FEBRUARY 1987

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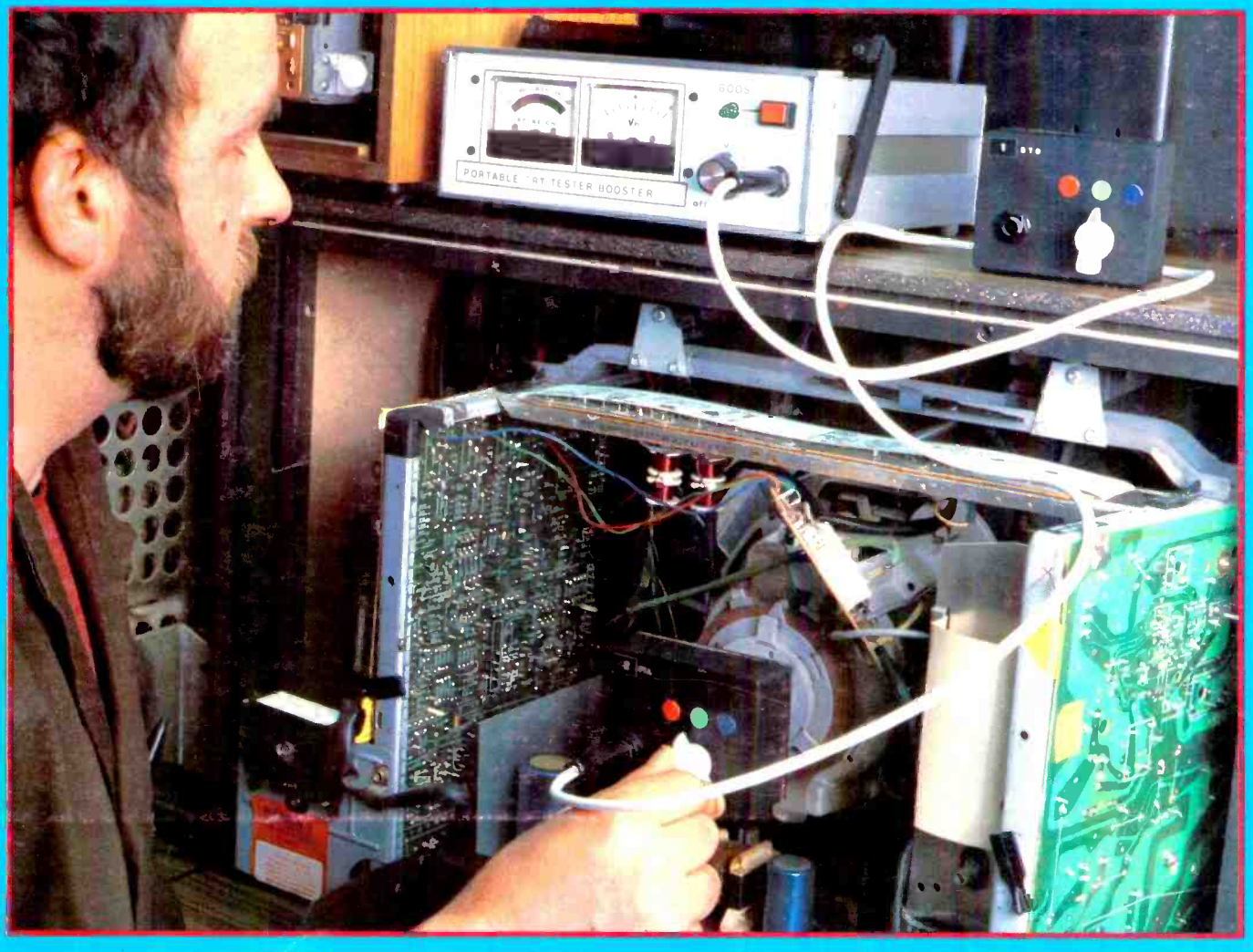
TELEVISION

SERVICING·PROJECTS·VIDEO·DEVELOPMENTS



Versatile CRT Tester-booster
The Problem of Tape Damage
Sony KV1810 GCS Conversion
Computer as an aid to Servicing
Sanyo VTC5000 Series Fault Notes
TV Fault Finding • VCR Clinic

MANOR SUPPLIES

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TEST DEMONSTRATIONS AT 172 WEST END LANE

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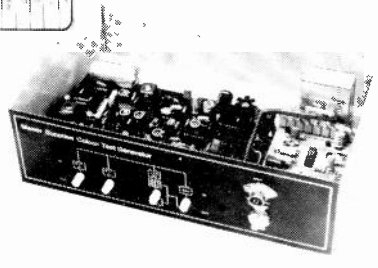
- ★ Mono outputs with border castellations, cross hatch, grey scale, vertical lines, horizontal lines and dots. UHF modulator output plugs straight into receiver aerial socket.
- ★ Additional video output for CCTV & VCR.
- ★ Facilities for sound output.
- ★ Easy to build kit, standard parts. Only 2 adjustments. 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 £2.50
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.

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 £2.20).

MK 4 (BATTERY) BUILT & TESTED £58.00 + £2.20 P & P.
MK 4 (MAINS) BUILT & TESTED £68.00 + £2.20 P & P.
VHF MODULATOR (CH 1 to 4) FOR OVERSEAS £5.75.
EASILY ADAPTED FOR VIDEO OUTPUT & C.C.T.V.

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Mullard Decorder panel + Interface **£35.00** p.p. £1.80
THORN TX10, PHILIPS G11 PRESTEL, TELETEXT
Mullard Units VM 6230, 6330 plus Line Coupler & Interface **£38.00** p.p. £2.50

EXTERNAL TELETEXT ADAPTOR
(RADOFIN) with cable remote control. Fully tested. **£150.00** p.p. £3.00. Plugs into aerial socket of any T.V.

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BACKED BY TWENTY YEARS EXPERIENCE & STAFF OF TECHNICAL EXPERTS

LOPTs, TRIPLERS, PANELS, TUNERS, SELECTORS ETC.

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PHILIPS G11 6 position touch tune channel selector units **£16.00** p.p. £1.80 (can replace earlier mechanical selector unit).
PHILIPS G11 PANELS (tested).
Power, Frame, IF, decoder **£18.00** each p.p. £2.00. Scan Panel **£28.00** p.p. £2.80.
PHILIPS G11 PANELS ex rental (untested).
Power, Scan **£10.00**, Frame, Decoder **£5.00** p.p. £2.00.
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COLOUR MANUALS p.p. 50p.
FERGUSON 9800 **£2.00.**
PHILIPS G11 **£3.50**, KT3 **£3.50**, CTX-I: **£1.50**, CTX-S **£1.50.**
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TX9 ULTRASONIC (3-button) **£15.00; TX9, TX10** Infra red **£18.00; TX9, TX10** Infra red Teletext **£20.00**, p.p. £1.20.
THORN ex rental handsets untested 9600, TX9, TX10 **£5.00** p.p. £1.00.
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THORN TX9 Ultrasonic Remote/Control/Receiver panels. **£8.50** p.p. £1.50.
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PAL ENCODER KIT (RGB to Video) **£18.50** p.p. £1.30.
TELETEXT DECODERS New & Tested Mullard VM 6101 **£30.00**, Texas XM11 **£28.00**, KT3 Tested **£30.00**, Untested **£5.00** p.p. £1.60
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. **£12.00** p.p. 80p. (Alum. Case **£2.90** p.p. £1.40) **ADDITIONAL GREY SCALE** Kit **£2.90** p.p. 45p.
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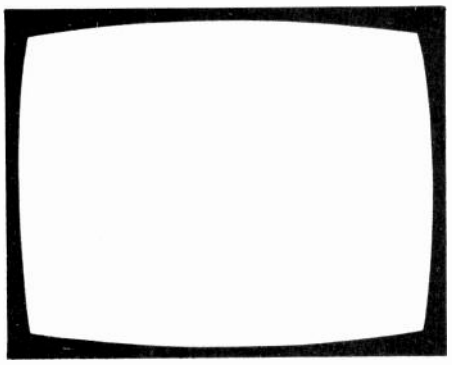

TELEVISION

February 1987

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On sale January 21st

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.

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BACK NUMBERS

Some back issues published during the last six months are available from the Editorial Office at £1·40 inclusive of postage and packing. Address as 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. All correspondents expecting a reply 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

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AC107	35
AC126	34
AC127	34
AC128	34
AC128K	40
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AC141K	39
AC176	35
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AF239	60
AF279	1.56
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BC178	26
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BC184L	15
BC186	35
BC187	25
BC204	10
BC208	13
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BC212L	15
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BC338	18
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BC549	10
BC550	10
BC557	10
BC558	9
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BC637	39
BC639	30
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BD115	45
BD116A	90
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BD131	50
BD132	49
BD133	60
BD135	38
BD136	38
BD137	38
BD138	35
BD139	35
BD140	44
BD144	1.70
BD150	60
BD159	65
BD160	1.60
BD166	52
BD179	70
BD182	1.20
BD183	1.18
BD201	85
BD202	91
BD203	80
BD204	99
BD222	46
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BD225	47
BD232	82
BD233	66
BD234	63
BD235	60
BD236	65
BD237	57
BD238	65
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BD244	85
BD410	79
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BD437	86
BD438	94
BD507	69
BD508	80
BD509	86
BD510	86
BD278A	81
BD517	60
BD519	1.08
BD520	75
BD535	82
BD536	91
BD696A	1.49
BD697=701	1.63
BD698=702	1.50
BD701	1.63
BD707	1.50
BDX32	2.10
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BF158	18
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BF197	16
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BF256	60
BF257	34
BF258	34
BF259	34
BF262	84
BF263	81
BF271	24
BF273	24
BF274	24
BF336	40
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BF355	56
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BF363	72
BF371	30
BF392	35
BF422	34
BF423	46
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BF457	35
BF458	43
BF459	58
BF460 = BF462	86
BF469	63
BF470	66
BF597	16
BF757	54
BF758	54
BFR39	27
BFR40	30
BFR79	85
BFR90	1.74
BFT42	42
BFT43	42
BFW10	60
BFX29	40
BFX84	42
BFX85	30
BFX86	30
BFX88	46
BFY50	32
BFY51	32
BFY52	32
BFY90	95
BR100	34
BR101	95
BR103	83
BR303	1.46
BRC4443	94
BRC4444	98
BRY39	56
BRY55	45
BRY56	57
BSR59	1.80
BSV57B	89
BT100	1.65
BT101	1.20
BT106	1.60
BT108	1.69
BT109	1.31
BT116	1.87
BT119	3.66
BT120	3.66
BT151/800	2.07
BU104	2.00
BU105	1.58
BU126	1.75
BU204	1.50
BU205	1.87
BU206	1.80
BU208	1.60
BU208A	1.65
BU208D	2.20
=BU800	
BUW81A	3.84
BU208/02	2.10
BU326A	2.00
BU407	1.70
BU426	3.07
BU500	2.50
BU526	2.46
BU508	3.20
BU806	1.40
BU807	2.94
BU826	4.95
BUW84	1.45
BUX84	1.50
E1222	40
MEO411	20
MJE340	68
MJE520	50
MJ3000	1.98
MPSA92	35
MR814	45
MR854	55
MR475	4.85
MR479	4.85
MR477	4.90
OT121	1.91
R2008B	1.90
R2010B	1.92
R2265	1.50
R2322	84
R2323	67
R2461	1.60
R2540	3.20
RC4558	2.20
RCA16334	90
RCA16029	1.18
RCA16039	1.18
RCA16092	1.18
RCA16040	96
RCA16041	84
RCA16334	90
=ON447	
RCA16335	90
=ON448	
RCA16957	2.88
TIC45	90
TIC46	60
TIC47	72
TIL32	65
TIL78	48
TIP29C	43
TIP30A	47
TIP30C	43
TIP31C	55
TIP32C	42
TIP33B	75
TIP34B	1.06
TIP41C	47
TIP42C	50
TIP47	93
TIP120	65
TIP161	2.15
TIP2955	90
TIP3055	63
TIS91	32
TU106/02	1.80
2N696	21
2N918	82
2N2904	51
2N2905	28
2N3055	79
2N3702	16
2N3703	16
2N3705	10
2N3706	10
2N3708	17
2N5294	48
2N5296	48
2N5298	69
2SB337	1.86
2N5496	53
2N6107	75
2N6109	81
2SA715	1.98
2SC495	1.10
2SC496	1.31
2SC643A	1.82
2SC1096	1.72
2SC1172Y	5.50
2SC1173Y	1.69
2SC1306	2.73
2SC1307	3.00
2SC1449	1.67
2SC1520	68
2SC1678	2.67
2SC1909	2.90
2SC1953	1.44
2SC1986	
=2SC1061	2.94
2SC2028	1.82
2SC2029	2.60
2SC2078	2.90
2SC2091	1.34
2SC2166	2.73
2SD870 (Sony)	6.35
DEC1	2.20
DEC2	2.20
THY15/80	2.40
THY15/85	2.40
Transistor mounting kit TO66, TO3, TO220AB	30

INTEGRATED CIRCUITS

AN214Q	3.91
AN240	3.84
AN318	6.37
AN262	4.10
AN301	5.15
AN715Q	3.97
AN6341N	8.97
AN6344	7.85
BA521	2.80
BA536	3.00
CA555	46
CA556	84
CA741	25
CA748	45
CA1532	4.20
CA3065	1.80
HA1151	3.89
HA1342	2.49
HA1306N	2.60
HA1366WR	2.80
HA1377	3.20
HA11219	4.21
HA11244	4.04
LA3350	1.59
LA4031P	3.21
LA4032P	3.15
LA4102	3.37
LA4112	3.25
LA4400	3.05
LA4422	3.28
LA4440	4.07
LC7130	5.93
LC7120	5.87
LC7137	5.50
LM1011	3.25
LM1340T	75
LM8361= MM5387ANN	4.15
MB3712	2.60
MC1307	1.99
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MC1351P	2.93
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MC1350	1.50
MC1352	1.75
MC1495L	3.00
ML231 ETTR6016	2.20
ML232	2.20
ML237	2.50
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ML922	3.29
ML928	2.18
NSM5807	7.87
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SAA1025	8.50
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SAA5010	6.30
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SAF1032	6.30
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SAS560S	2.07
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SAS670	3.25
SAS580	2.90
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SL901B	7.00
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SL1310	1.80
SL1327Q	1.20
SL1430	1.68
SL1432	3.36
SL76544	2.05
SL490	1.89
SN76115N	2.27
SN76131N	2.00
SN76226DN	2.72
SN76227N	1.18
SN76533N	1.70
SN76033N	2.49
SN76544N	2.35
SN76660N	80
SN76666N	1.52
SN76530A	1.47
STK015	7.36
STK032 = STK078	13.25
STK433	5.65
STK435	9.06
STK436	6.50
STK437	7.85
STK439	8.40
STK459	9.50
STK441	11.57
STK461=465	12.60
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STK2129	13.20
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TA7129AP	3.76
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TA7146P	4.67
TA7193P	5.67
TA7171P	8.90
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TA7223P	3.74
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7815	78
7818	78
7824	78
78L05	68
78L08	68
78L12	68
78L24	68
7905	98
7906	98
7908	98
7912	98
7915	98
7918	98
7924	98
79L05	72
79L12	72
79L15	72
79L24	72

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BA115	13
BA145	17
BA148	17
BA154	6
BA155	14
BA156	15
BA157	20
BA318	25
BAX13	4
BAX16	8
BB105G	30
BY122	96
BY127	11
BY133	15
BY164	45
BY176	85
BY179	63
BY182	87
BY184	55
BY199	28
BY206	14
BY210/600	28
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BY223	90
BY227	28
BY229	1.06
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BY299	22
BYX10	20
BYX36/10	30
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OA47	20
OA91	10
OA95	6
OA202	11
IN914	4
IN4001	4
IN4002	4
IN4003	4
IN4004	5
IN4005	5
IN4006	10
IN4007	10
IN4148	5
IN4448	10
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Battery Lid	WM2	1.27
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Motor	VO2850P	3.07
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CTX EHT Leads	7.36

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Counter Belt 2	3292/3V00/3V16/3V22	60
Reel Drive Belt	3292/3V00/3V16/3V22	1.00
Relay Belt	3V00	2.79
Capstan Belt	3292/3V00/3V01/3V16/3V22	3.28
Unloading Belt	3292/3V00/3V16/3V22	60
Drum Motor Belt	3292/3V00/3V16/3V22	2.79
Cassette Drive Belt	3V23	60
Capstan Belt	3V29/3V30	1.62
Loading Belt	3V23	60
Loading Belt	3V29/3V30	60
Loading Belt	3V35/3V36/3V38	60
Tape Spool Drive	3V35/3V36/3V38	60
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THORN REMOTE SETS

T723 Non Text	TX10 3767/3788	38.60
T725 Non Text/	TX9 20A2/2282/3781/37081/37101/3714/37351/37361/37371	19.40
T731 Text/ Stereo	TX9 10 20A4/22B4/37063/37093/37463/37371	20.01
T736 Text	100 20A3/2203/3795/3796/37003/37103/37353/37363/37373/37953/37963	31.60

THORN SWITCHES

On/Off Switch	TX9	2.98
On/Off Switch	TX10	2.74
Focus Unit	TX10	10.20
8 Way Tuner Unit (Not Drawer)	37141 TX90	12.88
8 Way Tuner Unit (Not Drawer)	37360 TX9	13.50
8 Way Tuner Unit (Not Drawer)	37340/37370 TX9	20.44
Volume Control	38030 1790	1.74
6 Way PB Assy	3722/4722/6722/8000 Thorn 9000	20.70

THORN TRANSFORMERS & INDUCTORS

LOPT	9000	25.53
FHT Transformer	TX10	33.80
LOPT	TX10	15.00
LOPT	TX9	23.85
LOPT	38030	6.18
RFI Choke	TX9	3.45
DC Input Choke	TX9	15.36
Mains Transformer	TX90	15.03
Linear Line Coil	TX9	1.77
RFI Input Choke	TX9	60

THORN MECH. REP. VCR

Take Up Rubber Tyre	3V92/3V00	60
Rewind Tyre	3V92/3V00	60
Timing Gear Assembly	3V00	3.97
Audio Control Head Sub Assembly	3V92/3V00/3V01/3V16/3V22	42.38
Fast Forward Idler	3292/3V00/3V16	1.63
Fast Forward Tyre	3V00/3V16	60
Pinch Roller	3V92/3V00/3V01/3V16/3V22/3V23	7.30
Stop Solenoid	3V16	10.42
Pause Solenoid	3V16	16.60
Take Up Idler Assmb	3V00 up to Serial No. 19006 3V16 up to Serial No. 16509 3V22 up to Serial No. 27700	7.54
Take Up Idler Assmb	3V00 19007 onwds 3V16 16510 onwds 3V22 27701 onwds	5.28
Rewind Idler	3V16	8.52
Take Up Tension Brkt	3V23	80
Roller Assembly	3V23	4.08
Take Up Spool Idler Assmb	3V29/3V30	2.12
Pinch Roller	3V29/3V30	8.66
Idler Counter Pulley	3V29/3V30	60
Cassette Housing Assmb	3V29/3V30	20.85
Take Up Clutch Assmb	3V29/3V30	2.36
Spool Carrier Idler Assmb	3V35/3V36/3V38	2.73
Cass. Housing Assy	3V35/3V36	36.74
Lower Door Spring	3V35	60
IF Panels	TX10	23.52
Cassette Cover	3V29/3V30	4.34
TX90 Battery Inverter	TA127	£37.81

TUNERS/MIXERS

Mix Booster	3292	30.62
Mix Booster	3V29	24.70
RF Convertor	3V29	59.32
Mix Booster	3V31/3V32	24.50
UHF Tuner	3V35/3V36	38.12
RF Convertor	3V35/3V36/3V38	36.08
UHF Tuner	3V39	21.87
Varicap Tuner	TX9/TX10	16.34

DECCA – General Components

Bridge Transformer	1.97
Decca 30 Width Cont.	50
8R Speaker	3.75

DECCA – Manuals

Decca 80	5.35

PHILIPS – G11 Sundries

47 pot with switch	85
Line Lin Coil	3.80
62 pot RGB	6.75
Line Scan Panel	54.00
Power Panel	41.06
Timebase Panel	37.50
Bridge Transformer	2.35
EW Correction Coil	1.95
Final Anode Lead	3.20
Focus Unit	6.80
39R Resistor	70
RGB 10G Diode	69
IF Panel with V321	12.00

PHILIPS – G8 Sundries

Knobs sm. or lg.	50
Rear Convergce Panel	23.00
AFC Unit	8.82

PHILIPS – Video Heads/Tape

Philips	V2000 Head	64.00
	1700 Head	64.00
LVC1700	Tape 120	17.50
VCC360	Scotch	6.33
VCC480	Scotch	7.23

PHILIPS – Manuals (Zero VAT)

Philips	G9	4.20
	G11	3.90
	K30	3.90
	KT3	3.90

PYE

IF Gain Module	9.00
CDA Panel	20.00
731 RF Choke	6.60

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HITACHI/GEC – Semiconductorsd

LA7801	2.20
STR454	4.73
SN76709	8.00
TDA1870	6.46
TDA4503	5.68
2SD1453	2.20

HITACHI/GEC – VCR GEC V4000H/ Hitachi 8000

Belt Counter (122)	47
Belt Loading	43
Belt Take Up	30
Idler FF/Rewind	1.87
Lamp Tape Sensor	65
Play Idler Assy V6414221	3.74
Pressure Pinch Roller	5.16
Pulley FF/Rewind V6383531	52
Relay	2.54
Upper Cylinder (Head)	35.62

HITACHI/GEC – VCR GEC V40001H/ V4002/Hitachi 9300/9500E

Belt (259)	47
Belt (289)	47
Belt Take Up (213)	30
Capstan Motor	31.00
Idler FF/Rewind	1.80
Lamp Tape Sensor	91
Play Idler Assy VS861482	3.72
Pulley FF/Rewind V6345173	36
Video Head	35.62
Remote Cont. Handset	9.33

HITACHI/GEC – VCR GEC V4004/ Hit.VT33E

Belt (302)	30
FF/Rewind Arm V6886971	2.90

HITACHI/GEC – VCR GEC V4100/ Hitachi VT11E

Belt 312	30
Belt 313	30
Belt 317	47
Belt 318	40
Capstan Motor	22.18
Upper Cylinder (Head)	33.35

HITACHI – Sundries

Vertical Output Module GECC2286, Hit. CPT2226 C2067 C2069	3.98

HITACHI/GEC – Service Manuals (Zero VAT)

GEC	Hitachi	
V4000H	8000	6.49
V4001H	9300E	6.49
V4002H	9500E	8.62
V4004	VT33E	7.18
V4005E	VT63	4.77
V4100	VT11E	6.49

THORN NEW LIFE EXCHANGE VHS VIDEO HEADS

Send us your old VHS head. We'll send an exchange one by return. £21.45 + VAT.

FIDELITY – Semiconductors

ML923	2.21
SL490	1.77
TDA2270	1.65
TDA3330	2.21
TDA8180	4.00
BC638	33
BU5080	1.77
TDA3810	3.86

FIDELITY – Switches

On/Off AVS	94
On/Off Remote Cont.	2.43
On/Off CTV 140	94

FIDELITY – Transformers

Flyback	FCC2015BE up to 22"	12.00
	FCC2215AE 22"	12.00
Mod. Kit included		

FIDELITY – Remote Controls

4 Button CTV20R/22R/140R	9.95
8 Button F14R	11.05
12 Button IS500	11.05
14 Button AVS	9.95
32 Button Teletext	12.16
Tuner Flap CTV 14S	83
Loudspeaker CM14/CTV140R	1.99

FIDELITY – Service Manuals (Zero VAT)

Audio	IS500	1.70
	IS700	1.70
	IS750	1.70
TV	CM14	1.70
	CTM1400	1.70
	F14R	1.70
	TV140	1.70
ZX2000TV	CTV20R	1.70
ZX3000TV	AVS1600	1.70
ZX3000TV	AVS2000	1.70
ZX3000TV	CTV20	1.70
ZX3000TV	Teletext	1.70
VCR 2 Parts VCR		2.90

NATIONAL PANASONIC SPECIFIC VIDEO

VXPo234 Play Idler	1.10
VXP0401 Idler Unit	1.08
VXP0344 Idler Unit	1.22
VXP0331 Idler Unit	1.28
VXP0141 Idler Unit	1.08
VXP0521 Idler Arm Unit	4.08
VXP0325 Loading Gear	1.63
VXP0520 Load Gear Unit	1.36
VDG0016 Action Gear	46
VDG0017 Interm. Gear	43
Direct Rep. Video Bulb	1.00

MAINS DROPPERS

Decca 20	2.48
Decca 27R/47R	1.40
Decca 56R/68R	1.40
R&M 823 56R/68R	94
PYE 725/31 3R/56R/27R	1.84
PYE 725 56R/27R	1.04
Philips 5050 30R/125R	1.75
Philips 5051 118/14B	1.93
Philips G8 47R	72
Philips G8 2R7/68R	1.38
Thorn 1400	1.52
Thorn 1500	1.47
Thorn 3500	1.20
Thorn 8000A	1.24
Thorn 8500	1.36
Decca 2R5	96
Decca Modulohm 3R9	60

PLUGS AND SOCKETS

Din Plugs	
5 pin 180°/240°/360°	20
6 pin	28
7 pin	35
8 pin	56
Chassis Sockets DIN	**Line Sock.**
5 pin din 180°/240°360°	28
	28 28
6 pin din	36 28
7 pin din	36 30
8 pin din	64 55
Phono plugs	12
2.5mm Jack plugs	11
3.5mm Jack plugs	15
3.5mm Jack Plugs Stereo	35
6.3mm Jack Plugs Stereo	36
Standard mono jack plugs	20
2 pin speaker plugs	10
I.D.C. plugs 36 way conn.	5.90
BNC plugs	1.15
Car aerial plugs	18
FM plugs	25
Coax plugs metal	18
Line connectors	16
Double ended female socket	1.20
In line socket metal	25
Crocodile Clips	25
Phono line socket	20
Phono chassis socket	10
2.5mm jack line socket	17
2.5mm jack chassis socket	14
3.5mm jack line socket	18
3.5mm jack chassis socket	24
3.5mm stereo line jack socket	28
3.5mm stereo jack chassis socket	18
6.3mm stereo jack socket	25
IDC 36 way socket	6.90
PL259 with reducer	1.30
Reducers for PL259	16

ADAPTORS

3.5mm Plug/6.3mm Soc.	25
3.5mm Plug/2.5mm Soc.	25

LEADS

2mm Fly m/m	70
2mm Fly m/f	70
4m Fly m/m	1.20
10m Fly	1.90
Fig. 8 Mains	62
Computer/TV	97
5 pin din/5 pin din	98
5 pin din/7 pin din	98
TA81 car bat. Thorn 1691	4.47
TA51 car bat. Thorn 1615	3.66
Car battery Philips	3.95
Scart Leads 2m (open end)	3.50

FILAMENT LAMPS

HES ROUND BULBS	**15p**
LILLIPUT (L.E.S.) BULBS	**12p**
CAPLESS LAMPS	**28p**
WIRE NEONS	**9p**
TUBULAR LAMPS CAPPED	**31p**
TUBULAR LAMPS (Wire ended)	**31p**
WIRE ENDED LAMPS	**31p**

AUDIO HEADS

Mono record/playback	4.32
Stereo playback	4.79
Stereo record/playback	4.99
Stereo record/playback (Dolby)	6.90
Mono/stereo erase	2.25

MOTORS ELECTRONIC/ ROTATION CLOCKWISE

6V MD6515	4.95
9V MD9516	4.95
12V MD12517	4.95

ANTEX

C15W Iron 240V	6.20
C240 Element	2.75
Bits 102, 106, 820, 821	1.10
CS17W 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
Temp Controlled	
30W Iron CSTC	16.95
40W Iron XSTC	16.95
Unit TCSU1	68.95
Antex Stand	2.10
MLXS Auto Rep. Kit	8.40
Sundry Irons	
Cordless Gas Iron	15.99
Tips for Gas Iron	5.00
25 Watt Philips	5.50

WELLER

Heat gun	15.95
Heat gun tips	83
3/16" Iron tips 25W	83

SERVISOL

Freeze-It	1.20
SUPER SERVISOL	1.04
Foam Cleanser	1.02
Plastics Seal	1.14
Silicone Grease	1.30
Tubes Silicone Grease	1.66
Aero Klene	94
Aero Duster	1.28
Excel Polish	96
Video Head Cleanser	90
Super 40	1.66
Fire Extinguisher 640G	3.08
Heat Sink Compound 25G	1.10
Solda Mop standard reel	77
Hylosil Silicone Rubber	2.98

SECURITY EQUIPMENT

	CONTROL PANELS	
NEW	1011 Hilclare	29.50
	Hilclare Zone Exp.	32.50
	BELLS/BOXES	
→	"C" Type Dummy	3.25
	"C" Type Polyprop.	4.55
	"C" Type Translux.	7.80
	6" MO Bell	5.52
	CABLE	
NEW	4 Core	5.43
	6 Core	7.84
→	8 Core	10.37
	INFRA-RED PASSIVE	
	6JD Mini	26.15
	Invader	24.00
	SECURITY LIGHTS	
NEW	Floodlights	17.74
	Infrascan	62.94
→	**S.A.B. MODULES**	
	Castle SAB	13.49
	P.A. BUTTONS	
	Stainless	2.88
	CONTACTS	
NEW	5 Term Flush M	59
	5 Term Surface M	59
→	4 Wire Flush M	62
	4 Wire Surface M	62
	RECHARG. BATTERIES	
	12V 1.9A	7.06
	EXTERNAL SOUNDERS	
	712 Ext. Siren 116dB	5.75
	1010 Ext. Siren 116dB	5.96
	Dinablast 127dB	18.14
	PIEZO SOUNDERS	
	SB1 (140dB)	3.37
	SB2 (111dB)	5.17
	PZ28 (105dB)	4.61
	BUZZERS	
	HB722	60
	TAMPER SWITCHES	
	2½ Tamper	50
	TRUNKING	
	Fused Spur	2.58
	XENON FLASHER	
	128 PCL	6.75
	121 PCL	6.90
	JUNCTION BOXES	
	6 Way	21
	8 way	39
	CABLE CLIPS	
	3.5m 100	98
	4.5m 100	1.08

CASSETTE DRIVE BELTS

35mm	35	46mm	37
57mm	37	66mm	39
71mm	43	90mm	43
101mm	59		

VIDEO PINCH ROLLERS

PANASONIC	NV7000	4.35
SANYO	VTC9300/VBS7000	4.35
SONY	C7/J7/SL17	4.35
JVC	TCE3V00/01/06/16/ 23/24	
JVC	HR2200/3320/3330/ 3660/1100/7700	
AKAI	VS9700	4.35
HITACHI	VT5000	4.35
SHARP	VC6300/6500	4.35

VIDEO BELT KITS

VEKIT 1	AKAI	VS9300/VS9500/VS9800	
	JVC		
	HR3300/HR3320/ HR3330/HR3360		
	TCE	8903/3V00/3V16/3V22	3.50
VEKIT 2	PANASONIC	NV7000B/NV7200B	3.00
VEKIT 3	SONY	SLC5/7	3.75
VEKIT 4	SONY	SL8000/8500/8600	4.50
VEKIT 5	SONY	SL3000UB	4.00
VEKIT 6	PANASONIC	NV3000B	3.00
VEKIT 7	SANYO	9300P	4.25
VEKIT 8	PANASONIC	NV2000B	3.75
VEKIT 9	PANASONIC	NV8600B/8610/V011	4.25
VEKIT 10	TOSHIBA	V8600	3.00
VEKIT 11	SHARP	VC7300	3.50
VEKIT 12	SHARP	VC6300/6600	4.00
VEKIT 13	SANYO	VTC5000	1.95
VEKIT 14	SANYO	VTC5300	2.50
VEKIT 15	JVC	HR7650	2.50
VEKIT 17	SHARP	8300	1.76
VEKIT 18	SHARP	9300	1.47
VEKIT 19	HITACHI	VT8000	1.12
VEKIT 20	HITACHI	VT11/33	2.15
VEKIT 21	HITACHI	9500	1.12

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
HITACHI	39.5	30	4.2	52p
PANASONIC	37	27	3.9	52p
PANASONIC	34.5	27	3.1	50p
AKAI	26	20	3.9	50p
JVC	32.8	3.4	3.9	56p
JVC	23.9	4.8	4	56p

VIDEO HEADS

Thorn New Life Heads (exchange)	21.45
3HSS	30.00
4HSS	31.00
PS3B Sony/Beta	35.00
Philips V2000	64.00
Philips 1700	64.00
Sanyo 9300/9455/9500	53.00
Sanyo 5000/5300/5400	53.00
Toshiba 9600 Upper Ass.	12.50
Toshiba 9600 (Rep. type only)	37.00
Sharp 2300	58.00
Sharp 6300	58.00
Sharp 7300/7700/7750	58.00
Sharp 8300	58.00
Sharp 3300/9700	56.00
Sharp 3HSS (S.P.)	42.00
Hitachi HIVI	35.62
Hitachi VT33E/GEC 4004	35.62
Hitachi VT11/GEC 4100	35.62

VIDEO TAPES

SKC	E60	2.50
	E120	2.88
	E180	2.80
	E240	3.78
	L500	2.90
	L750	3.40
Scotch	E30	3.66
	E60	4.00
	E120	3.24
	E180	3.86
	L750	5.22
	VCC360	6.33
	VCC480	7.23
Philips	LVC 1700 120	17.50

VIDEO SUNDRIES

VHS Drum Motor	25.50
VHS Capstan Motor	25.50
Sanyo 5000 Reel Motor	12.95
Sharp Reel Motor	19.50
Take up idler Ass./Clutch Ass.	
VHS (general purpose) Thorn/JVC etc.	5.95
Sharp 381/383/386/9100 9300/9500	2.48
Sanyo	6.95
Hitachi F.F. Idler VT11E/VT33E	2.90
Video Lamps	
Nat. Pan. Bulb VHS	1.00
General Purpose VHS	1.41
3V23 with plug VHS	1.95
Video Care	
Care Kit Deluxe	5.00
Care Kit	3.50
Universal Copy Kit	5.50
Head Cleaner	90
Beta Eccentricity Gauge	55.00

TURNTABLE DRIVE BELTS (suitable most types listed)

TB42 Thorens	1.20
TB23 Philips	1.20
TB50 Garrard	1.20
TB70 Hitachi	1.20
TB60 Sanyo	1.20
TB01 Pan., Sony, Pioneer, Technics, Sansui	1.20
TB03 BSR	1.20

REMOTE HANDSETS

PHILIPS

IR8331 KT3/K30 Mon. Text IR	15.85
218, 20135 KT3/K30 Mon. Text IR Gen. Philips	19.87
IR8420 KT3/K30 Text IR	16.70
218, 20291 KT3/K30 Text Gen. Philips	19.87
IR8435 G11 8 Way Text IR	20.85
OS8263 G11 Mon Text US	19.50
TP8431 G11 Mon Text US	19.50
US8518 G11 2 Function US	18.75
691, 17181 G11 31 Button US	27.00
RC5352 K35 Text/Mon Text	26.21

DECCA

VS8513 101 Mon. Text US	20.85
OS8511 80/100 3 Func. US	19.50

J.V.C.

RTP843 Text IR	13.50
Remote Control Tester	29.94

THORN

T723 (TMMA, 824, 004) TX10 Mon. Text Gen. Thorn	38.60
T723 IR8442 TX10 Mon. Text Rep. Type	19.50
T725 (TMMA, 860, 004) TX9 Mon. Text	19.40
T725 IR8688 TX9 Mon. Text Rep. Type	23.00
T731 (TMMA, 904, 004) TX9/10/100 Text Ster. Gen. Thorn	20.01
T736 (TMMA, 486, 004) TX9/10/100 Text Gen. Thorn	31.60
T736 IR8864 TX9/10/100 Text Rep. Type	23.85

GRUNDIG

RTP20 Telepilot 12	13.50
RTP05 Telepilot 8	13.50
RTP06 Telepilot 160	13.50
RTP07 Telepilot 300	13.50

REPAIR KITS INC. FOIL/BUTTON MATRIX/ INSTRUCTIONS

Philips KT3/30 1. without Text	8.95
2. with Text	8.95

EVER READY BATTERIES

HP2/R20	
LR20 Gold	82
R20S Silver	39
R20B Blue	27
RX20 Rechargeable	2.61
HP11/R14	
LR14 Gold	74
R14S Silver	33
R14B Blue	24
RX14 Rechargeable	2.31
HP7/R6	
LR6(BC4) Gold	41
LR6(BC2) Gold	43
R6S Silver	21
R6B Blue	15
RX6 Rechargeable	1.31
PP3/6F22	
6LF22 Gold	1.53
PP3S Silver	74
PP3B Blue	54
RX22 Rechargeable	4.89
HP16/R03	
LR03 Gold	41
Blue	18
No.8 Battery	30
Univ. Batt. Charger	7.50
5 Hour Chg.	9.18

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VARICAP TUNERS

ELC1043-05	8.40
ELC104305 Mullard	12.50
ELC1043-06	8.40
ELC2003	16.50
Philips G8/G9	10.50
Philips G11 (U321)	9.90
U322	7.20
U341	9.50
U342	8.50

PUSH BUTTON ASS.

Hitachi 4 way	12.36
Philips G8 (early)	17.82
Philips G8 (late)	18.97
Philips G11 Tip Switch unit	26.50
Philips KT3	16.67
Philips KT30	13.22
Pye 6 way (207/715)	18.40
Pye 697 repair kit	10.35
Pye 725-735 (also Red Mk.1)	12.60
Pye 725-735 tuning head with PCB	12.50
Decca 4 way	7.93
Decca 6 way	9.17
Decca 4/6 way conversion kit	17.50
Decca 7 way piano key rep. kit	15.62
GEC 2110 6 way	10.92
GEC 6 way slim	10.29
GEC/ITT/PYE 7 way	16.67
GEC Conversion kit	16.50
Rank A823	12.36
Rank T20A	11.21
ITT CVC 8/9 (mod)	13.80
ITT 6 way with VCR	8.90
Thorn 8500	6.50
GEC 7 B/P c neons	10.50

SWITCHES/ACCESSORIES

On/off gen. purpose 4A	80
G8 on/off metal or plastic	1.98
G11 on/off	1.58
G11 on/off remote	1.58
Rotary on/off gen. purpose	66
ITT CVC5 on/off	1.24
ITT mains switch wity solenoid	4.50
Rank T20 on-off switch	1.95
Rank mains switch with solenoid	4.50
Thorn TX9/10	2.98
Thorn 9/10	2.Tx 98
GEC 2040 on/off	98
Rank tuner buttons 3 sizes	20
Thorn 3500 A1 beam switch	86
GEC 2110 tuner neons	35
GEC 2110 A1 cont. R/B/G	58

POTENTIOMETERS

Midget controls, Insulated Spindle. Length 44mm Log. or Lin. Without Switch. 5K, 10K, 25K, 50K, 100K, 250K, 500K, 1M 54

DPST Switched log. 5K, 10K, 25K, 50K, 100K, 250K, 500K, 1M, 2M 1.26

Dual Gang Controls 1.25
16mm Rotary Controls 10K, 22K, 100K, 1M 1.25

Convergence Pots. 60
3W Stand
5R, 6R8, 10R, 20R, 50R, 100R, 200R, 500R

Metric/Philips Type 60
5R, 10R, 15R, 20R, 50R

Skeleton Presets 16
Stand. or miniature. Horiz. or Vert. 100R-2M2

Slider Potentiometers Lin. or Log. 75
470R, 1K, 2K2, 10K, 47K, 470K, 100K, 4K7 Log.

Multiturn Pots 65
GEC/TCE 100K, Philips G8, Decca/Rank

Thermal Cut Out Switches

Thorn 3000 2A Metal	2.68
GEC 2040 Metal	2.50

CAPACITORS
Main Replacement Electrolytic

Pye 169 (200/200/100/32)	3.74
Pye 691/7 (200/300/350V)	2.97
Philips G8 (600/300V)	2.53
Philips G9 (600/300V)	2.44
Philips G11 (470/250V)	3.19
Philips G11 (7n5 1500V)	1.40
Philips 320 (400/400/200V)	3.02
Decca 30 (400/400/350V)	3.74
Decca 80 (400/350V)	4.37
RBM A823 (2500/2500/30V)	1.83
RBM A823 (600/300V)	3.12
RR1 T20A (220/400V)	2.20
ITT CVC 5/9 (200/200/75/25)	3.28
ITT CVC 20 (220/400V)	2.20
GEC 200/200/150/150	2.91
Thorn 1500V (150/150/100/300V)	2.42
Thorn 1500V (12/300V)	35
Thorn 1591/1691 4700/25V	1.32
Thorn 3500 (400/40V)	33
Thorn 3500 (175/100/100/400/350V)	3.06
Thorn 3500 (1000/63V)	95
Thorn 3500 (1000/70V)	95
Thorn 8000/8500 (2500/2500/63V)	3.72
Thorn 8000/8500 (700/250V)	2.55
Thorn 8000/8500 (400/350V)	2.82
Thorn 9000 (400/400V)	3.61

LINE OUTPUT TRANS.

