliders at the left control the 16ft. pitch, the next three controlling the 8ft pitch.

The latter is a compression type and should be mounted on the top side of the board; use tinned copper wire to connect its two terminals to the corresponding holes in the PCB. Make absolutely sure that C6 is in the right holes and that the polarity is correct.

Solder in the semiconductors D1, D2, Tr1, Tr2 and Tr3. Be careful not to damage the plastic casing of the diodes, form the leads and make sure they are inserted the right way round.

Now the oscillator can be tested with the help of a medium-wave transistor radio. Temporarily connect the 0V and -12V rails of the power supply to the corresponding circuit pins on the main board (near the location for IC13), hook a length of insulated flex to the end of R10 nearest Tr3 and set VR1 to minimum vibrato, i.e. the slider should be furthest away from the edge of the board). Set VR2 to the centre of its range and switch on the radio, tuned to about the middle of the medium waveband. Place the insulated wire from R10 very close to the radio and switch on the organ's supply. Using a screwdriver, adjust C7 until a signal is picked up by the radio. If there is a station nearby you should hear a clear heterodyne whistle. A signal indicates that the oscillator is functioning.

If no signal is picked up at any setting of C7 then it is almost certain that there is a missed conection, or Tr3 or the diodes are the wrong way round. Proceed to check the tune control by tuning C7 for a clear heterodyne whistle at some position on the waveband and then try sliding VR2 across its travel. It should have much the same effect as tuning C7 except that the degree of control is much finer.

Finally, check the vibrato by listening to the whistle while advancing VR1. The whistle should start to "wobble" in frequency and eventually, as the control is advanced further, break-up altogether into a series of low frequency pulses.

TONE FORMING STAGES

However tempted one may be, do not under any circumstances, insert the MOS integrated circuits (ICs 1 to 13); this should be done at the very last stage in assembly. Instead, carry out assembly of the tone forming circuits and amplifiers.

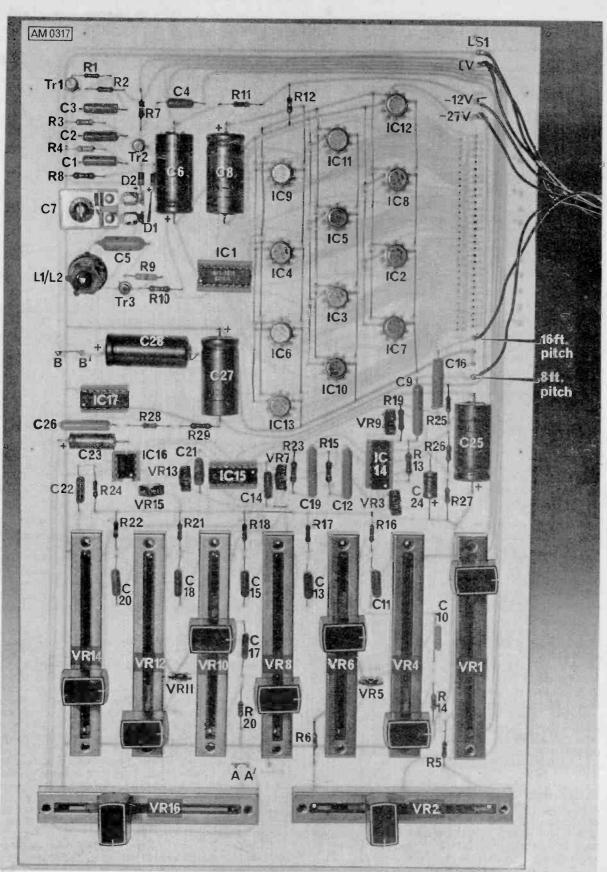
Start with all the IC sockets as this will help in locating the positions of other components. Complete the installation of the remaining passive components, R12 to R29, the seven pre-set potentiometers and C8 to C28. At the same time put temporary shorting links across the board pins. A and A₁, and B and B₁. The board has been designed for use with Mullard C280 capacitors but ample room has been left to accommodate other types. When using the C280 devices widen the distance between the lead-outs slightly; this should be done very carefully and the leads should not be bent too close to the plastic covering as they can sometimes break away altogether. It is best to hold the lead with a pair of long-nose pliers, very close to the case, and carry out the bending operation on the side of the pliers furthest from the case.

Integrated circuits IC14 to IC17 can now be inserted into their sockets ensuring that they are correctly orientated. Be careful in deciding which way round they go because the orientation mark is a very small indent in one corner of the top side. This should not be confused with the larger moulding mark which appears on some devices. Before proceeding to the final stage of board assembly set all the pre-set potentiometers to the centre of their adjustment.

MOS DEVICES

It only remains to insert the MOS devices. A reasonable amount of care is required for this operation because the devices, although protected to a degree, are subject to damage from high voltage static electricity, the type that can be induced on the body when one wears a pair of nylon overalls or a nylon sweater. To protect the devices in transit they are supplied with special packing. In the case of IC1 it will probably be sent in a plastic box, its pins pressed into a piece of black conducting foam rubber. It is quite safe to handle the device while its pins are thus protected but it would be a foolish man who did so immediately after combing his hair or stroking the cat, ideal ways of building up a high static charge on the body!!

Likewise, IC2 to IC13 are supplied with shorting devices, connected around the pins. Again the IC's



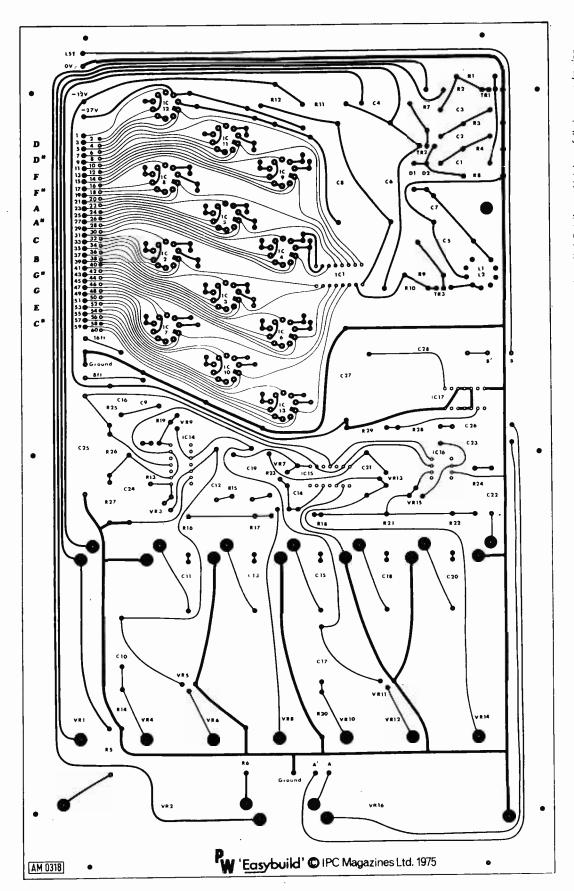


Fig. 9: Above, shows the main PCB layout, for reference purposes only. This is **NOT ACTUAL SIZE.** The board size is 330 x 205 mm (13 x 8in.) Details on obtaining a full-size paper drawing of the Poard is of the board, which will assist constructors to locate the components. The copper side of the board is underneath.

may be handled with these in place, but eventually these protective measures have to be removed so that one can solder the devices into place. IC1 is a dual-in-line package and hence a socket can be used for it and soldering is not required.

The ten-lead TO-5 packages of ICs 2 to 13, however, present a problem because sockets for this type of package are extremely expensive, making their use unjustifiable. Remember however, that soldering these devices straight to the board will probably invalidate any guarantee from the manufacturer for free replacement in the event of failure. As the sockets are very nearly as expensive as the devices themselves it was felt the extra insurance was hardly good value for money, and in any case provided these instructions are followed in every detail there should not be any problems.

The main worry is static electricity and every possible precaution must be taken to prevent introducing a static potential difference between the pins of the IC's which can be caused by a body charge induced by wearing synthetic fibre clothing while sitting on PVC chairs, wearing insulated soled shoes, a charge on a formica working surface that is insulated from the ground by rubber feet and from a charge induced on an unearthed soldering iron. Static is enhanced by

dry, hot conditions.

From the above it might seem that we are suggesting that you strip off all your clothes and go barefooted into the garden to do your assembly on the lawn on a wet cold winter's day! Fortunately one need not go to these lengths but it is necessary to do one or two apparently strange things to ensure com-

plete protection. The object is to try and keep everything at a uniform potential and to avoid aggravating problems, i.e. work on a wooden table and avoid PVC covered chairs, a good old fashioned wooden chair is safer. Take off those beautiful synthetic soled shoes and put on your oldest slippers. Prepare your working surface by covering it with a generous sheet of aluminium cooking foil and make sure that it covers all the area on which you intend to work. Put all your tools and the PCB on this sheet together with the soldering iron stand and connect a lead of fine wire between a cool metal part of the iron's case and this sheet. If the soldering iron is properly earthed this means that anything that comes in contact with your work surface will auomatically be earthed. While working on this part of the project, frequently touch the fingers on the foil. Alternatively roll up the sleeves so that the elbows frequently come into contact with the foil.

Tip out the IC's onto the aluminium foil and make sure that they have all come into contact with it. They can then be handled in the normal way without any further worries.

DIVIDER IC's

Inserting ten-lead devices through a drilled circuit board can be a bit of a problem. It is therefore advisable to trim the leads to different lengths making the lead immediately under the locating lug the longest. Then, working round the leads, trim each one a little shorter than its predecessor but do not overdo the trimming because it must end up with between 38in. and 12in. for the shortest lead!

The lead immediately under the lug of each of the twelve IC's should be inserted first into the hole which carries an identifying lug on the printed wiring side of the board. Then work round, carefully inserting each successively shorter lead in turn until the IC is in place. Push the circuit home making sure that the leads fan out gently without shorting against each other. Turn the board over and carefully solder the device into place with the maximum of care and the minimum of solder...

Proceed like this until all the TO-5 devices have been installed. Check that blobs of solder have not been dropped on the fine printed wiring and that there are no bridges between pads on the IC connection pattern. Finally insert IC1 into its socket, again making sure of its correct orientation, and the board is now complete and ready for testing.

Solder temporary leads, each about 12in. in length, to the board pins as follows: one wire to pin LS1, two wires to that marked 0V and one wire each to -12V, -27V, 16ft, and 8ft. Now dispense with the static protection paraphernalia as once the IC's are in circuit there is little chance of them being damaged.

TESTING

Test the main board by connecting the leads 0V, -12V and -27V to the corresponding pins on the power supply PCB, and another lead from the 0V pin together with one marked LS1 to the loudspeaker (not yet in the cabinet). Set the knobs of all the sliders as follows: VR1 furthest away from the front of the board, VR2 mid-way, VR4, 6, 8, 10, 12 and 14 furthest away from the front of the board (i.e. to minimum signal) and VR16 to the furthest left position (minimum volume). Switch on the power when a "clunk" from the loudspeaker should be heard and nothing more. If nothing at all is heard check shorted points B and B1 and similarly points A and A₁. Advance the volume control (VR16) to about mid-way and you could hear a gentle "singing" the loudspeaker. This may only be a faint signal but is a good sign that things are as they should be.

Now for the great moment: advance VR6, (the square wave control at 8ft pitch), to maximum and touch the flying lead from the 8ft pin on to any of the lands numbered 1 to 60. There should be a loud clear tone from the loudspeaker for every land that is touched. Pin 1 should be the lowest octave tone for the note D, pin 2 should be one octave up on this, pin 3 another octave higher, pin 4 one more octave higher and pin 5 the highest octave for D. Pin 6 should be the lowest octave for D and so on. Keep the wire on one mid-frequency tone and check that its loudness can be controlled by VR6 and the volume control VR16.

Now leave VR6 at minimum level and check the "spikey" signal by advancing VR4. It should sound much thinner and, probably, will be of much lower amplitude. Advance the volume control to maximum and turn VR15 (preset) down until the sound is at a comfortable level, approximately 25% up from its lowest position. If the sound is weak at this setting go to the busbar preamplifier gain control (pre-set) VR3 and adjust this to give a comfortable level.

PART 3 NEXT MONTH CONTINUES WITH THE TESTING OF THE MAIN PCB, AND WIRING OF THE KEYBOARD.

RECEIVER R.H. LONGDEN

THIS receiver uses an integrated circuit which provides mixer, oscillator, IF, detector and audio driver stages, with a ceramic filter in the IF position. A complementary push-pull audio output stage follows, to operate the speaker.

CIRCUIT DESIGN

The switching and tuning arrangements adopted are of a somewhat simple nature and the way in which the three bands are obtained will be clear from Fig. 1. VC1/VC2 is the tuning capacitor with an integral ball drive. The band switch has three poles. On "M", for medium wave reception, L1 and L2 are in series and tuned by VC1. VC2 tunes the oscillator coil, with padder C4 in circuit. S1 also places C2 across VC2. In these circumstances, oscillator coverage is approximately 1165 to 2020kHz. As the receiver intermediate frequency is 455kHz, the oscillator operating HF of the signal frequency, coverage is approximately 710-1565kHz. No pre-set trimmer is required in the oscillator circuit because the panel trimmer VC3 allows for peaking of the aerial circuit throughout the band.

With the switch at "160" C2 remains in circuit, but the padder is changed to C3. Oscillator coverage is now approximately 2160 to 2600kHz. The oscillator is HF of the signal frequency as before so the receiver tunes about 1705-2145kHz which includes the 160m band (1800-2000kHz). L1 and L2 remain in series, but aerial tuning coverage is reduced by TC2 in series with VC1, to obtain a suitable band.

With the switch at "80" S1 shorts out the MW section L2 leaving only the short wave winding L1 in use. C2 is no longer across VC2 and TC3 is in series with C4. As a result, oscillator coverage is approximately 3045 to 3415kHz. The oscillator is now on the LF side of the signal frequency giving a band of about 3500-3870kHz for 80m reception. TC1 is in series with VC1 providing suitable coverage in the aerial circuit.

Alignment of these circuits is not particularly tricky as VC3 is present on all bands allowing manual trimming. It should be noted that there is not a great deal of latitude in capacitor values. Capacitor C4 is larger than the usual padder because the oscillator coil has to be set to a somewhat lower inductance than normal, which is easily within the core adjustment. The circuit allows effective bandspreading of 160m and 80m plus most of the usual MW coverage without the switching otherwise necessary to select alternative oscillator coils for the various bands.



CIRCUIT DETAILS

The pins of IC1 are numbered as seen from below, Fig. 2. The aerial coil point 5 goes to the mixer base pin 1. Pin 3 is for the mixer emitter circuit with emitter bias components R2, R3 and C9. Pin 4 is the input of the audio amplifier, with pin 5 for negative feedback from the output transistors, via R16. Pin 6 is the audio section output, driving Tr1 and Tr2. Pin 7 is the IC earth line.

Pin 8 is the audio output going to volume control VR1, and AGC bias via R4 and R5 to control the gain of earlier stages. Pin 9 is the IC positive supply point. Pins 10 and 11 are the IF amplifier input, with by-pass capacitor C8 on pin 11.

Pins 12 and 13 are collector and emitter circuits of the IC oscillator, and go to the oscillator coil. Pin 14 is the mixer output in conjunction with pin 2, which is earthed via C7.

The IC is effectively 14 transistors, the end occupied by pins 1 and 14 being identified as shown in Fig. 2.

External connections only for the CFT455C filter are shown, pins are bridged and connected to place the ceramic filter in series with the coupling windings.

The output transistors employ emitter resistors R14 and R15 to stabilise working conditions the circuit being satisfactory for a loudspeaker of 8 ohms or over. A speaker of up to 75 ohms may be used, though output falls off a little, and a somewhat

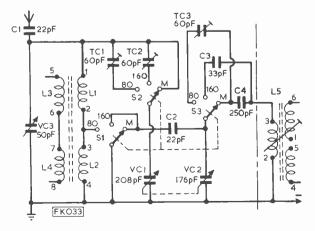


Fig. 1: Circuit diagram of the switching and tuning arrangements of the receiver. Connections to L3, L4 and L5 are shown in Fig. 2.

lower impedance (but not under 8 ohms) is more suitable. Low impedance phones may be plugged into the jack socket, for personnal listening.

CONSTRUCTION

The receiver, with speaker and battery, was constructed to fit a case $6\times3^1{}_2\times1^3{}_4$ in. internal dimensions, as a pocket set giving good 80m and 160m amateur band reception in addition to normal MW reception. The whole circuit of Fig. 2, with the exception of the aerial, VR1 and speaker, is assembled on 0·lin matrix plain Veroboard. In order that the components may be readily accommodated, it is most convenient to use the $^1{}_4$ watt resistors sometimes listed as "miniature". The capacitors are also of small size, and except for the electrolytics, are mostly low voltage disc ceramic.

The board is approximately $4^1_4 \times 1^5_{\rm gin}$, and components can be located from Fig. 3. Holes are first drilled to take the pins of the oscillator coil, IF filter and for bolts to secure the two angle brackets which attach the board to the receiver panel and which also form the earth return connecting points. Tags are fitted for this purpose. In most places the wire ends of resistors and capacitors can reach between the connecting points. Where other connections are required, these can be 24SWG tinned copper or similar wire. Insulating sleeving is necessary on many leads and different colours can be used to identify various connections.

When soldering to the IC, the same care to avoid overheating should be taken as when soldering the transistors. With the latter, short pieces of green sleeving were put on the emitter leads with white on the collector leads, to avoid possible short circuits and provide easy identification of connections. Flying leads are provided from R7, for VR1 centre tag and from R6/C12, also for VR1. The remaining VR1 tag is wired to chassis. Leads from C18 positive and the positive line run to the speaker. A red lead from C14 positive is fitted with a positive battery clip.

The bridging connections on the IF filter should not be overlooked and connections must not touch unused pins. C3 and C4 are soldered to pin 3 of the

* components list

Resis					
R1	22kΩ	R8	27kΩ	R15	2.20
R2	150Ω	R9	4700	R16	15kΩ
R3	8200	R10	10kΩ	R17	10kΩ
PO 2012 10 10 10 10 10 10 10 10 10 10 10 10 10	8-2km		100Ω	R18	220k0
	8·2kΩ	R12	680Ω	R19	2.7kQ
	390Ω	R13			
R7			2.20		
All	resistors	are 5%	4 watt		
VRI	5kΩ log.	poten	tiometer wit	h swit	ch S4
apa	citors				
C1			0-047µF	C15	0-25µF
	22pF		0-047µF		0.01µF
C3	33pF		0-047µF		32µF 6-4V
C4	250pF	C11	10#F 6·4V		320pf 6-4V
C5	0.047µF	C12	0-1µF		100pF
	0.1µF		320µF 6 · 4V		680pF
	0·1µF	C14	220µF 10V	C21	0-047µF
VC1	/VC2 208	/176pF v moti	gang (Jac on)	kson	Type 00 with
VC3	50p	F varia	ble (Jackso	n Type	C804)
VC4			ble (Jackso		C1604)
TC1	/2/3 60p	Fcom	pression pre	-sets	
iemi	conducto	ors			
	TAD100 imilar	Tr1 A	C141 Tr2	AC142	1 Tr3 ZTX108
	llaneous				
					MW winding
only). Oscilla	tor co	II L5 (Deno	o TO	C1). Filter F1
					pole 3 way
					r 8 ohm 2in.
	see text. d, see te:	Inaula	ated jack so	cket 3	5mm. Vero-

oscillator coil and will go to S3. C10 has short leads to pins 8 and 9 of IC1.

A small soldering iron is necessary and care must be taken not to form very large joints or to bridge adjacent points with solder. The layout of components is quite compact though there is some free space.

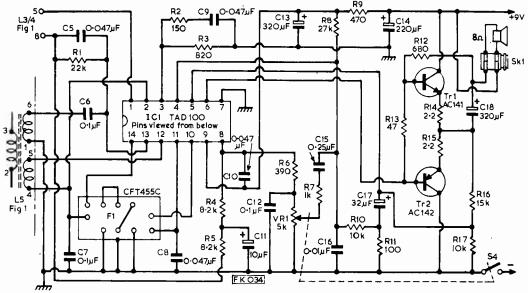


Fig. 2: Circuit diagram of the receiver and amplifier sections of the 'IC + 2'

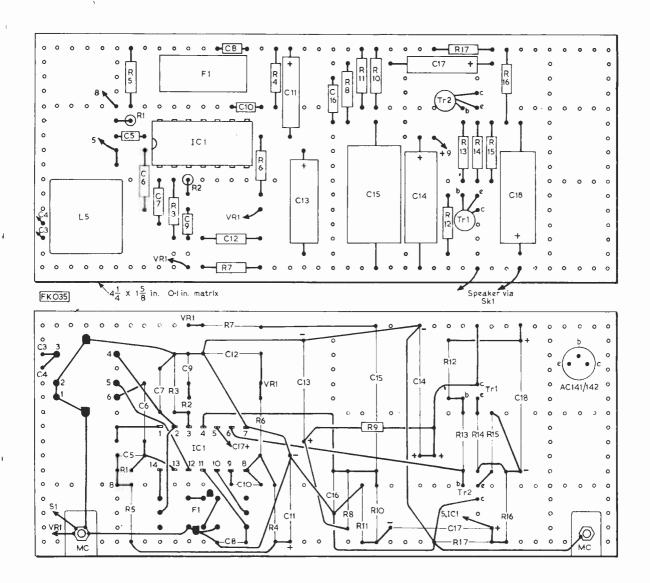


Fig. 3: Component layout on the perforated board. Use insulated wire for the underside wiring.

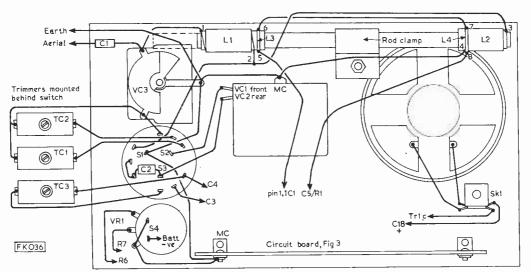


Fig. 4: Front panel component location and interwiring. Capacitors C3 and C4 are mounted between the board and the front panel.

The whole receiver is assembled on the panel of the case, so that it can be tested and adjusted easily. Connections here can be seen from Fig. 4.

VC1/VC2 is fixed with three 4BA countersunk bolts and is set back a little by placing extra unts or washers between the capacitor and panel. If this is not done the control knob will project much more than necessary, since the spindle could, in any case, only be cut down very little, due to the integral reduction drive. VC1 is the front section, having most plates, and VC2 the rear section.

The rotary switch is wired as shown except for the trimmers. These are then mounted by using 18 SWG or other stout wire directly to VC3 and the switch tags. These three trimmers are directly behind the switch.

FERRITE AERIAL

A 1¹2in 6BA bolt passes through the panel and a spacer or extra nuts allows the rod to be clamped as in Fig. 4, by passing a strip of stout card round it.

A strip of paper about lin to 1½ in long is wound round the end of the rod, with a little adhesive, forming a tube which will allow L1/L2 to be slid along the rod. L1 begins at 1, and is 30 turns of 26SWG enamelled wire, close wound, ending at 2. L3 is two turns of any thin insulated wire, say 34 SWG, near L1.

As the MW section L2 is intended for use by itself 17 turns are unwound from its outer end. All the individual strands of the wire must be carefully cleaned and soldered together. This lead is 3, Figs. 1 and 4. L1 and L2 must be so phased that beginning at 1, continuing on to 2 and 3, and then to 4, all turns are in the same direction.

L4, already present with L2, is modified to leave only three turns. L3 and L4 must be in the same direction, as explained for L1 and L2. It is worth noting that the receiver can be tested on medium waves only by connecting L2, unmodified, to VC1 and chassis, and L4 to C5 and 1, IC1. Position the winding on the rod so that VC3 peaks up signal throughout the range.

ALIGNMENT

This can be greatly simplified by using a signal generator or second receiver, but in any case efficiency is not lost provided VC3 can be rotated to peak up signals and is then not fully closed or fully open. However, band coverage does depend considerably on the trimmers and oscillator core setting.

If a calibrated receiver is available, place an insulated lead from its aerial socket near VC2. Switch to medium waves and close VC1/2. Unscrew the core of the oscillator coil until the oscillator frequency is 1165kHz, as shown by the receiver. If the receiver is not a type with a tuning indicator or BFO, the oscillator signal or carrier will be located only as a reduction in background noise, as when tuning in a station carrying no programme. The core can then be left in this position. Otherwise, unscrew the core a little, checking reception, until the MW band obtained is about 710-1565kHz. Any integral trimmers on the ganged capacitor should be left fully unscrewed.

Signals near the HF band end should peak up with VC3 about one-third closed. Position L2 on the rod so that VC3 is best in a similar position near the LF end of the band (VC1/2 nearly closed). With the

switch at 160, coverage depends on C3, and no other adjustment is provided. If 1.8 to 2MHz cannot be tuned, the oscillator coil core is probably wrongly set. There is some latitude, this range being about 1705 to 2145kHz. TC2 is adjusted so that the aerial circuit coverage is suitable, shown by VC3 not needing to be fully open for best volume.

When the switch is at 80, oscillator coil coverage is adjusted with TC3. There is not much latitude here, though a little over 3.5 to 3.8MHz can be tuned with the full swing of VC1/2. It is then necessary to set TC1 and if necessary also modify the position of L1 on the rod, until aerial coverage is similar, again as shown by VC3 peaking signals when rotated.

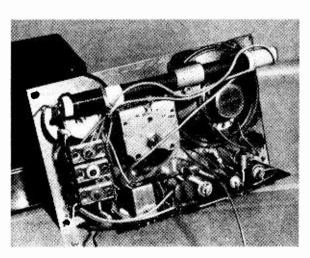
NOTES

MW reception will usually be by means of the internal ferrite rod, through an external aerial naturally increases range. The ferrite rod will give sufficient pick-up of strong local signals on the 80m and 160m bands. It may be necessary to make use of the directional effects of the aerial by turning the whole receiver. However, normally an external aerial will be provided for 80m and 160m.

This aerial increases range and signal strength so that more transmissions can be heard, even if it is only a relatively short indoor wire. The aerial lead goes to C1. If a very long aerial is available, a further small capacitor or preset of about 50pF maximum can be put in this lead. For best reception an earthed connection should also be available, as this can increase signal strength to a worthwhile extent.

The aerial and earth sockets are on the side of the case with thin flexible leads running to them. The phones socket must be of fully insulated type, or separately insulated from the metal panel.

The dial is $2^3_8 \times 2^1_4$ in with a scale marked 0-100. It is covered with a piece of thin Perspex of the same size, fixed with the bolt holding the ferrite rod mount, and a second bolt near VC3. A transparent cursor with a line marked on it can be drilled to be a tight fit on a small grommet, which firmly grips the 1_4 in. spindle. Alternatively, a metal pointer could be soldered on. A piece of metal is shaped to hold the battery against the end of the case, and is bolted inside the case.



Internal view of the 'IC + 2' receiver (without BFO).

OPTIONAL BFO

Broadcasts received on medium waves are AM or amplitude modulated and will be heard in the usual way. Some transmissions in the 160 and 80 metre bands are also AM. However, on the 80m amateur band in particular, a large number of single sideband and CW Morse transmissions will be present. A beat frequency oscillator is necessary to receive these and this can be assembled on the space provided at the end of the board, near the speaker. The BFO is not in use for the reception of AM signals, on any frequency.

Fig. 5 is the circuit of the BFO which is brought into operation by closing S5. The panel control VC4

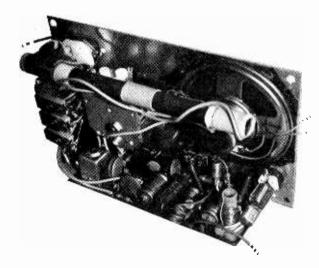
allows fine adjustment of BFO frequency.

As the BFO pitch control now occupies the hole used for the phone socket, this has to be moved to the side of the case. It is also necessary to position the battery immediately against the speaker, and near the ferrite rod, so as to clear VC4 and the coil.

The coil is wound with 38SWG wire, Fig. 6. L6 has 165 turns and L7 has 40 turns. The former is approximately 7mm in diameter with an adjustable core. Begin winding near the base of the former, this being point C. Wind L6 in a pile occupying about 8mm winding length, ending at D. Leave a space of about 1mm and begin at A, winding L7 in a pile occupying about 4mm and terminating at B. The windings can be secured with a little adhesive and the ends are left long enough to reach the various connecting points.

Components for this stage are positioned and wired as in Fig. 6. S5 is a miniature slide switch, fitted in a slot near the speaker. VC4 is also a miniature component, secured with its bush nut. As the spindle of the specified VC4 is not $^{1}4$ in in diameter, it is necessary to obtain a knob with a small hole, or to cut and shape a small piece of metal to pack out the spindle diameter. Or drill a $^{1}2$ in length of plastic rod $^{1}4$ in in diameter to fit the capacitor shaft.

No additional coupling into the receiver circuit was found necessary, other than that provided by stray capacitance and the unscreened coil.



The 'IC + 2' receiver with the extra BFO components added.

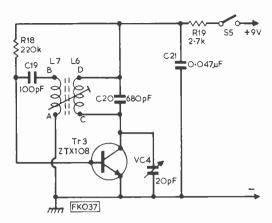


Fig. 5: Circuit diagram of the beat frequency oscillator.

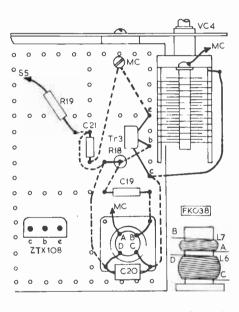


Fig. 6: Layout of the BFO components on the perforated board. The variable capacitor VC4 occupies the hole previously used for the jack socket.

BFO ADJUSTMENT

The BFO can have no effect until it is adjusted to about the same frequency as the receiver intermediate frequency of 455kHz. To do this, half closeVC4 and rotate the core of L6 until a strong heterodyne accompanies any AM signal tuned in. This is probably most easily done on the MW band. Check with more than one station to make sure the heterodyne is not a harmonic reaching the aerial circuit.

To receive CW, close S5 and adjust VC4 for the best note. For SSB reception, very careful adjustment of receiver tuning and VC4 are necessary. When CW or SSB signals are very strong, the aerial trimmer should be set to reduce them in power, so that VR1 can be near maximum gain. In this way the carrier of the BFO has sufficient strength to allow proper detection. A little use will soon show how the BFO control is adjusted.

PRODUCTION LINES colin riches

LED DIGITAL WATCH DISPLAYS

Litronix, the optoelectronic and semiconductor manufacturer, has added four new low-power LED displays to its range of semiconductor devices for electronic digital watches. These 4-digit displays are mounted on small ceramic substrates measuring only 0.75in. long x 0.21in. high. To minimize area requirements, the packages are provided with solder bump contacts designed for reflow solder attachment to a watch module. Designated the DL-5175 Series, the displays are available in four different types, each with colon between second and third digits:

The DL-5175 is a 4-digit display of continuous-line monolithic digits 0.1

in. high.

The DL-5176 is a 3-1/2 digit hybrid display of characters 0·115in. high. The DL-5177 is a 4-digit display in a monolithic package with digits magnified to create 0·1in. high characters.

The DL-5178 is a 4-digit version of the DL-5176 for a 24-hour watch. Prices start at £3.66 in quantities of 1000.

All displays are manufactured from specially selected high-brightness materials which minimize drive current requirements, and enhance visibility in high ambient light. In the case of the DL-5177 the use of a



magnifying lens, which concentrates the emitted light into a narrow cone, makes it particularly suited to veiwing in bright sunlight.

The pin-out configuration of the DL-5175 Series has been optimized to allow close spacing of associated integrated circuits, such as the Litronix LBC-1060 and LBC-1070 bipolar drivers.

For further information on these digital watch displays, contact *Bill Stott, Product Marketing Manager, Litronix, Bevan House, Bancroft Court, Hitchin, Herts, SG5 1LW.*

BIB RECORD DUST-OFF

BIB announce a new BIB Record Dust-off, for removing dust and dirt quickly and simply from gramophone records to reduce record and stylus wear.



Normally it is recommended that the Dust-Off is used dry, but it has been designed so that it can be used in a moist condition if records are excessively dirty. The BIB Dust-Off comes complete with a clear protective cover in which is included a foam pad which can be moistened with BIB liquid cleaner so that when the Dust-Off is inserted into the cover the velvet surface and absorbs the moisture from the foam pad evenly.

The handle of the BIB Dust-Off is moulded in a simulated teak finish and the cleaning pad is covered in a smart, special purpose, high quality red velvet.

Recommended Retail Price of the Dust-Off is 66p each, excluding VAT. BIB Hi-Fi Accessories Ltd., P.O. Box 78, Hemel Hempstead, Herts. HP2 7EP.

POCKET TEST METER

No bigger than a packet of cigarettes, the new ICE Microtest 80 test meter combines several unique features in one compactand accurate instrument.

Covering 8 fields of measurement and 40 ranges, the meter has a 20,000 ohm per volt sensitivity, with 2% accuracy on the a.c. and d.c. scales.

Design of the meter incorporates special automatic electronic regulation for zero ohms, and the movement is protected against on overload of 1,000 times in the ohmetric ranges before automatic cut out. Protecting the low ohmetric ranges is an internal fuse unit, easily repaired by winding on a fuse from a minute, internal bobbin.

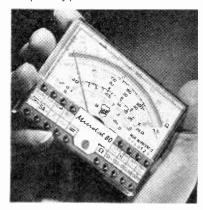
The shockproof movement, with a compensated magnetic core provides a closed magnetic circuit screened against all external magnetic fields. The 20 components are housed on a printed circuit board, making replacement of components fairly easy.

Power is from a special 1.35V mercury battery which, in normal usage, will last up to 3 years. A complete range of accessories is available with the meter to extend its performance.

Incorporated into the design of the Microtest 80 are the latest-type manganine and metallic film resistors giving high stability and precision of 0.5%, while the mirror scale gives clear and accurate reading.

Each test meter is supplied with a comprehensive instruction manual, and a protective case incorporating the leads. Size is 90mm x 70mm x 18 mm.

Meters or further information available direct from the sole UK importers, Electronic Brokers Ltd., of 49, Pancras Road, London NW1 2QB, the Microtest 80 is priced at £11.95 ex VAT with special terms for quantity purchases.



The Microtest 80 mini-meter.

HAM II ROTATOR

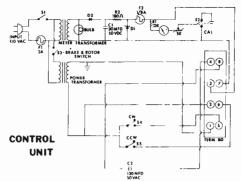
The Ham II rotator system, available from South Midlands Communications Ltd. is designed for Amateur aerial systems with a maximum of 7.5 sq. ft. It provides a full 360° range of rotation and aerial position is indicated on a meter scale.

The rotator motor, radial and thrust bearings, electrically-operated wedge brake, gear train and indicating sensing device are built into the bell-shaped aluminium housing.

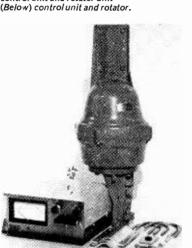
The control unit utilises two transformers. One supplies 30V a.c. for releasing the brake and operating the motor when the control levers are operated. Transformer overheating is eliminated by a thermal cut-out switch in the primary winding.

The meter transformer is energised as the on/off control is switched to the "on" position (see diagram). Rotator size is 8in diameter and 20in high. Brake torque is 3,500in./lbs. and an 8-core cable is required between control unit and motor. Rotator weight is 124/bs and power requirement 240V a.c.

These rotators are actually made in America but imported and retailed by South Midlands Communications Limited who will be pleased to supply details of prices etc. upon receipt of a stamped, addressed envelope. Their address is S. M. House, Osborne Road, Totton, Southampton, S04 4DM.



(Above) circuits (110V version) of the control unit and rotator unit (Below) control unit and rotator.



DIGITAL CAR CLOCK/ TIMER KIT

On the Heathkit GC-1093 digital electronic car clock/timer, hours and minutes are displayed in bright orange on 7 - segment Beckman planar gas discharge tubes—even visible in direct sunlight! When the sun goes in, the clock readout automatically dims so that the car driver won't be distracted while driving at night.

(1)(I)

37

(1)(6)

ROTATOR

UNIT

A quartz crystal time base and solid-state digital electronic circuitry combine to give the clock an accuracy of within one minute per month. The low - voltage clock memory is designed to maintain this accuracy even during battery-draining starting on cold mornings.

At the touch of a button on the front panel, the clock turns into a precise elapsed timer with a 20-hour capability. During the first ten minutes of elapsed timing, the digital readout is in minutes and seconds. Thereafter, readout is in hours and minutes for up to 20 hours. The clock readout can be recalled at any time without disturbing the memory of either the clock or the timer.

The GC-1093 kit is priced at £39·90 (this includes 8% VAT and delivery within the UK). Heath (Gloucester) Ltd., Gloucester GL1 6EE.



Please mention "Practical Wireless" when contacting manufacturers and suppliers whose addresses are given in "Production Lines".

EXHAUST GAS ANALYSER

With the new Heathkit CI-1080 Exhaust Gas Analyser, you can easily monitor exhaust output for minimum pollution and maximum efficiency. The CI-1080 will indicate relative combustion efficiency, air-fuel ratio and percentage of carbon monoxide from the exhaust emission of four cycle automotive engines. For best results, readings should be taken before and after an engine tune-up.

The CI-1080 consists of a large $4\frac{1}{2}$ in. meter and sensor which fit snugly inside the durable polystyrene carrying case. For operating power, the colour coded battery clips can be



attached to any 6 or 12 volt car battery. The meter is designed to hang on a partially open car door window or sit on any convenient flat surface. Flexible stainless steel tubing diverts exhaust gas from the engine exhaust pipe to the sensor where thermal conductivity of the gas is measured. A sensitive bridge circuit built into the instrument translates this measurement into units of air-fuel ratio, combustion efficiency (%) and carbon monoxide (%). These readings indicate the proper interaction of carburetter and ignition settings.

Operation of the CI-1080 is simple. After warming the engine to normal operating temperature and connecting the battery clips, the meter is adjusted to the balance point using the balance control. The flexible tubing is then connected to the sensor and the other end inserted into the exhaust pipe. After the meter stabilizes, readings can be taken. The kit K/CI-1080 costs £34.60 or Assembled: A/CI-1080 £49.90. (Including 8% VAT and delivery within the United Kingdom). Heath (Gloucester) Ltd., Bristol Road, Gloucester GL1 6EE.

duction Lines".

