

TELEVISION

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OCTOBER 1995 £2.20

SERVICING·VIDEO·SATELLITE·DEVELOPMENTS

A REED BUSINESS PUBLICATION

**FREE TV/Video
Spares Guide**

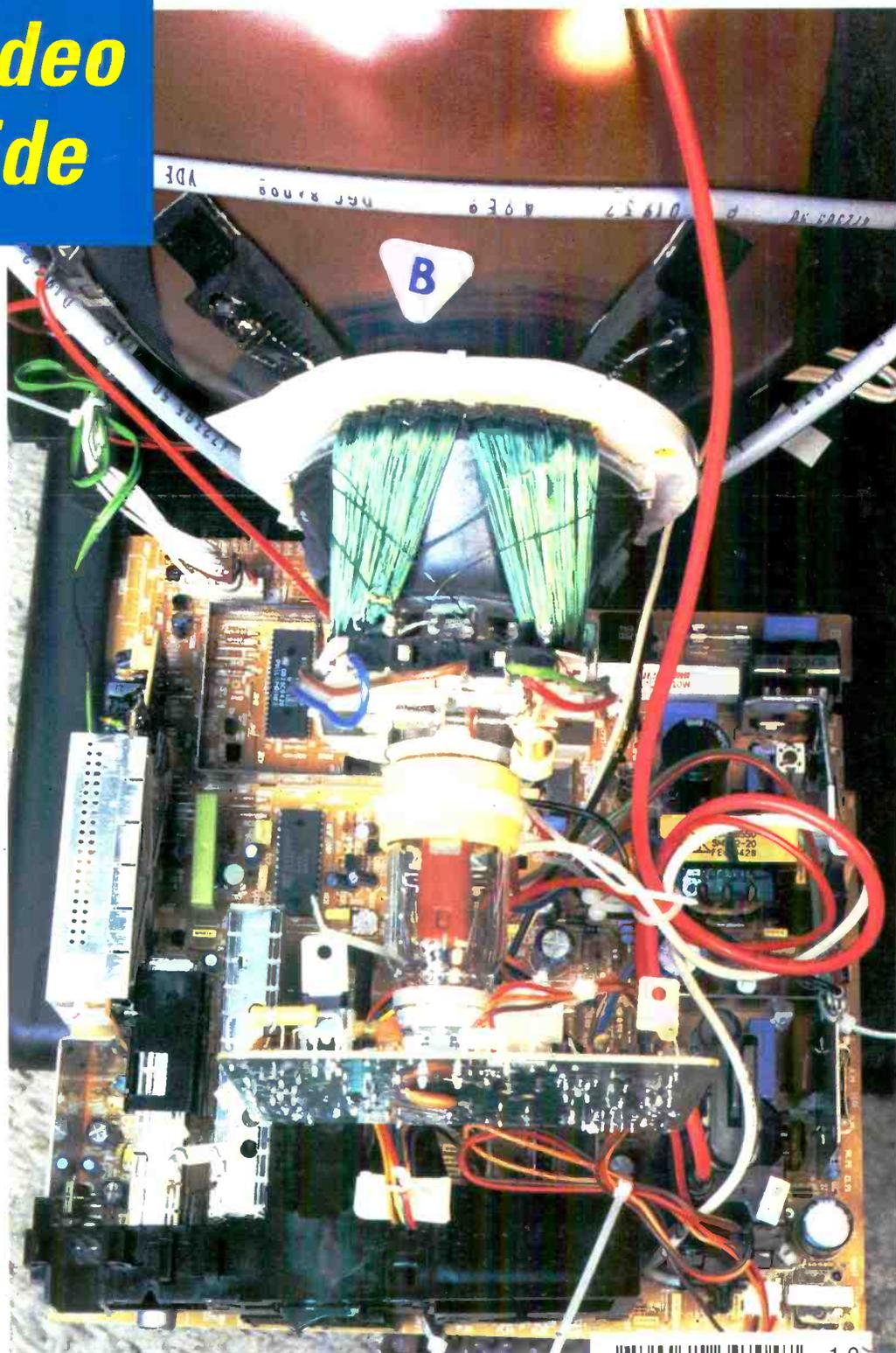
**Domestic TV
Distribution
Techniques**

**Hitachi
CPT2196/8
Service Notes**

**Satellite LNB
Developments**

VCR Servicing

**Satellite RX
Review – RR50**



Inside the Ferguson TX90 Chassis





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TELEVISION

October 1995

On sale
September 20th

Vol. 45, No. 12

Issue 540

846 A Day in the Life of . . . *Gerald White*
A typical day's problems in the workshop.

848 Inside the Ferguson TX90E Chassis, Part 1 *Mark Paul*
Start of an investigation into the technology used in this innovative Thomson designed chassis.

856 Satellite Notes *Hugh Cocks*
Satellite TV equipment problems and repairs

865 Toshiba Service Briefs
Know-how from Toshiba Technical.

866 LNB Developments – and Hot Bird *Martin Pickering, B.Eng.*
How LNBs have evolved to cater for wider bandwidth requirements, and lining up for Hot Bird.

869 IR Detector Cards *Ian Adshead*
One of the most useful tools is also inexpensive – a card that detects the presence of infra-red radiation.

870 Service Notes on the Hitachi Models CPT2196/2198 *John Coombes*
A fault-finding guide for these sets, which are fitted with the G8Q chassis.

874 Domestic Multi-channel TV Distribution Systems, Part 1 *Bill Wright*
The Clutters' installation, with five TV sets and associated equipment mostly linked together, illustrates what can go wrong, producing poor reception.

878 Satellite Workshop *Jack Armstrong*
Satellite receiver faults and repairs.

879 Servicing Matsui and Saisho VCRs, Part 2 *Jack Barclay*
Mainly on the electronics used in the later models in the post-

1990 ranges. Also a faults list and a list of commonly required part numbers.

884 Sat Receiver Review: the RR50 Mk 2 *Roger Bunney*
Being manually controlled, this is an ideal receiver for the sat-zapping enthusiast.

890 Grundig GRD150/250 Sound Mods *Steve Beeching, T.Eng.*
Official modifications that were introduced to improve the audio performance with these satellite receivers.

REGULAR FEATURES

Camcorner.....	883
Help Wanted.....	891
Leader.....	845
Letters.....	882
Long-distance Television.....	862
Next Month in Television.....	885
Teletopics.....	854
Test Case 394.....	867
TV Fault Finding.....	886
VCR Clinic.....	858
What a Life!.....	868

