

56 Penn

PRACTICAL

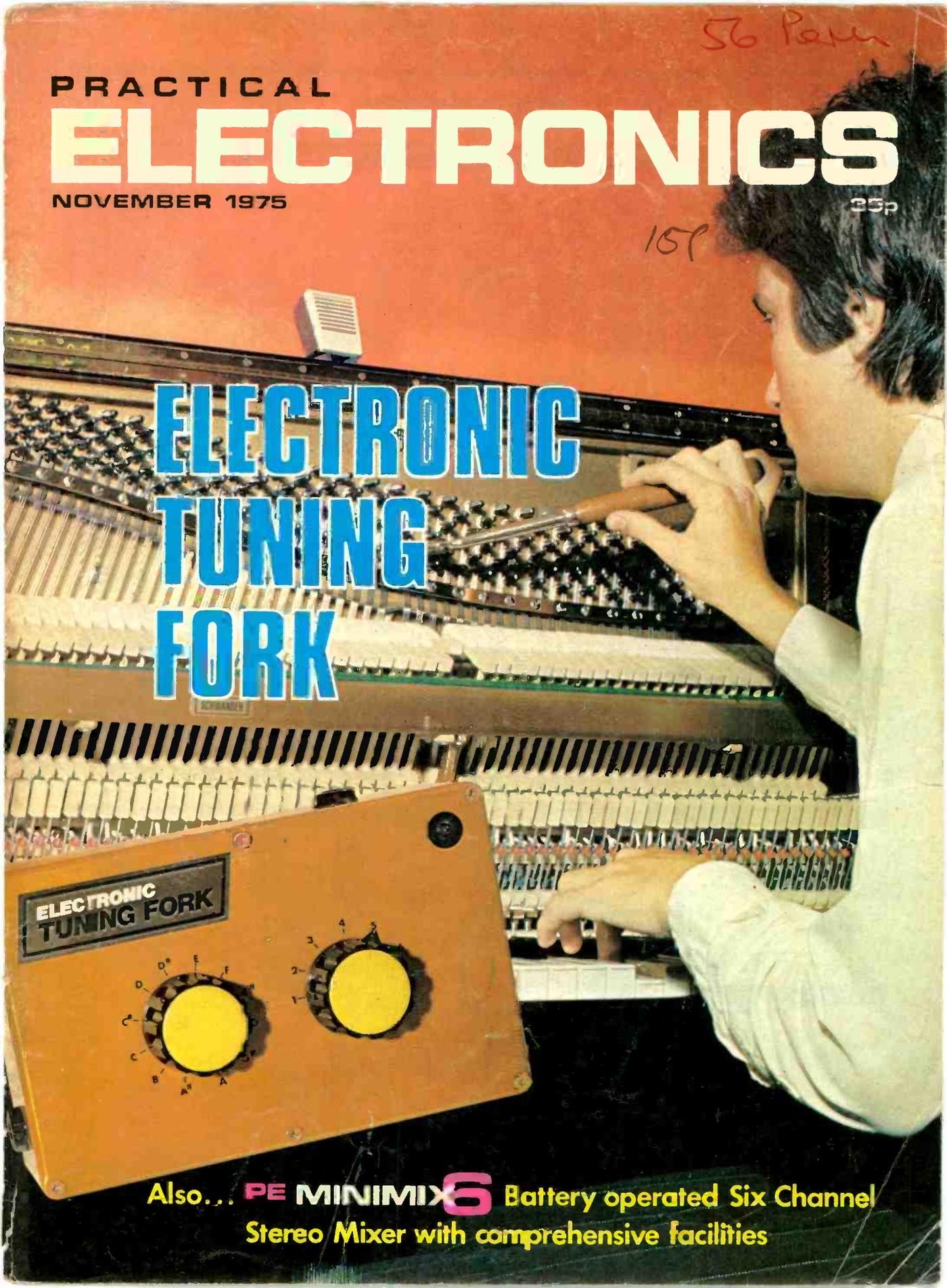
ELECTRONICS

NOVEMBER 1975

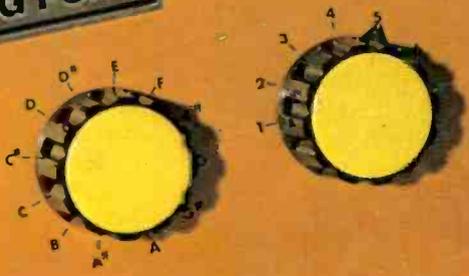
35p

15p

ELECTRONIC TUNING FORK



ELECTRONIC
TUNING FORK



Also... **PE MINIMIX 6** Battery operated Six Channel Stereo Mixer with comprehensive facilities

PRACTICAL ELECTRONICS

VOLUME 11 No. 11 NOVEMBER 1975

CONSTRUCTIONAL PROJECTS

- ELECTRONIC TUNING FORK** *by P. W. Busby*
Tuning aid for musical instruments 882
- P.E. ENGINE ANALYSER—2** *by D. Haley*
Construction of the dwell and tachometer board 890
- P.E. MINIMIX 6—1** *by G. D. Shaw*
The first part of a six channel, stereo mixer 904
- SIMPLE LIGHT COMPARATOR** *by C. C. Whitehead*
A low cost enlarger aid for the amateur photographer 910
- MAINS OPERATED 9V UNIT** *by C. H. Banthorpe*
A simple transformerless battery substitute 914

GENERAL FEATURES

- SEMICONDUCTOR UPDATE** *by D. W. Coles*
A review of interesting devices 896
- MICROPROCESSORS—2** *by V. E. Yates*
A detailed look into this important new technology 899
- INGENUITY UNLIMITED**
Music Generator—Triffid Power Supply—Logic Checker—
Electrolytic Tester 925

NEWS AND COMMENT

- EDITORIAL—A Compelling Force** 881
- SPACEWATCH** *by Frank W. Hyde*
Ice ages—Life in the Universe 889
- PATENTS REVIEW**
Protecting Ideas—Fusible Link—Move Monitor 908
- INDUSTRY NOTEBOOK** *by Nexus*
What's Happening Inside Industry 918
- BRITISH MUSICAL INDUSTRIES TRADE FAIR** *by G. Godbold*
A look at some of this year's exhibits 921
- READOUT**
A selection of reader's letters 929

Our December issue will be published on Friday, November 14, 1975

© IPC Magazines Limited 1975. Copyright in all drawings, photographs and articles published in PRACTICAL ELECTRONICS is fully protected, and reproduction or imitations in whole or part are expressly forbidden. All reasonable precautions are taken by PRACTICAL ELECTRONICS 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 quoted are those current as we go to press.

At Home Soldering?

You should be — with the LITESOLD CONQUEROR

A superbly handling lightweight iron, fully insulated and earthed for safety. Bits are interchangeable, non-seize, and are available in 16 different shapes and sizes, from 1/16" up to 1/4", in copper and long-life types. (Standard fitting, 1/8" copper single chisel shape). Covers a range of work often needing several different irons.

A special spring stand gives safe, easy location of the iron and spare bits. The heavy heat-resistant base is complete with non-slip pads and bit cleaning sponge.

Send cheque/PO direct, or ask for leaflet.



Conqueror Iron Only £3.35
 Iron & Spring Stand £5.66
 Iron, Stand & set of 4 spare copper bits £7.30
 (Prices include 8% VAT and p. & p.)

LIGHT SOLDERING DEVELOPMENTS LTD

97-99, Gloucester Road, Croydon, CRO 2DN. 01-689 0574

LS/M

ENGINEERS

FREE

YOURSELF FOR A BETTER JOB WITH MORE PAY!

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.

This helpful guide to success should be read by every ambitious 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 ever did.



CUT OUT THIS COUPON
CHOOSE A BRAND NEW FUTURE HERE!

Tick or state subject of interest. Post to the address below.

- | | | |
|---|---|--|
| <input type="checkbox"/> Practical Radio and Electronics (Technatron) | <input type="checkbox"/> C. & G. Radio, TV & Electronics, Mechanics | <input type="checkbox"/> C. & G. LI Installations and Wiring |
| <input type="checkbox"/> Electronic Engineering | <input type="checkbox"/> Radio Amateurs | <input type="checkbox"/> General Electrical |
| <input type="checkbox"/> Television Maintenance and Servicing | <input type="checkbox"/> Practical TV | <input type="checkbox"/> Engineering |
| <input type="checkbox"/> General Radio and TV Engineering | <input type="checkbox"/> Colour Television | <input type="checkbox"/> Society of Engineers (Electrical Engineering) |
| <input type="checkbox"/> Radio Servicing, Maintenance and Repairs | <input type="checkbox"/> Servicing | <input type="checkbox"/> Electrical Installations and Wiring |
| | <input type="checkbox"/> Computer Electronics | <input type="checkbox"/> C. & G. Electrical Technicians (Primary) |
| | <input type="checkbox"/> C. & G. LI Radio TV Servicing cert. | <input type="checkbox"/> C. & G. Telecommunications |
| | <input type="checkbox"/> Post Master General 1st & 2nd class certs. | |
| | <input type="checkbox"/> C. & G. Electrical Engineering Practise | |

To **ALDERMASTON COLLEGE** Dept. EPE 11, Reading RG7 4PF

Also at our London Advisory Office, 4 Fore St. Avenue, Moorgate, London EC2Y 5EJ. Tel: 01-428 2721.

NAME (Block Capitals Please)

ADDRESS

POSTCODE

Other subjects

Age

Accredited by C.A.C.C.

Member of A.B.C.C.

BRITISH INSTITUTE OF ENGINEERING TECHNOLOGY

P.E. ORION

Complete Kit of semiconductors £10.95
 High quality printed circuit £3.40

THIS GLASS FIBRE P.C.B. IS ROLLER TINNED AND SCREEN PRINTED WITH COMPONENT LOCATIONS.

FERRANTI semiconductors

BFS59 17p	ZTX301 16p	ZTX502 20p	ZS174 26p
BFS60 18p	ZTX302 19p	ZTX503 21p	ZS176 33p
BFS61 19p	ZTX303 21p	ZTX504 25p	ZS178 58p
BFS96 18p	ZTX304 24p	ZTX530 22p	ZS270 15p
BFS97 19p	ZTX320 20p	ZTX551 23p	ZS271 22p
BFS98 20p	ZTX330 21p	ZTX550 20p	ZS272 25p
ZTX107 14p	ZTX331 23p	ZTX551 21p	ZS274 29p
ZTX108 12p	ZTX382 20p	2N3055 76p	ZS276 38p
ZTX109 14p	ZTX383 19p		ZS278 61p
ZTX212 19p	ZTX384 21p	* DIODES *	
ZTX213 18p	ZTX450 20p	ZS142 45p	* ZENERS *
ZTX214 22p	ZTX451 20p	ZS170 14p	KS030A to
ZTX239 13p	ZTX500 16p	ZS171 16p	KS180A 28p
ZTX300 15p	ZTX501 17p	ZS172 22p	BZV19 series 18p

ZN414 radio microcircuit, with circuits and data £1.50
 ZN424E low noise audio i.c., with circuits and data £1.50
 ZN1034E precision timer i.c., with data £3.23
 ZN1040E universal count/display i.c., with data £12.96

PE TV SOUND SEPARATOR

Complete kit of semiconductors £2.40
 High quality printed circuit board £1.25
 Murata filters—SFE8—OMA 38p; CDA6—OMC 38p.
 MOTOROLA BD699 £1.27; BD700 £1.41; MKE2955 £1.50; MKE3055 87p; MC1357PO £1.60; MJ2501 £1.65; MJ3001 £1.59.
 PE JOANNA 77 ZTX108 £6.25, 183 ZS170 £18.30.
 POSTAGE AND PACKING 10p per order. Orders over £3 post free.
 All devices top grade, brand new, and to full manufacturers spec. We do not sell seconds or rejects. Send SAE for our data sheet and price list. We can supply any Ferranti device to order. SAE for quotation.

ALL PRICES INCLUDE VAT AT THE APPROPRIATE RATE

DAVIAN ELECTRONICS

PO BOX 38, OLDHAM, LANC8, OL2 8XJ

BI-PRE-PAK

The people for component bargains



Makers of Stirling Sound

audio equipment

ORIGINATORS OF PRE-PACKED COMPONENTS IN BRITAIN—AND STILL LEADING!

AUDIO MODULES — today's most challenging values!

POWER AMPS

SS103

Compact I.C. amp 3 watts R.M.S. Single channel (mono). On P.C.B. size 3½in x 2in. Needs 10-20V supply. **£1.75**



SS103-3

Stereo version of above (two I.C.s) **£3.25**



NEW! SS105 Mk. 2

A compact all-purpose power amp. Can be run from 12V car battery. Size 3½in x 2in. Useful 5W output (mono) into 3Ω using 12V. Excellent value. **£2.25**



SS110 Mk. 2

Similar in size to SS105 but will give 10W output into 4Ω using 24V (mono). Two in stereo give first-class results, suitable for many domestic applications. **£2.75**



SS140

Beautifully designed. Will give up to 40W R.M.S. into 4Ω. Excellent S.N.R. and transient response. Fine for P.A., disco use, etc. Operates from 45V d.c. Two in bridge formation will give 80W R.M.S. into 8Ω. **£3.60***

PRE-AMP/CONTROL MODULES

SS100

Active tone control unit to provide bass and treble facilities (stereo). **£1.60**

SS101

Pre-amp for stereo ceramic cartridges, radio and tape. **£1.60**

SS102

Pre-amp for low-output stereo magnetic cartridges, radio and tape. **£2.25**

BUILD A STEREO F.M. TUNER with these modules

SS201

Front End assembly. Ganged tuning with well engineered slow-motion geared drive in robust housing. A.F.C. facility. Requires 6-16V. Excellent sensitivity. 88-108MHz. **£6.25**

SS202

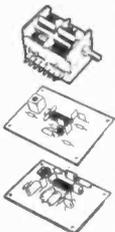
I.F. Stage (with I.C.). Designed to use with SS201 uses I.C. Carefully checked before despatch. **£5.25**

SS203

Stereo Decoder. Designed essentially for use with SS201 and SS202, this excellent decoder can also make a stereo tuner of almost any single channel FM tuner. Supplied ready aligned. A L.E.D. can easily be fitted. **£5.62**

SAVE £5 ON THE S/S TUNER

By buying Units SS201, SS202 and SS203 together, the price is £12.12—a genuine saving of £5 on this very efficient tuner. **£12.12**



3 SPECIAL OFFERS

LM 380 AUDIO I.C. (Marked SL 60745). Brand new and to spec. 3 watts R.M.S. out. With data. **£1.00***

2XSN 7490. Brand new I.C. to spec. decode counters. **£1.00***

3XSN 7400 Quad 2 input Nan gate I.C.s. **50p**

NEW RANGE TRANSISTOR AND COMPONENT PACKS

TP SELECTION

TP5 20 Transistors. PNP Germanium. Red Spot A.F.

TP6 20 Transistors. PNP Germanium. White spot RF

TP7 1 2N174 150W 80Vce Power Transistor. with mounting assembly.

TP19 100 diodes, mixed Germanium. Gold-bonded, etc. Marked/Unmarked.

TP23 Twenty NPN Silicon uncodded TO5. Similar to BFY50/2. 2N696, 2N1613, etc. Complementary to TP24.

TP24 Twenty PNP Silicon uncodded TO5. Similar to BFY64. 2N2904/5.

TP29 8 power diodes 400V. 1 2SA Silicon FST 3/4

UT SELECTION

UT1 50 PNP's Germanium. AF and RF.

UT2 150 Germanium diodes, min. glass.

UT4 100 Silicon diodes, min. glass, similar to IN914, IN916.

UT5 40 250mW Zener diodes OAZ24 range; average 50% good.

UT7 30 Silicon rectifiers 750mA, mixed voltages. Top Hats, etc.

UT9 40 NPN Silicon planers. Similar to 2N3707-11 range. Low noise amps.

UT12 25 2N3702/3 Transistors. PNP Silicon. Plastic to 92

CP SELECTION

CP1 Mixed bag of capacitors—Electrolytic, Paper, Silver Mica (Approx. 150—sold by weight).

CP2 200 (approx.) Resistors, various types, values, watts. (Sold by weight.)

CP3 40 Wire-wound resistors, mixed.

CP4 12 pots—pre-set, w/wound, carbon, dual, with/without switches—all mixed.

CP7 Heat sinks, assorted. To fit SO-Z (OC72) TO-1 (AC128), etc.

SUNDRY

PI PAK—Approx. 170 short-lead semi-conductors and components. PNP, NPN, diodes, rectifiers, etc. on PCBs. At least 30% factory marked. Some data supplied. 50p.

UHF 625 line tuner, rotary. £2.50.
Rev Counter (for cars) (8%). £1.00.*
Books by Bernard's Publications
Newnes-Butterworth's, etc.

THE FREE CATALOGUE

New edition better than ever. It's your's for free and well worth getting—only please send large S.A.E. with 10p stamp if we have to post it to you.

TERMS OF BUSINESS:

VAT at 25% must be added to total value of order, except for items marked * or (8%), when VAT is to be added at 8%. No VAT on overseas orders. POST & PACKING Add 22p for UK orders unless shown otherwise. Minimum mail order acceptable—£1. Overseas orders, add £1 for postage. Any difference will be credited or charged. PRICES Subject to alteration without notice. AVAILABILITY All items available at time of going to press when every effort is made to ensure correctness of information.



BI-PRE-PAK X-HATCH GENERATOR MK. 2

Four-pattern selector switch 3in x 5½in x 3in
Ready-built and tested in kit form **£9.93***
Please add 30p for postage and packing
is invaluable to industrial and home user alike. Improved circuitry assures reliability and still better accuracy. Very compact, self-contained. Robustly built. Widely used by TV rental and other engineers. With reinforced fibreglass case, instructions, but less batteries. (Three U2 type required.)

TV SIGNAL STRENGTH METER*

Complete kit as described in 'Television' £19.50 plus 40p for P & P, plus VAT at current rate.

ALL ABOVE PACKS—50p EACH. TP Tested and Guaranteed. UT Untested, unmarked. CP Components.

CAPACITOR DISCHARGE IGNITION KIT

Simple to assemble and fit. Improves car performance, saves on fuel P & P. 30p. **£7.50***

SS300 POWER SUPPLY STABILISER

Add this to your unbalanced supply to obtain a steady working voltage from 16 to 60V for your audio system, workbench, etc. Money saving and very reliable **£3.25***

PLASTIC POWER TRANSISTORS

40 WATT SILICON*				
Type	Polarity	Gain	VCE	Price
40N1	NPN	15	15	20p
40N2	NPN	40	40	30p
40P1	PNP	15	15	20p
40P2	PNP	40	40	30p

90 WATT SILICON*				
Type	Polarity	Gain	VCE	Price
90N1	NPN	15	15	25p
90N2	NPN	40	40	35p
90P1	PNP	15	15	25p
90P2	PNP	40	40	35p

If you prefer not to cut coupon out, please mention ETIP2 when writing.

To BI-PRE-PAK, 222-224 WEST ROAD, WESTCLIFF-ON-SEA, ESSEX

Please send

for which I enclose inc. VAT

NAME

ADDRESS

PE11

BI-PRE-PAK LTD

Co. Reg. No. B.41019

222 224 WEST ROAD, WESTCLIFF-ON-SEA, ESSEX SS0 9DF.

TELEPHONE: SOUTHEM (0702) 46344.

FOUNDED IN 1959



CHINAGLIA

PROFESSIONAL QUALITY TEST EQUIPMENT
FROM ONE OF ITALY'S LEADING MAKERS
CORTINA MINOR

33 RANGE POCKET MULTIMETER

- SENSITIVITY 20k Ω /V d.c. and 4k Ω /V a.c.
- ACCURACY $\pm 2.5\%$ d.c. and Ω , $\pm 3.5\%$ on a.c.
- 33 RANGES, d.c. V, 0-100mV, 1.5V, 5V, 15V, 50V, 150V, 500V, 1.5kV; d.c. I, 0-50 μ A, 5mA, 50mA, 500mA, 2.5A; a.c. V, 0-7.5V, 25V, 75V, 250V, 750V, 1.5kV; a.c. I, 0-25mA, 250mA, 2.5A, 12.5A; dB, -10 to +69 in 6 ranges; Ω 0-10k Ω , 10M Ω .
- ROBUST PROTECTED PRECISION MOVEMENT.
- CLEAR UNAMBIGUOUS DIAL CALIBRATION WITH ANTI-PARALLAX MIRROR.
- COMPACT, MEASURING 155 x 85 x 40mm. WEIGHT 350g WITH INTERNAL BATTERIES.
- PROFESSIONAL COMPONENTS AND CONSTRUCTION STANDARDS THROUGHOUT.
- FULL AFTER-SALES SERVICE AND SPARES FACILITIES
- SUPPLIED COMPLETE WITH TOUGH CARRYING CASE, LEADS, HANDBOOK AND FULL 12-MONTH GUARANTEE.
- OPTIONAL 30kV d.c. PROBE AVAILABLE.

Meter £19 inc. VAT (80p p.p.). 30kV Probe £9.50 inc. VAT

For details of this and the many other exciting instruments in the Chinaglia range, including multimeters, component measuring, automotive and electronic instruments please write or telephone:

CHINAGLIA
(U.K.) LTD. 19 Mulberry Walk, London
SW3 6DZ Tel: 01-352 1897



TRADE ENQUIRIES WELCOMED

FREE Brochure on New KITS

Whether professional,
student, teacher or amateur,
the field of electronics can open
up a new world for you.



CROFTON don't just sell kits, we offer you a technical back up service to ensure your success

The following is a selection of some of the more popular kits -

- ★ Mullard CCTV Camera
- ★ PE CCTV Camera
- ★ PE Rondo Quadraphonic Four Channel Sound (Designer Approved)
- ★ Electronic Ignition
- ★ Sound Operated Flash
- ★ P.W. Tele-Tennis Game
- ★ UHF Modulator
- ★ Bench Power Supply
- ★ Wobbulator
- ★ All ETI Top Projects
- ★ Many of the Elektor Projects

NOTE PCBs for most published projects available to order

CROFTON ELECTRONICS LTD

Dept E 124 Colne Road, Twickenham, Middx O1 898 1569

12in LONG PERSISTENCE CRT. Full spec. Price £5-50 to include V.A.T. and Carriage.

MAKE YOUR SINGLE BEAM SCOPE INTO A DOUBLE WITH OUR NEW LOW PRICED SOLID STATE SWITCH. 2Hz to 8MHz. Hook up to a 9 volt battery and connect to your scope and have two traces for ONLY £6-25, P. & P. 25p. (Not cased, not calibrated.)

WIDE RANGE WOBBLULATOR. 5MHz to 150MHz up to 15MHz 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 £6-75, P. & P. 35p. (Not cased, not calibrated.)

20Hz to 200kHz WB, SINE and SQUARE GENERATOR. Four ranges. Independent amplitude controls, thermistor stabilised. Ready to use. 9V supply required £8-85 each. SINE WAVE only £6-85 each. P. & P. 35p. (Not cased, not calibrated.)

GRATICULES 12cm x 14cm high quality plastic 15p each. P. & P. 8p.

*Large quantity of good quality components—NO PASSING TRADE—so we offer 3lb of ELECTRONIC GOODIES for £1-70. Post paid.

*METER PACK—3 different meters for £2. P. & P. 55p.

MIN TRANSFORMER. 240V input, 3V 1A output. Brand new 65p each. P. & P. 20p.

P.C.B. PACKS. S & D. Quantity 2 sq. ft—no tiny pieces. 50p, P. & P. 37p.

*CAPACITOR PACK—50 brand new components, only 50p, P. & P. 37p.

*TRIMMER PACK. 2 twin 50/200pF ceramic, 2 twin 10/60pF ceramic; 2 min strip with 4 preset 5/20pF on each; 3 air spaced preset 30/100pF on ceramic base. ALL BRAND NEW. 25p the lot, P. & P. 15p.

*PHOTOCELL equ. OCP71, 13p each.

*MULLARD OCP70, 10p each.

DELIVERED TO YOUR DOOR, 1cwt of Electronic Scrap chassis, boards, etc. No rubbish FOR ONLY £4.

*MODERN TELEPHONES. Type 706: two tone grey or black, £3-75 each. Type 7006: two-tone grey or green, £3-75 each. Style similar to Type 746: grey, or black, £3 each. As above but discoloured, grey only, £2 each. P. & P. all types 45p each.

*HANDSETS. Complete with 2 inserts and lead. £1-25 each. P. & P. 37p.

*DIALS. ONLY 50p 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.

*CRYSTALS. 4 43MHz Brand new. £1-25 each. P. & P. 15p.

RESETTABLE COUNTERS—4 digit by Sodeco/Stonebridge. 1,000 ohm coil, £2 each. P. & P. 35p.

*BEEHIVE TRIMMER 3/30 pF. Brand new. Qty 1-9 13p each, P. & P. 15p; 10-99 10p each, P. & P. 25p; 100-999 7p each, P. & P. free.

HE CRYSTAL DRIVE UNIT. 19in rack mount. Standard 240V input with superb crystal oven by Labgear (no crystals) £5 each. Carr. £2.

*1,000pF FEED THRU CAPACITORS. Only sold in packs of 10, 30p, P. & P. 15p.

SOME OSCILLOSCOPES ALWAYS AVAILABLE. S.A.E. stating specification and price range.

VAT NOT INCLUDED IN PRICE
Goods marked * 25% VAT, otherwise 8%
OPEN 9 a.m. to 6 p.m. ANY DAY



CHILTMead LTD

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



ORDER DIRECT FROM THE U.S. AND SAVE

SHIPMENT MADE WITHIN 3 DAYS FROM RECEIPT OF ORDER VIA AIR MAIL - POSTAGE PAID

10% Off on orders over £10
15% Off on orders over £50
20% Off on orders over £100

NOVEMBER SPECIALS

75491 SEGMENT DRIVER

MOS to LED quad segment driver - 50 ma sink capability per driver - high gain darlington circuits
 14 pin DIP **45p**

723 VOLTAGE REGULATOR

Input 40V max - output adj. 2 to 37V - 150 ma output current without ext. pass trans. 14 pin DIP or TO-5 **35p**

5314 CLOCK CIRCUIT

50-60 Hz - 4 to 6 digit - 12-24 HR - fast and slow set controls - 24 pin DIP with socket **£2-25**

2102-2 RAM

1024 bit fully decoded static RAM - DTL/TTL compatible - single +5V supply - 650 ns 16 pin DIP **£2-75**

8263 MULTIPLEXER

3 input, 4 bit gating array - active output structure - 24 pin DIP **£3-10**

8267 MULTIPLEXER

2 input, 4 bit monolithic array - bare collector output - 16 pin DIP **£1-40**

TTL SPECIALS DIP

7432	18p	7493	37p
7448	59p	74107	22p
7475	32p	74145	65p
7490	35p	74163	85p

TTL



7400	£0-11	7448	£0-80	74150	£0-75
7401	11	7450	12	74151	71
7402	11	7451	13	74153	71
7403	11	7453	13	74154	1-06
7404	13	7454	14	74155	95
7405	13	7460	11	74156	71
7406	22	7464	21	74157	71
7407	22	7465	21	74161	95
7408	14	7472	22	74163	1-05
7409	14	7473	26	74164	1-25
7410	11	7474	26	74165	1-25
7411	16	7475	41	74166	1-15
7413	35	7476	26	74173	95
7415	22	7483	70	74175	95
7416	22	7485	80	74176	95
7417	22	7486	24	74177	85
7420	11	7489	1-50	74180	80
7422	22	7490	45	74181	2-50
7423	22	7491	71	74182	80
7425	22	7492	44	74184	1-55
7426	23	7493	44	74185	1-45
7427	22	7494	49	74190	95
7430	12	7495	49	74191	95
7432	22	7496	55	74192	90
7437	25	74100	1-25	74193	85
7438	21	74105	60	74194	95
7440	11	74107	27	74195	80
7441	60	74121	32	74196	1-00
7422	55	74122	50	74197	75
7443	55	74123	55	74198	1-70
7444	60	74125	50	74199	1-70
7445	75	74126	50	74200	3-90
7446	85	74141	68		
7447	80	74145	75		

LOW POWER

74L00	£0-16	74L51	£0-16	74L90	£0-93
74L02	16	74L55	18	74L91	80
74L03	16	74L71	18	74L93	89
74L04	18	74L72	27	74L95	89
74L06	18	74L73	38	74L98	1-53
74L10	16	74L74	38	74L164	1-53
74L20	16	74L78	44	74L165	1-53
74L30	16	74L85	85		
74L42	89	74L86	38		

HIGH SPEED

74H00	£0-16	74H21	£0-16	74H55	£0-20
74H01	16	74H22	18	74H60	21
74H04	16	74H30	18	74H61	21
74H08	16	74H40	16	74H62	20
74H10	16	74H50	16	74H74	32
74H11	16	74H52	18		
74H20	16	74H53	20		

8000 SERIES

8091	£0-33	8214	£0-93	8811	£0-38
8092	33	8220	93	8812	60
8095	76	8230	1-42	8822	1-42
8121	49	8520	71	8830	1-42
8123	88	8551	91	8831	1-42
8130	1-20	8552	1-37	8836	27
8200	1-42	8554	1-37	8880	73
8210	1-92	8810	44		

9000 SERIES

9002	£0-21	9309	£0-49	9601	£0-54
9301	63	9312	49	9602	49

CMOS

74C00	£0-21	74C74	£0-63	74C162	£1-78	4000A	£1-18	4013A	£1-32	4025A	£1-18	4069A	£1-31
74C02	30	74C76	93	74C163	1-78	4001A	18	4014A	1-06	4027A	42	4071A	19
74C04	41	74C107	82	74C164	1-92	4006A	96	4015A	1-06	4028A	70	4072A	25
74C08	41	74C151	1-59	74C173	1-59	4007A	19	4016A	40	4030A	32	4073A	28
74C10	36	74C154	1-92	74C195	1-65	4008A	1-27	4017A	85	4035A	90	4075A	28
74C20	36	74C157	1-20	80C95	82	4009A	41	4021A	98	4042A	1-05	4078A	28
74C42	1-18	74C160	1-78	80C97	82	4010A	38	4022A	78	4050A	42	4082A	25
74C73	.85	74C161	1-78			4011A	21	4023A	18	4066A	63	4528A	1-14
						4012A	18	4024A	63	4068A	31	4585A	1-49

MEMORIES w/data

1101	256 bit RAM MOS	£0-96
1103	1024 bit RAM MOS	2-72
5203	2048 bit erasable PROM	13-68
5280	1024 bit RAM Low Power	2-16
7489	64 bit RAM TTL	1-50
8223	Programmable ROM	2-72

CALCULATOR & CLOCK CHIPS w/data

5001	12 DIG 4 funct hex dec	£1-46
5002	Same as 5001 exc btry pwr	1-95
5005	12 DIG 4 funct w/mem	2-42
MM5725	8 DIG 4 funct chain & dec	1-10
MM5736	18 pin 6 DIG 4 funct	2-42
MM5738	8 DIG 5 funct K & Mem	2-42
MM5739	9 DIG 4 funct (btry sur)	2-92
MM5311	28 pin BCD 6 dig mux	2-42
MM5312	24 pin 1 pps BCD 4 dig mux	1-94
MM5313	28 pin 1 pps BCD 6 dig mux	2-42
MM5314	24 pin 6 dig mux	2-42
MM5316	40 pin alarm 4 dig	2-42

LED & OPTO ISOLATOR

MV10B	Red TO 18	£0-14
MV50	Axial leads	8
MV5020	Jumbo Vis. Red (Red Dome)	18
	Jumbo Vis. Red (Clear Dome)	18
ME4	Intra red diff. dome	1-38
MAN 1	Red 7 seg. 270°	2-72
MAN 2	Red alpha num. 32"	1-62
MAN 4	Red 7 seg. 190°	1-62
MAN 5	Green 7 seg. 270°	3-81
MAN 6	6" high solid seg.	74
MAN 7	Red 7 seg. 270°	2-17
MAN 8	Yellow 7 seg. 270°	2-45
MAN 64	4" high solid seg.	2-55
MAN 66	6" high spaced seg.	38
MCT2	Opto iso transistor	

DTL

930	10	937	10	949	10
932	10	944	10	962	10
936	10	946	10	963	10

LINEAR CIRCUITS



300	Pos V Reg (super 723)	TO-5	£0-43
301	Hi Perf Op Amp	mDIP TO-5	18
302	Volt follower	TO-5	43
304	Neg V Reg	TO-5	49
305	Pos V Reg	TO-5	52
307	Op AMP (super 741)	mDIP TO-5	38
308	Micro Pwr Op Amp	mDIP TO-5	60
309K	5V 1A regulator	TO-3	91
310	V Follower Op Amp	TO-5 mDIP	65
311	Hi perf V Comp	mDIP TO-5	58
319	Hi Speed Dual Comp	DIP	71
320	Neg Reg 5.2, 12, 15	TO-3	74
322	Precision Timer	DIP	60
324	Quad Op Amp	DIP	1-07
330	Quad Comparator	DIP	92
340K	Pos. V reg (5, 6, 8, 12, 15, 18, 24)	TO-3	1-20
340T	Pos Volt Reg (6V 8V 12V 15V 18V 24V)	TO 220	1-07
370	AGC/Squelch AMPL	TO-5 or DIP	65
372	AF-IF Strip detector	DIP	44
376	Pos. V Reg	mDIP	33
377	2w Stereo amp	DIP	1-47
380	2w Audio Amp	DIP	81
380-8	6w Audio amp	mDIP	69
381	Lo Noise Dual preamp	DIP	98
382	Lo Noise Dual preamp	DIP	98
550	Prec V Reg	DIP	54
555	Timer	mDIP	44
560	Phase Locked Loop	DIP	1-94
562	Phase Locked Loop	DIP	1-94
565	Phase Locked Loop	DIP	1-20
566	Function Gen	mDIP	1-20
567	Tone Decoder	mDIP	1-20
709	Operational AMPL	DIP	27
710	Hi Speed Volt Comp	DIP	21
711	Dual Difference Compar	DIP	44
723	V Reg	DIP	38
739	Dual Hi Perf Op Amp	DIP	65
741	Comp Op AMP	mDIP TO-5	27
747	Dual 741 Op Amp	DIP or TO-5	44
748	Freq Adj 741	mDIP	27
1304	FM MulpX Stereo Demod	DIP	65
1307	FM MulpX Stereo Demod	DIP	45
1458	Dual Comp Op Amp	mDIP	38
LH2111	Dual LM 211 V Comp	DIP	1-07
	Audio preamp	DIP	44
	Quad Amplifier	DIP	33
7524	Core Mem Sense AMPL	DIP	1-04
7534	Core Mem Sense Amp	DIP	1-42
8864	9 DIG Led Cath Dvr	DIP	1-37
75451	Dual Peripheral Driver	mDIP	21
75452	Dual Peripheral Driver	mDIP	21
75453	(3S1) Dual Periph. Driver	mDIP	21
75491	Quad Seq Driver for LED	DIP	50
75492	Hex Digit Driver	DIP	55

Data included with order on request.
 Add 20p ea. if item is priced below 50p ea. Add 40p ea. if item is not ordered.

Satisfaction guaranteed. Send bank cheque with order. If international money order is used, send receipt with order. The above prices do not include any taxes leviable by a purchaser's country of residence. Minimum order £2-50.

INTERNATIONAL ELECTRONICS UNLIMITED
 P.O. BOX 1708 MONTEREY, CA. 93940 USA
 PHONE (408) 659-3171

The above prices do not include any taxes leviable by a purchaser's country of residence



PATENT PENDING



Sparkrite mk2

The tried, tested, proven, reliable, complete, professional, capacitive discharge, **Electronic Ignition Kit**



"Sparkrite" was voted best of 8 systems tested by Popular Motoring Magazine

ORDER NOW

TO ELECTRONICS DESIGN ASSOCIATES DEPT. PE11,
62 Bath Street, Walsall, WS1 3DE. Phone 33652.

FROM Name _____

Address _____

Qty. _____

SPARKRITE MK 2 DIY Assembly kit @ £10.93

SPARKRITE MK 2 Ready Built Negative earth @ £13.86

SPARKRITE MK 2 Ready Built Positive earth @ £13.86

Ignition changeover switches @ £2.79

R.P.M. Limit systems in the above units @ £2.42

I enclose cheque/P.O.s for £ _____

Cheque No. _____

(Send SAE if brochures only required)

Sparkrite MK2 is a high performance, high quality, capacitive discharge, electronic ignition system.

Because of the superb design of the Sparkrite circuit it completely eliminates problems of the contact breaker. There is no mistfire because contact breaker bounce is eliminated electronically by a pulse suppression circuit which prevents the unit firing if the points bounce open at high R.P.M. Contact breaker burn is eliminated by reducing the current to about 1/50th of the norm. It will perform equally well with new, old, or even badly pitted points and is not dependent upon the dwell time of the contact breaker for recharging the system. Sparkrite incorporates a short circuit protected inverter which eliminates the problems of SCR lock on and therefore eliminates the possibility of blowing the transistors or the SCR. (Many capacitive discharge ignitions are not completely foolproof in this respect.)

Sparkrite can therefore give you:-
up to 20% better fuel consumption, instant all weather starting, cleaner plugs - they last up to 5 times longer without attention, faster acceleration, higher top speeds, longer coil and battery life, efficient fuel burning and less air pollution, smoother running, continual peak performance.

THE KIT COMPRISES EVERYTHING NEEDED

Ready drilled pressed steel case coated in matt black epoxy resin, ready drilled base and heating, top quality 5 year

guaranteed vehicles and components, cables, coil connectors, printed circuit board, nuts, bolts, silicon grease, full instructions to make the kit negative or positive earth, and 10 page installation instructions.

OPTIONAL EXTRAS

Electronic R.P.M. limitation.

This can be included in the unit to prevent over revving, an advantage to most companies, hire firms, high performance drivers etc.

Electronic/conventional ignition switch.

Gives instant changeover from "Sparkrite" ignition to conventional ignition for performance comparisons, static timing etc., and will also switch the ignition off completely as a security device. Includes: switch connectors, mounting bracket and instructions. Cables excluded.

PRICES

D.I.Y. assembly kit £10.93 incl. V.A.T. post and packing
Ready built unit £13.86 incl. V.A.T. post and packing (Both to fit all vehicles with coil/distributor ignition up to 8 cylinders.)

Switch for instant changeover from "Sparkrite" ignition to conventional ignition £2.79 incl. V.A.T. post and packing
R.P.M. limiting control £2.42 incl. V.A.T. post and packing (Fitted in case on ready built unit, dashboard mounting on kit.)

CALLERS WELCOME



BURNEZE



**Cools
soothes
and heals
minor
burns**

Burneze - unique aerosol first aid cools instantly, contains a fast-acting local anaesthetic plus antihistamine to control swelling. It deals with the lingering pain of a minor burn or scald and reduces the chance of a blister.
From Boots and other chemists. S.A.E. to Potter & Clarke, Croydon CR9 3LP, for intriguing leaflet.

ELECTROLYTIC CAPACITOR OFFER

10000/63	£1-88	2200/63	20p	220/63	18p
10000/50	£1-50	1000/180	63p	160/25	9p
5000/70	76p	1000/30	25p	100/12	7p
5000/50	75p	1000/25	25p	8/450	16p
5000/35	56p	470/63	23p	16/450	25p
5000/12	25p	470/35	16p	50/450	30p
3000/25	30p	330/100	30p	32+32/450	38p
2500/70	63p	250/64	20p	50/50	8p

DIGITAL I.C.s
Large range of 7400 series in stock. Prices from 18p.

INTEGRATED AUDIO POWER AMPS.
20W RMS, 1 off £6-38, Stereo pair £11-95.
30W RMS 1 off £7-95, Stereo pair £14-80.
50W RMS 1 off £12-38, Stereo pair £22-78.
The 30 and 50W types have internal electronic protection and all types may be used on either single rail or + and - power supplies.
Freq. resp. 20Hz-100kHz (all types).
THD 0-5% at full power (all types).
O/P load 8 ohms.

50W RMS (4Q) amp. kits complete with building and application details. Suitable for instruments, disco, hi-fi, etc. £8-95.

ZN414 IC Radio, £1-20, 741 56p.	CRS1/40	89p
IC sockets DIL, all 25p.	CRS3/40	£1-08
Complete range of components held in stock.	CRS7/40	£1-38
Resistors C.F. 0-5W and 0-25W, all 2p.	CRS1/60	£1-25
Metal Oxide 0-5W, 5p.	CRS7/60	£1-80
MYLAR Caps.:	40669	£1-18
1nF, 2nF, 5nF, 6p; 10nF, 20nF, 30nF, 40nF, 47nF, 8p; 0-1µF, 0-2µF, 12p.	1N4002	6p
C280, Polyester 250V:	1N4003	6p
10nF, 22nF, 4p; 33nF, 47nF, 4p; 68nF, 5p; 0-1µF, 0-15µF, 5p; 0-22µF, 8p; 0-33µF, 9p; 0-47µF, 10p; 0-68µF, 14p; 1-0µF, 17p; 1-5µF, 25p; 2-2µF, 29p.	1N4004	7p
	1N4005	8p
	1N4006	8p
	1N4007	9p
	1N4148	5p
	OA90	8p
	OA91	8p
	ZENER DIODES	
	400mW	15p
	1 watt	19p

SEMICONDUCTORS

AC141	57p	BC167	14p	BD124	97p	MJ3001	£2-80	2N3053	26p
AC142	42p	BC168	14p	BD131	52p	MJ4200	£5-88	2N3054	66p
AD161	62p	BC169	15p	BD132	64p	MJE2955	£1-48	2N3055	59p
AD182	62p	BC182	13p	BD135	56p	MJE3055	75p	2N3711	14p
BC107	13p	BC212	16p	BD136	63p	TIP29A	69p	40361	55p
BC108	12p	BC301	32p	BFY50	23p	TIP30A	95p	40362	60p
BC109	16p	BC302	56p	BFY51	22p	TIP31A	87p	40406	55p
BC147	14p	BC303	37p	BFY52	24p	TIP32A	99p	40407	40p
BC148	12p	BCY70	18p	MJ481	£1-36	TIP42A	£1-27	40408	63p
BC149	14p	BCY71	50p	MJ491	£1-52	TIP2955	£1-38	40409-	
BC157	14p	BCY72	16p	MJ2500	£2-75	TIP3055	75p	40410	65p
BC158	12p	BD115	67p	MJ2501	£2-85				
BC159	12p	BD121	£1-48	MJ3000	£2-88				

ALL PRICES INCLUDE VAT
P. & P. 25p on all orders. Hundreds of other types of semiconductors held in stock. S.A.E. with all inquiries.

EBA

Elliott Blunt Audio Ltd.

40 YORK STREET, TWICKENHAM, MIDDX.
Tel. 01-891 1692

Opening hours 9.30 a.m. to 6 p.m. Monday to Saturday



FOR CHOICE

SEW PANEL METERS

STOCKED AT
481 Oxford Street 311 Edgware Road
42 Tottenham Court Rd. 3 Lisle Street
branches or by mail order.

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 S0640

Size: 85 x 64mm

50uA	£4.20		
100uA	£4.15		
200uA	£4.10		
500uA	£4.05		
50-0-50uA	£4.15		
100-0-100uA	£4.10		
1mA	£4.05		
5mA	£4.05		
10mA	£4.05	10V DC	£4.05
50mA	£4.05	20V DC	£4.05
100mA	£4.05	50V DC	£4.05
500mA	£4.05	300V DC	£4.05
1A DC	£4.05	15V AC	£4.15
5A DC	£4.05	30V AC	£4.15
10A DC	£4.05	300V AC	£4.15
5V DC	£4.05	VU Meter	£4.95



CLEAR PLASTIC MODEL SW100

Size: 100 x 80mm

50uA	£6.05		
100uA	£4.95		
500uA	£4.75		
50-0-50uA	£4.95		
100-0-100uA	£4.90		
1mA	£4.75		
1A DC	£4.75	150V AC	£4.90
5A DC	£4.75	300V AC	£4.90
20V DC	£4.75	VU Meter	£6.25
50V DC	£4.75		
300V DC	£4.75		



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.

50uA	£9.35		
100uA	£8.70		
50-0-50uA	£8.70		
1mA	£8.40	20V DC	£8.40
10-0-10mA	£8.40	50V DC	£8.40
1A DC	£8.40	300V DC	£8.40
5A DC	£8.40	500mA 5A DC	£9.50
5V DC	£8.40	5V 50V DC	£9.50
10V DC	£8.40	5V 15V DC	£9.50
15V DC	£8.40	1A 15A DC	£9.50



CLEAR PLASTIC MODEL S0460

Size: 58 x 46mm

50uA	£3.85		
100uA	£3.80		
200uA	£3.75		
500uA	£3.70		
50-0-50uA	£3.80		
100-0-100uA	£3.75		
1mA	£3.65		
5mA	£3.65	5V DC	£3.65
10mA	£3.65	10V DC	£3.65
50mA	£3.65	20V DC	£3.65
100mA	£3.65	50V DC	£3.65
500mA	£3.65	300V DC	£3.65
1A DC	£3.66	15V AC	£3.80
5A DC	£3.65	300V AC	£3.80
10A DC	£3.65	VU Meter	£4.65



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

CLEAR PLASTIC MODEL S0830

Size: 110 x 83mm

50uA	£4.75		
100uA	£4.75		
200uA	£4.60		
500uA	£4.55		
50-0-50uA	£4.65		
100-0-100uA	£4.60		
1mA	£4.50		
5mA	£4.50		
10mA	£4.60		
50mA	£4.50		
100mA	£4.50		
500mA	£4.50		
1A DC	£4.50	10V DC	£4.50
5V DC	£4.50	20V DC	£4.50
10A DC	£4.50	50V DC	£4.50
5V DC	£4.50	300V DC	£4.50
5V DC	£4.50	15V DC	£4.60
		300V AC	£4.60
		VU Meter	£5.60



CLEAR PLASTIC MODEL MR 45P

Size: 50 x 50mm

50uA	£3.55		
100uA	£3.50		
200uA	£3.45		
500uA	£3.30		
50-0-50uA	£3.60		
100-0-100uA	£3.45		
500-0-500uA	£3.25		
1mA	£3.25		
5mA	£3.25		
10mA	£3.25		
50mA	£3.25	15V AC	£3.40
100mA	£3.25	300V AC	£3.40
1A DC	£3.25	5 Meter 1mA	£3.75
5A DC	£3.25	VU Meter	£4.30
10V DC	£3.25	1A AC	£3.25*
20V DC	£3.25	5A AC	£3.25*
30V DC	£3.25	20A AC	£3.25*
300V DC	£3.25	30A AC	£3.25*



CLEAR PLASTIC MODEL MR 38P

Size: 42 x 42mm

50uA	£3.46		
100uA	£3.40		
200uA	£3.30		
500uA	£3.10		
50-0-50uA	£3.40		
100-0-100uA	£3.30		
500-0-500uA	£3.05		
1mA	£3.05		
1.0-1mA	£3.05		
2mA	£3.05	10V DC	£4.05
5mA	£3.05	15V DC	£3.05
10mA	£3.05	20V DC	£3.05
20mA	£3.05	50V DC	£3.05
50mA	£3.05	100V DC	£3.05
100mA	£3.05	150V DC	£3.10
150mA	£3.05	300V DC	£3.10
200mA	£3.05	500V DC	£3.15
300mA	£3.05	750V DC	£3.15
500mA	£3.05	15V AC	£3.15
750mA	£3.05	50V AC	£3.15
1A DC	£3.05	150V AC	£3.15
2A DC	£3.05	300V AC	£3.15
5A DC	£3.05	300V AC	£3.15
10A DC	£3.05	500V AC	£3.30
3V DC	£3.05	5 Meter 1mA	£3.50
		VU Meter	£4.10



CLEAR PLASTIC MODEL MR 85P

Size: 120 x 110mm

50uA	£6.00		
100uA	£5.90		
200uA	£5.90		
500uA	£5.80		
50-0-50uA	£5.95		
100-0-100uA	£5.90		
500-0-500uA	£6.65		
1mA	£5.75		
1.0-1mA	£5.75		
5mA	£5.75	50V DC	£5.75
10mA	£5.75	150V DC	£5.75
50mA	£5.75	300V DC	£5.75
60mA	£5.75	15V AC	£5.85
100mA	£5.75	300V AC	£5.85
500mA	£5.75	5 Meter 1mA	£6.65
1A DC	£5.75	VU Meter	£7.10
5A DC	£5.75	1A AC	£6.75*
15A DC	£5.75	5A AC	£5.75*
30A DC	£5.75	20A AC	£5.75*
10V DC	£5.75	30A AC	£5.75*
20V DC	£5.75		



EDGEWISE MODEL PE70

Size: 90 x 34mm

50uA	£4.55		
100uA	£4.50		
200uA	£4.45		
500uA	£4.30		
50-0-50uA	£4.50		
100-0-100uA	£4.45		
1mA	£4.25		
10V DC	£4.25		
30V DC	£4.35		
300V DC	£4.35		
VU Meter	£5.50		



BAKELITE MODEL S80 Enlarged Window

Size: 90 x 80mm

50uA	£4.95		
100uA	£4.90		
500uA	£4.60		
50-0-50uA	£4.80		
100-0-100uA	£4.65		
1mA	£4.60		
1A DC	£4.60		
5A DC	£4.60		
20V DC	£4.60		
50V DC	£4.60		
300V DC	£4.60		
300V AC	£4.75		
VU Meter	£5.95		



CLEAR PLASTIC MODEL MR 52P

Size: 60 x 60mm

50uA	£4.10		
100uA	£3.95		
500uA	£3.70		
50-0-50uA	£3.85		
100-0-100uA	£3.70		
1mA	£3.65		
5mA	£3.65		
10mA	£3.65		
50mA	£3.65		
100mA	£3.65		
500mA	£3.65		
1mA	£3.65		
5A DC	£3.65	5 Meter 1mA	£4.20
10V DC	£3.65	VU Meter	£4.85
20V DC	£3.65	1A AC	£3.65
50V DC	£3.65	5A AC	£3.65
300V DC	£3.65	10A AC	£3.65
15V AC	£3.75	20A AC	£3.65
30V AC	£3.75	30A AC	£3.65



BAKELITE MODEL MR 65

Size: 80 x 80mm

50uA	£5.90		
100uA	£4.40		
500uA	£4.05		
50-0-50uA	£4.35		
100-0-100uA	£4.35		
500-0-500uA	£3.95		
1mA	£3.95		
1.0-1mA	£3.95		
5mA	£3.95		
10mA	£3.95		
50mA	£3.95		
100mA	£3.95		
500mA	£3.95		
1A DC	£3.95	300V DC	£3.95
2A DC	£3.95	30V AC	£3.95
5A DC	£3.95	50V AC	£3.95
10A DC	£3.95	150V AC	£3.95
15A DC	£3.95	300V AC	£3.95
30A DC	£3.95	500V AC	£3.95
50A DC	£4.20	VU Meter	£5.20
5V DC	£3.95	1A AC	£3.95
10V DC	£3.95	5A AC	£3.95
15V DC	£3.95	10A AC	£3.95
20V DC	£3.95	20A AC	£3.95
60V DC	£3.95	30A AC	£3.95
150V DC	£3.95	50A AC	£3.95
		100V DC	£3.95
		500V DC	£4.15
		100V DC	£4.15



CLEAR PLASTIC MODEL MR 65P

Size: 86 x 78mm

50uA	£4.35		
100uA	£4.25		
200uA	£4.20		
500uA	£4.15		
50-0-50uA	£4.25		
100-0-100uA	£4.20		
500-0-500uA	£4.10		
1mA	£4.10		
1.0-1mA	£4.10		
5mA	£4.10		
10mA	£4.10		
50mA	£4.10		
100mA	£4.10		
500mA	£4.10		
1A DC	£4.10		
5A DC	£4.10		
10A DC	£4.10		
15A DC	£4.10		
20A DC	£4.10		
30A DC	£4.25		
50A DC	£4.10		
5V DC	£4.10		
10V DC	£4.10		
15V DC	£4.10		
20V DC	£4.10		
50V DC	£4.10		
150V DC	£4.10		
		300V DC	£4.10
		15V AC	£4.20
		50V AC	£4.20
		100V AC	£4.20
		150V AC	£4.20
		300V AC	£4.20
		500V AC	£4.30
		5 Meter 1mA	£4.85
		VU Meter	£5.20
		1A AC	£4.10*
		5A AC	£4.10*
		10A AC	£4.10*
		20A AC	£4.10*
		30A AC	£4.10*
		50A AC	£4.10*
		100A AC	£4.10*
		200A AC	£4.10*
		500A AC	£4.10*
		1000A AC	£4.10*



240° Wide Angle
1mA METERS
MW1-8.80 x 60mm
£7.45 P & P Ins.15p.

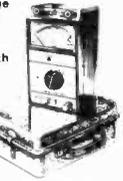
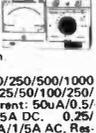
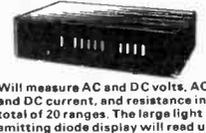


BATTERY/LEVEL PANEL INDICATOR

18mm Panel mounting.
OUR PRICE 95p p/p
& Ins 15p/Discounts for quantity.



IT MAKES SENSE TO

<p>HIOKI 730X 30,000 opv. Overload protection. Ranges: 6/30/60/300/600/1200V DC. 12/60/120/600/1200V AC. 60/μA/30mA/300mA. 2K/200K/2 Meg Ohm. -10 to +63dB. OUR PRICE £8.10 P/P & Ins 30p</p> 	<p>U4312 MULTIMETER Extremely sturdy instrument for general electrical use. 667 opv. Ranges: 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. 0/300A/1.5/6/15/150/60/600mA/1/1.5/6A DC. 0/1.5/6/15/60/150/600/1000/1.5/6A AC. 0/200/3K/30K ohms. DC accuracy 1%. AC 1.5%. Knife edge pointer, mirror scale. Complete with sturdy metal carrying case, leads and instructions. OUR PRICE £11.60 P/P & Ins 60p</p> 	<p>MODEL 500 30,000 opv with overload protection. Mirror scale. Ranges: 0/0.5/2.5/10/25/100/250/500/1000V DC. 0/2.5/10/25/100/250/500/1000V AC. 0/50A/0.5/5/10/25/100/250/500/1000V AC. 0/50A/0.5/5/10/25/100/250/500/1000V AC. 0/50A/0.5/5/10/25/100/250/500/1000V AC. 0/50A/0.5/5/10/25/100/250/500/1000V AC. 0/50A/0.5/5/10/25/100/250/500/1000V AC. OUR PRICE £15.05 P/P & Ins 60p</p> 	<p>KAMODEN HM720B FET VOM Input impedance 10 Megohms. Ranges: 0/25/12.5/10/50/100V DC. 0/2.5/10/50/250/1000V AC. 0/25A/0.25/25/250mA DC. 0/5k/50k/500k/5M 500 Megohms. OUR PRICE £24.30 P/P & Ins 60p</p> 	<p>370WTR MULTIMETER Features AC current ranges. 20,000 opv. Overload protected. Mirror scale. Ranges: -0/0.6/3/30/120/600/250/500/1000V DC. 0/5/10/50/100/250/500/1000V AC. 0/50A/0.1/100mA/1/10A DC. 0/100mA/1/10A AC. 0/3k/50k/500k/5 Meg/50 Meg. Decibels: -20 to +62dB. OUR PRICE £21.50 P/P & Ins 60p</p> 
<p>U4323 MULTIMETER 20,000 opv. 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. 0.05/0.6/6/60/500mA DC. Resistance: 0/100 x 1,000, x 10,000 (80%). 500Ω, 5kΩ, 50kΩ centre scale. Battery operated. Size: 160 x 97 x 40mm. Supplied in carrying case complete with test leads. OUR PRICE £8.60 P/P & Ins 60p</p> 	<p>U4315 MULTIMETER Sturdy 43-range multimeter for current and voltage in DC AC circuits with freq. 45-20kHz and DC resistance, capacitance, etc. Ranges: DC 50 μA/100A/0.5/1.5/7.5/25/100/500/2500V DC. 75mV/1V/2.5/6/10/25/100/250/500/1000V AC. 0.5/1.5/10/25/100/250/500/1000V AC. 0.5/1.5/10/25/100/250/500/1000V AC. 0.5/1.5/10/25/100/250/500/1000V AC. 0.5/1.5/10/25/100/250/500/1000V AC. OUR PRICE £10.80 P/P & Ins 60p</p> 	<p>U4317 MULTIMETER High sensitivity instrument for field and laboratory work. Knife edge pointer, 86mm mirror scale. Overload protection. Ranges: 100mV/0.5/2.5/10/25/50/100/250/500/1000V DC. 0.5/2.5/10/25/50/100/250/500/1000V AC. 0.5/1.5/10/25/100/250/500/1000V AC. 0.5/1.5/10/25/100/250/500/1000V AC. 0.5/1.5/10/25/100/250/500/1000V AC. 0.5/1.5/10/25/100/250/500/1000V AC. OUR PRICE £18.35 P/P & Ins 60p</p> 	<p>U91 Clamp VOLT METER 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 36mm. Complete with carrying case, leads and fuses. OUR PRICE £15.10 P/P & Ins 60p</p> 	<p>KAMODEN 72.200 Multitester High sensitivity tester. 200,000 opv. Overload protected. Mirror scale. Ranges: -0/0.6/3/30/120/600/250/500/1000V DC. 0/12A AC. -20 to +63dB. 0/2k/200k/2 Meg/200 Megohms. OUR PRICE £24.30 P/P & Ins 60p</p> 
<p>TMK 200 MULTIMETER KIT Build yourself a quality 20000 opv. multimeter and save money. Complete kit with meter scale, movement and rotary range selector ready mounted in cabinet. All parts, batteries, test prods and instructions. Ranges: 0/0.6/6/30/120/600/1200V D.C. 0/6/30/120/600/1200V A.C. Current: 0/0.6/6/60/600mA. Resistance: 0/10/100K/1/10 Meg ohms. Decibels: -20 to +63dB. Size: 90 x 150 x 36mm. OUR PRICE £9.65 P/P & Ins 30p</p> 	<p>TMK MODEL TW50K 46 ranges, mirror scale. 5000V DC. 50kV AC. DC Volts: 0.125/0.25/1.25/2.5/5/10/25/50/125/250/500/1000. AC Volts: 1.5/3/10/25/50/125/250/500/1000. DC current: 25/50A/2.5/6/25/10A. Resistance: 10k/100k/1 Meg/10 Meg ohms. -20 to +81.5dB. OUR PRICE £13.50 P/P & Ins 60p</p> 	<p>MODEL AS. 1000 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. 0/10A/0.1/1A/10A/100A/1000A. 12 amp. 0/2k/200k/2M/200 Meg Ohm. -20 to +17dB. OUR PRICE £18.90 P/P & Ins 60p</p> 	<p>SWR METER Model SWR3 Handy SWR meter for transmitter antenna alignment, with built-in field strength meter. Accuracy 5%. Impedance 52Ω. Indicator 100uA DC. Full scale 5 section adjustable antenna. Size 145 x 50 x 60mm. OUR PRICE £4.55 P/P & Ins 60p</p> 	<p>TE-200 RF SIGNAL GENERATOR Accurate wide range signal generator covering 120 kHz-500 MHz on 8 bands. Directly calibrated. Variable R.F. extender audio output. Xtal socket for calibration. 220/240V a.c. Brand new with instructions. Size 140mm x 215mm x 170mm. OUR PRICE £24.30 P/P & Ins 60p</p> 
<p>MODEL C7208FM 30,000 opv DC. 15,000 opv AC. Ranges: 6/3/15/60/300/600/1200V DC. 6/30/120/600/1200V AC. DC Resistance X1, X10, X100, X1000 (80%) centre scale. DC Current 30uA/3/30/600mA. -20 to +63dB. OUR PRICE £9.65 P/P & Ins 30p</p> 	<p>MODEL AF. 105 VOM 50,000 opv. Mirror scale. Meter protection. Ranges: 0/3/3/12/60/120/300/600/1200V DC. 0/6/30/120/300/600/1200V AC. 0/30A/6/60/300mA/5/12 Amp. 0/10K/1 Meg/10M/100M/10 Meg Ohms. -20 to +17dB. OUR PRICE £13.50 P/P & Ins 60p</p> 	<p>KAMODEN 360 MULTIMETER High sensitivity. DC 100kOhm/V AC 10kOhm/V μ mirror scale, overload protected. Ranges: 0.5/2.5/10/50/100/250/500/1000V DC. 5/10/50/250/1000V AC. Current: 0/0.1mA/0.5/5/50/500mA/10A. Resistance: 0/1/10/100 ohms/100/100k ohms/10/100M ohms. Decibels: -20 to +62dB. Battery operated. Size: 180 x 140 x 80mm. Supplied complete with test leads etc. OUR PRICE £18.90 P/P & Ins 60p</p> 	<p>KAMODEN TT35 TRANSISTOR TESTER Instrument to test reverse 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 instructions, leads carrying handle. OUR PRICE £18.90 P/P & Ins 60p</p> 	<p>MODEL TE15 GRID DIP METER Transistorised. Operates as Grid Dip. Oscillator. Absorption Wave Meter and Oscillating Detector. Frequency range 40kHz-280MHz in six coils. 500uA meter. 9V battery operated. Size: 180 x 80 x 40mm. OUR PRICE £18.90 P/P & Ins 30p</p> 
<p>U4324 MULTIMETER High sensitivity. 20,000 opv. Ranges: 0.6/1.2/3/12/30/60/120/600/1200V DC. 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. Resistance: 25/500 ohms/0.5/5/50/500 ohms/5 Mohms. Decibels: -10 to +12dB. Size 167 x 98 x 63mm. Supplied complete with test leads, spare diode and instructions. OUR PRICE £10.60 P/P & Ins 60p</p> 	<p>U4313 MULTIMETER High sensitivity (20,000 opv on DC and 2,000 opv on AC) and accuracy of 1.5% on DC and 2.5% on AC. Ranges: DC and AC current: 0.6 mA/3/15/60/300/1.5A. DC and AC Voltage: 1.6V/3/7.5/15/30/60/150/300/600V DC. DC resistance 1kOhm/10/100/1,000. -10 to +12dB. etc. Complete with steel carrying case and leads, manual. OUR PRICE £14.90 P/P & Ins 60p</p> 	<p>MODEL HT1008A MULTIMETER Overload protected, shock proof circuits. 9.5uA Meter with mirror scale. Sensitivity 100kV. Polarity change switch. Ranges: 0.5/2.5/10/50/100/250/500/1000V DC. 2.5/10/50/100/250/500/1000V AC. DC resistance 0-20/200k/2/20 Meg. ohms. DC current: -10/250A/2.5/25/250 mA/10A. AC current: -10/10A. -20 to +62dB. Operates from 2 x 1.5V batteries. Size: 180 x 134 x 79mm. OUR PRICE £21.50 P/P & Ins 60p</p> 	<p>S100TR MULTIMETER TRANSISTOR TESTER 100,000 opv. Mirror scale. Overload protection. 0/0.1/0.2/0.6/3/12/60/120/300/600V AC. 0/12/60/120/300mA/6/12A DC. 0/10k/1 Meg/100 Meg. -20 to +50dB. 0.01-0.2 MFD Transistor tester measures Alpha, Beta and Ico. Complete with instructions, batteries and leads. OUR PRICE £22.65 P/P & Ins 60p</p> 	<p>SINCLAIR DM2 DIGITAL MULTIMETER Will measure AC and DC volts, AC and DC current, 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 combined carrying handle and bench stand and sockets are provided for the connection of an external power supply. OUR PRICE £63.70 P/P & Ins 60p</p> 
<p>HIOKI 750X VOLT-OHM-MILLIAMETER 43 ranges: 0-0.3/0.6/1.5/3/6/12/30/60/150/300/600/1200V AC. Current: 0-30/60uA/300/600mA/3A DC. Resistance: 0-3/30k/3/30Mohms. Decibels: -10 to +17dB. Output: -0-3/6/15/30/60/120/300V. Accuracy \pm 3% DC. \pm 4% AC. Sensitivity: 50,000 opv DC. 5,000 opv AC. 4 inch meter. Built in protection. Size: 57 x 102 x 153mm. OUR PRICE £12.90 P/P & Ins 60p</p> 	<p>MODEL C7080EN 43 ranges, mirror scale. 20,000 opv. Ranges: 0/0.25/1.25/5/10/25/100/250/500/1000V DC. 0/2.5/10/25/100/250/500/1000V AC. 0/50A/0.5/5/10/25/100/250/500/1000V AC. 0/50A/0.5/5/10/25/100/250/500/1000V AC. 0/50A/0.5/5/10/25/100/250/500/1000V AC. OUR PRICE £21.50 P/P & Ins 60p</p> 	<p>C15 PULSE OSCILLOSCOPE For display of pulsed and periodic waveforms in electronic circuits. VERT. AMP. Bandwidth: 10MHz. Sensitivity at 100kHz: VRMS/mm: 0.1-25; HOR. AMP. Bandwidth: 50kHz. Sensitivity at 100kHz: VRMS/mm: 0.3-25. Preset triggered sweep 1-300us. Free running 20-200 kHz in nine ranges. Calibrator pips. 220 x 360 x 430mm. 115-230V AC. OUR PRICE £47.50 P/P & Ins £1.60</p> 	<p>EXPORT Personal exports arranged for overseas visitors. Goods specially packed, insured and dispatched to all parts of the world at minimum cost exclusive of VAT. Payment by bank transfer, certified cheque, postal order or money order in any currency.</p>	<p>CUSTOMER SERVICES Our Customer Services Division at Head Office will answer all your enquiries - just ring 01-200 1321</p> <p>ALL PRICES INCLUDE VAT</p>

BUY AT LASKYS

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

A new portable bridge offering excellent range and accuracy at low cost. Resistance: 6 ranges: 0.1 ohm-11.1 megohm \pm 1% Inductance: 6 ranges: 1 microhenry-111 henries \pm 2% Capacity: 6 ranges: 10pF-1110 nF \pm 2% Turns Ratio: 6 ranges: 1:1/1000-1:11100 \pm 1% Bridge Voltage at 1,000 cps. Operated from 9-volt battery. 100 microamp meter indication. Size 7 1/2" x 5" x 2" P/P & Ins 60p
OUR PRICE £29.70

TE22 SINE SQUARE WAVE AUDIO GENERATOR

Sine 20cps to 200kHz on 4 bands. Squares 20 cps to 30 kHz. Output impedance 5000 Ohms. 200/250V AC operation. Supplied brand new guaranteed, with instruction manual and leads.
OUR PRICE £26.90 P/P & Ins 60p

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. Output 1V maximum. 220/240V AC operation. Complete with instructions and leads.
OUR PRICE £40.50 P/P & Ins 60p

MODEL TE20 RF SIGNAL GENERATOR

Six bands, 120kHz-260MHz. Dual output RF terminals. Separate variable audio output. Accuracy \pm 2%. Audio output to 8V. Power requirements: P06-125V, 220-240V AC. Size 193 x 265 x 150mm. Complete with test leads etc.
OUR PRICE £20.45 P/P & Ins 60p

HANIMEX HDC 1900 DIGITAL ALARM CLOCK

240V operation with large clear numbers, night light and 'snore' switch. Attractively finished in white and silver.
OUR PRICE £8.10 P/P & Ins £1.00

ALL PRICES INCLUDE VAT

LASKYS make sense of Hi-Fi

AUDIOTRONIC HEADPHONES

LSH20 Individual volume controls. Mono/stereo switch. 40-19,000 Hz. 8 ohms.
OUR PRICE £6.25 P/P & Ins 50p

LSH30

Individual tone and volume controls. Mono/stereo switch. 30-20,000 Hz. 8 ohms.
OUR PRICE £8.95 P/P & Ins 30p

LSH40

Two-way speaker system. Individual volume controls. 20-20,000 Hz. 8 ohms.
OUR PRICE £10.75 P/P & Ins 30p

NEW GOLDRING G102 KIT

Belt-drive 2-speed turntable in kit form complete with pick up arm and head shell. P/P & Ins 60p.
OUR PRICE £21.15 P/P & Ins £1.00

AUDIOTRONIC AHA101 Stereo Headphone Amplifier

All silicon, transistor amplifier operates from magnetic, ceramic or tuner inputs with twin stereo headphone outputs and separate volume controls for each channel. Operates from 9V battery. INPUTS: 5mV and 100mV. OUTPUT: 50mV per channel.
OUR PRICE £10.65 P/P & Ins 30p

RANK AUDIO RA 210T STEREO AMPLIFIER

71-73 watts rms. Inputs for magnetic phono, tuner, tape and aux. Separate base, treble, balance and volume controls. Headphone socket. Teak case. Unrepeatable offer. P/P & Ins 60p.
OUR PRICE £21.85 P/P & Ins £1.00

MINIATURE ORGAN MUSIC MASTER AM100

Spanning nearly two octaves, including semitones. This instrument will give hours of enjoyment to 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, earphone socket and external 9V D.C. socket. Size 229mm x 127mm x 64mm
OUR PRICE £9.95 P/P & Ins 50p

SUPERB QUALITY LOW PRICES

AUDIOTRONIC DIGITAL CLOCK RADIOS

ADC22 24-hour clock radio, covering MW/FM wavebands. 180-minute sleep timer. Choice of Grey or White cabinet.
OUR PRICE £17.50 P/P & Ins £1.00

WALKIE TALKIES SKYFON NV7

Super low cost transmitter/receivers. 100MW with call buzzer and on/off volume control. 7 transistors. Telescopic rod antenna.
OUR PRICE £43.60 P/P & Ins 50p
 NOT LICENSABLE IN THE U.K.

SINCLAIR Project 80 Modules

Z40 Power Amp £5.80 P/P & Ins 15p
 Z60 Power Amp £8.95 P/P & Ins 15p
 Stereo 80 Pre-Amp £13.10 P/P & Ins 15p
 Active Filter Unit £7.40 P/P & Ins 15p
 FM Tuner £12.10 P/P & Ins 15p
 Stereo Decoder £8.40 P/P & Ins 15p
 P25 Power Supply £4.65 P/P & Ins 30p
 P26 Power Supply £8.40 P/P & Ins 30p
 P28 Power Supply £7.90 P/P & Ins 30p
 Transformer for P28 £5.10 P/P & Ins 30p

AUDIOTRONIC LOW NOISE CASSETTES

MODEL	5	10	15
C60	£2.05	£3.88	£5.50
C90	£2.81	£5.34	£7.57
C120	£3.59	£8.80	£9.64

AUDIOTRONIC HIGH ENERGY LOW NOISE CASSETTES

MODEL	5	10	15
C60LN	£3.59	£6.80	£9.64
C90LN	£5.13	£9.72	£13.77
C120LN	£6.15	£11.86	£16.82

p/p & Ins. 15p per order



ELIZABETHAN DCR26 DIGITAL CLOCK RADIO

A smaller than usual digital clock AM/FM radio, measuring only 8 1/2" x 3 1/2" x 4" h. The DCR is finished in simulated teak veneer and is fitted with a pre-set sleep timer switch that will turn on the radio at the precise time chosen (Mains operated) List Price £24.25
OUR PRICE £14.90 P/P & Ins. £1.35



ELIZABETHAN 8/LZ-1

8-Track Stereo Player. Home 8-Track player with automatic and manual programme change and illuminated channel indicators for use with your hi fi system. Size 7 1/2" w x 12" d x 2 1/2" h. List Price £28.90.
OUR PRICE £14.90 P/P & Ins. £1.35



HI-FI CATALOGUE

LASKYS 32 PAGE CATALOGUE AND PRICE LIST - absolutely free and available from all stores or by post (see coupon below). This exciting catalogue provides a comprehensive selection from the largest Hi-Fi Retailer in Europe - a MUST for every Hi-Fi enthusiast

ELECTRONIC CALCULATORS



We carry a tremendous range of both pocket and desk calculators from as little as £6.20. 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.

SPECIAL OFFER! SINCLAIR 4000 AMPLIFIER AND FM TUNER

Slimline elegance and great performance from SINCLAIR - the 4000 amplifier gives 17W RMS per channel (both drives) into 8 ohms, phones jack, active switchable scratch filter, low noise and distortion, and much more. List Price £74.95 p/p & Ins.
OUR PRICE £33.95 P/P & Ins. £1.65
 A perfect match for the 4000 amplifier is the 4000 FM tuner, which boasts a capture ratio of 3dB, sensitivity of 3uV for 30dB quieting, stereo beacon, etc. List Price £62.43 p/p & Ins.
OUR PRICE £29.95 P/P & Ins. £1.65

BELTEK C6260 AM/FM 8-TRACK IN-CAR PLAYER

The BELTEK C6260 includes AM/FM radio, and stereo 8-track cartridge player, with volume-tone and balance control, cartridge program indicator, automatic head cleaning; comes complete with installation kit, suppressors, and instructions. 12v Neg. p/p & Ins. (Speakers not included.)
OUR PRICE £22.50 P/P & Ins. £1.35

HIGH QUALITY CONSTRUCTION KITS

ALL PRICES REDUCED TO CLEAR

LIMITED STOCKS AT Oxford Street. 42 & 257 Tottenham Court Road, 162, Fleet Street, 311 Edgware Road, CROYDON BIRMINGHAM KINGSTON LEICESTER NORTHAMPTON SOUTHEND TUNBRIDGE WELLS WOLVERHAMPTON branches.

your nearest store

CENTRAL LONDON (01)
 481 Oxford Street, W1 493 8641
 10 Tottenham Court Rd. W1 637 2232
 33 Tottenham Court Rd. W1 636 2605
 42/45 Tottenham Ct. Rd. W1 636 0845
 257/8 Tottenham Ct. Rd. W1 580 0670
 3 Lisle Street, WC2 437 8204
 118 Edgware Road, W2 723 9789
 193 Edgware Road, W2 723 6211
 207 Edgware Road, W2 723 3271
 311 Edgware Road, W2 262 0387
 346 Edgware Road, W2 723 4453
 382 Edgware Road, W2 723 4194
 109 Fleet Street, EC4 353 5812
 152/3 Fleet Street, EC4 353 2833

BIRMINGHAM
 116 Corporation Street 021-236 3503

BRISTOL
 16-18-20 Penn Street 20421

CROYDON
 1046 Whitgift Centre 681 3027

KINGSTON 38/40 Eden St 546 1271

LEICESTER 45 Market Pl 537678

NORTHAMPTON
 78 Abington Street 35753

NOTTINGHAM
 5-7 Lower Parliament St 48987

OXFORD 16 Westgate Centre 722870

READING
 6 Friars Walk, Friar Street 0734 595459

RICHMOND 32 Hill Street 948 1441

ROMFORD 86 South Street 20218

SOUTHEND
 205/206 Churchhill West 612241

TUNBRIDGE WELLS
 53/57 Camden Road 423242

WOLVERHAMPTON
 30 Wulfrun Way 23384

Opening October in Slough & Lewisham. All prices correct at 20/8/75 but subject to change without notice E. & O. E.

TO LASKYS CUSTOMER SERVICES DIVISION

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

Please send me the following items

.....

Name

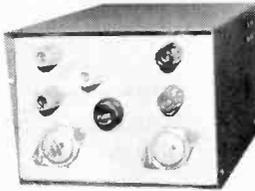
Address

Signature

TOTAL PURCHASE PRICE (inc. P/P & Ins.)
 Please send me your Free 32-page Hi-Fi catalogue price list
 I enclose cheque postal order money order
 I wish to pay by Barclaycard/Access and my number is

Registered in England No. 347947 at 12 Loxar Grosvenor Place, London SW1 0EX **PE11**

INVERTORS



240v-50Hz from your 12v car battery.

25 watt—£4.20 150 watt—£19.10
40 watt—£7.35 300 watt (12v)—£29.85
75 watt—£10.71 300 watt (24v)—£23.75

All above invertors are in kit form but may be purchased built up in metal case & ready for use. Price list sent on receipt of s.a.e. Prices include post & packing.

P. W. AUTOMATIC EMERGENCY SUPPLY

240v-50Hz-150 watt inverter with built in battery charger. In event of power failure switches over automatically from battery charging to inverter operation. Cct. as appeared in Dec. 72 P.W. Complete kit of parts (excluding meter) £22.50 + £1.10 p. & p.

FLUORESCENT LIGHT INVERTOR KIT
8 watt-12v-Fluorescent light, suitable for tents, caravans, houses, boats & secondary lighting for factories, hotels, etc.
12"-8 watt—£2.90 + 25p p. & p. Built up—£4 + 25p.
21"-13 watt—£3.30 + 30p p. & p. Built up—£4.50 + 30p.

TRANSFORMERS & COILS

Both high volume & small order capacity available.
Special offer. Miniature mains transformer 12-0-12v-6V. A.—85p plus 10p p. & p.

TRADE & EXPORT ENQUIRIES WELCOMED

P.E. ORION STEREO AMPLIFIER



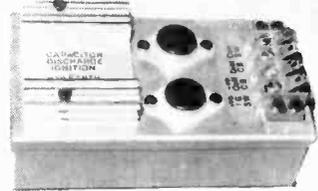
20 + 20 Watts r.m.s. into 8 ohm load. Distortion less than 0.01% 100Hz-10kHz. Frequency response ± 1 dB 20 Hz to 20 kHz. Hum level virtually nil with vol. full on.

This is a power amplifier of superb quality incorporating the very latest design features. Professional hi-fi enthusiasts have classed it as fantastic and real value for money. The CCT incorporates a low flux transformer and inputs for disc, tape, tuner, etc.

Complete kit of parts including slim line bookend case, silk screened front panel & knobs. £43 incl. VAT & p. & p.

The bookend case, I.C.s & semiconductors, P.C. board, Transformer, etc. may be purchased separately if desired. Send S.A.E. for further information

ASTRO IGNITION



ASTRO IGNITION SYSTEM

Complete kit of parts for this proven and tested system £9.50 incl. VAT. Ready built with only two connections to alter £12.50 incl. VAT. Thousands have used this system both home and abroad. Consider these advantages more power, faster acceleration, fuel economy, excellent cold starting, smoother running, no contact breaker burning. Also because of the high energy spark, the fuel mixture can be made weaker giving further economy and fewer plug problems. Fitting time when built 5 minutes approx. Please state whether positive or negative earth. Trade and export enquiries welcomed.

ASTRO ELECTRONICS

Spring Bank Road, West Park
Chesterfield.