NEW LOW PRICES!

Sinclair Scientific kit-

(Was £19.95 - save £5!)

Britain's most original calculator now in kit form

The Sinclair Scientific is an altogether remarkable calculator.

It offers logs, trig, and true scientific notation over a 200-decade range features normally found only on calculators costing around £100 or

Yet even ready-built, the Sinclair Scientific costs a mere £21.55 (including VAT).

And as a kit it costs under £15!

Forget slide rules and four-figure tables!

With the functions available on the Scientific keyboard, you can handle directly

sin and arcsin,

cos and arccos,

tan and arctan,

automatic squaring and doubling,

log₁₀, antilog₁₀, giving quick access to xY (including square and other roots),

plus, of course, addition, subtraction, multiplication, division, and any calculations based on them.

In fact, virtually all complex scientific or mathematical calculations can be handled with ease.

So is the Scientific difficult to assemble?

No Powerful though it is, the Sinclair Scientific is a model of tidy engineering,

All parts are supplied – all you need provide is a soldering iron and a pair of cutters. Complete step-by-step instructions are provided, and our Service Department will back you throughout if you've any queries or problems.

Of course, we'll happily supply the Scientific or the Cambridge already built, if you prefer - they're still exceptional value. Use the order form.

Components for Scientific Kit (illustrated)

- 1. Coil
- 2. LSI chip
- 3. Interface chips
- 4. Case mouldings, with buttons, windows and light-up display in position
- 5. Printed circuit board
- 6. Keyboard panel
- 7. Electronic components pack (diodes, resistors, capacitors, etc)
- 8. Battery assembly and on/off switch
- 9. Soft carrying wallet
- 10. Comprehensive instructions for use

Assembly time is about 3 hours.



Features of the Sinclair Scientific



- simple keyboard Basic logs and trig functions (and their inverses), all from a keyboard as simple as a normal arithmetic calculator's. 'Upper and lower case' operation means basic arithmetic keys each have two extra functions.
- Scientific notation Display shows 5-digit mantissa, 2-digit exponent, both signable.
- 200-decade range 10-99 to 10 : 99
- Reverse Polish logic Post-fixed operators allow chain calculations of unlimited length - eliminate need for an = button.
- 25-hour battery life 4 AAA manganese alkaline batteries (e.g. MN2400) give 25 hours continuous use. Complete independence from external
- Genuinely pocketable 41/3" x 2" x 11/16". Weight 4 oz. Attractively styled in grey, blue and

NEW LOW PRICES! Sinclair Cambridge kit

(Was £14.95-save £5!)

Components for Cambridge Kit

- 1. Coil
- 2. LSI chip
- 3. Interface chip
- 4. Thick film resistor pack
- 5. Case mouldings, with buttons, window and light-up display in position
- 6. Printed circuit board
- 7. Keyboard panel
- 8. Electronic components pack (diodes, resistors, capacitors, transistor)
- 9. Battery clips and on/off switch
- 10. Soft wallet

Assembly time is about 3 hours.

Take advantage of this money-back, no-risk offer today

The Sinclair Cambridge and Scientific kits are fully guaranteed. Return either kit within 10 days, and we'll refund your money without question. All parts are tested and checked before despatch - and we guarantee any correctly-assembled calculator for one year. (This guarantee also applies to calculators supplied in built form.)

Simply fill in the preferential order form below and slip it in the post today.

Scientific

Price in kit form £14.95 inc. VAT Price built £21.55 inc. VAT. Cambridge

Price in kit form £9.95 inc. VAT. Price built £13.99 inc. VAT.

Features of the Sinclair Cambridge

At its new low price, the

In less than a year, the

calculator.

Cambridge has become

original Sinclair Cambridge

kit remains unbeatable value.

Britain's most popular pocket

It's not surprising. Check the

features below - then ask

calculator offers such a

- 855 em - 800

Cambridge

reasonable price.

yourself what other pocket

powerful package at such a

Uniquely handy package. 41/3" x 2" x 11/16", weight 31/2 oz. Standard keyboard.

All you need for complex calculations.

- Clear-last-entry feature.
- Fully-floating decimal point.
- Algebraic logic.
- lacktriangle Four operators $(-, -, \times, \div)$, with constant on all four.
- Powerful constant with separate 'K' button.
- Constant and algebraic logic combine to act as a limited memory, allowing complex calculations on a calculator costing less tian £10.
- Calculates to 8 significant digits.
- Clear, bright 8-digit display.
- Operates for weeks on four AAA patteries.

	To: Sinclair Radionics Ltd, FREEPOST St Ives,
ĺ	Huntingdon, Cambs. PE174BR
П	Places cand ma

Sinclair Scientific kit at £14.95

Sinclair Scientific built at £21.55

Sinclair Cambridge kit at £9.95 | Sinclair Cambridge built at £13.99

All prices include 8% VAT.

*I enclose a cheque for £..... made out to Sinclair Radionics Ltd, and crossed.

*Please debit my *Barclaycard/ Access account. Account number

*Delete as required.

Signed

Name

Address

Please print, FREEPOST - no stamp

needed PW/4/75

FREEPOST St. Ives,

1119

Sinclair Radionics Ltd. Huntingdon, Cambs. PE174BR. Reg. No: 699483 England, VAT Reg. No: 213 8170 88.

www.americanradiohistory.com

UCCZ MUCCTUG A. FOWELL

ANYONE who has ever attempted to organise a quiz, either between friends or within the family, will no doubt have watched with envy the smooth running of such television programmes as University Challenge, Top of the Form, etc. In the home quiz, however, a free-for-all situation arises where a question is asked and whoever shouts first is allowed to answer! The difficulty here being in deciding who shouted first! In the TV programmes already mentioned the problem is solved using a buzzer system.

The quiz monitor described in this article was designed with a view to recreating a "University Challenge" atmosphere by providing each player with a button. The first button pressed turns on a corresponding light on the main console and sounds a buzzer. Once this has happened all other players are automatically excluded, and, although the buzzer stops upon releasing the button, the light remains on until cancelled by the quiz master.

Circuit

The complete circuit of the quiz monitor for up to four players is shown in Fig. 1. At first sight the circuit looks rather complicated but its operation can



be readily understood by considering the action of a similar circuit, but for two players only, Fig. 2.

PB3 is a normally closed push button, whilst PB1 and PB2 are normally open. The values of R1, R2. R3 and R4 are chosen so that on closing PB1, sufficient gate current flows to trigger TH1 into conduction and LP1 therefore lights up. The voltage on TH1 anode falls to about 1V under these conditions, so the cathode of D2 is firmly fixed at a potential of 1V. The junction of R5 and R6 cannot therefore rise above about 1 6V, even if PB2 is pressed. R6 and R7 are chosen so that under this condition there is insufficient drive to the gate of TH2 to cause it to conduct. The same arguments apply if the other button is pressed first.

Due to normal thyristor action LP1 will remain illuminated even when PB1 is released, and it can only be extinguished by momentarily reducing the current through TH1 to zero. PB3 is included in the circuit for this purpose and is under the control of the quiz master. The thyristors specified are sensitive gate types which necessitate the use of R4 and R8. These prevent premature firing of the thyristor

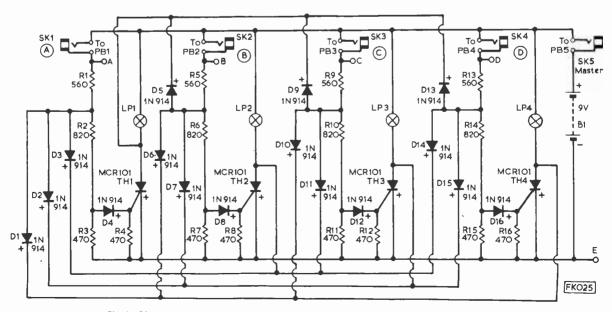


Fig. 1: Circuit diagram of the monitor proper the output being fed to the buzzer circuit of Fig. 3.

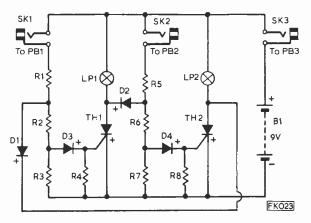


Fig. 2: A simplified circuit for two players only, to illustrate the operation of the monitor.

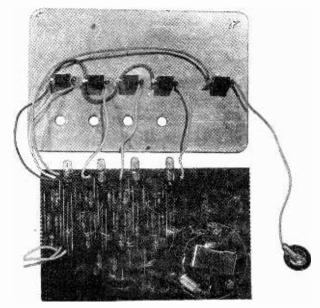
by providing a low impedance path to earth for any noise signals that may be present.

It is possible for the bulbs to light simultaneously if both buttons are pressed at precisely the same moment. In practice, however, this does not happen very often, but when it does it is reasonable to consider the situation as a draw. Diodes D3 and D4 are included in order to make the values of R2, R3, R6 and R7 relatively unimportant.

From this discussion it can be seen that from each stage of the circuit there must be one diode to every other stage. Thus for the four-channel circuit, Fig. 1, there are 12 diodes acting as feedback elements to other stages.

Audible Warning

Fig. 3 shows the buzzer circuitry. Diodes D17 to D20 act in conjunction with Tr1, R17 and R18 as a logic 'OR' gate, i.e. if any of the four buttons are pressed then Tr1 is turned on and the buzzer sounds. Diode D21 is essential to prevent high voltage spikes,



Finished circuit board wired to panel sockets. The lamps protrude through the holes in the panel.

due to the inductance of the buzzer coil, from damaging Trl. Cl is included to minimise interference from the buzzers' contacts.

It will be noted that separate batteries are used for the main circuit and for the buzzer. The reason for this is twofold. First, the buzzer used only requires around 4.5V and it is difficult to design the rest of the circuit to work reliably off such a low voltage. Second, and more important, is the fact that the buzzer draws about 1A from a 9V supply. This causes a substantial voltage drop which can upset the operation of the main circuit.

Construction

The prototype was built into a plastic instrument case measuring approximately $6 \times 4 \times 4$ in, although any case of about this size will suffice. All of the electronics, including the buzzer, are mounted on a piece of $0 \cdot 1$ in pitch veroboard about 5^3 in $\times 3^1$ in. The copper tracks need to be cut at several points, and these are indicated, with the corresponding component layout, in Fig. 4. The veroboard required is slightly longer than the standard 5 in length, but if the buzzer can be accommodated elsewhere within

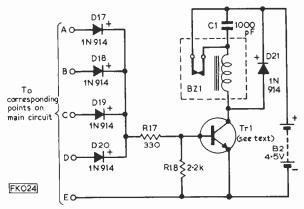


Fig. 3: Buzzer circuitry and input diodes fed from main circuit, Fig. 1.

the box, then the board dimensions can be reduced to $4 \times 3_{14}$ in.

The 21 diodes can be any general purpose signal type but D4, D8, D12 and D16 must be silicon since the forward voltage drop of germanium, about 0·2V, is too low for this part of the circuit. It is also recommended that the specified type of thyristor is used since its operating conditions are quite critical. The bulbs are 12V Lilliput types, which, with the 9V supply, only consume about 50mA. Bulb holders were dispensed with, for cheapness, and the bulbs soldered directly to the veroboard. Provided the soldering operation is carried out quickly the bulbs should not be damaged.

PB1 and PB4 can be ordinary bell pushes which are readily available very cheaply. PB5, on the other hand, must be a normally closed type, and may be a little more difficult to obtain. Tr1 can be any silicon NPN transistor with a collector current rating of at least 500mA. The buzzer is a standard domestic type which is easily obtainable at most electrical retailers.

The instrument case used for the prototype has two sets of slots moulded into it. These are used to secure the veroboard and an aluminium plate, the same size as the circuit board, which holds the two

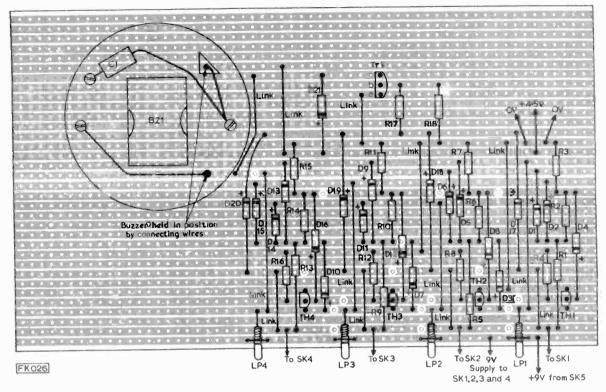


Fig. 4: Component layout on circuit board. Note carefully the breaks in the copper rails.

* components list

Resistors	
R1 560Ω	R10 820Ω
R2 820Ω	R11 470Ω
R3 470Ω	R12 470Ω
R4 470Ω	R13 560Ω
R5 560Ω	R14 820Ω
R6 820Ω	R15 470Ω
R7 470Ω	R16 470Ω
R8 470Ω	R17 330Ω
R9 560Ω	R18 2·2kΩ
All 1 or 1 W 10%	
Capacitor	
C1 1000pF 15V	
Semiconductors	
TH1	
TH2 Motorola N	1CR 101 (0-5A)
I M3	
TH4	4 481046 -1-
D1 to D21 1N914	
	con NPN type with collector current
rating of 500mA.	min.)
The state of the s	
Miscellaneous	
Miscellaneous Four normally of	pen push buttons. One normally
Four normally of	pen push buttons. One normally on. Five 2:5 or 3:5mm lack sockets
Four normally of closed push butt	pen push buttons. One normally on. Flve 2·5 or 3·5mm jack sockets Lilliput 12V bulbs. Friedland 'Min

Constructors of this monitor will be interested in the Reaction Timer also described in this issue. batteries. The front panel, again of aluminium, completes the case and holds the circuit and chassis in position, see photographs.

The five push-buttons are connected to the circuit by means of panel-mounted jack sockets and plugs. It will be noted that no on/off switch is included since, with the bulbs and buzzer off, the current taken is only the leakage current of the thyristors and Tr1, which is negligible. If the unit is to be left for any length of time the batteries can be disconnected.

No great difficulty should be encountered in the construction of this project but the following points may be helpful. Make sure that adjacent tracks on the veroboard are not shorted out by blobs of solder. This is easily avoided by the use of a soldering iron with a bit diameter of no more than \$^{1}_{8}\$in. Secondly, cut the veroboard track in accordance with Fig. 4 before mounting the components as it will be difficult to do so afterwards.

Testing

Having completed the unit, connect the batteries and press any one button. The corresponding bulb should light and remain lit upon releasing the button. The buzzer should also sound during the time the button is pressed. Pressing PB5 should extinguish the light. Repeat this test with each of the other three buttons. Now, press one button, bringing on the corresponding light, and press each of the other three buttons. The buzzer should sound each time but the original light only should be lit. If any part of these two tests fails then it is likely that one or more of the diodes is either not connected or is connected the wrong way round.



GIRO NO. 331 7056. Access accepted. C.W. O., only, P. & P. 10p on orders below £5 Discount: £10-10%. £20-15% (except net items Export: Order enquiries welcome (VAT free)

Official Orders accepted from Educational & Government Departments ALL PRICES INCLUDE VAT AT 8%

SPECIAL RESISTOR KITS (Prices include post & packing)

10E12 ±W KIT: 10 of each E12 value, 22 ohms—IM, a total of 570 (CARBON FILM 5%), £3.58 net 10E12 ±W KIT: 10 of each E12 value, 22 ohms—IM, a total of 570 (CARBON FILM 5%), £3.77 net 25E12 ±W KIT: 25 of each E12 value, 22 ohms—IM, a total of 1425 (CARBON FILM 5%), £8.19 net 25E12 ±W KIT: 25 of each E12 value, 22 ohms—IM, a total of 1425 (CARBON FILM 5%), £8.28 net 5E12 ±W KIT: 25 of each E12 value, 22 ohms—IM, a total of 1425 (CARBON FILM 5%), £8.28 net 5E12 ±W KIT: 50 each E12 value, 10 ohms—IM, a total of 305 (METAL FILM 5%), £9.80 net Due to current world shortages, resistor kits may contain some wattage and value substitutions.

Due to current w MULLARD POLYESTER CAPACITORS C280 SERIES 250V P.C. Mounting: 0·01μF, 0·015μF, 0·022μF, 0·033μF, 0·047μF, 3½p. 0·068μF 0·1μF, 4½p. 0·15μF, 4½p. 0·22μF, 5½p. 0·33μF, 8p. 0·47μF, 9p. 0·68μF, 12p·1μF, 15p. 1·5μF, 23p. 2·2μF, 24p.

MINIATURE CERAMIC PLATE CAPACITORS

50V: (pF) 22, 27, 33, 39, 47, 56, 68, 82, 100, 120, 150, 180, 220, 270, 330, 390, 470, 56, 680, 820, 16, K, 1K5, 2K2, 3K3, 4K7, 6K8, (µF) 0·01, 0·015, 0·022, 0·033, 0·047, 24p, each, 0·1, 30V, 5p.

POLYSTYRENE CAPACITORS 160V 5% (pF) 10, 15, 22, 33, 47, 63, 100, 150, 220, 330, 470, 680, 1000, 1500, 2200, 3300 4700, 6800, 10,000, 4jp.

RESISTORS

-High Stab Carbon Film, 5% MF-High Stab Metal Film, 5%: W. Type Range

† CF 22-IM

† CF 22-IM

† CF 22-IM

† CF 22-IM

† MF 10-2M7

† MF 10-2M2

MF 10-10M 6 MF—F 100-499 0 · 75 0 · 75 0 · 75 1 · 54 1 · 43 1 · 98 3 · 52 500-999 0 · 60 0 · 60 0 · 60 1 · 32 1 · 21 1000+ 0·55 0·55 0·55 Size mm 2 · 4×7 · 5 3 · 9×10 · 5 1-99 5.5x16 3x7 4.2x10.8 2 2 3 4 · 5

MF 10-10M MF 10-10M 1 · 65 2 · 75 value mixing prices, please refer to our catalogue. (price in pence each). VALUES AVAILABLE—E12 Series only. (Net prices above 100.)

3.08

PRESET SKELETON POTENTIOMETERS

MINIATURE 0-25W Vertical or horizontal 6p each 1K, 2K2, 4K7, 10K, etc. up to 1M Ω SUB-MIN 0-05W Vertical, 100 Ω to 220K Ω 5p each.



6.6x13 8x17.5

B. H. COMPONENT FACTORS LTD.

(P.W.) LEIGHTON ELECTRONICS CENTRE, 59 NORTH ST., LEIGHTON BUZZARD, BEDS. Tel: LEIGHTON BUZZARD 2316 (STD. Code 05253) CATALOGUE No. 3 20p

	Miniature	Mulla	rd Electroly	tics
	1.0µF 63V	6‡p	68µF 63V	i2p
	1 5µF 63V	6 }p	100µF 10V	6 ½ p
	2 2μF 63V	6 <u>₹</u> p	100µF 25V	6 1 p
	3 3μF 63V	6 p	100μF 63V	14p
	4 0µF 40V	6∳P	150µF 16V	6 p
	4·7μF 63V	6 1 P	150µF 63V 220µF 6:4V	15p
	6.8µF 63V 8.0µF 40V	6∳p 6∳p	220µF 6·4V 220µF 10V	6+p
	10µF 25V	6+p	220µF 16V	8p
į	10µF 63V	6+p	220µF 63V	2Ĭp
í	15µF 16V	6+p	330µF 16V	I2p
į	154F 63V	6 p	330µF 63V	25p
	16µF 40V	6 p	470µF 6 4	9p
	22μF 25V	6 ∳ p	470µF 40V	20p
	22μF 63V	6 j p	680µF 16V	15p
	32μF 10V	6∮P	680µF 40V	25p
	33μF 16V	6∳P	1000µF 16V	20p
	33µF 40V	6 P	1000µF 25V 1500µF6 4V	25p
	32μF 63V 47μF 10V	6∮p 6∮p	1500µF 16V	15p 25p
	47µF 25V	6 t P	2200µF 10V	256
	47µF 63V	8p	3300µF6 4V	26p
	684F 16V	6¥p	5555	

	2½ × 5" 2½ × 3½" 3½ × 5" 3½ × 3½" 2½ × 1"	36p 36p 33p 25p 42p 46p 36p 36p 9p 9p
	2½ x 5" (Plain) 2½ x 3½" (Plain) 5 x 3½" (Plain) Insertion tool Track Cutter Pins, Pkt. 25	— 19p — 16p — 29p 73p 73p 56p 56p 22p 22p
I	TRANSISTOR	s
į	ACI27 161p BC ACI28 22p BC BC107 11p BC	C213L 12p

3½ × 5" 3½ × 3½" 2½ × 1" 2½ × 5" 2½ × 3½" 5 × 3½" Insertion Track C Pins, Pk	Plain) (Plain) (Plain) n tool utter	42p 46p 36p 36p 9p 9p — 19p — 16p — 29p 73p 73p 56p 56p 22p 22p
TRANS ACI27 ACI28 BCI07 BCI08 BCI09 BCI48 BCI49 BCI49 BCI82L	12p B0 12p O 13p O 12p O 12p O	C212L 12p C213L 12p C214L 17p C44 18p C71 13p C81 16p C170 23p S43 33p

	TOTELLIONE				
Carbon Trac switch 26p.	Carbon Track 5K Ω to 2M Ω , log or lin (and IK lin). Single, 16½p Dual Gang 46p. Log single switch 26p. Slider Pots. 10K, 100K, 500K, semi log 30mm, 34p. 45mm, 47p. 60mm, 55p.				
DIODES	PLUGS	ELECTROLYTIC CAPACITORS. Tubular & Large			
IN400164p	DIN 2 Pin 12p	(uF/V): 1/25, 2/25, 4/25, 4-7/10, 5/25, 8/25, 10/10, 10/50,			
IN4002 7 p	3 Pin 13p	22/63, 25/25, 25/50, 32/25, 50/25, 100/10, 100/25, 6 p. 50/5			
IN4003 9p	5 Pin 180° 16p	100/50, 200/25, 11p. 250/50, 18p. 500/10. 11p. 500/25,			
IN4004 90p	Std. lack 20p	500/50, 18p. 1000/10, 15p. 1000/25, 22p. 1000/50, 40p. 20			
IN4005 12p	2.5mm lack I3p	20p. 1000/100, 88p. 2000/25, 30p. 2000/100, 93p. 2500/2			
IN4006 14p	Phono 6p	2500/50, 61p, 5000/25, 65p, 5000/50, £1 08.			
	SOCKETS				
	DIN 2 Pin 10p	HI-VOLT: 4/350, 14p. 8/350, 19p. 100/100 20p. 16/350			
BA100 10p	3 Pin 10p	100/100, 20p. 100/250, 30p.			
OAT 43-	5 Pin 180° 12p	METALLISED PAPER CAPACITORS			
		250V: 0.05μF, 0.1μF, 6p. 0.25, 6p. 0.5μF, 7½p. 1μF, 9p.			
OA47 9p	Std. Jack 15p	0.035 0.05 Ap 0.1 Ap 0.25 74p 0.5 9p 1000V			

POTENTIOMETERS

ELECTROLYTIC CAPACITORS. Tubular & Large Cans (uF/V): 1/25, 2/25, 4/25, 4.7/10, 5/25, 8/25, 10/10, 10/50, 16/25, 22/63, 25/25, 25/50, 32/25, 50/25, 100/10, 100/25, 6₁₀, 50/50, 8₀, 100/50, 200/25, 11p. 500/25, 15p. 500/50, 18p. 1000/10, 15p. 1000/25, 22p. 1000/50, 40p. 2000/10, 20p. 1000/100, 88p. 2000/25, 31p. 2000/10, 93p. 2500/25, 65p. 5000/50, £1.08

HI-VOLT: 4/350, 14p, 8/350, 19p. 100/100 20p. 16/350, 22p. 100/100, 20p. 100/250, 30p.

BA100 10p 3 Pin 10p METALLISED PAPER CAPACITORS OAS 42p 5 Pin 180° 12p METALLISED PAPER CAPACITORS OAS1 11p 0.500 12

PLEASE NOTE OUR NEW ADDRESS PLEASE NOTE OUR NEW ADDRESS

BC148 12p OC81 23p
BC1821 12p T1543 33p
BC1831 12p 2N3702 11p
BC1841 13p 2N3702 11p
BC1841 13p 2N3702 11p

MULTIMETER U4323

22 Ranges plus AF/IF Oscillator 20,000 Ω /Volt. Vdc—0 · 5—1000V in 7 ranges Vac—2 · 5—1000V in 6 ranges Resistance—5 Ω —1 $M\Omega$ in 4 ranges



MULTIMETER U4341

27 Ranges plus Transistor Tester.
16,7700, Yolk. Veverload protected.
Vdc—0.2—90 Vin Veverload protected.
Vdc—0.3—90 Vin Verload protected.
Vdc—0.4—90 Vin Verload Protected.
Vdc—0.4—300 MA in 5 ranges.
Iac—0.3—300 MA in 4 ranges.
Resistance—2k Ω —2M Ω in 4 ranges.
Accuracy—dc—2½ % ac—4% of F.S.D.
hfc—10—350 in 2 ranges.
Size—115 × 215 × 90 mm.
Complete with steel carrying
case, test leads, and battery.
PRICE £11-30 net p & p 30p.



U4341

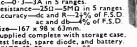
NEW CAPACITOR KITS

NEW CAPACITOR KITS

C280 Kit—PC Mounting polyester 250V. 5 of each value: 0.01 0.022, 0.047, 0.1, 0.22µ. 2 of 0.47, 1µF. £1-30 net.
C296 Kit—Tubular polyester, 400V. 5 of each value: 0.01, 0.022, 0.047, 0.1, 0.12µF. 2 of 0.47µF. £1-30 net.
Ceramic Kit—square planuette 50V. 5 each value: 22, 33, 47, 100, 220, 330, 470, 1000pF, 2200, 4700pF, 0.01µF. £1-30 net.
250V Paper kit—Tubular metal case. 3 of each value: 0.05, 0.1, 0.25, 0.5, 1µF. 90p net.
500V Paper Kit—Tubular metal case. 3 of each value: 0.025, 0.05, 0.1, 0.25, 0.5µF. 90p net.
1000V Paper Kit—Tubular metal case. 3 each value: 0.01, 0.025, 0.05, 0.1µF. £1.10 net.

MULTIMETER U4324

34 Ranges. High sensitivity. 20,000Ω/Volt. Overload protected. Vdc—0·6—1200V in 9 ranges. 20,000 /Volt. Overload protected Vdc—0.6—1200V in 9 ranges. Vac—3—900V in 8 ranges. Vac—3—900V in 8 ranges. Vac—3—34 in 5 ranges. Vac—6.3—34 in 5 ranges. Resistance—250—5M0 in 5 ranges. Accuracy—dc and 8—2.4% of F.S.D. Size—167 x 98 x 63mm. Supplied complete with storage case. test leads, spare diode, and battery. PRICE £9.95 net p & p 25p.





U4324

MULTIMETER U4313

33 ranges. Knife edge with mirror scale.
20,000 (Note. High accuracy. mVdc—75mV

vdc—1-5—600V in 9 ranges.

vdc—0-6—1500 mir oranges.

ldc—60—1500 mir oranges.

ldc—0-6—1500mA in 6 ranges.

lac—0-6—1500mA in 6 ranges.

lac—0-6—1500mA in 6 ranges.

lac—0-6—1500mA in 6 ranges.

lac—0-6—1500mA in 6 ranges.

loc—0-6—1500mA in 6 ranges.

loc—0-6—150



MULTIMETER U435 32 Ranges, High Sensitivity 20,0000 /Volt Vdc-75mV-1000V in 8 rgs. Vac-2-5-1000V in 7 rgs. Idc-0-001-2-5A in 6 rgs. Idc-0-005-2-5A in 5 rgs. Resistance-3-300K in 3 rgs. Capacitance scale 0-0-5µF Accuracy S-DeC S-DeC £2·14 T-DeC £3·92 μDeC "A"

Capacitance scale 0-0-5µF Accuracy— dc and R-2½% of F.S.D. Size-205 x 110 x 84mm COMPLETE WITH STEEL CARRYING CASE, TEST LEADS AND BATTERY PRICE £9-45 net p&p 25p ANTEX CCN240 £2-43 CN240 £2-01 X25 £2-01



SEND NOW!

YOUR SINGLE SOURCE FOR THE EASY-BUILD ORGAN Studio Electronics

LTD

PO BOX 18 HARLOW CM18 6SH ESSEX

Tel: HARLOW (STD 0279) 416771

New catalogue now available on receipt of S.A.E.



μDeC "B"

2 DeC £4.72

MM6* Calculator only £8 75 + 30p P. & P.

ELECTRONIC KITS

requires reliable firms well connected in own markets for handling exclusive sales in countries where no organisation yet exists.

Send enquiries to:

AMTRON

Casella Postale 4160, Milano, Italy



This could lead to something big.

A soldering iron and a screw driver. If you know how to use them, or at least know one end from the other, you know enough to enrol in our unique home electronics course.

This new style course will enable anyone to have a real understanding of electronics by a modern, practical and visual method. No previous knowledge is required, no maths, and an absolute minimum of theory.

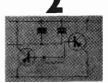
You build, see and learn as, step by step, we take you through all the fundamentals of electronics and show you

how easily the subject can be mastered and add a new dimension not only to your hobby but also to your earning capacity.

This course is accepted by and used in a large number of schools and colleges and forms an invaluable grounding for professional training in the subject. All the training is planned to be carried out in the comfort of your own home and work in your own time. You send them in when you are ready and not before. These culminate in a final test and a certificate of success.



As the first stage of your training, you actually build your own Cathode ray oscilloscope! This is no toy, but a professional test instrument that you willneed not only for the course's practical experiments, but also later if you decide to develop your knowledge and enter the profession. It remains your property and represents a very large saving over buying a similar piece



Read, draw and understand circuit diagrams.

In a short time you will be able to read and draw circuit diagrams, understand the very fundamentals of television, radio, computers and countless other electronic devices and their servicing procedures.



Carry out over 40 experiments on basic circuits.

We show you how to conduct experiments on a wide variety of different circuits and turn the information gained into a working knowledge of testing, servicing and maintaining all types of electronic equipment, radio, t.v. etc.

To find out more about how to learn electronics in a new, exciting and absorbing way, just clip the coupon for a free colour brochure and full details of enrolment.

PLUS_	of essential equipment.
LOS	
	0%
FREE GIF	COUNT 1

ALL STUDENTS ENROLLING IN OUR COURSES RECEIVE A FREE CIRCUIT BOARD ORIGINATING FROM A COMPUTER AND CONTAINING MANY DIFFERENT COMPONENTS THAT CAN BE USED IN EXPERIMENTS AND PROVIDE AN EXCELLENT EXAMPLE OF CURRENT ELECTRONIC PRACTICE

Brochure without obligation to: BRITISH NATIONAL RADIO & E SCHOOL, Dept WL/45 P.O. Box 156, Jersey, Channel Island	LECTRONICS
NAME	
ADDRESS	
	(Block caps please)

THE UNITRON

A MAGNETIC FIELD-EFFECT TECHNOLOGY

DON RESCHEVSKY

VERY once in a while, some major breakthrough in electronics changes the whole face of the industry. Now that world patents have been officially filed and registered, Solitronix Inc. has released details of a new device—in fact a new technology; the Unitron.

This component has such application potential that it is impossible to overstress its impact on the electronics scene both in industrial/professional and military applications plus, of course, consumer electronics. It works on an old, established principle but only now that there are newer materials available is it possible to exploit the full potential. Materials currently under investigation in the laboratories promise even better devices.

The device

The Unitron is extremely simple, both in operation and manufacture—which means cheap devices. The heading shows simple magnets with north and south poles. Text books inform that *like* poles repel while *unlike* poles attract. Push two north poles together and they will oppose you, but make it one north and one south pole and they'll try to get together—you have to physically hold them apart.

Now let us come to the clever part. Let us lay down a large number of very tiny magnets close together such that the flux or magnetic field of each magnet couples with that of its neighbours. If we lay them so that they attract, then there will be a certain interaction between the poles of each adjacent magnet. Similarly, a certain repulsion will take place if adjacent magnets have like poles.

It is at this juncture that materials start to play an important role. Until recently, materials available would only allow a magnet structure such as that above which, in itself, is pretty useless. Research during the past two years has led us to a new magnetic material/substance which is synthetic (i.e. man made). The new substance is called Polyferrosamarium-bybutylcobalt. To the layman it is a bit of a mouthful but to us it spelt success. Abbreviated to PSB it has the strangest effect upon magnetism and it is this effect which gives rise to the Unitron which makes possible a whole new family of devices.

The material PSB takes the form of a scft, plastic ferrite with a crystalline structure. In its normal synthesised state it is not magnetised, i.e. it isn't a magnet and thus has no north or south poles and has no field surrounding it—it is magnetically inert. If we now bring another magnet close to the material it will suddenly magnetise forming a miniature magnet complete with poles. This effect may also be obtained by simply applying some form of voltage either a.c. or d.c. Taking away the source of power makes the material magnetically inert again. The rise and fall times of this induced magnetic effect can be less than a microsecond, however, the material stores some of the power which is released when the next "pulse" of power is applied. The

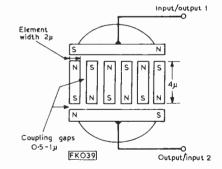
* Chief Design Engineer, Solitronix Inc. Anaheim, California.

power appears to be stored within the material itself as a series of minute magnets which are themselves composed of smaller magnets. This tiny atomic magnet structure has the combined power of all the tiny magnets locked within it, but the poles are set up in such a fashion as to make the net magnetic effect across the whole structure add up to zero—until the next signal pulse is applied.

Structure

A diagram of the device is shown in Fig. 1. The drawing is simplified to preserve clarity. For example, there are 100 tiny vertical magnets and in some devices the coupling magnets (the long ones top and bottom) are divided and cross-coupled. The sizes are given which shows just how tiny these structures are. The length of one magnet element is only 2μ wide by 4μ long.

Fig. 1: Devices commonly have 100 elements on a 300 μ x 10 μ area. Only six are shown here for clarity. Note $1\mu = 0.000393$ in. or 11000in $= 25\mu$.



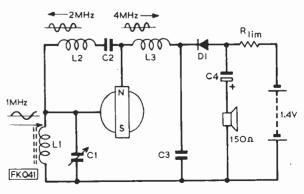


Fig. 2: M.W. receiver. The coil/capacitor combination L1/C1 tunes medium waves. (In example, we assume a 1MHz signal coming from the ferrite rod). L2/C2 tunes 2MHz and feeds signal back to input. L3/C3 tunes 4MHz and passes signal to D1, load R_{IIm} and speaker.

Device specifications in the semiconductor industry are commonly given in mils and to give some idea of the smallness of the elements in the Unitron it should be remembered that 1 mil is 1/1000in. which is equal to 25.4 microns. Thus even 25.4 microns (25.4μ) is only 0.001in. and thus 1μ is 0.001 divided by 25.4.

The Unitron structure is manufactured using similar techniques to those for making integrated circuits except that an electron beam is employed to trim the magnetic

pattern.

First, a solid layer (less than 0.05μ for small signal devices and up to 7μ for power components) is deposited on a ceramic substrate. Then, a computer-controlled programmed laser beam cuts the devices into separate areas. Lastly, another computer programmed electron beam divides the areas into a series of minute islands each forming an inert, potential magnet made of PSB.

Operation

There is another peculiarity of PSB. The signal-induced magnetic field runs from input to output coupling magnets—a sort of magnetic ripple along the individual magnetic structures. However, immediately a signal is applied, a secondary magnetic surface wave streaks along the surface of the material, like a flat stone skimming across a millpond. Further, such a secondary field is exactly twice the speed, and therefore twice the frequency, of the induced field and lastly, it is very much larger. In other words, we have magnetic amplification. The degree of amplification is a function of two things—the type of field which caused it and the permitive index of the grade of PSB used.

Maximum gain obtained from a Unitron to date is 120dB. This is from an area less than 0·01in². For power devices the same order of gain is obtainable but a larger area is required because dissipation is higher within the device

itself.

Perhaps the most startling thing about seeing a Unitron for the first time is that it has only two leads (although power devices may have their cases bonded to a heat sink to improve heat dissipation).

The Unitron does, of course, require a battery or some source of power. Efficiency is extremely high for small signal applications. For example, Fig. 2 shows the circuitry required for a small medium wave receiver running from a 1.4V power source. The resistor, R_{lim} is employed to act as a form of load, but also to limit the current taken by the device.

Thus if the output required (as shown in Fig. 2) is 250mW or $\frac{1}{4}$ W and the Unitron was a grade 1 device (efficiency 85%) then one simply allows d.c. power equal to 115% to be applied i.e., 85% plus the 15% to make up 100% plus 15% for the loss. In the case of Fig. 2 and assuming 250mW required, then R_{Ilm} would be calculated for 0·1785A to flow. This is a

simple calculation using only Ohms law viz; Volts x Current = Power which means $1.4V \times 0.1785A = 250mW$.

That's all there is to the design. Unitrons are classified and marked according to their frequency handling capability and power ability. Providing the frequency rating is greater than that for which the device is to be used, there are no problems. Power is simply a matter of Ohms law as explained i.e., the applied voltage multiplied by the current drawn by the device must equal a number which is less than the specified power rating of the particular device. Thus a 3PSB2 is a Unitron for use up to 3MHz (first figure) and must not dissipate more than 2W (last figure). Devices needing a heat sink are signified by the addition of the letter S after the last figure. If there is no S, then the dissipation is for free air.

A Unitron 3PSB1 (as used in Fig. 2) currently costs about one dollar on the US market, that's about 40p in English money. Already the consumer industry has placed orders for some 100 million devices and production lines are running flat out. The devices should find their way onto the US Amateur market by the third quarter of this year. By then, even better Unitrons will be available.

Some practical circuits are given in the remaining diagrams just to whet your appetite and show what can be achieved. Before closing the theoretical side, it is worth mentioning a spin off from the Unitron research program. Figure 3 shows a structure using only 3 magnets for simplicity. The complex build up of power i.e. stored field, in the PSB structure made us think. Isn't that just what a capacitor does—or even a coil?