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M50786	900p	STK1060	700p	STK5486	450p	STR65041	325p	TA8A20	100p	TD2002	50p	TDA3800	350p	TDA8405	550p	UPC1335V	320p	2SA993	50p
M50790	600p	STK1070	850p	STK5488	480p	STR65041	475p	TA8A950	100p	TD2003	65p	TDA3803A	500p	TDA8415	650p	UPC1350	115p	2SA999	30p
M51161	300p	STK1080	940p	STK5490	450p	STR60001	525p	TA8A990	60p	TD2004	150p	TDA3810	200p	TDA8417	550p	UPC1363	190p	2SA1006	100p
M51381P	200p	STK2025	620p	STK5632	450p	STR61001	550p	TC5081AP	200p	TD2005	150p	TDA3825	225p	TDA8421	500p	UPC1363C	300p	2SA1008	125p
M51387P	800p	STK2028	500p	STK5725	450p	STR60145	550p	TC5081AP	200p	TD2006	70p	TDA3840	200p	TDA8425	500p	UPC1364C	350p	2SA1009	200p
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M51848	150p	STK2038	700p	STK6316	300p	TRD1206	600p	TC9125BP	410p	TD2008	100p	TDA3845	325p	TDA8453	600p	UPC1370C	300p	2SA1011	80p
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M53730	160p	STK3042	370p	STK6982	600p	TA7069	300p	TC9163	375p	TD2170	260p	TDA4282	300p	TDA8732	400p	UPC1423CA	650p	2SA1036	60p
M53731	220p	STK3044	500p	STK7216	420p	TA7118	150p	TC9164	400p	TD2190	200p	TDA4290	300p	TDA8905	500p	UPC1432CA	550p	2SA1037	50p
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M53759	200p	STK3082	550p	STK7225	500p	TA7137	60p	TC9A940	100p	TD2320	80p	TDA4420	120p	TDA9403	150p	UPC1488H	150p	2SA1044	25p
M53759	360p	STK3102H	530p	STK7226	600p	TA7140	100p	TC9P100	100p	TD2501	400p	TDA4421	300p	TDA9503	150p	UPC1505C	400p	2SA1051	300p
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NE565	110p	STK4025	530p	STK7358	440p	TA7214	220p	TD6350P	200p	TD2515	450p	TDA4442	240p	TEA1024	150p	ZN425	260p	2SA1084	100p
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NE571	280p	STK4027	480p	STK7404	400p	TA7220	120p	TD6360P	200p	TD2531	225p	TDA4443	250p	TEA1060	225p	ZN427	580p	2SA1091	100p
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NE5932P	145p	STK4036	470p	STK7408	675p	TA7223	210p	TD6362	150p	TD2541	120p	TDA4452	250p	TEA1080P	170p	ZN459	190p	2SA1095	30p
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SAA1008	450p	STK4040H	650p	STK7454	600p	TA7226	290p	TD6364	100p	TD2543	210p	TDA4480	280p	TEA1101	425p	ZN134H	2150p	2SA1102	130p
SAA1010	400p	STK4042H	800p	STK7561	650p	TA7227	170p	TD6365	100p	TD2545	120p	TDA4482	350p	TEA1130	65p			2SA1103	140p
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SAA1025	250p	STK4046	950p	STK7563	80p	TA7232	95p	TD6367	100p	TD2547	120p	TDA4482	350p	TEA1131	150p			2SA1105	250p
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TYRE, SUPPLY REEL TABLE		TYRE, SUPPLY REEL TABLE	
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VT11/VT33			
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VT52/61/62/63/64/65/85/86/640			
<i>Contents</i>		<i>Economy Kit Contents</i>	
BELT SET, PINCH ROLLER, FF/REW ARM, CLUTCH PLATE, TENSION BAND		BELT SET, PINCH ROLLER, FF/REW IDLER	
Order Code: SK49	£14.00	Order Code: SK50	£3.00
VT400/405/410/13/14/15/18/420/25/26/28/430/31/35/48/450/498/510/520/25/26/30/35/36/540/545/46/48/570/75/576/580/85/88			
<i>Contents</i>			
TIMING BELT, PINCH ROLLER, FF/REW ARM, CLUTCH BASE, TENSION BAND			
Order Code: SK52		£9.75	
VT100/110/111/113/115/118/120/125/128/130/135/138/145/150/175/220/225/250/255/258/260/VTL30			
<i>Contents</i>			
BELT SET, PINCH ROLLER, FF/REW ARM, CLUTCH PLATE, TENSION BAND			
Order Code: SK51		£14.00	
PANASONIC			
NV2000/NV2010			
<i>Contents</i>		<i>Economy Kit Contents</i>	
BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES		BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES	
Order Code: SK03	£5.00	Order Code: SK02	£5.00
NV300/NV330/NV333/NV340/NV366			
<i>Contents</i>			
BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRE			
Order Code: SK01		£5.00	
NV2000/NV2010			
<i>Contents</i>		<i>Economy Kit Contents</i>	
BELT SET, PINCH ROLLER, FF IDLER, PLAY IDLER, TENSION BAND, VIDEO LAMP		BELT SET, PINCH ROLLER, IDLER TYRE, PULLEY TYRE	
Order Code: SK13	£6.00	Order Code: SK14	£3.50
NV7000/NV7200/NV7800			
<i>Contents</i>		<i>Economy Kit Contents</i>	
BELT SET, PINCH ROLLER, IDLER UNIT, PLAY IDLER, TENSION BAND		BELT SET, PINCH ROLLER, IDLER TYRE, CLUTCH TYRE	
Order Code: SK11	£8.50	Order Code: SK12	£3.25
NV300/NV330/NV333/NV340/NV366			
<i>Contents</i>		<i>Economy Kit Contents</i>	
BELT SET, PINCH ROLLER, IDLER UNIT, PLAY IDLER, TENSION BAND		BELT SET, PINCH ROLLER, IDLER TYRE, PLAY IDLER TYRE	
Order Code: SK15	£7.00	Order Code: SK16	£3.25
NVG7/NVG9/NVG10/NVG11/NVG12/NVG14/NVG15/NVG16/NVG18/NVG30/NVG120/NVG130/NVG400/NVH65 (PIVACY) AG1810 (PIK)			
<i>Contents</i>		<i>Economy Kit Contents</i>	
LOADING BELT, CAPSTAN, BELT, PINCH ROLLER, IDLER, TENSION BAND		LOADING BELT, CAPSTAN, BELT, PINCH ROLLER, IDLER TYRE	
Order Code: SK27	£6.00	Order Code: SK28	£3.00
NV332			
<i>Contents</i>		<i>Economy Kit Contents</i>	
BELT SET, PINCH ROLLER, PLAY IDLER, FF/REW IDLER, TENSION BAND, FF/REW TYRE		BELT SET, PINCH ROLLER, PLAY IDLER TYRE, FF/REW IDLER TYRE	
Order Code: SK29	£12.00	Order Code: SK30	£5.10
NV230/250/260/280/430/450/460/470/650/810/890			
AG1200PK/AG1500PK			
<i>Contents</i>		<i>Economy Kit Contents</i>	
BELT SET, PINCH ROLLER, IDLER, TENSION BAND		BELT SET, PINCH ROLLER, IDLER TYRE	
Order Code: SK23	£6.00	Order Code: SK24	£3.25
NV600/NV688			
<i>Contents</i>		<i>Economy Kit Contents</i>	
BELT SET, PINCH ROLLER, PLAY IDLER, FF/REW IDLER, TENSION BAND		BELT SET, PINCH ROLLER, PLAY IDLER TYRE, FF/REW IDLER TYRE	
Order Code: SK25	£12.00	Order Code: SK26	£6.00
NV730/NV770			
<i>Contents</i>		<i>Economy Kit Contents</i>	
SLOT IN BELT, LOADING BELT, PINCH ROLLER, IDLER UNIT, TENSION BAND		SLOT IN BELT, LOADING BELT, PINCH ROLLER, IDLER TYRE	
Order Code: SK19	£5.00	Order Code: SK20	£3.00
NV370/NV380/480/630/780/830/850/AG2100PK/AG2200PK			
<i>Contents</i>		<i>Economy Kit Contents</i>	
BELT SET, PINCH ROLLER, IDLER, TENSION BAND		BELT SET, PINCH ROLLER, IDLER TYRE	
Order Code: SK21	£5.00	Order Code: SK22	£2.75
NV777/NV788			
<i>Contents</i>		<i>Economy Kit Contents</i>	
BELT SET, PINCH ROLLER, IDLER UNIT, TENSION BAND		BELT SET, PINCH ROLLER, IDLER TYRE	
Order Code: SK17	£6.00	Order Code: SK18	£4.00

VIDEO SERVICE KITS (Cont.)

