SEPTEMBER 1988

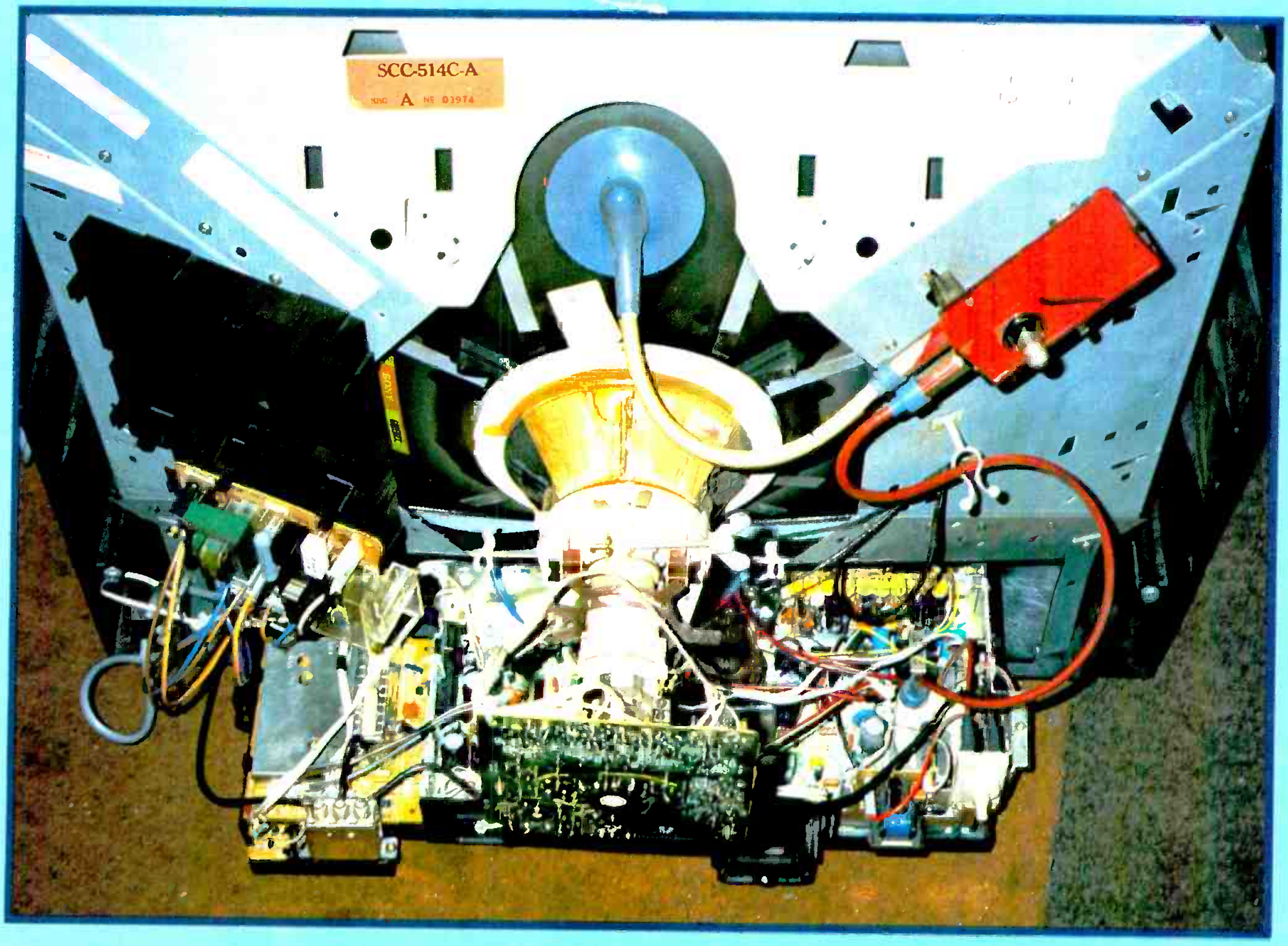
Australia $3·25, New Zealand $4·40 (inc. GST), Malaysia $6·10 Ireland £IR2·05 (inc VAT)

£1·40

TELEVISION

SERVICING·PROJECTS·VIDEO·DEVELOPMENTS

FREE 1A Power Diodes

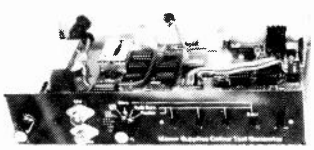


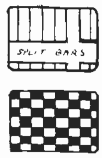
Servicing the Sony KV2752
International TV Standards
Multi-function Video Memories
Notes on the Panasonic G Deck
Anti-theft Device • DX-TV
VCR Clinic • TV Fault Finding

MANOR SUPPLIES

MKV PAL COLOUR TEST GENERATOR FOR DOMESTIC TV & VCR.

TEST DEMONSTRATIONS AT 172 WEST END LANE





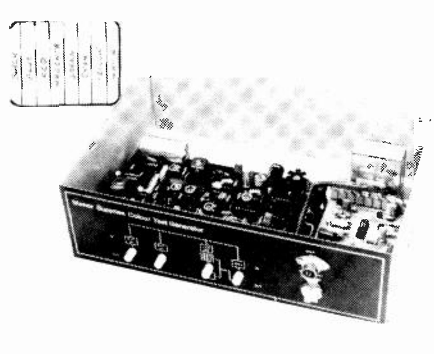
- ★ 40 different patterns and variations.
- ★ Fully interlaced sync pulses with correct picture blanking.
- ★ EBU colour bars, BBC colour bars, whole rasters & split bars (specially useful for VCR service), white, yellow, cyan, green, magenta, red, blue and black.
- ★ Chequerboard.
- ★ Mono outputs with border castellations, cross hatch, grey scale, vertical lines, horizontal lines and dots. UHF modulator output plugs straight into receiver aerial socket.
- ★ Additional video output for CCTV & VCR.
- ★ Facilities for sound output.
- ★ Easy to build kit, standard parts. Only 2 adjustments. No special test equipment required.
- ★ Mains operated with stabilised power supply.
- ★ All kits fully guaranteed with back-up service.
- ★ Also available with VHF Modulator.

Price of Kit	**£70.00**
Case (10″×6″×2¼″) app.	**£8.60**
Optional Sound Module (6MHz or 5.5MHz)	**£3.90**
Built & Tested in Case including Sound Module	**£108.00**

SPECIAL TEST REPORT 'TELEVISION' DEC. 1982

Post/Packing £2.80
Add VAT 15% TO ALL PRICES

PAL COLOUR BAR GENERATOR (Mk4)



- ★ Output at UHF, applied to receiver aerial socket.
- ★ In addition to colour bars R-Y, B-Y etc.
- ★ Cross-hatch, grey scale, peak white and black level.
- ★ Push button controls, battery or mains operated.
- ★ Simple design, only five i.c.s on colour bar P.C.B.
- ★ Backup service available.

PRICE OF MK 4 COLOUR BAR GENERATOR KIT £30.00. CASE £8.60. BATT HOLDERS £4.20. MAINS SUPPLY KIT £4.20 (Combined P&P £2.80).

MK 4 (BATTERY) BUILT & TESTED £58.00 + £2.80 P & P.
MK 4 (MAINS) BUILT & TESTED £68.00 + £2.80 P & P.
VHF MODULATOR (CH 1 to 4) FOR OVERSEAS £5.75.
EASILY ADAPTED FOR VIDEO OUTPUT & C.C.T.V.

ADD VAT 15%

TELETEXT DECODER PANELS (TESTED)
Mullard VM6101 **£25.00**, Philips KT3, K30 **£20.00**, p.p. £2.30

PHILIPS G11 PRESTEL, TELETEXT UNIT includes Mullard VM6230, Teletext Decoder, 6330 plus, plus Line Coupler and Interface **£30.00**, p.p. £2.80

TV SERVICE SPARES

BACKED BY TWENTY YEARS EXPERIENCE & STAFF OF TECHNICAL EXPERTS

LOPTs, TRIPLERS, PANELS, TUNERS, SELECTORS ETC.

PHILIPS KT3, K30 PANELS, tested, exchange, sound power, frame, RGB **£7.50** each, Decoder (Non-text) **£10.00** p.p. £1.50.
THORN TX9 PANELS Complete & tested **£28.00** Exchange. (Shop only).
THORN 8000 TO 8500 Panels tested exchange. Power **£7.80. 8800, 9800** power **£8.80** p.p £1.50. Frame **£10.00** p.p. £2.30.
THORN TX9, TX10 Facia Control Panel Incl Infra Red Remote Receiver **£8.50** p.p. £2.00.
BUSH T20/22 Touch Tune Facia Unit **£7.50** p.p. £2.00.
THORN 8800, 9800 Touch Tune Facia Unit **£3.50** p.p. £1.50.
PHILIPS G11 PANELS (tested).
Frame, IF, decoder **£12.50** each p.p. £2.00. Scan **£20.00** p.p. £2.80.
PHILIPS G11 PANELS ex rental (untested).
Scan Frame, Decoder **£5.00** p.p. £2.00.
PHILIPS G11 IF PANEL (New) Less Tuner **£2.50** p.p. £1.30
PHILIPS HANDSETS (New Replacements) p.p. £1.50.
G11 Ultrasonic Nontext **£19.50**, Infra red Text **£19.50.** Others available.
KT3 Non text (RC4001) **£22.50, KT3, K30 etc.** Text **£22.50.**
PHILIPS HANDSETS Ex rental, text, Untested. KT Text/Video Type, **£3.50** p.p. £1.00.
PHILIPS COLOUR MANUALS p.p. 80p.
G11, K30, K35, 2A **£3.50**, KT3 **£4.50**, CTX-E, CTX-S, CF1 **£1.50** each.
THORN REMOTE CONTROL HANDSETS
TX9, TX10 Infra red (Non-Text) **£18.00; TX9, TX10** Infra red Teletext **£19.50**, p.p. £1.20. Large selection others available: Sony, Grundig, etc.
TX9 Ultrasonic remote handset transducer **£2.00**, switches 3 for **£1.50** p.p. 50p.
TX Remote panel 1564 (incl. SAA5012) **£5.00** p.p. £1.80.
THORN TX9, TX10 Saw Filter IF Panel. **£5.00** p.p. 80p.
TX9, TX10 Remote & tuning control panel (1515) **£10.50** p.p. £1.80.
PAL DECODER KIT (Video to RGB) for Monitors **£27.00** p.p. £1.00.
PAL ENCODER KIT (RGB to Video) **£18.50** p.p. £1.30.
CROSS HATCH UNIT KIT, Aerial Input type, incl. T.V. sync. and UHF Modulator, Battery Operated, also gives Peak White & Black Levels, can be used for any set. **£13.50** p.p. 80p. (Alum. Case **£2.90** p.p. £1.40.) **ADDITIONAL GREY SCALE** Kit **£2.90** p.p. 45p.
UHF SIGNAL STRENGTH METER KIT £22.00 Alum. Case **£2.90.** De Luxe Case **£8.60** (Built & Tested **£48.00**) p.p. £2.30.
CRT TESTER & REACTIVATOR KIT For Colour & Mono complete with Case, Panel Meter Indicator – can be adapted for latest CRTs **£29.50** p.p. £2.80.
GEC 20AX Line Time Base **£18.00** p.p. £2.00.
ITT CVC30 SERIES. Convergence & Purity Panels, **£2.50** p.p. £1.50.
ITT CVC30 SERIES PANELS SURPLUS (untested) **£2.50 each.** CMP31, CMF31, CMA30, CM532, p.p. 80p; CMD33, p.p. £1.80.
ITT CVC20, 30 Series chassis for spares (shop only) **£2.50.**
THORN TX9 Panels ex factory for small spares. Includes I.Cs & Semiconductors etc. **£3.00** p.p. £2.00.
THORN TX9 Panels salvaged ex factory for spares incl. Electrolytic & Mains Transformers. **£8.50** p.p. £3.00.
THORN 8000/8500 IF/Decoder Panels salvaged **£3.20** p.p. £1.80.
THORN 9000 SERIES IF/Decoder **£10.00** p.p. £2.30.
THORN 9000 IF/Decoder Panels Salvaged. For spares **£2.50** p.p. £1.80.
PHILIPS G9 Power Supply Unit **£5.00** p.p. £2.30.
PHILIPS G8/G9 IF/Decoder Panels for small spares incl ICs **£2.50** p.p. £1.60.
GRUNDIG 8630 Series Varicap Tuners **£5.00** p.p. £1.00.
VARICAP TUNERS U321, U322/204, ELC1043 (equiv.) **£7.80** p.p. £1.00.
VHF Philips, NSF **£6.80** p.p. £1.00.
VARICAP UHF-VHF ELC 2000S **£9.80** p.p. £1.00.
UHF/625 TUNERS, many different types in stock. DECCA Bradford 5 position, MULLARD 4 position **£2.50**, JAP Rotary **£4.80** p.p. £1.80.
LOPTS New and guar. P/P **£1.50**, Bobbins **80p.**

FERG., HMV, MARCONI, ULTRA		**R.B.M.** T20, T22	**£9.80**
1590, 1591, 1612, 1613, 1712	**£4.80**	**R.B.M.** T20, T22 Bobbin	**£5.60**
FERGUSON 3787 (Normende)	**£9.80**	**DECCA** Bradford (state Mod No)	**£8.80**
THORN 1600, 1615, 1690, 1691, 1790	**£9.00**	**DECCA** 100	**£8.80**
THORN 3000/3500 SCAN, EHT	**£6.90**	**FIDELITY** ZX2000, 3000 (Not 22″)	**£14.50**
THORN 8000, 8500, 8800	**£12.80**	**GEC** 2110 series	**£10.60**
THORN 9000 to 9600	**£9.80**	**ITT** CVC 5 to 9, CVC20	**£9.80**
THORN TX9	**£12.50**	**ITT** CVC25, CVC30 series	**£8.80**
THORN TX10	**£16.50**	**ITT** CVC45	**£9.80**
SPECIAL OFFER		**PYE** 725 (90°) 731 to 741	**£9.20**
DECCA 70, 80	**£3.50**	**PHILIPS** G8	**£8.80**
ITT VC300	**£4.80**	**PHILIPS** G9	**£7.80**
GEC 2114J/Junior Fineline	**£2.80**	**PHILIPS** KT3	**£9.80**
PHILIPS 320	**£2.80**	**PHILIPS** K30, K35	**£27.00**
PHILIPS G11	**£5.00**	**PHILIPS** CTX-E	**£22.50**
GEC 2028, 2040, 2100	**£4.80**	**PHILIPS** CTX-S	**£22.50**
PYE 691-7 chassis type only	**£5.00**		

OTHERS AVAILABLE, PRICES ON REQUEST.
TRIPLERS Full range available, Mono & Colour.
SPECIAL OFFER TRIPLERS
THORN 3000/3500, **ITT** CVC5/9 20/30 **£2.50** p.p. £1.20.
THORN 1500 5 Stick **£1.50**, 1500 3 Stick **£1.50** p.p. 80p.
6·3V CRT Boost Transformers for Colour & Mono **£5.90** p.p. £1.40.
THORN TX10 focus control **£10.00** p.p. £1.00.
PHILIPS G8 6 position selector units (sloping buttons) **£2.50** p.p. £1.00.
455 CRYSTALS for Remote Control Handsets. 4 for **£1.00** p.p. 50p.
VHF to UHF Converters **£26.50** p.p. £2.50.

CALLERS WELCOME AT SHOP PREMISES
THOUSANDS OF ADDITIONAL ITEMS, ENQUIRIES INVITED
LARGE SELECTION TESTED COLOUR PANELS POPULAR MODELS
Goods available if in stock immediately over shop counter (Mail order between 3 days and 1 week from receipt of order). ADD VAT 15%

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MANOR SUPPLIES

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W. Hampstead Brit. Rail Stn. (Richmond, Dalston, Stratford, N. Woolwich)
W. Hampstead Brit. Rail Stn. (Bedford, Luton, Kings X, Crawley, Gatwick, Brighton)
Access from all over Greater London.
PLEASE ADD VAT 15% TO ALL PRICES INCL P+P

TELEVISION

September 1988 **Vol. 38, No. 11 Issue 455**

On sale August 17th

CORRESPONDENCE
All correspondence regarding advertisements should be addressed to the Advertisement Manager, "Television", King's Reach Tower, Stamford Street, London SE1 9LS. Editorial correspondence should be addressed to "Television", IPC Magazines Ltd., King's Reach Tower, Stamford Street, London SE1 9LS.

SUBSCRIPTIONS
An annual subscription costs £18 in the UK, £21 overseas (by surface mail). Send orders with payment to Quadrant Subscription Services Ltd., Oakfield House, Perrymount Road, Haywards Heath, Sussex, RH16 3DH.

BACK NUMBERS
Some copies of issues published **during the last six months** are available from the Editorial Office at £1·50 inclusive of postage and packing. Address requests to Television, Editorial Office, IPC Magazines Ltd., King's Reach Tower, Stamford Street, London, SE1 9LS.

INDEXES
Indexes to Vols. 35 and 36 are available at 80p each from the Editorial Office (address above).

QUERIES
We regret that we cannot answer technical queries over the telephone nor supply service sheets. We will endeavour to assist readers who have queries relating to articles published in *Television*, but we cannot offer advice on modifications to our published designs nor comment on alternative ways of using them. Correspondents should enclose a stamped addressed envelope. Requests for advice on dealing with servicing problems should be directed to our Queries Service. For details see our regular feature "Service Bureau". Send to the address given above (see "correspondence").

this month

OUR NEXT ISSUE DATED OCTOBER WILL BE PUBLISHED ON SEPTEMBER 14

VIDEO BELT KITS

★ PRICES DOWN ★

VKIT 1	AKAI	9300/9500/9800	2.40
	JVC	HR3300/3320/3360	
	TCE	8903/3V00/16/22	
VKIT 2	PANASONIC	NV7000/7200	1.45
VKIT 3	SONY	SLC5/7	2.25
VKIT 4	SONY	SL8000/8500/8600	3.60
VKIT 5	SONY	SL3000UB	2.10
VKIT 6	PANASONIC	NV3000B	1.99
VKIT 7	SANYO	9300P	2.75
VKIT 8	PANASONIC	NV2000B	1.45
VKIT 9	PANASONIC	NV8600/8610/V0111	1.50
VKIT 10	TOSHIBA	V8600	1.45
VKIT 11	SHARP	VC7300	1.50
VKIT 13	SANYO	VTC5000	0.95
VKIT 14	SANYO	VTC5300	1.85
VKIT 15	JVC	HR7650-3V31	2.00
VKIT 16	HITACHI	5000	1.90
VKIT 17	SHARP	8300	1.76
VKIT 18	SHARP	9300	1.47
VKIT 19	HITACHI	VT8000	1.05
VKIT 20	HITACHI	VT11/33	1.50
VKIT 21	HITACHI	9500	1.12
VKIT 22	SONY	SLC6	1.90
VKIT 23	SANYO	5500	1.05
VKIT 24	PANASONIC	NV300/333	1.55
VKIT 25	TOSHIBA	V7540	1.90
VKIT 26	JVC	HR7000	0.96
VKIT 27	THORN	3V29/HR7200	1.75
VKIT 28	AMSTRAD	7000	1.45
VKIT 29	PANASONIC	NV777	1.80
VKIT 30	SONY	T9	2.20
VKIT 31	TOSHIBA	9600	1.20

★ PRICES DOWN ★

VIDEO PINCH ROLLERS

PANASONIC	NV7000	3.75
SANYO	VTC9300/VBS7000	3.75
SONY	C7/J7/SL17	3.75
JVC	TCE3V00/01/06/16/23/24	3.75
JVC	HR2200/3320/3330/3660/1100/7700	3.75
AKAI	VS9700	3.75
HITACHI	VT5000	3.75
SHARP	VC6300/6500	3.75
SONY	TC6 GEN	3.75

★ PRICES DOWN ★

VIDEO IDLER TYRES

	O.Dia	I.Dia	Width	
SONY	23.7	17 4	4 9	50p
SONY	24 2	18	5 1	50p
HITACHI	31 8	25	4 9	50p
PANASONIC	37	29	3 9	52p
AKAI	26	20	3 9	50p
JVC	39 3	32.8	3 9	56p
JVC	33	23 9	4	56p
NATPAN	31 2	25	3 1	56p

ANTEX

C15 Iron 240v	6.20
C240 Element	2.75
Bits 102, 106, 820, 821	1.10
CS 17W Iron 240v.	6.40
CS240 Element.	2.75
Bits 1100, 1101, 1106	1.10
XS25W Iron 240v	6.50
XS240 Element	2.75
Bits 50, 51	1.10
Temperature Control 30W Iron CSTC	16.95
40W Iron XSTC	16.95
Unit TCSV1	68.95
Antex Stand	2.10
MLXS Auto Rep. Kit	8.40
Cordless Gas Iron	15.99
Tips for Gas Iron	5.00
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Plastic Seal	1.26
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Excel Polish	1.08
Video Head Cleaner	0.96
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Fire Extinguisher	3.80
Heat Sink Compound	1.20
Solda Mop Std	0.78
Hylosil Silicone Rubber	2.98
Aero Duster	1.40
Coldklene 110 Degreasing Solvent	1.78
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TURBO RECHARGEABLES

Drill Kit.	25.99
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Rep Tips	2.20
Rep. Bulbs	60

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WE HAVE A LARGER RANGE LISTED UNDER SPECIFIC MANUFACTURERS IN CATALOGUE FOR THORN, SONY, HITACHI, FIDELITY, NATIONAL PANASONIC, PHILIPS.

REFURBISHED HEADS (Exchange)
Equivalents Chart in Catalogue

THORN NEW LIFE (Most VHS types)	19.00
THORN NEW LIFE (National Panasonic)	21.00

ORDERS WELCOME FROM SCHOOLS, COLLEGES, GOVERNMENT ESTABL.

SUMMER SPECIALS ON VIDEO HEAD PRICES ★

REPLACEMENT VIDEO HEADS

AKAI

VS1	3HSSV	18.00
VS2	3HSSV	18.00
VS3	3HSSV	18.00
VS5	3HSSV	18.00
VS10	3HSSV	18.00
VS77	3HSSV	18.00
VS88	3HSSV	18.00
VS7100	3HSSV	18.00
VS7200	3HSSV	18.00
VS9300	3HSSV	18.00
VS9500	3HSSV	18.00
VS9700	3HSSV	18.00
VS9800	3HSSV	18.00

FERGUSON

3V00	3HSSV	18.00
3V01	3HSSV	18.00
3V06	3HSSV	18.00
3V16	3HSSV	18.00
3V22	3HSSV	18.00
3V23	3HSSV	18.00
3V24	3HSSV	18.00
3V29	3HSSV	18.00
3V30	3HSSV	18.00
3V31	3HSSV	18.00
3V35	3HSSV	18.00
3V36	3HSSV	18.00
8903	3HSSV	18.00

HITACHI

VT6500	3HSSHA	25.50
VT7000	3HSSHA	25.50
VT8000	3HSSHA	25.50
VT8040	3HSSHA	25.50
VT8100	3HSSHA	25.50
VT8500	3HSSHA	25.50
VT8700	3HSSHA	25.50
VT9000E	3HSSHA	25.50
VT9300	3HSSHA	25.50
VT9500S	3HSSHA	25.50
VT9700	3HSSHA	25.50
VT9900	3HSSHA	25.50
VT4000	3HSSH	25.50
VT4200	3HSSH	25.50
VT5000	3HSSH	25.50
VT5500	3HSSH	25.50
VT11E	3HSSHB	25.50

ORION

VH1	3HSSN	21.95
VH2	3HSSN	21.95

JVC

HRD110	3HSSV	18.00
HRD111	3HSSV	18.00
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HRD121	3HSSV	18.00
HRD220	3HSSV	18.00
HRD225	3HSSV	18.00
HR2200	3HSSV	18.00
HR3300	3HSSV	18.00
HR3320	3HSSV	18.00
HR3330	3HSSV	18.00
HR3350	3HSSV	18.00
HR3360	3HSSV	18.00
HR3660	3HSSV	18.00
HR3860	3HSSV	18.00
HR4000	3HSSV	18.00
HR4100	3HSSV	18.00
HR7200	3HSSV	18.00
HR7600	3HSSV	18.00
HR7610	3HSSV	18.00
HR7650	3HSSV	18.00
HR7700	3HSSV	18.00

NEC

PV760	PS3BS	19 00
PV764	PS3BS	19.00
PV774	PS3BS	19 00
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N831	3HSSV	18.00
N832	3HSSV	18.00
N833	3HSSV	18.00
PV2300	PS3BS	19.00
PV2400	PS3BS	19.00

SONY

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SLC24	PS4B2S	29.95
SLC30	PS4B2S	29.95
SLC33	PS4B2S	29.95
SLC40	PS4B2S	29.95
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SLF60	PS5B3S	39.95
SLK95	PS5B3S	39.95
SL200	PS5B3S	39.95
SL3000	PS3BS2	25.00
SL8000	PS3BS2	25.00
SL8080	PS3BS2	25.00

NAT. PAN.

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NV230	3HSSU2N	36.97
NV250	3HSSU2N	36.97
NV270	3HSSU2N	36.97
NV280	3HSSU2N	36.97
NV300	3HSSN	18.00
NV322	3HSSN	18.00
NV330	3HSS3N	35.99
NV333	3HSSN	18.00
NV340	3HSSN	18.00
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NV777	3HSS3N	35.99
NV861	3HSSN	18.00
NV2000	3HSSN	18.00
NV3000	3HSSN	18.00
NV7000	3HSSN	18.00
NV7200	3HSSN	18.00
NV7500	3HSSN	18.00
NV7800	3HSSN	18.00
NV7850	3HSSN	18.00
NV8170	3HSSN	18.00
NV8200	3HSSN	18.00
NV8400	3HSSN	18.00
NV8600	3HSSN	18.00
NV8620	3HSSN	18.00

SHARP

110	3HSSSP	26.95
381	3HSSSP	26.95
383	3HSSSP	26.95
384	3HSSSP	26.95
385	3HSSSP	26.95
386	3HSSSP	26.95
387	3HSSSP	26.95
388	3HSSSP	26.95
481	3HSSSP	26.95
482	3HSSSP	26.95
2000	3HSSSP	26.95
3300	3HSSSP	26.95
9100	3HSSSP	26.95
9300	3HSSSP	26.95
9400	3HSSSP	26.95
9500	3HSSSP	26.95
9600	3HSSSP	26.95
9700	3HSSSP	26.95

GEN PURPOSE VHS LAMP ONLY	50p

WE HAVE A FULL RANGE OF VIDEO LAMPS AVAILABLE UNDER "SPECIFIC SPARES"

NAT. PAN/SHARP VIDEO LAMP	1.30

TOSHIBA

V31	PS3BT	30.00
V33	PS3BT	30.00
V55	3HSSV	18.00
V57	3HSSV	18.00
V5470	PS3BS2	25.00
V9600	PS3BT	30.00

SANYO/FISHER

FVHP615	3HSSSF	35.00
FVHP910	3HSSSF	35.00

PHILIPS

OV462	3HSSU1N	25 99
6460	3HSSU1N	25.99
6520	3HSSU1N	25.99

GENUINE HEADS

SONY 8000UB	49 39
SONY SLC9	49 39
SHARP 3300/9700	56 00
TOSHIBA 9600 (upper cylinder) (not the heads)	14 50
HITACHI VT33E/GEC 4004	35 62
SANYO 9300/9435/9500	53 00
SANYO 5000/4700/5300	53 00
PHILIPS V2000	64 00
PHILIPS 1700	71 00
AMSTRAD 7000	58 68

SUNDRIES

VHS DRUM MOTOR	25.50
VHS CAPSTAN MOTOR	25.50
SANYO REEL MOTOR (5000)	12.95
SHARP REEL MOTOR	19.50
VHS (Gen Purp) THORN/JVC TAKE UP CLUTCH ASSY	4.95
SHARP TAKE UP IDLER 0005/GEZZ	2.20
0006/GEZZ	2.20
SANYO REEL DRIVE PULLEY	5.10
HITACHI F F IDLER VT11E/33E	2.90

PHILIPS VHS IDLER £3.50

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★ "DOWN IN PRICE" ★

SKC

E60	2 00
E120	2 30
E180	2.45
E240	3 45

MEMOREX

L750	2 70

SCOTCH

E30	2 90
E60	3 05
E120	2 89
E180	3.50
L750	3.65
VCC360	6 59
VCC480	7 50

Video Head Cleaning Tapes

VHS	£6.25
Beta	£7.41

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FOR ALL YOUR COMPONENTS
P&P 87p + VAT
up to **1k**
then 2.50 + VAT over
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Next day delivery

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MS10	Gen Pur 4R	0.80
MS01	08 On/Off Metal	1.98
MS02	08 On/Off Plastic	1.98
MS07	011 On/Off	1.58
MS20	011 On/Off Remote	1.58
MS03	Rotary On/Off Gen	0.66
MS02	1TT CUCS On/Off	1.24
MS25	1TT With Solenoid	5.31
MS20	Rank 120 On/Off	2.50
MS21	Rank with Solenoid	4.50
MT01	Thorn 1591	2.90
MS48	Thorn TX9/10 with solenoid	3.42
MS14	Thorn TX10	2.74
MS09	GEC 2040	0.97
MS31	Philips KT3	3.84
MS30	Philips K30	2.60
MS32	Fidelity 70109 Front Panel	0.91
MS33	Fidelity 70150 Remote	2.43
MS43	Fidelity 70170	0.94
NI130440	Amstrad UCR7000	5.32
NI150433	Amstrad VCR7000	1.87
NI150441	Amstrad VCR7000	1.87
NI1400009	Amstrad CTV1400	5.31
NI1402010	Amstrad CTV1401	3.56
NI1422017	Amstrad CTV2200	1.87
1-534-967-11	Sony KU14 2022/2060	4.14
1-552-116-11	Sony KU Gen Power	5.12
1-554-820-11	Sony KU Gen Power	5.12
1-552-836-00	SL 8000UB Slide Rec/back	1.82
1-552-834-00	SL 8000UB Slide Rec	1.27
	Sony W114 Stop/Eject	1.27
0-654-542-00	Sony SLC7 Control Knob	1.27
MS12	Fidelity 70110 Rear Mount	0.94

Please send large SAE (30p stamp) for our complete catalogue

REMOTE HAND SETS

EXPORT ORDERS WELCOME

DAY DESPATCH
FAST – FAIR – EFFICIENT SERVICE

AMSTRAD

1422292	CTV2210	15.00
1422187	CTV2200	15.00
151910	TV/VIDEO	15.00
1409221	CTV1409	15.00
151175	VCR5200	17.00
150583	VCR7000	10.00
150878	VCR9000	10.00

DECCA

80 100	NON TXT US	16.50
80/10	NON TXTUS8511	19.50
101	NON TXTUS8513	23.50

SONY

C5	RM75T	29.04
C6	RM72	22.62
C7	RMT200	45.00
C9	RMT213	45.00

ITT

305	IR8649	29.04
306	IR8650	22.65
CVC45 RG5	VS8262	25.00
CVC32 RG15	VS8573	25.00

PLEASE NOTE THAT SOME HANDSETS ARE MANUFACTURERS ORIGINALS BUT SOME MAY BE AN ALTERNATIVE TYPE

FIDELITY

FD09193	Txt	32 butt	15.90
FD09820	IS500	12 butt	13.81
FD09156	F14R	12 butt	13.81
FD09111	AVS	14 butt	13.75
FD09141	CTV14S 20R 22R 140R	4 butt	13.75

THORN/FERGUSON

T723	TX9/10	NON TXT IR	13.00
T725	TX9	NON TXT IR	13.00
T731	TX9/10/100	TXT STEREO IR	13.00
T732	TX10	TXT IR	13.00
T736	TX9/10/100	TXT IR	13.00
T739	TX100		13.00
3V23	IR 8817		14.95
3V31	IR 8945		14.95
3V35	IR 8946		14.95
T718	US 8517		16.50

GEC

GEC/HITACHI	9300 V4001	9.93
GC56520831	C1404H-C1656H	30.00
GCA512220	C1653	22.00
GCA512230	C2086H, C2087H	28.50
GCA510710	C2067H	28.50
GCA514620	C2089H, C2090H, C2889H, C2290H	21.00
GCA510870	C2069, C2269H	27.50

GRUNDIG

RTP20/VRC112	TP16-21-21VHR	IR	13.50
RTP05/VRC138	TP8-120-120E	IR	13.50
RTP06 IR107N	TP160-160E	IR	13.50
RTP07 IR380N	TP200-300-390	IR	13.50
RTP400/IR401	TP400VT-500VT	IR	13.50
VRC204	TP12	US	13.50
RTP400	TP400TT		13.00

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G11 (KONIG) TXT IR8435	22.20
G11 (KONIG) TXT 2 FUNCTION VS8518	18.75
G11 (KONIG) NON TXT VS8263	21.50
G11 31 BUTTON 691-17181 (PHILIPS) US	27.00
KT3/30 (KONIG) NON TXT IR8331	15.85
KT3/30 (KONIG) TEXT IR8420	17.90
KT3/30/35/40 RC5	13.95

JVC

TP843 TXT IR	13.50

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KT3/K30 WITHOUT TEXT	8.95
KT3/K30 WITH TEXT	8.95
REMOTE CONTROL TESTER	29.94

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Programmable Remote Control

Will operate most infra-red remote equipment TV-HiFi-VCR etc.

PRC6000 Engineers need only carry 1

Remote ONLY £52.95

DONT BE WITHOUT ONE!!

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17"m 18", 19", 20", 22" Deltas
£20 + VAT

Not glass required.

Ring for carriage costs.

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DOORCHAIN LOCK ALARM	2.75
PERSONAL ALARM TORCH	1.90
IMMERSION HEATER TIMER	14.50
PLUG IN 24 HOURS TIMERS	11.80
7 DAYS	13.90
PHOTO CELL SWITCH	10.50

BELLS/BOXES

GG1	CHALLENGER PANEL 8KII	27.95
A75	SHORROCK ACORN 75 PANEL	32.50
B1	EUROBELL (No S.A.B)*	21.00
B2	EUROBELL (with S A B)*	26.95
BV	6V BATTERY FOR EUROBELL	3.75

*Price includes Multi Adaptor to use with "C" type bell boxes

T1	12V BELL (Tan)	12.95
B5	'C' TYPE Polyprop Boxes (comp)	4.55
B6	'C' TYPE Polycarb Boxes (comp)	7.80
B12	'C' TYPE DUMMY COVER (no back)	3.25
B13	'C' TYPE Translucent	7.80

SOUNDERS/SIRENS

S2	712 EXTERNAL SIREN	(116db)	5.75
S4	1010/2010 EXTERNAL SIREN	(116db)	5.96
S22	DYNABLAST	(127db)	18.14
S13	SOUND BOMB 1	(104db)	3.37
S14	SOUND BOMB 2	(111db)	5.17
S15	SOUND BOMB 3 MULTITONE		4.50
S16	PZ28	(105db)	4.61
S17	MIKRO	(110db)	5.28
S18	362 PIEZO	(110db)	7.80
	12V MUSICAL BUZZER		1.56
M801	722 BUZZER		0.60
802	PMB27 BUZZER		0.70

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NEW RACAL EXTERNAL SECURITY LIGHT
Fluorescent (wired to main) £47.50

INFRA RED/SECURITY LIGHTS

817S	SHORROCK	PIR	22.50
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01	ORION	PIR	24.00
04	ORION EXTERNAL	PIR	48.00
05	ORION EXTERNAL with built in Floodlight		60.00
SL5	HALOGEN FLOOD with Lamp		17.74
SL5R	SPARE LAMPS SL5		4.50
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WE ARE AUTHORISED DISTRIBUTORS FOR SHORROCK SECURITY PRODUCTS

RECHG. BATTERIES

12V	1 2A	7.23
12V	2 6A	7.87
12V	6A	10.73
12V	1 9A	7.77

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SHORROCK S A B	8.76
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STND	2.88

SUNDRIES

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XE1	12 PCL 128 Red/Amber/Blue	6.75
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	TAMPER SWITCHES 2 5"	0.60
	SELF CONTAINED ALARM	25.00

CONTACTS

C10	5 TERM FLUSH	0.62
C11	4 WIRE FLUSH	0.62
C12	5 TERM SURFACE	0.59
C13	4 WIRE SURFACE SLIMFIT	0.62
C6	ROLLER SHUTTER CONTACTS	6.10
C9	ROLLER SHUTTER CONTACTS PLASTIC	2.28

PRESSURE MATS

PM1	STAIR MAT	1.35
PM2	STANDARD MAT	1.50

ACCESS VISA

LINKABLE SMOKE DETECTORS	£9.75
NEW SMOKE DETECTORS	£8.75
PERSONAL ALARM/TORCH	£1.90
DOOR CHAIN/LOCK ALARM	£2.75
SMOKE DETECTORS WITH LIGHT	£12.50

CONFUSED?

DON'T BE – IT'S EASY!
TYPICAL PACKAGE FOR 3 BED HOUSE
£120

Includes
- 2 Zone Panel with connection diagram ★
- Rechargeable Battery ★
- Outside Bell Box with Bell ★
- Inside Multitone Sounder ★
- Roll 6 core cable ★
- 2 × Infra Red Detectors ★
- 5 Pairs Window Contacts ★
- Panic Button ★
- Buzzer ★
- Tamper Switch ★

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WE NEED EXPIRY DATES FOR CREDIT CARD ORDERS

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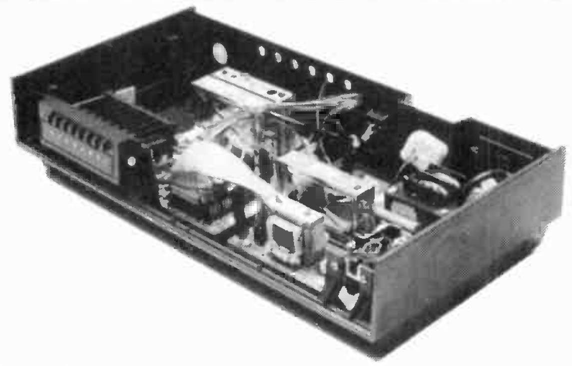
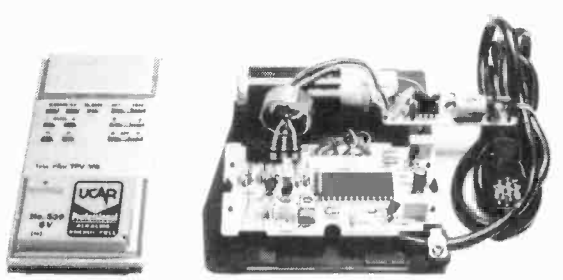
GRIFFIN G
FOR P.V.

REDIFFUSION TRANSLATOR
No. 847038 £4.99



8-way "Preomat" T.V. Tuning of band 1-111 & UHF with AFC, Mains power supply 240V, in cabinet 14 × 7½ × 3½ inches.
The TRANSLATOR may be used directly or modified to convert wired T.V. to normal use with Monitor (iV P-P), T.V. Sound tuner, (HI-FI), with any V.C.R. These units are guaranteed in perfect working order and A1 condition **£4.99. P&P £3. Circuit & Modification £1 extra**

GRUNDIG INFRA-RED REMOTE CONTROL VIF-K1 £4.99



(13 function) consists of transmitter TPV355 & receiver VIF-E1, suitable for use with GRUNDIG VIDEO 2 × 4 Super & Stereo. Brand new & boxed, complete with battery. **£4.99. P&P £2.**
VIF-E1 receivers in boxes of 10. **£9.99. P&P £3.50**

VIDEO HEAD CLEANERS VHS or BETA **£1.99** with full instructions. **P&P £1**

V2000 VIDEO TAPES "MEMOREX". All brand new & boxed.
VCC360 £6.99. VCC480 £7.99. P&P £1

C.B. CONVERTER 40 channel, works in conjunction with standard car radio (A/M). Brand new & boxed. **£2.50. P&P £1**

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BETA VIDEO RECORDER "SONY" C5 & C7 "SANYO" etc. Perfect working order. **£39.50**

PRICES INCLUDE VAT.

PLEASE NOTE WE ARE INTERESTED IN PURCHASING ALL TYPES OF EQUIPMENT.

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EXTERNAL MULTIPOLE UNIT NOT REQUIRED.

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TUBE FAILED?
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KEEP THAT OLDER SET PURCHASE A NEW 56-410 OR 47-342/3 TUBE FOR ONLY £5 + CARRIAGE

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most types of Inline Re-builds or new ex-stock
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Up to 19"	**£28**
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Delta only. Less 5% 5+

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Up to 22"	From **£40**
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ALL SIZES OF NEW AND REBUILT MONO TUBES AT COMPETITIVE PRICES

IN LINE TYPES (NOT REBUILDS) PHONE RE STOCK POS.

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14" (A34); 16" (A38); 21" (A51); FST now available at special low prices

MIN. CARRIAGE £5
£10 if glass collected.
TERMS
Cash with order
ALL PRICES EXCLUSIVE OF VAT

NOTE
Surcharge without exch. glass.

★ WE PURCHASE SURPLUS STOCKS OF INLINE TUBES: ALSO A56/66 – 510/540 ETC. OLD GLASS.
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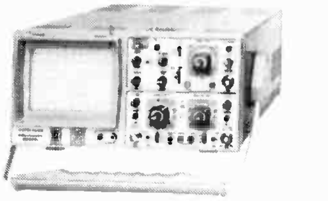
HAMEG are Europe's top selling **DUAL TRACE OSCILLOSCOPES.** Select from four superb models. All incorporate a useful **COMPONENT TESTER.** Size – all models – 285mm x 145mm x 380mm. Clear display 8 x 10cms. Mains supply 110/125/220/240V AC 50/60Hz. **2 YEAR WARRANTY**

HM203-6 20MHz Standard

FREE Securicor Delivery



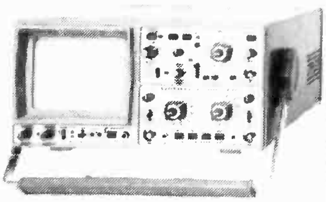
SPECIFICATION
- Bandwidth DC-20MHz
- Sens. Ch1, Ch2, 2mV/cm
- Time Base 0·2s/cm – 20ns/cm
- Trigger DC-40MHz AC, DC, HF, LF, (TV Frame) Active TV Sinc. Sep.
- Invert both channels
- Variable hold-off 10:1
- Calibrator
- Plus many more features

Price £314.00 + £47.10 V.A.T.
Including two probes

HM204-2 20MHz Multi-function

FREE Securicor Delivery

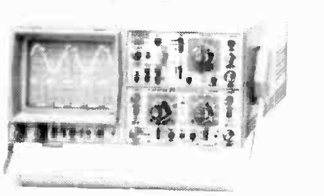
SPECIFICATION
- Bandwidth DC-20MHz
- Sens. Ch1, Ch2, 1mV/cm
- Delay Line
- Time Base 1·25s/cm – 10ns/cm
- Delayed Sweep 100ns – 0·1s
- Trigger DC-50MHz AC, DC, HF, LF, (TV Frame)
- Variable hold-off 10:1
- Overscan LED indicators
- Calibrator
- Plus many more features



Price £418.00 + £62.70 V.A.T.

HM205 20MHz Digital Storage

FREE Securicor Delivery



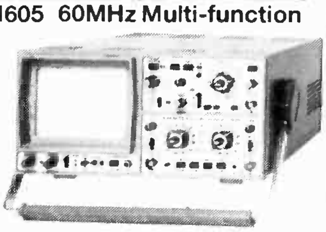
SPECIFICATION
- Digital Storage
- Analogue Real Time (Same as 203-6)
- Bandwidth DC-20MHz
- Sens. Ch1, Ch2, 2mV/cm
- Trigger DC-40MHz AC, DC, HP, LF, (TV Frame), Active TV Sinc. Sep.
- 100KHz Sample Rate
- 2 x 1K Storage
- Storage Range 1ms-5s/cm
- Variable hold-off 10:1
- Calibrator
- Plus many more features

Price £498.00 + £74.70 V.A.T.
Including two probes

HM605 60MHz Multi-function

FREE Securicor Delivery

SPECIFICATION
- Bandwidth DC-60MHz
- Sens. Ch1, Ch2, 1mV/cm
- Delay Line
- Delayed Sweep 100ns – 0·1s
- Trigger DC-80MHz AC, DC, HF, LF, (TV Frame)
- Variable hold-off 10:1
- Switchable Calibrator
- Overscan LED indicators
- Plus many more features



Price £583.00 + £87.45 V.A.T.

B & K PRECISION CRT ANALYSER-RESTORER

The number one CRT Test Instrument. Over 5000 U.K. Television engineers wouldn't be without it.

* All CRT's checked identically including all in-line and one gun types * Tests all three guns of colour CRT's simultaneously under actual operating conditions (model 467) * Exclusive multiplex technique (model 467) * Measures true dynamic beam current that actually passes through G1 aperture to screen * Measures all shorts and leaks – preserving more CRT's * Tests focus electrodes lead continuity finding faults that **other Testers miss** * Uses most powerful restoration method known with minimum danger to CRT * Rejuvenated CRT's guaranteed as new for two years * Obsolescence proof: Perpetual set up chart up-dated and new adaptors development * Tests and rejuvenates VDU's and Oscilloscope tubes * A range of over 40 CRT base adaptors available * Increases profit * Pays for itself in months.

PRICES

Model 467 Tri-dynamic three meter instrument Inc. 6 common adaptors	£395.00 + £59.25 V.A.T.
Without adaptors	£344.00 + £51.60 V.A.T.
Model 470 Single meter instrument Inc. 6 common adaptors	£294.00 + £44.10 V.A.T.
Without adaptors	£244.00 + £36.60 V.A.T.

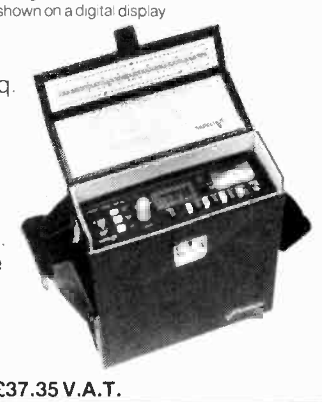
Technical leaflets available. GET INTO PROFIT NOW!

SADELTA FIELD STRENGTH METER TC-402

THE SADELTA FIELD STRENGTH METER TC-402 has been designed to measure the signal levels delivered by the antenna to a TV or FM receiver, in order to test the performance of the antenna and evaluate the best conditions during installation etc. To facilitate measurements, the tuning frequency readout is shown on a digital display.