To date, an electronic capacitor has been fabricated which could prove invaluable in the IC industry. There seems no reason why an electronic tuned circuit should not be manufactured using the Unitron technique. This would mean that complete receivers, transmitters, etc. could be manufactured on a single IC chip less than one hundredth of an inch square. The capacitor structure shown in Fig. 3 has allowed an electronic capacitance of $0.1\mu F$ at 3V working to be achieved in an area on 6μ by 10μ [$1\mu = 0.000393in$].

Applications

Radio Amateurs will be interested in the circuit shown in Fig. 4. Here, a single field effect transistor feeds a single Unitron. Although the f.e.t. v.f.o. needs to tune only one section of half the lowest band of interest (remember, the induced reverse surface wave is twice the frequency which induced it) then any higher harmonic can be tuned by simple selective tuned circuits. A signal coming in at, say, 3-5MHz would come out of the Unitron at 7MHz. Here, a simple 7MHz acceptor LC combination would either accept the signal and pass it to the next stage for amplification or could feed it back to the input. Here it would go back through

the Unitron and emerge as a 14MHz signal and so on. Input impedance of the Unitron varies with frequency but even at 20MHz this is still several hundred megohms so there is virtually zero damping of tuned circuits.

The Unitron may be a bit of a disappointment physically because it looks very much like an ordinary transistor.

Since the Unitron is bidirectional i.e., the signal can flow either way thus input and output are interchangeable, no pip or case marking is required and lead identification is unnecessary. What could be simpler!

It will be interesting to see just how far the Unitron has progressed by this time next year—who knows, transistors and ICs as we know them, may well be obsolete.

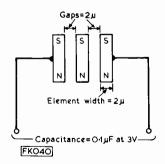
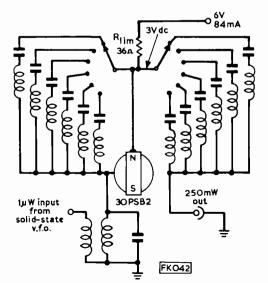


Fig. 3: (above) Electronic $0.1\mu F$ 3V wkg capacitor which takes up only 10μ x 6μ . An electronic coil can be fabricated (up to 86μ H) but is more complex.

complex. Fig. 4: (right) Single f.e.t. v.f.o. providing only 1µW can drive a single Unitron to give ½W output on six bands, 1-8-30MHz.



Bargains in Semi-Conductors, components, modules & equipment.

Bargains from our FREE Catalogue

20 large pages, filled with real bargains in transistors, I.Cs, components, equipment, etc. Send large S.A.E. with 6p stamp for your FREE copy of 6th Edition by return. Meanwhile, for prompt delivery order from this month's ad. NOW.

BPP TRANSISTOR PACKS ALL AT 50D EACH **TESTED & GUARANTEED**

	119	4	dlodes. 1,000PIV
	81	10	1 amp. plastic Reed Switches, 1" long \(\frac{1}{2} '' \) dia. High-
н	135 [(00	speed P.O. type Mixed Diodes, Germ. Gold bond-

ed, etc. Marked and Unmarked 30 Short lead Trans-Istors, NPN Slil-con Planar types H38

H66

H39

H41

Integrated circuits 4 gates BMC 962, 2 flip flops BMC 945 BD131/BD132 Complementary Plastic Transistors 40361 Type NPN Sil. Transistors

Sil. Translators TO-5 can comp. to

40362. Type PNP SII, Translators TO-5 can comp. to H65

UNMARKED & UNTESTED

B 1	50	German sistors and RF	PNP,	ran- AF

566 150 Germanium Di-odes Min. glass type

Transistors, man-ufacturers' rejects, AF, RF, SII. and Germ. Diodes

B84 100 Silicon Diodes DO-7 glass equiv to CA200, OA202

B86 100 Sil. Diodes sub.

Sil. Diodes sub. min. IN914 and IN916 types BY126/7 Type Sill-con Rectifiers 1 amp. plastic, Mix-ed volts Power Transis-tors, PNP. Germ. NPN Silicon TO-3 Can H20

3819N Channel FET's plastic case **H67**

PLASTIC POWER TRANSISTORS

In NPN or PNP at shattering low prices sold to you under our Tested

In NPN or PNP at shattering low prices sold to you under our Tested and Guaranteed terms.

Range 1, VCE. Min 15, HFE Min 15 Range 2, VCE. Min, 40, HFE Min 40 1-12 13-25 26-50 40 Watt 20p 18p 16p 40 Watt 30p 28c 26p 90 Watt 24p 22p 20p 90 Watt 35p 33p 30p Please state NPN or PNP on order.

NEW X-HATCH GENERATOR Mk.2



Essential for Colour T.V. alignment of 4 patterns. Featuring plug in IC's and a more sensitive sync. pick-up circuit. The case is virtually unbreakable—ideal for the engineer's toolbox—only measures 3" x 5½" x 3". Operates from 3 U.2 type batteries (extra).

Complete £7.93 Ready built unit only

£9.93

OVER 1,000,000 TRANSISTORS

of all most needed types in stocks including power, diode, rectifier, etc., etc., marked, tested and guaranteed. Hundreds of worthwhile bargains will be found in our FREE CATALOGUE (6th edition). Also Zener diodes, I.Cs, etc.

Metrication Pocket Charts 12p. 8 assorted relays £1.00. Pev. counter device (for cars) £1.00. U.H.F./TV Tuner Units £2.50. L.M.380 Audio 1.C. £1.00 and technical books of all kinds.

TERMS OF BUSINESS

I ERMS OF BUSINESS

V.A.T. Prices shown do not include V.A.T. Please add 8% to total value of your order including postage. No. V.A.T. on overseas orders.

POSTAGE Except where stated, add 15p for postage & packing in U.K. Overseas—add £1, any difference being charged or refunded.

PAYMENT Cash with order, Cheque or money order. Minimum value—£1. You can also pay by ACCESS.

IMPORTANT—Every effort is made to ensure accuracy of prices and description at time of preparing this advertisement and going to press. Prices are subject to alteration without notice.

challenging values! tirling

STIRLING SOUND AUDIO MODULES come to you as basic units assembled on P.C.Bs enabling you to add required components in layouts of your own choice. Modules are tested and boxed before despatched and include well printed

AMPLIFIER MODULES

Pre-amplifiers; tone control
SS.100 Active tone control unit to provide bass, £1.60
treble, balance and volume controls

SS.101 Pre-amp for ceramic cartridge, tape and radio £1.60

Pre-amp for low output magnetic cartridge, tape and radio. With R.I.A.A. correction ±1dB at 1K

55-103-3

SS.105

POWER AMPLIFIERS

.SS.103 Compact I.C. amp. with 3 watts R.M.S. output. Operating voltage 6 to 22. Size 3" x 2"

\$5.103-3 Stereo version of above using one I.C. on each channel

A compact and useful all-purpose amplifier which will run excellently on a 12V supply. With 5 west output, two make a good stereo amp. Size 21" x 11." SS.105

Similar in size to SS.103 but with a 10 watt output, ideal for many domestic and small-size P.A. applications. Operates from 26 to 32V.

Excellently designed 40 watt R.M.S. (Into 4 ohms) hi-fi amplifier. S/N ratio better than 75dB. THD better than 0.2%. Power requirements—45V. d.c. With 0-15" centre edge connections. Two can be bridged to give 80 watts R.M.S. Into 4 ohms

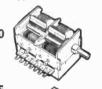
£2.40 SS 140

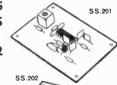
TUNER MODULES

SS.201 Ganged tuning condenser with accurately engineered slow-motion drive in rugged housing. Excellent sensitivity. Tunes 88-108MHz. With A.F.C. facility. Operates from 6V-16V

I.F. stage (with I.C.) Pre-tuned. A.F.C. connection. Operates from 4:5 to 14V

Stereo Decoder. Designed essentially for use with SS.201 and 2, this module can also be used in most mone FM tuners. A LED may be attached. Operating voltage 9-16V. d.c.





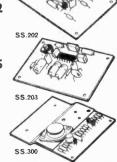
POWER SUPPLY STABILIZER

Add this to an unstabilised supply (say typically 45V output) to obtain a steady powerful working output adjustable from 12 to 60V. Essential or your audio and special systems. Money saving and very refliable 42.25

ALL MODULES TESTED AND GUARANTEED

WITH WELL PRINTED INSTRUCTIONS

FULL RANGES OF ANCILLARY COMPONENTS AVAILABLE—SEE CATALOGUE



THE RESERVE OF THE PARTY OF THE To BI-PRE-PAK, 222-224 WEST RD., WESTCLIFF-ON-SEA, ESSEX

for which I enclose

TELEPHONE: SOUTHEND (0702) 46344. WRITE ORDER SEPARATELY AND ATTACH COUPON IF REQUIRED

222 224 WEST ROAD, WESTCLIFF-ON-SEA, ESSEX SSO 9DF.

And now the FANE 'SPECIALIST' RANGE

L'SPEAKERS OF OUTSTANDING QUALITY FOR THE DISCRIMINATING PROFESSIONAL

Features include ROBUST CAST ALUMINIUM CHASSIS and 2" EXTRA HIGH POWER VOICE COILS All models available in impedances of 8 ohm or 15 ohm



OUR FAST SELLING

and RELIABLE

'POP'RANGE

IS STILL AVAILABLE AT

£6·30

REC. PRICES from

Recommended Prices inc. VAT

12" 'DISCO 60' 60 watts R.M.S.

Linen Cone Surround. Fitted extra large Tweeter Cone. Frequency Range 50-15,000 Hz Rec. Retail Price

£24·75

'GUITAR 60L' 60 watts R.M.S.

Plastiflex Cone Surround, Aluminium Centre Dome. Frequency Range 50-9,000 Hz.

Rec. Retail Price DESIGNED FOR LEAD GUITAR

12" 'GUITAR 60B' 60 watts R.M.S.

Linen Cone Surround. Frequency Range 45-9,000 Hz.

Rec. Retail Price

FOR USE IN MULTIPLES FOR BASS GUITAR

AND for those who can afford the very best there is our range of

'CRESCENDO' **MODELS**

12" UNITS

£39.95 from Rec. Retail

15" UNITS

£46·95

Rec. Retail

Please send S.A.E. for leaflets on any of above ranges

12" 'PA 60' 60 watts R.M.S.

Guarantee: 2 years

Plastiflex Cone Surround. Fitted Tweeter Cone. Frequency Range 50-15,000 Hz. Rec. Retail Price FOR GENERAL PURPOSE PUBLIC ADDRESS

15" 'BASS 70' 70 watts R.M.S.

Linen Cone Surround. Frequency Range 40-7,000 Hz. Can be used singly but ideally TWO UNITS IN A SINGLE CABINET.

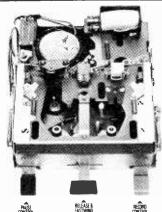
Rec. Retail Price RECOMMENDED FOR ALL BASS INSTRUMENTS



UNCHANGED PRICE

Rating with recommended filter 100 watts. Price inc. VAT HPXI HIGH POWER CROSS-OVER UNIT Suitable for above Horn Units £2.50 inc. VAT.

Distributors to Wholesale and Retail Traders—LINEAR PRODUCTS LTD., ELECTRON WORKS, ARMLEY, LEEDS.
Manufacturers enquiries to—FANE ACOUSTICS LTD., 286 BRADFORD ROAD, BATLEY, YORKS Prices shown correct at 14 Jan, 1975



GARRARD CT4'S' MK III **STEREO** CASSETTE **PLAYER &** RECORDER

has full facilities for record, playback, pause, erase, rest, fast forward and reverse wind, automatic tape end stop and cassette release.

Robust, precision engineered mechanism based on the "STARR" patented design. Ideal for use in Car stereo cassette players, HI-FI stereo cassette recorders. industrial and many other applications. Send cheque or Postal Orders for £19.98 (£18.50 + 8% VAT) (includes post and

BOTHWELL ELECTRIC SUPPLIES

(Glasgow) LIMITED 431 Sauchiehall Street **GLASGOW G23LG**

Tel: 041-332 6184

Scotland's Leading Electronics Centre

TECHNOMATIC LTD. 54 SANDHURST ROAD, Tel: 01-204 4333

Carlot and the said of	I Ga Chool			A THE PARTY OF THE		St. St. St. St. St. St. St. St. St. St.	COUNTRIES.
AC126 7,8 AC176 AC187/8 AD161/2 AF114/5/7 BC109/8 BC109 BC109C BC154 BC182/3 BC184 BC212/3	11p 12p 11p 36p 12p 9p 10p 10p 11p	21,2926 2N3053 2N3055 2N3055 2N3442 2N3702/3/4 2N3705/6 2N3773 2N3819 3N128 3N140/1 40361 40.62	8p 18p 49p 140p 11p 10p 220p 75p 85p 40p 43p	DIODES 1N4001 1N4007 1N914 OA202 AEY11 ZIJ TIL209 ZENERS 400mW 1 3W	5p 7p 4p 5p 50p 75p 16p	SCR THYRIS1 1A/50V 3A/400V C106D 2N3525 TRIAC 3A/400V 6A/400V 16A/500V DIAC	95p 120p 180p 180p
BC214 BCY71 BFY50/1/2 MPF103/5 TIP41A TIP42A 2N2646	13p 16p 15p 31p 65p 72p 35p	40103 40173 SCR MCR101	58p 18p 25p	1 5W BR. RECT 1A/50V 1A/600V 2A/100V 2A/400V 6A,100V	22p 29p 35p 45p 60p	DIL SOC (Low Prof Texas) 8 Pin 14 Pin 16 Pin	KETS

2N2646 35p	6.	A,100V 60 p	16 Pin 14p
TTL SERIES	Linear IC's PREG SV. 12V 555 50 140 556 1100 CA3046 55 667 2200 1CL8038 290 741 250 747 700 MC1310 225 DIL 8 of MC1312	MC1314 360 p MC1315 430 p MFC4000 50 p TBA800 100 p TBA810 p TBA810 p TBA820 P ZN414	CMOS LOGIC Gates (CD4001 AE, CD4001 AE etc) 37 p CD4013 AE 67 p CD4013 AE 67 p CD4017 AE 183 p CD4027 AE 108 p CD4027 AE 148 p CD4029 AE 325 p CD4024 AE 148 p CD4030 AE 82 p CD4047 AE 154 p (SAE for full list

			- р	
OPTO-	-	LIT747	210p	ī
ELECTRON	IICS	3 DIGIT READ	OUTS	
7 SEGMENT	T READ	"BLISDOR" L	ENS	
OUTS			250p	
3015F	1200	RED LENS	1850	
MAN3M	1000	LEDS		
MAN4	130p	TIL209 (Red)	16p	
LIT704	100p	Gleen/Yellow	35 m	
LIT707	100p	LDR ORP12	500	

5001 12 Digit Cald	ulator 485p
	650p
5314 Clock chip	
Clock chip with	
(Similar MM531	6)
•-	750p
PC Keyboard	
2 36" x 3 76" x	A 45#
2 30 X 3 /0 X	0.45
	400p
	4000

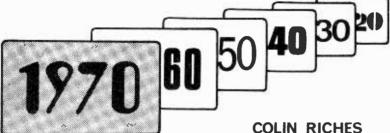
FOR MORE SELECTION REFER TO OUR ADVERTS IN P.E. OR W.W

Complete semiconductor kit for PW ASCOT STEREO CASSETTE DECK £5 70 + VAT.

MAIL ORDER ONLY MINIMUM ORDER £2 P & P 15p Add 8% VAT on total.

packing) to:

GOING BACK.



R. L. OWEN, 7 St. Richard's Road, Deal, Kent, writes to say that he used to have some small part in the manufacture of McMurdo Silver "15-17" receivers of about 1937-38. He says not many were made but, if anyone can help, he'd like to acquire one for old times' sake.

A photograph of the "R" type valves published a short while ago brought back two rather poignant memories to Mr. R. J. Hall of Penzance, Cornwall. He says that just after the First World War, he saw a shop window full of that type of valve for sale at 1d. each. Upon mentioning the fact to his elder brother who had been a radio operator in the R.N.A.S. on airships, he informed him that the "R" valves used by the Navy had filaments made of platinum wire—the filaments and lead-out wires being one single length of wire.

On hearing this, the young R.J.H. quickly returned to the shop to buy some but was promptly informed by the proprietor that he had disposed of the lot for a "a few shillings."

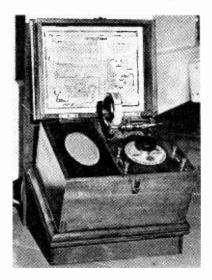
Mr. Hall's second recollection concerns an ex-Navy set which he had. It contained six "R" type valves all set in a row on the top of the set. Unfortunately a little accident occurred when H.T. and L.T. leads at the rear of the set were reversed. The valves lit up like arc lights for a few seconds, then were ruined forever.

Tempus fugit says W. J. Swift of 36 Pattenden Road, Catford, London SE6 4NQ, and this makes him less able to do the things he used to do. He has a book "Talks About Wireless" which contains some history of wireless pioneering. It is written by Sir Oliver Lodge and was published by Cassell in 1925. Another book in Mr. Swift's possession is "The Book

of Practical Radio," by John Scott-Taggart. It has 163 diagrams and 63 plates and was published by The Amalgamated Press in 1925. If anyone would like to make him an offer for these two books, please contact him direct.

Gilbert Davey of Harrow tells me that he has a "Hezzanith" horn loudspeaker which dates from about 1926 and which he uses in conjunction with his O-V-2 battery-operated receiver with which it was originally supplied. The maker's name, inscribed on the speaker is Heath and Co. of New Eltham, London. He wonders if there is any connection with the firm of scientific instrument makers of that name with an address in the same area.

Unlike the Brown "H" horn speaker shown in the October issue of P.W., Mr. Davey's speaker has a large diaphragm fixed around the edge and held over two magnets with the usual speech current windings round them. A knurled knob underneath operates a screw system



Mr. McAlister's modified crystal set.

which brings the magnets nearer to or further away from the diaphragm. After 50 years, the magnets seem as powerful as they always were. The horn mounting is in the centre of the diaphragm just above the magnet system.

Operating the speaker from the O-V-2 receiver, the quality is similar to that of a small, cheap transistor set. Mr. Davey stresses that speech is far better than music although he always enjoyed its rendering of Jack Payne and Henry Hall in the earlier days.

Wiltshire reader George Southgate (Fourways Cottage, Chilmark, Salisbury) tells me he has many items of vintage equipment for disposal—valves, phones, condensers, transformers, mainsenergised speakers, etc. If any readers are interested will they please send a stamped, addressed envelope to him for details.

A million pirates

Even in January 1927 the Post Office were contemplating taking steps to discover unlicensed users of broadcast receivers so that disciplinary action could be taken against them. They stated that it was difficult to estimate even approximately the number of "pirates" in the country but a conservative figure would be a million!

Anyone help?

S. J. McAlister, the manager of Bord Na Mona, Derrygreenagh Works, Rochfortbridge, Mullingar, Co. Westmeath, has sent me a photograph of an old crystal set and wonders if anyone can give him some more information on it.

The set was manufactured by Service Radio Co. Ltd., London N.16, and Mr. McAlister thinks it is dated c. 1925. It has two plugin coils (see picture) numbered 50 and 60 and signed John Nicols.

On the left of the set there is a space for a "Service" amplifier powered by accumulators of 4V for L.T. and 45V H.T.

The set is on display in Mr. McAlister's V.H.T. Radio Communications Workshop and to enable visitors to listen to it, he has fitted an audio amplifier, the speaker of which can be seen to the left of the unit. The set is in perfect working condition.

ON THE AIR

-continued from page 1102

on 4980 at 0230! (I must have been mad!) so for all those night owls here's one for the log book.

Thirteen year old **David Lovatt** of Cheadle, Staffs, wonders if anyone knows of Radio Malaya in the 49 metre band. Radio Malaysia, as it is now known, still has a service on 6100 and 6175 called the Voice of Malaysia. It is a 100kW transmitter from Kuala Lumpur.

Peter Kay from Maghull, Liverpool, sends a comprehensive list of QSL times that must have taken hours to type. The star prize goes to Voice of Vietnam via Radio Havana, Cuba, that came after nearly two years! It seems that Peter has not been able to latch on to some of the broadcasts that I have featured in the column, and to this I can only say that if the DX isn't running then even the most expensive set won't find it.

The ionosphere I once heard described as "like a moving bowl of custard", and when you ask for SINPO lists, Peter, you would find that they would be out of date, in some extreme cases, after two hours. I can help with your other request though, and to do this let us call on **David Gordon** whose QTH is in Salford. David sends info on three DX shows:—

R. Finland on 9500 at 1425 No Days given

R. Prague on 9605 at 1545 No Days given

R. Budapest on 9760 at 1615 Tues. and Fri.

Why not let me know of any DX shows you hear and then I will put together a week's list to ensure that you never miss any, thus keeping you glued to the set every spare minute.

When he has finished his days "collar feeling" policeman James Walker of Milton Keynes turns to feeling the tuning knob of his Heathkit SW717 with its 50ft long wire aerial. He has logged the following:—

VOA Greenville Mass. on 15430 at 1530

Vatican Radio on 11740 at 1500

R. Ghana on 21720 at 1500

James then goes on to tell me that R. Peking's 1975 calendar has arrived and that it is the traditional aspects of China painted by Chinese artists. This came, along with a huge collection of magazines and pennants, so here's your chance, pennant collectors, OSL Peking, and try your luck.

From the horse's mouth comes an answer to the

recent query regarding a TV set that puts out the Deutsche Welle sign-on tune. David Porter is a BBC engineer at Sutton Coldfield and he explains that the sound carrier of a u.h.f. set is demodulated in an intercarrier sound detector and runs at 6MHz, this being the difference between the sound and vision carriers. Thus there are circuits in the set tuned to 6MHz followed by an a.f. amplification stage. Any local 6MHz signal tends to be picked up and amplified by these circuits. So there we are!

David Blair from Airdrie in Bonny Scotland logs WYFR on 11645 at 1700 and wonders what it is all about. This station used to be called Radio New York World Wide (WNYW) and it was sold a year or so ago to "Family Radio Ltd" a religious broadcasting company that owns many local US stations, particularly on v.h.f. The new company retained all the old WNYW frequencies but changed the programming from sweet music to general religious broadcasts.

From wild and woolie Wales, Holyhead to be exact, comes a plea from John Higginbotham. He would like to know the exact info that he should put on a QSL request. Many s.w. stations like the following, John:—

1. Date, time and frequency of broadcast heard.

2. Your type of radio and aerial.

3. SINPO of that particular broadcast.

4. Ten minutes of prog. content written out.

It always helps to comment on the type of programme and some stations require either IRCs or return postage, or both.

Martin Daft at his QTH in Mapperley, Notts, is bothered by interference from household electrical goods since buying an r.f. amplifier. This is purely a case of "amplify the signal, amplify the noise." Finally Peter Roberts of Pont Vaillant, Guernsey, very kindly says that it was this column that turned him on to DXing and that his Heathkit GR1 with its 35ft long wire has rewarded him with, among others:—

Tema, Ghana on 9545 at 2110

WINB Red Lion on 15185 at 2000

V. of Nigeria on 15270 at 0610 (another early bird)
One final note while on the transmitter subject;
R. Finland is to start a service on 9620 with a new
100 watter and is seriously considering a service on
the MW. Thus we say farewell to this months
column and wish 73s to you and yours.

REACTION TIMER

-continued from page 1100

bration pot is turned up further until 2.4 volts is shown on the voltmeter, and VR2 is then slowly advanced until D9 comes on. At this point D7 will switch off.

The process is continued with the voltmeter indicating 2·7 volts for VR3 adjustment, 3 volts for VR4, 3·5 volts for VR5 and 4·3 volts for VR6. These voltages correspond to the charges that will be present on C2 after time intervals of 1/10, 1/9, 1/8, 1/7, 1/6 and 1/5 second from the signal light going off.

Calibration is now complete, and the meter and potentiometer can be removed.

For readers wishing to set the unit for intervals of time other than those given, the formula for the voltage on C2 is

$$V = \frac{It}{C_2}$$

where *I* is in microamps, C_2 is in microfarads, *t* is in seconds and *V* is in volts. In this unit I=1,000 microamps, $C_2=47\mu F$, and so $V=21\cdot 3\times t$.

The current through the presets VR1 and VR6 is minute in comparison with the 1mA charging current to C2, and is ignored in the calculations.

The total accuracy of the unit is determined mainly by the actual capacitance of C2. A common tolerance value for tantalum capacitors is 10 or 20 per cent, but one would be unlucky indeed to pick a capacitor at the edge of its tolerance.

If it is desired to increase the length of time that the signal light remains on, this is best achieved by increasing the value of C1. If a light dependent resistor is wored in series with R1 and placed behind a small aperture in the case, a random element will be introduced into the duration of the signal, due to changes in the light entering when the unit is mover, or time of day, etc.

ALL MAIL ORDER BY WELCOME

RETURN. G.O.D. SERVICE C. T. ELECTRONICS

V.A.T.
Unless otherwise stated all prices are EXCLUSIVE of V.A.T.
Please add 8% to all orders.
Carriage: orders under £5 plus 20p. Over £5 post free.

All mail order and enquiries to 270 Acton Lane

Tel: 01-994 6275

	_		-										
SE	VIIC	ONI	DUC	OTS	RS	TIP31B TIP32B	65p 77p			S.C.R.s CRS1/05 40	TXL228B	ACS	ī
A C107	35 _D		95p			TIP33B	£1-06	2N2222	20p	CRS1/10 56	I I ALZZOB	85 p	
A C125	25p	BCY34	60p	MPF102		TIP34B	£1 ·62	2N2222		CRS1/20 60		£1 · 40	
A C126	25p	BCY38	65 ₀	MPF103		TIP35B		2N2306	70p	CRS1/40 65	SC40F	£1 ·65	ш
AC127	27p	BCY39	£1.00	(2N5457		TIP36B			30p	CRS1/60 90i	SC45D	£1.70	1
A C128	25p	BCY55	£1.50	MPF10		TIP41B	78p	2N2640	50p	CRS3/10 62p	SC45E	£2·10	Ш
A C176	25p	BCY70	22p	(2N5458		TIP42B	95p			CRS3/20 62p		£2·42	1
A C188	30p	BCY71	22p	MPF105		TIP29C	68p	2N2904	25p	CRS3/40 90		£2.70	1 :
ACY17	25p	BCY72	22p	(2N5459		TIP30C	72p 80p	2N2906 2N2907	25p	CRS7/400 £1.00		25p	
ACY18 ACY19	30p 30p	BD121	75p	OA47	10p	TIP31C TIP32C		2N2907 2N2926	25p	CRS16/100 85p			1
ACY20	25p	BD123 BD124	75p 65p	OA70	10p	TIP33C	£1.20	2N3053	12p 25p	CRS16/200 90r CRS16/600 £1 6		R I.C.s	Ι.
ACY21	30p	BD131	40p	OA79	10p	TIP34C	£1 - R0	2N3054	65p	C106B 45p		V. 1A.	19
A D140	60p	BD132	50p	O A 81 O A 90	10p		£3.00	2N3055	50p	C106D 70		Reg.	
A D142	50p	BD153	75p	OA91	18p 18p	TIP38C	£3.74	2N3232	70p	40669 900		£2·10	1
A D149	60p	BD156	75p	OA200	10p	TIP41C	90p	2N3525	95p	TIC44 35p	LM723C 2	2.37∀.	1 2
A D161	44p	BDY11	£1 · 40	OA202	10p	TIP42C	£1 · 00	2N3643	30p	2N4444 £1.90			t
AD162	44p	BDY17	£1 · 60	OA210	35p	TIS50	40p	2N3702	14p	BT10/500A 90p	Voltage		9
AF114	25p	BDY19	£1-96	OA211	35p	ZTX107	15p	2N3703	12p		MFC4000	£1 · 05	1 3
AF115	25p		£1.40	OC16	90p	ZTX300	15p	2N3704	12p	BRIDGE	Audio	75p	2
AF116 AF117	25p	BF152	20p	OC19	85p	ZTX500	16p	2N3705 2N3706	12p	RECTIFIERS	TRA800 5		5
AF117	25p 60p	BF194	14p	OC22	55p	ZTX501	20 p	2N3706	12p 12p	W02 1A 200V 38p	Audio	£1.50	t
ASZ21	60p	BF195	15p	OC26	65p	ZTX504 ZTX531	50p	2N3708	12p	BY164 1 - 4 A 200 V	709C Op		F
ASY23	30p	BF196	15p	O C28	60 p	ZTX550	25p	2N3709	12p	57p	D.I.L./T	O99 45p	5
BA102	33p	BF197	20 p	O C35	60p	IN659	8p	2N3771	£1:70	MDA952/2 6A	741C Op /	Amp 8/14	
BA112	50 p	BF200	30p	OC36	65p	IN914	₽p	2N3772	£2 00	100V 80p	D.I.L./T	O99 35p	
BA114	16p	BF224J BFX29	30p 30p	OC42 OC44	40p	IN916	8p	2N3773	£2 · 50	75055 510550	748C Op /	4 mp	2
BA156	15p	BFX34	30p	OC45	20 p 25 p	IN4001	₹p	2N3319	35p	ZENER DIODES	D.I.L.	75p	1
BC107	12p	BFX85	30p	OC70	15p	IN4002	9p	2N3320	55p	BZY88 Series	747C Dua	£1 · 20	١,
BC108	12p	BFX86	30p	OC71	12p	IN4003	9p	2N3366	85p	400mW	ZN414 Rad	#11-20	F
BC109	14p	BFX88	30p	OC72	20p	IN4004	10p	2N3904	22p	3·3V-33V, 5% 11p 1·5W range 25p	ZINAIA Kat	£1.25	Ιi
BC113 BC115	15p 15p	BFY10	35p	OC75	25p	IN4005	12p	2N3905	25p	10W range 45p	TAD100 R	adio i c	
BC116	16p	BFY44	50p	OC76	25p	IN4006 IN4007	14p	2N4058	12p	1011 lange 43p		er 1£ 90	
BC117	20p	BFY50	25p	OC77	40p	IN4007	16p 7p	2N4059 2N4060	12p	L.E.D.	CA3014	£1 · 55	יו
BC118	12p	BFY51	25 p	OC81	25 p	2N696	25p	2N4060	12p 12p	TIL209 38p	CA3018	£1 · 00	1
BC147	11p	BFY52	25p	O C83	25p	2N697	20p	2N4126	17p	HP5082 28p	CA3028	£1 · 20	
BC148	11p	BFY53	25p	OC84	25p	2N698	25 p	2N4286	15p	MA2082R 20p	CA3036	£1:00	
BC149	12p	BFY90	65p	OC139 OC170	30p 25p	2N706	12p	2N4287	15p	III/LIGOLIN LOP	CA 3046	95p	١
BC153	15p	BSW63 BSW68	65p 80p	OC171	30p	2N606A	15p	2N4288	15p	L.D.R.	CA3048 CA3075	£2:35 £1:60	F
BC157	14p	BY127		OC200	60p	2N708	15p	2N4289	15p	ORP12 60p	CA3090Q	£4.85	1
BC158	15p	BY164	20 p	OC201	60p	2N930	20 p	2N4290	15p		MC1303L	£2·20	١
BC169 BC182	15p	IS104	65p 15p	O C202	75p	2N1132	25p	2N4444		NE555 Timer 80p	MC1310P	£2·80	
BC183	12p 12p	IS103	15p	TIP29A	45p	2N1302 2N1303	16p	2N4871	35p				
BC184	14p	MJ340	50p	TIP30	55p	2N1303	16p 25p		£1 10 £1 10	TO3 VOLTAGE	REGULATO	RS	١.
BC186	25p	MJ481	95p	TIP31 A	57p	2N1305	25p	2N5191	96p	L005 5V 650mA L036 12V 600mA			'
BC212	14p	MJ 2801	£1 · 25	TIP32A	69p	2N1306	25p		£1.10	L037 15V 450mA		E1 · 60 ea,	
BC212L	16p	MJ2901		TIP33A		2N1307	25p	40360	50p	2001 104 4501112		CI 00 64.	1
BC213	14p	MJE340	50p	TIP34A		2N1308	25p	40361	50p				i
BC214	14p	MJE370	75p	TIP35A		2N1309	25p	40362	50p	VEROBOARD			1
B C301	25p	MJE371 MJE520	90p	TIP41A		2N1613	25p	40669	90p	01 - 22	0·1 32p	0 - 15	1
BC302 BC303	25p 40p	MJ2955	65p	TIP42A	70p 85p	2N1711 2N2147	25p	40673	70p	2 x 32 2 x 5 32 x 32	32p 35p	23p 35p	1
BCY30	40p	MJE3055		TIP29B	54p	2N2160	70p		£1 · 00	31 x 34	35p	35p	1
BCY31	55p	MM1613	45p			2N2217	25p	Microwa Dłode		32 x 5	40p	41p	1
			COUNT		0% . 25.	+ 15%; to	O T GOO	, Dinge		17 x 2 1	£1 05	79p	1
				0. 12 1	0/8, 23	13/6, 10	UT-2U7	0		17 x 3∄	£1 · 43	£1 12	1
DIGIT	61 (N	TEAD	TEN	DIDOL	HTO I	SN74100	E2-00	SN74165	62.00	17 x 5	£1 · 84	_	1
10015111	AI IN	ITEGR/	4111	PHKI!	HIS	SN74104	£1 45	SN74166		PIN INS. TOOL	72p	72p	1
				VIIIU		SN74105		SN74167		SP.F. CUTTER	52p	52p	1
SN7400	18p	SN7427	42p	SN7470	30p	SN74107	55p	SN74170		100 PINS SS	30p	30p	1
SN7401	18p	SN7428	50p	SN7472	30p	SN74110	80p	SN74174	£2.00	100 PINS DS	30p	30p	1
SN7402	20p	SN7430	20p	SN7473	40p	SN74118	£1-90	SN74175	£1 · 35	500 PINS SS	£1 · 20	£1 · 20	1
SN7403	20p	SN7432	42p	SN7474	40p	SN741194	E1-90	SN74176		500 PINS DS	£1 · 20	£1-20	í
SN7404	20p	SN7433 SN7437	70p	SN7475	55p	SN74121		SN74177		330 1 1110 133	21.20	21.70	Ė
SN7405	20p	SN7437	50p 50p	SN7476 SN7480	45p 80p	SN74122 : SN74123 :		SN74180		ALSO STOCKE			1
SN7406	30p	SN7440	20p	SN7480	£4.25	SN74123		SN74181	26.00	ALSO STOCKE			ľ
SN7407	30p	SN7441 A		SN7482	87p	SN74145	64.50	SN74182 SN74184	£2.46	Electrolytic Car	pacitors,	Muliard,	
SN7408	20p	\$111 TT	```75n	SN7483	£1.00	SN74150	C4 . 25	CN74105	E-2.43	Sprague, Lorlin,	cc. Polyest	er, Poly-	1

DIGITA	IL IA	ITEGRATEI	CIRCUITS	SN74100 £2 · 00 SN74104 £1 · 45 SN74105 £1 · 00	SN74165 £2 · 00 SN74166 £4 · 00 SN74167 £4 · 25
SN7400	18p	SN7427 42p	SN7470 30p	SN74107 55p	SN74170 £4-10
SN7401	18p	SN7428 50p	SN7472 30p	SN74110 80p	
SN7402	20p	SN7430 20p SN7432 42p	SN7473 40p	SN74118 £1-90 SN74119 £1-90	SN74174 £2 · 00 SN74175 £1 · 35
SN7403 SN7404	20p 20p	SN7433 70p	SN7475 55p	SN74121 65p	SN74176 £1 · 60 SN74177 £1 · 60
SN7405	20p	SN7437 50p	SN7476 45p	SN74122 £1 ·35	SN74180 £1 · 55
SN7406		SN7438 50p	SN7480 80p	SN74123 £2 · 00	SN74181 £6 · 00
SN7407	30p	SN7440 20p	SN7481 £1 · 25	SN74141 £1-00	SN74182 £2 · 00
SN7408	20p	SN7441AN	SN7482 87p	SN74145 £1-50	SN74184 £2 · 45
SN7409	40p	75p	SN7484 90p	SN74150£1·35	SN74185 A
SN7410	18p	SN7442 75p		SN74151£1·10	£2·40
SN7411	23p	SN7443 £1 · 00	SN7486 45p	SN74153 £1 · 35	SN74190 £1 · 95
SN7412	22p	SN7445 £1 · 70	SN7490 75p	SN74154 £2 · 00	SN74191 £1 · 95
SN7413	40p	SN7446 £2:00 SN7447 £1:50	SN7491 AN £1.00	SN74155 £1 · 55 SN74156 £1 · 55	SN74192 £2 · 00 SN74193 £2 · 00
SN7416	30p	SN7448 £1.75	SN7492 75p	SN74157 £1 · 80	SN74194 £2 · 50
SN7417		SN7450 20p	SN7493 75p	SN74160 £1 · 60	SN74195 £1 · 85
SN7420	20p	SN7451 20p	SN7494 80p	SN74161 £1 · 60	SN74196 £1 · 50
SN7422	38p	SN4753 20p	SN7495 80p	SN74162 £1 · 60	SN74197 £1 · 50
SN7423	38p	SN7454 20p	SN7496 £1.00	SN74163£3-40	SN74198 £3-00
SN7425	38p	SN7460 20p	SN7497 £2.25	SN74164£2-75	SN74199 £2-69

L036 12V 600m A L037 15V 450m A		£1·60 ea.							
VEROBOARD									
	0.1	0.15							
2 x 3 2 2 x 5	32p 35p	23p							
31 x 31	35p	35p 35p							
3∄ x 5	40p	41p							
17 x 2 1	£1 05	79p							
17 x 3₹	£1 · 43	£1·12							
17 x 5	£1 · 84								
PIN INS. TOOL	72p	72p							
SP.F. CUTTER	52p	52p							
100 PINS SS	30p	30p							
100 PINS DS	30 p	30p							
500 PINS SS	£1 · 20	£1·20							
500 PINS DS	£1 · 20	£1 · 20							
ALSO STOCKE		Mulland							
Sprague, Lorlin,	etc. Polye	ster, Poly-							

Sprague, Lorlin, etc. Polyester, Polystyrene, Silver Mica Capacitors, etc. Resistors ‡W-10Watt. Potentiometers; carbon, wirewound, Preset, Rectilinear multiturn, Antex, Soldering Irons, switches, rotary, silde, toggle, etc. Cable, veroboard.