SHARP			
VC381			
<i>Contents</i>		<i>Economy Kit Contents</i>	
BELT SET, PINCH ROLLER, REEL IDLER, TENSION BAND, VIDEO LAMP		BELT SET, PINCH ROLLER, REEL IDLER TYRE	
Order Code: SK47	£8.00	Order Code: SK48	£3.25
VC500/VC571/VC581/VC582/VC583/VC584/VC5F3			
<i>Contents</i>		<i>Economy Kit Contents</i>	
BELT SET, PINCH ROLLER, REEL IDLER, TENSION BAND		BELT SET, PINCH ROLLER, REEL IDLER	
Order Code: SK60	£9.50	Order Code: SK61	£5.00
VC781/VC7810/VC7822/VC785/VC786/VC793/VC800			
VCA100/VCA102/VCA104/VCA202			
<i>Contents</i>		<i>Economy Kit Contents</i>	
BELT SET, PINCH ROLLER, REEL DRIVE UNIT, TENSION BAND		BELT SET, PINCH ROLLER, REEL DRIVE UNIT TYRE	
Order Code: SK64	£13.50	Order Code: SK65	£3.75
VC681/VC682/VC684/VC685/VC693/VC699/VC6F3/VC700			
<i>Contents</i>		<i>Economy Kit Contents</i>	
BELT SET, PINCH ROLLER, REEL DRIVE UNIT, TENSION BAND		BELT SET, PINCH ROLLER, REEL DRIVE UNIT TYRE	
Order Code: SK62	£13.50	Order Code: SK63	£5.00

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PLEASE RING US!**

BACKUP BATTERIES

REPLACEMENT PHILIPS NI-CAD BACKUP BATTERIES		
Replaces Ferguson Part No:		
00E6-067-001, used on TX10, L2V		150p
Replaces Philips Part No's:		
138-10138, 138-10313, 1.2V - 90mAh		100p
Replaces Philips Part No's:		
138-10229, 2.4V - 90mAh		180p
REPLACEMENT FERGUSON NI-CAD BACKUP BATTERIES		
Replaces Ferguson Part Nos:		
00E6-066-001, 2.4V		
Used on: 3V35, 3V56, 3V58, 3V65		200p

REPLACEMENT LINE OUTPUT TRANSFORMERS

Description	Price	Order Code
HITACHI 2433752	1500p	LOT01
ORION 3714002	1500p	LOT02
FIDELITY ZX300	1500p	LOT03
FE TX100 90 DEG	1500p	LOT04
SABA 490007182	1500p	LOT05
FE TX90 WHITE	1650p	LOT06
ITT D307/37 EQ	1600p	LOT07
BLAUPUNKT 210	1600p	LOT08
GRUNDIG 2922010	1600p	LOT09
ITT CVC800/1/3	1500p	LOT10
ITTD218/37 EQ	1600p	LOT11
NORMENDE 5255	1600p	LOT12
SABA 81000 200	1600p	LOT13
SALORA T236 EQ	1650p	LOT14
SABA 811-50-24	1600p	LOT15
SABA 770223500	1600p	LOT16
TELEFUNKEN AT1	1450p	LOT17
TELEFUNKEN EQ	1400p	LOT18
SALORA FM0218B	1600p	LOT19
NORMENDE 5255	1600p	LOT20
ITT CVC 1150/1	1500p	LOT21
ITT COMPACT 80	1500p	LOT22
FE TX100 GREEN	1450p	LOT23
HINARI CT4/5 5113	1500p	LOT24
SELECO 6320410	1600p	LOT25
BLAUPUNKT 8667	1600p	LOT26
ITT COMPACT B1	1450p	LOT27
ITT CT3326 MUL	1500p	LOT28
ITT D066/37 EQ	1600p	LOT29
ITT 3546 EQ	1500p	LOT30
LUXOR 5810110	1600p	LOT31
SABA 849380920	1600p	LOT32
HITACHI 2434141 CP	1450p	LOT33
FE TX100 110 D	1700p	LOT34
HANTAREX 28021	1600p	LOT35
SHARP C3700 EQ	1600p	LOT36
HITACHI 2432981 CP	1500p	LOT37
FERGUSON 00D3-508-002	1650p	LOT38
Fits Chassis TX99 41cm + 51cm		
Used On: 51K2, 51JB, 51J7, 4TH3, 41H9, 41H2, 51K3		
PANASONIC TLF14567F	1850p	LOT39
Used On: TC2043, TC2243, TX300		
PANASONIC TLF14568F	1850p	LOT40
Used On: TX2231, TX2244		
PANASONIC TLF14584F	2350p	LOT41
Used On: TC2210, TC2160, TX1752, TX2112		
TX2112, TX2162, TXC22		
PANASONIC TLF14586F	2350p	LOT42
TC1651, TC2051, TC2061, TC2253, TC2263, TX5500		
HINARI	1600p	LOT43
Used On: CT15		
HITACHI 2434274	1250p	LOT44
CPT2174, CPT2176, CPT2178, 2434274		

We stock line output transformers for over 100 different models. Please ring 0181-900 2329 for more information.

REMOTE CONTROLS

Description	Order Code	Price	Description	Order Code	Price
GRUNDIG			PHILIPS (continued)		
TP160E	RC 107	900p	RC38	RC 301	750p
TP200, TP300	RC 380	800p	KT3 TEXT	RC 5301	750p
TP400	RC 401	675p	RC5352	RC 5352	800p
TP590-600	RC 600	850p	RC5375	RC 5375	850p
TP390, TP610	RC 610	850p	RC5 STANDARD	RC 5534	850p
TP621	RC 621	850p	RC5901	RC 5901	850p
TP630, TP650	RC 650	850p	RC5903	RC 5903	700p
TP660	RC 660	850p			
TP661	RC 661	850p	SABA		
HITACHI			T6772	RC 149	900p
CLE800-CLE830	RC 140M	700p	TC315-320	RC 328	875p
A617402/655602	RC 192	875p	TC356	RC 356	875p
A512120/230	RC 900	800p	TC358	RC 358	850p
A514790	RC 901	800p	TC360	RC 360	800p
A5088470	RC 902	800p	TC365	RC 365	800p
A518612	RC903	900p			
SCL002	RC904	850p	SALORA		
C2096	RC 905	850p	SERIES L	RC 190	875p
A511940	RC 906	750p	86173	RC 882	850p
655602H	RC 907	800p	SANYO		
ITT			RC218, RC222, RC228, RC238	RC 140M	700p
IFB13, 14, 15	RC 143	875p	JXGE	RC 878	850p
FS4	RC 148	850p	JXOE	RC 884	850p
RG305	RC 305	675p	VHR2300	RC 890	850p
RG306	RC 306	825p	RC628	RC 865	900p
FS9/1-10/1	RC 307	850p	SHARP		
VS5 RUK	RC 308	825p	G0121CESA, 123CESA, 204, 251	RC 140M	850p
VS4-1	RC 310	850p	SIEMENS		
MULTICONTROL (17C2D)	RC 311	800p	FC616	RC 130	850p
KORTING			FC631	RC 132	850p
18279, 18396, 18460, 18521 SE	RC 108	850p	FC742	RC 164	900p
40540 VTS	RC 108	900p	SONY		
LOEWE			RM604, RM605, RM606	RC 140	700p
DC11	RC 146	850p	32 CHANNEL	RC 140M	700p
MATSUI			RM613	RC 141	750p
010270601	RC 889	850p	RM632, RM636	RC 160	675p
VX770	RC 892	850p	TATUNG		
METZ			FXA	RC 877	850p
JAVA COLOR (6890)	RC 166	850p	RC70	RC 883	750p
COLOR (7156)	RC 183	850p	FX70 FASTTEXT	RC 894	850p
JAVA (7180)	RC 184	850p	TELEFUNKEN		
MITSUBISHI			FB632	RC 632 ST	850p
939P/03607, 939P/03609	RC 140M	850p	FB639	RC 639 ST	850p
NOKIA			THORN/FERGUSON		
SATELLITE	RC 550	850p	3V35-42	RC 342	650p
NORDMENDE			3V31-32	RC 344	800p
TC2336	RC 351N	850p	3V57-58	RC 628	800p
CMC1, TC3519	RC 356	875p	TX10 TEXT	RC 732	575p
OCEANIC			TX10 STEREO TEXT	RC 738	575p
390C9500	RC 339	900p	TX9-90-100	RC 740	675p
ORION			3V55, FV11	RC 783	800p
RC53	RC 892	850p	TX100 FASTTEXT	RC 785	650p
PANASONIC			TX100 STEREO FASTTEXT	RC 789	650p
EUR51200	RC 200	800p	PROFESSIONAL	RC 790	650p
TC2200	RC 201	850p	TOSHIBA		
VSQ0357/NV730	RC 202	875p	CT937	RC 950	850p
TNQ1621	RC 203	900p	CT9117	RC 951	800p
PHILCO			201R48	RC 952	800p
CARVEL, CONCORDE,	RC 108	850p			
MERCURY, TELESTAR					
TC10	RC 152	900p			
PHILIPS					
RC5002,5154	RC 134	850p			
KT3 NON TEXT	RC 135	825p			
69117032	RC 178	875p			
69117194	RC 180	875p			
RC5991-UNIV	RC 300	580p			