FEATURES

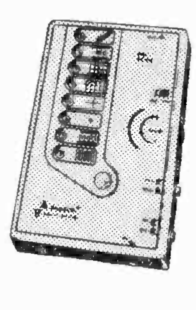
* Covering FM and all TV bands (UHF/VHF) including CATV freq.
* Digital tuning display (3 digits) for direct frequency readout.
* Accurate 10 turn tuning potentiometer.
* Built-in loudspeaker enables monitoring of sound in AM/FM.
* Meter measurement in voltage and dB from 20μV (26dB/μV).
* Continuity tester 0-500 ohms.
* Fully portable (battery).
* Sturdy carry case.



Price £249.00 + £37.35 V.A.T.

SADELTA COLOUR PATTERN GENERATORS

THE SADELTA RANGE OF HAND HELD COLOUR PATTERN GENERATORS is intended for use in production, installation and service of both colour and monochrome TV sets, video and computer monitors. In order to control and adjust the various parameters eight switchable patterns are provided. The technician has ready access to Laboratory, workshop and field use as the Generator has been designed using the latest micro-technology to achieve truly pocket size instruments, internal re-chargeable Ni-Cd's. Supplied with 9V power supply charger. Size 131mm x 81mm x 23mm.



T.V. PATTERN GENERATOR PAL MC11B UK
- Band IV (21-34)
- Band III (5-12)
- PAL 1
- O/Put 10mV into 75ohms
- Sound output

Price £124.95 + £18.74 V.A.T.

PAL VIDEO COMPOSITE GENERATOR
- PAL B.G.I.
- O/Put 1V p.p. @ 75ohms
- Audio O/Put 10mV
- Switching 12V @ 4K7ohms

Price £124.95 + £18.74 V.A.T.

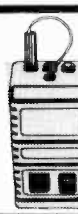
SECAM VIDEO COMPOSITE GENERATOR
- SECAM B.G.D.K.L.
- O/Put 1V p.p. @ 75ohms
- Audio O/Put 10mV
- Switching 12V @ 4K7ohms

Price £124.95 + £18.74 V.A.T.

R.G.B. PATTERN GENERATOR
- O/Put sigs. Pos RGB Neg. Composite
- O/Put TTL 5V P-P
- Blank Pulse etc. CCIR

Price £111.95 + £16.79 V.A.T.

B.K.'s CRT TESTER-REJUVENATOR

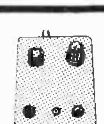


Tests and rejuvenates blue, green & red guns separately. Fitted with delta and P.I.L. sockets. Compact size 120 x 65 x 60 mm. Supply 240V AC

Price £32.00 + £4.80 V.A.T.

B.K.'s REVOLUTIONARY DYNAMIC 'LOPT' TESTER

Revolutionary L.O.P.T. tester. Operates in dynamic mode which actually tests the L.O.P.T. under high voltage conditions without de-soldering or removal. Size 75 x 100 x 40 mm. Supply 240V AC



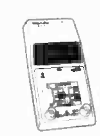
Price £25.99 + £3.90 V.A.T.

DIGITAL THERMOMETER

* Pocket Size
* −50°C to + 750°C
* 1°C Resolution
* 0.5" LCD
* Supplied with thermocouple

Price £59.50 + £8.92 V.A.T.

200MHz DIG. FREQ. METER



* Pocket Size
* 8 Dig. LED Display
* Freq. Range 20Hz to 200MHz
* Resolution 0.1Hz
* Sensitivity 10mV

Price £75.50 + £11.32 V.A.T.

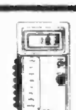
THANDAR SC110A PORTABLE OSCILLOSCOPE

- Only 2¼" thick
- Fits in a briefcase
- Sens. 10mV
- Bandwidth 10MHz
- Full trig. fac. inc. TV frame etc.
- Battery or mains adaptor
- Size 255mm x 148mm x 50mm

ACCESSORIES
Carry Case £6.25 + £0.93 V.A.T.
Probe £7.50 + £1.30 V.A.T.
Mains Adaptor £7.30 + £1.09 V.A.T.

Price £195.00 + £29.25 V.A.T.

DIGITAL CAPACITANCE METER



* High Accuracy
* 0·1pf-2,000μf
* LCD display
* 8 Ranges
* Accuracy ±0·5%
* Full scale ±1 digit

PRICE
£38.00
+ £5.70 VAT
Case Included

DIGITAL LCR METER

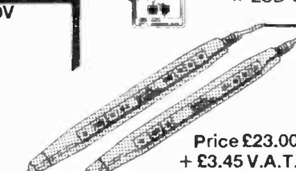
* LCD Display
* 18 Ranges
* Inductance 1μH – 2H
* Capacitance 1pf – 200μf
* Resistance 1 ohm – 20Mohm
* High acuracy

Price £95.00 + £14.25 V.A.T.

INSULATION TESTER 500V

- Electronic battery operated
- Measuring Voltage 500V DC
- Measuring Range 0-100Mohm
- Centre scale 2Mohm

Price £65.00 + £9.75 V.A.T.



Price £23.00 + £3.45 V.A.T. each

The **THANDAR TP1 LOGIC PROBE** and **TP2 LOGIC PULSER** are effective and economical tools for checking both TTL and CMOS circuits. TP1 can show 14 different circuit conditions and can detect pulses down to typically 10ns. TP2 can inject a signal directly into a circuit without damaging sensitive components. Together they can stimulate and monitor responses of components 'in circuit', greatly aiding fault finding.

BARCLAYCARD VISA

U.K. POST PAID, export enquiries welcome. Visa/Access or cheque with order, payable B.K. Electronics. Official Orders welcome from Govt. Depts., Colleges, P.L.C.'s etc. Large S.A.E. for technical leaflets of complete range. Delivery normally within seven days.

Access

B. K. ELECTRONICS DEPT. T

UNIT 5, COMET WAY, SOUTHEND-ON-SEA, ESSEX. SS2 6TR TEL: 0702-527572

POPULAR BAKERS DOZEN PACKS (Still available)

All packs are £1 each, if you order 12 then you are entitled to another free. Please state which one you want. Note the figure on the extreme left of the pack ref number and the next figure is the quantity of items in the pack, finally a short description.

BD2	5	13A spurs provide a fused outlet to a ring main where device such as a clock must not be switched off
BD7	4	in flex switches with neon on/off lights, saves leaving things switched on
BD9	2	6v. 1A mains transformers upright mounting with fixed clamps
BD11	1	6½" speaker cabinet ideal for extensions, takes your speaker. Ref BD137
BD13	12	30 watt reed switches, it's surprising what you can make with these — burglar alarms, secret switches, relay etc etc
BD22	2	25 watt loud speaker two unit cross-overs
BD29	1	B.O.A.C. stereo unit is wonderful value
BD30	2	nicad constant current chargers adapt to charge almost any nicad battery
BD32	2	humidity switches, as the air becomes damper the membrane stretches and operates a microswitch
BD34	48	2 meter length of connecting wire all colour coded
BD42	5	13A rocker switch three tags on/off, or change over with centre off
BD45	1	24hr time switch, ex-Electricity Board, automatically adjust for lengthening and shortening day. Original cost £40 each
BD49	10	neon valves, with series resistors, these make good night lights
BD56	1	mini uniselector, one use is for an electric jigsaw puzzle, we give circuit diagram for this. One pulse into motor, moves switch through one pole
BD59	2	flat solenoids – you could make your multi-tester read AC amps with this
BD67	1	suck or blow operated pressure switch, or it can be operated by any low pressure variation such as water level in water tanks
BD91	2	mains operated motors with gearbox. Final speed 16rpm, 2 watt rated
BD103A	1	6 750MA power supply, nicely cased with input and output leads
BD120	2	stripper boards each contains a 400v 2A bridge rectifier and 14 other diodes and rectifiers as well as dozens of condensers etc
BD122	10m	twin screened flex with white pvc cover
BD128	10	very fine drills for p.c.b. boards etc. Normal cost about 80p each
BD132	2	plastic boxes approx. 3" cube with square hole through top so ideal for interrupted beam switch
BD134	10	motors for model aeroplanes, spin to start so needs no switch
BD139	6	microphone inserts – magnetic 400 ohm also act as speakers
BD148	4	reed relay kits you get 16 reed switches and 4 coil sets with notes on making c/o relays and other gadgets
BD149	6	safety cover for 13A sockets – prevent those inquisitive little fingers getting nasty shocks
BD180	6	neon indicators in panel mounting holders with lens
BD193	6	5 amp 3 pin flush mounting sockets make a low cost disco panel
BD196	1	in flex simmerstat – keeps your soldering iron etc always at the ready
BD199	1	mains solenoid very powerful has 1" pull or could push if modified
BD200	8	keyboard switches – made for computers but have many other applications
BD210	4	transistors type 2N3055 probably the most useful power transistor
BD211	1	electric clock mains operated put this in a box and you need never be late
BD221	5	12v alarms make a noise about as loud as a car horn. Slightly soiled but OK
BD242	2	6" × 4" speakers 4 ohm made from Radiomobile so very good quality
BD246	2	tacho generators, generates one volt per 100revs
BD252	1	panostat, controls output of boiling ring from simmer up boil
BD259	50	leads with push on ¼" tags – a must for hook ups – mains connections etc
BD263	2	oblong push switches for bell or chimes, these can mains up to 5 amps so could be foot switch if fitted into pattress
BD268	1	mini 1 watt amp for record player. Will also change speed of record player motor
BD275	1	Guitar mic – clip on type suits most amps
BD283	3	mild steel boxes approx. 3" × 3" × 1" deep – standard electrical
BD293	50	mixed silicon diodes
BD296	3	car plugs with lead, fits into lighter socket
BD305	1	tubular dynamic mic with optional table rest

Most other packs still available and you can choose any as your free one.

5A BATTERY CHARGER KIT

All parts including case. Only £5 plus £1 postage.

OVER 400 GIFTS YOU CAN CHOOSE FROM

There is a total of over 400 packs in our Baker's dozen range and you become entitled to a free gift with each dozen packs.

Our latest "News Letter" will be enclosed with your goods, and you will automatically receive our next news letter. If you want our 1988 classified list please request this.

F.D.D. BARGAIN

3½ floppy Disk Drive, made by the Chinon Company of Japan. Beautifully made and probably the most compact device of its kind as it weighs only 600g and measures only 104mm wide, 162mm deep and has a height of only 32mm, other features are high precision head positioning – single push loading and eject – direct drive brushless motor – Shugart compatible Interface – standard connections – interchangeable with most other 3½ and 5¼ drives. Brand new with copy of makers manual. Offered this month at £28.50 post and VAT included.

CASE – adaptable for 3" or 3½" FDD, has room for power supply components price only **£4** includes circuit of PSU. Our Ref 4P7.

POWER SUPPLY FOR FDD – 5V and 12V voltage regulated outputs, complete kit of parts will fit into case 4P7 price **£8** or with case **£11.** Our ref. 11P2.

9" MONITOR

Ideal to work with computer or video camera uses Philips black and white tube ref M24/306W. Which tube is implosion and X-Ray radiation protected. VDU is brand new and has a time base and EHT circuitry. Requires only a 16V dc supply to set it going. It's made up in a lacquered metal framework but has open sides so should be cased. The VDU comes complete with circuit diagram and has been line tested and has our six months guarantee. Offered at a lot less than some firms are asking for the tube alone, only **£16** plus £5 post.

CASE FOR 9" MONITOR

We have arranged with a metal worker to make cases for the 9" Monitor. Delivery promised for the end of May and the price £12 plus £2 post. The case will be made from coated sheet steel, overall size approx 10in x 10in x 7in high which will give ample space for the Power Supply and external controls if you fit them.

FLIP-OVER DIGITAL CLOCK – Quite an eyecatcher, this is mains operated. The figures flip over per minute and per hour and give a larger than usual visual display. Supplied complete with front and perspex panels to glue together to make its case. **£2.00** each. Our ref 2P205.

3" FDD HITACHI 305SXA

This has standard Shugart connections and will work with most computers but is particularly suitable for Amstrads, in fact it was recommended in a recent "Computing with Amstrad" **Price £30** + £3 post.

TORROIDAL MAINS TRANSFORMER with twin outputs 6.3v 2amps and 12v lamp, so ideal for FDD power supply. Price **£5.00.** Our reference 5P122.

DOUBLE MICRO CASSETTE DECK made by the Japanese ABS Company. This takes two micro cassettes and is complete with motors, solonoids to select the deck to use and record and playback heads. Price **£10.00.** Our reference 10P49.

THIS MONTH'S SNIP

LASER TUBE. Made by Phillips Electrical. New and unused. This is helium-neon and has a typical power rating of .9mW. It emits random polarised light and is completely safe provided you do not look directly into the beam when eye damage could result. Do not use in the presence of children unless a diverging lens is fitted. DON'T MISS THIS SPECIAL BARGAIN! Price £29.95 plus £3.00 insured delivery

QUICK FIX MAINS CONNECTOR – A must for your workshop. Saves putting on plugs as you just push the wires under the spring clips. Automatically off when lid is up. Price **£7.50.** Our reference 7P5/1.

BT HANDSET with curly lead terminating at BT plug. Colour cream. Price £5.00. Our reference 5P123.

STEREO SPEAKERS – Each 10watts 8ohm and twin speakers mounted in Walnut-finish cabinets, size 16in high × 10in wide × 6in deep. Front is black Dacron and the finish is very pleasing. Price **£7.00** per pair. Extra postage and packing £3.00. Our reference 7P6.

DO YOU WANT TO MEASURE AC AMPS? – We have found a few more of the 50hz 0-40amp AC 2½in diameter panel meters, made for RAF equipment these are very reliable and robust. Price **£5.00** each. Our reference 5P105.

GPO TEST METER 12/C1

20,000 opv. 19 AC/DC ranges, including all the usual ones and a very useful low ohms range, also shunt provision for reading up to 10a. DC. It is in a real leather carrying case and comes complete with leads, prods and croc clips. Price **£7** Ref. 7P5.

8" GREEN SCREEN MONITOR

Complete and in a case with optional tilt stand for improved viewing angle. A very compact unit measuring only 10½"×10½"×7½" high operates from a 15V DC supply – composite input so ideal for use with Electron or similar computers. Used, but we test before despatch and guarantee 6 months. **Price £17.50** – Our Ref: 17P1 – please add £3 post.

CAMERA TUBE – Mullard PLUMBICON ref XQ1020G. Believed unused. Few only at **£50** each.

UNUSUAL MAINS MOTOR – Quite small, measures only 2in × 2in × 1in approx., but is surprisingly powerful, it revs at 3,000rpm and is reversible. It has good length ⅛in diameter spindle. Price **£1.00.** Order ref BD640.

POWERFUL IONISER

Generates approx. 10 times more IONS than the ETI and similar circuits. Will refresh your home, office, shop, workroom etc. Makes you feel better and work harder – a complete mains operated kit, case included **£11.50** + £3 P&P.

J & N BULL ELECTRICAL

Dept. T.V., 250 PORTLAND ROAD, HOVE, BRIGHTON, SUSSEX BN3 5QT.

MAIL ORDER TERMS: Cash, P.O. or cheque with order. Orders under £20 add £1 service charge. Monthly account orders accepted from schools and public companies. Access & B/card orders accepted. Brighton (0273) 734648 or 203500.

NEW ITEMS

Some of the many described in our current list which you will receive with your parcel.

RE-CHARGEABLE NICADS 'D' SIZE these are tagged for easy joining together but tags can easily be removed, virtually unused, tested and gntd. £2.00 each ref 2P141. 6 for £10 ref 10P47.

BRIGHT LIGHT SWITCH will control mains circuits up to 10 amps, gets its switch pulses from car headlights, bright daylight, etc. so it does not use batteries and its sensor is completely isolated from the mains, with full instruction supplied. Price £10 ref 10P46.

POWERFUL 12V MOTOR was intended for Sinclair Electric Car, rating approx ⅓ HP. Price £15 plus £2 post.

3 INCH FDD Hitachi ref. HFD 205SXA. Ideal replacement or second drive in most computers, especially Amstrad 6128, etc. Price £30 plus £3 post.

SOLAR POWERED NI-CAD CHARGER 4 NI-CAD batteries AA (HP7) charged in eight hours or two in only 4 hours. It is complete, boxed ready to use unit. Price £6. Our ref. 5P3.

50v 20A TRANSFORMER 'C' Core constuction so quite easy to adapt for other outputs – tapped mains input, only £25 but very heavy so please add £5, if not collecting, order Ref. 25P4.

FREE POWER! Can be yours if you use our solar cells—sturdily made modules with new system bubble magnifiers to concentrate the light and so eliminate the need for actual sunshine—they work just as well in bright light. Voltage input is .45—you join in series to get desired voltage—and in parallel for more amps. **Module A** gives 100mA, Price £1. Our ref. BD631. **Module C** gives 400mA, Price £2. Our ref. 2P199. **Module D** gives 700mA. Price £3. Our ref. 3P42.

SWITCH AC LOADS WITH YOUR COMPUTER This is easy and reliable if you use our solid state relay. This has no moving parts, has high input resistance and acts as a noise barrier and provides **4kW** isolation between logic terminals. The turn-on voltage is not critical, anything between 3 and 30V, internal resistance is about 1K ohm. AC loads up to 10A can be switched. Price is £2 each. Ref. 2P183.

METAL PROJECT BOX Ideal size for battery charger, power supply etc. sprayed grey, size 8" × 4¼" × 4" high, ends are louvered for ventilation other sides are flat and undrilled order Ref. 2P191 price £2.

BIG SMOOTHING CAPACITOR. Sprague powerlytic 39,000uF at 50V. £3. Our Ref. 3P41.

4-CORE FLEX CABLE. Cores separately insulated and grey PVC covered overall. Each copper core size 7/0.2mm. Ideal for long telephone runs or similar applications even at mains voltage. 20 metres £2. Our ref. 2P196 or 100 metres coil £8. Order ref. 8P19.

TWIN GANG TUNING CAPACITOR. Each section is .0005uF with trimmers and good length ¼in spindle. Old but unused and in very good condition. £1 each. Our ref. BD630.

13A PLUGS. Good British make complete with fuse, parcel of 5 for £2. Order ref. 2P186.

13A ADAPTERS – Takes 2 13A plugs, packet of 3 for £2. order Ref. 2P187.

20v – 0 – 20v – Mains transformers 2½ amp (100 watt) loading, tapped primary 200-245 upright mountings £4. order Ref. 4P24.

BENCH ISOLATION TRANSFORMERS 500 watt – 230v in and out with plenty of tappings to give exact volts. £12 + £3.

BURGLAR ALARM BELL – 6" gong – OK to fix outside in the rain and shelter – mains operation. £8. Ref. 8p2.

24 HOUR TIME SWITCH – 16A changeover contacts, up to 6 on/offs per day. Nicely cased, intended for wall mounting. Price £8. Ref. 8P6.

CAPACITOR BARGAIN – axial ended – 4700uf @ 25v Jap made. Normally 50p each, but you will get 4 for £1. Ref. 613.

PIEZO ELECTRIC FAN an unusual fan, more like the one used by Madame Butterfly, than the conventional type, it does not rotate. The air movements is caused by two vibrating arms. It is American made, mains operated, very economical and causes no interference. So it is ideal for computer and instrument cooling. Price is only £1 each. Ref. BD605.

SPRING LOADED TEST PRODS – heavy duty, made by the famous Bulgin company. Very good quality. Price four for £1. Ref. BD599.

CURLY LEAD – four core, standard replacement for telephone handset, extends to nearly two metres. Price £1 each. Ref. BD599.

TELEPHONE BELLS – these will work off our standard mains through a transformer, but to sound exactly like a telephone, they then must be fed with 25Hz 50v. So with these bells we give a circuit for a suitable power supply. Price 2 bells for £1. Ref. BD600.

ASTEC PSU. Mains operated switch mode so very compact (6½" × 4" × 2" approx.). Outputs: +5 Volts 3.5 amp, +12 Volts 1.5 amp, −5 Volt 1.5 amp. Brand new. Normal price £30+. Our price only £10. Ref. 10P34.

APPLIANCE THERMOSTATS – spindle adjust type suitable for convector heaters or similar. Price 2 for £1. Ref. BD582.

3 CORE FLEX BARGAIN No.1 – Core size 5mm so ideal for long extension leads carrying up to 5 amps or short leads up to 10 amps. 15mm for £2. order Ref. 2P189.

3 CORE FLEX BARGAIN No.2 – Core size 1.25mm so suitable for long extension leads carrying up to 13 amps – or short leads up to 25A. 10m for £2. order Ref. 2P190.

CASE WITH 13A PRONGS – to go into 13A socket, nice size and suitable for plenty of projects such as car battery trickle charger, speed controller, time switch, night light, noise suppressor, dimmers etc. Price – 2 for £1. Ref. BD565.

ALPHA-NUMERIC KEYBOARD – this keyboard has 73 keys with contactless capacitance switches giving long trouble free life and no contact bounce. The keys are arranged in two groups, the main area field is a QWERTY array and on the right is a 15 key number pad, board size is approx. 13" x 4" – brand new but offered at only a fraction of its cost namely £3, plus £1 post. Ref. 3P27.

TELEPHONE EXTENSIONS – it is now legal for you to undertake the wiring of telephone extensions. For this we can supply 4 core telephone cable, 100m coil £8.50. Extension BT sockets £2.95. Packet of 50 plastic headed staples £2. Dual adaptor for taking two appliances from one socket £3.95. Leads with BT plug for changing old phones 3 for £2.

WIRE BARGAIN – 500 metres 0.7mm solid copper tinned and p.v.c. covered. Only £3 + £1 post. Ref. 3P31 – that's well under 1p per metre, and this wire is ideal for push on connections.

INTERRUPTED BEAM KIT – this kit enables you to make a switch that will trigger when a steady beam of infra-red or ordinary light is broken. Main components – relay photo transistor, resistors and caps etc. Circuit diagram but no case. Price £2. Ref. 2P15.

3-30V VARIABLE VOLTAGE POWER SUPPLY UNIT – with 1 amp DC output. Intended for use on the bench for experimenters, students, inventors, service engineers etc. This is probably the most important piece of equipment you can own. (After a multi range test meter). It gives a variable output from 3-30 volts and has an automatic short circuit and overload protection, which operates at 1.1 amp approximately. Other features are very low ripple output, a typical ripple is 3mV pk-pk, 1mV rms. Mounted in a metal fronted plastic case, this has a voltmeter on the front panel in addition to the output control knob and the output terminals. Price for complete kit with full instructions is £15. Ref. 15P7.

TRANSMITTER SURVEILLANCE (BUG) – tiny, easily hidden, but which will enable conversation to be picked up with FM radio. Can be housed in a matchbox. All electronic parts and circuit. Price £2. Ref. 2P52.

BARCLAYCARD VISA

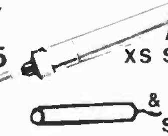
EAST CORNWALL COMPONENTS

Access

CATALOGUE available – range of components greatly increased – over 136 pages fully illustrated. Price £1.00 per copy (free upon request with orders over £15). Credit Tickets (3), Special Offer Sheets, Order Form and Pre-Paid Envelope. Order your copy now.

SEPTEMBER SPECIAL

ONLY £5.25

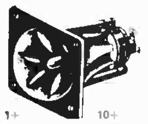


ANTEX XS SOLDERING IRON & PACK OF SOLDER

IRON ALONE NORMALLY £5.80

SPECIAL OFFERS WHILE STOCKS LAST

PIEZO – 3.25" – SUPER HORN



Flush Flange Expotential Horn
Size: 3.25" Round
Impedance: 1,000 ohm @ 1KHz
Power Nominal: 16V
Power Max.: 35V
Frequency Response: 3KHz-25KHz
Output SPL: 100 dB
Weight: 62g
Dimensions: 85 × 85 × 74 mm
Order Code – AUD/KSN1005A — 1+ / 10+
Price – £5.00 / £4.50

Rear Mounting Expotential Horn.
Idential to the above Piezo, but Rear Mounting.
Order Code – AUD/KSN1001A — 1+ / 10+
Price – £5.20 / £4.70

HALOGEN LAMP – 500 Watt
Tungsten Halogen Lamp for use in external Halogen Light Fittings.
Voltage: 240Vac Watts: 500.
Order Code SO/023 — Price: 3.50 Per 10: £3.00 each

END NIPPERS – Economy
Yellow insul. handles. Length 4½"
Order Code SO/024 — Price: £1.00 Per 10: 90p each

FLAT NOSE PLIERS – Economy
Yellow insul. handles Length 4"
Order Code SO/025 — Price. £1.00 Per 10: 90p each

ALUMINIUM SHEETS
Dimensions. 125mm × 220mm (Approx.)
Order Code. SO/014 — Price 50p Per 10 45 each

NI-CAD BATTERY CHARGER

Universal. PRICE: 1+ £4.50 each; 10+ £4.25 each; 100+ £3.75 each

NI-CAD BATTERIES

AAA	£1.25	£1.20 ea/10
AA	.90	.85 ea/10
C	£2.10	£1.90 ea/10
D	£2.50	£2.20 ea/10
PP3	£4.10	£3.90 ea/10

20mm FUSES

QUICK BLOW – 80mA, 100, 125, 160, 200, 250, 315, 400, 500, 630, 800, 1A, 1.25, 1.5, 1.6, 2, 2.5, 3.15, 4, 5, 6.3 — 45p/10
TIME DELAY – 50mA, 60, 80, 100, 125, 160, 200, 250, 315, 400, 500, 630, 800, 1A, 1.25, 1.6, 2, 2.5, 3.15, 4, 5, 6.3, 10 — 90p/10

1" DOMESTIC MAINS FUSES

ALL 13A, FUSED WITH NEON INDICATOR
2A, 3A, 5A, 13A — £1.00/10

1¼" QUICK FUSES

500mA, 1A 1.25A, 2A, 12A — 50p/10

BT APPROVED EQUIPMENT

Master Socket (Flush)	£2.90	Extension Lead 5 Mtr	£2.90
Master Socket (Surface)	£2.75	Wiring Tool	36p
Secondary Socket (Flush)	£1.90	Plug – 431A	25p
Secondary Socket (Surface)	£1.70	Slimtel Phone	£17.35
B.T. Cable (per metre)	15p	Viscount Phone	£26.04
Per 100 metres	£12.00	Conversion Kit &	
Line Jack Cord with Plug	£1.25	Wiring Diag	£6.90

T.V. AERIAL ACCESSORIES

Co-Ax Cable 75 Ohm 100 Metre Reel	£11.00
	1+ 10+
Co-Ax Metal Plug	20p, 18p
Co-Ax Line Socket	25p, 22p
Co-Ax Line Connector	12p, 10p
Co-Ax In-Line Splitter	80p
TV/Video/Computer Combiner 7042	£4.05
TV Indoor Amplifier 7253	
Improves signal 3 times	£16.95
Second Set Amplifier 7243	
Improves signal to 2 sets 50%	£15.75
CB Interference Suppressor 9700	
Minimises CB interference on TV	£5.55
TV/FM Diplexer 9006	
Separates UHF TV signals from FM radio signals	£4.95

VALVES

Enquiries are welcomed for any other valve not listed here.

Type	Price (£)		
		PC900	1.45
		PCC88	0.85
AZ31	4.55	PCC89	0.80
AZ41	2.05	PCC189	0.90
DAF96	1.05	PCF80	0.95
DF96	0.80	PCF82	1.00
DK96	2.70	PCF84	0.80
DM71	3.00	PCF86	1.30
DY86/87	0.70	PCF87	0.60
DY802	0.95	PCF200	2.00
CV850	2.55	PCF201	2.00
CV4015	2.85	PCF800	1.25
E180F	6.55	PCF801	1.10
EABC80	0.85	PCF802	1.10
EAF42	1.55	PCF805	1.75
EB91	1.35	PCF806	1.25
EBC41	3.50	PCF808	1.65
EBF80	0.80	PCL82	1.05
ECC81	1.05	PCL83	2.55
ECC82	0.95	PCL84	1.05
ECC83	1.20	PCL86	0.90
ECC84	0.85	PCL88	2.55
ECC85	1.00	PCL805	1.05
ECC88	1.25	PD500	2.95
ECC189	0.90	PFL200	1.80
ECF80	0.85	PL33	1.55
ECF82	0.90	PL36	1.80
ECF83	1.95	PL82	0.80
ECH35	3.80	PL95	2.05
ECH81	1.45	PL504	1.55
ECH84	1.55	PL508	2.75
ECL85	0.80	PL519/509	5.20
ECL86	1.80	PL802	5.55
EF80	0.80	PY81/800	1.15
EF86	1.85	PY82	1.80
EF91	2.05	PY88	0.80
EF95	1.70	PY500A	2.25
EF183	0.95	PY801	0.75
EF184	1.05	UABC80	0.90
EH90	1.00	UAF42	1.30
EL34	3.45	UBC41	4.35
EL36	2.30	UBC81	1.75
EL81	7.00	UCC85	0.80
EL84	2.40	UCF80	1.25
EL85	5.00	UCH42	5.65
EL86	6.95	UCH81	2.05
EL509	7.90	UCL82	1.85
EL519	8.00	UCL83	3.30
EM80	0.90	UF41	1.30
EM84	1.80	UF89	2.55
EM87	3.90	UL84	1.30
EY51	0.95	UY85	1.20
EY86/87	0.70	2D21	2.65
EY88	0.80	6AT6	1.30
EY500A	2.20	6AU6	1.05
EZ41	2.85	6C4	1.05
EZ81	0.85	6GH8A	1.25
GY501	1.45	6J5GT	2.55
GZ32	1.25	6K7G	2.05
KT66(G.E.C.)	18.00	6K8G	2.80
KT77	11.50	6KD6	6.55
KT88(G.E.C.)	19.00	6X4	1.55
PC88	1.45	30FL2	1.75
PC92	3.05	30FL12	1.65

NEW REDUCED PRICES FOR TELEVISION SPARES

REPLACEMENT VIDEO HEADS

AKAI	
VS1	29.45
VS2	29.45
VS3	29.45
VS5	29.45
VS10	29.45
VS77	29.45
VS88	29.45
VS7100	29.45
VS7200	29.45
VS9300	29.45
VS9500	29.45
VS9700	29.45
VS9800	29.45
FERGUSON	
3V00	21.45
3V01	21.45
3V06	21.45
3V16	21.45
3V22	21.45
3V23	21.45
3V24	21.45
3V29	21.45
3V30	21.45
3V31	21.45
3V35	21.45
3V36	21.45
8903	21.45
HITACHI	
VT6500	25.00
VT7000	25.00
VT8000	25.00
VT8040	25.00
VT8100	25.00
VT8500	25.00
VT8700	25.00
VT9000E	25.00
VT9300	25.00
VT9500S	25.00
VT9700	25.00
VT9900	25.00
VT4000	25.00
VT4200	25.00
VT5000	25.00
VT5500	25.00
ORION	
VH1	21.45
VH2	21.45
JVC	
HRD110	21.45
HRD111	21.45
HRD120	21.45
HRD121	21.45
HRD220	21.45
HRD225	21.45
HR2200	21.45
HR3300	21.45
HR3320	21.45
HR3330	21.45
HR3350	21.45
HR3360	21.45
HR3660	21.45
HR4000	21.45
HR4100	21.45
HR7200	21.45
HR7600	21.45
HR7610	21.45
HR7650	21.45
HR7700	21.45
NATIONAL PANASONIC	
NV100	25.45
NV230	36.45
NV250	36.45
NV270	36.45
NV280	36.45
NV300	21.45
NV322	21.45
NV330	35.45
NV333	21.45
NV340	21.45
NV370	25.45
NV380	25.45

NAT. PAN. Cont.	
NV390	21.45
NV450	36.45
NV470	36.45
NV430	36.45
NV600	35.45
NV777	35.45
NV861	21.45
NV2000	21.45
NV3000	21.45
NV7300	21.45
NV7200	21.45
NV7500	21.45
NV7800	21.45
NV7850	21.45
NV8170	21.45
NV8200	21.45
NV8400	21.45
NV8600	21.45
NV8620	21.45
NEC	
PV7E0	23.45
PV764	23.45
PV774	23.45
N830	21.45
N831	21.45
N832	21.45
N833	21.45
PV2300	23.45
PV2400	23.45
SHARP	
110	26.45
381	26.45
383	26.45
384	26.45
385	26.45
386	26.45
387	26.45
388	26.45
481	26.45
482	26.45
2000	26.45
3300	26.45
9100	26.45
9300	26.45
9400	26.45
9500	26.45
9600	26.45
9700	26.45
SANYO/FISHER	
FVHP515	34.50
FVHP910	34.50
PHILIPS	
DV462	25.45
6460	25.45
6520	25.45
SONY	
SLF1	29.45
SLC5	23.45
SLC6	23.45
SLC7	23.45
SLC8	39.45
SLC20	29.45
SLC24	29.45
SLC30	29.45
SLC33	29.45
SLC40	29.45
SLC50	39.45
SLC60	39.45
SLK95	39.45
SL200	39.45
SL3000	25.00
SL8000	24.50
SL8080	24.50
TOSHIBA	
V31	29.50
V33	29.50
V55	21.45
V57	21.45
V5470	24.50
V9600	29.50

TRANSISTORS + DIODES

Type	Price (£)
AC128	0.30
AC128K	0.38
AC141	0.58
AC141K	0.38
AC142	0.40
AC142K	0.38
AC152	0.48
AC153K	0.46
AC176K	0.32
AC187	0.40
AC187K	0.42
AC188	0.24
AC188K	0.38
ACY22	1.50
AD142	0.88
AD149	0.95
AD161/162	1.20
AF114	0.88
AF115	2.10
AF116	2.10
AF121	0.66
AF124	0.70
AF125	0.50
AF126	0.50
AF127	0.50
AF139	0.56
AF178	1.50
AF239	0.65
AF279S	1.40
ASY80	5.20
ASZ17	2.60
AU110	2.90
AY102	4.32
B40C200	1.03
BA115	0.12
BA121	0.40
BA148	0.16
BA155	0.12
BA157	0.20
BB105B	0.32
BB105G	0.30
BB110B	0.42
BC108	0.10
A,B or C	0.14
BC109	0.10
A,B or C	0.14
BC115	0.15
BC117	0.28
BC118	0.20
BC119	0.43
BC125	0.14
BC140	0.48
BC141	0.36
BC142	0.26
BC143	0.36
BC147B	0.16
BC148	0.10
BC148B	0.12
BC149C	0.14
BC159	0.14
B/C	0.16
BC160	0.38
BC161	0.30
BC168B	0.25
BC170/A/B/C	0.12
BC171/A/B	0.10
BC172/B/C	0.10
BC177/B/C	0.24
BC182/A/B/C	0.10
BC182L	0.10
LA LB LC	0.12
BC183/A/B/C	0.10
BC183L	0.10
LA LB LC	0.12
BC184	0.08
A B CL LC LB	0.10
BC212/A/B/C	0.10
BC212L	0.10
LA LB	0.10
BC213/A/B/C	0.10
BC213L	0.10
LA LB LC	0.10

Type	Price (£)
BC237	0.12
BC238	0.12
BC251/A/B	0.14
BC262	0.26
A B	0.29
BC301	0.36
BC302	0.38
BC303	0.36
BC307A	0.15
BC317B	0.15
BC323	0.90
BC327	0.10
BC328	0.10
BC337	0.08
BC338	0.10
BC350A	0.24
BC351	0.16
BC516	0.35
BC547	0.08
BC548	0.08
A B or C	0.10
BC549	0.08
A or B	0.10
BC550	0.10
A or B	0.10
BC557A	0.10
BC558A	0.10
BCY70	0.36
BCZ10	3.21
BCZ11	2.60
BD124P	1.20
BD129	0.90
BD130Y	0.68
BD131	0.46
BD132	0.50
BD135	0.26
BD136	0.26
BD137	0.28
BD138	0.30
BD139	0.30
BD140	0.29
BD142	1.60
BD145	1.82
BD150B	0.50
BD160	1.58
BD165	0.45
BD183	0.70
BD201	0.52
BD202	0.57
BD222	0.80
BD225	0.40
BD232	0.52
BD234	0.30
BD235	0.30
BD236	0.35
BD237	0.38
BD410	0.76
BD438	0.64
BD439	0.85
BD441	0.85
BD507	1.05
BD520	1.20
BD587	0.88
BD707	0.80
BDX18	1.00
BDX32	1.75
BF115	0.32
BF117	0.70
BF119	0.82
BF125	0.42
BF127	0.44
BF154	0.14
BF157	0.46
BF160	0.23
BF167	0.32
BF177	0.42
BF178	0.36
BF180	0.27
BF181	0.27
BF182	0.32
BF183	0.32
BF184	0.47

Type	Price (£)
BF185	0.28
BF194A	0.15
BF195	0.12
BF224J	0.20
BF240	0.15
BF241	0.18
BF257	0.22
BF258	0.26
BF259	0.30
BF262	0.34
BF263	0.38
BF270	0.30
BF271	0.28
BF273	0.22
BF274	0.34
BF294	0.46
BF336	0.40
BF337	0.38
BF338	0.28
BF355	0.42
BF371	0.27
BF450	0.30
BF457	0.36
BFR51	0.36
BFR61	0.32
BFR90	0.86
BFT41	0.68
BFT43	0.38
BFY50	0.32
BFY51	0.32
BFY52	0.32
BFY90	0.80
BFY90S	1.34
BR100	0.20
BR101	0.76
BR103	0.60
BR303	2.75
BRY39	0.80
BRY56	0.42
BSX20	0.20
BSY52	0.35
BSY95A	0.25
BT100A/02	0.90
BT101/300	2.75
BT101/500	3.25
BT102/300	3.60
BT106	2.05
BT116	1.20
BT119	3.30
BT138/600	0.98
BT151/560R	0.90
BTY79/400R	2.80
BU104	1.80
BU105	1.40
BU108	1.90
BU126	1.60
BU133	1.90
BU204	1.60
BU205	1.40
BU208A	1.50
BU326S	1.75
BU407	1.40
BUX80	2.90
BUY20	2.75
BUY69A	2.90
BUY69B	1.98
BY100	0.80
BY103	0.60
BY122	0.60
BY126	0.10
BY127	0.08
BY133	0.10
BY135	0.35
BY164	0.45
BY179	0.60
BY182	0.80
BY184	0.38
BY187	0.65
BY189	6.75
BY198	0.64
BY199	0.72
BY206	0.14
BY207	0.16
BY210/400	0.21
BY210/800	0.22

ORVX PORTASOL GAS SOLDERING IRON

PRICE — £16.00 each
SPARE TIPS – 1, 2.4, 3.2, 4.8mm — £4.00 each

RESISTORS – CARBON FILM 5%

¼W 1R0 to 10M (E12 Range)	2p each. 15p/10. 75p/100
½W 2R2 to 10M (E24 Range)	2p each. 15p/10. 75p/100
1W 10R to 2M2 (E12 Range)	5p each. 40p/10. 3.00/100
2W 10R to 2M2 (E6 Range)	8p each. 60p/10. 5.00/100

RESISTOR KITS – each value individually packed

¼W pack 10 each value E12 – 10R to 1M 610 pieces	4.50
¼W pack 5 each value E12 – 10R to 1M 305 pieces	2.95
¼W pack Popular – 10R to 10M 1000 pieces	6.50
½W pack 10 each value E12 – 2R2 to 2M2 730 pieces	7.75
½W pack 5 each value E12 – 2R2 to 2M2 365 pieces	4.70
½W pack Popular – 2R2 to 10M 1000 pieces	9.50
1W pack 5 each value E12 – 2R2 to 1M 353 pieces	13.75
2W pack 5 each value E6 – 10R to 2M2 317 pieces	21.75

ADDITIONAL KITS

DISC CERAMIC 50V	125 pieces	£3.50
ZENER DIODES 5ea	55 pieces	£3.50
ELECTROLYTICS R.	100 pieces	£7.25
FUSES Q/BLOW 20mm	80 pieces	£3.75
FUSES T/DELAY 20mm	80 pieces	£7.50
PRE-SET POTS-H	120 pieces	£6.75
PRE-SET POTS-V	120 pieces	£6.74

SOLDER: 60% TIN 40% ALLOY

22g. Non-corrosive Multi-core Solder.
500gm Reel £4.99 each – 10 Reels £3.75 each

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Soldering Station complete with 30W or 40W Iron (state which)	72.50	CS 18W, as above	10.90
XS25 W Iron kit/complete with stand, 1m lead & plug attached	8.20	Antex 15W iron	5.40
CS17 Iron Kit	7.99	Antex 18W iron	5.60
C15 Iron Kit	8.30	Antex 25W iron	5.80
XS25 W Iron kit/complete with steel & plug attached	11.00	Antex elements	3.20
		Antex bits	1.15
		Antex stands	2.20
		Soldersucker	2.99
		Spare nozzles for Soldersucker	0.60

SERVICE AIDS

Goldklene Degreasing Solvent	1.78	Aero Duster	1.55
Switch Cleaner Lubri	1.18	Super 40	1.94
Supa Freeze-it	1.46	Rapid Fire Extinguisher	3.45
Foam Cleanser	1.26	Silicone Grease Tube	1.82
Video/Tape Head Cleaner	1.14	Silicone Grease Spray	1.48
Plastic-Seal	1.40	Heat Sink Compound	1.20
Aero-Klene	1.16	**Solda Mop**	
Anti-Static Spray ellist	1.28	Light guage 0.08mm	0.80
Excel Polish	1.24	Standatd gauge1.2mm	0.78
		Industrial reel 1.2mm	2.96

13A TEST PLUG – useful for testing 13A sockets.
PRICE: 99p ea. 10 off 90p ea.

TEST PRODS – FUSED – 99p pair

SAFEBLOC – Quicktest – Mains – £6.75 each

HELPING HANDS WITH MAGNIFIER £3.99

EXTENSION MULTI SOCKETS

ALL 13A, FUSED WITH NEON INDICATOR

2-WAY	£2.75 each £2.50ea/5
3-WAY	£3.80 each £3.50ea/5
4-WAY	£3.99 each £3.75ea/5
4-WAY with lead & plug	£5.75 each £5.25ea/10+
PLUGS 13A 3-pin fused	£0.46 each £0.42ea/10

BOOKS

DATA VOLUME 1 – Trans. data & drawings A-BUY	£9.99
DATA VOLUME 2 – as above C-Z	£10.75
DATA VOLUME 3 – 2N-2N6735	£10.20
DATA VOLUME 4 – 2SA & on	£13.50
DIODES VOLUME 1	£10.75
DIODES VOLUME 2	£10.65
Both Volumes	£20.60
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THYRISTORS A to Z	£10.45
TRANSISTORS A to Z	£5.40
TRANSISTORS 2N-3N	£5.50
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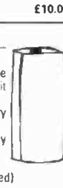
FM TRANSMITTER
Very High Quality 'MINI-BUG' – Ideal for Baby Alarm etc.!!



A very good range is obtainable – we have obtained over ½ mile, but it does depend on conditions.
Simply remove cover – insert battery – and you're ready to go.
Reception can be obtained on any F.M. Radio
Frequency: 105-109 MHz F.M
Power: PP3 9V Battery (not included)
Dimensions: 4.25" × 2.25" × 0.75".
Order Code – SO/034 — Price: £8.50

INTEGRATED CIRCUITS (£) EACH

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CA810QM	1.20
CA3020	2.10
CA3065	1.60
HA1366WR	1.59
LA4422	3.20
LC7131	4.90
LM324N	0.40
LM380N8-P	0.80
LM380N14-P	1.80
LM1011N	3.20
LM1458N	1.35
LM3900N	0.50
M51513L	2.30
M51515L	3.15
MC1307P	1.99
MC1327P	1.50
ML237B	2.30
NE555	0.20
SAS560S	1.85
SAS570S	1.85
SAS580	2.85
SAS590	2.85
SN76226DN	1.30
SN76227N	1.10
SN76533N	1.75
STK015	6.20
TA7203P	2.50
TA7204P	2.50
TA7205AP	1.80
TAA550	0.50
TAA611A12	3.50
TA120B	1.30
SA/SQ	1.30
TBA520	1.50
TBA530	1.20
TBA540	1.64
TBA560C	1.50
TBA810S	1.20
TBA950/2A	3.05
TCA270SQ	4.02
TDA1006A	2.45
TDA1035S	4.50
TDA1170S	1.99
TDA1352A	1.80
TDA2030	1.80
TDA2530	2.20
TDA2532	2.80
TDA2560	3.20
UPC575C2	1.45
UPC1350C	4.05
UPC1182H	2.75
UPC1208C	1.25
UPC1356C2	3.00

MOTORS

FERGUSON/JVC Capstan Motor 3V00-3V22	35.00
FERGUSON/JVC Drum Motor 3V00-3V22	35.00
SANYO Reel Motor VTC5150	9.60
SHARP Reel Motor VTC5150, VC9300	18.45
SHARP Reel Motor VC483	18.45
SONY DC Motor BHF/1100D C7	30.50
FERGUSON/JVC Capstan Motor	25.50

IDLERS

FERGUSON/JVC Take Up Idler 3V00-3V16	4.80
HITACHI F/Fwd Rewind 686 1471	2.25
HITACHI F/Fwd Rewind 6886971	1.90
HITACHI Idler 6413663	2.25
SANYO Reel Idler Assy VTC 5150 143-0-662T 01201	5.95
SHARP Idler NIDL 0005 GE22	1.90
SHARP Idler NIDL 0006 GE22	1.90
SONY Rewind Kit A-670-634-8B	4.95
SONY Rewind Kit A-670-639-1B	4.50

VIDEO BELT KITS

AKAI	9300/9500/9800	2.00
HITACHI	5000	1.35
	8000	1.05
JVC	HR7650-3V31	.68
PANASONIC	NV7000/7200	1.04
	NV2000B	1.07
	NV300/333	1.22
	NV777	1.16
	NV8600/8610/VO11	1.45
SANYO	VTC5000	.90
	VTC5300	1.80
	9300P	2.00
	5500	1.00
SHARP	VC7300	1.29
	VC6300/6600	1.57
	8300	1.70
	9300	1.10

VIDEO BELT KITS (Cont.)