POTENTIOMETERS								
Linear or Log	Single	Double						
Rotary Pots	15p	42p						
Rotary Switched	25 n	-						

SPECIAL OFFERS \star * \star

MULTICORE CABLE. 25-way, Individually screened, 14/0076. £1-00 per yard+V.A.T. Postage by weight.

IMHOFF 19" RACKING CABINETS. 13\pmu high, 22" wide, 13" deep. Brand new. £10.00 each + V.A.T. Carriage £1.00.

SIEMENS CONTACTORS, Over 1,000 in stock. All types. Phone or write for details.

METAL OXIDE RESISTORS TR4/5/6 in stock. All values. 1-off price 3p each. Discount on quantity.

19 TURN TRIMPOTS by Bourns, Mec, Painton, etc. All values in stock. 50p each, Discount on quantity.

9-WAY FULLY STABILISED BATTERY CHARGERS, 24" L, 71" H, 7" D. Price £14:00 each. Carriage £1:00+V.A.T.

DEAC RECHARGEABLE BATTERY CASSETTES. 13-4V (nom.). Type B/SA 8035/1/108. Heavy duty encapsulated DEAC supply. Size 3½" x 2½" x 1½". Price £5-00+V.A.T.

8-WAY BATTERY CHARGER. Type CC 999. Charges up to 8 of the above battery cassettes. Price £14-00+VA.T.

12-WAY BATTERY CHARGER. Type CC 999. Charges up to 12 of 13·4V DEAC batteries. Metered battery condition check. Price £25·00+VA.T.

★★SPECIAL OFFERS★★

MINIATURE MAINS TRANSFORMER. PRI 240V. SEC, 12V, 100MA Manuf.: Hinchley Size: 36 x 45 x 40mm. F.C. 53mm. rice 1-65p. 100-60p ea. 1,000-50p ea. 10,000-

3 CORE PVC INSULATED MAINS CABLE. GREY ML6650, 3x7/0·2mm. Price 100m-£4·50. 1000m-£35. 10,000m-£330.

0·47 mfd.50V MYLAR FILM CAPACITOR. Size 1" x 0·35" x 0·65" P.C. Mount. Price 100-4p ea. 1000-3p ea.

240V. A.C. SOLENOID. Reversible operation; twin coll. Size approx. 2\frac{1}{4} \times 1\frac{1}{4} \times 1\frac{1}{4} \times 1.

30 unmarked OC71 transistors 25 Unmarked 250mW Zener diodes, 4·7V, 5·1V, 6·2V, 7·5V, 9·1V, 10V, Measured and tested £1·00 Please state voltage regulred.

50 GE Diode OA47 equivalent.

TRANSFORMER: DOUGLAS PRI, 0, 115, 200, 220, 240 SEC. 25-0-25-0-6V, 2±A, £4 50 + 50p p.p. TRANSFORMER
PRI. 0, 115, 160, 205, 225, 245. SEC. 35-0-35, 1·2A £4·50 + 50p p.p.

MULLARD TUBULAR CERAMIC UHF TRIMMERS (PROFESSIONAL)

Type 092 0·8-2·2p 801 0·8-2·2p 991 0·5-1·3p Price 10p ea.

QUANTITY DISCOUNTS PLEASE TELE-PHONE 1000pF Feedthrough capacitor 5p ea. Miniature tubular P.C. trimmers 3:5-13pF 6-30pF 10p ea.

4p c/o Varley 700 Ω relay

METAL BOXES

	WITH		AL FOR P.K. SC	
AB7	2}″ Lo 4″	ng 5½" W	ide 1‡" Hi	gh 55p
AB8	4"	4"	14"	55p
AB9	4"	22"	1∳″	55p
AB10	4"	51"	1∯″ 2‴	55p
AB11	4"	2 ½" 2"	2"	65p
A B12	3"	2"	1"	50 p
AB13	6"	4"	2"	77p
AB14	7"	5″	3,"	90p
AB15	8"	6"	3"	£1 16
A B16	10"	7"	3"	£1 · 32
AB17	10"	44"	3"	£1·10
AB18	12"	5″	3"	£1 · 32
AB19	12"	8"	3"	£1 · 80
ALUMIN	IIUM B	OXES W	ITH SL	OPING

ALUMINIUM BOXES WITH SLOPING TOP PANEL—IDEAL FOR PRE-AMPS, ETC., USING SLIDER CONTROLS AB20 8" Long 9" Wide 3\footnote{1}" High at back \(\extit{22} \cdot \) 2" High at front \(\extit{6}'' \) Slope to front With P.K. Screws

AB21 As above but 10" long AB22 As above but 12" long £2:60

ELECTRONIC COMPONENTS

BARGAIN COMPONENT PACKS ALL COMPONENTS NEW & UNUSED £1 plus 25p p.p. per pack, £5 for 5 packs p/frce

Pack No.
1 500 Carbon resistors, \$, \$, 1, 2 watt.

100 Electrolytic Condensers.

250 Ceramic, Polystyrene, Silver Mica, etc., Condensers.
 4 250 Polyester. Polycarbonate, Paper, etc.,

Condensers.

5 25 Potentiometers, assorted.

6 250 High-stab. 1%, 2%, 5% resistors. 7 50 Assorted Tagstrips.

8 1lb. Assorted nuts, bolts, washers, spacers, etc. 9 25 Assorted switches, rotary, lever, micro,

toggled, etc. 10 50 Preset Potentiometers

11 Trial mixed component pack £1. 12 Jumbo mixed pack £5.

We are open from 9.30 a.m.—6.00 p.m. Monday-Saturday.

We have the largest retail selection of components available. Phone or write if you are in difficulties obtaining a particular component.

C.O.D. service welcome. All mail order by return. Official orders welcome to Government establishments, Education Authorities, etc. 01-994-6275

YOU DESERVE

"I earn more thanks to ICS"

Thousands of people have said it. Now it's your turn. ICS point the way to the better future you know you deserve.

Personal Tuition

Whether you need a basic grounding or tuition to complete your technical qualifications, ICS offer expert guidance from fully qualified tutors. You take the road to a better life at your own pace, in your own home, with the backing of the world's most experienced home study school.

Guaranteed success

ICS offer all examination students guaranteed tuition until successful. Plus expert advice on exam techniques. Make sure of your future with ICS. Choose the right course now.

City and Guilds Certificate

Make sure you get your Certificate with ICS: Telecommunications Technicians Radio TV and Electronics Technicians Electrical Installations Technicians Electrical Installation Work Radio Amateurs Also MPT Radio Communications Certificate

Technical Training

ICS offer a wide choice of non-exam courses designed to equip you for a better job in your particular branch of electronics, including:

Electronic Engineering & Maintenance Computer Engineering & Programming Radio TV & Audio Engineering & Servicing Electrical Engineering, Installations & Contracting Self Build Practical Radio Kits

Colour TV Servicing
Technicians trained in TV servicing are in constant demand. Learn all the techniques you need to service Colour and Mono TV sets through new home study course approved by leading manufacturer.

QUALIFY FOR A NEW CAREER

Home study courses also available for leading professional examinations and diploma courses for

over 200 business and technical subjects including: Accountancy Engineering Motor Personnel Administration Farming Advertising Heating Purchasing Air Conditioning Management Sales Marketing Building Storekeeping Catering Mechanical Work Study

G.C.E. 60 subjects at 'O' and 'A' levels.

POST OR PHONE TODAY FOR FREE BOOKLET

ø		
	I am interested in	
ii.	Name	
	Address	
	To: International Correspondence Schools, Dept. 530, Intertext House, LONDON SW8 4UJ or telephone: 01-622 9911 (all hours) Accredited by CACC.	

A. Marshall & Son (London) Limited Dept. PW 42 Cricklewood Broadway London NW? 3HD Tel: 01-452 0161 & 85 West Regent Street Glasgow G22 QD Tel:041-332 4133

Everything you need is in our new 1975 catalogue. Available now price 25p

Trade and export enquiries welcome

PW TELE TENNIS

As featured in PRACTICAL WIRELESS July - November 1974. Also on BBC Nationwide and in the Daily Mail October 2nd 1974.

This exciting new game is now available in kit form. Due to popular demand we are now able to offer a fantastic saving on list prices. Ideal game for whole family. No need to modify your TV set, just plugs in to aerial socket. Parts list as follows:

		-00	100			£1:00 p.p. 20p
	Potentiometer Pack		 	 		£I 25 p.p. 20p
	Capacitor Pack					£3 · 10 p.p. 20p
D	Semiconductor Pack					£14.50 p.p. 20p
E	IC Sockets					£4 00 p.p. 20p
F	Transformer					£1 15 p.p. 25p
G	PCB's		 			£7 50 p.p. 20p
H	Switches		 	 		£4.50 p.p. 20p
li'	UHF Modulator Kit		 ***	 	W	£7 20 p.p. 20p

Special Prices-complete kit (excluding case) £42:00 p.p. 50p Sections A-Fincl-

£23 - 50 plo	us 30p.	Assembly in	structions	with comp	olete kit o	of 75p on re	quest.
SN7400	16p	SN7420	20p	SN7453	I fp	SN7491	£1 · 10
SN7401	16p	SN7423	37p	SN7454	I6p	SN7492	75p
SN7401AN	1 38p	5N7425	37p	\$N7460	I6p	SN7493	65p
SN7402	16p	SN7427	45p	SN7470	30p	SN7494	85 p
\$N7403	I6p	SN7430	I6p	SN7472	38p	SN7495	80p
SN7404	24p	SN7432	45p	SN7473	44p	SN7496	£1 · 00
\$N7405	24p	SN7437	35p	SN7474	48p	SN74100	£2·16
SN7406	45p	SN7438	35p	SN7475	59p	SN74107	43p
SN7407	45p	SN7440	I 6p	SN7476	45p	SN74118	£1 00
SN7408	25p	SN7441	85p	SN7480	75p	SN74119	£1 · 92
\$N7409	33p	SN7442	85p	\$N7481	£1 · 25	SN74121	57p
SN7410	16p	SN7445	£1 · 59	\$N7482	87p	SN74122	80 _P
SN7411	25p	SN7446	£2.00	SN7483	£1 20	SN74123	71 _P
SN7412	28p	SN7447	£1 · 30	\$N7484	95p	SN74141	£1 00
SN7413	50p	SN7448	£1 · 50	SN7485	£1 58	SN74150	£1 44
SN7416	45p	SN7450	16p	SN7486	45p	SN74190	£1-95
SN7417	30 m	SN7451	I6n	SN7490	65n I		

TRY OUR NEW GLASGOW SHOP

Prices correct at March 1975, but all exclusive of V.A.T. Post and Package 20p postage and package charges

	Popular	Semi-condu	ctors			
1	2N696	22p 2N3707 16p 2N3708	13p AD142 70p AD143	59p BC309 45p BC327	10p LM709	48p
ı	2N697 2N698	40p 2N 37 15	£1.50 ADI61	50 p BC328	21p TO99 19p 8DIL	38p
8	2N699	45p 2N3716	£1-80 AD162	50p BCY70	17p 14DIL	40p
B	2N 302	19p 2N3771	£2.20 AD161	pr BCY71	22p LM723C	90p
8	2N1303 2N1304	19p 2N3772 24p 2N3773	£1-80 AD162 5 £3-20 AF109R	40p BD 123	13p LM741 82p TO99	40p
W	2N1304 2N1305	24p 2N3819	37p AFI15	24p DBI31	82p TO99 40p 8DIL	40p
u	2N I 306	31p 2N3820	38p AFI24	30 p BD 132	50p I4DIL	38p
H	2N1307	22p 2N3823	£1 42 AF125	30p BD135	42p LM747	£1 00
П	2N 1308	25p 2N3904 36p 2N3905	27p AFI26 24p AFI27	28p BD136 28p BD137	49p LM7805 55p MC1310	£2 00
۱	2N1309 2N1671	£1 44 2N4036	63p AF139	39p BD138	63p MJ480	90p
u		£1 · 54 2N4037	42p AF178	55p BD139	71 p M 481	£1:14
П	2N1671B	£1 72 2N4216	20p AF179	65p BD140	87p M 490	98p
ı		£4:32 2N4289 50p 2N4921	34p AF180 73p AF239	58p BF115	25p M 491	£1:38
u	2N2102 2N2147	78p 2N4922	84p AF240	51p BF116 72p BF117	23p MJE340 43p MJE29S5	45p £1 · 12
a	2N2148	94p 2N4923	83p AF279	54p BF154	16p MJE3055	68p
8	2N2160	60p 2N5190	92p AF280	54p BF163	32p MFC4000	B 40p
n	2N2218A	22p 2N5191	95p BC107	16p BF180	35p MFC4010	
H	2N2219 2N2219A	24p 2N5192 26p 2N5195	£1 - 24 BC 108	15p BF181	34p MFC4060	
æ	2N2221	18p 2N5245	43p BC147	19p BF184 12p BF194	30p MFC6040 12p NE555V	91p
ø	2N2221A	21 p 2N5457	49p BC148	13p BF195	12p NE560D	€4 - 48
ø	2N2222	20p 2N5458	45p BC149	12p BF196	13p NE\$31	£4-48
	2N2222A	25p 2N54\$9	49p BC167B	13p BF197	15p NE565A	£4:48
r	2N2646 2N2904	55p 40361 22p 40362	48p BC168B 50p BC168C	13p BF198 11p BF200	18p OC28 40p OC42	76p
B	2N2904A	24p 40363	88p BC169B	13p BF237	22p OC71	50p 20p
Ħ	2N290\$	24p 40406	44p BC169C	13p BF238	22p OC72	25p
H	2N290SA	26p 40407	33p BC182	12p BFX29	30p SL414A	£1.80
u	2N2906 2N2906A	19p 40408 21p 40409	50p BC182L 52p BC183	I2p BFX30	27p TAA263	£1.00
B	2N2907	22p 40410	52 p BC 183L	12p BFX84 12p BFX8S	24p TBA800 30p TBA810	£1:50
H	2N2907A	24p 40411	£2.00 BC184	13p BFX87	28p TIP29A	49p
H	2N2926	IIp 40602	46p BC184L	13p BFX88	25p TIP30A	58p
п	2N30\$3 2N3054	25p 40604	56p BC212K	16p BFX89	45p TIP31A	62p
u	2N 3054 2N 3055	60p 40669 75p AC117	20p BC212L	16p BFY19 21p BFYS1	62p TIP328 23p TIP33A	74p
и	2N3441	97p AC126	20p BC237	13p BFY52	21p TIP34A	£1 ·51
ı	2N3442	£1-69 AC127	20p BC238	13p BFY90	75p TIP3SA	€2.90
a	2N3415	10p AC128	20p BC239	I3p BRY39	48p TIP36A	£3.70
ø	2N3416 2N3417	15p ACI51V 21p ACI52V	25p BC2\$7 17p BC258	14p C106D	65p TIP41A	79 p
ij	2N3702	IID ACISSK	25p BC259	13p CA3020A 14p CA3046	70p T!P42A	90p 98p
ı	2N3703	12p AC176	18p BC300	36p CA3048	£2-11 TIP3055	уор 60р
	2N3704	14p AC176K	25p BC301	34p CA3089E	£1:96 ZTX300	13p
ı	2N3705	12p ACI87K	23p BC307	IIp CA30900	£4-23 ZTX302	20p
ı.	2N3706	9p1AC188K	34p BC308	I2p/LM301A	46p ZTX500	15p

Money saving high performance audio equipment DIRECT FROM OUR OWN FACTORIES

GUARANTEED TESTED HIGH PERFORMANCE MODULES—now better value than ever

SA35 £5.45 35W RMS 25-50V 7 transistors, 7 diodes

£6.90 Carriage free **SA50** 50W RMS 25-65V 7 transistors, 7 diodes

SA100 £12.50 Carriage free

100W RMS 45-70V 10 transistors, 7 diodes

Carriage | 25Hz-25kHz ★ 0·2% distortion ★ Noise—80dB

500mV into 20K 4-16 ohms Simple wiring

Short and open circuit proof
Continuously rated ★ Top-grade components



THE SAIM MODULE

POWER SUPPLIES

UNSTABILISED-READY WIRED PU45 Suits 2 SA35 or I SA50 (4 ohm) Carriage 30p £5.45 Suits 2 SA50 (8 ohm) or 2 SA100 Carriage 40p PU70 £8.45 STABILISED Suits 2 SA35 or 2 SA50 (4 ohm) Carriage **PS45** £4.45 Carriage 30p **MT45** Transformer for £3.50 Suits 2 SA100 **PS70** Carriage £5.45

N.B. PS70 is not suitable for the SA50

Transformer for

free

Carriage 40p

£4.90

Mk II STEREO DISCO MIXER £22.50

Carr. 30p This well tried unit mixes two decks, handles any Ihis well tried unit mixes two decks, handles any ceramic carridge, and features mic over-ride plus separate full range bass and treble controls on both mic and deck inputs. Ample headphone power is available for P.F.L. May be used for mono and is mains operated. Fitted with sturdy screening case Controls: Mic vol. base, treble, Left/Right fade, deck volume, bass, treble, h/phone select. vol. Mains, Size 17jin × 3in × 4in deep.



AXON disco-s

MT70

DISCO MODULE £9.50 Carr. 20p
Thousands sold of this extremely popular mono version. A mic input may be fitted using the VA30 (see below). Low consumption from a 9V battery. Features the same high standards of reproduction as the Stereo version. Controls: H/phone select, vol, Left deck vol, Right deck vol, bass, treble, master vol. Size 12½ in x 3in x 2in deep.



Only SAXON can supply such incredible value for money. This unit features 3kW power handling, full-wave control, bass, middle, treble AND master controls. Twin loudspeaker jacks for "through" connections. It may be used free standing or will panel mount next to either of the above. Also features unique CUT-BACK circuitry for extra wide range response. Size 12in x 3in x 2\$in deep, Professional standards at a price you can afford!

VERSION 47-50
Carr. free

Recently reduced in price due to increasing sales, handles lkW. Full wave operation.

ADD 8% VAT TO ALL ÖRDERS

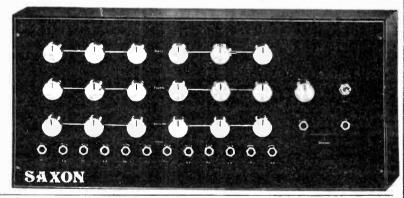


MULTI-PURPOSE MIXERS

M4HL M6HL

M4HL 419-50 Carr. 50p Featuring multiples of our VA30 module, the M4HL and M6HL fuffil the requirements of all clubs, groups, etc. where a high quality mixer is required. Each channel has one high and one low impedance input, plus volume, treble and bass controls. Input impedances may, if required, be easily changed. The M4HL has four channels, and one output, and the M6HL six channels (12 inputs) and a master control and two outputs. Either unit may be used free-standing or panel mounted. These mixers will feed all types of amplifier. Recommended for their versatility and high performance, and excellent value for money. versatility and value for money.

VA30 CHANNEL £3.50 Carr. free
This is the basic channel module in the above mixers and may also be used for extra imputs on either the mono or stereo mixers. Fitted with volume, bass and treble controls, requires just a jack and supply (9-100V) (9-100V)



SAXON CSE 100 COMPLETE AMPLIFIER

£39.90

Carr. free

100W of speech and music—Two music—Two separately controlled inputs. Wide range bass and treble. controls. Sturdy and attractive vynide case. Twin outputs. Ideal for groups, discos, etc. Fully discos, etc. tested and guaranteed. 50W version identical in appearance.

CSE50 £29.50 Carr. free **NEW!!**

SAXON MULTIMIX 100 £57-00 carr. free

100W rms four inputs slider controls plus master slider. Wide range bass and treble controls. Fantastic value, ideal for complete disco's, groups, clubs etc. SAXON MULTIMIX 50—Exactly as above but 50W rms. £45:00

CALLERS AND MAIL ORDER

SAXON ENTERTAINMENTS LIMITED 327-333 WHITEHORSE ROAD . CROYDON CRO 2HS

(Please quote magazine when ordering)
SHOP HOURS: 9 a.m.-5 p.m. — LUNCH 12.30-1.30 p.m. MAIL ORDER DESK: 10 a.m.-3 p.m.
24-HOUR ANSWER SERVICE. TEL. 01-684 6385. TECHNICAL ENQUIRIES: 01-684 0098.

SEND 10p FOR OUR 26 PAGE MANUAL—full circuits & details, TERMS OF BUSINESS: C.W.O. C.O.D. or ACCESS (just send in card number). Send 50p for C.O.D. Please send S.A.E. with all enquiries. VAT @ 8% must be added to all orders including carr, charges.

120 watt module complete with builtin supply-extra heavy duty £22.50 Carr.



WILMSLOW AUDIO

THE Firm for speakers!

SPEAKERS		Goodmans SD S or 15 ohm	£ E . 00
JI EAKEKS		Coodmans 10D 9 15 -b	CF 30
Baker Group 25 3, 8 or 15 ohm	£7·75	Goodmans for a or 15 onm	2,3 30
Baker Group 35.3, 8 or 15 ohm	ER-50	Goodmans 12P 8 or 15 onm	£12 95
Baker Group 50/12 8 or 15 ohm	612.50	Goodmans 12P-D 8 or 15 ohm	£16 75
Baker Deluve 10// d/	C40 75	Goodmans 12P-G 8 or 15 ohm	£15·75
Daker Deluke 12 d/cone	2,10.75	Goodmans Audlomay 12 AX 100 watt	€37-50
Baker Major	£8:50	Goodmana Audiomay 15AY	640.25
Baker Regent	£7·75	Goodman 15D 0 15 -b	2,40 23
Baker Superb	£14:50	Goodinalis 15P 8 of 15 onm	2,21 .00
Baker Auditorium 12	612-50	Goodmans 18P 8 or 15 ohm	£,346 · 00
Celestian MH1000 horn	£40.95	Goodmans Midax 750	£16.00
Calcotton BCT9 for Unit-	2,10 55	Goodmans Axent 100 tweeter	£7·25
Calestion P3 18 for Unitex	£2.33	Goodmans Audlom 100 12"	€12.00
Celestion G12M 8 or 15 onm	£12·00	Goodmans Avlom 401 19"	647.25
Celestion G12H 8 or 15 ohm	£15·00	Goodmans Turbariam 9	E,17 23
Celestion G15C 8 or 15 ohm	£24 · 00	Goodinans Twinaxiom 6	20.73
Celestion G18C 8 or 15 ohm	£33.00	Goodmans I winaxiom 10	£8.00
Coral 61"d/cone roll sure 8 ohm	62.50	Ket T27	£5·25
Corel 9"disons roll aut. 9 ohm	C2 00	Kef T15	£6.00
EM142 9.2. 0 45	23.25	Kef B110	€7-25
EMI 13 X 6 3, 8 OF 13 ONM	£.2 25	Kef B200	£R - 25
EMI 13 x 8 150 d/c 3, 8 or 15 ohm	£2·50	Kof B130	644.05
EMI 13 x 8 450 t/tw 8 ohm	£3 · 75	K-(DNO	E14.73
EMI 13 x 8 type 350 8 or 15 ohm	£8 ⋅ 25	Vel DM8	£2.00
FMI 13 x 8 20 watt base	66.60	Ket DN12	£4·95
EMI 61" 03850 4 or 8 ohm	63.00	Kef DN13	£3 30
EMI E" 00130CD C above	E3.00	STC4001G super tweeter	€6-19
EMI 3 90132CF 6 UIIII	2,2150	Richard Allan CGST 8"d/c r/eurr	56.35
EMI 6 X 5 d/cone, roll surr 10 watt	£2:50	21" 64 ohm 70mm 80 ohm 70mm 8 o	hm .88
EMI 24" tweeter 9/492A I	- 65	21" 75 ohm	
Eagle DT33 30 watt tweeter	£5 · 45	27 /3 UIIII	. 50
Eagle HT15 horn tweeter	£3-80	7" x 4" 3 or 8 onm	£1 · 40
Fagle CT5 cone tweeter	64.75	Goodmans 8P 8 or 15 ohm Goodmans 12P 8 or 15 ohm Goodmans 12P 8 or 15 ohm Goodmans 12P 8 or 15 ohm Goodmans 12P 8 or 15 ohm Goodmans 12P 8 or 15 ohm Goodmans 12P 8 or 15 ohm Goodmans Audiomax 12AX 100 wett Goodmans Audiomax 15AX Goodmans 18P 8 or 15 ohm Goodmans 18P 8 or 15 ohm Goodmans 18P 8 or 15 ohm Goodmans Audiom 100 12" Goodmans Audiom 100 12" Goodmans Audiom 100 12" Goodmans Twinaxiom 8 Goodmans Twinaxiom 10 Kef 1715 Kef 115 Kef 110 Kef 18200 Kef 18139 Kef DN12 Kef DN12 Kef DN12 Kef DN12 Kef DN12 Kef DN12 Kef DN13 STC4001G super tweeter Richard Allan CG8T 8"dic r/surr. 2½" 64 ohm, 70mm 80 ohm, 70mm 8 o 2½" 75 ohm, 70mm 80 ohm, 70mm 8 o 2½" 75 ohm 8" x 5" 3 or 8 ohm 8" x 5" 3 or 8 ohm 8" x 5" 3 or 8 ohm 10" x 6" 3, 8 or 15 ohm	£1 · 50
Fagle CT10 tweeter 8 or 16 ohm	62.66	10" x 6" 3, 8 or 15 ohm	£2·30
Eagle MUT40 been Assessed	22.33	·	
Eagle MH I to norn tweeter	£3 · 80		
Eagle crossover CN23, CN28, CN216	£1:50	SPEAKER KITS	
Eagle FR4	£5·30	OI EARLER TOTAL	
Eagle FR65	£8-35	Baker Major Module	each £10 75
Eagle FR8	€10-65	Goodmans Mezzo	pal, £45 · 00
Flac 9 v 5 59RM109 15 ohm		Goodmans DIN 20	each £9 ⋅ 75
50PM114 8 ohm	62.00	Helme XLK 25	nair € 22 · 80
Fine 61" 6DM171 d/a cell acces	E.Z. 00	Helme XI K 30	pair £14.05
EIAC OF ORMITT DIC FOIL SUFF.	2,3 39	Holme VI K 60	hait #14.83
Elac bi bkm220 d/cone	£2 65	Heline VEV 20	bair #38.82
Elac 4" tweeter TW4	£1 · 21	Kenit i	each £20.95
Elac 10" d/cone 10RM239 8 ohm	£2·65	Kenit 3	each £36 · 75
Elac 8" 8CS175 3 ohm	£2 · 50	Richard Allan Twinkit	each £8⋅95
Fane Pon 15 watt 12"	€5-25	Richard Alian Triple 8	each £13 75
Enne Pop 25/2 25 wett 10"	67.25	SPEAKER KITS Baker Major Module Goodmans Mezzo Goodmans DIN 20 Helme XLK 25 Helme XLK 30 Helme XLK 50 Keffit 1 Keffit 3 Richard Allan Twinkit Richard Allan Triple 8 Richard Allan Triple Richard Allan Super Triple Richard Allan Super Triple Richard Allan Super Super Triple Richard Allan Super S	anch £10.05
Fana Pan 40 wett 10"	E,1 '23	Richard Allan Super Triple	each £22.75
Fane Doe 50 west 10"	2,6 . 50	Wharfedala Linton 2 kit	Pacif £23 73
rane Pop 50 Watt 12	£12.00	What date Clandal a 14	hail #18.72
Pane Pop 55 12" 60 watt	£12 · 50	Wilariedale Glendale 3 kit	pair £34 50
Fane Pop 60 watt 15"	£13 · 25	Wharfedale Dovedale 3 kit	pair £52 ⋅ 50
Fane Pop 100 watt 18"	£24 50		
Fane Crescendo 12A 100 watt 12"	€29 : 00		
Fane Crescando 12R hace	620.00	PA/DISCO AMPLIFIER	15
Fane Crescando 15" 100 wett	£36.00	(carr and inc £1)	
Fano Create and 40" 450	E-30.00	(carr. arru iris. £1)	
Falle Crescendo 18" 150 Watt	£51 95	Baker Major 100 watt	£49.75
rane sul I 8" d/c roll surr.	£7·00	Linear 30/40	670.00
tane 807T 8" d/c roll surr.	£3 65	Linear 40/60	£30 00
Fane 808T 8" d/c	£2.75	Linear 90/400	E 33.00
Fane 701 twin ribbon horn	€35 00	Linear bu/100	£58·95
Fane 910 horn	£12.75	(carr. and ins. £1) Baker Major 100 watt Linear 30/40 Linear 40/60 Linear 80/100 Linear 100 watt slave	£44.00
SPEAKERS Baker Group 25 3, 8 or 15 ohm Baker Group 35 3, 8 or 15 ohm Baker Group 35 3, 8 or 15 ohm Baker Group 35 3, 8 or 15 ohm Baker Group 35 3, 8 or 15 ohm Baker Group 50/12 8 or 15 ohm Baker Leluxe 12" d/cone Baker Major Baker Regent Baker Auditorium 12 Celestion MH1000 horn Celestion FST8 for Unilex Celestion FST8 for Unilex Celestion G12M 8 or 15 ohm Celestion G12M 8 or 15 ohm Celestion G12K 8 or 15 ohm Celestion G18C 8 or 15 ohm Coral 6"d/cone roll surr. 8 ohm Coral 6"d/cone roll surr. 8 ohm Coral 6"d/cone roll surr. 8 ohm EM 13 x 8 3, 8 or 15 ohm EM 13 x 8 3, 8 or 15 ohm EM 13 x 8 4, 8 or 15 ohm EM 13 x 8 4, 8 or 15 ohm EM 13 x 8 4, 8 or 15 ohm EM 13 x 8 4, 8 or 15 ohm EM 13 x 8 1, 8 or 15 ohm EM 13 x 8 1, 8 or 15 ohm EM 13 x 8 1, 9 or 15 ohm EM 13 x 8 1, 9 or 15 ohm EM 13 x 8 1, 9 or 15 ohm EM 13 x 8 1, 9 or 15 ohm EM 15" 93850 4 or 8 ohm EM 18 x 5 d/cone, roll surr 10 watt EM 12" tweeter 97492 AT Eagle DT33 30 watt tweeter Eagle CT5 cone tweeter Eagle CT5 cone tweeter Eagle GFT 10 tweeter 8 or 16 ohm Eagle MHT10 horn tweeter Eagle FR65 Eagl	£32.00	Eagle DA renge to steel and for	
I wire end HUIII	E33.00	Eagle PA range In stock—ask fo	r catalogue.

Free with speaker orders over £7—

"Hi-Fi Loudspeaker Enclosures" book. All units guaranteed new and perfect. Prompt despatch. Carriage and packing: speakers 38p each, speaker kits 75p each (£1.50 pair) tweeters and crossovers 20p.

ALL PRICES QUOTED INCLUDE VAT. WILMSLOW AUDIO (Dept. PW)

Loudspeakers: Swan Works, Bank Square, Wilmslow, Cheshire. SK9 1HF Discount Radio, PA, Hi-Fi: 10 Swan St. Wilmslow Send stamp for free booklet "Choosing a Speaker"

64	Cassett	es	Th bes	st	
	Agfa Low Noise Cassettes AT LESS THAN HALF PRICE!	C60 C90 C120	1 37p 50p 63p	5 £1·80 £2·48 £3·10	10 £3·50 £4·95 £6·20
	AGFA HIGHDYNAMIC SUPER	C60+6 C90+6 C120	50p 88p 99p	£2·40 £3·35 £4·90	10 £4.70 £6.60 £8.80
	AGFA STEREO-CHROM CHROMIUM DIOXIDE	C60 C90	1 85p £1-08	5 £4·20 £5·35	10 £8-30 £10-60
	WILMS 10 SWA	LO	W /	AUI	

Wire Wound Resistors. Our selection of mixed values. 30 for £1.50. 100 for £4.00.

Aucio Amplifier Module, Mullard LP1: 33, output power, nominal 10 watt, supply voltage +24 volt, with data and circuit, £2:50.

Ferguson Stereogram chassis Model 3357, all transistor, medium long, VHF/FM. 3 watts per channel S/M. with connection data, less tuning scale, £20. Post paid.

connection data, less tuning scale, £20. Post pand.

Crystals HC6U: 52:03333 MHz: 52:0250C: 52:01667: 51:56667: 51:58330: 37:7525C: 37:7500C: 12:895:8: 12:891-6: 12:750. C: 9:458: 33: 9:456: 25: 9:455: 55: 9:533: 33: 9:531-64: 9:530: 55: 9:090: 62: 9:081: 5:50p each.

Electrolytics. 32/32/32/µF, 325v. 2"× 1½" 35p: 80µF 150vt 1½" x 1" 20p; 2000µF 30v, 2½" 1" 25p: 2000µF 35v 32" 1" 25p: 2000µF 35v 2"× 1½" 35p: 80µF 100v 3"×1½" 25p: 2000 ½00µF 25v 2"×1½" 35p: 30,000µF 25v 4½" 1" 20p: 40/40/ 20µF 275v 3">1" 20p: 4500; 900)900µF 35v 3"× 1½" 30p: 416µF 275v 1½" 3½" 35p: 30,000µF 30v 2½" × 1½" 35p: 30,000µF 30v 2½" × 1½" 35p: 30,000µF 30v 2½" × 1½" 50p: 4500; 900)900µF 30v 2½" × 1½" 50p: 4000µF 18v 2"× 1" 20p: 470µF 25v 1½" ½" 15p. Matched pair of bookshelf speakers. Teak finish, size 12"× 8"× 5". 8× 5 8" ohma ceramic, 5 watts RMS. Complete with cin leads. £11 00 pair.

Thorn TV IF chassis, 950 series (less valves), £1 75.

UHF625 transistor push button tuner (NSF Telefunken) as used on Decca MS24C0. Brand new and boxed, £3:25. Light Dependent Resistors (RCA sq3536) 30p each, 4 for £1 00.

P-C Bcards (not computer panels) 1 off 6 transistor single wave band. 1 off 4 transistor audio. 1 off 3 transistor

1 off 6 transistor single wave band. 1 off 4 transistor audio. 1 off 3 transistor

1 off 4 transistor audio. 1 off 3 transistor £1·60, three boards.

Rank EVR Teleplayer colour translator panels, type and components on new panels listed as follows, £2·50, each panel. Z305—14 off BC148: 2 RCA ca3054 (ic): 1 crystal 4·433618 MHz—Z607—12 off BC148: 1 BC108: 1 BC158: 1 RCA ca3046 (ic), 1 RCA ca3045 (ic): Z608—23 off BC148: 2 BC158—Z612—12 off ME4103: 2 BC251B: 1 BF150.

Mains Droppers. 10 mixed values

Mains Droppers, 10 mixed values. £1 .00.

Edgewise Level meters, 200μA,

Eugewise Lever meters, 200µA, s.ze \(\frac{1}{2} \) overall. \(\frac{50}{2} \). Chrome Plastic knobs, 3 types, 4 off each with spring clip, \(\frac{1}{2} \). \(\frac{1}{2} \). All minium Chassis, \(7\frac{1}{2} \) \(\frac{1}{2} \). \(\frac{1}{2} \) \(\frac{1}{2} \). \(\frac{1}{2} \) \(\frac{1}{2} \). \(\frac{1}{2} \) \(\frac{1}{2} \).

BSR P128, similar to HT70 single play, with heavy die cast turntable, less cartr dge, £11.00.

Transistorised FM tuner head, with A.M. gang slow motion drive 88-108 Mos, with circuit diagram, £2:30. 88-'(8:Mos, with circuit diagram, £2:30. Ferguson Stereogram Chassis. MW/LWY#HF with tuning scale (5+5 watts sine wave) 15 ohms £28:50. Post paid 15 ASSORTED SWITCHES £2.00. 50-3 way to 7 way TAG STRIPS, £1.25. ALMA REED RELAY TYPE DRH. 3 VOLTS. 55p.
REPANCO & DENCO COILS. NEW/BOXED OUR SELECTION-5 FOR £1.25.

Goods rot despatched outside UK 15p Handling charge on orders under £1:00.
Pease add 10% for post and packing on all items except gram chassis. All items include

216 LEAGRAVE ROAD, LUTON, LUI IJD, BEDS

CHESHIRE, SK9 1HF Cut-price prerecorded cassettes—send stamp for list

MAPLIN

132 Big Pages Includes dozens of

useful & interesting circuits you can build; data; hundreds of pictures, transistor equivalents list and hundreds of new lines. Packed with information. Only 35p.

-SERVICE - MEANS QUALITY COMPONENTS -

CARBON FILM

 $\frac{1}{3}$ W 1 Ω to 1M: 5%, IM2 to 10M: 10% E12 $\frac{1}{3}$ W 1 Ω to 10 Ω : 5%, IM2 to 10M: 10% E12 11 Ω to 910k: 5% E12 & E24 1p each METAL OXIDE

iW 10 Ω to 1M: 2% E12 & E24 4p each

3W 0.22Ω, 0.27Ω, 0.33Ω, 0.47Ω: 10%, 1Ω5% 1.2Ω to 270Ω: 5% E12 17p each 12Ω to 270Ω: 5% E12 10, 12, 15, 18, 22, 27, 33, 39, 47, 56, 68, 82 and decades. WIREWOUND

E24: 11, 13, 16, 20, 24, 30, 36, 43, 51, 62, 75, 91 and decades.