CJL LTD. P.O. BOX 34, CANTERBURY, CT1 1YT

NO EXTRAS-VAT INCLUDED-FREE DELIVERY

AERIALS

Telescopic, 15-120cm £1.50
Telescopic, H & V Swivel, 15-80cm £2.25
Indoor FM antenna, Compact design £2.45
Loft mounting FM dipole antenna £2.45

CAPACITANCE SUBSTITUTION BOXES

Single control for easy selection
0001, 001, 0022, 01, 022, 047, 0, 0.1, 0.22 £2.35

KEYNECTORS

Rapid connect to mains. Built-in plano switches, neon & 13A fuse £3.50

MULTIMETERS

Vdc-10, 50, 250, 1, 000. Vac-10, 50, 250, 1, 000. Idc-100mA, R-150k £4.95

PRINTED CIRCUIT KITS

Contain all items necessary to produce printed circuits £3.95

SIGNAL INJECTORS

Audio through video signals, ideal -servicing amplifiers, radio & tv £4.25

TEST SWITCHES

5 miniature push to test switches £1.00

VERNIER DIALS

Positive logging to 1/10th of a degree, 8:1 ratio, clear scales £2.45

VU METERS

Calibrated -20 to +3; 0-100%, ideal -recording level or power output £3.40



AUDIO PRODUCTS



AUDIO LEADS

5p din pig to 5p din pig, 1.5m lead £1.20
2p din pig to 2p din skt. 10m lead £1.45
5 pin din plug to 2 phono plugs £1.20

BIB HI-FI ACCESSORIES

GROOV-KLEENS-Ref. 42 £1.95
1/2" TAPE EDITING KITS-Ref. 23 £1.50
CASSETTE EDITING KITS-Ref. 24 £1.65
CASSETTE HEAD CLEANERS-Ref. 31 £0.65
HI-FI STEREO TEST CASSETTES-Ref. 53 £2.15

CASSETTE WALLETS (HOLD 6) -Ref. 39 £0.90

CASSETTE HEAD DEMAGNETISERS
Shaped pole piece-saves time £3.65

EARPHONES

Stethoscope style, 8 ohm dynamic £1.20
Crystal earphone with lead & plug £0.65
High resistance, 2000 ohm headphone £3.20

FOOT SWITCHES

Push on-push off. Anti skid base £2.70

INTERCOMS

2-station, ideal for the home-baby alarm, office, with cable & staples £6.35
Door-phone 'Answer door before opening' Completely weatherproof £9.95

MICROPHONES

Dynamic, remote start/stop, 200 ohms, 100-10kHz, 6mV output £2.15

MINIATURE TRANSISTOR MODULES

Microphone pre-amplifier £2.45
Power amplifier £2.70

(Each plug-in with mounting socket)

STEREO HEADPHONES

Superb stereo listening in comfort and privacy, 30-15kHz, 8 ohms £4.85

STEREO HEADPHONE JUNCTION BOXES

3 way switch unit selects phones only, speakers only or both £2.30

STEREO PRE-AMPLIFIERS

In: 3-30mV, Equalise: RIAA, Out: 200-800mV flat. 20-20kHz, Supply: PP3 £7.30

SPEAKERS

Miniature, 75mm dia, 8 ohms £0.95

TWEETERS & CROSSOVERS

Super Tweeters, 8 ohms, c/f 7kHz, For systems up to 30W RMS £4.60

Cone Tweeters, 8 ohms, c/f 3kHz, For systems up to 10W RMS £2.35

Crossovers, 8 ohms, c/f 800, 3kHz, 7kHz, For systems up to 40W RMS £5.85

Crossovers, 8 ohms, c/f 3kHz, For systems up to 15W RMS £2.10

BATTERY ELIMINATORS

Miniature AC adaptor-provides 9V at 50mA DC output from mains £4.35

POWER SUPPLY UNITS

P1 Switchable between 6 & 9V (200mA) ideal-most small radios, etc. £4.85

P2 Switchable to provide 6, 7.5, 9V at 400mA £7.15

TRANSFORMERS

Mains (miniature), 2 secondaries 0-6V, 0-6V RMS, 280mA £2.70

0-12V, 0-12V RMS, 150mA £2.70

Mains (sub miniature) 6-0-6V RMS, 100mA £1.45

12-0-12V RMS, 50mA £1.45

PERSONAL RADIOS

Philips RL077 with earphone & case £6.00

Philips RL020 with earphone & case £7.50



TOOLS



COMBINATION TRY & MITRE SQUARES

Cabinet/Chassis/P.C.B. work. One tool combining Try & Mitre Square, Depth, Height and Marking Gauges. 300mm/12in Rule, Spirit Level/Plumb & Steel Scriber £2.35

HAND DRILLS

Leytool compact, 5/16" chuck, Gears totally enclosed, S/L bearings £3.99

SOLDERING IRONS

Antex 25W, X25, 240V, Low leakage, 1/8" interchangeable long life bit 3/32", 1/8", 3/16" spare bits-each £2.05

X25 Elements £0.47

Stands, ST3, High grade base, spring, sponges, accommodation-spare bits £1.10

SOLDER -In handy Bib dispenser £0.43

WIRE STRIPPERS & CUTTERS

Bib 8B, 8 gauge selector, automatic opening, easy grip handles £0.85

1st GRADE COMPONENTS

FROM
MOTOROLA · MULLARD · SIGNETICS
MONSANTO · FERRANTI · GIM

We hold £250,000 worth of components and all items listed in this advertisement are ex-stock at the time of going to press • All products guaranteed • No minimum order charge

SIGNETICS 74 series TTL

N7400	14p	N7453	18p	N74148	£1.26
N7401	14p	N7454	18p	N74150	£2.45
N7402	14p	N7460	18p	N74151	£1.44
N7403	18p	N7470	36p	N74153	68p
N7404	18p	N7472	24p	N74154	£1.44
N7405	20p	N7473	36p	N74155	72p
N7406	41p	N7474	30p	N74156	72p
N7407	41p	N7475	54p	N74157	68p
N7408	41p	N7476	37p	N74158	68p
N7409	20p	N7480	50p	N74160	99p
N7410	15p	N7483	99p	N74161	99p
N7411	21p	N7485	£1.17	N74162	99p
N7413	29p	N7486	33p	N74163	99p
N7414	45p	N7490	63p	N74164	£1.26
N7416	27p	N7491	90p	N74165	£1.26
N7417	27p	N7492	63p	N74166	£1.26
N7420	15p	N7493	48p	N74170	£1.80
N7421	21p	N7494	90p	N74174	£1.13
N7426	23p	N7495	72p	N74175	81p
N7430	15p	N7496	£1.63	N74180	90p
N7432	23p	N74100	£1.35	N74181	£3.24
N7433	27p	N74107	32p	N74182	90p
N7437	27p	N74109	54p	N74190	£1.44
N7440	18p	N74116	£1.35	N74191	£1.44
N7442	70p	N74121	36p	N74192	£1.44
N7443	£1.35	N74122	50p	N74193	£1.44
N7444	£1.35	N74123	90p	N74194	£1.08
N7445	£1.35	N74125	43p	N74195	90p
N7446	£1.35	N74126	43p	N74198	£1.98
N7447	£1.12	N74128	45p	N74199	£1.80
N7448	£1.35	N74132	45p	N74221	90p
N7450	18p	N74145	90p	N74279	72p
N7451	18p	N74147	£1.44	N74298	£1.28

MOTOROLA C-MOS

MCI4000CP	19p	MCI4028CP	£1.31
MCI4001CP	19p	MCI4032CP	£1.70
MCI4002CP	19p	MCI4034CP	£3.59
MCI4006CP	£1.45	MCI4035CP	£1.34
MCI4007CP	19p	MCI4038CP	£1.21
MCI4008CP	£1.54	MCI4040CP	£1.21
MCI4009CP	91p	MCI4042CP	£1.14
MCI4010CP	91p	MCI4046CP	£1.67
MCI4011CP	19p	MCI4049CP	53p
MCI4012CP	19p	MCI4050CP	53p
MCI4013CP	53p	MCI4071CP	£1.60
MCI4014CP	£1.42	MCI4076CP	£1.19
MCI4015CP	53p	MCI4081CP	19p
MCI4016CP	53p	MCI4500 series	
MCI4017CP	£1.13	MCI4510CP	£1.26
MCI4021CP	£1.17	MCI4511CP	£1.95
MCI4022CP	£1.54	MCI4528CP	87p
MCI4023CP	19p	MCI4543CP	£2.00
MCI4024CP	£1.14	MCI4556CP	£2.90
MCI4025CP	78p	MCI4558CP	£1.79
MCI4027CP	19p	MCI4585CP	£1.46

MULLARD AUDIO AND RADIO MODULES

*LP1162 5W Audio Amp	£4.20
*LP1173 10W Audio Amp	£6.68
*LP1181 RF-IF	£3.94
*LP1183/2 Stereo Pre-amp Module	£4.32
*LP1185 FM IF Amplifier	£7.18
*LP1186 FM Tuner Module	£5.56
*LP1186 FM Tuner Module	£6.88
*LP1400 Stereo Decoder Module	£7.22

Data and suggested circuits available price 5p per Module.

MONSANTO LEDS AND DISPLAYS—THE FINEST IN THE WORLD

0.3" seven segment displays	
Red Green Yellow	
MAN71 MANS1 MANB1 common anode R.H. decimal	£1.34
MAN72 MANS2 MANB2 common anode L.H. decimal	£1.34
MAN73 MANS3 MANB3 common anode overflow (±1)	£1.34
MAN74 MANS4 MANB4 common cathode R.H. decimal	£1.34

LEDS

TIL209 type case, high intensity			
MV5074B red	15p	MV5274B green	32p
MV5174B orange	32p	MV5374B yellow	32p

VOLTAGE REGULATORS

Motorola Variable	
MCI723CP2 pos. or neg. 2-37V 150mA d.c.	49p
MCI461G positive 0-40V 500mA d.c.	£1.81

Motorola Fixed

MC7805CP 5V positive £1.28	MC7905CP 5V negative £1.80
MC7812CP 12V positive £1.28	MC7912CP 12V negative £1.80
MC7815CP 15V positive £1.28	MC7915CP 15V negative £1.80
MC7818CP 18V positive £1.28	MC7918CP 18V negative £1.80
MC7824CP 24V positive £1.28	MC7924CP 24V negative £1.80
MLM309X 5V positive TO-3 can	£1.73

COMPLETE LIST
AVAILABLE ON
MCI4500 SERIES.
SEND S.A.E.

SPECIAL OFFER

MAN3M 0.127" red
seven segment display
25p each

LINEAR ICs

SIGNETICS

LM301AY Ext. comp. operational amplifier	36p
LM307V Int. comp. operational amplifier	80p
MCI458V Dual comp. operational amplifier	45p
NE510A Video amplifier	£1.58
*NE540L Audio power driver	£1.17
NE555V Timer	44p
NE556A Dual 555 14 pin	95p
NE561B Phase locked loop with A.M. demod.	£2.70
NE562B Phase locked loop with V.C.O.	£2.70
NE566V Phase locked loop function gen.	£1.50
*PA239A Dual low noise stereo pre-amp.	95p
*A741CV Op. amp.	42p
*A747CA Dual op. amp.	90p

MOTOROLA

MCI303L Dual stereo pre-amp.	£1.47
*MCI306P 1/2W audio amp.	64p
MCI304P F.M. multiplex stereo demodulator	£1.12
*MC1301P Stereo demodulator	£1.92
*MC1312P	£1.94
*MC1314P Quadrophonic decoder kit	£3.31
*MC1315P	£3.59
*MC1330P Low level video detector	67p
MC1496G Double balanced mixer	77p
MFC6040 Electronic attenuator	77p

G.I.M. CONSUMER CIRCUITS

AY-5-1224 12/24 hour digital clock circuit	£4.25
AY-5-3510 3 1/2 digit DVM circuit	£6.10
*AY-1-0212 Master tone generator	£5.55
*AY-1-5051 4 stage divider	£1.20
*AY-1-6721/5 5 stage divider	£1.30
*AY-1-6721/6 6 stage divider	£1.45
*AY-1-5050 7 stage divider	£1.75
CS50 8 digit calculator chip	£6.50
CS50 8 digit calculator chip	£3.25

SIGNETICS MEMORIES

N82506B 256 bit bipolar RAM	£4.50
2602B MOS 1024 bit static RAM	£3.00

FERRANTI ICs

ZN1040E Universal counter/display cct	£12.00
ZN1034E Precision timer cct	£2.99
ZN414 A.M. radio circuit	£1.00
Data and circuits on ZN414	5p

MULLARD CONSUMER ICs

*TAA350A	£1.96
*TAA550	60p
TAA570	£2.19
TAA630	£3.80
*TAA700	£4.03
*TAD100	£1.35
*TBA480	£1.75
*TBA480Q	£2.84
*TBA500	£2.42
*TBA500Q	£2.53
*TBA510	£2.42
*TBA510Q	£2.35
*TBA520	£2.99
*TBA520Q	£3.08
*TBA530	£2.53
*TBA530Q	£2.62
*TBA540	£1.28
*TBA540Q	£2.97
*TBA550	£4.14
*TBA550Q	£4.23
*TBA560Q	£4.14
*TBA570	£1.38
*TBA570Q	£1.47
TBA673	£2.19
*TBA690	£2.23
*TBA690Q	£2.35
*TBA700	£1.84
*TBA700Q	£1.96
*TBA720AQ	£2.23
*TBA750	£2.23
*TBA750Q	£2.23
*TBA920	£3.68
*TBA920Q	£3.77
*TBA990Q	£3.77
*TCA160B	£2.84
*TCA160C	£1.93
*TCA270	£4.09
*TCA270	£4.19
*TCA290A	£2.76
*TCA420A	£1.96

TRANSISTORS, DIODES, ETC.

2AC176/1	128	BA163	78p	*BC237B	12p	*BC350A	12p	*BD140	45p
128	61p	BA182	18p	*BC238	9p	*BC350B	13p	BD142	56p
2AD161/1	162	BAV10	9p	*BC238A	10p	*BC351A	11p	BD144	£2.32
162	93p	BAW62	8p	*BC238B	10p	*BC351B	13p	*BD157	46p
AA119	9p	BAW63	35p	*BC238C	13p	*BC352	11p	*BD159	52p
AAZ15	19p	BAX13	8p	*BC239	11p	*BC352A	11p	*BD160	£1.95
AC122	19p	BAX16	10p	*BC239B	12p	*BC352B	13p	*BD165	42p
AC126	19p	*BB105B	20p	*BC239C	13p	*BC352L	10p	*BD166	46p
AC127	18p	*BB105G	19p	BC261	12p	*BC388	28p	*BD167	48p
AC128	13p	BC107	11p	BC261A	15p	BC445	99p	BD175	46p
AC153	8p	BC107A	13p	BC268A	11p	BC446	15p	BD176	50p
AC175K	30p	BC107B	13p	*BC307	16p	*BC447	15p	BD177	54p
AC176	18p	BC108	13p	*BC307A	12p	BC448	15p	BD178	58p
AC176/181	18p	BC108A	13p	*BC307B	13p	BC449	16p	BD179	60p
AC187/188/1	18p	BC108B	13p	*BC308	10p	BC485	15p	BD180	66p
AC187/188/1	18p	BC109	15p	*BC308A	11p	BC486	15p	BD181	£1.04
AC188	65p	BC109B	17p	*BC308B	12p	BC487	15p	BD182	£1.14
AC191	30p	BC109C	18p	*BC309	11p	BC488	17p	BD183	£1.23
AC192	16p	BC110	16p	*BC309A	14p	BC489	17p	BD185	54p
AC192	8p	BC111	16p	*BC317	14p	BCX25	13p	BD186	61p
AC192D	8p	BC112	16p	*BC318B	13p	BCX26	15p	BD187	61p
AD140	31p	BC113C	15p	*BC319	14p	BCX47	17p	BD189	74p
AD149	45p	BC136	20p	*BC320B	16p	BCX48	18p	BD190	79p
AD162	36p	BC137	20p	*BC321	14p	BCY21	62p	BD195	56p
AF114	25p	*BC147	10p	*BC322	16p	BCY58	18p	BD198	68p
AF115	22p	*BC148	8p	*BC327	15p	BCY59	20p	BD199	75p
AF116	19p	*BC149	8p	*BC328	15p	BCY70	24p	BD200	83p
AF117	18p	BC153	11p	*BC328	15p	BCY71	26p	BD201	£1.60
AF118	60p	*BC157	12p	*BC328	15p	BCY72	22p	BD203	£1.60
AF121	10p	BC158	10p	BC347	11p	BD115	34p	BD206	87p
AF125	24p	*BC159	13p	BC347A	11p	BD117	45p	BD207	74p
AF126	22p	BC170	15p	BC347B	12p	BD124	80p	BD208	96p
AF127	31p	BC177B	19p	BC347L	10p	*BD131	40p	BD232	£1.00
AF239	40p	BC178	18p	BC348	10p	*BD132	40p	BD233	45p
BA102	16p	BC179	20p	BC348A	11p	*BD133	49p	BD234	71p
BA114	9p	BC208A	10p	BC349	10p	*BD135	34p	BD235	78p
BA154	8p	BC214K	10p	BC349A	10p	BD136	35p	BD236	55p
BA155	9p	*BC237	11p	BC349B	10p	*BD137	36p	BD237	84p
BA156	9p	BC237A	12p	BC349L	9p	*BD138	38p	BD238	96p
		*BC237A	12p	*BC350	11p	*BD139	41p	BD311	93p



COMPONENTS

Terms of Business

Cash with order

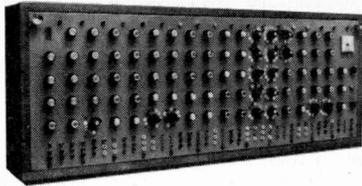
Postage 20p U.K.

£1 Overseas

Dept. P.E., 5 Northfield Industrial Estate
Beresford Avenue, Wembley, Middx. HA0 1SD
Telephone 01-903 3168

PRICES EXCLUSIVE OF V.A.T. WHICH MUST
BE ADDED AS SHOWN BELOW

V.A.T. 8% except where marked thus * these items 25%



P.E. SYNTHESISER

(P.E. Feb. 1973 to Feb. 1974)

The well acclaimed and highly versatile large-scale mains-operated Sound Synthesiser complete with keyboard circuits. All function circuits may be used independently, or interconnected. The greater the number of circuits, the greater the versatility. Other circuits in our lists may be used with the Synthesiser to good advantage.

THE MAIN SYNTHESISER

Stabilised Power Supply	£12.05
Two Linear Voltage Controlled Oscillators and one Inverter—all 3 circuits: PCB (2 are required)—each	£16.28
Two Ramp Generators and Two Input Amplifiers—all 4 circuits	£5.62
PCB (holds all 4 circuits)	£1.38
Sample-and-Hold and Noise Generator—PCB (holds both circuits)	£6.52
Tone Control, £2.43; PCB, 72p	£1.64
Reverberation Amplifier	£6.26
Spring Line unit for Reverb Amp	£4.95
Ring Modulator	£3.44
Peak Level Meter Circuit	£1.50
100µA Panel Meter	£3.75
PCB for Rev., R-Mod. & Meter Ccts.	£1.86
Envelope Shaper, £5.24; PCB, £1.42	
Voltage Controlled Amp. and Diff. Amp. PCB (holds both circuits)	£6.70
£1.26	
THE SYNTHESISER KEYBOARD CIRCUITS	
Can be used without the Main Synthesiser to make an independent musical instrument)	
2 Log. Voltage Controlled Oscillators	£14.51
PCB for both log VCO's	£2.32
Divider, 1 Hold Circuits, 2 Modulation Amplifiers, Mixer and 2 Envelope Shapers	£19.46
PCB (Holds the first 6 circuits)	£1.80
PCB for both Envelope Shapers	£1.50
Keyboard Stabilised Power Supply	£7.30
Printed Circuit Board	94p

SYNTHESISERS AND KEYBOARDS

P.E. JOANNA

(P.E. May to Aug. 1975)

The new electronic piano that has switchable alternative voicing of Piano Honky-Tonk and Harpsichord. All PCB's are "as published"

Power Supply	£8.85
Tone Generator and Top C Envelope Shaper	£10.26
PCB for above	£1.30
Envelope Shapers	
12 sets (full requirement)	£32.16
Set of 12 PCB's (full requirement)	£15.00
Voicing and Pre-Amplifier Circuits	£7.99
PCB for above circuits	£1.80

Remaining circuits: prices in lists.

KEYBOARDS

Kimber-Allen Keyboards as required for many published circuits, including the P.E. Joanna, P.E. Minisonic and P.E. Synthesiser. The manufacturers claim that these are the finest moulded plastic keyboards made.

3 Octave Keyboard (37 notes C to C)	£20.50	
4 Octave Keyboard (49 notes C to C)	£23.50	
5 Octave Keyboard (61 notes C to C)	£27.00	
Contact Assemblies for use with above keyboards:		
Single-pole change-over (SP) as for P.E. Joanna and P.E. Minisonic		
Two-pole normally-open make-break (2P) as for P.E. Synthesiser. Special contact assembly (4PS) having 4 poles, 3 of which are normally-open make-break contacts and the fourth is a change-over contact—this special assembly enables the same keyboard to be used with the P.E. Synthesiser, P.E. Minisonic, and P.E. Synthesiser simultaneously thus avoiding the cost of more than one keyboard.		
3 Octave	4 Octave	5 Octave
Contact	Each Set	Set
SP	20p	£7.40
2P	24p	£8.88
4PS	49p	£17.76
Set		£9.80
Set		£11.76
Set		£14.64
Set		£23.52
Set		£29.28

Printed Circuit Boards for use with the above contacts and thus eliminating most of the inter-wiring required, are available—details in our lists.



P.E. MINISONIC

(P.E. Nov. 1974 to March 1975)

A portable, battery or mains operated, miniature sound synthesiser, with keyboard circuits. Although having slightly fewer facilities than the large P.E. Synthesiser, the functions offered by this design give it great scope and versatility.

Two Voltage Controlled Oscillators	£5.14
Voltage Controlled Filter and Voltage Reference Circuit	£3.35
Two Envelope Shapers and Two Voltage Controlled Amplifiers	£7.25
Keyboard Controller and Hold Circuits	£2.62
Keyboard Divider Resistors (select type to suit keyboard used, all are 2% tolerance), 2 Octave, £1; 3 Oct., £1.48; 4 Oct., £1.96; 5 Oct., £2.44.	
H.F. Oscillator and Detector	£1.66
Ring Mod., Noise Gen. & Env. Inverter	£4.96
Two Power Amplifiers and Two Mixers	£3.51
Battery Eliminator	£5.68
Temperature Stabiliser	£1.47
PCB to hold 2 VCOs, VCF and V-Ref	£1.84
PCB to hold 2 ESs, 2 VCAs, 2 Mixers, Ring Mod., Keyboard Control and Hold	£1.99
PCB to hold 2 Power Amps, Noise Gen, Envelope Inverter, HF Osc. and Detector	£1.32
PCB for Battery Elim. & Temp. Stab.	£1.25

FOR ADDRESS, INFORMATION REGARDING POST AND PACKING, VAT, LISTS, AND EXPORT TERMS SEE OUR OTHER ADVERTISEMENT ON OPPOSITE PAGE

Photos: 2 of our units containing some of the P.E. projects built from our kits and PCBs. (The cases were built by ourselves and are not for sale.)

PHONOSONICS

DIGITAL CLOCK

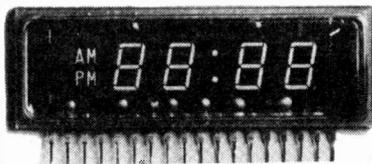
£9.56

inc. VAT, Post & Packing

MATCHED CHIP & DISPLAY

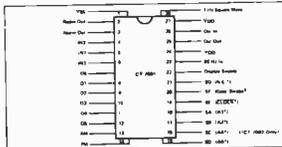
DISPLAY
Only Price
£6.36
inc. VAT

FUTABA 5-LT-01. 7 SEGMENT
Phosphor Diode. 12.5mm Digit
AM/PM and colon



CHIP
Only Price
£5.50
inc. VAT

CALTEX CT7001. MOS LSI
28/30/31 Day Calendar
24-hour Clock
Snooze Alarm
Clock Radio Feature
Easily Settable Counters



Payment with order

IMTECH PRODUCTS LTD.

IMP HOUSE, ASHFORD ROAD, ASHFORD, MIDDX.
Telephone: Ashford 44211
Telex: 936291

Dimmit

range of light dimmers and lighting control systems

Illustrated is the popular PMSD1000 module. A 1kW slider control dimmer, interference suppressed, 60mm slider range size 4½×2×1½in. Ideal for low cost stage and disco lighting. Used by schools, theatres, studios, etc. Complete with scale plate, fixing screws and full instructions. £8-60 inc. VAT and postage and packing.

Complete compact light dimmer systems for stage, club and disco lighting, etc.

DD61 (illustrated). Six 1kW channels, six outlet sockets, master control, mains on/off switch, size 23×8½×5in. Price £97-20 inc. VAT.

DD261. As above but with two-preset arrangement, i.e. two slider controls per channel, two master controls. Size 23×10×5in. Price £117-72 inc. VAT.

DD61-B. Six 1kW channels, using module PMSD1000, lowest cost system. Size 16½×8×5in. Price £59-50 inc. VAT.

DD62. Six 2kW channels, six outlet sockets, mains on/off switch. Size 25×10½×6in. Price £156-60 inc. VAT.

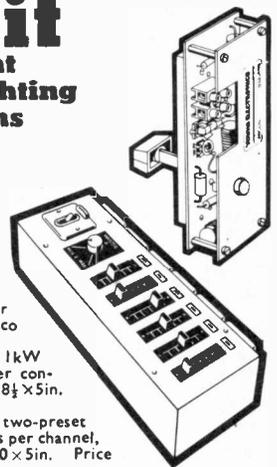
Add £2-20 postage and packing for all systems.

The Dimmit range includes rotary and slider control dimmers and sound to light converters for home, entertainment and professional applications. Ratings 1kW, 2kW, 3kW.

All products are guaranteed and are supplied with full instructions and applications. Full after-sales service. Technical advice given.

For full information on all modules and lighting control systems send 15p for our illustrated catalogue and price list. Callers welcome, visit our showroom for a demonstration of any of the modules or systems. Mon.-Fri. 9.30 to 6.0 p.m. Sat. by arrangement.

YOUNG ELECTRONICS LTD.
184 Royal College Street, London NW1 9NN Tel. 01-267 0201



PHONOSONICS

SUPPLIERS OF QUALITY PRINTED
CIRCUIT BOARDS, KITS AND
COMPONENTS TO A WORLD-WIDE MARKET

SOUND-TO-LIGHT (P.E. Apr./Aug. 71)

The ever-popular AURORA—4 or 8 channels each responding to a different sound frequency and controlling its own light. Can be used with most audio systems and lamp intensities. A MUST for any Disco, and a fascinating visual display for the home.

- 4 channel component set (excl. thyristors) £12.83
- 8 channel component set (excl. thyristors) £22.16
- Power supply component set £4.86
- PCB for 4 frequency channels £3.32
- PCB for power supply and 8 lamp drivers £1.56
- 1 Amp 400V thyristors (1 per chan. requ.) each 75p
- Panel meter (1µA) (optional) £3.75

VOICE OPERATED FADER (P.E. Dec. 73)

For automatically reducing music volume during "talk-over" particularly useful for Disco work or for home-movie shows.

- Component set incl. PCB £2.95

TAPE-NOISE LIMITER

Very effective circuit for reducing the hiss found in most tape recordings.

- Component set (incl. PCB) £2.50
- Regulated power supply (incl. PCB) £3.98

P.E. SYNTHESISER

SEE OUR ADVERTISEMENT ON OPPOSITE PAGE

GUITAR EFFECTS PEDAL (P.E. July 75)

Will modify an audio signal not only from a guitar but from any audio source, producing 8 different switchable effects that can be further modified by manual controls. Possibly the most interesting of all the low-priced sound effects units in our range.

- Component set with special foot operated switches £6.16
- Alternative component set with panel mounting switches £4.60
- Printed Circuit Board £1.10

HI-FI TAPE-LINK (P.E. Mar./Apr. 73)

Designed for use with reasonable quality tape-decks, this high performance pre-amp includes record playback and metering circuits.

- Stereo component set (excl. panel meter) £23.48
- Mono component set (excl. panel meter) £14.19
- Power supply component set £5.93
- Stereo main PCB £2.74
- Stereo sub-assembly PCB 98p

VOLTAGE CONTROLLED FILTER (P.E. Oct. 74)

An independently designed VCF that can be used with the P.E. Synthesiser.

- Component set £3.41
- Printed circuit board £1.20

ENVELOPE SHAPER

The new ADSP Envelope Shaper published in P.E. October 1975 and having manual control of its Attack, Release and Sustain functions.

- Component set incl. PCB £3.87

Component sets include all necessary resistors, capacitors, semiconductors, potentiometers and transformers. Fuller details are in our lists.

RHYTHM GENERATOR

(P.E. Mar./Apr. 74)

Programmable for 64,000 rhythm patterns from 8 effects circuits (high and low bongos, bass and snare drums, long and short brushes, blocks and soft cymbal), and with variable time signatures and rhythm rates. Really fascinating and useful.

- Tempo, Timing and Logic circuits £12.57
- PCB for above circuits (double-sided) £2.84
- Component set for all 8 effects circuits £10.49
- Set of 4 PCB's to hold all 8 effects £4.74
- Simple mixer (no PCB available) £2.76
- Alternative mixer with external volume controls and adjustable gain (independently designed), including PCB £9.22
- Power Supply, including PCB £6.32

SOUND BENDER (P.E. May 74)

A multi-purpose sound controller, the functions of which include envelope shaper, tremolo, voice operated fader, automatic fader and frequency-doubler.

- Component set for above functions (excl. SWs) £6.36
- Printed circuit board £1.54
- Optional extra—additional Audio Modulator, the use of which, in conjunction with the above component set, can produce "jungle-drum" rhythms.

- Component set (incl. PCB) £2.47

PHASING UNIT (P.E. Sept. 73)

A simple but effective manually controlled unit for introducing the "phasing" sound into live or recorded music.

- Component set (incl. PCB) £2.40

PHASING CONTROL UNIT (P.E. Oct. 74)

For use with the above Phasing Unit to automatically control the rate of phasing.

- Component set (incl. PCB) £3.65

P.E. JOANNA

SEE OUR ADVERTISEMENT ON OPPOSITE PAGE

WIND AND RAIN UNIT

A manually controlled unit for producing the above-named sounds.

- Component set incl. PCB £2.63

POWER SUPPLIES

Sophisticated low-noise highly-stabilised power supply kits complete with PCB's and detailed information are now available. Details in list.

Other PCB's (all "as published") While stocks last Bench Power Supply (P.E. Sept. 1974) 70p

CCTV:

Master Logic, Video Amp., Sync Mixer and Cathode Switch PCB (P.E. Oct. 1974) £2.20

PCB for remaining Circuits (P.E. Oct. 1974) £2.20

Digital Power Supply (P.E. Aug. 1972) 50p

Electronic Piano:

Pre-amp PCB (P.E. Oct. 1972) 85p

Power Supply PCB (P.E. Oct. 1972) 60p

Power Slaves: Power Supply PCB (P.E. Aug. 1974) 55p

Rondo:

CBS SQ Decoder PCB (P.E. Sept. 1973) 60p

Pre-Amp PCB (P.E. Oct. 1973) 60p

Tone, Balance and Volume Control PCB (P.E. Oct.) £1.40

BIOLOGICAL AMPLIFIER (P.E. Jan./Feb. 73)

Multi-function circuits that, with the use of other external equipment, can serve as lie detector, alphaphone, cardiophone, etc.

- Pre-Amplifier Module £3.60
- Component set and PCB

Basic Output Circuits

Combined component set with PCBs, for alphaphone cardiophone, frequency meter and visual feedback lamp driver circuits

- Audio Amplifier Module £5.50
- Type PC7

SINE AND SQUARE WAVE GENERATOR (P.E. July 75)

Suitable for audio, digital, or general purpose. Controllable through 4 decade ranges 10Hz to 100kHz. Switched attenuation through 10 ranges from 10V to 1mV peak-to-peak.

- Component set £7.16
- PCB for above components £1.55
- Power Supply £6.32
- PCB for Power Supply 72p

P.E. MINISONIC

SEE OUR ADVERTISEMENT ON OPPOSITE PAGE

REVERBERATION UNIT (P.W. Nov. Dec. 72)

A high quality unit having microphone and line input pre-amps, and providing full control over reverberation level.

- Component set (excl. spring unit) £7.49
- Printed circuit board £1.66
- 9 inch spring unit £4.95
- Panel meter (50µA) (optional) £3.75

ULTRASONIC TRANSMITTER-RECEIVER

(P.E. May 1972). A highly sensitive, tight-beam, long-range, "invisible beam" detection circuit with numerous applications. Component set with PCBs but excluding transducers

- £4.60

SEMI-CONDUCTOR TESTER (P.E. Oct. 73)

Essential test equipment for the enterprising home constructor. While stocks last.

Set of resistors, capacitors, semiconductors, potentiometers, makewatches and PCB

- Panel meter (500µA) £3.75

PHOTOPRINT PROCESS CONTROL (P.E. Jan./Feb. 72)

For colour and B & W, an indispensable dark-room unit for finding exposure, controlling enlarger timing, and stabilising mains voltage.

- Component set (excl. meter) £10.18
- Printed Circuit Board £1.74
- Panel meter (1mA) £3.75

ENLARGER EXPOSURE METER AND THERMOMETER (P.E. Sept. 73)

Dual-purpose dark-room unit with good accuracy.

- Component set with PCB but excl. meter £4.78
- Panel meter (100µA) £3.75

Transistors	BFY51	22p	2N3055	48p	Integrated Circuits	Zeners	Electrolytic Capacitors (µF/V)	Polyester (µF)	Tantalum (µF/V)
AC128	20p	BFY52	24p	2N3702	12p	709 TO5	0.47/63	8p	100/40
AC176	20p	BSY95A	24p	2N3703	12p	709 8-pin DIL	1.0/63	6p	100/63
BC107	13p	MJE2955	110p	2N3704	12p	723 TO5	1.5/63	6p	150/16
BC108	13p	MJE3055	75p	2N3819	12p	741 8-pin DIL	2.2/63	6p	150/63
BC109	13p	OC28	60p	2N3823E	39p	747 14-pin DIL	4.7/63	6p	220/10
BC147	12p	OC71	14p	2N4060	12p	748 TO5	6.8/40	6p	220/16
BC148	12p	OC72	14p	2N4871	36p	748 8-pin DIL	10/25	6p	220/25
BC149	12p	OC06	13p	2N5245	51p	748 14-pin DIL	10/63	6p	220/40
BC158	13p	ORP12	66p	2N5777	45p	µA7805 TO220	165p	9.1V	400mV 15p
BC159	13p	ZTX107	12p			µA7815 TO220	165p	9.1V	400mV 15p
BC182L	12p	ZTX108	71p	Diodes		µA78L15 TO220	165p	11V	1V 25p
BC184	12p	ZTX501	13p	IN914	4p	AY-1-0212	550p	12V	400mV 15p
BC187	25p	ZTX503	13p	IN4001	6p	CA3046	71p	12V	1V 25p
BC204	14p	ZTX531	23p	IN4002	7p	MC1312P	205p	15V	400mV 15p
BC209C	14p	2N914	22p	IN4004	9p	MFC4000B	73p	18V	400mV 15p
BC212L	14p	2N1304	22p	IN4007	10p	MFC6040	83p	18V	400mV 15p
BC213	15p	2N2219	27p	OA91	7p	SG3402N	202p	20V	400mV 15p
BC478	29p	2N2905	27p	OA200	8p	EP273015F	135p	20V	1V 25p
BCY71	22p	2N2907	22p	OA202	8p	(7-segment numeric display)		27V	400mV 15p
BF178	40p	2N3053	18p	Z51 (Z1L)	75p				
BFY50	22p	2N3054	66p	Z5171	16p				

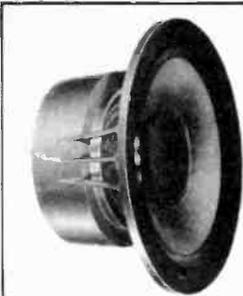
LIST Send S.A.E. with all U.K. requests for free list giving fuller details of PCBs, kits, and other components. Overseas enquiries for list: Europe—send 20p. Other countries—send 30p.

POST AND HANDLING U.K. orders: under £15 add 22p. over £15 add 40p. Optional: Fee for compensation against loss or damage in post (U.K., Eire & C.I. only): 35p.

VAT Add 25% (or current rate if different) to full total of goods, post and handling. Overseas—VAT does not currently apply.

Overseas—will be charged extra. minimum charge 70p. Details of kit weights, and postage rates will be sent with list. Eire and Channel Isles classify as overseas for posting purposes.

PHONOSONICS, DEPT. PE 3N, 25 KENTISH ROAD, BELVEDERE, KENT DA17 5BW MAIL ORDER AND C.W.O. ONLY DON'T FORGET VAT!



WILMSLOW AUDIO

THE Firm for speakers!

SPEAKERS

- Baker Group 253, 8 or 15 ohm
- Baker Group 35 3, 8 or 15 ohm
- Baker Group 50 12 8 or 15 ohm
- Baker Deluxe 12in d/cone
- Baker Major 12in d/cone
- Baker Regent
- Baker Superb
- Baker Auditorium 12
- Castle Super 8 RS/DD
- Celestion MH1000, 8 or 15 ohm
- Celestion PSB for Unix
- Celestion G12M 8 or 15 ohm
- Celestion G12H 8 or 15 ohm
- Celestion G15C 8 or 15 ohm
- Celestion G18C 8 or 15 ohm
- Decca London Ribbon Horn
- Decca London and crossover
- Decca DK30 and crossover
- EMI 13in x 8in 150 d/c 8 ohm
- EMI 13in x 8in type 350 8 or 15 ohm
- EMI 13in x 8in 20W base
- EMI 6in 93850 4 or 8 ohm
- EMI 5in 14A 7030 mid range 8 ohm
- EMI 2in tweeter 97492AT
- Eagle DT33 30W tweeter
- Eagle HT15 horn tweeter
- Eagle CT5 cone tweeter
- Eagle CT10 tweeter 8 or 16 ohm
- Eagle MHT10 horn tweeter
- Eagle crossover CN29, CN28, CN216
- Eagle FR4
- Eagle FR65
- Eagle FR8
- Elaic 9 x 5 59RM109 15 ohm, 59RM114 8 ohm
- Elaic 6in 6RM171 d/c roll surr
- Elaic 6in 6RM220 d/cone
- Elaic 4in tweeter TW4
- Elaic 10in d/cone 10RM239 8 ohm
- Elaic 8in 8CS175 3 ohm
- Fane Pop 15W 12in
- Fane Pop 25T 30W 12in
- Fane Pop 50W 12in
- Fane Pop 55 80W 12in
- Fane Pop 60W 15in
- Fane Pop 100W 18in
- Fane Crescendo 12A 100W 12in
- Fane Crescendo 12B bass
- Fane Crescendo 15in 100W
- Fane Crescendo 18in 100W
- Fane 801T 8in d/c roll surr
- Fane 807T 8in d/c roll surr
- Fane 808T 8in d/c
- Fane 701 twin ribbon horn
- Fane 910 horn
- Fane 920 horn

- Goodmans 8P 8in 8 or 15 ohm £5-50
- Goodmans 10P 8 or 15 ohm £5-80
- Goodmans 12P 8 or 15 ohm £13-95
- Goodmans 12P-D 8 or 15 ohm £16-95
- Goodmans 12P-G 8 or 15 ohm £15-95
- Goodmans Audiomax 12AX 100W £20-25
- Goodmans 15P 8 or 15 ohm £21-00
- Goodmans 18P 8 or 15 ohm £36-00
- Goodmans Hifax 750 £16-00
- Goodmans Axent 100 tweeter £8-44
- Goodmans Audlum 100 12in £13-90
- Goodmans Axiom 402 12in £20-00
- Goodmans Twinaxiom 8 £10-14
- Goodmans Twinaxiom 10 £10-75
- Jordan Watts Module £17-06
- Kef T27 £6-06
- Kef T15 £6-94
- Kef B110 £8-37
- Kef B200 £9-50
- Kef B139 £16-50
- Kef DN8 £2-31
- Kef DN12 £5-75
- Kef DN13 £3-87
- Peerless Dome Tweeter KO10DT £8-06
- STC 401G Super Tweeter £6-50
- Radford BD25 £18-44
- Radford FN11a £13-58
- Radford FN12a and 12b £12-44
- Radford MD9 £11-50
- Radford TD3 £8-06
- Richard Allan CG8T d/c r/surr £7-37
- 2in 64 ohm, 70mm 80 ohm, 70mm 8 ohm £0-77
- 2in 75 ohm £0-59
- 7in x 4in 3 or 8 ohm £1-63
- 8in x 5in 3 or 8 ohm £1-75
- 10in x 6in 3, 8 or 15 ohm £2-69

SPEAKER KITS

- Baker Major Module each £13-44
- Goodmans Mezzo twinkit pair £47-19
- Heime XLK25 pair £25-44
- Heime XLK30 pair £17-19
- Heime XLK50 pair £46-25
- Kefkit 3 each £42-50
- Richard Allan Twinkit each £10-37
- Richard Allan Triple 8 each £15-94
- Richard Allan Triple 12 each £23-12
- Richard Allan Super Triple each £27-50
- Wharfedale Linton 2 kit pair £23-12
- Wharfedale Glendale 3 kit pair £40-62
- Wharfedale Doveedale 3 kit pair £63-12
- Baker, Linear and Eagle PA disco amplifiers in stock. Send stamp for list.

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, 12in and up 50p each, speaker kits 75p each (£1-50 pair), tweeters and crossovers 25p.

Send stamp for free booklet 'Choosing a Speaker'

Including VAT 25% on Hi-Fi, 8% on PRO and PA

WILMSLOW AUDIO (Dept. PE)

Loudspeakers: Swan Works, Bank Square, Wilmslow, Cheshire SK9 1HF.

Discount Radio, PA, Hi-Fi: 10 Swan Street, Wilmslow.

Discount TV, Hi-Fi: Swift of Wilmslow, 5 Swan Street, Wilmslow.



Cassettes

The best buy!

Agfa Low Noise Cassettes AT LESS THAN HALF PRICE!	C80	C90	1		5		10	
			40p	54p	£2-00	£3-00	£3-00	£3-00
AGFA HIGH DYNAMIC SUPER	C80	6	54p	70p	£2-70	£3-50	£3-75	£3-75
	C90	6	54p	70p	£2-70	£3-50	£3-75	£3-75
	C120	6	99p	£4-85	£9-85	£9-85	£9-85	£9-85
AGFA STEREO-CHROM CHROMIUM DIOXIDE	C80	1	90p	£1-10	£4-50	£8-75	£10-90	£10-90
	C90	1	90p	£1-10	£4-50	£8-75	£10-90	£10-90

SAME DAY DESPATCH. P. & P. 15p per order

WILMSLOW AUDIO

(DEPT. PE)
10 SWAN STREET, WILMSLOW,
CHESHIRE, SK9 1HF

Cut-price pre-recorded cassettes—send stamp for list

JC12 AMPLIFIER

6W IC audio amp with free data and printed circuit £2-95



DELUXE KIT FOR THE JC12

Includes all parts for the printed circuit and volume, bass and treble controls needed to complete the mono version £2-52. Stereo model with balance control £5-20.

JC12 POWER KIT

Supplies 28V 0.5 Amps £4-77.

PREAMP KITS FOR THE JC12

Type 1 for magnetic pickups, mics and tuners. Mono model £2-15. Stereo model £3-70. Type 2 for ceramic or crystal pickups. Mono £1-27. Stereo £3-33. SEND S.A.E. FOR FREE LEAFLET ON KITS

SINCLAIR

IC20

AMPLIFIERS

IC20 10 + 10W stereo amp. kit with free booklet and printed circuit £8-58.

PZ20 power supply kit for above £5-91.

VP20 volume, tone control and preamp kit £6-79.

SEND S.A.E. FOR FREE DATA BOOKLET

JC40 AMPLIFIER

The big daddy of our range of IC audio amplifier kits. 20W output. With free booklet and printed circuit £6.

BATTERY Eliminator Bargains

6-WAY SPECIAL

The most versatile battery eliminator ever offered. Switched output of 3, 4, 6, 7, 9 and 12V at 500mA £5-45.

3-WAY MODEL

Switched outputs of 6, 7 and 9V at 250mA with unique 4-way multi-jack plug and socket output connector £3-55.

RADIO MODELS

50mA output with poppet battery connectors for transistor radios, etc. 6V £3-86; 9V £3-86; Double 4 + 4V £4-43; Double 6 + 6V £4-43; 9 + 9V £4-43.

TAPE RECORDER MAINS UNITS

7.5V output complete with 5 pin DIN plug to run cassette tape recorders from the a.c. mains £4-61.

SINCLAIR CALCULATORS

Cambridge	£9-95	MAINS UNITS
Cam. Memory	£14-10	For Oxford Series
Scientific	£14-10	£3-19
Oxford 100	£9-95	For Cambridge
Oxford 200	£15-90	Mem. and Scientific
Oxford 300	£22-98	£3-65

FERRANTI ZN414

IC radio chip with data £1-69. Also available kit of extra parts to complete a radio £3-38. Send S.A.E. for free leaflet.

SINCLAIR PROJECT 80

AFU £7-55	FM Tuner £13-25
Z40 £5-75	Stereo decoder for above £8-55
Z60 £7-10	Transformer for PZ8 £5-16
Q16 £9-71	Stereo 80 £13-25
PZ5 £6-21	Project 80S £38-22
PZ6 £8-70	Project 80SSQ £46-65
PZ8 £8-20	Project 80 Quadraphonic decoder £20-97

S-DECS and T-DECS

S-DeC £2-34.
T-DeC £4-15.
µ-DeC A £4-55.
µ-DeC B £7-85.
IC carriers: 16 dil: plain £1-18; with socket £2-21.
10 T05: Plain £1-09; with socket £2-08.



SWANLEY ELECTRONICS

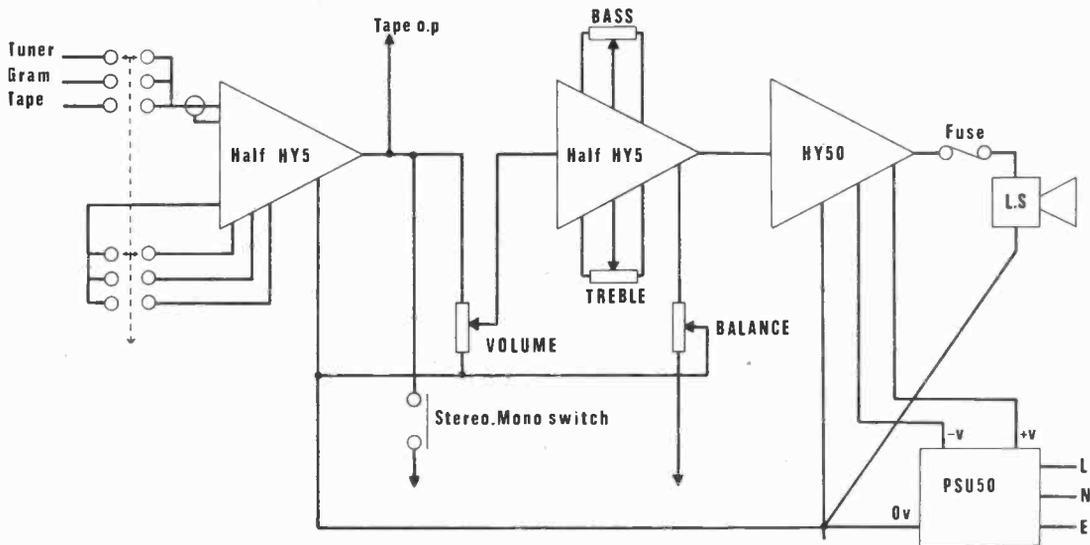
P.O. Box 68, Swanley, Kent BR8 8TQ

Prices include post and VAT. Official credit orders from schools, etc., welcome. No VAT charged on overseas orders. All prices are special offers.

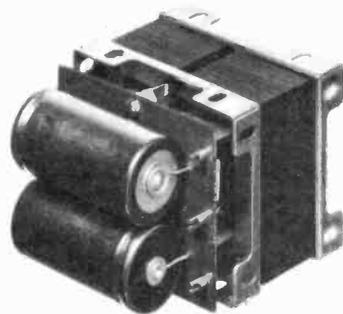
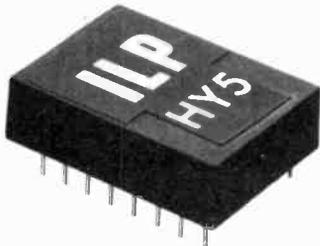


I.L.P. (Electronics) Ltd

SHEER SIMPLICITY!



MONO ELECTRICAL CIRCUIT DIAGRAM WITH INTERCONNECTIONS FOR STEREO SHOWN



The HY5 is a complete mono hybrid preamplifier, ideally suited 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 30mV; Microphone 10mV; Tuner 100mV; Auxiliary 3–100mV; Input Impedance 47k Ω at 1kHz. Outputs: Tape 100mV; Main output 0db (0.775V RMS). Active Tone Controls: Treble = 12db at 10kHz; Bass = 12db at 100Hz. Distortion: 0.5% at 1kHz. Signal/Noise Ratio: 68db. Overload Capability: 40db on most sensitive input. Supply Voltage: \pm 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 8 Ω . Load Impedance: 4–16 Ω . Input Sensitivity: 0db (0.775V RMS). Input Impedance: 47k Ω . Distortion: Less than 0.1% at 25W typically 0.05%. Signal/Noise Ratio: Better than 75db. Frequency Response: 10Hz–50kHz \pm 3db. Supply Voltage: \pm 25V. Size: 105 x 50 x 25mm

PRICE £6.20

+£1.55 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: \pm 25V. Input voltage: 210–240V. Size: L.70, D.90, H.60mm.

PRICE £6.25

+£1.56 VAT
P. & P. free

PRICE £4.75

+£1.19 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 Postal Orders Money Order
Please debit my Access account Barclaycard account
Account number
Name and Address
Signature

RST

VALVE MAIL ORDER CO.

16a WELLFIELD ROAD, LONDON SW16 2BS

SPECIAL EXPRESS MAIL ORDER SERVICE

IN21	1N21	1N22	1N23	1N24	1N25	1N26	1N27	1N28	1N29	1N30	1N31	1N32	1N33	1N34	1N35	1N36	1N37	1N38	1N39	1N40	1N41	1N42	1N43	1N44	1N45	1N46	1N47	1N48	1N49	1N50	1N51	1N52	1N53	1N54	1N55	1N56	1N57	1N58	1N59	1N60	1N61	1N62	1N63	1N64	1N65	1N66	1N67	1N68	1N69	1N70	1N71	1N72	1N73	1N74	1N75	1N76	1N77	1N78	1N79	1N80	1N81	1N82	1N83	1N84	1N85	1N86	1N87	1N88	1N89	1N90	1N91	1N92	1N93	1N94	1N95	1N96	1N97	1N98	1N99	1N100	1N101	1N102	1N103	1N104	1N105	1N106	1N107	1N108	1N109	1N110	1N111	1N112	1N113	1N114	1N115	1N116	1N117	1N118	1N119	1N120	1N121	1N122	1N123	1N124	1N125	1N126	1N127	1N128	1N129	1N130	1N131	1N132	1N133	1N134	1N135	1N136	1N137	1N138	1N139	1N140	1N141	1N142	1N143	1N144	1N145	1N146	1N147	1N148	1N149	1N150	1N151	1N152	1N153	1N154	1N155	1N156	1N157	1N158	1N159	1N160	1N161	1N162	1N163	1N164	1N165	1N166	1N167	1N168	1N169	1N170	1N171	1N172	1N173	1N174	1N175	1N176	1N177	1N178	1N179	1N180	1N181	1N182	1N183	1N184	1N185	1N186	1N187	1N188	1N189	1N190	1N191	1N192	1N193	1N194	1N195	1N196	1N197	1N198	1N199	1N200	1N201	1N202	1N203	1N204	1N205	1N206	1N207	1N208	1N209	1N210	1N211	1N212	1N213	1N214	1N215	1N216	1N217	1N218	1N219	1N220	1N221	1N222	1N223	1N224	1N225	1N226	1N227	1N228	1N229	1N230	1N231	1N232	1N233	1N234	1N235	1N236	1N237	1N238	1N239	1N240	1N241	1N242	1N243	1N244	1N245	1N246	1N247	1N248	1N249	1N250	1N251	1N252	1N253	1N254	1N255	1N256	1N257	1N258	1N259	1N260	1N261	1N262	1N263	1N264	1N265	1N266	1N267	1N268	1N269	1N270	1N271	1N272	1N273	1N274	1N275	1N276	1N277	1N278	1N279	1N280	1N281	1N282	1N283	1N284	1N285	1N286	1N287	1N288	1N289	1N290	1N291	1N292	1N293	1N294	1N295	1N296	1N297	1N298	1N299	1N300	1N301	1N302	1N303	1N304	1N305	1N306	1N307	1N308	1N309	1N310	1N311	1N312	1N313	1N314	1N315	1N316	1N317	1N318	1N319	1N320	1N321	1N322	1N323	1N324	1N325	1N326	1N327	1N328	1N329	1N330	1N331	1N332	1N333	1N334	1N335	1N336	1N337	1N338	1N339	1N340	1N341	1N342	1N343	1N344	1N345	1N346	1N347	1N348	1N349	1N350	1N351	1N352	1N353	1N354	1N355	1N356	1N357	1N358	1N359	1N360	1N361	1N362	1N363	1N364	1N365	1N366	1N367	1N368	1N369	1N370	1N371	1N372	1N373	1N374	1N375	1N376	1N377	1N378	1N379	1N380	1N381	1N382	1N383	1N384	1N385	1N386	1N387	1N388	1N389	1N390	1N391	1N392	1N393	1N394	1N395	1N396	1N397	1N398	1N399	1N400	1N401	1N402	1N403	1N404	1N405	1N406	1N407	1N408	1N409	1N410	1N411	1N412	1N413	1N414	1N415	1N416	1N417	1N418	1N419	1N420	1N421	1N422	1N423	1N424	1N425	1N426	1N427	1N428	1N429	1N430	1N431	1N432	1N433	1N434	1N435	1N436	1N437	1N438	1N439	1N440	1N441	1N442	1N443	1N444	1N445	1N446	1N447	1N448	1N449	1N450	1N451	1N452	1N453	1N454	1N455	1N456	1N457	1N458	1N459	1N460	1N461	1N462	1N463	1N464	1N465	1N466	1N467	1N468	1N469	1N470	1N471	1N472	1N473	1N474	1N475	1N476	1N477	1N478	1N479	1N480	1N481	1N482	1N483	1N484	1N485	1N486	1N487	1N488	1N489	1N490	1N491	1N492	1N493	1N494	1N495	1N496	1N497	1N498	1N499	1N500	1N501	1N502	1N503	1N504	1N505	1N506	1N507	1N508	1N509	1N510	1N511	1N512	1N513	1N514	1N515	1N516	1N517	1N518	1N519	1N520	1N521	1N522	1N523	1N524	1N525	1N526	1N527	1N528	1N529	1N530	1N531	1N532	1N533	1N534	1N535	1N536	1N537	1N538	1N539	1N540	1N541	1N542	1N543	1N544	1N545	1N546	1N547	1N548	1N549	1N550	1N551	1N552	1N553	1N554	1N555	1N556	1N557	1N558	1N559	1N560	1N561	1N562	1N563	1N564	1N565	1N566	1N567	1N568	1N569	1N570	1N571	1N572	1N573	1N574	1N575	1N576	1N577	1N578	1N579	1N580	1N581	1N582	1N583	1N584	1N585	1N586	1N587	1N588	1N589	1N590	1N591	1N592	1N593	1N594	1N595	1N596	1N597	1N598	1N599	1N600	1N601	1N602	1N603	1N604	1N605	1N606	1N607	1N608	1N609	1N610	1N611	1N612	1N613	1N614	1N615	1N616	1N617	1N618	1N619	1N620	1N621	1N622	1N623	1N624	1N625	1N626	1N627	1N628	1N629	1N630	1N631	1N632	1N633	1N634	1N635	1N636	1N637	1N638	1N639	1N640	1N641	1N642	1N643	1N644	1N645	1N646	1N647	1N648	1N649	1N650	1N651	1N652	1N653	1N654	1N655	1N656	1N657	1N658	1N659	1N660	1N661	1N662	1N663	1N664	1N665	1N666	1N667	1N668	1N669	1N670	1N671	1N672	1N673	1N674	1N675	1N676	1N677	1N678	1N679	1N680	1N681	1N682	1N683	1N684	1N685	1N686	1N687	1N688	1N689	1N690	1N691	1N692	1N693	1N694	1N695	1N696	1N697	1N698	1N699	1N700	1N701	1N702	1N703	1N704	1N705	1N706	1N707	1N708	1N709	1N710	1N711	1N712	1N713	1N714	1N715	1N716	1N717	1N718	1N719	1N720	1N721	1N722	1N723	1N724	1N725	1N726	1N727	1N728	1N729	1N730	1N731	1N732	1N733	1N734	1N735	1N736	1N737	1N738	1N739	1N740	1N741	1N742	1N743	1N744	1N745	1N746	1N747	1N748	1N749	1N750	1N751	1N752	1N753	1N754	1N755	1N756	1N757	1N758	1N759	1N760	1N761	1N762	1N763	1N764	1N765	1N766	1N767	1N768	1N769	1N770	1N771	1N772	1N773	1N774	1N775	1N776	1N777	1N778	1N779	1N780	1N781	1N782	1N783	1N784	1N785	1N786	1N787	1N788	1N789	1N790	1N791	1N792	1N793	1N794	1N795	1N796	1N797	1N798	1N799	1N800	1N801	1N802	1N803	1N804	1N805	1N806	1N807	1N808	1N809	1N810	1N811	1N812	1N813	1N814	1N815	1N816	1N817	1N818	1N819	1N820	1N821	1N822	1N823	1N824	1N825	1N826	1N827	1N828	1N829	1N830	1N831	1N832	1N833	1N834	1N835	1N836	1N837	1N838	1N839	1N840	1N841	1N842	1N843	1N844	1N845	1N846	1N847	1N848	1N849	1N850	1N851	1N852	1N853	1N854	1N855	1N856	1N857	1N858	1N859	1N860	1N861	1N862	1N863	1N864	1N865	1N866	1N867	1N868	1N869	1N870	1N871	1N872	1N873	1N874	1N875	1N876	1N877	1N878	1N879	1N880	1N881	1N882	1N883	1N884	1N885	1N886	1N887	1N888	1N889	1N890	1N891	1N892	1N893	1N894	1N895	1N896	1N897	1N898	1N899	1N900	1N901	1N902	1N903	1N904	1N905	1N906	1N907	1N908	1N909	1N910	1N911	1N912	1N913	1N914	1N915	1N916	1N917	1N918	1N919	1N920	1N921	1N922	1N923	1N924	1N925	1N926	1N927	1N928	1N929	1N930	1N931	1N932	1N933	1N934	1N935	1N936	1N937	1N938	1N939	1N940	1N941	1N942	1N943	1N944	1N945	1N946	1N947	1N948	1N949	1N950	1N951	1N952	1N953	1N954	1N955	1N956	1N957	1N958	1N959	1N960	1N961	1N962	1N963	1N964	1N965	1N966	1N967	1N968	1N969	1N970	1N971	1N972	1N973	1N974	1N975	1N976	1N977	1N978	1N979	1N980	1N981	1N982	1N983	1N984	1N985	1N986	1N987	1N988	1N989	1N990	1N991	1N992	1N993	1N994	1N995	1N996	1N997	1N998	1N999	1N1000
------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	--------

CLOCK COMPONENTS

ADVANCED CLOCK KITS—crystal control—Battery Back-up—Can be fitted to car or boat—The brightest 0.3" or 0.5" displays—attractive slim case—with alarm, touch-switch snooze, automatic intensity control.
Phone or write for details (a S.A.E. helps)

CRYSTAL TIMEBASE KIT—will provide stable 50kHz for clock ICs giving time accurate to within a few seconds a month: contains PCB, 32.768kHz Xtal, 3 CMOS ICs, trimmer, Cs, Rg, IC sockets, full instructions ES-28p

DLTIME 0.3in Red Common Cathode 7 segment LED display only 58p

FN0500 0.5in Red CC LED 170 MAN380 0.3in Red CC LED 48p

DL707 0.3in Red CA LED 170 DL747 0.6in Red CA LED E2-45

NK50253 4 or 6 digit 12 or 24 hr format alarm clock IC with snooze ES-80

NM5314 4/6 digit clock IC E4-44 AY51224 4 digit clock IC E4-25

SOLDERCON IC PIN SOCKETS

The sensible method for lowest cost sockets for ICs, displays, CMOS, TTL (nylon supports available if required; samples enclosed with any pin order). Strip of 100 pins for 50p; 400 for £2; 1,000 for £4; 3,000 for £10-50.

LSI Sockets (Soldercon pins with nylon supports) 24, 28 and 40 pin, 30p each.

RCA CMOS PRICES ARE DOWN

Widest stock range in UK—at the new manufacturers' one-off prices

CD4000	0-17	CD4021	0-83	CD4039	7-47	CD4057	20-35	CD4082	0-18
CD4001	0-17	CD4022	0-79	CD4040	0-88	CD4059	10-64	CD4085	0-57
CD4002	0-17	CD4023	0-78	CD4041	0-89	CD4060	0-92	CD4086	0-57
CD4006	0-87	CD4024	0-84	CD4042	0-89	CD4061	16-43	CD4083	0-86
CD4007	0-17	CD4025	0-17	CD4043	0-83	CD4062	7-33	CD4085	0-86
CD4008	0-79	CD4026	1-42	CD4044	0-77	CD4063	0-90	CD4086	0-86
CD4009	0-46	CD4027	0-46	CD4045	1-15	CD4066	0-58	CD4089	1-50
CD4010	0-46	CD4028	0-74	CD4046	1-10	CD4068	0-18	CD4501	0-32
CD4011	0-17	CD4029	0-94	CD4047	0-74	CD4069	0-18	CD4502	1-20
CD4012	0-17	CD4030	0-86	CD4048	0-46	CD4070	0-18	CD4508	4-02
CD4013	0-46	CD4031	1-81	CD4049	0-46	CD4071	0-18	CD4510	1-26
CD4014	0-83	CD4032	0-88	CD4050	0-46	CD4072	0-18	CD4511	1-95
CD4015	0-83	CD4033	1-14	CD4051	0-77	CD4073	0-18	CD4518	1-03
CD4016	0-46	CD4034	0-83	CD4052	0-77	CD4075	0-18	CD4520	1-03
CD4017	0-83	CD4035	0-77	CD4053	0-77	CD4076	1-27	CD4532	1-18
CD4018	0-83	CD4036	1-82	CD4054	0-95	CD4077	0-18	CD4555	0-74
CD4019	0-46	CD4037	0-78	CD4055	1-08	CD4078	0-18	CD4585	1-45
CD4020	0-92	CD4038	0-88	CD4056	1-08	CD4081	0-18		

RELAYS

SIEMENS, PLESSEY, Etc.
MINIATURE RELAYS

Col. (1) Coil ohms	1	2	3	4
Col. (2)	52	4-8	2 c/o	75p*
Working	58	5-9	6 c/o	85p*
d.c. volts	185	8-12	6M	65p*
Col. 3	230	9-18	2 c/o HD	85p*
Col. 3	430	15-24	4 c/o	85p*
Contacts	700	12-24	2 c/o	65p*
Col. (4)	700	16-24	4 c/o	65p*
Price	1,250	18-36	2 c/o	65p*
	2,500	31-43	2 c/o HD	65p*
HD =	2,500	36-45	6M	65p*
Heavy duty	9,000	40-70	2 c/o	65p*
	15k	85-110	6M	65p*

*Incl. Base. All prices incl. P. & P.

OPEN TYPE RELAYS

6 VOLT D.C. 1 make contacts 35p. Post 15p.
9 VOLT D.C. RELAY
3 c/o 5 amp contacts. 70 ohm coil. 75p. Post 15p.

12 VOLT D.C. RELAY

3 c/o 5 amp contacts. 120 ohm coil. 75p. Post 15p.

24 VOLT D.C. 3 c/o 75p. Post 15p.

ENCLOSED TYPE RELAYS

24 VOLT D.C. 3 c/o 75p. Post 20p. Base 15p extra.

24 VOLT A.C. Mfg. by ITT.3 h.d. c/o contacts.

55p. Post 20p. Base 15p.

55 VOLT A.C. RELAY

3 h.d. c/o contacts. Price 55p. Post 20p. Base 15p.

100 VOLT A.C. 3 c/o sealed type. 75p. Post 20p.

240 VOLT RELAY

3 h.d. c/o contacts. Price 75p. Post 20p. Octal

plug in base 15p extra.

230/240 VOLT A.C. RELAY. Mfg. by Arrow 2 h.d.

15 amp c/o contacts. Amp connectors. Price £1.

220/240 VOLT A.C. RELAY

3 c/o 5 amp contacts. Sealed. Mfg. ISKRA.

£1.25. Post 20p. Base 15p extra.

CLARE-ELLIOTT TYPE RP7641 G8

Miniature relay. 675 ohm coil. 24 Volt D.C. 2 c/o.

70p post paid.

110V. 2 c/o. 20 amp contacts. £1.25. Post 10p.

Many others from stock—phone for details.

C/O MICRO SWITCH

VERY SPECIAL OFFER. Mfg. by

C.E.M. 3 amp 250 volt. 10 amp 125

volt. 50 for £3. Post 36p. 100 for £5.

Post 50p. 1,000 for £45. Post paid.

Bulk purchase means LOW! LOW! prices.

SUB-MINIATURE REED

RELAY 3-9V d.c. 250 ohm Coil

Single make, size 1 1/2 x 1/2 x 1/4 in.

Outstanding Value only

£1 for six, £1-50 for ten. Post 15p. (Min. order

six.)

LATCHING RELAY

Twin latching relay, "flip-flop" 2 c/o

each relay. Mains contacts. 115V

A.C. or 50V D.C. operation. 240V

A.C. with 2.5K resistor. 85p. Post 20p.

TRIAC

Raytheon Tag symmetrical Triac. Type TAG.

230/500V, 10 amp, 500 p.i.v. Glass passivated plastic

triac. Swiss precision product for long term

reliability £1.00. Post 10p. (Inclusive of Data and

application sheet.) Suitable Diac 18p.

230/250 VOLT A.C. SOLENOID

Approximately 1 1/2 lb pull. Size of feet 1 1/2 x 1 1/2.

Price £1.00. Post 20p.

HEAVY DUTY TYPE, 10 lb. (approx.) pull. £2-50.

Post 50p.

24 VOLT DC SOLENOIDS

UNIT containing 1 heavy duty solenoid approx. 25lb

pull 1 inch travel. Two x approx. 1 1/2 lb pull 1/2 inch

travel. 6 x approx. 4oz. pull 1/2 inch travel. One

24 volt d.c. 1 heavy duty single make relay. Price

£2-50. Post £1. ABSOLUTE BARGAIN.

COIN MECHANISM (Ex London Transport)

Unit containing, selector mechanism for 1p, 2p and

5p coins. Micro switches, relays, solenoid operated

hopper. 24 volt D.C. Precision built to high stand-

ard. Incredible VALUE at only £2-50. Post £1-00.

VAT 25%. (Total price inc. VAT and post £4-21).

CENTRIFUGAL BLOWER

Mfg by Smiths Industries. 230/240V

a.c. Miniature Model. Series SE/200.

Size 95mm 82mm 82mm.

Aperture 38mm 31mm. 12

c.f.m. £2-75. Post 50p.

Mfg. by Airflow Developments Ltd.

Precision made, continuously rated, smooth running.

230/240V a.c. motor, 80 c.f.m. As illustrated but

with round aperture, £6-50. Post 75p.

Mfg. by Woods.

Extremely powerful. 220/250V a.c. 0.3A 2,700 r.p.m.

continuously rated. Capacitor start. Cast construction.

Aperture 66mm x 50mm, O/A 200mm. £12.

Post £1.

VARIABLE VOLTAGE TRANSFORMERS

INPUT 230/240V a.c. 50/60 OUTPUT

VARIABLE 0-260V All Types

SHROUDED TYPE

200 watt (1 amp) £10-00

0.5 KVA (2 1/2 amp) (MAX) £11-50

1 KVA (5 amp) (MAX) £17-50

2 KVA (10 amp) (MAX) £27-50

3 KVA (15 amp) (MAX) £37-50

4 KVA (20 amp) (MAX) £60-00

37.5 amp (MAX) £102-50

CARRIAGE AND PACKING EXTRA

OPEN TYPE 1 amp (panel mount) £10-00



L.T. TRANSFORMERS

0, 6, 12 Volt at 10 amp. £5-60. Post 70p.

0, 10, 17, 18 Volt at 10 amp. £7-90. Post £1-00

0, 4, 6, 24, 32 Volt at 12 amp. £9-90. Post £1-00

0, 6, 12 Volt at 20 amp. £9. Post £1-00

0, 12, 24 Volt at 10 amp. £9-20. Post £1-00

0, 6, 12, 17, 18, 20 Volt at 20 amp. £10-40. Post £1-00

Other types to order at short notice—Phone your enquiries.

'STC' 6" RED ALARM BELL

24/48 volt DC. Brand New.

Price £4. Post 75p. VAT 25%.

'GENTS' 6" ALARM BELL

200/250V AC/DC. Brand New. Price £5. Post 75p.

VAT 25%.



STROBE! STROBE! STROBE!

Build a Strobe Unit, using the latest type Xenon

white light flash tube. Solid state timing and

triggering circuit. 230/250V a.c. operation.

HY-LIGHT STROBE MK III

For use in large rooms; halls and utilises a silica

tube, printed circuit. Speed adjustable 0-20 f.p.s.

Light output greater than many (so called 4

Joule) strobes £14. Post 75p.

RANGE OF THREE OTHER STROBE

KITS FROM STOCK. From £6-30 to £22.

S.A.E. (Foolsap) for details.

BIG BLACK LIGHT

400 Watt. Mercury vapour ultra violet lamp

Powerful source of u.v. P.F. ballast is essential.

Price of matched ballast and bulb £21.

Post £1-50. Spare bulb £8. Post 65p.

BLACK LIGHT FLUORESCENT U.V. TUBES

4ft 40 watt, £5-50 (callers only).

2ft 20 watt, £4-25. Post 60p. (For use in

standard bi-pin. MINI. 12in 8 watt, £1-60.

Post 25p. 9in 6 watt, £1-30. Post 25p.

Complete ballast unit and holders for 9in and

12in tube. £1-70. Post 30p. (9in and 12in

SQUAD LIGHT

A new conception in

light control. Four

channels each capable

of handling 750 watts

of spot lights, flood lights or dozens of small

mains lamps. Seven programs all speed

controlled plus flash modulation, effectively

giving 14 different displays. Makes sound-to-

light obsolete. Completely electrically and

mechanically noise free. Can be used on same

circuit as: radiobikes or sensitive amplifiers.

A whole new range of lighting effects possible

with astounding results. Already in use in

London's foremost theatres, night clubs and

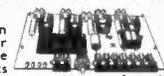
discos. Conforms to all R.F.I. tests, including

Common Market regulations. Supplied in

tough, well designed case with embossed

front panel. Price only £60. Post 75p. S.A.E.

(Foolsap) for further details.



POWER RHEOSTATS !!!

Superior Quality Precision Made

NEW POWER RHEOSTATS



New ceramic construction, vitreous

enamel embedded winding, heavy

duty brush assembly, continuously

rated.

25 WATT 10/25/50/100/150/250/500/1k/1-5k/2-5k

ohm. £1-70. Post 20p.

50 WATT 1/5/10/25/50/100/250/500/1k ohm

£2-10. Post 25p.

100 WATT 1/5/10/25/50/100/250/500/1k/1-5k/2-5k/

3-5k/5k ohm £3-30. Post 35p.

Black Silver, Skirted knob calibrated in Nos. 1-9

1 1/2in. dia. brass bush. Ideal for above 22p each.

VAT

VAT AT 8% MUST BE ADDED TO

ALL ORDERS FOR THE TOTAL VALUE

OF GOODS INCLUDING POSTAGE

UNLESS OTHERWISE STATED.

SERVICE TRADING CO.

METERS NEW

90mm diameter

TYPE 65C5. 2A D.C. M/C; 5A D.C. M/C

10A D.C. M/C; 20A D.C. M/C; 50A D.C. M/C.

Type 62T. 1A A.C. M/I; 20A A.C. M/I; 300V A.C.

M/I; ALL ABOVE £2. Post 30p.

TYPE 65L5. 300V A.C. R/M/C; £2-75. Post 30p.



REVERSIBLE MOTOR

General Electric, 230V a.c. 1,600

r.p.m. 0.25A. Complete with anti-

vibration mounting bracket and

capacitor. O/A size 110mm x 95mm.

Spindle 1/4in. dia. 20mm long. Ex.

equipment tested, £3. Post 50p.



230/240 VOLT A.C. MINIATURE MOTOR.

20 R.P.M. Price £1. Post 20p.

BODINE TYPE N.C.I.

GEARED MOTOR

(Type J) 71 r.p.m. torque 10 lb. in.

Reversible 1/70th h.p. cycle 0-38

amp. (Type 2) 28 r.p.m. torque 20

lb. in Reversible 1/80th h.p. 50 cycle 0-28 amp.

The above two precision made U.S.A. motors are

offered as new condition. Input voltage of motor

115V A.C. Supplied complete with transformer for

230/240V A.C. input.

Price, either type £6-25. Post 75p or less trans-

former £3-75. Post 65p.



'CARTER' 230 VOLT A.C.

GEARED MOTOR

230/240V A.C., smooth, powerful,

continuously rated. Two types: 32

r.p.m. or 110 r.p.m. Either type

£4-75. Post 50p.



ROTARY VACUUM AIR PUMP AND

COMPRESSOR

Carbon vane, oilless, 100/115V a.c.,

1 1/2 h.p. motor, 50/60 cycle, 2875/3450

r.p.m., 20 in vacuum, comp. 1-25

c.f.m., 10 p.s.i. (approx. figures).

New unused surplus stock. Supplied

with electrical connector data. FRACTION OF

MAKERS' PRICE £12. Post £1-00. Suitable 110/240V.

150 watt auto transformer £3-50. Post 50p. (Both

items together Post £1-25).

BI-PAK

SEMICONDUCTORS

COMPONENTS

CARBON RESISTOR PAKS

These Paks contain a range of Carbon Resistors, assorted into the following groups:

R1	50	Mixed	100 ohms-820 ohms	1/8th W	0-60
R2	50	Mixed	1K ohms-8.2K ohms	1/8th W	0-60
R3	50	Mixed	10K ohms-82K ohms	1/8th W	0-60
R4	50	Mixed	100K ohms-820K ohms	1/8th W	0-60
R5	30	Mixed	100 ohms-820 ohms	1/2 W	0-60
R6	30	Mixed	1K ohms-8.2K ohms	1/2 W	0-60
R7	30	Mixed	10K ohms-82K ohms	1/2 W	0-60
R8	30	Mixed	100K ohms-820K ohms	1/2 W	0-60

THESE ARE UNREPEATABLE PRICES

LOW COST CAPACITORS			
500	µF	50V Elect	0-09 each
001	µF	400V	0-03 each

REPANCO CHOKES & COILS

RF Chokes	CH1	2.5mH	0-27
	CH3	7.5mH	0-29
	CH5	1.5mH	0-26
	CH2	5.0mH	0-28
	CH4	10mH	0-31

COILS DRX1 Crystal set 0.29 DRR2 Dual range 0-42

CARBON POTENTIOMETERS

Log and Lin			
4.7K, 10K, 22K, 47K, 100K, 220K, 470K, 1M, 2M,			
VC 1	Single Less Switch		0-14
VC 2	Single D.P. Switch		0-26
VC 3	Tandem Less Switch		0-43
VC 4	1K Less Switch		0-16
VC 5	100K anti-Log		0-43

HORIZONTAL CARBON PRESETS

0.1W			0-06 each
100, 220, 470, 1K, 2.2K, 4.7K, 10K, 22K, 47K, 100K, 220K, 470K, 1M, 2M, 4.7M,			

REPANCO TRANSFORMERS

240V Primary, Secondary voltages available from selected tappings 4V, 7V, 8V, 10V, 40V, 50V and 25V-0.25V.			
Type	Amps	P & P	
MT50/1	1	£1.79	0-45p
MT50/1	1	£2.24	0-48p
MT50/2	2	£3.06	0-60p

COIL FORMERS & CORES

NORMAN	1	Cores & Formers	0-07p
J	2	Cores & Formers	0-09p

SWITCHES

DP/DT Toggle	0-28p	SP/ST Toggle	0-22p
--------------	-------	--------------	-------

FUSES

1 1/2 and 20mm, 100mA, 200mA, 250mA, 500mA, 1A, 1.5A, 2A QUICK BLOW,			
		0-50p each	
Anti-serve 20mm only		0-08p each	

VEROBOARDS

VBI1	containing approx. 50 sq.ins various sizes all 0.1 matrix	0-60p
VBI2	containing approx. 50 sq.ins various sizes all 0.15 matrix	0-60p

DECON-DALO 33PC Marker

Etch resistant printed circuit marker pen. Full instructions supplied with each pen. **0-92p**

BATTERY HOLDERS

Takes 6 H.P. 7s complete with terminal clip and lead **0-31p each**

CABLES

CABLES		
CP 1	Single lapped screen	0-08
CP 2	Twin Common Screen	0-11
CP 3	Stereo Screened	0-12
CP 4	Four Core Common Screen	0-21
CP 5	Four Core individually screened	0-28
CP 6	Microphone Fully Braided Cable	0-11
CP 7	Three Core Mains Cable	0-11
CP 8	Twin Oval Mains Cable	0-08
CP 9	Speaker Cable	0-06
CP 10	Low Loss Co-Axial	0-14

INSTRUMENT CASES

(In 2 sections, Black Vinyl covered top and sides and bezel)

No.	Length	Width	Height	Price
BV1	8"	5 1/2"	2"	£1-25
BV2	11"	6"	3"	£1-62
BV3	6"	4 1/2"	1 1/2"	0-92
BV4	9"	5 1/2"	2 1/2"	£1-39

ALUMINIUM BOXES

No.	Length	Width	Height	Price
BA1	5 1/2"	2 1/2"	1 1/2"	0-45
BA2	4"	4"	1 1/2"	0-45
BA3	4"	2 1/2"	1 1/2"	0-45
BA4	5 1/2"	4"	1 1/2"	0-54
BA5	4"	2 1/2"	2"	0-45
BA6	3"	2"	1"	0-39
BA7	7"	5"	2 1/2"	0-79
BA8	8"	6"	3"	£1-02
BA9	6"	4"	2"	0-65

(Each complete with 1/2" deep lid & screws) PLEASE ADD 20p POSTAGE AND PACKING FOR EACH BOX.

COMPONENT BOXES

Pak No.	Qty.	Description	Price
C1	200	Resistors mixed values approx. count by weight	0-60
C2	150	Capacitors mixed values approx. count by weight	0-60
C3	50	Precision Resistors mixed values	0-60
C4	75	1/8th width Resistors mixed preferred values	0-60
C5	5	Pieces assorted Ferrite Rods	0-60
C6	2	Tuning Gangs, MW/LW VHF	0-60
C7	1	Pak Wire 50 metres assorted colours	0-60
C8	10	Reed Switches	0-60
C9	3	Micro Switches	0-60
C10	15	Assorted Pots & Pre-Sets	0-60
C11	5	Jack Sockets 3 x 3.5m, 2 standard Switch Type	0-60
C12	30	Paper Condensers preferred types mixed values	0-60
C13	20	Electrolytics Trans. types 0-60	
C14	1	Pack assorted Hardware—Nuts/Bolts, Grommets, etc.	0-60
C15	5	Mains Slide Switches, 2 Amp	0-60
C16	20	Assorted Tag Strips & Panels	0-60
C17	10	Assorted Control Knobs	0-60
C18	4	Rotary Wave Change Switches	0-60
C19	2	Relays 6.24V Operating	0-60
C20		Sheets Copper Laminate approx. 200 sq.ins.	0-60

Please add 20p post and packing on all component packs, plus a further 10p on pack nos. C1, C2, C19 & C20.

AVDEL BOND

SOLVE THOSE STICKY PROBLEMS!

with **CYANOACRYLATE C2 ADHESIVE**

The wonder bond which works in seconds—bond plastic, rubber, transistors, components permanently, immediately!