VCR ALIGNMENT KIT

CONTAINS:

- SET OF 7 HEAD & TAPE PATH ALIGNERS
- SET OF 8 ALLEN KEYS
- * RCA TYPE AUDIO & CONTROL HEAD POSITIONING TOOL
- * RCA ADJUSTMENT TOOL FOR TAPE GUIDE POSTS
- * RCA TYPE BACK TENSION TOOL
- * TENSION ADJUSTMENT TOOL FOR VARIOUS USES
- * VCR ADJUSTMENT TOOL
- 3 Reversible Screwdrivers
- Spring Hook
- Circclip Pliers
- Micro Screwdriver
- VCR Head Extractor

Order Code: TOOL10 Price: 2900p

FUSES

Value	TIME LAG (20mm)		QUICK BLOW (20mm)	
	Order Code	Price	Order Code	Price
160mA	FUSE01	75P	FUSE17	60P
250mA	FUSE02	75P	FUSE18	60P
315mA	FUSE03	75P	FUSE19	60P
400mA	FUSE04	75P	FUSE20	60P
500mA	FUSE05	75P	FUSE21	60P
630mA	FUSE06	75P	FUSE22	60P
300mA	FUSE07	60P	FUSE23	60P
1A	FUSE08	60P	FUSE24	60P
1.25A	FUSE09	60P	FUSE25	60P
1.6A	FUSE10	60P	FUSE26	60P
2A	FUSE11	50P	FUSE27	60P
2.5A	FUSE12	50P	FUSE28	60P
3.15A	FUSE13	55P	FUSE29	50P
4A	FUSE14	55P	FUSE30	50P
5A	FUSE15	60P	FUSE31	50P
6.3A	FUSE16	60P	FUSE32	50P

FUSES

CURRENT RATING	ORDER CODE	PRICE
CERAMIC PLUG TOP		
3A	FUSE33	100P
5A	FUSE34	100P
13A	FUSE35	100P
20MM CERAMIC TIME LAG		
3.15A	FUSE41	100P
4A	FUSE42	100P
5A	FUSE43	100P
6.3A	FUSE38	100P
8A	FUSE39	100P
10A	FUSE40	100P
32MM CERAMIC SLOW BLOW		
8A	FUSE44	210P
16A	FUSE45	210P
15A	FUSE46	210P
20A	FUSE47	210P
38MM CERAMIC SLOW BLOW		
16A	FUSE48	875P

ALL THE ABOVE PRICES ARE FOR PACKS OF 10 FUSES

I.C. PROTECTOR

ICPF10	ICPF38	ICPN10	ICPN38
ICPF15	ICPF50	ICPN15	ICPN50
ICPF20	ICPF75	ICPN25	ICPN75
ICPF25	ICPN5	ICPN25	

Price: Only 30p each

AUDIO CONTROL HEAD
Amstrad Original No: 150751
Used on Amstrad TVR1.2.3, VCR4600, 4600MII, 4700
Funai V2S, VCR4600, 4800, 5200, 5600, 6600, VIP3000, 5000
Also fits: Fidelity, Funai, Hinari, Proline, Schneider, Towada, Ultravox
Order Code: AH01 Price: £13.50

Amstrad Original No: 153154
Used on Amstrad 008900, 8904, VCR2000, 6000, 8600, 8602, 8603, VCR8604, 8700, 8704, 8714, 8800, 9005, 9244
Also fits: Antitech, Boadstec, Casio, Crown, Fidelity, Goldhead, Granada, Hinari, Marguant, Omega, Protex, Schneider, SEG, Sentra, Shiptom, Tashiko, Tatung, Towada, Universum
Order Code: AH02 Price: £14.50

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Experience shows that 50% of all receiver power supplies 'bounce' unless the correct precautionary measures are taken when being serviced. A kit of all the recommended parts is supplied for the 4 most popular models, which when fitted should overcome this.

MAKE & MODEL	ORDER CODE	PRICE
PACE PRD800, PRD900	SATPSU1	650p
PACE SS9000, 9200, 9010, 9020, 9220	SATPSU2	650p
AMSTRAD SRD510, SRD520	SATPSU3	650p
AMSTRAD SRD500	SATPSU4	650p

Replacement Video Heads

MAKE	MODELS	PRICE
HITACHI	VT570, VT575, VT576, VT580, VT585, VT588, VTF70	3100p
I.T.T.	VR3761	3100p
JVC & FERGUSSON	HRD950, HRD960, HRD980, FV46	5000p
LUXOR	VR3761	3100p
MITSUBISHI	HSE51	3000p
NATIONAL	NVFS200, NVFS90, NVV8000	4600p
PANASONIC	NVHD100, NVHD101, NVHF100	3100p
	NVSD	1400p
	AG7330, AG7350, AG7355, AG7450	5000p
	NVFS100	5000p
N.E.C.	D5600	3500p
SANYO	TLS1000P, TLS1001P, TLS1100	3100p
	VHR7800, VHR7810, VHR8000SP, VHR8015P, VHRD4800	3100p
SHARP	VCH80, VCH81, VFH815	2800p
	VCA33, VCA36, VCA43, VCA44, VCA46, VCA49	1500p
	VCA55, VCA63	2200p
SONY	SLV656, SLV715, SLV757, SLV777, SLV815, SLV825	4600p
	SLV353UB	3200p
	CCDF340E, CCD500E, CCDV90E, CCDV95E, CCDSP5E	4800p

Original Video Heads

MAKE	MODELS	PRICE
NATIONAL PANASONIC	NVG20, NVG21, NVG22, NVG25, NVG25, NVG28, NVG200, NVHD48 PART NO: VEH 0343	3000p
	NVG33, NVG45, NVG46, NVL23, NVL25, NVL28 PART NO: VEH 0417	2900p
	NVJ30, NVHJ33, NVL20, NVL21, NVG30, NVG31, NVG40, NVG130 PART NO: VEH 0416	2700p