POTENTIOMETERS

Rotary miniature carbon track ½" spindle. Values available: 5k, 10k, 25k, 50k, 100k, 250k, 500k. IM, 2M. Log. Single-gang 18p Lin, Single-gang (+ 1K) 16p Log. or Lin. Single-gang with switch 33p

or Lin. Dual-gang Log. or Lin

without switch spile of the cased: overall length 86:15mm (knob extra 7p) Values available: 1k; 5k; 10k; 25k; 50k; 10k; 250k; 500k; 11M; 2M. Lin. Single Gang application of Log Single Gang 45p

CAPACITORS

Sub-miniature Axial lead electrolytic Axial lead of Mid V Price Mid V Price Pric etrolytic

MId V Price
68 6-3 6p
68 16 6p
68 83 14p
100 10 6p
100 25 6p
100 40 6p
100 63 16p
150 6-3 6p
150 16 6p 1 6p 6p 6p 6p 6p 6p 6p 6p 6p 6p 6p 6p 6p Mfd V Price 470 6:3 8p 470 10 14p 470 25 16p 470 40 25p 680 6:314p 680 16 18p 6.8 10 10 15 15 680 16 16 150 16 150 25 150 40 150 63 220 4 220 10 220 16 220 25 33 40 220 63 330 4 330 16 330 63 25 25p 40 28p 4 14p 10 16p 16 25p 6р 14р 680 18p 6p 6p 8p 14p 22 22 33 33 47 47 47 7000 1000 1000 1000 1000 10 16p 16 25p 25 28p 6-3 16p 8p 25p 1500 10 25p 1500 16 28p 6p 6p 14p 2200 6·3 25p 2200 10 25p 6р 6р 6р 25

330 63 MAINS CONNECTORS

63

P360 3-pin 1-5A Chaseis Plug with Line Socket

28n P437 3-pin 5A Chassis Socket with Line Plug 66p

SA2190 3-pin 5A Chassis Plug SA1862 Line Socket for

280

TRANSISTORS & DIODES

18p BY126

13p

AC127

	AC128	18p	BY127	13p
1	AC176	17p	BY164	49p
1	AD161	162 MP	BZY88	
1		93p		13p
Į	BA100	9p	MPF102	36p
ł	BA145	22p	OA91	6р
1	BC107	10p	OA200	7p
ı	BA108	10p	OC71	20p
1	BC109	13p	5C146D	88p
ı	BC109C		T1843	28p
1	BC142	23p	W:005	30p
ı	BC143	26p	W04	33p
J	BC147	10p	1N914	4p
Ĭ	BC148	10p	JN 4001	6p
ı	BC149	12p	IN 4002	6 ½ p
ſ	BC168C		IN4003	7p
ı	BC169C	12p	1N4004	73p
ı	BC178	17p	1N4005	Šp.
1	BC182L	10p	1N4006	8 ł p
ı	BC183L	12p	1N4007	9p
ı	BC184L		LN 1148	4p
ı	BC212L	14p	2N1302	20p
ı	BC213L	15p	2N1303	20p
ı	BC214L	18p	2N1304	30p
ı	BCY71	22p	2N1711	24p
ŀ	BD131	45p	2N2219	25p
1	BD132	54p	2N2646	45p
ı	BD131/1	BD132	2N2905	33p
ı	MP	£1.20	2N29260	10p
ı	BD135	36p	Ye	12p
ı	BD139	49p	Gn	13p
ı	BD140	69p	2N3053	18p
ı	BF258	35p	2N3055	49p
ı	BF259	25p	2N3819	22p
ı	BFX29	30p	2N5459	51p
١.	BFX30	83p	7400	16p
	BFX84	30p	7413	39p
ļ	BFX85	36p	7447	£1-10
ì	BFX87	30p	7473	54p
	BFX88	25p	7474	45p
	BFY50	20p	7490	93p
	BFY51	22p	7493	93p
	BFY52	20p	74121	39p
		RED		
	2med 1"	only		15p
	Panel m		_	5p
	(Other	colours	and	7-вед.
	displays	m our	catalogue))

INTEGRATED **CIRCUITS** CA3046 (14-pin DIL)

LH0042CH (TO99)	£4.25
MC1310P (14-pin DIL)	£2.50
MC1496 (UA796) (14-pin	DIL)
	95p
MFC4000B	59p
MFC6040	83p
NE555V (8-pin DIL)	65p
SC1495 (14-pin D1L)	£2.70
SG3402 (14-pin DIL)	£1.69
μA741C (8-pin D1L)	36p
μA741C (14-pin DIL)	45p
μA747C (14-pin DIL)	£1.05
μA748C (8-pin DIL)	39p
ZN414 (TO18)	£1.90
ZN414 (TO18)	

VOLTAGE REGULATORS μΑ7805 5V 1·5Α (TO3) £1·75 μΑ7815 15V 1·5Α (TO3) £1·75 MVR 5V, 12V, 15V, 500mA

μA78MO5 5V 500mA μΑ78MO5 5V 500mA
(Plastic power) £1-30
μΑ78M15 18V 506mA
(Plastic power)
μΑ78L05 5V 100mA (T092) 80p
μΑ78L15 15V 100mA (T092) 80p
μΑ732G Variable 2 10 37V
(T099 or 14-pin D1L) 75p

Our catalogue co Our catalogue contains applica-tion circuits and data for all the above I.C.'s and many more

DISCOUNTS

Details in our catalogue, Start collecting MES Discount Vouchers NOW!

SWITCHES

Rotary adjustable stop. 1 pole, 2 to 12 way; 2 pole, 2 to 6 way; 3 pole, 2 to 4 way; 4 pole, 2 or 3 way 36p each Slide Sub-min DPDT 9p Slide Min. DPDT 13p Push to make Non-locking SPST 14n Push-on, Push-off Locking DPST 250V 4A 48p Rocker White DPST 250V 10A 10A 40p Rotary Mains DPST 250V 2A 20p Toggle with ON/OFF plate DPDT 250V 1.5A 25p

BCD OUTPUT

BCD OUTPUT
SLIDE SWITCH
Marks the end of the oldfashioned thumb-wheel switch
With 7-segment type readout. Full details in our catalogue. £1.38

PLUGS & SOCKETS

ì	DIN	PLUG	CHASS	
	2-pin 3-pin 4-pin	8p 9p 10p	80CKI 6p 7p 7p	et •
	5-pin A (180°)	10p	7p	
	5-pin B (240°) 6-pin	10p 10p	7p 🔻	
	JACK PLUGS	Tob	9p	7
J	in. Std. Mono	Plastic Ba	rrel	13р
1	lin. Std. Mono	Metal Bar	rel	24p
1	in. Std. Sterec	Plastic B	arrel	18p
1	din. Btd. Sterec	Metal Ba	rrel	30p
ı	2.5mm Plastic		p	
ł	2.5mm Metal B			
1	3.5mm Plastic	Barrel 9	p	J
Î	3.5mm Metal B	arrel 15		
-8	* * ****			

JACK CHASSIS SOUNDED
2.5mm Open-type metal
3.5mm Open-type metal
4.7 Std. Mono Open-type metal
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. Mono Moulded with 2
4.7 Std. break contacts

1" Std. Stereo Open-type

15p

2" Std. Stereo Moulded with break contacts PHONO

Plastic-topped Plug Screened Plug Chassis Socket Single Chassis Socket Twin

TRANSFORMERS

LT700 min. output. Pri. 1k2; Sec. $5 \Omega 200 mW$	50p
Sub-min mains 6-0-6V 100mA	95p;
12-0-12V 50mA	95p
(Size both approx. 30 × 27 × 5 Min. mains	25mm)
0-6V 500mA, 0-6V 500mA	21.36
0-12V 250mA, 0-12V 250mA	£1.36
0-20V 150mA, 0-20V 150mA	£1.36
0-24V 125mA, 0-24V 125mA	£1.36
Mains MT3AT: Sec: 12-15-	-Mary
20-24-30V 2A £3-60	-
Mains MT206 AT: Sec: 0-15-	Difference of the last of the
20V 1A, 0-15-20V 1A £3-98	L. L.

M ORGAN CONSTRUCTION

A Full Scale Electronic Organ that you can Build to Your Own Specification.

FULL CONSTRUCTIONAL DETAILS IN OUR LEAFLETS

Leaflet MES 51; Price 15p. describes a fully polyphonic basic organ which can later be used as the basis of a large sophisticated instrument. Leaflet MES 52: Price 50 continues the description of

807

-

the MES 50 series organs and shows you how to add a second keyboard with lots more stops.

◆ THE AMAZING DMO2

A ready-built, tested and guaranteed digital master oscillator. Accurately generates the top 13 notes for your organ system and reduces the complete tuning of your organ to ONE SIMPLE adjustment. New design gives selectable C to C output ranges of (approx.) 4k to 8k (highest) or 2k to 4k or 1k to 2k, etc. right down to 16Hz to 32Hz! And this new compatible design is even smaller:—only 3.5in × 3.7in including goldplated edge connexion.

DMO2T includes built in variable depth and

rate frequency shift tremulant.

DMO2 \$18.25 DMO2T £14.25

SAJ 110: 7-stage frequency divider in 14-pin DIL package. Sine or square wave input. Square wave output may be converted to saw-tooth. £1.80 each or 6 for £9.94 or 12 for £18.16.

Keyboards high quality, fully sprung. Flat-front 48-note F to E €15·95 Sloping-front 49-note C to C £15.95 Sloping-front 61-note C to C Swell pedal with 10k log, pot £6.33 Spring Line Unit (Short) £3.05 *Spring Line Unit (Long) £8-29 *Reverberation Driver Module **Reverteration Driver module ** 20 oc ** 8.A.E. please for full details: leadet MES 24 (fold-clad phosobor-bronze wire 30p per yd. Palladium earth bar 15p per octave length. Contact Blocks 2-make (GB2) ** 22p £5:34 Stop Tabs rocker type not engraved (white, red, grey or black) with DPDT switch 59p

SPECIAL OFFER

5W Audio Amp 1C TBA 810S with Data and Circuits Price £1.00.

"ELECTRONICS TODAY INTERNATIONAL" 4600 SYNTHESISER

We stock all parts for this brilliantly designed synthesiser. This includes all the P.C.B.s, metalwork and drilled and printed front panel giving a truly professional finish. Authoritative opinions agree the E.T.I. International Synthesiser is technically superior to most of today's models. Complete constructional details in our booklet, available shortly. S.A.E. please for price list and specification.

We also stock all parts for the P.E. Synthesiser and Minisonic.



P.O. BOX 3, RAYLEIGH, ESSEX.

3300 6-3 28p 4700 4 28p

Tel.: Southend-on-Sea (0702)44101

VAT Please add 8% to the final total. Post and packing FREE in U.K. (15p handling charge on orders under £1).

First-class post pre-paid envelope supplied free with every order.

PE SCORPIO Mk 2 ignition system kit new from ELECTRO SPARES

* 6 OR 12 VOLT *+ VE AND - VE GROUND

Here's the new, improved version of the original PE Scorpio Electronic Ignition System—with a big plus over all the other kits—the PE Scorpio Kit is designed for both positive and negative ground automotive electrical systems. Not just +ve ground. Nor just +ve ground. But both! So if you change cars, you can be almost certain that you can change over your PE Scorpio Mk. 2 as well. Containing all the components you need, this Electro Spares PE Scorpio Mk. 2 Kit is simply built, using our easy-to-follow instructions. Each component is a branded unit by a reputable manufacturer and carries the manufacturer's guarantee. Ready drilled for fast assembly. Quickly fitted to any car.

Quickly fitted to any car. When your PE Scorpio Mk. 2 is installed, you instantly benefit from all these PE Scorpio Mk. 2 advantages.

- ★ Easier starting from cold ★ Firing even with wet or oiled-up plugs ★ Smoother running at high speed
- ★ Fuel saving ★ More power from your engine

★ Longer spark plug life ★ No more contact-breaker burn Electro Spares prices:

Deluxe Kit only £10.85 inc. VAT and p & p. Ready Made Unit £13.65 inc. VAT and p & p. State 6V or 12V system.

Send SAE now for details and free list.

FM VARICAP STEREO TUNER

As featured in the May 1973 issue of 'Practical Electronics'. Superb Hi-Fi tuner Kit now available from Electro Spares. Including cabinet and all components — pre-set Mullard modules for R.F. and I.F. circuits. Motorola I.C. Phase Lock Loop Decoder for perfect stereo reception. No alignment needed. Guaranteed first time results — or send it back, and we'll return it in perfect order (for a nominal handling charge). Electro Spares price only £28.50 inc. VAT and p & p.

'GEMINI' STEREO AMPLIFIER

A superb unit with a guaranteed output of 30 watts RMS per channel into 8 ohms. Full power THD is a mere 0.02%, and frequency response is —3 dB from 20 Hz to 100 kHz into 8 or 15 ohms. Electro Spares have already sold 100s and 100s of these Kits. Get yours now I Depending on your choice of certain components, the price can vary from £50 to £60 inc. VAT and p & p.

- ★ All components as specified by original authors, and sold separately if you wish.
- ★ Full constructional data book with specification graphs, fault finding guides, etc. 55p plus 9p postage.
- ★ Price List only, Please send S.A.E. (preferably 9 x 4 minimum) for full details.

ELECTRO SPARES



The Component Centre of the North
288 ECCLESALL RD., SHEFFIELD S11 8PE(C)
Tel: Sheffield (0742) 668888

VALVE BARGAINS

Any 5 50p, 10 75p, 50 £3·30, 100 £6·40. Your choice from the following list:

ECC82, ECL80, EB91, EF80, EF183, EF184, PC36, PC88, PC97, PC900, PCC84, PCC89, PCC189, PCF802, PCF802, PCF805, PCL82, PCL84, PCL85, PCL86, PF1200, PL36, PL504, PY33, PY81, PY800, PY88, EH90, 30FL1, 30FL2, 30PL14.

Colour Valves 25p each PL508 PL509, PY500/A

Press 4 Button UHF Tuners £2.50.

AERIAL BOOSTERS

We make three types of Aerial Boosters all for set top fitting, with Co-ax Plugs and Sockets.

BII—For Stereo and Standard VHF Radio

BI2—For the older VHF Television, please state BBC1 and ITV Channels.

B45—For mon. or colour this covers the complete UHF band.

All Boosters are complete with Battery and take only minutes to fit.

Price £3.40 each

BARGAIN PACKS

All Components in the Bargain Packs are unused and marked.

Pack I—Polyester (C280) Axial Leads Capacitors—250V/W & 400V/W, very good mixed selection from 0-01 UF to 2-2 UF. Price 100 £1, 1000 £8 (our choice).

Pack 2.—Electrolytic Capacitors—complete mix selection from 10V/W to

Pack 2.—Electrolytic Capacitors—complete mix selection from 1 UF to 1000 UF, and from 10V/W to 63V/W. Price 100 £1·50, 500 £6 (our choice).

Pack 3.—Transistors—any 10 80p, any 100 £7 (your choice). AC128 - AC176 - BC113 - BC115 - BC135 - BC132 BC133 BC135 - BC135 - BC135 - BC135 B

BC153' - BC171 - BC172.

Pack 4.—15 Mixed Plugs, mixed selection of co-ax, din 2-3-5 pins, jack standard—3:5mm-2:5mm. Price £1.

Prices include V.A.T. P. & P. under £1/10p, £1 to £3/15p, above £3/20p. Overseas at cost. Money back guarantee on all orders.

ELECTRONIC MAILORDER LTD., 62 BRIDGE ST., RAMSBOTTOM, BURY, LANCS. Tel. Rams. 3036.

CJL PRICES INCLUDE P&P AND V.A.T.

AERIAL, telescopic, 15-120cm	£1.20
DAERIAL, telescopic, h and v swivel, 15-80cm.	£1.78
BIB HI-FI ACCESSORIES	10/3
CASSETTE TAPE RECORDER CARE KIT	£1.95
CASSETTE SPLICING AND EDITING KIT	£1.50
THI-FI STEREO TEST CASSETTE	£2.10
D1" TAPE EDITING KIT	£1.35
DGROOV-KLEEN RECORD CLEANER	£1.85
□EARPHONE, stethoscope style, 6 ohm dynamic.	£1.00
☐HAND DRILL.(Leytool), compact precision drill,	•
5/16"chuck.Gears totally enclosed.S/L bearings.	£2.99
INTEGRATED CIRCUITS	
□AUDIO POWER AMPLIFIER (National) LM380	£1.00
□A,M,RADIO RECEIVER (RCA) CA3123E	£1,40
☐F.M.STEREO DECODER (Motorola) MC1310P	£2,80 1'
☐TIMER(Signetics) NE555V	£0.78
□VOLTAGE REGULATOR (Fairchild) uA7805	£1.70
UVOLTAGE REGULATOR (Signetics) NE550A	£0.80
□D.1.L.SOCKETS(Pk of 3) 8 or 14 pin	£0.50
■ KEYNECTOR.rapid connect to mains-single/mul	tiple
leads.Built-in plano switches neon & 13A fuse	£3.20
DLOCKFLEX RULE (Rabone Chesterman), 3m/10ft	
precision pocket rule. Easy to read, 13mm/}"wide	
steel tape.Blade length lockable-power return.	
A superb rule	£0.93
☐MICROPHONE, lightweight dynamic, remote start	
stop, 200 ohms, 100-10kHz, 6mV average output.	£1.80
☐MULTIMETER, attractive design, Vdc-10, 50, 250,	21.25
1,000.Vac-10,50,250,1,000.ldc-100mA.R-150k.	£4.95
SIGNAL INJECTOR, audio through video signals,	20 20 2
excellent for servicing amplifiers, radio & tv	£3.92
SOLDERING IRON, 25 WATT, (Antex), X25, 240V,	
Very low leakage,1/8"long life bit(interchangeable)	1///
□3/32"bit £0.45 □3/16"bit £0.45 □Element	10.95
[]STAND. ST3, High grade base, chrome plated	
spring, sponges and accompodation for spare bits .	£0.95
OSPEAKER, miniature, 75mm dia, 8 ohms	20.80
CIII CHUTCHOOM	

CJL LTD. P.O. BOX 34, CANTERBURY, CT1 1YT



"Sparkrite MK 2" is a high performance, high quality, capacitive discharge, electronic Ignition system. Sparkrite completely eliminates problems of the contact breaker. Misfire due to contact breaker bounce is electronically eliminated, contact breaker burn is eliminated, the condition of the contacts is not relevant to the performance of the ignition, and the system is no longer dependant on the dwell period for recharging.

Sparkrite will give you: Up to 20% hetter fuel consumption, instant all weather starting, cleaner plugs, faster acceleration, higher top speed, longer coil and battery life, efficient fuels burning and less air polution, smoother running, continual peak performance.

The Kit comprises everything needed. All ready drilled and guaranteed components and parts.

Prices: D.I.Y. assembly kit £10-93°. Ready built unit £13-86°. (Both to fit all vehicles with coll/distributor ignition up to 8 cylinders.) Switch for Instant changeover from "Sparkrite" ignition to conventional ignition £2-79°. R.P.M. limiting control £2-42°. Details of more specialised units on request. *Inc. V.A.T., p & p. CALL IN AND SEE US FOR A DEMONSTRATION.

of WALSALL

MINIUM

Prices include lids, screws and V.A.T. (@8%). Add 18p to the total order value for postage and packing. No. 7 5% x 2½ x 1½ high 47p No. 8 4" x 4½ x 1½" high 48p No. 9 4" x 2½ x 1½" high 49p No. 10 5½ x 4" x 1½" high 49p No. 11 4" x 2½ x 2½ high 45p No. 12 3" x 2" x 1" high 38p No. 14 7" x 5" x 2½" high 59 No. 15 6" x 4" x 2" high 59 No. 15 6" x 4" x 2" high 59 No. 15 8" x 6" x 3" high 59 No. 16 10" x 7" x 3" high £1 14

UORESCENT

You can build this reverse build this reverse polarity protected 12 v, 8 w, fluorescent light. Everything needed is supplied: white enamelled ready drilled metalwork, ready drilled heatsink, printed circuit board, high quality components and transformer, end caps, cable, the fluorescent tube, nuts boits washers, and simple assembly and operating instructions. Prices: Assembly kit £3-19*. Ready built £3-78*. Diffuser £59p*.

ORDER NOW

Electronics Design Associates Dept PW4 82 Bath Street, Walsall, WS1 3DE. TO Phone 33652

FROM Name

Address

Please Supply
SPARRITE MK 2 DIY Assembly kits
to build Nee. or Pos. @ £10-93
SPARRITE MK 2 Ready Built
Negative earth @ £13-8
SPARKRITE MK 2 Ready Built
Positive earth @ £13-8
Ignition changeover switches @ £2-79
R.P.M. Limit systems in the above
units @ £2-42
Fluorescent light sasembly kits
@ £3-5ent

@ £3-19
Fluorescent light bullt units @ £3-78
Diffusers for the above @ 59p
of number alum. boxes @
of number alum. boxes @
of number alum. boxes @

I enclose cheque/P.O.s for £......

Cheque No. (Send SAE if brochure only regulred)

TTL & SEMICONDUCTORS AT LOWER PRICES! FAST DELIVERY PRICES INCLUDE VAT (AT 8%)

Type	1/24		100+	Type	1/14	25/99	100+	Type	1/24	25/99	100+	
7400	0.14	0.13	0.12	7437	0 - 31	0 - 29	0.27	7476	0.35	0.32	0 · 31	
7401	0.15	0.14	0.13	7440	0.15	0.14	0.13	7480	0.50	0.47	0.44	
7402	0.15	0.14	0.13	7442	0.73	0.68	0.64	7483	0.95	0.89	0.83	
7403	0 · 15	0.14	0 13	7445	0.99	0.92	0.86	7486	0.34	0.33	0 - 31	
7404	0 - 18	0.16	0.15	7447	0.98	0.96	0.87	7489	3.56	3.33	2.96	
7405	0 - 18	0.16	0.15	7450	0.15	0.14	0 13	7490	0.49	0 . 48	0 - 46	
7408	0.18	0.16	0.15	7451	0.15	0.14	0.13	7492	0.54	0.58	0 - 47	
7410	0.15	0.14	0.13	7453	0.15	0.14	0.13	7493	0 - 51	0.50	0 - 47	
7412	0.23	0 · 21	0 - 20	7454	0.15	0.14	0.13	7495	0.73	0.68	0-64	
7413	0.33	0 · 32	0 · 31	7460	0.15	0.14	0.13	7496	0.83	0.78	0.73	
7417	0.33	0 · 32	0 · 31	7472	0 - 29	0.27	0 · 25	74107	0.34	0.33	0.31	
7420	0 - 15	0.14	0.13	7473	0.33	0.32	0 - 31	74121	0 - 34	0.33	0.31	
7427	0.31	0 - 29	0 - 27	7474	0.33	0.32	0 · 31	74123	0.70	0.66	0.64	١
7430	0.15	0.14	0.13	7475	0 - 51	0 - 49	0.47	74157	0.87	0 81	● · 72	
7432	0 - 31	0.29	0.27	7476	0.35	0 - 32	0-31	74175	0.99	0.95	0.84	П
1 N4148	4p. 1	N4001	41p. 11	N4002 5p.	1N40	03 Sp.	1N4004		(107.1			П
#1n. 7	TX109	111n.										Н

• All devices full spec. by famous manufacturers. TTL MAY BE MIXED FOR QUANTITY PRICES. S.A.E. for catalogue (includes TTL pln layout guide). 10p P. & P. on orders under £2, otherwise POST FREE.

J. C. JONES (Dept. PW3) 46 BURSTELLARS, ST. IVES, HUNTINGDON PE17 4XX
(Mail Order only)

FELSTEAD ELECTRONICS (PW90), CHEADLE, CHESHIRE SK8 4EE

STYLI. Replacements for virtually all ACOS. BER. COLLARO, GARRARD. PHILIPS. RONETTE, SONOTONE. Single Tip. Sapphire 18p. Diamond 37p. Double Tip. Can be Stereo(LP+78 or ST/LP. Sapphire 73p. Double Tip. Diamond ST/LP+18 apphire 78 p. Diamond ST/LP+18 phire 78 p. Diamond ST/LP+18 phire 78 p. Diamond ST/LP+10 piamond ST/LP+10 piam

CARTRIDGES. All with styli and fittings. Replacements for ACOS GP/91 SC (Stereomono compatible series) at £1.20, GP93 Stereo at £1.60, GP84 Stereo Ceramic at £2.20, Actual GP67-2, Front switch at £1.10, for BSR X3H, X5H and X5M at £1.50 each. SK5H and SK5M at £1.80 each. TCSH at £1.60. TCS Stereo, 3 pins £2.30; charges 10p any

quantity.

RECORDING TAPE. ALL FINEST BRITISH MYLAR 5" 600ft. 40p; 5" 900ft. 60p; 5\foxed{5}" 1200ft. 84p, 7" 1800ft. \$1-10. Charges for 5" and 5\foresign '.1-4 13p each; 5 and over, 33p the ot. Charges for 7", 1-3 15p each, 4-5 35p the lot, 6 and over 40p the lot.

CASSETTES with screws, in library cases. C60—38p. C90—44p, C120—50p each. (Charges up to five, 5p each, six to ten, 23p the lot).

SPEAKERS 21", 3, 8 or 64 ohins (state which) 55p. (Charges 10p each.) CONNECTING WIRE. Pkts of 5 coils, asstd. cols each 5yds. Solid core 19p Flexible 21p

(Charges 10p per pack).

EARPIECES, Magnetic 2-5mm or 3-5mm plugs (state which) 15p. CRYSTAL (3-5mm only 35p. (Charges all 16p up to 6). VIERATOES, 7 pin SYNOEH. (12SR7 type) 75p. 4-pin NON-synch (121HD4) 45p (Charges

Send SAE for free styll, cartridge, accessories and components list. All prices include VAT.

ENGINEERS



Do you want promotion, a better job, higher pay? "New Opportunities" shows you how to get them through a low-cost home study course. There are no books to buy and you can pay-as-you-learn.

POSX

Electrical

This 76 page FREE book shows how

WITH MORE

This helpful guide to success should be read by every ambitious enginee read by every amonious engineer. Send for this helpful 76 page FREE book now. No obligation and nobody will call on you. It could be the best thing you on you.

Technicians

Ì	■CUT	OUT	THIS C	OUPO	N III			Į
	CHOOS	E A	BRAND	NEW	FUT	URE	HERE	!
	Tick or s	state su	bject of inte	rest. Post	to the c	iddress	below.	

NO.	CK or state subject of inter	 	
Build-As-You-Learn PRACTICAL RADI	Electronic O Engineering	CITY AND Installations	

Build-As-You-Learn PRACTICAL RADIO AND ELECTRONICS	Electronic Engineering	CITY AND GUILDS Installations and Wiring
(with kit)	Computer Electronics	CITY AND GUILDS
Electrical	Computer	Electrical

Programming Engineering \Box General Radio and Electrical Installations TV Engineering and wiring

Electrical Draughtsmanship [

CITY AND GUILDS
Telecommunications Radio Servicing. Maintenance and Repairs

Radio Amateurs' Exametc, etc. Transistor Technology

П Mathematics To ALDERMASTON COLLEGE Dept. EPW-02, Reading RG7 4PF

EPW-02

NAME (Block Capitals Please)

ADDRESS POST CODE

Other subjects Accredited by C.A.C.C Member of A.B.C.C.

HOME OF BRITISH INSTITUTE OF ENGINEERING TECHNOLOGY

ALL OUR PRICES INCLUDE V.A.T.

BSR HI-FI AUTOCHANGER

STEREO AND MONO

Plays 12°, 10° or 7° records
Auto or Manual. A high
quality anti backed by BSR
reliability with 12 months'
guarantee. AC 200/250v.
Size 13\tau 11\tau.
Above motor board \$\frac{1}{2}\tau.
Below motor board \$\frac{1}{2}\tau.
With STEREO/MONO CARTRIDGE

47.95 Post 45p.



PORTABLE PLAYER CABINET

Modern design. Size 18" x 15" x 7" rexine covered Large front grille. Ringed Lid. Chrome £4.50 fittings. Motor board out for Garrard deck.

Post 45p. Few only, in red and black.

SOLID MAHOGANY PLINTH

With P.V.C. Cover. Cut out for most B.S.R., or Garrard decks. Size 12; × 14; × 7; in.

£6·50 Post 45p

BSR JUNIOR SINGLE PLAYER

Heavy duty 4-speed motor with separate pick-up arm fitted LP/78 turnover mono 44.95 Post 25p





R.C.S. DISCO DECK SINGLE RECORD PLAYER

Fitted with auto stop, stereo/mono cartridge. Base-plate. Size 11in × 8pin. Turntable. Size 7in diameter. A/C mains. 220/280V motor has a separate winding 14 volt to power a small amplifier. 3 a speeds plays all size £5.50 Post

COMPLETE STEREO SYSTEM



SPECIAL OFFER! SMITH'S CLOCKWORK 15 AMP TIME SWITCH 0-60 MINUTES



Single pole two-way Surface mounting with fixing screws. Will replace existing wall switch to give light for return home, garage, actomatic anti-burglar lights etc. Variable knob Turn on or off at full or intermediate settings. Fully insulated. Makers last list price 24-50. Brand new and fully guaranteed. OUR PRICE £2-20 Post 25p.

CASSETTE RECORDER MOTOR ONLY. 6 Volt. Will replace many types, Ideal for models. £1-25.

BLANK ALUMINIUM CHASSIS. 18 s.w.g. 2½in sides 6 × 4in 45p; 8 × 6in 53p; 10 × 7in 65p; 12 × 8in 85p; 14 × 9in 90p; 16 × 6in 90p; 12 × 3in 50p; 16 × 10in 21. ALUMINIUM BOXES $3 \times 3 \times 3$ in, 60p, $4 \times 4 \times 4$ in, 70p, $6 \times 4 \times 4$ in, 80p, $9 \times 4 \times 4$ in, $$1,12 \times 4 \times 4$ in, \$2.30, ALUMINIUM PANELS 18 s.w.g. 6×4 in 12p; 8×6 in 19p; 14×3 in 2up; 10×7 in 24p; 12×5 in 25p; 12×8 in 34p; 16×6 in 34p; 14×9 in 40p; 12×12 in 47p; 16×10 in 60p.

linch DIAMETER WAVECHANGE SWITCHES 45p. EA. 2 p. 2-way, or 2 p. 6-way, or 3 p. 4-way,.
1 p.1 2-way, or 4 p. 2-way, or 4 p. 3-way.

TOGGLE SWITCHES, sp. 20p; dp. 25p; dp. dt. 80p.

R.C.S. STABILISED POWER PACK KITS All parts and instructions with Zener Diode. Printed Circuit Bridge Rectifiers and Double Wound Mains Transformer. Input 200/240V a.c. Output voltages available 6 or 9 or 12 or 15 or 18 or 20 V d.c. at 100mA or less.

PLEASE STATE VOLTAGE REQUIRED.

22.20 Postall S.A.E. Size 34 × 14 × 18in.

Details S.A.E. Size 31 × 11 × 11in.

R.C.S. GENERAL PURPOSE TRANSISTOR

R.C.S. GENERAL PURPOSE TRANSISTOR PRE-AMPLIFIER BRITISH MADE
Ideal for Mike, Tape P.U., Guitar, etc. Can be used with Battery 9-127, or H.T. line 200-3007. D.C. operation. Size 1½" × 1½" × 1½" Response 25 c.p.s. to 25 Kc/s. 25 db gain. For use with valve or transistor equipment. £ 1.25 Post Full instructions supplied. Details 8.A.E.

NEW TUBULAR ELECTROLYTICS CAN TYPES 2/350V 4/350V 8/350V 16/350V 32/500V 100 + 50 + 50/850V85p 32 + 32 + 32/850 65p 900MFD/850V 95p OK/OKU 50/50V 100/25V

100/26V 10p | 82-482/350V 40p | 4700/63V 95p LOW VOLTAGE ELECTROLYTICS. | 1, 2, 4, 5, 8, 16, 25, 30, 50, 100, 200mF 15V 10p. 500mF 12V 15p; 25V 20p; 50V 30p. 1000mF 12V 15p; 25V 20p; 50V 30p. 1000mF 12V 15p; 25V 25p; 50V 47p; 100V 70p. 2000mF 6V 25p; 25V 42p; 50V 67p; 4700/63V 35p. 2500mF 50V 62p; 3000mF 25V 47p; 50V 65p. 5000mF 50V 42p; 50V 65p. 5000mF 50V 25p; 25V 65p; 25V 75p; 25V 85p; 50V 85p. 50V 25p; 15V 42p; 25V 75p; 25V 85p; 50V 85p. 50V-0-10 to -05 4p; 0-1 10p; 0-25 12p; 0-47 25p. CERAMIC 1pF to 0-01mF, 4p, 8ilver Mica 2 to 5000pF, 4p. PAPER 350V-0-1 7p; 0-1 18p; 1mF or 2mF 150V 15p. MICRO SWITCH single pole changeover 20p MICRO SWITCH single pole changeover 20p TWIN GANG. "0-0" 208pF +178pF, 21-10. Slow motion drive 385pF +865pF with 25pF +25pF, 50p; 500pF standard twin gang 75p. 120 PF twin gang 50p. SHORT WAVE SINGLE. 10pF, 30p; 25pF, 55p; 50pF, 55p.

ELAC 9×5 in. Hi-fi speaker. Type 59RM. This famous and widely used unit now available at bargain price 10 watt, 8 0HM. Geramic magnet.

REON PANEL INDICATORS. 250V AC/DC Amber, 30p RESISTORS, ½ w., ½ w., 1 w., 20%, 1p; 2 w. 5p. 10 Ω to 10 M HIGH STABILITY; ½ w. 2%, 10 ohms to 6 meg., 10p. Ditto 5%, Preferred values 10 ohms to 10 meg., 4p. WIRE-WOUND RESISTORS. 5 watt, 10 watt, 15 watt, 10 ohms to 100K, 10p sach; 2w 0.5 ohm to 8.2 ohms 10p. TAPE OSCILLATOR COLL. Value type, 35p. FERRITE ROD 8" × ¾" 20p; 6 × ¾" 20p; 8 × ¾" 10p.

MAINS TRANSFORMERS ALL POST

6 or 12v. outputs, 1} amp. 40p; 2 amp. 55p; 4 amp. 85p.

MAINS ISOLATING TRANSFORMER

Primary 0-110-240v. Secondary 0-240v. 3 amps. 780 watts. Insulated terminals. Varnish impregnated. Fully enclosed in seel case with firing feet. Famous make. (Value £19) OUR PRICE £12 Carr. Suitable for outside use.

SET OF 3 MOTORS FOR COLLARO STUDIO 115 volt TAPE DECK £1 50 Post 50p.

5 K. ohms to 2 Meg. LOG or LIN. L/S 20p. D.P. 35p. STEREO L/S 55p. D.P. 75p. Edge 5K. S.P. Transistor 25p

VOLUME CONTROLS | 80 Ohm Coax 50 yd. BRITISH AERIALITE
AERAXIAL-AIR SPACED
40 yd. 22; 60 yd. 23.
FRINGE LOW LOSS 10p per
Ideal 625 and colour.

Wirewound controls 1½in. diam. 8 watts. 10 ohms to 100K British made with long spindles ½in. dia 80p ea. DUAL CONCENTRIC POT 500k LOG + 500k switch. Inner spindle \$\frac{2}{2}\text{in}, 75p. 500k LIN D.P.

E.M.I. $13\frac{1}{2}$ × 8 in. SPEAKER SALE!

With twin tweeters.
And crossover, 10
watt. State 3 or 8 or
15 ohm. As illustrated.
Post 24

With flared tweeter cope and ceramic magnet. 10 watt.
Bass res. 45-80 cps.
Flux 10,000 gauss.
State 3 or 8 or 15 ohm. Post 25p

Bookshelf Cabinet

£6.60 Post 459 Fluted wood front 16×10×7in. Teak Veneer

GOODMANS 63 in. HI-FI WOOFER Solm, 10 watt. Large ceramic magne Special Rubber cone surround.

Frequency response 30-12,000 44

Frequency response 38-12,000 44

First Encloure Systems, etc.

Suitable cabinet 12 × 8 × 6 24-00.

Suitable abinet 12 × 8 × 6 24-00.





The moving coil disphragm gives a good radiation pattern to the higher frequencies and a smooth extension of total response from 1,000 cps to 18,000 cps. Size 84 × 81 × 2in. deep. Rating 10 watt, 3 ohm. Crossover £1.26 £1.90 £1.90

GOODMANS 8 in. WOOFER

8 ohm 12 watt. Deep cone. Heavy ceramic magnet. Bass resonance 85 cps. Frequency response 30-8,000 cps. Idaai bass unit for £3.75 Hi-Fi systems



LOUDSPEAKERS P.M. 3 OHMS. 7 × 4in. \$1-25; \$4in. \$1-50; \$8 × 5in. \$1-60; \$in. \$1-75; 10 × 6in. \$1-90; 10in. \$2-90. \$PECIAL OFFER LOUDSPEAKERS! All Brand New. 3 ohm, \$4in; \$2in; \$2in; \$3in; 5in. \$0 ohm, \$2in; \$2in; 5in; 5in. \$0 ohm, \$2in; \$2in; \$3in; 5in. \$0 ohm, \$2in; \$7 × 4in; \$8 × 5in. \$2 ohm, \$2in; \$1n; \$1n; 5in. \$3 ohm, \$3in; 51n. \$3 ohm; \$3in; 51n.

LOUDSPEAKER VOLUME CONTROL 15 ohm 10 watt with lin long threaded bush for wood panel mounting 65p.

WILL IN TORK TWENT COME LOUDSPEAKEER, SIR. diameter 4W \$2.50, 10tn. diameter 5W \$2.95; Post \$5p. 12tn. diameter 6W \$2.95; Post \$5p. 12tn. diameter, 6W \$3.95; Ost 8 to 115 ohm models. SPEAKEER COVERING MATERIALS, Samples Large S.A. B. Horn Tweeters 2-16Ke/S, 10W 8 ohm or 16 ohm \$3.90. De Lurs Horn Tweeters 2-18Ke/s, 15W, 8 ohm \$4.00. TWO-WAY 3,000 c.ps. CROSS OVERS 3, Sor 15 ohm \$1.95. S-WAY CROSSOVER 850 cps and 3000 cps (25 watt) \$1.95.

GOODMANS CONE TWEETER

18,000 cps. 25 watts. 8 ohm. Price £3.30.

ELECTRO MAGNETIC PENDULUM MECHANISM

1.5v d.c. operation over 250 hrs. continuous on SPS battery. fully adjustable swing and speed. Ideal displays teaching electro magnetism or for metronome; strobe etc. 95p, Post 20p

R.C.S. VALVE AMPLIFIER

2 Stare Triode Pentode valve. 3 watts 3 ohm output. Volume on/off and tone controls AC mains. Complete and tested. With Loudspeaker. £4-50 Post 25p.