OUR PRICE ONLY 60p for 2gm phial

ACCESSORIES

BIB HI-FI

Ref.	Description	Price
B	Stylus and turntable cleaning	0-31p
J	Tape head cleaning kit	0-68p
H	Hi-Fi cleaner	0-30p
P	Wire stripper/Cutter	0-94p
31	Cassette head cleaner	0-58p
32	Tape editing kit	£1-64
32A	Stylus balance	£1-24
66A	Record stylus cleaning kit	0-32p
42	De-luxe Groov-Kleen	£1-84
43	Record care kit	£2-68
45	Auto changer groove cleaner	0-98p
46	Spirit level	0-68p
58	Hi-Fi stereo hifi & tips	0-38p
60	Chrome finishes as above	£1-72

ANTEX EQUIPMENT

SOLDERING IRONS	
X25, 21W	£2-45
Model G. 18W	£2-70
CCN 240, 15W	£2-90
SK2, Soldering Kit	£3-90

BITS AND ELEMENTS	
Bit No.	
102 for model CN240 3/32"	0-42p
104 for model CN240 3/16"	0-42p
1100 for model CCN240 3/32"	0-42p
1101 for model CCN240 3/8"	0-42p
1102 for model CCN240 1/2"	0-42p
1020 for model G240 3/32"	0-42p
1021 for model G240 1/8"	0-42p
1022 for model G240 3/16"	0-42p
50 for model X25 3/32"	0-44p
51 for model X25 1/8"	0-44p
52 for model X25 3/16"	0-44p

ELEMENTS	
Model EX25	£1-20
Model ECN240	£1-10
Model EG240	£1-35
Model ECN240	£1-55

SOLDERING IRON STAND	
ST3 Suitable for all models	£1-10
Antex heat shunt	0-10p

PLUGS		
PS 2	DIN 2pin (Speaker)	0-10
PS 2	DIN 3pin	0-11
PS 3	DIN 4pin	0-14
PS 4	DIN 5pin 180	0-15
PS 5	DIN 5pin 240	0-15
PS 6	DIN 6pin	0-16
PS 7	DIN 7pin	0-17
PS 8	Jack 2.5mm Screened	0-17
PS 9	Jack 3.5mm Plastic	0-11
PS 10	Jack 3.5mm Screened	0-17
PS 11	Jack 1/2" Plastic	0-14
PS 12	Jack 1/2" Screened	0-20
PS 13	Jack Stereo Screened	0-33
PS 14	Phono	0-09
PS 15	Car Aerial	0-14
PS 16	Co-Axial	0-14

INLINE SOCKETS		
PS 21	DIN 2 Pin (Speaker)	0-18
PS 22	DIN 3 Pin	0-19
PS 23	DIN 5 Pin 180	0-19
PS 24	DIN 5 Pin 240	0-19
PS 25	Jack 2.5mm Plastic	0-15
PS 26	Jack 3.5mm Plastic	0-15
PS 27	Jack 1/2" Plastic	0-28
PS 28	Jack 1/2" Screened	0-32
PS 29	Jack Stereo Plastic	0-28
PS 30	Jack Stereo Screened	0-37
PS 31	Phono Screened	0-15
PS 32	Car Aerial	0-20
PS 33	Co-Axial	0-20

SOCKETS		
PS 35	DIN 2 Pin (Speaker)	0-07
PS 36	DIN 3 Pin	0-09
PS 37	DIN 5 Pin 180	0-90
PS 38	DIN 5 Pin 240	0-10
PS 39	Jack 2.5mm Switched	0-11
PS 40	Jack 3.5mm Switched	0-11
PS 41	Jack 1/2" Switched	0-19
PS 42	Jack Stereo Switched	0-28
PS 43	Phono Single	0-07
PS 44	Phono Double	0-09
PS 46	Co-Axial Surface	0-09
PS 47	Co-Axial Flush	0-19

P.C.B. KITS & PENS

PROFESSIONAL D.I.Y. PRINTED CIRCUIT KIT £7-80

Containing 6 sheets of 6" x 4" single sided laminate, a generous supply of etchant powder, etching dish, etchant measure, tweezers, etch resistant marking pen, high quality pump drill with spares, cutting knife with spare blades, 6" metal ruler, plus full easy to follow instructions. Spare container of etchant for above **0-60p**

PCB Pens 2 x Quality marker pens specifically designed for drawing fine line etch resistant circuits on copper laminate. Complete with full instructions. **0-53p per pair.**

LOW NOISE CASSETTES

C60	0-33p
C90	0-44p
C120	0-56p

AUDIO LEADS

S221	5 pin DIN plug to 4 phono plugs length 1.5m	£1-08
S222	5 pin DIN plug to 5 pin DIN socket length 1.5m	£1-00
S237	5 pin DIN plug to 5 pin DIN plug mirror image length 1.5m	£1-20
S238	2 pin DIN plug to 2 pin DIN socket length 5m	68p
S268	5 pin DIN plug to 3 pin DIN plug 1 & 4 and 3 & 5 length 1.5m	£1-00
S270	2 pin DIN plug to 2 pin DIN socket length 10m	80p
S271	5 pin DIN plug to 2 phono plugs connected to pins 3 & 5 length 1.5m	70p
S275	5 pin DIN plug to 2 phono sockets connected to pins 3 & 5 length 23cm	68p
S318	5 pin DIN socket to 2 phono plugs connected to pin 3 & 5 length 23cm	68p
S404	Coiled stereo headphones extension cord extends to 7m	£1-40
S217	3 pin DIN plug to 3 pin DIN plug length 1.5m	80p
S219	5 pin DIN plug to 5 pin DIN plug length 1.5m	80p
S474	3.5mm Jack to 3.5mm Jack length 1.5m	68p
S600	5 pin DIN plug to 3.5mm Jack connected to pins 3 & 5 length 1.5m	80p
S700	5 pin DIN plug to 3.5mm Jack connected to pins 1 & 4 length 1.5m	80p

CROSSOVER NETWORK

K4007 1/P Impedance 8 ohms, Insertion (2-way) Loss 3dB. Crossover Frequency 3 KHz. **PRICE £1-12**

H!PHONE JUNC. BOX

H1012 Enables change over from loud- (3-way) speaker to headphone listening, stereo) Also has a centre position for both outputs. **PRICE £1-73**

ALL PRICES EX

PLEASE ADD VAT ITEMS EXCEPT

GIRO NUMBER 388-7006

Postage & Packing Add extra for airmail.

HANDBOOKS

TRANSISTOR DATA BOOK DTE I 227 Pages packed with information on European Transistors. Full specification including outlines. **Price £2-95 each**

TRANSISTOR EQUIVALENT BOOK BPE 76 256 Pages of cross references and equivalents for European, American and Japanese Transistors. This is the most comprehensive equivalents book on the market today and has an introduction in 13 languages. **Price £2-68 each**

DIODE EQUIVALENT BOOK DE 74 144 Pages of cross references and equivalents for European, American and Japanese Diodes, Zeners, Thyristors, Triacs, Diacs and LED's. **Price £1-98 each**

THE WORLDS BROADCASTING STATIONS WBS 75 An up to the minute guide for those interested in DX-ing. Contains all the world's broadcasters on SW, MW and LW, as well as European FM/TV stations. **Price £-56 each**

TTL DATA BOOK DIC 75 Now complete Data book of 74 series TTL (7400-74132). Covering 13 main manufacturers in the U.S.A. and Europe, this book gives full data as well as equivalents. **Price £3-74 each**

A full range of technical books available on request.

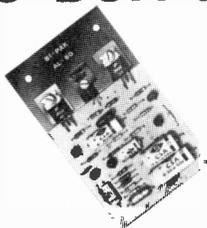
PO BOX 6, WARE, HERTS.

AL 60

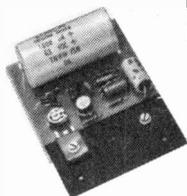
50W. PEAK (25W. R.M.S.)

● Max Heat Sink temp 90°C. ● Frequency Response 20Hz to 100kHz. ● Distortion better than 0.1 at 1kHz. ● Supply voltage 15-50V. ● Thermal Feedback. ● Latest Design Improvements. ● Load—3, 4, 5 or 16 ohms. ● Signal to noise ratio 80dB. ● Overall size 63mm x 105mm x 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. enthusiasts.

ONLY £3.95



STABILISED POWER MODULE SPM80

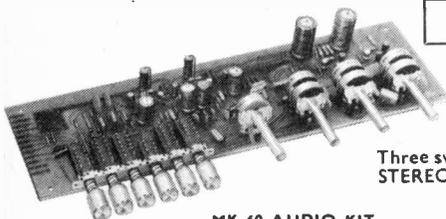


SPM80 is especially designed to power 2 of the AL60 Amplifiers, up to 15 watt (r.m.s.) per channel simultaneously. This module embodies the latest components and circuit techniques incorporating complete short circuit protection. With the addition of the Mains Transformer BMT80, the unit will provide outputs of up to 1.5A at 35V. Size: 63mm x 105mm x 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.

TRANSFORMER BMT80 £2.60

PRICE £3.00

STEREO PRE-AMPLIFIER TYPE PA100



Built to a specification and NOT a price, and yet still 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 unit incorporates no less than eight silicon planar transistors, two of these are specially selected low noise NPN 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.

PRICE £13.20

MK 60 AUDIO KIT

Comprising: 2 x AL60, 1 x SPM80, 1 x BTM80, 1 x PA100, 1 front panel, 1 kit of parts to include on-off switch, neon indicator, stereo headphone sockets plus instruction booklets.

COMPLETE PRICE: £27.55 plus 45p postage

TEAK 60 AUDIO KIT

Comprising: Teak veneered cabinet size 16½" x 11½" x 3½", other parts include aluminium chassis, heatsink and front panel bracket, plus back panel and appropriate sockets, etc.

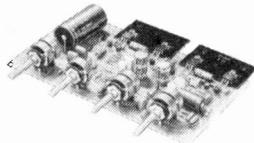
KIT PRICE: £9.20 plus 45p postage

CLUDE VAT
AT 25% TO ALL
★ADD 8%
NO VAT

add 20p* overseas
Minimum order 75p

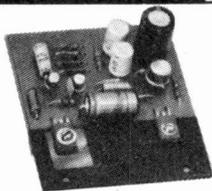
STEREO 30 COMPLETE AUDIO CHASSIS

7 + 7 WATTS R.M.S.



The Stereo 30 comprises a complete stereo pre-amplifier, power amplifiers and power supply. This with only the addition of a transformer or overwind, will produce a high quality audio unit suitable for use with a wide range of inputs, i.e. high quality ceramic pickup, stereo tuner, stereo tape deck, etc. Simple to install, capable of producing really first class results, this unit is supplied with full instructions, black front panel, knobs, mains switch, fuse and fuse holder and universal mounting brackets, enabling it to be installed in a record plinth, cabinets of your own construction or the cabinet available. Ideal for the beginner or advanced constructor who requires Hi-Fi performance with a minimum of installation difficulty. (Can be installed in 30 mins.) PRICE: £13.75 plus 45p postage and packing. TRANSFORMER: £2.45 plus 45p postage and packing. TEAK CASE: £3.65 plus 45p postage and packing.

AL 10/AL 20/AL 30



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 cassette and cartridge tape players in the car and at home. AL10 £2.30, AL20 £2.65, AL30 £2.95.

M.P.A. 38

Enjoy the quality of a magnetic cartridge with your existing ceramic equipment using the new BiPak M.P.A.38 which is a high quality pre-amplifier enabling magnetic cartridges to be used where facilities exist for the use of ceramic cartridges only. Used in the construction are 4 low noise, high gain, silicon-transistors. It is provided with a standard DIN input socket for ease of connection. Supplied with full, easy to follow instructions. PRICE £2.65

STORAGE/CARRYCASES ★

RECORD CASES
7 in E.P. 18½ in x 7 in x 8 in (50 records) ★£2.48
12 in L.P. 13½ in x 7½ in x 12½ in (50 records) ★£3.30

CASSETTE CASES
Holds 15. 10 in x 3½ in x 5 in. Lock and handle. ★£1.50

8-TRACK CARTRIDGE CASES
Holds 14. 13 in x 5 in x 6 in. Lock and handle. ★£2.20
Holds 24. 13½ in x 8 in x 5½ in Lock and handle. ★£3.20

CARTRIDGES

ACOS
GP91-1SC 200 mV at 1.2cms/sec £1.11
GP93-1 280mV at 1cm/sec £1.43
GP96-1 100mv at 1cm/sec £2.31

TTC
J-2005 Crystal/Hi Output 97p
J-2010C Crystal/Hi Output Compatible £1.11
J-2006S Stereo-Hi Output £1.52
J-2105 Ceramic/Med. Output £1.81
J-2203 Magnetic 5mV/5cm/sec, including stylus £4.78
J-2203B Replacement stylus for above £2.88
AT-55 Audio-technica magnetic cartridge 4mV/5cm/sec. £3.06

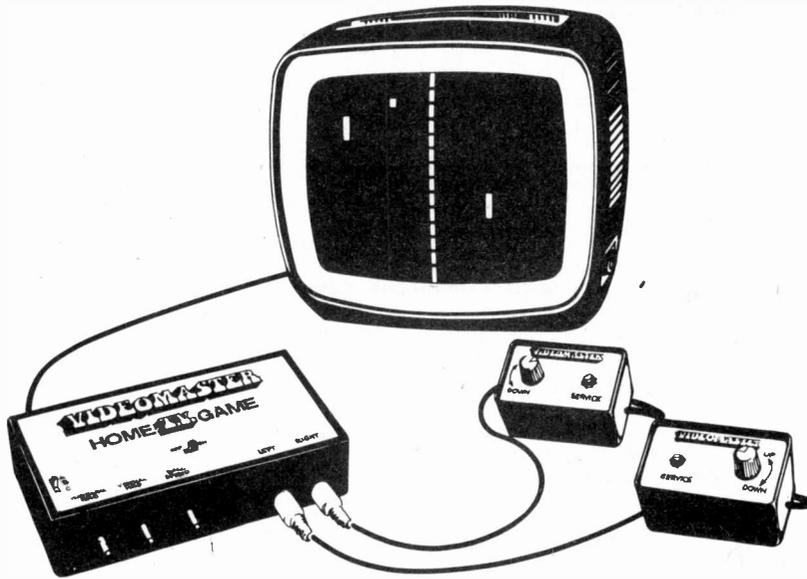
DYNAMIC MIC'PHONE

TYPE B1223. 200 ohms impedance. Complete with stand, on/off switch and 2.5mm and 3.5mm plugs. Suitable for cassette tape recorders.

PRICE £1.67

JUST OUT!
STEREO FM TUNER

WRITE NOW FOR FULL DETAILS



Videomaster urge all good electronics enthusiasts to play the game

The best thing about the Videomaster Home T.V. Game Mk. III is that the sheer pleasure of building it is immediately followed by the excitement of playing three fascinating games.

The famous Videomaster is now available for you to make. It plugs into any standard UHF 625 line TV set, and it shouldn't take you longer than a few hours to build.

In detail . . . The Videomaster Mk. III has eleven integrated circuits . . . four transistors . . . eleven diodes . . . is easy to build . . . with no alignment necessary because with ready-built and tested transistorized UHF modulator, is complete with all parts . . . including fully drilled and prepared p.c.b. . . handsome plastic box . . . control leads . . . complete step by step assembly instructions . . . Runs on a PP7 9 volt battery . . . and has logic and analogue "state of the art" circuitry all with National Semiconductors CMOS devices . . . with full specification.

The cost? Only **£19.95** (+ VAT)

POST TODAY TO:

Videomaster Ltd

119/120 Chancery Lane, London WC2A 1QU

Please send me (insert no.) Videomaster Mk. III kits at £21.55 ea. inc. VAT. P & P

I enclose my cheque/money order for £.

Tick if VHF Modulator required -£1 extra

NAME

ADDRESS



PE/II

ALLOW 14 DAYS FOR DELIVERY

Reg. No. 1115532

A COMPELLING FORCE

ELECTRONICS means many things to many people, as our post bag makes abundantly clear. Obviously the technology is a powerful force since it unites all manner of individuals who may have but little else in common. The powerful attraction offered by this highly technical and intellectual subject to vast numbers of persons who are not by trade or training "professionals" must be one of the more interesting and striking social phenomena of present times.

Particular areas of applied electronics have from time immemorial attracted their own devotees. These amateur enthusiasts have been easily identified as radio hams, audiophiles, radio control modellers or musical instrument builders. Outside such well defined areas the position is rather nebulous, the field is extremely wide and the applications too numerous for easy general classification. The equipments themselves are usually strictly functional and by and large fall within the definitions of sensing, measuring and controlling devices and systems. Highly valued for the duties they perform, they are installed and forgotten, or brought into use as a tool as the occasion demands. This is the comparatively new area of the hobby, and unlike the more traditional areas the end-products do not themselves directly foster any further creative or entertaining activities on the part of the owner.

As we all know this area is under constant exploration by the inventive minds. The probing into the vastness of this "application space" will continue, that's for sure, and will bring forth more and more rewarding discoveries. The enthusiast who pursues this kind of search may owe no allegiance to any well labelled group or sectional interest. He might be simply a devotee of electronics—just that; a member of a species that did not exist in any strength, outside the research laboratory, a couple of decades ago.

What should we call this free-ranging individual who respects no artificial bounds or limits in his pursuit of electronics in the common cause? The very universality of applied electronics gives the measure of the task. Frankly, we see no easy answer to our own question. But readers may think otherwise and may have their own ideas of an appropriate label.

Yet, as someone said, what's in a name? The bond of common interest in electronic circuitry and techniques is exceedingly strong and unites this huge band of enthusiasts, *at least so far as the means are concerned*. The *end* to which the technology is applied is entirely a personal affair. Here it must be admitted divergent views do sometimes emerge and even heated arguments can ensue between the various "specialists". But we should be tolerant in our approach to another man's uses or appropriations of electronics, and appreciate that the technology is free for all to apply and enjoy or benefit from, as they will.

F.E.B.

Editor

F. E. BENNETT

Editorial

D. BARRINGTON *Production Editor*
G. GODBOLD *Technical Editor*
R. W. LAWRENCE, B.Sc.

Art Dept.

J. D. POUNTNEY *Art Editor*
D. J. GOODING
R. J. GOODMAN
K. A. WOODRUFF

Advertisement Manager

D. W. B. TILLEARD
Phone: 01-634 4202

P. J. MEW

Phone: 01-634 4210

C. R. BROWN, *Classified*

Phone: 01-634 4301

Editorial & Advertising Offices:

Fleetway House, Farringdon St.

London EC4A 4AD

Phone: *Editorial* 01-634 4452

Advertisements 01-634 4202

THE tuning of keyboard instruments to the equal tempered scale is a task requiring considerable skill. The professional piano tuner uses a single tuning fork to obtain absolute pitch and then tunes all other notes by a system ascending tempered fifths and descending octaves.

The instrument described here uses two of the latest m.o.s. chips to produce 84 discrete tones from a single master oscillator. These tones can be used directly to tune any instrument by eliminating the beat frequency. Also included is a direct mixing input, which uses novel techniques to obtain the beat frequency. Also included is a direct mixing connection from an electronic organ, synthesiser, etc., or a microphone pick-up from any acoustic instrument, will produce visual beats via an l.e.d.

THE TEMPERED SCALE

Before describing the instrument, it may be helpful if we delve a little way into the theory behind the equal tempered scale. The scientifically orientated reader who has taken up a musical instrument may have been surprised by the distinct non-linearity in the musical scale. This is particularly apparent on the guitar, for if the scale of C is played on a single string, there is a separation of only one fret (a semitone) between E, F and B, C whilst all other notes have a whole tone separation requiring double fret intervals. On keyboard instruments this irregularity is tidied up by arranging the black notes in the familiar groups of two and three.

Why then is the scale in this form, and why don't we notice it? We don't notice it largely because we are accustomed to it. The formation of our scale goes back to Pythagoras in the 6th Century B.C. who discovered that strings harmonised best when their lengths were in simple ratios to each other. Thus the most consonant arrangement was a ratio of 2:1,

the octave, followed by the ratio 2:3 known as the fifth. The Pythagorean scale was based on just these intervals. In fact, there were several other scales in use until relatively recent times, but with the development of harmony (playing two or more notes together) most of these have become non-runners.

With the advent of keyboard instruments there was the requirement for playing in more than one key on a single instrument, without favouring a particular key. Clearly, the solution was to adopt a constant interval for the semitone. For this reason, the equal tempered scale was adopted in the 18th century, the only perfect intervals being the octaves and all semitone intervals equal to 1.0594, the twelfth root of two.

ELECTRONIC

TUNING

What all this means as far as we are concerned is that the traditional method of tuning a piano is not easy, for the professional will tune in ascending fifths flattened by just the required amount. Moreover, as far as our tuning aid is concerned, it means that we cannot derive digitally from a master source, the exact frequency we require; the notes are not in exact simple ratios. We can, however, produce a set of notes of sufficient accuracy if we start with a very high master frequency and divide it by a set of large number integers.

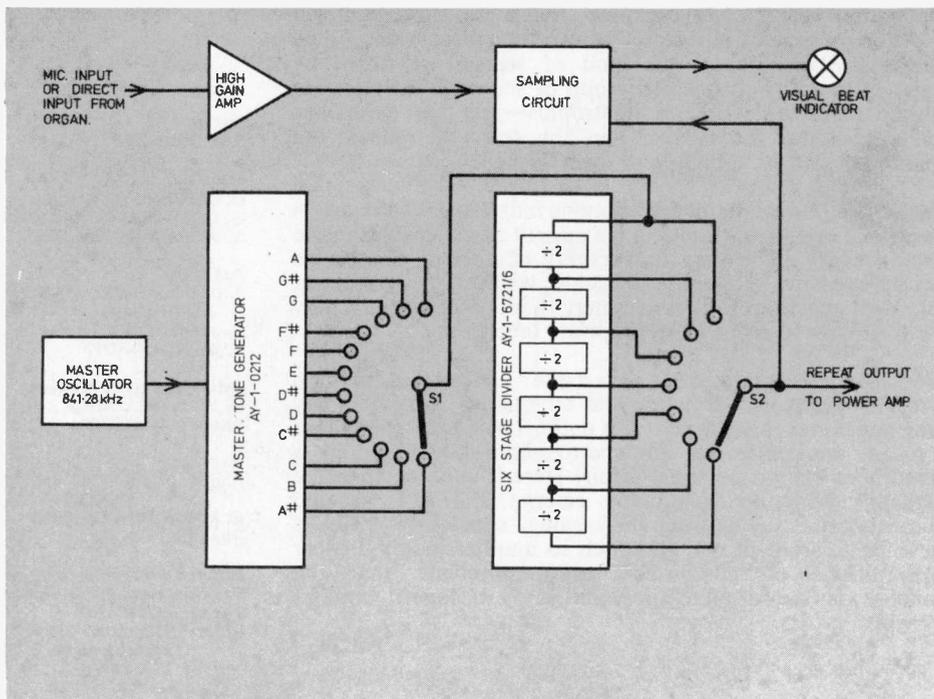


Fig. 1. Block schematic of Tuning Fork

The AY-1-0212 master tone generator was developed specifically for this purpose, its application being electronic organs of course. The block schematic is shown in Fig. 1; a frequency of 841.28kHz is produced by the master oscillator and fed directly to the tone generator chip. The outputs give directly the eleven notes of the highest octave. The lower octaves are produced by repeated division by two, a 6 stage divider chip AY-1-6721/6 being switched in directly.

Table 1 lists all the frequencies available from the instrument together with the pin number inputs for the master tone generator chip.

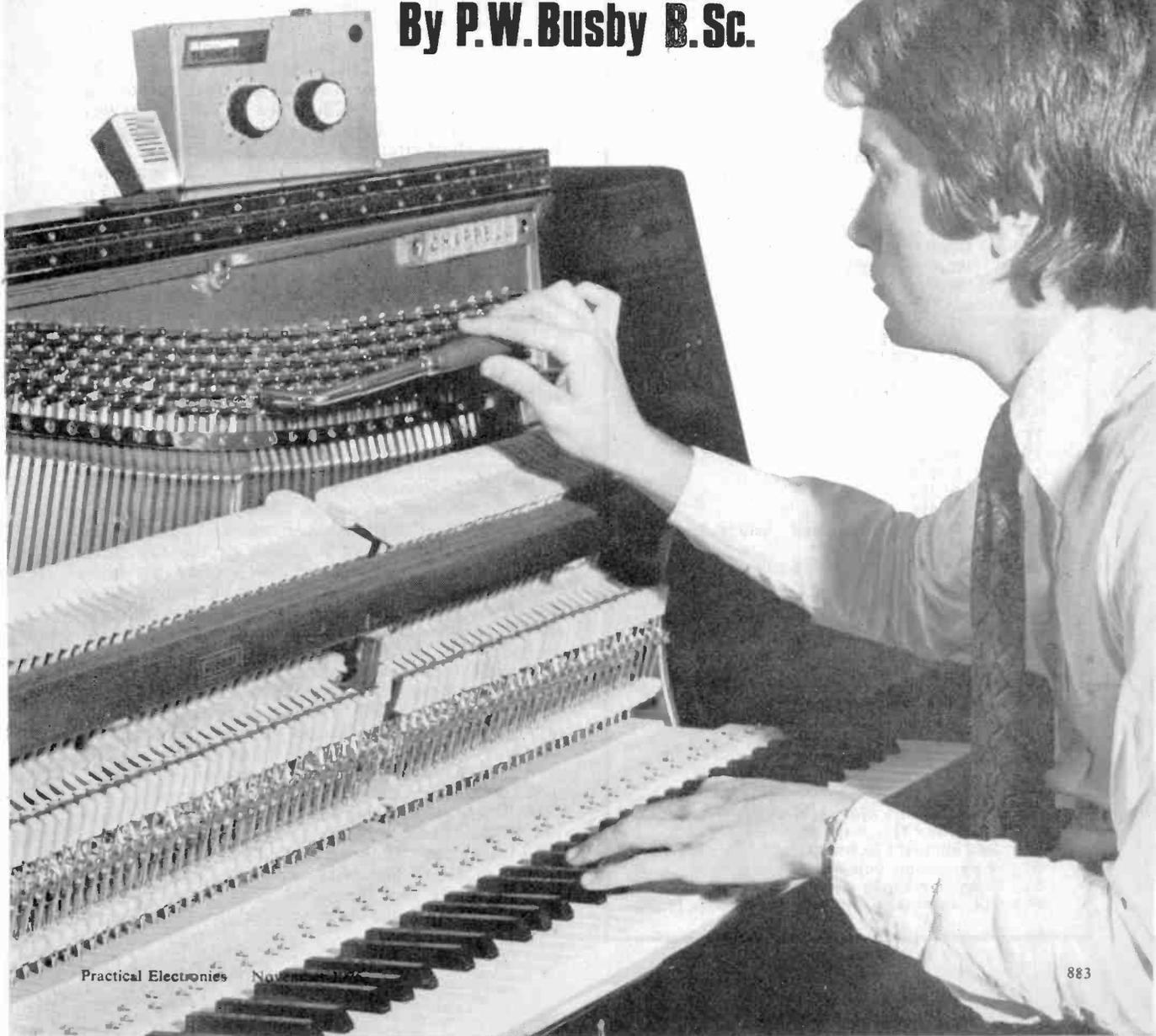
CIRCUIT DESCRIPTION

The circuit design for the basic tuning aid is shown in Fig. 2. The master oscillator feeding pin 2 of IC1 is basically a Colpitts oscillator with certain refinements. The additional capacitor C3 in series with the inductance L1 gives a substantial improvement in the frequency stability of the oscillator with respect to variations of the transistor parameters with temperature and supply voltage.

Also the ratio of C4 to C5 sets the tapping point for minimum tuned circuit loading and improves the circuit 'Q'. The use of an f.e.t. rather than a bipolar transistor further reduces the circuit loading. The inductor L1 is a standard single tuned

TUNING FORK

By P.W. Busby B.Sc.



COMPONENTS . . .

Resistors

R1	2.2M Ω	R21	4.7 Ω
R2	3.3k Ω	R22	6.8k Ω
R3	6.8k Ω	R23	10k Ω 2%
R4	10k Ω	R24	4.7 Ω 2%
R5	1k Ω	R25	3.9k Ω 2%
R6	1k Ω	R26	3.3k Ω 2%
R7	1M Ω		
R8	51 Ω		
R9	1k Ω		
R10	100k Ω		
R11	1k Ω		
R12	1k Ω		
R13	10k Ω		
R14	330 Ω		
R15	47k Ω		
R16	12k Ω		
R17	3.3k Ω		
R18	10k Ω		
R19	82 Ω 1W		
R20	62 Ω 1W		

All $\frac{1}{2}$ W 5% carbon unless otherwise stated

Capacitors

C1, C2	0.22 μ F ceramic
C3	100pF silver mica
C4	220pF silver mica
C5	820pF
C6	82pF
C7	10pF
C8	100 μ F elect. 35V
C9	10nF
C10	220pF
C11	0.22 μ F ceramic
C12	100 μ F elect. 35V
C13	100pF
C14	100 μ F elect. 35V
C15	100pF

Semiconductors

IC1	AY-1-0212
IC2	AY-1-6721/6
IC3	709 14 pin d.i.l.
IC4, 5	741 8 pin d.i.l.
IC6, 7	723 14 pin d.i.l.
TR1	2N3823 f.e.t.
TR2	2N3823 f.e.t.
TR3	BC214
TR4	BC184
D1-D2	1N914
D3-D6	Miniature moulded bridge rectifier (400V 1A)
D7-D10	Miniature moulded bridge rectifier (400V 1A) (Both from R.S)
D11	T1L209

Transformer

T1	Min. mains transformer—Sec. 20V (2 wind-ings) 3VA/winding (RS)
----	--

Inductor

L1	Denco IFT13 470kHz coil
----	-------------------------

Miscellaneous

	Diecast box 73 8in \times 4 $\frac{3}{4}$ in \times 2 $\frac{1}{2}$ in
	Veroboard 7in \times 3 $\frac{3}{4}$ in, 0.1in pitch
	SK1, SK2 standard jack sockets
S1	12 way, single pole wafer switch
S2	7 way single pole wafer switch
	14 pin i.c. sockets (4 off), 8 pin i.c. sockets (2 off)



470kHz i.f. transformer with the parallel capacitor removed.

The high input impedance of the m.o.s. chip IC1 allows it to be directly connected to the drain of TR1, eliminating the usual buffer transistor. The tone output from IC2 is taken through the attenuator R4, R5 which serves the dual purpose of reducing the 12V amplitude to a suitable power amplifier input level whilst protecting the output of IC2 from short circuits.

Referring to the circuit in Fig. 1, the incoming musical waveform, from a microphone say (SK1) is amplified by IC3 which has a gain of 1,000. The output from IC3 is a.c. coupled into IC4 which further amplifies it by a factor of 100. These two stages utilise operational amplifiers in standard configurations. The first stage, because of its very high gain, utilises a 709 with its attendant frequency compensation components. For the second stage we can manage with the limited bandwidth of a 741.

HIGH AMPLIFICATION

The reason for the high amplification of the signal is twofold. Firstly, it enables a magnetic pick-up or microphone with a sensitivity of a few millivolts to be used. Secondly, the over-amplification can be utilised to overcome the decay in amplitude, characteristic of stringed instruments. This is very important when tuning a piano, as the top notes decay very quickly; without this facility the beats would not be easily observed. There will be some initial squaring of the waveform, but this will not matter to us. The sampling circuit can cater for waveforms of any shape.

Passing on to the sample and hold circuit, a signal from the output of the tone generator (pole of S2) is amplified by TR3 to give a square wave of amplitude limited by the rail voltages. The leading edges of the square wave are differentiated by C10, R18 to give positive going pulses rising from -15.5V and rising to +12V. The diode D2 serves to suppress the negative going pulses generated at the trailing edge. These positive spikes turn on the f.e.t. TR2 and allow the hold capacitor C9 to store the output of IC4. The attenuator R11, R12 is necessary to ensure that the signal voltage on the drain of TR2 exceeds the gate voltage by the required 8V when TR2 is off.

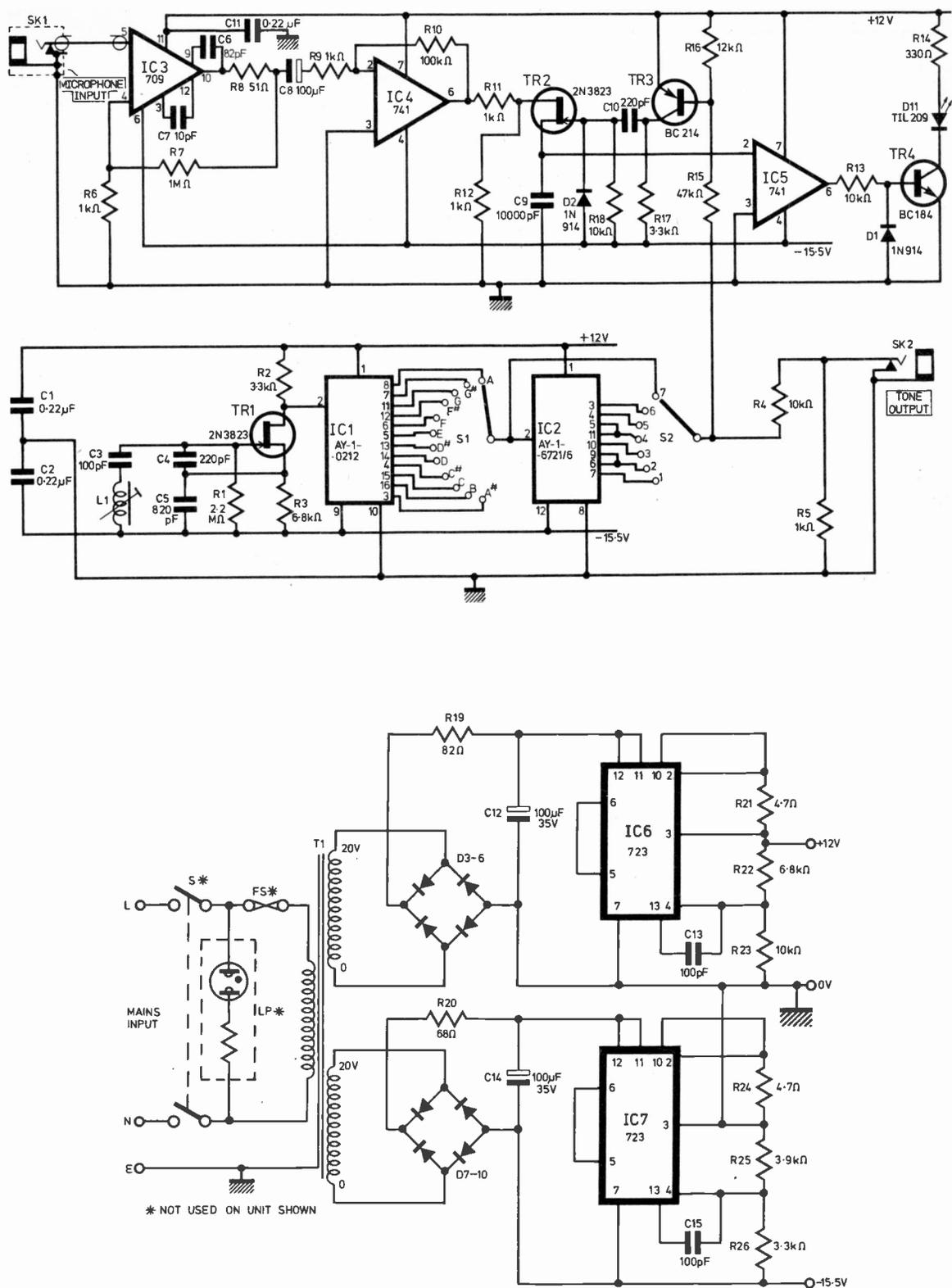


Fig. 2. The complete Tuning Fork circuit

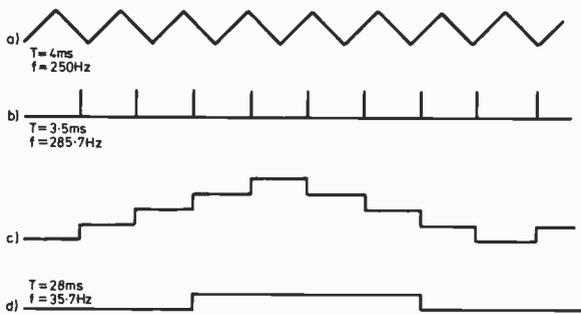


Fig. 3. Waveforms showing action of sampling circuit

SAMPLING WAVEFORMS

The action of the sampling circuit is depicted in Fig. 3. A simplified musical waveform (a) with period 4ms, frequency 250Hz is sampled by waveform (b) with period 3.5ms, frequency 285.7Hz. (c) is the output of the sample and hold circuit which corresponds in shape to the original waveform (a). (d) is formed from waveform (c) by the squaring circuit consisting of IC5 connected as a zero threshold comparator. The period of (c) and (d) is 28ms corresponding to a frequency of 35.7Hz. This is the beat frequency as $285.7 - 250 = 35.7\text{Hz}$. Finally, the output of IC5 feeds directly to the l.e.d. driver TR4 providing a visual beat display.

CONSTRUCTION

The main circuit is built on a single piece of Vero stripboard as shown in the accompanying photographs.

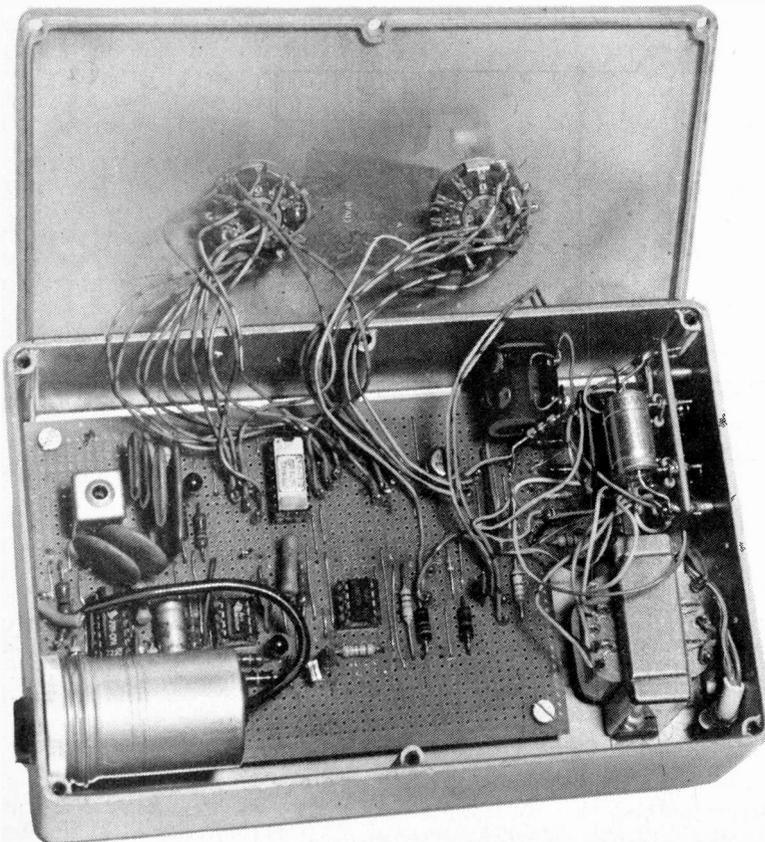
Note that the pin connections to the 723 refer to the 14 pin DIL package; if it is intended to use the 723 in a TO case, the pin numbering will be different and a different layout will be required.

When completed the output voltages should be measured. The tolerance on the supplies is $\pm 1\text{V}$ on the +12V rail and +1.5V on the -15.5V rail. With 2 per cent resistors for the potential dividers R25, R26 and R22, R23 the outputs should be in tolerance. If, for any reason, the outputs require adjustment, these are the resistors to vary.

With the power supply working satisfactorily, the rest of the circuit can confidently be built. The layout conveniently splits in two, so that the oscillator and divider circuit can be built and tested first.

It is strongly recommended that the expensive master tone generator i.c. is mounted in a socket. The divider i.c. will have to be soldered indirectly as it is packaged in a TO case. As this is an m.o.s. device precautions should be taken whilst soldering it. The metal spring ring, which shorts the leads together in transit, should be left in place until soldering is complete.

Mount the decoupling capacitors C1 and C2 close to the oscillator components and ensure that the tracks around the oscillator are broken, thus preventing the high frequency oscillations being picked up in other parts of the circuit. The construction of the rest of the circuitry is straightforward.



Photograph of Fork interior showing board assemblies and ancillary wiring to control switches. Note the use of a film canister for screening the microphone socket.

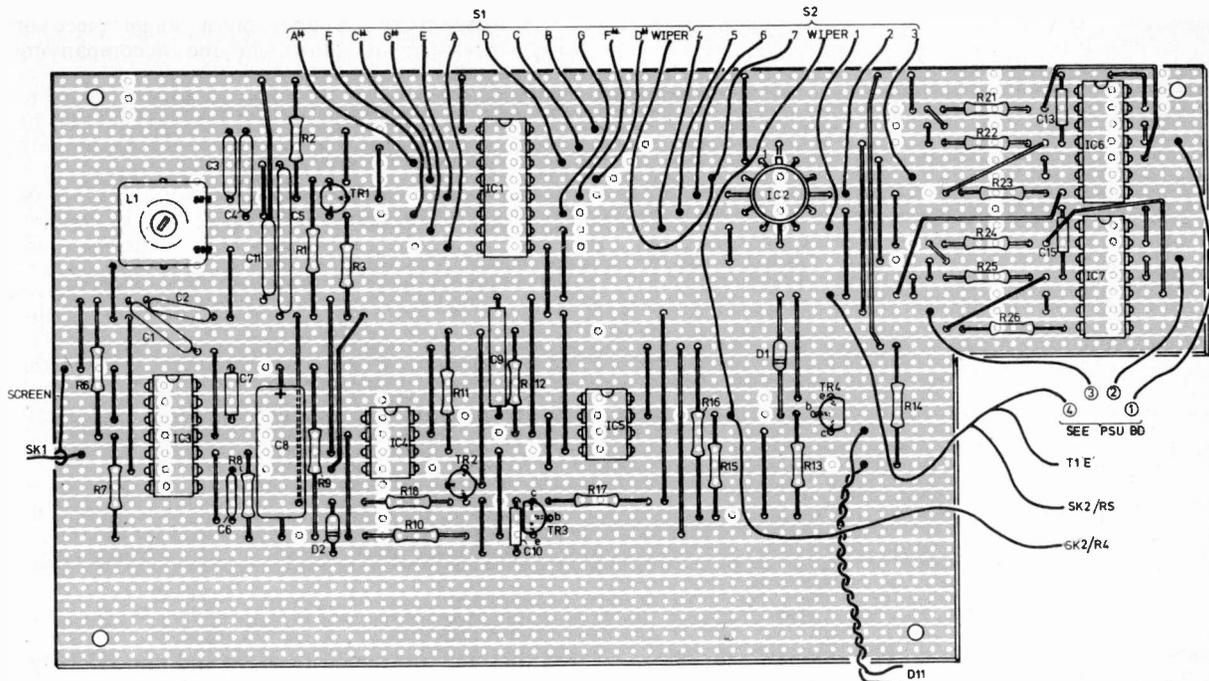


Fig. 4. Main board showing component assembly and copper track cuts required

As can be seen from Fig. 4 the p.s.u. regulators are mounted at the end of the main board.

The bridge rectifiers and smoothing capacitors are mounted on a small piece of board affixed to the side of the case as shown in Fig. 5 using countersunk screws and stand-off pillars.

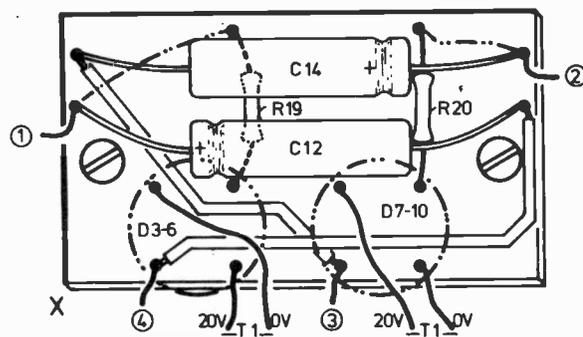


Fig. 5. Additional board for rectifiers and smoothing components

The complete instrument is housed in a diecast box. The microphone jack socket should be mounted close to the input connection to IC3. Also, shielding of this socket is necessary to prevent pick-up from the oscillator section. In the prototype, the complete socket was mounted inside a small aluminium canister and the connection to pin 5 of IC3 was made with screened lead.

TESTING

After carefully checking your wiring, plug the output into an audio amplifier and switch on. You should have 84 musical notes at your command. If you possess an oscilloscope you can ensure you have the correct input to IC1 by looking at the oscillator output (IC1 pin 2). This signal, which is not a sine wave, should have an amplitude which lies between the limits of +10V and +12V for the crest and +2V and -8V for the trough.

Before the visual beat circuitry can be tested, the instrument will have to be roughly calibrated against a known source; a musical instrument roughly in tune will suffice.

Select the note and octave required (middle C lies in range 4) and adjust the core of L1 for an audio beat frequency of about 1 beat per second.

Disconnect the audio output and connect a good quality magnetic microphone to the input jack; with the microphone in the vicinity of the musical instrument, the beat frequency should be clearly visible.

CALIBRATION AND USE

If you have access to a digital frequency counter, you will have no difficulty in calibration,

Table 1: AY-1-0212 Master Tone Generator

Pin No.	Note	Divisor	Frequency f Range 7	f/2 Range 6	f/4 Range 5	f/8 Range 4	f/16 Range 3	f/32 Range 2	f/64 Range 1	Correct frequency for f/8
8	A	239	3520	1760	880	440	220	110	55	440
7	G#	253	3325.22	1662.61	831.30	415.65	207.82	103.91	51.96	415.31
11	G	268	3139.1	1569.55	784.78	392.39	196.19	98.10	49.05	392.00
12	F#	284	2962.25	1481.12	740.56	370.28	185.14	92.57	46.29	369.99
6	F	301	2794	1397.48	698.74	349.37	174.68	87.34	43.67	349.23
5	E	319	2637.24	1318.62	659.62	329.66	164.83	82.41	41.21	329.68
13	D#	338	2488.99	1244.50	622.75	311.12	155.56	77.78	38.89	311.13
14	D	358	2349.94	1174.97	587.49	293.74	146.87	73.44	36.72	293.67
4	C#	379	2219.74	1109.87	554.93	277.47	138.73	69.37	34.68	277.18
15	C	402	2092.74	1046.37	523.18	261.59	130.80	65.40	32.70	261.62
16	B	426	1974.84	987.42	493.71	246.85	123.43	61.71	30.86	246.92
3	A#	451	1865.37	932.68	466.34	233.17	116.59	58.29	29.15	233.07

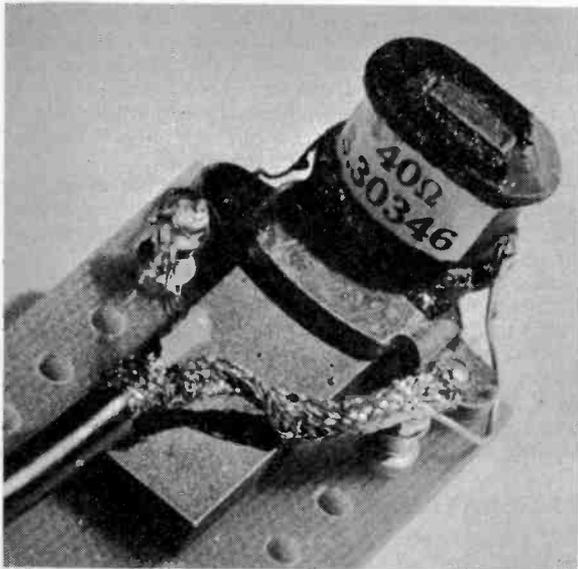
- 2 (f₀) input frequency = 841.28kHz
- 1 +12V supply
- 9 -15.5V supply
- 10 0V

however, do not connect the counter to the oscillator output at pin 2 of IC1 as the loading effect will give a false reading. The best accuracy can be obtained by using the counter in the period timing mode with the instrument switched to the low frequency A of 55Hz.

Alternatively, a tuning fork can be used—it may be worth purchasing one if the instrument is to be used a lot. Finally, if absolute pitch is not essential, the 50Hz mains frequency may be used.

Referring to Table 1 we see that the lowest note G has a frequency of 49.05Hz, in fact the correct frequency should be very near 49Hz. All that is required to pick up some mains hum, is a looped lead placed near the mains transformer. With the lowest G selected, tune L1 for 1 beat per second,

Pick-up for steel stringed instrument



check that you are tuning to 49Hz and not 51Hz by switching to the adjacent G# which should give approximately two beats per second.

ELECTRO-MAGNETIC PICK-UP

An alternative pick-up for steel stringed instruments is a coil wound round a permanent magnet as used for electric guitars. This type of pick-up gives a superior performance to a microphone for the very low strings on a piano and has advantages for tuning in noisy environments. The device shown in the photograph was fashioned from an old telephone earpiece of 1936 vintage. One of the coils was removed, together with the pole-piece and magnet. The components were mounted on a suitable handle in much the same way as in the original earpiece.

CONCLUSION

The Electronic Tuning Fork has been used to tune several instruments, including a piano and a 37-string autoharp. The visible beat indicator proved to be a boon as it allowed piano tuning to proceed without switching off the sacred TV set! This particular piano, being a poor specimen, was incapable of holding its tune unless the tension on the strings was relieved by tuning about three semitones below concert pitch. This was easily facilitated by simply loosening the note select knob, and advancing it three semitones.

Finally, don't be put off by the fact that the instrument is not perfect, for if you wish to be fanatical about your tuning, the utmost precision can be obtained by tuning to a specific number of beats. Referring to Table 1, we see that for a perfect A, G has the largest error of 0.39Hz at a frequency of 392Hz. If the instrument is tuned for 39 beats in a period of 100 seconds, then it will be precise. This is not possible for a stringed instrument, as the note will decay too soon. However, it might be worthwhile for tuning a divider organ where there are only twelve master frequencies to adjust. ★

ICE AGES

Talk of weather and ice ages has been increasing of late, so it is refreshing to have some new information on the subject. Recently, Professor McCrea, one of our most meticulous astronomers, has made certain suggestions regarding the advent of ice ages. He postulates that in the journey round the galaxy by the solar system, the Sun may pass through areas rich in dust. The infalling dust could reduce the effect of the Sun's output.

In McCrea's study, he did not attempt to explain how the changes occur, but looked at the evidence of the recurrence of ice ages related to the cosmic year. Support for this idea came from G. E. Williams of Australia, who quite independently made a detailed examination of the Sun's position during the cosmic year without offering any evidence of a link or mechanism for the ice ages.

These two approaches within a few weeks of each other has caused more attention to be given to a new model. In McCrea's calculations, orders of magnitude and estimates of the intervals were made. Williams, on the other hand, used geological evidence to an accuracy of a few tens of millions of years. This produced a fairly rigorous time scale for the glaciations.

In a summary, he indicates six principal occurrences. One of these has just been completed, one occurred in the Permo-Carboniferous period about 295 millions of years ago, another in the late Ordovician period some 450 millions of years ago and three in the late pre-Cambrian. That is 615, 770 and 940 millions of years ago. This reveals a gap at about 150 million years ago which was, however, a cool period.

From the evidence that Williams offers, a cosmic year for 303 millions emerges. This agrees with the impressions that the ice ages occur twice in the cosmic year. Williams offers the suggestion that this might be due to the bending of the galaxy due to the tides raised by the influence of the Magellanic clouds.

NEW PLANETS

The news recently released that Russian theoretical astronomy has examined a computerised experiment dealing with perturbations or orbits reveals the existence of one or maybe two planets beyond Pluto. There has always remained some doubt that all the corrections have not yet been made to the discrepancies in the Uranus predictions.

At the Institute of Theoretical Astronomy in Leningrad, this experiment has been carried out under the direction of Professor Chebotaryov,



a specialist in celestial mechanics, who has been computing the effects on the comet 1862-3. The parameters of the orbit make it an enticing argument that a planetary body would produce the data to fit the observations.

The invisible planets would have positions way out beyond the Plutonian orbit. One would have a diameter of about 12,000 miles, which would give it a mass of about the same as that of the Earth, and would be 54 times as far away from the Sun as the Earth. The other would be twice as large as the Earth and at a distance of a hundred times that of the Earth from the Sun.

The ancients have always held that there were other planets; perhaps one of these will be called Lilith also, if and when they are optically observed. Is this perhaps a good argument for a very large telescope aboard an orbiting observatory.

SPACE BIOLOGY

The *Apollo-Soyuz* programme dealt with a number of joint biological tasks. One of these was concerned with fish embryonic development, with the object of discovering what effects weightlessness would have. Similar fish, *Danyo Rerio*, had been taken to outer space by *Soyuz 16*.

The main object was to study the vestibular apparatus. On the ground, living things learn from birth to distinguish the difference between up and down, by the use of this mechanism. In space these notions become non-existent and this seems to cause changes in the organ.

Another experiment concerned the growth of micro-organisms, since weightlessness had a considerable effect on the vital activity of monocellular life. The organisms chosen for the experiment were *Chlamydomonada*, *Flowers Crepsis*, *Arbysopsis* and *Protea Vulgaris*.

Two experiments with microbial exchange were made from the USA module and the Russian *Soyuz*. Exchange was made from the astronauts themselves also. These will be compared back on Earth to discover how the microflora has changed.

This was an important joint venture to discover the effects of mutual exchange between the astronauts. It could reveal the processes by which illness develops especially during the first few days of a mission. It would also be of value to determine conditions of cross-infection between the individuals on Earth. Thus another spin-off appears for the benefit of mankind.

COMET TO ASTEROID

A rare phenomenon, the transformation of a comet into an asteroid has been observed by Soviet astronomers.

A comet of the 15th magnitude is moving between Jupiter's orbit and the asteroid belt. The comet has been named *Tamara Smirnova-Nikolai Chernkh*, and was discovered in March this year.

Unlike most comets, this one does not follow the elongated elliptical orbit but moves in an almost circular one, its path close to the asteroids. It would seem, therefore, that the theory of capture obtains here as it does with other material particles.

If the comet has gathered enough material round its icy nucleus to attain a mass sufficient to make it also a minor planet, it may become another of the random bodies under the control of the gravitation of Jupiter or a lesser place in the asteroid belt.

POLES APART

It is calculated that the magnetic poles are changing position. This will necessitate considerable changes in charts towards the end of the century.

If the Soviet scientist *Nikolai Medvedev* is correct, the Earth has already entered a new epoch of magnetic inversion. When it attains a maximum, the north magnetic pole will be in the area of the Persian Gulf, with the Southern pole in the area of the Phillipines.

The theory is based on the fact that the poles drift with the migration of the Earth's nucleus which is known not to coincide with the geographical poles.

PART TWO



PE Engine Analyser

FOR ECONOMY MOTORING

By D. HALEY

LAST month the construction and wiring of circuits involving static tests, that is tests without the engine running, were described. The remaining circuits involve dynamic tests on the engine under normal running conditions, and the first of these, to be described this month, is the dwell and tachometer board. The dwell period is the portion of the ignition timing cycle during which the contacts are closed, and current is allowed to build up in the ignition coil primary. Too short dwell time will mean that, at high engine speeds, the current will not reach a sufficiently high value to produce a good spark and mis-firing will result.

Dwell is usually quoted in degrees of rotation of the distributor shaft. Since in one 360 degree rotation, the distributor connects once to each sparkplug, the distributor angle per contact breaker cycle is $360/N$ degrees, where $N =$ number of cylinders. Hence, for a four-cylinder engine the maximum dwell angle is 90 degrees, for a six-cylinder 60 degrees and so on. On this instrument the meter scale for dwell has been calibrated 0 to 100 per cent of the maximum angle so that it applies to all engines. Of course, no engine will run with maximum dwell angle since the contacts would be closed all the time. The normal dwell angle for most cars is around 40 to 60 per cent of the total period.

INPUT WAVEFORM

Both r.p.m. and dwell time measurements make use of the pulses obtained from the contact breaker terminal on the ignition coil. Much of the circuit, shown in Fig. 2.1, is common to both measurements.

The squared letters on the circuit diagram refer to the waveforms shown in Fig. 2.2 occurring at the points indicated. The waveforms and circuit are described relative to the negative terminal of the battery, normally connected to chassis. The signal obtained from the contact breaker is waveform A.

When the contacts are closed, the terminal of the contact breaker is connected to chassis. When the contacts open the terminal is connected through the low voltage section of the coil to the positive side of the battery. At the instant the contacts open the energy stored in the coil inductance, due to the current flowing in it, is converted into potential energy and produces a series of high voltage oscillations (waveform A) which last for about 3 milliseconds. It is these oscillations which generate the high voltage energy necessary to produce the spark.

CARS WITH POSITIVE EARTH

On cars which have the positive pole of the battery connected to the chassis, the c.b. terminal on the coil will go to minus 12 volts when the contacts open, and waveforms A and B of Fig. 2.2 will be inverted. One section of IC2 (4 NOR gates) is used as an inverter, brought into circuit by S2, so that the input presented to pin 5 of IC1 is the same as waveform B.

METER SIGNALS

At this point it is worth digressing to consider what signals are required to produce meter readings

SPECIFICATION . . .

- **Ignition timing** By strobe lamp fired from inductive coupling to No. 1 spark plug lead.
- **Tachometer** 0 to 2500 r.p.m. on 1, 2, 4, 6 or 8 cylinder engines.
- **Dwell measurement** 10 per cent to 80 per cent at 1000 r.p.m.
- **Ohmmeter** 0 to 1000 ohms. 150 ohms centre scale.
- **Battery Charger** 12 volt 4A (High rate) or 2A (Low rate) or 6 volt 4A (High rate) or 2A (Low rate).
- **Voltmeter** 0 to 25 volts d.c. ± 5 per cent f.s.d.
- **Condenser check** 0.22 μ F condenser is substituted across contact breaker.
- **Power input** 240V a.c. at 50Hz or 12-16V d.c. at 1A.

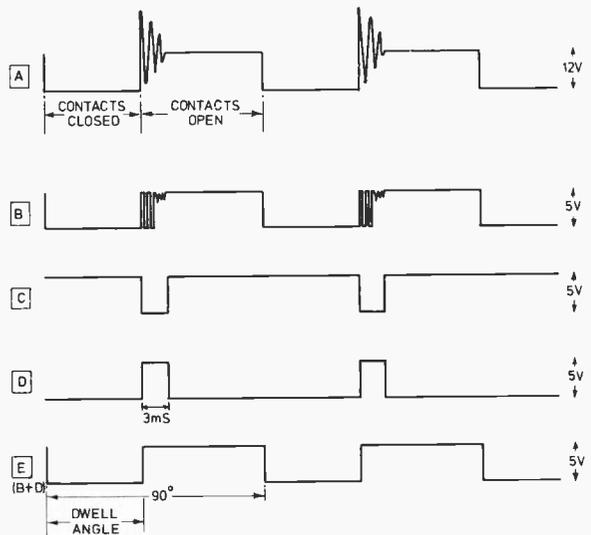


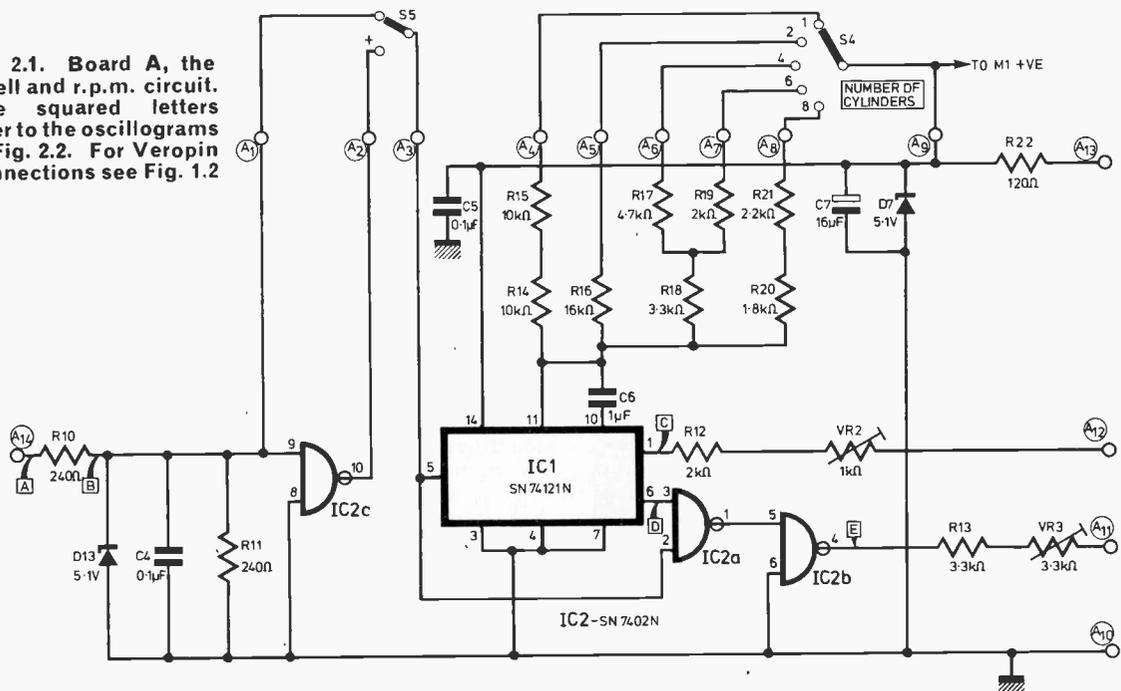
Fig. 2.2. The oscillograms to be found on test points of the dwell and r.p.m. circuit

reading will depend on the ratio of on to off time of these pulses. For instance, if current pulses of 1mA flow for 50 per cent of the time, the meter will read 0.5mA. Hence, considering waveform E of Fig. 2.2, it can be seen that if the dwell time is made the on part of the waveform, the meter will give a reading directly proportional to dwell angle. The 90 degree maximum dwell angle shown at E is for a four-cylinder engine. A six or eight-cylinder engine would have a maximum dwell angle of 60 degree and 45 degree respectively. If engine speed is varied,

proportional to engine speed and dwell time. If regular current pulses are passed through a meter, the meter will read current equal to the average value of the current pulses. Therefore, the meter

TACHOMETER AND DWELL CIRCUIT

Fig. 2.1. Board A, the dwell and r.p.m. circuit. The squared letters refer to the oscillograms in Fig. 2.2. For Veropin connections see Fig. 1.2



both the on and off parts of the waveform will change proportionally, and the average meter indication (dwell angle) is independent of engine speed.

Waveform C, is a fixed length pulse, produced once every time the contacts open. Here, changing engine speed does not alter the on time, but makes the pulse occur more or less often, depending on whether engine speed is increased or decreased. Thus doubling engine speed will double the current through a meter. These pulses (waveform C) are used to give an indication of r.p.m.

CIRCUIT DESCRIPTION

Now to consider Fig. 2.1, the circuit required to produce these two trains of pulses in a form suitable to give the required indications on a 0-1mA meter. The contact breaker signal is clipped by a 5-1V Zener diode D13 so that it is at the correct level for use with standard 5V logic integrated circuits. This produces waveform B at the input to IC1 (pin 5). This integrated circuit is a monostable multivibrator with a level detecting trigger input. Once fired, it will ignore any further input triggering pulses occurring during the time constant of the timing components C6, R14-21.

Thus the pulse chopping on waveform B caused by the coil ringing is ignored by the multivibrator, and the output at pin 1 of IC1 is waveform C. This signal is fed through series resistors R12 and VR2 to the meter, which will give a reading proportional to pulse repetition rate, i.e., r.p.m. The length of this pulse limits the maximum r.p.m. which can be measured, but if it is made too short there will be a risk of the i.c. double-firing and giving a false meter reading. About 3 milliseconds is the shortest pulse that can be safely tolerated. The integrated circuit has a maximum duty cycle of 60 per cent, which means that for 3 milliseconds on time, the total pulse period will be 5 milliseconds.

The formula for the maximum r.p.m. which can be measured with this circuit is given by

$$60 \times \text{max. duty cycle} \\ \text{Pulse length} \times \frac{1}{2} \text{ No. cylinders.}$$

from which it will be seen that the greatest limitation will be on engines with the highest number of cylinders. For an eight-cylinder engine, the limit will be

$$\frac{1,000 \times 60 \times 0.60}{3 \times 4} = 3,000 \text{ r.p.m.}$$

For ease of use and calibration it was decided to make the range the same (2,500 r.p.m.) for all types of engines and accordingly, the time constant associated with IC1 has been made switchable for a range of engines with differing number of cylinders from one to eight. This means that all carburettor adjustments are carried out with the r.p.m. meter reading near the centre of the scale, around 1,000 revolutions per minute.

As already described, dwell angle is measured by waveform E, which is a cleaned up version of B. The cleaning up is achieved by feeding waveform B and D into the two inputs of IC2a, or NOR gate A NOR gate produces "O" output when either of its inputs is a "1". Hence, since the positive going output of IC1 holds one input positive during the ringing on the other waveform, this ringing will be removed from the output. IC2b is a second NOR gate on the same i.c., used to invert the signal so that the correct portion of the waveform is in the on state to drive the meter positively.

From examination of waveform E it will be seen that 100 per cent dwell will be represented by constant zero voltage and zero dwell by constant positive level. This fact is made use of later in the calibration process.

The board is supplied from the 10V regulated supply which is further dropped to 5-1V for the integrated circuits by R22 and Zener diode D7.

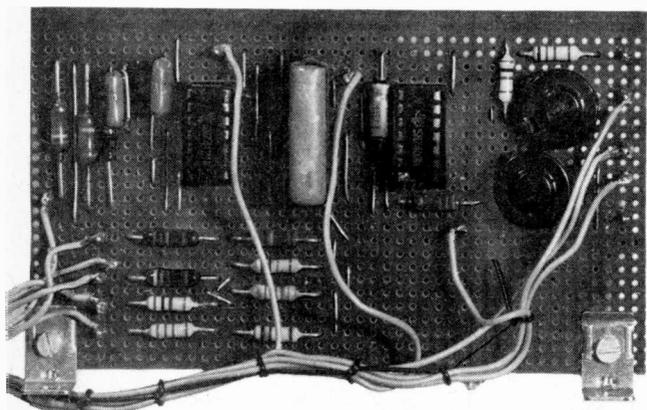
CIRCUIT BOARD CONSTRUCTION

The circuit for r.p.m. and dwell angle measurement is constructed on a piece of 0-1in pitch Vero board measuring 4-8in long by 2-7in wide. Fig. 2.3 shows the layout of components on the top side of the board, and the points at which the printed circuit track should be cut.

Tags are inserted at all points where the circuits show connections to switches. If the constructor does not require all the facilities provided by the switching, links may be soldered between appropriate tags to set the circuits for one particular type of car, e.g. four-cylinder, negative earth. 14-pin d.i.l. sockets are recommended for the two i.c.s in preference to direct soldering to the board as there is a risk of damage by overheating with direct soldering. Both i.c.s are mounted with their orientation identity, i.e., pin 1, towards the top edge of the board. Two small angle brackets are fixed to the bottom corners of the board for bolting to the chassis, beside the power supply regulator board.

WIRING IN

There is quite a considerable amount of wiring associated with this board. Fig. 2.3 shows the pin identities on the board and should be used in conjunction with Fig. 1.2 in the first article when wiring in. As well as the supply connections, which are made from the 10V regulator board via the 150mA fuse, connections must be made to the meter function, positive/negative, and number of cylinder switches and to the contact breaker socket on the front panel. A lead having a banana plug on one end and a crocodile clip on the other should be made up for connection to the contact breaker terminal.



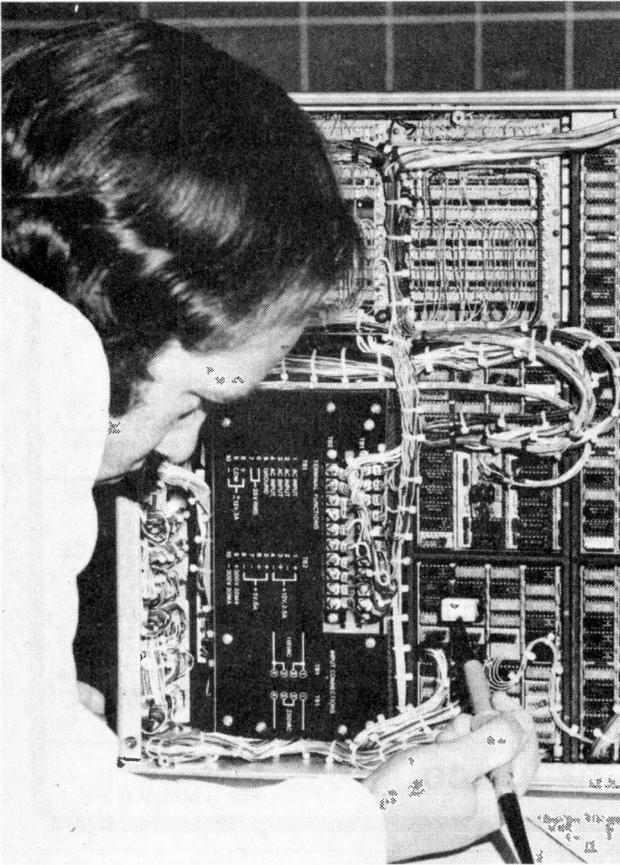
This hobby brings big rewards.

A soldering iron and a screwdriver. 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.

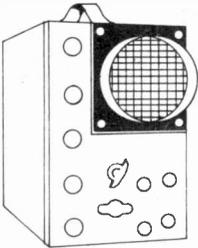
All the training is planned to be carried out in the comfort of your own home and work in your own time. You send them in when you are ready and not before. These culminate in a final test and a certificate of success.



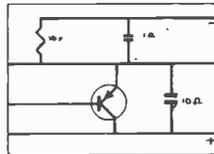
1

Build an oscilloscope.

As the first stage of your training, you actually build your own Cathode ray oscilloscope! This is no toy, but a test instrument that you will need 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 of essential equipment.



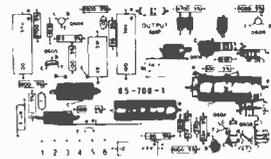
2



Read, draw and understand circuit diagrams.

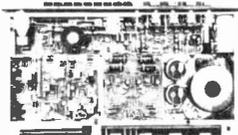
In a short time you will be able to read and draw circuit diagrams, understand the very fundamentals of television, radio, computers and countless other electronic devices and their servicing procedures.

3



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.



PLUS FREE GIFT!

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

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.

Brochure without obligation to:
**BRITISH NATIONAL RADIO
 & ELECTRONICS SCHOOL, Dept. EH115
 P.O. Box 156, Jersey, Channel Islands**

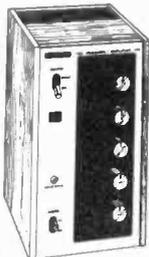
NAME _____

ADDRESS _____

(Block caps please)

SONY HALF PRICE

These top quality SQ Decoder/Amplifiers are offered at half price while stocks last. Brand new in manufacturers' cartons with one year guarantee.



SQA 100
SQ DECODER/AMPLIFIER
SQA 100. A versatile and space saving SQ decoder/amplifier which can convert your existing stereo system (providing your amplifier has a tape/source monitor switch) to exciting 4-channel realism—just add model SQA 100 and a pair of rear speakers. Other features include tone controls, balance controls, and power amplifier giving 8W RMS output per channel, master volume control for simultaneous adjustment of 4 channels and decoder output controls for independent use of decoder. Many of your favourite artists are now recording albums in SQ—ask at your local record shop.

REC. RETAIL £52.00 incl. VAT
OUR SPECIAL HALF PRICE OFFER
ONLY £26.00 incl. VAT
Please add £1.50 P. & P. and insurance

SQA 200
SQ DECODER/AMPLIFIER
OUR SPECIAL HALF PRICE OFFER
£38.80 incl. VAT
REC. RETAIL PRICE £77.68 incl. VAT
Please add £1.50 P. & P. and insurance



SQA 200
SQ DECODER/AMPLIFIER
SQA 200. Providing an output of 8W RMS per channel for the rear speakers. SQA 200 is a decoder/amplifier designed specifically to work with those complete audio units systems provided with a tape-source monitor switch. Now that so many of your favourite artists are recording SQ albums, the addition of SQA 200 plus a pair of rear speakers will add a new dimension to your stereo system.

DECLON FOAM SPEAKER FRONTS
as used by leading manufacturers

NEW SPECIAL PRICE

18½ x 10 x ½ black or brown £1.50 each
22 x 12 x ½ brown £2.00 each
29 x 11 x ½ brown £2.50 each
26 x 15½ x ½ brown £2.50 each

Prices include VAT and Post and Packing.
Can be easily cut to suit any loudspeaker enclosure.
Pattern as illustrated.



THE FABULOUS SANSUI 210 TUNER AMPLIFIER



REC. RETAIL PRICE
£111.85 incl. VAT
OUR PRICE
£69.95 incl. VAT
+ £1.50 P. & P. and insurance

210
Sansui 210 34W AM/FM Stereo Multiplex Tuner Amplifier. Equipped with an FET front end for exceptionally sensitive FM reception, linear scale FM dial for precise tuning and automatic FM stereo/mono switching, this model also provides a full system of accessory circuits, wide 30 to 25,000Hz power bandwidth and holds distortion to less than 1%.

CHEQUES, P.O.s AND
MONEY ORDERS TO

medway mail order co.

P.O. BOX 4G
GILLINGHAM
KENT, ME7 5LB

BI-PAK

BARGAIN BUNDLES

Send to: BI-PAK SEMICONDUCTORS,
DEPT. PO BOX 6, WARE, HERTS.

Bi-Pak bring you, for 2 months only a fantastic inflation beating offer designed to help you, the customer. With every Pak comes a useful FREE GIFT. In addition to this, our star attraction is the D.I.Y. Printed Circuit Kit. With every kit sold during this offer comes a voucher to the value of £1.50 to be spent on any items from our Retail Catalogue.



PRINTED CIRCUIT KIT. Containing 6 sheets of 6in x 4in single sided laminate, a generous supply of etchant powder, etching dish, etchant measure, tweezers, etch resistant marking pen, high quality pump drill with spares, cutting knife with spare blades, 6in metal ruler, plus full easy-to-follow instructions. £7.80p.



3 for the PRICE of 2
Buy 2 x C80 cassettes for 72p per pair—
GET 1 x C80 ABSOLUTELY FREE
Buy 2 x C90 cassettes for 96p per pair—
GET 1 x C90 ABSOLUTELY FREE

I.C. BUNDLE

2 x 7400 2 x 7474
2 x 74121 2 x 74141
2 x 741

PLUS FREE 2 x BPS8 and
2 x BPS16 I.C. Sockets.

ALL FOR ONLY
£1.50.

OFFER WORTH £3.27

TRANSISTOR BUNDLE

2 x BC108C
2 x OC71
2 x BF115
2 x 2N3819
2 x 2N3646

2 x BC178
2 x BC107
2 x BC109
2 x BFX84
2 x BFX29

PLUS FREE
ONE SHEET OF VEROBAND
ALL FOR ONLY
£1.50

OFFER WORTH £3

S.C.R. BUNDLE

2 x 0.6A 100V 2 x 3A 50V
2 x 1A 50V 2 x 5A 400V
2 x 1A 400V

PLUS FREE
2 METRES OF 18swg
MULTICORE SOLDER
ALL FOR ONLY
£1.50

OFFER WORTH £3

DIODE + RECTIFIER BUNDLE

20 GERM G.P. DIODES DIRECT REPLACEMENTS FOR OA81-85,
OA91-95

2 x BY100 4 x 1.5A 50V
4 x 1N4001 4 x 1.5A 400V
4 x 1N4004 4 x 1N4148

PLUS FREE BOOK
No. BP9 "38 PRACTICAL TESTED
DIODE CIRCUITS FOR THE HOME
CONSTRUCTOR"

ALL FOR ONLY £1.50

OFFER WORTH £3

CAPACITOR + RESISTOR BUNDLE

100 ½W Resistors in assorted values
ranging from 100 ohm to 1M ohm.
50 C280 Capacitors in assorted values
ranging from 0.01µF to 2.2µF

PLUS FREE
COLOUR CODE CHARTS
ALL FOR ONLY
£1.50

OFFER WORTH £3



WATCH THIS SPACE FOR THE GREAT BI-PAK CHRISTMAS COMPETITION WITH A FIRST PRIZE OF A COLOUR T.V. PLUS 52 OTHER PRIZES

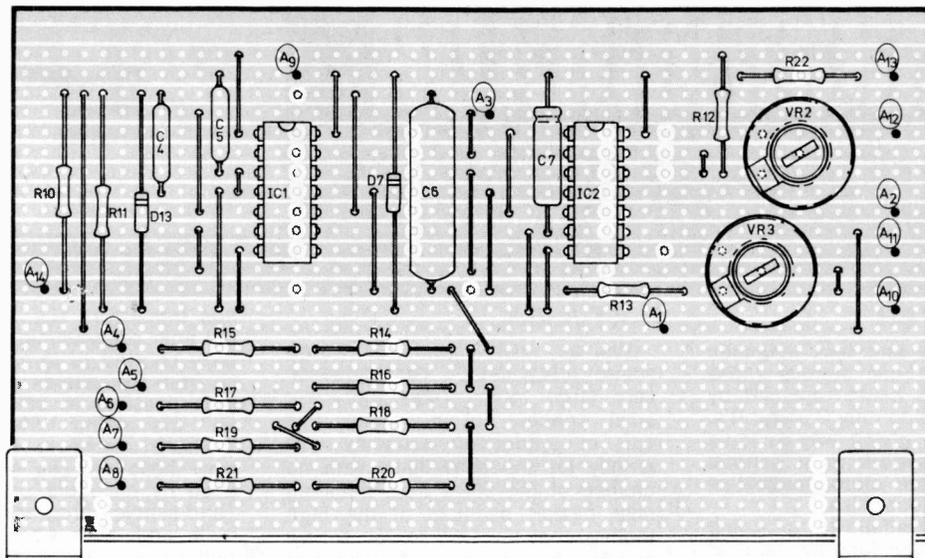


Fig. 2.3. Component layout and cutting details for Board A

TEST AND CALIBRATION

It only now remains to set the two calibration potentiometers VR2 and VR3 so that the meter indicates correct dwell and tachometer readings. It has already been noted that 100 per cent dwell is represented by contacts permanently closed. To set the dwell calibration, switch the meter to 'Dwell', Earth switch to negative and connect the contact breaker socket to supply negative. The meter should read approximately full scale. Adjust VR3 to set the meter reading to 100 per cent. Check that with contact breaker socket connected to +12V, the meter reading falls to zero. With the earth switch set to +ve, the readings should be reversed, i.e., 0 with c.b. socket connected to supply -ve and 100 per cent with c.b. socket connected to +12V.

To calibrate the tachometer scale, the 50Hz mains supply is used. The r.p.m. corresponding to 50Hz is $\frac{50 \times 60}{2} = 1,500$ r.p.m. for a four-cylinder engine.

Set the function switch to r.p.m., the No. of cylinders switch to 4, and connect the c.b. lead to one 12V a.c. terminal of the bridge rectifier. Adjust VR2 to give a meter reading of 1,500 on the r.p.m. scale. Check that the reading falls to 1,000 r.p.m. on six-cylinders and 750 r.p.m. on eight cylinders.

DWELL MEASUREMENT

To make measurements of dwell angle, the lead from the c.b. socket is connected to the c.b. terminal on the coil. A lead should also be connected between instrument chassis and car chassis. From the foregoing description it will be seen that the pulse produced by IC1 forms part of the 'off' portion of the dwell waveform (E of Fig. 2.2). As the engine speed increases waveform E contracts to a shorter time scale.

This pulse therefore sets the upper limit of dwell which can be measured, since the off section of the waveform cannot be less than D. It should be noted that waveforms C and D are only 3 milliseconds

for the eight-cylinder engine setting, being increased in width for less cylinders in order to maintain tachometer calibration. However, the period between sparks is also proportionally longer for less cylinders at a given engine speed, and waveform D will remain the same proportion of total period of waveform E for all engines, and will limit the maximum dwell measurement to the same percentage in each case. The following table should clarify this point.

Table 2.1.

No. of cylinders	Tach. pulse D	Period of E at 1,000 r.p.m.	Max. dwell at 1,000 r.p.m.
1	24 ms	120 ms	80 per cent
2	12 "	60 "	80 "
4	6 "	30 "	80 "
6	4 "	20 "	80 "
8	3 "	15 "	80 "

Increasing engine speed will reduce the maximum measurable dwell since it reduces the periodic time of waveform E. This limitation can be overcome to some extent, on less than eight-cylinder engines by leaving the "No. of Cylinders" switch on 8 for all dwell measurements. It must be remembered however, that the switch must be returned to its correct position when making tachometer readings.

SIX-VOLT SYSTEMS

In a 6V system the amplitude of the pulse obtained from the contact breaker will be only 6V instead of 12. It may therefore be necessary to reduce the value of R10 in Fig. 2.1 to around 50Ω. The full value of 240Ω must be used when setting the calibration of the tachometer and dwell scales, if this is done from 12V.

Next month: Strobe circuit and instructions for using the Analyser

SEMICONDUCTOR UPDATE. . . By R.W. COLES

ULN3006T
IM5200
DD10R

HALL SWITCH

We see less and less magnetic components in our circuits these days, coils are being replaced by active filters using only C's and R's, and relays are giving way to logic gates and thyristors in a general trend away from electromagnetics and towards electronics.

This state of affairs is not going to be tolerated for long by the ever loyal band of magnet-fanciers, and already they are launching a counter attack into the very heart of logic-land with a new device from Sprague called a Hall-Effect Switch.