Philips 320	8.70
Philips 210/300 Mono	10.00
Philips G8	8.75
Philips G9	9.50
Philips KT3	10.06
Philips K30	17.94
Philips TX2	13.39
Philips TX3	14.41
Philips G11	15.58
Pye 713/715	10.00
Pye 725 90°	10.50
Pye 169	10.00
Pye 741	8.20
Bang & Olufson (2000,3000)	14.69
DECCA 80	8.58
Decca 100	8.58
Decca 1700	9.00
Decca 1730	8.58
Decca 2230	8.58
GEC 2110	16.75
GEC 2040	9.50
ITT CVC 1/9	10.85
ITT CVC 25/30/32	8.65
ITT CVC 20	8.60
ITT CVC 45	8.60
R.B.M. T20	13.95
R.B.M. A7774 Mono	11.74
R.B.M. BUSHRANGER T16A	10.00
R.B.M. BUSHRANGER T18A	10.00
Thorn 3000 EHT	9.95
Thorn 3000 SCAN	7.95
Thorn 8500	17.50
Thorn 3000/3500 Mains	10.00
Thorn 1615	12.50
Thorn 1691	9.68
Thorn TX9	23.85
Thorn 9600	21.79

FUSES

Quick Blow 1.25"

100ma	73
250ma-500ma-750ma-1A	60
1.5A-2A-2.5A-3A-5A	60

Quick Blow 20mm

100ma, 250ma, 315ma, 500ma, 630ma, 800ma	90
1A, 1.25A, 1.6A, 2A, 2.5A, 3.15A, 5A	60

Mains Fuses

2A, 3A, 5A, 10A, 13A	1.00

Antisurge 1.25"

250ma, 500ma, 630ma, 750ma, 850ma	1.70
1A, 1.25A, 1.5A, 2A	1.70
2.5A, 3A, 5A	2.70

Antisurge 20mm

80ma	4.80
100ma	2.50
160ma, 200ma	2.20
315ma, 500ma, 630ma, 800ma	1.30
1A, 1.25A, 1.6A, 2A	1.30
400ma, 2.5A, 3.15A, 4A, 5A	1.90

RECTIFIER TRAYS

Thorn 1500 3 Stick	5.20
Thorn 1500 5 Stick	5.99
Thorn 3500	7.98
Thorn 8000	6.95
Thorn 8500/8800	7.15
Thorn 9000	8.70
Decca 1730/1830	5.48
Decca 30	6.76
Decca 80	7.12
Decca 100	7.50
Decca/Tatung 120/130	6.50
GEC 2100	7.40
GEC 2200 (20AX)	6.50
GEC 2040/2028	6.60
GEC 2110 (pre or post Jan '77)	7.00
Philips G8 Short Focus Lead	7.12
Philips G8 Long Focus 550	7.12
Philips G9	6.37
Pye/Philips KT3	12.50
Pye 691/3	7.58
Pye 713 4 Lead	8.79
Pye 713 5 Lead	8.79
Pye 731/25	8.75
R.B.M. A823 plug in	8.75
Rank T20/22	7.12
ITT CVC5/9	7.50
ITT CVC20/25/30 (Mullard)	7.12
ITT CVC45	8.65
Universal	6.00
TV 11 Stick	90
TV 13	1.26
TV 14	1.29
TV 18	1.10
TV 20	1.43

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T.T.L. 74LS SERIES

74LS00	1.12	74LS37	35	74LS92	65	74LS160	90	74LS251	65
74LS02	58	74LS38	35	74LS93	60	74LS161	85	74LS253	95
74LS03	58	74LS40	35	74LS107	80	74LS162	4.04	74LS257	1.20
74LS04	58	74LS42	80	74LS109	58	74LS163	85	74LS258	95
74LS05	58	74LS47	85	74LS112	50	74LS164	85	74LS259	1.70
74LS08	58	74LS48	83	74LS113	44	74LS165	1.50	74LS273	1.90
74LS10	58	74LS49	33	74LS114	70	74LS173	1.32	74LS283	1.30
74LS11	58	74LS51	33	74LS122	96	74LS174	85	74LS293	1.20
74LS13	37	74LS54	43	74LS123	80	74LS175	85	74LS352	1.40
74LS14	46	74LS55	60	74LS125	85	74LS191	1.02	74LS353	1.40
74LS15	33	74LS73	60	74LS126	60	74LS192	1.30	74LS365	65
74LS20	35	74LS74	65	74LS132	63	74LS193	1.30	74LS366	82
74LS21	35	74LS75	65	74LS138	83	74LS194	75	74LS367	1.67
74LS22	35	74LS76	65	74LS139	65	74LS197	95	74LS368	65
74LS26	44	74LS78	65	74LS151	85	74LS240	2.20	74LS373	1.40
74LS27	35	74LS83	89	74LS153	85	74LS241	2.20	74LS374	1.55
74LS30	35	74LS85	98	74LS155	65	74LS242	2.20	74LS393	1.20
74LS32	90	74LS86	39	74LS156	1.02	74LS243	2.20	74LS670	1.78
		74LS90	1.22	74LS157	78	74LS244	2.20		
				74LS158	65	74LS245	2.30		

CMOS 4000B Series

4001	21	4026	1.99	4068	22	4510	76	4539	77
4002	21	4027	39	4069	22	4512	72	4541	96
4008	72	4028	64	4070	22	4513	1.68	4543	1.12
4011	31	4029	90	4071	40	4514	1.88	4551	96
4012	21	4032	1.04	4072	22	4515	1.88	4553	2.40
4013	30	4035	80	4073	22	4516	76	4554	1.20
4014	74	4038	99	4075	22	4518	76	4556	48
4015	76	4040	72	4076	80	4519	64	4560	1.76
4016	42	4042	58	4077	22	4520	75	4561	74
4017	66	4043	71	4078	22	4521	1.68	4566	1.20
4018	72	4046	96	4093	49	4526	88	4580	3.60
4010	70	4047	70	4094	1.56	4527	1.20	4581	1.84
4020	76	4049	32	4099	1.20	4528	68	4582	80
4021	70	4050	32	4160	72	4529	1.04	4583	1.00
4022	70	4051	72	4161	72	4530	62	4584	40
4023	21	4052	72	4162	72	4531	72	4585	88
4024	50	4053	72	4163	72	4532	1.00	4597	1.84
4025	21	4060	96	4502	72	4536	2.64	4598	2.40
		4066	43	4505	1.86	4538	1.04	4599	2.00

VALVES CONT'D

30FL2	1.70
DY802	98
DY86/7	66
ECC81	1.08
ECC82	98
ECC83	1.07
ECC84	80
ECC85	98
ECC88	1.35
ECF80	1.30
ECF82	88
ECH81	1.60
ECH84	1.66
ECL80	84
ECL82	1.30
ECL86	1.99
EF80	95
EF86	2.20
EF183	99
EF184	1.09
EL90	1.75
EL34	3.50
EL84	1.05
EY86/7	68
EY500A	2.25
EZ80/81	56
GY501	1.45
GZ34	3.50
KT66	8.50
KT77	8.50
KT88 (alt type)	12.00
PC92	4.50
PC97	1.65
PCC85	85
PCC805	1.40
PCF80	1.00
PCF200	1.35
PCF800	1.38
PCF801	1.13
PCF802	1.12
PCF805	1.80
PCF808	1.63
PCH200	1.45
PCL82	1.20
PCL84	1.20
PCL805	1.09
PCL86	92
PFL200	1.86
PL36	1.87
PL81	94
PL95	2.25
6L6GT	2.30
12HG7	3.20
12BH7A	2.75
PL504	1.65
PL508	2.90
PL509/19	5.30
PY88	81
PY500A	2.30
PY800/1	69
UCH81	2.25
UCL83	1.82
UY85	1.35
PL802T	4.00
40KD6	5.30
21LU8	3.00
17DW4A	4.50
3AT2B	5.00
12BY7A	3.75

EQUIPMENT

Testlead Set (AVO Type)	2.20
Degaussing Coil Stick	19.00
Signal Injector	4.00
Electric Circuit Tester	1.50
Probes (x10) or (x1)	10.90
Philips Switchable Probes	13.25
Automatic Wire Strippers	6.95
I.C. Inserters	1.18
Micro Pliers	4.20
Micro Cutters	5.00
Trim Tools Metal Ended	30
Side Cutters sm.	1.20
Long Nose Pliers	1.20
Sm. Neon Screwdriver	40
Lg. Neon Screwdriver	65
Quick Set Adhesive (Superglue)	75
Dynascan Tube Reju./testers	
467 model inc. bases	399.00
470 model inc. bases	299.00
available without bases for 50.00 less	

Tube Bases For Dynascan

No. 1	9.09	No. 14	16.63
No. 3	9.50	No. 15	16.44
No. 5	9.09	No. 18	10.83
No. 6	11.08	No. 19	10.83
No. 7	9.09	No. 21	14.40
No. 8	10.08	No. 23	13.86
No. 9	9.09	No. 24	27.07
No. 13	11.11	No. 25	12.57

Avo Meters Factory Recon.	119.00
Avo Battery	2.09
Solder Sucker Antistat min.	4.50
Solder Sucker Antistat std.	5.40
Solder Sucker Antistat lge.	6.20
Solder 500g	7.00
D.I.Y. Solder Small Pack	45
Solder Sucker Nozzles	81
Solda Mop Stnd.	74
For sold. irons see Antex/Weller Under Specific Spares	
Choc Bloc 5A	30
Fuse Wire 5A, 15A, 30A	05
Fluorescent Starter 4-80W)	15
Battery Press Studs min.	11
Battery Press Studs std.	15
Vero Board	2.59
Double Sided Adhesive Tape	5.75
Tinned Copper Wire	
185 WG 45 Amp	1.86
14SWG 100 Amp	1.86
17SWG 60 Amp	1.86
19SWG 45 Amp	1.86
20SWG	2.75
22SWG	1.86
Insulated Copper Wire	9.11
Cable Ties ALT1 per 100 (small)	84
Cable Ties ALT21 per 100 (large)	1.69
Power Adapter (12v)	5.95
Reg. 88 Power Adap.	5.50
Reg. 650 Power Adap.	6.50

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TURBO RECHARGEABLE

Screwdriver Kit	22.71
Drill Kit	25.99
Sold. Iron Kit	16.99
Rep. Tips	2.20
Rep. Bulbs	28

LABGEAR

CM7261 Power Unit 12V	11.80
CM7262 Power Unit 12V	12.86
CM7065 VHF/UHF W/B 12V	15.05
CM7066 UHF/WB	14.04
CM7068 UHF High Gain A/B/CD	16.74
CM7253 Behind Set (Mains)	13.66
CM7243 Second Set Amp.	12.72
CM7093 Three Set Amp.	16.03
CM7063 Dist. Amp. VHF/UHF	23.27
CM7108 8+1 Dist. Amp.	43.26
CM9700 27mhz CB Suppressor	4.45
CM6011 Outdoor Splitter	7.83
CM9003 Flush Sing. Outlet	1.95
CM9010 Flush Twin Outlet	2.04
CM9034 UHF Filters A/B/CD)	8.07
CM9033 6way Pass Splitter	9.72
CM7042 TV Games Combiner	3.09
CM9009 Flush TV/FM Outlet	3.20
CM9006 VHF/UHF Diplexer	3.78
CM7122 Televerta Up. VHV to UHF	36.20
CM7057 Televerta Down UHF to VHF	41.01
CM7094 Dist. Amp. UHF/VHF	30.06
CM7274 4 Way Dist. Amp.	21.45
CM7082 UHF/VHF Dist. Amp.	65.69
CM7080/10 UHF NHA	15.71

EXPORT ORDERS WELCOME

AERIAL EQUIPMENT

Chimney Kits	55
6" pressed bkt.	55
6" bkt. with kit	1.75
9" welded bracket	1.35
9" bkt. with kit	2.90
Double bkts.	2.39
Double bkts. witha kit	4.75
13.5" Cradle bkt.	2.25
13.5" Cradle with kit	4.25
Std repair pack	1.10
Double repair pack(2)	2.39

Wall Brackets

6" welded	1.30
12" T&K	3.30
9" welded	1.87
Gutter Brackets	1.00

Clamps

1" × 1"	68
2" × 2"	1.25
Universal No. 1	1.02
1" u bolts	19
J bolts	20
1.25" u Bolts	20
2" u bolts	28

UHF TV Aerial

10 element	1.62
18 element	2.63

UHF TV Aerial

3 element	5.68
4 element	6.50

Masts

3ft crank 7/s shape	1.00
6ft 1"	1.60
10ft 1.5"	5.25
12ft 1.5"	6.00
16ft 2"	9.00

High Gain Aerials

Antiference X68	17.10
Antiference XG14	27.10

Set Top Aerials

Mercury Olympic 11	2.30
Antiference Super Set Top	5.56
Antiference Carratemna	6.80
Antiference Caravan Kit	11.00
Loop Aerial	1.00
Corner Plates	7
Lashing Wire	75
Lead Wall Nails (100)	4.95
Rawbolts	60
Caple Clips (100)	75
Coax Plugs	18
Line Connectors	12
Attenuators	1.80
Tape	76
Wood Screws	7
Mast couplers	8.92
27Mhz filter	2.10

Outlet Boxes

Surface Single	80
Surface Twin	1.10
Y Splitter	85
Flush Single	95
Flush Twin	1.20
TV/FM Flush	1.35

Antiference

SB11 Splitter	2.37
CS200 Comb/Split	3.94
COB11 Outlet	96
CS1000 Com/Split	4.77
PV1240 power	11.65
UP1300 MHA	9.09
XS2 xtraset	14.46
XS04 4wayDA	22.50
XS4/6	43.13
Diplexers	68
Match Trans	2.83

Back Boxes

Metal Single	45
Metal Double	80
Plastic Single	61
Plastic Double	1.09

Budget Range

Outdoor Splitter	5.50
Mast Head amp.	5.00
Power Unit	5.00

MULTIMETERS

Amprobe Digital Meter AM7	45.00
Amprobe Digital Meter AM9	55.00
Amprobe Volt/Ameter/Ohmeter RF3	68.00
Philips Meter 2000 R. per V.	20.71

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AN214Q	1.95
AN303	3.75
AN305	3.50
AN318	5.25
AN7114E	2.30
AN7115E	2.35
AN7116	2.10
AN7145M	2.95
AN7168	2.95
HA1339A	2.95
HA1366W	1.85
HA1366WR	1.85
HA1374	2.45
HA1377	2.95
HA1392	2.95
HA1397	3.95
LA1201	1.25
LA1230	2.95
LA1365	2.45
LA4440	2.75
LA4445	2.45
LA4460	2.45
LA4461	2.45
MC13002	3.95
SAA1250	3.85
SAA1251	4.95
SAA3027	3.95
SAA5010	4.95
SAA5012	4.95
SAF1032P	3.25
SAF1039P	2.75
SAS560S	2.45
SAS570S	2.45
SAS580S	2.65
SAS590S	2.65
SL470	2.95
SL471DP	2.95
SL480	2.85
SL490	2.50
SL1430	1.95
SL1432	1.75
SN76660N	.65
STK0039	6.45
STK0040	5.95
STK077	6.95
STK078	6.95
STK2129	8.50
STK433	5.95
STK4332	5.95
STK435	5.95
STK437	6.95
STK439	7.50
STK459	8.55
STK461	8.95
STK463	9.95
STK465	9.95
TA7193P	4.45
TA7204P	1.90
TA7205AP	1.45
TA7222P	1.85
TA7227P	2.95
TBA120AS	.95
TBA120T	1.25
TBA120U	.95
TBA520	1.00
TBA530	1.25
TBA560	1.45
TBA720A	2.95
TBA800	.75
TBA810S	1.25
TBA820	1.10
TBA890	3.25
TBA920S	1.95
TBA950/2X	2.25
TBA1440G	2.95
TBA2800	2.50
TCA270S	1.55
TDA760A	1.95
TDA440	2.95
TDA1035T	2.45
TDA1037	1.95
TDA1044	2.95
TDA1170S	1.80
TDA1180P	2.65
TDA1190Z	2.85
TDA1470	3.25
TDA1506	4.35
TDA1510	3.80
TDA1512	3.35
TDA1515	4.50
TDA1670A	4.20
TDA1770A	3.55
TDA1870	6.50
TDA1908A	2.25
TDA1950A	3.95
TDA2002	1.50
TDA2003	1.55
TDA2004	2.90
TDA2005	3.20
TDA2006	1.95
TDA2020	3.20
TDA2030	1.80
TDA2170	2.95
TDA2270	2.95
TDA2521/3	2.95
TDA2523	2.80
TDA2525	3.20
TDA2530	2.00
TDA2532	2.10
TDA2540	1.95
TDA2541	2.70
TDA2545	3.55
TDA2546	4.95
TDA2560	2.40
TDA2571A	4.95
TDA2576A	3.30
TDA2577	3.50
TDA2578A	2.95
TDA2581	2.00
TDA2582	1.95
TDA2591	2.30
TDA2593	2.30
TDA2594	2.95
TDA2600	6.35
TDA2611A	1.50
TOA2653A	3.55
TDA2654	4.30
TDA2655A	5.95
TDA3190	3.95
TDA3540	3.70
TDA3541	3.70
TDA3560	4.95
TDA3561A	4.95
TDA3562A	6.50
TDA3650A	4.75
TDA3651	2.70
TDA3651AQ	3.80
TDA3652	3.35
TDA4427	4.80
TDA4500	3.95
TDA4600/2	2.85
TDA4600/2D	3.30
TDA4610	3.50
TDA4700A	6.50
TDA5700	3.95
TDA8170	3.35
TDA8180	4.50
TDA8190	2.80
TDA9503	2.95
TDA9513	3.20
UPC1031H	2.60
UPC1181H	1.70
UPC1182H	1.70
UPC1185H	2.50
UPC1230H	4.35
UPC1363C	3.95
UPC1365C	4.20

TRANSISTORS

TYPE	PRICE
BC107	14
BC147	10
BC148	10
BC327	11
BC328	12
BC337	11
BC338	12
BC548	10
BC547	10
BC558	10
BC637	30
BC638	25
BC639	25
BD124M	60
BD131	33
BD132	33
BD160	50
BD201	80
BD203	90
BD222	50
BD225	50
BD237	40
BD238	40
BD438	70
BD439	70
BD677	65
BD701	95
BD707	95
BF337	28
BF338	30
BF458	35
BF757	70
BF758	70
BF871	80
BF960	1.25
BR103	75
BR303	1.95
BT116	1.30
BU126	1.50
BU205	1.40
BU208A	1.45
BU208/02	1.00
BU208D	1.95
BU326A	1.45
BU500	1.95
BU508A	1.75
BU508D	1.95
BU526	2.20
BU807	1.30
BUW81A	3.50
BUX84	.90
R2008B	.70
R2540	2.35
TIP31C	.45
TIP32C	.45
TIP33	.90
TIP41C	.45
TIP42C	.45
15/80H	2.45
15/85R	2.45
2SB618	2.20
2SC867A	3.20
2SC1034	2.40
2SC1114	5.95
2SC1124	1.00
2SC1413A	3.95
2SC1942	2.90
2SC3156	2.50
2SD588	2.20
2SD725	7.95
2SD870	6.50
2SD880	1.25
2SD1398	2.35

DIODES

TYPE	PRICE
BY127	.10
BY164	.45
BY179	.65
BY223	1.25
BY227M	.20
BY299/800	.95
BY299/800	.25
BYX10	.20
BYX55/600	.30
SKE5F3/10	1.45
1N4001-7	.07
1N5401-8	.18

VALVES

DY802	1.00
PCF802	.95
PCF802	1.10
PCL82	1.05
PCL85/805	1.00
PCL86	1.05
PCL200	1.60
PL504	1.60
PL508	3.00
PL509/519	5.95
PY500A	2.25
PY500A	2.25
PY801	1.00
PY81/880	1.05
PY88	1.00

E.H.T. TRAYS

DECCA 80	7.20
DECCA 100	7.35
DECCA 120/130	6.95
ITT CVC20/30	6.95
ITT CVC45	7.30
PHILIPS G8	7.90
PHILIPS KT3	7.95
RBM T20/T22A	7.35
THORN 8000	4.00
THORN 8500/8800	7.20
THORN 9000	8.00
UNIVERSAL	5.95

LINE O/P TR.

DECCA 80	7.95
DECCA 100	8.30
ITT CVC20	8.50
ITT CVC25/30/32	8.40
ITT CVC45	7.95
PHILIPS G8	8.75
PHILIPS G11	14.95
PHILIPS KT3	9.25
PHILIPS K30	12.95
RBM T20/T22A	9.95
THORN 1615	9.75
THORN 1690/1	9.95
THORN 1790/1	7.95

PUSH BUTTONS

DECCA/ITT 4 way	5.00
DECCA/ITT 6 way	8.50
HITACHI 4 way	5.00
ITT CVC5 7 way	10.40
ITT CVC8/9	12.80
ITT CVC45 (port.)	22.95
PHILIPS G8 (S/L 550)	14.50
PHILIPS KT3	8.95
PYE G11	8.50
RBM T20A 6 way	11.95

TUNERS (NEW)

ELC 1043/05	8.50
ELC 1043/06	9.35
ELC 2003	18.95
U321	8.75
U322	8.80
U431	8.30
U343	16.95
U411	11.95

TV ELECTROLYTICS

DECCA 80 (400/800)	3.95
FIDELITY ZX(220/385)	2.95
PHILIPS G8(600/300)	2.65
PHILIPS G11(470/250)	2.20
RBM T20A(220/400)	2.50
THORN 9000(400/400)	2.90

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LINE O/P TRANS
14"/16"/20"
Inc. Mod. Kit 11.95
22"/26" 11.95

THORN TV SPARES

TX9

Dual PTC	2.85
I.F. Gain Unit	22.95
Line O/P Trans	23.50
RFI Choke	2.55
Service Manual	28.50
Tuner	14.95

TX10

Focus Unit	8.50
Line O/P Trans	32.95
On/Off Switch	1.70
Service Manual	42.95
Tuner	14.95
10K ROT. POT.	.60

TX90

Line O/P Trans	19.30
On/Off Switch	1.20
Tuner	15.95
Service Manual	10.95

TX100

Choke	.85
Line O/P Trans	16.95
On/Off Switch	1.10
Service Manual	10.95
Teletext Board	64.95
Tuner	15.95

ON/OFF SWITCHES

PHILIPS G11	1.35
GYE G11 (remote)	1.95
RBM T20A (3K3)	2.95
THORN (Univ.)	1.10

GEC/HITACHI TV SPARES

FRAME MODULES

HM6232	5.95
HM6251	4.70
HM9032	5.70
STR441	5.50
STR451	5.50
STR454	5.50
STR6020 (Kit)	6.35
ET548 Tuner	14.95
ET556A Tuner	9.95

GEC/HITACHI VIDEO SPARES

V4000H/VT8000

Audio Head	18.95
Capstan Motor	31.90
Idler F.F./Rew	1.85
Pilot Lamp	.65
Pinch Roller	4.95
Play Idler	3.95
Service Manual	6.30
Video Head	34.95

V4100H/V4002H 9300E/9500E

Capstan Motor	30.95
Idler F.F./Rew	1.80
Play Idler	4.30
Pinch Roller	5.50
Pulley F.F./Rew	.40
R.F. Converter	28.95
Service Manual (9300)	6.40
Service Manual (9500)	8.50
Video Head	34.95

V4100H/VT11E

Audio Head	19.95
Capstan Motor	21.95
Clutch Assy	9.40
F.F./Rew Arm	2.90
Pinch Roller	5.50
Relay	2.95
Service Manual	6.50
Video Head	32.95

V4004H/TV33E

Video Head	34.95

NAT. PAN. VIDEO SPARES

NV333 Idler	1.10
NV2000 Idler	1.30
NV3000 Idler	1.25
NV7000 Idler	1.20
NV2000 Load. Gear	1.60
NV7000 Load. Gear	1.60
NV333 Pinch Roller	4.95
NV7000 Pinch Roller	4.95

PHILIPS VIDEO SPARES

VCR 6460/00/05

Audio Head	25.95
Idler Arm	8.25
F. Load Motor	14.10
Loading Motor	12.95
Service Manual	7.50
Take-up Reel	5.30
Tuner	13.95
Video Head	59.95

VCR 6462/00

Capstan Motor	38.95
Control Motor	9.95
Erase Head	11.75
Modulator	35.95
Winding Motor	43.35
Video Head	39.95

VCR 6520/00/05

Audio Head	26.50
F/Load Motor	14.10
Idler Unit	8.25
Loading Motor	12.95
Service Manual	7.50
Take-up Reel	5.60
Video Head	59.95

VCR 6560/00/05

Capstan Motor	44.70
Control Motor	8.50
Modulator	48.60
Video Head	32.95

VCR 6660

Capstan Motor	36.95
Control Motor	9.95
Take-up Idler	8.95
Video Head	39.95

SANYO SPARES

Capstan Motor	32.95
Gear Idler	6.95
Load. Roller	1.95
Pinch Roller	5.85
Reel Motor	8.95
Reel Pulley	6.70

SONY SPARES

C5/C7

Ace Head Assy	35.50
Limiter Assy	3.15
Motor (BHF1100D)	39.95
Pinch Roller	1.30
Rewind Kit	5.25
Service Manual C5	9.40
Service Manual C7	9.40
Video Head	45.00

C6

Ace Head Assy	42.20
Reel Motor	17.60
Reel Motor (C6MKII)	28.00
Rewind Kit	4.20
Service Manual (C6)	9.40
Service Manual (C6MKII)	9.40
Video Head	45.00

C9

DC-DC Conv.	22.70
Gear Kit	6.70
Guide Pin Kit	4.95
Service Manual	9.40
Video Head	45.95

VIDEO BELT KITS

Hitachi 9300/9500	1.80
Hitachi VT11E	2.95
Nat. Pan. 2000	2.55
Nat. Pan. NV7000	2.25
Sanyo 5000	1.00
Sanyo 5300	2.45
Sharp 7300	2.60
Sharp 8300	2.45
Sharp 9300	2.45
Sony C5/C7	2.80
Sony C6	2.45
Thorn 3V00/16/22	2.80
Thorn 3V29	1.80

V.C.R. PILOT BULBS

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National NV2000	1.00
Sharp 8300	1.00
Sharp 9300	2.65
Thorn (Plug)	.95
Universal	.50

THORN SPARES

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Capstan Motor	49.95
Drum Motor	43.95
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Pinch Roller	7.20
Rewind Idler	6.25
Take-up Idler (LG)	7.50
Take-up Idler (SM)	5.80
Video Head (3HSS)	32.95

3V29/30

Capstan Motor	38.60
Loading Motor	8.95
Pinch Roller	6.95
Reel Motor	31.90
Take-up Clutch	2.35
Take-up Idler	1.40
Video Head (3HSS)	32.95

3V35/36

Capstan Motor	28.50
Cass. Housing	34.95
Cass. Motor	6.70
Erase Head	9.60
Guide Roller	.30
Leaf Switch	1.45
Service Manual	26.00
Take-up Clutch	2.45
UHF Tuner	36.50

VIDEO MOTORS

Capstan Motor to fit Thorn 3V00/16/22 ..... 24.95
Drum Motor to fit Thorn 3000/16/22 ..... 24.95

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Handset Buttons & Foils
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Video Head Universal Copying Kit
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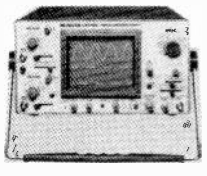

OSCILLOSCOPE MODEL LB0522

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£415.00 + VAT

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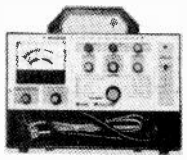

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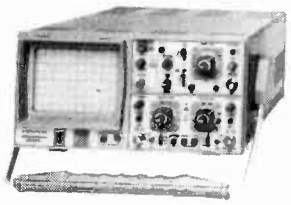

SPECIFICATION
- Bandwidth DC-20MHz
- Sens. Ch1, Ch2. 2mV/cm
- Time Base 0·2s/cm – 20ns/cm
- Trigger DC-40MHz AC, DC, HF, LF, (TV Frame) Active TV Sinc. Sep.
- Invert both channels
- Variable hold-off 10:1
- Calibrator
- Plus many more features

Price £298.00 + £44.70 V.A.T.
Including two probes

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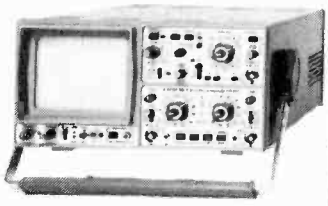

SPECIFICATION
- Bandwidth DC-20MHz
- Sens. Ch1, Ch2. 1mV/cm
- Delay Line
- Time Base 1·25s/cm – 10ns/cm
- Delayed Sweep 100ns – 0·1s
- Trigger DC-50MHz AC, DC, HF, LF, (TV Frame)
- Variable hold-off 10:1
- Overscan LED indicators
- Calibrator
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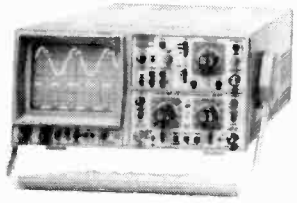

SPECIFICATION
- Digital Storage
- Analogue Real Time (Same as 203-6)
- Bandwidth DC-20MHz
- Sens. Ch1, Ch2. 2mV/cm
- Trigger DC-40MHz AC, DC, HP, LF, (TV Frame), Active TV Sinc. Sep.
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- Calibrator
- Plus many more features

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Including two probes

HM605 60MHz Multi-function

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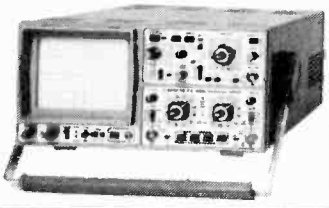

SPECIFICATION
- Bandwidth DC-60MHz
- Sens. Ch1, Ch2. 1mV/cm
- Delay Line
- Delayed Sweep 100ns – 0·1s
- Trigger DC-80MHz AC, DC, HF, LF, (TV Frame)
- Variable hold-off 10:1
- Switchable Calibrator
- Overscan LED indicators
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THANDAR SC110A PORTABLE OSCILLOSCOPE

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

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Probe £7.50 + £1.30 V.A.T.
Mains Adaptor £7.30 + £1.09 V.A.T.

Price £175.00 + £26.25 V.A.T.

DIGITAL CAPACITANCE METER

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

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INSULATION TESTER 500V

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

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LEADER LCT910-A CRT TESTER REJUVENATOR

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Our top selling instrument is designed to readily test the various characteristics and rejuvenation of both colour and B/W CRT's.
- Tests for shorts and leakage between electrodes.
- Tests cathode emission characteristics.
- Separately checks condition of guns.
- Removal of shorts and leakage between electrodes.
- Checks heater warm-up characteristics.
- Rejuvenation of low emission cathodes with automatic timing.
- Super rejuvenation with manual control.
- Complete with tube base adaptors.
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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.

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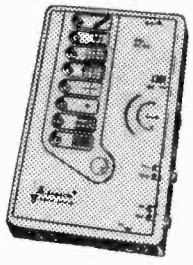
THE SADELTA RANGE OF HAND HELD COLOUR PATTERN GENERATORS is intended for use in production, installation and service of both colour and monochrome TV sets, video and computer monitors. In order to control and adjust the various parameters eight switchable patterns are provided. The technician has ready 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.



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- Band III (5-12)
- PAL I.
- O/Put 10mV into 75ohms
- Sound output

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PAL VIDEO COMPOSITE GENERATOR

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- O/Put 1V p.p. @ 75ohms
- Audio O/Put 10mV

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- O/Put 1V p.p. @ 75ohms
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- 8 Dig. LED Display
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LEADER High Voltage Metered **EHT PROBE.** Measures up to 40KV DC with safety. Built in meter. Accuracy ±3%

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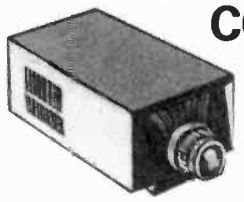

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5. 3 – electrical switches intermediate type, will also replace 1 or 2 way switches, white flush mounting
7. 4 – in flex line switches with neons
9. 2 – mains transformers with 6V 1A secondaries
10. 2 – mains transformers with 12V ½A secondaries
11. 1 – extension speaker cabinet for 6½" speaker
13. 12 – glass reed switches
17. 2 – ultrasonic transmitters and 2 receivers with circuit
19. 2 – light dependent resistors
25. 4 – wafer switches – 6p 2 way, 4p 3 way, 2p 6 way, 2p 5 way, 1p 12 way small one hold fixing and good length ¼ spindle your choice
28. 1 – 6 digit counter mains voltage
30. 2 – Nicad battery chargers
31. 1 – key switch with key
33. 2 – aerosol cans of ICI Dry Lubricant
34. 48 – 2 metre lengths colour-coded connecting wire
39. 1 – long and medium wave tuner kit
41. 8 – rocker switch 10 amp mains SPST
45. 1 – 24 hour time switch mains operated
49. 10 – neon valves – make good night lights
50. 2 – 12V DC or 24V AC, 3 CO relays
51. 1 – 12V 2 CO miniature relay very sensitive
52. 1 – 12V 4 CO miniature relay
54. 10 – rows of 32 gold plated IC sockets (total 320 sockets)
55. 1 – locking mechanism with 2 keys
56. 1 – miniature uniselector with circuit for electric jigsaw puzzle
60. 5 – ferrite rods 4" × 5/16" diameter aerials
61. 1 – Mullard thyristor trigger module
66. 1 – magnetic brake – stops rotation instantly
67. 1 – low pressure 3 level switch can be mouth operated
69. 2 – 25 watt pots 8 ohm
70. 2 – 25 watt pots 1000 ohm
71. 4 – wire wound pots – 18, 33, 50 and 100 ohm your choice
77. 1 – time reminder adjustable 1-60 mins clockwork
85. 1 – mains shaped pole motor ¾" stack – ¼ shaft
89. 1 – mains motor with gear box 1 rev per 24 hours
91. 2 – mains motors with gear box 16 rpm
96. 1 – thermostat for fridge
98. 1 – motorised stud switch (s.h.)
101. 1 – 2½ hours delay switch
102. mains PSU 9V
103. 1 – mains power supply unit – 6V DC
104. 1 – mains power supply unit – 4½V DC
107. 1 – 5" speaker size radio cabinet with handle
111. 2 – musical boxes (less keys)
112. 1 – heating pad 200 watts mains
114. 1 – 1W amplifier Mullard 1172
115. 1 – wall mounting thermostat 24V
118. 1 – teak effect extension 5" speaker cabinet
120. 2 – p.c. boards with 2 amp full wave and 17 other recs
121. 4 – push push switches for table lamps etc.
122. 10 – mtrs twin screened flex white p.v.c. outer
124. 25 – clear plastic lenses 1¾ diameter
127. 4 – pilot bulb lamp metal clip on type
128. 10 – very fine drills for pcbs etc.
129. 4 – extra thin screw drivers for instruments
132. 2 – plastic boxes with windows, ideal for interrupted beam switch
134. 10 – model aircraft motor – require no on/off switch, just spin to start
142. 10 – 48A spanners 1 end open, other end closed
145. 2 – 4 reed relay kits 3V coil normally open or c/o if magnets added
146. 20 – pilot bulbs 6.5V 3A Philips
154. 1 – 12V drip proof relay – ideal for car jobs
155. 3 – varicap push button tuners with knobs
169. 4 – short wave air spaced trimmers 2-30f
172. 10 – 12V 6W bulbs Philips m.e.s.
178. 3 – oblong amber indicators with liliputs 12V
180. 6 – round amber indicators with neons 240V
181. 100 – p.v.c. grommets ⅜ hole size
182. 1 – short wave tuning condenser 50 pf with ¼" spindle
184. 1 – three gang tuning condenser each section 500 pf with trimmers and good length ¼" spindle
188. 1 – plastic box sloping metal front, 16 × 95mm average depth 45mm
193. 6 – 5 amp 3 pin flush sockets brown
195. 5 – B.C. lampholders brown bakelite threaded entry
196. 1 – in flex simmerstat for electric blanket soldering iron etc.
197. 2 – thermostats, spindle setting – adjustable range for ovens etc.
199. 1 – mains operated solenoid with plunger 1" travel
200. 1 – 10 digit switch pad for telephones etc.
201. 8 – computer keyboard switches with knobs, pcb or vero mounting
211. 1 – electric clock mains driven, always right time – not cased
216. 1 – stereo pre-amp Mullard EP9001
232. 2 – 12V solenoids, small with plunger
236. 1 – mains transformer 9V 1 amp secondary C core construction
241. 1 – car door speaker (very flat) 6½" 15 ohm made for Radiomobile
241. 2 – speakers 6" × 4" 4 ohm 5 watt made for Radiomobile
243. 2 – speakers 6" × 4" 16 ohm 5 watt made for Radiomobile
244. 1 – mains motor with gear-box very small, toothed output 1 rpm
245. 4 – standard size pots. ½ meg with dp switch
249. 1 – 13A switched socket on double plate with fused spur for water heater etc.
266. 2 – mains transformers 9V ½A secondary split primary so ok also for 115V
267. 1 – mains transformers 15V 1A secondary p.c.b. mounting
291. 1 – ten turns 3 watt pot ¼ spindle 100 ohm
296. 3 – car cigar lighter socket plugs
298. 2 – 15 amp round pin plugs brown bakelite
300. 1 – mains solenoid with plunger compact type
301. 10 – ceramic magnets Mullard 1" × 3/8 × 5/16
303. 1 – 12 pole 3 way ceramic wave charge switch
304. 1 – stereo amp 2W per channel
305. 1 – tubular dynamic microphone with desk rest
308. 1 – T.V. turret tune (black & white T.V.)
310. 2 – oven thermostats
313. 5 – sub miniature micro switches
316. 1 – round pin kettle plug with moulded on lead

MULLARD UNILEX AMPLIFIERS

We are probably the only firm in the country with these now in stock. Although only four watts per channel, these give superb reproduction. We now offer the 4 Mullard modules – i.e. Mains power unit (EP9002) Pre amp module (EP9001) and two amplifier modules (EP9000) all for **£5.00** plus £2 postage. For prices of modules bought separately see TWO POUNDERS.

CAR STARTER/CHARGER KIT

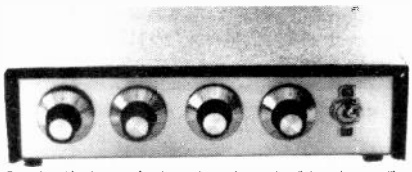
Flat Battery! Don't worry you will start your car in a few minutes with this unit – 250 watt transformer 20 amp rectifiers, all parts with data **£15** case £4 p&p £2.

Ex-Electricity Board. Guaranteed 12 months.

VENNER TIME SWITCH

Mains operated with 20 amp switch. One on and one off per 24 hrs. repeats daily automatically correcting for the lengthening or shortening day. An expensive time switch but you can have it for only **£2.95** without case, metal case – **£2.95**, adaptor kit to convert this into a normal 24hr. time switch but with the added advantage of up to 12 on/offs per 24hrs. This makes an ideal controller for the immersion heater. Price of adaptor kit is **£2.30.**

SOUND TO LIGHT UNIT



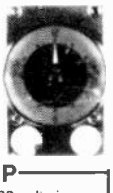
Complete kit of parts of a three channel sound to light unit controlling over 2000 watts of lighting. Use this at home if you wish but it is plenty rugged enough for disco work. The unit is housed in an attractive two tone metal case and has controls for each channel, and a master on/off. The audio input and output are by ¼" sockets and three panel mounting fuse holders provide thyristor protection. A four pin plug and socket facilitate ease of connecting lamps. Special price is **£14.95** in kit form.

12 volt MOTOR BY SMITHS

Made for use in cars, etc. these are very powerful and easily reversible. Size 3½" long by 3" dia. They have a good length of ¼" spindle –
1/10 hp **£3.45**
1/8 hp **£5.75.** 1/6 hp **£7.50**

25A ELECTRICAL PROGRAMMER

Learn in your sleep. Have radio playing and kettle boiling as you wake – switch on lights to ward off intruders – have a warm house to come home to. You can do all these and more. By a famous maker with 25 amp on/off switch. A beautiful unit at **£2.50**



THIS MONTH'S SNIP

400 Watt Mains Isolation Transformer 230 volts in 230 volts out. Supplementary 10 volt winding for voltage adjustments. Torroidal construction makes it most compact. Regular price £40. Our price **only £10.00** + £2 post.

MAKING SUNBEDS?

CHOKE AND STARTER for 6' 100uva tube **£2**, post £1 for 1 or 50p each in quantity.
TUBE HOLDERS Canopy type spring loaded, 4 pairs for **£1**, 100 pairs **£20**, 1,000 pairs **£150**, post paid.

TANGENTIAL HEATERS

We again have very good stocks of these quiet running instant heat units. They require only a simply case, or could easily be fitted into the bottom of a kitchen unit or book case etc. At present we have stocks of 1.2kw, 2kw, 2.5kw, and 3kw. Prices are **£5** each for the first 3, and **£6.95** for the 3k. Add post £1.50 per heater if not collecting.
CONTROL SWITCH enabling full heat, half heat or cold blow, with connection diagram, 50p for 2kw, 75p for 3kw.

FANS & BLOWERS

Woods extractors
5" **£5** + £1.25 post. 6" **£6** + £1.50 post
4" × 4" Muffin equipment cooling fan 115V **£2.00**
4" × 4" Muffin equipment cooling fan 230/240V **£5**
5" Plannair extractor **£5.50**
9" Extractor or blower 115V supplied with 230 to 115V adaptor **£9.50** + £2 post.
All above are ex computers but guaranteed 12 months.
10" × 3" Tangential Blower. New. Very quiet – supplied with 230 to 115V adaptor on use two in series to give long blow **£2.00** + £1.50 post or **£4.00** + £2.00 post for two.

IONISER KIT

Refresh your home, office, shop, work room etc. with a negative ION generator. Makes you feel better and work harder – a complete mains operated kit, case included. **£11.95** plus £2.00 post.

TELEPHONE BITS

Master sockets (has surge arrestor – ringing condenser etc) and takes B.T. plug **£3.95**
Extension socket **£2.95**
Dual adaptors (2 from one socket) **£3.95**
Cord terminating with B.T. plug 3 metres **£2.95**
Kit for converting old entry terminal box to new B.T. master socket, complete with 4 core cable, cable clips and 2 BT extension sockets **£11.50**

MINI MONO AMP on p.c.b. size 4" × 2" (app.)

Fitted volume control and a hole for a tone control should you require it. The amplifier has three transistors and we estimate the output to be 3W rms. More technical data will be included with the amp. Brand new, perfect condition, offered at the very low price of **£1.50 each, or 13 for £12.00**

J & N BULL ELECTRICAL (T)

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. Acces & B/card orders accepted. Brighton 0273 734648. **Bulk orders:** write for quote.

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There is a total of over 400 packs in our Baker's dozen range and you become entitled to a large free gift with each dozen pounds you spend on these packs. A classified list of these packs and our latest "News Letter" will be enclosed with your goods, and you will automatically receive our next news letter.

£2 POUNDERS*

2P2 – Wall mounting thermostat, high precision with mercury switch and thermometer
2P3 – Variable and reversible 8-12V psu for model control
2P4 – 24 volt psu with separate channels for stereo made for Mullard UNILEX
2P6 – 100W mains to 115V auto-transformer with voltage tappings
2P8 – Mains motor with gear box and variable speed selector Series wound so suitable for further speed control
2P9 – Time and set switch. Boxed, glass fronted and with knobs. Controls up to 15 amps. Ideal to program electric heaters
2P10 – 12 volt 5 amp mains transformer – low volt winding on separate bobbin and easy to remove to convert to lower voltages for higher currents
2P12 – Disc or Tape precision motor – has balanced rotor and is reversible 230V mains operator 1500 rpm
2P14 – Mug Stop kit – when thrown emits piercing swawk
2P15 – Interrupted Beam kit for burglar alarms, counters, etc.
2P17 – 2 rev pr minute mains driven motor with gear box, ideal to operate mirror ball
2P18 – Liquid/gas shut off valve mains solenoid operated
2P19 – Disco switch-motor drives 6 or more 10 amp change over micro switches supplied ready for mains operation
2P20 – 20 metres extension lead, 2 core – ideal most Black and Decker garden tools etc.
2P21 – 10 watt amplifier, Mullard module reference 1173
2P22 – Motor driven switch 20 secs on or off after push
2P24 – Clockwork operated 12 hour switch 15A 250V with clutch
2P26 – Counter resettable mains operated 3 digit
2P27 – Goodmans Speaker 6 inch round 8 ohm 12 watt
2P28 – Drill Pump – always useful couples to any make portable drill
2P31 – 4 metres 98 way interconnecting wire easy to strip
2P32 – Hot Wire amp meter – 4½ round surface mounting 0-10A – old but working and definitely a bit of history
2P34 – Solenoid Air Valve mains operated
2P38 – 200 R.P.M. Geared Mains Motor 1" stack quite powerful, definitely large enough to drive a rotating aerial or a tumbler for polishing stones etc.
2P43 – Small type blower or extractor fan, motor inset so very compact, 230V
2P46 – Our famous drill control kit complete and with prepared case
2P47 – Telephone ringing unit reduces mains to 50 volts and changes frequency from 50 hz to 25 hz to give right ringing tone
2P49 – Fire Alarm break glass switch in heavy cast case
2P51 – Stereo Headphone amplifier, with pre-amp
2P55 – Mains motor, extra powerful has 1½" stack and good length of spindle
2P62 – 1 pair Goodmans 15 ohm speakers for Unilox
2P64 – 1 five bladed fan 6½" with mains motor
2P66 – 1 2kw tangential heater 115v easily convertible for 230V
2P67 – 1 12v-0-12v 2 amp mains transformer
2P68 – 1 15v-0-15v 2 amp mains transformer
2P69 – 1 250v-0-250v 60 mA & 6.3v 5A mains transformer + £1 post
2P70 – 1 E.M.I. tape motor two speed and reversible
2P72 – 1 115v Muffin fan 4" × 4" approx. ex computer
2P75 – 1 2 hour timer, plugs into 13A socket
2P82 – 9v-0-9v 2 amp mains transformer
2P84 – Modern board with press keys for telephone redialler
2P85 – 20v-0-20v ½A Mains transformer
2P88 – Sangamo 24 hr time switch 20 amp S.H.
2P89 – 120 min. time switch with knob
2P90 – 90 min. time switch with edgewise engraved controller
2P95 – 13A socket on satin chrome plate very superior G.E.C.
2P97 – mains transformer 24v 2A upright mounting
2P98 – 20m 4 core telephone cable, white outer
2P99 – 500 hardened pin type staples for telephone cable
2P101 – mains transformer 15v 4A upright mounting
2P105 – capillary type thermostat adjustable for air temperatures with 10A c/o switch
2P107 – membrane keyboard, telephone type superior plug in type
2P108 – mains motor with gear box giving 110rpm
2P109 – 5" wide black adhesive pvc tape 33m, add £1 post if not collecting
2P111 – ITT line output unit
2P112 – 6 volt 200MA Voltage regulated PSU for 13 amp socket
2P113 – 9 volt 200MA Voltage regulated PSU for 13 amp socket
2P114 – 12 volt 200MA Voltage regulated PSU for 13 amp socket
2P116 – FM front end with tuning capacitor and F.M. circuitry
2P118 – 30rpm mains motor with gearbox
2P119 – Under carpet switch mat for burglar alarm etc.

LIGHT CHASER KIT

Motor driven switch bank with connection diagram, used in connection with 4 sets of X-mas lights makes a very eye catching display for home, shop or disco, **only £5** ref 5P56.

£5 POUNDERS*

5P1 12 volt submersible pump complete with a tap which when brought over the basin switches on the pump and when pushed back switches off, an ideal caravan unit.
5P2 Sound to light kit complete in case suitable for up to 750 watts.
5P3 Silent sentinel ultra sonic transmitter and receive kit, complete
5P5 250 watt isolating transformer to make your service bench safe, has voltage adj. taps, also as it has a 115v tapping it can be used to safely operate American or other 115v equipment which is often only insulated to 115V. Please add £3 postage if you can't collect as this is a heavy item.
5P6 12V alarm bell with heavy 6" gong, suitable for outside if protected from direct rainfall Ex GPO but in perfect order and guaranteed
5P15 Uniselector 5 pole 25 way 50 volt coil
5P18 motor driven water pump as fitted to many washing machines
5P20 2 kits, matchbox size, surveillance transmitter and FM receiver
5P23 miniature (appr. 2½" wide) tangential blow heater, 1.2kw
5P24 ¼hp motor, ex computer, 230v, mains operation 1450rpm. If not collect add £3 post
5P25 special effects lighting switch Up to 6 channels of lamps can be on or off for varying time penods
5P27 cartridge player 12v, has high quality stereo amplifier
5P28 gear pump, mains motor driven with inlet and outlet pipe connectors
5P32 large mains operated push or pull solenoid. Heavy so add £1.50 post
5P34 24v 5A toroidal mains transformer
5P35 modern board from telephone auto dialler, complete with keypad and all ICs
5P37 24 hour time switch, 2 on/offs and clockwork reserve, ex. Elec. Board loading up to 50A. Add £1 post
5P41 5" extractor fan, very quiet runner sh, gntd 12 mths.
5P45 pack of 6 cooker clock switches
5P48 telephone extension bell in black case, ex-GPO
5P50 box of 20 infra red quartz glass enclosed 360w heating elements
5P51 200w auto transformer 230v to 115v toroidal
5P52 mains transformer 26v 10A upright mounting, add £2 post
5P54 mains motor with gear box, final speed 5rpm
5P58 Amstrad stereo tuner FM and LM and S. AM
5P60 DC Muffin type fan 18w to 27v, only 3w
5P61 drill pump mounted on frame, coupled to mains motor
5P62 2½kw tangential blow heater, add £1.50 post if not collecting
FP69 Fluorescent light box for viewing PCB's or can be used for shop window sign

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DOUBLE 12" TUBE

Attractive white fitting ribbed perspex diffuser. On/off switch, 3ft cable. Transistorised circuitry. Keyhole fixing. 12V dc, 8W tube 360 × 62 × 37mm.

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Powered by ordinary lighter fuel. 60 mins. cont. use, adj. temp. 10/60W — Price **£16.00**

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2.4mm, 3.2mm, 4.8mm — **£4.50**

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Full range of high speed twist drills for metal and drill bits.