WEYRAD COILS
P50/1AC-60p. RA2W 85p. Twin Gang £1:10.
P50/2CC-40p. OPT1 65p. Printed Chronit 85p.
P50/3CC-40p. LFDT4. 85p. IN STOCK

COAXIAL PLUG 10p. PANEL SOCKETS 10p. LINE 18p
OUTLET BOXES, SURFACE MOUNTING 26p.
BALLANCED TWIN RIBBON FEEDER 300 ohms, 7p yd.
JACK SOCKET Std. open-circuit 15p, closed circuit 22p;
Chrome Lead Socket 45p, Phono Flugs 10p, Phono Socket 8p
JACK PLUGS 8td. Chrome 20p; 3-5mm Chrome 15p, DIM
SOCKETS Chassis 3-pin 10p; 5-pin 10p. DIM SOCKETS
Lead 3-pin 18p; 5-pin 18p, DIM FLUGS 3-pin 18p; 5-pin 25p.
VALVE HOLDERS 5p; CERAMIC 10p; CANS 5p.

FM/VHF AERIAL FEEDER CABLE 300 ohm suitable for stereo 7p per yard.

BRITISH FM/VHF TUNING HEART 88 to 108 Mc/s British made. 2 Transistors ready aligned—requires 10.7 Mc/s IF. Complete with tuning gang. Connections supplied but some Our Price £3.95

technical experience required. SUITABLE I.F. STRIP 24.95

Post 20p.

ALL PRICES INCLUDE VAT

MINIMUM POST AND PACKING 20p

Illustrated Brochure, Radio Books & Component Lists 10p. Written guarantee.

ALL OUR PRICES INCLUDE V.A.T.

E.M.I. WOOFER AND

THE PAIR, Post 45p. (Available separately, Wooter £4 25; Tweeter £1 90).

51.90). Comprising a fine example of a Woofer 162 × 64in, with a massive Grant Comprising a fine example of a Wooler 194 × 61in, with a massive Ceramic Magnet. 46oz. Gauss 13,000 lines. Aluminium Cone centre to improve middle and top response. Also the E.M.I. Tweeter 21in, square has a special lightweight paper cone and magnet flux 10,000 lines. Crossover condenser and

full instructions supplied. Impedance Standard 8 ohms Maximum power Useful Response Bass Resonance

8 0hms 12 watts 25 to 18,000 cps 45 cps

ELAC 8in. or 10×6 in.

HI-FI SPEAKER

£10.50

Post 75p

SUITABLE ENCLOSURE 20 × 18 × 9in. MODERN DESIGN. TEAK WOOD FINISH.





30-14,500 c/s. 12in. double cone, wooler and tweeter cone together with a BAKER ceramic magnet assembly having a flux density of 14,000 gauss and a total flux of 145,000 Maxwells. Bass resonance 40 c/s Rated 20 watts. NOTE: 3 or 8 or 15 ceramic contracts. 15 ohms must be stated.

Module kit, 80-17,000 c/s with tweeter, crossover, baffle and instructions. £10-95

Please state 3 or 8 or 15 ohms.

"BIG SOUND"

long periods of electronic power. As used by leading groups and discos Useful response 30-18,000 cps.

Bass Resonance 55 cps.

12in. 25 watt 3, 8 or 15 ohms. **GROUP "35"**

12in. 85 watt 8. 8 or 15 ohms.

Group + PA Cabinets in stock Send for Leaflet.





MODEL "A". 20 × 13 × 9in. For 12in. dia. £10.50 Post 10in. speaker. £10.50

LOUDSPEAKER CABINET WADDING 18in. wide, 20p it.

BAKER RECOMMENDED 12 inch Enclosure 4 cubic it. HI-FI CABINET 218-50. Carr. 22 each. Sise 30 × 20 × 12in. Teak Finished Fluted Front.

TEAKWOOD LOUDSPEAKER FRONT GRILLS
Modernise your cabinets with the Grooved look. Sizes124" × 104"—75p. 104" × 74"—45p.

BARGAIN 4 CHANNEL TRANSISTOR MONO MIXER, Add musical highlights and sound effects highlights and sound enecu-to recordings. Will max Microphone, records, tape and tuner with separate controls into single output. 9 volt battery £4.50

operated. STEREO VERSION OF ABOVE \$5.95.

R.C.S. STEREO FM TUNER **BRITISH MADE**



This completely cased mains powered Hi-Fi Tuner with brushed aluminium facia is British £23 using the latest circuitry.

BARGAIN 8 WATT AMPLIFIER. 4 Transistor

Push-Pull Ready built with volume, treble and bass controls. 18 volt battery operated. £3.50

WASER HEATING ELEMENTS

WAFER HEATING ELEMENTS
OFFERING 1001 USES for every type of heating and
drying applications in the home, garage, greenhouse,
lactory (available in manufacturing quantities). Approx.
isso 10½ × 8½ × ½in. Operating voltage 200/2507. a.c.
250 watts approx. Printed circuit element euclosed in
absets fatted with connecting wires. Completely farthle
providing sate Black heat. British-made for use in photocopiers and print drying equipment.
Ideal for home handymen and experimenters. Suitable
for Heating Pads, Food Warmers, Convector Heaters, etc.
Must be clamped between two sheets of metal or asbestos,
etc., to make efficient clothes dryers, towel rails—ideal for
airing cupboards. Ideal for anti-frost device for the garage
— preventing frozen radiators or acting as oil sump heater.
Use in the greenhouse for seed raising and plant protection.
Invaluable aid for bird houses, incubators, etc. Can
be used in series for lower heat. Or in parallel for higher
heat applications.

ONLY 40p EACH (FOUR FOR £1-50) ALL POST PAID-Discounts for quantity.

(Exports Remit cash and extra postage.)

MAJOR 100 WATT **ALL PURPOSE** TRANSISTOR **AMPLIFIER**

All purpose transistorised.
Ideal for Groups, Disco and P.A.
4 inputs speech and music. 4 way
mixing. Output 8/15 ohm. a.c. Mains.

mixing. Output 8/15 ohm. a.c. Separate treble and bass controls. Guaranteed. Details SAE.

NEW MODEL-MAJOR 50 WATT £39.95

4 inputs 2-way mixing. 2 ontputs separate treble and bass controls. Ideal disco or p.a. amp.

DE LUXE 100 WATT VALVE AMPLIFIER CHASSIS
4 input 10 wide range controls. For Mikes, Discos, Organs
Gnitars, etc. 4, 8 & 15 ohm loudspeakers matching \$69.00.

THE "INSTANT" BULK TAPE ERASER & HEAD DEMACRETISER. Suitable for cassettes, and all sizes of tape reels. A.C. mains 200/250V. Leafist S.A.E. 42.75 Post



£3.75 Post **QUALITY LOUDSPEAKER ENCLOSURE**

QUALITY LOUDSPEARER ENCLUSY
Teak renered in thick wood cabinet. Size
18in × 18in × 8in. Weight 23lbs. This
cabinet features a wide mesh Silver Grili
covering a separate compartment for mounting Tweeters or Mid-Range Horn. The fully
sealed bass compartment is cut ont for
8inch Woofer. 27-50 Carr. 85p.
Rosewood Version 28-60 Carr. 85p.
Baffic could be out to take larger speaker.

SPECIAL OFFERS
100 Ohm 20 watt Rheostat 2 in diam. Ceramic Former.
Screw Terminals in. diam. spindle.
AC mains relay 3 pole change over
75p.



REVERSIBLE 4 POLE MOTOR REVENDIBLE - 1 FOLL 1,400 r.p.m. Reversible 42 Watt, 1,400 r.p.m. Reversible 42 Watt, 1,200 r.p.m. Reversible 42 Watt, 22.25 apinde 14" × "/ss", size 3;" × 3". Post 35p As illustrated, 240v. AC mains.

E.M.1. TAPE MOTOR
4 pole, 240 v. 185 mA. Size 3½ × 2½ × 2½in.
1200 rpm. Spindle ½in diameter. Post 30p

BAKER HI-FI SPEAKERS HIGH QUALITY - BRITISH MADE

REGENT

12in. 15 watts

An inexpensive unit for the beginner in high fidelity and for general purposes. May be used to improve any Radio. Amplifier, Hi-Fi or Television receiver.

receiver.

Bass Resonance
Flux Density
Useful response
45-12,000gauss
45-12,000cps Useful response 45-13,000e 8 or 8 or 15 ohm models.

£7.75



DE-LUXE Mk II 12in 15 watts

Especially designed to provide full range reproduction at an economical cost. Suitable for use with any high fidelity system. Bullt-in concentric tweeter cone.

Bass Resonance 30cps
Flux Density 14,000ganss
Useful response 25-16,000cps
8 or 15 ohms models.

£9.75

SUPERB 12in. 20 watts

A high quality loudspeaker, its remarkable low cone resonance ensures clear reproduction of the despest bass. Fitted with a special copper drive and concentric tweeter cone resulting in full range reproduction with remarkable efficiency in the

remarkable emciency in the upper register.
Bass Resonance 25cps
Flux Density 16,500gauss
Useful response 20-17,000cps
8 or 15 ohms models.

£13.80

AUDITORIUM 12in. 25 watts

A full range reproducer for high power, Electric Guitars, public address, multi-speaker systems, electric organs. Ideal for Hi-Fi and Discotheques.

15in. 35 watts

A high wattage loudspeaker of exceptional quality with a level response to above 8,000 cps. Ideal for Public Address, Discotheques, Electronic instruments and the home HI-FI.

85cps Bass Resonance S5cps
Flux Density 15,000gauss
Useful response 20-14,000cps
8 or 15 ohms models.

£1,6.50

OPEN 9-6. WEDNESDAY 9-1. SATURDAY 9-5. Closed for lunch 1-15-2-30

CROYDON

Hi-Fi Enclosure Manual containing plans, designs, cross-over data and cubic tables. 60p. Post 3p.

CUSTOMERS FREE CAR PARK

ISTS

Buses 50, 68, 159. Rail Selhurst

Telephone 01-684-1665

















337 WHITEHORSE ROAD



NEW SINCLAIR IC20

AMPLIFIER KITS

IC20 10+10 Watt stereo amplifier kit £6.95 (82p) PZ20 power supply kit for above £4.10 (6p)

SINCLAIR CALCULATORS



Sinclair Scientific Assembled £16-95 (£1-70)
Cambridge Assembled £16-50 (£1-20)
Cambridge Memory Assembled £14-95 (£1-60)

FERRANTI ZN414

iC radio chip with data £1·20 (25p). Also available kit of extra parts to complete a radio £2·55 (47p). Send sae for free leaflet.

SINCLAIR PROJECT 80

AFU £6-38 (78p) Z40 £5-12 (68p) Z60 £6-38 (78p) Q16 £7-21 (95p) PZ5 £5-11 (73p)



PZS £3-11 (73p) PZS £7-78 (94p) PZS £7-78 (94p) Decoder £7-78 (89p). Trans for PZS £3-85 (70p). Trans £11 £2 (£1-42). Stereo 80 £11-62 (£1-42). Project 805 & £3-95 (£3-00). Project 805 SQ £33-95 (£3-00). Project 805 SQ Q

ECONOMICAL QUADRAPHONICS

Introducing the Napulex QA10
self contained matrix
quadraphonic synthesizer. Just
feed the output of any stereo
system (including Project 80 or
60) into it and hook on 4
speakers to obtain the latest in sound. Se for free leaflet, Only £10-15 (£1-10)

SINCLAIR SUPER IC12 8 Watt IC power amp and preamp With 44 page booklet and printed circuit £1:80 (43p)



DELUXE KIT FOR THE (C12

Includes all parts for the printed circuit and volume, bass and treble controls needed to complete the mono version £1.89 (31p). Stereo model with balance control £3.90 (49p),

IC12 POWER KIT

Supplies 28V 0.5 Amps £3.67 (62p) LOUDSPEAKERS FOR THE IC12

8 ohm £1.40 (44p), 5" x 8" 8 ohm £1.75 (57p).

PREAMP KITS FOR THE IC12

Type 1 for magnetic pickups, mics and tuners. Mono model £1·50 (30p). Stereo model £2·70 (36p). Type 2 for ceramic or crystal pickups. Mono 88p (23p). Stereo £1·60 (30p)

SEND SAE FOR FREE LEAFLET ON KITS

BATTERY ELIMINATOR BARGAINS

The most versatile battery eliminator ever offered. Switched output of 3, 4\frac{1}{4}, 6, 7\frac{1}{4}, 9 and 12V at 500 mA £3 90 (80p).



\$\forall \text{L2-30 (c5p)}, \ 4\forall \text{V £2-40 (40p). } 8\forall \text{E2-40 (40p). } 9\forall \text{£2-40 (40p). } 7\forall \text{V cassette type £2-85 (50p). } \ 6\forall + 6\forall \text{£2-95 (50p). } 9\forall + 9\forall \text{£2-95 (50p). } \ (50p). \ \end{array}

Heavy duty deluxe models 6V £2.78 (65p). 7½V £2.78 (65p). 9V £2.78 (65p).

S-DECS AND T-DECS £1 · 98 (36p) £3 · 63 (52p) DeC A £3-99 (56p) DeC B £6-99 (86p)



SWANLEY ELECTRONICS PO BOX 68, SWANLEY. KENT BR8 8TQ.

Please add the sum shown in brackets after the price to cover the cost of post and new VAT. Official credit orders from schools stic. welcome. No VAT charged on overseas orders.

TRANSISTORS (p. & p. 8p.)

All new and full spec. BC107/8/9, BC147/8/9, BC157/8/9 all 9p BF180 25p, BF182/3 40p, BF184 17p, BF187 13p, BFW10 55p, 741 8DIL 34p, BF336 35p, 2N3771 £1 10, 2N3441 50p, BD131 40p, 2N3055 45p, NE555 67p.

EX COMPUTER PC PANELS

4 x 2in packed with semiconductors and top quality resistors, capacitors, dlodes etc. Guaranteed min. 35 transistors, plus data 25 boards £1 (30p)

ELECTROLYTICS

2,200 µ 63v 35p (8p) 2,000µ 50v with clip 35p (8p) 50p (12p) 4,700 µ 63 v 15,000µ 30v, 68,000µ 16v 65p (22p) 30,000µ 25v 65p (22p) 4,000µ 70v, 3,600µ 40v 4 x 2" **55p** (15p) 5.000u 35v 40p (12p) 20A 100 piv Si recs 4 for £1 (12p) 4 for 50p (8p) 3A 100 piv SI recs 250 mlxed resistors 60p (13p) 250 mixed capacitors 60p (11p) 150 mixed HI-STABS 60p (11p) 60p (8p) 200 Si planar diodes 50p (7p) QH bulbs 12v 55w 2N3055 EQUIV 4 for £1 (10)

SMALL ELECTROLYTICS

2.2 \(\mu \) 10/16 \(\varphi \), 10 \(\mu \) 35 \(\varphi \), 50 \(\mu \) 40 \(\varphi \), 100 \(\mu \) 40 \(\varphi \), 100 \(\mu \) 64 \(\mu \) 12 for 45 \(\mu \). 100µ 6v, 150µ 10v, 64µ 10v

PRESETS 100mW

220Ω 470Ω 1k 4k7 10k 100k 12 for 50p. Postage and packing shown in brackets ADD 8% VAT TO TOTAL

KEYTRONICS

(Mail Order only)

44 EARLS COURT ROAD 01-478 8499 LONDON W8.

CENTURION

INSTRUMENT

CASES



Model Nos. 119 and 121 two part aluminium construction base front and back unit finished in white gloss. hooded cover finished in blue hammer stove enamel.

Model D Н

119 152mm 127mm 89mm £1 60 ea 152mm 203mm 76mm £2 · 00 ea 121

Model Nos. 221F and 222F flat packs. Front & Rear panels aluminium case mild steel front panel finished in white gloss other parts finished in blue hammer stove enamel.

152mm 203mm 152mm £2 · 80 ea 222F 197mm 254mm 159mm £3 · 40 ea

Prices include P & P U.K. Add 8% V.A.T. U.K. only. Send S.A.E. for full range brochure.

Manufactured by

Arbone Electronics Limited

Unit 13 East Hanningfield Ind. Est. Nr. Chelmsford, Essex CM3 5BG Tel. Chelmsford (0245) 400700.

Sheet metal work wiring assembly service available

8 PIN DIL 741's

Full spec of course

10 + 26p 100 + 21p25 + 23p 250 + 20p

555 TIMERS

3 + 60p 25 + 46p10 + 50p 100 + 43p

PC ETCHING KIT

Contains 11b Ferric Chloride, 100 sq ins copper clad board, DALO etch resist pen, abrasive cleaner, etching dish and instructions, £3-30,

FERRIC CHLORIDE
Anhydrous to Mil-spec in 1lb double
sealed packs. 1lb 90p, 3lbs £1-80;
10lbs £4-65.

COMPUTER PANELS

Large quantity always available, 31bs assorted £1.60, 71bs £2.85, 561bs £15.
12 High quality panels with IC's, Trimpots, Power Transistors, etc.

£2:65.
Pack with 50 14 pin DIL DTL IC's
£1:20. Pack with 20 multi-turn trimpots + other parts £1:10. Pack with
51A 200V SCR's + 60 other parts 60p.

VEROBOARD
Approx. 8 pieces, total 100 sq. ins. assorted sizes and pitches £1-15.

CAPACITORS
200 Mica, ceramic, poly, etc. £1 15.00
£42. 15 diff, trimmers, air-spaced and compression up to 1250pF, Only £1. 71b BARGAIN PARCELS

TID BARGAIN PARCELS
Hundreds of new components—
resistors, capacitors, pots, switches
+ PC boards with transistors and
dlodes, also loads of odds and ends.
Contents always changing as new
stocks arrive £2-60.

TRANSFORMERS

TTRANSFORMERS
All mains primary, 6-0-8V @ 100mA
\$5p; 9-0-8V @ 100mA 90p; 12-0-12V
@ 100mA 59p; 24-0-24V @ 500mA E2
Ex-equip: 22j-0-22jV @ 1A £2-10;
12V @ 15A £3-75; 18V @ 5A £3-40;
55V @ 5A £4-50.

HEAT SINKS 6 x 5 x 3" finned aluminium, with 2xOC29 or 2xOC35. Only £1.20,

POWER SUPPLIES

POWER SUPPLIES
G101: Mains transformer, 2A thermal cut-out, bridge rect. Will give 1-7V-10-5V output with 2 extra capacitors (provided). With data £1-30, G102: Stabilised supply giving 7½V @225mA (can be altered by changing zener). Not tested, probable minor fault. With circuit £1-10.
G104: Ex-LEO III. Contains 55V 5A transformer, 6 x 5 x 3" heat sink with 2xOC35, Stabiliser panel, 4x1000µF 63V caps, 1x4700µF 100V cap, etc. £12-50.

MICROPHONES
V996 Dynamic microphone 50k
Impedance, on/off switch, heavy destand. Very smart appearance £3:30
Crystal microphone insert 1" dia. 35p

Price increases, which we regret, are due to higher postal, packaging and advertising costs. Prices include 8% VAT and inland postage. SAE list, Computers, components and equipment always wanted for cash.

GREENWELD ELECTRONICS (PW4)

Mail order dept., retail/wholesale shop
51 SHIRLEY PARK ROAD, SOUTHAMPTON SO1 4FX. Tel. (9783) 772591
Also callers welcome at 21 Deptford Broadway SES, Tel. 01-692 2009 and
38 Lower Addiscombe Road, Croydon, Tel. 01-688 2950.

ULTRON COMPONENTS

35 PARK AVENUE, POTTERS BAR, HERTS. 01-882 4355

MAIL ORDER ONLY

CASH WITH ORDER, OR PHONE US

DISCOUNTS:-15% offfor 12 + 20% offfor 50 + 25% offfor 100 + COMPARE THESE PRICES—

Add 10p p & p for

ALL INCLUSIVE OF V.A.T.

Add 10p p & p for orders under £2.00

ALL TOP BRANDED MAKES, AND GUARANTEED

100			_		-				September 1989
AC126	13p	BCY42	27p	[MJE3055	65p	1 2N2907A		OCP71	75p
AC127	13p	BCY43	25p	MPF102	30p	2N2925	14p	ZTX 107	8p
AC128	13p	BCY58	16p	2N697	14p	2N 2926	9p	PL4005	10p
AC154	19p	BCY59	16p	2N698	28p	2N3053	18p	R.C.A.	
AC187	12p	BF154	16p	2N699	30p	2N 3054	42p	40309	30p
AC188	12p	BF177	27p	2N706A	11p	2N3055	44 p	40310	48p
ACY17	28p	BF182	33p	2N708	13p	2N3302	35p	40311	32p
ACY20	19p	BF183	83 p	2N914	16p	2N3440	50 p	40312	50p
ACY21	20p	BF185	20p	2N916	24p	2N3525	80p	40314	32p
ACY22	15p	BF195	20p	2N918	30p	2N3614	60p	40315	32p
ACY40	21p	BF196	11p	2N920	45p	2N3615	63p	40316	48p
ACY41	25p	BF200	31p	2N929	18p	2N3663	12p	40317	82p
ACY44	86p	BF274	18p	2N961	55p	2N3702	10p	40319	39p
AD149	45p	BFW88	19p	2N1131	20p	2N3703	10p	40320	32p
AD161	35p	BFW89	18p	2N1132	20p	2N3704	11p	28026	£8-00
AD162	35p	BFW91	17p	2N1302	16p	2N3705	10p	TIP33C	90p
AF114	13p	BFX29	25p	2N1303	16p	2N3707	10p	TIP35	£2.00
AF117	13p	BFX38	30p	2N1304	18p	2N3708	6p	T1P36C	£3.80
AF125	24p	BFX85	25p	2N 1305	23p	2N 3709	7p	Stud diod	les
AF139	32p	BFX87	23p	2N1306	23p	2N3710	11p	6 Amp	28p
AF178	49p	BFX88	21p	2N1307	28p	2N3711	11p	15p Am	45p
BC107	10p	BFY11	20p	2N1308	27p	2N3730	90p	Bridge	
BC107B	10p	BFY18	47p	2N1309	27p	2N3771	£1.10	Rectifiers	
BC108	10p	BFY19	54p	2N1671	90p	2N3773	£2·25	1A, 50V	24p
BC109	10p	BFY50	19p	2N1671A	95p	2N3791	£2.25	2A, 600 V	
BC109B	11p	BFY51	19p	2N1671B		2N3819	25p	4A, 200V	55p
BC113	13p	BFY64	33p	2N2160	60p	2N3866	70p	6A, 100V	
BC114	14p	BFY90	72p	2N2217	21p	2N3903	14p	S.C.R.s	
BC115	13p	BSW70	15p	2N2218	20p	2N3904	14p	1/05	30p
BC116	18p	B8X26	22p	2N2220	18p	2N3905	15p	1/10	35p
BC116A	14p	BSX67	26p	2N2297	27p	2N3906	15p	1/20	40p
BC117	18p	BY127	11p	2N2303	75p	2N4061	12p	16/400	80p
BC118	10p	BU105	£1.00	2N2369	13p	2N5458	27p	16/600	£1.20
BC119	22p	MEF103	35p	2N2369A	15p	OA81	15p	Triacs	
BC134	12p	MJ480	75p	2N2411	50p	OA91 OC20	£1.00	SC40D	£1-05
BC136	16p	MJ481	95 p	2N2646	44p	OC28	58p	SC45D	£1-30
BC137	16p	MJ490	85p	2N2846 2N2894	70p 35p	OC28	50p	8C45E	£1.45
BC138	16p	MJE371	60p	2N2894 2N2904A		OC35	48p	SC50D	£1.50
BC153 BC154	17p	MJE2801	£1-15	2N2904A 2N2905	45p 22p	OC36	50p	I.C.s	30
BC167B	17p 12p	MJE2955		2N2906	14p	OC71	30p	741	30p
BC183L	12p	mJ E/2909	£1.00		16p		200	1310	£2.40
DOTOST	TOD 1							1010	WE 40
		AND	M	ANY, N	IAN'	Y MOF	Œ		



learn how to become a radio-amateur in contact with the whole world. We give skilled preparation for the G.P.O. licence

•	 _	_	

Brochure, without obligation to:

BRITISH NATIONAL RADIO & ELECTRONICS

SCHOOL	Dept. W.B. 45, P.O. Box 156, JERSEY	
NAME .		

ADDRESS :_

BLOCK CAPS please

JCIENTRONICC

greet constructors with EXCLUSIVE INTRODUCTORY MONEY-SAVING OFFERS

SCIENTRONICS is a new company organised to develop and promote electronic designs of especial interest to constructors. We are privileged to offer, as our opening shot, a substantial quantity of selected items no longer part of the manufacturing programme of a famous manufacture. These include transistors by Ferranti, Texas, ITT and others made to stringent specifications, e.g., E 5401 with a guaranteed gain at 1 micro amp. All these transistors are brand new and guaranteed within the terms of our published specifications. S.A.E. brings full list by return. Leads on components are untrimmed.

TRANSIST					
GENERAL	NPN(N)	ONEOFF	VCE	HFE	m A
PURPOSE FRB 77	PNP(P)	PRICE in p	+50	Min.	
	۲.	7.5		100	
E 5368A	2 2		25	100	
E 5368B		7.5	25	150	!
E 5368C	N P	8	25	250	!
E 5369		7.5	20	70	1
LOW LEVEL					
₩E 5401	P	7.5	*30	50	IμA
■E 5403	P	7:5	*30	100	10µA
E 5404	N	7.5	*30	100	100µA
E 5405	Р	7 · 5	*30	100	100µA
DRIVERS & S	WITCHIN	G (tested for	law Vc	(set))	
FRB 772	P	8	40	40	
E 5370	Ň	5	20	15	500
		•		100	10
E 5398	P	8	40	40	60
E 5397	P	Ř	20	100	100
HIGH FREQ	HENCY M			,,,,	
E 5399	N N	7.5	30	20	9
E 5400	Ň	6 3	10	10	ĭ
XK 6116	Ň	š	20	iŏ	1
			20	10	
HIGH VOLT	AGE				
■E 5407	Ε.	9	65	50	10
 E 5408	N	7.5	65	50	10
QUANTITY	DISCOUN	TS (prices in	pence p	per device)	
Single 5 7		0.00	100	10	00
5	[4		3.6		-0
7		0	5 - 5		. 5
7 - 5		2	5-6		-6
8	7 -	4	5.7		· 9 · 5
9			6.5		

voltage operation as indicated—most can be selected for higher voltage working at an extra charge of 1p per device.

RESISTORS

Most values in E.12 series are available in 5% or 10% tolerances.

Miniature types $(\frac{1}{8} - \frac{1}{4})$ watt). Quantity rates apply for orders of same value. 0.8p each: 10 of same value 7p 100 - 55p: 1000 £4:50

CAPACITORS

CERAMICS

1·1p to 2p each in a range of useful values. 10p to 18p for 10; 77p to £1·45 for 100; £6·25 to £11·75 for 1000

ELECTROLYLIC 10-50v; I to 220mF from 3p each; 27p

for 10; £2-20 for 100; £17-25 for 1000. /SWITCHES/TRANSFORMERS/KNOBS/

NIXIE DISPLAYS/SWITCHES/TRANSFORMERS/KNOBS/ NUTS/BOLTS, etc.—Send S.A.E. for full lists and prices— REAL MONEY SAVERS THESE.

ENQUIRIES: TRADE & BULK BUYERS INVITED. SPECIAL QUANTITY DISCOUNTS.

ORDERING & GUARANTEE

All goods guaranteed within terms of specification and in stock at time of going to press. Send cheque or money order with order, or if cash, send reg. post. Please state requirements clearly. Satisfaction guaranteed or your money refunded. MIN. ORDER £1-00 All goods sent post paid in U.K. Overseas

postage charged at cost.

V.A.T.—Add 8% to total value of order in U.K.

SCIENTRONICS

(Dept. P.W.4)
40 HIGH STREET, SOMERSHAM,
HUNTINGDON, CAMBS PEI7 3JA.
Telephone Somersham (04874) 321



Practical Wireless Classified Advertisements

The pre-paid rate for classified advertisements is 12p per word (minimum 12 words), box number 30p extra. Semi-displayed setting £10.00 per single column inch. All cheques, postal orders, etc., to be made payable to PRACTICAL WIRELESS and crossed "Lloyds Bank Ltd." Treasury notes should always be sent registered post. Advertisements, together with remittance, should be sent to the Classified Advertisement Manager, PRACTICAL WIRELESS, IPC Magazines Ltd. Fleetway House, Farringdon Street, London, EC4A 4AD for insertion in the next available issue.

Receivers and Components

AMPLIFIER RMS MODULES, Absolutely complete, £2.65 inclusive. LTE, 46 Minehead Road, South Harrow, Middx.

250mA. Cartridge Fuses 1½" 90p per 100.
Unused Carbon Resistors. 100 different 50p.
Unused W/W Resistors. 100 assorted £1 10.
100 Capacitor Mixture, 85p.
110. 8 to 28A. Nut & Bolt mixture 28p. Brass 38p.
18 Assorted Potentiometers Unused £1 15p.
EX Government Standard Jack Piuga \$4 to 55p.
EV Government Standard Jack Piuga \$4 to 55p.
EV 134 or 18 watt Bulbs. SBC, 78p. per doz.
Earphones EX Govt. 85p. per pair.
New Meter or Cassette Cases, stiff imitation ieather 6½" x 3½" x 4" Only 55p.
EX T.V. Speakers. Perfect. 3Ω eliptical 55p.
0'300mA Meters New. £1 175p.
7" Tape Spools 16p each.
All postage in U.K. included in price
SOUND SYSTEMS OF SUFFOLK SOUND SYSTEMS OF SUFFOLK 678 Fexhall Rd., Ipswich, Suffelk IP3 8NQ

INFLATION? PRICE INCREASES?
ATES SGS 7 WATT IC TBABIOAS
only 99p. Send £1·98, post 20p, for two.
Data included. PC Boards 55p each.
Post 10p. Watson, c/o 131 Buxton Street, London El.

Precision Polycarbonate Capacitors

All High Stability	— Extrem	ely Low L	errre	
440V AC (±10%)	63V R	ange		
6·1μF (1½"×½") 50p		±1%	±2%	±5%
0-22µF (14"×4") 59p	0-47µF	56p	46p	36p
0.25HF (14"×4") 689	1.0µF	66p	569	46p
0-47µF (14"×4") 719	2.2µF	80p	65p	55p
0-5µF (14 × 4") 75p	4.7µF	£1·80	\$1.05	85p
9-68µF (2"×1") 80p		\$1.64	\$1.29	\$1.09
1.0µF (2"×1") 919	10-0µF	£2-00	\$1.60	\$1.40
2-04F (2"×1") \$1-22		82-75	£2·15	\$1.90
TANTALUM BEAD C			ION AV	silable:
0-1, 0-22, 0-47, 1-0, 2-2,	4-7 6-R	F at 151	125V o	r 35V:
10.0uF at 16V/20V or	N. 20.0	LATE at 61	/10V 0	- 14V
38 OuF at 6V or 10V; 47	.O. 17 at 9	V or 6V	00.0.1	at SV
ALL at 10p each, 10 i	OME SE	10 10 44	ioo oggi	
	83/183L		Y50	20p
	84/184L		Y51	20p
	12/212L		Y52	20p
RC147/R/9 10s BC5	47/558A	12p AF	178	80p

BC155/7/8 18p BF194 12p OC71 BC162/182L 11p BF197 18p 2N3055 BC182/182L 11p | BF197 13p | 2N3055 50p | POPULAE DIODES—1N914 5p, 8 for 45p, 18 for 90p; 1N916 5p, 6 for 45p, 14 for 80p; 1844 5p, 11 for 80p; 1840 6p, 00, 1N4146 5p, 6 for 27p, 12 for 48p; 1N4001 54p; 002 5p; 003 64p; 004 7p; 005 74p; 006 8p; 007 34p; 002 5p; 003 64p; 004 7p; 005 74p; 006 8p; 007 34p; 006 8p; 002 5p; 003 5p; 007 34p; 006 8p; 002 5p; 007 34p; 006 8p; 002 5p; 008 5p; 004 7p; 006 8p; 007 34p; 100 8p; 002 5p; 002 5p; 002 5p; 003 5p; 004 7p; 005 8p; 107 3p; 100 8p; 002 5p; 004 7p; 007 8p; 100 8p; 007 8p; 100 8p; 002 5p; 002 5p; 002 5p; 003 5p; 004 7p; 004 5p; 00

Zeners for \$5.50. Exhibits, low noise carbon film 5%, $\frac{1}{2}$ W at 40° C, $\frac{1}{2}$ W at 70° C. E12 series only—from 2-2 Ω to 2-2 M Ω . ALL at 1p each, 8p for 10 of any one value, 70p for 100 of any one value, 8PECIAL PACK: 10 of each value 2-2 Ω to 2-2 M Ω (730 resistors) £5. EXILION PLASTIC RECUTFIERS—1-5 amp, brand new wiresended DO27: 100 P.I.V. 7p (4 for 28p); 400 P.I.V. 8p

(4 for \$0p).

BRIDGE RECTIFIERS—21 amp: 200V 40p; 350V 45p;

MARCO TRADING (Dept. W4), he old School, Edstaston, Sr. Wem, Stropshire. Tel: Whizall 464/465 (STD 094 872) (Propra, Mindoost Trading Ltd.)

COMPONENTS GALORE. Pack of 500 COMPONENTS GALORE. Pack of 500 mixed components manufacturers surplus plus once used. Pack includes resistors, carbon and W.W., capacitors various, transistors, diodes, trimmers, potentiometers etc. Send £1+10p p&p. C.W.O. To: Caledonian Components, Combact Board Theoreton Fife Strathore Road, Thornton, Fife.

ALLARD ELECTRONICS

Branded Components-Full Specification

TRANSISTORS	T.T.L's	T.T.L's Price ea.
Price sa.	Price sa.	7486 0.87
BC212/3/4 0·11	Price ea. 7400/1/2/3 0-14 7404/5 0-18	7490 0-65
BC157/159 0-18	7404/5 0-18	7491AN 0-98
BC158 0 11	7406/7 0.88	174119 1.68
TIP29a 0.49		74141 0-90
TIP30a 0.57		74154 1.66
TIP31a 0.61		74191/2/3 1.90
TIP32a 0.74		74196/7 1.20
TIP41a 0.68	7428 0.38	
T1P42a 0.90	7432/33 0-86	FULL RANGE
I.C's	7438 0.87	7400 SERIES
709C (DIL or TO)	7441/2 AN 0-75	in our
0.85	7470/72 0.27	
723C (DIL or TO)		FREE LIST
0.75		Over 1,500
741C TO 0.88	7475 0·54	semi-conduc-
741C DIL 0.32	7480 0.60	tor types plus
748C TO 0.44	7482 0.85	other compon-
748C DIL 0.40	7483 1.10	ents. S.A.E.
LM309K 2:00	7484 0.95	please.
NE555 0.65	7484 0.90	
ZN414 1·10		
TBA800 1.85		ERS CARBON
DIL SUCKETS		RACK
14 pin 0-15		G. 1" BUSH-
Ten for £1 if	SPINDLE 2" F	
ordered with I.C's	5K to 2 Meg S	
ZENERS	5K to 2 Meg	,, with D/P sw
BZY88 all volt-		0.82 es.
ages 0·10		
BZX61 series	5K to 2 Meg	, D/P sw
1.3w 0.17		Log only 0.62 ea.

299/301 BALLARDS LANE LONDON NI2 8NP 01-445-5188 MAIL ORDER ONLY. Cash with order Orders under £3 plus 15p P & P. Add VAT to total

LEDs. Red, green, yellow. Sizes: 0·lin, 0·125in, 0·l6in, 0·2in. Mixed bags all sizes and colours. 50—£5, 100—£9 including postage, VAT. CWO. Individual types and larger quantities by negotiation. Industrial Electronic Supplies (Stockport) Ltd., 181a Bramhall Lane, Davenport, Stockport, Cheshire.

BETA DEVICES

FOR BETTER PRICES

1	TRANSISTO				BRIDGE I	
	AC187/8 PF			0.04		0.20
П	BC107/8/9		IN4148			
ł	BC109C		BY127	0.14		0.80
	BC147/8		IN4001/2		25A 200v	\$2·00
	BCY70/71/7		IN4003/4	/5 0.06		
	BFX88		IN4006/7	0.08		
	BFY50		IN5401	0.11	33 ₹ 5 %	
	BFY51/52	0.12			1 watt 6.8	
	2N1132	0.25	7 SEG DI	SPLAYS	200v 5%	0.15
	2N1711	0.25	3015F		L.E.D.	
1	2N2646	0.80	DL707-L	ED#1 70	209-RED	0.17
	2N2905A	0.21	DL747-L	ED42-45	LED CLIE	0.02
	2N 3053	0.14			OP. AMP.	
	2N3055	0.38	D.I.L. 80		709C TO99	
ų	TIP29A	0.49	8 Pin			
	TIP30A	0.57	14 Pin			
	TIP31A	0.61	16 Pin	0.14	741C D.I.I	. 0.86
	TIP32A	0.74			723C D.I.I	. 0.80
	TIP41A	0.74	V.A.T.		747C D.I.I	
	T1P42A	0.801			748C D.I.I	. 0.36
H	7400N	0.16	74 SERIE	ST.T.L.	7474N	0.87
Į	7401N	0.18	7420N	0.18	7490N	0.63
	7402N	0.18	7427N	0.28	7492N	0.63
ı	7404N	0.19	7430N		7493N	0.82
					79712111	0.50
ı	7408N	0.28	7440N			0.70
1	7410N	0.18	7447N	£1.00		£1.26
ı	7413N	0.39	7472N	0.82	74141N	£1·13
1		W.O	. PLUS	P.P. 15	in TO	I
1		В	ETA DE	VICES		1
ı	263 THE	RIDG	EWAY.	ENFI	LD. MID	DX.
•						

NEW COMPONENTS post free. 8% VAT included. 2N3702, 2N3704, 9p. Guest UPM 050 ½ W Carbon Film resistors Ip each. Seven segment common anode LED displays, 0·3in. DL707 E1-90, 0·6in DL747 £2.38. Siemens B32540 250V Polycarbonate 0·01, 0·015, 0·022, 0·033, 0·047, 4p; 0·068, 0·1µF, 5p. Triac TAG 250 400V/8A, 75p. D32 diac 25p. 300W Light Dimmer, £2.75. Delivery from stock or your money returned. Greenbank Electronics, 94 New Chester Road, Wirral, Merseyside L62 5AG.