Now for all you deviants who have forgotten what the Hall-Effect is, it goes something like this: If a current is made to flow from end to end of a bar shaped conductor, and a magnetic field is introduced perpendicular to the direction of current flow, then the effect of the field will be to deflect the end to end current flow, and to cause a small voltage to be developed across the width of the bar. This principle has been known for a long time, and has been put to good use in the past to measure the strength of particular magnetic fields.

The new use for the Hall-Effect is in a very small magnetically actuated switch with no moving parts, and the trick has been to integrate a Hall-sensor cell with a silicon integrated circuit and then to put the whole thing in a tiny three pin plastic package. The device code is **ULN3006T**, and providing that all the chips that come off the assembly line aren't gobbled up immediately by industry, this one could be a very useful addition to any amateur's component box.

The chip contains an amplifier which converts the tiny Hall voltage into a logic swing at the output. Switch ON point is about 500 Gauss, and switch OFF point is about 225 Gauss, making operation with any kind of magnet possible.

The standard use for this device will be as a keyswitch for teletypewriters, where a small permanent magnet mounted in the key top will activate the sensor when the key is depressed, but, of course, other uses are limited only by your own imagination! And most readers are not short of this.

D.I.Y./L.S.I.

We all know that l.s.i. (large scale integration) can squeeze very large logic arrays into very small spaces, but up to now this sort of production economy was strictly for the specialists, with no chance of the small man dictating chip design because of the high tooling cost involved for each new circuit. One glimmer of hope has been present for a number of years in the form of PROMs, or Programmable Read Only Memories, which are factory produced arrays which can be content-programmed by the user.

An ingenious new chip from Intersil, the **IM5200**, may at last bring the benefits of custom l.s.i. to everyone because it is the first Field Programmable Logic Array (F.P.L.A.) ever produced. A sort of Programmable Logic Array has been available in the past, but with these early devices programming had to be carried out at the final manufacturing stage. These were a help, because instead of having to order a new device in thousands, you could order in hundreds, but the new F.P.L.A. takes this idea much further because it is now economic to make a new device in only one-off quantities, and not only that, because programming is done by the user, a ready programmed chip can be edited or modified at will.

The **IM5200** has 14 logic inputs which are buffered and inverted internally and then fed to a programmable array of 48 AND gates which can each have any combination of the 14 input terms used as inputs.

The outputs of the AND gate array are fed to an OR gate array where each of eight OR gates can have any combination of AND terms as their inputs, and finally the eight OR outputs can be further programmed to give active high or active low outputs from the chip.

The secret of the new device lies in the A.I.M. (Avalanche Induced Migration) links used to hook-up the gate array when high current programming pulses are applied momentarily. As supplied, all A.I.M. links appear as open-base

npn transistors (i.e. open circuits) but after programming a link is partially shorted to form a diode, and so from the outside of the package it is possible to selectively "wire-up" the gating arrays.

There seems to be no reason why these devices should not be used by amateurs once a suitable (and simple) programmer has been built, and since each F.P.L.A. can replace up to 250 t.t.l. packages, do-it-yourself will take on a new meaning!

TEN TO THE BAR

A modern trend is to replace all "old-fashioned" analogue displays with a trendy bunch of seven-segment l.e.d.s, to achieve a mathematically precise numerical read-out. Of course, we all rather fancy a digital multimeter to replace the old faithful moving coil job, but in many circumstances the change to a digital type display actually decreases the amount, and clarity of available information; imagine for example the difficulties involved in reading a car speedo' which gave a digital output!

Now that the novelty of little flickering numbers is wearing off, the l.e.d. manufacturers are turning their skills to producing a new kind of analogue display, which, while being more suitable for use with today's advanced circuits than a moving coil meter, still gives a simple to read analogue information display which is not subject to misinterpretation.

An example of this practical thinking is the **DD10R** ten bar l.e.d. array from ITT which comes in a 20 pin d.i.l. package that can be stacked end to end to produce an array of light bars to any desired length. The anode and cathode of each of the ten l.e.d.s are individually accessible to ensure the utmost flexibility of application.

The usual way to display analogue variables such as speed, height, or depth on this sort of array is to illuminate more and more bars as the measured quantity increases, so as to give a variable length of column of light. Stacking several arrays alongside each other forms a histogram type display, and you can't do *that* with Nixie tubes!

Marshall's

A. Marshall (London) Ltd Dept: PE
 42 Cricklewood Broadway London NW2 3ET
 Tel: 01-452 0161/2 Telex: 21492
 & 85 West Regent St Glasgow G2 2DD
 Tel: 041-332 4133
 & 1 Straits Parade Fishponds Bristol BS16 2LX
 Tel: 0272 654201/2
 & 27 Rue Danton Issy Les Moulineaux Paris 92
 Tel: 642 2985

Call in and see us 9-5.30 Mon-Fri 9-5.00 Sat
 Trade and export enquiries welcome

Catalogue price 25p

Top 500 Semiconductors From the Largest Range in the U.K.

2N456	0-80	Orange	0-12	2N5192	1-24	AF106	0-40	BC186	0-25	BF159	0-27	LOO5T1	1-50	OC35	0-60
2N456A	0-85	2N3053	0-25	2N5195	1-48	AF109R	0-40	BC187	0-27	BF160	0-23	LM380	1-10	OC42	0-50
2N457A	1-20	2N3054	0-60	2N5245	0-47	AF114	0-35	BC207	0-12	BF163	0-32	LM381	2-20	OC45	3-32
2N490	4-00	2N3055	0-75	2N5294	0-48	AF115	0-35	BC208	0-11	BF166	0-40	LM702C	0-75	OC71	0-17
2N491	4-38	2N3390	0-45	2N5295	0-43	AF116	0-35	BC212K	0-16	BF167	0-25	LM709	0-25	OC72	0-25
2N492	5-00	2N3391	0-28	2N5296	0-48	AF117	0-35	BC212L	0-16	BF173	0-27	T099	0-48	OC81	0-25
2N493	5-20	2N3391A	0-20	2N5298	0-50	AF118	0-35	BC214L	0-18	BF177	0-29	BD1L	0-38	OC83	0-24
2N496	0-22	2N3392	0-15	2N5457	0-49	AF124	0-30	BC237	0-16	BF178	0-35	14DL1	0-40	ORP12	0-55
2N497	0-18	2N3393	0-15	2N5458	0-46	AF125	0-30	BC238	0-15	BF179	0-43	LM710	0-47	R53	1-30
2N498	0-82	2N3394	0-15	2N5459	0-49	AF126	0-28	BC239	0-15	BF180	0-35	LM723C	0-90	SL414A	1-80
2N499	0-59	2N3402	0-18	2N5492	0-58	AF127	0-28	BC251	0-25	BF181	0-36	LM741	0-30	SL610C	1-70
2N706	0-14	2N3403	0-19	2N5494	0-58	AF139	0-65	BC253	0-25	BF182	0-35	T099	0-40	SL611C	1-70
2N706A	0-16	2N3414	0-20	2N5496	0-61	AF186	0-45	BC257	0-16	BF183	0-55	BD1L	0-40	SL612C	1-70
2N708	0-17	2N3415	0-21	2N5577	0-45	AF200	0-65	BC258	0-16	BF184	0-30	14DL1	0-38	SL620C	2-60
2N709	0-42	2N3416	0-29	2N6027	0-45	AF239	0-65	BC259	0-17	BF185	0-30	LM747	1-00	SL621C	2-60
2N711	0-50	2N3417	0-29	2N6128	0-73	AF240	0-70	BC262	0-25	BF186	0-13	LM748	0-47	SL622	4-58
2N718	0-23	2N3440	0-59	2N6139	1-42	AF279	0-70	BC282	0-25	BF195	0-12	BD1L	0-60	SL623	4-58
2N718A	0-28	2N3441	0-57	2N6140	1-00	AF280	0-79	BC283	0-25	BF196	0-13	14DL1	0-73	SL641C	3-10
2N720	0-57	2N3442	1-40	2N6141	0-81	AL102	1-00	BC300	0-38	BF197	0-15	LM3900	0-70	SN76003N	2-92
2N814	0-39	2N3638	0-15	2N6200	2-49	AL103	1-00	BC301	0-34	BF198	0-18	LM7805	2-20	SN76013N	1-95
2N816	0-28	2N3638A	0-15	40361	0-40	BC107	0-14	BC302	0-29	BF200	0-20	LM7812	2-50	SN76023N	1-80
2N818	0-32	2N3639	0-17	40362	0-45	BC108	0-14	BC303	0-54	BF225J	0-43	LM7815	2-50	SN76033N	2-92
2N819	0-28	2N3641	0-15	40363	0-58	BC109	0-14	BC304	0-17	BF225	0-43	ST2	0-20	SN76033N	2-92
2N930	0-22	2N3702	0-12	40389	0-48	BC113	0-15	BC308A	0-15	BF245	0-45	MC1303	0-30	TA283	1-10
2N1302	0-19	2N3703	0-13	40394	0-56	BC115	0-17	BC309C	0-20	BF246	0-58	MC1310	2-50	TAA363	1-10
2N1303	0-19	2N3704	0-15	40395	0-65	BC116	0-17	BC317	0-12	BF247	0-65	MC1330P	0-80	TAA350	2-10
2N1304	0-26	2N3705	0-15	40406	0-44	BC116A	0-18	BC318	0-12	BF254	0-19	MC1351P	0-80	TAA550	0-60
2N1305	0-24	2N3706	0-15	40407	0-35	BC117	0-21	BC337	0-20	BF255	0-19	MC1352P	0-80	TAA611C	2-10
2N1306	0-31	2N3707	0-15	40408	0-35	BC118	0-14	BC338	0-20	BF257	0-47	MC1466	3-50	TAA821	2-03
2N1307	0-28	2N3708	0-14	40409	0-53	BC119	0-29	BCY30	0-80	BF258	0-65	TAA615B	1-32	TL020	0-49
2N1308	0-47	2N3709	0-15	40410	0-52	BC121	0-35	BCY31	0-85	BF259	0-55	ME0402	0-20	TAA616B	1-32
2N1309	0-47	2I13710	0-15	40411	2-00	BC125	0-16	BCY32	1-15	BF939	0-24	ME0404	0-13	TBA651	1-69
2N1671	1-54	2N3711	0-15	40594	0-74	BC126	0-23	BCY33	0-85	BF979	0-24	ME0412	0-18	TBA800	1-40
2N1671A	1-67	2N3712	1-20	40595	0-84	BC132	0-30	BCY34	0-79	BF979A	0-20	ME4102	0-11	TBA810	1-40
2N1671B	1-85	2N3713	1-20	40601	0-67	BC134	0-13	BCY36	1-00	BF982	1-36	ME4104	0-11	TBA820	1-15
2N1711	0-45	2N3714	1-20	40602	0-67	BCY39	1-50	BF561	0-27	MJ480	0-95	TBA920	2-30	TIL209	0-30
2N1907	0-50	2N3715	1-50	40603	0-58	BC136	0-17	BCY40	0-37	BF938	0-25	MJ481	1-20	TIP29A	0-49
2N2102	0-60	2N3716	1-80	40604	0-56	BC137	0-17	BCY42	0-28	BF928	0-30	MJ490	0-65	TIP29C	0-80
2N2147	0-78	2N3717	2-20	40636	1-10	BC140	0-68	BCY58	0-30	BFX30	0-27	MJ491	1-45	TIP29C	0-80
2N2148	0-94	2N3772	1-80	40669	1-00	BC141	0-68	BCY59	0-32	BFX84	0-24	MJ2955	1-00	TIP30A	0-58
2N2160	0-90	2N3773	2-65	40673	0-73	BC142	0-23	BCY70	0-17	BFX85	0-30	MJ2960	0-48	TIP30C	0-58
2N2218A	0-22	2N3774	2-08	40673	0-73	BC143	0-25	BCY71	0-22	BFX87	0-28	MJ2955	1-20	TIP31A	0-62
2N2219	0-24	2N3790	2-40	40674	0-20	BC147	0-14	BCY72	0-15	BFX88	0-25	MJ2955	0-75	TIP31C	1-00
2N2219A	0-26	2N3791	2-35	40675	0-20	BC148	0-14	BD115	0-75	BFX89	0-90	MJ370	0-65	TIP32C	0-74
2N2220	0-25	2N3792	2-60	40676	0-27	BC149	0-15	BD116	0-75	BFY50	0-23	MJ371	0-75	TIP32C	1-25
2N2221	0-18	2N3794	0-24	40677	0-49	BC153	0-18	BD121	1-00	BFY51	0-23	MJ370	0-60	TIP33A	1-01
2N2221A	0-21	2N3819	0-37	40678	0-35	BC154	0-18	BD123	0-82	BFY52	0-21	MJ371	0-70	TIP33C	1-45
2N2222	0-20	2N3820	0-64	40679	0-40	BC155	0-18	BD124	0-67	BFY53	0-18	MP811	0-32	TIP34A	1-51
2N2222A	0-25	2N3823	0-78	40680	0-25	BC158	0-18	BD131	0-40	BFY90	0-75	MP812	0-40	TIP34C	2-60
2N2368	0-25	2N3904	0-27	40681	0-30	BC160	0-80	BD132	0-50	BFY91	0-38	MP813	0-47	TIP35A	2-90
2N2368A	0-20	2N3906	0-27	40682	0-40	BC167B	0-15	BD135	0-43	BFX20	0-21	MPF102	0-39	TIP36A	3-70
2N2369A	0-22	2N4036	0-67	40683	0-35	BC168B	0-15	BD136	0-47	BSX21	0-29	MPSA05	0-25	TIP41A	0-79
2N2646	0-55	2N4037	0-42	40684	0-40	BC168C	0-15	BD137	0-55	BU104	2-00	MPSA06	0-31	TIP41C	1-40
2N2647	0-98	2N4058	0-18	40685	0-15	BD138	0-63	BU105	2-25	MPSA12	0-25	MPSA12	0-35	TIP42C	0-90
2N2904	0-22	2N4059	0-15	40686	0-27	BC169C	0-15	BD139	0-71	T106D	0-65	MPSA55	0-25	TIP49C	0-70
2N2904A	0-24	2N4060	0-15	40687	0-22	BC170A	0-15	BD140	0-87	CA3018A	0-85	MP5A56	0-31	TIP49C	0-70
2N2905	0-25	2N4061	0-15	40688	0-26	BC171	0-18	BD529	0-80	CA3020A	0-80	MPSU06	0-65	TIP53	0-98
2N2905A	0-26	2N4062	0-15	40689	0-20	BC172	0-17	BD530	0-80	CA3028A	0-79	MPSU06	0-58	TIP55S	0-98
2N2906	0-19	2N4126	0-21	40690	0-30	BC173	0-28	BDY20	1-05	CA3035	1-37	MPSU55	0-63	TIP305S	0-50
2N2906A	0-21	2N4289	0-34	40691	0-42	BC178	0-27	BDY21	1-05	CA3046	0-70	MPSU56	0-63	TIP305S	0-50
2N2907	0-22	2N4919	0-95	40692	0-68	BC179	0-30	BF117	0-55	CA3048	2-11	NE555V	0-70	ZTX300	0-13
2N2907A	0-24	2N4920	1-10	40693	1-20	BC182	0-12	BF121	0-35	CA3052	1-62	NE556	1-30	ZTX301	0-13
2N2924	0-20	2N4921	0-83	40694	1-15	BF122	0-35	CA3056	1-96	NE556	0-48	ZTX302	0-20	ZTX500	0-15
2N2925	0-20	2N4922	1-00	40695	1-15	BF125	0-35	CA3090A	4-23	NE561	4-48	ZTX501	0-13	ZTX502	0-18
2N2926	0-12	2N4923	1-00	40696	1-20	BC183L	0-12	BF152	0-20	LM301A	0-48	NE565A	4-48	ZTX501	0-13
Green	0-12	2N5190	0-92	40697	1-20	BC184	0-13	BF153	0-25	LM308	2-50	OC23	1-35	ZTX502	0-18
Yellow	0-12	2N5191	0-96	AD162	1-10	BC184L	0-13	BF154	0-20	LM309K	1-88	OC28	0-78	ZTX530	0-23

PW TELE TENNIS KIT

As featured on BBC Nationwide and in the Daily Mail 2 Oct. 74. Ideal game for whole family. No need to modify your TV set, just plug in to aerial socket.
 Parts list as follows: A Resistor Pack E1 25 P & P 20p, B Potentiometer Pack E1 25 P & P 20p, C Capacitor Pack E3 10 P & P 20p, D Semiconductor Pack E14 50 P & P 20p, E IC Sockets E4 P & P 20p, F Transformer E1 15 P & P 25p, G PCB & E7 50 P & P 20p, H Switches E4 50 P & P 20p, I UHF Modular Kit E7 50 P & P 20p.
 Special Prices—complete kit excluding case £42 P & P 50p. Sections A-F incl. £23 50 P & P 30p. Assembly instructions with complete kit or 75p on request.

P.C. Marker Pen Dalo 33PC 0-87p.

Zeners 400MW, 11p; 1W, 17p.
 IC Sockets 8 DIL 10p; 14 DIL 12p; 16 DIL 13p.
 Resistors 1W 2p; 1/2W 3p; 2W 9p; 5W 10p; 10W 12p.

Scorpio Car Ignition Kit—£12.50 + VAT.

1 IMF40V £1.50
 BSTD0246 E1 20. Transformer E3.
OPTO and LEDs
 Red, green and yellow.
 0.16 diameter 31p; 0.20 diameter 33p.
 DL707 E2 25 or 4 for E8.
 Minton E1 55.

Cmos Circuits (CD Range)

4000	0-36	4016	0-66	4030	0-87
4001	0-36	4017	1-72	4031	0-19
4002	0-36	4018	2-55	4037	1-93
4006	1-58	4019	0-86	4041	1-86
4007	0-36	4020	1-91	4042	1-38
4008	1-63	4021	1-72	4043	1-80
4009	1-18	4022	1-66	4044	1-80
4010	1-18	4023	0-36	4045	2-65

TRANSISTORS
 BC182 10p
 BC184 11p
 BC204 11p
 BC209C 11p
 BC212 14p
 BC213 15p
 BC214 16p
 MPS-L01 39p
 MPS-L51 41p
 MPS-U07 89p
 MPS-U57 85p
 ZTX300 17p
 ZTX500 17p
 2N219 22p
 2N2484 51p
 2N2904 30p
 2N2905 27p
 2N3054 100p

ARRAYS
 CA3046 75p
 CA3096AE 120p

DIODES
 BA148 25p
 1GP7 10p
 1N914 5p
 1N5401 21p
 1SJ50 12p

NOISE DIODES
 Z5J (Z1J) 75p
 Z1M 120p

RECTIFIERS
 EA100, 10 100p
 MDA942A 210p
 REC41A 120p
 REC46 255p
 REC70 40p

OP. AMPS
 709 (8-dii) 39p
 710 (TO5) 39p
 741 (8-dii) 24p
 748 (8-dii) 48p

8 PIN 741s
 FIRST GRADE DEVICES
 FROM WELL KNOWN
 MANUFACTURER
 NOW ONLY 24p

SPECIAL OFFERS

V. U. METERS
 MOVING COIL METERS
 SCALE 36 x 21mm
 OVERALL 40 x 40mm
 NOW ONLY £1-40

LINEARS
 MFC4000B 70p
 MFC5040 100p
 SG1495D 290p
 SG3402T 174p
 µA7815 220p
 723 180p

RESISTORS
 Triple rated high stability carbon film, 1p each.
 E24 values from 4R7 to 3M9.
 Metal oxide half watt, 5 for 18p.
 E12 values 10R to 1M0.

POTENTIOMETERS
 Carbon 24mm, lin and log; 5kΩ to 1MΩ, 25p.
 Wirewound 1W, lin only, 10Ω to 25kΩ semi-precision, 82p.

PRESETS
 Carbon, horizontal miniature, all values 100Ω to 2MΩ, 10p.
 Cermet, horizontal miniature, all values 100Ω to 1mΩ, 45p.
 Cermet, rectilinear 20 turn, all values 100Ω to 500kΩ, 128p.

MODULAR SYSTEM
 VERO constructional system still available. Send large S.A.E. for details.

SYNTHESIZER—DON'T BUY ANYTHING . . .

UNTIL YOU HAVE ALL THE FACTS ABOUT THE MINISONIC. Without any doubt, the best value for money in synthesizers today. Performance and versatility equal to ready made instruments costing over five times as much. Very high stability log oscillators (2); filter; noise generator; versatile keyboard control system; envelope shaper and V.C.A. (2 each); ring modulator and headphone/L.S. output.

Hear It—Exclusive C20 demonstration cassettes still available. "AUDIO FAIR 1974", an introduction to the MINISONIC by G. D. Shaw, an J "SYMBIOSIS", an experimental composition for the MINISONIC by Malcolm Pointon.

Each tape, £1.06 post free Together, £1.86 post free. 8% VAT

Play It—SYNTHESIZER MUSIC SERVICES, 12 Holland Park W11, Tel. 01-221 5665, have the MINISONIC on permanent demonstration.

Read It—Reprints of the MINISONIC series are available *only* from EATON AUDIO, details in lists.

Buy It—A top line Synthesizer in its own right, or a worthy addition to any music studio—you cannot fail to be impressed, not least by our new lower prices!

BASIC COMPONENT KIT, £38.00, UK post free
 POWER SUPPLY KIT, £8.90, UK post free

Lists—send S.A.E. or 10p stamps.

THE MINISONIC MK II
 Is coming soon!

C. MOS LOGIC
 Now available at bargain prices.

Examples:
 MC14011C 21p
 MC14016C 55p

EXTRA SPECIAL LINEARS

Device	Description	Manuf.	Case	Cost
LM318N	Very high speed, high gain, op. amp. (70V/µs)	N.S.	TO5	257p
LM381N	Very low noise, dual, audio preamp. (0-7µV noise)	N.S.	14-dii	174p
MC1306P	Half-watt, 8 ohm, audio preamp. and amplifier	Mot.	8-dii	75p
MC1741SCP	High speed 741, compensated, direct replacement	Mdt	8-dii	107p
ZN424E	High speed, Low noise, operational amplifier	Fer.	14-dii	130p

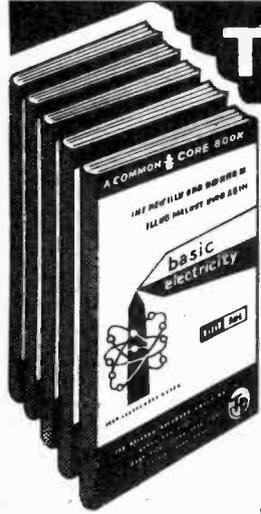
DATA SHEETS, all devices, 10p extra

P.E. MINIMIX 6
 All parts now available. Send 9 x 4in S.A.E. for details.

EATON AUDIO

DEPT. PE, P.O. BOX 3
 ST. NEOTS, CAMBS.
 PE19 3JB

TERMS: MAIL ORDER ONLY. C.W.O.. MINIMUM ORDER £1. VAT. Please add 25% to value of order inc. P. & P. unless otherwise stated. Cheques or P.O.s payable to Eaton Audio. Orders over £5 free of P. & P., otherwise please add 10p in the £1.



The Pictorial Method

**BASIC ELECTRICITY (5 vols)
 ELECTRONICS (6 vols)
 TELEVISION (3 vols)**

You'll find it easy to learn with this outstandingly successful PICTORIAL METHOD. The essential facts are explained in the simplest language, one at a time, and each is illustrated by an accurate cartoon-type drawing. These clear and concise illustrations make study a real pleasure. The books are based on the latest research into simplified learning techniques. This easy-approach-to-learning method has proved beyond doubt that acquiring knowledge can be an enjoyable experience.

YOUR 100% GUARANTEE

Should you be, in any way dissatisfied with the MANUALS your money will be refunded by return of post.

The series will be of exceptional value in training mechanics and technicians in Electricity, Radio and Electronics.

WHAT READERS SAY

I didn't know this subject could be so easily presented.
J. K., Earlsfield
 Pleased to say how understandable your books are—I now have a sound knowledge of the subject.
A. K., Hull
 Invaluable for my training as a Technician.
W. J., Stockport
 They have an easy approach to learning that a mathematical idiot like myself can easily understand.
K.L.Y., Ashton-u-Lyme
 Thank you for the excellent publication: the best in form and type I have ever come across.
T.L.O., Shanklin
 I find the Basic Manuals the best in their class and a real-help in my work in prototype electronics.
C.L.P., Cardiff

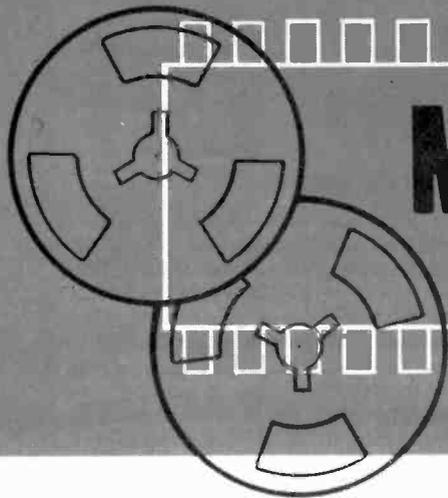
To The SELRAY BOOK CO., 60 HAYES HILL, HAYES, BROMLEY, KENT. BR2 7HP

Please find enclosed P.O./Cheque value £.....
 BASIC ELECTRICITY 5 parts £8.00
 BASIC ELECTRONICS 6 parts £9.50
 BASIC TELEVISION 3 parts £5.00

Tick Set(s) required. Prices include Postage
YOUR 100% GUARANTEE. If after 10 days examination you decide to return the Manuals your money will be refunded in full.

NAME
 BLOCK LETTERS
 FULL POSTAL.....
 ADDRESS

POST NOW FOR THIS OFFER!



MICROPROCESSORS

PART 2

By V. YATES*

LAST month we covered the fundamentals of the microprocessor, the hexadecimal coding system, and the function of some of the pins of the Motorola chip. This concluding article deals with the programming language used in the processor and the various types of memory.

THE LANGUAGE OF THE MPU

All instructions within an MPU system are in the form of binary words—more commonly referred to as machine code. However, the sequence of instructions which form a programme are normally first written in mnemonic form, using the list of instructions illustrated in Fig. 6, and are then converted into machine code.

A programme consists of a series of statements each comprising an instruction (mnemonic operator) and the operand. The operand can be a numerical value, an address, or an address where a numerical value can be found. Sometimes the operand is only present by implication. For instance, the instruction to add the contents of accumulator A to the contents of accumulator B and to place the result in accumulator A, represented by the mnemonic ABA, does not need an operand because it is obvious from the instruction that the operands must be in the accumulators.

Depending on the particular instruction an operand can be specified or located in a number of different ways:

Immediate: An example of immediate addressing is LDA A 05 (Load accumulator A with the number 05). In immediate addressing a programme statement comprises two bytes of machine code; in our example LDA A will form one byte and 05 the second. The machine code for LDA A in the immediate addressing mode is 86, so the whole statement becomes 86 05.

Direct: A statement using the direct form of addressing is a two byte statement comprising a single byte which specifies the instruction and a second byte which is the address where the operand will be found.

For example, the instruction LDA A 05 in the direct form of addressing would tell the MPU to load accumulator A with the content of memory location 00 05. In machine code this is 96 05.

The second byte of a statement employing the direct addressing mode forms the least significant

eight bits of the address and the most significant eight bits are assumed to be 00. Therefore, with direct addressing it is possible to address the memory locations from 00 00 to 00 FF (the first 256 locations).

Extended: The only difference between extended and direct addressing is that three bytes instead of two are employed so that a full address can be incorporated in a statement. For example, LDA A 12 05 (load accumulator A with the contents of memory location 12 05 using extended addressing) becomes B6 12 05 in machine code.

Indexed: The MPU contained a register called the index register which is used in indexed addressing. The index register holds a two byte address which can be set to any value by the programmer. In indexed addressing the operand is found at the

Fig. 6: Microprocessor Instruction Set

ABA	Add Accumulators	INS	Increment Stack Pointer
ADC	Add with Carry	INX	Increment Index Register
ADD	Add	JMP	Jump
AND	Logical And	JSR	Jump to Subroutine
ASL	Arithmetic Shift Left	LDA	Load Accumulator
ASR	Arithmetic Shift Right	LDS	Load Stack Pointer
BCC	Branch if Carry Clear	LDX	Load Index Register
BCS	Branch if Carry Set	LSR	Logical Shift Right
BEQ	Branch if Equal to Zero	NEG	Negate
BGE	Branch if Greater or Equal Zero	NOP	No Operation
BGT	Branch if Greater than Zero	ORA	Inclusive OR Accumulator
BHI	Branch if Higher	PSH	Push Data
BIT	Bit Test	PUL	Pull Data
BLE	Branch if Less or Equal	ROL	Rotate Left
BLS	Branch if Lower or Same	ROR	Rotate Right
BLT	Branch if Less than Zero	RTI	Return from Interrupt
BMI	Branch if Minus	RTS	Return from Subroutine
BNE	Branch if Not Equal to Zero	SBA	Subtract Accumulators
BPL	Branch if Plus	SBC	Subtract with Carry
BRA	Branch Always	SEC	Set Carry
BSR	Branch to Subroutine	SEI	Set Interrupt Mask
BVC	Branch if Overflow Clear	SEV	Set Overflow
BVS	Branch if Overflow Set	STA	Store Accumulator
CBA	Compare Accumulators	STS	Store Stack Register
CLC	Clear Carry	STX	Store Index Register
CLI	Clear Interrupt Mask	SUB	Subtract
CLR	Clear	SWI	Software Interrupt
CLV	Clear Overflow	TAB	Transfer Accumulators
CMP	Compare	TAP	Transfer Accumulators to Condition Code Reg.
COM	Complement	TBA	Transfer Accumulators
CPX	Compare Index Register	TPA	Transfer Condition Code Reg. to Accumulator
DAA	Decimal Adjust	TST	Test
DEC	Decrement	TSX	Transfer Stack Pointer to Index Register
DES	Decrement Stack Pointer	TXS	Transfer Index Register to Stack Pointer
DEX	Decrement Index Register	WAI	Wait for Interrupt
EOR	Exclusive OR		
INC	Increment		

*Director, MOS Marketing, Europe. Motorola Inc.

address specified by the index register plus the number which is contained in the second byte of the instruction.

For example, the instruction LDA A +6 in the indexed mode would load accumulator A with the contents of the memory location which is six locations higher than the location which is addressed by the index register. In machine code this is represented by A6 06.

If the index register held the address 12 02, the instruction A6 06 would load accumulator A with the contents of memory location 12 02 +6 = 12 08.

Relative: Certain instructions, namely branch instructions, for the MPU employ the relative mode of addressing. These instructions enable the MPU to carry out an instruction which is not the next one in sequence. Consider the following instruction programme;

```
LOOP DEC B
      BNE LOOP
      NEXT INSTRUCTION
```

In this sequence DEC B causes a 1 to be subtracted from the content of accumulator B. Instruction BNE compares what is left in accumulator B with zero and causes the next instruction to be carried out if the result is zero. If the accumulator is not zero BNE causes the MPU to branch back to "LOOP" and again subtract 1 from the accumulator. In machine code this instruction sequence is represented by

0010	5A	(DEC B)
0011	26	(BNE)
0012	FD	(-3)
0013		Next instruction

At memory location 00 11 the MPU encounters the instruction 26 (BNE). Memory location 00 12 contains the relative address of the next instruction should the conditions for a branch be met. If they are, the relative address (FD = -3) is added to the contents of the programme counter, so that the programme branches back to 0010 (DEC B): i.e. after reading the BNE instruction and the relative address the programme counter contains 00 13, to branch, the relative address is added to the programme counter; $00\ 13 + (-3) = 00\ 10$.

Numerical information within the machine, as has been mentioned before, is represented in binary form. For relative addressing, and for some mathematical operation the numerical value is in the form of a signed two's complement number.

In signed two's complement representation the most significant bit (left hand bit) of a number is used to indicate the sign of the number: all numbers beginning with 1 are negative and all numbers beginning with 0 are positive. The remaining seven bits are used to indicate the value of the number.

Therefore while unsigned binary numbers of 8 bits can have any value from 0 to 255 (decimal), signed binary numbers can have values from +127 to -128.

To find the signed two's complement of a negative number three steps are necessary.

For example, what is the two's complement of -23? Forget about the sign and express the number in binary form: $-23 = 00010111$. Complement the number (change 0 to 1 and 1 to 0) so that it equals 11101000. Add 1 to the result, $11101000 + 1 = 11101001$ and so -23 is equal to 11101001 or E9 (hexidecimal) in signed two's complement form.

The MPU can also operate on decimal numbers in binary coded form. As each decimal number requires four bits, each byte of binary code can represent two decimal numbers.

PROGRAMMING THE MPU

It is possible to programme the MPU directly in machine code, although this is rather a tedious and time consuming business. The industrialist who intends to use the MPU in an instrument, control system or in other equipment will use a "full-sized" computer to assist him in the preparation of his microprocessor programme.

Basically the process involves writing the microprocessor programme using the mnemonic instruction set (this is called the source programme), and then using the main computer to convert it into a sequence of machine coded instructions known as the object programme.

The whole conversion process is known as "assembly" and the programme which is run on the main computer to perform the conversion is called an assembler. The assembler, and some associated programmes, enable the source programme to be easily edited and manipulated by the programmer.

THE MEMORY

The MPU has, as we have seen, a 16-bit address bus for addressing locations in memory and input/output units (Peripherals). It has also been explained that a 16-bit binary word can have 65,536 different values, therefore the memory can have 65,536 locations.

Each 1,024 memory locations is referred to as 1K (it being generally accepted that in data processing 1K = 1,024, while in electronics 1k = 1,000) therefore, the memory for the Motorola MPU can have a capacity of up to 64K bytes.

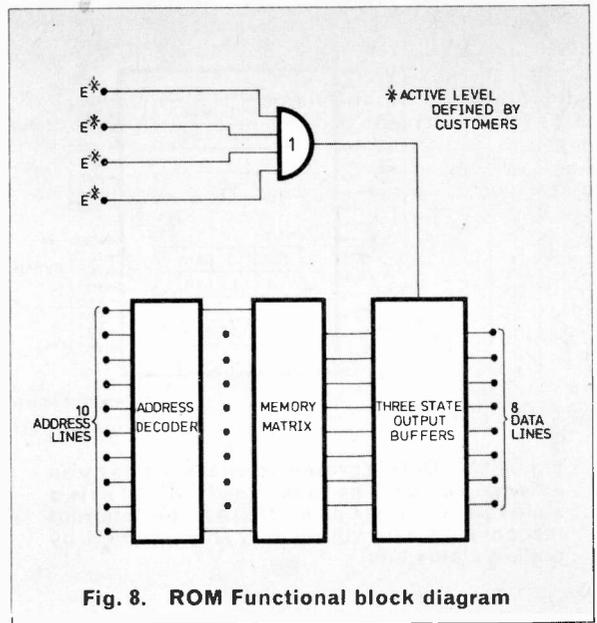
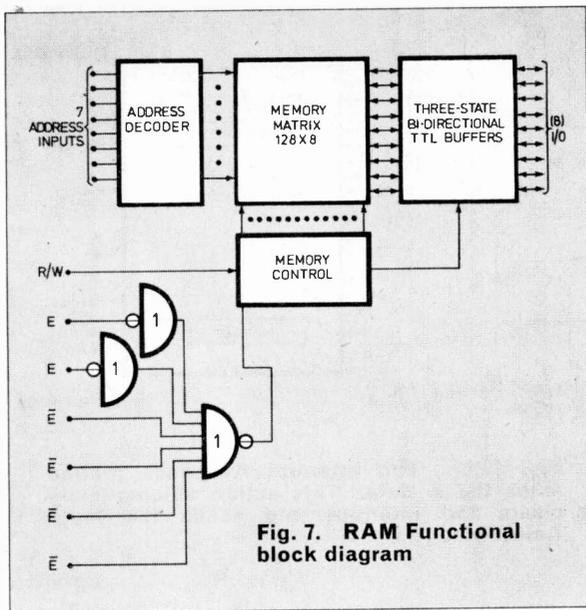
This memory will normally be made up from RAMs (Random Access Memories), ROMs (Read Only Memories) and PROMs (Programmable Read Only Memories). All these memory devices are semiconductor integrated circuits.

RAMs: A RAM consists of a number of storage cells—each cell capable of storing one bit—together with the necessary control and addressing circuitry. The design of the cells and the control circuit allows information to be written into, or read from, the memory at will.

ROMs: Like the RAM a ROM comprises a number of memory cells complete with the addressing and control circuitry. However, the design of the cells in a ROM is fundamentally different. The content (a binary 1 or 0) is set during the final stages of manufacture of the device and can never be subsequently changed.

The actual binary content of the ROM is determined by the customer who usually sends the ROM manufacturer a paper tape, or a set of punched cards, which specifies the content of the ROM. ROMs are only economic when a large number with the same binary content have to be manufactured.

PROMs: The difference between a PROM and a ROM is that the content of the memory is entered electrically by the user. Once a PROM has been programmed the contents cannot be altered.



Most microprocessors will employ RAMs, together with some form of read only storage. The ROM section of the store is used to hold frequently used programmes.

The RAM in Motorola's microprocessor set is known as the MCM6810 and is shown in Fig. 7. It will store 128 bytes and has eight bi-directional buffers for connecting to the microprocessing system's data bus. The 128 memory locations necessitate seven address inputs in order that each location can be individually selected. In addition, the MCM6810 has six chip select (E) inputs to facilitate easy memory expansion.

The ROM intended for use in the Motorola microprocessor will store 1K bytes (1,024 8-bit

words). It is known as the MCM6830 and, as shown in Fig. 8, it has four enable inputs and eight buffer stages for connection to the data bus.

THE OUTSIDE WORLD

A microprocessing system must be able to communicate with external equipment before it can be used. This equipment can take very many forms from simple relays to magnetic tape units, keyboards, video display units, printers and the like. Designing a circuit that will allow the microprocessing system to communicate with any or all of these is, to say the least, difficult.

In the Motorola microprocessor the problem is solved by a universal interface circuit known as the "Peripheral Interface Adaptor" (PIA) with the type number MC6820.

This is a complex LSI circuit of which a block diagram is given in Fig. 9. It is, as can be seen, divided into two sections; section A and section B. Connection to the microprocessor is made via the data highway (D_0 D_7), the address highway (A_0 , 1, 2, 13 and 14) and several control lines. The peripheral can be connected to the PIA by two bi-directional data highways (PA_{0-7} and PB_{0-7}) and four control lines.

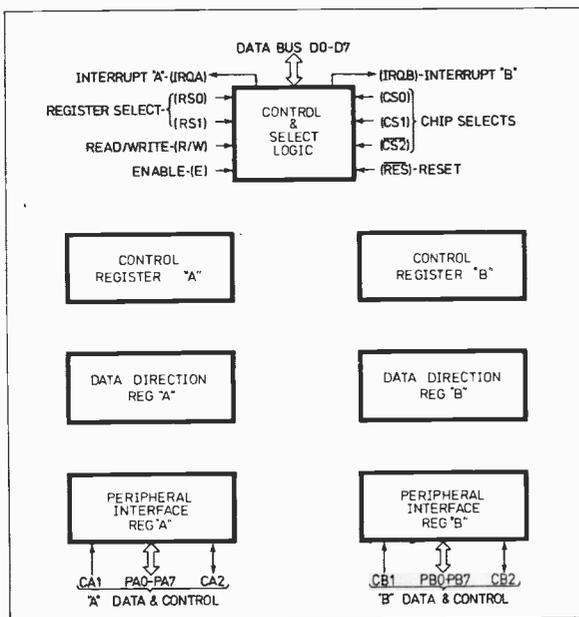
Each individual line in the two peripheral data highways can be programmed to be either an input or an output by binary words held in the data direction registers. Binary words held in the control registers set the function performed by the various PIA control lines to adjust the function performed by the PIA to suit the peripheral to which it is connected.

PIA IN ACTION

Let us consider an actual example of the PIA in action, as graphically illustrated in Fig. 10.

(1) Fig. 10(a). The peripheral tells the PIA that it wishes to input data by taking the PIA input ready line to logic "1". This causes the left hand bit in the

Fig. 9. PIA Block diagram



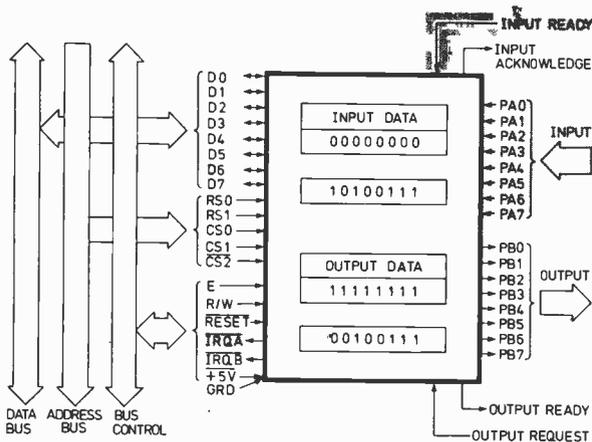


Fig. 10(a). Data is presented on the A side by an external device. The Input Ready signal sets a status bit and pulls down IRQA. The Interrupt response routine will identify this interrupt by polling status bits

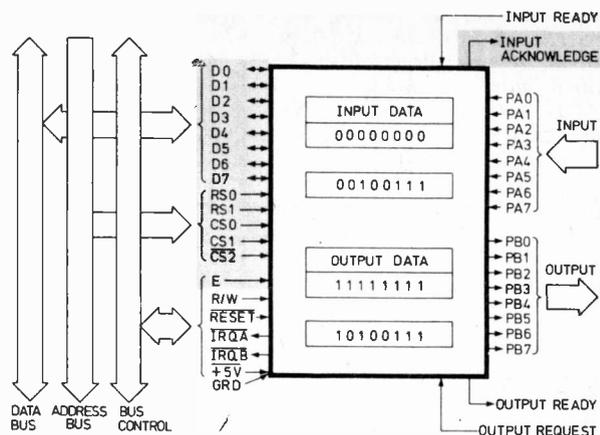


Fig. 10(b). The Interrupt Response routine reads the A data. This action automatically clears the interrupt and sends the Input Acknowledge signal

A control register to be set to 1. This bit is called a "flag" bit.

(2) The flag bit forces the system's "Interrupt request" (IRQ) line to logic "0". Normally, all IRQ lines will be connected together (wire-OR), including the IRQ input to the MPU.

(3) The MPU will go into an interrupt request sequence as described earlier. After storing the contents of all its internal registers away in the stack, the MPU will set the interrupt mask bit in the condition code register before going to a known location within memory for the first instruction in the interrupt programme.

(4) This programme will cause the MPU to examine each flag bit in all units capable of causing an IRQ in turn (this is known as "Polling").

(5) Fig.10(b). The MPU "sees" the PIA A control register flag at logic 1 and instructs the PIA to write its data onto the data highway.

(6) This action resets the flag in the PIA control register. The IRQ line goes high, the MPU resets the interrupt mask bit to 0, recalls the content of the stack and proceeds with its normal programme.

The situation resulting from a request from a peripheral for data is illustrated in Figs. 10(c) and 10(d). The sequence starts with an "output request" from the peripheral. The reader should by now be able to trace the sequence without the assistance of the printed word.

The PIA can be used in many other ways apart from the one that has been described here.

Motorola have another interface device for use with their MPU which is called the Asynchronous Communications Interface Adapter (ACIA). This is another very complex device and it is not proposed to describe it in very great detail here. However, its function will be discussed in principle.

All information transfers discussed so far have been carried out in parallel (all eight bits at the same time). However, when data is to be transferred over a single line it has to be done serially (one bit at a time). The ACIA receives each input word one bit at a time (serially) from the reception line.

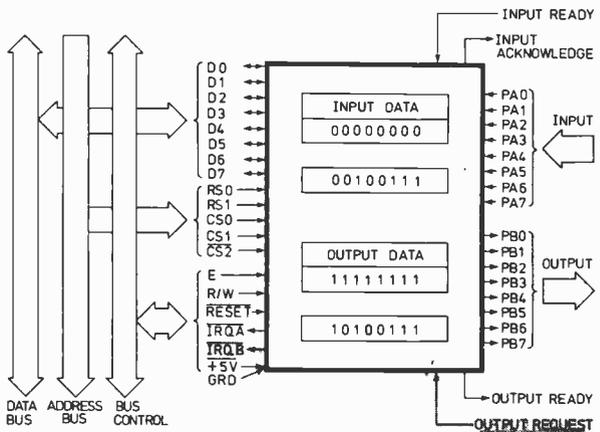


Fig. 10(c). An external device requests data on the B side with Output Request. This sets a status bit and pulls down IRQB

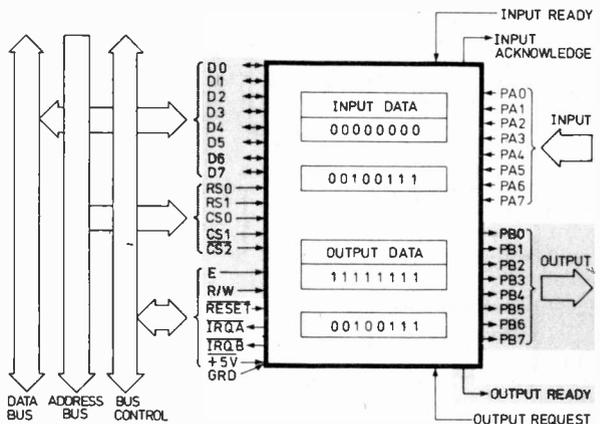


Fig. 10(d). The Interrupt Response routine identifies the interrupt by checking status bits. A read operation is used to clear the interrupt. Writing output data to the B side presents the data to the external device and automatically generates the output ready signal

performs certain checks, then transmits the data in parallel (8 bits) over the data highway to the MPU. In the reverse direction the MPU sends all eight bits of a word simultaneously to the ACIA and the ACIA re-transmits each word one bit at a time over the serial transmission line to the remote equipment.

Information on the serial transmission line appears as a string of 1s and 0s in the form of electrical pulses and is carried out in accordance with rules which are internationally agreed. Pulses of different length to the data pulses are inserted to identify the beginning and end of each word transmitted. The ACIA performs in accordance with the agreed rules. If required, the ACIA can be used whenever it is necessary to interface the MPU with other equipment over a single pair of wires.

MORE MICROPROCESSORS

We have examined the Motorola microprocessors in some detail. It was mentioned at the start of this article that there are now some thirty different microprocessors available. While we do not intend to mention all of these, it would be worth while having a brief look at some of them.

All the microprocessors consist of a central processing unit, a memory and suitable arrangements for input/output operations. In some cases the MPU itself has to be programmed to carry out the necessary handshaking routines with peripheral devices.

FIRST TYPES

Intel were the first semiconductor company to produce a microprocessor. It consists of four integrated circuits which together made up a complete 4-bit processing unit, known as the 4004N. The basic four-chip set comprises the central processing unit (CPU), a RAM, a ROM and an I/O unit.

Using the basic building blocks a 4004 system can have up to $4K \times 8$ -bit words in the ROM, 1280 4-bit words in the RAM and up to 128 I/O lines. With the addition of a few gates the system can be expanded to incorporate any combination of RAM and ROM up to 48 packages and to handle up to 192 I/O lines. The system has an instruction set comprising of 45 commands.

From the 4004 Intel progressed to the 8008, an 8-bit parallel central processing unit complete with associated integrated circuits. The 8008 was designed as a general purpose processing unit, which can directly address up to 16K bytes of memory.

The CPU unit itself comprises an 8-bit accumulator, two 8-bit temporary registers, four flag bits and eight 14-bit address registers. The instruction set consists of 48 commands which allow sub-routine nesting up to seven levels. Asynchronous or synchronous operation with external memory and multiple interrupts are standard features.

THE 8080

The next development from Intel was a more powerful and faster 8-bit microprocessor which was designated the 8080.

The 8080 provides 74 basic processor instructions including decimal and binary arithmetic and can address up to 65K bytes of memory. Up to 256 input/output units can be interfaced directly with the single chip processor unit. A basic 8080 system

consists of the CPU and seven other i.c. packages. A second 4-bit machine, known as the 4040, has been introduced by Intel. This is electrically identical to the 4004 but has an improved performance.

SERIES 3000

For applications where greater speed is required there is the series 3000. This employs Schottky bipolar circuitry throughout, and consists of a central processing element (3002), microprogramme control unit (3001) and seven other i.c.s including a look-ahead-carry generator and an interrupt control unit.

The main circuits are the 3001 and the 3002 which together form a 2-bit section of a high speed processing unit expandable up to 320 bits. One microprogramme control unit is required for every eight central processing elements. Each of the i.c.s within the system have multiple logic systems which can be rearranged by microprogramming.

MICROPROGRAMMING

Microprogramming is a technique which means that the function of the processor is determined by a series of short microprogrammes held in a ROM. The instruction set available is determined by the microprogramme and the user virtually chooses the instruction set he requires by writing the appropriate microprogrammes. Each instruction (called a microinstruction), when implemented, calls up a microprogramme consisting of a series of microinstructions. The time taken by the machines to perform a microinstruction is called a microcycle.

BCD OPERATION

Most microprocessors work in binary, following mainframe computer practice. However, a system has been introduced by Advance Electronics Ltd which operates in binary coded decimal (BCD). The decimal processor is contained on two LSI chips divided as follows: Chip 1—programme store (ROM) and input interface. Chip 2—arithmetic unit, data store (RAM) and output interface. The unit is intended for use in applications where fairly large quantities are required, as the ROM section has to be programmed by the manufacturers and, once programmed, cannot be altered.

CMP8

National Semiconductors have a fairly new microprocessor, designated CMP8, consisting of an 8-bit arithmetic and logic unit (ALU), two 16-bit index registers with auto increment/decrement plus four 8-bit registers. There are separate programme and address counters, a 16-bit stack pointer and direct memory access (DMA). It has the capability of directly addressing 65K bytes of memory, and comes in a 40-pin package.

Other microprocessor products available from National Semiconductors are designed around two p.m.o.s. l.s.i. chips which can be assembled in different combinations to form computer systems ranging from a simple 4-bit processor for elementary control functions upwards.

These two chips are the register, arithmetic and logic unit (RALU) and the control read-only

continued on page 916

MINIMIX 6



By G. D. SHAW

- ✱ *Panning between channels*
- ✱ *Twin VU meters for visual monitoring*
- ✱ *Headphone amplifiers for aural monitoring*
- ✱ *Switchable pre-fade monitoring offers a cueing facility*
- ✱ *Extension facilities enable extra channels to be added*

A miniature, battery operated, six-channel-into-two stereo mixer

SOUND mixing has, over the years, become more and more a part of the audio scene and is, of course, an essential prerequisite of the recording industry. Mixers of one form or another have always been in demand by the amateur constructor and find their place in p.a. work, discos, on stage live performances, and in the home studio. One of the difficulties has been to find a mixer which fits equally well into all these spheres of activity and which does not cost the earth to build.

Additionally the growth of interest in high fidelity reproduction and latterly, the boost given to interest in the creative manipulation of sound by the advent of instruments like the synthesiser has given rise to a fresh demand for sound mixers offering a little more than the "add or take away" requirement of a year or so ago.

It is with the synthesiser in mind, therefore, that the Minimix 6 has been designed but, at the same time, with the proviso that it should prove capable of employment in a diversity of applications.

USE OF THE 741

Essentially the Minimix 6 is a line mixer based on the ubiquitous 741 operational amplifier. However, the line preamplifiers have been given a gain range of up to +40dB and thus each line channel is capable of being operated satisfactorily by devices such as crystal pickups or crystal microphones. It is fairly generally recognised that the 741 operational amplifier is unsuitable for quality audio applications because the typical input noise figure of around 20 μ V creates problems particularly when any degree of gain is involved. A large proportion of the signal to noise problems can be overcome, however, by careful specification of signal levels and circuit layout.

The Minimix 6 provides unity gain as a true line mixer, i.e. for a 1V (0 V.U.) input the output is also 1V. In these circumstances, providing the input noise of the active units does not exceed 20 μ V then the theoretical signal/noise ratio is slightly less than -86dB. In practice the measured value on the prototype instrument proved to be -80dB, a figure which is likely to be more than adequate for the purposes specified. With a 10mV input, i.e. operating at maximum gain for a 1V output, the signal to noise ratio deteriorates to -70dB. Again, a figure which would be acceptable for most purposes.

SPECIFICATION . . .

Frequency Response (-3dB points)

1V (0 V.U.) input	14Hz to 42kHz
0.1V input	14Hz to 16kHz

Signal to Noise Ratio (Input channels)

0.1V input	-80dB
0.01V input	-70dB

Crosstalk

100Hz	-43dB
1kHz	-40dB
10kHz	-23dB

Overload capacity

Input Amplifiers	+14dB
Output Amplifiers	+14dB

Master Fader Rejection	-80dB
------------------------	-------

CROSSTALK

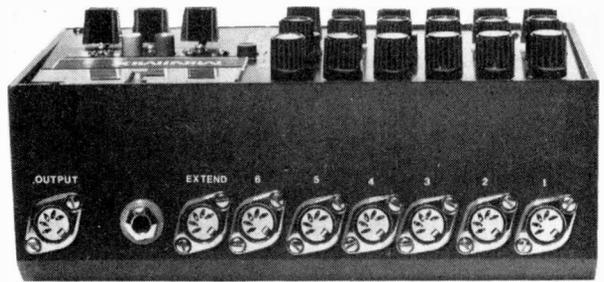
Crosstalk between channels is another problem, particularly when an attempt is made to compress all the necessary circuitry into a confined space. In the Minimix 6 the crosstalk at 100Hz is -43dB deteriorating to -23dB at 10kHz. Although the latter figure leaves much to be desired it compares favourably with the crosstalk in almost any stereo cartridge and in practice, with both channels driven there appears to be no discernible intrusion or interaction between channels. If only one channel is driven with a signal containing significant high audio-frequency elements the master fader rejection of -80dB ensures that the undriven output channel does not receive any unwanted signal.

BLOCK SCHEMATIC

A block schematic of the Minimix 6 is shown in Fig. 1. In all there are six input channels grouped in pairs as shown by channels one and two in the diagram. Signals from the input preamplifier are routed via the channel fader to the wiper of a pan-pot the ends of which are linked into the left and right pan busses. These are in fact virtual earth leads into the left and right group output mixer amplifiers. The group outputs are routed via the master faders into their respective output stages.

P.F.L. FACILITY

Cueing and monitoring facilities are often left out of home built mixers but are nevertheless frequently found to be useful, if not indispensable, in some circumstances. Aural and visual monitoring are provided in the Minimix 6 and may be switched so that the operator can monitor the outputs or any input irrespective of whether that input is actually driving into the group mixers. This latter facility is



known as Pre-Fade Listen (P.F.L.), and is extremely useful when setting up channel gains and signal levels prior to fading into the mix.

The monitoring of input signals is very much geared to the arrangement of the input channels which, as was explained above, are arranged in groups of two. For stereo operation the odd numbered channels 1, 3 and 5 are associated with the left output channel, while the even numbered channels 2, 4 and 6 are associated with the right output channel.

When a stereo signal is being mixed from a pre-recorded source (a tape or disc) it would normally be expected that the pan controls would be hard over to left or right since the stereo imaging would have been carried out during the original recording.

When mixing mono signals to form stereo, however, the pan controls on each channel have to be adjusted in order to give a subjective spatial position for the individual mono signals in the final stereo image. In these circumstances the signal has to be monitored twice. Firstly the input channel has to be adjusted for gain and the subjective quality of the sound assessed.

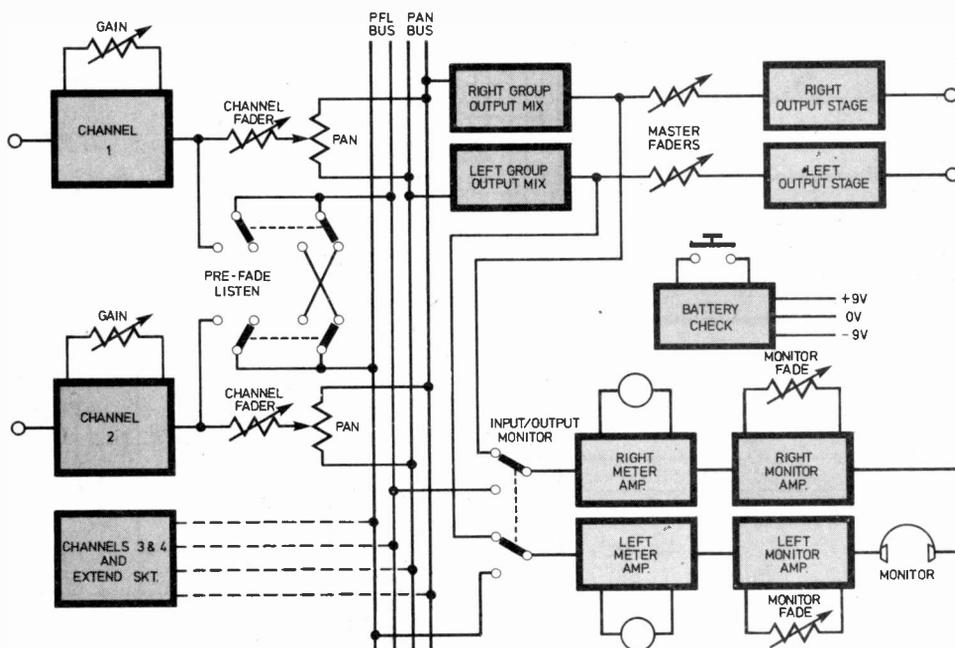


Fig. 1. Block schematic of the P.E. Minimix 6

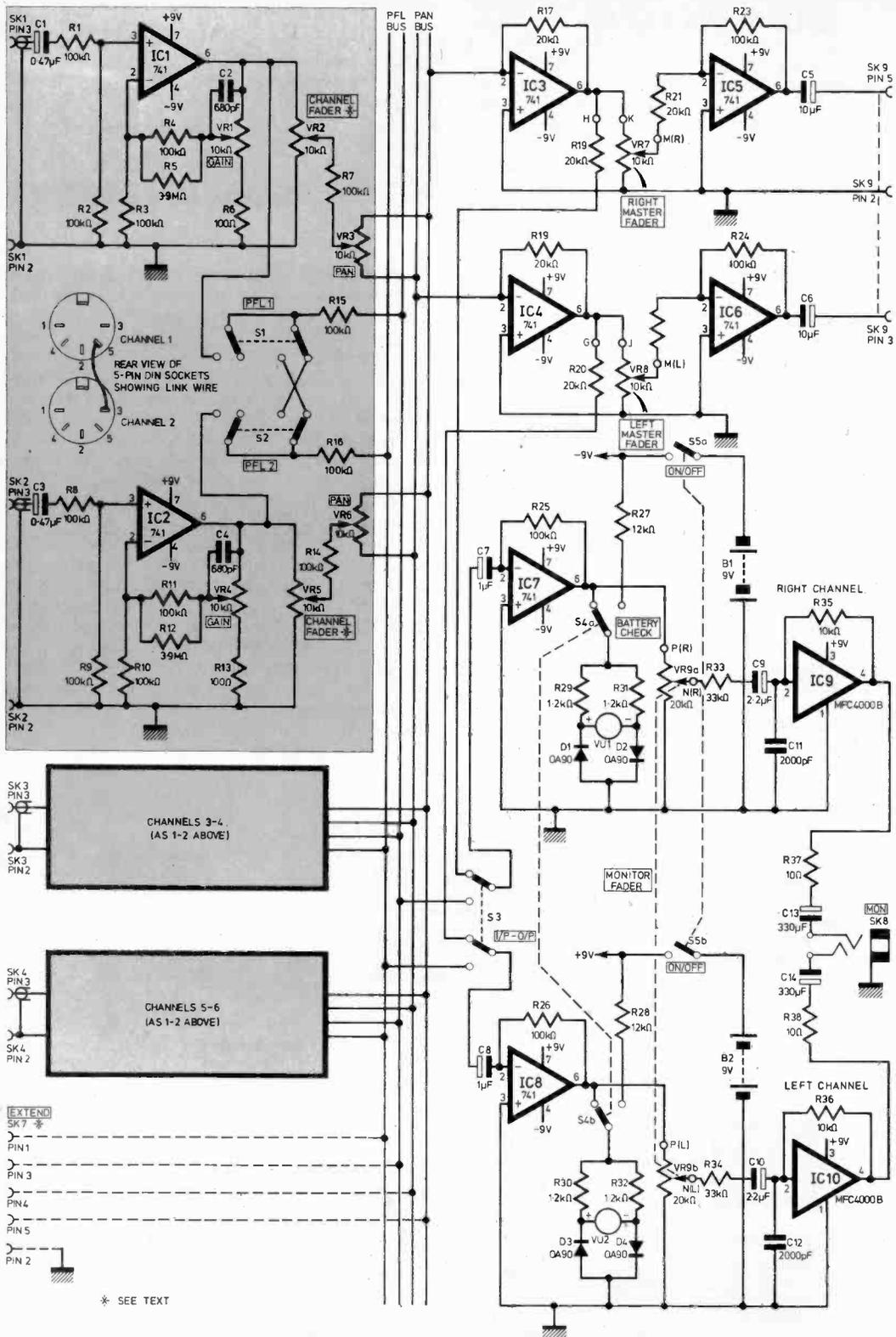


Fig. 2. Full circuit diagram of the P.E. Minimix 6. Note that channels 3-4 and 5-6 are identical to channels 1-2 (shaded areas)

BULK COMPONENTS

This list has been compiled to allow readers to take advantage of ordering all the components at once, and thus possibly obtain a quantity discount.

Resistors

10 Ω	2
100 Ω	6
1.2k Ω	4
10k Ω	2
12k Ω	2
20k Ω	6
100k Ω	40
3.9M Ω	6

Capacitors

680pF Ceramic	2
2,000pF Ceramic	2
0.47 μ F 35V Tantalum	6
1.0 μ F 35V Tantalum	2
2.2 μ F 35V Tantalum	2
10 μ F 16V Tantalum	2
330 μ F 10V Elect.	2

Potentiometers

20k Ω log. Tocos 35mm stereo slider controls	9
10k Ω log. miniature rotary pots (16mm dia.)	6
10k Ω lin. miniature rotary pots (16mm dia.)	6

Integrated Circuits

741 8 pin d.i.l.	12
MFC4000B 250mW power amplifiers	2

Semiconductors

OA80	4
------	---

Miscellaneous

PP6 type battery press studs	2 prs
Printed circuit board 200mm x 110mm	1
Case: Instrument case type 22 (R.S. components) or Vero case type 652523E (Vero Electronics)	1
Instrument case type 22	1
Rubber mounting feet, self-adhesive	4
5-way 180° DIN sockets	8
0.25in. stereo; jack socket	
Flush mounting V.U. meters type 3	2
Jean Renaud 2 pole changeover switches	9
10-way mounting frame	1
2-way mounting frame	1
Round push button (chrome finish)	6
Round push button (red, green, grey)	1 each
Control knobs for slider controls	9
Control knobs for rotary pots (4mm spindle)	12
Sundry 6BA nuts, bolts, washers	
2mm dia x 3.2mm spacers for mounting slider pots	18



This is done by closing the monitoring switch on the input channel in question and also by changing over the input/output monitor switch. In these circumstances the input signal is routed to both meter and monitoring amplifiers.

MONITORING ARRANGEMENT

Whilst it is not too important to have two visual indications of signal level, it is nevertheless very important to the overall assessment of the sound to have it heard by both ears rather than one alone. The arrangement of the monitoring or P.F.L. switches on paired channels is such that closure of either switch alone routes the input signal to both monitoring amplifiers, while closure of both switches routes the odd channel input signals to the left monitor amplifier and the even channel input signals to the right.

The second stage of stereo monitoring consists of checking the signal level and balance between output channels. This is done by switching the monitoring amplifiers so that they are coupled directly to the left and right group output mixers and adjusting the channel faders and panning level and, equally as important, that the spatial positioning of the respective signals appears to be correct.

CIRCUIT DETAILS

The circuit diagram is shown in Fig. 2. It can be seen that, with the exception of the line inputs, each amplifier is connected in the inverting mode. This is quite important as far as the bus amplifiers are concerned since the fact that the busses themselves are connected directly into the virtual earth points means that they are at very low impedance and therefore less likely to suffer from the induction of stray signals and/or hum.

The input channel or line amplifier has a variable gain and this would normally be set so that, with an input signal in the range 10mV to 1V, the output would be 1V. The bus or group mixer amplifiers have a gain of -14dB to allow for circumstances in which all channels might be routed at full level into one group amplifier and this is compensated for by the fact the output stage and output monitoring option have gains of +14dB. Thus with only one input signal per channel the output stage is still capable of producing a 1V signal.

BATTERY CHECK

The meter driving section incorporates a momentary action battery check switch in order that the battery condition may be conveniently monitored. With the values given a good battery will give a reading between 0V.U. and +1V.U. Below 0V.U. however the battery voltage is beginning to fall off and although the instrument will still operate satisfactorily with a reading of -1V.U. it would be imprudent to use the instrument on an important assignment with the batteries in this condition.

The headphone amplifiers are based on the MFC4000B and have an effective gain of -10dB thereby providing an output signal of around 300mV when the monitored channels are fully driven. This signal is quite sufficient to drive a pair of low impedance headphones to a listening level which is more than adequate.

Next month: Construction, testing and using the Minimix 6

PATENTS REVIEW...

PROTECTING IDEAS

Although this is essentially a patent column, concerned with new British patents for interesting electronic inventions, brief reference must now be made to an alternative approach to patenting. This is prophylactic, protective or defensive disclosure, by the deliberate publication of invention details, so as to block for ever the possibility of a patent on the idea.

The defensive disclosure approach is usually adopted by firms or individuals who can no longer afford to patent every development that they make, but are, understandably, worried over the possibility of a rival firm coincidentally coming up with the same idea, patenting it, and thereby securing a wide monopoly. Especially, now that the British Government is flying in the face of advice from the patent profession, industry and inventors, by raising the official fees payable on patents to unprecedented levels, the concept of deliberate disclosure may be of interest to readers.

Once details of a development have been published, for instance in these pages as a constructional article, it will be quite impossible for anyone (the author of the article included) to apply for a British patent to cover his idea. Because this magazine will find its way onto the shelves of libraries all round the world, such publication will likewise block the possibility of future patents in most civilised countries.

Only a fraction of the ideas conceived by inventors and research teams find their way into magazines, and it would be unwise for anyone to rely on such publication to defend their idea against patenting by others. It is far safer for an inventor who has taken a positive decision not to apply for a patent on a new idea to have brief details published as quickly as possible in some other manner.

One possibility open to firms with a house magazine is that a few pages of the magazine should regularly be set aside for the purpose of disclosure. As every single publication made in the United Kingdom (from children's comics to bus timetables to local borough

council minutes), must be deposited with the British Library, and because the existence of a single copy of a document in a public library can constitute legal publication, details in a house magazine will carry heavy legal weight in the U.K. But house magazines may not find their way into foreign libraries, and thus foreign patents may not always be blocked.

To achieve reliable, widespread foreign blocking, it is necessary to ensure that published details are placed on the shelves of public libraries throughout the world. Research Disclosure, of Homewell, Havant, Hampshire, has a long-standing system of swiftly publishing (at a price, of course) details of any invention, on request of the inventor, and sending them automatically to strategic libraries in virtually every country of the world.

Inventors and small firms desperate over the continually increasing cost of patenting and the worry of what others may do, should at least consider the possibility of protective disclosure in all or some of the ways mentioned above.

FUSIBLE LINK

BP 1 395 971

A clever new type of fusible link for protecting circuitry against overheating is described by ITT Creed Ltd., in BP 1 395 971.

A circular wheel turns about a central pivot and has an inner wall and an outer wall which together define an annular cavity. Two pairs of contact pins protrude through the outer wall of the wheel into the cavity. One pair of contact pins at the top of the wheel engage fixed contact plates mounted outside and adjacent to the wheel. A solid slug of low melting point alloy bridges the ends of these pins where they protrude into the annular cavity.

The whole arrangement is mounted vertically and the power supply to the equipment under protection is passed through the electrical circuit formed by the series connection of these contacts and pins.

The wheel is in thermal contact with the equipment under protection, and if the latter overheats the alloy slug melts and falls under gravity to the bottom of the cavity.

Here it solidifies again to bridge the gap between the other pair of contact pins. Thus, as the power supply connection between the first pins is broken, an alarm circuit connection between the second set of pins is made, for instance to ring a bell or light a warning lamp.

Once the fault has been corrected, the wheel is turned about its central pivot through 180 degrees, so that the slug bridging the bottom set of pins is moved to the top position to bridge the power supply contacts again. The isolated contacts are simultaneously moved into the alarm circuit at the bottom. Thus the link may be re-set as new after each fusing operation.

MOVE INDICATOR

BP 1 377 381

The Italian company Adriasud explains in BP 1 377 381 that problems arise in international bridge games, due to confusion at the moment of making a declaration. These problems are aggravated when the game is played by contestants speaking different languages.

The patent describes a circuit arrangement for enabling each contestant to positively indicate his declaration, with no possibility of thereafter altering it.

A series of indicator lights displaying the playing card numbers and symbols is shown in the patent. The lights are controlled using logic circuits, by a series of correspondingly marked switches. The circuitry is duplicated for each light and switch.

Each lamp is in series with a respective *npn* transistor across a supply line. The base of each transistor is connected via a resistor to the supply line and also via a diode to a bistable circuit. Initially a capacitor keeps the bistable supply briefly at zero so that all bistable circuits assume a start condition blocking their respective transistors and extinguishing all lights.

The patent goes on to describe in detail the effect of operating the keyswitches and how the circuit ensures that the first key operated has an inhibiting effect on all other keys in the same series of card symbol lights.

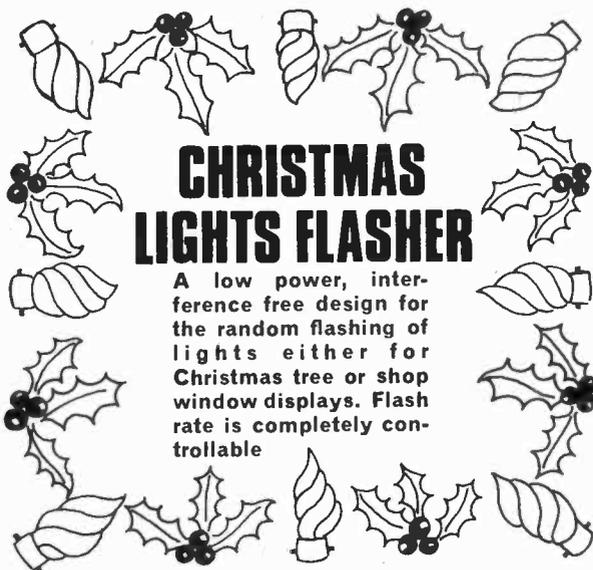
All in the DECEMBER ISSUE!

GUITAR AMPLIFIER

- Fifty watts output into 8 ohms
- Two independent input channels
- Bass and treble controls on each channel
- Output short circuit protection
- Low distortion

IC50

A 50 watt r.m.s. two-channel mono amplifier for use in pop groups/bands. Suitable for lead and bass electric guitars, electronic organs and can also be used for P.A. work



CHRISTMAS LIGHTS FLASHER

A low power, interference free design for the random flashing of lights either for Christmas tree or shop window displays. Flash rate is completely controllable

UNIVERSAL THERMOSTAT

A temperature controller with a host of useful applications. Simple to build and easy to calibrate

PRACTICAL ELECTRONICS

DECEMBER ISSUE ON SALE NOVEMBER 14, 1975 — PRICE 35p



**A LOW COST
ENLARGER AID
for the Amateur Photographer
with a range of 1:32
(i.e. 5 stops)
By C.C.WHITEHEAD**

THERE have been many descriptions of enlarging exposure-meters, but the one described in this article has several unique properties. It does not employ a milliammeter or microammeter (which can be expensive and easily damaged).

The components are cheap and readily obtainable; the cost being mainly determined by the "hardware".

It is designed from the point of view of the photographer and unlike expensive and sophisticated instruments it need not, nor in fact is, calibrated in terms of absolute illumination levels, which are seldom of interest to the practical amateur. It could best be described as an "illumination comparator".

Sufficiently sensitive to respond to weak illumination from dense negatives or shadow areas, and with a range of 5 stops or the equivalent in exposure time at any given stop. This is a ratio of at least 32:1 with reference to any given illumination level.

Its usual method of use is to "calibrate" it in arbitrary terms of exposure with a given stop under "average" conditions, i.e. an average degree of enlargement with a negative of average density and contrast ratio. On any particular negative the contrast ratio can be determined because the light-sensitive cell area is so small. The operator can then determine whether it is more important for his purpose to expose for the shadows or the highlights or for any intermediate effect.

Comparison of the density of negatives can be made at a convenient "standard" stop and degree of enlargement; then changes in ratio of enlargement is a simple matter of calculation. The great majority of competent amateurs are aware of these facts.

SIMPLE LIGHT COMPARATOR

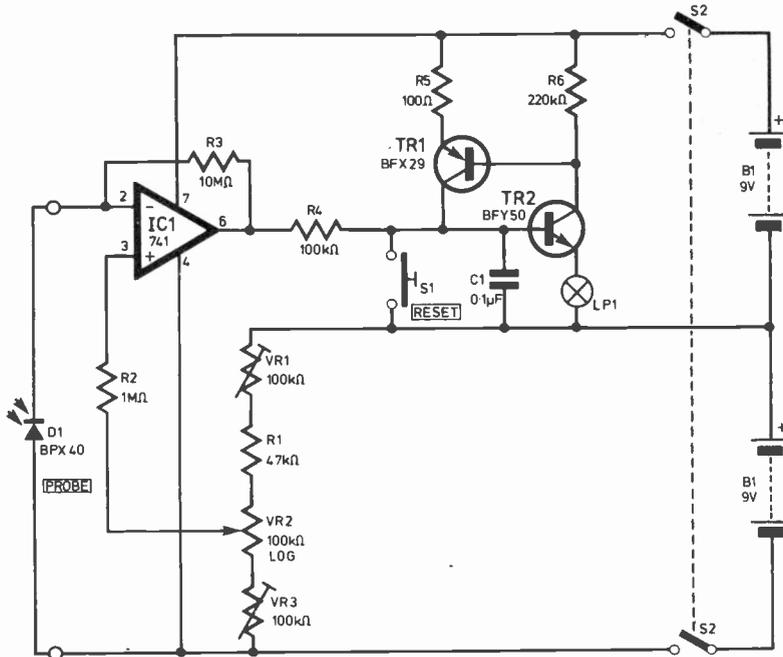


Fig. 1. Circuit diagram of the simple light comparator

The instrument is powered by small batteries (which in the writer's instrument are housed in the case) and which, owing to the very low power requirement, have practically "shelf life".

PHOTODIODE

Since one never obtains anything (except trouble!) for nothing, there is a price to pay for these advantages. As a very small photo diode (Mullard BPX90) is used (for "spot" readings) considerable amplification is required, which results in a limited range of light intensity readable. The range is 1:32, i.e. "5 stops". However, the intelligent photographer will know how to extend this range by operating procedure.

The circuit is shown in Fig. 1. The heart of the circuit is a 741 operating in the differential mode. In order to obtain a reasonably linear scale the potentiometer VR2 is logarithmic and used "backwards", i.e. with the high resistance end at the start of the reading. The preset potentiometers VR1 and VR3 are adjusted for best range and linearity of scale. It is not possible to obtain a close approximation to linearity, but this is not very important, having regard to the way in which the instrument is intended to be used.

TRIGGER CIRCUIT

The transistors TR1 and TR2, with resistors R5 and R6, form a "trigger-circuit" which operates abruptly when the potential at the base of TR2 is about 150mV with respect to 0V, and lights the lamp LP1.

The lamp used in the prototype is a 6V 0.04A cycle-lamp bulb, which is also under-run, to minimise the load on the battery. The lamp is normally

on for only a few seconds at a time. Otherwise the current drain on the batteries is only of the order of a couple of milliamperes. The battery B1 is a PP6, since it has to supply the lamp current. B2 can be a PP3, since it only has to supply the photocell current and the negative feed to the amplifier.

COMPONENTS . . .

Resistors

- R1 47k Ω
- R2 1M Ω
- R3 10M Ω
- R4 100k Ω
- R5 100 Ω
- R6 220k Ω
- All $\frac{1}{4}$ W, 10% carbon

Potentiometers

- VR1 100k Ω lin
- VR2 100k Ω log
- VR3 100k Ω lin

Semiconductors

- D1 BPX40 (Mullard Photodiode)
- TR1 BFX29
- TR2 BFY50

Integrated circuit

- IC1 741

Miscellaneous

- S1 Push to make non-locking switch
- S2 2-pole single throw (min.)
- LP1 6V 0.04A
- Veroboard
- C1 0.1 μ F

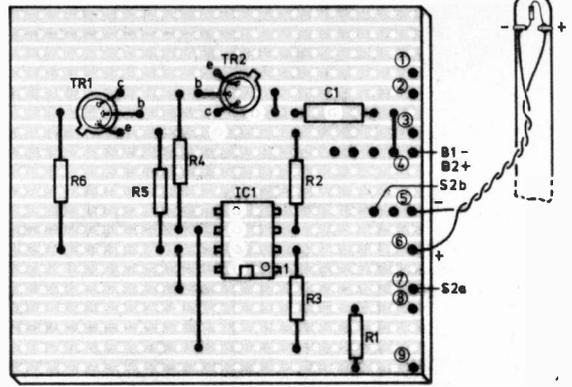
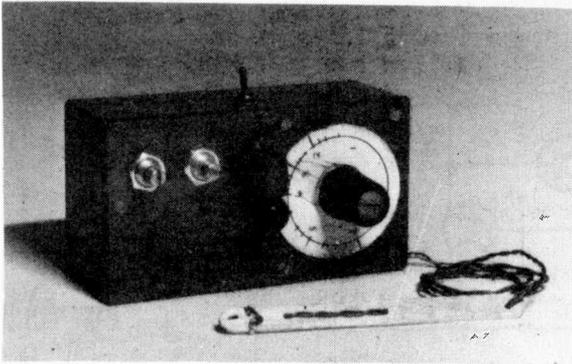


Fig. 2. Component layout and Veroboard cutting details

CONSTRUCTION

The potentiometer VR2 is provided with a blank scale and a good pointer (a slip of "celastine" or thin Perspex, with a scribed line filled with Indian ink makes an excellent index, mounted with a suitable adhesive on the underside of the knob). The photocell is mounted on the end of a "probe". A piece of wood (such as a lolly-stick) with a protective coating of varnish was used in the prototype with the photocell covered by a layer of stretch-and-seal film. The leads from the probe can be of any convenient length, preferably of very thin flexible wire such as gramophone pickup lead. Be careful not to put tension on the photocell leads, and anchor the attachment of the external leads securely. The probe is then quite robust.

The lamp is mounted close to the scale, and most of the bulb is blacked out with black enamel, except for a small clear portion to allow illumination of the scale. The circuit is constructed on a piece of Veroboard $2\frac{1}{2}$ in \times $1\frac{1}{2}$ in (60 \times 40mm) Fig. 2, and the whole instrument, including batteries, is contained in a plastic box with outside dimensions 5in \times $2\frac{1}{2}$ in \times $1\frac{1}{2}$ in (130 \times 70 \times 45mm).

CALIBRATION

Set up the enlarger in the darkroom. Place the probe in the centre of the image space. Have the enlarger lens at maximum aperture and only the enlarger light switched on. (Even the "safelight" should be off.) Set VR1 and VR2 at about half scale. Set VR1 (the indicating scale) at "maximum", i.e. fully clockwise.

Switch the instrument on by S1. The lamp will light. Press the "Reset" button S2. The lamp should go out. If it does not, raise the enlarger lamphouse (to reduce the illumination intensity on the easel) until when the reset button is pressed, the lamp goes out. It should be possible, with careful adjustment of the height of the lamphouse to cause the lamp to come on when the potentiometer is turned slightly anti-clockwise. Make a mark with a pencil on the scale. This is a trial datum. Stop the lens down one stop.

Press the reset button. The lamp should go out. Move the potentiometer slowly further anti-clockwise until the lamp again lights. Make another pencil mark on the scale here.

Repeat this procedure to five stops down. You will have six marks on the scale, at whole stop intervals. If the first and last marks don't come near the ends of the scale, repeat the procedure after adjusting VR1 and VR3, until the scale looks like Fig. 3. Having found the right values for these presets, they can be mounted inside the instrument and/or replaced by equivalent fixed resistors, and having finally obtained a convenient scale, make the markings permanent.