SONY	SLC5/7	1.64
	SL8000/8600/8600	2.60
	SL3000UB	2.05
	SLC6	1.85
	T9	2.15
THORN	3V29/HR7200	1.70
TOSHIBA	V8600	1.40
	V7540	1.50
	9600	1.15
AMSTRAD	7000	1.40
JVC	HR3300/3320/3360	2.00
	HR7000	.90

GENUINE HEADS

FERGUSON	8903/3V00/3V01/3V06/3V16/3V22/3V23/3V24/3V29/3V30	39.50
JVC	All sets	39.50
PANASONIC	NV-2200/3000/7000/7200/8400/8600/8170/8610/8620	39.50
	VEH0120/31	39.50
	VEH0218	38.35
	VEH0177	52.50
SANYO	VTC9300/9455/9500	52.50
	VTC5000/5300/5400	52.50
HITACHI/GEC	VT5000E	35.50
	Original/8/93/95	35.50
	Original/VT111E	35.50
	Original/VT33E	35.50
SHARP	Universal	55.00
SONY	C5/C6/C7/SL8000/8800	47.75
	Original/SLC9	48.00
	Original/SLC20/30/40	48.00
	Original/SLC5/6/7	48.00
	Original/8000	48.00
TOSHIBA	V5470A/B/D/P	48.00
	9600	48.00

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TELEVISION

Industrial Strategies

A trio of reports published by the National Economic Development Office has once more highlighted the shortcomings of the UK's electronics industry. It's as well that this should be done from time to time, and an Action Group has been set up to try to force the pace of remedial action. But one can't help feeling, with deep regret, that not a lot will come of it. After all, the problems are not new and many in the industry have been struggling to do something about them for a long time.

The main report, *Strengthening the Competitiveness of UK Electronics,* was prepared for the NEDC by management consultants McKinsey. It compares the performance of eight of the largest UK electronics groups with twenty two of their competitors in Europe, the USA, Japan and Korea. This report is supplemented by *Government IT Policies in Competitive Countries,* prepared by the Science Policy Research Unit at the University of Sussex, and *Comparative Education and Training Strategies,* prepared by NEDC staff. The McKinsey report criticises the outdated management style of UK electronics companies and their failure to develop markets because of lack of investment. It highlights a need for less dependence on the domestic UK market, in particular on defence electronics and telecommunications, and proposes a five-point strategy for survival in the increasingly competitive but still expanding world electronics market. The industry is urged to (1) focus on fewer, core electronics businesses and invest to achieve critical mass, i.e. production levels suited to a global market, (2) develop management structures and leadership styles that will support long-term strategies, (3) communicate these strategies to the financial market to correct the view that the industry concentrates solely on short-term profitability, (4) work with suppliers to create an improved components sector, and (5) create world-class skills and make better use of individual talent, in particular to compensate for the deficiencies in British education.

The report points out that while the UK electronics market grew by 9·4 per cent a year in real terms between 1976 and 1987, a growth rate as rapid as in any major world market except Japan, the sales of UK electronics companies rose by only 2·6 per cent during the period. It comments that major UK electronics companies were amongst the slowest growing of the thirty evaluated worldwide. During the period UK electronics companies reduced employment by 1·5 per cent a year while employment by their US and Japanese counterparts expanded by about 4·5 per cent a year. A sorry but by now familiar story. Nothing wrong with the "strategy for survival" – the report poses the question of whether much of an electronics industry will remain in the UK in a decade's time – except that it is really too vague a statement of good intentions to be capable of having much practical effect.

It's sad to note that the UK was once a world leader in electronics but has been unable to build on the technical achievements of earlier generations. It's decidedly worrying to reflect on the fact that electronics is a key factor in a modern, developed economy. Is it too late for the UK industry to re-establish a major presence in the international electronics market? Problems that have always been with us have included the relatively small domestic market and unfortunate timing – all too often times when major initiatives should have been taken have coincided with periods when the government of the day has imposed a regime of austerity to correct one or other sort of economic imbalance. It takes an iron will to press on with investment in the middle of a recession, combined with a grasp of market opportunities all too rare amongst the leaders of UK industry.

It should not be thought that the UK is alone in failing to take the right decisions at the right time and implement them. Philips for example has just announced appalling second quarter results, with earnings reduced by 44 per cent to the lowest quarterly level for five years. This despite the fact that the company has for some time been striving to get its act right. It has always invested heavily in research, but has often failed to make the most of the resultant know-how. It has been striving to impose a more effective management system on its world-wide activities, i.e. do the sorts of things suggested by the McKinsey "five-point strategy". One can but wish Philips well. One of Philips' problems of course is its heavy dependence on the highly competitive consumer electronics market. It's extraordinarily difficult to cope with the cut-throat competition from new firms in South East Asia's developing economies, operating as they do in a lost-cost environment. Difficult but not impossible, as Japanese industry has shown. The sort of thing required is highlighted by the investment made for example by Hitachi in VCR production. Between 1983-87 output per worker at Hitachi's Tokai VCR plant in Japan increased nine-fold, assembly time per machine being halved to just over one and a half minutes. But how many companies could hope to match that sort of performance?

The situation seems to be terminal as far as the UK's indigenous consumer electronics industry is concerned. Amstrad has shown that it's possible to become a major supplier of consumer electronics goods on an international basis despite the fierce competition, but to do so has had to rely on ingenious off-shore manufacturing operations. Its Hong Kong Asia base switches production between plants in a number of South East Asian countries, with quality control initially achieved by supervising and paying for the installation of tooling for its products and by having its own engineers working full-time in subcontractors, plants while new products are being introduced. A team of inspectors monitors quality control afterwards. Maybe this is how things will have to go. It is after all a development of a well-established practice – as far back as the early sixties US semiconductor manufacturers were having their device encapsulation done in off-shore plants.

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John A. Reddihough

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COVER PHOTO
This month's cover photograph shows the Sony Model KV2752UB – rear view with the back removed. See servicing article on pages 826-831. The photograph was taken by Nigel Hunt of JNB Television.

Servicing Notes on the Panasonic G Deck

Nick Beer

The Panasonic G tape deck mechanism has been with us now for some eighteen months. It's fitted to VCRs with model numbers NV-G21/25/40/45, NV-H65, NV-D48 and NV-D80. Rather illogically perhaps, it was not used in Models NV-G7/10/12. These had the D1 mechanism. Matters are further confused by the fact that the NV-D48 and NV-D80 D series machines (D for digital) have the G rather than the D mechanism. Ah well!

The G deck is a rather innovative design. Apart from the direct-drive drum unit there's only one motor which is used as the direct-drive capstan and also provides the drive for the reels, loading, mode selection and front loading! The latter is achieved by the use of a clever rack and lever system. The direct-drive drum unit is of considerably reduced height. In combination with the overall compactness of the new design, this enables a very small VCR to be built, typically only 82mm high. There's only one belt in the mechanism, a toothed timing belt (VDV0159) that transfers drive from the capstan motor to the reel and loading mechanisms. Instead of being engaged in the normal "swing in" fashion, the pinch roller descends from above on a worm shaft – again driven by the loading system. A rotary mode switch provides the syscon with mode detection, the first time that Panasonic has used such a device (a linear device was previously used), also the first time that it has been mounted on the top of the mechanism. It can be seen at the rear, right-hand side of the mechanism – a white, toothed wheel.

One novel feature of these machines is the real-time counter. This is done by reading the off-tape control pulses, so the tape has to be in contact with the control head at all times. The half-lace feature helps here: as soon as the tape is inserted it laces to the half-way position, in contact with the audio/control head. So the head is decidedly offset from its usual position in a VHS deck.

All these features go to produce what is probably the best range of VCRs currently on the market. But there have been a few teething troubles with the deck – this has been the experience of dealers here in North Devon anyway. This short article aims to help by providing a roundup of stock faults to date and what to do about them. It seems that Panasonic has stopped distributing technical bulletins, so you get to know about modifications only when you phone them. As a result you could spend several hours on a deck only to find that the job could have been done in ten minutes had the appropriate information been available.

These decks can be difficult to work on if you don't know them, but when you do know their habits there are none nicer. They are very light and fairly accessible. Once you've had a few to regear you get to know them intimately. The only problem is that some of the faults have unlikely causes. So you can easily be caught if you don't know them.

Creased or Chewed Tapes

The most common complaint we've had has been of creased or chewed tapes. This usually starts off with a rolling picture or a varying sound level. The cause is that the pinch roller becomes barrel shaped. As a result the tape rides up over the adjacent post P4, and this can be reflected back to the audio/control head. The remedy is to fit the modified pinch roller, part no. VXL1473. To tell the difference between the old and the new type, look at the colour of the roller's metal insert bearing. If it's brass it's the old type and should be changed regardless – if it hasn't caused trouble it soon will. The new type has an aluminium coloured insert. I've had one or two of these fail, giving the same trouble, but they are a great deal more reliable.

Pinch roller replacement is fairly straightforward – simply release the plastic cap above the assembly and slide the roller up. On earlier machines this cap tends to foul the front of the cassette carriage as you pull it up, so you should gently lever it forwards and up. Panasonic recommend that the cap (part no. VMX1078) is replaced at the same time as the roller.

Head Failure

The next common problem we've had has been failure of the VEH0343 video head used in Models NV-G21/25. Symptoms range from excessive noise bars in the trick modes to grainy recordings or no picture at all in any mode. Cleaning improves matters but the heads will still not give perfect results. In the vast majority of cases I've found that the back tension has been excessive – typically twice the specified level of 20-25g! I would suggest that this is checked whenever you work on one of these decks, and certainly every time a head is cleaned or replaced.

To remove the head drum, first take off the discharge angle (back on top again with the G deck) then withdraw the two large screws that hold the head to the lower drum. Next thoroughly remove all the solder from the eight arrowed connections to the head and ensure that each of the pins is free. If the head is stiff on its shaft, even after using a hairdryer to apply heat, use the Panasonic head puller (part no. VFK0341) for which these heads have the appropriate threaded holes. **Never** touch the three gold screws in the centre spindle of the direct-drive unit.

This problem is rather alarming as the trade price of the heads is over £50, which is a hefty charge for the customer or renter to bear now that these machines are approaching the end of their guarantee period. Panasonic tell me that the problem is under investigation. Even more alarming is the fact that we have had failure of five or more of the direct-drive units themselves. These cost over £220 trade, plus VAT of course. Until now they have been under guarantee. The problem has been that the leads from the rotary transformer to the bottom of the pins that come up to connect to the head tend to break, giving rise to faults that look as if the heads are clogging and cleaning themselves as the machine plays or records, but of course the places where they do so aren't constant.

Timing Problems

We've had a number of odd faults that have caused timing problems. On a few occasions the timing belt has slipped, upsetting things. The symptoms are things like failure to accept a cassette, or ejection of the tape as soon as it goes in, or going into fast forward then switching off. The general rule to follow is that all the gears should line up hole to hole as per the manual for the deck – note that the manuals for the individual VCRs don't carry this information. Unfortunately the instructions are not very accurate. Alignment should be done in the stop mode. But after this you are told how to reinstall the cassette carriage in the eject mode (page 14). So if you follow the list of instructions you'll find that things won't work – not only will they not work but the timing will go haywire again. You have to turn the page and fit the carriage as in the stop mode (page 16) – the mode to which you aligned the rest of the mechanism – though you aren't told that. Even here there's an error: in Fig. A20, page 16, second tooth of rack gear A should read first tooth. If you align the mechanism as per the manual (stop mode) and then want to run it without the carriage in you should connect a 2·2kΩ resistor across pins 4 and 3 of the flexible connector (P1503) that plugs into the carriage to trick the syscon into thinking that the insert switch has been operated. This isn't explained in the manual but is fairly obvious if you look at the circuit.

Audio/control Head Setting

Another fairly common fault was the subject of a recent Test Case, though that one related to another machine. The symptom is a line of noise at the bottom of the picture with the machine's own recordings, the line disappearing in the last two or so seconds. The cause of the trouble is that the audio/control head is set too high, the control head erasing the bottom part of the video track. The customer will usually complain about low sound as well.

Play Arm Sticking

The play arm sticking is something we've not encountered very often ourselves, though I know of other dealers who have. It means that the tape will be left looped out when the cassette is ejected, so you get crunched tape. Other cases have resulted in no take-up in play. Replace the arm (part no. VXL1490) and oil its pivot.

Noisy Machine

A final selection of faults can be grouped under one heading, "machine noisy". The usual area where noise is generated is the capstan flywheel/rotor. At the bottom of this unit, where the timing belt engages, there's a plastic pulley that's very weak and tends to run eccentrically, causing a cyclic knocking. A similar rubbing noise can be the result of a worn capstan brake pad. Replacement of these two parts is very easy. Excessive back tension can cause a louder than normal "thrumm" from the drum. Bear in mind that as these machines have no screening can or PCB over the mechanism, while the lid is very thin, the drum tick is more noticeable. We've had the odd complaint about this, but only from someone who's being pretty fussy.

In Conclusion

When servicing one of these decks it's always wise to check the tension of the timing belt. If it appears to be too slack and the machine has been in use for any length of time, don't be tempted to adjust the position of the jockey pulley – fit a new belt. There's at all times a certain amount of slack. Experience will show what's correct.

The electrical faults we've had with these machines will be included in VCR Clinic. We hope that things will soon settle down on the mechanical front. We've not yet had a fault on the latest series.

Haunted

Les Lawry-Johns

I seem to be haunted by Fidelity colour portables of late. If not of the ZX2000 series, then the later ZX3000 version. One that stopped me in my tracks for a while came in the other day. It was a CTV14S, fitted with the ZX3000 chassis. Its trouble was no green. Checks on the tube base panel revealed that the voltages in the green output stage were way out. It took some time to find that the 100kΩ bias resistor R214 was open-circuit. Fitting a replacement restored the green and my flagging spirits. The equivalent resistors in the red and blue channels are R224 and R204 respectively. So the moral is, if one colour goes check the relevant bias resistor on the tube base panel before you consider changing the TDA3562A colour decoder chip with its 28 pins.

The Philips KT3 chassis is also getting to be all too predictable. Quite apart from the 4·7Ω surge limiting resistor on the power supply panel and the tripler, which sometimes kills the line output transistor, it's now common to find that the tube is faulty. Sometimes you find that for some while only one colour appears, the other two finally coming on after a struggle. In this event I usually short out one of the heater chokes on the tube base to liven up the heaters so that the lazy colours are not so long in coming through. This seems to satisfy most people. But not Mrs. Grouser.

"I want the proper picture when I switch on. I don't see why you can't do it."

"I can for about eighty pounds Mrs. Grouser."

"What? I'm not paying that sort of money on this old set."

"Well you'll have to get a new one then."

"I will too. Snippers down the road have some nice ones. Quite cheap too."

"O.K. Mrs. Grouser. Just see if they're prepared to repair it if anything goes wrong."

So out she went, hoping to get something for nothing as they all do. Or nearly all.

Pete's 9600

Shortly afterwards this chap struggled in with an Ultra set fitted with the Thorn 9600 chassis. I vaguely recognised him but couldn't put a name to him. H.B. came into the shop from the kitchen. "Hullo Pete" she said. "Hullo love" said Pete.

I whipped the back off. The 2·5A mains fuse on the left-hand side had blown and a meter check showed that the chopper transistor on the right-hand side was short-circuit. I also noticed that the brown lead to plug 511 on the chopper power supply panel had been disconnected from the plug and soldered directly to the panel. "Some rough work has been done on this set" I commented.

Pete looked at me but didn't say anything.

"Pick it up later on?" I asked.

So he left, saying he'd be back before we closed.

When he'd gone H.B. asked me why I didn't recognise him as we'd sold him the set some years ago and had always looked after it. This meant that I'd done the rough work. Oh dear.

Still in a muddle, I prepared to replace the chopper transistor, stupidly unsoldering the base and emitter contacts, one of which broke off. When I removed the two screws that hold the transistor I was able to pull it out of its holder. So in fact I'd messed up the holder. This took some time to repair, but at last it was done and a new chopper transistor was fitted. I checked the circuit carefully but couldn't find anything else amiss. So I plugged the thing in and switched on. There was a flash from the right-hand side panel and the new transistor was dead. What had killed it? Closer examination showed that plug 511 had a poor neutral lead connection in addition to the previously attended to live lead connection. So the plug came out altogether and the neutral lead was soldered to the panel as the live one had been. If I'd done this years ago when the live lead gave trouble I wouldn't have had to fit another chopper transistor. Very rough work indeed, and all my own fault. Sorry, very sorry.

Another Blunder

A few years ago I sold a Philips CTX-E colour portable to a lady who phoned the other day to say that it had gone wrong. I nipped over and picked it up, not having time to do it on the spot. Back in the shop I plugged the set in and switched it on. Nothing happened. So I slid the chassis out and found that there was a full 300V at the chopper transistor's collector and nothing at its emitter. I searched everywhere and after an hour or so I gave up.

Later on I had another go and this time I looked at the front. The standby light was on. When I pressed the selector button I heard the set start up. All that mucking about over nothing. How stupid can I get? With an aerial connected the sound boomed out but there was nothing on the screen. A bell rang in the back of my mind. When I turned up the first anode control there was a white line across the screen. So I checked the voltages around the TDA3651 field output chip. The supply was present but there were no other voltages. I unsoldered the pins and removed it on its heatsink. It was marked TDA3653. Oh well. As I couldn't find one of these I ended up fitting a TDA3652, which worked just as well. I now had a very bright picture, so I had to turn the first anode control down again. Ten minutes later the set's owner turned up to collect it. She'd got her boss to run her up. What next?

The Next Disaster

The next disaster was a Thorn 9000 I'd sold some years ago. Its owner had mucked about with the fuses. Having got these right I checked the diode (W702) in series with the syclops transistor — on the transistor's surround — and found that it was short-circuit. So I replaced it and checked the syclops transistor itself and the 47Ω resistor connected between its base and emitter. This was well down in value, so I removed it — the test was made with one end disconnected — and fitted another. I then switched the set on. All I could hear was a soft tripping noise. I disconnected this, that and the other (the tripler etc.) but the tripping continued. So I put the set on one side and got on with some less mysterious jobs.

Having polished these off I returned to the 9000, this time on its side, and found that there was a short across one of the rectifiers (W706) supplied by the syclops transformer. It wasn't a dead short, so I made another check on the other side of the 5Ω surge limiting resistor R712 and this time found a dead short due to the reservoir capacitor C715 (22μF). This was removed and the set was tried again. It started up nicely, so I switched off and fitted a replacement electrolytic. The set behaved itself and sat there as good as gold, waiting to be collected.

Teletopics

SATELLITE TV

Amstrad has produced and tested a prototype of the £199 satellite TV receiving equipment it plans to start selling early next year for reception of Rupert Murdoch's Sky Television services from the Astra satellite. In a progress report Alan Sugar commented that he was "delighted with the quality of the picture" – reception was from one of the current satellites – and that he was confident the equipment would be available in quantity next year.

Meanwhile Sky Television has signed an agreement to lease a fourth transponder on the Astra satellite. This will be used for the multilingual Eurosports channel which is to be a joint venture between News International and a consortium of EBU members including the BBC. In a recent statement Rupert Murdoch commented that he expects the Sky Television services, including the existing Sky Channel, to loose £100-£150m before breaking even. Running the Sky Television services will initially cost some £100m a year, which suggests that breakeven is envisaged quite soon after the start of the new services.

The Maxwell Communications-W.H. Smith satellite TV broadcasting consortium is still deciding whether to use the Astra satellite or one of the 16-channel Eutelsat birds that will be launched in 1990.

Ariane Flight 24 successfully launched Eutelsat I-F5 in orbit on July 21st. It's located at 13°E where Eutelsat I-F1 is at present positioned and will take over F1's TV and radio channels when the latter satellite is moved to 16°E.

Eutelsat has completed technical and economic studies for a DBS service it plans to start in the mid-1990s. The project is known as Europesat and would provide a multinational service using DBS frequencies. Further talks between Eutelsat signatories on implementing the project are planned for the autumn. The present proposal is to use two co-located satellites each with 14 channels. Each satellite would have a number of overlapping downlink beams to cater for regional and linguistic requirements. An e.i.r.p. of 55dBW would be available at the edge of each beam's coverage, corresponding to a TWT amplifier output of 100-150W. The orbital location proposed is 29°E, though 19°W would be possible provided Eutelsat member countries with allocations at this slot would be prepared to modify them for Europesat use.

Telstar's satellite stereo sound processor has been launched on the UK market at £139 plus post and packing and VAT. This stand-alone unit is capable of handling all the stereo systems at present in use. Seven presets enable stations to be preselected and the unit incorporates a noise reduction system. For further details contact Telstar Satellite TV Ltd., Unit 9 Longspring, Porterswood, St. Albans, Herts AL3 6EN (telephone 0727 34 596).

BROADCASTING NEWS

The government has dropped the idea of restricting BBC-2 and Ch. 4 to satellite transmission. At the same time the government has confirmed its intention to launch a fifth national terrestrial TV channel as soon as this is technically possible – the present aim is in early 1992. A further proposal is to change the way in which the ITV companies are taxed from the present levy on profits to a levy on turnover, starting in 1990. The ITV companies have warned that this suggestion would remove any incentive to produce high-quality programmes.

The IBA has placed a contract for the supply of dual-channel sound distribution equipment with Re Instruments Ltd. of Crowthorne. The new system will be used for the ITV and Ch. 4 networks and will employ the sound-in-syncs technique. The equipment consists of NICAM encoders for coding two audio channels into the NICAM 728kbit format; DSIS encoders and decoders for distributing the 728kbit digital signal; transmitter input equipment to supply a QPSK (quadrature phase shift keyed) signal for modulating the transmitters with the 728kbit signal; and NICAM 728 decoders for studio use and for deriving a compatible mono signal. The IBA plans to introduce dual-channel/stereo sound via transmitters covering more than 70 per cent of the population by the end of 1990.

According to a report in the US publication *Radio-Electronics* NBC is conducting a test on the transmission of TV surround-sound along with the MTS stereo-sound signal. The surround-sound information can be matrixed into two channels. The aim of the tests is to check on the retrievability of surround-sound under a variety of conditions and the amount of degradation that occurs. Reception calls for a surround-sound decoder – apparently these are already being built into some higher priced sets – and one or two rear-facing speakers.

CABLE TV

Recent JICCAR figures show that the take up of subscriptions by those within reach of the new broadband cable systems increased from 11·4 per cent in April 1986 to 14·7 per cent in January 1988. This is still barely half of what most cable operators consider to be necessary to provide an economically viable service. According to the Cable Authority's annual report the average monthly subscription fell from £18·50 to £17·86 last year.

The third Cable and Satellite exhibition and conference will be held on March 16-19th 1989 at the National Hall, Olympia, London.

TRADE NEWS

The European Commission plans to impose duties of up to 30 per cent on VCRs from South Korea. This follows a substantial increase in VCR exports to Europe – during the first six months of the year the total was almost one million.

The French government has received European Commission approval to place a restriction on the import of colour TV receivers produced by Japanese companies in other European countries. Imports will be limited to 30,000 until the end of February 1989. The French government had complained about screwdriver operations that failed to achieve a 45 per cent value added in Europe, the EC criterion for classifying sets as European.

SEME Ltd., Unit 2E Saxby Road Industrial Estate, Melton Mowbray, Leicestershire LE13 1BS (0664 65392/66881) has just published a new 160-page trade catalogue listing over 11,500 items. The catalogue was produced in-house on the company's new desk-top publishing system. The copy we've received is extremely well laid out and easy to use.

Ex-rental VCR and TV wholesaler Bi-Tech (UK) Ltd. has opened a 7,500 sq. ft. depot in Glasgow. The depot will be managed by Jack Swan, formerly with Supertel Glasgow, and is located off the M8 on the Hillington Industrial Estate – Unit 9, Colquhoun Avenue, Glasgow (telephone 041 883 2610). Further expansion of the London depot will soon take place. Refurbishment of sets for the export market will be concentrated in Glasgow.

Despite a 51 per cent increase in sales in the year to April 30th Dixons group profits were virtually unchanged at £103·1 million. Sales reached £1·68 billion. Profits declined during the second half by slightly more than the increase achieved in the first half.

RED FACES!

A Reuter report states that the local Communist Party chief and the head of a TV station in NE China have been dismissed after broadcasting by mistake twelve minutes of a pornographic film that was being viewed by employees . . .

VIDEO NEWS

Ferguson has introduced its first digital VCR, Model FV26D, at the competitive suggested retail price of around £479·99. Features include picture-in-picture, multi-picture-in-picture, digital freeze frame, digital slow, plus special effects including solarisation, mosaic and strobe.

Hi-fi sound is to be added to some VHS-C machines on sale in the USA later this year. The small head drum will have four video and four audio heads. A flying erase head will be used.

George Cole writes: JVC has announced that it is to market professional Super-VHS and MII equipment in the UK. The Pro S-VHS specification will be identical to the domestic version, with an f.m. deviation of 5·4-7MHz giving a horizontal resolution of over 400 lines. There will be three Pro S-VHS recorders, Model BR-S610E, the portable BR-S410E and the full-function editing Model BR-S810E. A series of cameras and high-resolution monitors suitable for S-VHS will also be introduced. Pro S-VHS equipment is aimed at the industrial, business and educational markets.

For broadcasting purposes JVC is backing the MII system developed by Matsushita and the Japanese broadcasting corporation NHK. The format uses half-inch metal particle tape and separate tracks for the luminance and chroma signals. Three JVC MII VCRs have been announced, the KR-M800E and KR-M860E editing machines and the KR-M260E portable.

No prices or release dates have been announced for this equipment.

JVC has set up three new companies in the UK, West Germany and Italy to serve the professional market.

Long-distance Television

Roger Bunney

June was a very active and unusual month for Sporadic E reception. Activity on several days was intense, with quite remarkable results. Improved tropospheric conditions occurred at mid-month, and two minor auroral events were noted in Scotland on June 8th and 15th. The general SpE log follows. It's rather packed but reception of particular interest will be discussed later.

5/6/88 RAI (Italy) ch. IA, B; Telemarket (Italian free station) ch. E2; RTS (Albania) ch. IC; JRT (Yugoslavia) E3, 4; MTV (Hungary) R1, 2; TVP (Poland) R1, 2, 3; TVR (Rumania) R2, 3; ORF (Austria) E2a, 4; CST (Czechoslovakia) R1, 2; ARD (West Germany) E2, 4; DR (Denmark) E3, 4; TSS (USSR) R1, 2, 3, 4, 5; NRK (Norway) E2, 3, 4; SVT (Sweden) E2, 3, 4; YLE (Finland) E3, 4; RUV (Iceland) E2, 3, 4; +PTT (Switzerland) E2; TDF (Canal Plus, France) L2, 3, 4; TVE (Spain) E2, 3, 4; RTP (Portugal) E2, 3.

6/6/88 TSS R1, 2, 3; ORF E2a, 4; MTV R1, 2; CST R1, 2, 4; TVP R1, 2; TDF L2, 3, 4; +PTT E2; ARD E2, 3, 4; SVT E2, 3, 4; NRK E2, 3; DR E3; YLE E3, 4; TVE E2, 3, 4; TVE-2 E2; RTP E2, 3; RAI IA, B, TVA (Italian free station) IA; RUV E3, 4.

7/6/88 TSS R1, 2, 3; SVT E2, 3, 4; NRK E4; YLE E3, 4; RUV E3; TVP R1, 2; CST R1; ARD E2; TVE E2, 3, 4; RTP E2, 3; ORF E2a; TDF L4; RTE (Eire) IB.

8/6/88 TVE E2, 3, 4; TVE-2 E2; RAI IA, B; RTP E2, 3; JRT E3, 4; EPT (Greece) E3; MTV R1, 2; Syria E3; ARD E4; SVT E2, 3; NRK E2; CST R1, 2; TSS R1, 2; +PTT E2, 4; RUV E4.

9/6/88 NRK E2, 3, 4; TVE E2, 3, 4; TVE-2 E2; RTP E3, 4.

10/6/88 TVE E3; NRK E2, 3; CST R2.

12/6/88 TVE E2, 3, 4; RTP E2, 3; RAI IA.

14/6/88 TSS R1; TVE E3; RTP E3.

15/6/88 TVE E2, 3, 4; RTP E2.

16/6/88 TVE E2, 3, 4; RTP E2, 3.

17/6/88 TVE E2, 3, 4; TVE-2 E2; RTP E3; +PTT E2, 3; TDF L2, 4; RAI IA, B; TSS R1, 2.

18/6/88 RAI IA; TSS R1, 2; MTV R1, 2; DR E3; SVT E2, 3, 4.

19/6/88 TVE E2, 3, 4; RTP E2, 3; RAI IA; Arabic football match on ch. E4, origin not known.

20/6/88 TVE E2, 3.

21/6/88 YLE E3; SVT E2, 3, 4; MTV R1, 2; TSS R1; ARD E2; TVE E2; RTP E2; EPT E3; RAI IA, B; TVA IA; ORF E2a, 4.

22/6/88 RAI IA, B; JRT E3, 4; TVE E3; CST R2; NRK E2; SVT E3; TSS R1,2.

23/6/88 TVE E2, 3; RAI IA; DR E3; RUV E3, 4; TVP R1; CST R1, 2; TSS R1; MTV R2.

24/6/88 TSS R1, 2; YLE E3, 4; NRK E2, 3, 4; SVT E2, 4; TVP R1, 2; CST R1; RUV E4;TDF L3; RTP E2, 3.

25/6/88 RAI IA; JRT E3; TVE E2; RTP E3; MTV R1; ARD E2; CST R2; TSS R1, 2, 3; NRK E2, 3, 4; SVT E2, 3; TVP R1, 2; RUV E4.

26/6/88 TSS R1, 2; TVP R1, 2; YLE E3; ORF E2a; RAI IA, B; TDF L3, 4; TVE E2; RUV E4.

27/6/88 NRK E2, 3, 4; SVT E2, 3, 4; YLE E4; TSS R1, 2, 3; MTV R1, 2; CST R1, 2; ARD E2; +PTT E3; TVP R1; RAI IA, B; TDF L4; TVE E2, 3, 4.

28/6/88 TVE E2, 3, 4; RTP E3; RAI IA, B; TDF L2, 3, 4; ORF E2a, 4; ARD E2; CST R1, 2; JRT E3, 4; MTV R1, 2; TSS R1, 2, 3; TVP R2; SVT E2; NRK E2; RTB-F (Belgium) E3.

29/6/88 TVE E2, 3, 4; RTP E3; RAI IA, B; JRT E3; TDF L4; TSS R1; TVP R1, 2, 5; NRK E2, 3.

30/6/88 TVE E2, 3, 4; RTP E2, 3; SVT E3; NRK E3.

2/7/88 TVE E2, 3, 4; RTP E3.

3/7/88 MTV R1; TVE E2, 3; JRT E3.

Blanketing SpE conditions were present on the 25th. June 1988 will certainly go into the record books!

On the 5th Simon Hamer in Powys logged Band III signals (chs. E6 and 7) from RUV (Iceland) at 1220 BST. RUV signals on chs. E2, 3 and 4 were also present. This represents quite remarkable conditions – the PM5544 test pattern clearly identified the source. Band III RUV is a UK first! At about the same time ch. A4 signals were received from N. America, identified by the reduced height and rolling frame

The following day produced increased excitment for many enthusiasts including myself. At about 2300 BST, as

RUV chs. E3 and 4 were fading towards the end of a European SpE opening, System M (N. American) signals started to appear (first identified by rolling frame etc.). For the next two hours or more intense US/Canadian signals were present on chs. A2, 3, 4 and 5. Here in Romsey, Hants ch. A2 was unusable due to the many signals present. It was in effect jammed, but by tuning to the offset sound carriers at least three individual signals could be heard, all on programme. The main carrier was just distorted buzz and hum! Chs. A3 and 4 produced good quality signals at times. At 2400 ch. A3 produced a "News 3" caption while "LA Law" appeared on ch. A4. Here at Romsey ch. A5 just made it with a locked though very weak picture. Garry Smith in Derby confirmed reception of the NTV network with advertisements etc., the signal being from Grand Falls, Newfoundland (CJCN-TV) on ch. A4. Nearby Keith Hamer heard the CBS identification on ch. A3 – it could have been WCAX Vermont. I heard mention of North Carolina and Washington – probably news. Cyril Willis at King's Lynn received a clear identification from WEMY, Greensboro, N. Carolina, also a CBS identification. It was remarkable that despite such a long opening from an English-speaking area so little could be identified. The signal quality was at times excellent, with mainly US type programming and commercials. Chs. A3 and 4 fizzled out by 0150 BST but ch. A2 remained in action – reports suggest that it finally faded out at around 0500 on the 7th!

The following day brought fresh excitment when, at lunchtime, intense SpE conditions produced N. African/Arabic signals in Band III – from Algeria, Tunisia, Libya and Morocco! Again a UK first. DXers who have reported this reception include Keith Hamer, Garry Smith, Kevin Jackson, Dave Shirley and Philip Odell. The signals were strong, with co-channel interference at times. Algeria ch. E5, Tunisia ch. E6, Libya ch. E6 and possibly Morocco ch. M6 were logged. Philip Odell at Northolt, Middx. received very strong ch. E5 colour signals from Algeria using a hand-held indoor 8-element Jaybeam Band III aerial.

By way of an anticlimax June 8th produced Syria ch. E3 for Simon Hamer, with the usual PM5544 "ORTAS DAMAS" identification.

June 25th proved eventful towards midnight, with unidentified System M signals on chs. A2, 3 and 4. According to the BDXC a Dutch amateur logged 50MHz signals from Georgia, Texas, Puerto Rico and Greenland. A new Italian free station with the identification "E2 – Canale 31 5 Tele Ercalano" was seen.

Mid-June was rather quiet on the SpE front. Instead we had improved tropospheric conditions that in their way produced more excitment. The period of enhanced tropospheric propagation over June 9-19th coincided with some remarkably warm and sunny weather in the UK, associated with a high-pressure system. During this period the usual signals were received, i.e. from West and East Germany, France, and the Benelux countries in Band III and at u.h.f. Band III signals from Denmark were also present over much of the UK. Swedish u.h.f. signals were apparent and on the 14th Ryn Muntjewerff in Holland logged 23 SVT-2 u.h.f. outlets and nine SVT-1 v.h.f./u.h.f. outlets! RTL was seen using its new identification "RTL PLUS KOLN" on ch. E7, and even SSVC ch. E45 was noted. The 17th onwards tended to favour propagation from the French regions. A2, FR3, Canal Plus, La Cinq and M6 reception was widespread.

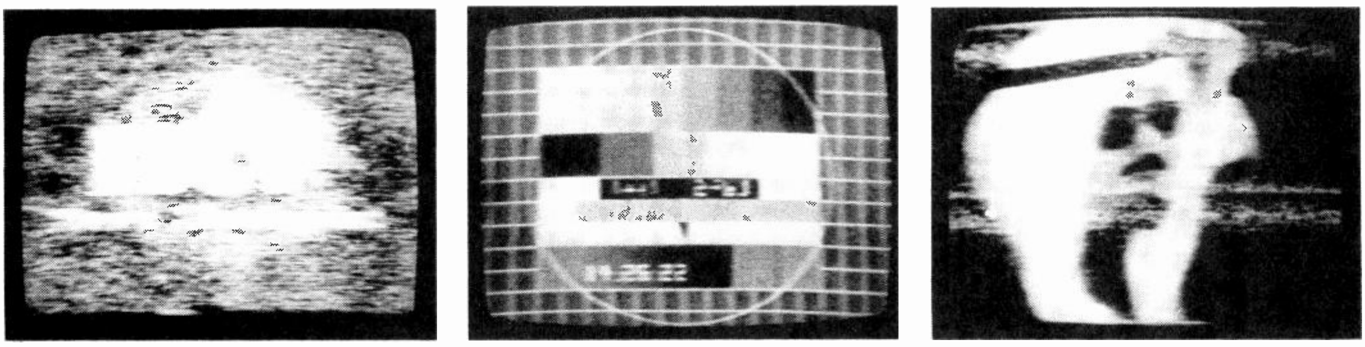
This intense tropospheric spell covered the whole UK, producing both the usual and some unusual signals – even AFRTS ch. A80 made it to North Wales! Iain Menzies reports perhaps the most unusual reception – from the Ekofisk North Sea oilfield. On two days Iain logged "EKOFISK TV CH. 1" and "EKOFISK CH. 2" on chs. E50 and E49 respectively. The ch. 1 service consists of mainly NRK (Norway) material while ch. 2 carries various offerings from Filmnet, Royal Club, Night Club and anything else that's selected from the available satellite services. The oilfield is run by Phillips Petroleum and is some 270 miles from Newcastle. Up to 1,000 men work there. This reception by Iain occurred on the 12th and 26th. Iain is seeking technical information on the transmitters.

On the 5th Simon Hamer logged AFRTS Spain, BFBS and GBC Gibraltar on his f.m. radio. The "Brud Med Studio" caption seen on the 7th originates from NRK. On the 14th SVT1/2 were noted with tests of scrambled TV. A report from Holland mentions reception of new AFRTS outlets on chs. E32/5/7 and RTL on chs. 35/6/45.

Certainly a throbbing month! My thanks to David Oliver (Birmingham), Peter Schubert (Rainham), Dave Shirley (Hastings), Tim Anderson (St. Leonards), Brian Renforth (Newcastle), Garry Smith (Derby), Keith Hamer (Derby), Keith Watkins (Redruth), Roger Fussell (Torpoint), Keith Chaplin (Leicester), Bill Cotterill (Tipton), Simon Hamer (Powys), Cyril Willis (King's Lynn), Dr. Duncan (Fife), Mark Baldwin (Rushden), Iain Menzies (Aberdeen) and Ryn Muntjewerff (Holland) for sending in details of their reception.

News Items

West Germany: RTL+/Tele 5 Hamburg ch. E46 is now running at full power (15kW e.r.p.) – RTL provides a regional programme (Schlag 6) from 1800-1845 (local



Photos of reception by Garry Smith, Derby, during the SpE opening on July 7th. Left, the NTV logo from Grand Falls, Newfoundland on ch. A4 – CJCN-TV relaying CJON-TV ch. A6. Centre, test pattern from the 20kW Libyan transmitter at Tripoli, ch. E6. Right, presumed Algeria ch. E7, possibly from the Constantine transmitter.

time) weekdays. The Hamburg ch. E48 SAT-1 transmitter is now running at 2kW e.r.p. Helgoland ch. E34 is on test with 30W and Aachen ch. E26 has a local service programme on test with directional transmission towards 220° – the caption shows Aachen cathedral and carries the identification "Lokaler TV Sender Aachen K26, Storungsannahme tel 1174". Dusseldorf/Burscheid ch. E36 local TV is on air with 20kW and a similar caption though relating to Dusseldorf. A new UK Services SSVC transmitter is in operation at Goch, on ch. E23.

Sweden: A high power, thought to be 1,000kW e.r.p., transmitter covering central Sweden is now providing the TV2 service from Vasteraas, on ch. E44.

USSR: A limited number of commercials provided by the Italian TV magnate Silvio Berlusconi are to be shown over a three-year period on all three networks. The thirty second to six minute slots will not break into the programmes themselves.

Yugoslavia: A local third programme service has started in Zagreb, for two-three hours daily.

China: Though not TV, it's of interest that the first f.m./v.h.f. radio service in English has started on 107·7MHz in the Shanghai region.

Satellite TV

Latinvision, a satellite news exchange service for the Caribbean/Central American region, is expected to be in operation shortly.

The first transmissions from the Astra satellite will use PAL with a main 6·5MHz audio carrier and four additional audio carriers at 7·02, 7·2, 7·38 and 7·56MHz, the latter being for stereo (Wegener/Panda 1 system) or multi-language sound. About ten channels, six English and four German, will probably use PAL with the others using MAC.

It seems that Intelsat VA F11 at 27·5°W has a fault that prevents the West spot beam being pointed any further north than Biscay. Hence a reduction in the downlink signal level to the UK – the beam should be centred on Birmingham.

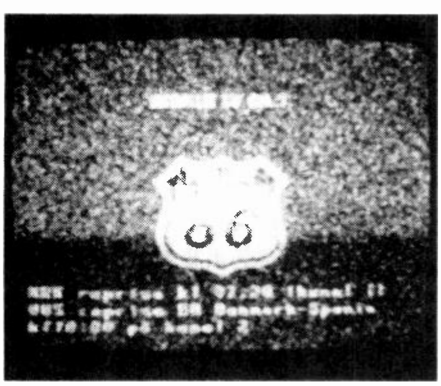
Publications

Scanners 2, the international v.h.f./u.h.f. communications guide for enthusiasts operating scanning equipment, has been published by Argus books at £9·95. Although intended for enthusiasts operating scanning equipment the book contains some very interesting preamplifier circuits for aerial/indoor use, including several v.h.f. circuits covering 50-250MHz. These use BF199 or BF981 transistors and have various gain figures between 12dB and 20dB. The book is written by Peter Rouse and is recommended, particularly if you are into general v.h.f./u.h.f. monitoring.

Aerial Techniques report that the second edition of the test card book *TV-Bild Katalog* is now available from them at £6·95 including postage within the UK. It was published in April and is essential reading for those seeking a definitive guide to test card/pattern/logo use within the European broadcasting area (excluding North Africa and the Middle East).

From our Correspondents . . .

Congratulations to George Gaskin whose 33 years with the Gibraltar fire service was marked by the award of a



Ekofisk TV Ch. 1 received by Iain Menzies in Aberdeen on ch. 50, The Ekofisk North Sea oilfield is operated by Phillips Petroleum.

BEM in the Queen's Birthday Honours List.

Robert Copeman reports from Perth, Western Australia, that a new commercial TV station "NEW 10 PERTH" came into operation in May. It's the first new station for some years in that region and uses the standard FUBK test pattern.

A West Country DXer comments that in rocky sea locations you could well monitor the RNLI 49MHz helmet radios used for cliff rescues. Despite the small helical helmet aerials these US sourced devices have been received at distances of up to five miles!

Jean-Louis Dubler is now associated with the Urbatel cable system in Lausanne, Switzerland. This network has a 40 channel capability and at present carries three Swiss, three French, two German and one Austrian service plus Telecine (pay-TV), RAI Uno, TV5 and Sky. He reports that the La Dole transmitter now has a second audio carrier for stereo/bilingual use and that a fourth national network is planned, mainly for sports and EBU programme exchanges.

Help Wanted

R. Hastie of 41 Elm Grove Drive, Dawlish, Devon EX7 0EY is seeking valve type Denco coils for the 30-50MHz range (range 6 or 7 if I remember correctly). He hopes to be able to use them in a low-band v.h.f. converter during the forthcoming solar cycle. It seems that Denco has closed down and the coils are no longer available.

Letters

REMOTE HANDSET REPAIR

A meek and gentle old lady brought her Sony remote control handset into our workshop recently. We were given the usual reminder about the desperate financial state of the country's pensioners, followed by "if it costs more than a few pounds I'll have to do without". Normally we have to harden our hearts, but on this occasion she got through our armour.

Her complaint was that some of the buttons wouldn't work. Sure enough we found that the conductive coating on the business end of the rubber push buttons concerned had worn away. A few minutes' deliberation was followed by a flash of inspiration from one of our young men – a very carefully placed smear of adhesive covered with the scrapings from a salvaged carbon brush. A last resort maybe, but it worked. A feather in our young man's cap, our good deed for the day and a bit of good P.R. Exit one happy senior citizen.

Tom Robbins, Service Manager,
TV and Video Repairs, Newcastle upon Tyne.

BRYAN TUCKFIELD DEFENDED

Bryan Tuckfield received rather a battering in the Letters pages last month. I feel I must come to his defence. To my mind the arrogant, greedy and self-centred views expressed my some of your correspondents indicate that they shouldn't be in business. Their attitudes are all too common however and do very little for the reputation of our trade.

We're all in this business to earn a living. I see nothing wrong in supplying spares to the public, provided they are prepared to pay for them (after adding our mark-up of course). If they don't like the price, that's tough! They can try elsewhere. It seems that your contributors haven't the initiative to demand payment before ordering parts for Joe Public, nor to apply legitimate disclaimers such as "goods not exchanged or refunds given unless faulty". If the customer gives you the wrong part number or description that's his problem. We can't be held responsible for their ignorance in such matters. I've found that some of the disadvantages mentioned are actually advantages, in that the customer may come back with his equipment for repair.

I wholly agree with Bryan Tuckfield when he says that many dealers are interested in only meaty jobs with nice big profits. This applies to other trades as well. The term for this attitude is greed. Talking of which Mastercare supply the reel idler for the Saisho VR605 at £9 plus VAT plus post and packing while Willow Vale supply the same item under their Sharp order code 27361C at £3 plus VAT (post and packing is free on orders over £30).

Not all of us share the bigoted opinions expressed last month. We're genuinely interested in offering our services to Joe Public — without losing money of course. Remember that the public has a right to have its goods repaired. What is one dealer's loss will often be a worthy repairer's gain. The most important person in any business is the customer, who provides our bread and butter. It doesn't do to overlook this fact and it's nonsensical to refuse the old £.s.d.

I agree that our trade is soul destroying, as many people have pointed out in these pages. But I think that this is partly due to those who share the "Bodge and Bodge Co." school of thought and advertise free this, free that and free everything else. How can we earn a decent crust when this mentality is so prevalent? Who can blame Joe Public for refusing an estimate of £80.90 to replace video heads when one of the less reputable local emporiums advertises in our local rag that it can do the job for £40? Joe Public gets what he deserves in this case, and I've no sympathy for him. So remember fellow sufferers, chin up, keep smiling and never let them get you down (during business hours anyway!).

Martin's TV Services,
Dewsbury, West Yorkshire.

DECCA 70/90 SERIES CHASSIS

In the April TV Fault Finding feature Nick Beer suggested using a BU426A to replace the BUW81A chopper resistor in the Decca 70/90 series chassis. We've tried this but find that the BU426A always fails. Its rating is less and it's not a Darlington device.

We find that even when a new BUW81A is fitted in one of these sets and the correct drive waveform is present the device sometimes blows (D608 and D610 having been replaced as well). Has anyone any ideas on this?

K. Booth,
Audiovision, Coventry.

Editorial note: This chassis employs a rather unusual complementary-symmetry chopper driver stage. Possibly slight leakage in one of the devices here could affect the operation of the circuit. Anyone wish to comment?

AVAILABILITY OF SPARES

I would like to see more independent rather than trade views expressed in your letters pages. On the subject of selling parts to the public it would be nice to see them available in blister packs at supermarket style outlets. A lot of us have the knowledge and skill to do our own repairs. The parts would have the make, model number and location shown and there would be a shelf full of manuals and circuits — just as they do for cars! There are no plans to stop DIY car servicing even though the result can be a misadjusted brake.

Difficulty in obtaining parts and manuals makes it hard for young people to take an interest in the subject. In the past many of us got started by buying ex-government bits and pieces with circuits. There are endless complaints about youngsters being simply out for kicks, yet they are told they can't do this and can't do that. Finally, on the subject of safety, how many of us have opened the back of a TV set to find a sticky mess on the flying leads and a dried up piece of tape on the circuit board?! Not to mention cookers with controls behind a steaming pan and the main switch even higher on the wall over that same pan. What Safety?!