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BTT6218	1.98	TDA2532	2.80
CA301AT	0.80	TDA2560	3.20
CA358	0.66	UPC57562	1.45
CA810QM	1.20	UPC1350C	4.05
CA3020	2.10	UPC1156H	2.75
CA3065	1.00	UPC1182H	2.75
CA3080E	0.65	UPC1218H	1.80
CA3140E	0.35	UPC1356C2	3.00
HA1366WR	1.59	UPC2002H	2.78
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LC7131	4.90		
LM324N	0.45		
LM380N8-P	1.15		
LM380N14-P	1.80		
LM1011N	3.00		
LM1458N	1.75		
LM3900N	0.85		
M51513L	1.90		
M51515L	2.98		
MC1307P	1.99		
MC1327P	1.50		
MC1330P	1.60		
ML232B	2.10		
ML237B	2.30		
NE555	0.25		
SAA1025	6.00		
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SN76227N	1.10		
SN76533N	1.70		
STK015	6.20		
STK032	13.00		
STK078	13.00		
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TA7146P	4.60		
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TA7204P	2.50		
TA7205AP	1.80		
TA7222P	2.32		
TAA550	0.50		
TAA611A12	4.50		
TAA621AX1	4.50		
TAD100	2.90		
TDA120A	1.20		
AS/S/SB/T/U	0.80		
TDA120B	1.30		
SA/SQ/UQ	1.30		
TBA520	1.50		
TBA530	1.20		
TBA540	1.64		
TDA560C	1.50		
TBA810S	1.20		
TBA950/2A	3.05		
TCA270SA	4.02		
TDA1003A	5.50		
TDA1006A	2.45		
TDA1035S	4.50		
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78L15	0.30
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7818	0.45
7824	0.45
7905	0.50
7912	0.50
7915	0.50
7918	0.50
7924	0.50
78H05	5.60
78H12	6.40
78HG	5.85
79HG	6.85
LM305H	1.48
LM317K	2.40
LM317T	1.25
LM723	0.65

TRANSISTORS + DIODES

Type	Price (£)	Type	Price (£)
AC127	0.28	BC118	0.16
AC128	0.30	BC119	0.28
AC128K	0.34	BC125	14
AC141	0.58	BC140	0.27
AC141K	0.38	BC141	0.24
AC142	0.56	BC142	0.24
AC142K	0.38	BC143	0.26
AC151	0.45	BC147	0.18
AC152	0.45	BC147B	0.14
AC153	0.57	BC148	0.10
AC153K	0.46	BC148B	0.12
AC176	0.30	BC149	0.10
AC176K	0.38	BC149C	0.14
AC187	0.28	BC157	0.10
AC187K	0.38	BC158	0.12
AC188	0.28	BC159	0.12
AC188K	0.38	B/C	0.14
ACY22	1.50	BC160	0.30
AD142	0.88	BC161	0.30
AD143	1.10	BC168B	0.20
AD149	0.72	BC169C	0.12
AD161/162	1.20	BC170/A/B/C	0.16
AD162	0.52	BC171/A/B	0.10
AF114	1.20	BC172/B/C	0.12
AF115	2.10	BC177/A/B/C	0.24
AF116	2.10	BC182/A/B/C	0.10
AF121	0.56	BC182L	0.12
AF124	0.42	LA LD LC	0.10
AF125	0.58	BC183/A/B/C	0.10
AF126	0.58	BC183L	0.10
AF127	0.38	LA LB LC	0.10
AF139	0.40	BC184	0.10
AF178	2.28	A B CL LC LB	0.10
AF239	0.50	BC207	0.15
AF279S	1.40	BC212/A/B/C	0.10
AL100	5.40	BC212L	0.09
AL102	4.40	LA LB	0.10
ASY80	5.20	BC213/A/B/C	0.10
ASZ17	2.00	BC213L	0.10
AU110	2.80	LA LB LC	0.10
AY102	4.40	BC237	0.11
B40C200	1.03	BC238	0.12
BA110	0.68	BC251/A/B	0.14
BA115	0.14	BC262	0.20
BA121	0.40	A B	0.28
BA129	0.38	BC301	0.30
BA148	0.16	BC302	0.30
BA155	0.12	BC303	0.30
BA157	0.28	BC307A	0.18
BB105B	0.30	BC317A	0.12
BB105G	0.48	BC323	0.90
BB110B	0.42	BC327	0.16
BC107	0.10	BC328	0.16
A or B	0.12	BC337	0.12
BC108	0.10	BC338	0.12
A,B or C	0.13	BC350A	0.24
BC109	0.10	BC351	0.16
A,B or C	0.14	BC440	0.36
BC115	0.12	BC441	0.40
BC116	0.12	BC461	0.58
BC117	0.22	BC478	0.24

Type	Price (£)	Type	Price (£)	Type	Price (£)	Type	Price (£)
BC516	0.48	BF178	0.26	BU126	1.40	ORP12	0.95
BC547	0.12	BF180	0.27	BU133	1.90	R2008B	1.20
A or B	0.10	BF181	0.27	BU204	1.30	R2010B	1.20
BC548	0.12	BF182	0.32	BU205	1.30	R2540	2.71
A B or C	0.10	BF183	0.32	BU206	1.50	TIP30A	0.32
BC549	0.10	BF184	0.30	BU208A	1.40	TIP31C	0.39
A or B	0.10	BF185	0.28	BU326S	1.75	TIP32	0.35
BC550	0.10	BF194A	0.15	BU407	1.10	TIP33A	0.55
A or B	0.10	BF195	0.12	BUX80	3.70	TIP34A	0.70
BC557	0.10	BF224J	0.20	BUY20	2.75	TIP41C	0.42
BC558A	0.10	BF240	0.30	BUY69A	2.60	TIP42	0.44
BCY70	0.16	BF241	0.30	BUY69B	1.98	TIP47	0.42
BCZ10	3.21	BF244A	0.30	BY100	0.80	TIP121	0.63
BCZ11	2.60	BF257	0.22	BY103	0.50	TIP2955	0.70
BD124P	0.70	BF258	0.26	BY122	0.60	TIP3055	0.58
BD129	0.90	BF259	0.30	BY126	0.10	TIS88	0.50
BD130Y	0.68	BF262	0.34	BY127	0.08	TIS90	0.27
BD131	0.36	BF263	0.38	BY133	0.06	Y728	0.14
BD132	0.36	BF270	0.30	BY135	0.35	Y969	2.80
BD135	0.26	BF271	0.28	BY164	0.45	IN4001	0.04
BD136	0.26	BF273	0.22	BY179	0.56	IN4003	0.05
BD137	0.28	BF274	0.34	BY182	0.80	IN4004	0.05
BD138	0.30	BF294	0.46	BY184	0.38	IN4006/7	0.07
BD139	0.30	BF336	0.32	BY187	0.65	IN4148	0.04
BD140	0.28	BF337	0.28	BY189	6.75	IN5400	0.12
BD142	1.26	BF338	0.28	BY198	0.64	IN5402	0.13
BD145	1.82	BF355	0.37	BY199	0.72	IN5405	0.16
BD150A	0.72	BF371	0.27	BY206	0.14	IN5406	0.17
BD160	1.58	BF450	0.38	BY207	0.16	IN5408	0.19
BD165	0.45	BF457	0.36	BY210/400	0.21	2N2122A	0.34
BD183	0.70	BFR51	0.36	BY210/600	0.24	2N2222	0.30
BD201	0.52	BFR61	0.32	BY210/800	0.28	2N2904A	0.48
BD202	0.57	BFR90	0.86	BY227	0.22	2N2926G	0.14
BD204	0.50	BFT41	0.68	BY228	0.46	2N3053	0.30
BD222	0.80	BFT43	0.86	BY238	0.65	2N3054	0.60
BD225	0.40	BFY50	0.22	BYX10	0.20	2N3055	0.65
BD232	0.45	BFY51	0.22	BYX36/150	0.40	2N3703	0.10
BD234	0.30	BFY52	0.22	BYX36/600	0.48	2N3773	2.80
BD235	0.30	BFY90	0.80	BYX48/300	0.70	2SB337	1.80
BD236	0.38	BFY90S	1.34	BYX55/600	0.30	2SC1098	0.84
BD237	0.38	BR100	0.25	BYX71/600	1.18	2SC1172Y	1.70
BD410	0.76	BR101	0.40	C106D (400V)	0.48	2SC1173Y	0.88
BD434	0.58	BR103	0.50	E1222	0.30	2SC1279	0.50
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BD439	0.85	BRY39	0.50	MCR106/5	1.20	2SC1413A	2.70
BD441	1.00	BRY56	0.42	ME0413	0.70	2AC1449	0.60
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BF115	0.32	BT102/300	3.60	MJE520	0.44	2SC21953	0.70
BF117	0.50	BT106	1.15	MJE2955	1.60	2SC1957	0.70
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PCF805	2.00
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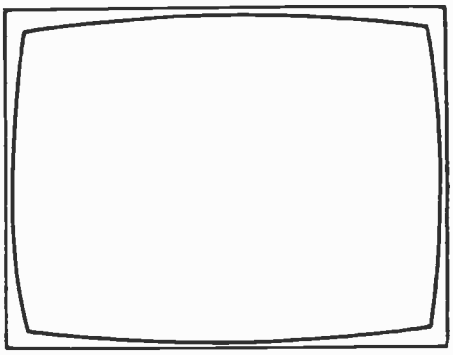

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John A. Reddihough

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COVER PHOTO
This month's cover photo shows Alan Willcox's c.r.t. tester-booster in action. See article on page 244. The Ampmace transformer specified in the article is available from Satellite TV and Video, 1 Albany Road, Roath, Cardiff at £5 plus VAT, including post and packing.

The Coming of DBS

Our congratulations to British Satellite Broadcasting (BSB) on being awarded the UK direct broadcasting by satellite (DBS) franchise. Five groups put in applications for the fifteen-year franchise and the competition was strong. It was apparently not an easy decision for the IBA and one gathers that it was touch and go until the last. There was certainly an odd little charade about the way in which the decision was communicated to the applicants. Representatives of all five were called to the IBA's Brompton Road headquarters and were sat in separate rooms where they were personally handed individual letters by the IBA's chairman Lord Thomson. One wonders why a single phone call or an invitation to the winner would not have been a simpler way of going about it, but it seems that the IBA was intent on being seen to be scrupulously fair in its dealings with the applicants. When one thinks of the unpleasant possibilities of subsequent complaints this was perhaps a reasonable way of going about it. There has certainly so far been a total lack of any complaints from the losers.

In reaching its decision it seems that the IBA was impressed by the expertise offered by the various members of the BSB consortium (Granada and Anglia TV, the Pearson group, Virgin and Amstrad Consumer Electronics). Between them these groups already have considerable interests in broadcasting along with publishing, banking, music recording and retailing, video production and distribution, film distribution and consumer electronics manufacturing and distribution interests. In its application for the franchise BSB emphasised that DBS had to be "programme-led" rather than relying on the novelty of a new way of going about programme transmission. It has also stressed the need for the programming to be complementary to that offered by the existing terrestrial networks so that viewers will be offered a wider range of choice. Not only that, but BSB's three channels, carrying four services (one news based, one general entertainment, a family programme and a premium film service) are to be separately targeted rather than being in competition. These are praiseworthy intentions that are not going to be easy to implement – there is, after all, a limit to what can be screened and the present terrestrial services already offer a fairly wide choice (except when they all go sports mad at the same time . . .).

BSB also explicitly recognised that the financial commitment (the cost of getting the service started is put at over £500m) represents a considerable risk, but felt that "the chances are now good enough, and the prospective rewards great enough, to justify an adventure on the grand scale". BSB will in particular be up against the ingrained habits of the viewing public – many a set is switched on early in the day and left on regardless of what comes up on the screen. BSB has not only the problem of getting its services known and persuading viewers to switch over, it also has the problem of persuading potential viewers to buy the necessary equipment. This is not simply a matter of shoving up an extra relatively inexpensive aerial, as when ITV started: a whole new receiving package is required. Not only that, but BSB have to provide the satellite – the ITV companies rely on the IBA to provide, for a fee, the means of transmission. BSB has certainly taken a lot upon itself and one admires its courage.

BSB has expressed the hope that some 400,000 homes will equip themselves for DBS reception in the first year of the service (1990, all being well) and that over half the houses in the UK will be so equipped after eight-ten years. That would be quite a rapid take-off in comparison to previous advances in domestic TV/video services (ITV, colour, the VCR). It hopes to break even in the third or fourth year of the franchise, with rapid profits growth (from advertising and subscription revenue for the film channel) thereafter. One recalls that ITV had a distinctly shaky start, but after the first couple of years or so came the famed "licence to print money". BSB will have a harder task than the original ITV companies not only because of the need to persaude the public to purchase the receiving equipment required but also because of the much greater competition it faces – from the BBC, the ITV companies, video and the cable services, also from other prospective DBS services.

This last point is one of the most intriguing aspects of the unfolding story of satellite broadcasting. By 1990 the German, French, Irish and Luxembourg satellites are likely to be in orbit, providing competition within the DBS field. It's likely that the French/German satellites will carry at least some English language programming – French channels have already been offered to prospective UK broadcasters. The Irish satellite will carry mainly English-language programming and indeed some of the consortia that failed to gain the UK DBS franchise may take channels on this one – or the Luxembourg satellite Astra. While Astra will not be a full-power DBS satellite it will nevertheless be receivable on a modestly sized dish, and of course the technology of reception is advancing all the time (noise rather than signal strength is the problem). The footprints of all these – and possibly other, e.g. Scandinavian – satellites will cover much of the UK. We shall certainly not be starved of channels, and to be successful BSB will have to rely on its promised programming strength.

So the nineties will see far more competition in the field of TV broadcasting than we've been used to. One has to ask the awkward question: will it all be financially viable? In the USA, where competition in TV broadcasting has always been much greater than in Europe, TV stations have come and gone, only the big networks and a few strong locals getting a firm hold. The rewards for successful DBS broadcasting in the UK could be considerable, but the risks are also great.

Long-distance Television

Roger Bunney

For the most part reception of DX-TV signals in the UK during November matched the weather – dismal! Daily reception of sorts was possible via meteor-scatter propagation, though the Leonids meteor shower failed to produce the excitement it has done in previous years. Sporadic E reception was noted on several days as follows:

7/11/86 CST (Czechoslovakia) ch. R2.
8/11/86 RAI (Italy) chs. IA, IB.
11/11/86 CST R1.
12/11/86 TSS (USSR) R1; JRT (Yugoslavia) E3, 4.
15/11/86 RAI IA; +PTT (Switzerland) E2.
18/11/86 TVP (Poland) R2; SR (Sweden) E4.

Iain Menzies in Aberdeen logged several auroral events during the evenings: NRK (Norway) was received on the 11th, RUV (Iceland) on the 12th, while the 15th produced signals from both NRK and RUV – all these signals were in Band I. He noted intense auroral activity on the 24-25th. During the first phase on the 24th, from 1600-1930, signals were received from NRK and there was "mush" type interference. Excellent RUV signals were received on the 25th, with mush throughout Band I.

There was an extremely intense tropospheric opening on the 28-30th, during a period of heavy fog associated with high pressure. Signals from France and the Benelux countries were received on the 28th. Reception distances increased on the 29th, with signals from W. Germany in Band III and at u.h.f. The opening peaked on the 30th, when E. German signals in Band III and at u.h.f. were received as far west as the Welsh coast. Extensive reception from TDF (France) was noted along the south and east coasts and well inland, the farthest distance being reception of Band III signals from Denmark in west Wales. Simon Hamer in Powys even noted a Dutch ATV station, PE1DWL, with P5 (noise free) signals at mid-day on the 30th – together with ch. E11 and 12 signals from E. Germany. A rewarding end to an otherwise gloomy month.

Whilst we in Europe approach the winter reception low things are picking up in Australia. Their SpE season is now in full swing. Robert Copeman in Melbourne reports extensive reception of New Zealand and W. Australian Band I signals during November. For Anthony Mann in Perth the season opened with a bang: he received a ch. A2 signal from the Philippines (vision only) on October 11th at 1400-1600 local time, a distance of 3,500 miles. There were also unidentified ch. E2, E3 and C1 signals.

Hugh Cocks writes from the Algarve, Portugal that during mid-November ZTV (Zimbabwe) ch. E2 was received almost daily at 1400-1630 via F2 propagation. The signals were very strong at times, though normally only the vision at 48·25MHz was received. Tropospheric reception has given him signals from the Canary Islands on chs. E30, E32, E40 (TVE-1) and E35 (TVE-2), also RTP Madeira ch. E5. Late October SpE signals seen by Hugh included BRT Antwerp ch. E2 at 100W on October 29/30th.

1987 Meteor Shower Dates

Our thanks to the Meteor Section of the British Astronomical Association for providing the following information on meteor showers during 1987. Note that the Leonids shower can in some years be very intense and is thus especially worth DX-TV attention. The 1987 Taurids shower will be weak with a long, flat maximum period.

Lyrids	April 19-25th, peaking on the 22nd.
May Aquarids	May 1-10th, peaking over the 5-6th.
Delta Aquarids	July 15th-August 20th, peaking on July 29th.
Perseids	July 25th-August 20th, peaking over August 12-13th.
Orionids	October 16-27th, peaking over the 20-22nd.
Taurids	October 20th-November 30th, peaking over November 1-10th.
Leonids	November 15-20th, peaking over the 17-18th.
Geminids	December 7-15th, peaking over the 13-14th.
Ursids	December 17-25th, peaking on the 23rd.

Meteor-scatter Reception

Meteor-scatter propagation can give reception of distant Band I signals on most days of the year. The signals are for the most part of brief duration, ranging in strength from weak to very strong. Typical MS signals appear rapidly, with perhaps a longer decay to noise level – over several seconds for a normal ping though super pings can last for upwards of twenty seconds. Daily MS is random in

Fig. 1: Map showing proposed W. German local TV stations.

nature, though the early morning period produces more intense pings (unfortunately few Band I transmitters are in operation in W. Europe during the early morning period). The cause of MS propagation is signal reflection from space debris that pass through the ionospheric layers, usually burning up at E layer height (around 70-90 miles). Reflection is from the ionised trails produced when the debris burn up, and occurs at Band I frequencies upwards – really intense trails will produce reflection in Band III. The brief, fleeting nature of the signals means that the receiver must be accurately tuned and the hold controls set for instant synchronisation.

Random MS propagation should not be confused with that provided by the major and predictable meteor showers mentioned above. These showers often produce long periods of reception, with characteristic fluctuating signal strengths, if you are lucky enough to be tuned in at the peak period.

An aerial used for SpE reception in Band I will provide MS signals – a wideband type makes reception easier. MS reception distances are similar to those of summertime single-hop SpE reception, i.e. around 500-1,200 miles.

News Items

Norway: The first local TV stations are now in operation at Bergen (ch. E45, 50W), Smoras (E48, 10W) and Geitanuken (E51, 10W).

Holland: A third network is expected to be in operation by the end of the year, financed by advertising which will be included in blocks between programmes. The latter will be provided by the present broadcasting organisations. The Europa satellite TV channel has ceased operations.

Italy: The Benelux DX Club reports that two more private TV stations are in operation transmitting on ch. IA. These are Vigevano "Telelomellina" and Novara "Tekeaktautakua" (or "TAI"). The latter has been received in Holland.

W. German Local TV

Technical specifications for W. German local TV services have now been agreed by the Deutches Bundespost. Although the powers to be used are much lower than with the main networks it's common for the low-power UK Forces TV network stations in W. Germany to be received in the UK during good tropospheric openings, so we can expect reception of the higher-powered "lokalen Fernseh" at such times. Table 1 lists proposed stations grouped in areas. See also the accompanying map. Our thanks to the Benelux DX Club for providing this information.

Interference produced by Computers

A major part of the BBC programme "Micro Live" on November 14th was devoted to radiation from microcomputers and the ways in which such radiation can be resolved using both sophisticated and simple TV receiving equipment. It was shown that signals from a supposedly secure microcomputer system could be received at 100 yards using a hand-held fan dipole assembly, with information clearly resolved on a TV receiver's screen at closer distances. The Yoko v.h.f./u.h.f. monochrome portable advertised in these pages recently by Aerial Techniques was used in these experiments, the only (though extensive) modification being to provide an external line timebase speed/sync control. This was added because many microcomputers run at speeds other than the usual 625 lines. The programme also showed that with mobile operation a 27MHz CB whip aerial mounted on the roof of a van produced from banks/offices etc. signals that could be clearly resolved by the roadside.

Microcomputer manufacturers are not happy to discuss this situation. One unit showed in the programme incorporated a system to scramble the radiation so that it could not be picked up by unauthorised operators. The real answer however is to reduce the problem at source by use of screening, earthing and good design.

I've had plenty of experience of computer/VDU radiation problems that are extremely difficult to remove at the domestic receiving site. The Sinclair Spectrum is noted for its high-level output in Bands I and II, and several other domestic microcomputers are reported to be receivable at a distance. Stopping this nuisance is now very difficult since there is no backing from the DTI. It may be possible to reduce radiation from a domestic micro by repositioning it. With commercial installations however you can often find that the operators are unwilling to screen/reposition offending VDUs. The legal process of trying to prove a public nuisance is unlikely to be successful. A more effective approach is to be able to prove that you can resolve the signals, thus making the operator aware of the lack of security. Liaison with the equipment manufacturer may help, especially when the equipment is produced by one of the larger manufacturers – smaller manufacturers tend to show less concern, as I found when experiencing trouble from a nearby word processor.

We'd be interested in hearing from any enthusiasts who have experienced these problems and may have worked out solutions.

Weston Developments' Aerials

Please note that Weston Developments, Romsey, has ceased to manufacture and sell wideband aerials for DX use. Requests for catalogues and orders for equipment will only result in disappointment.

405-line Corner

It's evident that there are many collections of 405-line equipment up and down the country and it seems that interest has increased since system A transmissions ceased. If anyone is thinking of starting a collection or is in need of spares, valves or circuit information an approach to Jack Millar of 107 King Street, Ramsgate, Kent may well be worthwhile. He has some 100 TV sets for disposal, none less than 25 years old, also a few radio receivers, tape recorders and v.h.f. booster amplifiers plus approximately 5,000 valves and 1,000 service manuals, service updates, etc. Jack can provide a photostat list for £1 including postage in the UK. Write to him directly, with a stamped s.a.e. for any specific requests – no random callers, please.

The dual-standard Bemex pattern generator mentioned in the December column went extremely quickly. At least one other enthusiast is seeking a 405-line Bemex or similar source of patterns. Let us know if you have anything suitable lurking unwanted in the back of the workshop – our correspondent (in Walsall) says he will pay a reasonable sum for such a beast. Please don't chuck away 405-line equipment: someone, somewhere is likely to want it!

Table 1: W. German local TV stations

Station	Channel(s)	ERP	Station	Channel(s)	ERP
		BAYERN			
Augsburg	E38	330W	Landshut	E47	63W
Amberg	E50	40W	Munchen	E59	1kW
Ansbach	E49	50W	Nurnberg	E40	760W
Aschaffenburg	E44	87W	Passau	E36/47	44W
Bamberg	E45	105W	Regensburg	E36	130W
Bayreuth	E46	83W	Rosenheim	E45	100W
Coburg	E38/47	48W	Schweinfurt	E22	68W
Erlangen	E50	100W	Straubing	E35	50W
Hof	E51	33W	Weiden	E48	45W
Inglostadt	E57	100W	Wurzburg	E21/38	140W
Kaufbeuren	E51	70W			
		BADEN-WURTTEMBERG			
Freiburg	E38	130W	Pforzheim	E23	105W
Ulm	E36	146W			
		BREMEN			
Bremen	E29	680W	Bremerhaven	E5	140W
		HAMBURG			
Hamburg	E36 or 48	1.4kW			
		HESSEN			
Kassel	E35	200W	Wiesbaden	E38	100W
		NIEDERSACHSEN			
Braunschweig	E60	250W	Hildesheim	E38	110W
Cuxhaven	E21	50W	Oldenburg	E35	130W
Gottingen	E39	110W	Salzgitter	E30/51	100W
Hannover	E40	770W	Wolfsburg	E38	120W
		NORDRHEIN-WESTFALEN			
Aachen	E26	260W	Hamm	E57	160W
Berg. Gladbach	E46	70W	Koln	E27/52	470W
Bielefeld	E38	430W	Krefeld	E33	520W
Bochum	E33	360W	Leverkusen	E53	130W
Bonn	E5/36	270W	Monchengladbach	E26/46	200W
Bottrop	E56	180W	Mulheim/Ruhr	E6	170W
Dortmund	E43/58	500W	Munster	E51	270W
Dusseldorf	E36	560W	Neuss	E44	140W
Duisburg	E43	520W	Paderborn	E54	120W
Essen	E12	600W	Recklinghausen	E28	210W
Gelsenkirchen	E51	670W			
		RHEINLAND-PFALZ			
Kaiserslautern	E50	80W	Mainz	E36	270W
Koblenz	E57	240W			
		SAARLAND			
Saarbrucken	E29/35/56	170W			
		SCHLESWIG-HOLSTEIN			
Flensburg	E24	100W	Lubek	E59 or 60	88W
Kiel	E24	320W			

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VCR Fault Analysis

Steve Beeching, T.Eng.

Fisher FVH615 Function Fault

Once put into play the machine wouldn't respond to stop. Eject gave pause. Forward picture search was o.k. but reverse search was ignored. Obviously brain failure, but where?

The starting point here is to eliminate the main microcomputer chip and check around the various input paths to it for errors. As play could be selected – the micro followed the play routine and playback was observed – it was a fair bet that the micro was all right, though we left open the possibility that it was defective (say a 90 per cent chance that it was o.k., a 10 per cent chance that it wasn't).

The input data comes via a comparator system and the basic operation is simple once explained. When a function key is pressed an input voltage from a resistive ladder network is applied to one input of an operational amplifier that acts as a comparator. See Fig. 1. The other input, applied to the non-inverting (+) input of the comparator, consists of a staircase waveform. This is obtained from the microcomputer chip's four-bit keyscan data output lines (D0-D3) via a digital-to-analogue converter – the latter simply adds the four-bit data pulses to provide the staircase waveform. When the staircase voltage waveform at one input of the comparator equals or exceeds the voltage at the other input the comparator's output changes state. The microcomputer notes this change and checks the state of its D0-D3 outputs at this point. It compares the D0-D3 conditions with a value stored in its memory and this tells it what function has been selected. The micro then takes the appropriate action.

In the case of play the ladder network applies 3·8V to the comparator's inverting input (−) pin. The appropriate conditions on the D3-D0 (note order) lines are 0001. Table 1 shows the conditions for various functions. So play is selected when the ladder network produces 3·8V and the D3-D0 lines are at 0001: for pause the conditions are 11mV and 1110 and for eject about 300mV and 1101. Thus if eject operates pause either the voltage value is wrong, the state of the D3-D0 lines is incorrect or the comparator chip is faulty. The voltages produced by the ladder network and the function keys checked out fine, which isolated the fault to the other side of the circuit.

One problem in practice is that the staircase waveform is not the linear affair one theoretically expects. So don't blame the microcomputer chip for nonlinearity. On the oscilloscope the microcomputer's outputs look like random pulse trains of various highs and lows.

A test routine is possible if a double-beam scope is available. Check the comparator output at pin 6 of the comparator/DA converter chip against one of the data inputs to locate a point in the data waveform of seemingly random marks and spaces where a change of output takes place. By locking the scope to that data line the other three can be checked against it and the digital conditions at the marked point where the comparator output alters can be established. In our case the comparator's output changed with different command inputs despite the data lines being in the same condition, i.e. the comparator was unable to differentiate between two different inputs.

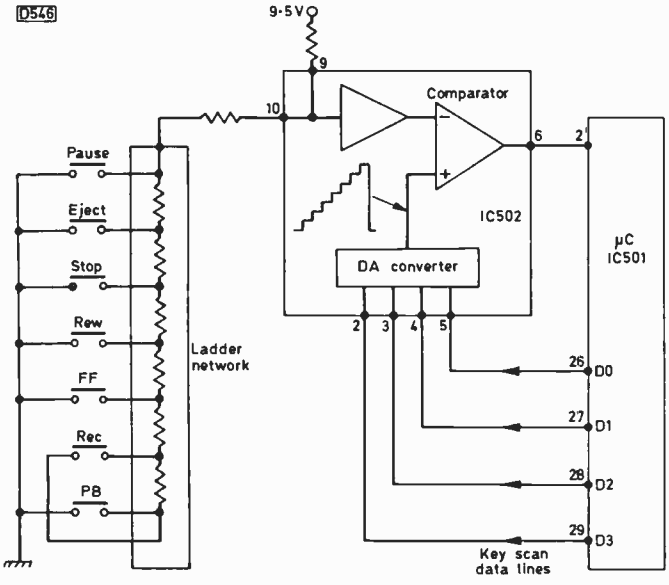


Fig. 1: Block diagram of the electronic function control system used in the Fisher FVH615. The arrangement is widely used in "electronic" VCRs.

Table 1: Function select conditions.

Function	*Key voltage*	*D3*	*D2*	*D1*	*D0*
Playback	3·8V	0	0	0	1
Record	3·49V	0	0	1	0
Fast forward	1·43V	1	0	0	1
Rewind	1·15V	1	0	1	0
Stop	863mV	1	0	1	1
Eject	296mV	1	1	0	1
Pause	11mV	1	1	1	0

Book Review

"A First Class Job!" – the biography of Frank Murphy, by Joan Long. Available at £5·95 per copy including post and packing from Mrs. Joan Long, 5c Weybourne Road, Sheringham, Norfolk, NR26 8HF.

Television readers who have long memories will be particularly interested in reading Joan Long's arresting memoir of her father, who founded Murphy Radio Ltd. in the early thirties. It will also appeal to those who take an interest in the history of radio generally, from the viewpoints of the customer, the dealer and those who work in the industry.

Frank Murphy was guided in business by the principle of giving value for money, and he used the firm he founded to practice what he preached. We learn with astonishment from Joan Long's book that his active involvement with the firm lasted for little more than six years, but in that short time he contrived to take the industry by the scruff of the neck and shake it from top to bottom. Not only were his radio sets of highly distinctive style, they were sold by dealers who had an unprecedented relationship with the factory and made by workers who in the mid-thirties had probably the best conditions in the industry. How Frank Murphy achieved all this makes fascinating reading, and Mrs. Long is to be congratulated on having produced a book that holds the reader's interest from start to finish – itself a first class job!

C.E.M.

Versatile Tube Tester-Booster

Alan Willcox

Although designed as a portable, battery-powered unit this tube tester-reactivator could as well be constructed as a workshop instrument operated from the bench power supply. It could also be built as a mains-powered unit, with the advantage that it requires only a low-voltage mains transformer instead of one with a high-voltage secondary winding and various heater tappings. A suitable transformer in this case would be one with a 9V, 1A secondary winding.

The heater supply provided by the unit is continuously variable between 0V and 12V. The boost voltage available is in the region of 450V. Use of a rechargeable 12V lead-acid battery to power the unit gives a maximum heater supply of 12V, which is useful for testing and boosting the tubes used in monochrome portables.

Circuit Description

Fig. 1 shows the circuit of the unit. We'll consider first the heater supply part of the circuit. A switch-mode system is used so that no power is wasted and no heat is created: transistor Tr1 is switched on and off by the variable pulse width input applied to its base. The 555 timer i.c. (IC1) is connected in the astable mode, the variable mark-space ratio of its output being set by VR1. Timing capacitor C1 is charged and discharged from output pin 3: charging is via D2 and discharge via D1, the ratio between the two being set by the position of VR1. When low, output pin 3 provides forward bias for Tr1. So the transistor's duty cycle and hence the average output voltage is proportional to VR1's position.

The high-voltage supply for tube boosting uses a similar arrangement, with the 555 timer chip IC2 driving Tr2. IC2 is again used in the astable mode but this time the mark-space ratio of the output is fixed at approximately 3:1. Tr2's collector current passes through the 0-12V windings of a small mains transformer. The phasing is arranged so that when Tr2 is switched off the collapsing field induces a high-voltage positive pulse in the 0-120V windings. This pulse is rectified by D3 with C3 and C4 as the reservoir capacitors, making sufficient current available for the boost process. Neon N1 serves as an indicator that this part of the circuit is working normally.

The voltage induced in T1's secondary winding is not simply a function of the turns ratio. This would be so only with a sinusoidal input, which would produce an output of about 120V. With a pulse input the output obtained is also a function of the duty cycle and frequency. Note that this circuit provides a high-impedance, low-current source. The current available for boosting is only that which has been stored relatively slowly in C3/4. Any attempt to draw a continuous current will simply reduce the voltage.

Meter M2 provides an indication of emission by measuring the control grid current when a 12V positive bias is applied. It's not claimed that this method is particularly accurate, but it does give a meaningful indication of emission and shows whether the boost process is providing any improvement. This method of estimating the emission was chosen because it requires only a three-wire connection to the tube, resulting in a considerable simplification in the wiring. Diode D4 isolates M2 when the boost voltage is applied.

Construction

The problem of different tube types and bases is an awkward one with home-constructed testers. It can mean the use of multicore cables and complicated switching. The approach adopted here is to use a three-wire cable with the beam switching appropriate to each tube type being carried out in a dedicated base box. Although a gun switch is required in each box this arrangement seems to be preferable in view of its simplicity and flexibility.

The minimum size case that will house the unit is about 200 × 125 × 75mm. A d.p.d.t. switch would enable a single meter movement to be used instead of two. If a more sensitive meter is used in the M2 position it's best to shunt it to read 5mA f.s.d. and stick to the value shown for R6. The heater supply meter M1 also enables the battery voltage to be monitored – at the maximum setting

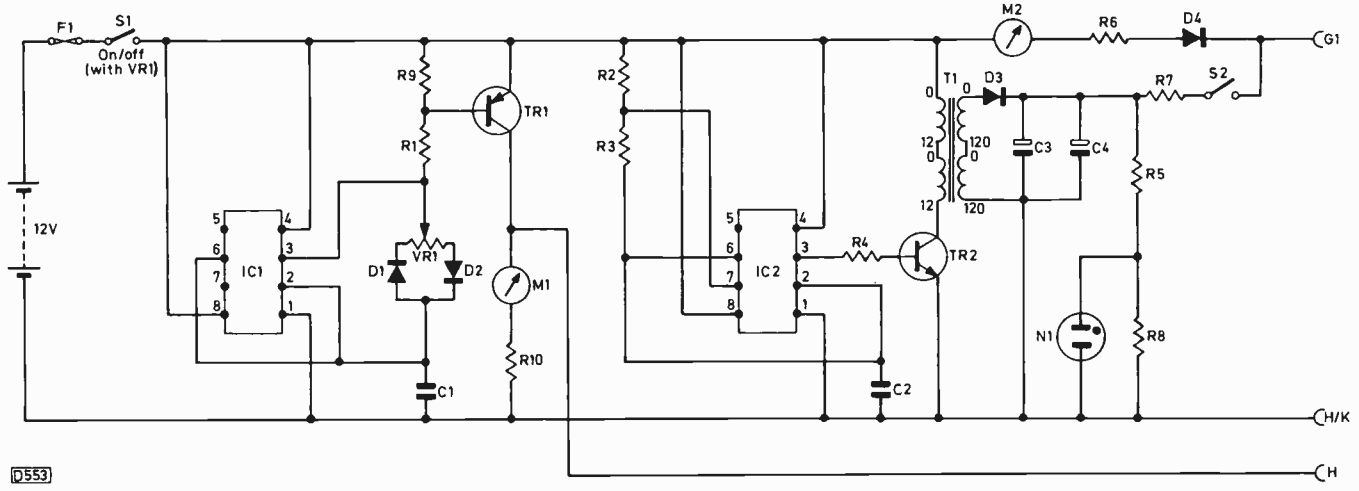


Fig. 1: Circuit diagram of the tube tester-booster.

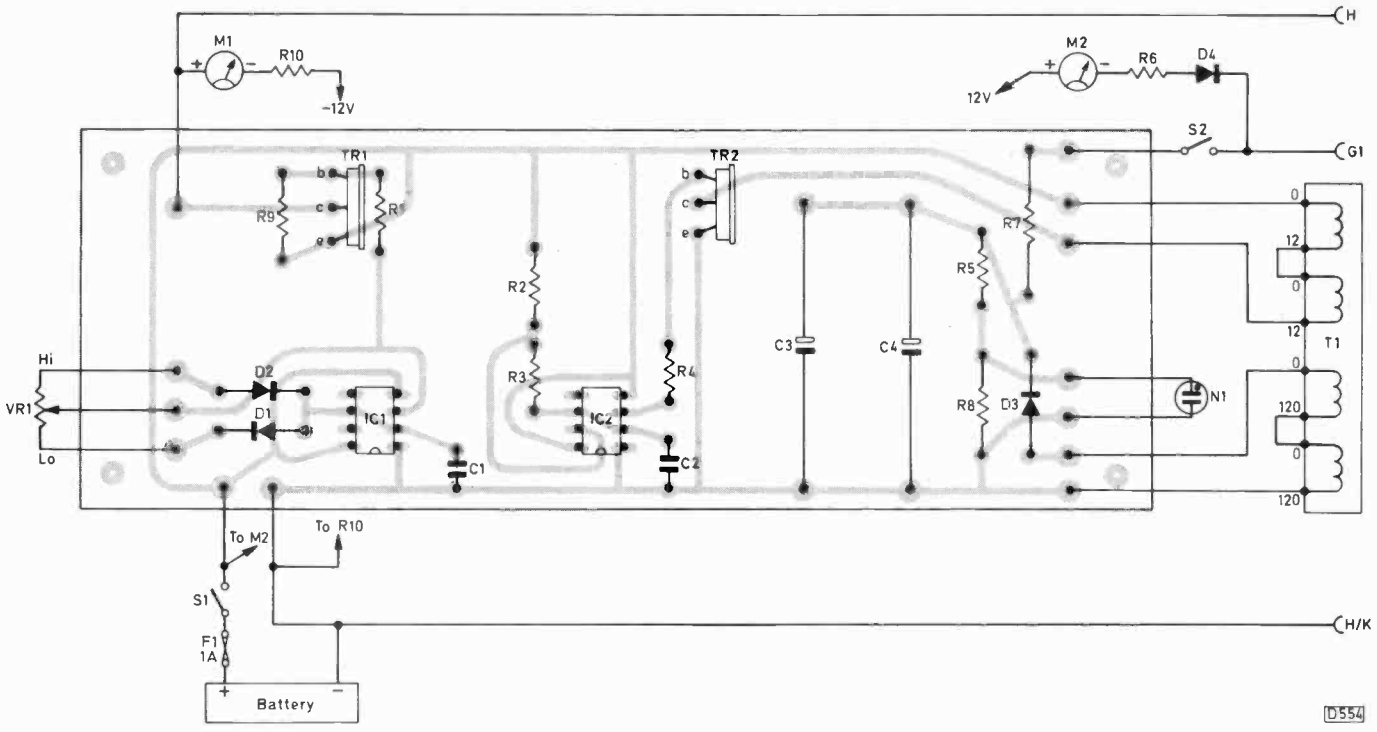


Fig. 2: Component layout.

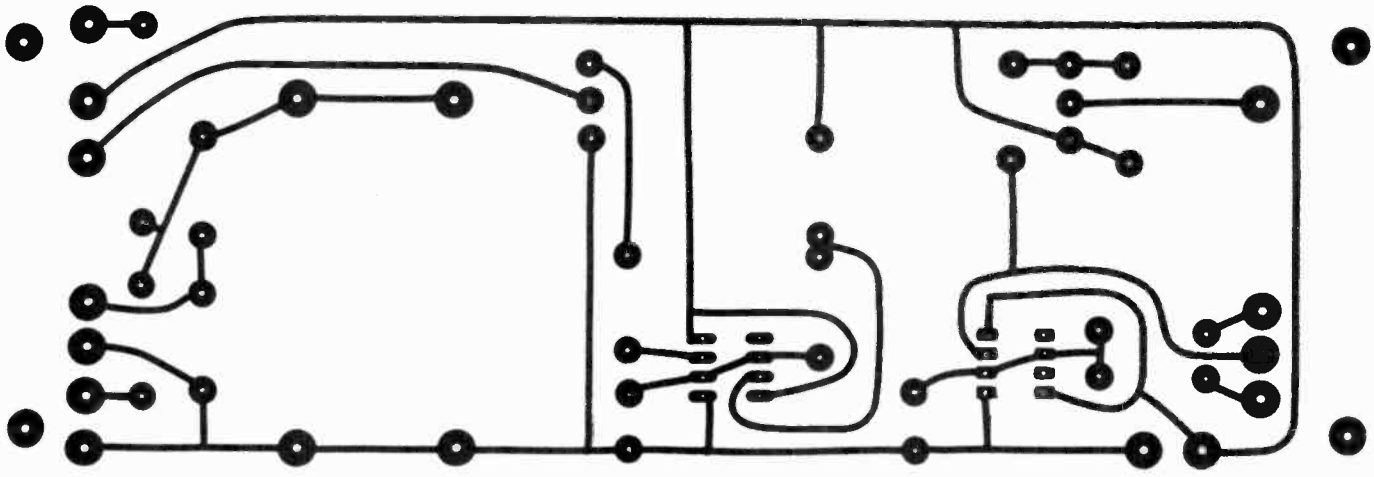


Fig. 3: PCB track pattern used in the prototype.

Components list

Resistors:
R1 100Ω, 1W
R2 18k, 0·5W
R3 6·8k, 0·5W
R4 100Ω, 1W
R5 1M, 0·5W
R6 1·5k, 0·5W
R7 1k, 5W W.W.
R8 820k, 0·5W
R9 100Ω, 0·5W
R10 See below
VR1 47k lin.*
*With switch

Capacitors:
C1,2 100n, min 63V
C3,4 33μF, 450V

Semiconductor devices:
D1,2 1N4148 or equivalent
D3 BY299
D4 BY298 or h.t. rectifier type
Tr1 BD204
Tr2 BD203
IC1,2 555

Miscellaneous:
M1 1mA (R10 12k) or 100μA (R10 120k)
M2 5mA
N1 Mains neon
F1 1A
T1 Ampmace Ltd. miniature 12V, 6VA transformer
Battery Yuasa 12V 1·9Ah (Maplin XG74R)

of VR1 the heater voltage equals the battery voltage.

Since both transistors are cool in normal use neither requires a heatsink. The frequency and duty cycle of the boost drive were chosen to suit the transformer specified.

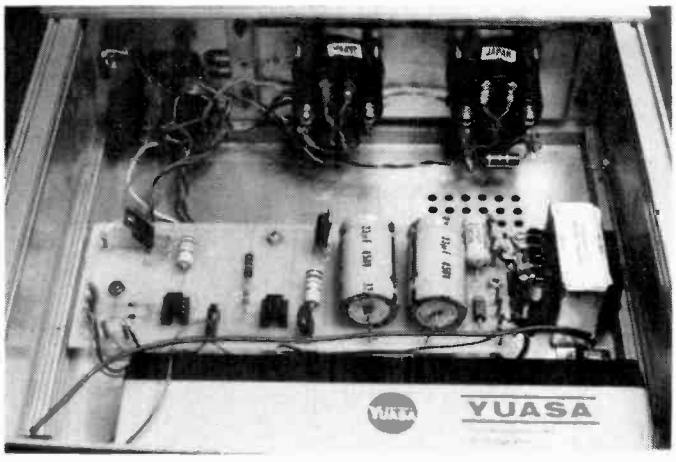


Photo showing the internal construction.

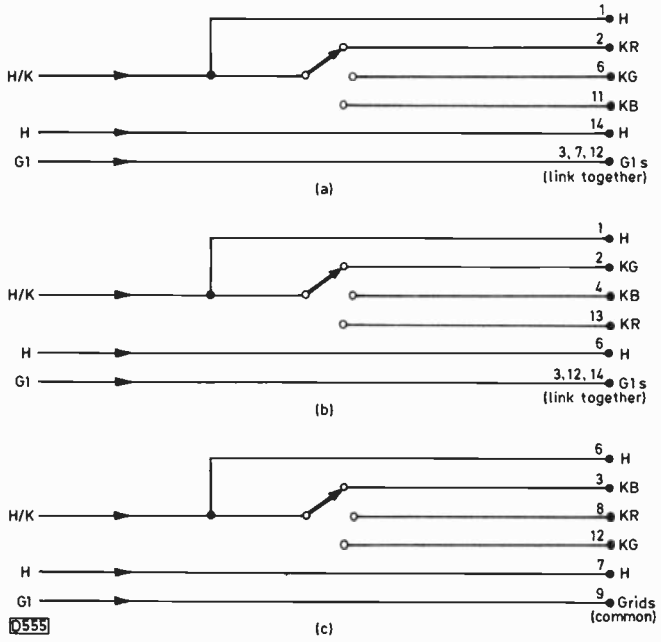


Fig. 4: Common c.r.t. base connections. (a) Delta-gun tube. (b) 20AX tube. (c) PIL tube.

if an alternative is used it might be necessary to experiment with the values of R2 and R3. If the boost voltage obtained is very low, reverse the connections to one of the windings. Rectifier D3 must be a BY299 – a BY298 will break down and limit the boost voltage though it will not be destroyed. Two BY298s in series seem to work o.k. As far as the boost switch is concerned, if like me you're lazy and don't bother to discharge the e.h.t. on a tube before testing I recommend a flick type switch with a long lever! Quarter inch jack plugs and sockets were used for the interconnections between the unit and the various bases.

C.R.T. base panels taken from scrapped sets were used to construct the bases. They were cut to size for use as the lid of a suitable box. For unusual tube types a lead with small spring clips to attach directly to the c.r.t. pins was made up. If you do this make sure you don't short the heater connections since Tr1 will overheat in this situation.

A faint whistle should be heard from T1 when the unit is first switched on. This whistle varies somewhat as C3/4 charge. It takes a few seconds for the boost supply to reach about 400V – with a fully charged battery it should finally settle at around 450V. As previously mentioned the heater voltage should be continuously variable over the range 0-12V, the upper limit being the battery voltage.

Use

For tube boosting best results are obtained when the heater supply is increased by some fifty per cent before the application of boost. The value of R7, which sets the discharge time of C3/4 when boost is applied, was experimented with on tubes in different conditions. Quite a low value was used first but best results were obtained with R7 about 1kΩ. The battery can be charged from a 13·8V power supply or from a car battery: a car battery charger should not be used.

The Computer as an Aid to Servicing

Chas E. Miller

Vivian Capel's article on word processors (December 1986) gave a valuable insight into this extremely useful piece of equipment. If you have to do a lot of office work that involves letter writing the word processor offers enormous advantages – it could be said that its superiority over a conventional typewriter is on a par with that of the latter over a quill pen! Once you've used one for a time and have mastered the techniques involved you'll wonder how on earth you managed before. It really is that good.

As a matter of interest this article was composed using a word processing program that enabled me to select in advance the spacing of the lines on the finished document and to centre the titles simply by pressing the appropriate keys. After that, if I wish to make any changes, correct errors, etc. as I go along, or even after I've completed the first draft, I can do so simply by pressing other keys and typing in the new bits or moving other bits around.

Before you rush out and buy a word processor however it will pay you to consider whether you want to do more than that one type of job in your office. A dedicated processor will do only that, hence the adjective. A personal computer on the other hand can tackle word processing as just one of many tasks, some of which can be of equal if not greater use to the service engineer.