TIME SCALE

These markings (representing stop numbers) can now for convenience have an added time scale. One can either mark the whole scale in time values, or mark the individual stop spaces with interpolating marks, or both. This is a simple mathematical exercise. It is probably most convenient to mark the individual stop spaces, having regard to the uses to which the instrument will usually be put. Each individual stop space will then be marked as in Fig.

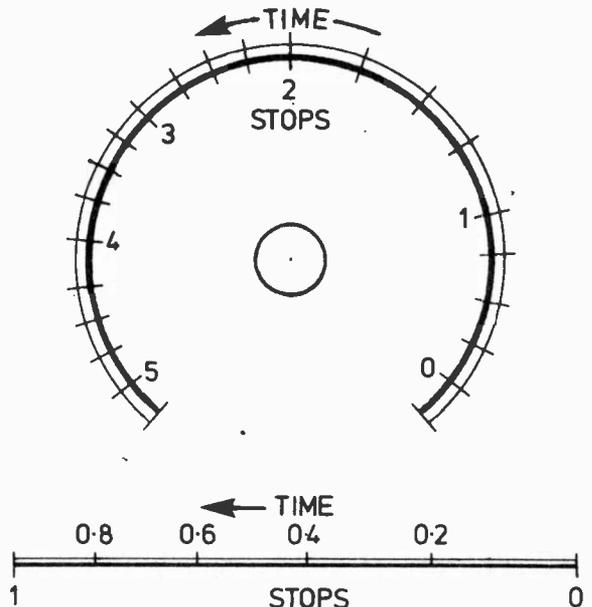
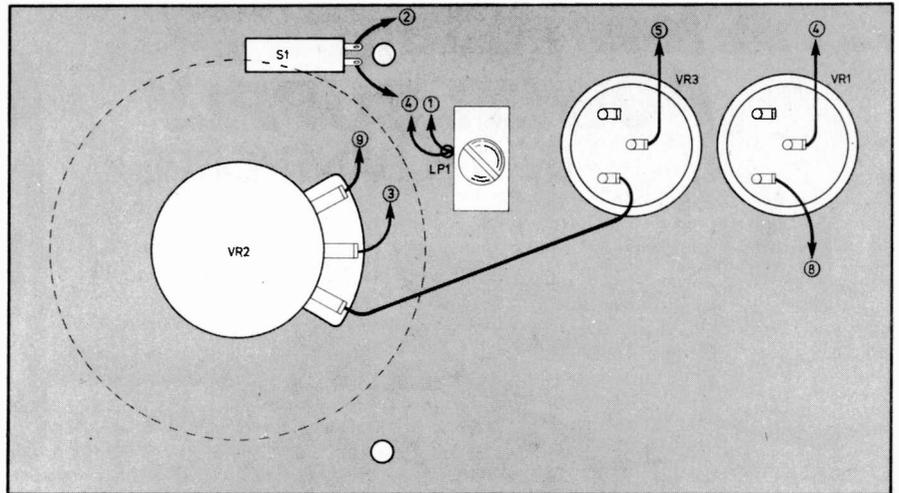


Fig. 3. Scale markings for the unit

Fig. 4. Rear of front panel showing the interwiring between controls and leads to the circuit board



3. Each stop space gives a time ratio of 2:1. Reading from right to left from the stop mark, we have time ratios of 1:1.2, 1:1.4, 1:1.6, 1:1.8, 1:2 (next stop mark), each stop space being marked as in Fig. 3.

USE OF THE EXPOSURE METER

Now as to method of use. You select a negative from which you have made an entirely satisfactory enlargement (by the method of "test strips" or trial and error). With the negative in the enlarger, decide whether you intend to establish your datum on the shadows (the brightest part of the image) or the highlights (the dimmest part of the image) or intermediately. Place the probe to receive the light at the selected part of the image (making a permanent note of what part of the image you have selected). Also make a permanent note of the paper used and the exposure time when making an entirely satisfactory print. This is your "standard" for that particular paper. Make a permanent note of the meter reading under these conditions. This is your "standard" meter reading.

EXAMPLE

A standard meter reading is obtained as above (e.g. 2.2) and the standard exposure time is, say, 10 seconds. The conditions are then changed (but not the paper). For example, a larger or smaller degree of enlargement, denser or lighter negative, etc. One then chooses whether it is more important to expose for the highlights or the shadows. The probe cell is then placed at the most important point of the image and the reading taken. Say the reading obtained in this fashion is 3.4.

MULTIPLICATION FACTOR

The difference between this and the standard 2.2 is 1.2 stops. The exposure multiplying factor is therefore 2.4, i.e. multiply by 2 for the one stop difference and by 1.2 of that value for the extra 0.2 of a stop. So one can either leave the stop unchanged and give 24 seconds exposure, or open the lens 1 stop and give 12 seconds, or close the lens 1 stop and give 48 seconds, according to choice.

If the reading goes the other way (due to a smaller degree of enlargement and/or a lighter negative, etc.)

say to 1.6, there is a difference of one stop plus 0.4 in terms of time. The multiplication factor is then $\frac{1}{2}$ (for the one stop difference) which is 5 seconds, and then this is multiplied by 0.4 for the extra 0.4 of a stop, making 7 seconds.

This may look like a clumsy way of reckoning, but it is a simple way that avoids mistakes, and is the reason why the stop interpolations are not marked over the scale (each stop space being marked as shown in Fig. 3). This last reading of 7 seconds is of course with an unchanged stop. If the lens is stopped down 1 stop the time would become 14 seconds. If another reading is now taken (taking care to place the probe in exactly the same place on the image) a reading of 2.6 would be obtained; that is to say, 10 seconds, the standard exposure, multiplied by 1.4 making 14 seconds.

STANDARD READINGS

With a given enlarging paper, any set of conditions may be adopted as "standard". If a number of different makes and grades of paper are in use, it will be convenient to determine the standard exposure time and meter reading for each, making a permanent record. It would be a further convenience to arrange conditions so that either a convenient exposure time (say 10 seconds) or a convenient meter reading (say 2 or 3) is involved.

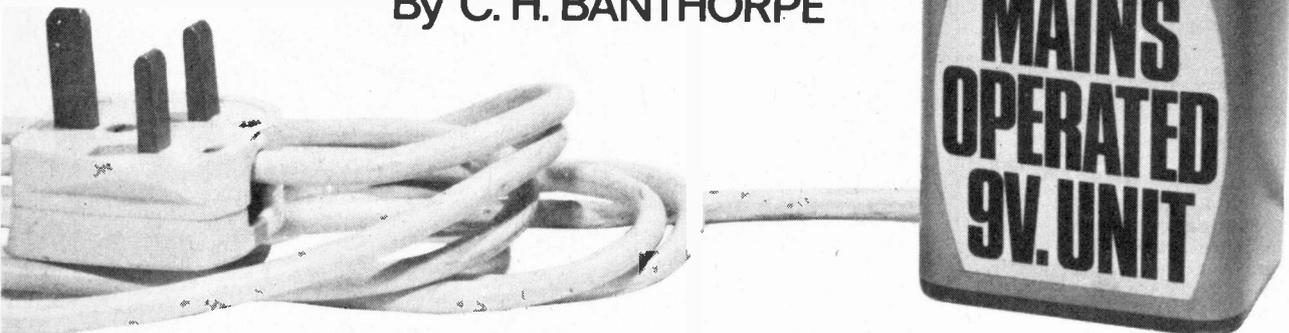
TEMPERATURE CONSIDERATIONS

To minimise cost, no attempt has been made to design the instrument for use over a wide temperature range, but this is not usually important because darkrooms are usually occupied at normal room temperature for other reasons. If there is very strong light on the easel, the rise in temperature of the photocell may affect the reading, but this cannot occur at any light level that the instrument is capable of reading.

Other ways of using the instrument (e.g. classifying negatives with respect to density) will be obvious to the photographer. If the light level used during the exposure is below the range covered by the instrument, the datum can be established at a light level within the range and allowance made for the change in terms of stop settings. This is not so accurate as a direct reading, but is quicker than guesswork or the time taken to make test strips. ★

... A low voltage POWER SUPPLY

By C. H. BANTHORPE



THIS mains-powered unit was originally built to replace the battery in a transistor radio and thus solve the recurring problem of deciding when the sound distortion caused by the falling battery voltage was noticeable enough to justify throwing away a far from dead battery and replacing it by a new and increasingly more expensive one.

The unit is very simple and lighter than the battery it replaces and generates virtually no heat. It is also over-load proof and will suffer no harm if a short circuit is connected to its output indefinitely. It is therefore also a useful unit to use when doing repair or experimental work as accidental short circuits can easily occur at such times.

CURRENT LIMITING

The circuit consists of series capacitors C2/C3 which controls the output current, in this case approximately 40mA, followed by a bridge rectifier, smoothing capacitor, series resistor and Zener diode. Each rectifier is shunted by a capacitor to eliminate interference caused by the rapid switching on and off of each diode and a capacitor is also connected across the mains input to prevent mains wiring interference getting into the receiver (See Fig. 1).

If a lower or higher voltage output is required it can be obtained by changing the Zener diode to one

with the desired voltage, but if higher, also change the electrolytic capacitor to one with a higher working voltage. The current will remain the same. For service work switched Zeners could be used, say 6V, 9V, 18V. If a higher current is required, C2/C3 must be changed to a larger value. The current output is roughly proportional to the capacity of C2/C3, doubling its value will provide approximately twice the output current. For example, in a unit needed for an output of about 70mA a 1 μ F capacitor was used. The Zener should also be changed to one of a higher current rating.

SAFETY PRECAUTIONS

It must be remembered that the output is connected to the mains via C2/C3 and the bridge rectifiers and it is therefore extremely important that safety precautions be taken. It would be unwise for instance to use the unit in a radio with exposed metal connected to the chassis. It is also safer to connect the live mains lead to C2/C3 as the current drawn from the mains is then at least limited to 40mA or so and a non-reversible mains connector should therefore always be used.

If the unit is used for service work it would normally be used on a mains supply from an isolating transformer and such safety problems would not arise.

COMPONENTS . . .

Resistor

R1 270 Ω 1W

Capacitors

C1 4,700pF 400V polyester film
C2 0.15 μ F 400V polyester film
C3 0.47 μ F 400V polyester film
C4-C7 4,700pF polyester film
C8 1,000 μ F elect 25V

Diodes

D1-D4 BY127 (4 off)
D5 BZY88/C9V1

Miscellaneous

Mains lead and four self-tapping screws

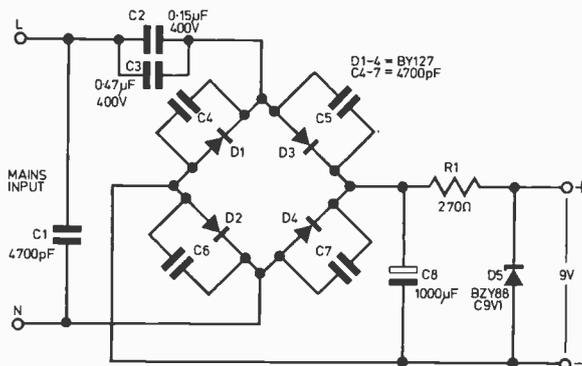


Fig. 1. Circuit of 9V p.s.u.

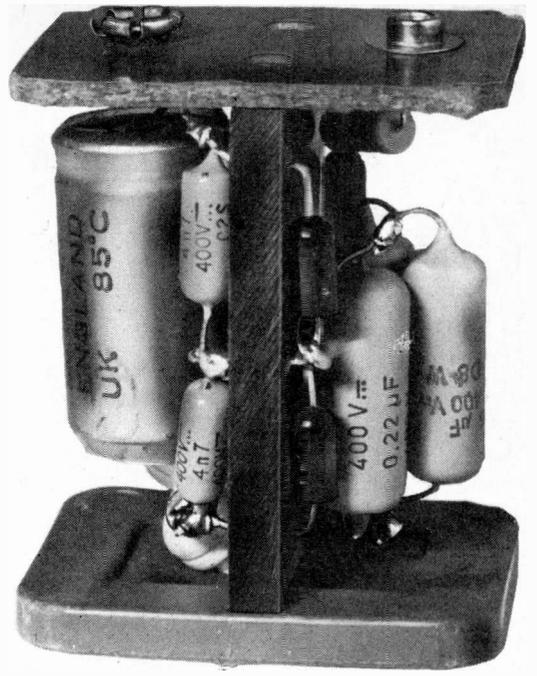
The circuit components are easily accommodated in the metal case of the battery it replaces. Remove the inside of the battery and retain the metal case and end pieces.

All the components of the unit can be mounted on a piece of insulated board cut and drilled as shown in Fig. 2. The wire ends of the components are pushed through small holes drilled in the board and after soldering is completed all components are self-secured. The two end pieces saved from the original battery are mounted on to the ends of the board by screws tapped into it. The Zener diode is soldered directly on to the two output connections, a small slot having been cut in the end of the insulating board to accommodate it. Make sure all components are well clear of the metal case.

COMPONENTS

As in all projects, if satisfactory and trouble free operation is required, good grade components operating within their limits must be used.

The writer has used Mullard polyester film capacitors in all positions, except the electrolytic, and they have proved to be satisfactory. C2/C3 is made up from one 0.47 μ F and one 0.15 μ F capacitor in parallel. They are subjected to approximately the peak of the mains voltage, about 350 volts, so 400 volt working voltage types were used. The same working voltage was also chosen for the other film capacitors. The voltage across the 1,000 μ F electrolytic is about 20 and a 25 volts working type was therefore chosen. It is probable that a smaller capacity would be satisfactory for most purposes so long as the working voltage is high enough.



If the unit is switched on and no current is taken from it then the full 40mA passes through the Zener diode. The Mullard type BZY88 is rated at 400mW up to an ambient temperature of 50°C. In this unit the 9 volts Zener passing 40mA will dissipate 360mW under no load; the worse conditions. As soon as a load is applied less current will flow through the Zener and its dissipation will reduce. It will therefore always be within, normally well within, its rating.

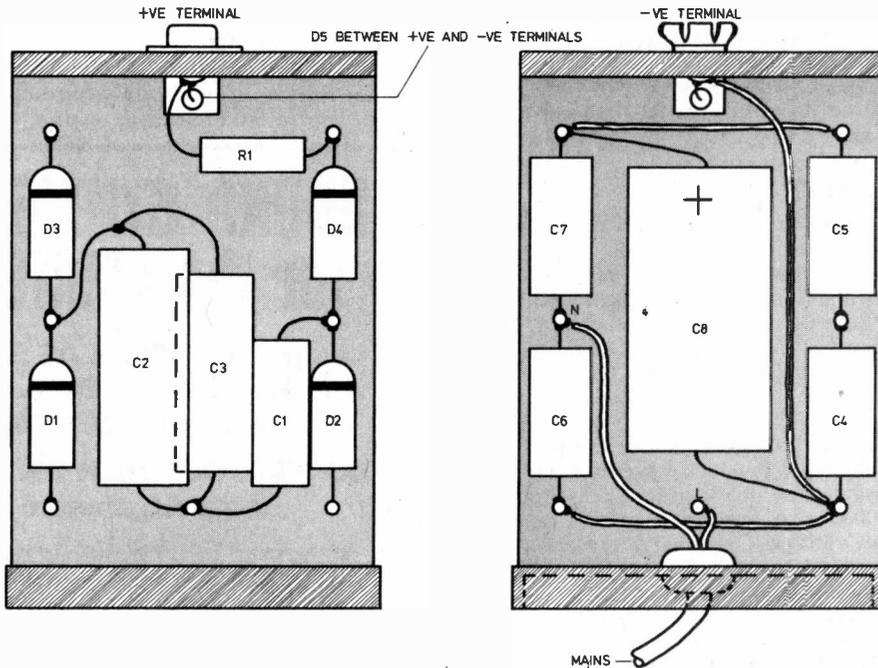


Fig. 2 Component assembly and board cutting details



The silicon diodes used are much better than necessary but are of proven reliability and easily available.

The current through the 270 ohm resistor remains at approximately 40mA regardless of the output load current as it merely divides between the Zener and the load. If the output is short-circuited all the 40mA flows through the short circuit. If it is open-circuited all the current flows through the Zener. The power dissipated by the resistor is therefore just over 0.4 watts.

When the mains unit is completed and inserted into the metal case the metal can be swaged back over the bottom end pieces by lightly tapping with a small hammer. The unswaging and re-swaging of the metal case was found to be very much easier than expected and needs little skill.

USE AS A CHARGER

The circuit can also be used in other applications where its current-limiting feature is important, such as a charger for re-chargeable cells. A conventional charger supplies a high current into a discharged cell. This may be too high until the cell becomes charged, and before that overheating and damage could result. With this circuit the current is constant. Components for the charger can be chosen as outlined for the above unit.

The capacitor size to establish the current and the Zener diode should be a few volts higher than the fully charged voltage of the cell or cells to be charged. The purpose of the Zener in this case is to limit the output voltage if no load was applied to the charger while it was switched on. The electrolytic capacitor need not be included.

A number of the 9 volts units have been made up and used during the last two years and have performed satisfactorily. Hum is negligible, indicating that the 1,000 μ F electrolytic is probably larger than necessary. ★

MICROPROCESSORS

continued from page 903

memory (CROM). The design is such that one to four CROM's may be used to control a single RALU and yet one CROM may control up to eight RALU's. Therefore, there are many possible combinations.

RALU's

Within the RALU, which is a 4-bit wide slice of a processor, are seven general-purpose registers, a status flag register, a 16-word stack, an ALU, an I/O multiplexer, and three data buses. RALU's may be interconnected to form larger systems, by means of control lines. For example, when four are put together to form a 16-bit computer, they all receive an instruction in parallel and all carry out the requisite fetches and data manipulations in parallel at the full system word size with a carry bit being transferred from the most significant bit of one RALU to the least significant bit of the next one where required.

The logic elements within the RALU are interconnected by the data buses, so that data may flow from any element into any other element. The RALU is completely general in design; the flow of data through the chip and, thus, the instruction set of the processor, is not fixed by the RALU at all, but is defined from outside by the second chip, the CROM.

The CROM is a form of ROM, coupled with some masking and sequencing logic. It contains the microprogramme control commands that direct the RALU's and define the instruction set of the system. National Semiconductors have available standard CROM's which contain the basic instruction set.

THE HOME CONSTRUCTOR AND MICROPROCESSORS

While difficult, these problems are not insurmountable. Likely applications home experimenters will have for microprocessors are electronic games, model railway control and television games. ★

SOUND SYNTHESIS for the AMATEUR

Lecture by **DOUGLAS SHAW**
with Live on stage Performance
of the **MINISONIC Mk.2**

SUNDAY OCTOBER 26th 1975
(Late Afternoon)

THE 1975 INTERNATIONAL
AUDIO FESTIVAL & FAIR.

OLYMPIA LONDON 20th-26th OCTOBER.
Admission 75p (live-theatre show FREE)

SPECIAL OFFER TO PRACTICAL ELECTRONICS READERS

SABCHRON DIGITAL

LED WRISTWATCH

As featured in the October 1975 issue of Practical Electronics

SAVE ABOUT £8.75*

(SPECIAL OFFER EXTENDED FOR A FURTHER PERIOD!)

● SINGLE BUTTON OPERATION ● DISPLAYS HOURS, MINUTES, SECONDS, MONTH AND DATE (DAY OF MONTH) ● GOLD PLATED SWISS MADE CASE WITH STAINLESS STEEL BACK COVER ● ACCURACY TO WITHIN 5 SECONDS PER MONTH ● AUTOMATIC READOUT INTENSITY CONTROL: BRIGHTENS DISPLAY IN BRIGHT LIGHT; DIMS DISPLAY IN SUBDUED LIGHT OR TOTAL DARKNESS ● BATTERIES LAST UP TO 1 YEAR WITH NORMAL USAGE ● WATER RESISTANT, SHOCK PROTECTED, ANTI-MAGNETIC

COMPLETE KIT (with batteries but without bracelet) **£36.25*** **ASSEMBLED WATCH** (with leather band and 12 mth guarantee on electronics) **£45.50***

All orders (with payment) shipped within 72 Hours, 27 Minutes and 53 Seconds!

★ IMPORTANT INFORMATION ABOUT PRICES

The above prices shown in British Pounds are approximate equivalents of the actual U.S. Dollar prices: Kits U.S. \$80.00. Assembled U.S. \$100.00. ALL PRICES INCLUDE AIRMAIL POSTAGE AND INSURANCE BUT DO NOT INCLUDE ANY TAXES LEVIABLE BY A PURCHASER'S COUNTRY OF RESIDENCE. REMITTANCE BY U.S. DOLLAR BANK DRAFTS OR U.S. DOLLAR MONEY ORDERS. DO NOT SEND PAYMENT IN ANY OTHER CURRENCY PLEASE.

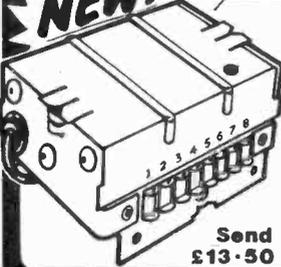
EXTRA SPECIAL! You can have your SABCHRON DIGITAL personalized with any name or initials (maximum 12 letters and spaces) engraved with gold coloured letters on the watch face for U.S. \$10.00 additional. Print or type clearly the name or initials to be engraved. (Allow 48 hours additional for personalized watch cases.)



ACTUAL SIZE

EURAY TRADING INC.

P.O. BOX 64683, DALLAS, TEXAS 75206, U.S.A.



NEW!

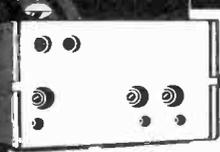
THE HOT ONE

DX FRONT END
VT03 88-108 MHz

- * 2 DUAL GATE MOSFETS
- * SILVER CLAD CHASSIS
- * A.G.C. and A.F.C.

A 4 stage Front End. Will pull out stations which on conventional receivers would be lost in the noise. Gain 30dB+ at 100 MHz. Noise 6-5dB Typ.

Send £13.50



V.H.F. FRONT END/CONVERTER

VT01

- * ADVANCED DESIGN
- * DUAL-GATE MOSFET FIRST STAGE

Covers: AIRCRAFT · WEATHER · SATELLITES · AMATEURS

VARICAP TUNED:
Input 118-150 MHz
I.F. Output 10.7 MHz

Send £10.90

I.F.T.O. HIGH PERFORMANCE DE-LUXE I.F. STRIP

NOW with 70dB gain

Send £8.60

- * SHARP SKIRT SELECTIVITY
- * CONTROLLABLE SQUELCH
- * CENTRE ZERO TUNING METER + SIGNAL STRENGTH METER OUTPUT

ALL PRICES QUOTED INCLUDE VAT AND P. & P.

Send 6p + S.A.E. for Data Sheets. Sole U.K. Agents

REEDHAMPTON LTD.
182-184 Addington Road, Selsdon, Surrey CR2 8LB

B. BAMBER ELECTRONICS

5 STATION ROAD, LITTLEPORT, CAMBS., CB6 1QE
Telephone: ELY (0353) 860185 (2 lines) Tuesday-Saturday

ALL BELOW—ADD 8% VAT

VARIABLE STABILISED PSU, solid-state 240V a.c. input, output 0-24V d.c. at 500mA, +32V d.c. at approx. 50mA. Voltage controlled by external 5kΩ pot. Size 7½ x 4 x 2½in (less 5kΩ pot). £5 each.

THREE-TURN WIRE-WOUND POT'S, 5kΩ, for above, 75p each.

MAINS TRANSFORMERS
All 240V input, voltages quoted approx. RMS. (Please quote type no. only when ordering.)

TYPE 10/2, 10-0-10V at 2A, £1.50 each.
TYPE 18/2, 18V at 2A, £1.85 each.
TYPE 28/4, 28V at 4A + 125V at 500mA, £4.
TYPE 63/1, 6.3V at 1A, 85p each or 2 for £1.50.
TYPE 129, 400V at 20mA + 200V at 10mA + 6.3V at 500mA, £1.25.
TYPE 72703, 400V at 10mA + 200V at 5mA + 6.3V at 400mA, £1.25.
TYPE 70462, 250-0-250V at 80mA + 6.3V at 3A, £1.78.

RADIOSPARES 500W AUTO TRANSFORMERS: 100-110-150-200-220-240-250V tapped input and output, step-up or step-down facility, ex-new equip. £8.

CURLY LEADS, 4 core telephone type, 2 for 20p.

PC board with drawal handles, mixed coils., 8 for 50p.

Solder, 20SWG, 60/40 alloy, approx. 8yds, 25p.

2-way ISEP PLUGS AND SOCKETS, 40p set (1 plug + 1 socket).

DIE CAST BOXES (approx. size in inches)

4.8 x 2.8 x 1.5	75p
4.8 x 3.8 x 1	85p
4.8 x 3.8 x 2	£1.00
6.8 x 4.8 x 2	£1.45
4.8 x 3.8 x 3	£1.55
6.8 x 4.8 x 4	£2.25

1mA METERS 2in square, plastic fronts (these have a paper scale stuck over the original, marked 0-1mA, which is easily peeled off, and an internal 18kΩ resistor which is easily removed). £1.75 each, or 2 for £3.

ALL BELOW—ADD 8% VAT

Black plastic knobs, ½in dia., ½in spindle, 4 for 50p.
Ring magnets, 7mm inside dia., 20 for 50p.
1½in polythene chassis mounting fuseholders, 6 for 30p.
LES Lamps, 24V 1.2W, 10 for 40p.
3 Switch Push Button Units, 3 x 2 pole, 2 way, min. push-push switches, ½in dia. buttons, mounted on one unit, 40p.
Perapex coil formers, 1½in x ½in dia., 5 for 25p.
Turret tags, ¼in dia., 25p pack.
Rotary switches, min. 4 pole 2-way, 2 for 50p.
Telephone type earpiece insert, 50p.
Reeds (for reed relays) single-pole make, 5 for 30p.
Mullard tubular ceramic trimmers, 1-18pF, 8 for 50p (as featured in Rad. Comm. Jan. p. 25).
I.C.'s, some coded, 14DIL type, untested, mixed, 20 for 25p.
Miniature slider switches, 2 pole, 2-way, 5 for 50p.

TRANSISTOR HEATSINKS, to take 2 x TO18 transistors, screw in clamps, block size 1 x ½ x ½in, with holes for mounting, 3 for 50p.
TO3 transistor insulator sets, 10 for 50p.

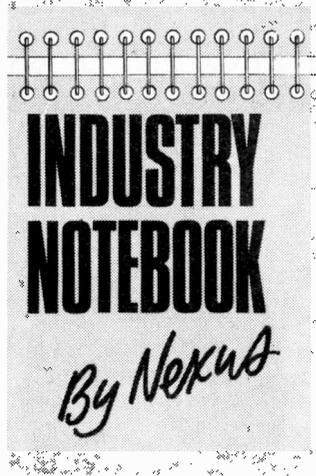
ALL BELOW—ADD 25% VAT

TV plugs, metal type, 6 for 50p.
TV sockets, metal type, 5 for 50p.
TV line connectors (back-to-back socket), 5 for 50p.
OC200 transistors, 6 for 50p.
GSV85A transistors, 6 for 50p.
BFY51 transistors, 4 for 50p.
BCY72 transistors, 5 for 50p.
PNP audio type TO3 transistors, 12 for 25p.
IF cans ½in square, suitable for rewinding, 6 for 30p.
DIN SPEAKER SOCKETS (2-pin) 4 for 30p.
HIGH QUALITY SPEAKERS, 8½ x 6in elliptical, only 2in deep, inverse magnet, 4 ohms, rated up to 10W, £1.50 each, or 2 for £2.75 (qty. discount available).

TERMS OF BUSINESS: CASH WITH ORDER (minimum order £1) POST FREE (UK ONLY); PLEASE ADD VAT AS SHOWN
Export enquiries welcome. Callers welcome. Tues. to Sat.
Please enclose S.A.E. with ALL enquiries.

Practical Electronics November 1975

917



WORLD-BEATER?

The Ferranti affair is now almost forgotten since, short of cash flow, it had some public money pumped in. In the face of bigger and more newsworthy commercial and industrial disasters such as British Leyland, Ferranti mercifully dropped into the background and keeping a comparatively low profile went quietly about its business.

Now Ferranti has popped up again in the news to let the world know that although the company might not have been very clever at holding down losses in the heavy power transformer division, it has some very bright people in the electronic component division and particularly in that area devoted to integrated circuits.

Their latest venture in I.s.i. has to be a winner. It uses the Collector Diffusion Isolation (CDI) technique which gives bipolar speeds with all the benefits of low-cost processing and small power consumption of unipolar devices. The particular device I have in mind is a single chip incorporating some 1,500 transistors which forms the central component of a whole range of modern digital instruments.

Initially, there are nine instruments of varying complexity in the range, each using the same chip which may be likened to a tiny central processor around which peripheral circuits may be added as required to provide various functions in the instrument. The chip includes circuits for input and output gating, the clock, decade counters, time base, plus all the associated logic circuits, and if all these circuits were realised with discrete components you would need something like a thousand.

The single-chip instrument is therefore less costly to assemble

and should be far more reliable in service. Of course, such a chip costs a small fortune to develop and this has to be amortised over a long production run and so the instruments are not at greatly reduced prices though very competitive.

Co-sponsors of this project are Racal Instruments Ltd. who will, of course, have exclusive use of it. First showing of the instrument range was at Racalex '75 which opened in London on September 23. Racal Instruments is naturally delighted with the whole project and expect considerable export business as well as brisk home demand. Ferranti, too, has all the satisfaction of seeing another success for the CDI technique and a quickening of interest in its potentialities.

OPTICAL COMMUNICATIONS

Ten years ago research started on communications by light through optical fibres as a possible alternative to electrons through metallic conductors. When it all started nobody knew whether a fibre could be made with low enough losses, whether a fibre could be made economically in commercial quantities, whether if a fibre could be made it would be capable of being handled and jointed, and nobody knew if l.e.d.s and lasers of suitable type would become available as the transmitting source or whether suitable photodiodes would be produced.

Now, at the IEE headquarters in London we have had the first full-scale international conference on the subject and although there are still problems ahead they are comparatively minor. A whole new industry seems to be in the build-up stage. Some modest systems are already in use, for example in warships and other military applications, but despite the considerable volume of experience that has been accumulated, especially in the last five years when research has accelerated sharply, it is unlikely that really big business in optical communications by fibre will start for another seven, possibly ten years. But when it comes it could be the biggest thing for the electronics industry since the electronic computer.

TANKER RISKS

Nobody likes to see disaster at sea but recent incidents involving supertankers do highlight the need for human navigating skills to be supplemented by the very best electronic aids. Decca Radar has just announced that their Channel Approach Aid is now operational at the big oil terminal at Milford

Haven after some two years of costly R and D and sea trials.

The Channel Approach Aid is portable and is taken on board by the ship's pilot. Working in conjunction with transponder beacons at shore sites, it provides the pilot with a digital read-out of ship's speed, a measurement of deviation from the channel centre line and distance-to-go to pre-determined points of turn.

Both the philosophy of the Channel Approach Aid and its engineering realisation are first class. It was developed by Decca in association with the Admiralty Surface Weapons Establishment and the Radar Research Establishment and so has an excellent pedigree. But I fear that despite all its obvious virtues it may not prove commercially successful, even after the fine example set by Milford Haven in installing the first system.

CMOS RELIABILITY

To kill rumours that CMOS plastic i.c.s are unreliable at supply voltages of 15V and above, Motorola has produced some remarkable figures on randomly selected devices tested at the higher end of the voltage range and at elevated temperatures. Military types operated at 18V and at 125 deg C survived with only four device failures in 1,200,000 device hours. Industrial quality circuits operated at 15V and at 85 deg C had eight failures in 5,819,500 device hours. The devices, say Motorola, were ordinary production items taken straight from the line.

CUTBACKS

Top spender in the industry is the Post Office as regular readers will already know. When the PO hiccups it reverberates all the way down the line and the PO with its unhappy financial situation is almost bound to trim its huge re-equipment programme regardless of urgency. GEC and Plessey are reported to have developed a nervous twitch at the prospect, while STC with the big TXE4 electronic exchange programme is reported as being fairly relaxed on the assumption that this prestige project will remain unharmed.

Of the trio, Plessey has a strong export business in cross-bar equipment and hopes to alleviate any home cut-backs by increasing overseas sales. But whichever way the cookie crumbles the Post Office must, in the end, have the equipment it so badly needs, the only trouble being that it will cost more later. Which could, of course, mean dearer telephone charges which could mean less subscribers with shorter and fewer calls which could put up unit costs which could . . . !

ENGINEERS

FREE

YOURSELF FOR A BETTER JOB WITH MORE PAY!



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.

This easy to follow GUIDE TO SUCCESS should be read by every ambitious engineer. Send for this helpful 76-page free book NOW! No obligation, nobody will call on you. It could be the best thing you ever did.

CHOOSE A BRAND NEW FUTURE HERE

CUT OUT THIS COUPON

Tick or state subject of interest. Post to address below.

- | | | | |
|---|--------------------------|--|--------------------------|
| ELECTRICAL & ELECTRONICS | | Air Registration Board Certs. | <input type="checkbox"/> |
| Practical Radio & Electronics (with kit) | <input type="checkbox"/> | MAA/IMI Dip. | <input type="checkbox"/> |
| Electronic Engineering Certificate | <input type="checkbox"/> | CONSTRUCTIONAL | |
| General Elect. Eng. Certificate | <input type="checkbox"/> | Heating Ventilating & Air Conditioning | <input type="checkbox"/> |
| C. & G. Elect. Installations | <input type="checkbox"/> | Architectural Draughtsmanship & Design | <input type="checkbox"/> |
| Elect. Install. & Work | <input type="checkbox"/> | L.I.O.B. | <input type="checkbox"/> |
| C. & G. Elect. Technicians | <input type="checkbox"/> | Carpentry & Joinery | <input type="checkbox"/> |
| | | Plumbing Technology | <input type="checkbox"/> |
| | | General Building | <input type="checkbox"/> |
| | | Painting & Decorating | <input type="checkbox"/> |
| RADIO & TELE-COMMUNICATIONS | | MECHANICAL | |
| Colour TV Servicing | <input type="checkbox"/> | A.M.S.E. (Mech.) | <input type="checkbox"/> |
| C. & G. Telecoms. Technician's Cert. | <input type="checkbox"/> | General Mech. Eng. | <input type="checkbox"/> |
| C. & G. Radio, TV & Electronics Mech. Cert. | <input type="checkbox"/> | Inst. Engineers & Technicians | <input type="checkbox"/> |
| Radio & TV Engineering Course | <input type="checkbox"/> | Maintenance Engineering | <input type="checkbox"/> |
| Radio, Servicing & Repairs | <input type="checkbox"/> | Welding | <input type="checkbox"/> |
| Radio Amateur's Exam | <input type="checkbox"/> | MANAGEMENT & PRODUCTION | |
| | | Computer Programming | <input type="checkbox"/> |
| | | Inst. of Cost & Managements Accts. | <input type="checkbox"/> |
| AUTO & AERO | | DRAUGHTSMANSHIP & DESIGN | |
| Motor Mechanics | <input type="checkbox"/> | General Draughtsmanship | <input type="checkbox"/> |
| C. & G. Motor V. Mechanics | <input type="checkbox"/> | A.M.I.E.D. | <input type="checkbox"/> |
| General Auto Engineering | <input type="checkbox"/> | Electrical Draughtsmanship | <input type="checkbox"/> |
| A.M.I.M.I. | <input type="checkbox"/> | | |

POST NOW

G.C.E.
—58 'O' & 'A' Level Subjects
—over 10,000 Group Passes!

Aldermaston College

Dept. TPE11, Reading RG7 4PF

also at our London Advisory Office, 4 Fore Street Avenue, Moorgate, London EC2Y 5EJ. Tel. 01-628 2721.

NAME (Block Capitals) _____
 ADDRESS _____

 Postcode _____
 Other subjects of interest _____ Age _____
 Accredited by C.A.C.C. Member of A.B.C.C.

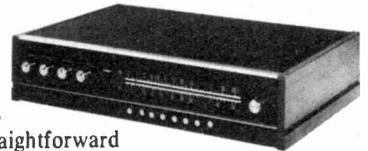
HOME OF BRITISH INSTITUTE OF ENGINEERING TECHNOLOGY

We don't miss anything out, so you won't miss out.

Our 1214 Series stereo equipment comes to you in kit form. And, as you would expect, coming from Heathkit, they are absolutely complete kits. With nothing left out.

So you'll have all you need to build our superb AR-1214 stereo receiver. Or, if you'd prefer, a separate amplifier and tuner (the AA-1214 and AJ-1214).

The easy to understand instruction manual you'll get makes assembly beautifully straightforward



And very enjoyable.

And the high performance of the 1214 Series means you won't miss out on listening pleasure in any way either.

From the stereo receiver, or separate amplifier, you'll get 15 watts r.m.s. a channel, with reproduction so good it makes many ready made systems really sit up and listen.

For full details of the 1214 Series, the rest of our audio range, including speakers, and our many other kits, just post the coupon now for your Heathkit catalogue.

Or call in at the London Heathkit Centre, 233 Tottenham Court Road.

Heath (Gloucester) Ltd., Dept. PE-115, Bristol Road, Gloucester GL2 6EE. Tel: (0452) 29451.



To: Heath (Gloucester) Limited, Dept. PE-115, Gloucester GL2 6EE. Please send me a Heathkit catalogue. I enclose a 10p stamp for postage.



Name _____
 Address _____

 Postcode _____

Monthly budget plan available

CRESCENT RADIO LTD.

11-15 & 17 MAYES ROAD, LONDON N22 6TL
(also) 13 SOUTH MALL, EDMONTON, N.9

MAIL ORDER DEPT.
1 ST. MICHAELS TERRACE, WOOD GREEN
LONDON N22 4SJ Phone 888-4474

BARGAIN PROJECT BOX

A plastic box with moulded extrusion rails for PC or Chassis panels with metal front plate fitted with four screws (all supplied).

An ideal box to give a small project a professional finish.

SIZE: (Internal) 81mm x 51mm x 28mm.

OCR PRICE 40p. + 8%



10in 8ohm DUAL CONE L/S

Manufactured by "ELAC" to a very high standard, these loudspeakers are a real bargain. SPEC:—Size 10in. Dual Cone Power—16 Watts. Frequency—40-12000Hz. + 25%. Our price £3.75 ea.

I.C. SOCKETS + 8%

D.I.L.
8 pin—13p 24 pin—24p
14 pin—14p 28 pin—28p
16 pin—14p 36 pin—38p

MINIATURE RELAYS

Brand new range of British made relays, size: 1 1/2in x 1in x 1/2in. All two changeovers with 250V 1.5A contacts and suitable for fitting on 0.1in veroboard.
Type Valve Current Ohms
27/A 12V 17mA 700 All
21/A 12V 28mA 430 £1.30
12/A 6V 33mA 185 each + 8%

MINI LOUSPEAKERS

2 1/2in 8ohm, 50p; 2 1/4in 40ohm, 50p. + 25%

MIDGET MAINS TRANSFORMER

Varnish Impregnated
Size 45mm x 36mm x 31mm
PRI 240V
Sec 3:0-3 100mA
Sec 6:0-6 100mA
Sec 9:0-9 100mA
Sec 12:0-12 100mA
Sec 20:0-20 100mA
£1.23 + 8%

CRESCENT BUBBLE LIGHT SHOW

This budget system compares very favourably with more sophisticated and higher priced models.
Specification:
Projector—150W convection cooled. At 30ft the projected image is 16ft.
Motor—1 rev. per 2 min.
Liquid Wheel—6in diameter multi colour.
The motor is fitted to the projector and can only be purchased as a single unit.
The liquid wheel is our standard model and may be purchased separately.
A bargain at: Projector, £15; Wheel, £5; Total £20. Plus 75p carr. + 8%.

CABLE LESS SOLDERING IRON WAHL "ISO-TIP"

- ★ Completely portable.
- ★ Solders up to 150 joints per charge.
- ★ Recharges in its own stand.
- ★ Fine tip for all types of soldering.
- ★ Only 8in long and weighs just 6ozs.

OUR PRICE £9.75 + 8%
(Spare bits are available)

"CRESCENT" 100 WATT R.M.S. ALL PURPOSE AMPLIFIER U BUILD IT

We supply the three modules for you to build this Disco-Group-P.A. amplifier into the cabinet of your choice.

★ THE POWER AMP MODULE
170W R.M.S. sq. wave 300W instantaneous peak into 8 ohm (60W into 16 ohm).

★ THE PRE-AMP MODULE
Four control pre-amp. Vol. Bass, Treble. Middle controls. Designed to drive most amplifiers using F.E.T. first stage.

★ THE POWER SUPPLY
Is applied complete with the mains transformer. Complete fixing instructions are supplied and no technical knowledge is required to connect the three ready wired modules. A fantastic bargain. £27.50, carr. £1.20. Send S.A.E. for further details on this or our ready built amplifiers. + 8%

12 0-12V 500M/A

240V primary transformer bargain. Approx. size: 60mm x 40mm x 50mm; fixing centres: 75mm. Our price £1.20. + 8%.

FERRIC CHLORIDE

Anhydrous ferric chloride in double sealed one pound poly packs.
Our Price 50p per lb. + P/P + VAT @ 8%.

LOW NOISE, LOW PRICE CASSETTES

Good quality tape in well made screw type cassettes. Presented in single plastic cases.
C60 31p C90 42p C120 68p
10% discount on ten or more cassettes of one type. + 8%.

ABS PLASTIC BOXES

Handy boxes for construction projects. Moulded extrusion rails for P.C. or chassis panels. Fitted with 1mm front panels. 1005, 105mm x 75mm x 45mm 55p; 1006, 150mm x 75mm x 45mm 72p; 1007, 184mm x 124mm x 60mm £1.28; 1021, 100mm x 74mm x 45mm (sloping front) 66p. + 8%.

P.C. ETCHING KIT

This kit contains all that the constructor will need to etch the circuits of his own design. Contents: Plastic etching dish. Sample copperclad board. Lamininate Cutter. 1lb Ferric Chloride. Large Plastic Spoon. Etch Resist Pen. Full Etching Instructions. Complete and Big Kit Value at £3.75 + 8% VAT.

2in. PANEL METERS

Size 59mm x 46mm
0-50µA—ME6 0-100mA—ME13
0-100µA—ME7 0-500mA—ME14
0-500µA—ME8 0-1A —ME15
0-1mA—ME9 0-50V —ME16
0-5mA—ME10 0-500V a.c.—ME17
0-10mA—ME11 8 meter —ME18
0-50mA—ME12 V.T. meter—ME19
£3 each. + 8%.

POWER PACKS

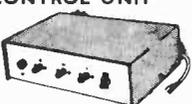
PP1 Switched 3-41-6-74-9 and 12V at 500mA with on/off switch and pilot light. Size 130M/A x 65M/A x 75M/A, only £4.
PP2 Switched 6-74-9V Battery Eliminator. Approx. size 2 1/2in x 2 1/2in x 3 1/2in. Ideal for cassette recorders, £3.25.
PP3 Car converter. From 12V Pos. or Neg. to ± 6-74-9V. Easy to fit and transistor regulated, £3.90. + 8%.

TELESCOPIC AERIAL

Nine section fully swivelling telescopic aerial with 4BA single bolt fixing or two hole fixing bracket. Fully extended 43". Fully closed 7". Our Price 50p + P/P + VAT @ 8%.

3 KILOWATTS PSYCHEDELIC LIGHT CONTROL UNIT

Three Channel: Bass, Middle, Treble. Each channel has its own sensitivity control. Just connect the input of this unit to the loudspeaker terminals of an amplifier, and connect three 250V up to 1000W lamps to the output terminals of the unit, and you produce a fascinating sound-light display. (All guaranteed.)
£18.50 plus 75p P. & P. + 8%.



U.K. CARRIAGE

20p UNLESS OTHERWISE STATED

VAT—All prices are excluding VAT. Please add to each item the VAT rate indicated.

SEND 30p FOR A CRESCENT CATALOGUE

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



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

★ Portable organ with 4 octave keyboard, £145.29. ★ Console organ with 5 octave keyboard, £250.93. ★ Console organ with 2 x 4 octave keyboards and 13 note pedal board, £470.65. ★ Console organ with 2 x 5 octave keyboards and 32 note pedal board, £600. ★ Console organ with 3 x 5 octave keyboards and 32 note pedal board, £960. ★ W/W Sound Synthesiser Part Kit, £149. ★ W/W Touch Sensitive Electronic Piano Part Kit, £110. ★ 2 speed rotating speaker units. Bass unit £68, Mid-Range £75, Hi Fi Twin Horns £89.

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 60p for catalogue which includes 5 x 10p vouchers or send your own parts list, enclosing S.A.E. for quotation.

Elvins Electronic Musical Instruments

Showroom and Head Office, 12 Brett Road, Hackney, London E8 1JP (Tel. 01-986 8455); 8 Putney Bridge Road, London SW18 1JU (Tel. 01-807 4949); 40a/42a Dalston Lane, Dalston Junction, London E8 (Tel. 01-249 5624).

Business hours: Open 9 a.m. to 6 p.m. Monday to Saturday. Closed all day Thursday. Open 10 a.m. to 1 p.m. Sunday by appointment.
Vacancy for shop assistant with electronic knowledge

DIGITAL CLOCK KITS

SENSATIONAL OFFER

£4 OFF FAST BUILDING, EASY TO FOLLOW INSTRUCTIONS. A VERY COMPLETE KIT



CLOCK DATA
SIZE 6 1/2 x 3 x 2 1/2 in
MAINS OPERATION
50/60Hz
12/24 HOUR

USUAL PRICE TO P.E. READERS

NO KNOWLEDGE OF ELECTRONICS REQUIRED

LATEST 1975 DESIGN—ONLY £14

(including P. & P., VAT, Circuit)

COMPARE OUR PRICES IF PURCHASED AS SINGLE ITEMS (INCLUDING VAT AND P. & P.)

1 MM53 14 N Clock Chip 12-24 hr option	2.95
4 0.63" LED Displays SNS 61 L	6.60
1 Segment Driver Chip	0.50
1 Pack Resistors, Caps., Transistors, Switch, etc.	1.60
1 Double Sided Glass Fibre P.C. Board	0.95
1 Double-wound Mains Transformer	1.50
1 Circuit/Assembly Manual	0.50
1 Futuristically-styled Case (state colour)—Red, Black, White, Mauve, Green, Blue	4.40

Pulse Electronics Ltd

Dept. PE3, 202 Shefford Road, Clifton, Beds.
Tel. Hitchin (0462) 814477

BRITISH MUSICAL INSTRUMENT TRADE FAIR



By G. GODBOLD

WE are all tired of the oft quoted words—depressed economy, setback, downward climb, gloomy times—most of these could be applied to the music industry when the imposition of VAT was applied. When I visited the British Musical Instrument Trade Fair (August 17-21) at Connaught Rooms, Bloomsbury Centre and Hotel Russell, I fully expected a reprise of last year's exhibits from a stagnant industry. No way—there was a lot of product range expansion notably at the low end of the organ market. Here, of course, electronics gimmickry, wizardry if you like, prevails.

It's an oft quoted fact that more than 90 per cent of the population do not own an instrument and for that matter cannot read music. With the range of "all singing all dancing" fun machines available and "at a glance" back up, music teaching software, the organ distributors have designs on reducing this statistic.

ANYONE CAN PLAY

The low end of the market consists mainly of instruments anyone can play. In the majority of cases this is true even if you are unfortunate enough to have one foot and two fingers. Usually what they have in *et ceteras* they lack in voicing and balance.

An addition to the Philips range, the "Automagic", has none of these problems. This has a professional specification, and most appealing to the beginner, illuminated touch controls that enable rapid and easy switching of preset registration and automatic bass chords coupled to rhythm.



The Thomas Majestic Royale 1157. Features of this include "Preset" and "Memo Chord" tabs, with these an ensemble of voices in chosen chords can provide an automatic accompaniment in time with the rhythm.

ORGAN INDUSTRY PIONEER

To the cognoscenti the name Hammond is synonymous with organ excellence both in product and sound produced. Over 40 years they have moved from tone wheel generation to the multiple derivative divider system still maintaining, arguably, that distinctive Hammond sound.

The tone wheel, in fact, pioneered the organ industry as we know it today.

In 1972 the incredible Concorde made its appearance combining l.s.i./m.d.d. technology with harmonic tone bar registration. The spin-off from this was evident in the Cougar and X2/X5 models. These offer tonebar performance, the latter being portable with a professional specification.

RHYTHM GENERATORS

Another development with roots in Concorde is the Autovari 64 which introduces almost lifelike realism to rhythm patterns. Completely different from the crashingly boring rhythm units attached to most organs.

That there is a demand for this type of unit is evidenced by the singular selling success of the Powerhouse drum rhythm unit when introduced this year at the Frankfurt International Spring Fair.

This consists of eight pre-recorded double-track tapes from which it is possible to obtain up to 64 different drum rhythms. Again, the emphasis is on authentic sound with each rhythm having a 32 bar sequence. Distributors for this unit are Benelux Musical Instruments Ltd.

Before leaving this subject one would have to mention the Farfisa "Super-partner". A rhythm box that allows the organist to augment rhythmic sequences. An extra facility makes this box rather remarkable. It adds a variety of instrumental accompaniments such as trumpet, guitar, trombone, etc. to the lower manual in conjunction with the selected rhythm. Different sounds either singly or in combination are predetermined by whichever rhythm is selected.

The unit is available with the new Farfisa Beresford and Buckingham, the latter being a clubland theatre organ.

SYNTHESISER ULTIMATE

Another extremely stylish clubland instrument, elegant in plastic and chrome, is the new EX42 from Yamaha. At £9,375 worthy of a mortgage but this paled into insignificance compared to its similarly clad companion, the £30,000 GX1 fully polyphonic synthesiser.

If you watched "Tomorrow's World" on the 11th of September you would have seen the American bandleader/arranger, George Fleury, give a commendable account of himself and the instrument. Orchestral instrument synthesis was convincing, particularly the big band brass *tutti*. Unfortunately any one player can only skim the surface potential of this multi-million pound research development.

OTHER SYNTHESISERS

I was told that a derivative of the technology is the new SY-2 synthesiser which, like the ARP Pro-

Soloist, has a whole range of preset instrumental voices and effects. All of these can be modified with a variety of filters and shapers. Obviously, this type of synthesiser makes an excellent addition to an organ. Unless you are lucky enough to have a Wurlitzer with integrated Orbit.

Weighing in at 15lb and checking out at around £460 is the ARP Axse. My introduction to this was the recreation of the unmistakable fired phasor and torpedo sounds from starship *Enterprise* by a dextrous Boosey and Hawkes demonstrator.

This is probably one of the simplest synthesisers to get to know; the fascia labelling and colour coded slide controls make this possible. An interface addition to the Axse is "Little Brother" which can be slaved to provide extra effects. I was told that Little Brothers could be stacked endlessly, which promotes some speculation.

Hohner Keyboards

New Hohner keyboards shown by Hornby-Skewes included the Hi-Piano String. I find these string ensemble units hard to resist as the impression is of playing in a cathedral. A melody picked out with piano or harpsichord voicing seems to have a full reverberant orchestral backing.

P.A. Gear

In P.A. equipment it seems that the old type column is out and the



The Yamaha SY-2 synthesiser complete with preset voices and a whole range of control facilities



system column and bin box in. This usually consists of h.f. horns and mixed diameter speakers and h.f. and woofer horns for the bin.

The diminutive Min Bin from Carlsboro is representative of the genre measuring a mere 35 x 20 x 20in but capable of pushing out 100W.

This company also had on display the comparatively low priced 35W Scorpion combination amplifier. This is described as the most exciting innovation in the small amplifier market for years.

Marshall provided continuous demonstrations of their Lead 100, 100W transistor amplifier with guitarists Bert Kirby, Jim Wilmer and Steve Thomas.

haps this is a harsh term for electronic effects; some purists might prefer colourisation. From reader reaction to this magazine we can tell where the interest lies and have provided many designs that rival commercial specifications.

One of the biggest producers of effects units is Solasound. New additions to their range are Chuck-a-Wah, an automatic wah-wah that is responsive to speed and dynamics in performance and Phase Pedal 4 for that way out rushing sound. An extension to this unit's capability is Supa Phaze which gives a passable Leslie imitation.

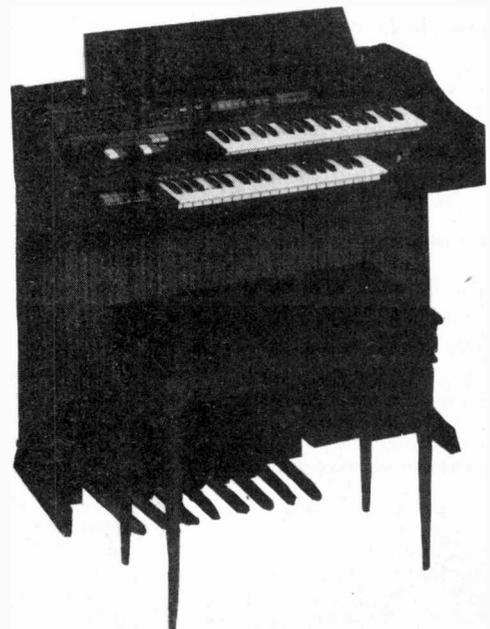
Increasingly popular is the foot controlled v.c.f. providing as it does an almost limitless range of tone colours in combination with voice or instrument. Two examples shown were the Univex Synthi Pedal and the Korg Traveler.

Effects Units

Distortion is big business. Per-



The Hohner Hi String, an electronic keyboard that synthesises the many sounds of a string orchestra



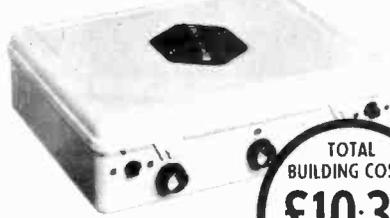
The Kimball Swinger 200. One of the new breed of two finger fun machines. One finger on the upper manual picks out the melody—one finger on the lower gives you rhythmic chords

RADIO EXCHANGE LTD.

ALL PRICES INCLUDE VAT
 We regret we cannot for the time being accept
 Overseas Orders. Open to U.K. and Ireland residents
 only.

NEW EDU-KIT MAJOR

**COMPLETELY SOLDERLESS
 ELECTRONIC CONSTRUCTION KIT
 BUILD THESE PROJECTS WITHOUT SOLDERING IRON OR SOLDER**



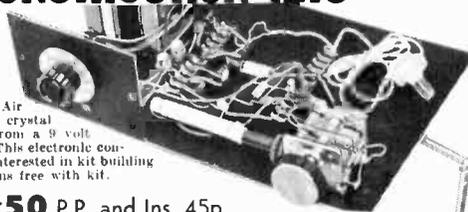
**TOTAL
 BUILDING COSTS
 £10.30**
 P.P. & Ins.
 65p

- 4 Transistor Earpiece Radio
- Signal Tracer
- 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.
- 24 Resistors ● 21 Capacitors ● 10 Transistors ● 3 1/2" Loudspeaker ● Earpiece ● Mica Baseboard
- 3 12-way Connectors ● 2 Volume Controls ● 2 Slider Switches ● 1 Tuning Condenser ● 3 Knobs
- Ready Wound MW/LW/SQ Coils ● Ferrite Rod ● 6 1/2 yards of wire ● 1 yard of sleeving, etc.
- Parts price list and plans 50p (free with parts)

ELECTRONIC CONSTRUCTION KITS

E.C.K. 1

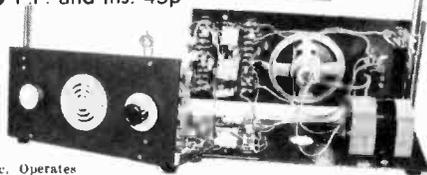
3 Transistor Easy Stage Earpiece Receiver Kit. Full medium wave coverage. Complete with ready wound ferrite rod aerial, high efficiency Air spaced tuning capacitor. Sensitive crystal earpiece and gain control. Operates from a 9 volt P.P. 7 battery (not supplied with kit). This electronic construction kit is a good starter for those interested in kit building and soldering. Parts price list and plans free with kit.



Complete kit of parts **£4.50** P.P. and Ins. 45p

E.C.K. 2 Self Contained Multi-Band V.H.F. Receiver Kit.

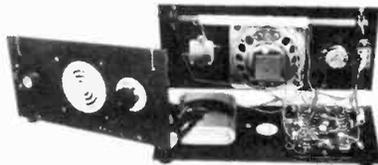
8 transistors and 3 diodes. Push pull output. 3in loudspeaker, gain control. superb 9 section swivel ratchet and retractable chrome plated telescopic aerial, V.H.F. tuning capacitor, resistors, capacitors, transistors, etc. Will receive (subject to local reception conditions) T.V. sound, public service band, aircraft, V.H.F. local stations, etc. Operates from a 9 volt P.P. 7 battery (not supplied with kit). Parts price list and plans supplied free with kit



Complete kit of parts **£7.95** P.P. and Ins. 55p

E.C.K. 3

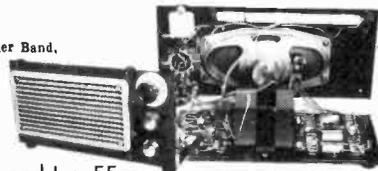
5 Transistor Medium Wave Receiver Kit. Class "A" output with 3 1/2in loudspeaker. Simple to operate with full medium wave coverage. Ready Wound 8in ferrite rod aerial. No external aerial required. 7 stages, 5 transistors and 2 diodes. Tuning capacitor, gain control, etc. Operates from a 4 1/2 volt Battery (not supplied). Parts price list and plans free with kit.



Complete kit of parts **£5.40** P.P. and Ins. 45p

E.C.K. 4

7 Transistors, 6 tuneable wavebands, MW, LW, Trawler Band, 3 Short Wave Bands, Receiver Kit. With 5in x 3in loudspeaker. Push pull output stage, gain control, and rotary switch. 7 transistors and 4 diodes. 8 in sensitive ready wound ferrite rod aerial, tuning capacitor, resistors, capacitors, etc. Operates from a 9 volt P.P. 7 battery (not supplied with kit). Parts price list and plans supplied free with kit.



Complete kit of parts **£7.25** P.P. and Ins. 55p

V.H.F. AIR CONVERTER KIT

Build this converter kit and receive the aircraft band by placing it by the side of a radio tuned to medium wave or the long wave band and operating as shown in the instructions supplied free with all parts.



Uses a retractable chrome plated telescopic aerial, gain control, V.H.F. tuning capacitor, transistor, etc. All parts including case and plans **£4.35** P.P. & Ins. 40p

ROAMER TEN MARK 2

WITH VHF INCLUDING AIRCRAFT
 Now with free earpiece and switched socket. 10 transistors. Latest 4in 2 watt ferrite magnet loudspeaker. 9 tuneable wavebands, MW1, NW2, LW SW1, SW2, SW3, trawler band, VHF and local stations, also aircraft band. Built in ferrite rod aerial for MW/LW. Chrome plated 6 section telescopic aerial, can be angled and rotated for peak short wave and VHF listening. Push 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 8 1/2in x 7in x 4 1/2in. Easy to follow instructions and diagrams. Parts price list and plans 50p free with parts.



Total building costs **£11.87** P.P. & Ins. 65p

RADIO EXCHANGE LTD.

To: RADIO EXCHANGE LTD.
 61A High Street
 Bedford MK40 1SA

Tel.: 0234 52367, REG NO. 788372
 ● Callers side entrance "Lavelle" Shop.
 ● Open 10-1, 2.30-4.30 Mon. Fri. 9-12 Sat

I enclose £..... for.....

Name.....

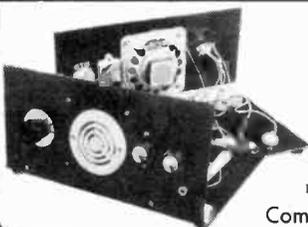
Address.....

PE11

EDU-KIT JUNIOR

Completely Solderless Electronic Construction Kit. Build these projects without Soldering Iron or Solder.

- Crystal radio medium wave coverage—No battery necessary.
 - One transistor radio.
 - 2 transistor regenerative radio.
 - 3 transistor earpiece radio medium wave coverage.
 - 4 transistor medium wave loudspeaker radio.
 - Electronic noise generator.
 - Electronic metronome.
 - 4 transistor push pull amplifier.
- All parts including loudspeaker, earpiece, MW ferrite rod aerial, capacitors, resistors, transistors, etc., plus parts price list and plans free with kit.



Complete kit of parts **£7.50** P.P. and Ins. 45p

IDEAL FOR DISCOS

Sound to Light Master Unit



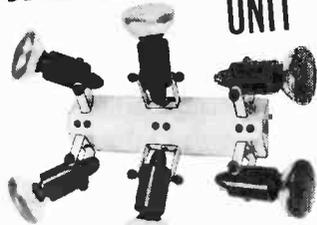
600 WATTS PER CHANNEL
Connects to your loudspeaker or loudspeaker socket. The unit can be connected to your existing spotlight fittings or to our type A or B fittings.

£30.95

including channel output plugs and mains input socket.

ALL PRICES INCLUDE V.A.T. and POST & PACKING
(These prices apply to the United Kingdom only)

Twin Bank 6 LIGHT UNIT



(less lamps)
B.C. FITTING £9.55 (each)
E.S. FITTING £10.35 (each)
Length 14½ inches

Type A

(less lamp)
B.C. FITTING £1.95 (each)
E.S. FITTING £2.12 (each)



100 WATT SPOT LAMPS

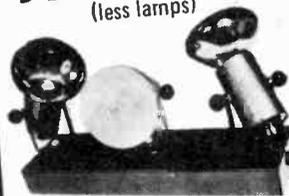
Red, pink, yellow, green, blue, clear. **£1.18 each**

Minimum 3 lamps **£3.54**

Only **£1.18** B.C. or E.S. Fitting

Type B 3 BANK UNIT

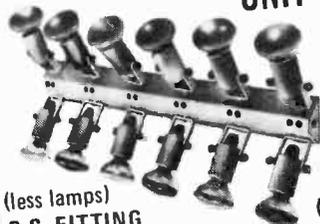
(less lamps)



B.C. FITTING £6.90 (each)
E.S. FITTING £7.26 (each)

Twin Bank 12 LIGHT UNIT

Length 31¼ inches



(less lamps)
B.C. FITTING £15.60 (each)
E.S. FITTING £17.00 (each)

Send 20p for illustrated leaflet & price list.

TRAFALGAR SUPPLIES
Dept. H.T., STANDISH STREET,
BURNLEY, LANCs.



TRAMPUS

Electronics Ltd.

WINDSOR, BERKS.
58/60 GROVE RD.

SEND C.W.O. ADD VAT TO ALL PRICES IN U.K. P&P 15p. EXPORTS 60p.

WE'VE BACK IF NOT SATISFIED.
LARGE STOCKS, LOW PRICES.
ALL BRAND NEW TOP GRADE FULL SPEC DEVICES. CALLERS WELCOME.
CATALOGUE/LIST FREE SEND SAE.
BARCLAYCARD & ACCESS x POST.

Digital Displays



SLA7 RED LED 0.3" DIGIT 0-9DP 89p ea
GREEN&YELLOW £1.40
JUNBO LED 0.6" 747 DISPLAY £2.25 ea.
3015F 0-9DP £1 ea.
ZENON FLASH TUBE £4. Data 15p.

LEDS red 13p

LEDS 209 STYLE ONLY 13p ea
TTL 209 WITH CLIP RED 15p ea
TTL 211 & CLIP GREEN 29p ea
LARGE 0.2" & CLIP RED 17p ea
LARGE 0.2" CLIP GREEN 30p ea
209 STYLE OR .2" ORANGE 29p ea
INFRA RED LED £1.2N5777 33p.

PHOTO IC 81p

TEC12 PHOTO AMP/SCHMITT/RELAY DRIVER or LED TTL INTERFACE 81p



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

DIGITAL CLOCK

IC AY51224 4 DIGIT CLOCK £3.75
MMS311/4 6 DIGIT CLOCK £7

CASSETTE mechanics £13.75

NEW 8tk CARTRIDGE MECHANISM £18
STEREO CASSETTE MECHANISM £13.75
Suitable for 'PW ASCOT' recorder with heads etc. SEND 15p for DATA

INTEGRATED CIRCUITS

709 DIL14 29p	LM377 2x2Wf2.87
555 TIMER 54p	LM380 2W AF 89p
703 RF/IF 28p	LM381 2xPre £2
709 7099 23p	LM3900 4xOPAG5p
709 DIL 14 28p	MC1303 £1.20
710 DIL 14 34p	MC1306 49p
723 Reg. 54p	MC1310&LEDC2.65
741 DIL 8 27p	MC1312 SQ £2.10
741 DIL 14 29p	MC1330 69p
741 7099 29p	MC1339 2xPre £1
747 2x741 70p	MC1350 55p
748 DIL 8 33p	NE536 fetOPA £2
7805 5V £1.40	NE540 Driver £1
7812 & 15 £1.40	NE550 2vRef 75p
76013 6W AF £1	NE555 Timer 55p
8038 SIG GEN £3	NE556 2x £1.20
CA3028 £1	NE560 PLL £3.15
CA3046 55p	NE561 PLL £3.15
CA3048 £2	NE562 PLL £3.18
CA3052 £1.50	NE565 PLL £2.69
CA3054 £1	SN72709 709 28p
LM300 2-20V £2	SN72741 741 26p
LM301 OPA 45p	SN72748 748 33p
LM304 0-4V £3	SN7660 IF £1
LM307 OPA 49p	SN76611 IF £1.25
LM308 H1Bo 95p	TAD110 IIF £2
LM309K 5V £1.48	TBA810 7WAF 99p
LM372 IF £1.80	ZN414 RX £1.09

SPECIAL OFFERS

2N3055 FULL HIGH SPEC 115W 37p
741C 8PIN DIL 27p. MFC4000B 33p
NE555 TIMER 55p. ZN414 RF £1.09
BC109 9p. 2N3819E 16p. BRY51 15p

7400 TTL

7400 GATES 13p	7473/74/76 29p
7404 INVERT 17p	7475 45p
7401/2/10etc14p	7480 52p
7413 SCHMITT 31p	7481/2/3/4 59p
7440 BUFFER 14p	74100 74175 £1
7447 DRIVER 89p	74121 32p
7470 & 7472 29p	74123 59p
	74141(&7441)73p

TRANSISTORS & DIODES

Price each	MATCHING	16p
AC127 & 128 16p	INS. BUSH SET10p	
AC187 & 188 19p	TIP 41 70p	
AD149 43p	TIP 42 88p	
AD161 & 162 33p	TIP 2955 90p	
BC107 & 108 9p	TIP 3055 55p	
BC109 10p	TIS43 see 2N2648	
BC147/8/9 10p	ZTX109&301 13p	
BC157/8/9 12p	1N4001 4p	
BC167/8/9 12p	1N4004 & 7 7p	
BC177/8/9 18p	1N4148 & 914 4p	
BC182/3/4&4L10p	2N697 14p	
BC212/3/4&4L11p	2N7068 11p	
BCY70/1/2 17p	2N2648 UJT 32p	
BD131 & 132 39p	2N2904 & 5 20p	
BFR51	2N2926royg 9p	
BFR50/51 23p	2N3053 17p	
BFR50/51 23p	2N3055 115W 37p	
BFR88 250V 29p	2N3563 & 64 16p	
BFY50/1/2 15p	2N3614 49p	
BSK19/20/21 16p	2N3702 & 3 9p	
MJE2855 80p	2N3704 & 5 10p	
MJE3055 85p	2N3706 & 7 9p	
MPI11 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 SELECTION IN OUR FRESH LISTS.

NEW TRAMPUS FULL SPEC PAKS

PAK A 10 RED LEDS our choice £1	
PAK B 4 741 OP AMP " " £1	
PAK C 4 2N3055 I.D 12 BC109 £1	
PAK D 10 BC182 I.F 11 2N3704 £1	
PAK E 8 BRY51 I.H 9 2N3819e £1	
PAK J 9 2N3053 I.K 40 1N914 £1	

BZV88 400mW	1A/50V SCR 36p
ZENER DIODES 9p	TAG1/400 55p
BRIDGE RECT	C106 & 7 SCR D1
1A 50V 20p	4A/400V 53p
BR100 DIAC 25p	SC146D TRIAC
	10A 400V 75p

vero

VERO PINSx36 28p. **NEW LOW PRICES!**
COPPER CLAD VEROBORAD 0.1"

2½"x5" 29p 2½"x3½" 26p. 3½"x3½" 31p.
3½"x5" 31p 3½"x17" £1.50
DIL IC's BOARDS 6x4½" £1.50
24 way edge connector 60p.
36 way 90p. PLAIN 3½"x17" £1.
FACE CUTTER 45p. PEC ETCH PAK 50p

DALOpen69p

PRINTED CIRCUIT BOARD KIT £1.69
DECON NO MESS ETCH PAK £1.69
DECON DESOLDER BRAID REEL 59p

HEATSINKS

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

CAPACITORS

CERAMIC 22pf to 0.1uf 50v 5p.
ELECTROLYTIC: 10/50/100 uf 1n
10v 5p. 25v 6p. 50v 8p. 2uf/10v 5p.
1000 uf/25v 18p. 200/500 25v 9p.

POTENTIOMETERS (POTS) AB or EGIN

LN or LOG ROTARY 13p. SWITCH 14p
DUAL 45p. SLIDERS 29p. STEREO 57p
KNOBS 7p. PRESETS 6p. RESISTORS 14p

SWITCHES: SPST 18p. DPDT 25p.

DIN PLUGS ALL 12p. SOCKETS 10p.

ALI CASES AB5/AB7 50p. AB13 65p.
TRANSFORMERS 1A 6v/6v or 12v/12v
Only £1.34. 100mA type CT 75p.

OIL sockets

SILVER GOLD
LOW PROFILE ea
8, 14, & 16 PIN 13p
SOLDERCON STRIPS:
100 PINS 50p. 1K £3.



INGENUITY UNLIMITED



A selection of readers suggested circuits. It should be emphasised that these designs have not been proven by us. They will at any rate stimulate further thought. Any idea published will be awarded payment according to its merits. Why not submit YOUR IDEA?

TRIFFID POWER SUPPLY

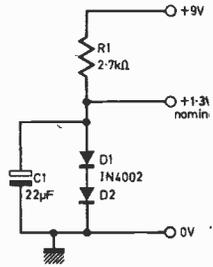


Fig. 1

A VERY simple circuit which can be used to provide the 1.3V necessary to power the ZN414 i.c. radio (as shown in P.E. Feb. 73) is shown in Fig. 1. Resistor R1 provides current to forward-bias the silicon diodes D1 and D2 to provide about 1.3V, and capacitor C1 decouples any noise to earth. The diodes can be any general purpose silicon types such as 1N4002, 1N4148, etc.

S. Newington-Bridges.
Amptney Crucis.

16 AND 14 PIN LOGIC CHECKER

No doubt P.E. readers will have noticed the "Logic Testers" that have come onto the market recently. Whilst being a worthwhile investment for laboratories etc., the price renders them unsuitable for amateurs with limited resources to fall back on.

The display being critical as regards both cost and acceptability, an oscilloscope display was adopted. This necessitates a Z-modulation facility in the scope being used. This is easily incorporated into scopes without this facility by simply coupling a one-valve grounded cathode stage to the c.r.t. cathode by a suitably high voltage capacitor of about 0.1μF.

IC4 and IC5 together with one NAND gate from IC3 form a sixteen-to-one line multiplexer, IC4 and 5 being alternately enabled by output D and the inverted output \bar{D} of IC2. The input pins of the multiplexer are wired to a sixteen-pin d.i.l. i.c. test clip. When this is clipped onto an i.c., the multiplexer output will go low if the pin being addressed by the multiplexer is low or grounded.

The resistors R2 to R4 together with IC2 from a staircase generator, which, when applied to the "X" amplifier of the oscilloscope forms a row of dots. Connecting the D output to the Y amplifier produces a double row of dots.

If the output of the multiplexer is now connected to the Z-modulation input, and if a given pin on the i.c. being checked is at logic 0, then the dot being drawn in the corresponding position on the oscilloscope face will be extinguished, thus indicating the state of the pin.

As can be seen from the circuit diagram, one of the NAND gates is being used to decode 7 (0111) and

15 (1111). These points in the cycle correspond to pins 9 and 8 respectively. If S1 is closed then on 7 and 15 the Z output will be forced low through D1, thus extinguishing pins 8 and 9, and modifying the output format to 14 pin.

The display was found easier to read using badly-focused dots, and has proved invaluable in diagnosing faults in digital circuits.

G. Butler, Hertford

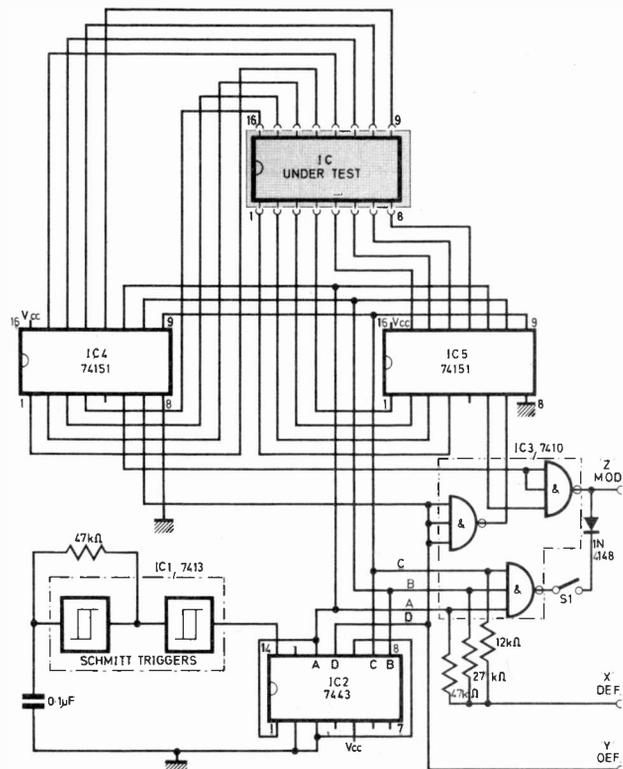


Fig. 1

SIMPLE ELECTROLYTIC COMPARATOR

A simple circuit which can be used to roughly determine the capacitance of an electrolytic capacitor is shown in Fig. 1.

A 555 timer in its monostable mode is used to provide a pulse, the duration of which being proportional to the unknown capacitor C4 and resistor R3. One simply times it with a capacitor of known value. the length of the pulse and compares Switch S1 commences the timing action.

A relay can be used instead of an l.e.d. which will make timing easier as one listens for the "click" of the relay dropping off whilst looking at a watch.

D. Lal, Amsterdam

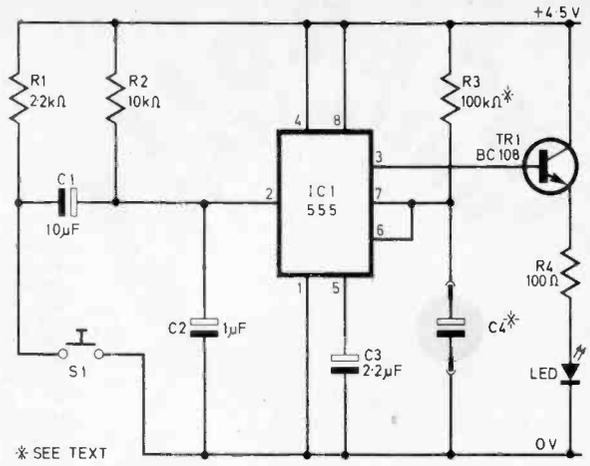


Fig. 1

* SEE TEXT

MUSIC GENERATOR

THE circuit of Fig. 1 can be used to play either repeating tunes of 32 notes or random tunes. Although the notes in the sequence cannot be individually determined, they are determined by the settings of only five controls. This simplifies both the circuitry and the operation.

The output is produced by a unijunction transistor oscillator, whose emitter is connected through five potentiometers to the outputs and input of a 4-bit binary counter IC2, IC3. If pulses are applied to the input, 32 different states are obtained in

sequence, and therefore 32 different notes. Diodes are connected in series with the potentiometers so that each potentiometer is isolated when the corresponding output is low.

The pulses for the counter can be produced either manually with a push button or automatically by a low-frequency astable consisting of TR1 and TR2, whose tempo can be controlled by two independent potentiometers.

The sequence can either be fixed in a 32-note cycle or random. An AND gate (IC1) is used to select these four modes.

When the other input, connected to the astable or push button, is high, the output is r.f. oscillation, and the counter counts at this frequency. When the voltage at this input drops, the counter will remain at the state at which it was before the voltage fell. Since the r.f. is much greater than the automatic pulsing frequency, this state cannot be predicted, and is therefore random.

J. Samson, Bishop's Stortford.

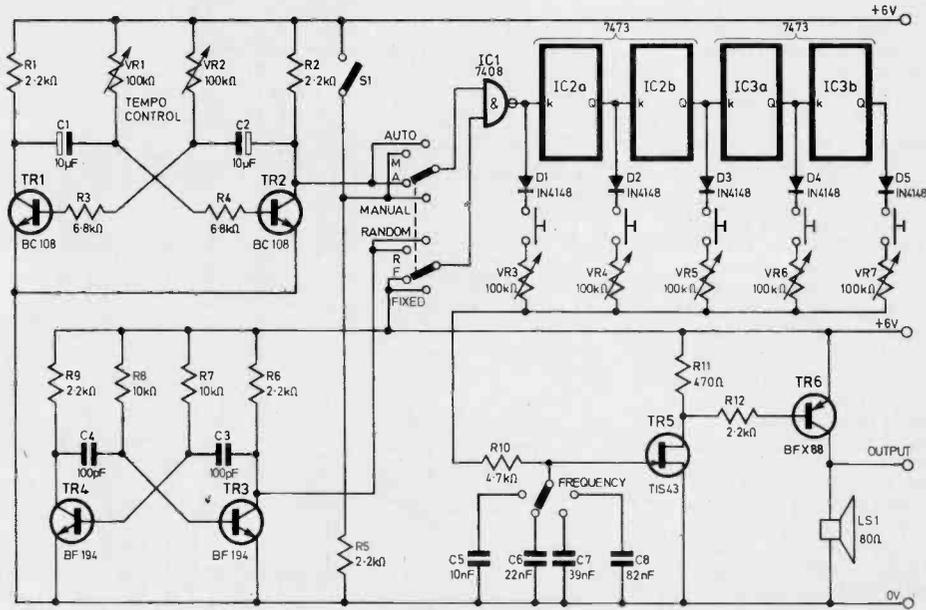


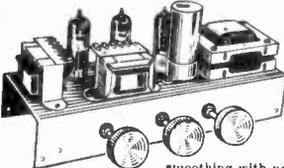
Fig. 1

SUPERSOUND 13 HI-FI MONO AMPLIFIER



A superb solid state audio amplifier. Brand new components throughout. 5 Silicon transistors plus 2 power output transistors in push-pull. Full wave rectification. Output approx. 13 watts r.m.s. into 8 ohms. Frequency response 12Hz. 30KHz \pm 3db. Fully integrated pre-amplifier stage with separate Volume, Bass boost and Input for ceramic or crystal cartridge. Sensitivity approx. 40mV for full output. Supplied ready built and tested, with knobs, escutcheon panel, input and output plugs. Overall size 3" high x 6" wide x 7 1/2" deep. AC 200/240V. PRICE £16-00. P. & P. 65p.

DE LUXE STEREO AMPLIFIER



AC mains 200-240 V using heavy duty fully isolated mains transformer with full wave rectification giving a valve line-up—2 x ECL82 (15 watts mono), 1 x E280 as rectifier. Two dual potentiometers 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 chassis. Input sensitivity is approximately 300mV for full peak output of 4 watts per channel (8 watts mono), into 8 ohm speakers. Full negative feedback in a carefully calculated circuit, allows high volume levels to be used with negligible distortion. Supplied complete with knobs, chassis size 11" x 4". Overall height including valves 6". Ready built and tested to a high standard. £12-50. P. & P. 85p.

ALL PURPOSE POWER SUPPLY UNIT 200/240V. A.C. input. Four switched fully smoothed D.C. outputs giving 6v, and 7 1/2v, and 9v, and 12v, at 1 amp on load. Fitted insulated output terminals and pilot lamp indicator. Hammer finish metal case overall size 6" x 3 1/2" x 2 1/2". Ready built and tested. PRICE £6-35. P. & P. 55p.