Ex-valve set dabbler.

Editorial comment: But cars have to pass an MOT test, which at least cuts down on some of the dangers. We can't see that the public would take kindly to paying for its TV sets etc. to be examined for safety every so often, or how this could be enforced. Much has been done in recent year to improve safety through BEAB testing.

USE OF BULBS – AND A CORRECTION

A point in connection with the use of a bulb (Servicing with a Variac and Bulbs, July) as a dummy load in place of the line output stage is that a bulb can sometimes cause confusion by providing an excessive load on the power supply being checked. On several occasions when I was repairing TV sets rather than VCRs I loaded a power supply with a bulb only to find that it tripped due to the excessive load – trying the power supply out in a known good set proved its innocence. This was particularly noted with Sony and Hitachi sets, more so the earlier ones. To overcome the problem I made up a dummy load of 250Ω at 100W, using four RS 1kΩ 25W resistors in parallel mounted in a case with sockets to connect a meter to monitor the rail. The d.c. resistance figures Eugene gives lead me to wonder whether the sets in question had some strange anomalies with switch-on surges, or that maybe the manufacture of some types of bulb is suspect? I've always been a great user of variacs and bulbs in TV servicing and have more recently adopted this approach in dealing with the ever more complex power supplies used in VCRs. I know that some engineers don't do this but I've never had a straight answer as to why not.

There was an editorial error in one of my notes in TV Fault Finding in the July issue. The heading Panasonic Alpha-2 chassis should have read Alpha-1 chassis. It should also be noted that the first batch of modification kits were not suitable for use with Model TX-C78.

Nick Beer,
Bideford, Devon.

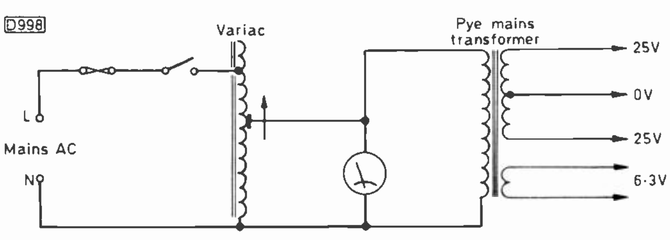


Fig. 1: Safe method of obtaining up to 25-0-25V from a variac – by using it in conjunction with a mains transformer from the Pye hybrid CTV chassis.

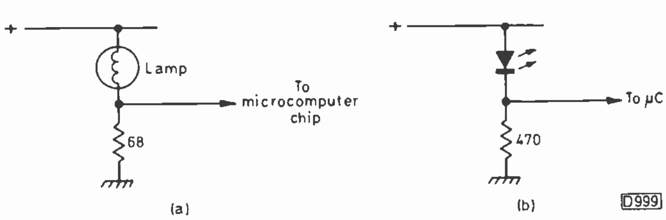


Fig. 2: Use of an LED or IR diode in place of a VCR lamp. (a) Original circuit. (b) Modified circuit.

SAFE VARIAC USE

In his article on servicing with a variac (July) Eugene Trundle mentioned the use of a variac to replace a low-voltage secondary winding. A safer method, which also provides a centre tap, is to use the mains transformer from an old Pye hybrid colour chassis, supplying this from the variac as shown in Fig. 1. The original 25-0-25V output can then be varied to suit the equipment being supplied.

Peter Westbury, G8PDI,
Bournemouth, Dorset.

VCR BULB MODIFICATION

In connection with the recent letter regarding the high cost and failure rate of the lamps used in older VCRs I'd like to suggest the modification shown in Fig. 2. Replace the lamp with a LED or an infra-red emitting diode and change the series resistor to 470Ω, ½W.

A. R. Lloyd,
Plymouth, Devon.

VCR Clinic

Reports from Eugene Trundle, Dave Dulson, Jim Rainey, J. Olijnyk, Joe Cieszynski, Philip Blundell, Eng. Tech. and Nick Beer

Tatung VRH8400/JVC HRD120/Ferguson 3V35

The problem with this one was that it would go to stop for a few seconds after embarking on any mode. It was quickly established that the cause lay with the reel-rotation sensor system – the machine would happily remain in the pause mode. The infra-red sensors used consist of a sender and a receiver, either of which can cause trouble. In this case the fault lay with the supply spool's optocoupler, whose receiver (phototransistor) was leaky. **E.T.**

JVC HRD180

We've had several cases of failure of the large STK5481 power supply chip used in this and allied models. The switched 5V output fails while circuit protector CP3 remains intact. You'll find that the symptoms are no on-LED indication, no drum rotation when playback or record is selected, and shutdown after a few seconds in the fast forward or rewind modes. None of the replacement chips has failed to date, so maybe it was batch problems – or perhaps the design of the chip has improved. **E.T.**

Panasonic NV180

These portable VCRs have had a longer production run than most, having been kept going to support Panasonic's excellent range of semi-professional cameras. This one came to us with the complaint that it wouldn't play. On investigation the capstan appeared to be seized solid. When the machine had been dismantled we found that the rotor of the direct-drive capstan motor was rubbing against the stator coils. Normally such contact is prevented by means of a springy clip in the bearing assembly – it clips into a waist in the motor shaft. What had happened was that the upper bearing (deck topside) had become dislodged, maybe due to an impact. Pushing this bearing home and relocating its protective cap did the trick. **E.T.**

JVC GRC1/Ferguson 3V41

"Going on holiday tomorrow, camcorder no go" said the job ticket. Clearly a priority job . . . The machine wouldn't switch on, and after dismantling it we found that circuit protector CP5 had gone open-circuit. After replacing it we discovered what had happened. The cassette front flap opener had stuck in the "high" position, preventing the flap from opening. The loading motor, now thwarted in its attempts to load the tape, stalled. As a result a high current passed through CP5 until it opened. Worth remembering, especially if it should happen on an intermittent basis. **E.T.**

Hitachi VT11 and Clones

Don't be fooled by what we thought was an intermittent fault in this and similar machines. If you touch or move C602, which is the control-track head coupler on the regulator/servo panel, the tape speed slows and the sound becomes slurred. The effect is due to 50Hz hum pick-up from your finger. This is at twice the normal control pulse rate, so the machine thinks it's got an LP tape and attempts to restore normality by switching to the LP mode. Perhaps this is obvious, especially with hindsight! In TV sets we used to prod and poke with a pen or a screwdriver handle, for fear of shock. No such nonsense could then arise. **E.T.**

Hitachi VT410

This machine would load a tape then shut down. If the operate switch was pressed the machine would come on for another thirty seconds and then switch off. No deck functions worked. The power supply was working correctly and checks around the syscon microcomputer chip failed to reveal anything amiss. A clue was given by pins 8 and 9 of IC901, the outputs that control the loading motor: pin 9 was high at 4·7V while pin 8 was at 0V. The system control was trying to unload but the loading motor wasn't doing anything. A quick check on the loading motor drive chip IC902 (BA6209U2) showed that its inputs were correct but there was no output. Replacing the i.c. cured the fault. **D.D.**

Hitachi VT11

This machine would select one mode no matter which button was pressed. We found that D453 was leaky. **J.R.**

Hinari VHL3/VHX3

If you require a play idler for this machine you can use a Sharp type, part number NIDL-0006GEZZ. They are the same unit. **J.R.**

Panasonic NV333

The fault was no playback picture. When I read the job card I thought it would be a simple head cleaning job, but I was wrong. No picture in fact meant a blank raster. After a lot of mucking about I found that D3012 (MA165) was short-circuit, damping the output from IC3003. **J.O.**

JVC GRC7 Camcorder

This machine would go off after three seconds. When I'd found the right page in the service manual and got the machine apart (please God, what are the chances of getting the thing back together?!) I soon found that R218 had come off print. Resoldering this put matters right. I did get it back together (just!), after several hours and several cups of coffee (black). **J.O.**

Saisho VR705

The reported faults were no picture and poor rewind. Many thanks for a simple job this time. Replacement heads and a new reel idler were all that were required. **J.O.**

Grundig 2 × 4 Super

This machine wouldn't accept a cassette or carry out any function. We found that the relay didn't stay in when power-on was selected. The cause of the trouble was that C446 (470μF) had lost capacitance.

Another of these machines stopped playing after a few seconds as the head drum was rotating very slowly. A quick check on the supply lines revealed a 5V ripple on the 15VR rail. C451 was low in value. It should be replaced with a Grundig part – if a standard capacitor is used there is still some ripple and the servos take a long time to lock in. **P.B.**

Philips VR6843-05

The problem with this machine was intermittent failure to select record. When this happened the cassette would eject. The cause of the problem was an intermittent short across the record inhibit switch. It was on the end sensor PCB, where the leads to pins 26 and 27 had been left too long. **P.B.**

Hitachi VT8300

The complaint was that at switch on smoke poured from the machine and it went dead. Initial inspection revealed that the drum motor drive amplifier was the source of the smoke – both i.c.s were cracked open. Having a scrap machine in the workshop was an immense help. Within no time a replacement panel was fitted, but it was difficult to know whether the drum motor had been damaged. So, with the drive panel disconnected, I checked that the power supply was correct and proceeded to switch on fully. There was no smoke, but neither was there any drum rotation. The 9V and 15V rails were reaching the drive panel via connector CN502, but there was no Hall bias at pin 4. Now having no Hall bias is the same as having a brush-type motor with no brushes! The 2·4V bias comes from Q513 on the main servo panel, and resistance checks showed that this was open-circuit base-to-emitter. Fitting a new transistor restored full operation – thankfully the drum motor was o.k. **J.C.**

Hitachi VT33

This one belonged to a girl who lived in Zambia. She brought it back on a visit after a local service engineer had said he couldn't repair it due to lack of information and spares. The player was dead, though the clock functioned. Checks around the power supply chip IC151 revealed that the always 12V line was present but the switched 9·5, 12 and 16V outputs were missing. The power-on signal from the microcomputer should bring in the 16V regulator via pin 13 of the chip, which in turn switches on the 9·5 and 12V lines via R153 and R151/2. Replacing the 16V output with an external supply restored all the power rails. Normal operation was obtained when IC151 had been replaced, but before returning the machine to Zambia I decided that a new idler and set of belts would be prudent. **J.C.**

Ferguson 3V35/JVC HRD120

This machine was brought in with the complaints "grainy picture and intermittent failure to lace up". As I'd just fitted a sensor lamp in a chargeable 3V30 I thought I'd stay with the easy ones. Things started well enough. The loading fault was due to a stretched belt. A new one was carefully fitted without removing the whole motor assembly, but there was no take-up – the belt was so slack that if it hadn't been for the flywheel bracket it would have dropped off its pulleys! This attended to I put the machine in play and noticed that the exit guide was very sluggish and didn't reach the end of its travel. The baseplate on the loading ring had become disengaged: its pip was worn with the result that it didn't remain in its slot, consequently the spring had become undone.

Rather than struggling with what was going to be a long job anyway I decided to remove the entire mechanism from the machine, a matter of unplugging and then removing eight screws including those for the carriage. To gain access to the loading rings I then had to take out six or so screws to release the top plate with the head drum and motor, the guide poles and audio/control head etc. A further three screws held the rings in place. I tried to refit everything but the exit guide baseplate was too worn. A new assembly had to be ordered and fitted after which reassembly went remarkably well. **N.B.**

Panasonic NV7200

This loan machine produced a recorded picture with high chrominance and low luminance – playback was fine. On removing the bottom cover I noticed a very small amount of spillage on the board just below the white clip control. This was cleaned off with 1-1-1 trichloroethane (RS Solvent Cleaner). The waveforms were wrong not far into the circuit, but were not drastically out. So I decided to see if the circuit could be set up as per the manual. After carrying out the dark and white clip and the luminance and chroma record current adjustments the machine performed well. One thing to note is on the white/dark clip adjustment: you should adjust the lower peak of the waveform for 175 per cent not 150 per cent as on the oscillogram. **N.B.**

Sony CCD-V30

This was a brand new stock machine – the autofocus version of the Handycam. When switched on in the camera mode the picture, in both the electronic viewfinder and via the external monitor, would be o.k. for twenty-thirty seconds after which vertical bars at regular intervals appeared across the screen, very faint at first then becoming darker, though you could see the picture through them. After a further thirty-six seconds the picture and bars disappeared, giving way to a white raster, with a pink tinge, that appeared to have no line sync (bars across it). We'd not yet received a manual, but the shop wanted the camcorder sorted out quickly. So it was dismantled, which is no mean feat. Inside the case we found a very basic block diagram, showing the PCB locations. I located the camera d.c.-d.c. converter, which seemed to be the most likely cause of the trouble, and sure enough application of heat and freezer proved that it was thermally sensitive.

Replacing the converter is a long job, as is reassembly. The camera section is enclosed in a can, and there are all sorts of small supports. A modicum of force is required because as well as all the screws that hold it together there are some snap-fit clips. Luckily we found that when the converter had been removed the part number was written on it (1-464-727-11), saving several days' delay. **N.B.**

B and O VHS63

The customer said that this machine chewed tapes. Why they continued to feed tapes in after one had been chewed is not clear, but you know customers! What had happened was that the customer had been over enthusiastic with the furniture polish. It had covered the drum and eaten into the metal – the cassette had been inserted while the drum was still wet. A new drum had to be fitted. **N.B.**

Servicing the Sony Model KV2752

David Botto

The Sony Model KV2752 is a 27in. receiver that provides a first-rate picture. It has two loudspeakers which together produce over 10W of high-quality audio output. The teletext version is Model KV2762 – a teletext panel can however be added to the KV2752. Full remote control is by means of the "Remote Commander" infra-red unit. The same basic chassis are used in the 22in. Models KV2252 and KV2256, so much of the information in this article applies to these sets as well. The circuitry is arranged on a number of printed boards that are identified by means of letters: we'll use the same board identification letters that Sony use.

Earlier versions are fitted with the PE3 chassis, latter versions being fitted with the RX chassis. It's quite easy to see which chassis you've got on the bench. In the RX chassis the complete power supply is mounted on board F. In the earlier PE3 chassis most of the power supply is on the main board D, the small F board containing a rectifier/regulator circuit that provides a 12V output. The main D panel also contains the CX523-017P system control chip, the memory, the timebase circuitry, the colour decoder and the audio circuits.

The Usual Symptom

These sets have a tendency to go dead suddenly after working well for a time. This is especially so with the PE3 chassis. You'll probably find that the mains fuse F1601 (3·15A time-lag) has blown and that the chopper transistor Q603 is short-circuit. More often than not you'll find that the line output transistor Q802 has also failed. These two transistors have to be obtained from Sony (or a Sony agent) and are very expensive. It's vital that Q603 is replaced with type 2SD1497-02, Sony part no. 8-729-301-

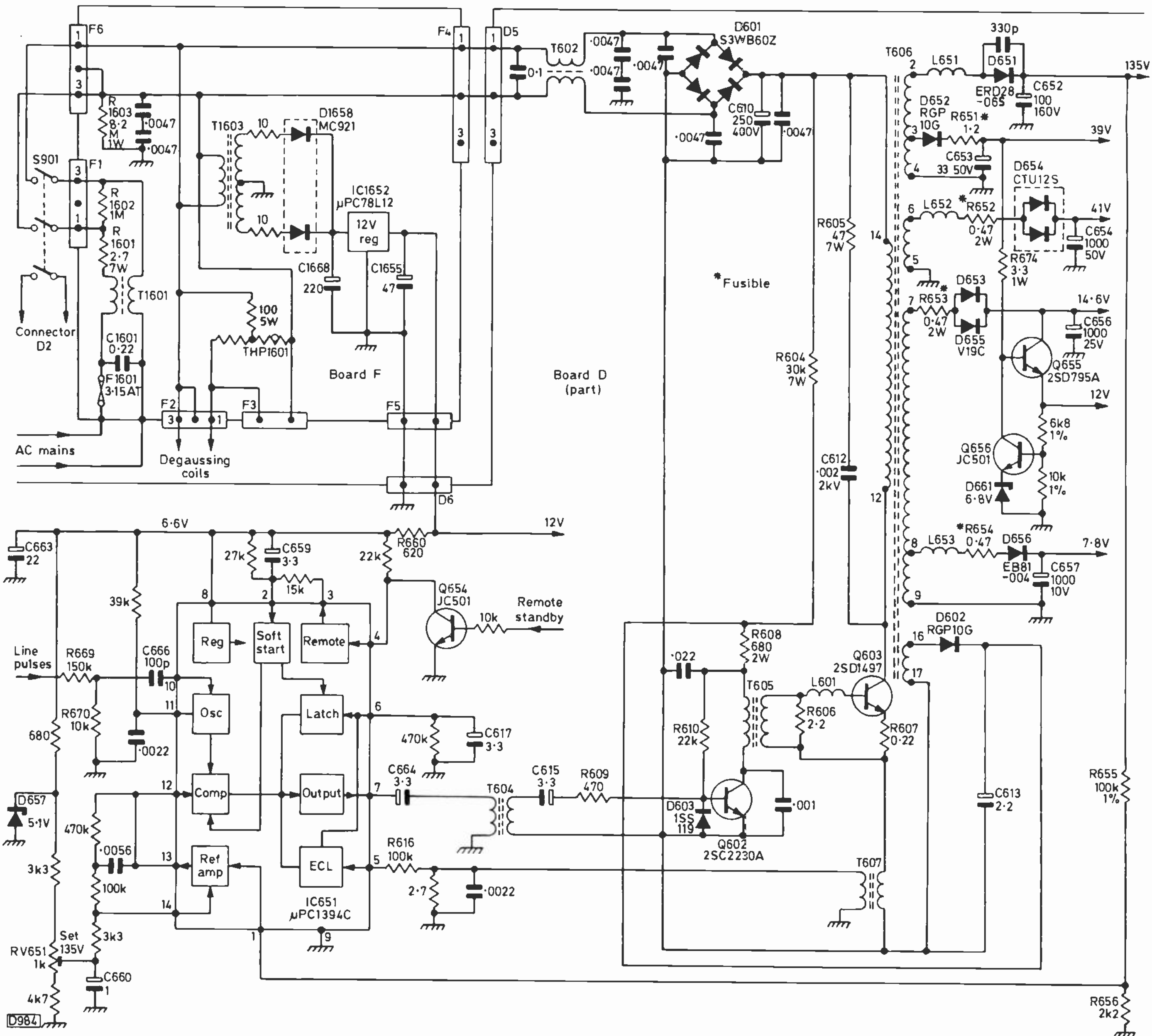


Fig. 1: The power supply circuitry used in the PE3 chassis.

00, and that Q802 is type 2SD1497-06, part no. 8-729-300-90. These two transistors are **not** interchangeable.

The logical way of going about things would be to check for shorts and then, if all's well, to replace the fuse and the two transistors. Unless further action is taken however the result is likely to be further failure of these items either at switch on, after an hour or two or after several days. This will remind many of you of the Sony Model KV1810.

PE3 Chassis Power Supply Circuit

Before tackling these sets it's best to take a little time to find out how the power supply section works. We'll consider the circuitry in the PE3 chassis – see Fig. 1.

While the power supply circuitry is quite complex, things are not as bad as they might seem since the circuit breaks down into a number of easy to understand sections.

The a.c. mains input goes first to fuse F1601 on board F, then to the filter coil T1601. The 0·22μF filter capacitor C1601 has proved to be reliable, though it can fail, blowing F1601. There follows the surge limiter resistor R1601 (2·7Ω, 7W special nonflammable) after which the supply is taken via connectors and the on/off power switch S901 to transformer T1603 on board F and choke T602 on board D. Note that S901 has a third pole which applies 5V d.c. to pin 17 (power on) of the control chip IC001. The mains a.c. input is also applied to the degaussing circuit of course.

T1603 drives two diodes which are encapsulated in one block, D1658 (MC921). These develop about 18V across the reservoir capacitor C1668 to feed the 12V regulator IC1652 (μPC78L12).

The supply to the chopper circuit passes via filter choke T602 to the bridge rectifier D601 (S3WB60Z) which produces about 270-280V across the reservoir capacitor C610 to feed the primary winding of the chopper transformer T606 at pin 14.

The 12V regulated output from panel F goes to the remote control circuitry, provides a start-up supply for the timebase generator chip and, via R660 which drops the voltage to 6·6V, provides the supply for the chopper control chip IC651 (μPC1394). This chip contains quite a lot of complex circuitry. Its output at pin 7 is coupled via C664/T604/C615/R609 to the base of the chopper driver transistor Q602. This transistor receives a start-up supply via R604 (30kΩ, 7W cemented). Its supply is provided by D602/C613 when the circuit has got going. The output from Q602 is transformer coupled (T605) to the base of the chopper transistor Q603. Notice that Sony use a transformer (T607) as the sensing device for the excess current limiting circuit in IC651. The primary winding of T607 is in series with the emitter of the chopper transistor while the secondary is connected via R616 to pin 5 of IC651. The oscillator in IC651 is locked to the line frequency by pulses from pin 10 of the line output transformer. These are coupled to pin 10 of the chip via the voltage divider network R669/670 and C666. Q654, connected to pin 4 of the chip, switches the set to standby. Its base receives the standby signal from pin 10 of the control chip IC001. In this mode there is no output from the chopper power supply. Feedback for voltage regulation is applied to pin 1 of IC651 via the voltage divider network R655/6 from the 135V h.t. line.

Secondary windings on the chopper transformer feed five more rectifier circuits. To save you the time and stress involved in tracing the destinations of these various supplies we'll list them here.

D651 produces 135V across its reservoir capacitor C652. This supply is used by the line output stage. As already mentioned any variation in this supply is sensed by IC651 which then adjusts the drive at its output pin. Preset RV651 is used to set up the 135V output.

D652 produces 39V across its reservoir capacitor C653. This supply is used by the line driver transistor Q801, by the tuning circuit, by Q656 in the 12V regulator circuit, and is also fed to the CY coils on the scan yoke via pin 3 of connector DY-3.

D654 produces 41V across its reservoir capacitor C654. This supply is used by the STK4362 audio output chip IC252.

Diodes D653 and D655 produce 14·6V across reservoir capacitor C656. This supply is used by the transistors that drive the CY coils – they are mounted on board D1 – and is fed to a second 12V regulator consisting of Q655/6 and zener diode D661. The 12V regulator works hard. It supplies the sync/timebase generator chip IC551, the pincushion correction chip IC553 and most of the signal circuitry. A 9V regulator that supplies the i.f. chip on panel A is fed from the 12V line.

Diode D656 develops 7·8V across its reservoir capacitor C657. The main use of this supply is to feed the 5V regulator in the system control circuit.

RX Chassis Power Supply Circuit

The RX chassis used in later models has a redesigned chopper power supply – see Fig. 2. The whole circuit is mounted on board F. You will notice that the excess current sensing transformer is no longer present and that feedback for regulation is fed via a μPC4558C voltage comparator (IC651) and the TLP581 optocoupler IC602 to pin 12 of the μPC1394C power supply chip IC601. In our experience this power supply arrangement has proved to be more reliable than that used in the PE3 chassis. One of the rectifiers provides a -30V supply which, in the PE3 chassis, is derived from a line output transformer fed rectifier. This negative supply is used by the memory chip in the control system.

PE3 Chassis Layout

We will concentrate on the PE3 chassis in this article, as it's the one we usually find in the sets we encounter.

The back cover comes away after removing six screws. The two loudspeakers are mounted at the rear – they look rather like two wings. When the back cover is off you'll get no sound. Inside, the boards are positioned as follows (see Fig. 3). The H1 board that contains the seven-segment LED indicator and the customer controls is at the front left (viewed from the rear), mounted upright. Next to it is the H2 board which contains three LED indicators. Also at the front, just above the H1 board, is the remote control preamplifier board N. At the bottom left, mounted horizontally, you'll find the tuner/i.f. panel A. At the front of this are panel S which contains a relay for switching between aerial and HIT inputs and panel S2 which contains the relay driver – these two panels may not be present in some sets.

The large panel D across the bottom is mounted in a plastic frame. It contains most of the circuitry, as previously mentioned. and can be slid out of the cabinet after removing four screws. To work on the underside the board must be balanced on one end. A number of plastic strips make access to the print rather difficult. The print is

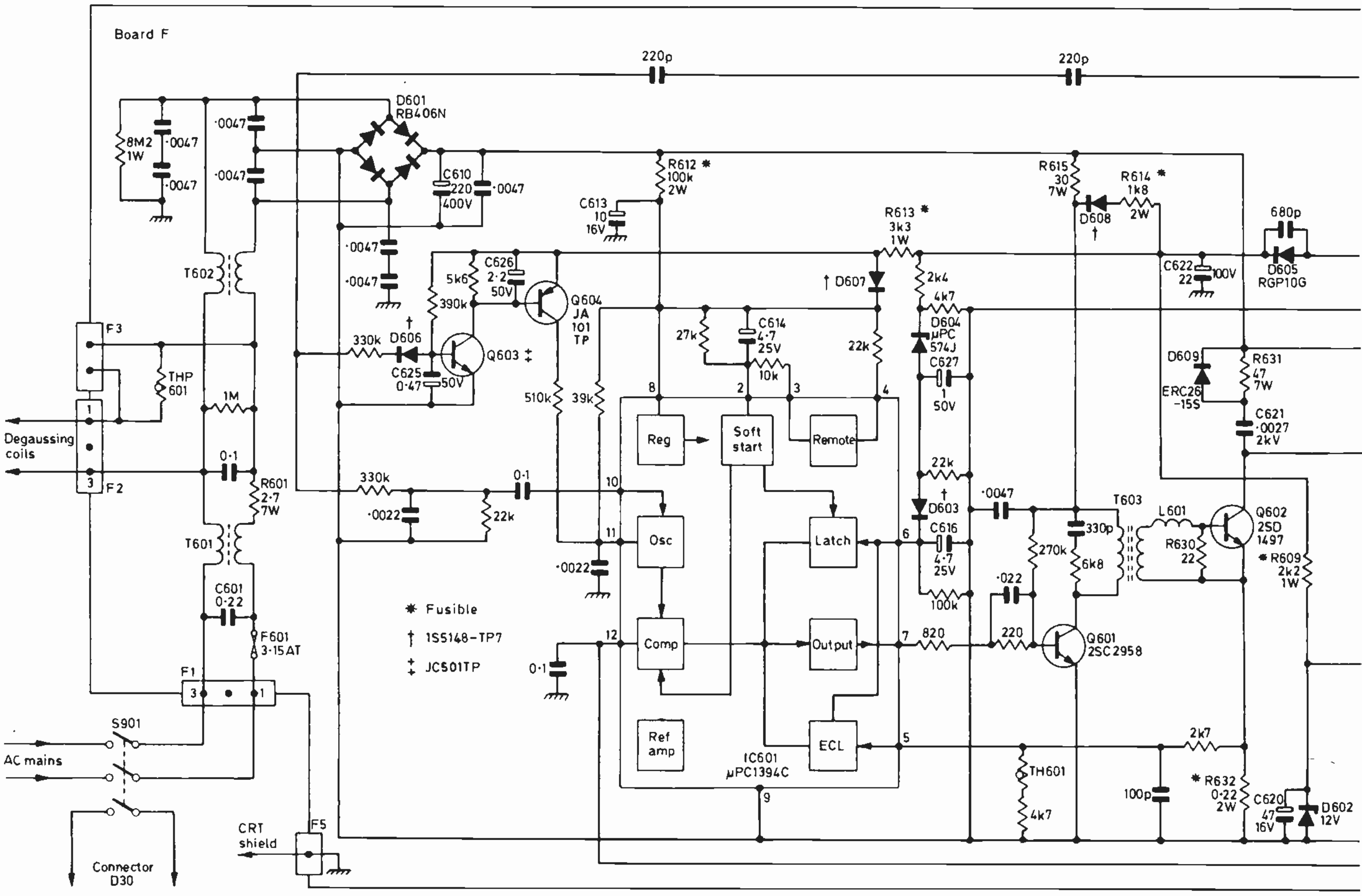


Fig. 2: The power supply circuit in the RX chassis.

very fine and is easily damaged, so be careful or you may end up with a few new faults.

There are four subpanels on the right, D1, D2, D3 and J2. Board D1 houses circuitry concerned with raster correction etc. Board D2 houses a few components concerned with dynamic focus correction. Board D3 houses a single transistor amplifier concerned with pulling correction. Board J2 provides connections to the loudspeakers. The small J1 panel at the front houses the external audio jack sockets. Tube base panel C houses the RGB output stages, a video muting transistor (Q713) and the velocity modulation amplifier and output stages (Q751-4). The latter circuit drives a coil on the tube neck. The F power supply panel is mounted on the c.r.t.'s degaussing shield.

Servicing the PE3 Power Supply

Servicing the power supply is not particularly easy. You must have a means of varying the mains input from about 60V to 240V – either a variac or a tapped mains transformer can be used. Since the print is easily damaged it's vital to use a temperature-controlled soldering iron when removing and replacing compoments.

If the set is completely dead, examine fuse F1601. If it has blown and is not blackened it may have failed from old age, but this is not very likely with these models. You'll most likely find that it's a nice black colour, indicating that Q603 has almost certainly failed and probably Q802 as well. Use only the correct Sony replacements and make sure that you also replace the insulating washers.

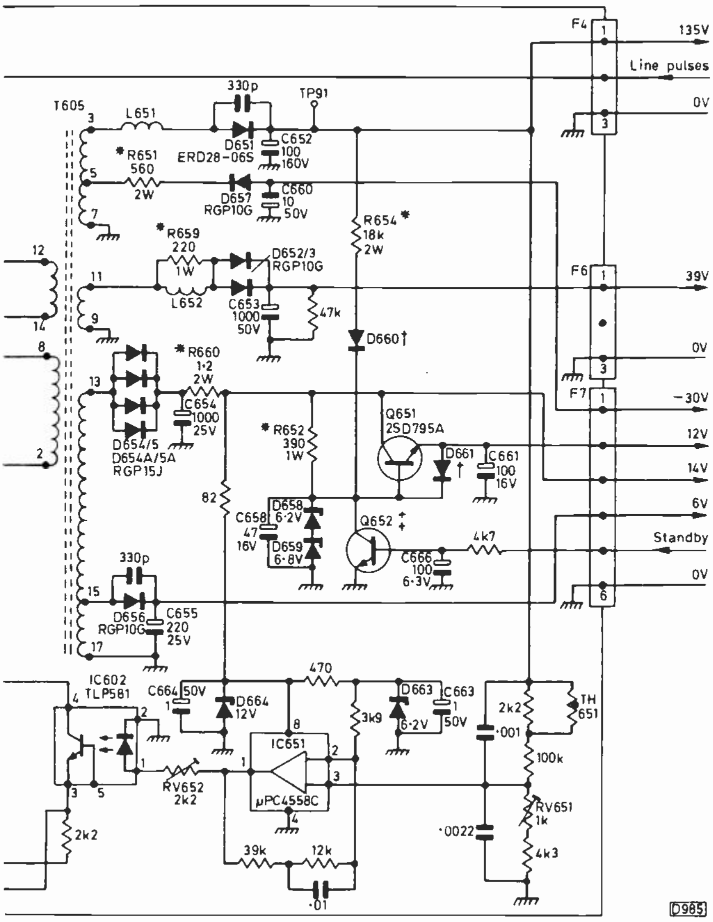
After replacing Q603, and possibly Q802 as well, proceed as follows before connecting to the mains supply. First carefully examine – best done with a high-power magnifying glass – all the printed circuitry in the power supply, line driver and line output stage areas of board D. Then inspect all the small electrolytic capacitors in the power supply and line timebase for signs of drying out or corrosion. Be sure to take your time over these two jobs – it could save you a lot of problems.

If you can't find a dry-joint or a leaky capacitor, start by disconnecting the collectors of Q603 and Q802. Next check C1655 on board F. Then, with the mains supply still disconnected, push the power switch S901 to the on position and connect the set to your variac (set the a.c. output to zero first). Connect your digital voltmeter across connector F5. It should give you a reading of 12V d.c. as the variac is slowly turned up to give 240V. R660 (620Ω, 1/6W, 5 per cent metal) on board D sometimes goes open-circuit or high-resistance, cutting off the 12V supply to IC651. If this has happened you may be fortunate and find that the set works when R660 has been replaced – provided Q603 has not gone short-circuit.

Measure the voltage at pin 12 of the chopper transformer T606. With no load connected you should read about 270V d.c. here. Connect your oscilloscope (10:1 probe) to pin 7 of IC651 then to the base of Q603. The waveforms should look something like those shown in Fig. 4 (a) and (b) respectively. These waveforms are with the oscillator in IC651 running free: they can vary. Don't assume that all is well if you get these waveforms. It's best not to try to display these waveforms on a working set that's displaying a raster – it's easy to disturb the operation of the chopper power supply and blow up Q603.

Turn the variac to the off position and disconnect it from the mains supply. The fast way to make the following tests is to use your component tester (see *Television* June 1984). With this you won't need to remove the following parts as many of them – but not all – can be checked in circuit.

Start by checking C1655 (47μF, 16V) on panel F and



C610 (250μF, 400V) on panel D. Next check the following capacitors on board D: C663 (22μF, 16V), C615/617/659/664 (all 3·3μF, 50V), C660 (1μF, 50V), C613 (2·2μF, 100V), C652 (100μF, 160V), C653 (33μF, 50V), C654 (1,000μF, 50V), C656 (1,000μF, 25V) and C657 (1,000μF, 10V). Then check D657 (RD5.1E-N2 zener), D602 (RGP10G), D603 (1S119), D651 (ERD28-06S), D654 (CTU12S), D653/5 (both V19C) and D656 (EB81-004). Finally check R604 (30kΩ, 7W cemented), R608 (680Ω, 2W fusible), R605 (47Ω, 7W cemented), R606 (2·2Ω, ¼W) and R607 (0·22Ω, ½W wirewound).

If these tests fail to reveal any faulty component *and* Q802 remained intact when the set failed you can now connect the set to the variac, with the on/off switch S901 at on and the collectors of Q603 and Q802 reconnected, and gradually turn up the mains input to the receiver.

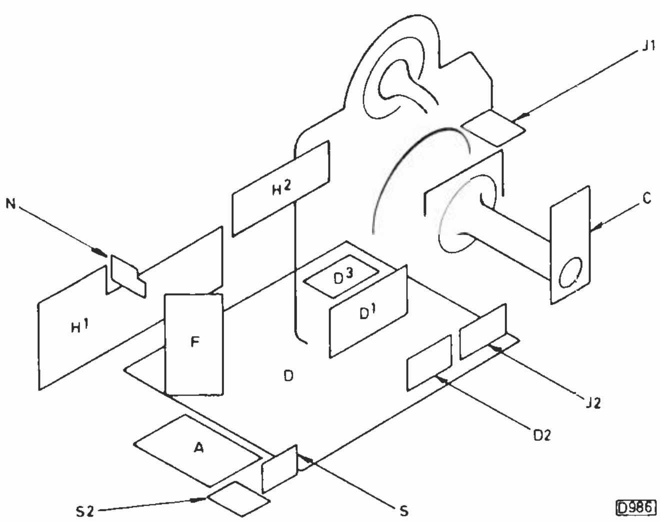


Fig. 3: Board positions in the PE3 chassis.

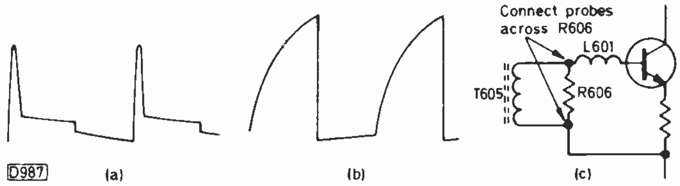


Fig. 4: Chopper drive waveforms, (a) at pin 7 of IC651, (b) at the base of the chopper transistor, measured as shown at (c). These waveforms are with the collectors of Q603 and Q802 disconnected. Since the chopper circuit oscillator is free-running the waveforms may vary a little.

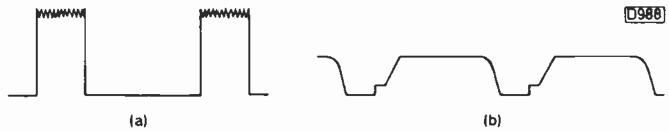


Fig. 5: Line drive waveforms, (a) at pin 11 of IC551, (b) at the junction of L808 and R803, with the collector of the line output transistor Q802 disconnected.

Monitor the 135V h.t. line while doing this. If a picture is obtained, leave the TV set running for at least a day before returning it to the customer.

All this sounds a lot of work, which it certainly is, especially as many of the components are difficult to get at. As colleague Pete is fond of telling me however, the longest way is often the quickest. There are no short cuts when repairing one of these receivers. Miss out one of the checks listed and you could end up with a pile of useless 2SD1497s.

If the components tested so far are all o.k. the next step is to unsolder one end of diodes D652, D654, D653/5 and D656 and isolate the collector of Q802. It pays to have a few spares handy when repairing these sets because the next thing to do is to replace IC651 (when faulty this i.c. tends to suddenly give excess output), T605, T604 and T606. Slowly turn up the input voltage from the variac. If the 135V h.t. supply appears, leave in the new chip and transformers. Turn the variac to zero output and check Q655, Q656 and D661. Reconnect D652, D654, D653/5 and D656, and check that there are no shorts across any of the d.c. supply lines. Slowly turn up the output from the variac and all should be well, with no voltage lines missing. If one or more voltages are absent, check the fusible resistors R651, R652, R653 and R654.

With the power supply now running and all the output voltages present, connect the oscilloscope (10:1 probe) to pin 11 of IC551 then to the junction of resistor R803 and choke L808 in the line output transistor's base circuit. Fig. 5 shows the waveforms that should be seen. Assuming that everything is in order, turn off the variac and make the following tests. First check Q802 again, to be on the safe side. Then check R824 (0·47Ω, 2W fusible), R825 (1·2kΩ, 1W fusible), C803 (330pF, 1·5kV), C804 (0·01μF, 3kV), D805/6 (both ERC26-15S), D801 (ERD29-08J) and the gate controlled switch Q803 (2SG264A). Always change these three diodes if Q803 has failed. You can now reconnect the collector of Q802. Gradually turn up the variac's output while monitoring the 135V line.

When the set has run for about an hour, readjust RV651 if necessary for a meter reading of 135V.

Sometimes you'll find that the power supply is dead and transistor Q603 is o.k. In this case check the 2SC2230A driver transistor Q602. If it's faulty, replace it with a 2SC2230A-GR and replace R610 with a 12kΩ resistor. Note that Q602 can sometimes cause distortion on the vertical lines in a picture: if you get this problem replace Q602 and R610 using the type and value just mentioned.

Another cause of a dead power supply when the components so far mentioned all seem to be o.k. is failure of the JC501 standby switch transistor Q654.

Sometimes these sets switch to standby for no apparent reason. The cure is to fit a 100pF, 50V capacitor between pin 1 of IC651 and the chassis end of R656.

Servicing the RX Power Supply

You'll find that the power supply in the RX chassis is far more engineer-friendly. It's all on board F which can be removed from the receiver so that you can rapidly check through the circuitry with your component tester. First check all the transistors – the chopper transistor Q602 (2SD1497-02), the driver transistor Q601 (2SC2958), the two transistors Q603 (JC501TP) and Q604 (JA101TP) in the over-voltage protection circuit, the 12V regulator transistor Q651 (2SD795A) and the standby switching transistor Q652 (JC501TP). Also check the zener diodes D604 (μPC574J), D602 and D664 (both RD12E-B2TN) and D663 (RD6.2E-N2TN). As with the PE3 chassis, by disconnecting the collector of the chopper transistor Q602 you can check the drive waveform at the collector of Q601 with your scope.

Again as with the PE3, never omit a careful check of the power supply for dry soldered joints and examine all the small electrolytics for any signs of corrosion or leakage. As yet we've experienced no failures of IC602 and IC651.

Line Timebase Faults

Faults that can cause the line output transistor Q802 to fail (and sometimes the diode modulator driver Q803 as well) are failure of or shorted-turns in the driver transformer T801. If you suspect this, replace it. Check the line driver transistor Q801 (2SD1138) at the same time. Hard to spot dry-joints in this area can also cause failure of Q802 or cut off its drive signal.

Failure of Q803 can kill the line output stage. The associated diodes D801/5/6 can go open-circuit under load. As previously mentioned, the diodes should be replaced if it's necessary to change Q803.

The small electrolytics in the line timebase circuitry can also be the cause of Q802 going short-circuit. Begin by checking C811 (0·47μF, 50V), then the small electrolytics associated with IC551 (TDA2578A), i.e. C531 (10μF, 16V), C507 (220μF, 16V), C509 (10μF, 16V) and C523 (4·7μF, 25V).

Sometimes the receiver will sit on your bench with one number (usually zero) showing in its seven-segment LED indicator while it makes a sort of "mee mee" noise as if it's trying to start up but can't. The cause of this is failure of the line output transformer T802. Fortunately there's usually no other damage when this happens.

When you find that Q802 has failed, leave the collector of its replacement disconnected to start with. Then make sure that 12V is present at the emitter of Q655 and that this voltage is arriving at pin 10 of IC551. With the RX chassis the voltage at pin 10 of IC551 should be 11·3V: if it's missing, suspect diode D501 (1SS119) on board D and check C510 (470μF, 16V) for loss of capacitance. Next connect your scope (10:1 probe) to pin 11 of IC551 and then to the base of Q802. The waveforms should be roughly as shown in Fig. 5. Provided you've made a thorough check on the line timebase circuitry you can now connect the collector of Q802 – disconnect the mains supply first of course. Gingerly increase the input from the variac until you obtain a picture.

A nasty line jitter effect, which may be intermittent, can be caused by the line frequency control RV501 (4·7kΩ preset). Don't try to clean it – fit a replacement. At the same time check C531 (10μF, 16V).

Amongst the supplies provided by the line output transformer are 200V for the RGB output stages and 26V which is used by the field timebase and the velocity modulation circuit. The 26V rectifier diode D804 is protected by surge limiter R811 (1·2Ω, ½W fusible). When this resistor goes high in value the result is field distortion – a line across the picture about a quarter to one third of the way down from the top of the raster.

Line linearity problems, the symptom being a thin black line at the left of the picture, occur when R825 (1·2kΩ, 1W fusible) goes high in value. At the same time check C803 (330pF, 1·5kV ceramic), C804 (0·01μF, 3kV ceramic) and C805 (0·015μF, 400V mylar). These components, also R824 (0·47Ω, 2W wirewound fusible), should always be checked when Q802 has to be replaced.

PE3 Chassis Field Timebase

The field generator is contained in IC551 which in the PE3 chassis is a TDA2578A. To date we've had no trouble with this chip. The field output at pin 1 is fed via R518 to pins 1 and 3 of the TDA3652 field output chip IC552. Complete or partial field collapse is usually caused by failure of this i.c. When replacing it, always fit a mica washer (Sony part no. 436 973 201) between the chip and chassis. Field collapse can also be caused by failure of zener diode D502 (EQA01-22R2) or D503 (EQA01-24R2). When this happens both diodes should be replaced.

RX Chassis Field Timebase

In the RX chassis IC551 is a TDA2579 and a discrete component field driver/output circuit is used. Pin 1 of IC551 drives Q508 (2SC2958) which in turn drives the output transistors Q506 (2SC2690A) and Q507 (2SC1220A). On rare occasions these transistors fail. When they do, check R556/548 (both 1·2Ω, 1W) and R527 (10Ω, ⅛W) before fitting replacements.

Miscellaneous Faults

The D1 board has given us few troubles. It contains the pincushion correction circuitry and the horizontal centring and amplitude circuitry. Horizontal centring can be upset when R1551/2 (4·7Ω, ¼W fusible) go high in value or open-circuit. The convergence will suffer if zener diode D1557 (EQB01-13) leaks or goes open-circuit. If D1552 (1SS119) suffers from the same problems the horizontal amplitude control RV1555 will not operate correctly.

Board A contains the tuner and the i.f. and a.f.c. circuitry. The tuner is very reliable. On the rare occasions when trouble is experienced it's best to fit a replacement. If the 9V supply at pins 19 and 21 of the i.f. chip IC101 (CX20015A) is missing or incorrect, check Q106 (2SD773). At the same time ensure that C138 (10μF, 16V) has not lost capacitance.

Tube base panel C has seventeen transistors mounted on it. Intermittent loss of picture, often after changing channels, can be due to failure of Q704, Q705 or Q706 (all 2SC2278). Use your component tester to check them – it will show up the slightest fault in a transistor. Check diodes D701/2/3 (1SS119) at the same time.

The usual problem with the teletext board is failure of the SAA5050 ROM IC4. When replacing it solder a 22μF, 25V electrolytic capacitor between pins 1 and 18, positive side to pin 18.

In the control circuitry on board D resistor R060 (330Ω, 1/6W metal) can fail, interfering with standby operation. Be sure to test zener diode D061 (RD5.6E-B2) when you replace it.

R237 (1MΩ, 1/6W metal) and R238 (10kΩ, 1/6W metal) on board D, at the base of transistor Q206 (JA101), can cause some puzzling symptoms. If R237 goes high in value the picture search doesn't stop. If both R237 and R238 vary in value the result can be no picture at all. Q206 acts as a sync separator feeding pulses to pin 16 of the control chip IC001.

Most of the chroma circuitry is contained in IC301 (TDA3562A). We've had few problems with the colour decoder. Before replacing a suspect IC301, examine the surrounding print carefully for dry-joints. Key waveforms for a colour-bar input are shown in Fig. 6. The crystal (X361) frequency is 8·867MHz.

In Conclusion

Only the panels on which we've experienced faults have been mentioned in this article. The others, in the sets we've handled, have as yet been trouble free. All component reference numbers have been for the PE3 chassis unless the RX version has been specifically mentioned.

There were quite a few modifications to the models in this series. The following notes refer to modifications of use to the service engineer.

To prevent mechanical buzz that varies in note as the picture changes, solder a 1,000pF, 50V capacitor in parallel with R655 (100kΩ) and replace R610 with a 12kΩ, $^1/_6$W resistor. Be very careful when carrying out this modification or you could end up with transistor Q603 shorted.

Model KV2252 sets after serial number 508,101 had a modified D panel with boards D3 and D4 omitted.