One of the chores that anyone concerned with repairs has to perform is to file wads of servicing information that usually takes up a great deal of shelf space and becomes ever increasingly difficult to sort through when a particular document is required. One can obviously make a rough and ready index by simply using a notebook with alphabetical markings, and I'd be the first to agree that if you don't have to consult many different manuals this is sufficient and cheap. On the other hand when you have to refer to all sorts of information frequently and in depth the notebook system is tedious and time consuming. You can even end up with a number of notebooks that themselves need to be indexed! In this case a computer data system is of tremendous assistance. One microdisc will hold vast amounts of information that would require rows of notebooks: moreover any item required can be selected and displayed within seconds.

One of the best-known data recording programs is dBase II. It will enable you to file information on all your service sheets in an extremely useful form and is available from software specialists for a wide range of personal computers. As with any program, it's worth studying the operating system in detail if maximum benefit is to be obtained, but here's a general guide to how dBase II works.

When you enter the program you'll receive a prompt sign on the screen. This is simply a full stop, so watch out! If you want to create a file you now type in "create". The computer will then ask you for a file name, which must not exceed eight characters. You could decide on something like "TVDATA" or "TVSHEETS". If you have a dual-drive computer it's best to have the file on a separate disc in the B drive – so that the program disc doesn't get cluttered up with information. In this case the full file name would be "B:TVDATA". You are next asked to decide on the way in which the information is to be stored

– the program refers to this as its record structure. Each record is made up of a number of "fields": there may be up to 32 fields for any one record, but in practice you probably won't need to use anywhere near this number.

Each field has its own number and is made up from four pieces of information called NAME, TYPE, WIDTH and DECIMAL PLACES. NAME is easy enough to understand, but the others require some explanation. We are restricted to ten characters for all field names, but this will be ample for most purposes. An obvious choice for the first field would be the name of a receiver manufacturer. So NAME would be entered as MAKER. TYPE refers to whether the NAME is made up of just numbers or a mixture of numbers and letters. If the first (unlikely in this case) one enters "n", if the second "c".

WIDTH means how many characters will be required to list the information. For this we need to know the longest manufacturer's name. Mitsubishi for example has ten characters: to be on the safe side we might opt for a length of fifteen characters, which ought to be sufficient for any setmaker's name. DECIMAL PLACES is mainly required when prices are to be included in the record. Since they won't exceed two (e.g. £155.95) this is the number to enter. If no decimal places are required you simply cancel them by making a carriage return or enter after WIDTH.

For the second field we would probably choose a receiver model number or chassis type number. So we would enter NAME as MODEL. If all model numbers consisted of numbers only we would use "n" for TYPE, but since in a lot of cases there are numbers and letters (e.g. G8) we enter "c". Few model numbers are very long so we might restrict the width to perhaps eight or ten characters.

The third field would contain whatever is the next most important piece of information for the user. It might for example be the location of the service manual. In this case NAME would be LOCATION. Where do you keep your manuals? If you have several box files you might designate these A, B, C etc. The same could be applied to individual shelves of a book case. Thus TYPE would be "c". Had you decided to number the files or shelves TYPE would be "n". Unless you have an extraordinarily large private library WIDTH won't have to be more than three.

As already mentioned we can go on adding fields up to the maximum of 32, but let's assume that the three just given are sufficient for our needs. The full procedure in commencing the file would, after receiving prompt, be as follows:

```
.create
ENTER FILENAME: b:TVDATA
ENTER RECORD STRUCTURE AS FOLLOWS:
FIELD NAME, TYPE, WIDTH, DECIMAL PLACES

001     Maker,c,15 (CR)
002     Model,c,10 (CR)
003     Location,c, (CR)
004     (CR)
```

As a working example of a record let's assume that we are entering details of a good oldie, the Philips G8 chassis, kept in box file B:

```
001     Philips (CR)
002     G8 (CR)
003     B (CR)
```

And that's all there is to it! The data is recorded and the screen clears ready for the next entry. You can continue to file information for a long time since the individual records absorb only 29 characters (no not 28: an extra one is used for storage purposes) and the disc might be capable of handling about 360,000. Not all of these will be available for records, especially if you are going to include indexing facilities, but the potential is still huge.

How indexing is carried out will have to await a further article, but we can give a general idea. Briefly, indexes can be created for any or all the fields, that is in our example setmakers, models and locations. Thus in seeking the Philips G8 we could ask for Philips models to be displayed and could have them all shown on the screen, after which we could select the one we want and from the record ascertain where data for it is to be found. Generally however we can go straight to the model index.

So far we've gone to some length to achieve what might have been done using a notebook, but we have scratched only the surface of what can be achieved with dBase II. We could for example ask to be shown all the service manuals kept in file B, which is almost impossible with the notebook method. And a little thought will show that we can extend the range of the records to include a lot of useful information that will in many cases save us actually having to refer to the manual. For example we might want to make a note of line output transistor and tripler types, the value of the surge limiting/h.t. smoothing resistor and so on. We can have instant access to this information by creating fields called Loptrans,c,6, Tripler,c,12 and Surgelim,c,20. These might be entered as follows:

```
004     2 × BU105
005     218 27109
006     2R2 + 6R
```

Clearly the records could be expanded to include all we need to know without our having to look at the circuit diagram, thus saving a great deal of time.

If we set up another file to control stock-keeping it becomes possible to check instantly whether the required component is in stock. Since we can use the setmaker's actual part numbers in the records ordering spares is greatly simplified. The cost can be put on record too.

We've now come a long way from the notebook stage, but there's more to it yet. Because we can use any of the fields as the basis for an index we could for example ask for a display of all the models using a particular tripler or transistor. This sort of thing could be of great help if we need to rob another set for an obsolete part: anyone running an operation that to any extent calls for cannibalisation is clearly going to find this facility very useful. Another of the items that suggests itself for indexing is the c.r.t. type.

Anyone wishing to keep customer records will find dBase II ideal. Fields covering the customer's name, type of set, date bought/hired and servicing record can be set up with ease. (Ike Hodge would probably include such invaluable data as the customer's likely bank balance and daughter's vital statistics, but not a word to my wife about that!) Expiry dates for rental agreements and so on are other candidates for records. And we're still only scratching the surface!

In a following article we'll take a closer look at how indexing is accomplished. We'll also examine some other software that will make life easier for the TV service engineer.

Teletopics

DBS FRANCHISE AWARDED

The IBA has awarded the UK satellite TV broadcasting franchise to British Satellite Broadcasting, a consortium consisting of the Granada and Anglia Television groups, Pearson plc (a holding company whose interests range from information and entertainment, including the *Financial Times,* Penguin Books, Goldcrest Films and Yorkshire Television, to oil, china and investment banking), Amstrad Consumer Electronics and the Virgin Group. BSB plans to provide four programme services, Now, Screen, Disney and Galaxy, on the three satellite channels available. Now will be an advertisement supported news channel, featuring extensive live coverage, transmitted for eight-ten hours a day. Screen is to be a subscription service devoted entirely to feature films: BSB plans to stimulate the production of at least twelve new feature films a year. Disney will have some advertising and will provide a family service for those at home during the day, while Galaxy will be an advertisement supported channel consisting of pure entertainment.

BSB intends to raise between £500m and £600m to get the services started and hopes to commence broadcasting in late 1990 – the franchise lasts for fifteen years. It expects to reach some 400,000 viewers during the first year of operation, eventually extending to half the homes in the UK, but does not expect to break even until three-four years into the service. If BSB succeeds in gaining an audience of this size in the time scale envisaged the take-off will be much faster than with colour in the early seventies and VCRs in the late seventies. One key to achieving an audience of this magnitude will be the provision of receiving equipment at a moderate cost: Amstrad will play a key role here and expects to have equipment on sale at less than £200 including VAT.

The BSB group has so far committed £80m to the project and has underwritten a further £120m. It hopes to attract other investors in raising the additional £300 or so required. £100m will be spent on programmes during the first year of operation. It's conceded that the risks are high, but rapid growth of profits is expected after the first three-four years of operation. The IBA estimates that the project could create up to 25,000 jobs over the next five years.

The charge for the subscription film service is expected to be about £2·50 a month. This service will share the same channel as the Disney family programme.

OTHER DBS DEVELOPMENTS

The UK's largest independent television company, Thames Television, intends to take a five per cent equity stake, with an option for a further five per cent, in SES, the Luxembourg company which plans to launch a medium-power, sixteen channel TV satellite (Astra) whose service area will cover most of Western Europe. The five per cent stake will cost Thames £3·7m. Astra is expected to be launched in 1988 and SES will be leasing out the channels, at least five of which are expected to carry English-language programming. Thames is considering taking one of the channels and it's understood that Robert Maxwell's Mirror Group has put forward a proposal to lease three channels. Reception of Astra should be possible using an 85cm dish. SES is funded mainly by Luxembourg, Belgian and W. German banks: £65m has so far been committed to the project, which is expected to cost around £125m.

Thames Television has withdrawn from the £40m Super Channel project which is intended to provide a UK originated service for W. European cable TV operators via satellite transmission.

The legal aspects of satellite TV broadcasting in W. Europe were considered by ministers from the 21 nations of the Council of Europe at a recent meeting in Vienna. A convention covering trans-frontier broadcasting was approved and is to be put to individual governments for ratification. This process is likely to take a couple of years. The Council of Europe was set up in 1949: moves to use it to provide a framework for European satellite broadcasting are seen as an alternative to EEC efforts to control European broadcasting.

The Irish government has awarded a licence to Atlantic Satellite, which is eighty per cent owned by the US concern Hughes Communications, to provide an Irish satellite TV service. Launch of a satellite is expected to be in 1990 and the footprint would cover the UK.

The Europa satellite/cable TV channel, which provided a mixture of news, sport and general programmes as a public service, has been closed down. Facilities for broadcasting were provided by the Dutch broadcasting organisation NOS which claims it was owed some £20m. Europa was run by a five country consortium (Ireland, W. Germany, Italy, Holland and Portugal) and had been in operation since October 1985.

SATELLITE TV RECEIVING EQUIPMENT

A new range of satellite receiver units aimed at the domestic market has been introduced by Megasat Ltd. (5, St. Pancras Commercial Centre, Pratt Street, London NW1 0BY. The XX3R is described as a budget system which nevertheless uses a low-noise LNB and a low-threshold receiver. It's unmotorised in its standard form but a motor package in matching case is available as an optional extra. The XX3RI is motorised and features remote control of all functions. The XX3G is the most sophisticated unit, offering extra features such as automatic de-emphasis selection, automatic skew adjustment, and narrow-band stereo sound selection with dynamic noise reduction.

NEC's latest satellite TV receiver unit, Model 2022, is understood to be able to handle MAC encoded signals. It's sold with a motorised 1·5m dish for £1,565 including VAT but not installation. An alternative 1·8m petal dish brings the price to £1,653. Further details can be obtained from NEC Home Electronics Division, Oval Road, London NW1 7EA.

TV DEVELOPMENTS

Several receivers now on the market incorporate colour transient improvement (CTI). The technique makes use of the Mullard TDA4560 chip which was described in our May 1985 issue (page 390). Basically, differentiation and integration are used to sharpen the slope of the demodulated colour-difference signals. This introduces a signal delay, so the the luminance signal has to be delayed to a corresponding extent – the chip incorporates a gyrator delay line that's used for this purpose. The net result of this extra signal processing is to improve the fit of the luminance and chrominance signals. Six models in the current Grundig range incorporate this feature. Amongst

other sets using CTI are ITT's 20in. Model CT3327 and 14in. Model CP3126.

A project costing £3·5m has been started in the UK to develop a large-screen liquid-crystal display for TV use, initially in a monochrome version. It's expected to last three years and is being run by STC Technology in conjunction with Thorn-EMI, BDH Chemicals, Hull University and the Royal Signals and Radar Establishment. The display will make use of a faster-operating type of liquid crystal and is being partially funded by government money. A colour version is said to pose no great problems.

Seiko Epson in Japan is understood to be working on a projection TV system that uses three LCDs as light valves. The light source is a specially developed 300W halogen bulb and a special optical system has been developed for the projector.

CD SEMINAR

The Society of Electronic and Radio Technicians is to hold a one-day seminar on compact disc systems at the Royal Institution, London on March 18th. Details can be obtained from the Society at 57/61 Newington Causeway, London SE1 6BL (01-403 2351).

TV SPARES

Wizard Distributors of Empress Street Works, Empress Street, Manchester M16 9EW (061 872 5438), who have been an appointed Spares Distributor for Fidelity for two years, will continue to stock and distribute their parts following the recent reorganisation of Fidelity's Spares Department. The full range of parts is available along with components for a wide range of other UK and Japanese brands – catalogues showing the full range, plus many other items, are available on request. SEME Ltd. of Units 2E and 2F, Saxby Road Industrial Estate, Melton Mowbray, Leicestershire LE13 1BS (066 465 392) have also been appointed official spares stockists for Fidelity.

An interesting article in a recent issue of *Electrical and Radio Trader*, describing work undertaken by Tech Semco, threw light on some current problems in the servicing industry – problems that seem likely to get worse. In the past Tech Semco has mainly provided a servicing back-up operation for importers. Tech Semco's chairman Lee Marks commented that this work is decreasing as importers are being cut out and more and more retail organisations are importing equipment directly. His firm is increasingly dealing with such retailers and with foreign manufacturers who have only a sales office in the UK. He warns that in many cases he's come across provision for spares and servicing is being cut back to unacceptable levels. It seems that we are going to encounter ever more of those obscure sets of uncertain origin for which spares sources don't seem to exist.

Mastercare has recently invested £3m on a modernisation programme and is to open several new branches around the country. The spares operation is being computerised and a new purpose-built head office is being built at Hemel Hempstead.

THORN TX10 CHASSIS TIP

The latest issue of *Ferguson Feedback* contains a helpful piece of advice for those experiencing problems with the TX10 chassis. It seems that R813 (121kΩ) is inclined to change value. This resistor is in a crucial position, providing the feedback between the h.t. supply and the chopper control circuit. Symptoms attributable to R813 include line tearing (may be intermittent), field roll, tripping, an arcing noise, high h.t., low h.t. (yes, both!) and destruction of the chopper transistor TR701. *Feedback* comments "when in doubt, check R813"!

AIDS

The Department of Employment and the Health and Safety Executive have issued a booklet, entitled "AIDS and Employment", giving guidance on AIDS as it affects the normal work environment. Copies are available from AIDS and Employment, The Mailing House, Leeland Road, London W13 9HL. It's emphasized that all those responsible for employing others should be familiar with the facts.

CORDLESS PHONES

DXers and others have long complained about the problems caused by cordless phones that operate over excessive distances. At last the Department of Trade and Industry is to take action. An order has been laid before the Commons making it a criminal offence to import, manufacture, sell or use cordless phones with a range of greater than 100 yards. Action has apparently been prompted by the fact that such phones have interfered with emergency services and marine telecommunications. The problem remains that large quantities of these phones have been sold (it has previously been an offence to use but not to sell such equipment), but at least it's a step in the right direction. Why did it take so long?

VIDEO NEWS

Two additions have been made to the Ferguson Videostar range of VCRs. Both incorporate the HQ system of enhanced picture quality and have been designed to provide remote control of the VCR and TV receiver from the same handset (the TV section of these remote control units is designed for use with Ferguson TV sets to be released later this year). The 3V57 supersedes the 3V54 and has a suggested price of £380; the 3V58 at a suggested price of £550 incorporates extra features including hi-fi stereo sound and a "go-to" facility to locate any point on the tape quickly. Ferguson point out that all their VCRs now incorporate HQ circuitry.

Thorn has announced that its associated company J2T, a joint venture with JVC and Thomson of France, is to acquire the VCR deck making Thomson subsidiary Steli which is located at Tonnerre, France. This will for the first time give J2T the facility to manufacture decks as well as the other sections of their VCR products. J2T will now have plants at Newhaven, Berlin and Tonnerre.

Two new VCRs have been released by JVC, the HRD370 at £600 and the HRD755 at £850. The later is, as its price suggests, a full-feature machine and is said to have "improved HQ circuitry".

Models featuring HQ circuitry have recently been added to the Fisher, ITT and Sharp ranges.

IN BRIEF

Channel 4 is planning to start a breakfast TV programme in October 1988. The two-hour programme will concentrate on business and international news . . . Philips has announced that the United States Philips Trust has been terminated, the assets reverting to N.V. Philips' ownership. The trust was originally established in 1939 to protect Philips' US assets from seizure. . . . The second

Broadcast trade fair is to be held at Frankfurt on October 14-17th. It's planned to hold the fair, which caters for professionals in the film/radio/TV/video fields, biennially in future . . . The South Korean videotape manufacturer Saehan Media is to establish production facilities in Sligo, Ireland. The plant will employ 800 people within two years and will supply markets in Europe, Africa and the middle east . . . Standard Elektrik Lorenz (SEL) of W. Germany is to establish a joint venture with Skala-Co-op in Hungary to produce ITT colour TV sets and VCRs for the E. European market . . . Philips is to establish a joint-venture operation in the People's Republic of China to produce colour tubes – production is expected to exceed half a million tubes a year. Further agreements covering the production of TV sets, VCRs and components are expected to follow.

VCR Clinic

Reports from Derek Snelling, Les Grogan, Philip Blundell, Eng. Tech., Eugene Trundle, Mick Dutton, Nick Beer, John Coombes and William G. Lockitt, Eng. Tech.

Philips VHS Machines

We are at present handling large numbers of Philips VHS machines that appear under various guises, e.g. the Philips VR6462, Pye DV464, Finlux VR1010 and Tatung VR8490. These are all basically the same VCR with minor differences such as remote control as standard or optional, reverse play or slow motion, etc. Several common faults have come to light.

The first may be described as no rewind, or no fast forward, or tape tangling, or intermittent play or jams. The cause is the brake solenoid sticking. A spot of oil may provide a temporary cure but replacement is required. If you are uncertain as to whether the solenoid is the cause of the problem, select rewind then fast forward without a tape in the machine. Repeat several times. During the change from one direction to the other a distinct click should be heard as the brakes operate. If you don't hear it the solenoid is at fault.

Another fault that can give rise to similar complaints is the idler wheel slipping. In this case the clicking will be heard during direction change. Cleaning the idler wheel doesn't seem to be too successful and replacement is recommended.

We have had three cases of clock failure with the display showing such things as 80.00 hours. In each case the TMS3763-28 clock chip was responsible.

If you ever need to remove a head from one of these machines don't do so unless you have a new head in stock – the replacement heads come with a couple of mica spacers that are needed to set the air gap between the head and the lower drum assembly when refitting the head. Luckily these spacers can be reused.

I've previously mentioned the no eject fault where a lever falls apart (see page 382, April 1986). It has since become apparent that replacement of the lever is necessary for a reliable repair. Whilst considering this area, we've had a couple of cases where the other lever operated from this cam has come adrift. Nothing breaks, it just comes out of the groove in the cam. The symptom in this event is that the pinch roller doesn't operate correctly. Refitting and a spot of graphite grease cures the problem.

We've had several cases of the cassette flap breaking at the hinge or the lever that operates it breaking. The cause is as yet unknown but replacing the damaged part seems to provide a lasting cure.

Finally I had an interesting fault that led me a merry dance on one of these machines. The problem was that half the front controls wouldn't operate, including the number pad. As the job was urgent the front panel, which appeared to be responsible, was replaced with a stock one and put aside for later attention. A few days later I investigated the fault more thoroughly. The faulty buttons were all connected to the same two data lines, and a scope check showed that whenever a button connected to these lines was pressed the same waveform appeared on both lines. Easy – a short between the two lines. But a bench check on the panel revealed no measurable short. Much time was then spent checking every component on the board, to no avail. Other pressing matters then had to be seen to and a colleague took over. About half an hour later he had found the cause of the problem. My original diagnosis had been correct: there was a short between the two data lines. What I hadn't realised was that when I originally swapped the front panel over I'd unplugged one of the leads at the main board end, but when checking the panel on the bench I had unplugged it at the panel end, thus failing to check the lead from the faulty machine. The cause of the trouble turned out to be a short-circuit between two adjacent pins in one of the plugs. The strange thing was that the machine worked perfectly for two months before the fault showed up. **D.S.**

JVC HRD120/Ferguson 3V35

The complaint with this machine was no functions and inability to set the clock. The "all 9V" supply was present at the input to the mechacon board: it feeds regulator circuit Q205/D205 which produces the 5V supply for the microcomputer chip. The 9V supply was not present at the regulator however – because fusible link CP2 was open-circuit. This link, which looks like a two-legged transistor, is not shown on the circuit diagram. **L.G.**

Philips VR6460

Before replacing the aerial amplifier/r.f. modulator module when the complaint is snowy EE and off-air TV pictures check that the 12V supply to the unit is present and correct. In one case we found that the 12V regulator chip IC7002 was faulty. **L.G.**

Sharp VC9700

When changing the clock chip I5002 in this machine it's wise to remove the back-up supply capacitor C5007 as well as taking the usual static precautions to prevent damaging the new i.c. For a too bright clock display check whether D6603 is short-circuit. **P.B.**

Finlux VR1010/Philips VR6462

If you encounter one of these machines with the head drum spinning way too fast check the waveform at 3D14.

It will probably be missing. If so check the voltages at the spindle side of the head drum optocoupler – you should find 4V and 2·5V here. If the readings are 12V and 0V the LED is open-circuit. If there's 12V on both pins the cassette LED is open-circuit – the two LEDs are connected in series. **P.B.**

Panasonic Aerial Amplifiers

Like many dealers we see quite a few of the earlier Panasonic machines with low-gain aerial amplifiers. As long as EE operation is o.k., replacing Q3 usually does the trick. **P.B.**

Sony SLC9

We've now had three of these machines with no off-air signals and no lights in the fluorescent display panels. In each case the cause of the trouble was failure of the d.c.-d.c. convertor (type CD-09) on power supply unit board D. This supplies the filament and operating voltages for the display panel and a 38·5V output which is the source of the varicap tuning voltage. Although the manual gives the circuit diagram the soldered sardine-can construction of this little module defied my efforts to get inside to repair it. The replacement (part no. 1-608-212-11) is expensive but the type supplied looks different – it has probably been modified to provide greater reliability.

We are now experiencing an epidemic of cracked loading gear pulleys on these machines. This causes very noisy lacing and unlacing. **E.T.**

Hitachi VT63/4/5

It seems that certain production runs of these machines incorporated a batch of contaminated tape-end sensor transistors. Because this VCR design features an unusual tie-up between the end-sensors and the loading mechanism, via the syscon, misleading symptoms arise when the phototransistors leak – as they commonly do. The symptoms vary from immediate ejection of the proffered tape to what appears to be a mechanical jamming effect of the front-loading mechanism. It's easily checked (once you know!) by measuring the voltages at pins 6 and 7 of PG904 with no tape in the machine. If the voltage at either pin reads less than 9·5V replace *both* sensors. They have different part numbers: one 5381681 and one 5381682 make a pair. **E.T.**

Hitachi VT39EM

The problem with this machine was low recorded and E-E sound. Playback was o.k. It seemed likely that the fault was in the i.f. strip. We were lucky since this machine has a dual i.f. strip, for use with 5·5MHz sound. Comparing the voltages in the two units revealed that output pin 5 of IC803 (AA313) in the faulty strip was low at 6V instead of 10·3V. Replacing this chip put matters right. **M.D.**

Sharp VC387

Only the clock worked on this machine. We soon found that there was no 9V supply to the microcomputer chip because the little black fuse in the supply line had gone open-circuit. Replacing this brought some life back to the machine but there was no drum rotation. This time the little fuse in the 14V supply was found to be open-circuit. Much confusion was caused by the fact that these fuses aren't shown in the circuit. We had to trace the printed tracks across several panels. **M.D.**

Ferguson 3V30

Every now and again this machine would die, leaving just snow on the screen. A gentle tap anywhere on the top would restore operation. The problem was caused by dry-joints on the regulator transistor Q101. **M.D.**

Sony SLC9

No clock display on this machine was caused by the d.c.-d.c. converter module in the power supply – it provides −26V and 3·5V a.c. supplies for the filament in the display. **M.D.**

Ferguson 3V22

Inability to set the drum speed in one of these machines was traced to a break in the print to the wiper of the drum discriminator control. In another machine a varying capstan speed effect was caused by the plastic flywheel support rising up the capstan slightly. **N.B.**

Sanyo VTC5000

Tape looping with these machines can be caused by a faulty reel motor or belt, but this problem occurs on loading or unloading. When the looping occurs on cassette ejection check the back spacing. If there's over rotation, suspect the rubber brakes. Cleaning and resetting should cure the problem. **J.C.**

Sharp VC9300

This machine wouldn't accept a cassette. It was a simple fault: the cassette-in switch was broken in half. This can be seen and removal of the cassette housing will soon put matters right. **J.C.**

Ferguson 3V45/JVC HRD140/Toshiba V65

In the event of no "on" or drum rotation, with the standby light on, check whether the switched 5V line is missing due to safety component CP4 being open-circuit. **J.C.**

Sanyo VTC5150

The problem with this machine was a faint vertical line down the screen. It was cured by repositioning the grey lead (JW18) between the two delay lines. **J.C.**

Sony SLC5/7

If the sound is o.k. with a prerecorded tape but there's no E-E or recorded sound check the voltages around the TDA120UB sound i.f. chip. If there's no voltage at pin 14 the chip is faulty – pin 14 gets its voltage via an internal resistor. **W.G.L.**

Sony SLC6

In the event of no capstan motor rotation check the drive from transistor Q022. If necessary check the capstan servo i.c. (CX143A) on the system control panel. If the 12V supply is high check regulator IC001 (STK5314) on panel TP16. **W.G.L.**

Sony KV1810 GCS Conversion

Colin Boggis

Our local sadist offered me a pair of Sony KV1810UB colour receivers. Not being a faint hearted fellow, and feeling in need of a challenge, I parted up with a few readies and took delivery of the twins. I couldn't help noticing how happy my benefactor looked as he drove smartly away.

The two sets were in pristine condition externally but when the cases were opened I was in both sets confronted by atomised 2·5A mains fuses (F601). This suggested that my worst fears were about to be confirmed. A quick check with an Avo proved that as expected the chopper and line output gate-controlled switches were short-circuit. These sets really do live up to their reputation!

Now the cost of these devices is very high, and there's every likelihood that they will blow again at switch on or shortly afterwards – especially if there are other faults. A cheaper and more reliable solution is to modify the set to use transistors in both the chopper and line output stages. I claim no originality for this idea – in fact there was a detailed article on he subject in the December 1984 issue of this magazine, and it provided me with some ideas on the subject. I've made some improvements however: with the modifications to be described the chopper driver transformer doesn't have to be replaced and use is made of a low-cost, home-made driver transformer in the line timebase. Following these modifications the two sets have been in use for many months and have behaved impeccably.

It goes without saying that before undertaking any work the c.r.t. should be tested. It's also essential to have access to a variac, a 19V d.c. power supply and an oscilloscope. It's wise to use an isolating transformer to supply the set being worked on: if one is not available be very, very careful.

Getting Under Way

The first job is to remove the two faulty GCSs, the line driver transistor and transformer and the various small components not required (see Figs. 1, 3 and 4).

Remove the chopper heatsink from board PR and the large aluminium panel attached to board VH. Take the chopper driver transformer from the board and fit to it the copper heatsink attached to the line driver transformer: it will be necessary to bend down the tallest limb to avoid it fouling on the capacitors mounted below the high-voltage module on the main chassis.

The chopper heatsink should be redrilled, using a TO3 washer as a template, to accept a BU526A transistor. It's advisable to beef up the heatsink with an extra piece of aluminium. Drill holes in the PCB to provide clearance for the transistor connections. Drill the large panel from board VH to take another TO3 transistor (BU208A): the chosen site for this is directly adjacent to the legend "horiz. out", above the site of the original GCS.

Modified Chopper Circuit

The modified chopper circuit is shown in Fig. 2. Diodes D1001-3 and resistor R1001 can be mounted on the board using holes vacated by unwanted components. Mount R1000 between the existing resistors R607 and R610. There are two pins that are ideal for this on the print side of the board – note that it's necessary to cut the track that joins these pins. It's most important to disconnect C606's positive lead from R610 and reconnect it to the junction of R607/R1000. If this is not done and the crowbar circuit suggested later is incorporated there's nothing to limit the instantaneous current that could flow through the crowbar thyristor. Disconnect R608 from the input side of R607 and reconnect it to the junction of R610/R1000. This ensures that the start-up circuit is protected in the event of R607 or R1000 going open-circuit.

Modified Line Drive Circuit

The modified line drive circuit is shown in Fig. 5. Apart from the mechanical modifications the most difficult item in the line timebase is the new driver transformer. This is wound on a Mullard FX2242 pot core, though a ready-made component can be used if preferred. For the home-brew transformer, first wind on 17 turns of 19 gauge enamelled copper wire, followed by a turn of insulation, then wind on 66 turns of 24 gauge wire and finish off with another turn of insulation. This transformer can be mounted on the large aluminium panel above the site of

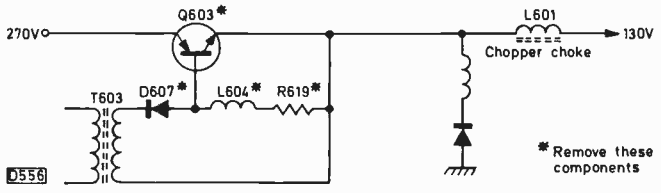


Fig. 1: Original chopper drive circuit.

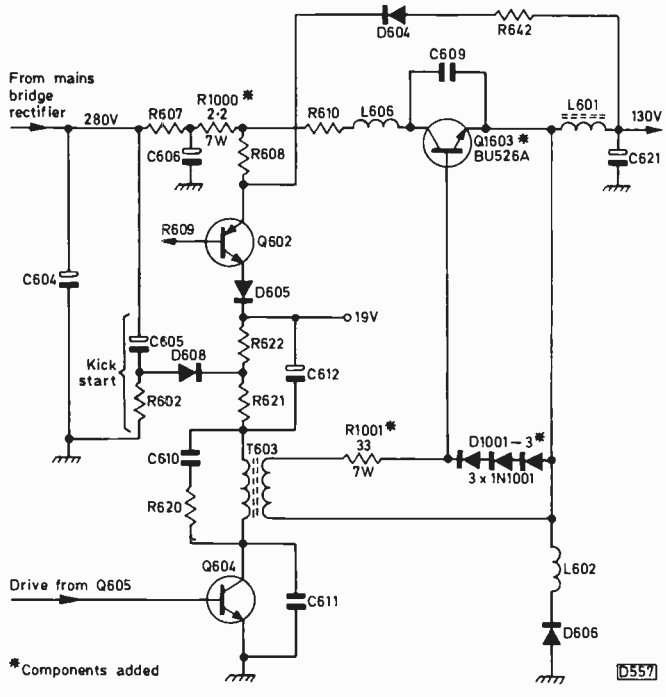


Fig. 2: Modified chopper circuit.

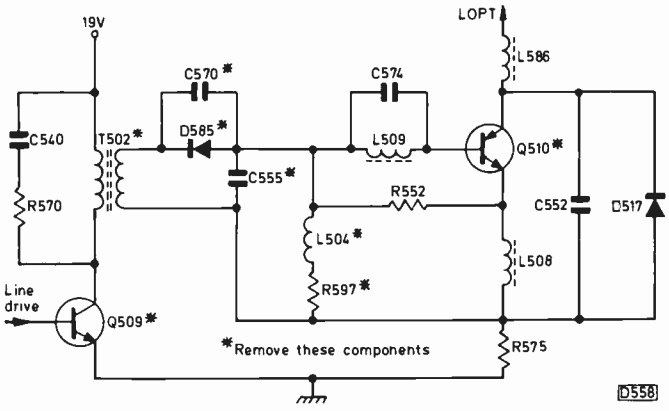


Fig. 3: Line output GCS drive circuit used in the Mk. I version of the Sony KV1810UB.

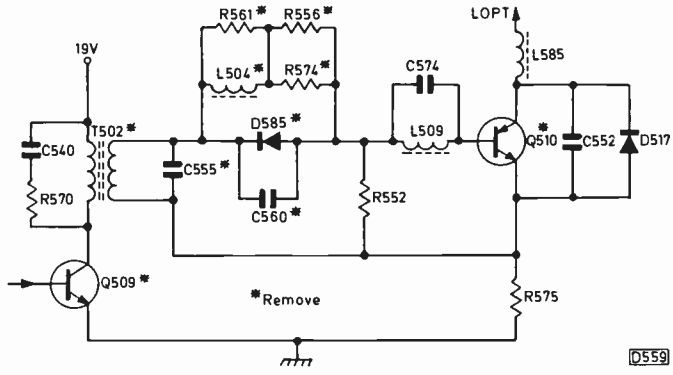


Fig. 4: Line output GCS drive circuit used in the Mk. II version of the Sony KV1810UB.

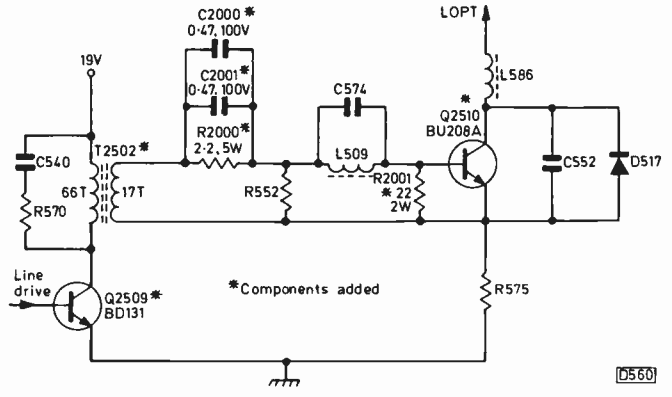


Fig. 5: Line output transistor drive circuit for the Sony KV1810UB. Leave L508 in circuit in the Mk. I version.

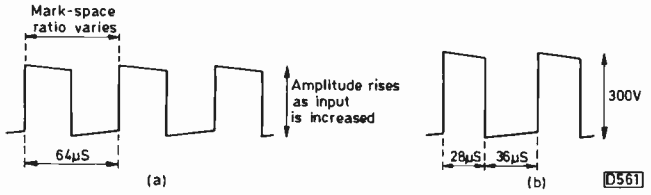


Fig. 6: (a) Chopper output waveform as the input from the variac is increased. (b) Chopper output waveform at full h.t.

the original driver transformer. The new components required in the line drive circuit are mounted in suitable holes from which original components have been removed on board VH. Note that the new line driver transistor (Q2509) must be fitted with a small heatsink of approximately 1·5 sq. in. area.

If you don't want to wind your own line driver trans-

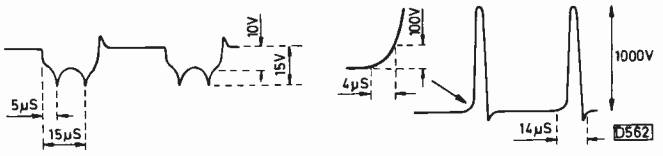


Fig. 7 (left): Line output transistor base drive waveform.

Fig. 8 (right): Line output transistor collector waveform.

former the transformer from the Fidelity Model F14 can be used instead (part no. 73163), but in this case C2000 and C2001 should both be 1μF.

Setting Up

It's vital to make a number of checks to ensure satisfactory performance before the set is switched on. This is where the variac, the 19V supply and the scope are required.

First check the chopper circuit. Connect the set to the mains supply via the variac, first ensuring that this is set at zero. An isolation transformer should be used. If you don't have one, make sure that the scope and 19V power supply are not earthed, and be very careful how you handle everything. Disconnect the leads from pins 19, 21 and 22 on board PR. Disconnect one end of D605. Connect the 19V supply to pin 17 via a 1N4001 diode, with the negative power supply lead to pins 15/16. Connect the scope probe (×10) to the emitter of Q1603, earthy lead again to pins 15/16. Wire a 100W bulb between pin 19 and pins 15/16. Connect an Avo across the bulb, set to the 250V range.

Switch on the 19V power supply. A very faint line-frequency whistle should be heard. Advance the variac slowly, observing the scope, bulb and Avo. The voltage indication should start to rise, causing the bulb to glow. A square waveform should be visible on the scope – shape as shown in Fig. 6(a), rising in amplitude as the a.c. input is increased. At approximately 100V a.c. input the d.c. output should be 70V.

If all is well continue to increase the input from the variac until a point is reached where the output remains constant despite further increases in the input. When this point is reached the output should be about 130V d.c. This steady state should be reached when the input is 200V a.c. If the output is not 130V, adjust VR601 until it is correct. Also check that the waveform frequency is correct: the leading edges of the waveform should be 64μsec apart. If this is wrong adjust VR504. VR601 will then have to be reset.

Once the correct power supply conditions have been obtained disconnect the lamp load, the Avo and the scope.

Now to the line output stage. Turn the variac to zero and reconnect the leads to pins 19, 21 and 22 of board PR. Leave the 19V supply connected and apply the scope probe to the base of Q2510. The waveform seen should be similar to that shown in Fig. 7, though it will be identical only when the full h.t. is applied. The change in waveform shape will be seen when the h.t. is increased. With the variac still at zero, move the scope probe to the collector of Q2510. Just an indication of 64μsec line flyback pulses should be visible. Increase the variac setting slowly, watching the pulses increase in amplitude as the h.t. rises.

Check the 200V rail (cathode of D516) when the input has been increased to 100V: the reading should be about 150V. Study the line flyback waveform carefully, parti-

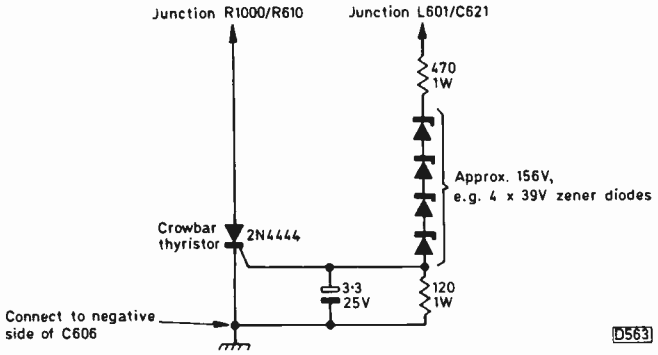


Fig. 9: Suggested crowbar over-voltage protection circuit.

cularly the knee of the curve, i.e. the "turn-on" area – see Fig. 8. Provided the amplitude rises to over 100V in less than 4μsec all is well and the variac can be wound up to give an input of 200V. At this point the 200V rail should read 200V, while with full input and the correct h.t. the amplitude of the line flyback pulses should be 1kV – so be wary of handling the probe.

Switch off the TV set and all the equipment. Disconnect the test gear and reconnect D605 on board PR. Reconnect the set directly to the mains supply (use the isolation transformer if you have one). Switch the set on and it should burst into life. If it doesn't, there's a fault in the kick-start circuit (C605, R602, D608) or in R608, Q602, D605 or the associated drive circuits.

Assuming that the set starts up, a thorough check of all functions can be carried out in the safe knowledge that the chopper and line output stage circuits are unlikely to commit hara-kiri at any moment. In general very few faults other than with the GCSs will be found in these sets.

Crowbar Circuit

The protection circuit fitted in these sets is pretty useless. It's a good idea to fit a crowbar circuit to safeguard components in the event of an abnormally high h.t. voltage (now that you've converted the chopper to a transistor this is not very likely – but it can and does happen!). A suitable circuit is shown in Fig. 9. The components can be mounted on a small piece of Veroboard or something similar and mounted anywhere convenient, e.g. the edge of the PR board's metal frame. Remove the original protection circuit transistor Q610 as it's no longer required.

Test Report: Orion Pattern Generator

Eugene Trundle

Things have moved on in the consumer TV equipment field over the years: the video "general practitioner" nowadays has much more on his plate than ordinary TV receivers. VCRs are now part of the staple diet, and requests to service computers and monitors, and to convert sets to and from other world standards, are becoming common. When I heard of a relatively inexpensive pattern generator designed with these things in mind I welcomed the opportunity of testing and reporting on it.

Description

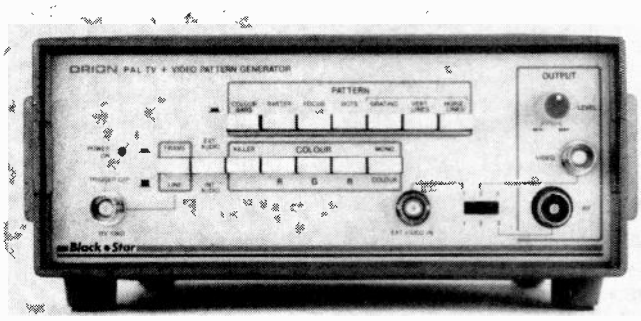
The Orion TV/video pattern generator is designed and manufactured in the UK by Black Star Ltd. It operates from mains power and generates a range of colour and monochrome test patterns – the main ones are primary colour bars, blank rasters in white and primary/complementary colours, a crosshatch grating, a dot matrix, and finally vertical and horizontal line patterns. The video output is available in CVBS form at the front panel and in switchable (1V or TTL) RGB form from rear-mounted BNC and DIN sockets. The video signal can also be modulated in positive or negative form on to a v.h.f. carrier whose third harmonic provides a u.h.f. output for direct connection to a Band IV/V TV or VCR aerial socket. An external video input can also be applied to the r.f. modulator. The r.f. carrier can be simultaneously modulated by an internal 1kHz tone or an external audio source: the sound modulator is very versatile, with carrier spacings of 5·5, 6 or 6·5MHz and a choice of f.m. or a.m. These switched facilities enable the instrument to provide outputs that correspond with the PAL system B, C, D, G, H, I, K, K' and L specifications.

The internally generated patterns are available in PAL colour (i.e. with swinging burst), in NTSC/4·43 (killer switch activated) or in true monochrome form with no subcarrier signal. In addition R, G and B can each be switched off. This gives a total of more than fifty pattern combinations. Other facilities include the provision of line and field frequency trigger pulses at a front panel socket, a mixed sync feed that's available on its own or superimposed on the 1V G output, and provision for operation from a 110V mains supply. The instrument is housed in an attractive grey ABS moulded case with tilt stand/carrying handle. The main controls and connections are on the recessed front panel with the secondary ones rear mounted. For a fuller specification see Table 1.

Test

Our test pattern generator spent most of its trial period on a TV/video servicing bench in the workshop. The u.h.f. output level (third harmonic, 570MHz, ch. 33) was found to be about 3mV (from about 12mV at 190MHz). I was a little disappointed with the modulator which generated some spurious outputs and was microphonic – it moved several u.h.f. channels up band at a touch of the rear casing or switches. In spite of the manual's claim that a.g.c. systems can be tested, the r.f. output is not level adjustable. The wide range of frequency adjustment (rear panel trimmer) was appreciated however when we tried piping the signal around our u.h.f. distribution system.

The patterns provided are appropriate for setting-up and evaluating TV sets and monitors and there was a welcome absence of crosstalk between the sound and vision. The "focus" pattern consists of a screenful of vertical bars at 1MHz rate: I found it easier and more accurate to set up the focus using the finer crosshatch or dot patterns. The raster settings give good strong colour fields (95 per cent saturation) in six colours and white. The colour phases for these and the colour bars were found to be well within tolerance when checked with the



The Orion pattern generator.

vectorscope. While the white raster was clear and free from spurious patterns I was unable, at any setting of the buttons, to get a clean screen at black level. The colour bar pattern is unusual in having a peak-white bar at the extreme right – as a reference. It makes an unusual sight on the TV screen and on the scope but I found no use for it – indeed I would have cheerfully traded both it and the 1MHz focus pattern for a set of border castellations to enable a check of line sync phasing and picture centring to be made.

In selecting the patterns I was unlucky with the pushbuttons. The mono/colour one tended to jam in the in position and the killer button wouldn't latch, problems which I'm sure are confined to the particular unit sent for review. The layout of the recessed front panel is good and logical and offers physical protection for the controls. The video level control enables up to 2·3V peak-peak of CVBS signal to be obtained from the adjacent socket.

When checking the level I noticed that while the video/sync ratio is correct at 7:3 the burst amplitude is somewhat low – 70 per cent of sync height in fact. Later production models will I hope be more accurately set up internally. In such respects as the sync and blanking periods, burst positioning, line and subcarrier frequencies I found the instrument to be beyond reproach. The sync is not interlaced however and a single broad pulse serves for field sync – this is due to the "multi-chip" design of the pulse generator circuit. These limitations and the lack of a circle for linearity checks are what keeps the overall price down, which is fair enough.

On the credit side the versatile RGB facilities and system switching arrangements are very useful for servicing and checking all types of monitor. They open the way to a lucrative trade in TV and VCR system conversions for intending emigrants and jet-set itinerants. The instruction manual contains a useful list of TV systems by countries and specifies the switch settings for each. With this and its 110V mains capability the Orion machine could accompany the roving engineer from New Zealand to the Netherlands or from Spain to the Seychelles (how I wish I was one) . . .

But back from such flights of fancy to the workbench, where I dismantled the machine for internal investigation. There are three double-sided fibreglass PCBs which house a mixed bag of i.c.s and discrete components. The internal construction is of good quality and should last well, especially since the mains transformer runs very cool – even after many hours' use.

Conclusions

There seem to be more pros and cons in this review than in most. The shortcomings noted were mainly due to production sillies that are unlikely to affect later models, especially if quality control is tightened up a bit. Is it worth £199 plus VAT? If you need the extra facilities offered by this generator, in terms of inputs, outputs and operating modes, I'm sure it is. If not and your activities are confined to run-of-the-mill TV and video work I'm not so sure – simpler pattern generators, most with the same degree of signal integrity, are available at considerably lower prices (e.g. Labgear, Manor Supplies, Sadelta). Who could however be sure that he would never need any of the "specials" of which this instrument is capable?

The Orion pattern generator is marketed by SEME Ltd., Units 2E and 2F, Saxby Road Trading Estate, Melton Mowbray, Leics. LE13 1BS (telephone 066 465 392).

Table 1: Orion pattern generator specifications.