NEW MODEL V.H.F. KIT MK2 Our latest kit. Improved design and mycomance plus extra amplifier stage, receives alreafs, amateurs, mobile, radio 2, 3, 4, etc., this novel little set will give you endless hours of and can be built in one evening built

emplifier.
Only £4-50 +p&p 30p U.K. only. illustrated catalogue of selected kits and components, 35p Inc. VAT. P&P free.

ALL PRICES PLUS 8% VAT Galleon Trading Co, 12, Burrs Way, Corringham, Stanford-Le-Hope, Essex, SS17 9DE

BRAND NEW COMPONENTS by return. Electrolytics, 15V, 25V, 50V 0.47, 1, 2·2, 4·7, 10 Mfds.—4p. 22, 47—4¹-p (50V—5p). 100—5¹-2p (50V—7p). 220—6p (50V—9p). Subminiature beadtype tantalums 0·1/35V, 0·22/35V, 0·47/35V, 10·35V, 2·2/35V, 4·7/35V, 10·1/35V, 2·2/35V, 4·7/35V, 10·1/35V, 0·22/35V, 0·47/35V, 10·1/35V, 0·22/35V, 0·47/35V, 10·1/35V, 0·22/35V, 0·47/35V, 10·1/35V, 0·22/35V, 0·1/35V, 0·22/35V, 0·1/35V, 0·22/35V, 0·1/35V, 0·



corders from £2 ea.

MULTI-BAND RADIOS. Grundig Satellit, 13 band, £129; Koyo, mærine, aircraft, PSB, FM, SW1, SW2, MW, LW, batt/mains, £44; 4-band, MW, FM, aircraft, PSB, £14. SAE lists. Langtons Radio, High Street, Rocester, Staffordshire. 088 923 388.

Ladders

LADDERS. timber and aluminium. Tel: Telford 586644 for brochure.

Situations Vacant

vours

Jobs galore? Tens of thousands of new computer personnel needed over the next few years alone. With our revolutionary, direct-from-America, course, you train as a Computer Operator in only 4 weeks! Pay prospects? £3500 + p.a.

London Computer Operators Training Centre subscribes to the British Government backed National Computing Centre code of practice for Computer Training Schools so you know your training will be second to none

After training, our executive appointments bureau—one of the world's leaders of its kind—introduces you FREE to world-wide opportunities. Write or 'phone TODAY, without obligation.

London Computer Operators Training Centre

V22. Oxford Hee. 9-15 Oxford St. W1. Tel: 01-734 2874

Service Sheets

SERVICE SHEETS, Radio, TV etc., 8,000 models. Catalogue 20p. S.A.E. enquiries. Telray, 11 Maudland Bank, Preston.

LARGE SUPPLIER SERVICE SHEETS

(T.V., RADIO, TAPE RECORDERS, RECORD PLAYERS, TRANSISTORS, STEREOGRAMS, RADIOGRAMS, CAR RADIOS) ALL AT 50p EACH

"PLEASE ENCLOSE LARGE S.A.E WITH ALL ENQUIRIES & ORDERS"

Otherwise cannot be attended to (Uncrossed P.O.'s please, original returned if service sheets not available.)

PLEASE NOTE
We operate a "by return of post" service. Any claims for non-delivery should be made within 7-days of posting your order.

C. CARANNA

71 BEAUFORT PARK LONDON, N.W.11 6BX

We have the largest supplies of Service Sheets (strictly by return of post). Please state make and model number alternative.

Free TV fault tracing chart or TV list on request with order.

Mall order or phone 01-458 4882

BELL'S TELEVISION SERVICES for Service Sheets, Manuals, Books on Radios, TVs, etc. Service Sheets 50p plus SAE. Free booklists on request. Back issues of PW, PE, EE, TV available 25p plus 9p post, SAE with enquiries.—BTS (Mail Order Dept.), 190 Kings Road, Harrogate, Yorks. Telepnone (0423) 55885.

Educational

GO TO SEA as a Radio Officer. Write: Principal, Nautical College, Broad-water, Fleetwood FY7 8JZ.

TELEVISION TRAINING

16 MONTHS' full-time practical and theoretical training course in Radio and TV Servicing (Mono and Colour) for beginners.

13 WEEKS' full-time Colour TV Servicing course. Includes 100 hours practical training. Mono revision if necessary. Good electronics background essential.

NEXT SESSION commences on April 21st.

Prospectus from: London Electronics College, Department B4, 20 Penywern Road, London SW5 9SU. Tel. 01-373

C AND G EXAMS

Make sure you succeed with an ICS home study course for C and G Electrical Installation Work & Technicians Radio/TV/Electronics Technicians. Telecomms Technicians and Radio Amateurs.

COLOUR TV SERVICING

Make the most of the current boom! Learn the techniques of servicing Colour and Mono TV sets through new home study courses, approved by leading manufacturers.

TECHNICAL TRAINING

Home study courses in Electronics and Electrical Engineering, Maintenance, Radio. TV, Audio, Computer Engineering and Programming. Also self-build radio kits. Get the qualifications you need to succeed.

Free details from:

INTERNATIONAL CORRESPONDENCE SCHOOLS, Dept 732, Intertext House, London SW8 4UJ. Or Phone 01-622 9911 (All Hours)

Aerials

J. and A. TWEEDY
(Electronic Supplies) Limited
Full range of Jaybeam Aerials available
We supply High Gain Multibeam aerials.
Carriage and VAT included in the quoted price.
MBM 48 £5-06, MBM 70 £11-06.
MBM 48 £5-06, MBM 70 £11-06.
PARABEAM UNF TV AERIALS PBM 12 £4-06,
PBM 18 £5-06.
STEREOBEAMS FM AERIALS SBM 2 £3-06,
SBM 3 £4-06, SBM 5 £5-06, SBM 6 £8-06.
SAE for full list of accessories available—Low
Loss Co-ax 12p/m.
79 Chatsworth Road, Chesterfield, Derbyshire
Tele: 34582

For Sale

PW, WW, HI-FI NEWS, Radio Constr., etc. 1950-70. 450 mags. Mostly com-plete volumes. Birmingham. Box No.

SELLING COMPLETE: Volumes Practical Wireless between 1953 and 1969. Offers, SAE please. Box 123.

HRO-MX, twelve coils, power unit, "Q" multiplier; £45. Mitchell, Tel: 0484 842777 (Yorkshire).

SOUNDLIGHT CONVERTORS. 3 channel 1.5 kW £17; 3kW £25; 1 channel lkW £9. STROBES: from £21. SEQUENCERS (Chasers): £93, etc. Call or catalogue sent. Aarvak Electronics, 98A (P), West Green Road (side door), London N15 5NS. Tel. 01-800 8656.

THYRISTORS, BT106, branded products, 95p each. Tantalum Bead Capacitors IMFD 35V, 22MFD 16V 12p each. Prices are exclusive of VAT. CWO plus p.p. 10p. Pace Electronics Ltd., 138 Glebe Road, Deanshanger, Milton Keynes, MK19 6NB.

COPPER CLAD LAMINATE
FOR
PRINTED CIRCUITS
Single sided 1/16" paper base—1-0p/sq. inch.
Single sided 1/16" paper base—1-0p/sq. inch.
Any rectangular sizes cut to your requirements.
Please send cash with order,
Price includes postage and packing.
From: SIMTECH ENGINEERING LTD
VOLUNTARY PLACE
WANSTEAD
LONDON E.11. 01-530-4246.

MICROPHONES: AKG D109, £12.65; AKG D202EI, £43.45; AKG D190C, £18.70; AKG D190E, £20; AKG D224 £55; Sennheiser MD211N, £49.50; Sennheiser MD413N, £29.70. All brand new and boxed. Send CWO to J. J. Francis, (Wood Green) Ltd., Manwood House, Matching Green, Harlow, Essex. Tel: Matching 476.

GREENBANK ELECTRONICS. New components. Digital Clock chip AY-5-1224 + data £3·66, data alone 16p (refundable on order). DL747 0·6in "Jumbo" LED display now only £2·04. ½ W Carbon Film Resistors 4·7 ohm to 4·7 Meg 1p each. Triac TAG 250-400 8A, 69p. D32 diac 23p. 1N914/4148 3p. 2N3702/3704 9p. Post free, add standard VAT. 94 New Chester Road, Wirral, Merseyside L62 5AG.

Wanted

AVO. 7 & 8 any condition. Any quantity. Huggett's, 2 Pawsons Road, W. tity. Hug Croydon.

EARLY WIRELESS receivers, com-ponents and magazines, details to Johnson Raffles, Haverbreaks, Lancaster.

TOP PRICES PAID for NEW VALVES and TRANSISTORS

popular T.V and Radio types. KENSINGTON SUPPLIES (C). 367 Kensington Street, Bradford 8. Yorkshire.

WE BUY New Valves, Transistors and clean new components, large or small quantities, all details, quotation by return. WALTON'S, 55 Worcester return. WALTON'S, Street, Wolverhampton.

"RADIO & TV SERVICING" books wanted from 1961 onwards. Any quantity. £2:00 paid per copy by return of post.—Bell's Television Services, 190 Kings Road, Harrogate, Yorkshire. Tel. (0423) 55885.

Books and Publications

ON ELECTRONICS

£1 · 60 Electronics £1.60
—An elementary introduction for beginners (SI Units). The eagerly awaited step by step explanation for those meeting with the subject for the first time.

Mullard Publications

Integrated Circuits	50p
Thyristors	60p
Magnetic Core	
Memories	50p
Simple Transistor	
Measurements	30p
Simple Valve	
Measurements	30p
Principles of X-Rays	30p
Principles of	
Electrostatics	30p
A Simple Closed Circuit	
Television Camera	.90p
(A Construction Manual)	
(Prices include postage & pac	king)

SELRAY BOOK COMPANY 60, Hayes Hill, Hayes, Bromley, BR2 7HP.

Technical Books -

naulo Electronii	_
World's Radio & TV Stations (International Edit).	.£0.68
Audin Amplifiers	.£0.70
Boys Book of Crystal Sets & Simple Circuits	,£0.33
Television Timebase Circuits	£1.15
Radio TV and Industrial Tube & Valve Equiv	.£0.68
How to get the best out of your Tape Recorder	.£1.67
Modern Electronic Troubleshooting	.£1.55
Jack Darr's Service Clinic	
Transistor Circuits for Modern Test Equipment	. LU.00
Rad & Electr Colour Codes and Data Chart Handbk of Transistor Equiv. and Substitutes	.EU.2U
Hi Fi, PA & Disco Amplifier Design Hndbk	£0.46
Radio Servicing Problems	£0.75
Electronic Circuits for the Amet Photographer	£0.68
Handbook of Simple Transistor Circuits	.£0.40
TV Fault Finding	.£1.10
Sound and Loudspeaker Manual	.£0.60
TV Technicians Bench Manual	£2.80
Radio Amateur Operator's Handbook	.£0.85
Television Servicing Vol. No. 1	£1,00
Television Servicing Vol. No. 3	CO 75
Television Servicing Vol. No. 4	61.00
Radio Technicians Bench Manual	£3.30
Servicing Transistor Radio Receivers	
1st Book of Hi Fi Loudspeaker Enclosures	. £0.68
2nd Book of Hi Fi Loudpeaker Enclosures	.£0.68
Manual of Electronic Circuits for the Home	
Modern Crystal Set Circuits for Beginners	
Electronic Novelties for the Motorist	EU.58
Handbook of Electronic Musical Novelties	£1.07
Transistorised Novelties for Hi Fi Enthusiast	£0.40
Fault Location Exercises in Rad.& TV Vol.1	£0.95
Fault Location Exercises in Rad & TV Vol. 2	.£1.55
Colour TV Picture Faults	, .£2.70
Practical Transistor Novelty Circuits	.£0.48
Boys Book of Practical Radio & Electronics	.£0.68
Radio Receiver Construction using ICs & Transis.	EU.68
1Cs & Transistor Gadgets Construction Handb'k	, LU.68
Integrated Circuits Equiv.& Substitutes Hbk Audio Technicians Bench Manual	
Improving your Hi-Fi	
Guide to Printed Circuits	£2.30
Receiving Pal Colour Television	f5.35
Receiving Pat Colour Television	£3.80

All prices include Postage & Packing RADIO BOOK SERVICE 40 Elwill Way, Beckenham BR3 2RZ

Miscellaneous

HEADPHONES: 8 ohms. Suitable communications receivers, £3.39. Partridge Electronics Ltd., Broadstairs, Kent.

LOW COST I.C. MOUNTING. Lengths of 100 I.C. pin sockets, 60p (p & p 5p). Quantity rates, SAE details & sample. L.E.D. (MLED500), 20p each. (post paid). P.K.G. Electronics, "Oak Lodge", Tansley, Derbyshire.



MINI ACCUMULATORS GARFIELDS, 269 Rye Lane, London, S.E.15

HAVE YOU HAD YOUR CHIPS? AY-5-1224 Digital Clock chip now £3.95 inc. VAT, post free. Circuit and de-tails s.a.e. GREENBANK ELEC-TRONICS (Dept. 322), 94 New Chester Road, Wirral, Merseyside L62 5AG.

SIMPLE TO FORM
NON-MAGNETIC RUST PROOF MILL FINISH

ALUMINIUM

FLAT MINI SHEETS 10ins. x 14ins. 20 swg (0.90mm.) 6 sheets for £2 incl P&P

OTHER SIZES AVAILABLE For general car repairs,

trims, kick plates, etc. BAYKIN ENGINEERING LTD.

(Dept. PW)
GREVILLE ROAD, BEDMINSTER, BRISTOL, BS3 1LL

EX-EQUIPMENT COMPONENTS. Indiext-EQUIPMENT COMPONENTS. Indi-cators modifiable to aerial direction monitors, chokes, relays, switches, instruments fuse holders, push but-tons, caps, etc. SAE for list. Eldun Electronics, 16 Raven Road, Timperley, Cheshire.

Add 10p P. & P. tor orders under £2. Data. and circuits where appropriate, supplied with orders or available separately 41or available stamp each).

3 Digit DIP LED calculator £1:35+VAT=£1:45

MN30250NT+8XDL/04
0-3In LED's
Complete circuits and special prices for MK50250N with LED's, Minitrons or SP352's.
SINTEL, 53n ASTON ST, OXFORD Tel (0865) 43203

SUPERB INSTRUMENT CASE by Bazelli, manufactured from heavy duty PVC faced steel. Hundreds of Radio, Electronics and Hi-Fi enthusiasts are observed to the control of the co SUPERB INSTRUMENT choosing the case they require from our range of over 200 models. Gen-erous trade discount. Fast despatch. Free literature, Bazelli, Department No. 25, St. Wilfrids, Foundry Lane, Halton, Lancaster LA2 6LT.

FANTASTIC NEW MICROTEST

MEASURES ONLY

90×70×18 mm



Amazing Value at £11.95

8 fields of measurement and 40 ranges

ARU 4U ranges $\begin{array}{c} \textbf{ARU 4U ranges} \\ \textbf{200V.} & -1000V. & (20k \, \Omega/V) \\ \textbf{201V.} & -1000V. & (20k \, \Omega/V) \\ \textbf{Voits A.C. 5 ranges: } & 1.5V. -10V. -50V. -250V. -1000V. & (4k \, \Omega/V) \\ \textbf{Arp. D.C. 6 ranges: } & 50 \mu A & -500 \mu A & -5 m A -500 \mu A -5 m A -500 \mu A -5 m A -250 \mu A -2.5 m A -250 \mu A -2.5 m A -250 \mu A -2.5 m A -250 \mu A -2.5 m A -250 \mu A -2.5 m A -250 \mu A -2.5 m A -250 \mu A -2.5 m A -250 \mu A -2.5 m A -250 \mu A -2.5 m A -250 \mu A -2.5 m A -250 \mu A -2.5 m A -250 \mu A -2.5 m A -250 \mu A -2.5 m A -250 \mu A -2.5 m A -250 \mu A -2.5 m A -250 \mu A -2.5 m A -250 \mu A -2.5 m A -2$

1000V.

Decibels 5 ranges: + 6dB, +22dB, +36dB, +5ddB, +62dB

Capacity 4 ranges: 25µF - 250µF - 2500µF - 25,000µF -



SUPERTESTER 680R ICE
2,000 Ohm per Voit/sensitivity Fully screened
squarist external magnetic
fields Scale width and
small case dimensions (128
x 95 x 32mm) Accuracy
2% in A.C.) of indicated
and stability (1% in D.C.,
2% in A.C.) of indicated
screening Simplicity and
ease of use and readibility Full ranges of
accessories 1000 times overload Printed
circuit board is removable without de-soldering
More ranges than any other
meter. Ask for free catalogue £18*50 SUPERTESTER 680R ICE

Accessories (extra) available to convert Microtest 80 & Supertester 890R into following: SIG NAL INJECTOR, GAUSS METER, ELECTRONIC VOLTMETER AMPERCLAMP, TRANSISTOR TESTER, TEMPERATURE PROBE, PHA SE SEQUENCE INDICATOR—Send for details.

MORE RANGES FOR LESS MONEY! AC/DC Multimeter type U4324

AC/DC Multimeter type U4324
A-DC 0-06-3A - 6 Ranges.
A-AC 0-3-3A - 5 Ranges.
V-DC 0-6-1200 V - 9 Ranges.
V-DC 0-6-1200 V - 9 Ranges.
Freq.: In the range of 45 to 20kHz.
Freq.: In the range of 45 to 20kHz.
Resistance: 500 Ohm to 5 Mohm-5 Ranges. Decibel: -10 to + 12dB.
Accuracy: ± 2-5% DC. ± 4% AC Dimensions: 167 x 98 x 63 mm.

Only £8'85

ALPHANUMERIC NIXIE TUBES 87971
The Alphanumeric NIXIE tube has the ability to display all the letters of the alphabet, numerals 0 thrugh and special characters in a single tube. From the standpoint of both





From the stand-point of both readability and electrical characteristics, the Alphanumeric NIXIE tube provides many unique benefits including ½ 170v-21mA ½ All d.c. operation ½ Uniform, continuous line characters of equal height ½ Memory with simple solid state drive circuits ½ Readability in high ambient light 200 footlamberts brightness ½ Cong life with no loss of brightness ★ Character height 2½in.

Price only 99p each plus 16p P/P. Bases for above 80p each.

IUST ARRIVED!! NUMERIC INDICATOR TUBES

Ultra-long life, high quality, 0-9 and 2 independent decimal points. Supply voltage 200V D.C. Current 14mA, Pulse duration 100µs. Character height 0-51, overall size 1-4.

Brand new, guaranteed. Surplus to manufacturers results a manufacturers.

and new, guaranteed. Surplus to manufacturing guirements. Type B58538t 55£1.00 25 + 90p 100 + 20p 1000 + price on application Add 8% VAT to all items + 35p P & P ELECTRONIC BROKERS LTD. 49-53 Pancras Road, London NW1 2QB

Tel: 01-837 7781

VALVES, TRANSISTORS, STYLI. Valves 1930 to 1975, 1,500 types in stock, many obsolete. List 15p. Transistors, list 15p. Diamond styli, 83p each, list 10p. 159 TV aerial chimney lashing. Heavy duty steel £250. Buyer collect. Cox Radio (Sussex) Ltd., The Parade, East Wittering, Sussex. West Wittering 2023. Wittering 2023.

Synthesiser Sounds Supreme

by Dewtron (VAT extra.)

Famous kits, e.g. waa-waa complete kit £3·50; Fuzz kit £5·50. P & P 25p under £10. Ring Modulator modules £9. "Mister Bassman" Bass Pedal Units and whole range of synthesiser modules, musical novelties, etc. Catalogue 15p from D.E.W. Ltd., 254 Ringwood Road, Ferndown, Dorset.

PRINTED CIRCUITS. PCB for any Practical Wireless and Practical Electronics project, 50p per board. From individual patterns £1, plus 5p per sq in. Add VAT plus 5p P & P per board. Mail order only. TEC, 241 Burnt Oak Broadway, Middlesex.

P.W. EASY-BUILD ORGAN

SET OF TWO P.C.B's £7 20 SET OF THIRTEEN MOS I.C.s £21 -65 SET OF ALL SEMICONDUCTORS £26 - 70 SET OF ALL SEMICONDUCTORS PLUS THE P.C.B.'s

ALL INCLUDE P & P AND V.A.T.

FORESIGHT ELECTRONICS 62 HIGH ST., CROYDON, SURREY

PCBs PRODUCED quickly. 5p/sq in, 50 minimum. FERRIC CHLORIDE, strong solution, 500ml bottle, £1-95. PCB INK (blue etch resistant) 175cc bottle, £1-25. P.W. easybuild organ keyboard, fitted gold contacts and resistors. One only, £22-00. Prices inclusive. Cheques, POs to J. F. Haggins, 8 Portnall House, Portnall Road, London W9 3BH.

DON'T LOOK

unless you can resist the temptation to get these super 'attention-getters':

- * Pocket-sized MAXI-VOLT Big inch Spark Generator (instant 15,000 volts!). Ready-made, needs no batteries. Carry it around any-where. Only weighs about 3 oz. (89g.) send £1.90 for your Maxi-Volt now! Volt now!
- Unique TRANSMITTER/RE-CEIVER Kit. No licence examinations or tests required to operate this transistorised equipment. Easy to build. Get transmitting. Send
- ★ Psychedelic MINI-STROBE Kit. Take a pocket-sized lightning storm to Disco's & parties. 'Brain-freeze' to Disco's & parties. Brain-freeze'em with vari-speed stop-motion flashes. Includes super case too. Send £2.90 now! (all prices include V.A.T., packing & postage.)

Send remittance to:

BOFFIN PROJECTS, 4 CUNLIFFE ROAD, STONELEIGH, EWELL, SURREY

(Mail order U.K. only)
Or for more details, send 20p for lists

P.W. CRATA F.M. TUNER. Set of five P.C. boards £3, p&p 20p. Other com-ponents available. S.A.E. for lists. Teleradio, 325 Fore Street, Edmonton London N9 0PE.

PRINTED CIRCUIT MANUFACTURERS OFFER, PCBs for All PE and PW projects published after June '74, at one price, 70p each. Any 5, £2.85. PCB sets for: PW Tele-tennis, £3.50. Sandown Tuner with screens, £2.20. PE CCTV, £1.45, Power Slaves, £1.35; Scorpio Ignition, 'WW' Ferret Metal Locator, 65p each. CWO Prices inclusive. PRODUCTION SPACE AVAILABLE FOR: PCB production, PCB and electronic design, electroplating, silk-screening, roller tinning, photography and all artwork. Estimates by return post or phone. WKF Electronics Wellbeck Street, Whitwell, Worksop, Notts. Tel: 695. PRINTED CIRCUIT MANUFACTURERS



TREASURE TRACER

MK III Metal Locator

- Varicap tuning
 Britain's best selling metal locator kit
 Weighs only 220z.
 Speaker and earphone operation
 Knocks down to only 17in.
 Prebuilt search coil assembly
 Thoroughly professional finish
 As seen on BBC1 and BBC2 TY
 You only need soldering iron, screwdriver, pliers and snips
 Five transistor circuit

Send s.a.e. for leaflet

Complete £9.80 Built, tested £13.75
PAP 60p - 18p VAT PAP 60p, - £1:10 VAT MINIKITS ELECTRONICS, 5a CLEVELAND ROAD, LONDON, E18 2AN (Mail order only)

ANTIQUE WIRELESS ENTHUSIASTS! ANTIQUE WIRELESS ENTHUSIASTS: For all your requirements in obsolete radio, contact "Tudor Rees." 1975 Full catalogue now available, 40p post paid. Antique Wireless Service, 64 Broad Street, Staple Hill, Bristol, BS16 5NL. Tel. 0272 565472.

LOWEST COST IC SOCKETS. Use Soldercon IC socket pins for 8 to 40 pin DIL's. Make 8 pin sockets for 40 pt 14 pin for 7p (at 300 pin price). 70p for strip of 100 pins, £1·50 for 3 x 100 £4 for 1000. 10p p&p for orders under £2. Add 8% VAT. Instructions supplied—send sae for sample. SINTEL, 55n Aston Street, Oxford, Tel: 0865 43203.

12 VOLT 21" 13 (Watt Fluorescent Lighting (by Thorn/AE)) with diffuser & on/off switch, ideal caravan, boat, emergency lighting,etc. Guaranteed.



£5 . 50 inc. VAT & Post, List price £7.02 inc. VAT SALOP ELECTRONICS 23 Wyle Cop. Shrewsbury, Shropshire Tel. 53296 Shrewsbury, Shropshire

HARDWARE. Comprehensive range of screws, nuts, washers, etc. in small quantities, and many useful Constructors' items. Sheet aluminium to individual requirements, punched, drilled, etc. Fascia panels, dials, nameplates in etched aluminium. Printed circuit boards for this magazine and other individual requirements, one-offs and small runs. Machine engraving in metals and plastics, contour milling. Send 2 x 412 p stamps for catalogue. Ramar Constructor Services, Masons Road, Stratford on Avon, Warwicks., CV37 9NF.

AMBIT INTERNATIONAL

INTEGRATED		TRANSISTOR	-
CA3053	40 p	BF256L	14p
CA3089E	1.94	MEM614/5	34p
CA3090AO	£3·75		38p
CA3030AQ CA3123E	£1-40		50 p
CT7001	£9-80		99p 60p
ICL8038	£3-10	11123055	anb
LM309K	£1.90	7 SEG LED DIS	D1 4 V
LM380N	£1 00		
LM381N	£1 ·85	DL704 cc red	95p
LM1496	£1.02	SLA7 ca red	£1 · 50
LM3900	68p	SLA21 ca yellow	£1.75
NE550	80p		_
NE555v	78p	TOKO FILTERS	۶,
NE560B	£3·19	COILS	
NE561B	£3·19	CFK10.7	60p
NE562B	£3-19	CFS10.7	40p
NE565 A	£2.75	CFT455/470	45p
NE566v	£2.55	MFH41/71T	£1.75
NE567v	£2:75	BBR3125N	£1:30
и A 720	£1 · 40	BLR3107	£1:75
u A 723	80p		ch 27p
u A741	40p	set of 3	60 p
uA753	99 p		
uA7805UC	£1.50	FM RADIO	
uA7805KC	£1.75	Larsen complete	
TBA120A	£1.00	tunerset 7252	£20
TBA651	£1-81	Larsen head 8319	
TBA810s	£1 · 30	TOKO head 5603	
TDA1200	£1 · 94	TOKO head 703	
SN76660N	£1.00	3089E quad coll	36p
7400	20p	3089E 22uH	15p
7413	38p	3090 A Q 2mH	30p
7446/7	£1 · 20		
7448	£1 · 25	KITS	
7490	71 p	CA3090AQ	£6 · 40
74121	38p	bullt	£7.60
74192	£1.57	MC1310	£5-40
745112	£2·30	FM1185 built	£4·35
78L12	45p	TBA810s	£2·75
9368	£2 · 20		
9582	£2·50	VAT 8%	
95H90	£9·90	p/p 15p	

STAR ITEMS

CT7001 Clock/Calendar chip with 24hr alarm and two auxiliary timers £9.80

7252 Larsen tunerset. VHF-FM to audio. Voltage tuned with AFC 8038 Sine, square and triangle waveform generator with voltage control £3·10

CA3090AQ PLL stereo decoder with stereo defeat. New low-noise version of this industry-standard RCA IC £3.75

LM380/1 2 Watt four terminal audio power amplifier and low noise stereo preamplifier £1.00/£1.85

DATA

1 page free on request with everything we sell. Data booklets free with ICL8038 CA3089E, LM380, EF5603

CATALOGUE

Contains data and applications on our range of high technology IC'S.

Price 25p inc. VAT and postage.

37a High Street, Brentwood, Essex CM14 4RH. (216029)

CARDIFF ROAD, WATFORD, HERTS, ENGLAI MAIL ORDER. CALLERS SATURDAYS ÖNLY

Send 10p postage for our comprehensive catalogue

WO A NOICE	ORS (less 10	9/ for 25 ± of on	e type)		
		/	I OC81 24p	2N1131 20p	2N3773 240p
AC125 13p	1 BC149C 8p		OC82 15p	2N1132 20p	2N3819 24p
AC126 11p			OC83 20p	2N1301 20p	2N3820 38p
AC127 11p				2N1302 20p	2N3823 60p
AC128 11p				2N1302 20p	2N3824 50p
AC176 11p			OC201 70p	2N1304 24p	2N3904 15p
AC187 12p	BC167 12p		TIP29 43p	2N1305 24p	2N3905 17p
AC188 11p				2N1306 24D	2N3906 17p
ACY17 35p				2N1307 24p	2N4037 35p
ACY19 25p			TIP30 48p	2N1893 30p	2N5457 30p
ACY20 24p			TIP30 A 54p	2N1990 45p	2N5458 30p
ACY21 29p				2N2217 23p	2N5459 30p
ACY22 16p				2N2303 25p	2143435 OOP
AD140 48p			TIP33 95p	2N2483 30p	DIODES
AD149 48p			TIP34 130p	2N2646 31p	AA120 10p
AD161 78p	BC182 10p		TIP42 70p	2N2906 15p	BY100 18p
AD162 78p		BFY53 17p	TIP42 74p	2N2907 18p	BY127 11p
AF114 13p			TIS43 26p	2N2926R 9p	BY164 35p
AF115 13p	BC212 12p			2N2926O 9p	BYZ11 25p
AF116 18p			TIS44 17p	2N2926Y 9p	OA5 38p
AF117 13p			ZTX108 10p	2N2926G 9p	OA9 9p
AF118 40p			ZTX109 12p	2N3053 18p	OA79 10p
AF121 33p			ZTX300 12p	2N3054 42p	OA81 8p
AF124 30p	BCY58 18		ZTX300 14p	2N3055 45p	OA85 13p
AF125 30r	BCY59 18		ZTX302 18p	2N3614 59p	OA90 6p
AF126 30p			ZTX304 22p	2N3615 65p	OA91 6p
AF127 30r			ZTX311 10p	2N3702 12p	OA200 6p
AF139 33p			ZTX341 19p	2N3703 12p	OA202 6p
AF181 45			ZTX500 15p	2N3704 12p	PL4001 6p
AF186 48p			ZTX502 18p	2N3705 12p	PL4004 6p
AF239 38			ZTX504 42p	2N3706 10p	PL4007 6p
BC107 9p			ZTX531 23p	2N3707 10p	1N914 5p
BC108 9p			ZTX550 18p	2N3708 8p	1N4001/2 5p
BC108B 11			2N706 11p	2N3709 8p	1N4003 6p
BC109 101 BC109C 111			2N708 16p	2N3710 9p	1N4004/5 6p
			2N918 40p	2N3771 140p	1N4006/7 7p
BC147 70 BC148 70			2N930 18p	2N3772 160p	1N4148 5p
DC148 /	1 1 11/19 33	7 1 0 0.4 LOP			

TTL 74				
DIGITAL ICS	Less	5% for 15+ m 10% for 25+ r 15% for 50+ r	nixed nixed	SPECIAL OFFER While stocks last
7400 14p 7428 7401 14p 7430 7402 15p 7432 7403 15p 7433 7404 18p 7437 7405 18p 7438 7406 38p 7440	38p 7473 15p 7474 25p 7475 36p 7476 27p 7480 27p 7481 15p 7482	33p 74121 32p 74123 47p 74141 32p 74151 44p 74153 99p 74155 75p 74156	32p 63p 75p 69p 69p 70p	709C 8 pin 27p 723C 14 pin 50p 741C 8 pin 26p 748C 8 pin 26p TBA 800 95p ZN 414 105p
7407 38 7441 7408 15 7442 7410 15 7443 7410 15 7443 7411 20 7445 7412 20 7445 7412 20 7447 7414 60 7448 7416 35 7457 7450 15 7450 7450 15 7450 7460 7460 7476 7460 7476 7460	75p 7483 65p 7484 120p 7485	83p 74160 125p 74167 334p 74170 47p 74172 80p 74176 48p 74184 63p 74185 72p 74190 40p 74192 40p 74193 33p 74193	101 p 143 p 315 p 215 p 540 p 103 p 106 p 160 p 160 p 160 p 128 p 128 p 210 p	OPTO ELECTRONICS Minitrons 3105F 7 seg display 110p OCP70 40p OCP71 85p ORP12 58p ORP60 45p ORP61 46p LED TIL 209 (Red) (with socket) 180

							- 1
LINEAR I		ess 5 % 50 + m	ixed)	BRIDGE RECTIFIER	SCR (Thyristor)	DIL	
	50p	MC724	60p	(plastic case)	1 A 50V 38p	8 pin 14	
723C		MC1303L	130p	1A50V 20p	1A 100V 42p	14 pin 14	
741 C	26p	MC1304P	360p	1A100V 21p	1 A 400V 52p	16 pin 15	
747C	80p	MC1310P	240p	1A200V 24p	1A 600V 70p	24 pin 75	Р
748C	26p	MC1710CG	60p	1A600V 25p	3A 100V 44p	ALUM.	-
7805 (T03)	160 p	MFC4000B	39p	2A50V 30p 2A100V 35p	3A 400V 75p	BOXES	
AY-1-0212	5 50p	MLM309K	158p	2A200V 40p	3A 600V 91p	23x51x11" 45	D
AY-1-5051	1-15p	MVR12	170p	2A400V 44p	7A 600V 109p	4x4x11" 45	
CA3018	72p	NE555	55p	2A600V 45p	16A 400V 99p	4x23x11 45	
CA3035	135p	NE562	310p	4A800V 90p	MCR101 34p	4x5½x1½" 48	
CA3036	90p	PA263	195p	6A100V 58p		4x21x2" 50	
CA3046	55p	SL403D	150p		TRIACS	3x2x1" 38	
CA3048	210p	SL403D	150p		200 V 3A 91 p	7x5x21" 78	
CA3075	150p	SN76033	250p	ZENER	500V 3A 120p	8x6x3" 99	
CA3081	150p	SN76115	250p	DIODES	400V 6A 120p	10x7x3" 118	
CA3089E	199p	TAD100	140p	Range	500V 6A 150p		p
		TBA800	95p 150p	3·3V - 33V	DIAC	12x5x3" 120	
CA3090Q	310p	TBA810		400mW 9p	ST2 25p	12x8x3" 150	
LM300	170p	J ZN414	£105	1-3W 17p	1312 23p	121013 130	P

FUSES AND HOLD	RS	ĺ.
20mm 150m A-5A	3р	יו
1" 2A-13A mains	4p	
11 250m A-15 A	3p	ı
Panel Holder Single	6p	
Chassis Holder 20mm	16p	
Chassis Holder 11"	22p	l .

BUZZER for 4.5V operation 39p

ENAMEL COPPER WIRE (20z reel)
16, 18, 20, 22 SWG 32p
24, 26, 28, 30 SWG 39p
32, 34, 36, 40 SWG 48p FERRITE RODS: 3" diam. 2" - 8p; 5\frac{1}{2}" - 12p; 6\frac{2}{4}" - 16p

STEREO JUNCTION BOXES
Provides multiple output to your Amplifier.
JB31: 4 outputs. 2 for two sets of stereo headphones and 2 for two speakers.
Price: £1 48 only.
JB11D: Has output for two sets of stereo headphones, 2 speakers and 3 position switch for headphones, loudspeakers or both.
Price: £1.95 only.

AIRCRAFT BAND CONVERTOR
Mod. VHF 105
Enjoy listening to Aircraft band by
merely placing it beside a radio.
Price: £4:75 p & p 15p.

THERMISTORS 15p each

VA 1034; VA 1040; VA 1055; VA 1056; VA 1058; VA 1066; VA 1067; VA 1077; VA 1098; VA 1100.

ALL DEVICES BRAND NEW AND FULLY GUARANTEED. ORDERS DESPATCHED BY RETURN OF POST. TERMS OF BUSINESS : CASH/CHEQUE/P.O.s OR BANKERS DRAFT WITH ORDER, GOVERNMENT AND EDUCATIONAL INSTITUTIONS OFFICIAL ORDERS ACCEPTED. TRADE AND EXPORT INQUIRY WELCOME. P & P ADD 15p TO ORDERS UNDER £4 00. OVERSEAS ORDERS POSTAGE AT COST, AIR/SURFACE. PRICES EXCLUSIVE OF VAT.

POLYESTER CAPACITORS: Axial lead type. (Values are in μf).
400V: 0.001, 0.0012, 0.0015, 0.0018, 0.0022, 0.0033, 0.0047, 0.0068, 0.01 3p; 0.015,
0.022, 0.033, 0.047, 0.068, 0.1 4p; 0.15, 0.027, pp. 0.33, 1pp; 0.47, 13p; 160V: 0.1, 0.15,
4p; 0.22 5p; 0.33 6p; 0.47 9p; 0.68 10p; 1.0 13p, 250V: 0.22 6p; 0.33 8p; 0.68 12p; 47 9p; 2·2 18p.

RADIAL LEAD P.C. TYPE (Values are in μ 1). 250 V: 0-01, 0-015, 0-022, 30-033, 0-037, 0-068, 31p; 0-14p; 0-154p; 0-22, 0-335p; 0-47p; 0-6810p; 1-0-11p; 1-520p; 2-2-22p.

ELECTROLYTIC CAPACITORS. Axial lead type (Values are in µf) 63V: 0. 47, 1-0, 1-5, 2-2, 3-3, 4, 4-7, 6-8, 10, 15, 20, 22, 47, 68, 6p, 100, 12p, 40V: 100, 6p 30V: 3500, 35p, 25V: 10, 68, 150, 6p; 220, 11p; 470, 13p; 680, 18p; 1000, 24p; 2200, 34p, 3000, 33p; 4700, 47p, 16V: 40, 125, 250, 6p, 16V: 1000, 1500, 16p, 10V: 4, 100, 5p; 640, 10p; 1000, 14p; 2200, 18p.