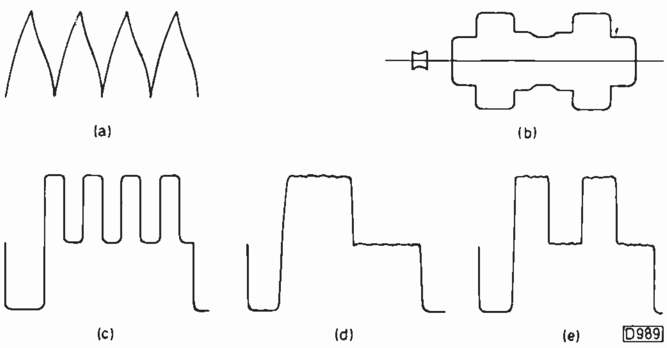


Fig. 6: Key colour decoder waveforms: (a) 8·867MHz at pin 26 of IC301; (b) the cotton-reel at pin 4; (c), (d) and (e) the blue, green and red output waveforms at pins 17, 15 and 13 respectively.

With KV2252 sets before serial number 504,001 and KV2256 sets before serial number 501,001, to prevent failure of transistors Q603 and Q802 after a short period of use replace R616 with a 330Ω, ¼W metal type, solder an extra 2·7Ω, ¼W resistor in parallel with R612 and add a 6·8kΩ, ¼W resistor between pins 5 and 8 of IC651. Don't carry out this modification to a set that's working satisfactorily.

These are quite complex sets with a fair amount of unusual circuitry. We've referred to the dynamic focus and velocity modulation circuits. There's an interesting sharpness circuit and the audio circuit has left- and right-hand channels. Several stages are associated with the SCART socket. You'll probably never have to worry about such niceties however.

It's essential to use only official Sony parts – if you don't you'll make lots of extra work for yourself. A thin coat of circuit varnish sprayed on any panels you've soldered makes a professional job and helps to prevent future problems. Run the set for at least a day before returning it to the customer.

A Simple Anti-theft Circuit

Jim Littler

It was Saturday and the shop was busy, so not much notice was taken of the three small girls who came in. The eldest was about fourteen. Then one went in front of the window display, two behind it. In five seconds they were outside with two Walkmans. The scene may be familiar to some of you, but it was new to me. I decided to do something about it. On enquiry I discovered that the price of commercially available wire-loop alarm systems seemed to be a bit high for what they are, so I designed the circuit shown in Fig. 1 to serve the purpose.

The device is powered by a PP9 battery. When thyristor Th1 is fired, power is applied to Tr2-4. Tr2-3 comprise a straightforward astable multivibrator, the output transistor Tr4 driving a telephone earpiece type loudspeaker. Tr1 is used to fire the thyristor. Its base is normally shorted to the earth side of the circuit by the wire trip link, which prevents it conducting. When the link is broken, base bias via R1 turns Tr1 on. This applies gate current to the thyristor which in turn switches on, starting the oscillator to sound the alarm. I found that the use of the switching transistor resulted in better battery economy than just switching the thyristor's gate – the quiescent current is 300μA compared to several milliamps with the trip connected directy to the gate. R2 draws sufficient current to maintain Th1 in conduction: the current is then about 180mA. A 1W carbon film resistor is used in this position.

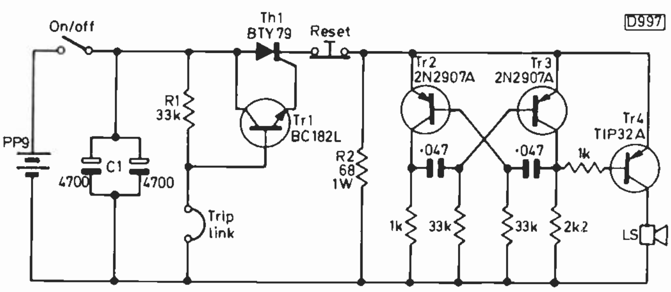


Fig. 1: Circuit of the anti-theft device.

The large capacitor C1, comprising two 4,700μF electrolytics in parallel, is included simply to enable the device to work in the event of someone accidentally switching it off. Larger value capacitors could be used if available or, if a key switch is used, C1 could probably be dispensed with.

While this is not strictly speaking a TV/video circuit, I'm sure it will be of interest to anyone who runs a shop, especially if you've had the sort of experience related above.

Practical Computer Programming

Part 7

Mike Phelan

By now you should have an assortment of pieces of paper with screen layouts, report layouts and file structures, also some notes on what the system should do. The latter need expanding into something that can be converted into a computer program in a high-level language.

Pseudo-code

One of the best tools for this job is something known as "pseudo-code". It's a restricted subset of English that reflects the structure of a program, i.e. loops and conditions are indented to make the operation clear. In case this is difficult to follow, an example should make things easier. Consider the following pseudo-code fragment that deals with amending a name and address file. The file could be part of a service database or anything else – in fact the code could be applied to the maintenance of any file since the things we need to do are usually the same, namely to add to, change or delete a record and possibly supply a list of its contents on the screen:

```
open files
repeat
  repeat
    get entry to amend
    check entry is a valid record
    if not valid
      print message
    else
      go to record
    end if
  until valid entry found
  display record
  get amendments
  ask is this OK to save
  if OK
    save record
  end if
  ask if more amendments
until no more amendments
close files
```

At first this example of pseudo-code looks like a programming language, with IF and REPEAT, but it's actually a way of describing the operation of a program. It can be converted to a high-level language after testing. But wait a minute! How can you test a piece of writing? Here's how!

Modules

When you start to design a system, as opposed to designing a program (that will come later), you start with a generalised description of the whole thing and then gradually break it down into detail, with individual modules written in pseudo-code. How do we decide what constitutes a module? A typical application will be some sort of database interrogation system that will be menu driven. The pseudo-code for the menus need be only a list of choices and explanations, and the lowest level will call a piece of program that may be a subroutine, function or procedure depending on the language chosen. Each of these is a "module" which does one job or a number of jobs that are conveniently grouped together.

Such a module can be expressed in pseudo-code and tested. To do this, imagine that you are the compiler or interpreter reading the program and carrying out each process literally. This will show up any serious inherent faults in the logic. In addition, ask yourself what will happen if the user does something wrong. This technique is known as a "walk-through". It may seem to be rather pointless, but it's a very useful method of curing faults at the design stage and decreasing the number of bugs in the final program.

Preventing Crashes

The one thing that must not happen is that the program "crashes" or returns the user to the command level. This would mean that the program has stopped its execution. The program error that caused this must be found and preventive action taken.

For example, say we have a program that accepts a code letter for something, e.g. a repair category. This code would normally be a capital (upper case) letter. Suppose that a lower case letter is entered by mistake. The program then crashes. There's little excuse for this sort of thing, even if the program was written by the user. Taking this example, there are at least four solutions:

(1) Put a message on the screen that either the CAPS LOCK key must be on or the entry made in upper case.

(2) Make the software force the CAPS LOCK key on.

(3) Make the software reject lower case entries.

(4) Allow either type of entry.

These solutions to the problem vary from bad to good. Clearly (1) is a lazy way out and is not really acceptable. (2) is better, but what happens if someone uses the key again and leaves it switched off? (3) would work but would waste user time by rejecting entries which then have to be re-entered. Clearly the only really acceptable solution is (4), which is bullet-proof and ensures that an incorrect entry is not made.

The same approach can be applied to other areas of a program, for example a menu where you have to choose a letter between say A to F. To print an error message if a lower case letter or say G is entered instead is just a waste of time – and very soon becomes tiresome. Lower case should be accepted, and nothing at all should happen if a letter outside the range is chosen.

For the upper case conversion, most languages have a case conversion function. Or we can subtract 32 from the ASCII code or AND it with 223 which will give the same effect: 223 is 1101 1111 in binary, so the AND will clear the 32 bit which is clear in 223. All the lower case characters are the upper case codes with this bit set, i.e. +32.

Module Re-use

When designing a module it's sometimes better if we can "re-use" it. Some things have to happen several times at various places in a system, maybe with slight variations. To give a few examples:

Print a message on the screen and ask for a Y or N response.

Print a message on the screen saying that the computer is doing something, please wait.

Print a message and prompt the user to press a key.

I find myself using these three umpteen times in everything that I design. The only thing that varies is the printed message – or part of it. Other modules can supply the missing bit, i.e. the variable part of the message. Here are some examples, in pseudo-code:

```
(1) Y or N response module
    message = variable part of message
    message = message + '? Y/N'
    print message on screen
    repeat
      get response
      convert to U.C.
    until response is Y or N
    clear message and response from screen
    return true if Y

(2) Please wait module
    message = variable part of message
    message = 'Please wait – ' + message
    print message on screen
    return nothing

(3) Press a key module
    message = variable part of message
    message = message + ' – press any key'
    print message on screen
    wait for keypress
    clear message
    return nothing
```

Conventions

We'll see what these actually look like in real code next month. For now, on with the design. It will be necessary to adopt a convention in our pseudo-code for passing control to a module. CALL (module name) is as good as anything. We can adopt upper case for our key words, i.e. those that are part of the pseudo-code language, and lower case for everything else, and precede each module with a short description of what it does. We'll stick to the term "module" until a choice of language has been made, as there are different types of modules in different langauges, sometimes several. Another convention is to use for each module a name that will be valid in real code and may describe what it does.

File Maintenance Menu

An example of a file maintenance menu would be something like this, together with one of the modules that can be called up:

```
MODULE f_menu
* Provides maintenance of customer file *
* by calling further modules *
CLEAR SCREEN
PRINT title
PRINT rest of menu
(A)  Add a new customer
(B)  Change customer details
(C)  Delete a customer
(D)  List customers on screen
Press ESC to return to main menu
GET keypress and convert to UC
CASE A CALL custadd
CASE B CALL custamnd
CASE C CALL custdel
CASE D CALL custlist
CASE ESC RETURN

MODULE custadel
* Deletes customer from file *
OPEN customer file
REPEAT
  ASK for customer to delete
  SEARCH file
  IF not found
    CALL press_key with 'Not on file'
  ELSE
    DISPLAY details
    CALL y_or_n with 'Are you sure'
    IF yes
      DELETE record
    ELSE
      CALL press_key with 'Deletion aborted'
    END IF
  END IF
  CALL y_or_n with 'Any more deletions'
UNTIL no
CLOSE file
RETURN
```

We can improve upon this. For example, what happens if the user selects the delete option my mistake? They would have to go through the motions of searching and replying 'N' to the 'Are you sure? Y/N' prompt. It would be better if the program could test say for ESC being pressed in response to the prompt for the name or number of the customer, thus returning the user to the previous menu.

Next Month

Next month a look at program design.

The Room at the Back

J. LeJeune

Sid Bias, service manager at Topcuts of Millthorpe, was not in the best of moods. He felt that vulgar changes at the front of the store were transforming what was an old family run business into a facsimile of any High Street electrical chain store. It even had what Sid called "a salesman with a lean and hungry look", in the person of Terry Green, Ralph Topcut's latest recruit. "The whole thing's going to pot" he said as he sat down heavily on the stool beside his bench. This brought him face-to-face with his current dislike, a Pye 2615. He'd been trying to eliminate striations for two days and was close to giving up, but still had his pride. He knew that Norman was itching to have a go at it, but as it was still unsold stock there was no one anxiously awaiting its return. The otherwise excellent picture had some striations that were about an eighth of an inch wide.

Norman and Andy were poring over a Toshiba turntable with linear tracking, attempting to discover its inner secrets without the aid of a service sheet. It had come in for "no left-hand channel".

Sid once more turned his attention to the Pye while his assistants were thus preoccupied. He was busily checking some plugs and sockets, steadying the circuit board with his left hand, when he glanced at the mirror and discovered that the striations were no longer present. Surprised, he took hold of the mirror and angled it to get a better view. The striations had returned. He steadied the chassis, preparatory to wriggling the plugs and sockets once more, and noticed that the close proximity of his fingers to the area of the main PCB near the teletext decoder diminished or even removed the striations! This seemed to be the only cure that would work. As Sid was pondering on the possibility of being able to sell Gareth along with the set, thus killing two birds with one stone, Nigel from Grandview came in through the back door, looking for a cup of tea. Grandview is a family-run business about twenty miles away: Nigel is the only son, and the only service engineer.

"Good morning Sid" beamed Nigel, "got a brew going yet?"

"You've got to earn it this time" replied Sid, "I've a lovely Pye for you to repair!"

"Doesn't look too bad from here" said Nigel. Then, coming closer, "oh, you've got those striations. We've had them as well – but we've got rid of them now."

"Well tell us what you did" said Sid, "don't keep us in suspense."

"We spoke to Philips Service about it. They told us to change plug and socket 9. We did, and it worked."

"Thank you" said Sid, smiling weakly, "how on earth can changing a plug and socket get rid of striations?"

"Same way as garlic wards off evil spirits I suppose! Now, have I earned that cuppa?"

Attention in the workshop shifted to the Toshiba. Norman and Gareth surfaced from contemplating its innermost secrets and became sociable again. But not for long.

"Righto then" said Sid, "have our resident genius and his assistant got to the bottom of the problem, or are we on too high a level at present to consider the possibility of a faulty pickup cartridge?"

"The problem," Norman commented, "is that the cartridge is glued into the tracking arm during manufacture. I understand we'll have to replace the whole assembly."

The Ferguson TX90

Terry came through the door from the shop with a little Ferguson TX90, one of the white colour portables. "Lady brought this back just now, says it's got a rustling noise on sound" he informed them. Norman took the set and placed it on an empty bench, then connected it to an aerial and the mains supply. When he switched on a good picture quickly appeared. As the sound was turned up the colour disappeared. Turning down the volume restored the colour again.

"She forgot to mention the second problem" moaned Sid. Nigel said nothing as he sipped at some tea. Gareth looked slightly odd, as though he was about to utter a profound wisdom. "I've something at the back of my mind that says we've had this one before" he said, "a dry-joint or something – I'll look in my notebook."

Gareth had taken to keeping a big book in which he wrote down all the faults they encountered on particular chassis. The book was divided into manufacturers and chassis, but his writing was so bad that it took him a time to find what he wanted.

"Here it is!" he exclaimed. "A dry-joint in the sound circuit, on C166. Makes the audio amplifier go into oscillation, causing noise on sound and interfering with the colour decoder."

Sid beamed with pleasure. "An hour ago I was contemplating selling you off with a faulty set, as resident engineer, but maybe I should change my mind. Here, let's have a look at that book."

Norman removed the back and started to look for C166. "Got you" he said, wriggling the component to show that it was indeed the culprit. "I wish they were all as easy as that, but Gareth's big black book has certainly earned its keep today."

Nigel stood up to leave. "Must be getting back to my side of the mountain."

Norman now had a Thorens TD105 turntable on his bench – and a baffled look.

"Got you stumped has it?" said Sid.

"Think I'll take an early lunch and come back to it" replied Norman, picking up the small service manual.

More Problems

Sid retired to his desk to shuffle papers, while Gareth turned his attention to an Hitachi set, NP81 chassis, with cramping at the bottom of the picture. The field output stage module was the first suspect, but changing it made no difference. The h.t. was correct at 111V, but there was insufficient peak current to scan the lower half of the c.r.t. fully. The set was o.k. in every other respect. Sid sauntered across and peered into the back. "Got a sticky one?" he said.

"Everything looks normal but the bottom is cramped" explained Gareth, "I've change the field output module and the h.t. supply is correct."

"Have you thought about the supply decoupling at pin 1 of the module?" asked Sid, "C608 to be precise." He gave Gareth a thoughtful look as he went to the component drawer for a replacement 22μF, 160V electrolytic.

Silence reigned while Gareth removed the suspect, which did look a little careworn, and fitted the replacement. When he'd done this the picture filled the screen.

"Never forget decoupling" said Sid, "it can save you a lot of time."

Norman returned and went straight to his bench.

"Are we to be enlightened about the fault on the simple gramophone turntable?" asked Sid. Norman admitted to being stumped, but said he'd had an idea he wanted to try. "Works properly at 33 r.p.m." he added, "but won't run at 45 r.p.m."

Checks with the meter showed that the speed selection process was working, but no motor voltage was applied. The operational-amplifier driving the emitter-follower that fed the voltage to the motor was cut off.

"It's either T109 or D210" suggested Gareth. "I'd go for D210 as it's an LED and they do go open-circuit, whereas transistors normally go short-circuit when they fail."

Norman was astounded. "Fifty pence in my pocket says you're wrong!"

"Well we'll have to try it then" said Gareth.

Norman went to the LED, which serves to indicate the speed selected and is in the d.c. feed to T109. With no collector supply, the input current requirements of the motor drive operational-amplifier couldn't be satisfied. Fitting a new LED restored correct operation, and Gareth was duly congratulated. Sid reflected on how quickly the young learn.

Terry put his head through the door frame. "Can we fix 8mm projectors?" he asked.

"No" said Sid.

Terry came all the way in with a cardboard box containing a Eumig Model M. "Good" he said, "now's the time to learn."

For once Sid was speechless.

International TV Standards

Eugene Trundle

There's a steadily increasing interest in world-wide TV standards. Amongst the reasons for this are: the popularity of DX-TV; the increasing number of satellites whose footprints overlap national boundaries; the greater mobility of people, who hope to be able to take hardware and software around with them; the trend amongst manufacturers to design TV and video equipment for world-wide markets, tailoring the final product to suit its destination; the growing availability of transcoding modules which are now, for example, incorporated as a standard feature of Video-8 format machines sold in SECAM areas; the requirement to exchange video tapes between people in different countries; and the wide availability of multistandard VCRs, TV sets and monitors.

With multistandard equipment it's important to bear in mind that while each item will operate with all the standards specified for it, it cannot change the standard. Thus a PAL/SECAM/NTSC VCR cannot replay a US tape via a UK receiver unless the latter is also equipped for multistandard operation. Similarly a three-system TV set or monitor will make no sense of a US tape played via a standard UK VCR. Many multistandard designs use a hybrid system called NTSC 4·43 when dealing with system M signals in PAL or SECAM areas. Here the signal is to the NTSC specification in all respects apart from the colour subcarrier frequency which is 4·433619MHz instead of 3·579545MHz. This simplifies the design and reduces the cost of the equipment: with this arrangement the NTSC signal recorded on the tape remains in standard form.

The original French colour system (SECAM V) used only field-rate ident signals. More recent versions include line-rate ident signals.

Table 1 shows the main characteristics of all the TV systems in current use, with a general indication of the areas where they are used. For satellite transmissions the basic scanning standards and encoding systems in general hold good, though f.m. is used for the vision signal and scrambling systems are widely employed. The MAC type transmissions are quite different of course.

Table 2 provides a comprehensive listing of countries of the world with details of their TV systems. As much information as we can obtain has been included on Bands, channels and mains supply characteristics. A few countries still don't have a colour TV service, and some islands tend to use whatever equipment and transmissions they chance upon! Any additions, corrections or updates would be welcome for future use.

An article in the January 1988 issue of *Television* dealt in a general way with the conversion of video and TV equipment from abroad for use in the UK – the principles operate both ways of course.

Table 1: TV Systems.

System	*Lines*	*Channel bandwidth*	*Vision bandwidth*	*Sound spacing*	*Vision modulation sense*	*Sound modulation*	*Geographical areas*
B	625	7MHz	5MHz	+5·5MHz	Negative	f.m.	Western Europe, India, Australasia, parts of Africa, Middle East and Far East. V.H.F.
D	625	8MHz	6MHz	+6·5MHz	Negative	f.m.	Eastern Europe, USSR, China.
G, H*	625	8MHz	5MHz	+5·5MHz	Negative	f.m.	Western Europe. U.H.F.
I*	625	8MHz	5·5MHz	+6MHz	Negative	f.m.	UK, Ireland, Hong Kong.
K, K¹*	625	8MHz	6MHz	+6·5MHz	Negative	f.m.	French overseas territories.
L*	625	8MHz	6MHz	+6·5MHz	Positive	a.m.	France (U.H.F.), Luxembourg.
M	525	6MHz	4·2MHz	+4·5MHz	Negative	f.m.	North and South America, Japan, Caribbean, parts of Pacific and Far East, US Forces Broadcasting (AFRTS).
N	625	6MHz	4·2MHz	+4·5MHz	Negative	f.m.	Argentina, Bolivia, Uruguay.

*Vestigial sideband 1·25MHz – all others 0·75MHz

Table 2: International TV Standards.

Country	System	Colour	Sound carrier (MHz)	Channels	Mains supply
Abu Dhabi	B, G	PAL	+5·5	E5-11, 35-48	240/50
Afghanistan	D	PAL	+6·5	E5	220/50
Albania	B	SECAM	+6·5	–	220/50
Algeria	B	PAL	+5·5	E5-11	220/50
Andorra	B	PAL	+5·5	–	220/50
Angola	I	PAL	+6	E9	220/50
Antigua and Barbuda	M	NTSC	+4·5	A7-10	230/60
Antiles	M	NTSC	+4·5	A3-13	120/60
Argentina	N	PAL	+4·5	A2-13	220/50
Ascension Is.	I	PAL	+6	–	–
Australia	B	PAL	+5·5	0-11, 28-69	240/50
Austria	B, G	PAL	+5·5	1-12, 21-68	220/50
Azores	B	PAL	+5·5	E7-9	220/50
(US Forces)	M	NTSC	+4·5	A5	–
Bahamas	M	NTSC	+4·5	A13	120/60
Bahrain	B	PAL	+5·5	E4	230/50
Bangladesh	B	PAL	+5·5	E5-11	230/50
Barbados	N	NTSC	+4·5	A3	110/50
Belgium	B, G	PAL	+5·5	1-12, 21-68	220/50
Belize	M	NTSC	+4·5	–	–
Benin	K	SECAM	+6·5	–	220/50
Bermuda	M	NTSC	+4·5	A8-10	120/60
Bhutan	B	PAL	+5·5	E2	220/50
Bolivia	N	NTSC	+4·5	A7, 10	120/50
Botswana	I	PAL	+6	21-68	220/50
Brazil	M	PAL	+4·5	A2-13	110/50
Brunei	B	PAL	+5·5	E5-8	230/50
Bulgaria	D	SECAM	+6·5	R7-12	220/50
Burma	M	NTSC	+4·5	–	220/50
Burundi	K	SECAM	+6·5	–	220/50
Cameroon	K	SECAM	+6·5	–	127/50
Canada	M	NTSC	+4·5	A2-13, A15-30	120/60
Canary Is.	B	PAL	+5·5	E3-10	220/50
Central African Rep.	K	SECAM	+6·5	–	220/50
Chad	K	SECAM	+6·5	–	220/50
Chile	M	NTSC	+4·5	A2-13	220/50
China	D	PAL	+6·5	R1-5	220/50
Colombia	M	SECAM	+4·5	A2-13	110/60
Congo	D	SECAM	+6·5	R7	220/50
Costa Rica	M	NTSC	+4·5	A2-12	120/60
Cuba	M	NTSC	+4·5	A2-13	120/60
Curacao	M	NTSC	+4·5	A8-13, A19	220/60
Cyprus	B, G	SECAM	+5·5	E6-11, 35-38	240/50
Cyprus (Turkish)	B, G	PAL	+5·5	E5-11, 24-33	–
Czechoslovakia	D, K	SECAM	+6·5	R1-12, 21-39	220/50
Kampuchea	M	SECAM	+4·5	A7-13	220/50
Kenya	B, G	PAL	+5·5	E2-10	240/50
Korea, North	D	SECAM	+6·5	R5-12	110/60
Korea, South	M	NTSC	+4·5	A4-13	110/60
Kuwait	B, G	PAL	+5·5	E5-10	240/50
Laos	M	PAL	+4·5	A8, 10	220/50
Lebanon	B	SECAM	+5·5	E2-11	220/50
Leeward Is.	M	NTSC	+4·5	A7-8	230/60
Lesotho	I	PAL	+6	10, 25, 29	220/50
Liberia	B, H	PAL	+5·5	E6-10	120/60
Libya	B, G	SECAM	+5·5	E5-11	230/50
Liechtenstein	B, G	PAL	+5·5	E2-12, 21-69	220/50
Luxembourg	B, G	PAL	+5·5	E7, 21	220/50
Macao	I	PAL	+5·5	21-38	110/50
Madagascar	K	SECAM	+6·5	K5	220/50
Madeira	B	PAL	+5·5	E5-12	220/50
Malawi	B, G	PAL	+5·5	–	230/50
Malaysia	B, G	PAL	+5·5	E2-10	230/50
Maldives	B	PAL	+5·5	E7	220/50
Mali	K[1]	SECAM	+6·5	–	220/50
Malta	B, G	PAL	+5·5	E10	240/50
Martinique	K	SECAM	+6·5	K4-8	220/50
Mauretania	K	SECAM	+6·5	E5	220/50
Mauritius	B	SECAM	+5·5	E4-11	230/50
Mexico	M	NTSC	+4·5	A2-13, 14-45	120/60
Micronesia	M	NTSC	+4·5	A4	120/60
Midway Is.	M	NTSC	+4·5	A4	120/60
Monaco	G, L	SECAM	+6·5	E10, 30, 35	220/50
Mongolia	D	SECAM	+6·5	R1-5	127/50
Montserrat	M	NTSC	+4·5	A7	230/60
Morocco	B, H	SECAM	+5·5	M4-10	220/50
Mozambique	G	PAL	+5·5	E3	220/50
Namibia	I	PAL	+6	SA4-10	220/50
Nepal	B	PAL	+5·5	E3	230/50
Netherlands	B, G	PAL	+5·5	E1-12	220/50
New Caledonia	K[1]	SECAM	+6·5	K4-10	220/50
New Zealand	B	PAL	+5·5	NZ1-9	230/50
Nicaragua	M	NTSC	+4·5	A2-13	120/60
Niger	K	SECAM	+6·5	K4-9	220/50
Nigeria	B	PAL	+5·5	E2-10	230/50
Norway	B, G	PAL	+5·5	E2-10, 44	230/50
Okinawa	M	NTSC	+4·5	A8, J6	100/60
Oman	B, G	PAL	+5·5	E5-12	220/50
Pakistan	B	PAL	+5·5	E4-10	230/50
Panama	M	NTSC	+4·5	A2-12	120/60
Papua-New Guinea	B, G	PAL	+5·5	–	240/50
Paraguay	M	NTSC	+4·5	A9	220/50
Peru	M	NTSC	+4·5	A2-13	220/60
Philippines	M	NTSC	+4·5	A2-14	110/60
Poland	D, K	SECAM	+6·5	R1-12,21-37	220/50
Portugal	B, G	PAL	+5·5	E2-11, 25-46	220/50

Dahomey	K	SECAM	+6·5	K4	220/50
Denmark	B, G	PAL	+5·5	E3-11	220/50
Diego Garcia	M	NTSC	+4·5	A8	220/60
Djibouti	K[1]	SECAM	+6·5	K5	220/50
Dominica	M	NTSC	+4·5	–	–
Dominican Rep.	M	NTSC	+4·5	A2-13	110/60
Dubai	B, G	PAL	+5·5	E2-12, 33-41	220/50
Ecuador	M	NTSC	+4·5	A2-10	110/60
Egypt	B	SECAM	+5·5	E3-11	220/50
El Salvador	M	NTSC	+4·5	A2-20	115/60
Equatorial Guinea	B	PAL	+5·5	E2	220/50
Ethiopia	B	PAL	+5·5	E7	220/50
Falkland Is.	I	PAL	+6	–	230/50
Fernando Po	B	PAL	+5·5	E2	220/50
Fiji	B	PAL	+5·5	–	240/50
Finland	B	PAL	+5·5	E1-12	220/50
France	L	SECAM	+6·5	F1-12, 21-68	220/50
French Polynesia	K[1]	SECAM	+6·5	K4-9	220/60
Gabon	K	SECAM	+6·5	K3, 10	220/50
Gambia	I	PAL	+6	–	–
Germany (East)	B, G	SECAM	+5·5	E5-12, 21-39	220/50
Germany (West)	B, G	PAL	+5·5	E2-11, 21-60	220/50
(US Forces)	M	NTSC	+4·5	–	220/50
Ghana	B	PAL	+5·5	E2-5	220/50
Gibralter	B	PAL	+5·5	E6,11	240/50
Greece	B	PAL	+5·5	E5-11, 23-49	220/50
Greenland	M	NTSC	+4·5	A8	220/50
Guadeloupe	K	SECAM	+6·5	K5-8	220/60
Guam	M	NTSC	+4·5	A8, 12	110/60
Guatemala	M	NTSC	+4·5	A3-13	120/60
Guinea (Bissau)	I		+6	–	–
Guinea (Rep.)	K	SECAM	+6·5	–	220/50
Guyana (French)	K	SECAM	+6·5	K4-6	220/50
Guyana (Rep.)	B, G	SECAM	+5·5	K5	220/50
Haiti	M	SECAM	+4·5	A2-5	115/60
Hawaii	M	NTSC	+4·5	A2-13	115/60
Honduras	M	NTSC	+4·5	A3-13	110/60
Hong Kong	I	PAL	+6	E1-12, 21-36	200/50
Hungary	D, K	SECAM	+6·5	R1-12, 24-32	220/50
Iceland	B, G	PAL	+5·5	E3-10	220/50
India	B	PAL	+5·5	E4-7	230/50
Indonesia	B	PAL	+5·5	E4-10	220/50
Iran	B, G	SECAM	+5·5	E3-11	220/50
Iraq	B	SECAM	+5·5	E5-11	220/50
Ireland	I	PAL	+6	A-J, 21-68	220/50
Israel	B, G	PAL	+5·5	E5-11, 24-56	230/50
Italy	B, G	PAL	+5·5	A-H, 21-34	220/50
Ivory Coast	K	SECAM	+6·5	K4-10	220/50
Jamaica	M	NTSC	+4·5	A7-13	110/50
Japan	M	NTSC	+4·5	J1-12, 28-62	100/60
Jordan	B, G	PAL	+5·5	E3-9	220/50

Puerto Rico	M	NTSC	+4·5	A2-12	120/60
Qatar	B	PAL	+5·5	E9, 11	240/50
Reunion	K	SECAM	+6·5	K4-9	220/50
Rumania	D, K	SECAM	+6·5	R2-12	220/50
Rwanda	K	SECAM	+6·5	–	220/50
Sabah and Sarawak	B	PAL	+5·5	E2-10	240/50
Samoa Eastern	M	NTSC	+4·5	A2-12	230/50
Samoa Western	–	PAL	–	–	–
San Marino	B, G	PAL	+5·5	–	220/50
Saudi Arabia	B, G	SECAM	+5·5	E5-10	220/50
Senegal	K	SECAM	+6·5	K7	220/50
Seychelles	I	PAL	+6	–	–
Sierra Leone	B, G	PAL	+5·5	E2	230/50
Singapore	B, G	PAL	+5·5	E5, 8	230/50
Society Is.	K[1]	SECAM	+6·5	K4-9	220/60
Somalia	B, G	PAL	+5·5	–	230/50
South Africa	I	PAL	+6	SA4-13, 21-68	220/50
Spain	B, G	PAL	+5·5	E2-11, 21-65	220/50
Sri Lanka	B, G	PAL	+5·5	–	230/50
Sudan	B	PAL	+5·5	E5-7	240/50
Surinam	M	NTSC	+4·5	A7-12	115/60
Swaziland	B, G	PAL	+5·5	–	230/50
Sweden	B, G	PAL	+5·5	E2-11, 21-68	220/50
Switzerland	B, G	PAL	+5·5	E2-12, 21-63	220/50
Syria	B, H	SECAM	+5·5	E4-9	220/50
Tahiti	K	SECAM	+6·5	K4-8	240/60
Taiwan	M	NTSC	+4·5	A7-12	110/60
Tanzania	B, I	PAL	+5·5	E21	230/50
Thailand	B, G	PAL	+5·5	A2-13	220/50
Tibet	D	SECAM	+6·5	–	220/50
Togo	K	SECAM	+6·5	K6-8	220/50
Trinidad & Tobago	M	NTSC	+4·5	A2-13	115/60
Tunisia	B	SECAM	+5·5	E5-12	220/50
Turkey	B, G	PAL	+5·5	E5-10	220/50
United Arab Emirates	B, G	PAL	+5·5	E2-11	220/50
Uganda	B, G	PAL	+5·5	E5-10	240/50
United Kingdom	I	PAL	+6	21-68	240/50
Upper Volta	K	SECAM	+6·5	K6	220/50
Uruguay	N	PAL	+4·5	A3-13	220/50
USA	M	NTSC	+4·5	A2-13, A14-83	120/60
USSR	D, K	SECAM	+6·5	R1-12, 21-68	220/50
Vatican	B, G	PAL	+5·5	–	220/50
Venezuela	M	NTSC	+4·5	A2-13	120/60
Vietnam	D, M	NTSC	+4·5	R6, A7-13	230/50
Virgin Is.	M	NTSC	+4·5	A5-12	110/60
Yemen Rep.	B	PAL	+5·5	E4-10	220/50
Yugoslavia	B, H	PAL	+5·5	E2-12, 21-68	220/50
Zaire	B, K	SECAM	+5·5	K5-9	220/50
Zambia	B, G	PAL	+5·5	E2-4	230/50
Zanzibar	I	PAL	+6	E9, 21	220/50
Zimbabwe	B, G	PAL	+5·5	E2-4	230/50

TV Fault Finding

Reports from Eugene Trundle, Alfred Damp, Philip Blundell, Eng. Tech., G. Hewins, J. R. Armagh, Roger Burchett, Nick Beer and Ian Bowden.

Mitsubishi CT2224B etc

Several Mitsubishi sets have chassis that are similar to the one in this model and the following tip seems worth passing on – we've encountered the same fault several times. The symptom is a very elusive intermittent loss of sound and picture and the cause is dry-joints at the legs of the line driver transformer T751. The bad joints are not always obvious on inspection. Flux and solder all four pins. **E.T.**

Panasonic TC2110

This set was dead with the chopper transistor Q803 short-circuit. With many of today's switch-mode power supplies the demise of a power transistor can be due to an open-circuit resistor (usually of high value), a short-circuit diode, etc. This was no exception: R803 (330kΩ) was open-circuit. **A.D.**

Ferguson 20E1 (TX90 Chassis)

This one had field collapse and the customer had left the set running while listening to the snooker commentary. The field output transistors TR104 and TR105 and zener diode D137 were all short-circuit. Replacing these components still left us with field collapse and further checks revealed that the collector of TR104 was at 40V instead of 100V. Zener diode D106 was suspected but in fact the feed resistor R268 was open-circuit. Note that some of these items are present only in the 20in. version of the chassis. **A.D.**

GEC 20AX Mk II Chassis

This fault could apply to any of these sets with the combined decoder with i.f. module and tuner. The symptom was an intermittently blue picture. Remove the back and the fault cleared of course. As a first step the TDA2530 chip was replaced since this is the only component common to the missing green and red outputs, but the fault persisted and couldn't be provoked by heating, freezing or prodding around. Eventually it stayed on long enough for measurements to be made around the chip. We found that the blue output pin was at 7·5V while the red and green output pins were at 11V. At these voltage levels the red and green output stages should have been fully on, not off. Further checks revealed that the blue output transistor's emitter voltage was correct at 6·8V but the voltage at the emitters of the red and green output transistors was 11V. The cause of the fault was a feed-through solder rivet in the print – it disconnected the green and red output stages from the 6·8V reference line. **A.D.**

Ferguson TX10 Chassis

For low width check the resistance value of the width control RV851. In one case recently it had fallen from 220kΩ to 70kΩ. **P.B.**

Grundig P1223 Portable

I've had a spate of Grundig monochrome portables recently with low gain. They have a combined tuner/i.f. unit that's expensive, even on an exchange basis. A rough test for the r.f. f.e.t. is to measure across R2007 (the 100kΩ resistor between its gate and source) with a digital meter. If the f.e.t. is faulty you'll get a reading of about 2kΩ. If the set is being used in an area with a reasonable signal you can fit the BF961 transistor from the v.h.f. r.f. amplifier stage in the u.h.f. position. **P.B.**

Pye K30 Chassis

The versions of the K30 chassis that use a slide-out tuning draw have a tendency to suffer from tuning drift. If caught in the early stages, resoldering the crimped plug connections on the drawer and switchbank usually does the trick, but if the drawer has been slid out a lot of times the solid cored wires can break. **P.B.**

Some Quickies

Here are some quickies with a common theme. In each case an i.c. was wrongly suspected!

Ferguson 38000 (1696 chassis): The fault was loss of sync and field collapse after running for a few minutes. The TDA1044 field timebase chip was suspected but the cause was the series regulator transistor. A TIP42A seems to work quite happily in this position.

Grundig 4400 etc.: The fault was buzz on sound after about two hours. The TDA120U chip was changed but the culprit was the 3·3μF tantalum capacitor C2216 (C216 in some chassis) which was leaky.

Ferguson 3878: The brightness increased over a period of about half an hour until the picture "swamped". The TDA2560 chip in the decoder was suspected but the cause of the trouble was the 1μF tantalum capacitor CG05 connected to pin 12. This is the 14in. colour portable manufactured by NordMende.

Grundig CUC120 chassis: There was field collapse and R2761 (6·8Ω) was burnt. Naturally the TDA1170 chip was suspected but C2762 (1,000μF, 35V) was short-circuit.

Ferguson TX90 chassis: The symptom was patterning but no picture. The TDA4500 chip was changed but the trouble was due to C121 (0·01μF) being leaky. **G.H.**

Hitachi CPT1455

After repairing a dead power supply we got a picture with a few vertical striations on the left-hand side. A scope check at the tube's first anode produced a tell-tale pulse and ring display. Adding extra capacitance did nothing to help so the earth print had to be open-circuit. It was – there was an almost invisible crack on the c.r.t. base panel. It had been caused by the drag of the leads to chassis while I had the chassis out. I've been bothered by this sort of thing several times recently, on new sets of various makes, especially on very large panels. **J.R.A.**

Fidelity F14

In the June issue I mentioned a problem with teletext lines over the top third of the raster, the picture being otherwise o.k. (Hitachi NP81CQ chassis), and asked whether such a display is usual in other sets when the blanking fails. Then this Fidelity F14 came in with identical symptoms. So straight to the blanking circuit where C63 was found to be open-circuit. Just to help, it's carefully disguised on the chassis layout as a wire link, near the back of the set. These are the only two blanking faults I've had in years! **J.R.A.**

Hinari CT4/5/6/7

We've had several of these sets where the tuning has been critical to keep the colour on. The solution is to turn the a.f.c. on when tuned as near as you can then adjust L131 slightly – we find that one quarter or one eighth of a turn is enough. As always in such cases, mark the position before you start. It's best to carry out this adjustment in the field as the problem may show up in the customer's home when the set worked all right in the workshop. **J.R.A.**

Hitachi CNP190/192 etc

There was colour in the central area but monochrome only on the left- and right-hand sides. Now the modern whiz kid doesn't need to know about the 7·8kHz ripple from the burst detector being rectified, smoothed and used to operate the colour killer, but being an old hand I did. I went straight to C561 (22μF) and for once got it right first time. **J.R.A.**

Thorn 3000 with Spectrum 128K

The computer worked well with an elderly GEC C2110 series set but with this even older model the sound was very low with considerable background noise. Off-air sound was acceptable. Careful readjustment of the 33·5MHz rejector coil L101 improved matters no end. Spectrum modulators are not all that good, and this one was particularly bad. Both these old sets accepted the Spectrum's sync pulses with no problems – no bouncing or line twitching at all. **R.B.**

More Quickies

Philips CTX-S chassis: A common complaint now is "picture just fades away, sound remains o.k." The cure is to resolder all the line output transformer pins – they'll usually need it. The ones that cause this particular fault are 2 and 8 which provide the tube's heater supply.
Rank T26 chassis: For intermittent lack of sound resolder the pins of the audio chip (top left of the i.f./decoder panel, with the large heatsink). **R.B.**

Amstrad CTV2000

This set would intermittently trip. By looking in at the back under dim lighting conditions we could see that the case of the line output transformer was breaking down and arcing to chassis. **N.B.**

Ferguson 20C3 (TX100 Chassis)

This set came from the shop with the complaint "dead" and it sure was! The 2·5A mains fuse was open-circuit – well blackened – so attention was centred on the chopper transistor TR6. A check revealed that it was short-circuit all ways round. We also found that D13 in its base circuit had shorted. After replacing these two items everything seemed to be o.k. so we switched on. Bang! There was a flash that made the three fluorescent lights look dim and FS1 and TR6 had again bitten the dust. This time D13 had survived but the h.t. rectifier D15 was short-circuit, which it hadn't been two minutes previously.