VYNAIR & REKIME SPEAKERS & CABINET FABRICS apt. 54 in. wide. Our price £1-30 yd. length. P. & P. 30p per yd. (min. 1 yd.). S.A.E. for samples.

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 watts. Volume and tone controls. Chassis size only 7in. wide x 3in. deep x 6in. high overall. AC mains 200/240v. Supplied absolutely Brand New completely wired and tested with good quality output transformer. P. & P. 60p. BARGAIN PRICE £5-00

FEW ONLY. High grade mains transformer with grain oriented lamination. Primary 200/240. Secondary 18-0 volts at 0.6 amps and 4-6 volts at 0.3 amps. Size 2in. long x 2 1/2in. wide x 2in. deep overall. £1-40 plus 35p. P. & P.

BRAND NEW MULTI-RATIO MAINS TRANSFORMERS. Give 13 alternative. Primary: 0-210-240v. Secondary combinations: 5-10-15-20-25-30-35-40-50v. half wave at 1 amp, or 10-0-10, 20-0-20, 30-0-30v, at 2 amps full wave. Size 3in. long x 3 1/2in. wide x 3in. deep. Price £2-75. P. & P. 65p.

MAINS TRANSFORMER. For power supplies. Fri. 200/240v. Sec. 9-0-9 at 500 mA. £1-35. P. & P. 30p. Fri. 200/240v. Sec. 12-0-12 at 1 amp. £1-50. P. & P. 30p. Fri. 200/240v. Sec. 10-0-10 at 2 amp. £2-20. P. & P. 40p.

8 VOLT RELAY. 100 mA single pole normally closed. 2 for 60p. P. & P. 15p.

GENERAL PURPOSE HIGH STABILITY TRANSISTOR PRE-AMPLIFIER

For 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. Frequency response 15Hz-25KHz. Gain 26dB. Solid encapsulation size 1 1/2" x 1 1/2" x 1/2". Brand new complete with instructions. Price £1-36. P. & P. 15p.

HANDBOOK OF TRANSISTOR EQUIVS. AND SUBS. A must for servicemen and home constructors. Including many 1000's of British, U.S.A. European and Japanese transistors. ONLY 40p. Post 7p.

3 Reference Encyclopedias for Electronic Engineers and Designers, covering between them transistor characteristics, diode and transistor equivalents. Many thousands of up to date European types listed. Diode Equiv. Sec. £1. Transistor Equivalents £1-20. Transistor Characteristics £1-40. POST FREE. All three together £3-20.

NEW ISSUE

Thyristor, Triac, Diac etc. encyclopedias £1-70. Post Free. 8 pole 3 way 2 bank low loss Xaleyte type switches 1 1/2" sections. Standard spindle. 2 switches 75p + 15p P. & P.

Open 9.30-5.30 Monday to Friday. 9.30-5 Saturday. Closed Wednesday.

Prices and specifications correct at time of press. Subject to alteration without notice

HARVERSONIC MAINS OPERATED SOLID STATE STEREO FM TUNER



Enjoy Fabulous Stereo Radio at this Low Introductory Price!

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-grain, low noise IF stages. Automatic frequency control to "lock on" station and prevent drift. IC stereo decoder for maximum stereo separation. L.E.D. for stereo beacon indicator. Nominal output of tuner 100mV. Approximate size 12 1/2in wide x 8in deep by 2 1/2in high. Supplied ready built, fully tested and fully guaranteed (not available in kit form). PRICE £27-50. Post and Packing £1-00.

STEREO-DECODER SIZE 2" x 3" x 1/2"

Ready built. Pre-aligned and tested. Sens. 20-660mV 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 3rd order audio filters (inclusive of hints and tips) supplied. £2-25 plus 15p P. & P. Stereo beacon light if required 45p extra.



LATEST HI 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. £18-25. P. & P. 25p.

LATEST ACOS GP11/18C mono compatible cartridge with T/O stylus for LP/EP/78. Universal mounting bracket. £1-75. P. & P. 15p.

CERAMIC STEREO CARTRIDGE. Universal mounting brackets and turnover stylus. 70mV per channel output. ONLY £2-05. P. & P. 15p.

SONOTONE STAHC COMPATIBLE STEREO CARTRIDGE T/O stylus Diamond Stereo LP and Sapphires 78. ONLY £2-62. P. & P. 10p. Also available fitted with twin Diamond T/O stylus for Stereo LP. £3-18. P. & P. 15p.

LATEST CRYSTAL T/O STEREO/COMPATIBLE CARTRIDGE for EP/LP/Stereo 78. £1-98. P. & P. 15p. **LATEST T/O COMPATIBLE CARTRIDGE** for playing EP/LP/78 mono or stereo records on mono equipment. Only £1-75. P. & P. 15p.

QUALITY RECORD PLAYER AMPLIFIER MK. II A top quality record player amplifier employing heavy duty double wound mains transformer, ECC83, EL84, and rectifier. Separate Bass, Treble and Volume controls. Complete with output transformer matched for 3 ohm speaker. Size 7in wide x 3in deep x 6in high. Ready built and tested. PRICE £36-50. P. & P. 75p. ALSO AVAILABLE mounted on board with output transformer and speaker. PRICE £7-75. P. & P. 75p.

HI-FI LOUDSPEAKER SYSTEM Mk II

Beautifully made simulated teak finish enclosure now with most attractive slatted front. Size 16 1/2" high x 10 1/2" wide x 9" deep (approx.). Fitted with E.M.I. Ceramic Magnet 13" x 8" bass unit, H.F. tweeter and crossover. AVAILABLE IN NOMINAL 4 ohm, 8 ohm or 16 ohm impedance (state which).

OUR PRICE £11-25 each. Carr. £1-25

Cabinet Available Separately £8-25. Carr. £1-10. Also available in 8 ohms with EM1 13" x 8" base speaker with parasitic tweeter £10-00. Carr. £1-25.

LOUDSPEAKER BINS

5in. 3 ohm £1-45, P. & P. 15p. 7 x 4in. 3 ohm £1-69, P. & P. 25p. 10 x 6in. 3 or 15 ohm £2-50, P. & P. 35p. E.M.I. 8 x 5in. 3 ohm with high flux magnet £2-06, P. & P. 25p. E.M.I. 13 1/2 x 8in. with high flux ceramic magnet with parasitic tweeter 3, 8 or 15 ohm £4-12, P. & P. 35p. E.M.I. 13 x 8in 3, 8 or 15 ohm with inbuilt tweeter and crossover network £5-50, P. & P. 35p. E.M.I. tweeter. Approx. 3 1/2". Available 3 or 8 or 15 ohms, £2-00 + 25p. P. & P.

BRAND NEW. Bakers Loudspeakers at substantial discounts. 12in. 15w. H/D Speakers, 3, 8 or 15 ohms. State which. Current production by well-known British maker. Now with HiFlux ceramic ferrobar magnet assembly £9-50. Guitars models: 30w. £8.95 35w. £10-50. P. & P. 75p.

"POLY PLANAR" WAFFLE-TYPE, WIDE RANGE ELECTRO-DYNAMIC SPEAKER

Size 11 1/2" x 14 1/2" x 1 1/2" deep. Weight 19oz. Power handling 20W r.m.s. (40W peak). Impedance 8 ohm only. Response 40Hz-20KHz. Can be mounted on ceilings, walls, doors, under tables, etc., and used with or without baffle. Send S.A.E. for details. Only £7-69 each. P. & P. 50p. NOW ALSO AVAILABLE 8in. 10W rms 20W peak 40Hz-20,000Hz. Overall depth 1in. Ideal for Hi-Fi or for use in cars. £5-18. P. & P. 40p.

SPECIAL BARGAIN OFFER! Limited number of BSR C129/123 Auto Changer De Luxe with lightweight tubular arm and stereo cartridge. Brand new. ONLY £11-0 + p. & p. 50p.

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 of 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 Ceramic or Crystal cartridges. Very simple to modify to suit magnetic cartridge—instructions included. Output stage for any speakers from 8 to 16 ohms. Compact design, all parts supplied including drilled metal work, high quality ready drilled printed circuit board with component identification clearly marked, smart brushed anodised aluminium front panel with matching knobs, wire, solder, nuts, bolts—no extras to buy. Simple step by step instructions enable any constructor to build an amplifier to be proud of. Brief specifications: Power output: 14 watts r.m.s. per channel into 8 ohms. Frequency response \pm 3dB 12-30,000 Hz. Sensitivity: better than 80mV into 1M Ω . Full power bandwidth: \pm 3dB 12-15,000 Hz. Bass, boost approx. to \pm 12dB. Treble cut approx. to -16dB. Negative feedback 18dB over main amp. Power requirements 35v. at 1-0 amp. Overall Size 12" w. x 8" d. x 2 1/2" h. Fully detailed 7 page construction manual and parts list free with kit or send 25p plus large S.A.E. **AMPLIFIER KIT** £15-00 P. & P. 50p (Magnetic input components 33p extra) **POWER PACK KIT** £5-35 P. & P. 55p **CABINET** £5-35 P. & P. 55p (Post Free if all units purchased at same time) Full after sales service.

Also available ready built and tested £32-50. 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 Discotheque use, etc.



3-VALVE AUDIO KIT **AMPLIFIER HA34 MK II.** Designed for Hi-Fi reproduction of records. A.C. Mains operation. Ready built on plated heavy gauge metal chassis size 7 1/2" w. x 4 1/2" d. Incorporates ECC83, EL84, E280 valves. Heavy duty, double wound mains transformer and output transformer matched for 3 ohm

speaker. Separate volume control and now with improved wide range tone controls giving bass and treble lift and cut. Negative feedback line. Output 4 1/2 watts. Front panel can be detached and leads extended for remote mounting of controls. Complete with knobs, valves, etc., wired and tested for only £27-75. P. & P. 70p. **HBL "FOUR" AMPLIFIER KIT.** Similar in appearance to HA34 above but employs entirely different and advanced circuitry. Complete set of parts, etc. £6-50. P. & P. 70p.

10/14 WATT HI-FI AMPLIFIER KIT

A stylishly finished monaural amplifier with an output of 14 watts from 2 EL84s in push-pull. Super reproduction of both music and speech, with negligible hum. Separate inputs for mike and gram allow records and announcements to follow each other. Fully shrouded section wound output transformer to match 3-15 Ω speaker and 2 independent volume controls, and separate bass and treble controls are provided giving good lift and cut. Valve line-up 2 EL84s, ECC83, EP36 and E280 rectifier. Simple instruction booklet 25p x S.A.E. (Free with parts). All parts sold separately. ONLY £12-00. P. & P. £1-00. Also available ready built and tested £16-00. P. & P. £1-00.



HI-FI STEREO HEADPHONES

Adjustable headband with comfortable flexi-foam ear-inlets. Wired and fitted with standard stereo 1in jack plug. Frequency response 30-15,000Hz. Matching impedance 8-16 ohms. Easily converted for Mono. PRICE £4-05. P. & P. 25p.

OUR PRICES INCLUDE VAT AT CURRENT RATES

(Please write clearly)

PLEASE NOTE: P. & P. CHARGES QUOTED APPLY TO U.K. ONLY. P. & P. OF OVERSEAS ORDERS CHARGED EXTRA.

HARVERSON SURPLUS CO. LTD.

(Dept. P.E.) 170 HIGH ST., MERTON, LONDON, S.W.19 Tel.: 01-540 3985

A few minutes from South Wimbledon Tube Station

SEND STAMPED ADDRESSED ENVELOPE WITH ALL ENQUIRIES

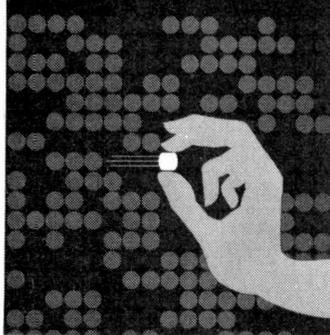
Towers' International Transistor Selector

by

T. D. TOWERS
MBE, MA, BSc, CEng, MIERE

Towers' International Transistor Selector

T D Towers, MBE, MA, BSc, CEng, MIERE
Over 10,000 American, British, European and Japanese Transistors with
Technical and Mechanical Specifications, Manufacturers and Distributors



No professional or enthusiast engineer should be without this time saving, comprehensive reference work. Compiled by an expert to cater for the requirements of industry it is equally essential to the hobbyist, teacher, component buyer and service man.

The 142 large pages are crammed with concise information on over 10,000 British, U.S., European and Japanese devices, sensibly tabulated for easy reference.

Contents include electrical specifications, base types and connections, source of manufacture, maker's addresses and much other vital information.

All for
£3.15
including postage

To: Technical Book Services (PE2)
25 Court Close, Bray, Maidenhead, Berks.
SL6 2DL
Please supply (.....) copies of Towers
International Transistor Selector

I enclose cheque/postal order for £.....

Name

Address

BLOCK CAPITALS

DIGITAL CLOCK KITS

MHI—A modular approach to digital clock building. An MHI Kit clock uses an MHI clock kit plus an MHI display kit. Any of the clock kits will interface with any of the display kits or with any other common-anode LED display. Each clock kit contains basic components plus a PCB—all you have to supply is a few resistors, transistors, etc.

MHI-5378—This kit has full car/boat clock facilities, quartz time source, brightness control, etc. Display is switchable with ignition for power saving.

KH: MMS378, socket, CA3081, 2MHz, Xtal and trimmers, PCB £15-10

MHI-5024—The MHI-5024 kit will act as a 6 or 4 digit stopwatch chip with readouts down to 1/10 sec. Clock will count up or down and can (with additional components) also act as a calculator.

Kit: MK50204, socket, CA3081, PCB £14-00

MHI-5314—Six digit basic clock, 12/24 hour, MM5314 chip £6-60

MHI-5025—Six digit alarm clock, Snooze, MK50250 chip £9-35

MHI-7001—Six digit time/date/alarm/timer, can be used as electronic time-switch in addition to other functions £10-00

MHI-D707—Four or six digit display kit, 0-3in digits. Supplied with PCB 4 digit—£8-80, 6 digit—£9-50

MHI-D727—Four or six digits, 0-5in high digits. Supplied with 6 digit PCB 4 digit—£8-50, 6 digit—£12-00

MHI-D747—Four or six digits, 0-6in high digits. Supplied with PCB for 6 digits 4 digit—£9-80, 6 digit—£14-70

Terms: CWO. Access. Barclaycard (simply quote your number and sign). Credit facilities to accredited account holders.

VAT—All prices exclude VAT (8%). P. & P. 15p

BYWOOD

68 Ebbens Road, Hemel Hempstead
Herts. HP3 9ORB

Tel. 0442 62757

OSMABET LTD

We make transformers amongst other things

AUTO TRANSFORMERS 110-200-220/240V
30W, £2-10; 50W, £2-70; 75W £3-45; 100W, £4-50; 150W, £5-10; 200W, £6-35, etc.

LOW VOLTAGE TRANSFORMERS

Prim. 200/240V a.c.: 5V 1A, 60p; 6-3V 1-5A, £1-45; 3A, £1-80; 6A, £3-80; 12V 1-5A, £1-80; 3A, £3-30; 6A CT, £4-50; 18V 1-5A CT, £3-30; 24V 1-5A CT, £3-30; 3A CT, £4-50; 5A, £8-75; 6A, £8-70; 12A, £12-40; 40V 3A CT, £8-50; 6A CT, £15-75; 25V 2A + 25V 2A, £8-40; 12V 4A + 12V 4A, £8-40.

LT TRANSFORMERS TAPPED SEC. Prim 200/240V

0-10-12-14-16-18V 2A, £3-30; 4A, £4-50.
0-12-15-20-24-30V 2A, £4-20; 4A, £8.
0-5-20-30-40-60V 1A, £4-20; 2A, £8.
0-40-50-60-80-90-100-110V 1A, £8-40.

MIDGET RECTIFIER TRANSFORMERS

For FW rect., 200/240V a.c. 6-0-6V 1-5A or 9-0-9V 1A £1-85 each; 12-0-12V 1A or 20-0-20V 0-75A or 9-0-9V 0-3A or 12-0-12V 0-25A or 20-0-20V 0-15A or 6V 0-5A + 6V 0-5A or 9V 0-35A + 9V 0-35A or 12V 0-25A + 12V 0-25A or 20V 0-15A + 20V 1-5A, all at £1-80 each.

MAINS TRANSFORMERS

Prim. 200/240V a.c. TX8 sec., 425-0-425V 500 MA, 6-3V CT 6A, 6-3V CT 6A, 0-5-0-3V 3A £18-75; TX1 425-0-425V 250 MA, 6-3V CT 4A, 6-3V CT 4A, 0-5-6-3V 3A, £11-25; MT3 Prim. 0-110-240V, sec., 250V 100 MA, 6-3V 2A, E/S, £3-75.

O/P TRANSFORMERS FOR POWER AMPLIFIERS

P.P. sec., tapped 3-8-15 ohms, A-A 6-8kΩ 30W £8-75; A-A 3kΩ 50W £10-15; 100W (EL34 KT88, etc.), £17-25.

G.E.C. MANUAL OF POWER AMPLIFIERS

Covering valve amplifiers of 30W to 400W 35p.

HI-FI SPEAKERS

Sin 8Ω, £1-15; Goodman 10W full throw 8Ω, £4-25; Sin 4Ω, £1-50; EMI 12 x 8in 8Ω, "450", £4-25; Sin twin cone 8Ω, £2; 8 x 5in 3, 8, 15 or 25Ω, £1-75.

LOUDSPEAKERS

2½in 8 or 75Ω, 2½in 8 or 25Ω, 3in 3, 8 or 35Ω, 3½in 8Ω, 15Ω or 80Ω, 85p each; 5in 3, 8 or 25Ω, 5 x 3in 3, 8, 15, 25 or 35Ω, 95p each; 7 x 4in 3, 15 or 25Ω, 10 x 6in 3Ω, £1-50, 9 x 6in HI-FI C/M 8Ω, £2-50.

SPEAKER AUTO MATCHING TRANSFORMER

12W 3 to 8 or 15Ω up or down, £1-50.

PAPER TUBULAR CONDENSERS W.E.

4-7mF, 160V, 30 x 20mm, 20p; 100 for £10.

"INSTANT" BULK TAPE/CASSETTE ERASER

Instant erasure, any diameter tape spools, cassettes, demagnetises tape heads, 200/240V a.c., £3-75.

FLEXIBLE PVC MINI 3-CORE CABLE, 19 x 0-10mm.

100 metres £3. Ideal for speakers, intercoms, etc.

Carriage and VAT extra on all orders

S.A.E. ENQUIRIES, LISTS, MAIL ORDER ONLY

46 Kenilworth Road, Edgware, Middx. HA8 8YG

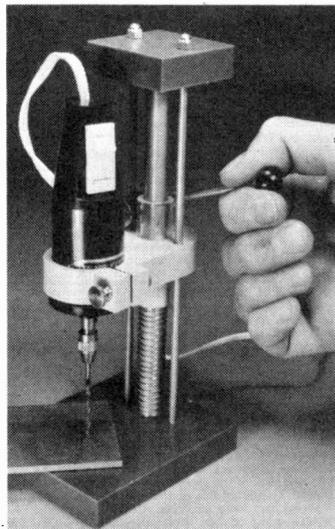
Tel. 01-958 8314

PRECISION PETITE LTD.

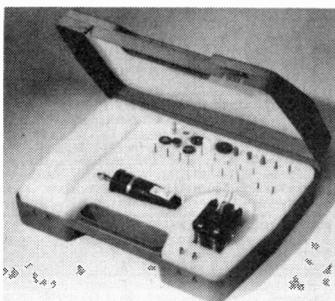
119A HIGH STREET,
TEDDINGTON TW11 8HG

Tel. 01-977 0878

INTRODUCING A
MINIATURE
PRECISION 12V. D.C.
DRILL DESIGNED FOR
THE ELECTRONIC
ENGINEER



Drill only £7-00 p.p. 35p
Stand £3-75 p.p. 58p



Complete kit as illustrated (less batts.) with a variety of 30 tools. Space for Stand and Transformer.

KIT 30 TOOLS £15-01 p.p. 75p
STAND £3-76 p.p. 58p
TRANSFORMER £5-50 p.p. 75p

S.A.E. FOR DETAILS

Readout—

A SELECTION FROM OUR POSTBAG

Readers requiring a reply to any letter must include a stamped addressed envelope. We regret that we cannot answer any technical queries on the telephone.

Bridge that gap

Sir—Gas ignitors of identical design to that featured in the July issue of PRACTICAL ELECTRONICS have been in commercial production for some considerable time now. During this time I have been called upon to repair quite a few. In most cases the spark gap component was not functioning.

As I was unable to obtain direct replacements for these components, I replaced them with 200V thyristors, which worked just as well. The thyristor was connected directly in place of the spark gap, anode to cathode of rectifier and cathode to output transformer primary. The gate was not connected and the lead was cut off. Although the P.E. article mentions that a current of "several tens of amps" may pass through the spark gap under pulse conditions, a 3A thyristor was found to suffice. This is probably due to the extremely short time for which the current flows.

I feel sure that this information may prove useful to some of your readers who wish to construct a gas ignitor from your design.

S. Champion,
King's Langley.

I have been aware of the technique of using a thyristor for some time but because of the difficulties outlined below, did not use it in our design. However, in case any readers encounter problems in using the technique, I feel that I should briefly outline the drawbacks.

Although this solution will work in particular cases, semiconductor manufacturers have informed me that there are two drawbacks to triggering thyristors by applying excess voltage between anode and cathode:

Typically the excess voltage required between devices may vary from a few volts to twice the rated voltage of the device.

The magnitude of excess voltage is temperature dependent.

Therefore, anybody contemplating using this technique may have to experiment to find a suitable device.

With regard to the current carrying capability of the device, Mr Champion is generally correct in stating that a 3A device is suitable because of the relatively short duration of the pulse.—R.D.B.

Highest reward

Sir—Having just completed building a £200 synthesiser using Dewtron modules and our own bits and pieces, I recommend the v.c.o., v.c.f., envelope shaper, etc. but warn people beware of gimmicks.

P.E. must be congratulated for stimulating interest in the field of musical synthesis; we think the patching used in both projects, i.e. plugs and sockets is unsatisfactory; we used slide switches along with slider potentiometers.

I think that the first project was too bulky and expensive; the "P.E. Minisonic" was good except for the use of a touchboard, which you yourself admitted leaves something to be desired. The actual choice of modules for Minisonic was good, the ring modulator, noise generator and v.c.f. are essential along with the sawtooth v.c.o.

The "Symbiosis" piece by Malcolm Pointon (June-July 1975) was very interesting and is the kind of use synthesisers should be put to. Synthesisers should explore new sounds rather than imitate conventional ones. I hope "Symbiosis" prompts other owners/composers to attempt their own recordings along these lines.

My synthesiser is designed for "experimental" sound exploration rather than conventional music and has virtually all patching routes possible, stereo output, noise, ring modulation, low frequency oscillator, v.c. phaser along with the more conventional modules I mentioned earlier.

Synthesisers give the highest reward from an involvement in electronics, a creative, artistic product, unlike some projects I could name.

R. D. Martin,
Congresbury,
Bristol.

Mr Martin raises some interesting points in his letter but I do feel that a number of them need some slight qualification.

I believe that synthesisers fall into two classifications. In the "live" performance area the instrument requires flexibility and yet has to be easy to play. In these circumstances some form of switch patching is ideal since it enables changeovers to be accomplished swiftly and accurately. The disadvantage to this method is that it provides a considerable restriction to the overall versatility of the instrument.

In the studio the requirement to achieve speed in patch changeover is not nearly so important and a method of patching can be adopted which allows the user to maximise on the interconnection options available. In these circumstances I strongly believe that a patch cord system is the ideal. In general terms the greater contact area and relatively wide spacing minimises noise and crosstalk problems and these are distinct advantages over the neater, but relatively costly, matrix patch boards now available.

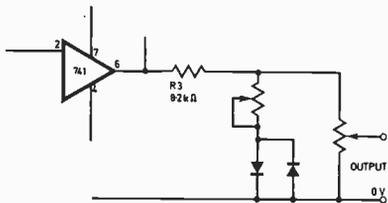
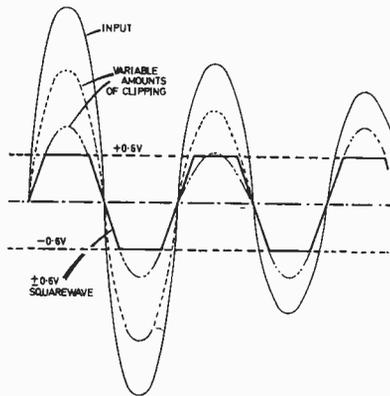
The P.E. Sound Synthesiser was an attempt to provide an introduction to both types of instrument. The modular system was essentially a studio instrument featuring cord patching while the Keyboard Unit was geared for live performance and required no patching at all other than the options of coupling it directly to external processing devices if required. In the case of the Minisonic it was the aim to provide a design, aimed particularly at the younger constructor, which would offer a maximum of flexibility with the lowest possible price. The "touch" keyboard simply provided a very economical way of getting the constructor off the ground and there is always the option of adding a conventional keyboard at a later date.

Finally, a word on the use of the synthesiser. Mr Martin feels that the instrument should be used in an imaginative sense rather than in an imitative one. To a certain extent I go along with this but I make the qualification that, because of its inherent versatility, the synthesiser is not an easy instrument to master. If it is used in an entirely imaginative way there is a danger that performances will become stilted, at best, or that the listening public will become frightened off by the unaccustomed and rather weird sounds which can be produced. I believe that imitative sound synthesis is an extremely good exercise in the use of the instrument and serves to train the user to exploit the full potential of the instrument in terms of dynamic range and register.—G.D.S.

Fuzz control

Sir—Mr Carter's fuzz effect circuit (see *Ingenuity Unlimited*, August) is similar to a design of my own, and readers may be interested in a few further ideas. Mr Carter's "Fuzz" control only effectively reduces the length of sustain, which in itself is a continuous $\pm 0.6V$ square wave.

If a variable resistor is put in series with the diodes a very different range of effects is produced. At zero setting $R = 0\Omega$, the effect is the same as Mr Carter's. However, if the resistance is increased the amount of clipping is reduced as the $8.2k\Omega$ resistor and the variable resistor split the voltage between the amp output and the diode voltage.

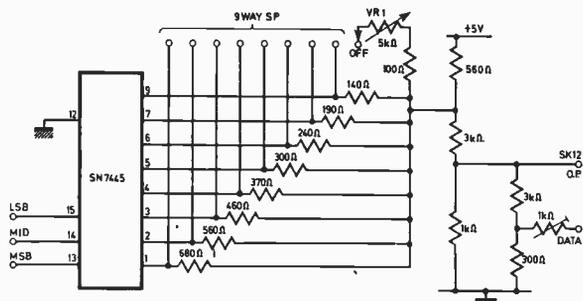


Modified Fuzz

If the potentiometer is around $100k\Omega$ the effect will be variable from square wave to almost no fuzz at all. A log potentiometer is best wired so that half way = $10k\Omega$.

It now becomes necessary to look at another point; the amp is able under some signal conditions, to clip itself, which in the no fuzz mode, is undesirable. The important factor is the ratio between rail volts and diode volts. This ratio can easily be improved by increasing rail volts and/or easier still, using lower voltage diodes, germanium selenium or micro alloy.

G. C. Cleasby,
Reigate.



Suggested D/A converter improvement

Right beam

Sir—I must congratulate A. C. Ainslie on the 8-channel trace multiplier design in the August issue of P.E. The facilities provided by most reasonably priced oscilloscopes are inadequate, when working with logic circuitry, and techniques like Trace Multiplying help to fill the gap.

May I suggest an improvement to the D/A converter of Fig. 3. In practice, it is essential to be able to compare any two traces by overlaying them at the same vertical position, particularly for well separated channels. The attached circuit permits this facility, by switching VR1 to the appropriate channel.

I would also like to point out the trend in commercial instruments towards presenting displays of the actual logic states of a circuit by strobing the states at an appropriate time, using units such as the Hewlett-Packard pattern analyser.

While such instruments are obviously outside the range of the amateur, the use of digital time-base generation does allow some fairly powerful circuit analysis methods to be used, if the time base is designed to be accessible. For example, the time-base counter inputs to the internal D/A converter can be replaced by inputs from up to five test points in the circuit under test. This will immediately show up any disallowed combinations of logic levels on the five inputs, since each combination corresponds to a particular X-deflection.

Also, the response of another test point to the allowed combinations can be checked by connection to the Y-amp, or Z-mod. Such displays are simpler to interpret than timing diagrams in most cases.

Other advantages are the presentation of the correct display is often automatic, without any knob twiddling. The display is independent of changes in clock rate. Direct read-out of time (in terms of number of clock pulses) between events is feasible, for example on 7-segment l.e.d.'s.

The addition of a data selector i.e., e.g. a 74151 to the time base counter allows the states of up to eight test points to be shown in an

easily readable format. The timing diagram display can be more difficult to decipher if the logic levels on the channels do not change during the sweep, particularly with the smaller sizes of display tube.

As a user of a combined trace multiplier and digital time-base unit for some time, I have found the trace multiplying section rarely preferable to the more direct methods indicated above.

J. R. Keneally,
Weymouth.

Mr Keneally's simple D/A Converter was of the type tried originally but which had to be scrapped because of poor pulse response. This would appear to be because there is no defined system impedance, whereas with the ladder network a characteristic impedance, R (the ladder being R, R_2, R , etc.) can be chosen for optimum performance. This type of converter, however, does not lend itself to providing trace shifting.

Trace overlay is usually used to give more accurate comparison between times than is possible with a spaced display. However, should modern c.r.t.'s and internal graticules still leave one in doubt with a separated display, it is a simple matter to trigger from one of the signals under consideration, there then being no ambiguity as to which of the two channels is "in the lead". Modern high performance scopes with dual timebases and trace expansion also simplify comparison.

The instruments to which Mr Keneally refers using digital discrete step timebase are most useful and I have used one for several months from a commercial manufacturer. With little space it is not possible to go fully into their advantages but by using memories they allow complex and accurate investigation to be performed.

For the majority of uses, however, it is considered that a simple timing diagram display holds virtually "all the answers" in an unambiguous form, and it was for this reason that the Trace Multiplier was developed; to supplement, rather than replace, existing and costly digital instrumentation.—A.C.A.



GIRO NO. 331 7056. Access and Barclaycards accepted.

C.W.O. only. P. & P. 20p on orders below £5
Discount: £10-10% (except net items)
Export Order enquiries welcome (VAT free)

Official Orders accepted from
Educational & Government Departments
ALL PRICES INCLUDE VAT at 8%

DUE TO RECENT V.A.T. CHANGES PLEASE ADD 15% TO TOTAL ORDER VALUE EXCEPT TEST METERS, AND VEROBOARD (Please TOTAL 8% and 25% items separately)

SPECIAL RESISTOR KITS (Prices include post & packing)
10E12 1W KIT: 10 of each E12 value, 22 ohms—1M, a total of 570 (CARBON FILM 5%), £4.60 net
25E12 1W KIT: 25 of each E12 value, 22 ohms—1M, a total of 1425 (CARBON FILM 5%), £10.99 net

MULLARD POLYESTER CAPACITORS C280 SERIES

250V P.C. Mounting: 0.01µF, 0.015µF, 0.022µF, 3µF, 0.033µF, 0.047µF, 4p, 0.068µF, 0.1µF, 4µF, 0.15µF, 5p, 0.22µF, 6p, 0.33µF, 8p, 0.47µF, 10p, 0.68µF, 13p, 1µF, 17p, 1.5µF, 26p, 2.2µF, 28p.

MULLARD POLYESTER CAPACITORS C296 SERIES

400V, 0.001µF, 0.0015µF, 0.0022µF, 0.0033µF, 0.0047µF, 0.0068µF, 0.01µF, 0.015µF, 0.022µF, 0.033µF, 4p, 0.047µF, 0.068µF, 0.1µF, 5p, 0.15µF, 8p, 0.22µF, 10p, 0.33µF, 15p, 0.47µF, 18p.
160V: 0.01µF, 0.015µF, 0.022µF, 0.047µF, 0.068µF, 4p, 0.1µF, 5p, 0.15µF, 8p, 0.22µF, 7p, 0.33µF, 8p, 0.47µF, 10p, 0.68µF, 14p, 1µF, 17p.

MINIATURE CERAMIC PLATE CAPACITORS

50V: (pF) 22, 27, 33, 39, 47, 56, 68, 82, 100, 120, 150, 180, 220, 270, 330, 390, 470, 560, 680, 820, 1K, 1K5, 2K2, 3K3, 4K7, 6K8, (µF) 0.01, 0.015, 0.022, 0.033, 0.047, 2µF, each, 0.1, 30V, 5p.

POLYSTYRENE CAPACITORS 160V 5%

(pF) 10, 15, 22, 33, 47, 68, 100, 150, 220, 330, 470, 680, 1000, 1500, 2200, 3300, 4700, 6800, 10,000, 4µF.

RESISTORS

CF—High Stab Carbon Film, 5%	MF—High Stab Metal Film, 5%		
W. Type Range	1-99	100-499	500-999
1 CF 12-1M	1	0.90	0.85
2 CF 22-2M2	1	0.90	0.85
3 MF 10-2M7	2	1.7	1.4
4 MF 10-2M2	2	1.6	1.3
1 MF 10-10M	3	1.98	1.81
2 MF 10-10M	4-5	3.52	3.08

(Price in pence each).
VALUES AVAILABLE—E12 Series only. (Net prices above 100.)

PRESET SKELETON POTENTIOMETERS

MINIATURE 0.25W Vertical or horizontal 17p each 1K, 2K2, 4K7, 10K, etc. up to 1M Ω
SUB-MIN 0.05W Vertical, 100 Ω to 220K Ω 7p each.



(P.E., LEIGHTON ELECTRONICS CENTRE, 59 NORTH STREET, LEIGHTON BUZZARD, LU7 7EG. Tel.: Leighton Buzzard 2316 (Std. Code 02523)

B. H. COMPONENT FACTORS LTD.

Miniature Mullard Electrolytics

1.0µF 63V	7p	68µF 16V	7p
1.5µF 63V	7p	68µF 63V	14p
2.2µF 63V	7p	100µF 10V	7p
3.3µF 63V	7p	100µF 25V	7p
4.0µF 63V	7p	150µF 63V	17p
4.7µF 63V	7p	150µF 16V	7p
6.8µF 63V	7p	150µF 63V	17p
8.0µF 40V	7p	220µF 6.4V	7p
10µF 16V	7p	220µF 10V	7p
10µF 25V	7p	220µF 16V	8p
10µF 63V	7p	220µF 63V	21p
15µF 16V	7p	330µF 16V	8p
15µF 63V	7p	330µF 63V	25p
16µF 40V	7p	470µF 6.4	14p
22µF 25V	7p	470µF 40V	26p
22µF 63V	7p	680µF 16V	8p
32µF 16V	7p	680µF 40V	25p
32µF 10V	7p	1000µF 16V	17p
32µF 40V	7p	1000µF 25V	28p
32µF 63V	7p	1500µF 6.4V25p	
47µF 10V	7p	1500µF 16V	28p
47µF 25V	7p	2200µF 10V	17p
47µF 63V	8p	3300µF 6.4V	28p

VEROBOARD 0.1 0.15

2 1/2 x 5"	45p	45p
3 1/2 x 5"	41	30p
3 1/2 x 5"	51p	53p
3 1/2 x 3 1/2"	45p	45p
1 1/2 x 1"	11p	10p
2 1/2 x 5" (Plain)	—	22p
2 1/2 x 3 1/2" (Plain)	—	20p
5 x 3 1/2" (Plain)	—	37p
Insertion tool	87p	87p
Track Cutter	68p	68p
Pins, Pkt. 25	25p	25p

TRANSISTORS

AC127 21p	BC212L 13p
AC128 22p	BC213L 13p
BC107 12p	BC214L 18p
BC108 12p	OC4A 19p
BC109 13p	OC71 13p
BC148 13p	OC81 17p
BC149 13p	OC170 29p
BC182L 13p	TIS43 45p
BC183L 13p	2N2926 13p
BC184L 14p	2N3702 14p

POTENTIOMETERS. Carbon Track 5K Ω to 2M Ω, log or lin (and 1K lin). Single, 17p Dual Gang 48p. Log single with switch 28p. Slider Pots. 60mm, 5K—500K, log or lin, 45p. Dual 55p. Knob 10p.

DIODES

IN4001 63p	Din 2 Pin	12p
IN4002 73p	3 Pin	13p
IN4003 9p	5 Pin 180°	16p
IN4004 9p	Std. Jack	20p
IN4005 12p	2.5mm jack	13p
IN4006 14p	Phone	7p
IN914 7p		
IN916 7p	Din 2 Pin	10p
BA100 10p	3 Pin	10p
OAS 42p	5 Pin 180°	12p
OA47 9p	Std. Jack	18p
OAB1 11p	2.5mm Jack	13p
OAZ20 8p	Phone	7p

LEIGHTON ELECTRONICS CENTRE

Our New Electronics Centre is now open in Leighton Buzzard and all callers are welcome. As well as our normal stock of over 3,000 products we have a large range of surplus bargains and calculators, etc. Open 6 days. 9-12.30. 1.30-5 pm.



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
Idc—0.05—500mA in 5 ranges
Resistance—5 Ω—1M Ω in 4 ranges.
Accuracy—5% of F.S.D.
OSCILLATOR—1 KHz and 465KHz (A, M.) at approx. 1 Volt.
Size—160 x 97 x 40mm.
Supplied complete with carrying case, test leads and battery.
PRICE £8.64 net P. & P. 50p.



U4323

MULTIMETER U4324

34 Ranges. High sensitivity. 20,000 Ω/Volt. Overload protected.
Vdc—0.6—1200V in 9 ranges.
Vac—3—900V in 8 ranges.
Idc—0.06—3A in 6 ranges.
Iac—0.3—3A in 5 ranges.
Resistance—25 Ω—5M Ω in 5 ranges.
Accuracy—dc and R—2% of F.S.D. ac and db—4% of F.S.D.
Size—167 x 98 x 63mm.
Supplied complete with storage case, test leads, spare diode, and battery.
PRICE £10.64 net P. & P. 50p.



U4324

MULTIMETER U4341

27 Ranges plus Transistor Tester, 16,700 Ω/Volt. Overload protected.
Vdc—0.3—900V in 8 ranges.
Vac—1.5—750V in 6 ranges.
Idc—0.06—600mA in 5 ranges.
Iac—0.3—300mA in 4 ranges.
Resistance—2K Ω—2M Ω in 4 ranges. Accuracy—dc—2½%, ac—4% of F.S.D.
hfe—10—350 in 2 ranges.
Size—115 x 215 x 90mm.
Complete with steel carrying case, test leads, and battery.
PRICE £11.88 net P. & P. 50p.



U4341

MULTIMETER U4313

33 ranges. Knife edge with mirror scale, 20,000 Ω/Volt. High accuracy, mVdc—75mV.
Vdc—1.5—600V in 9 ranges.
Vac—1.5—600V in 9 ranges.
Idc—0.6—120 microamps in 2
Iac—0.6—1500mA in 6 ranges.
Resistance—1K Ω—1M Ω in 4 ranges.
db scale—10 to + 12db.
Accuracy—dc—1½%, ac—2½%
Size—115 x 215 x 90mm.
Complete with steel carrying case, test leads, and battery.
PRICE £14.90 net P. & P. 50p.



U4313



66 Pages
3,000 Items
600 Pictures
YOUR COMPLETE ELECTRONIC STORES, MAIL ORDER AND SHOP
20p

HAVE YOU GOT YOURS

CATALOGUE No. 4A
NEW CONVENIENT SIZE, AND FULLY ILLUSTRATED

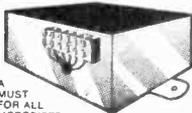
CONTAINS MANY HARD TO GET ITEMS

POST FREE

PAYS FOR ITSELF WITH DISCOUNT VOUCHERS WORTH 20p

- * DISCOUNTS
- * ALL NEW STOCK
- * SATISFACTION GUARANTEE
- * DEPENDABLE SERVICE

PLEASE SEND S.A.E. FOR SUPPLEMENT No. 1



P.E. SCORPIO MK II ELECTRONIC IGNITION

DIRECT FROM MANUFACTURER
SAVE PETROL—SAVE MONEY

The improved Scorpio Mk II Dual Capacitive Discharge Electronic Ignition Unit.
This unit features one of the best tried systems on the market, giving more miles per gallon; longer life for points, plugs, battery; easier starting; smoother running, etc.
Available in 12V or 6V version. Both models used on either positive (+) or negative (-) earth cars.
The Scorpio—tested and guaranteed with full installation instructions.
State 12V or 6V when ordering.

ONLY £14

(Including post, packing and VAT)

E. & A. PRODUCTS

Barrow Hill, Chesterfield, Derbyshire
Tel. Staveley (024-687) 3758

SPECIAL OFFER

FREE—741 Operational Amplifier I.C. with every copy of R. M. Marston's book "110 Operational Amplifier Projects for the Home Constructor", price £1.80. Includes circuits for musical instruments, fire alarm, burglar alarm, touch-activated switch and many other exciting projects.

ZN414 £1.10

Ferranti Application Booklet for ZN414, 25p

ZN1034E New Ferranti Precision Timer I.C. £2.90

Ferranti Data Sheets for ZN1034E 10p
741 Operational Amplifier I.C. 33p

RADNAGE RADIO & ELECTRONICS

2 Bottom Road, Radnage, High Wycombe, Bucks.
Prices inclusive. Add 15p Post and Packing UK, 60p Exports.
Mail order only

RTVC

FOR SPEAKERS AT FANTASTIC REDUCTIONS

NEW!



LE-4 SPEAKERS

Superb performance and beautifully finished in selected teak veneers. A professional standard four-way speaker system giving 25 watts RMS power handling. Bass unit is 14" x 9" with 8" x 5" unit for mid-range and twin 3" high frequency units to give monitor type quality and performance.

Specification — Size 33" x 14" x 16" approx. Impedance 8 ohms. Power handling 25W RMS. (Peak 50 watts.) Frequency range 35 Hz–20 KHz.

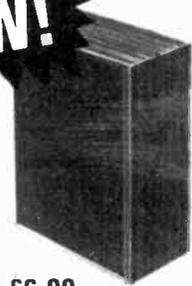
Our Price £34.00 each
(normally £66.00) + £5.80 p & p.
Scotland and the Orkneys
P & P Surcharge £3.50

THE 'COMPACT'

EASY BUILD SPEAKER KIT

A compact bookshelf speaker system giving a high electro acoustic efficiency for the low powered amplifier. The professional finish can be obtained with the minimum of tools, the infinite baffle type enclosures come ready mitred and professionally finished, simply apply glue, fold up around baffle board, and fix together with masking tape till glue dries.

The cabinet measures 12" x 9" x 5" deep approx finished in simulated teak, incorporating a quality 7" x 4" elliptical speaker, power handling 4 watts, flux density 30,000 maxwells, impedance 8-15 ohms nominal, voice coil dia 3" magnet size 2 7/8" approx.

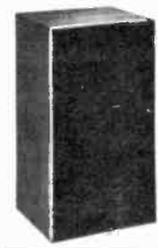


£6.00
pair inclusive P & P £1.70

EASY TO BUILD SPEAKER KITS

These superb simulated teak-finished speaker kits have been specially designed by RT-VC for the cost-conscious hi-fi enthusiast who wants top quality speakers but doesn't want to spend the earth. Built to EMI's exacting specification, these new RT-VC speaker kits (350 type kit) incorporate 13" x 8" woofer, 3 1/4" tweeter and matching crossover.

Easily put together with just a few basic tools. **Specification (each speaker):** Impedance 8 ohms. Power handling 15 watts RMS (30 watts peak). Response 20–20,000 Hz. Size 20" x 11" x 9 1/2" approx. Comparable built units (EMI LE3) sold elsewhere for over £45 pair.



£22.00 pair complete + £5.20 p & p.
Complete with crossover Components and circuit diagram



EMI 350 KIT

System consists of a 13" x 8" approx. woofer with a 3" tweeter, crossover components and circuit diagram. Frequency response: 20 Hz to 20 KHz. Power handling 15 watts RMS into 8 ohms. (Peak 30 watts.)

£7.25 + £1.20 p & p.
Complete with crossover Components and circuit diagram

RTVC*

VISCOUNT IV STEREO SYSTEM

System 1a. £69.00

The new 20+20 watt Stereo Amplifier incorporating the latest silicon transistor solid state circuitry, the RT-VC VISCOUNT IV gives you a powerful 20 watts RMS per channel into 8 ohms. Superb teak-finished cabinet, with anodised fascia to harmonise with any decor. Polished trim and knobs.

The VISCOUNT IV has a comprehensive range of controls — volume, bass, treble, balance, mono/stereo, mode selector, and scratch filter.

Front panel socket for stereo headphones. And a host of sockets at the rear — for left and right speakers, tape recorder, auxiliary, tuner, disc and microphone.

SPECIFICATION: 20 watts RMS per channel 40 watts peak. Suitable 8-15 ohms speakers. Total distortion @ 10 watts better than 0.2%. Six switched inputs: 1. Magnetic P.U. — 3 millivolts @ 47 K ohms (R.I.A.A.); 2. Crystal/ceramic P.U. — 50 millivolts @ 50 K ohms (R.I.A.A.); 3, 4, 6. Tape Tuner/Aux. — 140 millivolts @ 50 K ohms (flat frequency response); 5. Microphone — 3 millivolts @ 50 K ohms (flat frequency response).

CONTROLS: Push button ON/OFF, stereo/mono, scratch filter, 6 position rotary selector. Individual rotary controls for treble, bass, balance and volume. Headphone socket, tape out socket. Aux. mains output. Frequency response: 25 Hz to 25 KHz @ full rated output. Signal to noise ratio: better than -50 dB on all inputs. Tone control range: Bass ± 15 dB @ 50 Hz; Treble ± 12 dB @ 10 KHz. Power requirements: 200-250V A.C. mains @ 60 watts. Approx. size: 15 1/2" x 3" x 10".

MP60 type deck with magnetic cartridge, de luxe plinth and cover.

Two Duo Type IIa matched speakers — Enclosure size approx. 19 1/2" x 10 1/2" x 7 1/2" in simulated teak. Drive unit 13" x 8" with 3" tweeter, 15 watts handling, 30 watts peak.

Complete System with these speakers **£69.00** + £6.50 p & p.

System 2. £85.00

Viscount IV amplifier (As System 1a)
MP60 type deck (As System 1a)

Two Duo Type III matched speakers

— Enclosure size approx. 27" x 13" x 11 1/2". Finished in teak simulate.

Drive units 13" x 8" bass driver, and two 3" (approx.) tweeters, 20 watts RMS, 8 ohms frequency range — 20 Hz to 18,000 Hz.

Complete System with these speakers **£85.00** + £7.60 p & p.

PRICES: SYSTEM 1a
Viscount IV R103 amplifier £27.50 + £1.90 p & p.

2 Duo Type IIa speakers £30.00 + £6.50 p & p.

MP60 type deck with Mag. cartridge de luxe plinth and cover £22.00 + £3.30 p & p.

Total if purchased separately: £79.50

Available complete for only: **£69.00** + £6.50 p & p.

PRICES: SYSTEM 2
Viscount IV R103 amplifier £27.50 + £1.90 p & p.

2 Duo Type III speakers £46.00 + £7.50 p & p.

MP60 type deck with Mag. cartridge de luxe plinth and cover £22.00 + £3.30 p & p.

Total if purchased separately: £95.50

Available complete for only **£85.00** + £7.60 p & p.



20x20 SYSTEM

Scotland and the Orkneys P & P Surcharge
System 1a £1.70 System 2 £3.50

PUSH BUTTON CAR RADIO KIT— THE TOURIST TT*



NO SOLDERING REQUIRED

NOW BUILD YOUR OWN PUSH BUTTON CAR RADIO

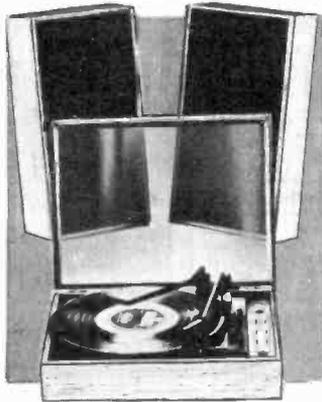
Easy to assemble construction kit comprising fully completed and tested printed circuit board on which no soldering is required. All connections are simple push fit type making for easy assembly. Fine tuning push button mechanism is fully built and tested to mate with printed circuit board.

TECHNICAL SPECIFICATION: (1) Output 4 watts RMS 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 1/2" deep approx. **£9.50** + £1.05 p & p. Speaker including baffle and fixing strip **£2.00** + 45p p & p. Car Aerial Recommended — fully retractable **£1.60** + 40p p & p.

The Tourist I Kit for the experienced constructor. If you can solder on a printed circuit board you can build this model. Same technical specification as Tourist TT. **Price £8.20** + £1.05 p & p.

* STEREO 21 QUALITY SOUND FOR LESS THAN £24.00



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 — BSR 3 speed deck, automatic, manual facilities together with stereo cartridge.

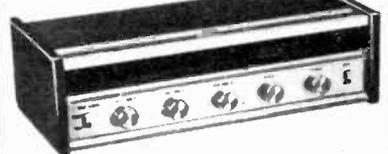
Two speakers with cabinets. Amplifier module. Ready built with control panel, speaker leads and full, easy to follow assembly instructions.

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. **Overall Dimensions.** Speakers approx 15 1/2" x 8" x 4". Complete deck and cover in closed position approx. 15 1/2" x 12" x 6".

Complete only £23.20 + £3.00 p & p.

Extras if required. Optional Diamond Styli **£1.60**. Specially selected pair of stereo headphones with individual level controls and padded earpieces to give optimum performance **£5.80**.

* DISCO AMPLIFIER



Reliant Mk IV Mono Amplifier, ideal for the small disco or house parties. Output 20 watts RMS 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: 12 1/2" x 6" x 3 1/2".

£20.00 + £1.35 p & p.

8 TRACK HOME CARTRIDGE PLAYER



Elegant self selector push button player for use with your stereo system. Compatible with Viscount IV system, Unisound module and the Stereo 21. Technical specification Mains input, 240V, Output sensitivity 125mV.

Yours for only **£16.20** + £1.70 p & p.

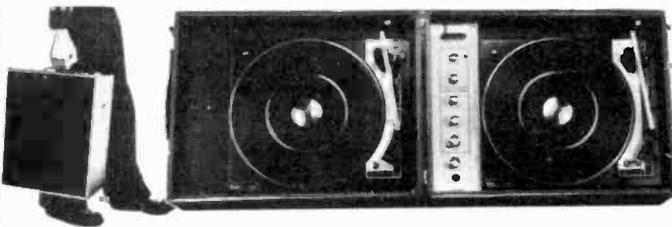
BUILD YOUR OWN STEREO AMPLIFIER*



For the man who wants to design his own stereo — here's your chance to start, with Unisound — pre-amp, power amplifier and control panel. No soldering — just simply screw together. 4 watts per channel into 8 ohms. Inputs: 120mV (for ceramic cartridge). The heart of Unisound is high efficiency I.C. monolithic power chips which ensure very low distortion over the audio spectrum. 240V. AC only.

Also available with 2 speakers (7"x4") **£10** + £1.75 p & p. **£8.95** + £1.05 p & p. Also available with the 'Compact' (see opposite page) easy build speaker kit **£13.50** + £2 p & p.

PORTABLE DISCO CONSOLE*



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. MP60 type single play professional series decks, fitted with crystal 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 kalee 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 1/2" x 13 1/2" x 8 1/2" (app.) Unit Open — 35 1/2" x 13 1/2" x 4 1/2" (app.) 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 **£49.00** + £6.50 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 Sept 1975 and subject to change without notice.

All prices include VAT at current rates



21 HIGH STREET, ACTON, LONDON W3 6NG
323 EDGWARE ROAD, LONDON W2

Personal Shoppers EDGWARE RD: 9 a.m.—5.30p.m. Half day Thurs
ACTON: 9.30a.m.—5p.m. Closed all day Wed.

ERSIN



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 oxidised surfaces. No extra flux is required.

SAVBIT handy solder dispenser



A coil of Ersin Multicore Savbit Solder in a dispenser 7 1/2 in of 18 s.w.g. (2.2 metres of 1.22mm). The Solder that reduces the wear of soldering iron bits.

Size 5
32p

SAVBIT solder for general purpose work

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

Size 12 £1.80



ALU-SOL for soldering aluminium

New Multicore Alu-sol flux-cored solder in 16 s.w.g. 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.g. (42.0 metres of 0.71mm) Ersin Multicore 5 core solder wound on a plastic reel. Suitable for intricate work and small components.

Size 10 £1.44



For soldering fine joints



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

Size 15 40p

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

NEW BIB WIRE STRIPPER & CUTTER



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



Absorbs solder instantly, from tags and printed circuits. Only needs 40 to 50 Watt soldering iron. Quick and easy to use. Does not need flux and is non-corrosive.

Size 18 90p

Bib Hi-Fi Accessories Limited,

Sole U.K. Sales Concessionaires, P.O. Box 78 Hemel Hempstead, Herts. HP2 4RH

Prices shown are recommended retail excluding VAT. From Electrical and Hardware Shops. If unobtainable, send 20p P & P plus VAT at 8p in the £1. Prices and specifications subject to change without notice

P.E. JOANNA

Electronic Piano



ALL PARTS CAN BE SUPPLIED

Keyboard, Keyswitch, P.C.B.s, Hardware, Semiconductors, Resistors, Capacitors, Cabinets Complete kits or easy stages
Constructed Planos to order
Send S.A.E. for details

Clef Products

31 Mountfield Road, Bramhall Stockport, Cheshire SK7 1LY

BRIDGE ELECTRONICS COMPONENTS

E	E	E
AC126	BD138	2N2218A
AC127	BD139	2N2219
AC128	BD140	2N2219A
AC151	BDY56	2N2221
AC152	BF115	2N2221A
AC153	BF200	2N2222
AC176	BF194	2N2646
AC187K	BF195	2N2904
AC188K	BF198	2N2905
AD161	BF199	2N2906
AD162	BF257	2N2907
BA102	BF258	2N2926G
BAK13	BF259	2N3053
BAX16	BF259	2N3054
BC107	BFX30	2N3055
BC108	BFX84	2N3393
BC109	BFX85	2N3441
BC147	BFY30	2N3442
BC148	BFY51	2N3638
BC149	BFY52	2N3638A
BC167	BY126	2N3702
BC168	OA47	2N3704
BC169	OA77	2N3706
BC182	OA90	2N3708
BC183	OA91	2N3771
BC184	OA92	2N3772
BC212	OA200	2N3772
BC213	OA202	2N3772
BC214	IN914	2N3904
BC214	IN4004	2N3906
BC237	IN4007	2N5294
BC238	IN4148	2N5296
BC239	IS920	2N5784
BC307	2N697	2N3819
BC308	2N698	2N4036
BC309	2N705	2N4037
BC327	2N708	2N4921
BC328	2N916	2N5060
BCY70	2N1305	2N4289
BCY71	2N1307	2N5447
BCY72	2N1308	2N5449
BD135	2N1613	2N5457
BD136	2N1711	2N5458
BD137	2N2218	2N6027

FULLY GUARANTEED

Mail order only VAT extra p&p 20p
Bridge Electronics
P.O. Box No. 10 Fishponds Bristol BS16 2LX

4-STATION INTERCOM



£15.95
+ VAT £1-28

Solve your communication problems with this 4-Station Transistor Intercom system (1 master and 3 Subs), in robust plastic cabinets for desk or wall mounting. Call/talk/listen from Master to Subs and Subs to Master. Ideally suitable for Business, Surgery, Schools, Hospitals, Office and Home. Operates on one 9V battery. On/off switch. Volume control. Complete with 3 connecting wires each 66ft and other accessories. P. & P. 70p.

MAINS INTERCOM NEW MODEL

No batteries—no wires. Just plug in the mains for instant two-way, loud and clear communication. On off switch and volume control. Price £29.98 per pair. P. & P. 70p.

NEW! AMERICAN TYPE CRADLE TELEPHONE AMPLIFIER



ONLY
£12.95
+ VAT £1-04

Latest transistorised Telephone Amplifier with detached plug-in speaker. Placing the receiver on to the cradle activates on/off 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. Volume. Direct talk recording model at £13.95 + VAT £1-12. P. & P. 70p. 10-day price refund guarantee.

WEST LONDON DIRECT SUPPLIES (PE11)
169 KENSINGTON HIGH STREET, LONDON, W.8



4 1/4 in x 3 1/2 in METER. 30μA, 50μA or 100μA, £3-85. 13p P. & P.

TAPE RECORDER LEVEL METER



500μA, 70p. 10p P. & P.

CARDIOID DYNAMIC MICROPHONE

Model UD-130. Frequency response 50-15,000c/s. Impedance Dual 50K and 600 ohms, £7-40. 13p P. & P.

42 x 42mm meters 1mA, 10mA, 100mA, 500μA, £2-76. 11p P. & P.

60 x 45mm meters 50μA, 100μA, 500μA and 1mA VU meter, £2-92. 11p P. & P.

Edgewise meters 90mm x 34mm 1mA, £3-40. 13p P. & P.

MULTI-METER

Model ITI-2
20,000 ohm/volt, £6-90.
16p P. & P.



3 WATT STEREO (1 1/2 + 1 1/2) PER CHANNEL AMPLIFIER
£4-30. 12p P. & P.



All above prices include V.A.T. LARGE S.A.E. for List No. 11. Special prices for quantity quoted on request.

M. DZIUBAS

158 Bradshawgate • Bolton • Lancs. BL2 1BA

RELAY UNIT

Smart steel case 12 x 7 x 4 1/2 in with 22 PO type relays, most with at least 3 sets c/o contacts. 4 reed relays + coils. 2 pots, resistors, diodes, 12BH7 valve, capacitors, tag board, etc., etc. £3-75.

PC ETCHING KIT MKII

Containing 1lb Ferric Chloride, 100 sq.in copper clad board, DALO etch resist pen, abrasive cleaner, etching dish, 2 miniature drill bits, and full instructions, £3-85.

7lb BARGAIN PARCELS

Hundreds of new components—pots, resistors, capacitors, switches, + PC boards with transistors and diodes, also loads of odds and ends. Amazing value at only £3-25.

COMPUTER PANELS

Large quantity always available. 3lb assorted £1-75; 7lb £3; 56lb £18. Pack with about 500 components inc. at least 50 transistors. Pack with 12 high quality panels, inc. power transistors, multitrans trimpots, ICs, zeners, and stacks of small signal transistors, resistors and capacitors. Only £2-75.

FERRIC CHLORIDE

Anhydrous technical quality in 1lb double sealed bags. 1lb 85p; 3lb £1-90; 10lb £4-80; 100lb £36.

TRANSFORMERS

All have mains primaries. 5-0-5V 100mA 90p; 9-0-9V 100mA 95p; 12-0-12V 50mA 85p; 12-0-12V 100mA £1; 24-0-24V 500mA £2-85. Multitapped transformer to give 3, 4, 5, 6, 8, 9, 10, 12, 15, 18, 20, 24 or 30V, or 12-0-12V, or 15-0-15V. 1A version £3-15; 2A version £4-45; 30-0-30V 1A £3-25; 6-0-6V 1 1/2A £1-95; 12-0-12V 1A £2-15; 25V 1 1/2A £2.

VEROBOARD

100 sq.in assorted sizes and pitches, about 8 pieces, £1-20.
All prices quoted include V.A.T. at 8% or 25% as appropriate, and U.K. postage. Price increases are due to new postal rates which came into effect 29th Sept. S.A.E. list, enquiries. Send 10p for Multimeter brochure. Surplus components and equipment wanted for cash.

GREENWELD (PE11)

51 Shirley Park Road, Southampton, SO1 4FX. Tel. (0703) 772501. Also callers at 21 Deptford Broadway, SE8. Tel. 01-692 2009, and 38 Lower Addiscombe Road, Croydon. Tel. 01-688 2950.

BARGAIN PACKS		25 1N4001	£1-20
12 BC107	£1-20	22 1N4002	£1-20
14 BC108	£1-20	20 1N4003	£1-20
12 BC109	£1-20	18 1N4004	£1-20
15 BC148	£1-20	15 1N4005	£1-20
12 BC149	£1-20	14 1N4006	£1-20
12 BC157	£1-20	12 1N4007	£1-20
12 BC158	£1-20	40 1N4148	£1-20
12 BC159	£1-20	3 2N3055	£1-20
2 2N2646	£1-20	12 BC548	£1-20
10 BC328	£1-20	6 BY103	£1-20
12 BF194	£1-20	14 100F40V	£1-20
7 BF173	£1-20	25 100F25V PC	£1-20
5 BF181	£1-20		£1-20
12 BF195	£1-20	1 5N76013	£1-20

All items full spec. and marked.

8 PIN DIL 741's
10 x 26p; 25 x 23p; 1,000 x 21p.

555 TIMERS
3+ 35p; 10+ 45p; 25+ 40p.

RESISTOR AND CAPACITOR PACKS

400 assort. carbon resistors £1-50
250 Hi-Stabs, 1, 2.5% ±1W £1-40
100 Wirewounds, 2-15W £2-00
200 Poly, mica, ceramic, etc. £1-10
100 C280 Polyesters 0-01-0-47 £1-30
200 Min electrolytics, but mainly unmarked, so only
15 Airpaced and compression trimmers up to 1250pF £1-10
200 Miniature resistors, 1/4, 1/2 and 3/4W mostly carbon film £1-10
JUMBO PACK: 1 each of the above 8 packs. £10-90 value for £8-50!!!

TRANSISTOR PACKS

Unmarked out-of-spec. transistors—NPN PNP Ge Si Small signal and TO3 power types. About 75% useable devices. 200 for £1-50. Out-of-spec. 2N3055s—now 10 for £1. 25 untested BFY51/2N3053 type £1. 40 untested BC108 £1, 100 £2.

Clearance of our warehouse at Tower Wharf Raymond Street, CHESTER ends on 1st November. 100 tons to clear.

JUST IN—115V 65W SOLDERING IRONS— use 2 in series for mains operation. Only £1-50 for 2. **IMMERSION HEATERS:** 250V 700W £1. 40 x 2 metre length HOOK-UP FLEX £1-30. 150 x ASSORTED GROMMETS, all shapes and sizes 50p.

TRANSFORMERS
ALL EX-STOCK—SAME DAY DESPATCH

MAINS ISOLATING 115V or 240V Sec. only Centre tapped and Screened			
Ref. No.	VA (Watts)	£	P & P
07	20	2-80	38
149	60	4-37	45
150	100	4-88	45
151	200	8-13	53
152	250	9-83	73
153	350	11-88	73
154	500	13-65	91
155	750	20-51	BRS
156	1000	28-15	BRS
157	1500	33-23	BRS
158	2000	37-07	BRS

12 AND OR 24 VOLT PRIMARY 240-250 VOLTS			
Ref. No.	VA (Watts)	£	P & P
111	0-5	0-25	1-35
213	1-0	0-5	1-74
71	2	1	2-38
4	2	2	2-88
6	3	3	4-12
106	8	4	4-58
72	10	5	5-14
116	12	6	5-52
117	16	8	7-38
115	20	10	10-38
187	30	15	13-88
226	60	30	18-83

30 VOLT RANGE Secondary Taps 0-12-15-20-24-30			
Ref. No.	Amps.	£	P & P
112	0-5	1-81	30
78	1-0	2-40	36
3	2-0	3-48	38
2	3-0	4-35	45
21	4-0	5-13	53
51	5-0	6-41	53
117	6-0	7-18	60
88	8-0	9-87	67
89	10-0	9-90	73

50 VOLT RANGE Secondary Taps 0-19-25-33-40-50			
Ref. No.	Amps.	£	P & P
102	0-5	2-58	30
103	1-0	3-38	38
104	2-0	4-88	45
105	3-0	5-81	53
106	4-0	7-69	60
107	6-0	12-10	67
118	8-0	12-88	85
119	10-0	18-99	BRS

80 VOLT RANGE Secondary Taps 0-24-30-40-48-60			
Ref. No.	Amps.	£	P & P
124	0-5	2-33	38
126	1-0	3-41	38
127	2-0	5-08	45
125	3-0	7-52	60
123	4-0	8-75	67
40	5-0	9-75	73
120	6-0	11-30	85
121	8-0	15-00	BRS
122	10-0	17-52	BRS
189	12-0	19-98	BRS

AUTO TRANSFORMERS			
Ref. No.	VA (Watts)	Auto Taps	£ P & P
113	20	0-115-210-240	1-87 30
64	75	0-115-210-240	2-88 38
4	150	0-115-200-220-240	4-12 45
86	300	0-115-200-220-240	5-82 53
87	500	0-115-200-220-240	8-82 67
84	1000	0-115-200-220-240	13-68 91
93	1500	0-115-200-220-240	18-11 118
95	2000	0-115-200-220-240	24-20 BRS
73	3000	0-115-200-220-240	38-88 BRS

SCREENED MINIATURES			
Ref. mA	Volts	£	P & P
238	200	3-0-3	1-54 10
212	1A, 1A	0-6, 0-6	1-84 30
13	100	9-0-9	1-61 13
235	330, 330	0-9, 0-9	1-58 19
207	500, 500	0-9, 0-9	1-82 30
208	1A, 1A	0-8-9, 0-8-9	3-38 38
238	200, 200	0-15, 0-15	1-43 19
214	300, 300	0-20, 0-20	1-83 30
221	700 (d.c.)	20-12-0-12-20	2-17 38
208	1A, 1A	0-15-20-0-15-20	3-48 38
203	500, 500	0-15-27-0-15-27	3-88 38
204	1A, 1A	0-15-27-0-15-27	3-85 38
S112	500	12-15-20-24-30	1-88 37

CASED AUTO TRANSFORMERS			
Ref. VA	Auto Taps	£	P & P
20VA	£3-23	P. & P. 38p	113W
150VA	£10-70	P. & P. 82p	4W
500VA	£18-48	P. & P. 80p	67W
1000VA	£17-51	P. & P. 80p	84W

HIGH VOLTAGE MAINS ISOLATING			
VA	Ref.	£	P & P
2000	252	41-87	BRS

POWER UNIT			
CC12-05 Output Switched 3-4-5-6-7-5-9-12V at 500mA, £4-08. P & P 30p			

BRIDGE RECTIFIERS			
50V	2A	35p	
100V	2A	40p	
200V	1A	45p	
400V	4A	85p	
600V	2A	50p	
500V	1A (PM 7A8)	£2-35	

PLUS			
------	--	--	--

TEST METERS			
AVO 8 MK5	£50-80		
AVO 72 <td>£18-75</td> <td></td> <td></td>	£18-75		
U4313*	£11-80		
U4315*	£13-85		

HIGH QUALITY MODULES			
3 W RMS Amplifier	£2-30		
5W RMS Amplifier	£2-65		
10W RMS Amplifier	£2-85		
25W RMS Amplifier	£3-95		
Pre-Amp for 3-5-10W	£4-83		
Pre-Amp for 25W	£13-20		
Power Supplies 3-5-10W	£3-00		
Transformer 3W	£1-48		
Transformer 5-10W	£2-13		
Transformer 25W	£2-88		
P. & P. Amps/Pre-Amps/Power Supplies 18p			
P. & P. Transformers 37p.			

ANTEX SOLDERING IRONS			
15W	£2-88	18W	£2-45
		25W	£2-28

BSR MINI-DECK			
4 Speed Autochanger P. & P. 80p.			

MAGNETIC TO CERAMIC CARTRIDGE CONVERTOR			
Operating voltage 20-45V only £2-85 P. & P. 18p.			

CAR STEREO SPEAKERS			
8Ω angled £3-98 pr. P. & P. 37p.			

PLEASE ADD VAT AFTER P & P
Audio Accessories and Bargain Component Paks.
Electrosil and Semi-Conductor stockists.
Callers welcome (Mon-Fri) or send stamp for lists

Barrie Electronics Ltd.

3, THE MINORIES, LONDON EC3N 1BJ

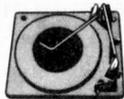
TELEPHONE: 01-488 3316/8

NEAREST TUBE STATIONS: ALDGATE & LIVERPOOL ST.

RETURN OF POST MAIL ORDER SERVICE

BSR HI-FI AUTOCHANGER STEREO & MONO

Plays 12", 10" or 7" records. Auto or Manual. A high quality unit backed by BSR reliability with 12 months' guarantee. AC 200/250V. Size 13 1/2" x 11 1/2". Above motor board 3 1/2". Below motor board 2 1/2".



with STEREO and MONO XTAL £9.25 Post 50p.

PORTABLE PLAYER CABINET

Modern design. Resine covered. Large front grille. Lift-up Lid. Chrome fittings. Approx. size 17in x 15in x 7in. Few only in red and black resine. £5.25 Post 50p Motor board cut for Garrard deck

B.S.R. SINGLE PLAYER

MODEL P128. IDEAL AS DISCO PLAYER. 3 SPEEDS. BALANCED ARM. CUEING DEVICE STEREO CERAMIC CARTRIDGE. BARGAIN. SIMILAR TO MP60



£16.50 PLUS POST 75p



R.C.S. DISCO DECK SINGLE RECORD PLAYER

Fitted with auto stop. Compatible cartridge. Baseplate. Size 11in x 8in. Turntable. Size 7in diameter. A/C mains. 200.250V motor has a separate winding 14 volt to power a small amplifier. Three speeds. Plays all records.

£6.95 Post 45p

SOLID MAHOGANY PLINTH

With P.V.C. Cover. Cut out for most B.S.R. or Garrard decks. Size 12 1/2" x 14 1/2" x 7 1/2".

Post 75p £7.50

COMPLETE STEREO HI-FI SYSTEM

Two full size loudspeakers 13 1/2" x 10" x 3 1/2". Player unit clips to loudspeakers making it extremely compact, overall size only 13 1/2" x 10" x 8 1/2". 3 watts per channel, plays all records 33 r.p.m., 45 r.p.m. Separate volume and tone controls. 250V AC Mains.



Attractive Teak finish Weight 13 lb.

Barkain Price £25 85p Carriage

SPECIAL OFFER! SMITH'S CLOCKWORK 15 AMP TIME SWITCH UP TO 60 MINUTES



OUR PRICE £2.50 Post 45p

ALUMINIUM BOXES. 3 x 3 x 3in 75p; 4 x 4 x 4in 90p; 6 x 4 x 4in £1.10; 9 x 4 x 4in £1.30; 12 x 4 x 4in £1.50.

BLANK ALUMINIUM CHASSIS. 18 s.w.g. 2 1/2in sides 6 x 4in 55p; 8 x 6in 65p; 10 x 7in 80p; 12 x 8in £1. 14 x 9in £1.20; 16 x 6in £1.20; 12 x 3in 60p; 18 x 10in £1.40. ALUMINIUM PANELS 18 s.w.g. 6 x 4in 15p; 8 x 6 in 25p; 14 x 3in 25p; 10 x 7in 30p; 12 x 8in 30p; 16 x 6in 45p; 14 x 9in 50p; 12 x 12in 55p; 16 x 10in 75p. 1" inch DIAMETER WAVECHARGE 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. 30p.

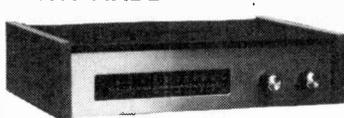
BRITISH FM/VHF TUNING HEART

88 to 108 Mc. a British made. 2 Transistors ready aligned requires 10-7 Mc/s I.F. Complete with tuning gang. Connections supplied but some technical experience essential.

Our price £3.95 Post 20p

SUITABLE I.F. STRIP £4.95. DECODER £4.95

R.C.S. STEREO FM TUNER BRITISH MADE



This completely cased mains powered Hi-Fi Tuner with brushed aluminium fascia is British made using the latest circuitry. Few Only. £30 Post 75p.

R.C.S. GENERAL PURPOSE TRANSISTOR PRE-AMPLIFIER BRITISH MADE

Ideal for Mike, Tape, P.U., Guitar, etc. Can be used with Battery 9-12V or H.T. line 200-300V d.c. operation. Size: 1 1/2 x 1 1/2 x 1 in. Response 25 c/s to 25 kc/s. 26 dB gain. For use with valve or transistor equipment. £1.45 Post 30p Full instructions supplied. Details S.A.E.

R.C.S. POWER PACK KIT

12 VOLT, 750mA. Complete with printed circuit board and assembly instructions. £3.25 Post 45p
12 VOLT 300mA KIT, £3 9 VOLT 1 AMP KIT, £3.25.

4MFD 800V DC PAPER CAPACITOR

Block Capacitor. Ideal as Filter Unit in 100 watt Loudspeaker Systems. 85p each, post 30p.

NEW TUBULAR ELECTROLYTICS		CAN TYPES	
2/350V	20p	250/25V	14p
4/350V	20p	500/25V	20p
8/350V	22p	100+100/275V	65p
16/350V	30p	150+200/275V	70p
32/500V	50p	8+8/850V	22p
25/25V	10p	8+16/850V	25p
50/50V	10p	16+16/850V	40p
100/25V	10p	32+32/850V	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 20p; 25V 35p; 50V 47p; 100V 70p.
2000mF 6V 25p; 25V 42p; 50V 57p.
2500mF 5V 62p; 3000mF 25V 47p; 50V 65p.
5000mF 6V 25p; 12V 42p; 25V 75p; 35V 85p; 50V 95p.
CERAMIC 1pF to 0.01mF. 4p. Silver Mica 2 to 5000pF. 4p.
PAPER 350V-0.1 7p; 0.5 18p; 1mF 15p; 2mF 150V 15p.
500V-0.001 to 0.05 4p; 0.1 10p; 0.25 8p; 0.4 25p.
TWIN GANG. "0-0" 20pF. 1.75pF. £1.30p.

Slow motion drive 360pF + 365pF with 25pF + 25pF. 50p; Twin 500pF 75p. Twin 410pF 50p. Twin 120pF 50p.
SHORT WAVE SINGLE. GANGABLE 50pF. 65p.
NEON PANEL INDICATORS 250V AC/DC. Amber 30p.
RESISTORS. 1W, 1/4W, 1/10W, 20%; 2W, 10p, 10% to 10MΩ.
HIGH STABILITY. 1W 2%; 10 ohms to 10 meg. 10p.
Ditto 0.5%. Preferred values 10 ohms to 10 meg. 4p.
WIRE-WOUND RESISTORS 5 watt, 10 watt, 15 watt, 10 ohms to 100K 12p each.

TAPE OSCILLATOR COIL Valve type 35p.
FERRITE ROD 8 x 1/2in 20p; 6 x 1/2in 20p; 3 x 1/2in 10p

ALL POST Small 45p each Large 75p each

MAINS TRANSFORMERS

250-0-250 80mA. 6.3V 2 amp £2.90
250-0-250 80 mA. 6.3V 3-5A 6.3V 1A or 5V 2A £4.80
250-0-250 80 mA 6.3V 3-5A, 6.3V 1A or 5V 2A £5.80
300-0-300V 120mA. 6.3V C.T. 6.3V 2A £7.90
SMALL 220V 45mA. 6.3V 2A 2x 1/2in £1.25
HEATER TRANS. 6.3V; amp 85p, 3 amp £1.40p
GENERAL PURPOSE LOW VOLTAGE. Tapped outputs at 2 amp. 3, 4, 5, 6, 8, 9, 10, 12, 15, 18, 24 and 30V £4.60
1 amp, 6, 8, 10, 12, 15, 18, 20, 24, 30, 35, 40, 45, 60 £4.60
2 amp, 6, 8, 10, 12, 15, 18, 20, 24, 30, 35, 40, 45, 60 £7.00
5 amp, 6, 8, 10, 12, 15, 18, 20, 24, 30, 35, 40, 45, 60 £11.25
10, 30, 40V 2 amp. 25%; 20V 3 amp. £2.30. 5, 8, 13V, 5 amp. £1.50; 6-0-6V 500mA 90p; 9V 1 amp. 95p; 12V 300mA 75p; 12V 500mA 85p; 12V 750mA 95p; 40V 2 amp. £2.75; 22-0-22V 4 amp. D.C. £3.45; 16V; 1 amp. 95p; 18V 2 A. £2; 5V, 8V, 10V, 16V; A. £1.90. 20V 1A. £2.
AUTO TRANSFORMERS. 115V to 230V or 230V to 115V 150W £4.60; 500W £8.70; 750W £17.50; 1000W £21.
CHARGER TRANSFORMERS. 11A £2.75 4 amp £4.60. BATTERY CHARGERS. Ready built with leads and clips. 4 amp 24; 5 amp. £4.50.
FULL WAVE BRIDGE CHARGER RECTIFIERS: 6 or 12V outputs. 1; 1 amp 40p; 2 amp 55p; 4 amp 85p.

MAINS ISOLATING TRANSFORMER

Primary 0-110-240V. Secondary 0-240V 3 amps 720 watts. Insulated terminals. Varnish impregnated. Fully enclosed in steel case with fixing feet. £13.50 Carr. Famous make (Value £19) OUR PRICE £13.50 95p Can be used as 800 watt auto transformers 240-110V.

VOLUME CONTROLS

Long spindles. Midget Size 5 K. ohms to 2 Meg. LOG or LIN. L/S 25p. D.P. 40p. STEREO L/S 55p. D.P. 75p. Edge 5K. S.P. Transistor 25p.

80 ohm Coax 5p yd.

BRITISH AERIALITE AERAXIAL-AL SPACED 40 yd £2.00; 60 yd £3.00. FRINGE LOW LOSS 10p per yd Ideal 625 and colour. 10p yd

Wire K.W. Transistor 1 1/2in diam. 3 Watts, 10 ohms to 100K British Made with long spindles 1/2in dia. 85p each. FULL CONCENTRIC POT 500K LOG AND 500K LIN D.P. switch. Inner spindle 3 1/2in; outer spindle 2 1/2in 75p.

E.M.I. 1 1/2" x 8in. SPEAKER SALE!

With tweeter and crossover. 10 watt. State 3 or 8 or 15 ohm. As illustrated. Post 45p
With flared tweeter cone and ceramic magnet. 10 watt. Bass res. 45-60 c/s. Flux 10,000 gauss. £3.45
State 3 or 8 or 15 ohm. Post 45p
1 1/2" x 8in Bass unit 20 watt rubber cone surround £6.60



LOUDSPEAKER FRONT GRILLES

Teakwood strips mounted on cloth backing, easily glued on to baffle to modernise cabinets. Size 18 1/2in x 10 1/2in. 75p Or size 10 1/2in x 7 1/2in. 45p

GOODMANS 6 1/2in. HI-FI SPEAKER

8 ohm. 10W. Large ceramic magnet. Special Rubber cone surround. Frequency response. Twin cone. 30-12,000 c/s. Ideal P.A. Columns. Hi-Fi Enclosure Systems, etc. £4.60



ELAC CONE TWEETER

The moving coil diaphragm gives a good radiation pattern to the higher frequencies and a smooth extension of total response from 1,000 c/s to 18,000 c/s. Size 3 1/2" x 2 1/2" deep. Rating 10W, 3 ohm. Crossover £1.85 £2.20 Post 30p.

GOODMANS 8in. WOOFER

8 ohm 15 watt. Rubber surround. Heavy ceramic magnet. Bass resonance 35 cps. Frequency response 30-8,000 cps. Ideal bass unit for Hi-Fi system. £5.75 Post 50p



SPECIAL OFFER LOUDSPEAKERS

3 ohm, 2 1/2in; 2 1/2in; 3 1/2in; 5in; 7 x 4in; 8 x 5in. 8 ohm, 2 1/2in; 2 1/2in; 3 1/2in; 5in; 7 x 4in; 8 x 5in. 15 ohm, 3 1/2in; 5in; 6 x 4in; 5 x 8in; 7 x 4in; 8 x 5in. 25 ohm, 2 1/2in; 5 x 3in; 5in; 6 x 4in; 7 x 4in. 35 ohm, 3in; 5in. 64 ohm 2 1/2in. 80 ohm, 2 1/2in; 2 1/2in. 120 ohm 3in. £1.25 EACH

RICHARD ALLAN TWIN CONE LOUDSPEAKERS. 3in diameter 4W £2.50, 10 in diameter 5W £2.95; Post 25p
12in diameter, 6W, £3.50; 3 or 8 or 15 ohm models.
SPEAKER COVERING MATERIALS. Samples Large S.A.E. Horn Tweeters 2-16K/c/s. 8V 8 ohm or 15 ohm £2.50 De Luxe Horn Tweeters 2-18K/c/s. 15W, 15 ohm £4.50 TWO-WAY 3,000 c.p.s. CROSSOVERS 3, 8 or 15 ohm £1.85

CASSETTE MACHINE MOTOR. 6 Volt. Will replace many types £1.25.