Systems: PAL B, C, D, G, H, I, K, K', L.
Test Signals: (1) Colour bars with white reference. (2) Purity patterns – RGB plus three complementary colours. (3) 100 per cent white raster. (4) Grey-scale with white reference (derived from colour bars). (5) Crosshatch. (6) Vertical lines. (7) Horizontal lines. (8) Dots. (9) Focus – 1MHz vertical lines. These can all have the burst signal switched on or off via a front-panel switch.
Vision carrier: V.H.F. (fundamental) 190MHz with approximate tuning range 165-290MHz. U.H.F. (third harmonic) 570MHz with approximate tuning range 495-870MHz.
R.F. output: Front panel socket at 75Ω. Level >10mV (fundamental). Modulation a.m., positive- or negative-going.
Video input: Front panel, BNC connector, 1V p-p, 75Ω, positive-going.
Video outputs: Front panel output at 75Ω via BNC connector, with level control. Rear panel outputs comprise 6-pin socket for RGB plus sync, individual BNC connectors for RGB, sync, red, blue (at 1V p-p or TTL) and green (at 1V, TTL or 1V plus 0·3V syncs). All TTL and RGB outputs positive-going. Note: (1) 1V non-composite outputs nominally 1V p-p at 75Ω; (2) 1V+sync output nominally 1V video plus 0·3V sync pulses at 75Ω.
Sound carrier: 5·5, 6 and 6·5MHz selected by rear panel switch. Sound/vision carrier ratio nominally 12·5dB.
Internal sound modulation: A.M. or f.m. switchable. Modulating signal 1kHz sinewave. Output from rear panel via 5-pin DIN socket, 5V p-p.
External sound modulation: Input via 5-pin DIN socket, 5V p-p maximum.
Chroma signal characteristics: PAL with crystal controlled 4·433MHz carrier. Swinging burst blanked during field blanking period. Burst amplitude nominally 0·3V p-p. Chroma amplitude nominally 75% or 95% bars selected by PCB link – factory set to 95%.
Line frequency: 15·625kHz crystal controlled.
Sync system: Non-interlaced.
Field rate: 50Hz.
Frame sync: Single broad pulse for vertical synchronisation and blanking.
Front panel sync pulse outputs: Line or field, nominally 12V at 10kΩ.
Rear panel sync output: 1V at 75Ω or TTL/TTL mixed sync.
Power requirements: 110/120V a.c. or 220/240V a.c. at 12VA.
Operating temperature: 0-40°C (10-80% non-condensing).
Case: Custom-moulded, sturdy lightweight ABS with tilt stand.
Weight and size: 219 × 240 × 98mm, 2·5kg product only; 321 × 352 × 174mm, 3·2kg packed.
Accessories supplied: Mains lead, instruction manual and spare fuse.
Optional accessories: BNC cable assemblies, service manual.

The Problem of Tape Damage

Christopher Holland

There's nothing quite so frustrating as a really intermittent fault. Not just the type that shows up only after a matter of minutes or hours but one that decides to rear its ugly head at intervals you can count in months. The example I have in mind concerns a JVC HR7700 video recorder that would very infrequently damage tapes. Now the average customer might be prepared to put up with say occasional momentary loss of colour or something like that but a damaged tape is a different matter. The problem was compounded by the fact that the machine in question was launched in 1981 as the most advanced home VCR of its time, a veritable "Rolls Royce of the video world" (to quote a salesman's patter that sticks in my mind). In those far off days when multi-head and HQ VCRs were no more than a twinkle in a Japanese engineer's eye the HR7700 was a truly impressive machine, with its row of touch controls, a complement of trick facilities and a tape loading mechanism that silently sucked the cassette from the user's hand, all in an elegantly styled package that said "class". Oh yes, and with a price tag to match.

Dealing with Owners

It's this last point that has led to HR7700 owners tending to be a rather disgruntled lot. To purchase such a unit they would tend to be "video buffs" (such people used to exist in those days) so you can imagine their chagrin when, before their h.p. payments were even half cleared, they were reading about new models with superior performance at a cheaper price. Such was the pace of development. Some owners traded in their machines, normally at some financial loss, but most appear to have remained loyal to their "Rolls Royces" and just stopped buying the video magazines. That's why in my experience you have to be very careful when dealing with the owners of HR7700s or the Ferguson equivalent 3V23: they always seem to welcome reassurance about the quality of their purchase. As you hand the machine back after a service, point out the weight of the machine and say "they don't make them like that any more". You'll make a friend for life.

Damage Every 3-4 Months

What this is leading to is the double-edged problem we had with one of these machines. Over a two year period the owner had called in at maybe three or four monthly intervals and almost apologetically informed me that it had damaged another tape. I would ask to see the damaged tape in case it offered any clues as to the cause of the problem but no tape was ever forthcoming. Now this usually means that he's watching the sort of tapes he doesn't want you to know he watches, if you know what I mean, although I found this impossible to believe in the case of this particular gentleman and his good lady wife. Well, improbable anyway. So each time I would take in the machine, remove the top covers and put it on the test bench. There were never any signs of fragments of damaged tape in the machine, and it always performed perfectly on test. When the owner called to collect it I would report this to him, tell him what a great VCR it was, and ask him to bring it in with the damaged tape if it misbehaved again and to tell me the exact circumstances in which the damage occurred, something about which he was never certain.

Common Causes

Now I suppose I should mention the common ways in which VHS machines can destroy tapes. The big favourite in the days of the old-style mechanical videos was for the tape to stop playing after about an hour or so as the main solenoid fired. When the cassette was ejected a loop of tape with a distinctly crunched-up appearance would be left hanging from the cassette flap cover. This problem is caused by a lack of take-up torque, which means that while the pinch roller and capstan shaft are still drawing tape past the heads the tape is no longer being spooled into the cassette. By the time the reel detector reacts and tells the machine to close down there's a length of tape around the pinch solenoid. This inevitably catches on something when an attempt is made to eject the cassette. The cure is to replace the take-up clutch. If you haven't come across this one you don't fix videos for a living! Similar damage can be caused by lack of unloading torque: on selecting the stop mode the rewind spool doesn't draw the tape back from the heads and again tape damage occurs when the cassette is ejected. This tends to occur with models that use a reel motor to perform unloading, and is normally due to failure of a component in the circuit that drives the motor in the required direction.

Another favourite is a tendency for a machine to take a thin slice off the bottom edge of the tape. Often this has no effect other than to leave thin slivers of tape deposited around the capstan flywheel shaft and pinch roller, but in bad cases it can destroy the section of tape that contains the control pulses, rendering the tape useless. This problem is caused by the lower edge of the tape lapping over the bottom of the take-up guide pole and becoming sliced or serrated by the guide pole itself or, more commonly, the bottom edge of the cassette body. The fault normally shows up at the beginning of E180 tapes and is due to one of the following: the pinch roller coming down crooked on to the capstan flywheel shaft, which obviously makes the tape creep down; excessive take-up torque, where the take-up spool tries to pull the tape back into the cassette housing faster than the pinch roller can supply it; or a faulty roller within the body of the cassette – a roller that's not perpendicular to the path of tape travel. Any VCR will of course damage the tape if the cassette is faulty, while the problem of crooked pinch rollers is largely confined to early mechanical models. Excessive take-up torque occurs mainly with later electronic VCRs that use a reel motor, where a preset is often provided to adjust the torque. The JVC portable HR2200 (Ferguson 3V24) suffered from this to some extent when it first came out.

Condensation

One last problem that manages to catch me out on the first cold day of every autumn occurs when a VCR comes

in for repair and I innocently load a test tape to see what's wrong only to hear a sickening crunching sound. Condensation of course. The VCR has travelled for a few miles in the boot of a car and has then been brought into the warm workshop environment (can I really describe our workshops like that?). Condensation then forms on the head drum and as soon as the tape is loaded it sticks to the drum body. Before you can react six to eight feet of tape have been wound round the heads, large pieces of magnetic oxide being firmly stuck to the drum. Every year the first cold spell of winter catches me out, whereupon I try to remember to warn every customer collecting a unit to leave it at room temperature for an hour or so before switching it on after their return home.

Back to the HR7700

Back to our HR7700. I wasn't certain how the tapes were being damaged, but I could discount the condensation theory since there was never any tape stuck to the open drum and the heads themselves never required cleaning. Also this is a winter problem and the fault had been reported in June, though when you consider some of the summers we've had recently maybe I shouldn't have been so certain. I could also dismiss the fault of bottom edge tape slicing since the giveaway slivers of tape were absent. My own suspicion was that the tape was not unloading from the heads when the stop function was returned, though this never occurred on the bench: there was plenty of unloading torque and the brakes weren't fouling the rewind spool.

At this stage I should mention a problem that appears to be inherent in the design of this model. If a tape is fully rewound and then stopped the rewind spool can stop suddenly, before the supply spool has been braked, resulting in a small loop of tape not being rewound into the cassette. If the tape is then ejected a small portion of it can get caught in the cassette flap. The damage is normally very slight and doesn't affect the tape too badly, but I've yet to come across an effective cure or modification. All subsequent front-loading JVC models have overcome the problem by going into rewind for a second whenever the eject button is pressed. I'd been trying to break this gently to the machine's owner, but since Rolls Royce's don't have inherent faults I had to be careful how I did it.

Clues at Last

When the machine arrived again some four months after its last visit it was accompanied by a faulty cassette. Since there was a loop consisting of about a foot of tape hanging from the cassette body I felt that my initial suspicions were correct. But I was wrong: the loop consisted of the first foot of tape. When the cassette was played we found that the introduction to "Dallas" had been ruined – what good taste JVC engineer into their machines – while interrogating the owner elicited the information that it happened when the machine was used for the first time in a couple of days. It had played for a few seconds and then stopped: when the cassette was ejected the result was this loop of tape.

We were now getting somewhere, so the top cover was removed and a tape was loaded. Perfect, as were the following half dozen attempts. The same procedure was tried frequently over the next few days before the fault put in an appearance for us. We pressed play and the tape loaded to the heads but there was no take-up reel movement. Since there were no reel pulses the machine cut out a few seconds later, leaving a length of tape around the pinch roller. Had eject been pressed the result would have been tape damage, so rewind was selected and the tape wound harmlessly back into the cassette.

A bit of thought was now needed. The fault could have been either mechanical or electronic, so a voltmeter was connected across the reel motor, at pins 111 and 112 on the mechacon panel. The front was taken off to give access to the cassette housing and after this had been removed the cassette lamp was covered and the tape loading switch was disabled. A decent view of what was happening could then be obtained. Needless to say everything worked properly.

Previous Attempts

I had tried a few things during previous unsuccessful attempts at repair. Preset R1 on the mechacon panel had been adjusted to increase the take-up torque towards the upper end of its 60-140 gm/cm tolerance, though I wouldn't recommend this since it could lead to the control track being sliced off the tape. So the torque was restored to about 100 gm/cm, which might also make the fault occur with a bit more regularity. I had also covered what I felt were possible electronic faults when I had initially suspected intermittent unloading, and this is of course the same circuit that drives the reel motor during play. Four relevant 2SC2655 transistors, X18, Z22, X24 and X25, had been changed since I've had trouble with this type of transistor before. I'd also connected direct wire links from the emitters of X23 and X25 to the reel motor plug connections (111 and 112) since the PCB tracks follow a rather tortuous route on both sides of the board – while this panel is not prone to dry-joints, I'd been getting a bit desperate.

The Solution

And there the machine sat for two days, meter by its side, performing perfectly each time it was put into play. The best part of a can of freezer was sacrificed to the beast to no avail, and I'd almost given up hope when it at last happened. After pressing play the arms loaded to the head, the pinch roller pulled in, the meter read 2V d.c. but the take-up spool was stationary. A fingertip applied to the reel motor pulley proved that it wasn't turning while the meter said that it should have been. Surely not an intermittent reel motor?

Remembering a tip an ingenious colleague had once passed on to me I took out the reel motor and connected it up to a 12V power supply via an ammeter. This is a good check when you suspect either a drum or capstan motor in one of the old piano-key models, and is particularly useful when preparing estimates. In such a set-up a good motor should draw 20mA or less: any more and a replacement is required. I agree that this is not a 100 per cent scientific test, but it's not let me down yet. And how did our suspect reel motor behave? On initially applying power the motor turned but required 75mA to do so. This rapidly dropped to 35mA, but never went below this. The loan of two new reel motors was obtained from a trusting source and experiments with these showed that the current never rose above 25mA with one and 30mA with the other. Got it!

Just to be sure, and by way of a belt and braces job, I

noted that the reel idler in the HR7700 appeared to be the same as that in the HR7200 (3V29) series, and since I had some of these one of them went in along with the new motor. Set up the take-up torque, make several checks over the next few days and it was time for reassembly. Naturally the machine wouldn't work at all when it was all back together again, but the panic soon subsided when I realised what I'd done – I'd fitted the front facia in such a way that the stop button was permanently engaged. This seems to happen whenever I put the front back on one of these machines these days, something I don't recall happening when they were new. Slackening the six retaining screws and jiggling the front soon cured that, and when the owner called for his video a few days later I was able to report with all confidence that his problems were now over. For once I would appear to have been right, since I've not seen this particular HR7700 or its owner for over a year.

Servicing Notes: Sanyo 5000 Series VCRs

John Coombes

The following notes relate to the Sanyo Models VTC5000, VTC5300 and VTC5400 which were sold during the period 1982-3.

Model VTC5000

(1) No results: Check the mains fuse F5201 (315mAT). The cause of it being open-circuit may be a "spikey" mains supply. If this is suspected, change the mains filter capacitor C5201 from 0·1μF to 0·0047μF (350V a.c.). If a replacement fuse blows check C5201 and the mains bridge rectifier diodes D5201-4 (type DSA17C) for shorts. The STK7216 regulator chip IC5101 can also cause fuse blowing – check by substition. If there is no input to IC5101 (there should be 27V at pin 13) check whether C5102 (220μF) is short-circuit.

If there is 27V at pin 13 of IC5101, check whether 12V is present at pins 12 and 5 and 9V at pin 2. Check whether zener diode D5102 (BZ150) is short-circuit if the 12V supply is missing. If the 9V supply is missing check zener diode D5101 (BZ110) for being short-circuit. If still no 12V and 9V outputs replace IC5101.

You may find that IC5101 is type STK7216A. An STK7216 is supplied for replacement purposes. If one of these is used to replace an STK7216A, remove the 1kΩ, 2W metal-glaze resistor between pins 15 and 13. Failure to do this will result in ruination of the STK7216 chip.

(2) No results with the capstan motor running very fast: Check for 5V at pin 41 of the LM6402A095 microcomputer chip IC3001. If this voltage is absent check the 5V regulator transistor Q3001 (2SC2274E, F) by replacement. IC3001 could be the cause of the fault.

(3) No rewind/forward drive: This is usually due to a faulty rewind/fast forward reel drive assembly. As a temporary measure and to prove the point cleaning may restore normal operation. The assembly should be replaced however.

(4) Improved reel motor drive: This modification helps to overcome increased torque on the reel motor during playback or unloading. Fit a 3·3V zener diode (type GZA3·3Z or BZY88C3V3) in position D3006 and change R3049 (2·2Ω) on board SY1 to 1Ω, 0·5W (metal film).

(5) Tape problems: Tape creasing is quite a common problem. The most likely cause is the reel belt. Also check the reel drive assembly and the reel motor. It may be necessary to replace all these items to prevent further trouble in the future. See also note at end.

We had a problem with tape folding on one of these machines. It occurred very intermittently and was eventually traced to a faulty pinch roller.

No supply to the reel motor will ruin the tape. The cause can be IC3006 (BA6209) on the system control panel SY1.

(6) Flashing lines on screen or picture break-up: Make sure that the earth connections are made between the r.f. booster and the metal frame, also to the video preamplifier. All earthing straps in position will give correct operation.

(7) Snowy picture from one head: If the head is not dirty or faulty check IC1501 (LA7027) by replacement.

(8) Poor definition: There's a modification for this fault. Change C1048 on PCB VD1 from 150pF to 56pF or 68pF.

This modification also applies to Model **VTC6500** where the capacitor is C1046 and to Model **VTC5400** where the capacitor is C1044.

(9) Noise bar on screen, sound not affected: The cause is a drum servo fault. Check that the PG pulses are being generated correctly and amplified by IC4001 (BA848A) which should if necessary be checked by replacement. Then suspect IC4012 (HA11713). Again check by replacement.

(10) Noise bars with sound flutter: The cause is sometimes a faulty capstan motor. Also suspect loss of the FG pulses which are amplified in IC4013 (HA11713). It may be necessary to check this chip by replacement. Ensure that all plugs and sockets are making good connection.

(11) Loss of servo lock in the record mode: This can happen when there's a sudden change of picture content. Make the following modifications. Add a 1,000pF capacitor between pins 2 and 28 of IC1002 on board VD1 and a 56kΩ resistor between pins 13 and 14 of IC4001 on board SV1. Where very bad interference is experienced fit a noise-masking sub-board on servo PCB SV1 – it fits on the print side, behind IC4001. When this is done add a

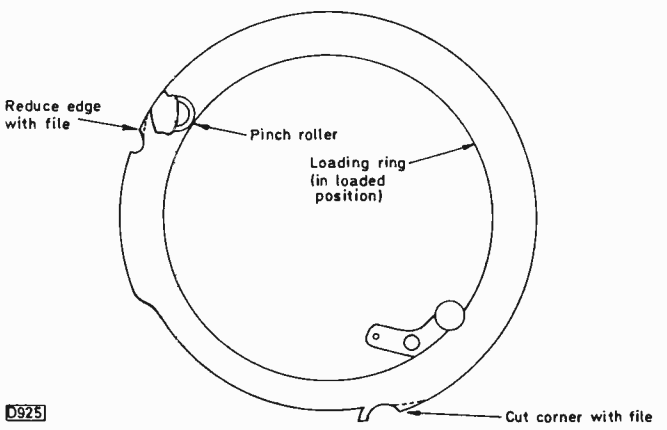


Fig. 1: Loading ring modification for the VTC5300/5400.

1,000pF capacitor (not a 56kΩ resistor) between pins 13 and 14 of IC4001, remove C4008 and change R4009 and R4010 to 4·7kΩ.

(12) Will not playback own recordings: If you find it necessary to reset the tracking control after making a recording check IC4501 (NJM2904S) by replacement. Check C4505 (1μF) which could be open-circuit.

(13) No E-E sound: Check for 12V at pin 5 of Q6006 (LA1365). If the voltage is high the power supply regulator chip could be defective. If the 12V supply is missing check whether R6032 is open-circuit. If R6032 overheats when replaced fit another LA1365 chip in position Q6006.

(14) Clock problems: For no clock display check that 9V is present at pin 1 of connector S5203 on PCB PW2. If the voltage is 7V or less check whether regulator transistor Q5202 (2SD313D, E or F) is open-circuit. If the clock intermittently flashes 8888 check for dry-joints on Q5202.

Models VTC5300 and VTC5400

The mains fuse/filter capacitor note mentioned under (1) above also applies to these models, i.e. for mains fuse blowing when no fault can be found in the machine change the filter capacitor to 0·0047μF. The advice on flashing lines/picture break-up under (6) above also applies. For poor definition with Model VTC5400 see note (8) above. For loss of servo lock in the record mode with Model VTC5300 – see note (11) above – the appropriate modifications are as follows: change R1009 on board VD1 from 390kΩ to 150kΩ; on board VD2 add a 10kΩ resistor across C1308 and a 47μF, 16V electrolytic across R1344, with the negative side connected to the emitter of Q1238.

Vivid white horizontal bands of interference across the screen with the VTC5400 occur when the power transformer's insulating washer which fits between the heatsink and chassis is left off.

A case of wow on sound with the VTC5400 (capstan speed varying) was cured by replacing C4040 (0·47μF).

Interference on playback (white spots) can be caused by a faulty reel motor (see below). Ensure that a static brush is fitted to the drum spindle and that the power supply module fixing screws are not loose.

The main problem with these two machines relates to loading/unloading. No loading, sticking or intermittent loading occurs when the loading torque is not enough. One step to take is to remove the sharp edges of the cams on the loading ring for the load-end rollers – see Fig. 1. Then fit a modified loading belt (part no. 143-2-564T-02303). Unfortunately the problem may well have damaged the loading/reel motor which often has to be replaced. A damaged motor can cause white spots on the screen since it produces interference which is picked up by the video preamplifiers. If the loading ring sticks in the half loaded position check the loading belt and ensure that a modified one (with yellow band) is fitted. When the ring is stuck half way the drum motor will make a loud howling noise.

General

If the tape loops when a cassette is ejected check the supply spool back spacing. If the spool rotates too far remove the spools and clean the brakes with methyl alcohol. Replace the spools if they are badly worn. The tape should then be wound back into the cassette correctly.

ECONOMIC DEVICES, PO BOX 228, TELFORD TF2 8QP

15/80H	3.30	2SA940	1.81	2SC535	0.79	AF180	0.55	BA656	8.99	BC560C	0.14	BDX63A	1.96	BFY52	0.27	BYX71-350	1.40
15/85R	3.30	2SA940-2	2.14	2SC536	0.41	AF181	0.53	BA7100	10.85	BC635	0.36	BDY20	1.21	BFY79	0.49	BYX94	0.16
16039	0.79	2SA950	0.72	2SC537	0.54	AF186	0.53	BA841A	28.98	BC636	0.42	BDY81	1.18	BFY90	0.61	BYY56	1.20
16181	1.04	2SA951	1.26	2SC605L	1.16	AF239	0.43	BA843	3.96	BC637	0.24	BF115	0.40	BLY49	2.20	BZY93C30	1.86
16182	1.04	2SA966-Y	1.16	2SC620	1.46	AF279	0.88	BA854	5.76	BC639	0.20	BF117	0.66	BR00	0.22	BZY88 RANGE	0.10
16334	0.98	2SA999	1.36	2SC643A	1.54	AL113	1.36	BAV18	0.21	BC640	0.24	BF118	0.67	BR01	0.75	BZX61 RANGE	0.18
16335	0.94	2SB774	1.15	2SC668	0.67	AN115	3.98	BAV19	0.11	BC879	0.39	BF121	0.25	BR03	0.75	BZX79 RANGE	0.10
16446	0.98	2SB185	1.13	2SC681	4.40	AN155	1.89	BAV20	0.31	BC880	0.31	BF123	0.21	BR03	1.26	C106D	0.46
16600	1.38	2SB375	3.87	2SC682	1.88	AN206	2.58	BAV21	0.34	BCX34	0.40	BF127	0.13	BRC116	0.67	C106M	0.76
16802	1.27	2SB400	0.40	2SC684	1.65	AN208	3.55	BAW62	0.19	BCY70	0.30	BF137	0.29	BRC300	2.01	C1129	0.58
17052	5.61	2SB405	1.03	2SC693	0.63	AN210	2.28	BAX12	0.44	BCY71	0.21	BF153	0.58	BRC5296	0.77	CA3046	2.55
17053	5.61	2SB407	3.24	2SC710	0.69	AN211	3.25	BAX13	0.11	BCY72	0.20	BF154	0.26	BRC6109	0.83	CA3089	0.83
17074	9.30	2SB449B	6.98	2SC711A	0.50	AN214Q	2.75	BAX16	0.11	BD115	0.46	BF157	0.33	BRC82	1.08	CA3090AQ	3.25
17089	5.35	2SB511	2.50	2SC717	1.28	AN231	14.65	BC107	0.13	BD116	0.70	BF158	0.18	BRC83	2.19	CA3094	2.20
17127	3.51	2SB54	1.39	2SC734	1.43	AN234	5.92	BC107A	0.11	BD124	1.31	BF159	0.18	BRC84	2.08	CA3131EM	3.12
17376	1.58	2SB546	3.75	2SC761-Y	0.95	AN236	3.78	BC107B	0.18	BD124P+KIT	0.69	BF160	0.31	BRX44	0.60	CBF16848N-071	1.56
17523	1.32	2SB56	2.80	2SC783	3.98	AN239	6.95	BC108	0.15	BD131	0.54	BF167	0.38	BRX49	0.53	CD4001	0.38
17524	1.32	2SB618A	2.22	2SC790Y	1.64	AN240P	1.52	BC108B	0.15	BD132	0.42	BF173	0.34	BRY39	0.69	CD4002	0.27
1N4001	0.06	2SB631	3.25	2SC828	0.28	AN241	1.71	BC109	0.12	BD133	0.53	BF177	0.35	BSS38	0.87	CD4008	1.35
1N4002	0.06	2SB643	0.61	2SC867A	3.05	AN245	4.49	BC109B	0.15	BD135	0.36	BF178	0.40	BSTBD140G	5.25	CD4011	0.29
1N4003	0.06	2SB669	3.67	2SC876	0.96	AN253	2.97	BC109C	0.12	BD136	0.26	BF179	0.36	BSTC0246	7.25	CD4012	0.24
1N4004	0.06	2SB681	3.96	2SC930	0.54	AN260	3.85	BC113	0.14	BD137	0.36	BF180	0.36	BSTC0233	7.25	CD4013	0.47
1N4005	0.08	2SB695	1.98	2SC935	4.13	AN262	1.98	BC119	0.36	BD138	0.46	BF181	0.32	BSTCC0143	3.07	CD4016	0.46
1N4006	0.08	2SB75	1.04	2SC936	8.66	AN272	7.92	BC126	0.23	BD139	0.34	BF182	0.34	BSTD1043	2.85	CD4017	0.82
1N4007	0.07	2SB774	0.72	2SC940	4.68	AN281	6.65	BC132	0.14	BD140	0.37	BF183	0.39	BSV57B	3.49	CD4020	1.23
1N4148	0.06	2SB819	0.89	2SD1128	2.90	AN295	5.52	BC135	0.14	BD144	1.70	BF184	0.43	BSW68	0.60	CD4021	0.39
1N4448	0.05	2SC1034	6.75	2SD1138	1.07	AN301	3.60	BC137	0.18	BD150	1.25	BF185	0.39	BSX19	1.29	CD4023	0.28
1N5401	0.14	2SC1050	5.06	2SD1273	1.25	AN302	3.99	BC138	0.34	BD157	0.67	BF194	0.14	BSX20	0.34	CD4025	0.64
1N5402	0.15	2SC1096	1.16	2SD1453	0.75	AN303	4.39	BC139	0.28	BD160	1.60	BF195	0.14	BSY52	0.50	CD4028	0.84
1N5403	0.16	2SC1104	3.98	2SD152K	2.64	AN305	9.47	BC140	0.45	BD163	0.71	BF196	0.17	BSY79	0.51	CD4040B	0.85
1N5404	0.15	2SC1106	4.54	2SD198	3.87	AN315	2.46	BC141	0.34	BD165	0.62	BF197	0.18	BT100A	1.61	CD4047	1.06
1N5408	0.35	2SC1114	6.75	2SD234	0.49	AN316	5.53	BC142	0.34	BD166	0.42	BF198	0.17	BT106	1.55	CD4049	0.46
1N914	0.04	2SC1116	4.95	2SD235	0.60	AN318	6.27	BC143	0.33	BD168	0.73	BF199	0.17	BT108	1.45	CD4052	0.75
IR3403	5.00	2SC1124	1.26	2SD24	2.29	AN320	5.47	BC147	0.08	BD175	0.60	BF200	0.37	BT119	1.76	CD4066	0.38
1S1555	0.20	2SC1129	0.34	2SD257	2.94	AN321	2.25	BC148A	0.10	BD179	0.49	BF218	0.36	BT120	2.17	CD4069	0.29
1S44	0.10	2SC1131	0.64	2SD292	2.59	AN322	5.85	BC148B	0.13	BD181	0.99	BF224	0.17	BT121	2.48	CD4070	0.66
1S5012A	0.81	2SC1158	3.33	2SD313	2.59	AN331	4.59	BC148C	0.11	BD182	0.99	BF237	0.65	BT123	1.98	CD4081	0.35
1S921	0.10	2SC1162	1.05	2SD325D	1.95	AN337	5.37	BC149	0.11	BD183	0.99	BF240	0.17	TBA970	3.06	CD4093	0.72
2N1303	0.38	2SC1172	2.22	2SD348	16.13	AN340P	1.17	BC149B	0.13	BD184	1.21	BF241	0.17	BT151-800R	1.15	CD4511	1.10
2N2219A	0.40	2SC1195	3.26	2SD350	5.20	AN355	5.98	BC153	0.14	BD187	0.53	BF245	0.50	BTT6018	2.42	CD4528	2.04
2N2222	0.38	2SC1212A	1.97	2SD350A	2.80	AN362	1.75	BC154	0.14	BD189	0.69	BF245A	0.52	BTT8124	4.89	CD4556	1.47
2N2646	0.80	2SC1213	0.89	2SD353	7.50	AN370	3.95	BC159	0.36	BD190	0.69	BF245B	0.49	BU106	2.48	CR02AM-8	1.55
2N2904	0.36	2SC1226	1.46	2SD389	2.41	AN5010	5.70	BC160	0.40	BD201	0.53	BF246A	2.52	BU108	1.50	CV12E	3.07
2N2905	0.43	2SC1293	0.90	2SD401	2.55	AN5111	2.92	BC161	0.28	BD202	0.60	BF255	0.20	BU109	2.65	CX095D	3.14
2N2906	0.38	2SC1306	1.98	2SD414	1.98	AN5120N	4.50	BC168	0.36	BD203	0.50	BF256	0.28	BU110	5.69	CX104	9.64
2N2926	0.15	2SC1316	4.10	2SD471	2.13	AN5132	4.39	BC169C	0.16	BD204	0.61	BF256LB	0.42	BU111Y	4.16	CX108	10.50
2N3053	0.27	2SC1317	0.87	2SD560	2.95	AN5250	3.98	BC170	0.16	BD207	1.79	BF256LC	0.42	BU125	2.48	CX109	7.86
2N3054	0.99	2SC1364	0.49	2SD588A	2.36	AN5435	3.08	BC171	0.11	BD208	0.34	BF257	0.34	BU126	1.55	CX130	8.76
2N3055	0.61	2SC1383	1.20	2SD600	3.25	AN5610	2.85	BC172	0.13	BD222	0.49	BF258	0.36	BU137	6.53	CX134	11.04
2N3442	1.56	2SC1391	2.45	2SD601R	0.65	AN5612	4.25	BC172B	0.27	BD225	0.49	BF259	0.34	BU205	1.08	CX136	11.49
2N3702	0.14	2SC1398	0.94	2SD613	1.03	AN5613	4.63	BC173	0.17	BD228	0.63	BF262	0.57	BU206	1.27	CX139	11.83
2N3703	0.14	2SC1413A	3.05	2SD621	12.85	AN5630	3.95	BC174B	0.27	BD229	1.05	BF263	0.57	BU207	1.65	CX157	4.84
2N3705	0.16	2SC1446	1.25	2SD636	0.55	AN5701N	1.66	BC177	0.20	BD232	0.50	BF271	0.34	BU208	1.12	CX158	4.10
2N3706	0.14	2SC1447	2.07	2SD639-R	0.85	AN6250	2.95	BC178	0.26	BD234	0.42	BF273	0.20	BU208/02	1.97	CX177	6.75
2N3707	0.16	2SC1475	0.37	2SD655	0.98	AN6300	7.00	BC179	0.26	BD237	0.47	BF274	0.20	BU208A	1.12	CX187	5.26
2N3711	0.11	2SC1505	1.00	2SD657	3.25	AN6310	8.74	BC182	0.09	BD238	0.39	BF324	0.35	BU208D	1.95	CX755	12.95
2N3771	2.04	2SC1514	1.41	2SD661A	0.80	AN6320N	4.28	BC182L	0.10	BD239	0.45	BF336	0.33	BU209	1.93	CX885A	6.85
2N3772	1.71	2SC1573Q	1.25	2SD731	2.45	AN6340	11.00	BC182LB	0.14	BD240	0.37	BF337	0.40	BU226	2.95	DEC1	2.20
2N3773	2.29	2SC1578	8.74	2SD773	0.33	AN6341	5.98	BC183L	0.11	BD241	0.39	BF338	0.44	BU326	2.00	DEC2	2.20
2N3819	0.42	2SC1583	1.17	2SD811	5.54	AN6342	1.61	BC183LB	0.26	BD242	0.39	BF355	0.49	BU326A	2.20	DS3486N	4.33
2N3823	1.17	2SC1617	3.89	2SD823	1.98	AN6363	16.00	BC184	0.13	BD243A	0.37	BF362	0.66	BU326S	2.20	DS3487N	4.33
2N3904	0.62	2SC675	1.41	2SD837	1.56	AN6371	9.24	BC184L	0.14	BD243C	0.79	BF363	0.60	BU406	1.49	E1222	0.40
2N3908	0.62	2SC1678	1.98	2SD841	3.65	AN6387	7.95	BC184LB	0.26	BD244	0.51	BF371	0.50	BU406D	1.79	E5024	0.28
2N4101	1.73	2SC1741	1.25	2SD856	2.25	AN6531	1.95	BC186	0.27	BD244C	0.79	BF391	0.25	BU407	0.82	E5386	0.25
2N4240	3.30	2SC1810	1.70	2SD857Q	1.84	AN6551	1.35	BC187	0.28	BD245C	0.99	BF417	0.84	BU407D	1.09	E9003	0.46
2N4444	1.73	2SC1815	0.66	2SD882	1.50	AN6552	0.68	BC204	0.16	BD246C	1.25	BF418	1.87	BU412	9.15	E9005	0.50
2N5293	0.50	2SC1826	0.65	2SD894	1.50	AN6610	2.40	BC207	0.14	BD253	1.05	BF422	0.29	BU426A	1.67	ESM310BP	4.15
2N5294	0.50	2SC1829	3.34	2SD898	5.45	AN6677	8.95	BC212	0.11	BD278A	0.80	BF423	0.52	BU500	1.95	FND500	5.78
2N5296	0.49	2SC1875	5.85	2SK105H	2.15	AN7111	1.45	BC212B	0.26	BD317	2.60	BF450	0.35	BU508A	1.75	GC374	1.65
2N5297	0.50	2SC1881K	2.98	2SK152	2.95	AN7114E	5.94	BC213L	0.10	BD318	2.85	BF451	0.29	BU536	5.80	GD243	4.95
2N5298	0.61	2SC1893	3.02	2SK34	0.76	AN7115	2.55	BC213LB	0.15	BD375	0.42	BF457	0.41	BU608	2.65	GF758	0.84
2N5771	1.18	2SC1906	0.98	2SK41	1.07	AN7120	4.65	BC214	0.10	BD380	0.76	BF458	0.39	BU705	4.07	GH3F	1.82
2N6109	1.58	2SC1921	1.37	2SK79	2.98	AN7145	2.80	BC214LB	0.26	BD410	0.52	BF459	0.52	BU806	1.79	HA11215	4.50
2N6130	0.72	2SC1923	1.07	40408	0.50	AN7146	4.35	BC225	0.40	BD433	0.47	BF460	1.56	BU807	0.80	HA11211	2.53
2N6133	1.25	2SC1929	2.25	40594	1.53	AN7151	2.26	BC237	0.10	BD434	0.49	BF469	0.31	BU826A	2.15	HA11225	4.29
2N6180	0.95	2SC1942	4.20	40636	1.43	AN7156	2.85	BC237BJ	0.12	BD435	0.49	BF470	0.55	BUW84	1.39	HA11226	8.71
2N6292	1.65	2SC1945	7.99	4EX581	0.80	AN7158	6.75	BC238	0.10	BD436	0.60	BF471	0.31	BUX84	1.00	HA11229	2.88
2N696	0.43	2SC1959	0.45	741	0.30	AN7218	1.64	BC238A	0.13	BD437	0.49	BF472	0.33	BUX85	1.10	HA11235	2.48
2N698	0.43	2SC1957	1.09	7805-T022	0.63	AN7223	4.25	BC238B	0.13	BD438	0.40	BF479	0.61	BUY69A	2.04	HA11124	5.25
2SA1006	1.50	2SC1953	1.93	7806	0.73	AU107	3.50	BC239	0.12	BD441	1.42	BF480	1.38	BY126	0.13	HA11244	2.82
2SA1011	1.65	2SC1962	1.93	7808	0.85	AU110	2.25	BC239B	0.25	BD442	1.41	BF491	1.99	BY127	0.13	HA11251	4.47
2SA1015	0.49	2SC1969	3.10	7812-T022	1.16	AU113	5.25	BC251A	0.31	BD509	1.42	BF495	0.64	BY133	0.11	HA1125	4.29
2SA1012	1.25	2SC1983	8.35	7815	0.64	AY105K	2.08	BC294	0.50	BD510	1.07	BF506	0.43	BY164	0.47	HA1137W	2.87
2SA1020Y	0.86	2SC1985	1.55	7818	0.92	AY106	1.09	BC300	0.35	BD519	1.50	BF509	0.41	BY176	0.52	HA1138	5.03
2SA1027R	0.45	2SC2009	0.34	7824	0.64	BA524	8.21	BC301	0.45	BD529	1.32	BF523	0.24	BY179	0.62	HA11414	5.65
2SA473	0.75	2SC2029	2.33	7905	0.80	B250	2.65	BC302	0.53	BD530	1.18	BF532	0.45	BY182	1.05	HA1144	7.87
2SA766S	4.95	2SC2028	2.11	9368	10.70	B40	1.55	BC303	1.04	BD533	0.67	BF596	0.18	BY184	0.47	HA1156	1.16
2SC1173Y	1.25	2SC2063	0.99	AA133	0.12	BA130	0.14	BC307	0.18	BD534	0.53	BF597	0.27	BY187	0.77	HA1160	4.78
2SC1474	1.25	2SC2078	0.95	AC133	0.12	BA1310	1.98	BC307A	0.14	BD535	0.79	BF694	0.22	BY189	1.79	HA1166	5.25
2SC1509	1.35	2SC2073	1.54	AC123K	0.43	BA1320	1.38	BC308	0.18	BD536	0.61	BF757	0.59	BY198	1.62	HA1166X	5.36
2SD1391RL	3.95	2SC2085-Q	1.40	AC127	0.27	BA1322	3.95	BC308A	0.11	BD537	0.74	BF759	0.47	BY201/2	1.50	HA1167	5.36
2SA1095	4.10	2SC2091	1.30	AC128	0.34	BA1330	2.75	BC309	0.17	BD538	1.45	BF761	1.05	BY203/20	0.59	HA11706	9.50
2SA1103	6.55	2SC2141	1.86	AC138	0.24	BA145	0.19	BC317A	0.13	BD544B	0.83	BF762	0.75	BY207	0.22	HA11705	8.00
2SA329	0.40	2SC2166	1.98	AC141	0.29	BA148	0.33	BC327	0.15	BD598	1.25	BF869	0.47	BY208	0.46	HA11703	4.95
2SA351	1.17	2SC2216	0.69	AC142K	0.44	BA154	0.40	BC328	0.11	BD677	0.56	BF870	0.30	BY210-400	0.19	HA11701	4.56
2SA489	1.17	2SC2233	2.20	AC151	0.28	BA155	0.12	BC337	0.09	BD679	0.57	BF959	0.42	BY210-600	0.27	HA11710	9.50
2SA490	2.25	2SC2236	1.65	AC176	0.30	BA156	0.05	BC338	0.34	BD680	0.76	BF960	0.69	BY210-800	0.34	HA11713	8.13
2SA493	2.25	2SC2278	1.25	AC179	0.28	BA159	0.15	BC368	0.24	BD681	1.48	BF970	0.69	BY218	1.64	HA11711	20.16
2SA562	0.57	2SC2314	2.17	AC183	0.72	BA182	0.24	BC440	1.09	BD696	2.47	BFR39	0.44	BY223	1.23	HA11715	8.13
2SA564	0.75	2SC2335-KI	10.41	AC187	0.39	BA222	1.66	BC441	0.44	BD699	3.49	BFR61	0.50	BY224-600	1.88	HA11714	7.76
2SA614	4.88	2SC2551	1.26	AC187K	0.43	BA302	1.24	BC454	0.36	BD700	3.70	BFR62	0.50	BY225-100	1.13	HA11716	13.10
2SA628	1.14	2SC2565	4.14	AC188	0.49	BA311	1.32	BC460	0.42	BD707	1.06	BFR79	0.29	BY226	0.25	HA11725	18.26
2SA639S	1.50	2SC2570	1.85	AC188-01	0.49	BA312	0.97	BC461	0.47	BD709	1.12	BFR81	1.65	BY227	0.49	HA11725MP	16.00
2SA659	0.49	2SC2577	3.58	AC188K	0.43	BA313	0.76	BC462	1.15	BD710	0.80	BFR86	1.08	BY228	0.60	HA117555P	6.23
2SA673	1.27	2SC2578	6.75	AC193K	0.65	BA317	0.08	BC463	0.64	BD809	0.85	BFR89	1.63	BY229-1000	1.12	HA11781	8.90
2SA684	1.61	2SC2671	1.99	AC194K	0.65	BA318	0.09	BC477	0.37	BD810	0.69	BFR90A	1.30	BY229-600	0.92	HA1180	5.15
2SA697	0.82	2SC2826	2.07	AD140	1.06	BA328	4.77	BC478	0.32	BD879	0.74	BFT42	0.43	BY255	0.69	HA1196	7.43
2SA699	1.75	2SC288A	1.85	AD143	1.41	BA333	1.37	BC479	0.41	BD880	0.79	BFT43	0.43	BY295-600	1.03	HA13001	6.25
2SA715	0.95	2SC3153	5.26	AD145	1.60	BA335	6.27	BC532	0.28	BD895	2.31	BFT84	0.40	BY298	0.20	HA1306	2.26
2SA747	8.26	2SC372	1.40	AD161	0.56	BA5102A	3.78	BC546	0.17	BD899	2.48	BFW10	0.60	BY299	0.45	HA1338	7.50
2SA748	1.36	2SC373	1.16	AD162	0.45	BA511	2.92	BC547	0.10	BD901	0.79	BFX29	0.34	BY407	0.90	HA1339	2.33
2SA817	0.65	2SC383	1.33	AD262	1.25	BA514	2.20	BC548	0.10	BD902	0.84	BFX84	0.37	BY409	1.49	HA13402	7.87
2SA818	1.82	2SC388	0.50	AF114	2.47	BA521	2.52	BC549	0.10	BDW83C	1.56	BFX85	0.41	BY448	0.69	HA13342	2.65
2SA835	2.50	2SC394V	0.81	AF115	1.24	BA524	8.94	BC550	0.10	BDW84C	1.56	BFX86	0.36	BY713	1.10	HA13365	4.02
2SA836	0.89	2SC403C	0.39	AF118	1.20	BA526	7.98	BC556	0.16	BDX32	1.75	BFX87	0.55	BYW19/1000	0.69	HA1366WR	1.86
2SA844	0.35	2SC41	2.19	AF127	0.50	BA527	2.98	BC557	0.10	BDX53A	4.93	BFX88	0.34	BYW56	0.34	HA1367	4.32
2SA872	0.70	2SC458	0.39	AF139	0.53	BA532	1.56	BC558	0.10	BDX53B	3.35	BFX89	0.44	BYX10	0.29	HA1368R	2.45
2SA884	2.15	2SC495	0.92	AF178	1.45	BA536	2.95	BC559	0.10	BDX54B	2.16	BFY50	0.32	BYX55-600	0.19	HA1368	2.07
2SA937R	0.97	2SC515A	2.85	AF179	0.55	BA6209	4.75	BC559B	0.11	BDX62A	2.15	BFY51	0.50	BYX71-600	1.25	HA1370	3.71

IF YOU DON'T SEE IT LISTED ASK FOR QUOTE. GIVE MAKE MODEL LOCATION. REMEMBER TO ADD 0.60p POST & HANDLING. ADD 15% VAT TO TOTAL

TEL 0902 712083 TELEX 338490

HA1374	4.80
HA1377	4.98
HA1389R	2.05
HA1389	2.39
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HA1394	3.95
HA1397	3.76
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HISH1002	9.50
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LA4112	1.56
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MC14528BCP	2.70
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ME0404/2	0.47
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ME6102	0.28
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OC72	0.44
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SG613	8.75
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SKE4F2/08	1.24
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SN76708	4.86
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SN76707N	5.11
SN76705N	1.34
SN76730	5.36
SN76810N	0.60
SN76832N	3.25
SN94041	5.54
SN94042	4.35
SP8385	0.55
SPS5384	1.98
ST1702L	0.99
STA401	6.76
STA441C	2.75
STA471C	7.56
STK0029	5.54
STK0039	5.35
STK0040	12.00
STK0050	7.72
STK0080	9.16
STK011	5.08
STK013	9.25
STK014	9.80
STK015	7.75
STK016	8.45
STK022	5.25
STK025	12.50
STK031	12.95
STK040	9.40
STK043	13.44
STK054	7.13
STK058	18.25
STK077	7.67
STK078	8.91
STK080	16.50
STK082	11.86
STK086	13.59
STK1039	5.75
STK2110	7.33
STK2145	16.25
STK2230	7.70
STK2240	14.40
STK2250	18.95
STK3042	11.05
STK3044	5.75
STK4019	4.50
STK430	11.75
STK433	4.95
STK4332	8.25
STK435	5.94
STK4352	12.25
STK436	7.21
STK437	7.80
STK4372	3.85
STK439	8.31
STK441	11.28
STK443	10.29
STK457	13.45
STK460	14.83
STK461	9.68
STK463	11.53
STK466	11.77
STK4833	16.95
STK501	6.32
STK502	5.74
STK5314	9.48
STK5730	3.95
STK7216	12.67
STK772	6.95
STR1096	5.45
STR4090	11.98
STR440	7.85
STR441	6.50
STR451	4.95
STR453	8.16
STR454	7.50
STR6020	8.31
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	0.65
T9003V	1.25
T9005V	2.38
T9011V	0.49
T9013V	7.96
T9014V	2.60
T9016	1.02
T9019W	1.98
T9034V	1.45
T9035V	2.33
T9051	7.45
T9054V	1.15
T9057V	0.70
T9062V	0.49
T9064	1.51
TA6002	4.35
TA7027	4.80
TA7050	1.74
TA7051	1.74
TA7054	2.55
TA7060AP	0.71
TA7061AP	1.27
TA7069	3.13
TA7070P	1.83
TA7072P	2.57
TA7073P	5.86
TA7074P	1.98
TA7076P	7.80
TA7089P	3.10
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	1.27
TA7136AP	1.27
TA7137P	0.98
TA7141AP	3.87
TA7146	2.50
TA7146P	4.23
TA7148P	1.67
TA7149P	3.26
TA7152P	1.91
TA7153P	7.47
TA7161P	5.45
TA7162P	3.25
TA7169	9.54
TA7172P	1.41
TA7176P	2.48
TA7193AP	6.67
TA7193P	5.50
TA7201P	2.71
TA7203P	2.18
TA7204P	2.16
TA7205P	1.38
TA7206P	6.35
TA7207P	3.34
TA7208P	2.15
TA7210P	3.58
TA7214P	3.63
TA7215P	2.58
TA7217AP	1.45
TA7222	1.95
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TA7227P	2.81
TA7229P	4.45
TA7230P	4.98
TA7232P	6.60
TA7233P	6.95
TA7240AP	7.83
TA7245P	7.50
TA7270	7.50
TA7310P	2.15
TA7312P	2.45
TA7313AP	1.50
TA7314	5.94
TA7323P	3.15
TA7325P	1.15
TA7339P	1.60
TA7340P	5.06
TA7607AP	13.90
TA7609	3.28
TA7611AP	4.80
TA7616P	5.25
TA7622AP	8.94
TA7628P	5.98
TA7629P	7.50
TA7630P	2.98
TA764QAP	1.55
TA7672P	2.25
TA7676P	2.81
TA7726P	10.25
TAA320A	1.27
TAA350A	6.45
TAA570	1.74
TAA621AX1	4.85
TAA621A12	2.14
TAA661B	2.62
TAA691	8.58
TAA700	3.75
TAA930	4.87
TAA970	2.83
TAA110	2.52
TAG232-600	0.73
TAG626-600	1.06
TBA120AS	1.24
TBA120SB	1.05
TBA120T	0.95
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TBA120A	1.05
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TBA1440G	5.20
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TBA240A	3.99
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TBA395Q	1.10
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TBA400	2.39
TBA440P	2.45
TBA480Q	1.30
TBA500P	6.58
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TBA570Q	1.60
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TBA810T	1.50
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TC4081BP	3.25
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TC9002BP	13.10
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TCA270SQ	1.65
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TCA420A	2.16
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TCA530	2.24
TCA640	7.36
TCA650	2.04
TCA660B	3.30
TCA730	3.81
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TCA890	5.44
TCA900	2.04
TCA910	2.04
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TCE330	3.89
TCEP100Q	10.25
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TD3F900H	4.16
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TD62104P	2.50
TD62706P	4.50
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TDA1005A	2.22
TDA1006A	2.11
TDA1010AF	4.25
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TDA1035S	2.95
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TDA1047	4.10
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TDA1060	2.60
TDA1082	3.25
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TDA1190	2.11
TDA1190Z	3.96
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TDA1236	4.30
TDA1270	3.55
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TDA1412	1.05
TDA1420	2.55
TDA1440	3.45
TDA1470	3.16
TDA1470P	4.25
TDA1506	7.45
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TDA2571AQ	3.60
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TDA2593	2.47
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TDA2595	3.65
TDA2600	5.50
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TDA3652	5.44
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TDA4420	4.02
TDA4422	8.32
TDA4427S	9.00
TDA4431	2.27
TDA4440	2.87
TDA4442	4.75
TDA4500	6.30
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TDA4610	4.80
TDA4620	4.78
TDA5500	4.78
TDA5700	2.60
TDA7270S	2.25
TDA8190	3.47
TDA9403	3.15
TDA9503	2.92
TDA9513	5.44
TDB1033	6.68
TDE1081	6.61
TE626	1.49
TEA1002	3.47
TEA1009	1.86
TEA1014	3.30
TEA1020SP	8.21
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TIC44	0.72
TIC45	0.77
TIC47	0.35
TIP120	1.06
TIP110	0.53
TIP112E	0.85
TIP112	0.88
TIP117	0.95
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TIP126	0.73
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TIP137	1.50
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TIP29C	0.40
TIP29D	0.75
TIP3055	0.75
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TIP30C	0.16
TIP31A	0.34
TIP31B	0.38
TIP31C	0.50
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TIP32B	0.69
TIP32C	0.40
TIP33	0.85
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TIP34	3.54
TIP41A	0.49
TIP41B	0.65
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TIP42A	0.49
TIP42B	0.53
TIP42C	0.53
TIP47	0.65
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TIP49	3.61
TIP55A	3.65
TIS43	1.43
TIS90	0.28
TL011CP	1.55
TL072	2.85
TL494CN	6.74
TLD72CP	2.55
TMP4320	15.00
TMS1024NLL	11.25
TMS1025N	16.95
TMS3720ANS	19.50
TMS3748NS	14.95
TMS3755	13.65
TMS3894NL	19.25
MS5102NLL	6.25
TUA2000	8.98
TV106	1.86
TY6010B	2.97
U05G	1.14
ULN2204	11.45
UPA53C	4.94
UPC1003	5.95
UPC1009C	6.32
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UPC1028H	2.00
UPC1020H	2.77
UPC1032H	0.62
UPC1042C	8.95
UPC1156H	2.96
UPC1158	5.84
UPC1161C	4.50
UPC1182H	1.82
UPC1186H	1.05
UPC1181H	1.25
UPC1185H	2.94
UPC1188	6.95
UPC1213C	1.25
UPC1212C	1.72
UPC1225H	3.25
UPC1230	5.24
UPC1238	3.15
UPC1263	3.45
UPC1277H	5.85
UPC1278H	4.85
UPC1351C	1.81
UPC1350C	1.40
UPC1353	7.85
UPC1355C	2.13
UPC1363	4.20
UPC1362	2.98
UPC1365C	6.98
UPC1366	7.25
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UPC1378H	4.25
UPC141C	3.75
UPC1458	8.66
UPC151C	2.95
UPC2002	1.48
UPC30C	2.51
UPC324C	4.70
UPC32C	5.25
UPC339C	4.90
UPC41C	4.10
UPC4558C	2.15
UPC474	5.11
UPC554C	1.85
UPC566H	2.95
UPC574	3.25
UPC575C2	2.40
UPC576H	2.58
UPC577H	1.25
UPC578C	8.70
UPC580C	4.13
UPC587C2	1.34
UPC592H	2.15
UPC595	2.95
UPC596	1.98
UPD1514C	8.95
UPD2819C	4.98
UPD4013B	4.00
UPD4066B	4.95
UPD553-164	19.25
UPD8049C-1	10.85
X0007TA	4.68
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	6.52
X0065CE	6.25
X0074GE	10.00
X0077GE	15.96
X0079CE	4.95
X0092CE	4.95
X0096CE	5.98
X0109CE	11.25
X0113CE	2.07
X0195CE	7.50
X0204CE	8.74
X0261CE	8.75
X1222AF	3.63
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Letters

INTERFERENCE WITH VCRs

I would like to add a couple of comments on the problem of interference and VCRs (see December issue, pages 103 and 115). Today's rather badly screened VCRs are often housed in a cabinet beneath the TV receiver and interference between the power supplies in the two pieces of equipment can cause patterning. The best solution is to increase the separation between the two, but this is not always convenient. In such cases a layer of aluminium kitchen foil, glued to the underside of the shelf or receiver base (take care not to block any ventilation holes), will nearly always provide a cure. It's ironic when one recalls that such a screen was almost a standard fitting in receivers before the days of VCRs.