A new BY299 h.t. rectifier was fitted and the other items were replaced, along with D13 for good measure, and bless my soul the set ran – for about two and a half minutes. The whole lot had gone again! Now the 119V h.t. supply is used by the tuning circuit as well as the line output stage, and although the aerial had been plugged in there had been no tuning. Interesting! The ZTK33ADPD tuning voltage regulator IC2006 was suspect but the culprit turned out to be the nearby transistor TR2016 (BF460) which was short-circuit collector to emitter. It's associated with the memory in IC2007. When this was put right the set continued to run. **N.B.**

B and O 77XX Series

This set wouldn't switch on from standby. There had been a complaint about intermittent trouble a week earlier and a field engineer had resoldered some suspect joints in the deflection circuit. Now the fault was permanent and the set was in the workshop. When this fault arises I usually dive for the 5·2V supply on the tuning/control panel (PCB55). This voltage is critical and any intermittent trouble of this sort can usually be cured by careful adjustment. In this case the rail, which can be conveniently measured across C7, was low at about 3·7V, so I knew I was on the right lines. It didn't take long to find that TR9 (BC547) was very high resistance between its base and emitter. **N.B.**

Panasonic TC2207 (U2 Chassis)

The complaint was of a generally low picture. A colleague had checked the ever-suspect A56-540X tube, but it was tracking well. He'd also discovered that the ABL potentiometer R555 had no effect. When we traced the line back to the TDA2560 chip on the signals panel we discovered that R305 (820kΩ) was open-circuit. It's situated right underneath plug CO-2AP. **N.B.**

Decca Series 10 Chassis

The complaint was no sync. Switching the set on confirmed this, but the fault cleared after about ten minutes. It was affected as soon as the back was removed or replaced. The cause was located by prodding and poking: there were dry joints on the i.f. panel's multi-pin plug. **N.B.**

B and O 39XX (Beovision 5000, 6000)

When this set was first switched on the protection circuit would operate once then the set would be all right. The fault was narrowed down to the 25V supply. If this is low, due to excessive current, the protection circuit detects this and closes down the power supply. The cause of the trouble turned out to be a faulty reservoir capacitor, 0C2 (3,300μF, 35V). **I.B.**

Salora 1H4 (Ipsalo 2)

This set was dead. Both the primary switching transistors TB700 and TB701 in the power supply were short-circuit and the 22Ω filter resistor RB713 was open-circuit. The cause of the fault was traced to the scan coil coupling capacitor CB532 (0·33μF, 250V) which had a dry-joint at the left-hand side. This made it heat up and expand. **I.B.**

ECONOMIC DEVICES PO BOX 15, WOLVERHAMPTON, WV2 4AZ

15/80H	3.30
15/85R	3.30
17052	5.61
17053	5.61
17074	9.30
17089	3.45
17127	2.50
17376	1.58
1N4001	0.04
1N4002	0.06
1N4003	0.06
1N4004	0.05
1N4005	0.05
1N4006	0.08
1N4007	0.07
1N4148	0.03
1N4448	0.05
1N5401	0.14
1N5402	0.15
1N5403	0.16
1N5404	0.15
1N5408	0.35
1N914	0.04
1S1555	0.31
1S44	0.10
1S921	0.10
2N2219A	0.33
2N3053	0.35
2N3054	0.99
2N3055	0.61
2N3442	1.56
2N3702	0.14
2N3703	0.18
2N3705	0.16
2N3706	0.14
2N3707	0.16
2N3711	0.13
2N3771	0.70
2N3772	1.71
2N3773	2.00
2N3819	0.54
2N3823	1.17
2N3904	0.62
2N3906	0.62
2N4101	1.73
2N4240	3.30
2N4444	0.99
2N5293	0.50
2N5294	0.50
2N5296	0.49
2N5297	0.50
2N5298	0.61
2N6109	1.58
2N6130	0.80
2N6133	1.25
2N6180	0.95
2N6292	1.65
2SA1006	1.50
2SA1011	1.65
2SA1015	0.49
2SA1012	1.25
2SA1020Y	0.89
2SA1027R	0.45
2SA473	0.75
2SA766S	4.95
2SC1173Y	1.25
2SC1474	1.25
2SC1509	1.35
2SA1095	3.00
2SA1103	6.55
2SA329	0.40
2SA489	1.17
2SA490	2.25
2SA493	2.25
2SA562	0.57
2SA564	0.75
2SA614	4.88
2SA628	1.14
2SA639S	1.75
2SA659	0.49
2SA673	1.50
2SA684	1.61
2SA697	1.05
2SA699	1.75
2SA715	0.95
2SA748	1.95
2SA817	0.65
2SA835	2.50
2SA836	0.89
2SA844	0.65
2SA872	0.80
2SA884	2.15
2SA937R	0.97
2SA940	1.32
2SA940-2	2.14
2SA950	0.72
2SA951	1.75
2SA966 Y	1.16
2SA999	1.36
2SB774	1.15
2SB185	1.13
2SB375	3.87
2SB400	0.40
2SB405	1.03
2SB511	2.50
2SB54	1.39
2SB546	0.56
2SB56	2.80
2SB618A	2.22
2SB631	1.45
2SB643	0.50
2SB669	3.67
2SB681	3.96
2SB695	1.98
2SB774	0.65
2SB819	1.13
2SC1096	1.16
2SC1104	3.98
2SC1106	4.54
2SC1114	3.25
2SC1116	4.95
2SC1124	1.28
2SC1129	1.65
2SC1131	0.64
2SC1158	3.33
2SC1162	0.55
2SC1172	2.22
2SC1195	3.26
2SC1213	0.89
2SC1226	1.46
2SC1293	0.90
2SC1306	1.98
2SC1317	0.50
2SC1364	0.49
2SC1383	1.20
2SC1391	2.45
2SC1398	0.75
2SC1413A	3.05
2SC1446	1.25
2SC1447	2.07
2SC1475	0.60
2SC1505	1.00
2SC1514	1.69
2SC1573Q	1.25
2SC1583	0.50
2SC1617	3.89
2SC1678	1.98
2SC1741	1.25
2SC1810	1.70
2SC1815	0.45

2SC1826	0.67
2SC1829	2.22
2SC1875	4.50
2SC1893	3.02
2SC1906	0.98
2SC1921	1.37
2SC1923	0.30
2SC1929	2.25
2SC1942	1.65
2SC1959	0.26
2SC1957	1.09
2SC1953	1.93
2SC1962	1.93
2SC1969	2.04
2SC1983	2.21
2SC1985	1.55
2SC2009	0.34
2SC2029	2.33
2SC2028	2.11
2SC2063	0.99
2SC2078	3.11
2SC2073	2.25
2SC2085-Q	1.65
2SC2091	1.30
2SC2141	2.44
2SC2166	1.98
2SC2216	0.69
2SC2233	1.80
2SC2236	1.65
2SC2278	1.69
2SC2314	2.17
2SC2335+Kit	12.95
2SC2551	1.26
2SC2565	3.92
2SC2570	2.88
2SC2577	1.60
2SC2578	6.75
2SC2671	1.99
2SC288A	1.85
2SC3153	6.84
2SC372	1.40
2SC373	1.16
2SC383	1.33
2SC388	0.50
2SC394V	0.81
2SC403C	0.60
2SC458	0.15
2SC495	0.92
2SC515A	2.85
2SC535	0.79
2SC536	0.45
2SC537	0.54
2SC605L	1.16
2SC620	0.95
2SC643A	1.54
2SC668	0.67
2SC681	4.40
2SC682	1.88
2SC684	1.65
2SC693	0.63
2SC710	0.69
2SC711A	0.50
2SC717	1.28
2SC734	1.43
2SC761-Y	0.95
2SC783	3.98
2SC790Y	1.85
2SC828	0.28
2SC867A	3.84
2SC876	0.96
2SC930	0.54
2SC935	4.13
2SC940	4.68
2SD1128	2.90
2SD1138	0.94
2SD1273	1.56
2SD1453	1.40
2SD152K	2.64
2SD198	4.28
2SD234	0.49
2SD235	0.60
2SD24	2.29
2SD257	1.98
2SD292	2.59
2SD313	2.65
2SD325D	2.26
2SD350	5.20
2SD353	7.50
2SD389	2.41
2SD401	1.40
2SD414	1.98
2SD471	2.13
2SD560	2.95
2SD600	2.98
2SD601R	0.65
2SD613	1.03
2SD636	0.55
2SD639 R	3.96
2SD655	0.98
2SD657	3.50
2SD661A	0.11
2SD731	1.05
2SD773	0.60
2SD811	3.30
2SD823	1.98
2SD837	1.56
2SD841	2.60
2SD856	1.25
2SD857Q	1.84
2SD882	1.15
2SD894	1.75
2SD898	1.85
2SK105H	2.15
7805 T022	0.63
7808	0.85
7812-T022	0.35
7815	0.64
7905	0.80
AC133	0.12
AC127	0.27
AC128	0.34
AC138	0.24
AC141	0.29
AC142K	0.35
AC176	0.30
AC179	0.28
AC183	0.72
AC187	0.39
AC188	0.37
AC188K	0.43
AD140	1.06
AD143	1.93
AD145	1.60
AD161	0.30
AD162	0.30
AF114	2.47
AF115	0.79
AF118	1.20
AF127	0.79
AF139	0.40
AF178	1.45
AF179	0.55
AF180	0.55
AF181	0.53
AF186	0.53
AF239	0.43
AF279	0.88
AN115	3.98
AN155	1.89

AN206	2.58
AN208	3.55
AN210	2.28
AN211	3.25
AN214Q	2.40
AN234	5.92
AN236	3.78
AN240P	1.25
AN241	1.71
AN245	4.50
AN253	1.80
AN260	3.85
AN272	8.25
AN295	5.52
AN301	2.00
AN302	1.93
AN305	3.20
AN315	1.29
AN316	3.50
AN318	4.41
AN320	5.47
AN321	2.25
AN322	5.85
AN337	5.37
AN340P	1.17
AN355	5.98
AN362	1.32
AN370	3.95
AN5111	3.43
AN5120N	4.50
AN5132	5.39
AN5250	4.40
AN5610	5.50
AN5612	2.30
AN5613	4.20
AN5630	3.95
AN5701N	1.66
AN6250	0.33
AN6300	4.40
AN6310	4.54
AN6340	10.14
AN6341	1.43
AN6363	16.00
AN6531	1.95
AN6551	1.35
AN6552	0.68
AN6610	2.40
AN7111	1.25
AN7115	3.38
AN7145	1.68
AN7146	2.05
AN7151	2.37
AN7156	2.85
AN7158	2.34
AN7218	1.64
AN7223	4.25
AU107	3.50
AU110	2.25
AU113	6.40
AY105K	2.08
AY106	1.09
BA524	8.21
BA310	0.14
BA1310	1.98
BA1320	1.38
BA1322	3.95
BA1330	2.75
BA145	0.19
BA148	0.25
BA154	0.40
BA155	0.12
BA156	0.05
BA159	0.08
BA182	0.24
BA222	1.66
BA302	1.24
BA311	1.32
BA312	1.45
BA313	0.76
BA317	0.08
BA318	0.02
BA328	1.65
BA333	1.37
BA335	6.27
BA5102A	2.86
BA511	1.95
BA514	2.20
BA521	2.52
BA524	8.94
BA526	7.98
BA527	2.98
BA532	1.50
BA536	2.05
BA6209	4.55
BA656	1.00
BA7100	11.35
BA841A	28.98
BA843	3.96
BA854	5.76
BAV18	0.21
BAV19	0.11
BAV20	0.35
BAV21	0.12
BAW62	0.11
BAX12	0.48
BAX13	0.11
BAX16	0.11
BC107B	0.18
BC108B	0.15
BC109B	0.15
BC113	0.14
BC119	0.36
BC126	0.23
BC132	0.14
BC135	0.14
BC137	0.18
BC138	0.34
BC139	0.28
BC140	0.45
BC141	0.34
BC142	0.23
BC143	0.19
BC147	0.13
BC148B	0.13
BC148C	0.11
BC149B	0.13
BC153	0.14
BC154	0.14
BC159	0.36
BC160	0.40
BC161	0.28
BC168	0.36
BC169C	0.16
BC170	0.16
BC171	0.11
BC172B	0.27
BC173	0.17
BC174B	0.27
BC177	0.35
BC178	0.26
BC179	0.26
BC182	0.05
BC182LB	0.07
BC183LB	0.26
BC184	0.13
BC184LB	0.26
BC186	0.25
BC187	0.28
BC204	0.16

BC207	0.14
BC212B	0.26
BC213L	0.10
BC214	0.10
BC225	0.40
BC237	0.10
BC238	0.10
BC238B	0.08
BC239B	0.25
BC251A	0.31
BC294	0.50
BC300	0.35
BC301	0.45
BC302	0.53
BC303	1.04
BC307A	0.08
BC308A	0.11
BC309	0.17
BC317A	0.13
BC327	0.15
BC328	0.10
BC337	0.09
BC338	0.10
BC368	0.24
BC440	0.69
BC441	0.44
BC454	0.36
BC460	0.42
BC461	0.35
BC462	1.15
BC463	0.64
BC478	0.22
BC479	0.41
BC532	0.28
BC546	0.08
BC547	0.10
BC548	0.12
BC549	0.10
BC550	0.10
BC556	0.10
BC557	0.10
BC558	0.50
BC559	0.10
BC560C	0.14
BC635	0.36
BC636	0.28
BC637	0.24
BC639	0.20
BC640	0.24
BCX34	0.18
BD115	0.34
BD116	0.70
BD124	1.31
BD131	0.57
BD132	0.20
BD133	0.53
BD135	0.36
BD136	0.26
BD137	0.26
BD138	0.33
BD139	0.28
BD140	0.29
BD144	1.70
BD150	1.25
BD157	0.67
BD160	1.60
BD163	0.71
BD166	0.42
BD175	0.20
BD179	0.45
BD181	0.99
BD182	0.99
BD183	0.48
BD184	1.21
BD187	0.53
BD189	0.69
BD190	0.72
BD201	0.65
BD202	0.60
BD203	0.50
BD204	0.41
BD207	1.79
BD208	0.34
BD222	0.50
BD225	0.49
BD228	0.63
BD229	1.05
BD232	0.50
BD234	0.42
BD237	0.47
BD238	0.39
BD239	0.45
BD240	0.57
BD241	0.39
BD242	0.39
BD243A	0.35
BD243C	0.29
BD244	0.45
BD244C	0.79
BD245C	0.99
BD246C	0.77
BD253	0.60
BD278A	0.60
BD317	2.60
BD318	2.00
BD375	0.42
BD380	0.76
BD410	0.52
BD433	0.47
BD434	0.56
BD435	0.49
BD436	0.60
BD437	0.49
BD438	0.40
BD441	1.42
BD442	1.41
BD509	1.65
BD510	0.62
BD519	0.98
BD529	0.80
BD530	1.18
BD533	0.67
BD534	0.52
BD535	0.45
BD536	0.61
BD537	0.80
BD538	0.80
BD544B	0.83
BD677	0.69
BD679	0.57
BD680	0.76
BD681	1.48
BD696	2.47
BD699	3.49
BD700	3.70
BD707	0.98
BD709	1.05
BD710	0.80
BD809	0.80
BD810	0.69
BD879	0.74
BD895	2.31
BD901	0.99
BD902	0.84
BDW83C	1.45
BDW84C	1.56
BDX32	1.75
BDX53A	1.25
BDX53B	1.85

BDX54B	2.16
BDX62A	2.15
BDX63A	1.96
BDY20	1.21
BDY81	1.01
BF115	0.40
BF117	0.66
BF118	0.67
BF121	0.25
BF123	0.21
BF127	0.13
BF137	0.29
BF153	0.58
BF154	0.26
BF157	0.33
BF158	0.18
BF159	0.18
BF160	0.31
BF167	0.38
BF173	0.34
BF177	0.35
BF178	0.40
BF179	0.36
BF180	0.36
BF181	0.32
BF182	0.34
BF183	0.39
BF184	0.43
BF185	0.39
BF194	0.14
BF195	0.14
BF196	0.17
BF197	0.18
BF198	0.17
BF199	0.17
BF200	0.37
BF218	0.36
BF224	0.17
BF237	0.65
BF240	0.17
BF241	0.15
BF245	0.50
BF245B	0.49
BF246A	2.52
BF255	0.20
BF256	0.38
BF257	0.34
BF258	0.36
BF259	0.34
BF262	0.28
BF263	0.57
BF271	0.34
BF273	0.20
BF274	0.20
BF324	0.35
BF336	0.33
BF337	0.45
BF338	0.33
BF355	0.49
BF362	0.62
BF363	0.50
BF371	0.50
BF391	0.25
BF417	0.84
BF418	1.87
BF422	0.30
BF423	0.52
BF450	0.35
BF451	0.29
BF457	0.41
BF458	0.33
BF459	0.52
BF460	1.45
BF469	0.22
BF470	0.55
BF471	0.33
BF472	0.33
BF479	0.35
BF480	1.38
BF491	2.20
BF506	0.43
BF532	0.45
BF596	0.18
BF597	0.27
BF694	0.22
BF757	0.59
BF759	0.47
BF761	1.05
BF762	0.50
BF869	0.47
BF870	0.30
BF959	0.42
BF960	0.49
BF970	0.50
BFR39	0.44
BFR61	0.92
BFR62	0.50
BFR79	0.29
BFR81	1.65
BFR86	1.08
BFR88	1.63
BFR90A	0.90
BFX29	0.34
BFX84	0.37
BFX85	0.41
BFX86	0.36
BFX87	0.55
BFX88	0.34
BFX89	0.44
BFY50	0.30
BFY51	0.25
BFY52	0.27
BFY79	0.49
BFY90	0.61
BLY49	2.20
BR100	0.29
BR101	0.65
BR103	0.55
BR303	1.15
BRC84	2.08
BRX44	0.60
BRX49	0.67
BRY39	0.69
BSS38	0.87
BSTBD140G	5.25
BSTC0246	6.99
BSTC0233	7.25
BSTCC0143	3.07
BSTD1043	2.85
BSV57B	3.49
BSW68	0.60
BSX19	1.29
BSX20	0.30
BSY52	0.50
BSY79	0.51
BT108	1.45
BT119	1.76
BT120	2.17
BT121	2.48
BT123	1.98
BT151 800R	0.89
BTT6018	2.42
BU106	2.48
BU108	1.50
BU109	2.65
BU110	5.69
BU125	2.48
BU126	1.45
BU137	6.53

BU205	1.15
BU206	1.27
BU207	1.65
BU208	1.20
BU208/02	1.97
BU208A	1.12
BU208D	1.95
BU209	1.50
BU226	2.45
BU326	2.00
BU326A	1.20
BU406	1.49
BU406D	1.79
BU407	0.82
BU412	5.29
BU426A	1.13
BU500	1.45
BU508A	1.25
BU536	1.65
BU608	1.80
BU705	2.95
BU806	1.79
BU807	0.80
BU826A	1.95
BUW84	1.39
BUX84	1.00
BUX85	1.10
BY126	0.13
BY127	0.08
BY133	0.12
BY164	0.44
BY176	0.52
BY179	1.08
BY182	0.95
BY187	0.77
BY189	1.79
BY198	1.62
BY207	0.22
BY208	0.46
BY210 400	0.19
BY210-600	0.27
BY210-800	0.30
BY218	1.64
BY223	1.23
BY224 600	1.88
BY226	0.25
BY227	0.20
BY228	0.60
BY229 1000	1.12
BY229 600	0.92
BY255	0.66
BY295-600	1.03
BY298	0.36
BY299	0.45
BY407	0.90
BY409	1.49
BY448	1.35
BY713	0.65
BYW56	0.14
BYX55-600	0.23
BYX71 600	0.85
BYX71 350	0.72
BYY56	1.20
BZY93C30	1.86
BZY88 RANGE	0.10
BZX61 RANGE	0.18
BZX79 RANGE	0.10
C106D	0.46
C106M	0.74
CA3046	1.55
CA3089	0.83
CA3090AQ	3.25
CA3094	2.20
CA3131EM	2.95
CD4001	0.34
CD4002	0.27
CD4008	1.35
CD4011	0.29
CD4012	0.24
CD4013	0.23
CD4016	0.46
CD4017	0.82
CD4020	1.23
CD4021	0.39
CD4023	0.28
CD4025	0.64
CD4028	0.84
CD4040B	0.85
CD4047	1.06
CD4049	0.24
CD4052	0.75
CD4066	0.20
CD4069	0.29
CD4070	0.66
CD4081	0.35
CD4093	0.72
CD4511	1.10
CD4528	2.04
CD4556	1.47
CR02AM-8	1.70
CX095D	3.14
CX104	9.64
CX108	12.48
CX109	7.86
CX130	8.76
CX134	12.32
CX136	11.49
CX139	11.83
CX157	5.52
CX158	5.50
CX177	6.46
CX187	6.84
CX755	12.95
CX885A	6.85
E1222	0.40
E5024	0.28
E5386	0.25
GD243	4.34
GF758	0.84
HA11215	1.75
HA11211	2.53
HA11225	1.12
HA11229	1.96
HA11235	1.47
HA11124	5.25
HA1125	1.17
HA1137W	1.26
HA1138	5.03
HA11414	5.65
HA1156	0.80
HA1160	4.78
HA1166X	6.43
HA1167	6.45
HA11706	3.61
HA11705	5.00
HA11703	3.84
HA11701	2.98
HA11710	3.13
HA11713	9.75
HA11711	7.50
HA11715	3.25
HA11714	9.75
HA11716	13.10
HA11725	18.26
HA11725MP	16.00
HA117555P	6.23
HA11781	19.90
HA1180	5.15

HA1196	7.43
HA13001	1.73
HA1306	2.26
HA13402	7.87
HA13342	2.65
HA13365	4.02
HA1366WR	1.51
HA1367	2.75
HA1368R	2.45
HA1368	1.76
HA1370	3.30
HA1374	4.80
AA117	9
HA1377	1.75
HA1389R	2.05
HA1389	2.39
HA1392	2.17
HA1394	1.95
HA1397	2.17
HA1398	2.29
HA1406	1.30
HA1452	0.85
HD14538	2.07
HD38702-A2	7.95
HD38750A53	10.44
HD38750A-7	7.25
HD38800A50	14.09
HD44801A05	19.98
HISH1010	8.59
HiSH1004	6.00
HISH1002	9.50
HM6231	9.81
HM6232	5.25
HM6251	5.25
HM7103	4.85
HM9032	9.98
HM9012	3.22
HM9015	3.24
HT4207	17.16
HT4208	20.65
KA2101	2.92
KC581C	7.60
KC582C	3.97
L200CV	1.69
LA1201	0.75
LA1210	1.33
LA1230	1.05
LA1320	2.87
LA1357N	11.07
LA1363	1.05
LA1364	1.03
LA1365J	2.08
LA1385	1.53
LA1387	5.95
LA3350	1.00
LA3361	0.91
LA3390	5.52
LA4032P	1.40
LA4100	0.87
LA4101	0.94
LA4102	0.75
LA4112	0.56
LA4125	1.88
LA4138	4.55
LA4140	0.70
LA4192	1.55
LA4220	1.04
LA4420	1.35
LA4422	1.72
LA4430	1.29
LA4440	1.81
LA4445	3.95
LA4460	1.47
LA4461	2.95
LA5112N	1.16
LA7020	13.86
LA7025	11.97
LA7027	10.92
LA7040	9.20
LA7042	3.90
LA7800	1.00
LA7801	1.30
LB1274	3.61
LC7800	9.20
LD3120	1.13
LD3150	2.75
LM1017N	1.75
LM1877	13.43
LM2808	6.25
LM2877	7.45
LM317CKC	1.08
LM324N	0.98
LM339N	0.35
LM340K	11.85
LM348N	2.15
LM380N	2.80
LM384N01	3.25
LM567CN	1.71
LM6402/011	10.23
LM6402A093	10.15
LM748	0.69
LM8360	3.87
LM8361	3.57
LR3419	9.37
LR3471	9.37
LU1141	7.27
LU52012	5.95
LU52011	14.95
LU03112	12.37
M193	6.83
M21C	1.13
M23C	1.98
M293	6.95
M51102L	1.86
M5115P	5.24
M51203L	3.15
M51231P	0.95
M5134 9341	4.13
M51353P	5.25
M51381P	5.45
M51393AP	9.35
M51394P	14.05
M5142P	6.85
M5144P	2.97
M51513L	1.56
M51515BL	2.15
M51517L	1.61
M5192	2.20
M5194AP	5.74
M5231L	1.95
M53274P	1.33
M54532P	1.88
M54544L	3.45
M58478P	8.77
M58485P	14.25
MA06	1.07
MA8001	0.82
MA8003	1.16
MB3705	1.44
MB3712	1.00
MB3713	1.69
MB3730	2.09
MC13002	3.60
MC1310P	0.58
MC1327P	0.40
MC1330P	1.91
MC1350P	1.66

MC1351P	2.96
MC1352P	2.50
MC1357P	2.15
MC1358P	1.35
MC14001	2.40
MC14013	0.41
MC14493P	7.65
MC14494P	2.15
MC14497	3.46
MC14510BAL	3.75
MC14511BCP	1.10
MC14528BCP	2.15
MC1712	3.88
MC5192	19.50
MC7724CP	3.49
MC7818C	2.18
MCR106 5/6	0.95
MCR220/7	2.28
ME0411	0.28
ME6002	0.26
ME6102	0.28
ME8001	0.34
ME0411	0.75
MJ2501	3.30
MJ3001	1.76
MJ481	1.53
MJ802	4.90
MJE2955	1.89
MJE3055	1.25
MJE340	0.49
MJE520	0.49
ML231	3.33
ML232B	3.01
ML237B	2.51
ML238	5.77
ML923	3.00
ML926	3.98
MM5314N	8.99
MM5316N	9.16
MM5318N	3.11
MM5369N	2.01
MM5387AA/N	6.20
MM5841N	6.64
MN1400VL	13.65
MN1405	12.50
MN1435VX	12.40
MP1192	5.07
MP2794	4.00
MP2812	5.07
MP8512	1.57
MPC596	2.13
MPF256C	0.60
MPS6570	0.48
MPSA42	0.65
MPSA56	0.27
MPSA92	0.72
MPSU05	0.86
MPSU10	1.45
MPSU56	0.78
MPSU60	1.98
MR818	0.33
MR854	0.85
MR914	1.20
MSM5816RS	17.35
MSM5840H	15.15
MVS460-02	0.61
NE542	2.65
NE555	0.16
NE556	0.65
NP1106	7.25
OA202	0.11
OA47	0.16
OA91	0.14
OA95	0.13
OC28	2.95
OC29	2.15
OC36	1.28
OC44	0.35
OC45	0.18
OC72	0.44
OC75	0.44
ON236	1.06
ON782	1.98
OT121	1.45
PT6042	2.45
PT8504	4.98
R1038	2.19
R1039	2.19
R2008B	1.33
R2009	1.98
R2010B	1.33
R2029	1.33
R2030	1.33
R2257	3.71
R2265	1.49
R2305	1.18
R2322	2.59
R2323	0.76
R2354A	2.01
R2354B	2.01
R2443	0.88
R2461	1.50
R2540	1.91
R2540X	3.30
R2615	0.67
RCA2060	2.00
RGP01-15	1.65
RGP10	0.30
RGP30M	0.28
RT402	1.58
RT905A	2.38
S1299	5.34
S2800D	5.54
S2802	3.47
S2818	3.05
S3702S	6.15
S40W	18.64
S6080B	8.80
SA8063	5.17
SAA1006	1.85
SAA1020	4.76
SAA1025	4.40
SAA1024	2.81
SAA1075	4.25
SAA1121	7.44
SAA1130	4.99
SAA1174	7.77
SAA1250	4.15
SAA1251	2.20
SAA1351	8.11
SAA3027P	2.55
SAA5000	2.50
SAA5010	4.40
SAA5012	5.50
SAA5020	5.78
SAA5030	8.25
SAA5050	7.74
SAB1009B	5.98
SAB3011	7.34
SAB3013	3.76
SAB3021	7.90
SAB3024	6.36
SAB3209	5.82
SAB3210	3.10
SAF1032P	3.58
SAF1039	2.95
SAS5010	8.39
SAS560S	1.86

SAS560T	5.42
SAS570T	5.42
SAS570S	2.61
SAS580	2.25
SAS6600	1.33
SAS660	2.97
SAS6700	1.33
SAS670	3.96
SAS6710	2.21
SBA750	1.61
SC84203	19.35
SC9504P	1.46
SDA2006	17.95
SDA2112/2	12.85
SG264A	6.45
SG613	10.75
SG629	8.27
SG6533	11.96
SI1125H	7.50
SI1225HD	18.35
SI1630HD	20.50
SKE2F1/04	1.39
SKE2G3/04	0.85
SKE4F1/06	0.35
SKE4F2/08	1.07
SKE4F2/06	0.44
SKE4F2/10	1.24
SKE4G2/02	0.96
SKE5F3/10	1.60
SKS1/10	2.15
SL1310	3.14
SL1430T	0.89
SL414	3.69
SL432A	3.44
SL439	2.48
SL471	2.50
SL480	3.98
SL490	1.25
SL901B	6.95
SL918A	9.07
SN16861ANO	1.95
SN16862AN	2.98
SN16966N	10.25
SN29717N	7.19
SN29716N	3.66
SN29715N	6.04
SN29722	11.95
SN29723AN	8.77
SN29764AN	1.65
SN29767	4.90
SN29770BN	1.95
SN29772BN	4.91
SN29771BN	1.65
SN29791	2.98
SN29798N	5.56
SN2709	0.44
SN7400N	0.34
SN7401N	0.36
SN7402N	0.65
SN7404N	0.52
SN7408N	0.27
SN7410N	0.27
SN74121	1.60
SN7413N	0.74
SN74141N	2.65
SN74151AN	1.51
SN74154N	1.27
SN74190	1.35
SN7420N	0.55
SN7430	0.49
SN7440N	0.27
SN7472	1.54
SN7474N	0.44
SN7490AN	0.93
SN74LS26N	1.45
SN76001N	1.65
SN76003ND	3.50
SN76023N	2.75
SN76023ND	3.96
SN76033N	3.65
SN76110N	1.13
SN76115AN	1.61
SN76131	1.92
SN76227N	0.85
SN76226DN	2.00
SN76228N	3.27
SN76242	8.95
SN76243	8.50
SN76396	2.90
SN76533N	2.47
SN76532N	0.95
SN76545	1.95
SN76546N	3.30
SN76549	2.59
SN76570	3.08
SN76611	2.59
SN76620	2.59
SN76660N	2.48
SN76666N	1.20
SN76708	4.86
SN76709N	3.30
SN76707N	5.11
SN76705N	6.60
SN76730	6.00
SN76810N	0.60
SN76832N	1.35
SN94041	5.54
SN94042	5.54
SP8385	0.55
SPS5384	1.98
ST1702L	0.99
STA401	6.76
STA441C	3.00
STA471C	7.95
STK0029	3.33
STK0050	5.63
STK016	8.45
STK022	5.25
STK031	12.95
STK040	13.34
STK054	7.13
STK058	27.50
STK077	5.96
STK1039	5.10
STK2110	7.33
STK2145	16.95
STK2240	16.65
STK2250	18.95
STK3042	4.95
STK3044	5.75
STK4019	4.50
STK433	6.25
STK4332	4.30
STK435	4.93
STK4352	1.95
STK436	3.95
STK437	5.62
STK4372	11.15
STK460	7.02
STK466	11.77
STK4833	10.95
STK501	5.28
STK502	7.25
STK5314	12.40
STK5730	2.99
STK7216	14.50
STK772	6.95
STR1096	4.98
STR4090	10.55

STR440	4.78
STR451	5.36
STR453	8.16
STR454	4.95
STR6020	5.25
T6029V	5.75
T6035V	0.73
T6036	0.67
T6037	2.11
T6044V	0.97
T6045	1.20
T6049	1.45
T6052V	0.87
T6058	3.08
T6059	2.77
T9003V	1.25
T9005V	2.38
T9011V	1.40
T9013V	4.95
T9014V	2.42
T9016	1.02
T9019W	1.98
T9034V	1.45
T9035V	1.95
T9051	6.95
T9054V	5.34
T9057V	0.70
T9062V	0.49
T9064	1.25
TA7027	4.80
TA7050	1.74
TA7051	1.74
TA7054	0.80
TA7060AP	0.71
TA7061AP	1.27
TA7069	3.13
TA7070P	1.83
TA7072P	2.57
TA7074P	1.98
TA7076P	7.80
TA7089P	2.82
TA7092P	8.65
TA7093P	3.99
TA7102P	5.88
TA7108P	1.61
TA7109	3.71
TA7122B/P	0.92
TA7124P	2.34
TA7129P	1.50
TA7130P	0.63
TA7136AP	1.89
TA7137P	0.73
TA7141AP	3.87
TA7146	2.50
TA7146P	4.23
TA7148P	1.67
TA7149P	3.26
TA7152P	2.72
TA7161P	4.50
TA7162P	3.61
TA7172P	1.41
TA7176P	1.54
TA7193P	3.84
TA7204P	2.16
TA7206P	12.49
TA7207P	2.34
TA7208P	1.12
TA7210P	1.45
TA7214P	3.63
TA7215P	2.07
TA7217AP	1.45
TA7222	1.12
TA7226	3.57
TA7229P	2.13
TA7230P	1.30
TA7233P	1.67
TA7240AP	3.55
TA7245P	3.55
TA7310P	0.94
TA7313AP	1.36
TA7314	1.90
TA7323P	3.15
TA7325P	0.61
TA7339P	1.85
TA7340P	5.95
TA7607AP	2.10
TA7609	2.65
TA7611AP	2.32
TA7616P	5.25
TA7622AP	8.94
TA7628P	2.50
TA7629P	7.50
TA7630P	0.95
TA7640AP	1.08
TA7672P	2.55
TA7676P	2.81
TA7726P	12.50
TAA320A	1.27
TAA350A	6.45
TAA570	1.85
TAA621AX1	4.85
TAA621A12	2.14
TAA661B	2.62
TAA691	8.58
TAA700	2.37
TAA930	4.87
TAA970	2.83
TAG626 600	1.20
TBA120AS	0.69
TBA120SB	1.05
TBA120T	0.97
TBA120U	0.62
TBA120A	1.05
TBA1440	1.78
TBA1441	1.62
TBA240A	2.65
TBA395	1.10
TBA395Q	1.10
TBA396	1.20
TBA400	2.39
TBA440C	2.34
TBA480Q	1.30
TBA510	2.11
TBA520	1.15
TBA520Q	1.68
TBA530	1.30
TBA530	1.30
TBA540	1.15
TBA540Q	1.15
TBA560C	1.40
TBA560CQ	1.60
TBA570Q	1.35
TBA570A	1.71
TBA651	0.87
TBA673	2.60
TBA700	1.85
TBA720	3.50
TBA730	3.55
TBA750Q	2.90
TBA760	1.71
TBA800	0.92
TBA810S	1.61
TBA810T	1.50
TBA810AS	1.00
TBA820	1.52
TBA820M	0.82
TBA890	2.50
TBA920	1.53
TBA920Q	2.31

TBA940	1.87
TBA950	1.84
TBA970	3.56
TBA990	1.98
TBA990Q	1.68
TCA270Q	1.86
TCA270S	0.95
TCA270SQ	1.05
TCA290A	2.39
TCA420A	2.16
TCA440	2.25
TCA530	2.24
TCA640	2.25
TCA650	3.05
TCA660B	2.60
TCA730	3.81
TCA750	2.25
TCA800Q	6.95
TCA830S	2.38
TCA890	5.44
TCA900	2.04
TCA910	2.04
TCA940	2.47
TCA940E	2.93
TD3F800R	3.66
TD3F900H	4.16
TD62706P	4.50
TDA1001B	2.31
TDA1003A	2.25
TDA1005A	2.38
TDA1006A	2.11
TDA1010AF	4.25
TDA1011	0.95
TDA1010	1.28
TDA1011A	1.03
TDA1028	2.45
TDA1034B	2.42
TDA1035S	2.95
TDA1035T	1.85
TDA1037	1.95
TDA1037D	2.05
TDA1044	1.95
TDA1047	3.25
TDA1059B	0.98
TDA1054M	1.35
TDA1060	2.60
TDA1082	3.25
TDA1151	1.22
TDA1190	2.11
TDA1190Z	3.96
TDA1200	1.51
TDA1235	3.88
TDA1236	4.30
TDA1270	3.55
TDA1327A	1.33
TDA1412	0.92
TDA1420	2.55
TDA1440	3.45
TDA1470	2.90
TDA1470P	4.25
TDA1506	7.85
TDA1510	4.60
TDA1512	3.69
TDA1515	2.60
TDA1559	3.15
TDA1670	4.48
TDA1770	6.85
TDA1905	1.27
TDA1908	2.98
TDA1940	1.95
TDA1950	2.95
TDA2005	1.45
TDA2006	1.32
TDA2004	1.48
TDA2002	0.69
TDA2003	1.00
TDA2030	1.45
TDA2140	1.68
TDA2150	6.20
TDA2151	2.07
TDA2160	4.01
TDA2161	1.85
TDA2170	2.88
TDA2270	2.25
TDA2520	2.37
TDA2522	3.46
TDA2524	4.50
TDA2521	3.71
TDA2525	3.80
TDA2532	0.82
TDA2530	2.55
TDA2541	1.88
TDA2540	0.66
TDA2545Q	5.94
TDA2560	0.76
TDA2575A	0.50
TDA2578A	2.57
TDA2576A + Kit	12.35
TDA2581	1.60
TDA2582	1.80
TDA2591	2.50
TDA2594	3.40
TDA2593	2.47
TDA2595	1.69
TDA2600	5.60
TDA2611AQ	2.98
TDA2612Q	4.68
TDA2611A	1.05
TDA2610	3.08
TDA2620	2.15
TDA2630	1.96
TDA2631	2.73
TDA2640	2.95
TDA2652	13.45
TDA2653	2.95
TDA2654	6.18
TDA2670	2.54
TDA2680	3.20
TDA2740	6.00
TDA2780AQ	5.14
TDA2795	2.78
TDA2791	2.5
TDA2910	13.25
TDA3300B	6.98
TDA3330	2.95
TDA3506	4.40
TDA3501	7.25
TDA3500	4.25
TDA3510	5.95
TDA3520	9.71
TDA3540	6.99
TDA3541	2.22
TDA3560	4.25
TDA3571Q	2.83
TDA3576	7.48
TDA3590	5.79
TDA3591	6.45
TDA3650	5.90
TDA3652	2.60
TDA3651AQ	3.95
TDA3651	2.95
TDA3651A	2.96
TDA3950	4.50
TDA4050B	3.95
TDA4280	5.95
TDA4290	4.47
TDA4400	2.27
TDA4420	2.55
TDA4422	3.65
TDA4427S	9.00

TDA4431	2.27
TDA4440	3.26
TDA4442	4.15
TDA4500	4.75
TDA4600-2	2.10
TDA4610	6.88
TDA4620	4.78
TDA5500	6.20
TDA5700	2.75
TDA7270S	2.25
TDA8190	2.75
TDA9403	3.15
TDA9503	1.95
TDA9513	3.15
TDB1033	2.68
TDE1081	7.05
TEA1002	2.30
TEA1009	1.50
TEA1014	2.50
TEA1020SP	8.21
TIC106C	0.61
TIC106M	0.77
TIC44	0.72
TIC45	0.50
TIC47	0.35
TIP120	1.06
TIP110	0.45
TIP112	0.54
TIP117	0.50
TIP121	0.50
TIP126	0.73
TIP132	0.99
TIP137	1.50
TIP29	0.84
TIP2955	0.95
TIP29A	0.46
TIP29B	0.63
TIP29C	0.40
TIP29D	0.75
TIP3055	0.75
TIP30A	0.41
TIP30C	0.16
TIP31A	0.34
TIP31B	0.38
TIP31C	0.50
TIP32A	0.35
TIP32B	0.69
TIP32C	0.40
TIP33	0.85
TIP33A	1.05
TIP33C	0.80
TIP34	0.50
TIP41A	0.49
TIP41B	0.65
TIP41C	0.25
TIP42A	0.49
TIP42B	0.53
TIP42C	0.25
TIP47	0.37
TIS43	1.43
TIS90	0.28
TL011CP	0.95
TL494CN	8.95
TLD72CP	2.55
TMP4320	15.00
TMS1024NLL	13.75
TMS1025N	16.95
TMS3720ANS	5.25
TMS3748NS	14.95
TMS3755	13.65
TMS3894NL	19.25
TMS5102NLL	6.25
TUA2000	8.98
TY6010B	2.97
ULN2204	8.50
UPA53C	4.94
UPC1003	5.95
UPC1009C	8.95
UPC1025H	2.20
UPC1028H	0.86
UPC1032H	0.62
UPC1042C	8.95
UPC1156H	1.45
UPC1161C	4.98
UPC1182H	1.50
UPC1186H	0.79
UPC1181H	1.03
UPC1185H	2.10
UPC1188	7.40
UPC1212C	1.72
UPC1225H	3.25
UPC1230	1.78
UPC1238	1.15
UPC1278H	2.15
UPC1351C	1.81
UPC1350C	1.00
UPC1353	1.40
UPC1355C	2.13
UPC1363	1.00
UPC1362	2.64
UPC1365C	1.65
UPC1366	2.25
UPC1360C	4.51
UPC1378H	1.25
UPC141C	4.95
UPC1458	3.34
UPC151C	2.95
UPC2002	1.48
UPC30C	2.51
UPC324C	4.17
UPC32C	5.25
UPC339C	4.35
UPC41C	4.10
UPC4558C	2.15
UPC474	5.11
UPC554C	1.21
UPC575C2	0.77
UPC580C	2.85
UPC587C2	1.34
UPC592H	2.15
UPC595	1.15
UPC596	1.80
UPD1514C	4.76
UPD2819C	4.98
UPD4013B	4.00
UPD4066B	4.95
UPD553-164	19.52
UPD8049C-1	11.50
X0022CE	5.75
X0029CE	7.09
X0031CE	4.95
X0035TA	5.98
X0040TA	4.50
X0042CE	4.35
X0043CE	2.75
X0056CE	6.25
X0057GE	6.00
X0062CE	8.35
X0065CE	4.60
X0074GE	10.00
X0077GE	15.96
X0079CE	4.95
X0092CE	4.95
X0096CE	5.95
X0109CE	11.25
X0113CE	2.07
X0195CE	7.50
X0204CE	8.74
X0261CE	8.75
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VCR4600 VCR9000 — **VHS T**

FERGUSON/JVC
Machine Nos.: 3292 8903 3V00 3V01 3V06 3V16 3V22 3V23 3V24 3V29 3V30 3V31 3V35 3V36 3V38 3V39 3V49 — **VHS A**

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GEC
Head Part Nos.: 5458161 5458165
Machine Nos.: 4000H 4001H 4002H — **VHS I**
Head Part Nos.: 5458282 5458413 5458415 5458992
Machine Nos.: 4001H 4004H — **VHS K**

HITACHI
Machine Nos.: VT3000 — **VHS A**
Head Part Nos.: 5458104
Machine Nos.: VT4000 VT4200 VT5000 VT5500 — **VHS H**
Head Part Nos.: 5458161 5458165
Machine Nos.: VT6500 VT7000 VT8000 VT8040 VT8100 VT8500 VT8700 VT9000 VT9300 VT9500 VT9700 VT9900 — **VHS I**

Head Part Nos.: 5458282 5458413 5458415 5458992
Machine Nos.: VT11 V14 VT33 VT34 VT330 VT340 VT5030 VTP10 VTP30 — **VHS K**

ITT
Machine Nos.: VR3605 VR3033 VR3905 VR3913 VR3914 VR3935 VR3943 VR3963 VR3993 VR3975 VR3985 VR3986 VR3833 — **VHS A**

JVC (see also Ferguson)
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MITSUBISHI
Machine No.: HS200 — **VHS A**
HS7008 — **VH700**

NATIONAL PANASONIC
Head Part Nos.: VEH0099 0103 0115 0121 0131
Machine Nos.: NV300 NV322 NV332 NV333 NV340 NV390 NV2000 NV3000 NV7000 NV7200 NV7500 NV7800 NV7850 NV8170 NV8200 NV8400 NV8600 NV8610 NV8620 — **VHS B**
Head Part Nos.: VEH0171 VEH0218
Machine No.: NV370 NV3708 — **VHS M**
Head Part Nos.: VEH0171
Machine No.: NV330 NV777 — **VHS N**
Head Part Nos.: VEH0286
Machine No.: NV430 — **VHS W**
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Machine No.: NV366 — **VHS X**

SHARP
Head Part Nos.: DDRMU 0002 HE17/21/27
Machine No.: VC581/2/3 651 681/2/3/5 659 699 — **VHS S**
Head Part Nos.: DDRMU 0001 HE00 0002 HE02 04 05 06
Machine No.: 2C9 VC110 VC200 VC220 VC300 VC381 VC384 VC386 VC387 VC388 VC477 VC481 VC482 VC930 VC970 VC3300 VC9100 VC9300 VC9400 VC9500 VC9600 VC9700 — **VHS C**
Head Part Nos.: DDRMU 0001 HE09
Machine No.: VC7300 VC7700 VC7750 — **VHS D**
Head Part Nos.: DDRMU 0001 HE10
Machine No.: VC6300 — **VHS E**
Head Part Nos.: DDRMU 0001 HE12
Machine No.: VC8300 — **VHS L**
Head Part Nos.: DDRMU 0001 HE14
Machine No.: VC2300 — **VHS F**

SANYO
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Machine No.: VTC5000 VTC5150 VTC5300 VTC5400 — **BETA D**
Head Part Nos.: 1430242 T02200
Machine No.: VTC5350 VTC5500 — **BETA D**
Head Part Nos.: 1430762 T02000
Machine No.: VTC9300 VTC9455 VTC9500 — **BETA X**
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Machine No.: VTC9300PS VTC9350 — **BETA X**

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Head Part Nos.: A6762 044A, 044B, 054A, 147A
Machine No.: SL3000, 8000, 8080, SLT 6Me, 7, 7E, 7ME — **BETA A**
Head Part Nos.: A6762 012A, 038A, 055A, 129A
Machine No.: SL5W, 5000 5100 SLC5, C6, C7 — **BETA B**
Head Part Nos.: A6762 072A, 122A, 136A, 139A, 213A
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01X0 040 002	£48.32
01X0 056 013	£61.55
01X0 057 002	£31.36
01X0 082 001	£46.02
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691 201 12	£61.66
691 201 66	£61.93
691 201 78	£49.96
691 202 87	£55.37

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VID2	01X0-018-024	Take up idler T3292/PU47752	5.00
VID3	01X0-018-025	Rewind idler assembly T3V16/PU49282	6.20
VID4	01X0-018-729	Take up idler T3V00/PU49280	6.95
VID5	01X0-040-006	Loading belt T3V29/30/PU48941-2	0.50
VID6	01X0-033-454	Roller Assy. (cass. Housing) T3V23/PU49042	4.50
VID7	01X0-040-007	Take up idler 3V29/30/PU48967B	2.90
VID8	01X0-040-017	Reel motor assembly 3V29/30/PU51381V	27.95
VID9	01X0-065-009	Capston motor 3V35/36/38/39/PU55371V	27.00
VID10	01X0-065-016	Cass. housing Assy. 3V35/36/38/39/PU29825	27.00

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VID11	V5577355	GEC 4100/Hitachi VT11E capston motor	21.90
VID12	V6413663	GEC 4000/Hitachi VT33 f/f rewind arm	2.10
VID13	V6861471	GEC 4001/2/Hitachi 93/9500 f/f rewind arm	1.70
VID14	V6861482	GEC 4001/2/Hitachi 93/9500 play idler assy.	4.75
VID15	V6886971	GEC 4004/Hitachi VT33 f/f rewind arm	1.80
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NATIONAL PANASONIC

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VID23	VXP0401	Idler wheel NV333	0.90

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VID26	PR2758	Pinch roller VTC5000/5150	3.85
VID27	1430490400900	Gear idler Fisher FVH-P615	6.50
VID28	1430420400300	Heart idler Fisher FVH-P615	6.05

SHARP

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VID31	NIDL0006	Idler VC387H etc	1.95
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Storing TV Pictures in Chips

Part 4

Eugene Trundle

In previous instalments we've dealt with memory arrangements for freeze frame, graphics effects and other applications where a complete TV field has to be stored, and for picture-in-picture displays where the memory capacity required is much less. This month we'll take a look at the multi-function memory system used in current Sanyo digital VCRs.

Sanyo System

The Sanyo VHRD500/700 series of VCRs offers a comprehensive range of digital functions. Picture information is quantised in six-bit form and is stored in three memory chips, two for the luminance (Y) data and one for chrominance (U, V) data. The total memory capacity available is just under 1·5Mbits, of which 1·232Mbits are used. Because the PIP feature is included, the video signal to be stored is first decoded to YUV form – as described last month – before AD conversion and is subsequently recoded to PAL form for display.

Outline

An outline of the system, in block diagram form, is shown in Fig. 22. In the freeze frame and mono-strobe modes the stored picture occupies the full screen area, so considerable detail must be committed to memory. Hence the separate Y and chroma AD conversion and memory sections. 10MHz/100nsec sampling with 6-bit quantisation is used for the Y signal, giving an overall frequency response of about 4MHz, which is comparable with the resolution capabilities of an ordinary tube. The decoded V and U signals are alternately selected by a time-division-multiplex switch before being sampled at a rate of 2·5MHz and then stored in 6-bit form.

AD Conversion

AD conversion details for the YUV signals are shown in Fig. 23. A.G.C. is used to maintain the luminance component within 1V (from black level to white), then the black level is clamped at 2·75V. The sync pulses are not sampled or AD converted: in the full-screen memory modes sync pulses are generated and inserted between memory read-out lines. The chrominance components can be positive- or negative-going: the zero crossover point is clamped at 3·25V and the maximum signal excursion is limited to 1V peak-to-peak by a.g.c. action. Alternate sampling of the U and V signals is controlled by a control multiplex (CMPX) signal that's generated by the memory-control chip.

Memory Arrangement

The arrangement of one of the RAM chips is shown in Fig. 24. The incoming data first enters a 256 × 6 bit register, shown at the top, and is then transferred to individual memory cells. The main RAM section, shown at the centre, is arranged in 256 rows and 320 columns, giving a storage capacity of 491,520 bits. An output data register completes the system. This is similar to the line buffer memory previously mentioned, and enables reading and writing to be done at different rates.

The use of two memory chips for the Y data is interesting. The 6-bit data is fed to both chips in parallel, each chip being alternately enabled by SIC (serial in clock) and /SIC pulses – see Fig. 25. This allows slow memories to be used. During the readout each chip is enabled in turn by the Y1A and Y1B pulses: the outputs are selected by the Y multiplex switch which is driven by an identical squarewave to Y1A. Waveforms 1-11 in Fig. 25 clarify the process and show how the data is shared between the two memories and then reassembled for DA conversion.

Chroma Memory

The lower part of Fig. 25 illustrates the operation of the chroma memory. As previously mentioned, the U and V signals are time multiplexed. The data entering the memory, slower than in the case of the luminance data, corresponds to waveform 12 in Fig. 25. Storage in the memory is controlled by the 5MHz SIC signal, which is divided by two within the chip. Readout is controlled by the SOC (serial out clock) signal, the interleaved U and V data being passed to two DA converters. Each latches only its own data, under control of the DACK and / DACK signals respectively. Waveforms 15-18 show the readout and DA processes and the derivation of continuous U and V signals.

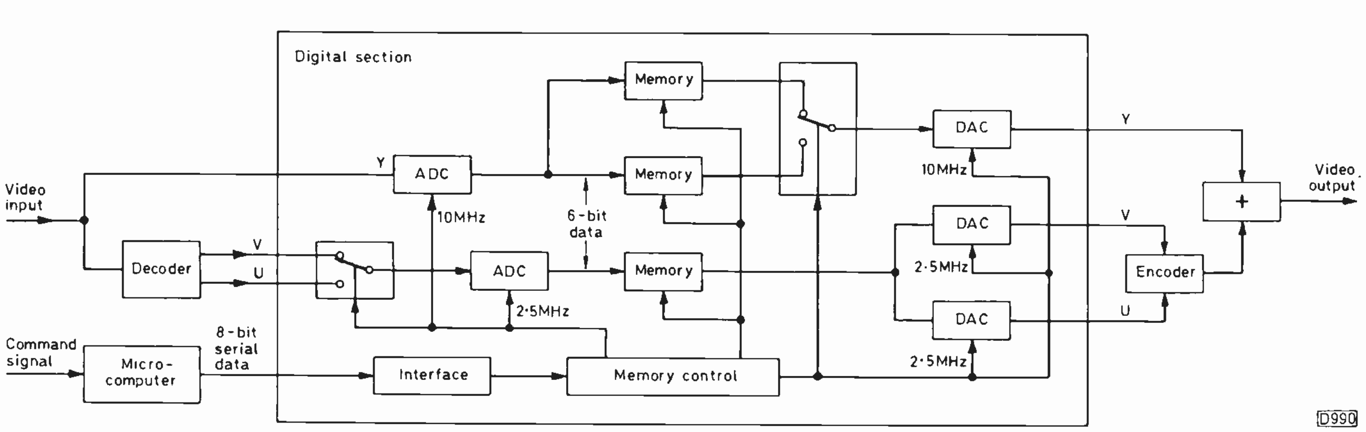

Fig. 22: Signal/data routing and memory arrangement used in the Sanyo VHRD500 VCR.