R.C.S. 2/3 WAY CROSSOVER

Complete with 12 in. twin lead fitted with dia speaker plug. Ready assembled with leads for speakers, bass, mid and tweeter. Crossover frequencies—950 cps and 3,000 cps. For systems up to 25 watts. £2.25

VALVE OUTPUT TRANSFORMER 50p.
MIKE TRANSFORMER MU metal 100-1 £1.25.
PUSH-PULL VALVE OUTPUT TRANSFORMERS. 50 watt watt £14.00 100 watt £20.00

ELECTRO MAGNETIC PENDULUM MECHANISM

1.5V d.c. operation over 200 hours continuous on SP2 battery, fully adjustable swing and speed. Ideal displays, teaching electro magnetism or for metronome. 95p Post 30p

R.C.S. "MINOR" 10 watt AMPLIFIER KIT

This kit is suitable for record players, guitars, tape playback, electronic instruments or small P.A. systems. Two versions available: Mono, £12.50; Stereo, £20. Post 45p. Specification 10W per channel; input 100mV; size 9 1/2" x 3 x 2 1/2in. approx. S.A.E. details. Full instructions supplied.

COAXIAL PLUG 10p. PANEL SOCKETS 10p. LINE 18 OUTLET BOXES, SURFACE MOUNTING 50p. BALANCED TWIN RIBBON FEEDER 300 ohms, 7p yd. JACK SOCKET 8td. open-circuit 20p. closed circuit 30p; Chrome Lead Socket 45p. Phono Plugs 7p. Phono Socket 7p. JACK PLUGS 8td. Chrome 30p; 3-5mm Chrome 20p. DIN SOCKETS Chassis 3-pin 10p; 5-pin 10p. DIN SOCKETS Lead 3-pin 25p; 5-pin 25p. DIN PLUGS 3-pin 25p; 5-pin 25p. VALVE HOLDERS 5p; CERAMIC 10p; CANS 5p.

CASH PRICES INCLUDE VAT • 30p MINIMUM POST AND PACKING • CALLERS WELCOME •

RADIO COMPONENT

Illustrated Brochure, Radio Books & Component Lists 10p Written guarantee.

RETURN OF POST MAIL ORDER SERVICE

JUST RELEASED

R.C.S. 100 watt VALVE AMPLIFIER



Four inputs. Four way mixing, master volume, treble and bass controls. Suits all speakers. This professional quality amplifier chassis is suitable for all groups, disco, P.A., where high quality power is required. 5 speaker outputs. A/C mains operated. Slave output. Produced by demand for a quality valve amplifier. Price **£85**, carr. £2-50

ANOTHER R.C.S. BARGAIN!

ELAC 9 x 5in. HI-FI SPEAKER TYPE 59RM
This famous unit now available, 10 watts, 8 ohm.

Price **£3.45** Post 40p



8" or 10" x 6" ELAC HI-FI SPEAKER

Dual cone plasticised roll surround. Large ceramic magnet. 50-18,000 cps. Bass resonance 55 cps. 8 ohm impedance. 10 watts. **£4.35**

10in round £5.

TEAK VENEER HI-FI SPEAKER CABINETS Fluted Wood Fronts

MODEL "A". 20 x 13 x 12in
For 12 in. dia. or 10in speaker. **£12.50** Post 95p

MODEL "B". 18 x 10 x 7in
For 13 x 8in. or 8in. speaker **£6.95** 75p

MODEL "4C". 30 x 20 x 12in.
Reflex cabinet will accept 1-12in. bass unit, 1-6in. mid range, 1-3in. tweeter. Teak finish. Grooved front **£21.50** Carr. £3

LOUDSPEAKER CABINET
WADDING 18in wide, 20p ft.

GOODMANS CONE TWEETER

3in. diam. 18,000 C.P.S. 25 WATTS 8 Ω **£3.60**

BARGAIN 4 CHANNEL TRANSISTOR MONO MIXER. Add musical highlights and sound effects to recordings. Will mix Microphone, records, tape and tuner with separate controls into single output. 9 volt battery operated. **£5.20**

STEREO VERSION OF ABOVE £6-85.

BARGAIN 3 WATT AMPLIFIER. 4 Transistor Push-Pull Ready built with volume, treble and bass controls. 18 volt battery operated. Mains Supply £3-45.

THE "INSTANT" BULK TAPE ERASER & HEAD DEMAGNETISER. Suitable for cassettes, and all sizes of tape reels. A.C. mains 200/250V. Leaflet S.A.E. **£4.35** Post 40p

WAFER HEATING ELEMENTS

OFFERING 1001 USES for every type of heating and drying applications in the home, garage, greenhouse factory (available in manufacturing quantities) Approx size 10 1/2 x 8 1/2 x 1/4 in. Operating voltage 200/250V. a.c. 250 watts approx. Printed circuit element enclosed in asbestos fitted with connecting wires. Completely flexible providing safe Back heat. British-made for use in photocopies 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 greenhouse for seed raising and plant protection. Invaluable aid for bird houses, incubators, etc., 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.

BAKER MAJOR 12" £11-50



30-14,500 c/s. 12in. double cone, woofer 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 ohms must be stated.

Module kit, 30-17,000 c/s with tweeter, crossover, baffle and instructions. **£14-50**

Please state 3 or 8 or 15 ohms. Post 50p

BAKER SPEAKERS "BIG SOUND"

Robustly constructed to stand up to long periods of electronic power. As used by leading groups. Useful response 30-13,000 cps. Bass Resonance 55 cps.

GROUP "25" **£8.95**
12in 25 watt
3, 8 or 15 ohms. Post 50p

GROUP "35" **£10.50**
12in 35 watt
3, 8 or 15 ohms. Post 50p

GROUP "50" **£19.50**
15in. 50 watt
8 or 15 ohms. Post 90p

GROUP "50/12" **£14.50**
12in 50 watt professional model. 8 ohms or 15 ohms Post 80p

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 2/15 ohm a.c. Mains. Separate treble and bass controls. Guaranteed. Details S.A.E. **£59** Carr. £1-00

DE-LUXE MODEL IN WOOD CABINET. BLACK. #69.

NEW MODEL MAJOR 50 WATT

4 inputs, 2 way mixing, £49.95. Carr. £1. Ideal disco amp.

QUALITY LOUDSPEAKER ENCLOSURE

Teak veneered 3/4in thick wood cabinet. Size 18 1/2in x 18 1/2in x 8 1/2in. Weight 23lb. This cabinet features a wide mesh Silver Grill covering a separate compartment for mounting Tweeters or Mid-Range Horn. The fully sealed bass compartment is cut out for 6in Woofer. 27-50. Carr. 85p. Rosewood Version 28-50. Carr. 85p. Baffle could be cut for larger speaker.

3 CHANNEL SOUND TO LIGHT KIT
1,000 watts per channel. Full instructions. **£12-50**
3 way light bank. To Suit £11.60.

R.C.S. STEREO DECODER

British made. Ready aligned and tested. Complete with instructions. Size 8in x 2in. **£4-95**

WEYRAD COILS

| | | | |
|---------|-----|-----------|-------|
| P50/2EC | 40p | RA2W | 85p |
| P50/1AC | 60p | OPT1 | 65p |
| P50/3CC | 40p | LFDT4 | 65p |
| PCAL | 85p | Twin gang | £1-20 |

E.M.I. TAPE MOTOR
4 pole, 240 v. 1.35 mA. Size 3 1/2 x 2 1/2 in. 1200 rpm. Spindle 3/4in. diameter. 120v version £1. **£1-85** Post 45p

E.M.I. GRAM MOTOR
120V or 240V a.c. 2,400 rpm. 2-pole 70mA. Size 2 1/2 x 2 1/2 x 2 1/2 in. **£1-25** Post 35p

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.

Bass Resonance 45cps
Flux Density 12,000 gauss
Useful response 45-13,000cps
3 or 8 or 15 ohm models.

£10.50 Post 60p

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. Built-in concentric tweeter cone. Bass Resonance 30cps
Flux Density 14,000 gauss
Useful response 25-16,000cps
8 or 15 ohm models.

£13.50 Post 60p

SUPERB

12in. 20 watts

A high quality loudspeaker, its remarkable low cone resonance ensures clear reproduction of the deepest bass. Fitted with a special copper drive and concentric tweeter cone resulting in full range reproduction with remarkable efficiency in the upper register. Bass Resonance 25cps
Flux Density 16,500 gauss
Useful response 20-17,000cps
3 or 15 ohms models.

£17 Post 80p

AUDITORIUM 12in. 35 watts

A full range reproducer for high power. Electric Guitars, public address, multi-speaker systems, electric organs. Ideal for Hi-Fi and Discotheque. Bass Resonance 35cps
Flux Density 15,000 gauss
Useful response 25-16,000cps
8 or 15 ohms models.

£15.50 Post 80p

AUDITORIUM 15in 45 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. Bass Resonance 35cps
Flux Density 15,000 gauss
Useful response 20-14,000cps
8 or 15 ohms models.

£19.50 Post 90p

Hi-Fi Enclosure Manual containing plans, designs, crossover data and cubic tables. 68p.

CUSTOMERS FREE CAR PARK

OPEN 9-6 p.m. WEDNESDAYS 9-1 p.m., SATURDAYS 9-5 p.m. (Closed for Lunch 1.15-2.30)

SPECIALISTS 337 WHITEHORSE ROAD · CROYDON

(Export: Remit cash and extra postage.)

Buses 50, 68, 159. Rail Selhurst

Telephone 01-684-1665

Connoisseur

THE B.D.2 TURNTABLE ASSEMBLY

The famous B.D.2 belt drive turntable with press button speed change has now been developed to feature a newly designed matt and brushed aluminium trim, and the Perspex cover has an easy "hinged-on, hinged-off" movement. The B.D.2 is available as a chassis unit or spring mounted on a wood plinth, as above.



S.A.U.2 PICK-UP ARM

Recognised as one of today's most advanced pick-up arms it features

- * Auto-bias Compensator
- * Hydraulic Lowering Device
- * Precision Balance
- * Adjustable Head Shell



S.C.U.1 STEREO CARTRIDGE

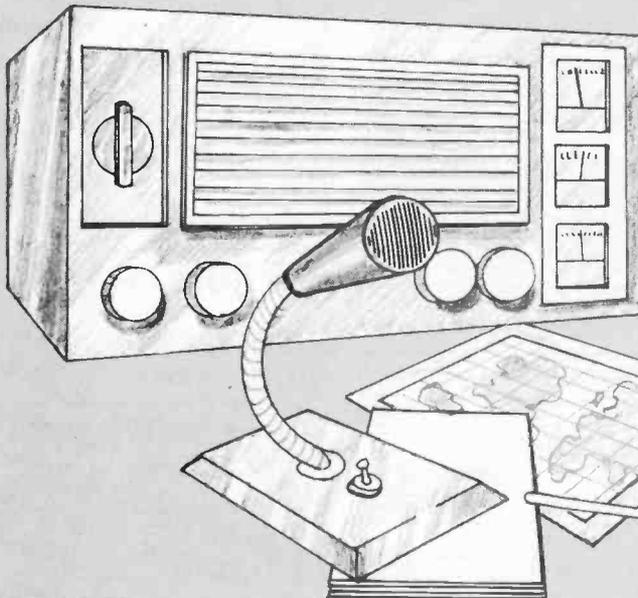
A quality cartridge designed specifically for the person who appreciates his equipment.



Contact your dealer for information or send stamp for a brochure.

A. R. SUGDEN & CO. (ENGINEERS) LTD

Atlas Mill Road, Brighouse HD6 1ER Telephone: Brighouse (04847) 2142. Telegrams and cables: Connoisseur, Brighouse



Become a radio amateur.

Learn how to become a radio-amateur in contact with the whole world. We give skilled preparation for the G.P.O. licence.

Free!

Brochure, without obligation to:
BRITISH NATIONAL RADIO & ELECTRONICS SCHOOL, Dept. EB115
P.O. Box 156, Jersey, Channel Islands.

NAME _____

ADDRESS _____ Block caps please

TELEVISIONS AND SPARES TO THE TRADE

MONOCHROME TELEVISIONS

BBC 2 Dual Standard TVs (19in. 23in) in batches of 10—£3 each (makes include Bush, Thorn, Philips, Pye/Ekco, Baird). Many with transistorised tuners. GEC 2000, Thorn 950 series, Bush 141, Philips Style 70, Baird 600 and 700 series all at £8 each. Thorn 1400, Bush 160/170 series, Philips 210, Pye-Ekco Olympic, etc., Baird 673, Push Button—all at £12-50 each. 20in and 24in square screen Dual Standard sets—Thorn, GEC, etc., 20in—£15, 24in—£16-50. 20in and 24in Single Standard Thorn 1500, GEC, Bush Acoustic, 20in—£19-50, 24in—£22.

- (1) Discounts for quantities. (2) All monochrome spares supplied free of charge. (3) All tubes guaranteed. (4) All cabinets very good. (5) All sets "walk and talk". (6) All sets guaranteed complete inside and out. (7) Delivery and VAT extra.

COLOUR TELEVISIONS

Colour TVs 19in and 25in. Makes include Thorn 2000, Bush CTV25, Decca CTV 19/25in, Pye-Ekco, Baird 700 and 710 series, Philips G6, GEC 2028. All sets guaranteed complete inside and out—cabinets first class and tubes guaranteed. From £65 each. 20in and 22in Colour Televisions are always available in varying quantities—please telephone for availability and cost.

Please Note: (1) We deliver anywhere by our own transport. (2) All goods are blanket wrapped in our vans. (3) All orders with half deposit, balance on delivery after inspection. (4) Cheques most welcome. (5) Any quantity supplied. (6) We do not sell rubbish, and we stand by our guarantees. (7) We aim to please. (8) All spares supplied free of charge (mono only). N.B. Special arrangements for delivery to North and South Ireland and world-wide exports orders welcomed.

TEST BENCH FACILITIES ALWAYS AVAILABLE

WORLD WIDE DELIVERIES OF TVs, SPARES

MISCELLANEOUS ITEMS

Large quantities of stereograms, fridges, deep freezers, Hoovermatics, radios, etc., always at hand—prices on request.

Colour All dual standard £5 plus £1 P. & P. **SCAN COILS** All makes £2 inclusive. **Mono**

All colour valves 40p each plus 5p P. & P. per valve. All mono valves 10p each plus 2p each P. & P.

TUBES 19in—£15, 22in—£22, 25in—£20 (post. insurance, packing £5). 19in—£4, 20in—£5-50, 23in—£5, 24in—£7 (post. insurance, packing £3-50).

CABINETS 19in—£12, 22in—£16, 25in—£14 (post. insurance, packing £5). All cabinets—£5 including post. insurance, packing.

LOPTs All dual standard colour £5-50 plus £1 P. & P. All makes available. All dual standard mono £2-50 plus £1 P. & P. All makes available.

PLEASE ALLOW 2 WEEKS DELIVERY. S.A.E. PLEASE FOR ENQUIRIES. ALL STOCK EX-EQUIPMENT

BARCLAYCARD, ACCESS AND PROVIDENT WELCOME

TRADE DISTRIBUTORS

EMPIRE BUILDINGS, CHELTENHAM PARADE, HARROGATE, YORKSHIRE

Telephone: (STD 0423) 3498 and 62347

Colour IF, Decoder and Convergence—frame IF, Line timebase £3 plus £1 P. & P. All output for all dual standard models dual standard models in stock. from £7-50 plus £1-50 P. & P. All models available.

SLOT METERS

10p meters—£1-50 each including postage and packing.

SPEAKERS

6in x 4in, 5in Round, 8in x 2in 30p each plus 10p P. & P.

MAIL ORDER SERVICES

BLACK/WHITE TELEVISIONS

Working: 19in—£12-50, 23in—£15, 20in—£25, 24in—£29-50.

Untested (but guaranteed complete with good tubes): 19in—£4, 23in—£5, 20in—£15, 24in—£19.

(Postage, packing and insurance £4-50 each, prices include VAT.)

N.B. All tubes guaranteed

COLOUR TELEVISIONS

Working: 19in—£85, 22in—£125, 25in—£130.

Untested (but guaranteed complete with good tubes): 19in—£70, 22in—£90, 25in—£95.

(Postage, packing and insurance £9 each; prices include VAT.)

Thorn 2000, Bush CTV25, Philips G6, GEC2028, Baird 700, Decca CTV25

MAIL ORDER SPARES. Special Offer—Brand new spares:

BRC 2000 panels, video, convergence, and regulator—only £12-50 plus £1-50 P. & P.

Bush CTV 25 Line timebase-tower unit including LOPT and valves Mk. I and II only—£18 plus £3 P. & P.

BRC single standard colour 4 button tuners colour and mono—£7-50 plus £1 P. & P.

UHF Vari-cap tuner units—£6-50 plus £1 P. & P.

VHF Vari-cap tuner units—£7-50 plus £1 P. & P.

Pye-Ekco CTV Tripler units—£6-25 plus 75p P. & P.

Philips G8 Tripler units—£7-50 plus 75p P. & P.

KB VC Series LOPT £2-50 including P. & P.

Bush 125 and 135 IF PANELS—£3-50 plus 75p P. & P.

Thorn 850 IF Panels—£2-50 plus £1 P. & P.

GEC 2000 IF Panels—£3-50 plus £1 P. & P.

EX-EQUIPMENT TUNERS:

Colour:

All dual standard colour push button—rotary and integrated models in stock from £4-50 plus £1 P. & P.

Mono:

All VHF tuners available from £2 plus £1 P. & P.

All UHF tuners for dual standard models in stock. Push button—£4-50 plus £1-50 P. & P.

Rotary—£2-50 plus £1 P. & P.

Integrated (UHF and VHF) £4-50 plus £1-50 P. & P.

Comprehensive list of capacitors, resistors, etc., too numerous to mention. Prices on request.



SCREWS

WASHERS, NUTS, ETC.

BARGAIN PACK FOR HOME CONSTRUCTOR
100 assorted steel screws, nuts and washers—various BA sizes and lengths—all plated for rust prevention £1-50 or 10 bargain packs for £13-50.

Packs of 10 individual parts:

| Length | 2BA | 4BA | 6BA |
|---------------|-----|-----|-----|
| 1in. | 10p | 7p | 7p |
| 1 1/4in. | 10p | 8p | 8p |
| 1 1/2in. | 12p | 10p | 10p |
| Nuts | 5p | 7p | 5p |
| 5/16p washers | 2p | 2p | 2p |
| Plain washers | 5p | 5p | 4p |



Also available 10A terminal blocks 3-way moulded pvc 250V a.c. wkg., 10p each. Panel mounting variable transformers 0-9A output complete with knob and dial, £7-50 each. Terms: C.W.O. only. P. & P. 20p up to £5; 50p up to £10; 75p above £10. Please add 8% VAT to total. Phone: 023-063 542.

INSTRUMENT ENGINEERING

High Street, Riseley, Bedford, MK44 1DX

BELLARD DISCO-LITE UNIT

- SEQUENCE
- SOUND TO LIGHT
- STROBE
- SOUND SEQUENCE
- SPOT FACILITY
- LAMP TESTER
- BREAKDOWN OVERRIDE FACILITY



● ONLY £85 + VAT (8%)
CARRIAGE FREE

S.A.E. FOR DETAILS

BELLARD ELECTRONICS

BELLARD HOUSE
BELLARD DRIVE
CHESTER Tel. Chester 43671

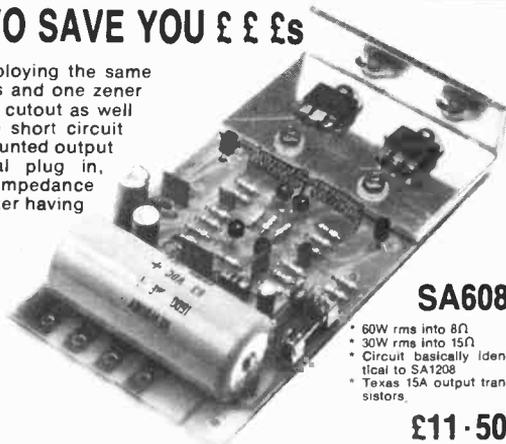
SAXON ENTERTAINMENTS LTD.

NEW PROFESSIONAL QUALITY MODULES TO SAVE YOU £ £ £s

THE NEW POWER AMPLIFIERS

Three brilliant new power modules employing the same circuitry use 10 transistors, three diodes and one zener diode, with electronic over temperature cutout as well as normal thermal protection, load line short circuit and wrong load protection, integrally mounted output capacitor, etc. Fused supply terminal plug in, solder or screw connections. The input impedance is high enough to accept all types of mixer having an output of 250mV or higher.

- * NEW 90°C overtemperature electronic cut-out, not mechanical.
- * NEW integral output capacitor means no external components normally required.
- * Short circuit load line type protection with twin summing amplifiers.
- * Inherently open circuit proof.
- * Input sensitivity -10dBm (240mV into 100k) permits use with most mixers.
- * Frequency response 20Hz-40kHz ± 1dB.
- * Distortion typically 0.4%. Noise -80dB.
- * Compact: only 15cm x 8cm x 3cm.
- * Suitable for all public address, discotheque, and group applications.
- * Fused supply terminal.
- * Single supply line (split supply not required).



SA608

- * 60W rms into 8Ω
- * 30W rms into 15Ω
- * Circuit basically identical to SA1208
- * Texas 15A output transistors.

£11.50

CONSTRUCTIONALLY AND ELECTRONICALLY IMPROVED: MULTIPLE TESTED: GUARANTEED

SA1208

120W rms into 8Ω, or 60W rms into 15Ω. Glass fibre pcb for strength and hard wear. 15A output transistors.

£16.00

SA308

30W rms into 8Ω, or 15W rms into 15Ω. Circuit is basically identical to that of SA1208. 10A "Plastic Power" output transistors, etc.

£9.00

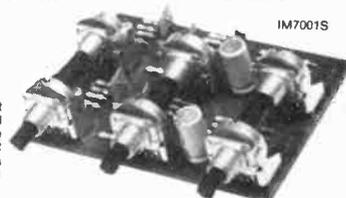
THE NEW POWER SUPPLIES

One piece units, ready to wire assembly with integral glass fibre pcb, size 10 x 8 x 10cm (PM1201 10 x 8 x 13cm). Grain oriented laminated transformers are used for compactness. Also facilities for preamp supply. Fully fused.

| | | |
|--------|--------------------------|---------------|
| PM1201 | 95V for one SA1208 | £11.00 |
| PM1202 | 95V for two SA1208 | £14.00 |
| PM601 | 65V for one or two SA608 | £9.00 |
| PM301 | 45V for one or two SA308 | £7.50 |

MODULAR PRE-AMPS

Mono and Stereo
Up to 20 x IM17001 input modules may be used with mixer module IM17002. Each input module has various types of equalisation and monitor path outlets.



IM7001S

* With equalisation to suit ceramic AND magnetic cartridges, low and high imp. mic. and all musical instruments. * Mono and stereo. * Mono module may be matrixed into a stereo system. * Carbon film resistors in low noise circuitry. * 20Hz-50kHz ± 1dB response. * Wide range bass and treble controls—zero noise with volume at min. * For 18V operation. * Outputs for monitoring and echo send. * May be used with the discotheque mixers and Minotaur amplifiers.

IM7001M (mono) £5.50

IM7001S (stereo) £9.00

IM7002 MIXER MODULE with output suitable for most amplifiers PLUS full 500mW of monitoring power.

- * Accepts up to twenty IM7001 input modules.
- * Mono or stereo.
- * Up to 3V output—will feed loads down to 600 ohms.
- * Up to 1W into 8Ω for monitoring (will feed higher impedance).
- * Accepts echo and other effects send and return signals.

IM7002M (mono) £5.50

IM7002S (stereo) £9.00

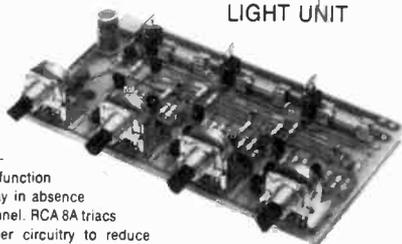
SAXON SUPERFECT

(illustrated)

All these features in ONE UNIT:

No other commercially available module to our knowledge, offers all these facilities in one complete unit.

Sequential display with variable speed, frequency dependent channels—individually fused, and continuously variable function control to give uninterrupted light display in absence of signal. Electronic override on each channel. RCA 6A triacs handling 1,000W per channel, plus timer circuitry to reduce "flicker". Individually controlled bass middle and treble plus master audio control for ease of adjustment.



LIGHT UNIT

£19.75

SAXON SOUND-LITE

Our ever popular 3000 watt unit is now available in module form at only £13.50 Gives individual control of bass middle and treble plus master control for ease of adjustment. 1,000W per channel—individually fused. Negligible load on amplifier. RCA 6 AMP triacs for reliability.

£13.50

The ultimate in mixer modules

* Inputs for two decks (ceramic cartridge) plus tape, with overall bass and treble controls. * Hi/lo imp. mic. input with separate volume bass and treble controls. * Continuously variable autofade depth plus preset threshold control. * Up to 0.5W from low distortion push pull monitor amplifier. * Frequency response 20Hz-50kHz -1dB. * Low noise (-80dB) virtual earth mixing circuitry. * Low power consumption (20mA at 18 volts). * Size: mono 40 x 6 x 3cm, stereo 40 x 10 x 3cm. * Output -10dBm (240mV) suits all Saxon and most other amplifiers.

SAXON MONO AND STEREO DISCOTHEQUE MIXERS WITH AUTO FADE



MONO VERSION £18.50

STEREO VERSION £27.50

SAXON ENTERTAINMENTS LTD. 327 WHITE HORSE ROAD, CROYDON, SURREY, CR0 2HS

SYSTEM 7000

PROFESSIONAL STANDARD COMPLETE UNITS

A total range project to satisfy the most discerning

Note these compelling features:

- Stainless Steel Escutcheons†
- Totally compatible with all Saxon modules.
- Tough easily-read facia.
- Plug/socket terminations throughout.
- 100W rms into 8Ω.
- Two mixed inputs, wide range bass and treble controls.
- May be operated as a slave amplifier.
- Amazingly compact (27 x 16 x 10cm).

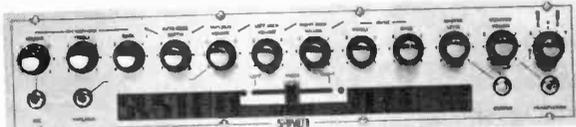


* Fully protected against all incorrect loads and short circuits.

MINOTAUR 100 £47.50

†Except Minotaur (anodised aluminium)

SYSTEM 7000 DISCO CONTROL UNIT



- Mono or stereo versions.
- Two deck and one tape inputs, individually controlled plus deck fader (ineffective in central position).
- Wide range bass and treble controls plus separate mic. vol. bass and treble controls. Overall master control.
- Continuously variable autofade depth and threshold.
- Five position monitoring switch with two mute positions—ample headphone power.
- Noise -80dB response 20Hz-50kHz ±1dB.
- Complete, cased with all terminations by plug socket, etc.

MONO VERSION £28.50

STEREO VERSION £45.00

SYSTEM 7000 MODULAR MIXING

COMPLETE VERSIONS OF THE IM7001 AND IM7002 modules shown in our advertisement.

Let you make a professional quality versatile mixer to your requirements using these modules. Mono and stereo inputs may be combined.

- The mixing modules split mono signals.
- Each input module has own monitor switch.
- Stainless steel panel on 15 x 5cm matrix (approx.).
- Input equalisation for all types of signal inc. magnetic cartridge.
- Complete system may comprise twenty channels, mono or stereo with ample monitoring power.
- May be patched in with disco mixers or Minotaur amplifier.
- Echo send/return facility.



MONO INPUT MODULE £8.50

STEREO INPUT MODULE £12.00

MONO MIXER MODULE £8.50

STEREO MIXER MODULE £12.00

POWER SUPPLY UNIT FOR UP

TO 20 MODULES £7.50

SYSTEM 7000 LIGHTING CONTROL UNIT

1,000W per channel. Sound light and SEQUENTIAL and

OVERRIDE

Individual bass, mid. and treble controls.

Master control.

Plug/socket terminations.

Slider control for function, for sound/light, sequencing or both combined.

Stainless steel front panel matching to disco control unit.

Compact (17 x 10 x 10cm approx.).

Electronic override eliminates clicks.

High sensitivity, negligible input power.



£35

All Saxon Modules are guaranteed for two years from date of purchase

To order, telephone 01-684 6385 now or call 01-684 0098 for more details.

WE ACCEPT TELEPHONE ORDERS FOR C.O.D. AND ACCESS/BARCLAYCARD ACCOUNT HOLDERS

If ordering by post please send cheque/crossed postal orders made payable to Saxon

Entertainments Ltd. or simply enclose your Access/Barclaycard number.

Shop hours Mon.-Sat. 9.00-5.00 p.m. Tel. 01-684 6385

All prices include postage and packing, but V.A.T. at 8% must be added to total value of order. S.A.E. all enquiries please.

Trade enquiries

Saxon products are available from Norman Rose Electrical Ltd.

Branches in:

London. Tel. 01-837 9111

Manchester. Tel. 061-273 1498

Birmingham. Tel. 021-236 4710

Bradford. Tel. (0274) 24008

BARCLAY ELECTRONICS

NOW OFFER YOU A FULL RANGE OF
ORDINARY AND SCIENTIFIC
CALCULATORS



● FULLY GUARANTEED

● AT THE BEST POSSIBLE PRICES!

| | Price incl. VAT |
|---|-----------------|
| 4 FUNCTION | £ |
| CBM 774D 7 digit, slim pocket* | 5.80 |
| SINCLAIR CAMBRIDGE 8 digit, slim pocket, constant | 10.70 |
| SINCLAIR OXFORD 100, 8 digit, constant* | 10.70 |
| 4 FUNCTION % CONSTANT | |
| DECIMO VATMAN SPY 8 digit, slim pocket* | 11.80 |
| DECIMO VATMAN 8 digit, green display | 12.40 |
| CBM 385R 8 digit rechargeable | 10.40 |
| CBM 866R 8 digit, green display, rechargeable | 14.80 |
| ROCKWELL 8R 8 digit, constant* | 9.20 |
| 4 FUNCTION, STORE MEMORY, % | |
| CBM 776MD 7 digit, pocket slim* | 6.80 |
| CBM GL976MR 7 digit, green display, rechargeable | 13.25 |
| ROCKWELL 18R Store memory, constant* | 11.50 |
| 4 FUNCTION, FULL MEMORY, CONSTANT | |
| SINCLAIR CAMBRIDGE MEMORY 8 digit, pocket slim | 14.55 |
| SINCLAIR OXFORD 200 8 digit, %* | 16.25 |
| CBM 887D 8 digit, factor exchange, %* | 11.50 |
| CBM2GL987R 8 digit, %, factor exchange, green display, rechargeable | 17.60 |
| DECIMO VATMAN MEMORY 8 digit, green display, % factor exchange | 20.50 |
| ROCKWELL 20R 8 digit, %* | 14.00 |
| ROCKWELL 21R 8 digit, %, rechargeable | 17.50 |
| DECIMO COUNTER SPY 8 digit, %, pocket slim mini* | 16.95 |
| SEMI-SCIENTIFIC FULL MEMORY | |
| DECIMO SUPER VATMAN 8 digit, green display, \sqrt{x} , x^2 , factor exchange, % reciprocals* | 21.50 |
| CBM 989 8 digit, green display \sqrt{x} , x^2 , factor exchange, % reciprocals, rechargeable | 23.50 |
| ROCKWELL 30R 8 digit, \sqrt{x} , x^2 , factor exchange, %, reciprocals* | 15.90 |
| ROCKWELL 31R As 30R but rechargeable | 19.30 |
| TEXAS SR11 8 digit, 2 exponent, \sqrt{x} , x^2 , reciprocal, factor exchange (no memory), rechargeable | 34.50 |
| DECIMO SUPER SPY 8 digit, \sqrt{x} , x^2 , factor exchange, reciprocals, %, pocket slim mini* | 18.95 |
| SCIENTIFICS, ALGEBRAIC LOGIC, DUAL FUNCTION KEYS | |
| SINCLAIR OXFORD 300 5 digit, 2 exponents, trig, log, π , \sqrt{x} , reciprocals, x^2 , memory* | 26.50 |
| DECIMO 2001 8 digit, trig, log, π , \sqrt{x} reciprocals, memory, memory exchange, y^x , e^x , x^y , degrees, radians, pocket slim* | 31.00 |
| DECIMO VATMAN SCIENTIFIC, as 2001 but large green display | 31.00 |
| DECIMO SCIENTIFIC SUPERMAN 8 digit, 2 exponents, log, 1 memory, 1 memory store, y^x , e^x , reciprocals, \sqrt{x} , x^2 , pocket slim* | 29.50 |
| CBM SR6120R 8 digit, 2 exponents, trig, log, π , \sqrt{x} , reciprocals, e^x , x^y , (parenthesis), exponent shift, mean and standard deviation, polar rectangular, co-ordinates, rechargeable, 2 memory stores | 34.50 |
| ROCKWELL 61R 8 digit, large green display, trig, log, π , \sqrt{x} , reciprocals, memory, e^x , y^x , x^y , $M \div x^2$, factor exchange, memory exchange, degrees, rad, rechargeable | 34.95 |
| ROCKWELL 63R 8 digit, 2 exponent, same as 61R but in addition 2 level parenthesis, rechargeable | 39.50 |
| TEXAS SR16 8 digits, 2 exponent, logs, store memory, y^x , \sqrt{x} , x^2 , reciprocals, factor exchange, rechargeable | 39.50 |
| TEXAS SR50A 10 digit, 2 exponent, trig, log, π , \sqrt{x} , x^y , reciprocals, x^2 , store memory, degree, rad, hyperbolic, factor exchange, y^x , e^x , factor key, rechargeable | 47.70 |
| TEXAS SR51 Same as SR50A but in addition has mean variance and standard deviation, 3 memories, %, permutations, linear regressions | 70.30 |
| SCIENTIFICS, ALGEBRAIC LOGIC, SINGLE FUNCTION KEYS | |
| DECIMO 2001E 10 digit, 2 exponents, trig, log, π , \sqrt{x} , reciprocals, memory, degrees, rads, y^x , x^y , memory exchange, hyperbolics, pocket slim* | 40.60 |
| CBM SR4148R same as SR120R but in addition has 10 digits, 2 exponents, 2 store memory and single function keys | 44.50 |
| SCIENTIFICS, REVERSE POLISH LOGIC—SINGLE FUNCTION KEYS | |
| SINCLAIR SCIENTIFIC 5 digit, 2 exponents, trig, log, slim pocket, dual function NOVUS (BY NATIONAL SEMI-CONDUCTORS) | 16.40 |
| 6010 8 digit, trig, log, x^2 , \sqrt{x} , π , x^y , reciprocals, memory | 29.95 |
| 4510 | 37.50 |
| 4515 102 step programmable | 79.95 |
| 6020 | 49.95 |
| 6030 | 49.95 |
| 6035 | 84.95 |
| HEWLETT PACKARD | |
| HP21 | |
| HP35 | |
| HP45 | |
| HP55 | |
| HP65 | |

PLEASE SEND S.A.E. FOR NEW LOW PRICES

*These models employ ordinary batteries but mains adaptors are available, as an optional extra.

DECIMO ADAPTOR £3.00

SINCLAIR OXFORD ADAPTOR £2.95

CBM ADAPTOR £2.70

Please add the correct amount to total if adaptor is required.

NOTE—All rechargeable machines supplied complete with nicad

batteries and chargers for the stated price.

All prices include V.A.T. at 8% and although correct at time of going

to press, may be subject to alteration without notice.

PHONE CALLS AND PERSONAL CALLERS WELCOME

MONDAY-THURSDAY BETWEEN 2 and 5 p.m.

To BARCLAY ELECTRONICS, 1115 Finchley Rd., London, N.W.11
Please send me of model(s)
with/without optional mains adaptor. I enclose cheque/money order
total value £..... which includes 50p insured post and
packing charge.

NAME

ADDRESS

Don't miss your copy of HENRY'S NEW 1975 CATALOGUE

only
50p
Plus 20p
P&P



- ★ OVER 5,000 ITEMS - largest UK range of electronic components for home constructors.
- ★ 200 PAGES - every aspect of electronics and components for amateurs and hobbyists - kits, projects, test gear.
- ★ DOZENS of new lines and new ranges.
- ★ MANY price reductions throughout the new Catalogue.
- ★ A Discount Voucher with every copy, worth 50p.

Now 231 TOTTENHAM COURT ROAD, W1
open: 94/96 Upper Parliament Street, Nottingham

Write now for your copy, enclosing 70p remittance

ELECTRONIC FOOTBALL AND TENNIS WITH THE FABULOUS VIDEO SPORT ON YOUR OWN TV

Play three exciting electronic ball games. FOOTBALL, TENNIS, HOLE IN THE WALL on your own TV! Just plug Video Sport into the aerial socket of your TV and away you go. Completely safe for you, your children and your TV. Mains operated.



OUR INCREDIBLE PRICE
£29.50 incl. VAT
NOW AVAILABLE AS A KIT **£19.50**
Demonstrations now in all CENTRES!

AM/FM MODULES

LP1179 LP1171

Combined AM/FM tuner modules. Together with a small number of R's and C's and Ferrite Aerial, make up a sensitive FM/MW/LW tuner. 6 Volt supply, supplied with date and circuit sheets.

LP1171 combined IF strip £4.80.
LP1179 FM front end and AM gang £4.60.
£8-82 the pair.
Suitable Ferrite aerial 87p.



UHF TV TUNERS

625 line receiver UHF transistorised tuners U.K. operation. Brand new (Post/packing 25p each).
TYPE A variable tuning slow motion drive £3.50.
TYPE B 4-button push button (adjustable) £4.60.
TYPE C variable tuning £2.90.
TYPE D 6-button UHF/VHF tuner £5.20

BUILD THE TEXAN + FM TUNER TEXAN 20 + 20W STEREO AMP

Features glass fibre PC board, Gardners low field transformer, 6-1.C.s., 10-transistors plus diodes, etc. Designed by Texas Instruments engineers for Henry's and P.W. 1972. Overall size 154 x 21 x 6 1/2in. Mains operated. Free teak sleeve with every kit.



£29.95
(carriage 50p)
(also built and tested
£39.95).

HENELEC STEREO FM TUNER

Features capacity diode tuning, lead and tuning meter indicators, mains operated, High performance and sensitivity. Overall size in teak sleeve 6 x 2 1/2 x 6 1/2in. Complete kit with teak sleeve.

£26.25 (carriage 50p)
(also built and tested £31.20).

JOIN THE LARGE BAND OF CONSTRUCTORS!

GARRARD CT4

SPECIAL OFFER—STEREO CASSETTE TRANSPORT MECHANISM

Features: Stereo heads *Built in motor stabiliser. *Auto stop + eject. *Pause control. *12V d.c. operation. 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. Suitable for the PW Ascot Stereo Cassette Deck.



£13.50 INCL. VAT P. & P. 35p

AWO 9 MOVEMENTS

NEW CONDITION

£6.50, inc. VAT

ALL PRICES INCLUSIVE
OF VAT

HENRY'S

Electronic Centres
404-406 Electronic Components & Equipment 01-402 8381
354 Pa-Disco Lighting High Power Sound 01-402 5854
303 Special offers and bargains store
231 Tottenham Court Road, W1
94-96 Upper Parliament Street, Nottingham
All mail to 303 Edgware Road, London W2 1BW
Prices correct at time of preparation. Subject to change without notice. E & O E

Hi-Fi and
Electronics
Centres Open
9am - 6pm



Build yourself a Teletext Decoder

— exclusive constructional design

Teletext is the unified version of the CEEFAX and ORACLE information systems operated by the BBC and IBA. It brings over 50 pages of information to your TV screen, including news, weather reports, sports results and topical events. To receive Teletext a special decoder is necessary. At the moment these are not generally available so our constructional feature is yet another Wireless World design scoop. Don't miss the first part in this issue.

Wireless World

November issue Out now 35p

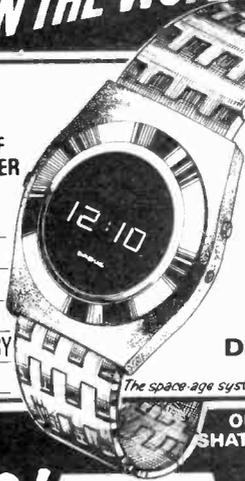
A TECHNOLOGICAL MIRACLE DEVELOPED BY U.S. SPACE SCIENTISTS!

NOW YOU CAN JUDGE FOR YOURSELF WHETHER OR NOT THIS

MAKES VIRTUALLY EVERY OTHER TYPE OF WATCH IN THE WORLD OBSOLETE!

THE GREATEST HOROLOGICAL ADVANCE SINCE THE INVENTION OF THE CHRONOMETER

THE SYSTEM EXCELLED IN ACCURACY ONLY BY THE ATOMIC FREQUENCY STANDARD!



ELECTRONIC QUARTZ CRYSTAL WRIST WATCH WITH L.E.D.

'COMPUTER DIGITAL READ OUT'

FEATURED ON TV!

FROM WORLD FAMOUS MAKERS! The greatest Watch offer since time began! Everyone who sees it is fascinated by it! It's unbelievable! At the touch of a button, through the sub-atomic miracle of the L.E.D. which converts electrical energy into light to give you continuously changing hours, minutes and pulsating seconds instantly displayed on the ruby red time screen like a continuously changing TV picture! Clearly visible Day or Night! Now (just like your favourite "Telly" cop) YOU can join the elite few—the proud owners of a watch that is utterly different from any other timepiece you've ever known! THEY'RE NEWS! THE WATCH OF TOMORROW-TODAY! AND you buy at a price that's just a fraction of what you could have paid! But remember—you can only buy at this amazing price from Shopertunities. ★ UNBELIEVABLY ACCURATE TO WITHIN SECONDS A YEAR! The system excelled in accuracy only by the Atomic frequency standard! Now TIM can phone you for a time check! ★ NO MOVING PARTS! ★ NO MAINTENANCE! ★ ABSOLUTELY SILENT! ★ BUILT TO GIVE A LIFE-TIME OF SERVICE! ★ 18CT GOLD PLATED CASE! ★ BRAND SPANKING NEW ADVANCE 1975 MODEL! WRITTEN GUARANTEE. Developed from the fantastic "space-age" techniques that first put men on the moon, this incredible watch is based on the natural action of Quartz Crystal, that vibrates approx. 32,768 times per second! A veritable miracle of micro-circuitry! You could even spend up to £200 or more for a Quartz Crystal watch! OUR fantastic cash price for this masterpiece, complete in handsome presentation case, is ONLY £43.95, registered post, pack, etc. 55p, matching adjustable safety bracelet £2.50 extra. Send quickly and test for yourself on 7 days mail order approval from receipt of goods. REFUND IF NOT DELIGHTED. Please hurry! Limited quantity! THIS is the greatest investment you'll EVER make! Or call at either store and see this fabulous watch for yourself! At this price you just can't lose!

SAVE UP TO £153!

ELSEWHERE YOU COULD PAY UP TO £200 OR MORE FOR THIS INCREDIBLE NEW SPACE-AGE TYPE OF WATCH!

OUR WORLD SHATTERING PRICE ONLY

£43.95

REGISTERED POST PACK ETC. 55p

Order by post to Uxbridge Road, or call at either store

★ ACCESS & BARCLAYCARDS WELCOME— PLEASE STATE NUMBER WHEN ORDERING BY POST!

COMMERCIAL TRAVELLERS PLEASE NOTE Merchandising office at Holborn.

SEND OR CALL

SHOPERTUNITIES LTD

Dept. PE/43, 164 UXBRIDGE ROAD (facing Shepherds Bush Green), LONDON W12 8AQ. (Thurs. 1, Fri. 7). Also at 37/38 HIGH HOLBORN (opposite Chancery Lane), LONDON, W.C.1. (Thurs 7 p.m.) BOTH OPEN FROM MONDAY TO SATURDAY FROM 9 A.M. TILL 6 P.M.

THE RADIO SHOP

16 Cherry Lane, Bristol BS1 3NG
Tel.: Bristol 421196. STD Code 0272

Your West Country shop for electronic components and solid state devices

| THYRISTORS | | | | | | |
|------------|------|------|------|------|------|------|
| PIV | 1-6A | 4A | 6A | 8A | 10A | 16A |
| 50 | 0-25 | 0-26 | 0-37 | 0-41 | 0-45 | 0-50 |
| 100 | 0-28 | 0-30 | 0-42 | 0-47 | 0-50 | 0-58 |
| 200 | 0-31 | 0-36 | 0-50 | 0-59 | 0-65 | 0-72 |
| 400 | 0-40 | 0-57 | 0-77 | 0-85 | 0-97 | 1-15 |

| TRIACS | | | | | | |
|--------|------|------|------|------|------|------|
| PIV | 1-6A | 3-5A | 6A | 8A | 10A | 15A |
| 100 | 0-28 | 0-52 | 0-61 | 0-68 | 0-72 | 0-80 |
| 200 | 0-29 | 0-56 | 0-65 | 0-76 | 0-76 | 1-02 |
| 400 | 0-38 | 0-67 | 0-70 | 0-85 | 0-99 | 1-51 |
| 600 | 0-45 | 0-68 | 0-76 | 1-06 | 1-24 | 1-84 |

TRIACS WITH INTERNAL TRIGGERS

| PIV | 1-6A | 3-5A | 6A | 8A | 10A | 15A |
|-----|------|------|------|------|------|------|
| 100 | 0-28 | 0-52 | 0-65 | 0-68 | 0-72 | 0-88 |
| 200 | 0-30 | 0-67 | 0-68 | 0-76 | 0-76 | 1-02 |
| 400 | 0-39 | 0-68 | 0-72 | 0-88 | 1-04 | 1-52 |
| 600 | 0-50 | 0-84 | 0-88 | 1-10 | 1-31 | 1-89 |

Quantity prices on application S.A.E.
Diacs for use with triacs 23p.

THYRISTORS C106 SERIES 4 AMP

50V 32p; 100V 37p; 200V 46p; 400V 56p; 600V 70p.

INTEGRATED CIRCUITS

| | | | |
|--------------|--------|------------|------|
| TAA 550 TO18 | 54p | 709 14 pin | 27p* |
| TAA 263 TO18 | 82p | 741 8 pin | 35p* |
| TBA 810AS | £1-08* | 748 14 pin | 50p* |
| ZN 414 TO18 | 75p* | 723 14 pin | 67p |

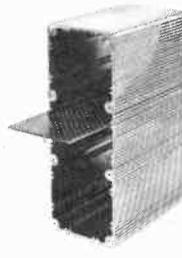
CLOCK CHIPS

| | | | |
|----------------|-------|------------------|-------|
| CT 7001 28 pin | £4-95 | AY-5-1224 16 pin | £3-75 |
| 28 pin skt. | 55p | 16 pin skt. | 16p |
| Data | 15p | Data | 15p |

7 SEC. LED DISPLAYS 0.3 in high.
704 £1; 707 Common Anode 90p
EVERY DAY ELECTRONICS TEACH IN KIT
OCTOBER '75, £16 INC. VAT, P & P 50p

Catalogue 20p post paid.
*Please add 25% VAT. Remainder Add 8%
Postage and packing 20p per order
Phone in your Access and Barclaycard order
Callers welcome

verobox



ALUMINIUM ENCLOSURES

- 6 standard sizes available from your local retailer.
- Made from precision extrusions with integral board guide slots.
- Finned sides improve appearance and radiate heat.
- Parallel sides for ease of component mounting.



VERO ELECTRONICS LTD.
Eastleigh, Hants. SO5 3ZR
Tel.: Chandler's Ford 2952 Telex: 47551

Subsidiaries and Agents
throughout the World

INTERNATIONAL TRANSISTOR SELECTOR

Over 10,000 USA, EURO., JAP., BRITISH TRANSISTORS, ELECTRICAL, MECHANICAL SPECIFICATIONS, MANUFACTURERS AND AVAILABLE SUBSTITUTES

by T. D. Towers, M.B.E. Price £3.40

PRINCIPLES OF TRANSISTOR CIRCUITS

by S. W. Amos Price £3.45

R.C.A. SOLID STATE HOBBY CIRCUITS

Price £1.20

RADIO CONTROL FOR MODELS

by R. H. Warring Price £5.80

DIGITAL ELECTRONIC CIRCUITS AND SYSTEMS

by N. M. Morris Price £2.50

RADIO SERVICING POCKET BOOK

by V. Capel Price £2.15

★ PRICES INCLUDE POSTAGE ★

THE MODERN BOOK CO.

BRITAIN'S LARGEST STOCKIST
of British and American Technical Books

19-21 PRAED STREET
LONDON W2 1NP

Phone 01-723 4185

Closed Saturday 1 p.m.

Practical Electronics Classified Advertisements

RATES: 13p per word (minimum 12 words). Box No. 35p extra. Semi-Display £10.00 per single column inch. Advertisements must be prepaid and addressed to Classified Advertisement Manager, "Practical Electronics" IPC MAGAZINES LTD., Fleetway House, Farringdon Street, London EC4A 4AD. Tel. 01-634 4451.

RECEIVERS AND COMPONENTS

R.T. SERVICES (MAIL ORDER ONLY)

77 Hayfield Rd., Salford 6, Lancs.

Tapped Auto Transformer, 240V-110V, 80 watts, £2 P.P. New.

Tapped Auto Transformer, 240V-115V, 200 watts, £4-50 P.P. New.

100 Watt Valve Output Transformer. KT88s, etc. 8 or 150 or 100 volt line output, £13-60 P.P.

FM Tuner with R.F. Stage and A.G.C., 3 transistors, neg. earth, 2½ x 2 x 1½ in. with circuit, £1-54 P.P.

Crouzet Geared Motors, 30 r.p.m. New, £1-75 P.P.

UHF TV Tuners, Transistorised, £2-10 P.P. Panels with I.C.'s on 8½p per I.C. min. order 10 I.C.'s.

Transformers, 7.5V + 7.5V ¼A, £1-12 inc. P.P. 12-0-12V, 100mA, £1-25 inc. P.P. 9-0-9V, 100mA, £1-25 inc. P.P. 29V 50mA, 95p inc. P.P. 6-0-6V, 100mA, £1-25 inc. P.P.

Transformer, 24 volt, approx. 1 amp + 6-3V CT approx. 500mA, £1-60 inc. P.P.

Transformer, 20 volt, 1 amp, £1-40 P.P.

Transformer, 45 volt, 2 amp, £3-38 P.P.

P.C. Board, S/S, 5½ x 5½ in, 10 for £1-10 P.P. Transistorised Timer. Variable delay. 110 or 250V A.C. input. With instructions.

Brand new, £2-25 inc. P.P. Size 3" x 2" x 2". Power Unit Components Transformer. 18 volt 1 amp F/W bridge rectifier, 2.1250 mfd capacitors, all new £1-60 per kit. P.P.

Electrolytic Capacitors, 4,000 MF, 50VW, 4½ x 1½ 90p. inc. P.P.

Mixed Pack of C280 series Mullard capacitors. 100 for £1-30 inc. P.P.

VALVES, RADIO, TV, TRANSMITTING, INDUSTRIAL. 1930 to 1975. 2,200 types in stock, many obsolete. List 20p. Quotation S.A.E. Postal export service. We wish to purchase new and boxed valves. Dealers, wholesalers, etc., stocks purchased. GOX RADIO (SUSSEX) LTD., The Parade, East Wittering, Sussex. Tel. West Wittering 2023.

Bank of 20 Neons 74p (16p). 5 Figure Resettable Counter 18/22V works on 12, £2-50 (45p). Box with 20 x LA2 Pot Cores + 20 x 1% Caps £1-75 (75p). Copper Clad Pax Panels 5½ x 5½ in. 6-70p 12 x 12 in. 75p; 6 x 9½ in. 75p; 8 x 9½ in. 3-41p; Fibre Glass Disco 12½ x 7 in. 90p; 18 x 4 in. 85p; 7 x 8 in. 60p; 1½ x 1½ in. £1-75. All C.P. 74 Series ICs on Panels, 10-85p (10p). Three Transistor Audio Amp. Transistors Equiv. to AC128, OC274 40p (10p). 3-£1, c.p. T.V. Convergence Panels 2 x AC128, 3 slugged coils, 3 slide switches, 11 W. V. pots, 3 carbon presets, 2 ferrite chokes, etc. £1-30, c.p. Bank of 5 Neons with 5-C407 driver transistors. 35p (10p). Talking Page Panel 2 pots, 12 silicon transistors and 5 C.R. 8 nice electrolytics 80p (15p). Valupaks P3. 10 silicon diodes 650V. 1½A on tagboard 50p (10p). P6. 10 assorted small presets 50p (10p). P9 100 5/Mica Caps 35p (10p). P11 100 Polystyrene Caps 80p (10p) Above Four £2, c.p. Lists 12p Refund on purchase.

7lb assorted components £2-50
3lb assorted computer panels £1-70

J.W.B. RADIO

2 Barnfield Crescent, Sale, Cheshire M33 1NL
Postage in brackets Mail order only

BARCAIN RELPAK TESTED SEMICONDUCTORS

R6.7.2N2926—Mixed 75p R7.5.BC107NPN 75p
50 Mixed CARBON FILM Resistors ¼ W Packs
R9 100-820 ohms 75p ZN 414 £1-36
R10.IK-8K2 75p IN4001 6p IN4002 7p
R11.IK-82K 75p IN4006 13p IN4148 6p
R12.100K-820K 75p TTL-74001/2/3/4 17p
Lists 25p Technical enquiries pro rata
Export enquiries welcomed. Deduct 8% VAT.
Mail Order only. Satisfaction guaranteed or
money back. P & P & VAT included

RELTRAN LIMITED (Dept PE)
P.O. Box 18, Camberley, Surrey

BETA DEVICES

MANUFACTURERS BRANDED PRODUCTS

| TRANSISTORS | I.C.'s | DIODES & RECT. |
|-----------------|------------------|-----------------|
| AC187/188 | 709C TO99 0-30 | IN914 0-04 |
| PR. | 709C D.I.L. 0-30 | 1N4148 0-04 |
| BC107/ | 741C TO99 0-38 | 0A202 0-09 |
| BC108 | 741C D.I.L. 0-38 | 1N4001/2 0-05 |
| BC109C | 723C D.I.L. 0-80 | 1N4003/4/5 0-06 |
| BC147/8/9 | 747C D.I.L. 0-85 | 1N4006/7 0-08 |
| BCY70/71/720-13 | 748C D.I.L. 0-38 | BRIDGES |
| BFX86/87/88 | | 600V 1A 0-18 |
| | 3015F 1-00 | 100V 1A 0-20 |
| BFY50 | 1-18 | 300V 1A 0-30 |
| BFY51/52 | 8G8-ATES 0-90 | 200V 25A 2-00 |
| OC28 | 0-45 | ZENERS |
| OC35 | 0-85 | D.I.L. SOCKETS |
| 2N2846 | 0-80 | 8-Pin 0-12 |
| 2N3053 | 0-14 | 14-Pin 0-12 |
| OC25 | 0-48 | 16-Pin 0-14 |
| OC36 | 0-38 | |
| TIP41A | 0-74 | Please add |
| TIP42A | 0-90 | 17% V.A.T. |
| | | 209-Red 0-17 |
| | | L.E.D. 0-08 |

C.W.O. PLUS Pp. 15p TO BETA DEVICES
4 High Bridge Street, Waltham Abbey, Essex

TURN YOUR SURPLUS capacitors, transistors, etc., into cash. Contact COLES-HARDING & CO., P.O. Box 5, Frome, Somerset. Immediate cash settlement.

LED S

| | | | | |
|-----|-----|-----|-----------------|-------|
| RED | 15p | 19p | INFRA RED | 550nm |
| G/Y | 27p | 33p | Actual lead 40p | 1-5mw |
| OR | 27p | 33p | TO48 £1-18 | |

panel clip 1p

| OPTO-ISOLATORS | SCR's | 50V | 100V | 400V |
|--------------------|-------|---------|--------|------|
| IL74 1-5kV. 150kHz | T1 | TOS 1A | 27p | 46p |
| 4350 2-5kV. 5MHz | 12-25 | T08C 3A | 27p | 36p |
| | | TRAC | TOS 2A | 400p |

Data free with all OPTO

| VOLTAGE REGS. | BRIDGE RECTS. | ZENERS BZY68 |
|------------------|------------------|----------------|
| AD181/182 40p | 2N2828(G) 12p | 2-7-33V 8p |
| AF117 20p | 2N3053 18p | NE555V 80p |
| AF124S/87 34p | N3055 41p | NE566 £1-10 |
| BC107/8/9 9p | 2N3702/3/4 12p | ZN414 £1-18 |
| BC109C 12p | 2N3903/4/5/6 18p | 7400 18p |
| BC147/8/9 10p | 2N546 35p | D.I.L. SOCKETS |
| BC157/8/9 11p | MPF102 40p | 8-Pin 13p |
| BC167/8/9 11p | 2N3619 25p | 14-Pin 14p |
| BC169C 12p | 2N3823 20p | Mica + bushes |
| BC177/8/9 17p | BR100 Diac 21p | TO3 TO88 5p |
| BC182/3/4/11 11p | IN914 3p | Dialo Pen 7p |
| BC188/7 30p | IN4001 5p | |
| BC212/3/4/12 12p | IN4002/3 6p | |
| BCY70/71/72 13p | IN4004/5 7p | |
| BF184/5 12p | IN4006/7 8p | |
| BF188/7 14p | IN448 4p | |
| BFY50/51 16p | CA47 6p | |
| BFX29 30p | CA70 OA79 8p | |
| BFX84 24p | CA81 OA80 7p | |
| BSX19/20 16p | CA81 OA85 6p | |
| OC70 10p | CA200 6p | |
| OC128 10p | CA202 7p | |
| OC274 10p | IN914 3p | |
| OC275 10p | IN4001 5p | |
| OC276 10p | IN4002/3 6p | |
| OC277 10p | IN4004/5 7p | |
| OC278 10p | IN4006/7 8p | |
| OC279 10p | IN448 4p | |
| OC280 10p | CA47 6p | |
| OC281 10p | CA70 OA79 8p | |
| OC282 10p | CA81 OA80 7p | |
| OC283 10p | CA81 OA85 6p | |
| OC284 10p | CA200 6p | |
| OC285 10p | CA202 7p | |
| OC286 10p | IN914 3p | |
| OC287 10p | IN4001 5p | |
| OC288 10p | IN4002/3 6p | |
| OC289 10p | IN4004/5 7p | |
| OC290 10p | IN4006/7 8p | |
| OC291 10p | IN448 4p | |
| OC292 10p | CA47 6p | |
| OC293 10p | CA70 OA79 8p | |
| OC294 10p | CA81 OA80 7p | |
| OC295 10p | CA81 OA85 6p | |
| OC296 10p | CA200 6p | |
| OC297 10p | CA202 7p | |
| OC298 10p | IN914 3p | |
| OC299 10p | IN4001 5p | |
| OC300 10p | IN4002/3 6p | |
| OC301 10p | IN4004/5 7p | |
| OC302 10p | IN4006/7 8p | |
| OC303 10p | IN448 4p | |
| OC304 10p | CA47 6p | |
| OC305 10p | CA70 OA79 8p | |
| OC306 10p | CA81 OA80 7p | |
| OC307 10p | CA81 OA85 6p | |
| OC308 10p | CA200 6p | |
| OC309 10p | CA202 7p | |
| OC310 10p | IN914 3p | |
| OC311 10p | IN4001 5p | |
| OC312 10p | IN4002/3 6p | |
| OC313 10p | IN4004/5 7p | |
| OC314 10p | IN4006/7 8p | |
| OC315 10p | IN448 4p | |
| OC316 10p | CA47 6p | |
| OC317 10p | CA70 OA79 8p | |
| OC318 10p | CA81 OA80 7p | |
| OC319 10p | CA81 OA85 6p | |
| OC320 10p | CA200 6p | |
| OC321 10p | CA202 7p | |
| OC322 10p | IN914 3p | |
| OC323 10p | IN4001 5p | |
| OC324 10p | IN4002/3 6p | |
| OC325 10p | IN4004/5 7p | |
| OC326 10p | IN4006/7 8p | |
| OC327 10p | IN448 4p | |
| OC328 10p | CA47 6p | |
| OC329 10p | CA70 OA79 8p | |
| OC330 10p | CA81 OA80 7p | |
| OC331 10p | CA81 OA85 6p | |
| OC332 10p | CA200 6p | |
| OC333 10p | CA202 7p | |
| OC334 10p | IN914 3p | |
| OC335 10p | IN4001 5p | |
| OC336 10p | IN4002/3 6p | |
| OC337 10p | IN4004/5 7p | |
| OC338 10p | IN4006/7 8p | |
| OC339 10p | IN448 4p | |
| OC340 10p | CA47 6p | |
| OC341 10p | CA70 OA79 8p | |
| OC342 10p | CA81 OA80 7p | |
| OC343 10p | CA81 OA85 6p | |
| OC344 10p | CA200 6p | |
| OC345 10p | CA202 7p | |
| OC346 10p | IN914 3p | |
| OC347 10p | IN4001 5p | |
| OC348 10p | IN4002/3 6p | |
| OC349 10p | IN4004/5 7p | |
| OC350 10p | IN4006/7 8p | |
| OC351 10p | IN448 4p | |
| OC352 10p | CA47 6p | |
| OC353 10p | CA70 OA79 8p | |
| OC354 10p | CA81 OA80 7p | |
| OC355 10p | CA81 OA85 6p | |
| OC356 10p | CA200 6p | |
| OC357 10p | CA202 7p | |
| OC358 10p | IN914 3p | |
| OC359 10p | IN4001 5p | |
| OC360 10p | IN4002/3 6p | |
| OC361 10p | IN4004/5 7p | |
| OC362 10p | IN4006/7 8p | |
| OC363 10p | IN448 4p | |
| OC364 10p | CA47 6p | |
| OC365 10p | CA70 OA79 8p | |
| OC366 10p | CA81 OA80 7p | |
| OC367 10p | CA81 OA85 6p | |
| OC368 10p | CA200 6p | |
| OC369 10p | CA202 7p | |
| OC370 10p | IN914 3p | |
| OC371 10p | IN4001 5p | |
| OC372 10p | IN4002/3 6p | |
| OC373 10p | IN4004/5 7p | |
| OC374 10p | IN4006/7 8p | |
| OC375 10p | IN448 4p | |
| OC376 10p | CA47 6p | |
| OC377 10p | CA70 OA79 8p | |
| OC378 10p | CA81 OA80 7p | |
| OC379 10p | CA81 OA85 6p | |
| OC380 10p | CA200 6p | |
| OC381 10p | CA202 7p | |
| OC382 10p | IN914 3p | |
| OC383 10p | IN4001 5p | |
| OC384 10p | IN4002/3 6p | |
| OC385 10p | IN4004/5 7p | |
| OC386 10p | IN4006/7 8p | |
| OC387 10p | IN448 4p | |
| OC388 10p | CA47 6p | |
| OC389 10p | CA70 OA79 8p | |
| OC390 10p | CA81 OA80 7p | |
| OC391 10p | CA81 OA85 6p | |
| OC392 10p | CA200 6p | |
| OC393 10p | CA202 7p | |
| OC394 10p | IN914 3p | |
| OC395 10p | IN4001 5p | |
| OC396 10p | IN4002/3 6p | |
| OC397 10p | IN4004/5 7p | |
| OC398 10p | IN4006/7 8p | |
| OC399 10p | IN448 4p | |
| OC400 10p | CA47 6p | |

PRICES INCLUSIVE + 15p P. & P. (1st class)
ISLAND DEVICES, P.O. Box 11, Margate, Kent

BRAND NEW COMPONENTS BY RETURN. Electrolytics 16V, 25V, 50V, 0-47, 1-0, 2-2, 4-7, 10mfd, 5p; 22, 47, 51p (50V, 6p); 100, 7p (50V, 8p); 220, 8p (50V, 10p); 500, 11p (50V, 16p); 1000/25V, 18p. Subminiature bead-type tantalums. 0-1/35V, 0-22/35V, 0-47/35V, 1-0/35V, 2-2/35V, 4-7/35V, 10/20V, 22/16V, 47/6V, 100/3V, 11p. Mylar Film 100V, 0-001, 0-002, 0-005, 0-01, 0-02, 3p; 0-04, 0-05, 3.1p. Mullard tubular polyester 400V E6 series, 6-001-0-022, 3.1p; 0-033-0.1, 4.1p. Mullard polyester 160V tubular or 250V miniature for vertical mounting E6 series, 0-01-0-047, 3.1p; 0-068, 0-1, 4.1p; 0-15, 0-22, 6p; 0-33, 7p; 0-47, 9p; 0-68, 11p; 1-0, 14p; 1-5/250V, 18p; 2-2/250V, 22p. Mullard miniature (C333 ceramics 63V E12 series 2%, 1-8pE-47pF, 3p; 56pF-330pF, 3.1p. Pnt ceramics 50V E6 series 470pF, 47,000pF, 2p. Polystyrene 63V, E12 series 10pF-1,000pF, 3p; 1,200pF-10,000pF, 4p. Miniature highstab carbon film resistors ¼W E12 series 5% (10% over 1MΩ) 1Ω-10MΩ, 1-2p; IN4002, 6p; IN4006, 8p; IN4148, 6p. Postage 10p. Prices VAT inclusive. THE C.R. SUPPLY CO., 127 Chesterfield Road, Sheffield, S8 0RN.

AXIAL PRODUCTS LTD.

DEPT. 29
23 AVERY AVENUE
HIGH WYCOMBE
BUCKS.

AERIALS
4 ELEMENT FM STEREO
£3-80 + 25% VAT + 50 P. & P.
18 ELEMENT TV
£2-00 + 25% VAT + 50 P. & P.
18 ELEMENT TV
£1-75 + 25% VAT + 50 P. & P.

New design, superior quality, including mounting bracket and full instructions.

| AC127 | 18p | Zener Diodes | TTL IC's |
|--------|-----|--------------|----------|
| AC128 | 18p | 400mw | 7400 |
| BC107 | 11p | 1W | 7403 |
| BC108 | 11p | | 7404 |
| BC109 | 12p | 1N4001 | 7405 |
| BC113 | 12p | 1N4004 | 7410 |
| BC147 | 11p | 1N4007 | 7412 |
| BF194 | 11p | 1N4148 | 7413 |
| BF195 | 12p | 8 Pin DI | 7415 |
| BFY50 | 12p | 741 op amp | 7417 |
| BFY51 | 12p | 301 op amp | 7418 |
| 2N2906 | 12p | 555 Timer | 7420 |
| 2N2928 | 11p | 14 Pin DI | 7421 |
| 2N3055 | 31p | 8kte | 74180 |
| | | | 74182 |

All Semiconductor prices include VAT at appropriate rates. P. & P. 10p. C.U. £2
C.W.O. MAIL ORDER ONLY

ELECTROLYTICS 6-3, 10, 16V 10, 25, 33, 50, 100mF, 25, 50, 63V 1, 2-2, 4-7, 6-8, 10, 25, 33, 50mF. All at 5p each or £4-60 for 100.

TTL AT NEW REDUCED PRICES!

(Fast delivery. All prices include VAT)

SPECIAL OFFER OF 7400 at 10p each
ZTX108 at 7p each

Above offer ends 30th November 1975, and is
regardless of quantity ordered.

| Type | 1/24 | 25/99 | Type | 1/24 | 25/99 |
|-------|------|-------|-------|------|-------|
| 7400 | 0-14 | 0-12 | 7480 | 0-47 | 0-42 |
| 7401 | 0-14 | 0-12 | 7483 | 0-80 | 0-75 |
| 7402 | 0-14 | 0-12 | 7484 | 0-92 | 0-89 |
| 7403 | 0-14 | 0-12 | 7485 | 1-30 | 1-09 |
| 7404 | 0-16 | 0-13 | 7486 | 0-30 | 0-26 |
| 7405 | 0-16 | 0-15 | 7489 | 2-99 | 2-80 |
| 7406 | 0-36 | 0-31 | 7490 | 0-46 | 0-40 |
| 7408 | 0-16 | 0-13 | 7491 | 0-65 | 0-55 |
| 7410 | 0-14 | 0-13 | 7492 | 0-48 | 0-45 |
| 7411 | 0-23 | 0-20 | 7493 | 0-46 | 0-40 |
| 7412 | 0-16 | 0-15 | 7495 | 0-59 | 0-55 |
| 7413 | 0-32 | 0-31 | 7496 | 0-77 | 0-69 |
| 7414 | 0-69 | 0-60 | 74100 | 1-08 | 0-89 |
| 7417 | 0-30 | 0-29 | 74107 | 0-34 | 0-28 |
| 7420 | 0-14 | 0-13 | 74109 | 0-54 | 0-48 |
| 7422 | 0-24 | 0-22 | 74121 | 0-34 | 0-28 |
| 7425 | 0-27 | 0-25 | 74122 | 0-47 | 0-39 |
| 7427 | 0-27 | 0-25 | 74123 | 0-65 | 0-61 |
| 7430 | 0-14 | 0-13 | 74141 | 0-71 | 0-63 |
| 7432 | 0-27 | 0-25 | 74145 | 0-68 | 0-58 |
| 7437 | 0-27 | 0-25 | 74150 | 1-05 | 0-95 |
| 7440 | 0-14 | 0-13 | 74151 | 0-91 | 0-88 |
| 7441 | 0-75 | 0-62 | 74153 | 0-76 | 0-72 |
| 7442 | 0-65 | 0-55 | 74154 | 1-60 | 1-45 |
| 7445 | 0-85 | 0-71 | 74155 | 0-95 | 0-85 |
| 7447 | 0-81 | 0-79 | 74157 | 0-83 | 0-79 |
| 7450 | 0-14 | 0-13 | 74160 | 1-05 | 0-95 |
| 7451 | 0-14 | 0-13 | 74164 | 1-25 | 1-05 |
| 7453 | 0-14 | 0-13 | 74171 | 0-99 | 0-83 |
| 7454 | 0-14 | 0-13 | 74175 | 0-99 | 0-83 |
| 7460 | 0-14 | 0-13 | 74181 | 2-09 | 1-95 |
| 7472 | 0-25 | 0-21 | 74190 | 1-25 | 1-15 |
| 7473 | 0-30 | 0-25 | 74191 | 1-25 | 1-15 |
| 7474 | 0-32 | 0-26 | 74192 | 1-35 | 1-14 |
| 7475 | 0-45 | 0-39 | 74193 | 1-35 | 1-14 |
| 7476 | 0-32 | 0-26 | 74195 | 0-88 | 0-79 |
| 74196 | 1-64 | 1-34 | | | |

TTL (except special offer) may be mixed for
quantity prices. All devices full spec. by famous
manufacturers. S.A.E. for full lists. All goods
sent by 1st class post. 12p P. & P. on orders
below £2 (12p P. & P. on all orders for special
offers).

J. C. JONES (Dept. PE11)
46 Burstallars, St. Ives, Huntingdon PE17 4XX
(Mail Order only)

WANTED

TOP PRICES PAID
NEW VALVES AND TRANSISTORS
Popular T.V. and Radio types
KENSINGTON SUPPLIES (B)
367 Kensington Street
Bradford 8, Yorks.

FOR SALE

PRACTICAL ELECTRONICS. Bound volumes
1 to 10 plus 1975 issues, offers to: BRIDGE,
301 Old Road, Ashton-in-Makerfield, Lan-
cashire.

SITUATIONS VACANT

MEN!
• £90 p.w.
can be yours

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!

It can pay around £35 p.w. as a
starter and can reach over £90 p.w.
After training, our exclusive ap-
pointments bureau—one of the
world's leaders of its kind—intro-
duces you FREE to world-wide
opportunities. Write or phone
TODAY, without obligation.

London Computer Operators
Training Centre Y41, Oxford Hse.
9-15 Oxford St., W.1. Tel. 01-734 2874

EDUCATIONAL

TECHNICAL TRAINING.

Get the training you need to move up
into a higher paid job. Take the first
step now—write or phone ICS for details
of ICS specialist homestudy courses on
Radio, TV, Audio Eng. and Servicing,
Electronics, Computers; also self-
build radio kits. Full details from: ICS
SCHOOL OF ELECTRONICS, Dept.
316, Intertext House, London, SW8 4UJ.
Tel. 01-622 9911 (all hours).

CITY & GUILDS EXAMS.

Study for success with ICS. An ICS
homestudy course will ensure that you
pass your C. & G. exams. Special
courses for: Telecoms. Technicians,
Electrical Installations, Radio, TV &
Electronics Technicians, Radio
Amateurs. Full details from: ICS
SCHOOL OF ELECTRONICS, Dept.
315, Intertext House, London, SW8 4UJ.
Tel. 01-622 9911 (all hours).

COLOUR TV SERVICING.

Learn the techniques of servicing Colour
TV sets through new homestudy course
approved by leading manufacturers.
Covers principles, practice and align-
ment with numerous illustrations and
diagrams. Other courses for radio and
audio servicing. Full details from: ICS
SCHOOL OF ELECTRONICS, Dept.
317, Intertext House, London, SW8 4UJ.
Tel. 01-622 9911 (all hours).

TELEVISION TRAINING

16 MONTHS' full-time
practical and theoretical training
course in Radio and TV
Servicing (Mono and Colour)
for beginners, with GCE (or
equivalent) in Maths & English.

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
January 5th.

Prospectus from London Elec-
tronics College, Dept. A11, 20
Penyern Road, London SW5
9SU. Tel. 01-373 8721.

BUSINESS OPPORTUNITIES

BUSINESS OPPORTUNITY for young
electronics man with experience in N.C. I
need assistance to develop a unique automa-
tion system. Mid-Essex. Box. No. 61.

LADDERS

LADDERS, timber and aluminium. Tel.
Telford 586644 for brochure.

SERVICE SHEETS

SERVICE SHEETS, radio, TV, etc. 10,000
models. Catalogue 24p plus S.A.E. with
orders-enquiries. TELRAY, 154 Brook Street,
Preston, PRI 7HP.

SERVICE SHEETS for radio, TV, tape re-
corders, stereo, etc., with free fault-finding
guide, 50p and S.A.E. HAMILTON RADIO,
47 Bohemia Road, St. Leonards, Sussex..

BELL'S TELEVISION SERVICES for service
sheets, manuals and books on Radio/TV,
etc. Service sheets 50p plus S.A.E. Service
sheet catalogue 25p. Back issues of magazines
from April '74 onwards. Cover price plus 12p
post. Free booklists on request. S.A.E. with
enquiries please to: B.T.S. 190 Kings Road,
Harrogate, Yorkshire. Tel. Harrogate (0423)
55885.

MISCELLANEOUS

LIGHTING CONTROL UNITS

3 x 1½kW per channel sound-to-light converter using
isolated control circuitry for maximum safety. The
unit comes in kit or ready built form and features
individual sensitivity controls, sensitivity range switch
and dimming switch. (Bypass controls as an optional
extra.) Kit: £13.99. Ready built: £16.99

Details of dimmers, sequencers and other lighting
control units available on request.

Mail order or written enquiries only to:

SELEKTRON

21 Prior's Road, Windsor, Berks. SL4 4PD

SUPERB INSTRUMENT CASES by Bazelli,
manufactured from heavy duty PVC faced steel.
Hundreds of people and industrial users are
choosing the cases they require from our vast
range, competitive prices start at a low 75p.
Examples, Width, Depth, Height, 8" x 5" x 3"
£1-55; 10" x 6" x 3" £2-20; 10" x 8" x 3"
£2-75; 12" x 10" x 3" £3-60; 8" x 4" x 4"
£1-80; 10" x 8" x 4" £2-70; 12" x 8" x 4"
£3-60; 7" x 7" x 5" £2-65; 8" x 10" x 6"
£3-60; 12" x 8" x 7" £4; 12" x 12" x 7" £4-40.
Plus 5% VAT & 50p postage. Over 200 models
to choose from. Prompt despatch. Free liter-
ature (stamp would be appreciated).
BAZELLI, Dept. No. 23, St. Wilfrid's,
Foundry Lane, Halton, Lancaster LA2 6LT.

BUILDING YOUR OWN HI-FI AMPLIFIER?

WHY NOT USE A PROFESSIONAL CASE?
We have a limited number of high quality case
assemblies valued at over £15.00 which must be
sold.

LOOK AT THESE FEATURES:

- ★ Ready punched steel chassis
 - ★ 3 piece, teak veneered case
 - ★ Screen printed front and rear plates
 - ★ Supplied complete with push switches
- Overall dimensions 17" x 8½" x 3".
Fantastic value at only £8-95
(inc. VAT and P. & P.)

Send cheque or P.O. now to:

SOUND ELECTRONICS (NEWCASTLE) LIMITED

43 Heaton Grove, Newcastle upon Tyne, NE6 5NP
Tel. (0632) 650108

"PE JOANNA"

BULK COMPONENTS LIST

(page 388 May '75 issue)

EVERYTHING LISTED FOR JUST
£44.61 inc. VAT & OUR USUAL
DISCOUNT VOUCHERS or
WITHOUT DISCOUNT VOUCHERS
£41-61 inc. BY RETURN OF POST
... of course!

These are all top quality brand new components
Capacitors and Resistors by Mullard, Diodes by
I.T etc. For keyboards etc. see our catalogue/40p.

• CT2 Transformer in stock £2.72 inc. VAT •
Maplin Electronic Supplies
P.O. Box 3, Rayleigh, Essex

Large Computer Panel Packed with Polyester Caps Resistors, Transistors, etc., approximate size 14in x 12in our price only 32p (28p). Bumper parcel of electronic components and oddments, capacitors, resistors, pots, coils, switches, rectifiers, valves, knobs, PCB panels, etc. A 50-50 lot of new and ex equipment parts. Fantastic value £3 (£1) for a 20 lb box full, 3 core mains leads 6A 2 metres long 10p (10p). Video Tape decks: all video equipment stripped but can be used as a tape deck with a little bit of work otherwise complete but untested, hence the ridiculously low price of £3 (£2). TCC block modules and wiring circuit for dual flasher, rain, fire and burglar alarms, anyone 75p (28p). Large chassis containing 2 heat sinks 6in x 4in, 3 power transistors 2N5496, 2x80V F/W Solid State rectifiers at 3.5A 1x2A, choke caps thyristors resistors, etc. £1.95 (£1.30). Panel containing 95, 1,000pf capacitors 350V, 120 resistors, 120 diodes, etc. £1 (75p). Pot cores LA3 75p (16p), LA4 £1 (20p). Ever Ready 6V heavy duty batteries P88 54p (29p). Over 200 ceramic and mica capacitors and resistors 65p bag (20p). Denco LA3 oscillator coils: new plus data 54p (30p). Panel containing 10 miniature relays (30-700 ohms), jam packed with modern transistors, capacitors, I.A. diodes, etc., etc., only £2.50 (65p). P. & P. shown in brackets following prices. Lists available soon to all who enquire or have enquired.

INDUSTRIAL RF SERVICES

51 DEPTFORD BROADWAY
LONDON, S.E.8
Tel. 01-692 4284

PRINTED CIRCUIT BOARDS, all prices inclusive of P. & P. etc. No extras. We offer: "P.E.L." Joanna PCB's, full spec., ready to assemble, any £1-30, each. Also full spec., ready to assemble PCB's for "P.E." Orion £1-30p, Power-slaves (2 PCB's) £1-52, C.C. TV (2 PCB's) £2-15, "Practical Wireless" Easy-build organ (2 PCB's) £5-70, telecenis (6 PCB's) £3-00, sound effects £1-10, tricolour £1-35, Ferret locator 75p, many others available. C.W.O. Send S.A.E. for lists. Production space available for PCB production, silk-screen printing, tinning, plus all art/graphic, photographic and design facilities. We also sell direct art/graphic aids and supplies. Cat. 40p. Production estimates by return or phone: W.K.F. ELECTRONICS, Welbeck Street, Whitwell, Workson, Notts., S80 4TW. Tel. Whitwell (Derby's) 695 or 544, STD 090974. Callers seen by appointment only at Station Road.