In this area we are often troubled by interference from civil aeronautical radar using frequencies in the spectrum 1·215-1·365GHz. The standard solution to this problem is the old-fashioned quarter or half wavelength stub cut to the radar wavelength. The technique was described in *Television* many years ago but for the benefit of newer readers the details are as follows. An open-circuit half wavelength or short-circuit quarter wavelength of coaxial cable acts as a short-circuit to interfering signals when wired across the aerial feeder. If the frequency of the interference is roughly known, cut off a length of coax somewhat longer than a half wavelength. Temporarily connect one end across the feeder at the aerial socket and trim off the other end – about half an inch at a time. The interference will be reduced and, when the correct length is found, will disappear. It may be that the wanted signal will fall during this process – keep going, the stub has only been tuned to the wrong frequency. When the correct open-circuit length has been found the cable can be cut in half and the inner and outer conductors short-circuited. At the frequencies involved here this reduces the length to about three inches – the open-circuit length is quite easily soldered to the back of the coaxial socket and 'lost' inside the cabinet.

Geoff Lewis,
Canterbury, Kent.

SONY SLC5/7 DODGE

Further to G. Jackson's comments (December) on reversing the idler tyre in the Sony SLC7 to cure faulty rewind I tried this dodge on my SLC5 and it's been fine ever since. That was three years ago – I should have written before!

Has anyone any idea why R1308 (47Ω) on the mains input panel in the Philips G11 chassis should burn out? We've found three of these sets where this has occurred.

P. Odenrode, B.A. (open),
Sale, Cheshire.

THUMBS DOWN TELETEXT!

Thinking about the letters on the subject of teletext prompts me to put pen to paper. If the BBC didn't put out pages of Ceefax all day would any self-respecting engineer or salesman ever sell a teletext receiver? I think not! Having spent so much money (from the licence fee) in producing the service they have to push it to justify its existence. The receivers cost far more at first but the cost has been reduced through tax/rental/h.p. concessions because the sets weren't selling at all. *If* information is required, Prestel is the only service I'd personally recommend.

H. Rogers,
St. Albans, Herts.

MORE ON THE AMSTRAD PCW8256/8512

In his recent article (December) Vivian Capel outlined what you can achieve with a word processor, taking the Amstrad PCW8256 as an example. Having used one of these units for the past year I can only agree with the conclusions he reaches on the advantages of word processing and the pros and cons of the LocoScript program provided with the machine. If you use one of these for a while, going back to a typewriter is like giving up your car for a horse and cart!

But the PCW is more than a word processor. As well as running Basic, Logo, Pascal and the other computer languages available you can use any of the vast range of software written under the CPM operating code. Databases to replace your filing systems and spreadsheets to simplify and analyse your figures and accounts are all helpful: the opportunity to computerise a one-man operation at a realistic cost is finally here!

If, as a television engineer, that aspect of the PCW doesn't seem relevant, don't forget that we are still talking about a piece of electronic equipment that's selling in large numbers. Look on it as a monochrome monitor with a built-in computer and an associated keyboard and printer and, despite its reliability, some servicing opportunities might arise. In this connection the following notes may be of assistance.

The PCW does not have an extensive built-in ROM as do the home computers with which most of us are by now fairly familiar. At switch on you just get a green raster with no welcome message. A small program runs from switch-on, but this merely enquires whether a disc has yet been loaded. To initiate the system you have to load a disc (or boot a disc as computer people like to say). So you must insert either the LocoScript or CPM disc to get things going. With the disc in, the red indicator for disc drive should flash and a few seconds later you should have a display on the monitor.

Should the disc slot home, followed by the sound of a whirring motor with the LED flashing in accompaniment, but nothing except perhaps a slight change of intensity and what seems to be flyback lines appears on the screen, suspect a faulty disc drive assembly. There's not much you can do with these without the correct alignment disc, and Amstrad do not appear to be too liberal with these. A quick check that the disc is seating correctly is worthwhile however, also an inspection for any foreign objects. Otherwise an exchange disc drive is the answer.

If inserting a disc has no discernible effect at all you have a problem with the CPU section. Confirm that the monitor circuit is providing the required 5, 12 and 24V d.c. lines, then check for the presence of 4MHz pulses at pin 6 of the Z80 microprocessor chip. At initial power on a nice clean reset pulse should reach pin 26 of the Z80. Still no success? Then check the outputs of each of the eight RAM chips (16 in the PCW8512). A scope connected to pin 14 of each RAM chip in turn should reveal a 5V peak-peak signal, with each chip providing a more or less identical output. Any waveform that looks to be

distorted or damped in amplitude will identify a faulty chip. Note that on a couple of occasions I've had two faulty RAM chips at the same time.

Should the procedure so far draw a blank you have to consider a problem with the ULA or one of the PIO chips. These are Amstrad special components and are soldered directly into the double-sided print. As substitution is the only real confirmation of a faulty chip, and the ULA is one of those 80-pin flat-pack devices, you might at this point consider cutting your losses. There's no need to feel too intimidated however – nearly all problems with the CPU section are caused by the Z80 or the pluggable RAM chips.

Problems with the printer tend to be mechanical. Dirt in the mechanism can make the print head jump or stick. With some new printers one of the pins in the print head sticks in the out position, causing a line to be etched through all the words in a document. This normally clears itself after a couple of runs and doesn't justify changing the print head itself.

TV engineers will feel most at home with the monitor itself of course. The green-screen monitor's circuitry is straighforward. The only thing to watch out for is a faulty power supply chip in a dead unit. If the STK7308 power supply chip has to be replaced, check the following components before switching on: R5001, R5002, R5011, D5007 and D5005. Field collapse is always due to the field timebase chip IC4001. Bent verticals at the top of the display after the unit has been running for a period of time merely requires the line hold control to be reset. This is VR4005 and access is available through a hole in the back of the cabinet. Lack of brightness with e.h.t. present is not common but if this is experienced check the video output transistor Q8001 and bear in mind that the problem could be due to the CPU panel.

One final point on these computers. There are two versions, the PCW8256 which has one disc drive and 256K of RAM and the later PCW8512 with two disc drives and 512K of RAM. There's a big demand for upgrading the earlier units to the 8512 specification. This is a simple task for the technician but is somewhat daunting to the layman, so some opportunities could arise here. Conversions could consist of fitting a second disc drive, fitting eight additional RAM chips, or both.

Fitting a second disc drive is easy if you follow the instructions provided. One point to note is that the three black transport screws fitted to the new disc drive assembly must be removed – some instructions don't make this clear. Upgrading the RAM capacity consists of fitting eight 16-pin in-line chips into the holders provided on the CPU panel. Some suppliers provide a dummy chip for you to practice with, but I think we can overlook this!

Having fitted the extra chips a switching bank must be altered. Later models have a row of four clearly marked switches, A, B, C and D. For 256K (eight chips) switches A and D are in the on position while for 512K (16 chips) switches B and D must be in the on position. The earliest versions of the PCW8256 have soldered wire links instead of switches. This is where people trying to upgrade their computers tend to run into trouble. Two links are used in the PCW8256, from point B to a centre point and from point C to a centre point. When upgrading to a PCW8512 remove the wire link to point B and reconnect it to point A. A quick look at the panel soon makes it obvious what has to be done.

C. Holland,
Dundalk, Co. Louth.

The ITT FT110

George Wilding

The ITT Model FT110 – the FT stands for Feather-Touch channel selection – was the first solid-state colour set from ITT to be sold in the UK. It's a 26in. model with a 110° delta-gun tube and was designed and manufactured in W. Germany. Its release in the UK seems to have been something of an interim measure, occurring as it did towards the end of the long period when the famed CVC5-CVC9 series of hybrid receivers were on sale. Though the number of FT110s around is not great, if you can get one with a good tube – as is usually the case – you'll find it a good bet for the second-hand market. The shallow, teak finish cabinet, modern styling, eight channel touch-button station selector and "ideal colour" facility make it an attractive set.

Reliability is good, apart from the BYX55-350 diodes (D507-8) used in the EW modulator circuit. Replacements should have higher current and voltage ratings. There are only three chips in the set, the TBA120 used in the intercarrier sound channel and the SAS560/SAS570 touch tuning combination, which has a good service record. The two-position drop-down chassis and convergence box that pulls up to provide adjustment from the front make servicing straightforward.

Power Supply Arrangements

The one thing likely to puzzle those not familiar with this chassis is the integrated chopper power supply/line timebase arrangement used. Fig. 1 shows the arrangement in block diagram form. Basically, the chopper circuit is interposed between the line oscillator and the line output stage. The line oscillator provides a pulse output to drive the pulse-width modulator circuit while the line output transistor is driven by a secondary winding on the chopper transformer. ITT refer to the chopper as a converter stage. Operation of the chopper circuit is conventional: the pulse-width modulator stage provides the variable mark-space ratio drive required to stabilise the output voltages obtained from the chopper transformer, feedback from the 28V rail providing the necessary sample of the output conditions.

The single BY133 h.t. rectifier charges C731 (reservoir) and C732 (filter) to 280V. Make sure that these capacitors are discharged before you handle the "switch-mode/line oscillator" board. The chopper transistor T712 is specified as being a specially selected BU208. I've yet to find one that has failed, but if replacement is necessary it would be best to use a transistor with a higher rating. R737 sets the chopper output voltages: adjust it for 163V across C752.

All outputs from the chopper stage are turned off if there's an excessive current demand on any of them. R755 (1·5Ω, 2W) in the chopper transistor's emitter circuit is used to sense the output conditions. The voltage across this resistor varies from 0·6V at zero beam current to 0·9V at maximum beam current. If the voltage rises above 0·9V the trip transistors T708/T711 switch on, removing the input to the base of the chopper driver transistor. The trip circuit also senses the conditions in the line output stage. It operates for about 400msec, after which T708/T711 switch off. The chopper supplies are then built up again and if the overload persists the trip action is repeated, giving rise to a repetitive clicking sound.

The BU208 line output stage is conventional, with a diode modulator used for EW raster correction and a transductor for NS correction.

Points to Note

While converging a 110° tube is always more difficult than converging a 90° tube, the process is made easier by the previously mentioned pull-up box. The coil cores are all of the extra wide type however and though fitted with what the manual describes as "turning screws", i.e. plastic blades with a small knobbed extension which passes through the core, ferrite particles tend to break off and cause jamming. This means that the former can move slightly, breaking the coil connections. If any core is found to be hard to adjust it's best to remove it in the easiest direction, clean the interior and exterior threads, and apply a light coating of Vaseline before proceeding

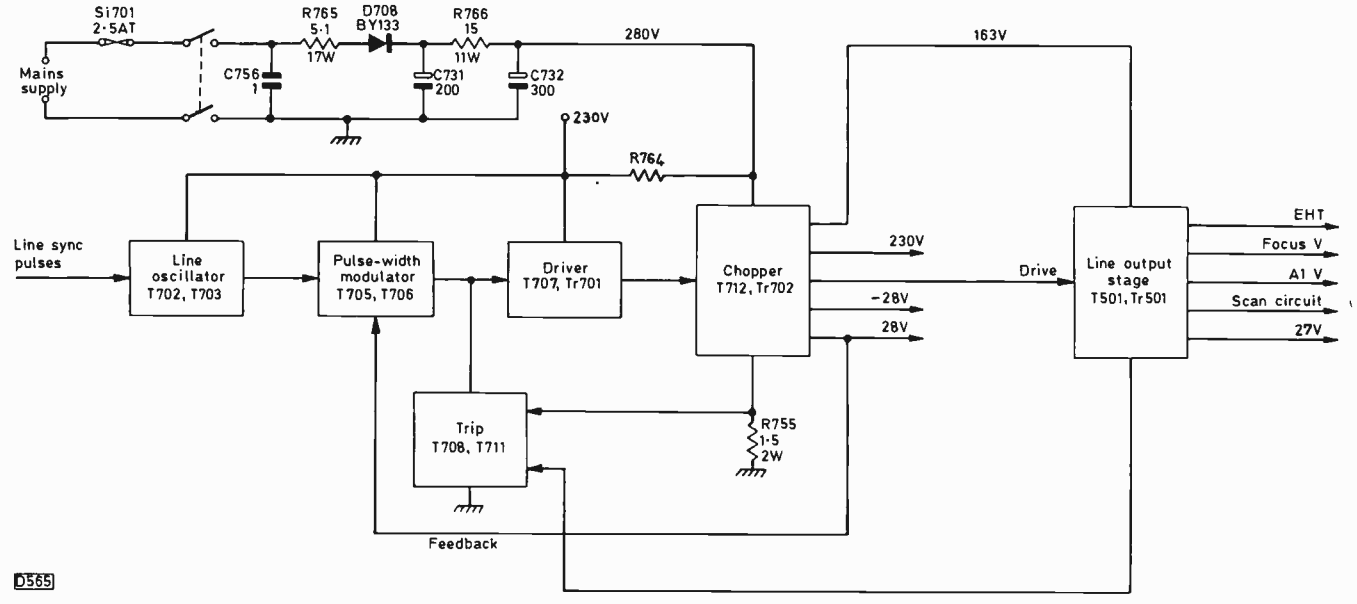

Fig. 1: Block diagram showing the power supply arrangements used in the ITT Model FT110. R764 (3·3kΩ, 4W) provides a start-up feed.

further.

After some years of service the carbon track of the special, chassis-mounted R/G scan-correction potentiometer R478 (5kΩ) tends to flake off. As a result it goes open-circuit. This potentiometer is no longer available from ITT, but as a hole was provided on the chassis for the knob to go through it's usually possible to obtain a similar or larger wattage replacement and fit it so as to give screwdriver adjustment.

Note that the usual static convergence magnets are supplemented by three potentiometers at the base of the convergence box, R682, R684 and R689. These should be set to the centre of their travel before adjusting the magnets.

Bless 'em All

Les Lawry-Johns

Having seen the Singing Detective on TV I was reminded of that awful period last autumn when I was covered with psoriasis. It appeared just as my usual mild summer attack was waning. Perhaps the shock of my friend's suicide upset the whole system, for within a matter of days I was covered with it – except for my face which was relatively free. In this condition I went to see Laura Lovitt – the one who used to have the dicey Decca.

The Singing TV Engineer

This time it was a TX9, suffering I hoped from nothing more than a failed fuse. I took the back off, pulled off the fuse cover and checked the fuse. It was open-circuit with no sign of blackening. So I slipped in a new 2·5A fuse and switched the set on. A nice picture appeared and Laura came over and placed her hand on my badly affected shoulder. I had to shake the hand away and Laura stared at me.

"Can't I touch you now?"

"Not at the moment dear. I'll show you why."

So saying I pulled back my sleeve to show her the mess. She backed away.

"It's VD you see."

"Ahh" she screamed. "Keep away from me you beast."

I laughed as I pulled down my sleeve. "Don't worry Laura. It's actually psoriasis and I can't give it away. It'll go when it's ready, which shouldn't be long now. A friend of mine hung himself and this came up all over me. Nice isn't it?"

I could see that Laura was glad to see me go. Fortunately it did clear up soon afterwards.

The Prinzvision

Back at the ranch I found a Prinzvision TV171 17in. monochrome portable on the bench. The tag said intermittent field collapse. I didn't have a circuit and I couldn't see the field output transistors, only those around the height and hold controls – and they were small ones. When I switched the set on the raster was fully scanned. I directed the hairdryer around the height control area and the raster collapsed. I then sprayed the area with freezer, but the white line remained. I sprayed here and there until it looked like something from the depths of the Yukon (which I wrote about some time back but the editor cut out because he doesn't like Eskimo Nell, spoil-sport that he is . . .).

At last I got around to making a more intelligent examination and followed the scan coil leads down to chassis, then looked underneath to see where they went. They sloped off up to the left-hand side, to a raised heatsink panel where the two output transistors lived. I never thought of looking up there. I sprayed them and the front one turned out to be the culprit. It was replaced in a flash, restoring peace on the home front.

The Pye 741

The chap who brought in this Pye set (741 chassis) said "it comes up from the bottom and pokes a finger up at you". This I had to see. I connected the set, switched on and a perfect picture appeared.

"I'll leave it with you so you can look at it."

"Thanks very much, very nice of you" I said.

Well after about an hour the bottom of the picture came up about four inches (26in. tube) and a black finger poked up at the bottom right side of the reduced picture, just like the chap said it would. I was shocked. Fancy it doing that to someone who was going to try to make it better.

The set had vertical panels like the 725 series and I thought that the trouble would be on the upper right side field output panel. I tapped around this and even pulled the earthing tag off. This relieved the load on the supply, which is derived from the line output stage to the left of the tube. The voltage rose and the 30V stabilising zener diode decided to go short-circuit. This destroyed the 6·8Ω filter resistor which didn't even spring open. I was a bit upset by this since these items are not in the most accessible of positions. Some time was spent on replacing them. When peace was restored and a raster at last appeared on the screen it was fully scanned.

I examined the field output panel with ice cool eyes (glasses off). There appeared to be many dry-joints which were attacked with my usual ruthlessness, iron and solder. Nothing escaped. After this the set remained stable for about four hours and I concluded that I'd won. The owner returned to pick up the set and paid – all in ten pence pieces. His son later told me that they were from his money box. The swine!

Later that night, as we were drinking our whisky coffee, we heard a bang on the shop door and the dogs went mad. I slipped down the stairs and found the same bloke standing there.

"It's gone again and I paid you."

"O.k. old chap, bring it back tomorrow and I'll give it a longer test. At the moment I'm entertaining the Queen and Prince Philip."

"Posh, aren't we?"

"Not really. They often pop in when passing."

So it came back next day and I spent some time trying to find out what had damaged the zener diode. The one I'd fitted was big enough for gawd's sake but it had gone short-circuit. I took it out and switched the set on. There was full scan and the chap who'd brought it back admired it, together with half his family – whom I wanted to get rid off as quickly as possible.

"That's it. You've done it."

I protested weakly that it could well happen again and that he wouldn't like it much if it did.

"It's not me mate, it's the wife. She screams the place

down when the finger comes up."

"Get rid of her, that's the best thing. Or tell her to repair it herself."

And off they went, doubtless to return another day.

A Call from Mrs Furnace

Mrs. Furnace had phoned to say that her Philips G6 (the one I bragged about some time ago, having given sixteen years long and faithful service) had given up the ghost. I rushed up to her house to hear her sad story and took the back off the set while I listened. As I could find no juice at the on-off switch I lay on the floor and played with the two-pin plug that went into a shaver socket that went into the mains switched socket. There was juice there all right. Mrs. Furnace accused me of looking in the wrong place.

"My light lights when I plug it in there, so it must be all right."

I undid the two-pin plug and found a lead out. This was refitted and we tried again. The set now came on and worked fine.

"Could I have done that myself?"

"Yes dear. You didn't need to spend that long and lonely evening on your own. But how were you to know that?"

TV Fault Finding

Reports from Philip Blundell, Eng. Tech., D. Burke, L. Dinsdale, Roger Burchett, Paul Hardy and Michael Dranfield

Philips K35 Chassis

This set was suffering from a very bad case of hooking on video playback. There have been quite a few modifications to the chassis to improve the performance with VCR operation but this set had the latest version (BY05) of the sync module and should have been all right. A stock BY02 module was tried and gave correct operation, so the two circuits were compared to see what the differences were. One was that C375 had been removed. Fitting this capacitor produced a stable picture. **P.B.**

Telefunken 415 Chassis

Continental TV sets with multi-band tuners catch me out every time! This example had very bad patterning on ITV only and I'd changed the tuner and half the components in the i.f. strip before I thought to check the band switching voltages. Yes, the set was trying to receive Bands I, III and u.h.f. all at the same time due to a leaky band switching transistor. **P.B.**

ITT Digi-3 Chassis

Intermittent operation of the remote control system was the problem with this set. Substitution proved that the fault was on the control panel, but a change of all the socketed chips had no effect. The supplies were o.k. and the remote control signals were reaching pin 12 of the microcomputer chip which was intermittently ignoring them. Applying freezer around the clock oscillator seemed to instigate the fault so T1410 (BC238) was replaced. This restored normal operation. **P.B.**

Philips G11 Chassis

Dry-joints on R4059 (15kΩ) on the power supply panel are becoming a problem with this chassis and can result in a blown BU208 line output transistor. **D.B.**

ITT CVC45/1 Chassis

This set would trip ten seconds after switching on. The delay threw suspicion on the line output stage – maybe the tripler was faulty. Sure enough disconnecting this stopped the tripping, but a new tripler failed to provide a cure. It was next assumed that an excess current rip was operating due to some other fault in the line output stage. Turning down the brightness and contrast controls stopped the tripping, so the service manual was consulted. This revealed that the set doesn't have an excess current trip, only an over-voltage trip. As the h.t. was correct at 127V it seemed that there was a fault in the trip circuit. Removal of the chopper drive panel revealed a couple of likely looking resistors in the trip circuit. When R806 (470kΩ) was removed it was found to read 594kΩ while R809 (220kΩ) had risen in value to 4·3MΩ. Replacing these two resistors cured the fault but left us with the puzzle as to why disconnecting the tripler had stopped the tripping. We can only assume that the reduced line output stage loading affected the supply to the trip circuit. **M.D.**

Decca 80 Series Chassis

Here's a warning for some of you. The set was dead with a blown mains fuse. No shorts could be found so a new fuse was tried. At switch on the line output stage showed signs of distress and the fuse blew. Without doubt the tripler was faulty, so I proceeded to disconnect it from the nipple on the line output transformer overwinding. Guess what? The nipple fell off, so a new line output transformer had to be fitted free of charge. So be warned: use only light pressure when applying the soldering iron to the joint to remove the tripler connection from the transformer. **M.D.**

Philips TX Chassis

The fault with this set was field collapse. It's not uncommon with these portables and is usually due to the field scan coils being open-circuit. Sure enough there was no continuity across the coils, but a closer look revealed that the wires connected to the scan coil pins had broken off. New wires were very carefully soldered on to the copper wire, then on to the pins, providing a cure. It seemed that the set had been dropped: the cabinet was slightly cracked and the vibration had probably jolted the scan coils, causing the wires to snap. **M.D.**

Grundig 45in Projection TV

A local pub asked us to look at this set which was reported to have a very poor picture. After taking a look I can only describe the picture as being like that produced by a G8 with a dud tube. The picture was very dull and

smeary even at full brightness.

The cause of the trouble was evident when the back panel was removed. The R, G and B tubes point directly at a small tilted mirror which reflects the beams upwards on to a larger mirror which in turn directs them at the screen. Sitting at the bottom of the cabinet, the small tilted mirror had become so thickly coated with dust that its reflective properties were severely reduced. A good clean with a duster and polish restored a bright, clear picture. The set was six years old and had never been serviced, so the problem was not surprising – especially as the mirror is right under the massive ventilation holes in the back. **M.D.**

Ferguson 3787

This set had the not uncommon symptoms of no field scan with the spark gap VA26 burnt up. The set performed satisfactorily when the faulty items and the scan and flyback thyristors had been replaced – for a time. Then the set tripped and the TDA1170 field timebase chip went short-circuit. After changing just about everything that seemed likely to have caused the problem the fault was still present. It was eventually cured by replacing CA12 and CA14 in the line output stage. These capacitors are both shown as 390pF on the circuit diagram but were actually 330pF. They tested o.k. but appeared to be lossy even by disc capacitor standards. Putting the original line output stage thyristors back restored the fault condition so both they and the capacitors were faulty. The set has been working daily for over six months so we do seem to have cured the trouble. **P.H.**

Thorn 8000 Series Chassis

This set had line drift as it warmed up – and the line oscillator couldn't be set up in accordance with the instructions given in the manual. Changing the flywheel sync discriminator diodes made no difference and we eventually traced the cause of the fault to C412 (10μF, 100V) which smooths the 18V supply to the line generator circuit. **P.H.**

Sony KV1820UB

The fault on this set was intermittent: at switch on there would sometimes be an almost completely black raster with just a little bit of picture showing at the bottom. A normal picture would eventually appear if the set was left on. I never saw this fault symptom but what I did find was that with no signal input the snowy raster would be blanked out intermittently. It seemed that there was a fault in the blanking circuit. The threshold is set by R820, R821 and R822 (whose value is adjusted on test). R821 was found to be 3·9kΩ instead of 4·2kΩ and when the correct value was fitted in this position the fault had cleared. Though the altered resistance value of the combined network wasn't great it was enough to upset the action of the blanking circuit. **P.H.**

Grundig GSC100/200 Chassis

This set was tripping. Earthing tag b (line drive) on the line output transformer made no difference so the fault was clearly somewhere on the flyback side of the line output stage or the preceding circuitry. Changing the flyback and e.h.t. regulating thyristors Ty501 and Ty503 didn't provide a cure and when the overload protection thyristor Ty615 was bypassed the result was smoke from R621. So there was definitely an overload somewhere.

About the only thing left was the module that drives the e.h.t. regulator thyristor. As a check, the flyback thyristor's gate and cathode were short-circuited to disable it, the start-up circuit was disconnected by unsoldering R607, and the line oscillator was run from a separate 12V supply so that I could look at the drive to the e.h.t. regulator thyristor. The output pulses from the monostable chip IC2511 were found to be varying in width erratically. Transistor Tr2516, which provides the regulating action, was very sensitive to freezer spray: when it was removed for testing it turned out to have a 5kΩ collector-emitter leak. Replacing it provided a complete cure. **P.H.**

Thorn 9000 Chassis

The fault report said "dead set". We found that h.t. was present at the collector of the syclops transistor VT701 but there was only 12V instead of 149V at the collector of the driver transistor VT412 – its base and emitter were also at about 12V. The line oscillator's output waveform (TP410) was correct so there appeared to be something wrong on the syclops control panel. As the voltages here all seemed to be incorrect the panel was removed to enable tests to be carried out on the transistors. Apart from VT601 and VT602 all the transistors were either short-circuit or open-circuit, while diodes W604 and W606 were both short-circuit. In addition R616 (100Ω) was open-circuit.

After replacing these faulty items the set was switched on. This produced a slight ticking noise from the syclops power board. Following the fault procedure given in the manual we shorted the base and emitter of VT601. This renders the syclops control loop open-circuit. The result was tripping with a loud hum on sound. Several electrolytics in the power supply were in poor condition and were replaced, but the problem persisted. Eventually I managed to borrow another syclops control panel. Fitting this restored normal operation, proving that the fault was on the original panel. Though the 4·3V zener diode W602 was all right when checked for resistance replacing it finally cured the fault. **L.D.**

Thorn 1696/7 Chassis

Considering how difficult it often is to locate a dry-joint, ponder on how this monochrome portable had worked for over eighteen months with the hot end of R1 and the bottom end of R2 devoid of solder, thus robbing the tuning line of its stabilised 33V supply! The set had also been left on for a fortnight hooked up to a video game. Apparently the two-way adaptor had eventually melted! The only damage to the set seemed to be slight scorching of the plastic on the mains transformer. **R.B.**

Rank T16 Chassis

Sound but no vision was the complaint with this monochrome portable. On inspection we found that R36 (18Ω) in the feed to the TBA800 field output chip had burnt out – the chip takes its supply from the 26V boost rail. As these sets are now quite old I suspected age as the cause of the resistor failure but the replacement got very hot. We were told that the set had recently fallen some distance so a more thorough inspection was carried out. This revealed a minuscule crack in the print near the positive tag of the boost reservoir capacitor C27 (220μF).

As a result the boost voltage was low at only about 20V. Repairing the break provided a complete cure. **R.B.**

Bush BC6004

The problem with this set was lack of width which couldn't be adjusted by means of P768. T764 (BC237B) was open-circuit base-to-emitter. Note that this transistor, which is part of the EW correction circuit, is on the field timebase panel. **R.B.**

Pye 713 Series Chassis

The complaint with this set was intermittent colour. We found that the fault was sensitive to movement of the decoder panel and on inspecting this C389 (2·2μF) turned out to be dry-jointed on one leg. **R.B.**

Grundig GSC100/Matsui Video

The Grundig set has been acquired with the house, which is at the end of a country lane. During a recent cold spell I received an enquiry as to why it wouldn't give good results when connected to the VCR. As I knew that four-wheel drive would be an advantage, and the trouble sounded like tracking errors, I suggested that Currys might like to check the video first! Later I received a call to the effect that the machine had been given a clean bill of health so could I check the set?

I found that the machine's own recordings played back quite well, but my test tape produced violent line pulling over the top quarter of the screen. The VCR was tried with the customer's other set and all was calm. So it must be the Grundig. The line speed was found to be spot on, so I retuned one of the spare channel selectors to the VCR's output. Still bad. Now this set has a twelve-button selector, with ch. 12 the AV one. As off-air results were o.k., something had to be wrong with the ch. 12 arrangement. A voltage check at the relevant input pin on the line generator module revealed a "floating" voltage that varied depending on which selector had been operated. When I traced the source back to the tuning board I found a single plug and socket marked "VCR". This hadn't been connected – or had been removed. Reconnecting it restored normal operation. Now Grundig experts might have spotted this immediately, but the lead was hidden by the ribbon cables and was not immediately apparent. Another lesson learnt the hard way! **R.B.**

A Guide to Coarse Servicing

Chas E. Miller

Some rather strange things happened when I popped in to see Ike Hodge recently, after an interval of a couple of months or more. First I had to park my 1955 Standard 8 a few yards away from Ike's shop door as there was a two-blocks long Boggs Super Saloon parked dead in front of it. This in itself was unusual to say the least: what followed was even more so.

Ike's shop door opened and out stepped an extraordinarily handsome lady, ushered out by the boyo himself. I saw some words being exchanged then the handsome lady threw her arms around Ike and planted this great kiss on his cheek. She then stepped into the Super Saloon and sped away.

I edged my Standard up to the vacated spot and peered out at Ike, who was standing there as though rooted to the spot, with a dreamy smile on his face. When I got out I addressed him several times before he noticed my presence.

"Whaddya say?"

"I said who on earth was that?" I repeated for the third time.

"Lucy Shadbold" he replied, still with that dreamy air about him. "We've known each other for years, ever since we were kids."

"Then what in the name of all that's sensible was she up to coming to see you?"

"Very funny I must say. As a matter of fact I've just done her a good turn."

"And you a married man!"

"No need to be coarse. The kiss was just a little bonus for services rendered. The real payment was this." So saying he flashed a cheque under my nose.

"Fifty quid!" I exclaimed. I was about to ask him how he could have possibly earnt such a sum when something else struck me. "How come you accepted a cheque? Isn't that against your principles?"

"Who says?"

"You do, frequently. I remember playing chess with you one day and when I said 'check' you replied 'sorry, cash only'."

"Just a slip of the tongue. This here cheque is cast iron solid – Lucy's married to Willie Shadbold the builder, and he's good for a sight more than that."

"You've not explained what she was doing here."

"It so happens," Ike replied loftily, "that I was able to do something for her that no one else could do."

"You mean something illegal?"

"Certainly not" exclaimed Ike, "just a bit dodgy."

"I know I'm going to regret asking about it, but what was this dodgy deed?"

"I've just saved her from being publicly ostracised, that's all."

"You mean you've promised not to tell anyone you know her?"

"If you'll refrain from cheap cracks I'll explain. I gave her back the most precious thing in her life – her credit rating."

"This wife of a wealthy man comes to you to restore her credit rating?"

"Lucy came from a poor family and was used to having to put money aside to pay bills as they came in. It's not necessary now but she can't break the habit. She still pays every bill on the dot, with cash."

"Except yours" I pointed out.

"I'll explain that. Now a month or so ago Lucy visited her sister who lives somewhere up north. This sister wanted to buy a car on the knock, but the h.p. company required a guarantor. Lucy offered to help out and was surprised when the car salesman came back and said he couldn't accept her – he didn't say as much, but gave the distinct impression that Lucy certainly wasn't credit worthy. Now Lucy had never owed anyone a penny in her life, so there had to be something wrong. She thanked her lucky stars it hadn't happened at home. What would they

have thought here if word had got about? And her husband's affairs wouldn't have looked too good, would they? So she came to see me – she didn't dare tell Willie."

"What could you do about it then?"

"Well, being a trader I could consult the national debt data register. I found that Lucy was down as owing five weeks on her TV rental. From the car salesman's point of view if she couldn't keep up a payment of about two quid a week what chance would she have of forking out thirty if called to do so? When I mentioned this to Lucy she said she'd never missed a week on rental payments in twenty years – she'd all the receipts to prove that she was up-to-date. So the next step was to check up on what was happening at the rental company."

"Which one?"

"Rockhard Rentals. As you know they've branches all round the area, with thousands of customers. Still a family business too. It's owned by two brothers, Jack and Nathan Rockhard. Straight as dies but they're getting on now and don't take an active part in it. There's a relative by marriage called Bender who runs the business for them, on a salary. Out of interest I went out and cased his home address. By the look of things he does pretty well for himself. Better I thought than he could do on what the Rockhards would be likely to pay him. So I started to wonder whether Bender might have some other source of income – in other words a fiddle."

"The fair Lucy couldn't have picked a better person to look into that" I commented, but the irony escaped Ike. He nodded complacently and continued.

"My feelings exactly. Next I started to do a bit of checking to see how the rental money is handled once the payments have been made into the branches. Apparently ninety per cent of it is in cash, and Bender collects it on Friday nights, taking it from the various branches to his main office where he bungs it in the safe. On Saturday mornings he checks it all out and enters the payments into the master account books. The branches have ordinary little duplicate receipt books – the customer gets the top copy and the counterfoil is handed over to Bender with the cash. That way he has an exact record of who's paid what."

"Sounds straightforward enough. Incidentally, I assume I'm not supposed to ask how you found all this out?"

"Naturally. Anyway, armed with this knowledge I sat down and tried to figure out what I might do in such a situation. Then next day I went and had a private talk with Mr. Bender. Told him I was a writer . . ."

"You didn't give him my name by any chance?" A horrible suspicion had struck me.

"Now would I do a thing like that?" said Ike. "What I said was that I was working on the plot of a crime story and needed a bit of professional help to ensure that the plot was plausible. He was beginning to look at me a bit strangely, but you should have seen his face as I went on! I said that in the plot the central character managed a TV rental business and had worked out a sure-fire scheme to make a bit on the side. Amongst the thousands of customers there would always be a few who missed the odd payment, and he could deal with these at his own discretion provided they didn't exceed a month in any twelve. So my fictional character started to hold back a certain number of payments each week, marking them down in the master account book as missed and putting the money into his own pocket. Provided he kept varying the list of supposed non-payers he could keep this up almost indefinitely, because so long as any one person appeared to owe the firm only one payment he could write it off as a normal business hazard. Only the real hard-case non-payers were pressed for payment and eventually had their names sent to the national debt data register. I figured out that he could easily make a hundred quid or more a week, tax-free, without any danger of being caught. Then something happened to give the game away. My fictional manager somehow slipped up and used the same customer's name too often so that it appeared on the register. By sheer coincidence the customer got to know about this and made a fuss that triggered off an investigation."

"Ike" I said in sorrow. "I know you've a scheming mind, but that beats everything. Were you thrown out on your ear?"

"Of course not. Bender had by then gone a sort of sickly colour and muttered that in his opinion such a scheme couldn't possibly work in practice. Said he was very busy and could we call it a day?"

"What happened after that?"

"I left it for a week or so then had another look at the register. The entry for Lucy had been amended 'due to wrong information provided in the first place' – well that's what it said. Anyway her credit rating is now excellent, hence the fifty quid cheque and kiss on the cheek. And friend Bender has gone off to visit his uncle in Australia."

"But didn't you say Lucy always paid cash?"

"She's learnt better. Cash can't be traced, but cheques can. You're far safer paying by cheque and crossing it 'A/C payee' so that it can't be used by anyone else for their own purposes."

"So I could pay you by cheque now?" I said brightly.

"Do you mind" snorted Ike. "There are limits to this sort of thing you know."

Service Bureau

Requests for advice in dealing with servicing problems must be accompanied by a £1·50 cheque or postal order (made out to IPC Magazines Ltd.), the query coupon and a stamped addressed envelope. We can deal with only one query at a time. We regret that we cannot supply service sheets nor answer queries over the telephone.

PHILIPS KT3 WITH TELETEXT

When the set is switched to text the display seems to be scrambled, i.e. with no line or field synchronisation. Text is all right in the mixed text/picture mode however. The power supply voltages to the teletext decoder panel seem to be correct.

It's possible, though unlikely, that there's a fault on the decoder panel. The first thing to do is to check that the 16V, 12V and 5V lines are correct and free from ripple – the three MC78-series regulator chips IC005, IC007 and IC010 can cause various problems. If the sync problem persists, key test points to check with a scope are pins 12 (syncs) and 16 (video) of the SAA5030 chip IC7007.

THORN TX10 CHASSIS

When the picture is dim enough (dark backgrounds etc.) a thin, vertical brighter line is superimposed on the picture about a quarter way across the screen from the left-hand side. Unlike a reflection it's not static but wavers. The line is not noticeable with a bright picture and also fails to appear with dead black, but with the right grey it comes into view and is then of constant brightness, slightly above the background level.

The only known fault of this type arises with remote-controlled receivers using receiver/decoder panel PC1548. If the set is of this type, change C915 from 0·1μF to 10μF, 25V. The cause of the problem is line pulse ripple on the 12V line. If the set doesn't incorporate this panel, check the 12V line with a scope. If the line-rate ripple exceeds 200mV, investigate the regulator and decoupling circuits.

PANASONIC NV370

The take-up spool doesn't rotate in the play mode, with the result that the tape is unwound into the machine. In the fast forward mode however the spool works, taking up the tape.

This fault is very common with the NV370 – and the NV850, which uses the same deck. It can be cured by fitting a modified idler assembly, part no. VXP0521. The improved idler can be identified by the blue plastic moulding or black dot on the left-hand side of the idler arm. Replacement is very easy.

TYNE 5224

The initial problem was no raster. Fitting a new tripler produced e.h.t. but the problem now is field collapse. Unfortunately it doesn't seem to be possible to get any data on these sets.

Tyne have been out of business for several years now, so that data and spares are no longer available. The field timebase used in this set is very simple however, consisting of a TBA800 chip (IC401) and a handful of peripheral components. Check the fusible resistor R421, then for dry-joints around Q401, the pincushion distortion correction components and the connections to the scan coils. If these are in order replace the TBA800.

GRUNDIG 5010 SERIES VCR OPERATION

Playback of my Panasonic NV370's own recordings on this set is perfect but with prerecorded tapes the top 3in. of the picture bends to the left, with a lot of distortion. Trying different channel selector positions makes no difference. It's been suggested that a modification may be necessary.

In many of these sets the seventh selector brings in the AV time-constant. If position seven gives no better results than the other positions fit a combination of a 1kΩ resistor and a 1N4148 diode, with the diode anode to pin 12 on the horizontal module and the resistor to pin Z9 on the electronic module. The diode (Di417) may already be present in the horizontal module.

HITACHI CPT1473

This set works perfectly when switched on from cold but after about five minutes it trips up and down from channel to channel for a couple of minutes then returns to standby. A channel cannot be selected until the set has been switched off for a couple of minutes, then the same sequence occurs.

Check for correct voltage level and absence of ripple on the supply lines to the two i.c.s on the programme selector panel, i.e. for 12V at pin 14 of IC1101 and 5V at pin 28 of IC1102. If these supplies are in order IC1102 (μPD1514) is suspect. Before condemning it, disconnect J1101 to eliminate the possibility of noise from the remote receiver section (IC1103, D1171 etc.) triggering false commands.

SONY KV1800UB

The problem with this set is no colour. There's no output at chroma bandpass transformer T302 and no voltage at the emitter of the associated amplifier transistor Q301, but we can't find the cause of the trouble. We've checked for faulty electrolytics, which seem to cause a lot of problems with the decoder panel, but have had no success this time.