Audio Control Head

AMSTRAD ORIGINAL NO: 150751
Used on: AMSTRAD TVR1, 2, 3, VCR4600, 4600MKII, 4700, FUNAI VS2, VCR4600, 4800, 5200, 5600, 6600, VIP3000, 5000
Also fits: FIDELITY, FUNAI, HINARI, PROLINE, SCHNEIDER, TOWADA, UNIVERSUM ORDER CODE: AH01 PRICE: 1350p

AMSTRAD ORIGINAL NO: 153134
Used on: AMSTRAD DDR900, 8904, VCR2000, 6000, 6100, 8600, 8602, 8603, VCR8604, 8700, 8704, 8714, 8800, 9005, 8244
Also fits: ANITECH, BONDSTEC, CASIO, CROWN, FIDELITY, GOLDHAND, GRANADA, HINARI, MARQUANT, OMEGA, PROFEX, SCHNEIDER, SEG, SENTRA, SHINTOM, TASHIKO, TATUNG, TOWADA, UNIVERSUM ORDER CODE: AH02 PRICE: 1450p

Replacement Audio Control Video Sound Head for National Panasonic

PART NUMBER	MODELS	PRICE
VBR 0091	NVG7 etc	875p
VBR 0050	NV300, NV340 etc	875p
VBR 0061	NV777 etc	875p
VBR 0103A	NV250, NV450 etc	625p
VBR 0125		625p

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A single remote control to operate Televisions, Videos and Satellite Receivers. Plus Auxiliary Options!!
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* Clear (large key) layout * Code Search Facility
* Stylish and easy to operate * Replace broken or lost remotes
* Original Remote not required
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Replacement Video Cassette Housings

MAKE	MODELS	CODE	PRICE
AKAI	VS35, VS53, VS55, VS56, VS75	CH18	2600p
GRANADA	VHSDP1	CH05	1100p
	VHSYJ2	CH01	2600p
GOLDSTAR	GHV1290P, 1291P, 1295P, 9400, 73401, GSE1295P, GSE1891F, 20001Q, 20051Q, VCP4200, 4300, 4301, 4305, VCP4306, 4311, 4315, 4316, 4320, 4321, 4325	CH25	2000p
	GHV51, 1221, 1232, 1240, 1241, 1242, 1244, 1246, 1248, GHV8000, 8200	CH26	2900p
FERGUSON & J.V.C.	3V38, 3V39, 8943, 8944, 8951, 3V35, 3V36, 3V49, HRD 110, 111, 120, 121, 225	CH01	2600p
	3V42, 3V43, 3V44, 3V45, 3V48, 3V53, 3V54, 3V55, 3V57, 8945, 8947, 8948, HRD140, 141, 150, 157, 158, 160, 250, HRD257, 455, 565, 566, 725, 755	CH02	2600p
	8948, 8950, FV10B, 12L, 13H, 14T, 20B, 21R, 22L, 26, 395, HRD230, 430, 530	CH03	2600p
	3V58, 3V59, 3V64, 3V65, FV11R, 8950, 8951, HRD170, HRD180, HRD370	CH04	2600p
	FV31R	CH19	4300p
	HRD515, 520, 527, 540, 550, 580, 600, 610, 620, 660, 670, HRCB30, 840, 850, 860, 4050, 6600, FV37H	CH20	2400p
	HRD540, 580, 830, 860, 910, 960, HRD970, HRDX20, FERGUSSON FV57H	CH27	2400p
I.T.T.	VR3605, VR3905	CH01	2600p
	VR3916, 3926, 3946, 3948, 3976, 3986, 3995, 3997, 6948	CH02	2600p
	VR3916, 3926, 3946, 3948, 3976, 3986, 3995, 3997, 6948	CH02	2600p
NATIONAL PANASONIC	NV730	CH06	4300p
N.E.C.	N830EG, N831EG, N832, N833EG	CH01	2600p
	N895	CH02	2600p
PHILIPS	CASSETTE LIFT ASSEMBLY (69120366) DV186, 190, 286, 471, 562, 761, VR6180, 6182, 6185, 6285, VR6290, 6291, 6293, 6362, 6367, 6393, 6467, 6468, 6470, VR6561, 6670, 6760, 6761, 6870, 6970	CH05	1100p
	VR6443	CH22	2900p
	VR6448	CH23	2500p
	49SB6	CH24	2500p
SHARP	VCA100, VCH851, VCH852	CH22	2900p
	VCA103, 103GV, 106, 106GVM, 254GVM	CH23	2500p
	VCS211, 244, 5055, 605, VCB230, VCD806G, 810G, VCT212, 310, 410G, 610	CH24	2500p
TELEFUNKEN	VR2970	CH02	2600p
THOMSON	V320, 321, 323, 326, 4200, 4300	CH01	2600p
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DESCRIPTION	VOLUME	CODE	PRICE
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SILICONE GREASE	200ML	SP03	170p
FREEZE IT	170ML	SP04	220p
FREEZE IT	400ML	SP16	350p
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AERO DUSTER	400ML	SP17	425p
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GLASS CLEANER	250ML	SP10	160p
COLDKLENE	250ML	SP13	200p
EXCEL POLISH 80	250ML	SP18	150p
ADHESIVE 120	400ML	SP19	190p
LABEL REMOVER 130	200ML	SP20	240p
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TUBE SILICON SEALANT WHITE	75ML	SP22	280p
TUBE SILICON SEALANT CLEAR	75ML	SP23	280p
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CFD68, 750, 755, 760, 765, 770, 775, 440S, W100, 100S	2200p