PCB DIY SUPPLIES. We offer ferric chloride as used in our own plant, 4 lb £2-50, 1 cwt £23, 1 ton £350. 1 lb makes 1 gall. good strength. Solid carbide PCB drill bits from 1 mm up, £2-50. Most supplies for PCB production available from: W.K.F. ELECTRONICS, Welbeck Street, Whitwell, Workson, Notts. Tel. Whitwell (Derby's) 695.

ALUMINIUM PROJECT BOXES, lids and screws included

| Box No. | Length" | Width" | Height" | Price |
|---------|---------|--------|---------|-------|
| 7 | 5 1/2 | 2 1/2 | 1 1/2 | 47p |
| 8 | 4 | 4 | 1 1/2 | 48p |
| 9 | 4 | 2 1/2 | 1 1/2 | 46p |
| 10 | 4 1/2 | 4 | 1 1/2 | 49p |
| 11 | 4 | 2 1/2 | 2 | 46p |
| 12 | 3 | 2 | 1 | 38p |
| 13 | 6 | 4 | 4 | 58p |
| 14 | 7 | 5 | 2 1/2 | 75p |
| 15 | 8 | 6 | 3 | 93p |
| 16 | 10 | 7 | 3 | £1-14 |

Prices include VAT (at 8%) but 18p should be added to the total order value for postage & packing.

8 WATT 12V FLUORESCENT LIGHT KIT Complete kit including all components, heatsink, channel, tube, etc. Only £3-49 inc. VAT p. & p. Ready built £4-10 inc. VAT, p. & p. Diffuser 59p extra inc. VAT p. & p. Send cheque or P.O.'s with your order direct to:

ELECTRONICS DESIGN ASSOCIATES
Dept. PE, 82 Bath Street, Walsall, WS1 3DE.
Phone, Walsall 33652

DIGITAL CLOCK COMPONENTS. AY-5-1224 clock chip, £3-66. 0.3in high economy type LED displays, DL-704E, 85p; 0.6in high ditto, DL-747E £1-70. I.C.B. to suit chip and displays, etc. (two types), 95p each. MK 50253 alarm clock chip, £5-50. Full details of both chips, circuit diagrams, data, etc., free on request. Add 10p per order and VAT at 8%. GREENBANK ELECTRONICS (Dept. BCP), 94 New Chester Road, New Ferry, Wirral, Merseyside, L62 5AG.

THE SCIENTIFIC WIRE CO.

Copper—Nickel Chrome—Eureka—
Manganin Wires,
Enamelled—Silk—Cotton—Tinned
Coverings.
No minimum charges or quantities.
S.A.E. Brings List.
Trade and export enquiries welcome.
P.O. BOX 30, LONDON E4 9BW

Fibre optic suppliers

MARE'S TAILS. Build a decorative display with this professionally finished unit, 22in diameter with 7,000+ fibres. Looks immaculate. £18.
FIBROFLEX SIZE 1. Flexible 440 strand glass light conduit, bundle dia. 1.14mm. 48p per metre (£3 per 10m).
FIBROFLEX SIZE 4. 2-28mm bundle dia., 1,760 strand glass light conduit, £1-80 per metre (£12 per 10m).
CROPON 1818. 64-strand plastic light conduit, bundle dia. 1.8mm. O.D. 3.3mm. £1-20 per metre (£3 per 10m).
PLASTIC OPTICAL MONITORING. For multiple illumination from one source, displays, internal illumination, effects, optical coupling, etc.
*FP20 (0.5mm dia.)—80p per 10m; £4 per 100m.
*FP40 (1mm dia.)—£2.20 per 10m; £15 per 100m.
*FP80 (1.5mm dia.)—£4 per 10m; £30 per 100m.
OPTIKIT 183. Contains 2m Crofon 1810 plus 5m each FP20, FP40, FP80 plus polishing compound. A handy pack for the experimenter and laboratory. £4-86.
LENSES AND REFLECTORS. We stock a range of 6 lenses and 5 reflectors for use in proximity detectors, intruder detectors, batch counters, tachometers, short range optical communications.
OPTIKIT LS. 1 each of 6 convex lenses. £3.
OPTIKIT RRS. 1 each of 5 retro-reflectors. £2-50.

CIRCULAR POLARISERS. Cut that glare. Reduce specular reflection by up to 20%—enhance contrast on orla, LED displays, nixies, instruments, etc. Available in red/amber/green/neutral. 50mm square 75p; 75mm £1-40; 150mm £4-86.
LIGHT SOURCES AND DETECTORS: MV54 Miniature (2mm) Red LED, 20p (10+17p); MLED500 T092 Red LED, 20p (10+17p); MLED100 Doppler Shift Intruder Detector; XC208-A 3mm Red LED, 20p (10+17p); XC208-Y or -G Yellow/Green, 30p (10+25p); 2N5777 High Sensitivity Photodetector Silicon Detector, gain x2,500, 80p (10+48p); MRD100 Phototransistor—high speed, ultra good sensitivity, 75p (10+48p).

****NEW MLD585.** Latest Motorola Light Activated SCR. High sensitivity 10mV/cm; high current 400mA (5A peak); 60V. Switch small motors or relay direct from optical control, up to 24W power. £1-50 (10+£1-10).
SE808-407/R ULTRASONIC TRANSDUCER PAIR. Suitable for "Ultrasonic Doppler Shift Intruder Detector"; Practical Electronics, March 1975. Tx/Rx pair £4.
SE808-527/R ULTRASONIC TRANSDUCER PAIR. **NEW** The SE808-407/R has proved to be an extremely popular item in our range and we are therefore introducing the 25kHz version. Although bandwidth is less at ±800Hz, sensitivity is better by 10dB. Suitable for burglar alarm systems, proximity switches, counters, level meters, anti-collision devices. 25kHz Tx/Rx pair £4.
Please add 8% VAT to price above (plus 22p on orders less than £3). Send 9in x 6in S.A.E. for short form list.

FIBRE OPTIC SUPPLIES

(Dept. PE), 2 Loudoun Road Mews
London NW8 0DN
(Please note change of address)

CABINET FITTINGS

FOR
Stage Loudspeakers and Amplifier Cabs
Fretcloths, Coverings, Recess Handles, Strap Handles, Feet, Castors, Locks and Hinges,
Corners, Trim, Speaker Bolts, etc., etc.
Send 2 x 7p Stamps for samples and list.
ADAM HALL (P.E. SUPPLIES)
Unit 6, Starline Works, Grainger Road
Southend-on-Sea, Essex.

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-off's and small runs. Machine engraving in metals and plastics, contour milling. Send 2 4p stamps for catalogue. **RAMAR CONSTRUCTOR SERVICES**, Masons Road, Stratford on Avon, Warwick. CV37 9XF.

6-CHANNEL TOUCH TUNING UNIT

Mechanical tuning a thing of the past. Our all electronic 6 channel unit, with AFC Mute output, feeds Varicap tuners for VHF or MW radio, VHF or UHF TV, etc. Kit comprises quality glass fibre PCB, drilled and tinned, all electronic components and instructions.
Only £9, inclusive. Six L.E.D.s £1-20 extra. Mail order only.

TECHNALOGICS

8 Egerton Street, Liverpool L8 7LY

FANTASTIC NEW MICROTEST 80

MEASURES ONLY

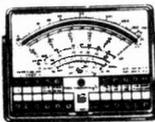
90 x 70 x 18mm
ELECTRONIC ZERO Ω



Amazing Value at £11.95
8 fields of measurement
and 40 ranges

PRINTED CIRCUIT BOARD IS REMOVABLE WITHOUT SOLDERING

Volts d.c. 8 ranges: 100mV, 2V, 10V, 50V, 200V, 1,000V (20kΩ/V). 2% precision on d.c. and a.c.
Volts a.c. 8 ranges: 1-5V, 10V, 50V, 250V, 1,000V (4kΩ/V).
Amp. d.c. 8 ranges: 50µA, 500µA, 5mA, 50mA, 500mA, 5A.
Amp. a.c. 8 ranges: 250µA, 2-5mA, 25mA, 250mA, 2-5A.
Ohms 4 ranges: Low Ω, Ω x 1, Ω x 10, Ω x 100 (from 1/10 Ω to 10MΩ).
V Output 5 ranges: 1-5V, 10V, 50V, 250V, 1,000V.
Decibels 5 ranges: +6dB, +22dB, +36dB, +50dB, +82dB.
Capacity 4 ranges: 25µF, 250µF, 2,500µF, 25,000µF.



SUPERTESTER 680R ICE
20,000 Ohm per Volt sensitivity
Fully screened against external magnetic fields
Scale width and small case dimensions (128 x 95 x 32mm) Accuracy and stability (1% in D.C., 2% in A.C.) of indicated reading
Simplicity and ease of use and readability of full ranges of accessories

● 1,000 times overload ● Printed circuit board is removable without desoldering ● More ranges than any other meter. Ask for free catalogue.
Accessories (extra) available to convert Microtest 80 and SuperTester 680R into following: LIGHTMETER, GAUSS METER, ELECTRONIC VOLT/METER, AMPER-CLAMP, TRANSISTOR TESTER, TEMPERATURE PROBE, PHASE SEQUENCE INDICATOR, Ω x 100kΩ Multiplier, SIGNAL INJECTOR—Send for details.

£18-50
Accessories Extra

MORE RANGES FOR LESS MONEY!

AC/DC Multimeter type U4324

A-DC 0-06-3A-6 Ranges.
A-AC 0-3-3A-5 Ranges.
V-DC 0-6-120V V-8 Ranges.
V-AC 3-900 V-8 Ranges.

Frequency 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 63mm.
Only £9-25



ALPHANUMERIC NIXIE TUBES B7911

The Alphanumeric NIXIE tube has the ability to display all the letters of the alphabet, numerals 0 thru 9 and special characters in a single tube. From the standpoint of both readability and electrical characteristics, the Alphanumeric NIXIE tube provides many unique benefits including *



including * 170V-21mA * All d.c. operation * Uniform, continuous sine characters of equal height * Memory with simple solid state drive circuits * Readability in high ambient light * 200 footcandle brightness * Long life with no loss of brightness * Character height 2jin.
Bases for above 60p each.
Price only 99p each plus 16p P./P.

JUST 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 manufacturer's requirements. Type B853at

1-25 £1-00; 25 + 90p; 100 + 80p; 1,000 + 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

BLUE P.C.B INK

ONLY (ETCH ~ RESIST)
75p USE WITH ANY PEN!
(30 cc)



In UK VAT & Post FREE
C.W.O. Please to:
JFH SUPPLIES, 30 BAKER ST., LONDON W1M.

CLEARING LABORATORY, scopes, recorders, testmeters, bridges, audio, R.F. generators, turntables, tapeheads, stabilised P.S.U.s, sweep generators, test equipment, etc. Lower Beeding 236.

BUILD THE **TREASURE TRACER**
MK III Metal Locator



- Varicap tuning
- Britain's best selling metal locator kit
- Fitted with Faraday shield
- Speaker and earphone operation
- Knocks down to only 17in
- Prebuilt search coil assembly
- Five transistor circuit
- Thoroughly professional finish
- You only need soldering iron, screwdriver, pliers and snips
- As seen on BBC-1 and BBC-2 TV

Send stamped, addressed envelope for leaflet

Complete kit **£10.90** Built and tested **£15.25**
Post 50p 92p VAT (8%) Post 50p £1.27 VAT (8%)

MINIKITS ELECTRONICS, 6g CLEVELAND ROAD
LONDON E18 2AN (Mail Order Only)

SEEN MY LIST? Screws, electrical, all sorts. S.A.E.: C. BRITAIN, The Bungalow, Old Titniss, Buckhurst Lane, Sunninghill, Ascot, Berks., SLF 7QB.

I.C. EXPERIMENTER'S KITS

Learn about modern electronics with our new series of Kits on digital logic techniques. Kits contain specially selected I.C.'s, Holders, Veroboard, L.E.D.'s, instructions and data. Now available at £3.50 each:

Kit One: Gates Kit Two: Flip-Flops
Kit Three: Shift Registers

Experimenter's Pak, I.C.'s of Gates, Flip-Flops, Inverters, Counters, Holders and data. £3.00.

S.A.E. for further details to:
AUTOMATED HOMES
69 High Street, Ryton, Coventry CV8 3FJ
(Mail Order only)

12 VOLT 21in 13 watt **FLUORESCENT LIGHTING** (by THORN/AEI) with diffuser and on/off switch. Ideal, caravan, boat, emergency lighting, etc. **Guaranteed**



£5.50 inc. VAT and post.
List price £7.02 inc. VAT

SALOP ELECTRONICS Tel. 53208
23 Wyle Cop. Shrewsbury, Shropshire

LOW COST I.C. MOUNTING for any size DIL package. 100 pin sockets 50p. 7 and 8 hole plastic supports 5p pair. Quantity rates. S.A.E. details and sample. Trial pack 50p. (P. & P. 10p order). P.K.G. ELECTRONICS, Oak Lodge, Tansley, Derbyshire, DE4 5FE.

ENAMELLED COPPER WIRE

| S.W.G. | 1lb reel | 1/2lb reel |
|----------|----------|------------|
| 10 to 19 | £2.40 | £1.35 |
| 20 to 29 | £2.45 | £1.40 |
| 30 to 34 | £2.60 | £1.50 |
| 35 to 40 | £2.85 | £1.60 |

All the above prices are inclusive of postage and packing in the U.K.

COPPER SUPPLIES
102 Parrswood Road, Withington,
Manchester 20
Telephone 061-445 8753

EXTRA SPECIAL OFFERS "ALL NEW"

100 x 11b reels of Resin Cored Solder 18 and 22 s.w.g., price £2 per reel. P. & P. 20p extra. 1,000 sub miniature Micro Switches S.P.D.T. 5A 125-250 VAC. Lever action, price 50p for 2 switches. P. & P. 10p extra. 45,000 7/32 4 type Z c'sunk head self-tapping screws cadmium plated. Price £1 thousand. P. & P. 20p extra.

E.M.A. (MAIL ORDER)
6 Shaftesbury Road, London E4 7BW

BUILD YOUR OWN

YOU ARE INVITED TO SEND S.A.E. FOR LISTS ON OUR VERY EXTENSIVE RANGE OF HIGH QUALITY AMPLIFIERS, PRE-AMPS, F.M. TUNERS, INSTRUMENTS, RADIO CONTROL, IGNITION UNITS AND MANY OTHER KITS. STATE REQUIREMENTS.

TELERRADIO ELECTRONICS
325 Fore St., Edmonton, London N9

HOME SCIENTISTS

Get the key to a FANTASTIC WORLD of previously UNHEARD-OF PROJECTS. The NEW Boffin catalogue lists LOTS of HIGHLY UNUSUAL, LOW-COST BARGAINS, READY-BUILT MODULES.

Here are just a few examples, there are stocks more!

Dazzling MINI-STROBE (pocket size) £3.50
PEOPLE DETECTOR .. £4.20
Big-Ear SOUND-CATCHER .. £4.20
Mini DREAM LABORATORY .. £4.20

Don't take our word for it though! GET A COPY AND SEE! SEND ONLY 20p and we'll RUSH YOU A COPY (YOU'LL GET THE 'GOODIES' JUST AS QUICKLY TOO!)

BOFFIN PROJECTS
4 Cunliffe Road, Stoneleigh
Ewell, Surrey
(Mail Order U.K. only)

100 PRECISION TURNED SPACERS

Build any project with the aid of our pack of 100 brand new top quality assorted spacers, containing 6 and 4BA threaded through and clearance types, round and hexagon, male and female, in metric lengths. An excellent assortment for only £1.00 post free.

Electro-Mech Products, 7 Chantry Avenue
Bideford, Devon
Manufacturers of Precision Turned Components for the Electronics Industry

FREE CASE

Blue Hooded Top-Vents—aluminium—4in x 2 1/2in x 1 1/2in with all orders from PE readers.

BRAND NEW. Full Spec. components in mixed PAK's (semiconductors, resistors, caps, heatsinks etc.). S.A.E. for details.

Normal price £7.50—sale price £2.75 per PAK including VAT and P. & P.

Genuine Offer—we now manufacture instrument cases and must dispose of our remaining component stock.

ADFONIC
18 YEW LANE, ASHLEY
NEW MILTON, HANTS.

MINI ACCUMULATORS

2 volt **MULTI-USE** Sealed Lead Acid Rechargeable Cells.

Size L450—1.4" x 1.1" x 0.44". 3 for £2.15 inc. P. & P.

Size GA2—1.7" x 1.3" x 0.5". 3 for £2.65 inc. P. & P.

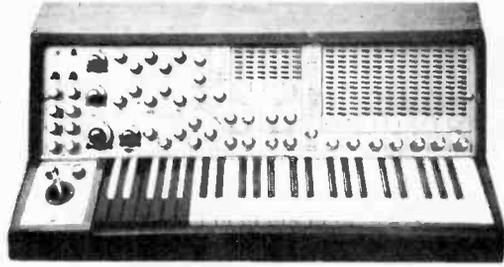
Suits Fi-Cord

GARFIELDS, 295 Rye Lane, London SE15



SYNTHESISER

Modules by Dewtron®



The synthesiser illustrated was built using Dewtron modules, as sold to constructors for some years now. With over 10 years' experience in mail-order, we have supplied many famous people and groups. Over 30 types of synthesis modules, some of extremely precision design, e.g. VCO-2 log-law oscillator; 3-wave o/p/s; sample/hold/envelope module; 3-octave keyboards, contacts, special tuning-ladder resistors, etc. Famous "Modumatrix" patching system makes other patching a thing of the past! Send just 20p for full catalogue to:

D.E.W. LTD.
254 Ringwood Road, Ferndown
Dorset BH22 9AR

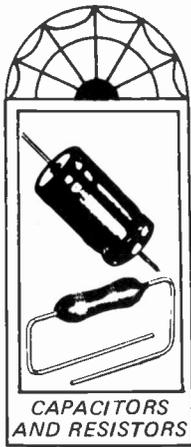
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|-----------------------------|------------------------|-----------|-----|--------|-----|--------|------|--------|-----|--------|------|--------|-----|--------|------|--------|-----|--------|------|--------|-----|--------|------|--------|-----|--------|------|--------|-----|--------|------|--------|------|--------|------|--------|------|--------|-----|--------|------|--------|-----|--------|-----|--------|-----|--------|------|--------|------|--------|-----|--------|------|---|-------------|-------|-----|------|-----|--------------------|------|------|--------|---------------------------|-----|------|--------|-----------------------------|------|------|--------|---------------------|------|------|--------|-----------------------|------|------|-----------|----------------------|------|------|-------|----------------------|-----|------|-------|----------------------|------|------|------|--------------------|------|------|---------|-----------------------|------|------|--------|----------------------|-------|------|--------|-------------------|-----|------|--------|-------------------|------|------|----------|-----------------------|------|------|---------|-------------|-----|------|-------|-----------------|------|------|-------|--------------------|------|------|-------|---------------------|------|------|-------|------------------|------|------|-------|-----------|------|------|-------|---------------------|------|------|-------|------------------------|------|------|------|-----------------|------|------|---------|-------------------|------|------|--------|-------------------|-----|------|--------|-------------------|------|------|-------|-------------------|------|---|----------|---------------------|------|--|--------|-------------------------|------|--|-------|-------------------------|------|--|-------------------------------------|------------------------|-----|--|--|-------------------------|-----|--|-----|---------------------|-----|------------------------|-----|----------------------|-----|-----------------|------|-----------------------|------|--------------------|---------|---------------------------|------|-----------------|--------|---------------------------|-----|-----------------|--------|-------------------------|-----|-----------------|-------|--------------------|---------|--------|---|--|----------------|--|--|-----|------------|-----|------------|------------|--------------|-----------|---------------|---------------|------------|-----------|---------|---------------|-------------|-----------|--------------|---------------|-------------|-----|----------|---------------|-----------------|-----|--------------|---|-----------------|-----|---------|------|-----------------|------|----------------|------|-----------------|------|---------|------|--|-----|--------------|-----|-------------------------|-----|----------|-----|-------|-----|--------------|-----|-------|-----|-----------|-----|-------|-----|--------------|-----|---------|-----|-----------|-----|--|--------|------|-----|---------|------------|--------|------|-------|-----------|--------|------|-------|-----------|------|------|---------|-------------|------|------|---------|-------------|------|------|---------|----|--------|------|-------|---|--------|-----|-------|-----|--------|-----|---------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|------|---------|-----|--------|------|-------------|-----|--------|------|-------|-----|--------|-----|-------|-----|--------|-----|--------|-----|--------|----|-------|-----|--------|-----|---------|-----|--------|-----|-------|-----|--------|-----|-------|-----|-------|-----|-------|-----|---|-----------|-------|-----|-------|--|-------|-----|-------|-----------------|-------|-----|-------|-----|-------|-----|----------|-----|-------|-----|----------|-----|------|-----|--------|-----|-------|-----|--------|-----|-------|-----|--------|-----|----------|-----|--------|-----|----------|-----|--------|-----|-------|-----|----------|-----|-------|-----|--------|-----|---------|-----|--------|-----|-------|-----|----------|-----|-------|-----|----------|----|-------|-----|---------|----|-------|-----|----------|----|-------|-----|--------|-----|-------|-----|--|--|----------|-----|--|--|-------|------|--|--|-------|------|--|--|--|---------|--|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|-------|-----|--|--|
| <table border="1"> <tr><td>TTLa</td><td>13p</td><td>7482</td><td>70p</td></tr> <tr><td>7400</td><td>13p</td><td>7483</td><td>80p</td></tr> <tr><td>7401</td><td>14p</td><td>7484</td><td>95p</td></tr> <tr><td>7402</td><td>14p</td><td>7485</td><td>120p</td></tr> <tr><td>7403</td><td>16p</td><td>7486</td><td>30p</td></tr> <tr><td>7404</td><td>16p</td><td>7489</td><td>270p</td></tr> <tr><td>7405</td><td>16p</td><td>7490</td><td>40p</td></tr> <tr><td>7406</td><td>38p</td><td>7491</td><td>75p</td></tr> <tr><td>7407</td><td>38p</td><td>7492</td><td>45p</td></tr> <tr><td>7408</td><td>16p</td><td>7493</td><td>40p</td></tr> <tr><td>7409</td><td>20p</td><td>7494</td><td>75p</td></tr> <tr><td>7410</td><td>14p</td><td>7495</td><td>65p</td></tr> <tr><td>7412</td><td>23p</td><td>7496</td><td>78p</td></tr> <tr><td>7413</td><td>32p</td><td>7497</td><td>40p</td></tr> <tr><td>7414</td><td>60p</td><td>74121</td><td>30p</td></tr> <tr><td>7416</td><td>33p</td><td>74122</td><td>68p</td></tr> <tr><td>7420</td><td>14p</td><td>74123</td><td>48p</td></tr> <tr><td>7422</td><td>18p</td><td>74141</td><td>85p</td></tr> <tr><td>7423</td><td>34p</td><td>74151</td><td>72p</td></tr> <tr><td>7425</td><td>30p</td><td>74153</td><td>85p</td></tr> <tr><td>7427</td><td>37p</td><td>74154</td><td>150p</td></tr> <tr><td>7430</td><td>14p</td><td>74155</td><td>76p</td></tr> <tr><td>7432</td><td>25p</td><td>74156</td><td>76p</td></tr> <tr><td>7437</td><td>25p</td><td>74160</td><td>99p</td></tr> <tr><td>7440</td><td>14p</td><td>74161</td><td>99p</td></tr> <tr><td>7441</td><td>65p</td><td>74162</td><td>99p</td></tr> <tr><td>7442</td><td>60p</td><td>74163</td><td>99p</td></tr> <tr><td>7447</td><td>75p</td><td>74164</td><td>120p</td></tr> <tr><td>7448</td><td>70p</td><td>74166</td><td>126p</td></tr> <tr><td>7450</td><td>15p</td><td>74175</td><td>85p</td></tr> <tr><td>7451</td><td>16p</td><td>74180</td><td>100p</td></tr> <tr><td>7453</td><td>16p</td><td>74181</td><td>298p</td></tr> <tr><td>7454</td><td>16p</td><td>74182</td><td>82p</td></tr> <tr><td>7460</td><td>15p</td><td>74185</td><td>135p</td></tr> <tr><td>7470</td><td>27p</td><td>74191</td><td>144p</td></tr> <tr><td>7472</td><td>25p</td><td>74191</td><td>144p</td></tr> <tr><td>7473</td><td>30p</td><td>74192</td><td>120p</td></tr> <tr><td>7474</td><td>30p</td><td>74193</td><td>120p</td></tr> <tr><td>7475</td><td>45p</td><td>74194</td><td>108p</td></tr> <tr><td>7476</td><td>30p</td><td>74195</td><td>75p</td></tr> <tr><td>7480</td><td>50p</td><td>74198</td><td>198p</td></tr> <tr><td>7481</td><td>95p</td><td>74199</td><td>180p</td></tr> </table> | TTLa | 13p | 7482 | 70p | 7400 | 13p | 7483 | 80p | 7401 | 14p | 7484 | 95p | 7402 | 14p | 7485 | 120p | 7403 | 16p | 7486 | 30p | 7404 | 16p | 7489 | 270p | 7405 | 16p | 7490 | 40p | 7406 | 38p | 7491 | 75p | 7407 | 38p | 7492 | 45p | 7408 | 16p | 7493 | 40p | 7409 | 20p | 7494 | 75p | 7410 | 14p | 7495 | 65p | 7412 | 23p | 7496 | 78p | 7413 | 32p | 7497 | 40p | 7414 | 60p | 74121 | 30p | 7416 | 33p | 74122 | 68p | 7420 | 14p | 74123 | 48p | 7422 | 18p | 74141 | 85p | 7423 | 34p | 74151 | 72p | 7425 | 30p | 74153 | 85p | 7427 | 37p | 74154 | 150p | 7430 | 14p | 74155 | 76p | 7432 | 25p | 74156 | 76p | 7437 | 25p | 74160 | 99p | 7440 | 14p | 74161 | 99p | 7441 | 65p | 74162 | 99p | 7442 | 60p | 74163 | 99p | 7447 | 75p | 74164 | 120p | 7448 | 70p | 74166 | 126p | 7450 | 15p | 74175 | 85p | 7451 | 16p | 74180 | 100p | 7453 | 16p | 74181 | 298p | 7454 | 16p | 74182 | 82p | 7460 | 15p | 74185 | 135p | 7470 | 27p | 74191 | 144p | 7472 | 25p | 74191 | 144p | 7473 | 30p | 74192 | 120p | 7474 | 30p | 74193 | 120p | 7475 | 45p | 74194 | 108p | 7476 | 30p | 74195 | 75p | 7480 | 50p | 74198 | 198p | 7481 | 95p | 74199 | 180p | <table border="1"> <tr><td>DP. AMPS</td><td></td><td></td><td></td></tr> <tr><td>70A</td><td>Ext. Comp. 8 pin DIL</td><td>36p</td><td></td></tr> <tr><td>70B</td><td>Ext. Comp. 8/14 pin DIL</td><td>30p</td><td></td></tr> <tr><td>710</td><td>Diff. Comp. 14 pin DIL</td><td>50p</td><td></td></tr> <tr><td>741</td><td>Int. Comp. 8/14 pin DIL</td><td>25p</td><td></td></tr> <tr><td>747</td><td>Dual 741 14 pin DIL</td><td>70p</td><td></td></tr> <tr><td>748</td><td>Ext. Comp. 5 pin DIL</td><td>36p</td><td></td></tr> <tr><td>776</td><td>Programmable Op. Amp.</td><td>140p</td><td></td></tr> <tr><td>CA3130S</td><td>COSMOS Op. Amp. 8 pin DIL</td><td>100p</td><td></td></tr> <tr><td>LM3900</td><td>Quad. Op. Amp. 14 pin DIL</td><td>70p</td><td></td></tr> <tr><td>MC1458</td><td>Dual Op. Amp. 8 pin DIL</td><td>70p</td><td></td></tr> <tr><td>NE53T</td><td>DIFF. Op. Amp. TOS</td><td>275p</td><td></td></tr> </table> | DP. AMPS | | | | 70A | Ext. Comp. 8 pin DIL | 36p | | 70B | Ext. Comp. 8/14 pin DIL | 30p | | 710 | Diff. Comp. 14 pin DIL | 50p | | 741 | Int. Comp. 8/14 pin DIL | 25p | | 747 | Dual 741 14 pin DIL | 70p | | 748 | Ext. Comp. 5 pin DIL | 36p | | 776 | Programmable Op. Amp. | 140p | | CA3130S | COSMOS Op. Amp. 8 pin DIL | 100p | | LM3900 | Quad. Op. Amp. 14 pin DIL | 70p | | MC1458 | Dual Op. Amp. 8 pin DIL | 70p | | NE53T | DIFF. Op. Amp. TOS | 275p | | <table border="1"> <tr><td>VOLTAGE REGULATORS (PLASTIC)</td><td></td><td></td><td></td></tr> <tr><td>723</td><td>1 amp +Ve</td><td>-Ve</td><td></td></tr> <tr><td>14 pin DIL</td><td>5V 7805 140p</td><td>7812 250p</td><td></td></tr> <tr><td>12V 7812 140p</td><td>7815 250p</td><td>7818 250p</td><td></td></tr> <tr><td>15V 7815 140p</td><td>7818 250p</td><td>7824 250p</td><td></td></tr> <tr><td>18V 7818 140p</td><td>7824 250p</td><td></td><td></td></tr> <tr><td>24V 7824 140p</td><td>7824 250p</td><td></td><td></td></tr> </table> | VOLTAGE REGULATORS (PLASTIC) | | | | 723 | 1 amp +Ve | -Ve | | 14 pin DIL | 5V 7805 140p | 7812 250p | | 12V 7812 140p | 7815 250p | 7818 250p | | 15V 7815 140p | 7818 250p | 7824 250p | | 18V 7818 140p | 7824 250p | | | 24V 7824 140p | 7824 250p | | | <table border="1"> <tr><td>Transistors</td><td></td><td></td><td></td></tr> <tr><td>AC128/7</td><td>11p</td><td>MJE340</td><td>45p</td></tr> <tr><td>AC128</td><td>11p</td><td>MJE2855</td><td>99p</td></tr> <tr><td>AC141/2</td><td>18p</td><td>MJE3055</td><td>65p</td></tr> <tr><td>AC178</td><td>11p</td><td>MPSA06</td><td>30p</td></tr> <tr><td>AC187</td><td>11p</td><td>MPSA12</td><td>50p</td></tr> <tr><td>AC188</td><td>11p</td><td>MPSU08</td><td>62p</td></tr> <tr><td>AD149</td><td>43p</td><td>MPSU56</td><td>78p</td></tr> <tr><td>AD181/2</td><td>36p</td><td>OC26</td><td>55p</td></tr> <tr><td>AF114/5</td><td>18p</td><td>OC35</td><td>48p</td></tr> <tr><td>AF118/7</td><td>18p</td><td>OC41/2</td><td>16p</td></tr> <tr><td>AF139</td><td>33p</td><td>OC44/5</td><td>16p</td></tr> <tr><td>AF239</td><td>40p</td><td>OC71</td><td>16p</td></tr> <tr><td>BC107/8</td><td>11p</td><td>OC72</td><td>20p</td></tr> <tr><td>BC109/C</td><td>10p</td><td>OC85</td><td>28p</td></tr> <tr><td>BC147/8</td><td>7p</td><td>TIP295</td><td>290p</td></tr> <tr><td>BC149</td><td>8p</td><td>TIP29A</td><td>40p</td></tr> <tr><td>BC157</td><td>10p</td><td>TIP30A</td><td>48p</td></tr> <tr><td>BC158/9</td><td>12p</td><td>TIP31A</td><td>52p</td></tr> <tr><td>BC177</td><td>18p</td><td>TIP32A</td><td>58p</td></tr> <tr><td>BC178</td><td>18p</td><td>TIP33A</td><td>90p</td></tr> <tr><td>BC179</td><td>18p</td><td>TIP34A</td><td>115p</td></tr> <tr><td>BC182/3</td><td>10p</td><td>TIP35A</td><td>115p</td></tr> <tr><td>BC184</td><td>11p</td><td>TIP36A</td><td>370p</td></tr> <tr><td>BC187</td><td>30p</td><td>TIP41A</td><td>65p</td></tr> <tr><td>BC212</td><td>11p</td><td>TIP42A</td><td>70p</td></tr> <tr><td>BC213</td><td>10p</td><td>ZTX108</td><td>8p</td></tr> <tr><td>BC214</td><td>14p</td><td>ZTX300</td><td>13p</td></tr> <tr><td>BCY70</td><td>18p</td><td>ZTX504</td><td>48p</td></tr> <tr><td>BCY71</td><td>22p</td><td>ZTX504</td><td>48p</td></tr> <tr><td>BD123</td><td>20p</td><td>2N687</td><td>13p</td></tr> <tr><td>BD124</td><td>65p</td><td>2N698</td><td>30p</td></tr> <tr><td>BD131</td><td>38p</td><td>2N706</td><td>12p</td></tr> <tr><td>BD132</td><td>40p</td><td>2N708</td><td>18p</td></tr> <tr><td>BD135</td><td>43p</td><td>2N930</td><td>18p</td></tr> <tr><td>BD139</td><td>63p</td><td>2N1131/2</td><td>19p</td></tr> <tr><td>BD140</td><td>70p</td><td>2N1304/5</td><td>21p</td></tr> <tr><td>BF15</td><td>22p</td><td>2N1306</td><td>28p</td></tr> <tr><td>BF173</td><td>25p</td><td>2N1613</td><td>20p</td></tr> <tr><td>BF257</td><td>32p</td><td>2N1711</td><td>20p</td></tr> <tr><td>BFR38/40</td><td>30p</td><td>2N1893</td><td>30p</td></tr> <tr><td>BFR78/80</td><td>30p</td><td>2N2219</td><td>20p</td></tr> <tr><td>BFR88</td><td>30p</td><td>2N2219/2</td><td>20p</td></tr> <tr><td>BFX84</td><td>28p</td><td>2N2369</td><td>14p</td></tr> <tr><td>BFX85/6</td><td>25p</td><td>2N2484</td><td>30p</td></tr> <tr><td>BFX87</td><td>20p</td><td>2N2804/5</td><td>20p</td></tr> <tr><td>BFX88</td><td>24p</td><td>2N2828RB</td><td>7p</td></tr> <tr><td>BFY50</td><td>18p</td><td>2N2928C</td><td>8p</td></tr> <tr><td>BFY51</td><td>15p</td><td>2N2928VG</td><td>8p</td></tr> <tr><td>BFY52</td><td>16p</td><td>2N3053</td><td>19p</td></tr> <tr><td>BRV30</td><td>34p</td><td></td><td></td></tr> <tr><td>BSX19/20</td><td>16p</td><td></td><td></td></tr> <tr><td>BU105</td><td>140p</td><td></td><td></td></tr> <tr><td>BU108</td><td>250p</td><td></td><td></td></tr> </table> | Transistors | | | | AC128/7 | 11p | MJE340 | 45p | AC128 | 11p | MJE2855 | 99p | AC141/2 | 18p | MJE3055 | 65p | AC178 | 11p | MPSA06 | 30p | AC187 | 11p | MPSA12 | 50p | AC188 | 11p | MPSU08 | 62p | AD149 | 43p | MPSU56 | 78p | AD181/2 | 36p | OC26 | 55p | AF114/5 | 18p | OC35 | 48p | AF118/7 | 18p | OC41/2 | 16p | AF139 | 33p | OC44/5 | 16p | AF239 | 40p | OC71 | 16p | BC107/8 | 11p | OC72 | 20p | BC109/C | 10p | OC85 | 28p | BC147/8 | 7p | TIP295 | 290p | BC149 | 8p | TIP29A | 40p | BC157 | 10p | TIP30A | 48p | BC158/9 | 12p | TIP31A | 52p | BC177 | 18p | TIP32A | 58p | BC178 | 18p | TIP33A | 90p | BC179 | 18p | TIP34A | 115p | BC182/3 | 10p | TIP35A | 115p | BC184 | 11p | TIP36A | 370p | BC187 | 30p | TIP41A | 65p | BC212 | 11p | TIP42A | 70p | BC213 | 10p | ZTX108 | 8p | BC214 | 14p | ZTX300 | 13p | BCY70 | 18p | ZTX504 | 48p | BCY71 | 22p | ZTX504 | 48p | BD123 | 20p | 2N687 | 13p | BD124 | 65p | 2N698 | 30p | BD131 | 38p | 2N706 | 12p | BD132 | 40p | 2N708 | 18p | BD135 | 43p | 2N930 | 18p | BD139 | 63p | 2N1131/2 | 19p | BD140 | 70p | 2N1304/5 | 21p | BF15 | 22p | 2N1306 | 28p | BF173 | 25p | 2N1613 | 20p | BF257 | 32p | 2N1711 | 20p | BFR38/40 | 30p | 2N1893 | 30p | BFR78/80 | 30p | 2N2219 | 20p | BFR88 | 30p | 2N2219/2 | 20p | BFX84 | 28p | 2N2369 | 14p | BFX85/6 | 25p | 2N2484 | 30p | BFX87 | 20p | 2N2804/5 | 20p | BFX88 | 24p | 2N2828RB | 7p | BFY50 | 18p | 2N2928C | 8p | BFY51 | 15p | 2N2928VG | 8p | BFY52 | 16p | 2N3053 | 19p | BRV30 | 34p | | | BSX19/20 | 16p | | | BU105 | 140p | | | BU108 | 250p | | | <table border="1"> <tr><td>MOBFETs</td><td></td><td></td><td></td></tr> <tr><td>3N128</td><td>75p</td><td></td><td></td></tr> <tr><td>3N140</td><td>85p</td><td></td><td></td></tr> <tr><td>3N141</td><td>75p</td><td></td><td></td></tr> <tr><td>3N142</td><td>50p</td><td></td><td></td></tr> <tr><td>3N143</td><td>27p</td><td></td><td></td></tr> <tr><td>3N144</td><td>80p</td><td></td><td></td></tr> <tr><td>3N145</td><td>50p</td><td></td><td></td></tr> <tr><td>3N146</td><td>38p</td><td></td><td></td></tr> <tr><td>3N147</td><td>30p</td><td></td><td></td></tr> <tr><td>3N148</td><td>48p</td><td></td><td></td></tr> <tr><td>3N149</td><td>48p</td><td></td><td></td></tr> <tr><td>3N150</td><td>48p</td><td></td><td></td></tr> <tr><td>3N151</td><td>48p</td><td></td><td></td></tr> <tr><td>3N152</td><td>48p</td><td></td><td></td></tr> <tr><td>3N153</td><td>48p</td><td></td><td></td></tr> <tr><td>3N154</td><td>48p</td><td></td><td></td></tr> <tr><td>3N155</td><td>48p</td><td></td><td></td></tr> <tr><td>3N156</td><td>48p</td><td></td><td></td></tr> <tr><td>3N157</td><td>48p</td><td></td><td></td></tr> <tr><td>3N158</td><td>48p</td><td></td><td></td></tr> <tr><td>3N159</td><td>48p</td><td></td><td></td></tr> <tr><td>3N160</td><td>48p</td><td></td><td></td></tr> <tr><td>3N161</td><td>48p</td><td></td><td></td></tr> <tr><td>3N162</td><td>48p</td><td></td><td></td></tr> <tr><td>3N163</td><td>48p</td><td></td><td></td></tr> <tr><td>3N164</td><td>48p</td><td></td><td></td></tr> <tr><td>3N165</td><td>48p</td><td></td><td></td></tr> <tr><td>3N166</td><td>48p</td><td></td><td></td></tr> <tr><td>3N167</td><td>48p</td><td></td><td></td></tr> <tr><td>3N168</td><td>48p</td><td></td><td></td></tr> <tr><td>3N169</td><td>48p</td><td></td><td></td></tr> <tr><td>3N170</td><td>48p</td><td></td><td></td></tr> <tr><td>3N171</td><td>48p</td><td></td><td></td></tr> <tr><td>3N172</td><td>48p</td><td></td><td></td></tr> <tr><td>3N173</td><td>48p</td><td></td><td></td></tr> <tr><td>3N174</td><td>48p</td><td></td><td></td></tr> <tr><td>3N175</td><td>48p</td><td></td><td></td></tr> <tr><td>3N176</td><td>48p</td><td></td><td></td></tr> <tr><td>3N177</td><td>48p</td><td></td><td></td></tr> <tr><td>3N178</td><td>48p</td><td></td><td></td></tr> <tr><td>3N179</td><td>48p</td><td></td><td></td></tr> <tr><td>3N180</td><td>48p</td><td></td><td></td></tr> <tr><td>3N181</td><td>48p</td><td></td><td></td></tr> <tr><td>3N182</td><td>48p</td><td></td><td></td></tr> <tr><td>3N183</td><td>48p</td><td></td><td></td></tr> <tr><td>3N184</td><td>48p</td><td></td><td></td></tr> <tr><td>3N185</td><td>48p</td><td></td><td></td></tr> <tr><td>3N186</td><td>48p</td><td></td><td></td></tr> <tr><td>3N187</td><td>48p</td><td></td><td></td></tr> <tr><td>3N188</td><td>48p</td><td></td><td></td></tr> <tr><td>3N189</td><td>48p</td><td></td><td></td></tr> <tr><td>3N190</td><td>48p</td><td></td><td></td></tr> <tr><td>3N191</td><td>48p</td><td></td><td></td></tr> <tr><td>3N192</td><td>48p</td><td></td><td></td></tr> <tr><td>3N193</td><td>48p</td><td></td><td></td></tr> <tr><td>3N194</td><td>48p</td><td></td><td></td></tr> <tr><td>3N195</td><td>48p</td><td></td><td></td></tr> <tr><td>3N196</td><td>48p</td><td></td><td></td></tr> <tr><td>3N197</td><td>48p</td><td></td><td></td></tr> <tr><td>3N198</td><td>48p</td><td></td><td></td></tr> <tr><td>3N199</td><td>48p</td><td></td><td></td></tr> <tr><td>3N200</td><td>48p</td><td></td><td></td></tr> </table> | MOBFETs | | | | 3N128 | 75p | | | 3N140 | 85p | | | 3N141 | 75p | | | 3N142 | 50p | | | 3N143 | 27p | | | 3N144 | 80p | | | 3N145 | 50p | | | 3N146 | 38p | | | 3N147 | 30p | | | 3N148 | 48p | | | 3N149 | 48p | | | 3N150 | 48p | | | 3N151 | 48p | | | 3N152 | 48p | | | 3N153 | 48p | | | 3N154 | 48p | | | 3N155 | 48p | | | 3N156 | 48p | | | 3N157 | 48p | | | 3N158 | 48p | | | 3N159 | 48p | | | 3N160 | 48p | | | 3N161 | 48p | | | 3N162 | 48p | | | 3N163 | 48p | | | 3N164 | 48p | | | 3N165 | 48p | | | 3N166 | 48p | | | 3N167 | 48p | | | 3N168 | 48p | | | 3N169 | 48p | | | 3N170 | 48p | | | 3N171 | 48p | | | 3N172 | 48p | | | 3N173 | 48p | | | 3N174 | 48p | | | 3N175 | 48p | | | 3N176 | 48p | | | 3N177 | 48p | | | 3N178 | 48p | | | 3N179 | 48p | | | 3N180 | 48p | | | 3N181 | 48p | | | 3N182 | 48p | | | 3N183 | 48p | | | 3N184 | 48p | | | 3N185 | 48p | | | 3N186 | 48p | | | 3N187 | 48p | | | 3N188 | 48p | | | 3N189 | 48p | | | 3N190 | 48p | | | 3N191 | 48p | | | 3N192 | 48p | | | 3N193 | 48p | | | 3N194 | 48p | | | 3N195 | 48p | | | 3N196 | 48p | | | 3N197 | 48p | | | 3N198 | 48p | | | 3N199 | 48p | | | 3N200 | 48p | | |
| TTLa | 13p | 7482 | 70p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7400 | 13p | 7483 | 80p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7401 | 14p | 7484 | 95p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7402 | 14p | 7485 | 120p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7403 | 16p | 7486 | 30p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7404 | 16p | 7489 | 270p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7405 | 16p | 7490 | 40p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7406 | 38p | 7491 | 75p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7407 | 38p | 7492 | 45p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7408 | 16p | 7493 | 40p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7409 | 20p | 7494 | 75p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7410 | 14p | 7495 | 65p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7412 | 23p | 7496 | 78p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7413 | 32p | 7497 | 40p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7414 | 60p | 74121 | 30p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7416 | 33p | 74122 | 68p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7420 | 14p | 74123 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7422 | 18p | 74141 | 85p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7423 | 34p | 74151 | 72p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7425 | 30p | 74153 | 85p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7427 | 37p | 74154 | 150p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7430 | 14p | 74155 | 76p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7432 | 25p | 74156 | 76p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7437 | 25p | 74160 | 99p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7440 | 14p | 74161 | 99p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7441 | 65p | 74162 | 99p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7442 | 60p | 74163 | 99p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7447 | 75p | 74164 | 120p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7448 | 70p | 74166 | 126p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7450 | 15p | 74175 | 85p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7451 | 16p | 74180 | 100p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7453 | 16p | 74181 | 298p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7454 | 16p | 74182 | 82p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7460 | 15p | 74185 | 135p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7470 | 27p | 74191 | 144p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7472 | 25p | 74191 | 144p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7473 | 30p | 74192 | 120p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7474 | 30p | 74193 | 120p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7475 | 45p | 74194 | 108p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7476 | 30p | 74195 | 75p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7480 | 50p | 74198 | 198p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7481 | 95p | 74199 | 180p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DP. AMPS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 70A | Ext. Comp. 8 pin DIL | 36p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 70B | Ext. Comp. 8/14 pin DIL | 30p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 710 | Diff. Comp. 14 pin DIL | 50p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 741 | Int. Comp. 8/14 pin DIL | 25p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 747 | Dual 741 14 pin DIL | 70p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 748 | Ext. Comp. 5 pin DIL | 36p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 776 | Programmable Op. Amp. | 140p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CA3130S | COSMOS Op. Amp. 8 pin DIL | 100p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LM3900 | Quad. Op. Amp. 14 pin DIL | 70p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MC1458 | Dual Op. Amp. 8 pin DIL | 70p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NE53T | DIFF. Op. Amp. TOS | 275p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| VOLTAGE REGULATORS (PLASTIC) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 723 | 1 amp +Ve | -Ve | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 pin DIL | 5V 7805 140p | 7812 250p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12V 7812 140p | 7815 250p | 7818 250p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15V 7815 140p | 7818 250p | 7824 250p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18V 7818 140p | 7824 250p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 24V 7824 140p | 7824 250p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Transistors | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AC128/7 | 11p | MJE340 | 45p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AC128 | 11p | MJE2855 | 99p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AC141/2 | 18p | MJE3055 | 65p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AC178 | 11p | MPSA06 | 30p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AC187 | 11p | MPSA12 | 50p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AC188 | 11p | MPSU08 | 62p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AD149 | 43p | MPSU56 | 78p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AD181/2 | 36p | OC26 | 55p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AF114/5 | 18p | OC35 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AF118/7 | 18p | OC41/2 | 16p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AF139 | 33p | OC44/5 | 16p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AF239 | 40p | OC71 | 16p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BC107/8 | 11p | OC72 | 20p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BC109/C | 10p | OC85 | 28p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BC147/8 | 7p | TIP295 | 290p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BC149 | 8p | TIP29A | 40p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BC157 | 10p | TIP30A | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BC158/9 | 12p | TIP31A | 52p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BC177 | 18p | TIP32A | 58p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BC178 | 18p | TIP33A | 90p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BC179 | 18p | TIP34A | 115p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BC182/3 | 10p | TIP35A | 115p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BC184 | 11p | TIP36A | 370p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BC187 | 30p | TIP41A | 65p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BC212 | 11p | TIP42A | 70p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BC213 | 10p | ZTX108 | 8p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BC214 | 14p | ZTX300 | 13p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BCY70 | 18p | ZTX504 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BCY71 | 22p | ZTX504 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BD123 | 20p | 2N687 | 13p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BD124 | 65p | 2N698 | 30p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BD131 | 38p | 2N706 | 12p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BD132 | 40p | 2N708 | 18p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BD135 | 43p | 2N930 | 18p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BD139 | 63p | 2N1131/2 | 19p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BD140 | 70p | 2N1304/5 | 21p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BF15 | 22p | 2N1306 | 28p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BF173 | 25p | 2N1613 | 20p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BF257 | 32p | 2N1711 | 20p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BFR38/40 | 30p | 2N1893 | 30p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BFR78/80 | 30p | 2N2219 | 20p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BFR88 | 30p | 2N2219/2 | 20p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BFX84 | 28p | 2N2369 | 14p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BFX85/6 | 25p | 2N2484 | 30p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BFX87 | 20p | 2N2804/5 | 20p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BFX88 | 24p | 2N2828RB | 7p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BFY50 | 18p | 2N2928C | 8p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BFY51 | 15p | 2N2928VG | 8p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BFY52 | 16p | 2N3053 | 19p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BRV30 | 34p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BSX19/20 | 16p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BU105 | 140p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BU108 | 250p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MOBFETs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N128 | 75p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N140 | 85p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N141 | 75p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N142 | 50p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N143 | 27p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N144 | 80p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N145 | 50p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N146 | 38p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N147 | 30p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N148 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N149 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N150 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N151 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N152 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N153 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N154 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N155 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N156 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N157 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N158 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N159 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N160 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N161 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N162 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N163 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N164 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N165 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N166 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N167 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N168 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N169 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N170 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N171 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N172 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N173 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N174 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N175 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N176 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N177 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N178 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N179 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N180 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N181 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N182 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N183 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N184 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N185 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N186 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N187 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N188 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N189 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N190 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N191 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N192 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N193 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N194 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N195 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N196 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N197 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N198 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N199 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3N200 | 48p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1"> <tr><td>C-MOS I.Cs</td><td></td><td></td><td></td></tr> <tr><td>4002AE</td><td>19p</td><td>4028AE</td><td>140p</td></tr> <tr><td>4001AE</td><td>19p</td><td>4029AE</td><td>198p</td></tr> <tr><td>4002AE</td><td>19p</td><td>4048AE</td><td>140p</td></tr> <tr><td>4008AE</td><td>67p</td><td>4047AE</td><td>137p</td></tr> <tr><td>4011AE</td><td>19p</td><td>4049AE</td><td>50p</td></tr> <tr><td>4013AE</td><td>31p</td><td>4051AE</td><td>180p</td></tr> <tr><td>4016AE</td><td>50p</td><td>4055AE</td><td>180p</td></tr> <tr><td>4017AE</td><td>115p</td><td>4056AE</td><td>135p</td></tr> <tr><td>4018AE</td><td>225p</td><td>4069AE</td><td>37p</td></tr> <tr><td>4022AE</td><td>180p</td><td>4071AE</td><td>28p</td></tr> <tr><td>4023AE</td><td>21p</td><td>4081AE</td><td>19p</td></tr> <tr><td>4024AE</td><td>118p</td><td>4510AE</td><td>130p</td></tr> <tr><td>4027AE</td><td>75p</td><td>4511AE</td><td>280p</td></tr> </table> | C-MOS I.Cs | | | | 4002AE | 19p | 4028AE | 140p | 4001AE | 19p | 4029AE | 198p | 4002AE | 19p | 4048AE | 140p | 4008AE | 67p | 4047AE | 137p | 4011AE | 19p | 4049AE | 50p | 4013AE | 31p | 4051AE | 180p | 4016AE | 50p | 4055AE | 180p | 4017AE | 115p | 4056AE | 135p | 4018AE | 225p | 4069AE | 37p | 4022AE | 180p | 4071AE | 28p | 4023AE | 21p | 4081AE | 19p | 4024AE | 118p | 4510AE | 130p | 4027AE | 75p | 4511AE | 280p | <table border="1"> <tr><td>LINEAR I.Cs</td><td></td><td></td><td></td></tr> <tr><td>741</td><td>Diff. Cascade Amp.</td><td>100p</td><td></td></tr> <tr><td>CA3046</td><td>5-Transistor Array 14 DIL</td><td>90p</td><td></td></tr> <tr><td>CA3048</td><td>Quad. Low Noise Amp. 16 DIL</td><td>200p</td><td></td></tr> <tr><td>CA3089</td><td>FM IF System 16 DIL</td><td>200p</td><td></td></tr> <tr><td>CA3090</td><td>FM Stereo Dec. 16 DIL</td><td>160p</td><td></td></tr> <tr><td>ICL8038CC</td><td>VCO Fun. Gen. 14 DIL</td><td>275p</td><td></td></tr> <tr><td>LM380</td><td>2W Audio Amp. 14 DIL</td><td>90p</td><td></td></tr> <tr><td>LM381</td><td>Stereo Pramp. 14 DIL</td><td>160p</td><td></td></tr> <tr><td>M252</td><td>Rhythm Gen. 16 DIL</td><td>900p</td><td></td></tr> <tr><td>MC1310P</td><td>FM Stereo Dec. 14 DIL</td><td>175p</td><td></td></tr> <tr><td>MC1312</td><td>SO Quad. Dec. 14 DIL</td><td>1100p</td><td></td></tr> <tr><td>MC1314</td><td>SW Audio Amp. PCB</td><td>70p</td><td></td></tr> <tr><td>MC1315</td><td>JW Audio Amp. PCB</td><td>70p</td><td></td></tr> <tr><td>MFC4008B</td><td>Electronic Attenuator</td><td>90p</td><td></td></tr> <tr><td>MFC8040</td><td>Timer 8 DIL</td><td>45p</td><td></td></tr> <tr><td>NE555</td><td>Dual 555 14 DIL</td><td>100p</td><td></td></tr> <tr><td>NE561</td><td>PLL with AM Demod.</td><td>325p</td><td></td></tr> <tr><td>NE562</td><td>PLL with VCO 18 DIL</td><td>325p</td><td></td></tr> <tr><td>NE563</td><td>PLL FM/IF Demod.</td><td>250p</td><td></td></tr> <tr><td>NE565</td><td>PLL 4 DIL</td><td>200p</td><td></td></tr> <tr><td>NE566</td><td>PLL Fun. Gen. 8 DIL</td><td>200p</td><td></td></tr> <tr><td>NE567</td><td>PLL Tone Decoder 8 DIL</td><td>250p</td><td></td></tr> <tr><td>2567</td><td>Dual 567 14 DIL</td><td>370p</td><td></td></tr> <tr><td>SN72733</td><td>Video Amp. 14 DIL</td><td>120p</td><td></td></tr> <tr><td>TBA260</td><td>SW Audio Amp. OIL</td><td>90p</td><td></td></tr> <tr><td>TBA810</td><td>7W Audio Amp. OIL</td><td>100p</td><td></td></tr> <tr><td>TB820</td><td>2W Audio Amp. OIL</td><td>80p</td><td></td></tr> <tr><td>TDA1200</td><td>FM IF System 16 DIL</td><td>200p</td><td></td></tr> <tr><td>XR2240</td><td>Prog. Timer/Counter DIL</td><td>370p</td><td></td></tr> <tr><td>ZN414</td><td>TRF Radio Receiver</td><td>110p</td><td></td></tr> <tr><td>Basic data sheets at 10p each + SAE</td><td></td><td></td><td></td></tr> </table> | LINEAR I.Cs | | | | 741 | Diff. Cascade Amp. | 100p | | CA3046 | 5-Transistor Array 14 DIL | 90p | | CA3048 | Quad. Low Noise Amp. 16 DIL | 200p | | CA3089 | FM IF System 16 DIL | 200p | | CA3090 | FM Stereo Dec. 16 DIL | 160p | | ICL8038CC | VCO Fun. Gen. 14 DIL | 275p | | LM380 | 2W Audio Amp. 14 DIL | 90p | | LM381 | Stereo Pramp. 14 DIL | 160p | | M252 | Rhythm Gen. 16 DIL | 900p | | MC1310P | FM Stereo Dec. 14 DIL | 175p | | MC1312 | SO Quad. Dec. 14 DIL | 1100p | | MC1314 | SW Audio Amp. PCB | 70p | | MC1315 | JW Audio Amp. PCB | 70p | | MFC4008B | Electronic Attenuator | 90p | | MFC8040 | Timer 8 DIL | 45p | | NE555 | Dual 555 14 DIL | 100p | | NE561 | PLL with AM Demod. | 325p | | NE562 | PLL with VCO 18 DIL | 325p | | NE563 | PLL FM/IF Demod. | 250p | | NE565 | PLL 4 DIL | 200p | | NE566 | PLL Fun. Gen. 8 DIL | 200p | | NE567 | PLL Tone Decoder 8 DIL | 250p | | 2567 | Dual 567 14 DIL | 370p | | SN72733 | Video Amp. 14 DIL | 120p | | TBA260 | SW Audio Amp. OIL | 90p | | TBA810 | 7W Audio Amp. OIL | 100p | | TB820 | 2W Audio Amp. OIL | 80p | | TDA1200 | FM IF System 16 DIL | 200p | | XR2240 | Prog. Timer/Counter DIL | 370p | | ZN414 | TRF Radio Receiver | 110p | | Basic data sheets at 10p each + SAE | | | | <table border="1"> <tr><td>OPTO-ELECTRONICS</td><td></td><td></td><td></td></tr> <tr><td>OC770</td><td>30p</td><td>Seven Segment Displays</td><td></td></tr> <tr><td>OC771</td><td>90p</td><td>3015F 0-3in DIL</td><td>120p</td></tr> <tr><td>ORP12</td><td>50p</td><td>MAN3M 0-127in. PCB</td><td>110p</td></tr> <tr><td>ORP80</td><td>60p</td><td>DL704 0-3in DIL</td><td>135p</td></tr> <tr><td>ORP81</td><td>60p</td><td>DL707 0-3in DIL</td><td>135p</td></tr> <tr><td>2N5777</td><td>40p</td><td>DL747 0-6in DIL</td><td>225p</td></tr> <tr><td>LEDS: TIL209</td><td>Red 16p</td><td>TIL211</td><td>Green 36p</td></tr> </table> | OPTO-ELECTRONICS | | | | OC770 | 30p | Seven Segment Displays | | OC771 | 90p | 3015F 0-3in DIL | 120p | ORP12 | 50p | MAN3M 0-127in. PCB | 110p | ORP80 | 60p | DL704 0-3in DIL | 135p | ORP81 | 60p | DL707 0-3in DIL | 135p | 2N5777 | 40p | DL747 0-6in DIL | 225p | LEDS: TIL209 | Red 16p | TIL211 | Green 36p | <table border="1"> <tr><td>SCR-THYRISTORS</td><td></td><td></td><td></td></tr> <tr><td>1A100V TOS</td><td>40p</td><td>BT106 Stud</td><td>140p</td></tr> <tr><td>1A400V TOS</td><td>52p</td><td>C106D Plastic</td><td>55p</td></tr> <tr><td>1A600V TOS</td><td>70p</td><td>3A/400V</td><td>55p</td></tr> <tr><td>3A100V Stud</td><td>49p</td><td>MCR101 TO-92</td><td>25p</td></tr> <tr><td>3A400V Stud</td><td>75p</td><td>0-5A/15V</td><td>25p</td></tr> <tr><td>7A100V TOS + HS</td><td>90p</td><td>2N3525 TO-92</td><td>91p</td></tr> <tr><td>7A400V TOS + HS</td><td>90p</td><td>5A/400V</td><td>185p</td></tr> <tr><td>16A100V Plastic</td><td>160p</td><td>2N4444 Plastic</td><td>185p</td></tr> <tr><td>16A400V Plastic</td><td>180p</td><td>8A/800V</td><td>185p</td></tr> <tr><td>M252 MOS IC RHYTHM GENERATOR, Drive 8 sound gens. 15 prog. rhythms. D3 + 2% VAT.</td><td></td><td>2N5080 TO-92</td><td>34p</td></tr> <tr><td>Basic data 25p + S.A.E.</td><td></td><td>0-8A/30V</td><td>40p</td></tr> <tr><td></td><td></td><td>2N5082 TO-92</td><td>40p</td></tr> <tr><td></td><td></td><td>0-8A/100V</td><td>40p</td></tr> <tr><td></td><td></td><td>2N5084 TO-92</td><td>45p</td></tr> <tr><td></td><td></td><td>0-8A/200V</td><td>45p</td></tr> </table> | SCR-THYRISTORS | | | | 1A100V TOS | 40p | BT106 Stud | 140p | 1A400V TOS | 52p | C106D Plastic | 55p | 1A600V TOS | 70p | 3A/400V | 55p | 3A100V Stud | 49p | MCR101 TO-92 | 25p | 3A400V Stud | 75p | 0-5A/15V | 25p | 7A100V TOS + HS | 90p | 2N3525 TO-92 | 91p | 7A400V TOS + HS | 90p | 5A/400V | 185p | 16A100V Plastic | 160p | 2N4444 Plastic | 185p | 16A400V Plastic | 180p | 8A/800V | 185p | M252 MOS IC RHYTHM GENERATOR, Drive 8 sound gens. 15 prog. rhythms. D3 + 2% VAT. | | 2N5080 TO-92 | 34p | Basic data 25p + S.A.E. | | 0-8A/30V | 40p | | | 2N5082 TO-92 | 40p | | | 0-8A/100V | 40p | | | 2N5084 TO-92 | 45p | | | 0-8A/200V | 45p | <table border="1"> <tr><td>TRIACS</td><td></td><td></td><td></td></tr> <tr><td>3 amp 100V</td><td>40V</td><td>4030</td><td>99p</td></tr> <tr><td>6 amp 85p</td><td>99p</td><td>120p</td><td>99p</td></tr> <tr><td>6 amp 88p</td><td>120p</td><td>150p</td><td>4068p</td></tr> <tr><td>10 amp 109p</td><td>154p</td><td>185p</td><td>BR100</td></tr> <tr><td>15 amp 145p</td><td>180p</td><td>220p</td><td>DIAC</td></tr> <tr><td></td><td></td><td></td><td>21p</td></tr> </table> | TRIACS | | | | 3 amp 100V | 40V | 4030 | 99p | 6 amp 85p | 99p | 120p | 99p | 6 amp 88p | 120p | 150p | 4068p | 10 amp 109p | 154p | 185p | BR100 | 15 amp 145p | 180p | 220p | DIAC | | | | 21p | <table border="1"> <tr><td>DIODES</td><td></td><td></td><td></td></tr> <tr><td>BY100</td><td>25p</td><td>IN4001</td><td>5p</td></tr> <tr><td>BY126</td><td>12p</td><td>IN4004</td><td>6p</td></tr> <tr><td>BY127</td><td>12p</td><td>IN4007</td><td>6p</td></tr> <tr><td>QA47</td><td>7p</td><td>IN4148</td><td>4p</td></tr> <tr><td>OA70</td><td>8p</td><td>ZENERS</td><td></td></tr> <tr><td>OA78</td><td>7p</td><td>3-3V to 33V</td><td></td></tr> <tr><td>OA81</td><td>7p</td><td>400mW</td><td>9p</td></tr> <tr><td>OA85</td><td>9p</td><td>1W</td><td>18p</td></tr> <tr><td>OA89</td><td>6p</td><td>Tunnel</td><td>50p</td></tr> <tr><td>OA91</td><td>6p</td><td>AEY11</td><td>34p</td></tr> <tr><td>OA85</td><td>7p</td><td>Varicap</td><td>34p</td></tr> <tr><td>OA200</td><td>6p</td><td>BB105</td><td>30p</td></tr> <tr><td>OA202</td><td>7p</td><td>Noise</td><td>90p</td></tr> <tr><td>IN914</td><td>4p</td><td>ZU</td><td>30p</td></tr> </table> | DIODES | | | | BY100 | 25p | IN4001 | 5p | BY126 | 12p | IN4004 | 6p | BY127 | 12p | IN4007 | 6p | QA47 | 7p | IN4148 | 4p | OA70 | 8p | ZENERS | | OA78 | 7p | 3-3V to 33V | | OA81 | 7p | 400mW | 9p | OA85 | 9p | 1W | 18p | OA89 | 6p | Tunnel | 50p | OA91 | 6p | AEY11 | 34p | OA85 | 7p | Varicap | 34p | OA200 | 6p | BB105 | 30p | OA202 | 7p | Noise | 90p | IN914 | 4p | ZU | 30p | <table border="1"> <tr><td>VAT RATES</td><td></td><td></td><td></td></tr> <tr><td>8% TTLa, CMOs, VRs, Opto Devices, SCRs, Triacs, many Lin. ICs and DIL sockets.</td><td></td><td></td><td></td></tr> <tr><td>25% all others.</td><td></td><td></td><td></td></tr> </table> | VAT RATES | | | | 8% TTLa, CMOs, VRs, Opto Devices, SCRs, Triacs, many Lin. ICs and DIL sockets. | | | | 25% all others. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C-MOS I.Cs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4002AE | 19p | 4028AE | 140p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4001AE | 19p | 4029AE | 198p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4002AE | 19p | 4048AE | 140p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4008AE | 67p | 4047AE | 137p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4011AE | 19p | 4049AE | 50p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4013AE | 31p | 4051AE | 180p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4016AE | 50p | 4055AE | 180p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4017AE | 115p | 4056AE | 135p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4018AE | 225p | 4069AE | 37p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4022AE | 180p | 4071AE | 28p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4023AE | 21p | 4081AE | 19p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4024AE | 118p | 4510AE | 130p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4027AE | 75p | 4511AE | 280p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LINEAR I.Cs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 741 | Diff. Cascade Amp. | 100p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CA3046 | 5-Transistor Array 14 DIL | 90p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CA3048 | Quad. Low Noise Amp. 16 DIL | 200p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CA3089 | FM IF System 16 DIL | 200p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CA3090 | FM Stereo Dec. 16 DIL | 160p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ICL8038CC | VCO Fun. Gen. 14 DIL | 275p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LM380 | 2W Audio Amp. 14 DIL | 90p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LM381 | Stereo Pramp. 14 DIL | 160p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| M252 | Rhythm Gen. 16 DIL | 900p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MC1310P | FM Stereo Dec. 14 DIL | 175p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MC1312 | SO Quad. Dec. 14 DIL | 1100p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MC1314 | SW Audio Amp. PCB | 70p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MC1315 | JW Audio Amp. PCB | 70p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MFC4008B | Electronic Attenuator | 90p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MFC8040 | Timer 8 DIL | 45p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NE555 | Dual 555 14 DIL | 100p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NE561 | PLL with AM Demod. | 325p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NE562 | PLL with VCO 18 DIL | 325p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NE563 | PLL FM/IF Demod. | 250p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NE565 | PLL 4 DIL | 200p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NE566 | PLL Fun. Gen. 8 DIL | 200p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NE567 | PLL Tone Decoder 8 DIL | 250p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2567 | Dual 567 14 DIL | 370p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SN72733 | Video Amp. 14 DIL | 120p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TBA260 | SW Audio Amp. OIL | 90p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TBA810 | 7W Audio Amp. OIL | 100p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TB820 | 2W Audio Amp. OIL | 80p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TDA1200 | FM IF System 16 DIL | 200p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| XR2240 | Prog. Timer/Counter DIL | 370p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZN414 | TRF Radio Receiver | 110p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Basic data sheets at 10p each + SAE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OPTO-ELECTRONICS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OC770 | 30p | Seven Segment Displays | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OC771 | 90p | 3015F 0-3in DIL | 120p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ORP12 | 50p | MAN3M 0-127in. PCB | 110p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ORP80 | 60p | DL704 0-3in DIL | 135p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ORP81 | 60p | DL707 0-3in DIL | 135p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2N5777 | 40p | DL747 0-6in DIL | 225p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LEDS: TIL209 | Red 16p | TIL211 | Green 36p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SCR-THYRISTORS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1A100V TOS | 40p | BT106 Stud | 140p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1A400V TOS | 52p | C106D Plastic | 55p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1A600V TOS | 70p | 3A/400V | 55p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3A100V Stud | 49p | MCR101 TO-92 | 25p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3A400V Stud | 75p | 0-5A/15V | 25p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7A100V TOS + HS | 90p | 2N3525 TO-92 | 91p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7A400V TOS + HS | 90p | 5A/400V | 185p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16A100V Plastic | 160p | 2N4444 Plastic | 185p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16A400V Plastic | 180p | 8A/800V | 185p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| M252 MOS IC RHYTHM GENERATOR, Drive 8 sound gens. 15 prog. rhythms. D3 + 2% VAT. | | 2N5080 TO-92 | 34p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Basic data 25p + S.A.E. | | 0-8A/30V | 40p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2N5082 TO-92 | 40p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 0-8A/100V | 40p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2N5084 TO-92 | 45p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 0-8A/200V | 45p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TRIACS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 amp 100V | 40V | 4030 | 99p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 amp 85p | 99p | 120p | 99p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 amp 88p | 120p | 150p | 4068p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 amp 109p | 154p | 185p | BR100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 amp 145p | 180p | 220p | DIAC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 21p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DIODES | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BY100 | 25p | IN4001 | 5p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BY126 | 12p | IN4004 | 6p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BY127 | 12p | IN4007 | 6p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| QA47 | 7p | IN4148 | 4p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OA70 | 8p | ZENERS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OA78 | 7p | 3-3V to 33V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OA81 | 7p | 400mW | 9p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OA85 | 9p | 1W | 18p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OA89 | 6p | Tunnel | 50p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OA91 | 6p | AEY11 | 34p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OA85 | 7p | Varicap | 34p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OA200 | 6p | BB105 | 30p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OA202 | 7p | Noise | 90p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IN914 | 4p | ZU | 30p | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| VAT RATES | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8% TTLa, CMOs, VRs, Opto Devices, SCRs, Triacs, many Lin. ICs and DIL sockets. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25% all others. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Minimum order £2. P. & P. 20p MAIL ORDER ONLY
 Please add VAT as shown Govt., Colleges, etc., orders welcome</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

TECHNOMATIC LTD.

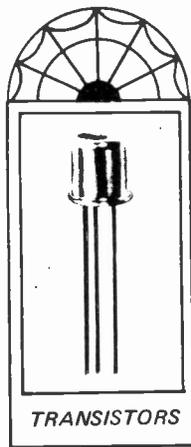
54 SANDHURST ROAD
LONDON, NW9
Tel. 01-204 4333

INDEX TO ADVERTISERS

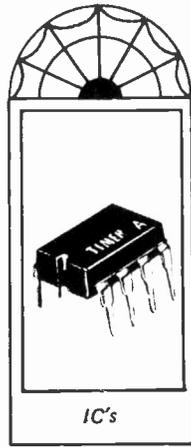
| | | | | | |
|--|---------------|--|---------------|-----------------------------------|----------|
| Adam Hall (P.E. Supplies)..... | 948 | Electrovalue Ltd..... | 876 | Phonosonics..... | 872, 873 |
| Adfonic..... | 947 | Elliot Blunt Audio..... | 866 | Precision Petite..... | 928 |
| Astro Electronics..... | 870 | Elvins Electronics..... | 920 | Pulse Electronics Ltd..... | 920 |
| Automated Homes..... | 947 | Euray Trading..... | 917 | Radio Components Specialists..... | 936, 937 |
| Axial Products..... | 944 | Fibre Optics..... | 946 | Radio Exchange..... | 923 |
| Bamber, B., Electronics..... | 917 | Garfields..... | 947 | Radio Shop..... | 943 |
| Barclay Electronics..... | 941 | Greenwald Electronics..... | 935 | Radnag..... | 931 |
| Barrie Electronics..... | 935 | Harverson's..... | 927 | Reedhampton..... | 917 |
| Bellard Electronics..... | 939 | Heath (Gloucester) Ltd..... | 919 | Reitran Ltd..... | 944 |
| Beta Devices..... | 944 | Henry's Radio..... | 942 | R & TV Components Ltd..... | 932, 933 |
| B. H. Components..... | 931 | I.L.P. Electronics Ltd..... | 875 | R.S.T. Valve Mail Order Co..... | 876 |
| Bib-Ni-Fi Solder..... | 934 | Intech Products..... | 872 | R.T. Services..... | 944 |
| BI-Pak..... | 878, 879, 894 | Industrial RF Services..... | 946 | Sales Team..... | 880 |
| BI-Pre-Pak Ltd..... | 883 | International Electronics Unlimited..... | 865 | Salop Enterprises..... | 947 |
| Boffin Projects..... | 947 | Instrumental Engineer..... | 939 | Saxon Entertainments Ltd..... | 940, 941 |
| British Institute of Engineering Technology..... | 882, 919 | Intertext ICS..... | 945 | Scientific Wine Co..... | 946 |
| British National Radio & Electronics School..... | 893, 938 | Island Devices..... | 944 | S.C.S. Components..... | 871 |
| Burneze..... | 866 | J F H Supplies..... | 947 | Selektron..... | 945 |
| Bywood..... | 928 | Jones, J. C..... | 945 | Selray Book..... | 898 |
| Chiltmead Ltd..... | 864 | J.W.B. Radio..... | 844 | Service Trading..... | 877 |
| Chinaglia..... | 864 | Kensington Supplies..... | 945 | Shopertunities..... | 943 |
| Chromasonic Electronics..... | cover II | Laskys..... | 867, 868, 869 | Sintel..... | 976 |
| C.J.L..... | 870 | Light Soldering Development..... | 862 | | |



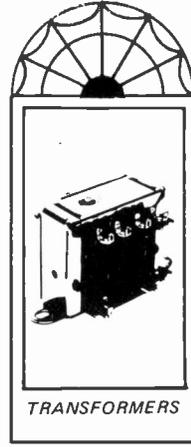
CAPACITORS
AND RESISTORS



TRANSISTORS



IC's



TRANSFORMERS

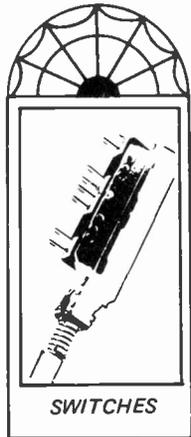


CONNECTORS

Use DORAM components for your project



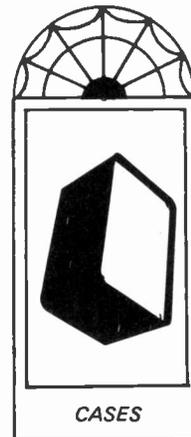
SPEAKERS



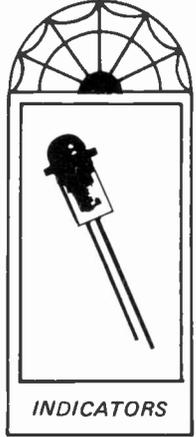
SWITCHES



TOOLS



CASES



INDICATORS

The doorway to Amateur Electronics



- ★ DORAM'S NEW CATALOGUE OFFERS THOUSANDS UPON THOUSANDS OF QUALITY ELECTRONIC COMPONENTS AND AUDIO ACCESSORIES FROM TRUSTED BIG NAME MANUFACTURERS.
- ★ ALL COMPONENTS ARE INDIVIDUALLY CODED AND PRICED - MANY NEW COMPONENTS ADDED FROM CUSTOMER REQUESTS.
- ★ 16 EXTRA PAGE DATA SECTION.
- ★ UNIQUE FREE UP-DATE PRODUCT INFORMATION SERVICE DURING LIFE SPAN OF CATALOGUE.
- ★ ALL COMPONENTS SENT BY RETURN OF POST.
- ★ POST AND PACKING FREE (only applies for Great Britain, N. Ireland and B.F.P.O. Nos. - overseas orders F.O.B.)
- ★ NO QUIBBLE REPLACEMENT PART SERVICE

The doorway to amateur electronics

DORAM

DORAM ELECTRONICS LIMITED
P. O. Box TR8
Leeds LS12 2UF

I enclose 60p. Please send me by return my new Doram Catalogue. (Overseas orders except for B.F.P.O., please add 30p for post and packing surface only).

PLEASE PRINT BLOCK CAPITALS

PE10

NAME _____

ADDRESS _____

Post Code _____

Published approximately on the 15th of each month by IPC Magazines Ltd., Fleetway House, Farringdon Street, London, EC4A 4AD Printed in England by Chapel River Press, Andover, Hants. Sole Agents for Australia and New Zealand—Gordon & Gotch (A/Sia) Ltd. South Africa—Central News Agency Ltd. Subscriptions not available at home or overseas.

International Giro facilities Account No. 5122007 Please state reason for payment, "message to payee". Practical Electronics is sold subject to the following conditions, namely, that it shall not, without the written consent of the Publishers first given, be lent, resold, hired out or otherwise disposed of by way of Trade at more than the recommended selling price shown on the cover, excluding Fire where the selling price is subject to V.A.T., and that it shall not be lent, resold or hired out or otherwise disposed of in a mutilated condition or in any unauthorised cover by way of Trade, or affixed to or as part of any publication or advertising, literary or pictorial matter whatsoever.

More than just a catalogue

Projects for you to build.

4-digit clock, 6-digit clock, 10W high quality power amp., High quality stereo pre-amp., Stereo Tuner, F.M. Stereo decoder, etc., etc. . . .

CIRCUITS . . . Frequency Doublers, Oscillators, Timers, Voltmeters, Power Supplies, Amplifiers, Capacitance Multiplier, etc., etc. . . .

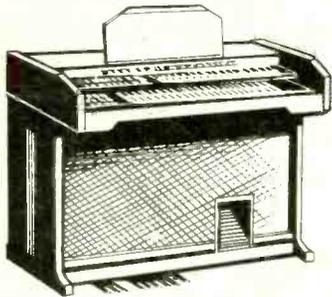
Full details and pictures of our wide range of components, e.g. capacitors, cases, knobs, veroboards, edge connectors, plugs and sockets, lamps and lampholders, audio leads, adaptor plugs, rotary and slide potentiometers, presets, relays, resistors (even 1% types!), switches, interlocking pushbutton switches, pot cores, transformers, cable and wire, panel meters, nuts and bolts, tools, organ components, keyboards, L.E.D.'s, 7-segment displays, heatsinks, transistors, diodes, integrated circuits, etc., etc., etc. . . .

REALLY GOOD VALUE FOR MONEY AT JUST 40p.

**MAPLIN
ELECTRONIC
SUPPLIES**

**SUPERSONIC
SAME-DAY-SERVICE
QUALITY COMPONENTS
-FAST!**

ELECTRONIC ORGAN



Build yourself an exciting Electronic Organ. Our leaflet MES51, price 15p, deals with the basic theory of electronic organs and describes the construction of a simple 49-note instrument with a single keyboard and a limited number of stops.

Leaflet MES52, price 15p, describes the extension of the organ to two keyboards each with five voices and the extension by an octave of the organ's range.

Solid-state switching and new footages along with a pedal board and a further extension of the organ's range are shown in leaflet MES53, priced at 35p.

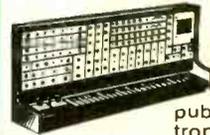
No more doubts about prices

Now our prices are **GUARANTEED** (changes in VAT excluded) for two month periods—and we'll tell you about price changes in advance for just **30p** a year (refunded on purchases). If you already have our catalogue send us an S.A.E. and we'll send you our latest list of **GUARANTEED** prices. Send us **30p** and we'll put you on our mailing list—you'll receive immediately our latest price list then every two months from the starting date shown on that list you'll receive details of our prices for the next **GUARANTEED** period *before* the prices are implemented!—plus details of any new lines, special offers, interesting projects—and clip-off coupons to spend on components to repay your **30p** when used as directed.

NOTE: The price list is based on the Order Codes shown in our catalogue so an investment in our super catalogue is an essential first step.

Call in at our shop, 284 London Road, Westcliff-on-Sea, Essex. Please address all mail to P.O. Box 3, Rayleigh, Essex, SS6 8LR.

SYNTHESISER



A reprint of the complete article giving full construction details published by "Electronics Today International" between January-September '74 of the International Voltage Controlled Synthesiser, developed as a "state of the art", now available, price **£1.50**. S.A.E. please for detailed price list.

GRAPHIC EQUALISER



A really superior high quality stereo graphic equaliser as described in the January edition of "Electronics Today International". We stock all the parts (except woodwork) including the metalwork drilled and printed. **15p** brings you a reprint of the article or a S.A.E. please for our detailed price list.

**MAPLIN
ELECTRONIC
SUPPLIES**

P.O. Box 3 Rayleigh Essex SS6 8LR.
Telephone: Southend-on-Sea (0702) 44101