If Q301's base voltage is above 0·7V it's almost certain that this transistor is faulty, with an open-circuit base-emitter junction. Check the base and emitter voltages at the legs of this transistor, since bad joints are quite common on the decoder panel. An alternative and less likely possibility is that the a.c.c. transistor Q302 in Q301's emitter circuit is short-circuit of being driven excessively. Meter checks should soon prove this point.

FERGUSON 3V16

This VCR normally works all right but on occasions there's a fault on playback. When this occurs the picture breaks up every one-two seconds, slowly drifts back then breaks up again. The break-up is accompanied by a swishing noise on sound. It's sometimes possible to correct the fault by running the tape back and forth a few times.

The symptom is loss of capstan lock. After a long period we've known drift to necessitate resetting of the capstan servo: set up the capstan sampling position controls R106 and R109, using a scope. If the fault persists, check for the presence of control pulses at TP4 and the MM output at TP3. If the ripple voltage across the motor exceeds 0·6V peak-peak the motor itself is faulty.

THORN 9600 CHASSIS

The problem we've got with one of these sets is field jitter. Any suggestions?

The usual cause of field jitter with this chassis is faulty electrolytic capacitors or bad soldered joints. Check the joints first, especially in and around the field output stage. Make sure that none of the presets (linearity, shift, NS balance, height, etc.) is junky, then if necessary check the decoupling capacitor C823 (47μF), the field scan coupling capacitor C829 (1,500μF), and the linearity sampling resistor R844 (1Ω).

TEST CASE

290

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.

How time flies! We tend to think of the Thorn TX9 chassis as a very up-to-date one – it seems only yesterday that it was introduced. Yet the TX9 was launched over seven years ago. It was one of the last designs to use a thyristor power supply, though the final 1044 version used a chopper instead. The tale of woe to be unfolded concerns an early version (1980 vintage) with a thyristor to provide h.t. regulation. Its problem, initially dealt with at the customer's home, was violent mains fuse blowing. A new 1·6A anti-surge fuse had been fitted and the set had then roared into life with no sign of distress. So it had been left at that. But within days the new fuse blew in no uncertain manner and, after its owner had been given a close grilling, it was brought into the workshop.

"Did it go at switch on?"

"No, it was running at the time."

"Were there any sound or picture disturbances before it went?"

"Don't know, I was in the kitchen at the time."

Oh well!

The workshop technician had some ideas. He changed the bifilar mains filter choke L64 – he'd once found one of these internally short-circuit in a similar set. Next he replaced the mains bridge rectifier diodes D62-5 for BY127s. He then reassembled the set and let it run. Late that same day the mains fuse blew again. The technician wasn't there when it happened. He was in the little kitchen out back, making some coffee . . .

What was for sure was that the overload, whatever it was, happened while the set was running. Taking advice from several quarters the technician replaced the large chopper choke L65 with the later "002" version, the over-voltage sensing zener diode D85 with an approved type, and changed the bridge rectifier protection capacitors C134/5 to 0·01μF types supplied by Ferguson. The latter would take care of the mains-borne spikes that everyone assumed were at the root of the trouble. But the 1·6A fuse continued to blow at random intervals.

What now? The most expensive new part, the chopper choke, was hastily removed and the original was refitted. Since the excess current sensing resistor R197 (10Ω) in the h.t. line appeared to be quite unstrained it was assumed that crowbar thyristor CSR2 was providing the fault current path – a correct assumption as it turned out. So the thyristor was changed in case it was leaky. It probably wasn't, because the fuse-blowing continued unabated at intervals of a few hours, sometimes a day or two.

By now a great deal of time had been spent on the set and lots of perfectly good components, as well as the blackened and shattered fuses, had been removed from it. The guilty little culprit was eventually found – and would have been found much sooner had a proper diagnostic procedure been followed instead of a trial-and-error binge. Any ideas? See next month for the solution.

ANSWER TO TEST CASE 289
– page 194 last month –

Our ITT colour set (CVC30 chassis) last month was suffering from tube trouble – or was it? We left Resident Workshop Sage grimly sitting behind the set, with its blurred, greenish and flat picture, equipped with his scope and test meter. His initial investigation had revealed that all the critical voltages in the set were low, though this was far from obvious in view of the picture's full width and height.

All became clear when the h.t. voltage was checked. The reading obtained across the smoothing capacitor C52 was about 130V instead of the expected 160V. To compensate for the resulting low scan amplitudes someone had wound up the width and height controls. It was at first thought that a CMP10 (125V output type) chopper control module had been fitted in error, but the label said CMP30 and that's what it was. Adjustment of R808 (output voltage) put things right. We'll never know why it had been set low with the amplitude controls wound up: perhaps the most likely explanation is that the twiddling had taken place to eliminate flashover in the original tube.

Why did the twenty per cent reduction in the h.t. voltage have such an effect on all aspects of tube operation? Because all the tube's supplies – heater, cathode, first anode, focus and e.h.t. – were proportionally reduced. The combined effect was tremendous.

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4275	0.047 1KV X5	2.47
4276	0.1 600V X5	1.20
4277	0.1 1KV X5	1.98
4278	0.1 1250V X5	2.38
4279	0.1 2KV X1	0.75
4280	0.22 600V X5	1.45
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2907	T3500 THICK FILM VID LOAD	1.56
4563	T38000 MAINS ON/OFF SW.	3.10
4412	T4000 FOCUS CONTROL UNIT	7.60
3273	T6818 220K BRIGHT CTRL	2.18
2909	T8500 FOCUS CONTROL UNIT	2.56
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SAFETY CERAMIC

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3029	MAINS DROPPER THORN 1500	1.75
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5386	MAINS DROPPER DECCA 100	1.00
5533	PYE CT200 PHILIPS 579 DROPPER	3.45

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4379	PHILIPS/PYE G11 2 FUNC RCU	18.90
4359	PHILIPS/PYE KT3/KT30	16.13
4385	RBM 16CH NONTEXT RCU	24.10
4386	RBM 8CH NONTEXT RCU	23.40
4387	RBM TEXT&V/DATA RCU	20.78
2980	REMOTE CTRL UNIT PHILIPS G9	9.85
4390	TCE 9000CHAS 2 FUNC RCU	19.20
4398	TCE TX10(9653)+TEXT RCU	24.78
4400	TCE TX10(9670)+PREST RCU	21.78
4397	TCE TX9/TX10	19.20

PUSH BUTTON UNITS

2870	4 WAY DECCA ETC	8.25
2871	6 WAY DECCA	11.78
2873	4 WAY HITACHI ETC	5.50
2875	4 WAY PYE/TCE	10.07
2877	6 WAY GEC 2110	11.25
2878	7 WAY GEC 2112	10.95
2879	6 WAY T3500	2.75
2880	6 WAY PYE 713	15.75
2881	6 WAY T9000	7.25
2882	4 WAY BUSH A823	10.93
2884	6 WAY MOD CVC9	12.85
2885	6 WAY 520 PHILIPS	19.30
2886	6 WAY PHILIPS 550	21.25
2887	T1P SWITCH UNIT PHILIPS G11	27.50
2888	6 WAY PYE G11	11.25
2889	PIANO KEY MOD DECCA 2631	22.40
4935	7 WAY ITT CVC5	12.90
5278	GEC 2136 TAPERED	12.62
5279	ITT 6 WAY +VCR	10.70
5280	6 WAY BUSH T20	13.01

ITT SPARES

2972	ITT CP340 PB ASSY	32.98
4501	ITT CP340 SLIDER ASSY	7.50
4683	ITT CV40 FOCUS UNIT	1.95
5543	ITT CVC20 LINE DRIVE TX	3.85
4571	ITT CVC20 MAINS SWITCH	1.36
4787	ITT CVC25 6N2 2KV CAP	1.35
4786	ITT CVC25 8N2 2KV CAPS	2.15
2970	ITT CVC25 BRIDGE COIL	4.05
4789	ITT CVC25 E/W LOAD COIL	1.92
4567	ITT CVC25/30 MAINS SW.	6.89
2969	ITT CVC32 DRIVER TX	2.55
4568	ITT CVC32 REMOTE MAIN SH	7.67
2971	ITT CVC32 SH MODE TX	5.00
4795	ITT CVC45 ON/OFF SWITCH	2.00
3286	ITT CVC5 1MFD 250V CAP	0.40
4569	ITT CVC5 MAINS SWITCH	1.05
4781	ITT CVC5 SHIFT POT 25R	1.82
4780	ITT CVC5 SLIDER BANK	7.41
2967	ITT CVC5-9 MAINS TX	8.40
4570	ITT CVC9 MAINS SWITCH	5.61

FUSES

STANDARD RANGES

20MM Q/B FUSE X 10	0.66
20MM A/S FUSE X 10	
63MA - 160MA	1.00
200MA - 5A	1.20
1.25" Q/B FUSE X10	
250MA - 800MA	0.95
1A - 5A	0.70
1.25" A/S FUSE X 10	
250MA - 2A	1.50
2.5A - 5A	2.30
PLUG TO P FUSE X 10	
2, 3, 5, 7, 10, 13A	0.95

SERVICE MANUALS

5011	DECCA 101/100	6.00
5047	DECCA 80 CHASIS	6.00
5442	DECCA/TATUNG 120	7.00
5022	GEC C2055H-C2255H	6.00
5023	GEC C2065H-C2265H	4.95
5026	GEC C2110-C2149	6.00
5068	HITACHI CPT2024	5.00
5074	HITACHI CPT2234	5.00
5094	ITT CVC20	4.00
5095	ITT CVC25+30	9.00
5096	ITT CVC40	9.00
5097	ITT CVC45/1	5.00
5513	ITT CVC800/801	5.00
5093	ITT CVC9	4.00
5123	MITSUBISHI CT200B	5.00
5527	PANASONIC TC2205	9.00
5116	PANASONIC TX2234	5.00
5127	PHILIPS G11 CHASSIS	4.00
5126	PHILIPS G8 CHASSIS	6.00
4515	PHILIPS KT3 SERV.	5.00
5135	PHILIPS T8-E	2.00
5136	PHILIPS TX	2.00
5143	PYE 725 731 SER	5.00
5145	REDIFFUSION MK1	3.00
5146	REDIFFUSION MK3	3.00
5147	REDIFFUSION MK4	5.00
5148	REDIFFUSION MK5	4.00
5167	THORN 1500	1.00
5168	THORN 1600	1.50
5171	THORN 1615	3.00
5172	THORN 1690-1691	5.00
5184	THORN 38030	2.00
5187	THORN 3V01	12.00
5188	THORN 3V16	12.00
5178	THORN 9000	6.00
5182	THORN 9800	10.00

RANK RADIO SPARES

4650	RRI T20 SPEAKER	2.36
5524	RRI T24E ON/OFF + VOL SH	2.35
4842	RRI 1122 SH+VOL 22K PULL	3.10
4843	RRI A823 100K TUNER POT	1.78
4847	RRI A823 FOCUS ASSEMBLY	6.03
2998	RRI A823 PLASTIC CAM	0.35
5300	RRI A823ETC RING SPK GAP	0.55
4988	RRI T20 (TYPE) FOCUS ASY	0.60
3001	RRI T20 3K3 SH+VOL CTRL	2.67
4852	RRI T20 9N1 2KV CAP.	1.98
4853	RRI T20 CONTRAST+AFC POT	3.23
3003	RRI T20 E/W CORR. COIL	3.29
3000	RRI T20 FOCUS ASSY	5.60
3004	RRI T20 SH MODE TX	11.20
4849	RRI 2718 3K3 SH+VOLUME	3.36

PHILIPS PYE SPARES

4969	PHILIPS 128711 4K7 VOL+SH	4.45
3288	PHILIPS 300 470L VOL+SWITCH	3.25
4449	PHILIPS 570/713 IF MODULE	7.00
5425	PHILIPS CTX-S EHT LEAD	10.11
5418	PHILIPS CTX-S FOCUS UNIT	5.50
4655	PHILIPS G11 100K TUNER POT	0.66
2983	PHILIPS G11 CVC32 B/COIL	1.95
2984	PHILIPS G11 E/W CORR COIL	2.64
2985	PHILIPS G11 FILTER COIL	12.00
2986	PHILIPS G11 FOCUS UNIT	9.15
2987	PHILIPS G11 G2 CONTROL ASSY	7.98
4575	PHILIPS G11 RND SHAFT SH.	2.32
4576	PHILIPS G11 SQ SHAFT SWITCH	2.32
4645	PHILIPS G11 TDA2600 HOLDER	0.65
5284	PHILIPS G8 100K TUN P/SET	0.84
2977	PHILIPS G8 10K COLOUR CTRL	0.98
4525	PHILIPS G8 10K CON POT (550)	0.87
4524	PHILIPS G8 15R CON POT (550)	1.07
2975	PHILIPS G8 2K2 BRIGHT CONTL	2.11
4526	PHILIPS G8 2H A1 POT (550)	3.00
4522	PHILIPS G8 5N1 1500V CAP.	1.00
4523	PHILIPS G8 5R CONV POT (550)	0.64
4858	PHILIPS G8 6×4" 70R SPKR	5.98
2979	PHILIPS G8 EQUALIS. COIL	3.20
4503	PHILIPS G8 METAL SH	1.72
2978	PHILIPS G8 RED/GRW SYM COIL	4.63
4504	PHILIPS G8/G11 NON REM SH	1.72
5307	PHILIPS K12 THICK FILM UNIT	14.99
4649	PHILIPS KT3 4X4 SPEAKER	2.85
4566	PHILIPS KT3 MAINS SWITCH	8.60
4907	PHILIPS KT4 THICK FILM UNIT	10.29
4564	PHILIPS T173 MAINS SWITCH	3.45
4648	PHILIPS G11 6X4 SPEAKER	3.85
2992	PYE 169 LINE OSC COIL	3.45
4839	PYE 731 3R3 50W RESISTOR	1.98
4535	PYE 731 47K VOL. SWITCH	5.25
2992	PYE 731 FOCUS UNIT	3.45
5545	PYE 731 L/H 3X 100K PSET	3.20
5546	PYE 731 R/H 3X 100K PSET	3.20
2994	PYE 731 THICK FILM ASSY	1.55
4938	PYE KT2 FOCUS UNIT	2.85
4864	PYE T194/6 SPEAKER	5.95
5556	PHILIPS G11 SHORT SHAFT SH	2.01

THORN VIDEO SPARES (OVER 450 PARTS)

QUOTE THORN PART NUMBER IF POSSIBLE

5561	T3292 BOOSTER	44.62
5562	T3292 CAPSTAN BELT	3.40
5563	T3292 CAPSTAN MOTOR	51.16
5568	T3292 CASSETTE LAMP	1.80
5569	T3292 COUNTER BELT1	0.60
5571	T3292 COUNTER BELT2	0.60
5575	T3292 DRUM MOTOR	47.70
5577	T3292 F/F IDLER	2.02
5582	T3292 GUIDE ROLL ASSY	11.40
5585	T3292 LOWER DRUM ASY	80.48
5587	T3292 PINCH ROLL ASSY	11.45
5591	T3292 REWIND IDLER ASSY	7.04
5592	T3292 REWIND RUBBER TYRE	0.60
5621	T3292 UNLOADING BELT	0.78
5622	T3292 UNLOADING IDL ASSY	6.43
5624	T3292 UPP/DRUM KIT+MOD	35.94
5629	T3V00 CAPS. MOTOR BELT	0.60
5635	T3V00 COUNTER BELT 1	0.60
5637	T3V00 DRUM MOTOR	49.39
5646	T3V00 PINCH ROLLER ASSY.	7.31
5648	T3V00 RECORDING LAMP	2.34
5650	T3V00 SERVICE MANUAL	17.57
5655	T3V00 T/U IDLER ASSY	6.35
5657	T3V00 UPPER DRUM+MOD KIT	35.94
5663	T3V16 PINCH ROLLER ASSY	7.31
5666	T3V00 CAPSTAN MOTOR	51.16
5688	T3V00 TENSION BAND	2.16
5689	T3V00 TIMING GEAR	4.12
5692	T3V00 UNLOADING IDLER ASSY	6.43
5710	T3V01 TENSION BAND	2.16
5716	T3V16 CAPSTAN BENT	3.85
5720	T3V16 CASSETTE LAMP	1.80
5721	T3V16 CHANGE GEAR	0.86
5726	T3V16 DIODE STACK	3.41
5727	T3V16 DRIVE ARM ASSY	4.50
5750	T3V16 SERVICE MANUAL	26.24
5758	T3V16 T/U IDLER ASSY	6.25
5759	T3V16 T/U IDLER ASSY (LA)	8.95
5765	T3V16 UNLOADING IDLER	6.43
5772	T3V22 CAPSTAN MOTOR	51.16
5773	T3V22 CAPSTAN MOTOR BAND	0.60
5774	T3V22 CAPSTAN BELT	3.86
5790	T3V22 F/F IDLER	1.74
5803	T3V22 GUIDE ROLLER ASSY	8.39
5807	T3V22 MICRO SWITCH	4.25
5809	T3V22 PINCH ROLLER ASSY	7.31
5814	T3V22 REWIND IDLER ASSY	7.04
5822	T3V22 SUPP SPOOL CARRIER	4.08
5824	T3V22 TAKE UP IDLER SMALL	6.25
5825	T3V22 TAKE UP IDLER LARGE	8.95
5828	T3V22 TENSION BAND	2.16
5834	T3V22 UPPER DRUM ASSY	35.94
5840	T3V23 BOOSTER	24.71
5844	T3V23 CAPSTAN MOTOR	55.83
5852	T3V23 CONNECT GEAR ASSY	6.56
5856	T3V23 GUIDE ROLLER TYRE	0.60
5862	T3V23 PINCH ROLLER ARM AS	4.10
5868	T3V23 REEL IDLER ASSY	2.87
5869	T3V23 REEL MOTOR ASSY	32.81
5879	T3V23 T/U REEL DISK ASSY	5.17
5880	T3V23 TAKE UP REEL ASSY	2.58
5882	T3V23 UPPER DRUM ASSY	35.94
5885	T3V23 WORM GEAR SPINDLE	5.95
5886	T3V23 WORM GEAR SPROCKET	1.63
5888	T3V24 BRAKE SHOE	0.60
5896	T3V24 CASSETTE LAMP	1.80
5899	T3V24 DEW SENSOR ASSY	9.05
5902	T3V24 F/ERASE HEAD ASSY	10.41
5908	T3V24 LOADING GEAR ASSY	28.91
5909	T3V24 LOADING MOTOR	10.25
5912	T3V24 PINCH RLR LVR ASSY	0.62
5920	T3V24 SERVICE MANUAL	28.50
5945	T3V29/30 BOOSTER	24.71
5946	T3V29/30 BRAKE SHOE	0.67
5951	T3V29/30 CAPSTAN BELT	1.95
5952	T3V29/30 CAPSTAN MOTOR ASSY	36.88
5957	T3V29/30 CASSETTE LAMP	1.65
5962	T3V29/30 EJECT LCK ARM	0.60
5974	T3V29/30 LOADING MOTOR	10.25
5976	T3V29/30 LOHR DRUM ASSY	78.72
5980	T3V29/30 PINCH RLLR ASSY	8.66
5981	T3V29/30 PINCH RLLR SLND	10.15
5985	T3V29/30 REEL MTR ASSY	34.66
5990	T3V29 SERVICE MANUAL	25.85
5991	T3V30 SERVICE MANUAL	15.75
5998	T3V29/30 TAKE UP CLUTCH	0.60
5999	T3V29/30 T/U CLUTCH ASSY	2.78
6001	T3V29/30 T/U LDG RING ASSY	2.73
6003	T3V29/30 T/U SPL IDLER	2.64
6012	T3V31 BOOSTER	32.37
6016	T3V31 CAPSTAN BELT	1.95
6017	T3V31 CASSETTE LAMP	1.71
6027	T3V31 LOADING GEAR ASSY	6.60
6028	T3V31 LONG TRIMMING TOOL	0.93
6030	T3V31 PINCH ROLLER ASSY	8.66
6033	T3V31 SERVICE MANUAL	27.31
6034	T3V31 SERVO TEST JIG	49.94
6038	T3V31 TAKE UP CLUTCH ASSY	2.75
6039	T3V31 T/U LOAD/RING ASSY	2.73
6042	T3V31 UPPER DRUM ASSY	35.94
6044	T3V32 BOOSTER	32.37
6048	T3V32 CAPSTAN BELT	1.95
6053	T3V32 CASS MOTOR ASSY	9.45
6066	T3V32 LOADING GEAR ASSY	6.60
6068	T3V32 PINCH ROLLER ASSY	8.66
6071	T3V32 SERVICE MANUAL	18.65
6072	T3V32 SUPP/LDG RING ASSY	2.58
6081	T3V32 UPPER DRUM ASSY	35.94
6085	T3V35/6 BRAKE PAD X2	0.67
6086	T3V35/6 BRAKE SHOE	0.67
6087	T3V35/6 BRUSH ASSY	2.07
6090	T3V35/6 CAPSTAN MOTOR	23.91
6091	T3V35/6 CASSETTE MOTOR	8.10
6103	T3V35/6 PINCH ROLLER	9.84
6105	T3V35 REMOTE CONTROL	19.43
6107	T3V35/6 SERVICE MANUAL	27.00
6117	T3V35/6 TENSION BRAKE	0.60
6118	T3V35/6 UPPER DRUM ASSY	35.94
6119	T3V40 SERVICE MANUAL	15.00
6158	T3V29/30 UPPER DRM ASSY	35.94

SONY VIDEO

6133	SONY 8000UB FORWARD BELT	1.20
6136	SONY C6UB THREADING BELT	1.20
6138	SONY C6UB CAPSTAN BELT	1.77
6145	SONY C7UB BRAKE ASSEMBLY	1.77
6150	SONY C5UB CAPSTAN MOTOR	38.75
6152	SONY C6UB MK2 REEL MTR	23.00
6154	SONY C7 DC MTR (BHF/1100)	38.75
6155	SONY C7UB REMOTE CONTROL	43.75
6156	SONY C5UB REMOTE CONTROL	20.63
6157	SONY C6UB REMOTE CONTROL	18.13
4953	SONY C5/7 REWIND KIT	5.40
4954	SONY C6 REWIND KIT	5.40
4948	SONY SL-7/SL-T7 BELT KIT	4.00
4944	SONY SLC7/SLJ7 BELT KIT	5.50
4949	SONY SLT 9ME/J9 BELT KIT	4.50

GEC

6173	V4000H UPPER CYLINDER	40.50
6174	V4000H RELAY	4.12
6175	V4000H PINCH ROLLER	7.44
6178	V4000H CAPSTAN MOTOR	38.78
6181	V4000H TAPE SENSOR LAMP	0.79
6185	V4001H PINCH ROLLER	5.81
6192	V4002H UPPER CYLINDER	40.50
6204	V4004 CLUTCH ASSY	11.18
6212	V4100 AUDIO CONTROL	28.13
6253	V4000H SERVICE MANUAL	10.50
6254	V4001H SERVICE MANUAL	8.31
6255	V4002H SERVICE MANUAL	11.00
6256	V4004 SERVICE MANUAL	11.50
6257	V4100 SERVICE MANUAL	8.31

HITACHI VIDEO SPARES

6214	8000 UPPER CYLINDER	38.99
6218	8000 AUDIO CONTROL	23.85
6220	8000 F/FWD REWIND ASSY	0.69
6224	9300E RELAY	3.30
6230	9300E TAPE SENSOR LAMP	0.95
6231	9300E TUNER	18.21
6240	VT33E UPPER CYLINDER	38.99
6244	VT33E CAPSTAN MOTOR	27.72
6249	VT11E F/FWD REWIND ARM	4.85
6252	VT11E CAPSTAN MOTOR	23.63

VIDEO HEADS

SEE FULL LIST FOR COMPARISON CHART

6258	BETA - A VIDEO HEAD	40.50
6259	BETA - B VIDEO HEAD	40.50
6265	VHS - A VIDEO HEAD	34.50
6266	VHS - A VIDEO HEAD	34.50
6274	PHILIPS H1500 VIDEO HEAD	50.95
6275	PHILIPS H1700/2 VIDEO HEAD	66.20
6276	PHILIPS 2020/2 VIDEO HEAD	57.95
6277	PHILIPS 2030 VIDEO HEAD	53.98

GENERAL SPARES

4999	ANTEX BIT 1/8" DIAMETER	1.45
5000	ANTEX BIT 3/16" DIAMETER	1.45
4452	ATTENUATOR 12DB	1.68
4469	ATTENUATOR 18DB	1.37
4451	ATTENUATOR 6DB	1.68
5419	COLOUR CRYSTAL 8.86MHz	0.60
4659	HEAT SINK COMPOUND	1.00
5001	QUICK TEST MAINS CONN.	9.30
4700	SERVISOL FOAM CLEANER	1.05
4453	SERVISOL FREEZE-IT	1.15
4724	SERVISOL SW CLEANER	1.05
4516	SERVISOL VIDEO HEAD CLEANER	0.95
4976	SOLDER 0.5 KILO REEL	8.60
4466	SUPER WICK 2MMX1.6M	0.99
4970	TV LOOP AERIAL	0.55
4998	WELLER INST. HEAT GUN TIP	0.68

PLEASE ADD £1.25 POST & HANDLING THEN 15% VAT TO TOTAL.

QUICK SAVE TV SPARES

THE COACH HOUSE, MUXTON LANE, TELFORD, SALOP

FULL LIST OF OVER 3000 ITEMS SENT WITH ORDER OR SEND 9" × 4" SAE. PLEASE USE STOCK NUMBER WHEN ORDERING, OR USE SET MAKER'S PART NUMBER. ACCESS AND VISA ACCEPTED. OFFICIAL ORDERS FROM GOVERNMENT OR SCHOOLS WELCOMED. ALL GOODS ARE STOCK ITEMS.

FAST VIDEO SPARES FAST

ALL STOCK ITEMS ARE DESPATCHED BY RETURN OF POST

WE CARRY HUNDREDS OF VIDEO SPARES INC. PLAY IDLERS, CLUTCHES, MOTORS, SERVICE MANUALS, TENSION BANDS, BELTS AUDIO/CONTROL HEADS, ALIGNMENT TOOLS AND TAPES ETC.
****SPECIAL ORDER FACILITIES****
****FOR NON-STOCK ITEMS****

ALL SPARES LISTED ARE GENUINE PARTS. WE ALSO STOCK THE FULL RANGE OF CHEAPER REPLACEMENT PARTS *E.G.* BELT KITS, PINCH ROLLERS, HEADS, ETC. P.O.A.

CREDIT CARD ORDERS BY TELEPHONE RECEIVED BY 4 PM. ARE DESPATCHED *SAME DAY*

VIDEO HEADS

Panasonic
NV2000, 2010, 7000, 7200, 8600, 8610, 333, 370 genuine £39.50
NV366,688,777,788 genuine £56.95
Panasonic 4HSS Equivalent heads £31.95

Ferguson
3292, 3V00, 3V16, 3V22, 3V23, 3V24, 3V29, 3V30, 3V35, 3V36, 3V38 genuine £39.50
Ferguson 3HSS Equivalent heads £31.95

Sharp
VC9300, 9500, 9700, 381, 386, 387, 388, 482, 581 genuine £49.90
Sharp VC7300, 7700, 8300 genuine £58.20
Sharp VC9300 etc Equivalent £39.90

Sony
C5, C6, C7 genuine £39.50
Sony SL8000, 8080 genuine £44.50
Sony C9, C20, C30 genuine £44.50
Sony C9, C20, C30 Equivalent £36.50
Sony C5, C6, C7 Equivalent £31.95

Sanyo
VTC9300, 5000, 5150, 5300, 5400 genuine £49.90

Toshiba
V9600, V31, V33 Equivalent £42.50
Toshiba V9600, V31, V33 genuine £56.95
Toshiba V8600 genuine £67.50

Hitachi
VT5000, 8000, 8300, 9300, 9500, 9700, VT11, VT14E genuine £39.95
Amstrad 7000 Equivalent £39.90

PINCH ROLLERS

Panasonic
NV2000, 7000, 7200 ..... £5.95
NV333, 366, 688, 370 ..... £6.95
NV430, 730 ..... £6.95

Sharp
VC6300 ..... £5.95
VC7300, 7700, 8300 ..... £7.90
VC9300, 381, 386 etc £4.90

Hitachi
VT5000, 8000, 9000 ..... £6.95
VT11E, 14E, 17E, 19E £6.95

Sony
C5, C6, C7 ..... £5.95
SL-C20, C30, C40 ..... £5.95
SL8000, 8080 ..... £12.75

Ferguson/JVC
3V00, 3V16, 3V22 ..... £5.95
3V23, 3V24, 3V29/30 ..... £7.95
3V35, 36, 38, 39 ..... £8.90

Sanyo
VTC9300, 5000, 5300 ..... £7.95
VTC5400, 5150, 6500 ..... £7.95

SENSOR LAMPS

All Panasonic £1.80
All Ferg/JVC £1.80
Sharp VC9300 etc £2.15
Sharp VC7300 etc £2.60
Amstrad 7000 ..... £2.15
All Hitachi £1.80

SENSOR L.E.D's

All Panasonic £2.90
All Ferg/JVC £2.90
All Hitachi £5.75

HUNDREDS OF SPARES FOR PANASONIC, HITACHI, SANYO, SONY, FERGUSON, ETC. AVAILABLE

IDLERS

Panasonic
NV2000, 7000, 7200 ..... £3.45
NV333, 366, 688, 788 ..... £3.45
NV777, 370, 430 ..... £4.50
NV730 ..... £6.50

Sharp
VC9300, 9500, 9700 ..... £3.90
381, 386, 387, 388 ..... £3.90
482, 483, 486, 581 etc £3.90

Amstrad
7000 ..... £3.90

Sony
C5/C7 Idler kit £6.95
C6 Idler kit £6.95
C5/6/7 Idler only £1.45

Sanyo
Reel drive pulley £8.88
VTC5000, 5150, 6500 ..... £8.88

Hitachi
VT8000, 8300, 8500 ..... £4.72
VT9300, 9500, 9700 ..... £4.75
VT11E, 14E, 17E 19E £6.50

Ferguson
Clutch assy large £6.95
3292, 3V00, 3V16, 3V22 ..... £6.95
Clutch assy small £6.95
Idler assy 3V29, 30 ..... £3.45
3V35, 3V36, 3V38, 3V39 ..... £4.50

Fisher
FVHP615 ..... £6.90

MOST OTHERS AVAILABLE

BELT KITS (GENUINE)

Panasonic
NV2000, 2010 ..... £6.50
NV7000, 7200 ..... £6.50
NV333, 366 ..... £6.50
NV688, 788 ..... £4.70
NV8600, 8610 ..... £6.50

Sharp
VC6300 ..... £6.50
VC7300, 7700 ..... £6.50
VC8300 ..... £6.50
VC9300, 381 etc £6.50

Sanyo
VTC9300 ..... £6.50
VTC5000 ..... £1.99
VTC5300, 5400 ..... £6.50

Sony
SLC5, C7 ..... £6.50
SLC6 ..... £6.50
SL8000, 8080 ..... £6.50

Hitachi
VT5000 ..... £6.50
VT8000, 8500 ..... £2.90
VT9300, 9300 ..... £3.30
VT11E, 14E, 17E £6.50

Ferguson/JVC
3V00, 3V16, 3V22 ..... £6.50
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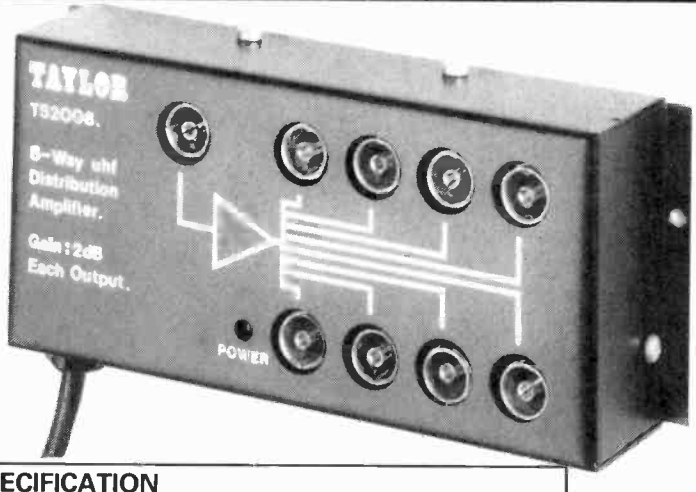

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AN295	£3.60	BA402	£0.80	HA1398	£2.75	LA3350	£1.30	MB8719	£3.85	TA7109AP	£2.50	UPC595C	£2.20	2SB54	£0.70
AN301	£3.50	BA403	£1.95	HA1457W	£1.75	LA3361	£1.20	S 40W	£10.50	TA7120P	£0.75	UPC1001H	£2.20	2SB75	£0.60
AN302	£3.30	BA511A	£1.80	HA1112W	£3.75	LA3370	£2.80	S-1125H	£7.50	TA7122AP	£0.90	UPC1009C	£2.20	2SB341V	£2.75
AN303	£2.75	BA514	£1.90	HA1211	£2.30	LA4030P	£2.00	Si-1125H	£7.50	TA7130P	£1.00	UPC1018C	£1.95	2SB405	£0.80
AN305	£3.50	BA521	£1.80	HA11215A	£4.35	LA4031P	£1.95	STK011	£3.95	TA7136P	£1.00	UPC1025H	£2.30	2SB426	£2.95
AN313U	£2.95	BA526	£3.50	HA11219	£3.25	LA4032P	£1.90	STK013	£7.25	TA7137P	£1.00	UPC1026C	£1.00	2SB471	£3.50
AN315	£2.30	BA527	£1.60	HA11221	£2.75	LA4051P	£2.20	STK014	£7.25	TA7139P	£2.50	UPC1028H	£0.90	2SB492	£0.75
AN316	£3.75	BA532	£1.60	HA11223W	£3.80	LA4100	£1.20	STK015	£5.20	TA7140P	£1.75	UPC1031H	£1.95	2SB509D	£1.95
AN318	£4.95	BA536	£2.40	HA11225	£1.95	LA4101	£1.00	STK020	£5.75	TA7142P	£2.95	UPC1032H	£0.60	2SB536	£0.95
AN331	£2.95	BA547	£2.50	HA11226	£4.50	LA4102	£1.40	STK022	£5.30	TA7145P	£2.50	UPC1035C	£1.95	2SB546	£1.50
AN340P	£1.50	BA612	£1.80	HA11227	£2.20	LA4110	£1.75	STK030	£7.50	TA7150P	£2.75	UPC1037H	£1.25	2SB561	£0.35
AN360	£1.30	BA631	£5.75	HA11235	£2.30	LA4112	£1.75	STK040	£8.70	TA7152P	£2.50	UPC1156H	£2.95	2SB698	£0.40
AN362L	£1.60	BA656	£4.50	HA11244	£4.60	LA4120	£2.95	STK043	£10.50	TA7157P	£1.65	UPC1158H	£0.95	2SB755	£3.50
AN366P	£1.70	BA843	£4.50	HA11401	£2.80	LA4125	£2.20	STK077	£6.50	TA7176P	£2.75	UPC1165C	£1.30	2SC372	£0.35
AN374P	£2.20	BA847	£3.75	HA11423	£4.75	LA4126	£2.60	STK078	£6.75	TA7193P	£4.00	UPC1168C	£1.30	2SC380	£0.35
AN377	£2.00	BA853	£7.50	HA11440A	£3.95	LA4160	£2.40	STK080	£7.50	TA7202P	£4.50	UPC1170H	£1.60	2SC458	£0.30
AN610P	£1.80	BA1310F	£1.75	HA11701	£3.50	LA4170	£3.50	STK082G	£7.75	TA7203P	£1.90	UPC1171C	£1.50	2SC460	£0.35
AN612	£1.80	BA1320	£1.25	HA11703	£4.50	LA4182	£2.10	STK086	£9.50	TA7204P	£1.75	UPC1176C	£1.75	2SC461	£0.35
AN5033	£5.25	BA1330	£1.75	HA11704	£5.20	LA4192	£1.95	STK430	£5.50	TA7205AP	£1.00	UPC1177H	£1.60	2SC503Y	£0.70
AN5265	£3.20	BA1360	£1.80	HA11705	£6.95	LA4200	£1.50	STK431	£5.95	TA7207P	£1.75	UPC1181H	£1.10	2SC536	£0.35
AN5510	£2.75	BA5102A	£2.75	HA11706	£4.75	LA4201	£1.60	STK433	£5.25	TA7208P	£1.75	UPC1182H	£1.10	2SC537	£0.35
AN5620X	£3.50	BA5406	£3.20	HA11710	£3.75	LA4220	£1.50	STK435	£5.50	TA7210P	£2.50	UPC1183H	£2.20	2SC710	£0.35
AN5701	£1.80	BA6137	£2.75	HA11711	£9.50	LA4230	£2.25	STK436	£5.25	TA7214P	£2.60	UPC1185H	£2.50	2SC732	£0.35
AN5722	£1.60	BA6209	£3.75	HA11713	£6.50	LA4250	£2.75	STK437	£6.50	TA7215P	£2.30	UPC1186H	£0.90	2SC733	£0.35
AN5730	£1.85	BA6304	£2.20	HA11714	£5.95	LA4420	£1.60	STK439	£5.95	TA7217AP	£1.60	UPC1187V	£1.75	2SC828	£0.30
AN5732	£1.85	CX0642	£8.50	HA11715	£6.25	LA4422	£1.40	STK441	£7.95	TA7220P	£2.50	UPC1215V	£1.35	2SC840	£1.50
AN5753	£1.95	CX065B	£2.95	HA11716	£4.75	LA4430	£1.40	STK443	£7.95	TA7222AP	£1.30	UPC1223C	£2.20	2SC900	£0.35
AN6250	£2.30	CX075B	£2.75	HA11717	£5.75	LA4440	£2.50	STK457	£6.50	TA7223P	£2.30	UPC1225H	£2.00	2SC929D	£0.35
AN6310	£6.25	CX095C	£2.85	HA11718	£4.75	LA4445	£2.75	STK459	£6.75	TA7225P	£3.25	UPC1230H	£2.50	2SC930D	£0.35
AN6341N	£4.00	CX100D	£6.75	HA11727	£9.50	LA4460	£1.80	STK461	£7.50	TA7226P	£3.20	UPC1263C	£2.50	2SC1034	£4.75
AN6344	£4.75	CX101G	£7.75	HA11745	£9.00	LA4461	£1.80	STK463	£8.48	TA7227P	£2.20	UPC1277H	£2.75	2SC1061	£1.20
AN6350	£7.50	CX130	£4.75	HA11747	£9.50	LA4500	£2.60	STK465	£8.50	TA7229P	£3.25	UPC1278H	£2.75	2SC1096	£0.70
AN6356N	£3.85	CX136A	£7.50	HA11747ANT	£9.50	LA4505	£2.80	STK501	£6.25	TA7230P	£1.95	UPC1350C	£1.20	2SC1364	£0.35
AN6360	£4.50	CX143A	£7.50	HA11749	£4.75	LA4507	£4.25	STK0025	£4.95	TA7232P	£2.95	UPC1353C	£1.95	2SC1815Y	£0.45
AN6362	£5.50	CX157	£4.25	HA11750	£5.00	LA4520	£2.50	STK0029	£4.75	TA7240AP	£2.95	UPC1356C	£2.00	2SC1875	£2.95
AN6363	£7.50	CX158	£3.75	HA11753NT	£8.50	LA5112	£1.85	STK0039	£4.75	TA7241AP	£2.95	UPC1363C	£2.20	2SC1942	£3.25
AN6387	£5.95	CX160	£3.50	HA11758NT	£8.50	LA64580	£1.20	STK0040	£6.25	TA7270P	£2.75	UPC1378H	£2.40	2SC1957	£0.80
AN6610	£1.80	CX161A	£3.50	HA11768	£4.50	LA7016	£2.75	STK0049	£6.50	TA7310P	£1.85	UPC1382C	£1.10	2SC1969	£1.75
AN6677	£6.30	CX162	£3.95	HA11788	£4.50	LA7215	£2.75	STK0059	£7.00	TA7312P	£1.50	UPC1384C	£2.85	2SC2078	£0.95
AN6811	£1.60	CX170	£6.75	HA11816NT	£6.50	LA7751	£4.75	STK0080	£7.75	TA7313AP	£1.50	UPC1387C	£2.50	2SC2166	£0.95
AN6873	£4.50	CX181	£8.75	HA11828NT	£9.50	LA7755	£3.20	STK2028	£7.50	TA7314P	£2.50	UPC1391H	£1.50	2SC2335	£1.50
AN6884	£2.75	HA1124A	£2.75	HA12001W	£6.50	LA7800	£1.95	STK2029	£5.75	TA7315AP	£2.35	UPC1403CA	£5.75	2SC2577	£1.95
AN7105	£2.30	HA1125	£1.75	HA12002	£2.95	LA7801	£2.95	STK2129	£6.75	TA7317P	£2.75	UPC1420CA	£6.50	2SC2578	£2.75
AN7110	£1.50	HA1137W	£1.75	HA12017	£2.75	LA7806	£2.75	STK2230	£6.50	TA7324P	£2.50	UPC1458C	£0.95	2SC2579	£2.75
AN7111	£1.50	HA1144	£4.25	HA12035	£9.50	LA7808	£2.95	STK3042	£6.50	TA7325P	£1.00	UPC1533HA	£2.75	2SC2580	£2.75
AN7114E	£1.75	HA1151	£2.50	HA12038	£6.75	LB1287	£2.75	STK4060	£6.50	TA7328AP	£2.20	UPC4557C	£1.50	TDA1515	£4.50
AN7115E	£1.60	HA1156W	£1.20	HA12413	£2.75	LB1405	£2.20	STK4141II	£7.50	TA7331P	£2.20	UPC4558C	£0.90	TDA2002	£0.80
AN7116	£1.50	HA1167	£3.75	HA13001	£2.95	LC4066B	£2.95	STK4191II	£8.95	TA7343P	£2.95	UPD1514C	£5.75	TDA2003	£0.90
AN7120	£1.50	HA1176	£1.75	HA13402	£4.95	LC7120	£3.50	STK4332	£5.75	TA7607AP	£2.95	UPD4514BC	£3.50	TDA2004	£2.20
AN7130	£1.30	HA1196	£1.75	HA13403	£7.50	LC7131	£3.75	STK4392	£7.50	TA7608CP	£3.95	X0042CE	£2.20	TDA2005	£2.75
AN7145M	£1.95	HA13430A	£4.50	HA13430A	£4.50	LC7136	£2.75	STK5211	£6.75	TA7609P	£2.70	X0077GE	£9.95	TDA2006	£1.50
						LC7137	£2.75	STK5421	£6.50	TA7611AP	£3.20	X0092CE	£5.60	TDA2020	£1.40
								STK5422	£6.75	TA7614AP	£2.75			TDA2030	£1.40
										TA7617AP	£2.50			TDA3562A	£5.50

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TELE-GEN

Telegen-1

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- *EXCEPTIONALLY LIGHT AND DURABLE*
- *POCKET SIZE FOR OUTSIDE SERVICE*
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A lightweight, extremely portable and versatile pattern generator for black/white and colour T.V. alignment and service at the customer's home. At the turn of a switch, the generator can provide five essential test patterns for correct installation, fast checks and repairs. Pattern stability is first class and compares favourably with other more costly bulky generators only suitable for bench work. The generator is pocket size measuring 10 × 7.5 × 4 cm and weighs only 190 grams. Switched 3.5 mm jack socket allows use of external power supply with battery in situ.

Telegen-2

PRICE £34.45 (Inc. VAT)

- *EXCEPTIONALLY LIGHT & DURABLE*
- *COMPACT 10 × 12 × 4.5 cms*
- *RED RASTER * GREEN RASTER*
- *BLUE RASTER*
- *COLOUR BARS*
- *3.5 mm JACK SOCKET FOR P.S.U.*
- *PROVIDES UHF SIGNAL APPROX. CHANNEL 35*

Telegen 2 is a colour bar generator at a very modest price and yet is extremely effective, stable and durable. It is the perfect compliment to Telegen 1, giving colour bars arranged in the following sequence: white, yellow, cyan, green, magenta, red, blue and black. The unit provides a signal in the UHF band approx. Channel 35 and requires a supply of 14 to 18 volts D.C.