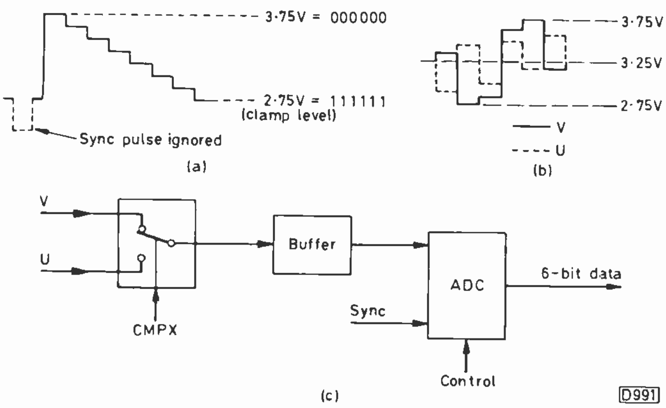

Fig. 23: Clamping, AD conversion and the chroma multiplex system used in the Sanyo VHRD500. (a) Luminance waveform, (b) chroma waveform, (c) simplified block diagram for chroma AD conversion.

An area of 248 × 276 × 6 is used in each of the three memory chips, making a total of 1,232,064 stored bits.

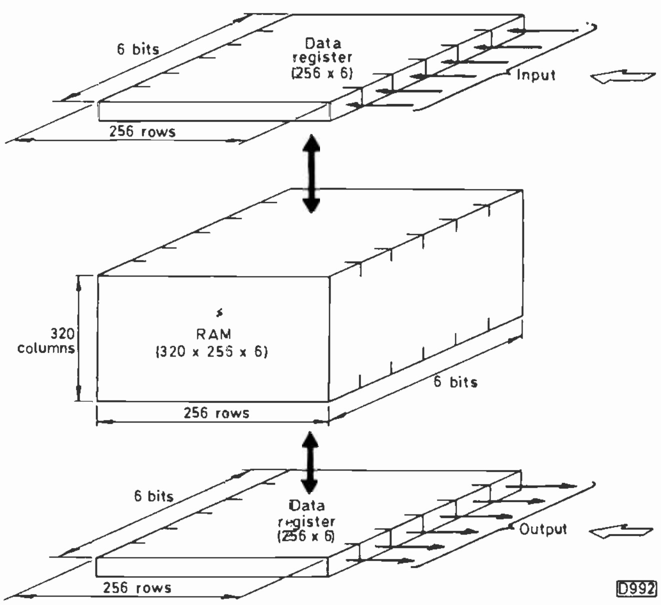

Fig. 24: Three-dimensional representation of the RAM chips used in the Sanyo VCR. The machine uses three such RAMs, two for luminance and one for chroma data.

PIP Memory Map

Fig. 25 showed the use of the memory in the still mode, in which the stored data provides a whole-screen display. In the PIP mode the memory area is divided, rather like the screen itself. Fig. 26 shows the Y data for a single PIP display stored in one corner of the memory array, occupying about one ninth of its area. Waveform 1 represents the incoming Y signal. Two out of every three lines and two out of every three pixels in the stored lines are discarded so that the input for the PIP display is effectively compressed to one ninth of its original area. The SIC trains, waveforms 2 and 3, also run at a third of the normal 5MHz rate, i.e. 1·67MHz. As before the Y data is

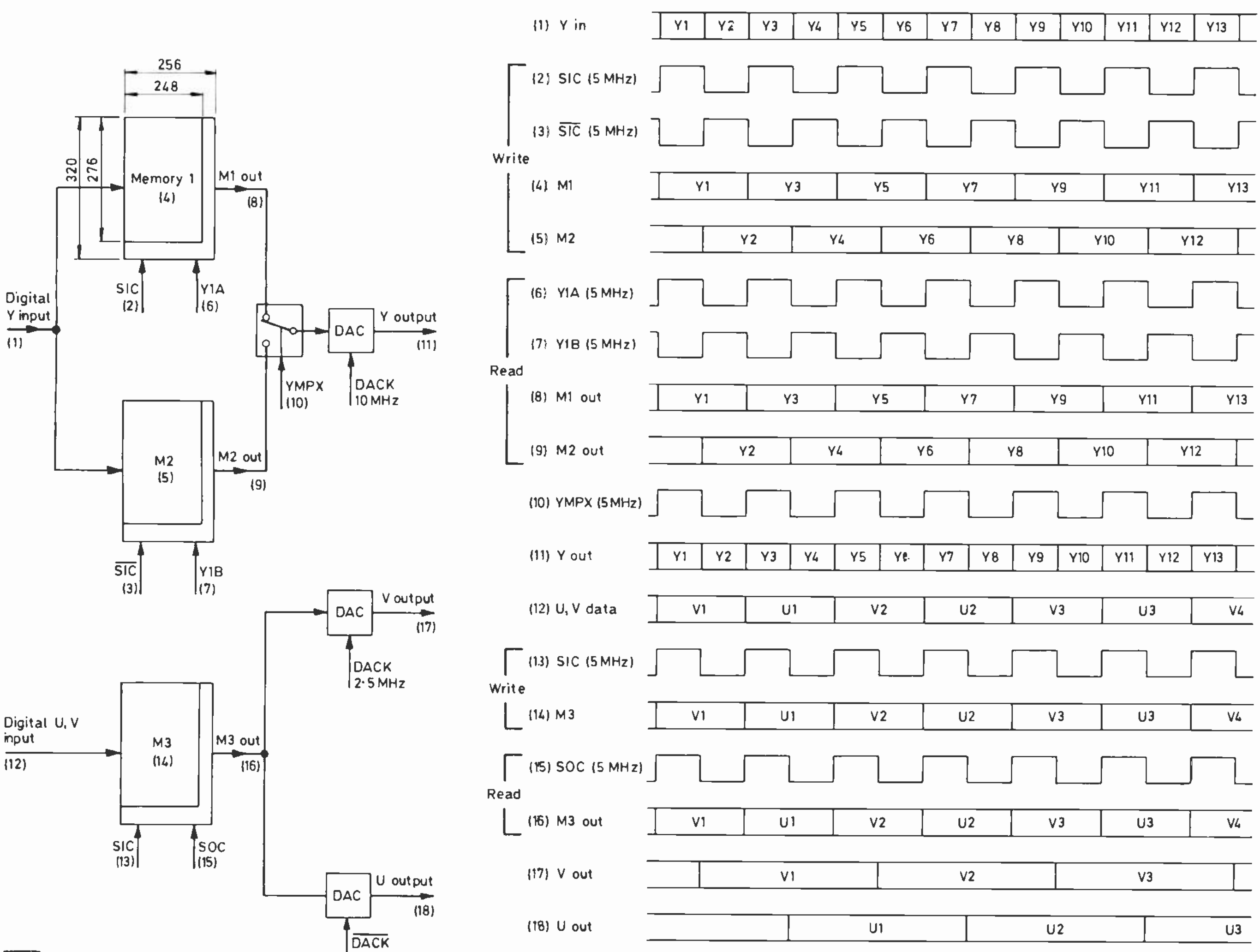

Fig. 25: Memory maps for the full-screen still mode. The time-related chart shows data-transfer timing.

alternately fed into the two storage chips, so memory one stores Y1, Y7, Y13 etc. while memory two stores Y4, Y10, Y16 etc., as shown in waveforms 4 and 5. The memories thus become loaded to the extent of 82 rows and 92 columns during a full field period. Clearly there's room for another eight PIPs if required.

Waveforms 6-11 illustrate PIP readout. Signals Y1A and Y1B interrogate the memory chips alternately, reading Y1, Y7, Y13 etc. from memory one interleaved with Y4, Y10, Y16 etc. from memory two. The Y multiplexing switch is again driven by squarewave Y1A to produce continuous Y data, now in time-compressed form – see waveform 11. A PIP line readout takes one third of a normal line period, and all the lines will have been read out by the time the field scan is one third of the way down the screen.

The chroma read and write processes in memory three are very similar, following the same time-warp rules in synchronism with the memory one and memory two read and write sequences. Thus the top left-hand corner of memory three is used for chroma storage, employing the same 82 row by 92 column block.

All memory write/read processes, the AD and DA clocks etc. are controlled by a complex memory control chip.

Features of the Sanyo VHRD500

The memory arrangement just described can, in conjunction with the versatile control chip, provide an impressive repertoire of trick displays. We'll describe each in turn briefly, giving a short account of the processing involved. Each mode is called up by the remote control handset. Instructions enter the control microcomputer in the form of an 8-bit word – this is referred to as mode control data. Not all the 256 possible combinations are used! The four most significant bits indicate the mode (freeze frame, strobe, PIP etc.) while the four least significant bits give information like strobe speed, zoom ratio etc.

In the still mode writing into the memory is inhibited while readout continues, giving a full-screen freeze frame image from tape or off-air.

The mono strobe mode operates as above but a write cycle is performed at regular intervals to give a frame-advance effect, updating the still each time. The strobe rate can be selected by the user.

In the basic PIP mode the PIP display can be positioned in any of the four corners of the screen by starting the memory readout at the appropriate time during the main display's line and field scans. The main and PIP pictures can be interchanged.

In the multi-PIP mode the screen is divided into nine sections, each fed by one block of memory in the manner shown in Fig. 26. This is used for the cycle strobe feature, where the screen centre shows a normal moving picture surrounded by eight stills, each representing a frame-advance sequence cycling around the central picture, with adjustable strobe speed. Each "outer" block of memory is read continuously and written intermittently in this mode. If required the centre block of memory can also be frozen, by inhibiting its write cycle.

The multi-PIP mode is also used for the multi-TV programme scan feature, in which the u.h.f. tuner tunes to available TV channels in turn, the VCR loading the signal from each into a different section of its memory. With the multi-index scan feature the start of each recording or scene on tape, indexed by the user during record, is loaded into different memory sections and frozen in turn as the tape is quickly wound forwards or backwards. The tape transport system slows down to give five seconds of normal playback at each index point.

In the zoom mode the memory writing rate remains normal but the readout rate is decreased to give the picture a magnification effect. By this means the central area of the picture can be enlarged by ×4, ×9 or ×16. The central area of the memory is used for this variable speed readout. By slow readout from the memories' outer areas any individual quarter of the screen can be enlarged by ×4 and made to occupy the full screen area.

The solarisation mode is similar to the graphic effect described earlier in connection with the Panasonic system (see Fig. 16, July). Three degrees of solarisation can be selected by the user. These knock out two, three or four of the least significant bits from the 6-bit video data. Selection is achieved by disabling the appropriate DA converter input lines.

For the mosaic effect the pixel count in the displayed picture is reduced in three stages selected by the user. This is done by reducing the rate at which the DA converters are clocked during memory readout. The data is latched at progressively longer intervals to give the picture a "coloured squares" effect. For weak, medium and strong mosaic effects the DA converter clock rates, which are normally 10MHz for Y and 2·5MHz for the chroma signals, become 2·5, 1·25 and 0·625MHz respectively for both the Y and the chroma DA converters.

Advanced Field Store Chip

To round off our first excursion into TV field storage we'll take a look at a newly developed memory chip. Many of the memory chips currently used were not specifically designed for TV field store applications. As a result, some of their capacity and capabilities are lost when they are pressed into service for TV/video use. With a purpose-designed chip advantage can be taken of the sequential nature of a TV signal and the fact that data is stored and retrieved in a series of blocks representing pixels and complete TV lines.

Fig. 27 shows in simplified block diagram form the internal arrangements used in the Hitachi HM514256 CMOS TV memory chip. This chip has a capacity of 1Mbits which are arranged as four pages consisting of 1,024 columns by 256 rows. Each row is divided into eight blocks of 32 bits. These blocks have their own addresses, giving access for sequential TV data transfer. Any one of the 8,192 block addresses can be selected at random. To define 8K different addresses calls for 13 bits, and since both read and write addresses are required the total number of address bits is theoretically 26. In fact the total is 29, with three for random access control. A serial addressing system (SAD) is used, within 32 clock pulses.

Thus independent access is available to each 32 × 4 bit block for both reading and writing. For random access the memory array is serially addressed, starting at the point specified by the input address data, after which internally generated addresses are used until new data appears on the SAD line. Only three pins are required for addressing: SAD, SAS (serial address strobe) and TAS (transfer address strobe). The latter two are used for random access applications. This greatly simpilfies the wiring and memory-control arrangements.

Two such memory chips are required for a TV field store. Each stores four bits of the 8-bit video data words. Separate input and output ports are provided. The write

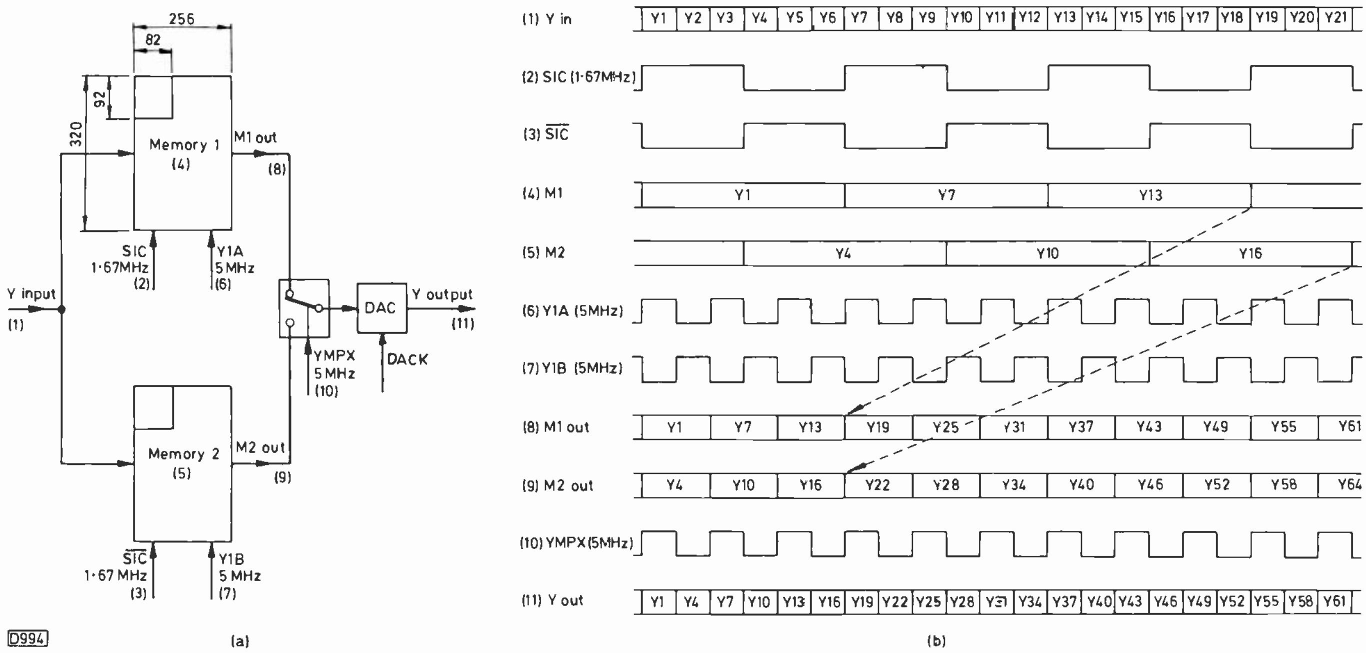

Fig. 26: Luminance memory map for PIP operation. At all times the total memory area corresponds to the full display screen area. Thus the single PIP shown here occupies one ninth of the screen area. The timing chart shows the time-warp effect of different writing and reading rates.

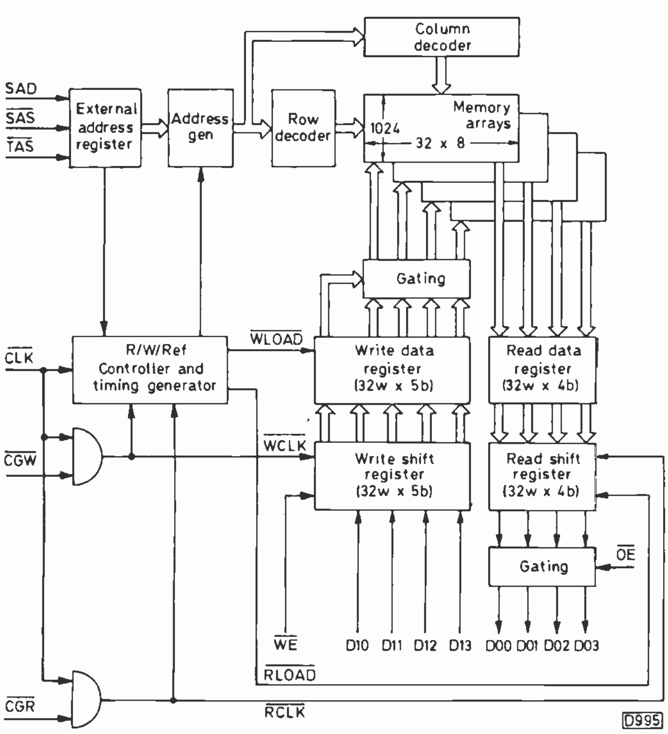

Fig. 27: Simplified block diagram of the purpose-designed Hitachi 1Mbit TV field memory chip.

and read shift registers are latched by the CGW (clock gate write) and CGR (clock gate read) inputs.

A typical way of using these inputs is shown in Fig. 28 – for PIP sampling. Here the clock and horizontal drive pulses of an incoming signal are each divided by three and fed to the inputs of a nand gate. The /CGW pulse thus produced loads data into the memory on only every third TV line, and then only on every third clock pulse. This, like the latched DA converters etc. described in the previous examples, reduces both the vertical and horizontal picture size by a factor of three to give a one ninth area PIP display – and, if required, multi-PIP with data for nine small images distributed around the memory in similar fashion to the map in Fig. 26.

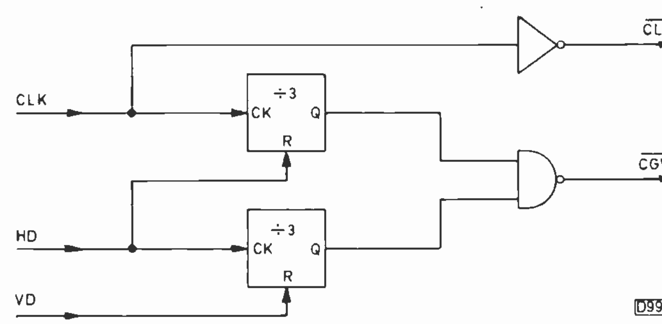

Fig. 28: The simple external divider system shown here provides selective latching pulses for PIP sampling within the memory.

This chip, which is intended for frame comb filtering and digital noise reduction as well as freeze frame and effect applications, has several outstanding features. It's very fast, with an access time of 35nsec, and can hold data for 8msec between refresh cycles. Internal refreshing is carried out at intervals of 32 CLK pulses, permitting operation over a wide range of clock frequencies – from 4MHz to over 20MHz. The memory also has a word-masking function, carried out by a 32-bit WE data register and a 32-bit WE shift register: this is primarily intended for dropout compensation in VCRs.

Sophisticated though this memory system is, it will undoubtedly be replaced by more advanced types as time marches on. Digital picture processing is at present the fastest developing technology in consumer electronics equipment. The next step is the elimination of flicker, cross-colour and the visible line structure in domestic TV sets. Watch this space! The development in recent times of techniques like these is beginning to make the existing picture transmission and display systems decidely old hat.

Acknowledgement

Information on the systems used for digital signal processing in consumer electronic products is somewhat sparse at present. I'm indebted to the technical departments of Hitachi, Panasonic and Sanyo for the considerable trouble they went to in seeking and providing information on their equipment.

Service Bureau

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GRUNDIG 2 × 4

The top half of the picture is streaky while the bottom half is only half as clear as it should be, with the colour flickering on and off. The sound is normal but becomes distorted when loud music starts suddenly. Sometimes there's wow, as if the capstan is not operating properly. Checks on the servo show that all the waveforms seem to be o.k. though the waveforms at pin 5 of the mixer chip IC1640 and for the head changeover adjustment are incorrect.

Tracking on this machine operates via the heads in a DTF system. We've experienced this combination of symptoms on more than one occasion and have each time found that the cause was failure of the video drum assembly.

SONY KV2704UB

In the standby mode the h.t. from the power supply oscillates between normal (135V) and approximately 80V at about 1Hz. With the power supply completely unloaded (all outputs disconnected) the h.t. drops to 80V and stays there. In both cases the 40V and 12V outputs are relatively unaffected. Regulation is poor, the picture breathing slightly with the sound, especially at high volume levels.

The most common culprits for this condition are C623 (33μF, 250V), C621 (1μF, 35V) and R612 (0·82Ω, 2W). Check these along with zener diode D612 and if necessary potentiometer R614.

SHARP VC381

This machine won't play Scotch pre-recorded tapes from switch on when cold – the top of the picture tears and pulls to the left. Playback is normal when the machine has warmed up for about 45 minutes. Only Scotch brand cassettes have this effect.

We suggest you check the back-tension setting which may have to be set at one end of the specified 50-57g range to accommodate Scotch tapes.

REDIFFUSION Mk 4 CHASSIS

The trouble with this set is a regular matrix pattern of white dots covering the entire screen area. It's present on all channels and also with a VCR input. In all other respects the set operates normally.

The most likely cause of the dots is radiation from the power supply, which contains an oscillator – within 4IC1 – running at about 25kHz. First check that the dressing of the wires and cable looms in the set has not been disturbed, then suspect 4C27, 4C15, 4D16 and 4L2 in the power supply. If these are all in order it would be simplest to check by fitting a complete substitute power supply module.

SONY SLC7

There's a problem on playback of either its own or prerecorded tapes. Wherever there's a vertical white-to-black transition a thick black outline appears. There are no smudges or streaking, the picture definition being very good. The tracking control has no effect on the fault. New heads, correctly set up, DOC adjustment, YC6 board alignment and preamp adjustment have all been tried without success. The playback envelope looks perfect and no voltage discrepancies have been found.

A judicious tweak of the noise canceller preset RV1 on the NC1 board is worth trying. Return it to its original position if this doesn't improve the overshoot effect. The other possibility is excessive edge enhancement (aperture correction). This is based on the 0·6μsec delay line DL3 which may be mismatched. Check whether C264 is open-circuit, DL3's earth connection, and the matching resistors R330, R331 and R96.

DECCA 100 CHASSIS

Colour lock has become rather weak and is critical to tune in with the channel tuning controls. A monochrome picture may be shown from cold, very slight adjustment of the tuning control being required to bring in the colour – but still a little touchy. Everything else is excellent.

We have often found that this problem is due to a faulty TDA3950 chrominance chip or a 4·43MHz crystal (Z200) that's drifted – replacement will provide a cure. First however ensure that the gating pulse waveform at test point TL201 is correct. If not, check the operation of the pulse shaper stage – Tr201 and associated components.

HITACHI VT8500

This machine will not work using the remote control handset – all other controls work satisfactorily. The remote control board has been removed and powered from the bench supply. With the remote control handset in position and operated a good signal is present at pin 21 of IC01A but there is no output at pins 2-8. All voltages are correct and h.f. oscillations are present at pins 1 and 28. A new chip has made no difference. I can't understand why the chip appears to be dead when there's a good input and all the voltages etc. are correct, but am uncertain what the transistor circuit associated with pin 26 does.

The two-transistor circuit connected to pin 26 of IC01A provides a reset pulse at switch on. As C17A charges, Q13A's collector should momentarily pulse high. Check this, because most other possibilities appear to have been covered. We've sometimes had puzzling faults on this board due to physical factors, i.e. hairline cracks in the print.

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TELEVISION SEPTEMBER 1988

SONY KV2000 Mk. II

When the set is switched on the sound is present but the picture takes almost half an hour to appear. It then appears slowly, from the bottom of the screen, stopping two thirds of the way up with the top third missing. The fault is not lack of height or foldover.

There is little doubt that the problem is in the blanking circuit. Check C818, D811, Q801 and Q802 in that order. Use of freezer and gentle heat from a hairdryer may assist in pinpointing the trouble-spot.

TEST CASE

309

Each month we provide an interesting case of TV/video servicing to exercise your ingenuity. These are not trick questions but are based on actual practical faults.

This summer seems to be the season of the oldies! Last month we had a Decca 100 chassis, this time it's an ITT CVC20 chassis. It's a fact of course that older designs are more prone to failure in warm weather – sets using valves were particularly vulnerable to a hot August. Surprisingly few of those in the TV service business today are familiar with the sets of a decade or more ago, or so it seems here – they've either forgotten about them or are relative newcomers.

The job with the CVC20 started with a check on the tube's emission, even though the specific complaint was of low width. Not much point in getting too involved if the tube is on the way out. Its emission was reasonable however, so the diagnosis – if you can call it that – began.

The width was certainly low: there was a black margin about 2·5cm wide on either side of the screen. What causes low width? A common cause is a reduced h.t. supply to the line output stage. It should have been 125V in this case. It wasn't, exactly, and setting up the preset control in the power supply had little effect. What causes low width when the supply voltage is about right? The line output transformer's tuning capacitors could be responsible. In this chassis the line output transformer has a split primary winding, so there are two tuning capacitors, C57/8. The Oracle was next asked whether 16nF capacitors were in stock. He finally came and had a look at the set. Finding that it was a CVC20, he gave the following advice. Pull out the EW modulator control board (panel CMH10): if the width then jumps out the cause of the problem is on the panel; if it doesn't, check around the EW driver transistor T17 on the main board.

A check revealed that the presets (width, trapezium and pincushion) on the CMH10 panel had no effect whatsoever on the picture, so the little panel was removed. When the set was switched on again the picture was still narrow. So the fault had to be on the main board. Two of T17's legs were freed from the board for testing. Checks with the ohmmeter proved that it was o.k. With the Avo 8's black probe connected to its base, the readings, on the $\Omega \times 100$ range, to the emitter and collector were each about 1kΩ. So the transistor was soldered in again and attention was turned to the associated components. R101 and C72 were both of the correct value and the driver transformer L33/4 looked o.k. – the continuity of the windings was checked and found to be correct. There seemed to be little point in checking the EW modulator diodes because they also provide the 24V supply and, indirectly, the 12V supply. These were obviously present in view of the good picture and sound. Measurement confirmed this. What next?

The Oracle was again consulted. "Transistor is o.k., so are the diodes and other bits." After a quick look at the circuit, Oracle suggested a check on the capacitors associated with the EW modulator diodes and, if they were o.k., to leave the set on one side for him to look at later. The capacitors were removed and tested but were all right.

So it came about that a little while later Oracle found himself inside the offending TV set with his prods and probes and methodical air. Expecting a nasty, obscure fault he was surprised to find that the cause of the trouble was quite simple – indeed it had cropped up many times before. The ensuing inquest revealed a major flaw in the reasoning and the methods of the previous man on the job. Where had he gone wrong and what was the cause of the fault? See next month.

ANSWER TO TEST CASE 308
– page 770 last month –

Our problem last month was an unusual one – a grossly overheating chip in the colour decoder section of a Decca 80/100 series chassis. The MC1327 device concerned provides chroma demodulation, RGB matrixing and PAL switching, and the amazing thing was that with an internal dissipation of what felt like several watts and with some of its pin voltages wildly incorrect it nevertheless provided the correct signal processing until it got really hot. It was also surprising that, as we subsequently discovered, neither of the MC1327 chips involved suffered permanent damage – indeed the original i.c. is now back in the set and working well.

As Fig. 1 last month showed, the MC1327 has an internal power supply regulator which provides several outputs for use within the chip – some of the feeds are taken via external components. One of these outputs appears at pin 5, where it's decoupled and used as a bias for the reference signal inputs at pins 12 and 13. Decoupling is carried out by the 1μF tantalum capacitor C241 which, on removal for test with the ohmmeter, was found to be very leaky – it was ready to pass d.c. in either direction.

By thus pulling the potential at pin 5 towards earth the fault grossly increased the dissipation in the chip's internal regulator circuit, but the signal-handling functions were not affected until the substrate became very hot. Fusible resistor R246 didn't open – it's there mainly to guard against the effect of zener diode D202 going short-circuit.

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AA117	9p
AA119	9p
AAY32	9p
AC107	40p
AC125	25p
AC126	25p
AC127	21p
AC128	21p
AC128K	26p
AC141K	30p
AC142K	30p
AC153K	23p
AC176	22p
AC176K	28p
AC187	21p
AC187K	28p
AC188	21p
AC188K	28p
ACY18	48p
ACY19	48p
AD142	100p
AD149	80p
AD161	35p
AD162	35p
AD164	200p
AF106	50p
AF109	45p
AF124	50p
AF125	50p
AF126	50p
AF127	50p
AF139	30p
AF239	30p
AF201	70p
AF379	45p
AL100	450p
AL112	300p
AM150	28p
AM151	30p
AM154	35p
AM156	35p
AM158	50p
ASZ15	100p
ASZ17	100p
AU113	600p
BA145	10p
BA148	10p
BA154	6p
BA157	12p
BAY78	250p
BAY82	20p
BB101	13p
BB103	16p
BB105B	18p
BB205B	24p
BC107	8p
BC108	8p
BC109	8p
BC109C	10p
BC115	10p
BC118	11p
BC140	20p
BC141	20p
BC142	20p
BC143	20p
BC147	8p
BC148	8p
BC149	8p
BC157	8p
BC158	10p
BC159	8p
BC160	30p
BC171	10p
BC172	10p
BC177	14p
BC178	14p
BC179	14p
BC182	7p
BC182L	7p
BC183	7p
BC183L	7p
BC184	7p
BC184L	7p
BC212	7p
BC212L	7p
BC213	7p
BC213L	7p
BC214	7p
BC214L	7p
BC237	7p
BC238	7p
BC239	7p
BC300	20p
BC301	20p
BC302	20p
BC303	20p
BC304	25p
BC308	10p
BC327	7p
BC328	7p
BC337	7p
BC338	7p
BC441	28p
BC446	8p
BC449	15p
BC461	28p
BC477	18p
BC478	18p
BC479	18p
BC489	20p
BC490	18p
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BC556	8p
BC557	7p
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BC560	8p
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BC638	20p
BC639	20p
BC640	20p
BCY32	200p
BCY33	200p
BCY34	200p
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BCY56	16p
BCY70	16p
BCY71	16p
BCY72	16p
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BD237	21p
BD238	24p
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BDX33	60p
BDX53	60p
BDX65	80p
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BDW94	50p
BDY20	100p
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BF200	16p
BF225	30p
BF240	16p
BF241	10p
BF245	25p
BF247	25p
BF254	15p
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BF258	18p
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MR856	36p
MRF479	350p
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MV209	48p
MV2209	48p
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OC35	250p
OC36	250p
OC45	50p
OC71	30p
OC72	50p
OC200	180p
OT121	120p
R2008B	100p
R2010B	100p
R2030	100p
R2306	55p
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S2800M	72p
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T2800M	72p
TAG4442	76p
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TAG4444	76p
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TIP33C	60p
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TIP35C	65p
TIP36C	65p
TIP41A	22p
TIP41C	25p
TIP42A	22p
TIP42C	25p
TIP47	40p
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TIP107	65p
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TIS44	40p
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VN.89AF	110p
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ZTX501	13p
ZTX502	18p
ZTX503	18p
ZTX504	25p
ZTX550	24p
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2N.697	22p
2N.698	40p
2N.699	45p
2N.706	22p
2N.708	22p
2N.914	28p
2N.918	36p
2N.930	18p
2N.1131	28p

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2N.1613	24p
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2N.2102	50p
2N.2160	300p
2N.2218A	24p
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2N.2222	23p
2N.2369	15p
2N.2484	20p
2N.2646	40p
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2N.2905	20p
2N.2906	18p
2N.2907	18p
2N.2926	8p
2N.3019	28p
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2N.3055H	50p
2N.3440	58p
2N.3442	85p
2N.3525	150p
2N.3583	90p
2N.3585	120p
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2N.3703	9p
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2N.3706	9p
2N.3707	9p
2N.3708	9p
2N.3710	12p
2N.3711	12p
2N.3771	85p
2N.3772	90p
2N.3773	110p
2N.3799	18p
2N.3819	29p
2N.3866	68p
2N.3903	11p
2N.3904	11p
2N.3905	11p
2N.3906	11p
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2N.4036	25p
2N.4037	25p
2N.4058	13p
2N.4062	12p
2N.4064	100p
2N.4240	150p
2N.4248	130p
2N.4401	12p
2N.4403	12p
2N.4443	76p
2N.4444	76p
2N.4904	75p
2N.5061	20p
2N.5062	28p
2N.5088	20p
2N.5163	45p
2N.5192	50p
2N.5241	500p
2N.5245	45p
2N.5294	30p
2N.5296	30p
2N.5303	200p
2N.5320	90p
2N.5321	60p
2N.5366	25p
2N.5401	12p
2N.5448	12p
2N.5496	80p
2N.5777	40p
2N.6106	40p
2N.6107	40p
2N.6109	40p
2N.6254	110p
2N.6292	40p
2N.6384	120p
2N.6385	120p
2N.6403	160p
2N.6649	140p
3N.128	55p
3N.143	65p
DIODES	
AA119	9p
BY100	40p
BY103	32p
BY126	6p
BY127	8p
BY133	8p
BY164	40p
BY176	85p
BY179	35p
BY182	32p
BY184	32p
BY187	32p
BY196	20p
BY206	11p
BY207	11p
BY208	18p
BY210	22p
BY223	72p
BY225	120p
BY226	18p
BY227	19p
BY228	32p
BY296	20p
BY298	26p
BY299	28p
BY476	90p
BYX10	15p
BYX55/350	30p
BYX55/600	30p
BYX55/800	32p
BYX70/300	29p
BYX70/500	32p
BYX70/800	36p
BYX71/600	80p
OA47	6p
OA90	6p
OA91	8p
OA200	7p
OA202	7p
IN.914	2p
IN.4001	4p
IN.4002	4p
IN.4003	4p
IN.4004	4p
IN.4005	4p
IN 4006	4p
IN.4007	5p
IN.4148	2p
IN 5400	9p
IN.5401	10p
IN.5402	10p
IN.5403	11p
IN.5404	11p
IN.5405	12p
IN.5406	13p
IN.5407	13p
IN.5408	13p
SKE4F2/06	50p
SKE4F2/08	70p
SKE4F2/10	90p
I.C. SOCKETS	
8pin	6p
14pin	8p
16pin	9p
18pin	12p
20pin	14p
22pin	16p
24pin	18p
28pin	20p
40pin	25p

ZENER	
400MV	
BYZ88 RANGE	
2V7 to 39V	6p
1.3W	
BZX61 RANGE	
2V7 to 39V	12p
VOLTAGE REGULATORS	
7805	35p
7806	35p
7808	35p
7812	35p
7815	35p
7818	35p
7824	35p
7905	35p
7906	40p
7908	40p
7912	40p
7915	40p
7918	40p
7924	40p
78L05	28p
78L08	28p
78L12	28p
78L15	28p
78L18	28p
78L24	28p
79L05	40p
79L08	40p
79L12	40p
79L15	40p
7818KC	100p
7824KC	100p
LM309K	100p
LM317K	220p
LM317T	180p
LM323K	420p
LM723	40p
78HGKC	570p
78HO5KC	800p
78H12KC	700p
78GU1C	190p
79GU1C	215p
79HGKC	800p
VALVES	
DAF96	60p
DF96	50p
DL92	60p
DY86	50p
DY87	60p
DY802	75p
EABC80	60p
E891	44p
EBF80	45p
EBF89	50p
ECC82	80p
ECC83	80p
ECC84	70p
ECC85	80p
ECH81	100p
ECH84	70p
ECL80	65p
ECL82	80p
ECL84	70p
ECL85	70p
ECL86	90p
EF80	65p
EF85	65p
EF89	85p
EF183	75p
EF184	85p
EL34	250p
EL36	90p
EL84	75p
EL95	85p
EL500	100p
EL504	130p
EY86	45p
EY87	45p
EY88	65p
EZ35	65p
EZ80	70p
EZ81	55p
GZ34	200p
PC97	100p
PCC85	60p
PCF80	80p
PCF200	135p
PCF801	110p
PCF802	80p
PCF806	115p
PCH200	100p
PCL81	62p
PCL82	80p
PCL84	50p
PCL85	80p
PCL86	80p
PCL805	80p
PFL200	110p
PL36	120p
PL82	60p
PL83	60p
PL84	80p
PL95	180p
PL500	110p
PL504	120p
PL508	200p
PL519	450p
PY81	90p
PY88	70p
PY500A	190p
L.E.D.'S	
LED 3MM RED	5p
LED	3MM
YEL	10p
LED	3MM
GRN	10p
LED 5MM RED	5p
LED	5MM
YEL	10p
LED	5MM
GRN	10p
LINEAR IC'S	
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AN-127	250p
AN-136	250p
AN-203	210p
AN-210	165p
AN-214Q	170p
AN-228	280p
AN-234	450p
AN-235	450p
AN-236	235p
AN-238	400p
AN-239Q	400p
AN-240P	150p
AN-241	135p
AN-245	290p
AN-247	230p
AN-252	150p
AN-259	250p
AN-262	140p
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AN-271	230p
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AN-274	250p
AN-294	380p
AN-295	340p
AN-301	330p
AN-303	250p
AN-304	360p
AN-305	320p
AN-306	800p
AN-313	270p
AN-315	210p

AN-316	350p
AN-318	460p
AN-331	295p
AN-360	100p
AN-362	140p
AN-366	150p
AN-610	160p
AN-612	160p
AN-3320K	900p
AN-5151	600p
AN-5430	280p
AN-5612	400p
AN-5620	330p
AN-5712	350p
AN-5722	140p
AN-5730	160p
AN-5732	160p
AN-5753	170p
AN-6100	425p
AN-6120	400p
AN-6135	150p
AN-6300	600p
AN 6320	300p
AN-6330	380p
AN-6340	830p
AN-6341	350p
AN 6344	440p
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AN-6359	810p
AN-6360	400p
AN-6362	480p
AN-6371	510p
AN 6387	560p
AN 6430	390p
AN 6431	400p
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AN-6811	130p
AN 6876	270p
AN 6884	240p
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AN-7110	130p
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AN-7115	150p
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AN-7120	130p
AN-7130	110p
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AN-7311	90p
AN-7410	250p
AN-7420	250p
AN-7140	450p
AN-7145	195p
AN-7146	210p
AN-7154	180p
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AN-7178	270p
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AY3-1270	800p
AY3-1350	450p
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CA-3089E	150p
CA-3089Q	250p
CA-3130E	80p
CA-3130S	100p
CA-3134E	280p
CA-3140E	38p
CA-3160	85p
CA-3161E	140p
CA-3162E	450p
CA-3189E	230p
CA-3193E	230p
CA-3240E	90p
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CX-108	750p
CX-130	450p
CX-136	610p
CX-139A	1150p
CX-143A	580p
ER-1400	200p

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HA 1144	380p
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HA-1199	145p
HA-1306W	170p
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HA-1374	230p
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HA-11223	340p
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HA 11705	620p
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HA-11714	400p
HA-11715	560p
HA-11724	800p
HA-12005	450p
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HA-13007	400p
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ICL-7016	650p
ICL-7017	950p
ICL-7611	90p
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ICM-7555	60p
ICM-7556	130p
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LA 1385	170p
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LA-4160	220p
LA 4180	300p
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LA-4190	300p
LA-4192	180p
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LA-4201	120p
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LA 6458	100p
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LA-7011	220p
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LA-7015	300p
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LA 7018	160p
LA 7019	160p
LA-7020	400p
LA-7025	380p

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LA-7032	700p
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LA-7040	280p
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LA-7046	300p
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LA-7920	150p
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LAG 600	200p
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LAM-508	200p
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LC-7132	400p
LC-7137	450p
LF-347	110p
LF-351	45p
LF-353	48p
LF-355	60p
LF-356	60p
LF-357	70p
LF-398	300p
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LM-307	42p
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LM-319	165p
LM-324	35p
LM-325	45p
LM-334Z	115p
LM-335Z	120p
LM-336	140p
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LM-380	100p
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LM-384	130p
LM-386	85p
LM-387	100p
LM-389	150p
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LM-393	55p
LM-394CH	370p
LM-558	160p
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LM-710	45p
LM-711	85p
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M-51514	160p
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M-51516	260p
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MB-3705	150p
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MB-8719	360p
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MC-1413	65p
MC-1455	45p
MC-1458	33p
MC-1469	290p
MC-1488	65p
MC-1489	65p
MC-1494	670p
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MC-1569	210p
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MC-3401	45p
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MC-3423	75p
MF-10	295p
ML-920	480p
ML-922	380p

NE-531	115p
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NE-555	20p
NE-556	40p
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NE-566	130p
NE-567	115p
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SAS-560	110p
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TC 5020	285p
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TDA-4420	180p
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TDA-7211	150p
TDA-7220	150p
TDA-7270	150p
TEA-1002	650p
TLO-61	40p
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TLO-74	92p
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TLO-83	67p
TLO-84	80p
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ULN-2804	170p
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UPC-1158H2	70p
UPC-	p
1167C2	170p
UPC-1168	105p
UPC-1181	110p
UPC-1182	110p
UPC-1183	200p
UPC-	p
1185H2	2350p
UPC-1186	80p
UPC-1187	150p
UPC-1191	100p
UPC-1197	140p
UPC-1216	120p
UPC-1222	130p
UPC-1230	210p
UPC-1238	120p
UPC-1263	230p
UPC-1277	240p
UPC-1278	240p
UPC-1350	115p
UPC-1353	160p
UPC-1363	190p
UPC-1365	320p
UPC-1373	85p
UPC-1378	210p
UPC-1380	450p
UPC-1382	110p
UPC-1383	250p
UPC-1384	260p
UPC-1394	170p
UPC-1397	450p
UPC-1470	200p
ZN-423	100p
ZN-424	100p
ZN-425	320p
ZN-426	260p
ZN-427	560p
ZN-428	425p
ZN-429	215p
ZN-435	340p
ZN-448	510p
ZN-459	190p
ZN-1034	170p
ZN-1040	640p
ZNA-134H2	150p
ZNA-234E	920p
2SJ-48	480p
2SJ-49	425p
2SJ-50	425p
2SJ 77	350p
2SJ-122	580p
2SK-15	350p
2SK-19	45p
2SK-49	50p
2SK-55	100p
2SK-68	100p
2SK-133	480p
2SK-134	415p
2SK-135	415p
2SK-147	160p
2SK-176	800p
2SK 191	160p
2SK 192	45p
2SK 195	150p
2SK 197	140p
2SK 210	130p
2SK-211	130p
2SK 217	130p
2SK-291	300p
2SK-294	400p
2SK-312	750p
2SK 322	300p
2SK-323	130p
2SK-555	480p
2SK-557	650p
3SK-88	70p

A.Z. ELECTRICS

Stock items despatched by return

Access & Visa Accepted

VIDEO HEADS

Ferguson
3HSSV – JVC/Ferguson most models £18.00
3HSSVA – Ferguson 3V42/44/45/46 etc. £38.00
3HSS4VB – Ferguson 3V3/ HR7655 £45.00
3HSS4VC – Ferguson 3V48/ HRD565 £46.00

Panasonic
3HSSN – Panasonic most models £18.00
3HSSU1N – Panasonic NV370/380/100 Phillips VR6460 £20.00
3HSSU2N – Panasonic NV230/470/480/G9/G10/ G11/G15PX £34.20
3HSSU3N – Panasonic NV430/460 £22.75
3HSS3N – Panasonic NV777/330 £32.20
3HSS4NB – Panasonic NV730 £46.00
3HSS4NA – Panasonic NV366 £45.00

Hitachi
3HSSHA – VT8000/9500 etc. £22.00
3HSSHB – VT11/33/63 etc. £22.00

Amstrad
3HSSR – VCR4600, 7000, 9000 also Saisho, Orion, Triumph etc £24.10
PSF1 – VCR4500/5200 £22.85

Sanyo
3HSSSY – VHR1100/1110/1300 £39.50
3HSS3SY – VHR1500 £52.00

Other Models
3HSSSP – Sharp VC9300/9500 etc £22.00
PS3B – Sony SLC5/C6/C7/8000 etc £22.00
PS3BT – Toshiba V9600/31/33 £23.75
3HSSSF – Fisher FVH710/510 etc £24.50

VIDEO MOTORS

Drum Motors
Ferguson/JVC (Mechanical models) £21.45
Sharp VC7300/7700/7750/8300 £21.00

Reel Motors
Sanyo VTC5000/5150/5300/5400 £7.90
Sharp VC9300/9500 etc. £15.90
Panasonic NV333/366 £13.20
Ferguson 3V29/30 JVC HR200/7300 £22.70

Capstan Motors
Ferguson/JVC (mechanical models) £21.45
Ferguson 3V35 £22.50
Sony SLC7/C5 (BHF1100D) £28.20
Sharp VC7300/770/7750 £26.90

REMOTE CONTROLS

Ferguson, Grundig, ITT, Phillips, Pye, Sony and Hitachi various models TV & Video £13.50

CAR RADIO/AUDIO MOTORS

6V, 9V, 12V and 13 2V clockwise or anticlockwise. Three sizes available
(1) Shaft 10mm, Height 34mm, Width 38mm £3.50
(2) Shaft 7mm, Height 21.5mm, Width 34mm £3.50
(3) Shaft 8mm, Height 25mm, Width 36mm £3.50

LINE OUTPUT TRANSFORMERS

Decca 100 £8.50
ITT CVC 25/30/32 £8.50
Rank Bush T20A £9.25

OTHER SPARES

IC STR6020 Mod kit for Hitachi CPT1471/ 1473 £6.95
Universal Video Copying Kit £3.60
Universal Video Copying Kit (scart) £5.20
Video Cassette Lamp suitable for Ferguson/JVC with/ without plug £0.50
Cassette Lamps suitable for Sharp/Panasonic £0.50
Cassette Lamp suitable for Sharp 9300 etc. complete with plastic moulding £1.25
Universal Cassette Lamps 40ma or 60ma £0.50
CRT Anode Caps £0.60
Universal Tripler £4.50
Thorn TX10 Focus Unit £8.50
Video Tape Splicing Kit £5.25
Hitachi TV Frame Module HM6251 £4.60
Cassette Housing Assembley for Ferguson 3V35/36/ 38/39/42/43/44/43 etc £25.25

TV ON/OFF SWITCHES

ITT, Phillips, Decca, Thorn, Fidelity, Grundig, Sony etc State model and part number for price
Sony Universal with two brackets £3.75
Phillips G11, G8 plastic £0.95
Thorn 1690, 3000, 3500, 8000, 8500, 9000, TX9 etc. £0.90

FOR ORIGINAL PANASONIC SPARES (TV, VIDEO & AUDIO) QUOTE PANASONIC PART NO FOR PRICE. MOST SPARES AND MANUALS AVAILABLE.