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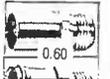
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CPT1446	1625	AN5183	2.99	LA7868	3.00	STK6994	5.80	TD41547	1.00
CPT1455	1630	AN5184	2.99	LA7869	3.00	STK6995	5.80	TD41548	1.00
CPT1476	1635	AN5185	2.99	LA7870	3.00	STK6996	5.80	TD41549	1.00
CPT1493	1640	AN5186	2.99	LA7871	3.00	STK6997	5.80	TD41550	1.00
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CPT2028	1650	AN5188	2.99	LA7873	3.00	STK6999	5.80	TD41552	1.00
CPT2036	1655	AN5189	2.99	LA7874	3.00	STK7000	5.80	TD41553	1.00
CPT2048	1660	AN5190	2.99	LA7875	3.00	STK7001	5.80	TD41554	1.00
CPT2078	1665	AN5191	2.99	LA7876	3.00	STK7002	5.80	TD41555	1.00
CPT2248	1670	AN5192	2.99	LA7877	3.00	STK7003	5.80	TD41556	1.00
CPT2084	1675	AN5193	2.99	LA7878	3.00	STK7004	5.80	TD41557	1.00
CPT2087	1680	AN5194	2.99	LA7879	3.00	STK7005	5.80	TD41558	1.00
CPT2158	1685	AN5195	2.99	LA7880	3.00	STK7006	5.80	TD41559	1.00
CPT2176	1690	AN5196	2.99	LA7881	3.00	STK7007	5.80	TD41560	1.00
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CPT2176	1725	AN5203	2.99	LA7888	3.00	STK7014	5.80	TD41567	1.00
CPT2178	1730	AN5204	2.99	LA7889	3.00	STK7015	5.80	TD41568	1.00
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CPT2078	1740	AN5206	2.99	LA7891	3.00	STK7017	5.80	TD41570	1.00
CPT2084	1745	AN5207	2.99	LA7892	3.00	STK7018	5.80	TD41571	1.00
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CPT2078	1775	AN5213	2.99	LA7898	3.00	STK7024	5.80	TD41577	1.00
CPT2084	1780	AN5214	2.99	LA7899	3.00	STK7025	5.80	TD41578	1.00
CPT2087	1785	AN5215	2.99	LA7900	3.00	STK7026	5.80	TD41579	1.00
CPT2158	1790	AN5216	2.99	LA7901	3.00	STK7027	5.80	TD41580	1.00
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CPT2158	1825	AN5223	2.99	LA7908	3.00	STK7034	5.80	TD41587	1.00
CPT2176	1830	AN5224	2.99	LA7909	3.00	STK7035	5.80	TD41588	1.00
CPT2178	1835	AN5225	2.99	LA7910	3.00	STK7036	5.80	TD41589	1.00
CPT2238	1840	AN5226	2.99	LA7911	3.00	STK7037	5.80	TD41590	1.00
CPT2078	1845	AN5227	2.99	LA7912	3.00	STK7038	5.80	TD41591	1.00
CPT2084	1850	AN5228	2.99	LA7913	3.00	STK7039	5.80	TD41592	1.00
CPT2087	1855	AN5229	2.99	LA7914	3.00	STK7040	5.80	TD41593	1.00
CPT2158	1860	AN5230	2.99	LA7915	3.00	STK7041	5.80	TD41594	1.00
CPT2176	1865	AN5231	2.99	LA7916	3.00	STK7042	5.80	TD41595	1.00
CPT2178	1870	AN5232	2.99	LA7917	3.00	STK7043	5.80	TD41596	1.00
CPT2238	1875	AN5233	2.99	LA7918	3.00	STK7044	5.80	TD41597	1.00
CPT2078	1880	AN5234	2.99	LA7919	3.00	STK7045	5.80	TD41598	1.00
CPT2084	1885	AN5235	2.99	LA7920	3.00	STK7046	5.80	TD41599	1.00
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CPT2176	1900	AN5238	2.99	LA7923	3.00	STK7049	5.80	TD41602	1.00
CPT2178	1905	AN5239	2.99	LA7924	3.00	STK7050	5.80	TD41603	1.00
CPT2238	1910	AN5240	2.99	LA7925	3.00	STK7051	5.80	TD41604	1.00
CPT2078	1915	AN5241	2.99	LA7926	3.00	STK7052	5.80	TD41605	1.00
CPT2084	1920	AN5242	2.99	LA7927	3.00	STK7053	5.80	TD41606	1.00
CPT2087	1925	AN5243	2.99	LA7928	3.00	STK7054	5.80	TD41607	1.00
CPT2158	1930	AN5244	2.99	LA7929	3.00	STK7055	5.80	TD41608	1.00
CPT2176	1935	AN5245	2.99	LA7930	3.00	STK7056	5.80	TD41609	1.00
CPT2178	1940	AN5246	2.99	LA7931	3.00	STK7057	5.80	TD41610	1.00
CPT2238	1945	AN5247	2.99	LA7932	3.00	STK7058	5.80	TD41611	1.00
CPT2078	1950	AN5248	2.99	LA7933	3.00	STK7059	5.80	TD41612	1.00
CPT2084	1955	AN5249	2.99	LA7934	3.00	STK7060	5.80	TD41613	1.00
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Digital Terrestrial TV

The government's White Paper on the introduction of digital terrestrial TV (DTT) broadcasting is welcome. It leaves a number of questions unanswered, but lays down a suggested framework (see summary on page 854) within which the broadcasters will operate. The important point at this stage is to get things moving. The technology is there, and the industry is anxious to make a start. UK DTT services could begin as early as 1997.

It is deeply satisfying that the country which started the first regular analogue TV service, in 1936, is likely to be the first to start DTT services. Deservedly satisfying, since so much of the development work on digital TV has been carried out by UK companies. Not only development work either: digital TV equipment is already being produced in the UK, by NTL and Pace amongst others. It was not so long ago that the UK's future in the TV industry was in question. Fortunately the digital TV teams at NTL and the BBC kept on with their work.

DTT should present few technical problems. Teletext and Nicam have long since proved the robustness of digital signals. In most places reception should be satisfactory using simple aerials, with no ghosting problems. So there should be no need to change aerials.

The industry has responded positively to the government's proposals. A number of the country's major communications, TV and electronics organisations have set

up the Digital TV Group (DTG), which aims to co-ordinate efforts to develop as quickly as possible the technical systems necessary for DTT to become operational, in particular giving a boost to practical development. A key factor is expected to be put in place this autumn, when the technical standard for DTT across Europe should be agreed by the members of the European Digital Video Broadcasting project.

One major problem will be to decide on an encryption/access standard as opposed to the basic transmission standard. A decision on this could involve some tricky commercial and political decisions. Most of the extra services to be provided by DTT will probably be paid for by subscription or on a pay-per-view basis. The public will be severely inconvenienced – and put off – unless a single access system comes into use. No one wants a multiplicity of decoders, or to have to switch a decoder from one standard to another. But current (analogue) encryption standards are proprietary, which introduces commercial problems. Hopefully the DTG will find a way around this one.

It's sad, in a way, that we are likely to lose our analogue TV services some time during the next fifteen or so years. The 625-line system with PAL has served us well. There are still those who mourn the loss of 405-line transmissions. But technology won't stand still. The longer-term question is whether or not to continue with terrestrial TV

transmissions, since satellites can do the job perfectly satisfactorily.

While most of us will benefit from digital TV – terrestrial, satellite or both – there will be some interesting commercial consequences. For a start Channel 5, in the form so far proposed, looks like a lost cause. And it will be interesting to see whether cable and off-air services will co-exist indefinitely. In the early days cable became a niche technology, used mainly where off-air reception was difficult or in situations, such as hotels, where large numbers of sets had to be served by a single system. Since there are so few limits to what can be done via satellite digital services, will the cable companies end up as mainly telecommunications servers?

PRICE INCREASE

We regret the need to increase the cover price of *Television* to £2.35 from the next issue (November). The price has been kept at the present level since November 1992 despite numerous increases in our costs, in particular a substantial rise in the cost of paper. Those with subscriptions will continue to receive their issues at the current rate.

Some improvements to *Television* are planned, including a revised front cover.

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COVER PHOTO

This month's cover photograph shows the Ferguson TX90 chassis, in Model C49F. See new series starting on page 848.

A Day in the Life of . . .

Gerald White

It was raining as I arrived outside the shop. Keeping a wary eye out for "Dai book an' pencil" I parked in the loading bay outside. As it was all clear, I made a dash for the workshop, which is situated some distance behind the shop itself. You have to negotiate an alleyway some 75 yards long, which is no joke when you are carrying a 22in. Sony colour set.

Opening the workshop doors is another exercise in agility. They are large, double ones which, when it's raining, collect a puddle on the top sill. The trick is to remove the padlock, kick the door and at the same time move sharply backwards. Many an unsuspecting component rep has had an early bath before now. Roy, ex SEME, will remember it well.

Once In

Anyway I'm now in, having skillfully dodged the deluge. As usual on a Monday morning, the workshop is cold and uninviting, with TV sets and videos everywhere but in their right place – the result of having no inside engineer on Saturday, with the sales people dumping sets just anywhere. My bench, which I'd cleared so carefully on Friday, resembles Steptoe's yard.

Oh well, coat off, heaters on and, first job, check for any messages from the sales staff. Just one, to telephone Mr Price about his Sharp video. It had originally come in for an insurance estimate. Although it was not working, there was no evidence of damage or liquid spillage. So we'd told him, via the shop, that we couldn't provide an insurance estimate. Unfortunately Mr Price was not happy with that decision. He'd called in at the shop on Saturday to see me. I was asked to phone him at work on Monday. A job for later, I think!