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AAY32	9p	BC557	6p	BF194	5p	BFY90	45p	TIP33	50p	2N.1613	24p	BY299	28p	7905	35p	PL36	80p	LM301	26p	TBA800	35p	74LS26	17p
AC107	28p	BCY32	150p	BF195	5p	BLY48	85p	TIP34	50p	2N.1711	24p	BY476	90p	7912	40p	PL82	45p	LM311	35p	TBA810S	60p	74LS27	17p
AC126	17p	BCY33	150p	BF196	6p	BLY49	85p	TIP41A	22p	2N.2102	50p	BYX10	15p	7915	40p	PL83	32p	LM324	35p	TBA820	75p	74LS28	17p
AC127	15p	BCY34	150p	BF197	7p	BR100	14p	TIP41C	25p	2N.2160	300p	BYX55/350	30p	7918	40p	PL84	50p	LM325	45p	TBA920	100p	74LS30	17p
AC128	15p	BCY42	20p	BF198	7p	BR101	43p	TIP42A	22p	2N.2218A	24p	BYX55/600	30p	7924	40p	PL95	140p	LM339	40p	TBA950	100p	74LS32	17p
AC128K	23p	BCY56	16p	BF199	6p	BR103	37p	TIP42C	25p	2N.2219	24p	BYX55/800	32p	78L05	28p	PL500	110p	LM348	60p	TBA990	100p	74LS33	17p
AC141K	30p	BCY70	16p	BF200	16p	BSX20	15p	TIP47	40p	2N.2221	23p	BYX70/300	29p	78L12	28p	PL504	95p	LM380	100p	TCA270	40p	74LS37	17p
AC142K	30p	BCY71	16p	BF240	16p	BSX26	18p	TIP48	40p	2N.2222	23p	BYX70/500	32p	78L15	28p	PL508	170p	LM381	150p	TCA940	100p	74LS38	17p
AC153K	23p	BCY72	16p	BF241	10p	BSX29	19p	TIP50	60p	2N.2369	15p	BYX70/800	36p	78L18	28p	PL519	450p	LM382	130p	TDA1170	100p	74LS40	17p
AC176	18p	BD115	26p	BF255	12p	BT106	90p	TIP51	120p	2N.2484	20p	BYX71/600	80p	78L24	28p	PY81	70p	LM387	100p	TDA1412	60p	74LS42	39p
AC176K	20p	BD124P	50p	BF256	18p	BT109	90p	TIP52	120p	2N.2646	40p	DA47	6p	79L05	40p	PY88	48p	LM709DIL	30p	TDA2002	80p	74LS47	70p
AC187	15p	BD124	110p	BF257	18p	BT116	80p	TIP53	120p	2N.2904	20p	OA90	4p	79L12	45p	PY500A	160p	LM723	40p	TDA2003	150p	74LS48	60p
AC187K	20p	BD128	35p	BF258	18p	BT119	100p	TIP54	140p	2N.2905	20p	OA91	4p	79L15	48p	**LINEAR IC'S**		LM741DIL	18p	TDA2020	140p	74LS51	17p
AC188	17p	BD131	25p	BF259	18p	BT120	100p	TIP105	85p	2N.2906	18p	OA200	7p	LM309K	100p	AN-214P	200p	LM741 MET	45p	TDA2030	140p	74LS54	17p
AC188K	23p	BD132	25p	BF262	25p	BU100A	110p	TIP106	65p	2N.2907	18p	OA202	7p	LM317K	220p	AN-240P	150p	LM747	58p	TDA2522	90p	74LS55	17p
ACY18	48p	BD135	20p	BF263	25p	BU104	100p	TIP107	65p	2N.2926	8p	IN.914	2p	LM317T	180p	AN-360	120p	LM748	35p	TDA2530	100p	74LS73	28p
ACY19	48p	BD136	25p	BF270	18p	BU105	80p	TIP110	47p	2N.3019	28p	IN.4001	4p	LM323K	420p	AN-7110	140p	LM1458	33p	TDA2532	100p	74LS74	26p
AD142	60p	BD137	20p	BF273	18p	BU106	100p	TIP111	50p	2N.3053	18p	IN.4002	4p	LM723	32p	AN-7114	160p	LM3900	30p	TDA2540	100p	74LS75	32p
AD149	45p	BD138	20p	BF311	21p	BU110	110p	TIP112	40p	2N.3054	35p	IN.4003	4p	78HGKC	570p	AN-7115	160p	M-51513L	180p	TDA2560	100p	74LS76	28p
AD161	22p	BD139	20p	BF324	25p	BU111	140p	TIP115	45p	2N.3055	35p	IN.4004	4p	78HO5KC	520p	AN-7120	140p	M-51515BL	270p	TDA2593	100p	74LS78	34p
AD162	22p	BD140	20p	BF336	20p	BU124	80p	TIP116	45p	2N.3055H	50p	IN.4005	4p	78GU1C	190p	AY3-1270	680p	M-51516	280p	TDA2690	100p	74LS83	46p
AF124	25p	BD144	90p	BF337	20p	BU126	70p	TIP117	50p	2N.3440	58p	IN.4006	4p	79GU1C	215p	AY3-1350	300p	M-51517L	280p	TDA2030	140p	UPC-555H	60p
AF125	25p	BD150	30p	BF338	20p	BU204	75p	TIP120	43p	2N.3442	85p	IN.4007	5p	79HGKC	670p	AY3-8910	360p	MB3712	150p	UPC-556H	80p	74LS85	50p
AF126	25p	BD157	38p	BF355	28p	BU205	70p	TIP121	46p	2N.3702	9p	IN.4148	2p	**VALVES**		AY3-8912	300p	MB3730	260p	UPC-575C2	100p	74LS86	30p
AF127	25p	BD158	38p	BF362	30p	BU208	75p	TIP122	47p	2N.3703	9p	IN.5400	9p	DAF96	60p	AY5-3600	570p	MB3756	260p	UPC-577H	64p	74LS90	39p
AF139	22p	BD166	30p	BF367	13p	BU208A	80p	TIP125	47p	2N.3704	9p	IN.5401	10p	DF96	50p	CA270	40p	MC1327	70p	UPC-592H2	95p	74LS91	75p
AF239	22p	BD175	30p	BF371	17p	BU208D	100p	TIP126	56p	2N.3705	9p	IN.5402	10p	DL92	47p	CA3046	60p	NE555	20p	UPC-1001H	220p	74LS92	46p
AL112	70p	BD177	30p	BF414	18p	BU325	85p	TIP127	56p	2N.3706	9p	IN.5403	11p	DY86	50p	CA3048	190p	NE556	40p	UPC-1025H	230p	74LS93	40p
AL113	80p	BD179	32p	BF420	16p	BU326	85p	TIP141	90p	2N.3707	9p	IN.5404	11p	DY87	50p	CA3060	280p	SAS560	110p	UPC-1026C	105p	74LS95	52p
ASZ15	100p	BD181	45p	BF421	18p	BU406	85p	TIP142	90p	2N.3708	9p	IN.5405	12p	DY802	45p	CA3080E	70p	SAS570	110p	UPC-1028H	90p	74LS96	63p
ASZ17	100p	BD182	60p	BF422	21p	BU406D	95p	TIP145	65p	2N.3771	85p	IN.5406	13p	EABC80	50p	CA3086	55p	SN76003N	140p	UPC-1031H2		74LS107	35p
AU110	110p	BD183	60p	BF423	15p	BU407	75p	TIP146	90p	2N.3772	90p	IN.5407	13p	EB91	44p	CA3089E	150p	SN76013N	140p		180p	74LS109	36p
AY102	180p	BD187	30p	BF440	16p	BU407D	95p	TIP147	100p	2N.3773	100p	IN.5408	13p	EBF80	45p	CA3090AQ	300p	SN76023N	140p	UPC-1032H	70p	74LS112	38p
AY106	180p	BD201	33p	BF451	17p	BU408	85p	TIP2955	42p	2N.3819	29p	**ZENERS**		EBF89	50p	CA3130E	80p	SN76033N	140p	UPC-1155	200p	74LS113	32p
BA145	10p	BD202	38p	BF455	14p	BU408D	95p	TIP3054	45p	2N.3866	68p	400MV		ECC82	40p	CA3130S	100p	SN76110N	140p	UPC-1156H	150p	74LS114	38p
BA148	10p	BD203	42p	BF458	19p	BU409	95p	TIP3055	42p	2N.3903	11p	BYZ88 Range		ECC83	43p	CA3140E	38p	SN76115	140p	UPC-1156H	140p	74LS122	44p
BA154	8p	BD204	42p	BF459	19p	BU426	120p	TIS43	45p	2N.3904	11p	2V7 to 39V	6p	ECC84	40p	CA3189E	250p	T2800D	70p	UPC-1181H	115p	74LS123	50p
BA157	12p	BD222	31p	BF461	60p	BU500	110p	TIS44	40p	2N.3905	11p	1.3W Zeners		ECC85	40p	CA3240E	90p	T2800D	52p	UPC-1182H	150p	74LS124	85p
BB101	13p	BD225	31p	BF462	52p	BU526	60p	TIS61	15p	2N.3906	11p	BZX61 Range		ECH81	49p	HA-1156W	110p	T2800D	52p	UPC-1185H2		74LS125	36p
BB103	16p	BD232	31p	BF469	30p	BU801	95p	TIS88A	45p	2N.4031	25p	2V7 to 39V	12p	ECH84	52p	HA-1197	150p	TA-7120	55p		250p	74LS126	42p
BB105B	18p	BD234	32p	BF470	28p	BU806	120p	TIS90	15p	2N.4036	25p	**JAPANESE**		ECL80	57p	HA-1306W	170p	TA-7137P	83p	UPC-1350C	150p	74LS132	44p
BB205B	24p	BD235	28p	BF471	28p	BU807	95p	TIS91	18p	2N.4037	25p	**TRANSISTORS**		ECL82	59p	HA-1319	250p	TA-7146P	400p			74LS133	34p
BC107	7p	BD236	30p	BF479	30p	C106D	23p	TIS93	20p	2N.4058	13p	2SB324	55p	ECL84	57p	HA-1339	170p	TA-7193P	400p			74LS136	35p
BC108	7p	BD237	21p	BF493	18p			VK1010	88p	2N.4443	76p	2SB507	68p	ECL85	57p	HA-1342	170p	TA-7200	200p	**74LS SERIES**		74LS138	38p
BC109	7p	BD238	24p	BF494	16p	MJ2500	100p	VN.10KM	60p	2N.4444	76p	2SB754	80p	ECL86	49p	HA-1366WR		TA-7201	200p	74LS00	17p	74LS139	40p
BC115	10p	BD244	50p	BF495	16p	MJ2501	110p	VN.46AF	88p	2N.5061	20p	2SB754	80p	EF80	31p			TA-7203	180p	74LS01	17p	74LS145	83p
BC118	11p	BD245	50p	BF596	16p	MJ2955	55p	VN.66AF	100p	2N.5294	30p	2SC495	60p	EF85	34p	HA-1368	160p	TA-7204	110p	74LS02	17p	74LS147	120p
BC140	19p	BD433	28p	BF597	10p	MJ3000	115p	VN.88AF	115p	2N.5296	30p	2SC1060	99p	EF89	43p	HA-1377	220p	TA-7205	80p	74LS03	17p	74LS148	110p
BC141	19p	BD434	30p	BF615	30p	MJ3001	115p	VN.89AF	110p	2N.6106	40p	2SC1061	200p	EF183	45p	HA-1389	140p	TA-7210	200p	74LS04	17p	74LS151	38p
BC142	19p	BD435	31p	BF758	41p	MJE29A	30p			2N.6107	40p	2SC1096	78p	EF184	53p	HA-1392	230p	TA-72222AP		74LS05	17p	74LS153	42p
BC143	19p	BD437	28p	BF869	22p	MJE30A	30p	ZTX107	11p	2N.6109	40p	2SC1161	110p	EL34	190p	HA-1397	250p	TA-7310P	100p	74LS08	17p	74LS154	100p
BC147	6p	BD438	38p	BF870	22p	MJE340	25p	ZTX108	11p	3N.128	55p	2SC1172	150p	EL36	60p	HA-1398	240p	TA-7609	270p	74LS09	17p	74LS155	51p
BC148	6p	BD439	40p	BF872	23p	MJE350	80p	ZTX109	12p	3N.143	65p	2SC1306	90p	EL84	50p	LA-1201	85p	TAA550	16p	74S10	17p	74LS156	49p
BC149	6p	BD440	40p	BF960	38p	MJE520	30p	ZTX212	27p			2SC1307	100p	EL95	50p	LA-1352	120p	TBA120S	45p	74S11	17p	74LS157	35p
BC157	6p	BD441	40p	BF963	40p	MJE2955K	90p	ZTX300	13p	**DIODES**		2SC1678	120p	EL500	80p	LA-1365	140p	TBA395	60p	74S12	17p	74LS158	47p
BC159	6p	BD442	40p	BF964	38p	OC28	100p	ZTX301	16p	AA119	9p	2SC1969	130p	EL504	100p	LA-3301	120p	TBA396	60p	74S13	26p	74LS160	52p
BC182	6p	BD533	50p	BF966	40p	OC29	80p	ZTX302	16p	BY100	40p	2SC2028	75p	EY86	31p	LA-3350	120p	TBA520	100p	74S14	30p	74LS161	56p
BC182L	6p	BD534	38p	BFR40	25p	OC35	100p	ZTX303	24p	BY103	32p	2SC2029	120p	EY87	31p	LA-3361	115p	TBA530	100p	74S15	17p	74LS162	50p
BC183	6p	BD535	38p	BFR51	21p	OC36	120p	ZTX304	17p	BY126	6p	2SC2078	120p	EY88	42p	LA-4030	200p	TBA540	100p	74LS20	17p	74LS163	50p
BC183L	6p	BD536	38p	BFR62	21p	OC45	50p	ZTX320	29p	BY127	8p			EZ35	45p	LA-4031	140p			74LS21	17p		
BC184	6p	BD537	40p	BFR79	25p	OC71	30p	ZTX326	29p	BY133	8p	**LOW PROFILE**		EZ80	55p	LA-4032	140p						
BC184L	6p	BD538	40p	BFR90	52p	OC72	50p	ZTX500	13p	BY164	40p	**SOCKETS**		EZ81	55p	LA-4050	130p						
BC212	6p	BD675	40p	BFR91	99p	OC200	180p	ZTX501	13p	BY176	85p	8pin	6p	GZ34	180p	LA-4051	160p						
BC212L	6p	BD676	40p	BFX29	20p			ZTX502	18p	BY179	35p	14pin	8p	PC97	100p	LA-4100	120p						
BC213	6p	BD677	38p	BFX84	20p	R2008B	100p	ZTX503	18p	BY182	32p	16pin	9p	PCC85	42p	LA-4101	100p						
BC213L	6p	BD678	40p	BFX85	20p	R2010B	100p	ZTX504	25p	BY184	32p	18pin	12p	PCF80	58p	LA-4102SK	140p						
BC214	6p	BD679	40p	BFX87	18p	TAG4443	76p	ZTX550	24p	BY187	32p	20pin	14p	PCF200	135p	LA-4112	250p						
BC214L	6p	BD680	40p	BFX88	15p	TAG4444	76p			BY196	20p	22pin	16p	PCF801	110p	LA-4125	210p						
BC237	7p	BD681	45p	BFX89	60p	TIP29	15p	2N.696	26p	BY206	11p	24pin	18p	PCF802	67p	LA-4140	70p						
BC238	7p	BD682	45p	BFY17	30p	TIP29A	22p	2N.697	22p	BY207	11p	28pin	20p	PCF806	115p	LA-4201	120p						
BC300	16p	BDX32	100p	BFY18	40p	TIP29C	25p	2N.698	40p	BY208	18p	40pin	25p	PCH200	100p	LA-4220	120p						
BC301	18p	BDX65	80p	BFY41	28p	TIP30	25p	2N.699	45p	BY210	22p			PCL81	54p	LA-4400	190p						
BC302	18p	BDY92	100p	BFY50	14p	TIP30C	30p	2N.706A	22p	BY223	72p	**VOLTAGE**		PCL82	63p	LA-4420	140p						
BC303	18p	BF180	16p	BFY51	14p	TIP31A	24p	2N.708	22p	BY225	120p	**REGULATORS**		PCL84	50p	LA-4422	130p						
BC327	6p	BF181	18p	BFY52	14p	TIP31C	30p	2N.914	28p	BY226	18p	7805	35p	PCL85	55p	LA-4430	130p						
BC328	6p	BF183	20p	BFY56	25p	TIP32	24p	2N.918	36p	BY227	19p	7812	35p	PCL86	55p	LA-4460	170p						
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2SC-1018	£0.75	AN-7168	£2.60	TA-7315	£1.35	TBA-800	£0.45	VBS-7000	£2.40	135 × 1.25	£0.12	*KENWOOD (Trio)*		STY-750	£2.60	RW-410	£0.45	*PHOTO BATTERIES*	
2SC-1061	£0.75	AN-7213	£1.00	TA-7317	£1.00	TBA-810S	£0.60	VBS-9000	£0.80	*FLAT*		N-11	£2.60	STY-751	£2.60	RW-411	£0.45	867 (J)	£1.54
2SC-1173	£0.40	AN-7218	£1.10	TA-7323	£1.20	TBA-810P	£1.00	*HITACHI*		68 × 0.5 × 4	£0.25	N-39	£2.60	*SONY*		RW-413	£0.45	RPX-1	£0.61
2SC-1383	£0.25	AN-7220	£1.60	TA-7324	£1.10	TBA-810AS	£0.90	VT-5000E	£1.55	68 × 0.5 × 5	£0.25	N-39/II	£2.60	ND-14G	£2.60	RW-415	£0.45	RPX-14	£1.45
2SC-1384	£0.25	AN-7223	£1.40	TA-7325	£0.75	TBA-810AP	£1.20	*JVC*		70 × 0.5 × 4	£0.25	N-39/III	£2.60	ND-15G	£2.60	RW-418	£0.91	RPX-23	£1.23
2SC-1413AH	£3.00	AN-7224	£1.25	TA-7326	£1.35	TBA-820	£0.68	HR-3330	£2.00	70 × 0.5 × 5	£0.25	N-47	£2.60	ND-45	£2.60	RW-30	£0.38	RPX-27	£2.05
2SC-1454	£3.50	AN-7311	£0.90	TA-7328	£1.40	TBA-820M	£0.60	HR-7200	£0.75	72 × 0.5 × 4	£0.25	N-50	£2.60	ND-100G	£2.60	RW-33	£0.45	RPX-28	£2.35
2SC-1567	£0.50	AN-7410	£1.50	TA-7331	£1.00	TBA-950	£1.90	HR-3360	£1.95	72 × 0.5 × 5	£0.25	N-52	£2.60	ND-126G	£2.60	RW-36	£0.48	RPX-400	£1.48
2SC-1815	£0.15	AN-7812	£1.00	TA-7628	£1.60	TBA-1441	£1.05	HR-4100	£1.95	74 × 0.5 × 4	£0.25	*NATIONAL (Technics)*		ND-133G	£2.60	RW-37	£0.31	RPX-625	£0.40
2SC-1913	£0.90	BA-301	£1.00	TA-7658	£1.20	TCA-660	£2.50	HR-6500	£2.25	74 × 0.5 × 5	£0.25	EPS-23CS	£2.60	ND-135G	£2.60	RW-39	£0.52	RPX-675	£0.39
2SC-2320	£0.15	BA-308	£1.00	UPC-575	£1.05	TCA-900	£0.75	HR-3300	£2.55	76 × 0.5 × 4	£0.25	EPS-24CS	£2.60	ND-136G	£2.60	RW-300	£0.52	RPX-825	£0.55
2SC-2550	£0.75	BA-311	£1.00	UPC-1031	£1.30	TCA-940N	£0.60	HR-7700	£0.77	76 × 0.5 × 5	£0.25	EPS-25CS	£2.60	ND-137G	£2.60	RW-310	£0.38	RS-76	£0.60
2SC-2577	£1.25	BA-333	£1.00	UPC-1181	£1.05	TCA-3089	£1.65	HR-7650	£0.77	78 × 0.5 × 4	£0.25	EPS-30CS	£2.60	ND-142G	£2.60	RW-311	£0.39	T-164	£0.64
2SD-288	£0.75	HA-1124	£1.25	UPC-1182	£1.05	TDA-440	£1.45			78 × 0.5 × 5	£0.25	EPS-207	£2.60	ND-145	£2.60	RW-313	£0.44	T-640	£0.98
2SD-381	£0.90	HA-1125	£1.25	UPC-1185	£1.72	TDA-1054M	£1.10	*NATIONAL*		80 × 0.5 × 4	£0.25	EPS-270SD	£2.60	ND-150G	£2.60	RW-315	£0.42	*LONGLIFE*	
2SD-525	£0.75	HA-1137W	£1.35	UPC-1212	£1.10	TDA-1151	£0.75	NV-333	£1.35	80 × 0.5 × 5	£0.25			ND-200	£2.60	RW-316	£0.51	AC-3 (PP)	£0.52
2SD-526	£0.75	HA-1137P	£1.35	UPC-1213	£1.05	TDA-1170	£1.00	NV-8600	£1.65	82 × 0.5 × 4	£0.25								
2SD-718	£1.25	HA-1151	£1.25	UPC-1230	£1.99	TDA-1180	£1.45	NV-777	£0.95	82 × 0.5 × 5	£0.25								
2SD-837	£0.85	HA-1156	£1.30	UPC-1353	£2.45	TDA-1905	£0.99	NV-7200	£0.84	84 × 0.5 × 4	£0.25								
2SD-845	£1.75	HA-1392	£2.50	AC-187	£0.15	TDA-1908	£1.20	NV-7000	£0.95	84 × 0.5 × 5	£0.25								
2SD-850	£2.60	HA-1406	£0.75	AC-188	£0.15	TDA-1670	£2.70	NV-600	£1.45	86 × 0.5 × 4	£0.25								
2SD-869	£3.20	HA-11227	£1.00	AD-166	£1.80	TDA-2002H	£0.80			86 × 0.5 × 5	£0.25								
2SD-880	£0.50	HA-11423	£2.10	BC-177B	£0.19	TDA-2002V	£0.80	*SANYO*		88 × 0.5 × 4	£0.25								
2SD-882	£4.50	HA-12017	£1.30	BC-179B	£0.22	TDA-2003H	£1.20	VTC-5500	£0.98	88 × 0.5 × 5	£0.25								
2SD-1135	£0.85	HA-12413	£1.30	BC-327B	£0.55	TDA-2003V	£1.20	VTC-9300	£2.50	122 × 0.5 × 5	£0.60								
AN-203	£1.00	HA-12411	£1.60	BC-328	£0.55	TDA-2004	£1.80			189 × 0.5 × 5	£0.60								
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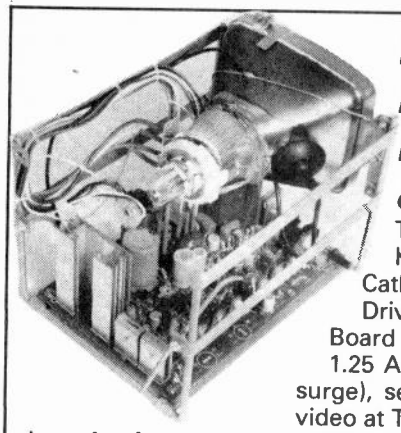

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22mfd 25v	£0.11	470mfd 63v	£0.68	2200mfd 25v	£0.68
47mfd 25v	£0.12	1000mfd 63v	£1.20	1mfd 63v	£0.06
100mfd 25v	£0.14	2200mfd 63v	£1.38	2·2mfd 63v	£0.06
220mfd 25v	£0.20	1mfd 450v	£0.24	4·7mfd 63v	£0.06
470mfd 25v	£0.32	2.2mfd 450v	£0.30	10mfd 63v	£0.08
1000mfd 25v	£0.52	3.3mfd 450v	£0.38	22mfd 63v	£0.10
2200mfd 25v	£0.84	4.7mfd 450v	£0.40	47mfd 63v	£0.16
4700mfd 25v	£1.20	10mfd 450v	£0.60	100mfd 63v	£0.20
1mfd 63v	£0.10	22mfd 450v	£0.70	220mfd 63v	£0.30
2·2mfd 63v	£0.10	33mfd 450v	£0.72	470mfd 63v	£0.54
4·7mfd 63v	£0.11			1000mfd 63v	£0.82
10mfd 63v	£0.11	**CAPACITORS – RADIAL**		10mfd 16v	£0.06
22mfd 63v	£0.13	1·22mfd 25v	£0.06	22mfd 16v	£0.06
47mfd 63v	£0.18	47mfd 25v	£0.08	47mfd 16v	£0.06
100mfd 63v	£0.26	100mfd 25v	£0.10	100mfd 16v	£0.08
		220mfd 25v	£0.14	220mfd 16v	£0.10
		470mfd 25v	£0.22	470mfd 16v	£0.16
				2200mfd 16v	£0.60

TUNERS

ELC 1043/05	£8.50
ELC 1043/06	£8.50
U321	£10.00
U322	£7.50
U341	£9.50
U342	£8.50
G8 Varicap	£10.50
ET596 Hitachi (Video)	£10.00

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Universal Tripler	£6.00
General purpose on/off switch	
Mains front mounting (PB3008)	£0.75
Anode cap	£0.60
Coax Coupler	£0.17
Coax Plug	£0.17
TX10 Focus Unit	£9.95

HOW TO ORDER – Add 15% VAT plus ·75p per order P&P. Cheque or P.O. with order payable to Montana Mail Order. Write or ring for fast efficient service. Prices subject to change without notice. Official orders from Schools and Colleges accepted.

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Between 3–6 pm
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VHS VHS VHS

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£60

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Makes inc. PHILIPS, GEC, HITACHI, ITT, BUSH, PANASONIC, SONY, DECCA, FERGUSON, GRUNDIG etc.

COLOUR TV from £5

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Suits JVC 2650 PORTABLE, JVC 2200, FERGUSON 3V24. Also suits JVC 6" MONITORS, MODEL No's TM22, TM41. ONLY £25 each including post and packing **ONLY £25**

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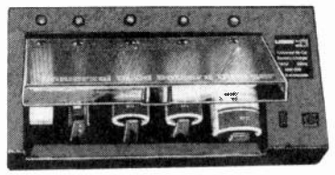

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☎ 01-688 2950 **SHOP HOURS Mon-Sat 10-5.30 (Closed Weds)**

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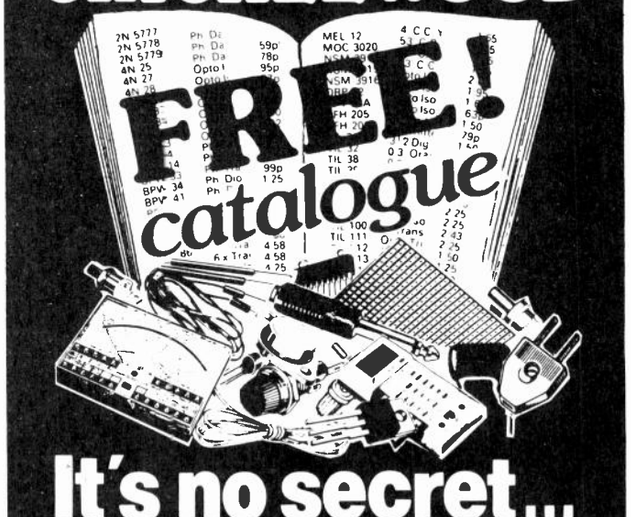

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All at UNBEATABLE PRICES for QUANTITY & QUALITY

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THORN 8800 **(remote)** ★★★★★★★★★★★★★★★★★£30
THORN 9000 ★★★★★★★★★★★★★★★★★★★★★★★£30
THORN 9000 **(remote)** ★★★★★★★★★★★★★★★★★£35
THORN 9600 ★★★★★★★★★★★★★★★★★★★★★★★£40
THORN 9600 **(full feature remote)** ★★★★★★★★★★£45

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(VARIOUS MODELS)
THORN 9900 ★★★★★★★★★★★★★★★★★★★★★★★£50
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PHILIPS G11 ★★★★★★★★★★★★★★★★★★★★★★£55

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Brand New Remote Control Hand Sets Available for the majority of British & European TV sets.

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Bush T20 & T22 etc	**£30**
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G11s	**£35**
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Thorn from 8,800 to T/X from	**£20**
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TELEQUIPMENT S54A. Single Trace 10MHz. Solid State. With Manual. .. £110

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Auto ranging; max reading 20,000. AC/DC volts – resistance. .. **Only £50** (P&P £5)

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Handled. GO/NO GO for In-situ Testing. Compete with batteries, leads & instructions.
(p&p £3) **NOW ONLY £12**

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240V In – 240V Out 100VA .. **£6 each** P&P £2

DISK DRIVE PSU.240V IN; 5V 1.6A & 12V 1.5A out. Size: W125mm, H75mm, D180mm. Cased. Un-used. Only £10.00 each (P&P £2)
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Various 5¼" Floppy Disk Drives and Stepping Motors Available.

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LABGEAR COLOURMATCH PATTERN GENERATOR Type CM6038-DB Crosshatch/Grey Scale/Blank Raster. Mains or Battery. .. **ONLY £12 each** (P&P £2)

CROSSHATCH GENERATOR TVT5M Crosshatch/Dots/White. RF & Video Outputs. Tuner Control **£10** (P&P £4)
DEGAUSSING COILS .. **£20** (P&P £4)
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METRIX WOBBULATOR Type 210. 5-220MHz .. **£20**
LABGEAR COLOUR BAR GENERATOR CM6037 (P&P £4) .. **£60**
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PHILIPS COLOURBAR GENERATOR type 5501 (P&P £5) .. **£100**
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HAMEG OSCILLOSCOPE 605. Dual Trace 60MHz. Delay Sweep. Component Tester .. **£567**
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All Other Models Available.

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Callers welcome 9 am-5.30 pm Mon.-Fri. (until 8 pm Thurs.)

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GENUINE GRUNDIG SPARES. Fast helpful service, sensible prices. TELEQUIPMENT, PHILIPS, OSCILLOSCOPES, TEST EQUIPMENT, MANUALS. **Ochre Mill Technical. Stone 0785 814643.**

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CASH PAID Now for your surplus TV spares, Transistors, I.C.'s etc. Tel. MR. FORSHAW 0902 29022.

PHILIPS G11 AND BUSH T20 regular supplies. For prices phone 01-845 2036.

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ONE YEAR GUARANTEE

14" 370 – KRB – LHB – HGB – HFB – HUB – BRB – EGB – EFB – MEB – GUB – AXT 37 – 001 – AXM 37 – 001 – 37 – 565 – 570 – 552 – 554 – 590 – A34 EAC 00X.
Broken Tube We Can Help.

16" 420 EDB – EFB – CZB, 42 – 001, 42 – 556.

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26" 66 – 500 – 510 – 540 – 611 – 615 £55.

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SONY £65 Cash & Carry only.

DELTAS £29.00 Reguns.
£14.50 Slightly used. 6 month guarantee.
A56-120 A56-140 A51-110 A49-191 A47-342 or 343
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(ie new belts, clutches, heads)

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Whilst prices of goods shown in classified advertisements are correct at time of closing for press, readers are advised to check with the advertiser both prices and availability of goods before ordering from non-current issues of the magazine.

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COLOUR TV'S AND VIDEOS

Refurbished TV's

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ALL PRICES INCLUSIVE OF POSTAGE BUT PLUS VAT
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BUSH 718 ..... £20
BUSH 2 CHIP £8
GRUNDIG 5010 £10
PYE KT3 ..... £50
GEC 2213 ..... £30
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Best Stock in Country over 2000 in stock (90% of our TV's Switch on)

Special Price Quoted For Bulk Purchases From Source.

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HITACHI, VT11,
FERGUSON 3V29

SANYO,
SONY,
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5 MINS FROM MOTORWAY

100's PX
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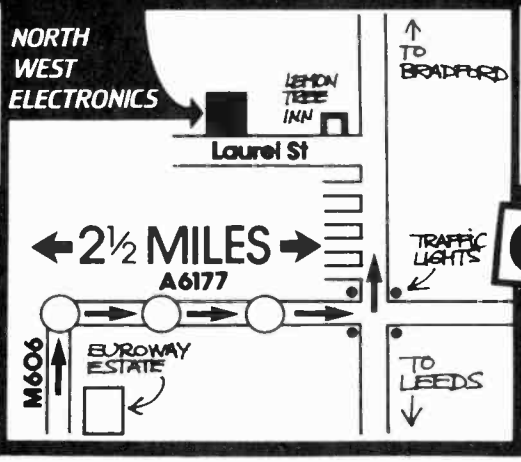
All models in stock



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WORKING TV & VIDEO

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GUARANTEED COMPLETE AND UNCANNIBALISED GOOD CABINETS AT LOW LOW PRICES

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K30, KT3, G11, TEXT, REMOTE AND BASICS

ITT, GEC, BUSH, JAPS., DECCA, ETC.

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0268 728966

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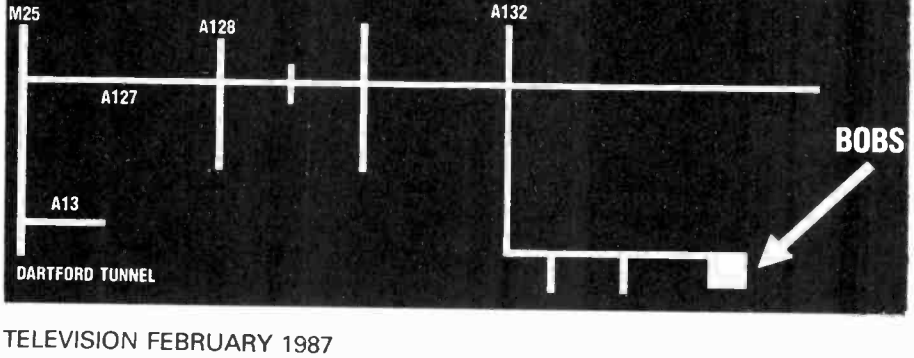

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All covers made from sturdy quilted anorak-type material & personalised with your trading name.

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(tea cosy style)

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★ Give all-round protection against damage/scratching during transit
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★ Fit all modern VCRs – excluding portables
★ Allow discreet removal to and fro

Price (including P & P)
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Pack of 5 – £30
Pack of 10 – £55

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2 × Standard TV Covers
2 × VCR Protective Covers
1 × Extra Large TV Cover
} **£30**

WHY NOT JOIN OUR MANY SATISFIED CUSTOMERS?

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You'll wonder what you did without them!

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Please allow 21 days for delivery

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Philips G11 – Guarantees Only		

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Good working from £10 push buttons, Sale or Exchange

Professional stick

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£22.50 delivered

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UNTESTED FROM £15.00
WORKING TVs £20.00
RE-GUNNING TUBES

2 year guarantee
Most types available including Sony

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We supply spares for most makes including Sony and Fidelity all at competitive prices.

We also stock a comprehensive range of rebuilt C.R.T.'s including Hitachi and Sony.

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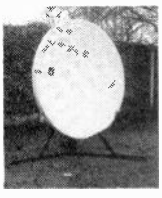

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Amstrad TV chassis Complete damaged print **£5 + £5 post**

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

1A/1600V **10p**

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**
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 **70p**
BU 205 **£1**
BU 206 **£1**
BU 207 **£1**
BU 208 **80p**
BU 208A **£1.10**
BU 208D **90p**
BU 222 **£1**
BU 326 **£1**
BU 407 **60p**
BU 426V **60p**
BU 500 **£1.10**
BU 500D **£1**
BU 508A **£1.20**
BU 526 **75p**
BU 807 **£1**
BU 824 **50p**
BUW 11 **£1.00**
BUW 84 **60p**
BYW 20-08-9 **£1**
BYW 95 **10p**
TIC 106a **30p**
TIC 116m **40p**
TIC 116n/Y 1003 **35p**
TIC 126N **40p**
TIC 206m **30p**
TIC 225S **40p**
TIC 226E **40p**
TIC 226m **30p**
TIC 236m **30p**
TAG 226/600 **50p**
TICV 106D (T092 case 2A/400V) **10p**
TIP 29 **20p**
TIP 30 **35p**
TIP 30A **35p**
TIP 30B **40p**
TIP 30C **45p**
TIP 31 **30p**
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 41B **40p**
TIP 41D **70p**
TIP 42/BRC 6109 **30p**
TIP 48 **40p**
TIP 49 **30p**
TIP 57 **30p**
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 **25p**
TIP 136 **30p**
TIP 140 **50p**
TIP 640 **50p**
TIP 2955 **35p**
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**
MJE 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**
Mains ViewData 240V/240/6V/4 amp/6v 500m/a in / out – – – – – – –

Mains trans 240/12v-0-12v 2 amp **£3.50**

Voltage Regulators
+5V/UA78PO5SC **30p**
−5V/LM79MO5CP **25p**
−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**
+15V/78M15 **15p**
+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**
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**
6v-9v-13v tape motor **75p**

Infra red led
LD57CA **15p**
AT 4041/41 transductor **£1**
15K-20 turn pots **20p**
Thorn panel 6×100 pot + changeover switch (Irish) **50p**
Battery converter TA 75 for colour TV. 12/24v Thorn 3787 **£6**
Thorn 3500 2A cut out **50p**

Stereo GEC amp 20 watt + pre-amp with 4 pots + mains power unit with circuit **£6**

SPECIAL OFFER
Decca-TTT etc.
FEO4/1/250AC/4 Mains filters (grey type) × 4 **50p**

BRIDGES
KBL 005 **30p**
KBL 02 **30p**
KBP 04 **30p**
W02 **15p**
W004 **15p**
W005 **20p**

Thorn Chassis U916D Complete **£10**

Thorn TX9 Remote Panels with I.C.s **£2.50**

Thorn 9000 4 Slider Front Panel **£4**

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 push button unit with mains lead & slider pots **£10.00**

8000/30v **50p**
470/40v × 10 **£1**
22/100v × 10 **£1**
100/350v **70p**
400/350v **70p**
.47/500v **25p**
1/600v **25p**
.022/1kv **10p**

NI.CD Charger MW398 6A.A **£8**
NI.CD 5 Hours Battery Charger **£8**

Nickel Cadmium Battery Charger AA-C-D-PP9 **£6**

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**

CVC8-9 Push Button Unit **£10**

Electronic Buzzer **60p**

15V, 015V, 1A Print Type Trans **£1**

Philip's Headphones Compact Disc Stereo Type **£13**

ITT Display Tube 58705 **50p**

8 Seg Display FND500 **29p**

Model 3000 Pocket Personal D.M.M. Volts range AC, DC 200M/V to 300V. Res. 2000Km **£24**

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+15v 1 Amp Transformers **£1**

RGP30K **10p**
RGP30G **8p**
RGP10B **5p**
RGP15G **6p**

Multi Core
60–40 Soldar 500G 20 SWG **£4.50**
15 Watt Stereo Amp Sanyo Module with Data **£5.00**
25pcs Precision Screwdriver & Tool Set **50p**
25 Watt Solder Iron **£6.00**
Various Tools and Accessories **£4.00**
T/V V/Aerial 300Ω or 75Ω **£1.50**
L.C.D. clock display with alarm **75p**
* 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 15 watt/25 watt **£5.00**
Hitachi Silver Oxide Battery G13 UCC357 1EC 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**

Panel Meters VM/A
Gray front and .0-300V AC/DC 2¾ × 2¼ and 1M/A **£2.00 each**

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

GEC Decoder Panel PC772A3 PC446A5 **£6**

Tube Base 20AX GEC PC852B3 **£1**

Thorn Aerial Socket TX10 **£1**

12 Volt Mains Trans 500M/A **£1.00**
18V or 12 Volt Mains Trans 500M/A **75p**

Quantity Reductions
BY204/4 **25 for £1.00**
BY206 **25 for £1.00**
W005 bridge **20 for £2**
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**
Antistatic Discloth **5 for £1**

SENDZ COMPONENTS
TO ORDER SEE BACK PAGE

Plastic Boxes 4¾ × 4 × 1 × ¾ **50p**
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**
20 Slider Knobs **70p**

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**
50 Mixed AC series Transistor **£4.50**
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**
100 Transistor **£2.50**
20 Convergence Pots **80p**
10 Thermistors **50p**
20 Slider Pots **£1.00**
30 Presets **50p**
40 glass reed switch **£1**
10 press to make switch **70p**
40 Pots **£1.50**
5 Tube Bases **£1.00**
1,000 Diodes. Condensers, Resistors on Bandolier **£2.00**
20 Knobs **£1.00**
20mm Fuse Holders Chassis Mount **20 for £1**
1N4001/6 100 mixed **£2.50**
EHT Diodes, small **20 for £1**

200 Mixed Diodes **£1**

100 500M/A Fuse **£1**
100 1.225 Amp 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

Thorn Spares

New 9000 Decoder	£8.50
9000 Frame panel	£8
9000 Cyclops panel	£1.50
8000/8500 timebase panel	£8
8800 convergence panel	£6
8500 convergence panel	£6
4000 Power supply	£3
1600 Mains lead, switch	
3500 6 push button + cable form	£1.50
T605 1vNPN 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
G8 Push Button Unit	£10.00
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

G8 2R2+68R	£1.25
G8 47R 15 watt	£1.00
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
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
3¾" dia	8 ohm	75p
3" dia	8 ohm	75p
4½" sq.	15 ohm	75p
KT3 speaker	K30	75p
3" dia	15 ohm	60p
1600 5×3	12 ohm	£1
K45 Philp	15 ohm	75p
K30 15 watt		£1

K13-K30

OE-425		
OE-550	F. W.	10p
OE-513	correction	10p
OE-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
BY 299 Red	20p
BY 229/400	30p
BY 299/60p Lag	30p
BY 237	5p
BY 254	10p
BY 255	30p
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
XK 3102	50p
BYV 28/200	20p
800/2.75 amps	10p
International Rectifier EHT Diodes G770/HV34 6KV	3 for 8p
6A/600V Stud Diodes	20p
6A/1000V Stud Diodes	20p

K35 Decoder	£8
K35 Sound OP	£4
K35 Split Diode 3122-138-35930	£10.00
K35 IF	£5

Fidelity Tube Base with transitor & focus pot	£1.50
Bush Tube Base on panel	£1.00

Line Transformers

Thorn 1690 LOPT	£6.50
2 J/Pots 3,500 I 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
1690 Thorn EHT over-wind with diode lead & anode cap	£2.50
GEC 2040	£3.00
GEC 2110	£7.00
Mullard AT 2036	£1.50
Pye 169 Line Trans	£3.00
Pye mono	£3.00
Rank mono T704A	£3.50
Split Diode Trans	£7.00
GEC 20 AX Rank Z522	£3
Rank L.O.P.T. Z970	£3
CVC20 ITT	£3.50
A T2080/15	£5.00
CVC 30 ITT	£5.00
CVC32 Line Tran	£6.00
CVC800 Line Trans	£6.00
CVC40 Slip/Diode	£12.00
CVC 45	£5.00
GEC Portable G1OT2041	£3.00
GEC Portable G1OT2046	£3.00
ITT Split Diode Leads ITT	£1.00
3500L O.P.T. & ITT Trans	each £2
LOPT Rank Z763	£5
K35 Split Diode 3122/138/35930	£7

Black Triplers

S.T.C. Universal Tripler	£5.00
11 ITT	£2.50
11 TGA	£2.00
ITT CVC 5-8-9	£3.50
Rank T25LE Tripler	£2.00
Rank ITTCP A823	£3.50
TU 25.30K Rank	£3.00
11 TEZ Rank	£3.00
G9 Philips	£4.00
GEC 2110	£4.00
3500 Thorn	£3.00
8500 Thorn	£4.00
9000 Thorn	£6.00
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
Green Tripler with foaes pot	£6.00
CVC 825 ITT CVC 20/25/30/32	£3.50
Decca 80 100	£4.50
Grundig TVK 52	£2.50
11TBQ Pye 731	£3.00
11THY	£4.00
D22 for Pye 18" colour portable	£4.00
LP 1193/63	£4.00
BG 100/41	£3.25
FRO Tripler print type with foaes	
PO7 BG2087	£5
F/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 I.C's + pots	£4.00
G11 F.W. Transformer	50p
G11 F.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 NE5111N	£1.20
LM337M Reg.	30p
20 GEC Black Spark Gaps	£1.00
KT3 Front Panel Control Assy	£2.50
BTW 30/50	50p

TELETEX DECODER

I.C. SAA 5051	K30
I.C. SAA 5042	
I.C. SAA 5030	
I.C. SAA 5020 etc.	£8.00

BTW 92/800R	£3
25A473 PNP C/P	10p

Rank T20 Z136 Panel	£6
NEW 1617 THORN Chassis with ICs & AU113	£5.00
NEW GEC 20AX Power Supply Switch Mode	£12.00
Complete new GEC portable chassis M1201H/M1501H with P.B.U./ s cap/LOPT	£10
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 f/unit	£3.90
Pye 205 Line op panel	£7.50
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
Pye CDA/205 panel	£6.00
GEC portable chassis + LOPTI 2114 New	£4.00
Thorn 1613/1713 chassis	9.75
G9 Power Panel	£6.00
Mono RANK Chassis 127A NEW	£10.00
NEW G9 Frame Panel	£4.00
NEW G11 IF Panel	£10.00

G8 Tuner Unit + Panel	£4.00
G8 Power Supply	£5.00
G8 6 Sloping PBU	£8.00
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
AEC V/Cap Resistor Unit UHF with IC SAS660 SAS670	£3.00
Z714 RANK IF Panels 6MHz I.C. SL437F	£3.00
Z909B RANK IF Panels Export 5.5MHz 2 I.C's TBA120SB 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 and 12 button units	£9.00
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Unversal Focus. Fits Pye, Thorn and Decca Units.	
T147 Rank tube base on panel	£1.00
Z718 Focus Unit	£1.50
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Decca Small	75p
KT3 Focus Unit	75p
K30 Focus Pot	75p
K30 Tube base on panel	£1.00
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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
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Remo TV12SP	50p
1600 Thorn EHT Rec and Lead	50p
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TV20	£1.30
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G11 drawer ASS 3 pots Mains switch and lead	£2.00

K30 Drawer Ass with pots cable forme	£1.00

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

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RANK & ITT Remote Switch 2800 ohm	£1.50
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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

22/1000	20p
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1/100	5p
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2000/100	70p
4700/100	75p
47/160	10p
300 300/300V	80p
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2.2 250v	10p
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
GEC/600/250	60p
700/250	£1
300+300 MFD 350v	£1.00
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4/350	5p
8/350	8p
4.7M/350v	10p
33/350	20p
220/350	30p
300/350	40p
400/350	50p
10/375	10p
22/375	15p
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K13 F/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
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0.047/1000	10p
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0.1/1000	10p
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.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
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8n2/2KV	15p
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350V 400M	60p
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175/100/100/350v	£1.00
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200/100/100/350v	£1.50
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ITT 8 and 6 Push Button	£1.00
Pye 725 LOPTs	£6.00
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CMD 800 Chassis No tuner	£20.00

CMD 800 Decoder	£8.00

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G11 I.I.C. Receiver Panel	£1.50

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BC143	25p
BC147	10p
BC148	10p
BC149	10p
BC153	10p
BC154	10p
BC157a	10p
BC158	10p
BC159	10p
BC160/16	25p
BC171	10p
BC172	10p
BC173	10p
BC174	10p
BC183	10p
BC184	10p
BC204	10p
BC207	10p
BC212	10p
BC213	10p
BC214	10p
BC237	10p
BC238	8p
BC239	10p
BC250	8p
BC251	10p
BC252	10p
BC262	10p
BC263b	20p
BC294	30p
BC298	10p
BC300	30p
BC301	30p
BC303	30p
BC307	7p
BC308	7p
BC309	10p
BC327	10p
BC328	10p
BC328/338 pair	15p
BC337	10p
BC338	10p
BC347	10p
BC349b	10p
BC350	20p
BC365	10p
BC368	10p
BC384	10p
BC394	10p
BC413	10p
BC414	10p
BC416	10p
BC440	30p
BC454	10p

BC455	10p
BC456	10p
BC460	25p
BC462	10p
BC463	10p
BC478	10p
BC527	10p
BC532	10p
BC546	10p
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BC548	10p
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BD235	30p
BD238	30p
BD239	15p
BD240	50p
BD243c	30p
BD244	50p
BD250a	30p
BD252	20p
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BD331	20p
BD373b	20p
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BF199	10p
BF200	20p
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BF224	15p
BF238	20p
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BF363	15p
BF367	15p
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BF394	10p
BF419	30p
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BF423	15p
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BF450	20p
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