BELT KITS

Many Models From £0.80
Sanyo VTC5000 £0.55

PINCH ROLLERS

Many Models £2.70

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BZX55 – 500mW Most values in stock £0.06
BZX85 – 1.3W Most values in stock £0.10

TRANSISTORS

BC107	£0.10	BF198	£0.07
BC108B	£0.10	BF259	£0.22
BC147A	£0.07	BU108	£0.75
BC172C	£0.07	BU126	£0.70
BC214A	£0.07	BU208	£0.70
BC237	£0.07	BU208A	£0.75
BC238	£0.07	BU208D	£0.75
BC308B	£0.07	BU326A	£0.75
BC327-25	£0.07	BU407	£0.50
BC328-40	£0.05	BU426A	£0.75
BC337	£0.07	BU500	£0.95
BC547	£0.07	BU508A	£0.75
BC548	£0.07	BU508D	£0.95
BC549	£0.07	BU806	£0.75
BC559	£0.07	BU807	£0.75
BD237	£0.22	BUT11	£0.75
BD238	£0.22	BLX84	£0.60
BD243B	£0.30	TIP31	£0.30
BD243C	£0.30	TIP32	£0.30
BD244	£0.30	TIP41	£0.27
BD244C	£0.30	TIP42	£0.20
BF195	£0.07	TIP42C	£0.40

INTEGRATED CIRCUITS

TBA120S	£0.50	TDA2560Q	£1.10
TBA530	£1.00	TDA2581	£1.55
TBA560	£1.00	TDA2600	£5.80
TBA800	£0.85	TDA2653A	£3.50
TBA920S	£1.00	TDA3650	£3.50
TDA1044	£1.50	TDA3950	£3.00
TDA2611A	£1.15	TDA9503	£2.55
TDA3650	£3.75	TDA3562A	£2.50
TDA1170S	£1.20	TDA3652	£2.50
TDA1412	£1.00	TDA2590	£2.00
TDA1940	£1.80	TDA3561	£2.50

IDLER ASSEMBLIES

Sharp
VC9300/9500 etc £1.75
VC481/581 etc £1.90
VC9300/9500/481/581 etc (NDL005GEZZ or NDL006GEZZ) Original £3.50

Hitachi
VT11/33/14/17/19/63 etc. £1.75
VT9300/9500 etc. Play Idler £3.65
VT9300/9500 F/F Idler £1.50
VT8000/8300/8500/8700 F/F Rew Idler £1.90
VT8000/8500 etc. Play Idler Assembly £2.85
VT8000/8500 etc. FF/Rew Pulley £0.70

Ferguson
Take up Clutch (mechanical models) £4.95
3V29/30 Take up Idler £1.20
3V29/30 Take up Clutch £2.10
3V29/30 Reel Idler £2.50
3V35 Reel Idler £2.40
3V35/36/38/39 Take up Clutch £2.00

Sanyo
VTC5000/5150/6500 Idler roller assembly £1.95
VTC5000/5150/6500 Reel Drive Pulley Unit £5.00

Panasonic
NV370 (VXP0521) £1.75
NV8600/8610 Play Idler (VXP0243) £0.95
NV332/777/788 Idler Unit (VXP0463) £3.95
NV600/688 Idler (VXP0515) £3.75
NV333/366 Idler Arm (VXL0997) £3.10
NV8400/8600/8610/8620 (VXP0245) £0.70
NV333/366 etc. (VXP0401) NV700/7200/7800 (VXP0344) NV2000/3000 (VXP0331) (VXP0329) £0.70

Fisher
FVHP615 Idler Assembly £5.40
FVHP615 Gear Idler Assembly £4.35
FVHP905/910 Gear Idler Assembly £3.30
FVHP520/530 Idler £2.60
FVHP520/530 Pulley £0.70

REWIND KIT

Sony C5/7 Rewind Kit £4.20

Service Aids – Switch Cleaner, Silicone Grease, Heat Sink Compound, Freezer etc now in stock. Ask for prices

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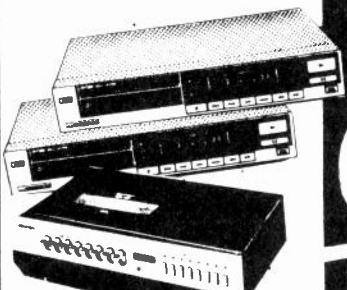

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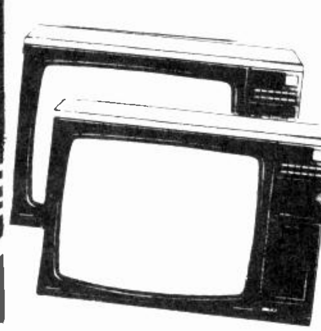

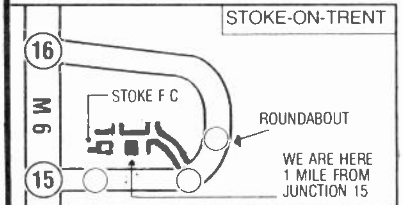

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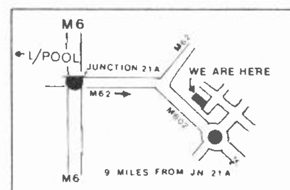

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M51517L	£2.80
M51518L	£2.20
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MB3705	£1.80
MB3712	£1.50
MB3713	£1.60
MB3714	£2.95
MB3722	£3.50
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STK084	£7.60
STK430	£5.50
STK431	£5.95
STK433	£5.25
STK435	£5.50
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STK437	£6.50
STK439	£5.95
STK441	£7.95
STK443	£7.95
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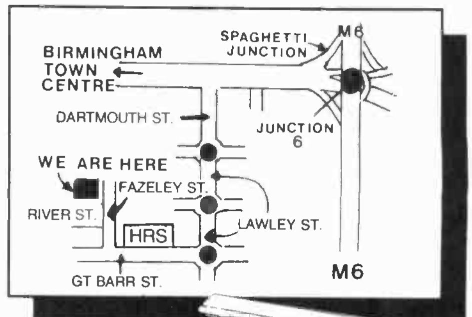

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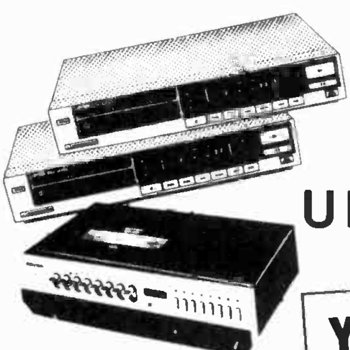

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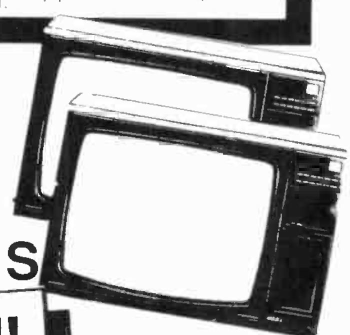

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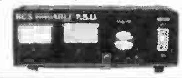

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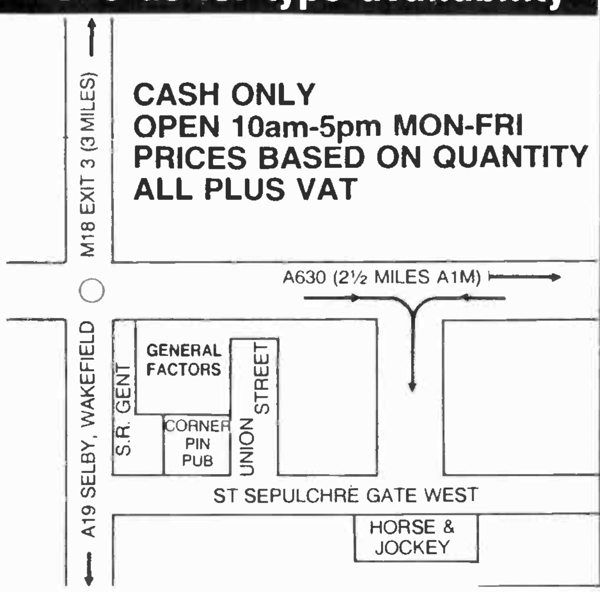

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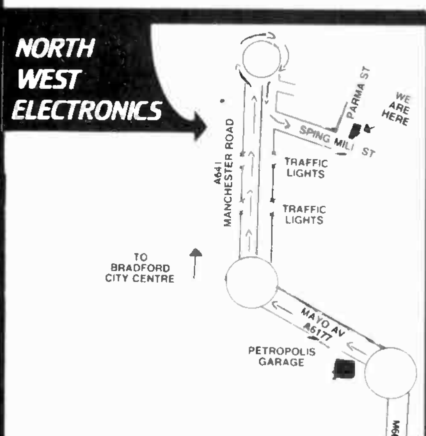

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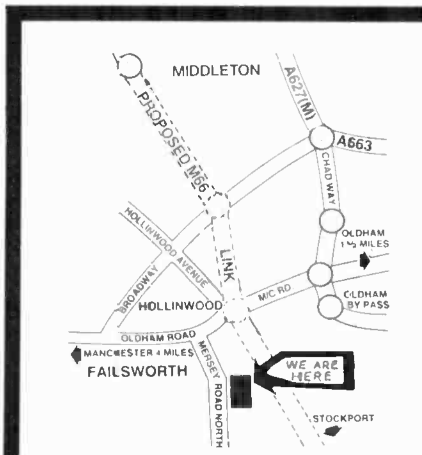

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Company registered in England. Registered No. 53626. Registered Office: King's Reach Tower, Stamford Street, London SE1 9LS. 9/88

INDEX TO ADVERTISERS

MAIL ORDER ADVERTISING

British Code of Advertising Practice

Advertisements in this publication are required to conform to the British Code of Advertising Practice. In respect of mail order advertisements where money is paid in advance, the code requires advertisers to fulfil orders within 28 days, unless a longer delivery period is stated. Where goods are returned undamaged within seven days, the purchaser's money must be refunded. Please retain proof of postage/despatch as this may be needed.

Mail Order Protection Scheme

If you order goods as a private individual from Mail Order advertisements in this magazine and pay by post in advance of delivery, Television will consider you for compensation if the Advertiser should become bankrupt or go into liquidation provided:

(1) You have not received the goods or had your money returned; and

(2) You write to the Publisher of Television summarising the situation not earlier than 28 days from the official on sale date of the publication and not later than three months from that date. (Please retain proof of payment).

Please do not wait until the last moment to inform us. When you write, we will tell you how to make your claim and what evidence of payment is required.

We guarantee to meet claims from readers made in accordance with the above procedure as soon as possible after the Advertiser has become subject to bankruptcy proceedings or gone into liquidation up to a limit of £4,050 per annum for any one Advertiser so affected and up to £12,150 per annum in respect of all advertisers.*

This guarantee covers only advance payment sent in direct response to an advertisement in this magazine (not, for example, payment made in response to catalogues etc., received as a result of answering such advertisements. All display advertisements are covered but only boxed trader classified advertisements are included. Advertisements as loose inserts are not covered.

Hill Intercom £10

Philips small stereo headphones £4

Rank UHF 4 push button tuner £4

GRC power supply PC743B £10

Rank front panel Z950 £5

GEC IF tuner panel PC786B £12.50

Rank IF 742 £3

TX10 8 Button Unit £10

6 Button Unit Rediffusion Mark 3 £5

Rediffusion Mark 4 & 7 Push Button unit £10

Tuner IF Cans ITT CMR200 £10

ITT SEL HF Modul 2 UK IF Tuner £8

4 types of front panels Fidelity 2000/3000 types £5

CVC20, CVC32 I.F. CVC40 Cans £5

20AX Line lin coil 50p

GEC switch mode trans 20AX
ITT mains CVC9 to CVC33 print type 60p

ITT 2,800 mains remote switch 50p

NEW

2110 GEC Sound O/P Panel £1

2110 GEC L.O.P.T. Panel £6

2110 GEC Power Panel £5

Line o/p frame panels GEC 20AX £10.00

ITT CVC40 Push Button Unit & Mains Switch £12

Pye Teletext Adaptor Model 7056 with Hand Set £90

6 Push Button and IF & Tuner U342 with Pre-set 5"×6½" UHF £6

BA 301 £1
TA 4127 £1
HD 3884 2A23 £3
TA 4184 £1
TA 2125 £1
TA 4190 £1
TA 4138 £1
TA 4196 £1
TA 4174 £1
TA 4139 £1
TA 4198 £1
TA 4167 £1
TA 4199 £1
BA 546 £1
BA 328 £1
TA 4176 £1
TA 4145 £1
TA 4191 £1
HA 11710 £1
TA 4188 £1
TA 4197 £1
TA 4183 £1
TA 4197 £1
TA 4183 £1
TA 4195 £1
TA 4175 £1
TA 4177 £1
TA 4192 £1
TA 4146 £1
TA 7265 £3
TA 7699P £3

The Service Engineers Guide to Teletex £2

4 Types Fedility front panels with i.c. & pats £2 each

BB 103 10p
BB 105A×12 £1
BB 105B×12 £1
BB 105G×12 £1
BB 121a 10p
47 10p each

1A/1600V 10p

DG3P EQV-BY228 10 **for £1**

2 amp bridge rec. wire end 15p

CV 8617 10p
Y 716 10p
Y 729 30p
Y 730 10p
Y 827: 6A/1KV 20p
Y 860 30p
Y 933 5p
Y 969 50p
Y 997 30p
Min 12 volt Relays 75p
R 1038 40p
R 1039 40p
R 2009 80p
R 2010b £1
R 2029 50p
R 2210 60p
R 2257 60p
R 2265 50p
R 2305 50p
R 2306 30p
R 2322/2323 pair 80p
R 2323 15p
R 2396 50p
R 2461 80p
R 2030 50p
R 2443=BD124 30p
R 2540 £2
R 2737 40p
R 2738=TIP41 30p
R 2775=TIP41c 40p
R 3129=TIP47 40p
R 4050 £1.00
S 2008b 80p
2SD898B £1
2SC1942 £1
Hitachi sets etc.
STR441 £2.50
STR454 £2
STR6020 £2
S 2000AF line o.p. £1
2SC940 £1
BU 105/04 80p
BU 108 £1
BU 124 50p
BU 126 80p
BU 180a 65p
BU 204 60p
BU 205 75p
BU 206 £1
BU 207 £1
BU 208 80p
BU 208A 75p
BU 208D 90p
BU 222 £1
BU 326 £1
BU 407 60p
BU 426A 45p
BU 426V 60p
BU 500 £1.10
BU 500D £1
BU 508A 90p
BU 508V £1
BU 705 £1
BU 807 £1
BU 824 50p
BUT 11 50p
BU113 600V-28A £1
BUW 11 50p
BUW 84 60p
BYW 20-08-9 £1
BYW 95 10p
BUX39 25A-150V £1
BUX84 50p
BUX85 50p
TIC 106a 30p
TIC 116m 30p
TIC 116n/Y 1003 30p
TIC 126N 30p
TIC 225S 30p
TIC 226E 30p
TIC 226m 30p
TIC 236m 30p
TAG 226/600 30p
TICV 106D
(TO92 case 2A/400V) 10p
TIP 29 25p
TIP 30 25p
TIP 30A 25p
TIP 30B 25p
TIP 30C 25p
TIP 31 25p
TIP 32 25p
TIP 33B 50p
TIP 33C 70p
TIP 34A 50p
TIP 34B 60p
TIP 34C 70p
TIP 35B 50p
TIP 35C 70p
TIP 35D 80p
TIP 36 50p
TIP 36C 70p
TIP 41 15p
TIP 41B 40p
TIP 41D 70p
TIP 42 10p
TIP 42/BRC 6109 10p
TIP 48 40p
TIP 49 30p
TIP 57 30p
TIP 110 20p
TIP 100 30p
TIP 102 30p
TIP 115 50p
TIP 117 50p
TIP 125 35p
TIP 126 40p
TIP 127 40p
TIP 130 30p
TIP 131 6p
TIP 136 30p
TIP 140 50p
TIP 142 80p
TIP 640 50p
TIP 2955 35p
TIP L761A-1000V/4Amp 75p
T 6032 30p
T 6036 40p
T 6040 40p
T 6047 40p
T 6049 40p
T 6051 40p
T 6052 40p

T 9004 40p
T 9005 40p
ZTX 107 10p
ZTX 108c 10p
ZTX 109k 5p
ZTX 213 5p
ZTX 341 10p
ZTX 342 10p
ZTX 384 10p
ZTX 451 10p
ZTX 550 10p
MJ 2253 60p
MJF 3040 60p
MJE 2209 10p
SP 8385 50p
SAB 3205 £1.00
SAB 4209 £1.00
300M + 700 320V £1.80
200 + 100 + 100 + 50 300V 50p
150 + 200 + 250M 300V 50p

Computer Transformer 20v/2.25A; 20v/1.5A; 17/.5A; 19/.5A; 28/.05A £3

OLD TYPE TEX. I.C.
TX004F £3.50
TX005GN £3.00
TX904 £3.00
X908 £4.00
MM2102AN £2.00

Voltage Regulators
+5V/UA78PO5SC 30p
−8V/79M08c 30p
+6V/78M06c 30p
+10v/78LA10 20p
LM 337 30p
LM 342/18 30p
LM 340T 5.0 50p
+12V/LM 340T12 50p
+18V/MC78M18 20p
+24V/78M24 30p
MC 7724cp 40p
MC 7824 40p

TIS 90 10p
TIS 92 20p
TIS 93 20p

U 19885 40p
U 3832 15p
U 3845 15p
MR 508 10p
MR 501 10p
MR 502 10p
BCW 71R 30p
BYF 1202 10p
BYF 1204 10p
BYF 3126 40p
BYF 3214 40p
BYX 10 10p
BYX 36/600 35p
BYX 38/300 25p
BYX49/600R 75p
BYX 55/350 10p
BYX 55/600 (Bead) 10p
BYX 71/350 20p
BYX 71/600 50p
BYX 72/300 20p
BYX 36/600 50p
BYV 95B 10p
BVY 95C 12p
BYV 96D 10p
BYZ 106 10p
BPW 41 15p
BYW 56 2A/1000v G11 8p
BYW 29/50 15p
BZU 15/24 54p
BZY 93c75 50p
BZV 15/18 30p
BZV 15/30 30p
BZW 70c6v2 10p
BZX 79.3v 10p

Bush thyristor RCA 76122 £1
Transformer 240v/20v-500Ma 75p
Chassis type Transformer 240v/12 Volts 500m/a 75p
CVC 20 tube base £2
Tube Base Rank & G11 £1.20
Infra red led LD57CA 15p
15K-20 turn pots 20p
Thorn 3500 2A cut out 50p

BBH/SAFETY MAINS ISOLATING TRANSFORMER
250V-250V/A £10

BRIDGES
KBL 005 30p
KBL 02 30p
KBP 04 30p
W02 15p
W004 15p
W005 20p
800V Bridges 2½ Amp 30p

MAINS MICRO SWITCH
GEC & Double etc. £1

4 amp-1.2V Nickel Cadmium Battery D Cell £1.00

12V Video Battery Packs 4Amp U2 Cells £10

24V 4Amp (100VA) Trans £4.00

Mains 240V (100VA) to 240V out fully shrouded £5.00

ITT CVC45 8 way resistor unit for v/cap £3

CVC40 8 button unit with mains lead & slider pots with sockets £10.00

Book on An Introduction to Satellite TV £5.95 No VAT

Book TV DX Handbook by R. Bunny £5.95 No VAT

Electronics Hobbyists Handbook £4.95 No VAT

Hills £4.50
NI.CD 5 Hours Battery Charger with battery test £6

Hill Deluxe Universal Ni-Cad Charger £6

Nickel Cadmium Battery Charger AA-C-D-PP9 £4.50

12 Volt Aerial Changer over Relays 144 Mc/s 45 watts 50p

6 Push Button Unit for GEC 2100 Series Replacement for Touch Button Unit £8

8 SEG LED Display with driver I.C. LM1017 50p

PHILIPS' MIN. HEAD PHONES - £1.50

Electronic Buzzer 6 volt, 12 volt 40p

15V, 015V, 1A £1
Print Type Trans

Regulated Power Supply 3-12 volts 1 amp in box with switch and mains lead £4

Philips' Video Cleaning Cassette SBC461 £6

Philips' Headphones Compact Disc Stereo Type £10

ITT Display Tube 58705 50p

8 Seg Display FND500 20p

Model 3000 Pocket Personal D.M.M. Volts range AC, DC 200M/V to 400V. Res. 2000Km £20

Export PYE731
6 Push Button unit with (UHF-VHF) band switch £4

ITT Micro Phone M5 50p with switch

1½ Volt Sub Min Relays 25p

Philips Solar Scientific SBC1730 Calculator £12

15v-0-15v 1 Amp Transformers £1

RGP30K 10p
RGP30G 8p
RGP10B 5p
RGP15G 6p
T6024WG1 10p
GP10 5p
GP15O 5p

THORN RGP80G 30p

Multi Core £4.50
60–40 Soldar 500G 20 SWG £5.00
15 Watt Stereo Amp Sanyo Module with Data 50p
PHILIPS
25 Watt Solder Iron £4.00

Various Tools and Accessories

10 mixed tube bars £4.00
5000 Diodes-Resistors £3 pack
T/V V/Aerial 300Ω or 75Ω £1.50
* D/P push mains switch 20p each
Mains lead & two pin socket for radio cassette 35p
T/V loop aerial 75p
Radio Telescopic Aerial £1.00
Philips Neon Lamps for TV sets 5p
Freeze Philips £1.20
Foam Cleaner Philips £1.20
Contact Cleaner Philips £1.20
Cans of Anti Static, Degrease Cleaner and Anti Corona All at £1.40
Lorlin Full Remote Relay Switch fit most T/V sets, mains 4 tag, 2 tag 12 volt £1.00
Mains timer. 13 amp — up to 2 hours: easy to use, plugs into socket £3.00
Screen locking agent, large can £1.50
Red E.H.T. LAED and Anode Cap £1.00
Weller solder iron 25 watt £4.00
Hitachi Silver Oxide Battery G13 UCC357 IEC SR44 1.5V 60p
100 Coax Plugs £12.00
De-solder pump + 2 nozzels Philips £4.00
Flat Red LED and Green 5p
500gm 60/40 solder reel £6
Solder 1 kilo reel £5.50
Dual v/u meter -20 – +10db £1
K30 thermistor 232266298009 75p
De-solder Pump £2.50
Portasol Flameless Gas Soldering Iron £16.00
Green & Red, LED pack mixed 100 for £1.00

HILLS
Miniature Linesman Pliers £2.20
Miniature Side Cutters £2.20
Miniature Pliers £2.20
Miniature End Cutters £2.20

KT3 PANELS
Sound Output RGB Output Chroma Panel, I.F. Panel and Line OSC £7.00 each

PYE 6 Key Switch & Panel G11 Front Panel £10

SONY 1400KV Chroma Panel £6
SONY 1400KV Touch button unit £3.50

GEC Decoder Panel PC772A3
PC446A5 £6

12 Volt Mains Trans 500M/A £1.00

Double 1.5 Digital Display. High brightness 20p

Quantity Reductions
BY204/4 25 for £1.00
BY206 25 for £1.00
KT3 touch button black 6 for £1
G11 touch button red 6 for £1
K30 full remote Dawer Ass with 3 I.C. £7.00
K30 VHF, UHF Dawer Ass £6.00
BY298 3 amp/fast/R 20 for £1.50
BU126 10 for £6.00
BU205 10 for £8.00
BU105 10 for £6.00
BF458 10 for £1.00
BF224 20 for £1.40
OA90 40 for £1.00
50 Ceramic Condensers £1.50
Mixed Mounting Kit for Power Transistors 50p
300 Condensers £1.50
300 Resistors £1.50
150 Electrolytics £2.00
15 Bulbs Philips 40p
GEC-Hitachi Thick Film Frame £5

100 Fuses £2.00
100 W/W Res. £1.50
BF 199 20 for £1
10 × 20 Turn 100k pots, Rank £2
BF 470 20 for £2

6 Mixed UHF Aerial Isolating Sockets, some with long leads. Fit ITT, GEC, Philips, Pye £1.00

Mixed Packs
TO66 12 Power Trans RCA 16182 NPN Replacement for BD124 and Mounting Kits £1.00
25 Panel Mount Bulbs & Neons £1.50
10A £1.50
25 LED red/yellow/green £1.50
20I/C Holders £1.20
20 Large LED Red £1.00
20 Small LED Red £1.00
10×20 Turn 100K Pots £1.00

Red & Green LED on Panel 1p each

Mixed 100 Transistor B.F. and B.C. and PET £1.50 1000 for £10.00

12 Volt 4 Amp Video Battery Pack 10 of Type D Cells £8.50

40 glass reed switch £1
10 press to make switch 70p
40 Pots £1.50
With Focus Pin, 10 Tube Bases, mixed £2.00
1,000 Diodes, Condensers, Resistors on Bandolier £1.00
20mm Fuse Holders
Chassis Mount 20 for £1
EHT Diodes, small 20 for £1

300 Mixed Diodes £2

100 500M/A Fuse £1
Mixed V/Cap Pots ITT-GEC-Hitachi-Philips etc. 20 for £1
ITT Mains Switch with Remont CMC113 £1

SENDZ COMPONENTS
TO ORDER SEE BACK PAGE

SENDZ COMPONENTS
TO ORDER SEE BACK PAGE

Matsushita PY34220 Tuner £7
C. Cam Decoder with TDA3591 £5
Toshiba VHF/UHF EG5221 £6
Mitsumi MEC1-F51 £5

Thorn Spares
New 9000 Decoder £8.50
9000 Frame panel £8
9000 Cyclops panel £1.50
8800 convergence panel £6
8500 convergence panel £6
4000 Power supply £3
1600 Mains lead, switch
T605 1xNPN T066 80v/6A 10p
9000 Sound output panel £1
3500 Focus unit £1.50
3500 Mains Trans £4
3500 cut outs 10 for £4
3500 IF panel £2
3500 Frame panel £3
3500 Line panel £3
3500 A1 Diode 20p
Export 3500 IF panel £2
IC board with set of SN74LS £1
4000 Tube base £4
3500 A1 pots 50p
Beam limiter panel £1.50
3500 Power panel with Y969 £1
3 Way regulated adaptor 240V 6V/7.5/9V/300mA £3.50
Rank/Toshiba preh unit 0354 £9.50
4 Push button unit preh £1.00
6 Push button VHF/UHF for v/cap. GEC-Decca type £7.00
7 Push button for CVC5 ITT £8.00
KT3 12 Push button unit £2.00
KT3 (Export) 12 P.B.u £2
6 Push button Unit Thorn £1.00
6 Push button GRC £6.00
6 Push button PYE 731 £6.00
Hearing aid unit £3
Rank Z718 4 P/B/Unit MECH £4
7 Button Unit GEC with Lamps £7
697 Push Button Unit £6.00
Z916B panel £5.00
T513AP panel £5.00

Mains Droppers
Pye 731 3+56+27R 50p
Thorn 50/17/1K5 £1.00
120/20/20/48/117 £1.00
270/10/6 for Thorn 4000 50p
18/320/70/39 £1.10
Thorn 50-40R-1K5 50p
Ac Socket & Lead
GEC, ITT, Philips, Pye 25p
7×3¼ Thorn £1
Thorn 1600-1700 £1.50
Rank Toshiba Tube Bases 30p

Speakers
6×4 G11 25 ohm £1.00
5½×2½ 3 ohm £1.00
5×3 80 ohm 70p
5×3 50 ohm 50p
5×3 35 ohm 70p
4×4 8 ohm 15 watt £1
6×4 15 ohm £1.00
6×4 speaker 16 ohm
7×3 70 ohm £1.00
8×5 8 ohm 15 watt £2
8×5 8 ohm £1
5×3 8 ohm 70p
7×3 16 ohm £1.00
5" dia 16 ohm £1.00
5" dia 8 ohm £1.50
6½" dia 4 ohm £1.50
6½" dia 3 ohm £1.50
2¾" dia 8 ohm 75p
3" dia 8 ohm 75p
4½" sq 15 ohm 75p
KT3 speaker K30 75p
3" dia 15 ohm 60p
1690 5×3 12 ohm £1
K45 Philp 15 ohm 75p
K30 15 watt £1

KT3-K30
OI-425
OF-550 F W 10p
OF-513 correction 10p
OI-557 50p

DIODES
BY 126 10p
BY 127 10p
BY 133 10p
BY 134 10p
BY 164 50p
BY 176 25p
BY 179 40p
BY 184 25p
BY 187 10p
BY 190 40p
BY 196 30p
BY 198 10p
BY 204/4 8p
BY 206 8p
BY 208/800 8p
BY 210/400 5p
BY 210/800 10p
BY 223 60p
BY 224/600, 4 8A/600v bridge 50p
BY 226 15p
BY 227 15p
BY 228 1500v 20p
Flat BY229 black 15p
BY 299 Red 30p
BY 229/400 30p
BY 299/60p Tag 30p
BY 237 5p
BY 254 10p
BY 255 10p
BY 298 10p
BY 299 10p
BY 406 8p
BY 527 20p
BY 407a 10p
BY 527 10p
BY 602 10p
F 247 10p
GP20G 5p
GRP80G (TX10) 60p
XK 3102 50p
BYV 28/200 20p
Bridge TX10 800/3 amps 30p
KBPC35-02 Bridge £1.50
Bridge Rec D35B10 40p

K35 Decoder £8.00
K35 Sound OP £4.00
Thick Film Daughter KT3 3122-127-43891 £3
12 CH. K30 Tex Rec Front Panel with IC £5
K35 H £5.00

Plug In
K4 Focus Pot £1.00

Fidelity Tube Base with transitor & focus pot £1.50

Bush Tube Base on panel £1.00

TX10 Tube Base on Panel £3.00

Line Transformers
Line O P Trans Mono T.X. 12"-14"
Philips
27482 £10
4822 £10
10273 £10
Thorn 1690 LOPT £7.50
2 J/Pots 3,500 1 off each type £3.00
G8 Trans Philips £7.00
G11 Split Diode £12.00
CVC820 Split Diode ITT £10.00
Thorn B/W AD5308F + Stik + Lead £1.50
GEC 2040 £3.00
GEC 2110 £7.00
Mullard A1 2036 £1.50
Pye 169 Line Trans £3.00
Pye mono £3.00
Rank mono 1704A £3.50
Split Diode Trans £7.00
GEC 20 AX Rank Z522 £3.00
Rank L O P T Z970 £3.00
CVC32 £6.00
A1208015 £5.00
CVC30 ITT £5.00
CVC32 Line Tran £7.00
CVC800 Line Trans £6.00
CVC40 Slip/Diode £12.00
CVC 45 £5.00
GEC Portable G1OT2041 £3.00
GEC Portable G1O12046 £3.00
EHT Split Diode Leads ITT £1.00
3500 L O P T & HT Trans each £2.00
LOPT Rank Z763 £5.00
K35 Split Diode 3122/13835930 £10.00

Universal Tripler
with small focus pot. Green type £7.00

Black Triplers
KT3 Triplers £6.00
S T C Universal Tripler £6.00
II 1H £2.50
11 1GA £2.00
ITT CVC 5-8-9 £3.50
Rank 1251.1 Tripler £2.00
Rank 1H1CP A823 £3.50
TU 25 30K Rank £3.00
11 1LZ Rank £3.00
G9 Philips £4.00
GEC 2110 £4.00
3500 Thorn £3.00
8500 Thorn £4.00
9000 Thorn £7.00
9500 Thorn £4.50
9600 Thorn £4.00
2040 GEC £3.50
GEC TVM25 Tripler £2.00
Universal Tripler £5.00
G8 Tripler £5.00
CVC20-32 £5.00
Decca 80 100 £4.50
Grundig TVK 52 £2.50
1HTBO Pye 731 £3.00
1H1HY £4.00
D22 for Pye 18" colour portable £4.00
TP 1193/63 £4.00
BG 100/41 £3.25
FRO Tripler print type with focus PO7 BG2087 £5
1/text ultrasonic rec'r panel £14.00
12-14V 20 for £5.00 200 for £25.00
GEC 8 touch unit assy complete with all IC's + pots £4.00
G11 E W Transformer 50p
G11 E W coils £1.00
G11 Transient Suppressors 245V 20p
G11 Scan Coils £5.00
G11 100K tuner pots 12 for £1
KT3 IF panel £6.00
KT3 line OSC transformer £1
KT3/K30 infra-red receiver head £1
K30 drawer unit with IC's (home) £10
K30 drawer unit with IC's (export) £10
KT3 AE Sockets 50p
KT3 receiver panel £8
KT3 line driver transformer 50p
Pye, K30, GEC etc Pre-mains stand-by switch £1
Decca 80/100 IF panel £5
NPN PNP 80V 6 Amp TO66 O.P Trans pair 25p
5 button touch tuner BBC1/2 ITV1/2 video with ic SAS 560T/570T £7.00
Control panel 5 sliders + mains lead £1.50
G11 8 touch button unit replaces old 6 P B U £24
Tube base + base unit for 820 Euro chassis £4.00
GEC Line O/P Trans & Rec Stick for Portable £3.00
CVC 20/25/30/35/40 decoder panel £10
CVC 20/25/30/35/40 decoder panel (untested) £5
CVC 40/45 IF panel £5
40K Transducer 50p
PHILIPS NE511N £1.20
LM337M Reg 30p
20 GEC Black Spark Gaps £1.00
KT3 Front Panel Control Assy £2.50
BTW 30/50 50p

International Rectifier EHT Diodes G770/HV34 6KV 3 for 8p
6A/600V Stud Diodes 20p
6A/1000V Stud Diodes 20p
BTW 92/800R £3
25A473 PNP C/P 10p

Rank T20 Z136 Panel £6.00
NEW GEC 20AX Power Supply Switch Mode £12.00
Field + Jungle panel for GEC 3133/3135 £1.50
GEC 2110 line panel with transformer £7.00
GEC 2110 tuner unit + IF Panel £12.00
Pye/Chelsea Line op panel £12.00
Pye 205 T/unit £3.90
Pye 713 IF panel and tuner £7.00
Pye 713 Chroma £10.00
Pye/Chelsea Timebase panel with LOPTI £10.00
Pye 731 Frame Panel £5.00
Pye 731 Convergence Panel £5.00
Pye 731 Chroma £10.00
Pye 731 IF panel + tuner £10.00
GEC portable chassis + LOPTI 2114 New £4.00
G9 Power Panel £6.00
Mono RANK Chassis 127A NEW £10.00
NEW G9 Frame Panel £4.00
NEW G11 IF Panel £10.00

25% OFF ALL PANELS

G8 Tuner Unit + Panel £4.00
G8 IF & Chroma £6.00
G8 Chroma £3.00

G11 IF Detector £3.00
G11 Selector gain module £3
Complete CVC 825 Chassis (both panels) £40.00
AFC V/Cap Resistor Unit UHF with IC SAS660 SAS670 £3.00
Z714 RANK IF Panels 6MHz 1 I.C. SL437F £3.00
Z909B RANK IF Panels Export 5.5MHz 2 I.C.'s
TBA1205B TCA2705Q £2.50
K35 IF £6.00
Z743 RANK IF Panel Export 5.5MHz 3 I.C.'s TBA750+SC9504P+SC9503P £1.50
Pye G11 Front panel with transducer, pots, tuner pots, 6 pb switch+lead £5.00
Pye 6 button switch portable £1.00
GEC V/cap VHF/UHF tuner and IF+ sound O/P PC 706B3 (Export) £12.00
GEC Line O/P PC 659B3 £6.00
2110 GEC Power Panel £8.00
CVC 20 Front panel with sliders + mains input panel £4
CVC 40 PUSH BUTTON ASSY with sliders: complete with lamp assy + pots 8 button units £9.00
CVC9 slider pots panel 50p
Universal Focus. Fits Pye, Thorn and Decca Units.
T147 Rank tube base on panel £1.00
Z718 Focus Unit £1.50
T20 Focus Unit £1.00
Large Type 75p
Decca Small 75p
KT3 Focus Unit 75p
K30 Focus Pot 75p
K30 Tube base on panel £1.00
TX10 Focus Units £8.50
CVC 32 Focus Unit 75p
Fedility Focus Unit 14R–14S 30p
3500 Thorn Focus Unit £1.00
ITT Small for use with Split
Z718 Bush Focus £2.00
Diode 50p
Remo TV12SP 50p
1600 Thorn EHT Rec and Lead 50p
TV14 50p
TV20 £1.00
TV45 50p
Thorn 14/1500 rec stick 5p

TX10 8 Button Unit £10.00

TX10/TX100 16 Button £10.00

G11 drawer ASS 3 pots Mains switch and lead £2.00

K30 Drawer Ass with pots cable forme £1.00

TX10 Drawer with 8 way pots. ass. £2.50

TX10 Ex port with band switch (drawer) £2.50

Line O/P panel GEC 2217/2218/2213/2214/2226/2227/2228 £10

PHILIPS BATTERIES
(Small Types) HAND SETS
SR41 25p
SR43 25p
SR44 25p
SR54 25p
LR43 25p
LR44 25p
LR54 25p
CR2032 25p
10 500PF 2KV 20p
22/1000 20p
1/250AC 20p
.1/100 5p
1MFD-250AC 25p
TAA7750 £1.00
HA11485 £1.00
UPC1373 50p
M50143 £1.00
M491BB1 £1.00
M58657P 25p
M50441/550 3p
M58658P £1.00
Delay Line TDK Small 10p

420M 400V £1.00
470M 380V £1.00
220/400V £1.00

1+1 MFD Mains Filter ITT 3 Pin 15p

1/100 × 10 30p
22/100 10p
4.7M/100 5p
470/100 20p
4700/100 75p
47/160 10p
300 300/300V 80p
800/160 50p
.1/250 Pulse 5p
2.2 250v 10p
7N5 1500V 15p
3n3/250 A.C 10p
33/250V 20p
39/250V 15p
4n7/250 tested 5KV 25p
22/250 15p
47/250 10p
100/250 20p
G11 470/250V £1.75
GEC600/250 60p
700/250 £1
300+300 MFD 350v £1.00
800/250 40p
32/300 20p
4/350 5p
8/350 8p
4.7M/350v 10p
33/350 20p
220/350 30p
300/350 40p
400/350 50p
22/375 15p
220/385 (ITT) 75p
330/385 CVC 820HT 60p
0.1/400 15p
K13 E/W 39/400 15p
.56K/400v 20p
4700pf/400 10p
.22/400 10p
8/400 15p
33/400 20p
400/400 40p
394K/400V 20p
220/450 40p
47/500 25p
0.1/600 15p
0.1/1200V wire end 20p
0.1/450 A/C wire end 20p
.22/1000 20p
.047/600 15p
0.047/1000 10p
0.01/1000 10p
0.1/1000 10p
.47/1000v 65p
.47/250V A C 10p
.001K/1250 10p
0.0047/1500 10p
.005/1500 10p
.0105/1500 10p
1n8/1500 15p
2n0/1500 10p
2n2/1500 15p
.01/1600 15p
G11.8200/2KV 15p
0.1/2KV 20p
3n9/2KV 15p
0.0015/2KV 10p
6n2/2KV 15p
2n0/2KV 15p
2n2/2KV 15p
470pf 4KV 10p
750pf/2KV 10p
3000PF/3000V 10p
4n7/2KV 15p
6n2/2KV 10p
7n1/1500V 10p
8n2/1500V 10p
9n1/2000V 10p
8n2/2KV 15p
0.0082/2500 15p
150/3500 10p
1800/4KV 5p
4.7nf/5KV 10p
170/8KV 10p
180/8KV 10p
210/8KV 10p
1000/10KV 10p
.47/100V 80p
Tube Thermpath 167 £1.00
Rank Secam Decoder Panel UHF & VHF T115A £13.00
10 off .91 CAP G11 £2.00
Philips K4 CAP 150M/385V 50p

CVC 20-25-30 Mains Switches 60p
Infra Red and Ultrasonic G11 Teletext Decoder Panel £30
RANK & ITT Mains Remote On-Off Switch (720R) £1.50
RANK & ITT Remote Switch 2800 ohm £1.50
G11 Mains Switch 50p
4 amp Mains Switch 25p
GEC Mains Switch 4 amp 30p
KT3 Mainswitch £1.00
G8 Mains Switch 75p
G11 Preh Red LED P/Button for C.H. Change 20p
RANK TOSHIBA Transductors TPC-2011 50p
Mains Switch ITT Long Type Print 75p
Mains Switch Philip Long Type TAG 75p
Mains Switch GEC Long Type TAG 75p
2000 Chassis Fidelity Mains Switch (4 TAG) 60p
250V/4A White Lorlin Mains Switch 60p
KT3-K30-K35 Full Remote Mains Switch (6 TAG) £1
Teletext Adaptor Kit TY-500 Panasonic £12

Multi-Caps
220 MFD Sprague 385V 50p
350V 300M + 300M £1.00
400V 400M 60p
350V 400M 60p
Thorn 3500
175/100/100/350v £1.00
KT3/200/25/25/385v £1.00
KT3-K30 220+40+40 75p
200+200+75+25M 325V £1.00
300+300+150+100+50MFD 350V £2.00
G11 CAP 470/250 £2.50
47/220/350v 60p
150/150/100/100/100/320v £2.00
2500/2500/63v 50p
150/200/200/300v 70p
300/100/100/16/275v £1.50
100/200/325v 40p
150/150/100/375v £1.50
200/200/75/25M 375V £1.00
Thorn TX9 Caps 500+500M 175V £1.00
300/300/100/32/32/300v 2.00
1500/2000/30v 50p
150/150/100/100/320v £2.00
100/350 + 300/200/100/16/275v £2.00
225+25/380 GEC 70p
200/100/100/350v £1.50
500/500/25v 50p
150/150/100/300v 75p
200/150/150/300v 1.00

ITT 8 and 6 Push Button £1.00
Pye 725 LOPTs £6.00
Pye 731 LOPTs £6.00
Thorn 8500-8800 LOPTs £5.00

CMC 301 front panel £5.00
CMC 303 front panel £5.00

CMC 302 Panel with TC mains switch etc £5.00

CMD 800 Decoder £8.00

G11 £1.50
1 I.C. Receiver Panel

3 I.C. Power Supply G11 Full Remote Receiver Panel £3.00

PHILIPS SBC 469 Stereo Microphone £23.00
Meters Hills 520 £17.00
Meters Hills 420 £15.00
Hills HD5000 Digital Meter 1000V DC 750AC 10 Amp 20 MRG Rangers £28

HT100 Multimeter £6.75
HT300 Multimeter £7.75
HT500 Multimeter £9.00
HT700 £15.00
HD1000 Digital £20.00
HD3000 Digital £25.00
HD5000 Digital £25.00
HD6500 Digital £32.00
HD8000 Digital £37.00
HD9500 Digital with capacity Temp Trans Volts Ohms and Amps ranges £60

Infra Red
Hanset Tester
Works at 24 feet – Sound repeater.
Works off 9 volt battery £8.00
Fits in top pocket

Handset Tester with LED £4.50

Repaired Handsets
Philips K4-K35, RC5350-RC5300, RC5370, RC5375, repaired same day £10.00

RC4001 Full Remote KT3 K30 Teletext Handsets exchanged £15.00

NEW Type RC4001 9 buttons not 12 £6.00

GEC Full Remote Infra-red, 1983 models £15.00

Timers, 60 mins, small £1.00

TOSHIBA
HAND SETS
24 Button CT938 Fullremote £5.00
32 Button CT983 Videotext £6.00

THORN
VCR Front Display Panel £7.00

Large type ITT TV and V.C R. Handset £15.00

GEC Ultrasonic 8C11 Full Remote £10.00

G11 Full Remote Ultrasonic £32.00
G11 Ultrasonic Teletext Handset £20.00
8 C.H. Ultrasonic GEC Full Remote C201411/C221911 £15.00
New Replacement for G11 Ultrasonic Full Remote £12.00
Thorn 4000 insert with 7 buttons £5.00
Decca RC 11 £14.00
Decca RC 12 £14.00
G11 Infra-red full teletext £24.00
Dynatron-Full remote CTV 62, 63, 64 £19.00
Hitachi infra red handset £18.00
Philips full remote KT3, 16C928/20C934; 7228/7324, K12 26C 797/1ST 66K 1826 £12.00
G11, Full remote top button assy. £12.00
G11, Full remote repair service (exchange unit) £18.00
G11, Full remote new ultrasonic £32.00
GEC infra red full remote 8 channel (I.C SAA1250) £14.00
Philips infra red full remote 9 channel for 60 CP2605 £6.00
Philips infra red full remote 12 channel for 60 CP2605 £12.00
K35
KT3/K30 T/Text £15.00
KT3/K30 Full remote £15.00
KT3 Power supply £4.00
GEC infra-red 2236-2026 £4.00
GEC 8 button full remote £14.00
GEC push pad handset button blobs each 10p
Pye & Philips handset KT3-K30 chassis. No RC5150-RC5176-RC5171-RC5177.
Special Price £13.00
RC4001 KT3 and Teletex £14.00
IT CVC 32 handset repaired £15.00
CVC 32 Hand Set £15.00
CVC 45-3 and 2 Pin
TX10 Hand Set Text £19.00
TX9 with Text £19.00
TX9 & TX10 button print £2.00

ITT
T/V & Video Processor 1200 Type £10.00

PHILIPS
UNIVERSAL HAND SET £12.00 RC5
KT3 – K45

We have all parts for Philips Handsets

RC5353 £15.00
RC5300 £12.00
Philips RC5 £15.00

TEXT-TYPE
Replace Hand Set for
Philips KT3-K30, K4 etc £12.30

THORN HAND SETS
9000 – 9600 – TX9 TX10 TX100
Text and Non-Text £10.00

PHILIPS
RC5171 £12.00