SLIDER POTENTIOMETERS	_	
2ΚΩ-2ΜΩ dual gang stereo	42p	
$5K\Omega$ -2M Ω single gang D/P switch	28p	
KΩ-2MΩ single gang	14p	
Track, 0·25W Log & 0·5W Linear va		
POTENTIOMETERS (AB) Car		

0.25W log and linear values $5K \Omega$ -500K Ω single gang 35p 50p 10K-500K ohm Dual gang KNOBS for above Black or Silvered 8p

PRESET POTENTIOMETERS 0.1W 50 $\Omega\text{--}1M\,\Omega$ Vertical only 0.25W 100 $\Omega\text{--}2M\,\Omega$ Horizontal 0.25W 1K Ω -2M Ω Vertical 6р 0

TANTALUM BEAD CAPACITORS 25V: 0·1μF, 0·2, 0·47, 1·0, 2·2, 4·7, 6·8 35V: 0·1μF, 0·2, 0·47, 1·0, 2·2, 4·7 20V: 10μF; 16V: 22μF; 10V: 33μF, 22μF. 6V: 33μF, 47μF; 3V: 47μF, 100μF.

Price: 10p each MYLAR FILM CAPACITORS 100V: 0·001, 0·002, 0·005, 0·01μF 0·015, 0·02, 0·04, 0·05μF 3р 4p 0·15, 0·2 100 V 50 V: 0·47 F

CERAMIC CAPACITORS 50V d.c. Plaquette body 25mm leads. Range: 5pf-10,000pf 20 0.015 \(\mu f \), 0.022 \(\mu f \), 0.033 \(\mu f \), 0.047 \(\mu f \) 3р

UALIT	TY RE	SIST	DRS.	ERIE	MAH	(E			(]
mali S	ize, H	igh Sta			Noise	е	PRICE		1 9
уре	Pwr	Tol.		nge	Val.	1-99	100-499	500+	
arbon	1W	5% 5%				1p	0.8b	0.7p	(
arbon	₽W	5%		2-10M	E12	1p	0·8p	0·7p	1 1
arbon	1W	5%		2-10M	E12	2·5p	2p	_	
٧W	4W			2-100 \$		8p	7p	_	3
uantity	price	applie	s to r	esisto	rs of	each v	alue not	mixed.	5

JACKSONS DIELECTRIC TUNING CAPACITORS 1a00pf 80p 00pf 88p 500 pf 95 p

	JAC	K P	LUG	3	soc	KETS		METERS
2·5mm 3·5mm Standard Mono Standard Stereo	Scree chro 10; 14; 17; 30;	me o	Plas bod 8p 10p 13p 18p	у	Open metal 8p 8p 13p 15p	Moulded with break contacts 17p 25p	require	46mm x 35mm 5 1½" hole SCALE 0-50μA 0-100μA 0-500μA 0-100μA
DIN 2PIN LOUDSPEA TYPE. 3, 4, 5 (18 240°) 6PIN		Plu 12g			ckets 8p	Couplers 15p	ME 10 ME 11 ME 12 ME 13	0-5mA 0-10mA 0-50mA 0-100mA
CO-AXIAL (TV)		10	0		8p	15p (f.f.)	ME 14	0-500mA
PHONO assorted colours		61	0	7p	(sgl.) (dbl.) (trpl.)	9р	ME 15 ME 16 ME 17 ME 18	0-1 amp 0-50V AC 0-300V AC ''S'' Meter
BANANA		71	,		7р	_	Price £	2·48, p & p 10p

	SWITCHES	R.F.	
	PUSH BUTTON: Miniature push	CHOKES	
DPDT 22p	to make or break non locking 15p	1 · 5mH	18p
SUB-MIN TOGGLE	ROCKER (white): 10A 250V SP changeover centre off 25p	2·5mH	18p
SP changeover 40p SPST on/off 45p	ROCKER: Illuminated (white) Incorp-	HEAT SINK	s
DPDT 6 Tag 64 p	orates neon, lights when on	Low Power	
SLIDE:	3A 240V 45p	To5	15p
1A DP 250V 10p	ROTARY SWITCH: 1 pole/12way	To18	15p
1A DP 250V C/O 12p	2p/6w, 2p/2w, 2/p4w, 3p/3w 3p/4w,	To66 (TV2)	15p
+A DP 250V 9p	4p/2w, 4p/3w 24p	To1 (H13)	5p

TRANSFORME	RS MAINS	
Primary 220-240\	/	
6-0-6 (minlature	100mA	90 p
9-0-9 (miniature)	100 m A	90 p
12-0-12 (miniatus		90 p
18-0-18 also 24V	100m A	90 p
24-0-24V	500m A	220p
30-24-20-15-12-0	2 A	340 p
Pulse Transform	er PT ATA	85 p
VEROBOARD	Pitch	
	0.1 0.15	0.15

VEROBOARD	F	itch	
	0 · 1	0.15	0.15
	(copper	clad)	(plain)
2½x3¾"	30p	23p	14p
2½x5"	32 p	32p	15 p
31x31"	32p	32 p	-
32x5"	38p	38 p	26 p
2½x17"	96p	75 p	53p
32x17"	130p	105p	79p
4₹x17"	173p	_	109p
Pkt of 36 pins			22p
Spot face cutter			48p
Pin insertion to	ol		99p

LAMP HOLDERS AND LAM	PS
LES HOLDER Dome shaped, Rec	i, Blue,
Green, Yellow, White	14p
LES BULBS 6v and 12v	6p
MES HOLDERS Chrome cover,	Redor
Amber, Jewelled top	28p
MES BULBS 3.5V 6V and 24V	6р
NEON: RED round top 250V	21 p
NEON: 1" square top, red,	green,
amber. Req. #" hole	21p

K e:	NOBS (fits #" shaft, with grub so cept K2 and K8)	rew
К	1 Black or white pointer type	9p
K	2 Slim silvered aluminium	10p
K	3 Black 1½" with chrome rlm	15p
K	4 Black serrated. Metal top with line indicator 33m diam.	18p
K	5 Black fluted metal top and skirt calibrated 0-10, 37mm dla.	20p
K	6 PK2 as K5 with pointer on skirt	20 p
	7 Black, knuried, tapered. Metal and skirt. Calibrated 0-10, 30mm	top 20p
K	Black or silvered for slider pot	9p

"SLO-SYN" 3-LEAD SYNCHRONOUS STEPPING MOTOR



Type SS15. These fine motors are easily reversed, starting and stopping in less than 50 ping
UNISELECTORS

8 Bank 25 way double sweep 48v. D.C. ex-computer in 1st class condition. £4 plus 95p. P & P.

SHADED POLE MAINS

A quality shaded pole motor. Open frame, 3" high \times $2\frac{1}{2}$ " \times 2", Spindle 1" \times $\frac{1}{4}$ ". 1,420 r.p.m. £1-85 P & P 20p

CROUZET Open Frame

Shaded pole motor, 115/240 V.A.C. 1425 r.p.m. approx, size; $2\frac{1}{2}$ inches x $2\frac{1}{2}$ inches x $1\frac{1}{2}$ inches deep $\frac{1}{2}$ " dia. spindle $\frac{1}{2}$ " long £2·25 p. & p. 25p.

"LABGEAR ELIMINAC"

P.S.U. 200-250v. 40/60Hz. Alternative outputs fully variable (variac incorporated). Output 1. 12v at 5a. D.C. fully smoothed. Output 2, 12v at 8a. D.C., with ripple content. Output 3. 20v at 10a. A.C. 24 % 22 ff flush 0-20v D.C. m/c meter. In attractive grey hammer finish case. In maker's carton £27-50. Carr. & Pkg. £1-50.

SPECIAL OFFER LIGHT DEPENDENT RESISTORS

Matched pairs Pioneer Type 174 similar to ORP 12. Resistance 1K to 40K Dia ½" with ½" flange. £1.50 for two pairs (minimum) 10 or more pairs, 50p. per pair incl. P & P.

MAINS SOLENOID

This little unit gives vertical lift of approximately 1" through hinged "e I b o w".
Bracket incorporates 2 fixing screws. Length of arm. 24". 240V AC. Pull at coil is approximately 11b. £1. FREE P. & P. Special quotes for quantities.

SOLENOIDS by WESTOOL

240AC type MM6.
3lb, pull, 2½" x 1" x 1 ½". Travel 1". £1 each. P. & P. 20p.
240AC type MM4. 2lb. pull, 1½" x 1½" x 1" Travel ½" 80p each. P. & P. 20p. Quantity discounts: 10-50 10%, 50 upwards 26%. wards 25%

OPEN FRAME shaded pole **GEARED MOTORS**

240 AC., 110rpm. NEW HIGH TORQUE approx. overall size: 3½" x 3½" x 2½"+ spindle ½" dia. £3. P. 4. P. 50p. 110rpm with pressed steel gear case (similar to above but slightly smaller). £2-70. P. 4. P. 30p.

SILVANIA **MAGNETIC SWITCH**

Now complete with reference magnet!

A magnetically activated switch, vacuum sealed in a glass envelope. Silver contacts, normally closed, Rated Samp at 120.1 \$\frac{1}{2}\$ and 20.5 \$\frac{1}{2}\$ a

AMPEX 7.5v. D.C. MOTOR



An ultra precision tape motor designed for use in the AG20 portable recorder. Torque 450GM/CM. Stall load at 500ma. Draws 60ma on run compm ± speed adjustment. Internal AF/RF suppression. ½" dia. x12". Original cost £16:50. OUR PRICE £4:25, P. 4P. 25p. Quantity available. Mu-metal enclosure available. Mu-metal enclosure available. 75p each. FREE P. & P.

FAN/BLOWER

Precision-built in Germany.
Dynamically balanced mains
unit (200/240) continuous
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversible 60MA on
rated, reversib

ALL PRICES INCLUDE V.A.T.

Whilst we welcome official orders from established companies and Educational Departments, it is no longer practical to invoice goods under £5. Therefore, please remit cash with orders below this amount.

ELECTRO-TECH COMPONENTS LTD.

315/317, EDGWARE ROAD, LONDON, W2. Tel: 01-723 5667 01-402 5580

INDEX TO ADVERTISERS

				Elvins Electronics
Allard Electronics			1142	
Ambit International			1145	
Amtron Electronics			1123	Felstead Electronics
Arbour Electronics			1140	Foresight Electronics
A.S.P. Ltd			1070 I	_
Astro Electronics Ltd			1070	
	•••	•••		Galleon Trading
			- 1	Garfields
Barrie Electronics			1078	Goldring Ltd
Baykin Engineering Ltd.			1144	Greenweld Electronic
Benford Cabinets			1078	Or control a alcour office
			1142	
Beta Devices B.H. Component Factors Ltd.	• • •	• • •	1123	H.A.C. (Shortwave) Pr
Bi-Pak Semiconductors		1082-		Harversons Surplus C
D1 D D 1 I . 1			1127	Heath (Gloucester) L
	• • •			
		• • •	1076	Henry's Radio Ltd.
Boffin Projects			1145	
Bothwell British Institute of Engineer			1128	14 5 (5)
British Institute of Engineer	ing Te	ch-		I.L.P. (Electronics) Ltd
nology 107 British National Radio & El	4, 1137	7, cov	er i i i	Intergrex Ltd
British National Radio & El	lectror	nics		Intertext (I.C.S.)
School	1062, 1	1124,	1141	
J. Bull (Electrical) Ltd			1081	
				Jones, J. C
C. Caranna			1143	
Chiltmead Ltd			1062	Kensington Supplies
Chromasonic Electronics			1075	Keytronics
C.J.L. Ltd			1136	•
Codar			1062	
Colomor (Electronics) Ltd.			1096	Lasky's
Crescent Radio Ltd			1070	Lewis Radio
Crofton Electronics			1096	Linear Products Ltd.
C.T. Electronics			1131	London Computer Op
C. I. Electronics			'''' I	Centre
			- 1	London Electronics Co
Dabar Electronics Products			1068	Editadii Electronics Co
	•••	• • •	1145	
D.E.W. Ltd			1173	Mantin Elementic Con
			l	Maplin Electronic Sup
			1	Marco Trading
Electronic Brokers			1144	Marshall, A
Electronic Design Associates			1137	M and B. Compone
Electronic Mail Order Ltd.			1136	Milward, G. F
Electroni-Kit			1070	Minikits Electronics

Electrospares Electro-Tech Electrovalue Ltd Elvins Electronic			 	1186 1147 1077 1092
Felstead Electron Foresight Electro			 	37 145
Galleon Trading Garfields Goldring Ltd. Greenweld Electi			 	42 44 074 140
H.A.C. (Shortwa Harversons Surp Heath (Glouceste Henry's Radio Lt	lus Co er) Lto	Ltd.	 cov	1096 1095 1091 er iv
I.L.P. (Electronics Intergrex Ltd. Intertext (I.C.S.)		•••	 32 &	1069 1080 1143
Jones, J. C.			 	1137
Kensington Supp Keytronics			 	1143 1140
Lasky's Lewis Radio Linear Products London Compute Centre London Electroni	Ltd. er Ope	 erators	•••	1067 1068 1128 1143 1143
Maplin Electroni Marco Trading Marshall, A. M and B. Cor Milward, G. F. Minikits Electror	 npone 	•••	 	1135 1142 1132 1096 1148 1145

Newmart Electronics			 1079
Partridge Electronics L	.td.		 1068
Radio Book Services Radio Components Sp. Radio Exchange Ltd. R.C.S. Products Ltd. R.D.I. Ltd. R.S.C. (Hi-Fi) Centre R.S.T. Valve Mail Ord R & TV Components L Riversdale Electronics Rivlin Instruments	 Ltd. er Co. td.	 5 	1144 -1139 ver ii 1076 1142 1063 1064 -1073 1092 1078
Salop Electronics Saxon Entertainments Scientronics Selray Book Co Sinclair (Cambridge) L Simtech Engineering Li Sintel Sound Systems of Suffopecial Products Distr Studio Electronics Surplectronics Swanley Electronics	 .td. td.	 Ltd.	 1145 1133 1141 1144 -1119 1143 1144 1142 1092 1123 1134 1140
Technomatic Ltd. Trampus Electronics L Tweedy (J. & A.)	 .td.		 1128 1080 1143
Ultro components Ltd Vero Electronics			 1141 1076
Watford Electronics West London Direct St Wilmslow Audio	 uppl i es		 1146 1076 1134
Z & I Aero Services			 1148

Head Office and Warehouse 44A WESTBOURNE GROVE LONDON W2 5SF Tel: 727 5641/2/3

Z & I AERO SERVICES LTD.

Please send all correspondence and Mail-Orders to Head Office Our new 1975 Catalogue/Price list of valves, tubes, semiconductors, Test Equipment and passive components is now ready. Please send £0'20 for your copy. No C.O.D. orders accepted

Retail Shop **85 TOTTENHAM COURT ROAD** LONDON WI Tel: 580 8403 Open all day Saturday

AC/DC MULTIMETER **TYPE U4324**



33 ranges up to 3 Amps AC/DC; 1200V DC, 900V AC, 500kΩ, +12

Sensitivity: 20kΩ/V DC; 4kΩ/V AC

Accuracy: ±2 5% DC; ±4% AC

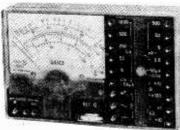
Movement is protected by silicon

Dimensions 167 × 98 × 63 mm. Weight: 1.5lb

PRICE: complete with test leads, instruction manual and fibre-board storage case £9.85. Packing & carr. £0.50.

MULTIMETER **TYPE U4323**

Sensitivity: 20,000 Ω/V



7 D.C. Voltage ranges 0.5-1000V 6 A.C. Voltage ranges 2:5-1000V 5 D.C. Current ranges 0.05-500mA 4 Resistance ranges 1kΩ-1mΩ

Built-in oscillator providing AF output of 1kHz and I.F. output of 465kHz with an amplitude of 1 volt minimum.

Dimensions: 140×87×40 mm. Weight 0 5kg

PRICE complete with leads and plastic storage case £8.00. Packing & postage £0.50

AC/DC MULTIMETER **TYPE U4313**



39 ranges: 600μA to 1.5A 60μA to 1.5A DC 75mV to 600V 1.5V to 600V AC $1M\Omega$, 0.5μ F, 12db

Accuracy: 1.5% DC: 2.5% AC

İIG

Sensitivity: 20k Ω/V DC; $2k\Omega/V$

Mirror scale 86mm long.

Dimensions: 115 × 215 × 90 mm, Weight 3·3lb.

PRICE, complete with test leads, service manual and steel carrying case £13 80. Packing & carriage £0.50.

ALL THE ABOVE INSTRUMENTS FEATURE TAUT SUSPENSION MOVEMENTS PRICES ARE EXCLUSIVE OF V.A.T.

G. F. MILWARD, 369 Alum Rock Road, Birmingham B8 3DR. Tel. 021-327 2339

We are glad to say that it is now possible to supply from stock the following integrated circuits.

ALL ARE BRANDED, FULL SPECIFICATION devices offered at unbeatable prices

	1/99	100/499	500/1000	1	1/99	100/499	500/1000	I.	1/99	100/499	500/1000
7400	£0 15	£0 125	£0:10	7442	£0-645	£0.537	£0.43	7494	£0 · 495	£0.412	£0.33
7401	£0-15	£0.125	£0·10	7443	£1 275	£1-062	£0 · 85	7495	£0.63	£0 525	£0.42
7402	£0-15	£0 · 125	£0·10	7445	£0-855	£0.712	£0.57	7496	£0 · 72	£0.60	£0 · 48
7403	£0-15	£0 · 125	£0 10	7446	£1.05	£0.875	£0.70	74104	£0.315	£0 262	£0 · 21
7404	£0-18	£0 · 15	£0·12	7446A	£1 · 05	£0.875	£0 · 70	74105	£0.315	£0 262	£0-21
7405	£0.18	£0-15	£0-12	7447	£1 - 05	£0.875	£0.70	74107	£0 · 315	£0 262	£0-21
7405	£0 375	£0:312	£0 · 25	7447A	£1.05	£0.875	£8.70	74121	£0·315	£0 · 262	£0·21
		£0.312	£0 · 25	7448	£0.855	£0.712	€0 - 57	74122	£0 · 45	£0.375	£0.30
7407	£0 375					£0-125	£0·10	74123	£0.63	£0 · 525	£0.42
7408	£0·15	£0·125	£0·10	7450	£0-15					£0 · 625	£0.50
7409	£0 15	£0·125	£0:10	7451	£0 · 15	£0·125	£0·10	74141	£0.75		
7410	£0.15	£0·125	£0·10	7453	£0·15	£0·125	£0·10	74151	£0·69	£0·575	£0·46
7412	£0·195	£0·162	£0·13	7454	£0-15	£0·125	£0·10	74153	£0 · 69	£0·575	£0 · 46
7413	£0·345	£0·287	£0·23	7460	£0-15	£0·125	€0·10	74155	£0·69	£0·575	£0 · 46
7416	£0·345	£0·287	£0·23	7472	£0 · 255	£0-212	£0·17	74156	£0.69	£0·575	£0·46
7417	£0·345	£0·287	£0·23	7473	£0·315	£0·262	£0·21	74160	£1 · 005	£0 837	£0·67
7420	£0·15	£0·125	£0·10	7474	£0·315	£0·262	£0 · 21	74161	£1 · 005	£0·837	£0·67
7423	£0.27	£0.225	£0·18	7475	£0 · 465	£0:387	£0·31	74162	£1 · 005	£0·837	£0-67
7425	£0 · 27	£0-225	£0-18	7476	£0·315	£0 · 262	£0 · 21	74163	£1 · 805	£0.837	£0·67
7426	£0.27	£0.225	£0-18	7480	£0.435	£0-362	£0 · 29	74166	£1 · 425	£1-187	£0.95
7427	£0.27	£0 · 225	£0·18	7482	€0.75	£0-625	£0.50	74174	£1 · 20	£1 · 00	£0 · 80
7430	£0·15	£0·125	£0·10	7483	£0.825	£0-687	£0 · 55	74175	£0.975	£0.812	£0-65
7432	£0.27	£0-225	£0·18	7485	£1 · 275	£1 · 062	£0·85	74192	£1 · 275	£1 · 062	£0·85
7437	£0 · 27	£0 · 225	£0·18	7486	£0:315	£0 · 262	£0 · 21	74193	£1 · 275	£1 062	£0.85
7438	£0.27	£0 · 225	£0-18	7490	£0 · 465	£0:387	£0·31	74198	£2 10	£1.75	£1-40
7440	£0.15	€0 125	£0-10	7492	£0.465	£0:387	£0·31	74199	£2 · 10	£1 · 75	£1 · 40
7441 A	£0 - 825	£0 · 687	£0·55	7493	£0 · 465	£0.387	£0·31	1 7 1 80		w. 19	40
, 791 /	~~ 923	T- 001		1 1700	ma 400	~~ ~~ .	W4 41				

To secure the above prices, all orders for these devices must exceed £10 in total value. Price rating is established by TOTAL NUMBER OF DEVICES ORDERED. Any mix may be made. For special quotations for large orders ring 021-327 2339 NOW!

NEW! NEW! NEW! NEW!

An aerosol spray providing a convenient means of producing any number of copies of a printed circuit both simply and quickly. Method: Spray copper laminate board with light sensitive spray. Cover with transparent film upon which circuit has been drawn. Expose to light. (No need to use ultra-violet.) Spray with developer, rinse and etch in normal manner.

Light sensitive aerosol spray Developer and Etchant

£1:00 50p PLUS POSTAGE

BRAN TUB!!!

- Resistors, Wire-wound and
- Capacitors, Silver-mica, Paper, Ceramic, Polyester and Electrolytic
- ★ Controls, Volume, Pre-set, Carbon, Wire
- ★ Diodes, Silicon, Germanium, Zener
- * Transistors, Silicon, Germanium

All the above are new and unused

We have made up packs of 2lb gross weight, all are different in content, and contain a mixture of components from the above list. This is a fantastic unrepeatable offer that will enable you to get a good stock of spares at a tiny fraction of normal price!

To make things even more interesting
—TWENTY OF THESE BAGS ALSO
CONTAIN A POUND NOTE!
TWENTY CUSTOMERS WILL BE
VERY PLEASED INDEED!

Rush your order now! This offer is only made to reduce our surplus stock! It is unlikely that in these days of rising prices we shall ever be able to repeat!

And the price that we are asking? Only £1:58 including both postage and VAT!

FIBRE-GLASS COPPER LAMINATE

Single-sided 75p sq. ft. Double-sided £1 sq. ft.

Cut in any multiple of 6"

To a maximum size of 3' x 4'

POSTAGE 30p

NOTE: ALL GOODS PLUS 8% VAT (EXCEPT OVERSEAS)

POSTAGE 30p

Over 150 This FREE 76 page book can put you on the road to success ways to through a BIET Home Study Course Choose your subject now! engineer a better future



find out how in just 2 minutes

That's how long it will take you to fill in the coupon. Mail it today and we'll send you full details and a free book. We have successfully trained thousands of men at home—equipped them for higher pay and better, more interesting jobs. We can do as much for YOU. A low-cost home study course gets results fast—makes learning easier and something to look forward to. There are no books to buy and you can pay-as-you-learn.

Why not do the thing that really interests you? Without losing a day's pay, you could quietly turn yourself into something of an expert. Complete the coupon (or write if you prefer not to cut the page). No obligation and nobody will call in on you ... but it could be the best thing you ever did.

Others have done it, so can you

"Yesterday I received a letter from the Institution informing that my application for Associate Membership had been approved. I can honestly say that this has been the best value for money I have ever obtained, a view echoed by two colleagues who recently commenced the course Student D.I.B., Yorks.

"Completing your course, meant going from a job I detested to a job that I love, with unlimited prospects"—Student J.A.O. Dublin.
"My training quickly changed my earning capacity and, in the next few years, my earnings increased fourfold". Student C.C.P., Bucks.

FIND OUT FOR YOURSELF

These letters and there are many more on file at Aldermaston College, speak of the rewards that come to the man who has given himself the specialised know-how employers seek. There's no surer way of getting ahead or of opening up new opportunities for yourself. It will cost you a stamp to find out how we can help you. Write to

ALDERMASTON COLLEGE

Dept. RPW04, Reading RG7 4PF.

. HOME OF BRITISH INSTITUTE OF ENGINEERING TECHNOLOGY

Practical Radio & Electronics Certificate course includes a learn while you build

3 transistor radio kit.

Everything you need to know

about Radio & **Electronics** maintenance and repairs for a spare time income and a *career* for a better future.

CUT OUT THIS COUPON Tick or state subject of interest. Post to address below. MECHANICAL. DRAUGHTSMAN-SHIP Construction
Surveyors Institute
L.C.S.I.
City & Guilda
General Building
(all branches)
Heating & Vent.
Inst. Clerk of
Works
Site Surveying
Heatth Engineering Construction Society of Institute of Engineering Designers (A.M.1.E.D.) General Engineers—
A.M.S.E. (Mech)
Institute of
Engineer &
Tasknigiang Technicians A.M.I.E.) General
Draughtsmanship
Elec. Draughtsmanship
Architectural
Draughtsmanship (A.M.I.E.) CITY & GUILDS Gen, Mech. Eng. Maintenance Eng. Health Engineering Road Construction Welding
Gen. Diesel Eng.
Sheet Metal Work
Eng. Inspection
Eng. Metallurgy Quantities Estimates Technical Drawing Hydraulics Structural Eng RADIO & TELE-COMMUNICATIONS ELECTRICAL & ELECTRONIC CITY & GUILDS GENERAL City & Guilds Agricultural Eng. Council of Eng. Institutions Telecoms. Gen. Radio & TV ien. Electrical Eng. Radio Amateurs Engineering Farm Science lectrical Plastics Exam Radio Servicing nstallations Electrical Maths Electrical Maths
Computer
Electronics
Electronic Eng.
Practical Radio
& Electronics
(with kit) Supplimentary courses for Nat. Certificates AUTOMOBILE & AERONAUTICAL AERONAUTICAL
Institute of the
Motor Industry | A.M.4.1. | |
MAA/IM | |
Gity & Guilds | |
Auto Eng. | |
Auto Eng. | |
Auto Eng. | |
Auto Disest Eng. | |
Garage M'ment | |
AEC Aero Engineering Exams | |
Gen. Aero Eng. | | MANAGEMENT & PRODUCTION G.C.E. -choose from A Management
Acctnts.
Computer
Programming
Works M'ment
Work Study
Gen. Production 58 '0' & 'A' level subjects Eng. Estimating & Planning CONSTRUCTIONAL Coaching for many exams, including C & G Storekeeping Management Institute of Building L.I.O.B.
A.B.T. Clerk of Works Quality Contro TODAY To Aldermaston College, Dept. RPW04, Reading RG7 4PF. Block capitals please ADDRESS POSTCODE

AGE.

Member of ABCC

OTHER SUBJECTS

Accredited by C.A.C.C.

LARGEST SELECTION OF ELECTRONIC COMPONENTS AND EQUIPMENT. LOW PRICES - MEAN LESS VAT.

You can build the Texan and Stereo FM Tuner TEXAN 20 + 20 WATT IC STEREO AMPLIFIER

Features glass fibre PC board, Gardners low field transformer 5-IC's, 10-transistors plus diodes, etc. Designed by Texas Instruments engineers for Henry's and, P. W. 1972. Supplied with full chassis work, detailed construction handbook and all necessary parts. Full input and control facilities. Stabilised supply, Overali size 152" x 21" x 61" mains operated. Free teak sleeve with every kit. £31.00 (Carriage 50p).



(also bullt

and tested £37 50) HENELEC Stereo FM Tuner Features capacity diode tuning, lead and tuning meter indicators, stabilised power supply—mains operated. High performance and sensitivity with unique station indication iC stereo decoder. Overall size in teak sleeve 8" x 22" x 61". Complete kit with teak sleeve 6" x 22" x 64". Complete kit with teak sleeve 6" x 22" x 60". £21.00 (Carriage 50p). (also built and tested £24 95)

TEST EQUIPMENT **MULTIMETERS**

Carr/packing 35p) £ p J4324 20kΩ/V J4324 zun... with case 9 zs J435 20kΩ/V with case 8 75 J435 20k Ω/V with steel case 8.75 J4313 20k Ω/V with steel case 12.50 J4317 20 Ω/V with case J4341 33k Ω/V plus tran-10.50 sistor steel case U4323 20kΩ/V plus 1kHz U4322 20k Ω/V olus 1kHz
OSC with case 7-70
OSC with case 7-70
ITI-2 20k Ω/V slim type 5-95
THU33D (L33D X) 2k Ω/V
PSSN 20k Ω/V (Case £2) 8-25
TPIOS 20k Ω/V 10-00
TW50K 50k Ω/V 11-25
EP10KM 10k Ω/V 9-95 S100TR 100kΩ/V plus transistor tester 22 - 50 NEW REVOLUTIONARY

SUPERTESTER 680R & p

680R Multi-tester 18:50 †TE40 AC Multivoltmeter 19:75 †TE15 Grid dip meter 440kHz-28mHz 19:50 †TE520 R Range valve voltmeter 22:50 †TE20D RF Generator 18:95 †TE20D AF Generator 18:95

19 - 95

†TE22D AF Generator 20Hz-200kHz *HM350 in circuit tran-

SEND NOW FOR OUR FREE LIST NO. 36 FOR OUR COMPLETE RANGE OF OVER 10,000 SEMICONDUCTOR DEVICES NEW LOW PRICES.

ALL PRICES SUB-JECT TO 8% VAT

TTL "7400 series" IC's from

Cosmos "4000 series" IC's from 27p each Linear Op-Amps from 40p each Signotics Phase Lock IC's; RCA Linear IC's; TO3 Power Devices in PNP and NPN; BC107 and "BC range" Range of "OC" types Plastic Power Devices, Rectifiers, Zener Diodes up to 10 watts, Power Regulator IC's and many others 8 pin DIL Sockets 14 pln DIL Sockets 15p 16 pin DIL Sockets 17p 705 IC Sockets from 40 p 24 pin DIL Sockets £1 - 15 28 pin DIL Sockets £1 · 25

NOMBREX TEST EQUIPMENT

Model 35 Stabilised Power Supply

A short circuit proof power supply delivery up to 30 volts at 1 Amp. Built-In Volts and ammeters. £23 · 60

Model 40 Wide Range Audio Signal Generator

A high stability signal generator using the low distortion Wien bridge principle. Covering 10Hz to 100 KHz in 4 ranges. Adjustable output from 1mV to 1V, Sine and Square wave output.

£25 · 90

16p each

Covering 150 KHz to 220 MHz in 8 ranges. Built in AF mod. Output up to 50mV. Crystal calibration facilities.

£35 · 00

Model 41 RF Signal Generator

Large linear scale with slow motion drive.

Model 42 Wide Range RF Signal

Generator

Covering 150 KHz to 300 MHz in 8 ranges. Highest range in harmonic. Built in AF mod. Output up to 50mV. Circular scale. £17:50

Model 43 RC Bridge

Null indicating bridge for resistors and capacitors. Resistance range 10R to 10M ±2% at Centre Scale. Capacity range 10µF to 10µF ±2% Centre Scale except 1pF to 10pF Range ±5%. Power Factor Measurement £16:50

Model 44 Inductance Bridge

Measures 1pH to 100H in 4 ranges ±5% accuracy. Q measurement from 0·1-1,000 ±10%. £27 · 50

Model 45 Direct Reading Frequency Meter

10Hz to 100 KHz in 4 ranges. Input from 10MV to 5V

£28 · 90

9 am - 6 pm

All models except Model 35 are internally powered from 9V battery (extra). Carriage and packing all models 37p.

NOW OPEN-SUPERMARKET

Come and browse round the new ccmponents supermarket at 404 Edgware Road. Bargains galore. Goodie Bags. Components,

WATCH FOR FURTHER DEVELOPMENTS!

IOIN THE LARGE BAND OF HAPPY CONSTRUCTORS!

NEW SPECIAL PURCHASE



FM Coverage Bandwidth 87-108 MHz 300 KHz Selectivity
Signal to noise at
limiting threshold
Audio output 36 dB 40 dB

6 · 5 KHz 1 pV Bandwidth Sensitivity
Built-in AGC
Supply 6V negative earth
LP1179 and LP1171 £7-50
Suitable Ferrite aerial £0-75

Amplifiers with controls 12 volt 2½ + 2½ watts 8 ohms Mains 7 + 7 watts 8 ohms Mains 15 + 15 watts 8 ohms 9 volt 1½ + 1½ watts 8 ohms 12 volt 3 + 3 watts 8 ohms E1210

AM/FM Modules Mullard LP 1186 FM tuner (front end) with data 10-7 MHZ O/P 4 85 I P1157 AM/Module £2:50 AM/FM Module £4:50 Mullard LP 1185 10.7 MHZ IF unit with

Gorler Permability FM tuner (front end) 10-7 MHZ O/P FM and AM Tuners and Decoders FM and AM Tuners and Decoders
FM5231 (tu 2.6 voll fm luner 7.95
FM5231 (tu 2.6 voll fm luner 7.95
SD4912 Stereo Decoder for Tu 3:12 volt 7.95
SP62H 6 volt stereo FM tuner 4.95
SInclair 12/45 volt FM tuner stereo recorder for above A1018 9 volt FM tuner in cabinet 13:95
A1050M (S) 9-12 volt Stereo decoder FM for above 7.50 for above 106Z 12 volt Stereo decoder general

purpose 6 - 50 Preamplifiers
 Preamplifiers
 Stereo 60 Preamplifier
 5-75

 E1300
 Cart/Tape Mic Inputs 9 volt
 2-85

 E1310
 Stereo 3-30 mV mal cart 9 volt
 4-75

 FF3
 Stereo 3 mV tape head 9 volt
 4-95

 3402
 Stereo 5-20 mV Mag. cart.
 5-95
 5.95 Mono 3-250 mV Tape/Cart/Flay 9 voit EQ25

Power Supplies Mains Input (*chassis-rest cased) (*Chassis-rest cased)
470.6(7)4(9)4 300 MA with ad'rs
P500 9 volt 500 MA
HC244R 3(6)74(9)4 400 MA stabilised
*P11 29. ‡ amp. 3-30
*P15 28V. ‡ amp.
*P1080 122 1A 4-70
*P1081 45V 0-9A
P12 4]-12V. 0-4—1 amp
SE1015 3(6)9/12V. † amp stabilised
P1076 3(4)6(7)4(9)12V. ‡ amp
SE800A 1-15 VOLT 0-‡A stabilised 2 25 3 20 5 50 3 30 3 30 80 15 75 12

EMISPEAKERS SPECIAL **PURCHASE**

13 in. x 8 in. chassisspeakers (Carr./packing 30p ea. or 50p pr). *150 TC 10 watts 8 ohms twin cone

EW 15 watt 8 ohms with EW 15 watt 8 ohms with tweeter £5:25 350 20 watt 8, 15 ohm with tweeter £7:80 each *Polished wood cabinet £4:80 carr., etc. 35p each or 50p pair.

UHF TV TUNERS

625 line receiver UHF transistorised tuners UK operation. Brand new. (Post/ packing 25p. each). TYPE C variable tuning £2:50 TYPE B 4-button push-button (adjustable) £3:50

PA-DISCOTHEQUE LIGHTING EQUIPMENT



Without doubt U.K.'s best range of modular and complete equipment. Lighting, mixing, microphones, accessories, speakers, amplifiers, lenses, etc., etc.

4:50

FREE stock lists (Ref. No. 18) on request CALL IN AND SEE FOR YOURSELF at

HENRY'S DISCO CENTRE, 309 EDGWARE ROAD. TEL. 01-723 6963

EP27 Low Cost Seven Segment Led. Digit Height 1/3 inch. £1 35 pp 15p L450 RECHARGEABLE BAT-TERY 2v 400mA/HR 50p pp 15p.

PHILIPS 12V FLUORESCENT INVERTOR

for 8w fluorescent tube. Supplies with instr. and tube for £3:50 p.o. 30p.

STC & ITT

MINIA	TURE	KELA	YS		
150R	6v		2p	c.o.	
180R	6/12v		2p	C.O.	Г
185R	12v		2p	c.o.	
1250R	12/55		2p	c.o.	
1700R	18/24v		2p	C.O.	
1800R	24v		4p	c.o.	
2500R	18/24v		2p	c.o.	ł
4000R	24v		2 p	C.O.	
BRAN	D NEW	60p	p.p.	15p	

*SE35O A De-luxe signal tracer 12-95 (SE400 Mini-lab all In one tester 15-50 (Carr £100) (Carr £100) (Carr £100) (Carr £100) (Carr £100) (Carr £100) (Carr £100) (Carr £100) (Carr £10) (Ca TAPE HEADS

Marriot XRPS/17* Track High Marriot XRPS/18 * Track Med. Marriot XRPS/36 * Track 2 - 50 Med. Marriot XRPS/63 1 Track High Marriot Erase Heads for XRSP 17/18/36 (XES11) 1.75 XRSP 17/18/36 (XES11) 75p Marriot BXIZE 343 ‡Track erase R/RP1 Rec'd/Play ‡ Track 45p HRP S'gle Tr'k Rec/Play 35p Bogen Type UL290 Erase Miniature Stereo Cas-sette Rec/Play 22:25

EXCLUSIVE -5 WATT IC **AMPLIFIERS**

Special purchase 5 watt output 8-16 ohm load. 30 volt max. DC operation, complete with data. Price £1:50 each or 2 for Printed Circuit Panels

CALCULATORS

Sinclair Cambridge
Kit £9:95 (inc VAT)
Sinclair Cambridge
(B'll) £12:95(inc VAT)
Sinclair Memory
£17:95 (inc VAT)
Sinclair Scientific
£19:95 (inc VAT)
Sinclair Scientific
£19:95 (inc VAT)

Kit £14 -50 (inc





404-406 Electronic Components & Equipment 01-402 8381 309 PA-Disco-Lighting High Power Sound 01-723 6963 303 Special offers and bargains store Hi Fi and Electronics Centres Open

All mail to 303 Edgware Road Landon W2 BW Prices correct at time of preparation. Subject to change without notice. E.&O.E.