What's on the bench? Two videos and a portable TV, plus an assortment of leads, drive belts and two drawers from the stock room. The videos were both Mitsubishis, our main line. Poor playback was the complaint with one of them, while the other one wouldn't accept a tape. As it was an M48 this was almost certainly a housing problem. No sound or vision was the complaint with the Tatum set. After moving them to their proper places on the incoming repair shelf, returning the drawers to the stock room and binning the old drive belts I cleaned the bench.

By this time Jim had arrived, pipe clamped firmly between his teeth, puffing and cursing after his dash down the alleyway. He's our outside engineer and, like myself, has been in the trade some thirty years or so. Many a happy hour passes when we recollect the good old days. Also like myself he served time in the army. In fact our working lives have followed remarkably similar patterns. The army, then working for Radio Rentals, then a spell with a local independent store with a terrible reputation for its treatment of staff and customers. Our moans and stories about that particular company certainly can't be printed.

Repairs

Monday had brought the usual flood of requests to deal with weekend breakdowns. So after a quick cuppa Jim hit the road, leaving me to sort out the Friday and Saturday additions to the workshop load. While I was building up courage to tackle the first problem, a 25in. Mitsubishi TV set on the soak test bench

suddenly produced the line collapse symptom then shut down. I switched it off and removed the back, carefully so as not to disturb anything too much in case the cause of the fault was a dry-joint. When I switched on again the set sprang to life. Fortunately the line collapse occurred again after a few seconds, and this time the set didn't shut down.

I reduced the first anode voltage to prevent screen burn and went to work with the freezer. Bingo! A very cold, shivering capacitor – C958 – appeared to be the culprit as the raster had been restored. To make sure, I gently heated C958 by holding the soldering iron close to it. The line collapsed almost immediately. After a quick replacement I put the set back on soak test.

The day had started quite well for a Monday. Surely this can't last? Almost on cue, the door burst open and Jim staggered back with a 25in. Sony set. Spotting my empty bench, Jim quickly found a resting place for the set. When he'd recovered his breath he told me that it was only a matter of field collapse. But the house had been so dark, even with the main light on (all 60W!), that he couldn't see. To attempt to replace a chip in those conditions could well create more problems than it solved, so a quick workshop repair was required.

No problem! Back off, chassis up, desolder and remove UPC1488 chip and protection fuse, clean heatsink, apply smear of silicone grease, fit new chip and fuse, reassemble chassis, switch on and find one Sony set back in working order.

In the meantime Jim had gone to the shop to arrange for some help in returning the set. As I was replacing the screws in the back he returned with Clive, our delivery/installation boy. Clive is keen to learn, and his enthusiasm tends to wear us out. But to be fair he saves Jim a lot of time on field calls by checking the tuning and for possible aerial problems first.

An Installation Problem

As he waited for Jim he mentioned his worries about an installation he'd booked for the afternoon. Apparently a 20in. GoldStar set was to be installed in an old cottage in a nearby village. There was no 13A socket in the room, and the prospective customer had asked for an extension mains lead to be fitted to the new set. This is of course not allowed. I told him that he should ask the customer to get a local electrical installer to fit a 13A outlet close to where the TV set was to be sited. The problem, as Clive explained it, was that the present TV set, an old KB monochrome TV, had about fifteen yards of extension lead which had been joined using insulation tape.

The trade used to do these things years ago. Even the national rental companies would extend a mains lead if it meant a sale or a new rental contract. It's only during the last ten years or so that, thank goodness, greater emphasis has been placed on safety. With the new codes of practice, responsible companies are now more careful. So Clive would have to tell the customer that an extension lead was out. It might help if the shop manager or Jim called to explain the situation. Very often a customer will agree with an engineer, though he created problems in the shop.

Lunch

With Jim, Clive and the Sony gone, I realised that it was nearly lunch time. Where had the morning gone? I enjoy the

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hour's break. The midday news, then half an hour of peace and quiet. I recalled my early days in the trade, with valves and hand-wired chassis. Fault finding was a challenge in those days. Then there were the amusing incidents that were part of the field engineer's everyday life.

One involved a call to an old lady who lived alone in a small village. She had a 17in. monochrome Ekco set that had lost its picture. The repair consisted of fitting a new U25 e.h.t. rectifier, one of the wire-in types. These rectifiers often went 'soft', turning a delicate shade of blue. After soldering in the replacement, taking great care not to leave any spikes that could cause arcing and corona discharge, I switched the set on.

While waiting for the picture to appear, I noticed a large cork that protruded from a hole in the cabinet, just above the c.r.t. and the implosion guard. Intrigued by this, I asked why the addition to her TV set had been made?

She replied by giving me a demonstration. After removing the cork, she retrieved from a corner of the fireplace a bamboo stick with a cloth wrapped around one end. She then inserted the stick in the hole in the cabinet and proceeded to clean the screen! Sets that were fitted with an implosion guard had this disadvantage, that the screen needed cleaning periodically. Because the c.r.t. had to be removed to gain access to the inside of the implosion guard, the operation had to be carried out in the workshop. It took some time, with a bill to match. The old lady had obviously hit on an ingenious way of cleaning the screen and saving money.

The Afternoon Session

Back to reality. The first thing to do is to phone Mr Price about the estimate. No problem, fortunately. He'd had time

to think about it and was now happy to have just a repair estimate.

What's next? Not wishing to push my luck too far, I chose the Mitsubishi video with poor playback. Fortunately this was just a matter of dirty heads. After cleaning them I made a couple of test recordings. The results were good. I boxed up the machine, completed the job card and placed the repair in the out bay.

Then on to a couple of Sony remote control units. I like to clear these as they come in - from experience, customers complain quickest when their remote control units aren't working. The first one had a broken battery connector. After replacing this I removed the touch pad and PCB, cleaned them, then reassembled the unit and tested it. Another job done. The other remote control unit was transmitting all the time, which is a common problem. As usual, one leg had broken off the crystal. A new crystal restored correct operation.

As the sales people had been asking about the progress of the Tatung colour portable, I put this on the bench next. Although the job card said no sound or vision, the actual fault was that the picture shook when the volume was high. It looked like field jitter. While checking voltages I noticed that the 13.6V supply fluctuated when the volume was increased. Moving back to the source of the supply, I noticed that R817 appeared to be in poor condition. Its value should be 0.22Ω. When checked out of circuit however it read in the region of 15Ω. Its value varied quite considerably when I blew hot air on it then froze it. A replacement put an end to the mischief.

By now Jim was back from his calls and it was 5.25 p.m. Time to go home. If tomorrow goes like today, I'll be a happy man.

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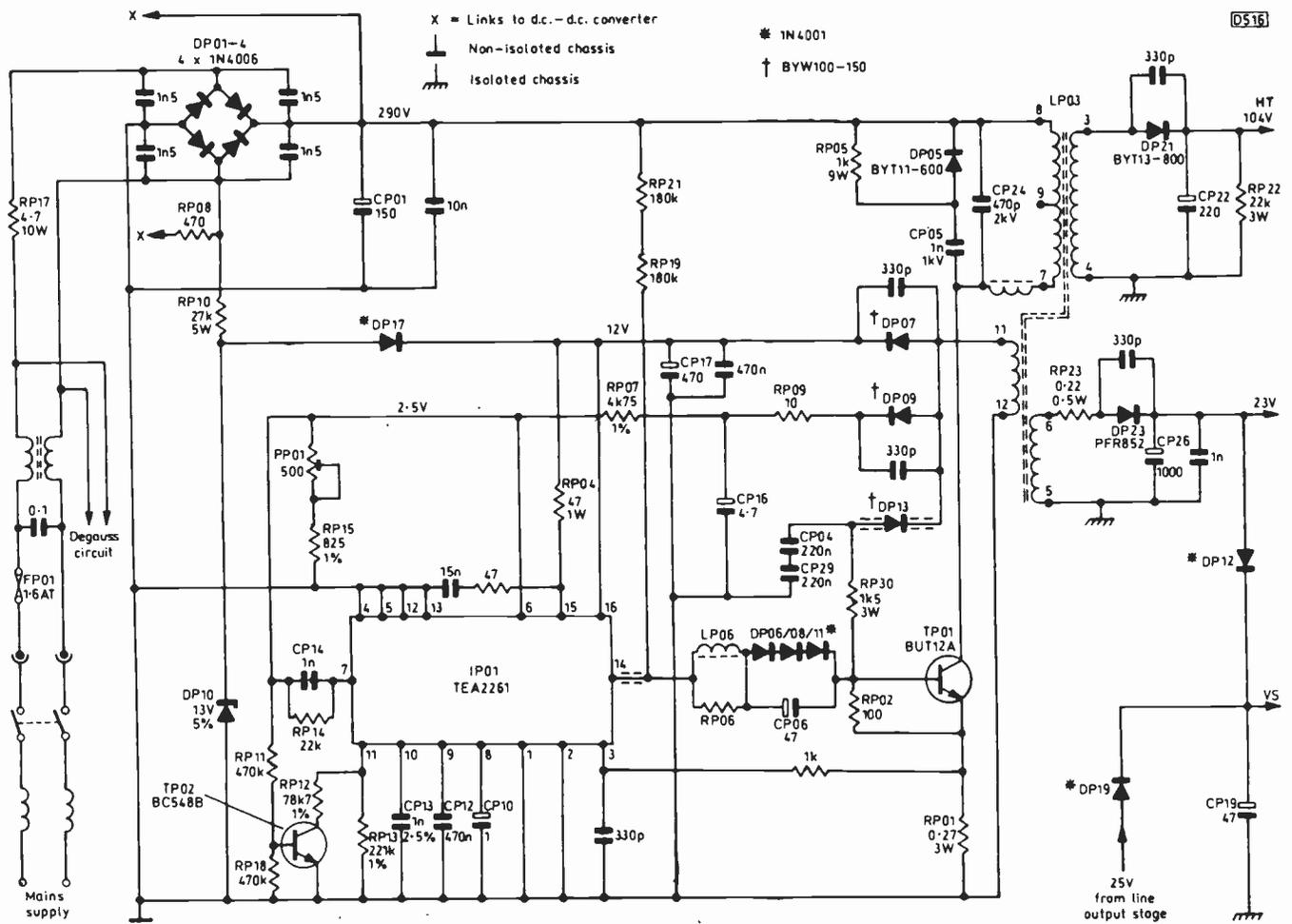


Fig. 2: The power supply circuit. Some component values/voltages depend on the type of tube fitted. We have shown the values for the 14in. model, since this is the one mainly sold in the UK.

switch on. This consists of RP10 (27kΩ, 5W), DP10 and DP17, which charges CP17. When the voltage at pin 16 of IP01 reaches about 10.3V, the oscillator inside the

chip starts to operate. The RC delay before the initial start is around two seconds.

Once IP01 starts to produce the drive for TP01 and

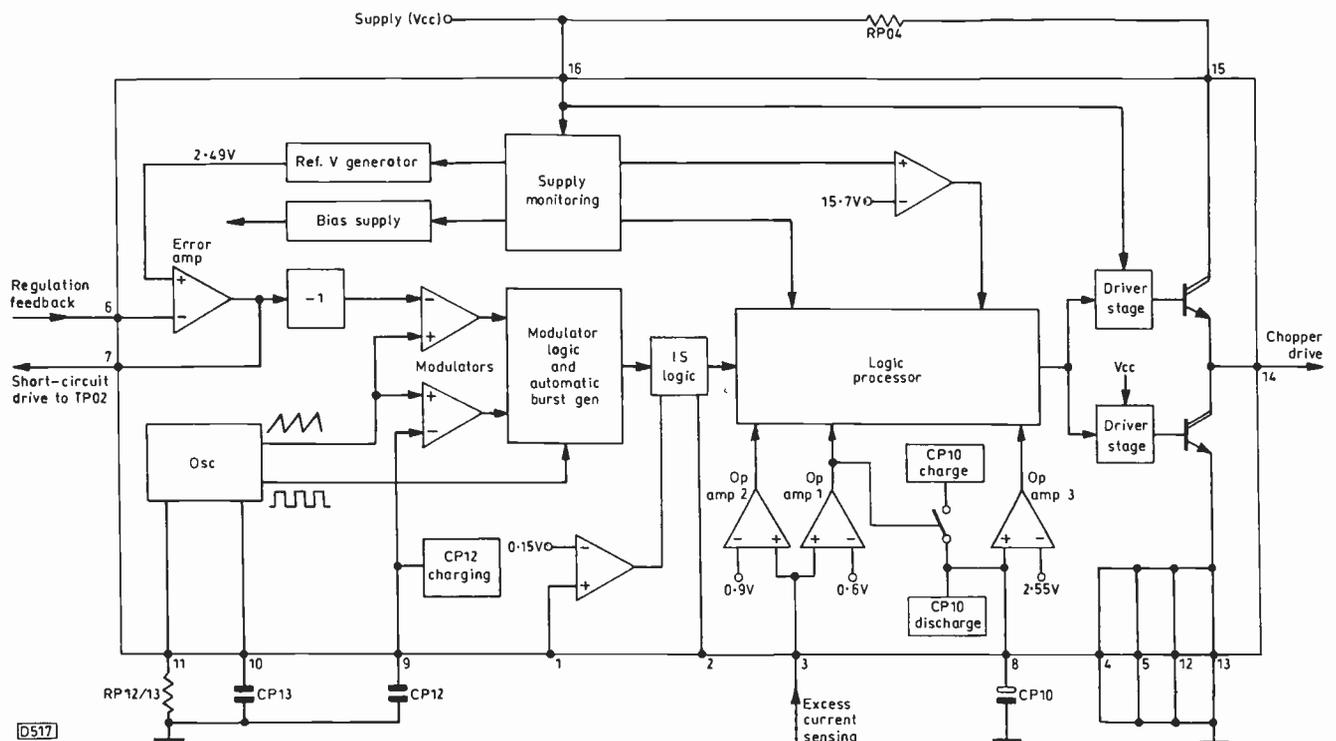


Fig. 3: Simplified block diagram showing the arrangements used in the TEA2261 chopper control chip IP01.

the full circuit comes into operation, the pulse voltage developed across winding 12-11 on the transformer is rectified by DP07, adding to the charge across CP17. DP17 becomes reverse biased, providing isolation from the mains input. In this way IP01's d.c. supply is always from a regulated source and is not subject to mains voltage fluctuations.

There's more to the start-up than this however. When the voltage at pin 16 of IP01 reaches 10.3V, the circuit starts its soft-start operation by charging CP12 (pin 9) to 1.5V. Output pulses begin to appear at pin 14. This ensures a safe minimum initial switch-on time for TP01. The drive then increases in a controlled manner until the circuit is operating with its normal duty cycle (TP01 on/off timing).

The voltage across CP12 also rises in a controlled manner. Whilst increasing from 0V to 1.5V, the logic circuit within IP01 gets ready. The soft-start period occurs when the voltage across CP12 is rising from 1.5V to 2.7V. During this period the duty cycle of the output pulses at pin 14 increases progressively. The voltage across CP12 continues to rise until it reaches 3.1V. During this period the soft-start action ends and normal operation begins.

Regulation

Winding 12-11 on the transformer feeds three rectifiers, DP07, DP09 and DP13. DP09 produces a sample voltage across CP16 for regulation purposes. This voltage is fed to pin 6 of IP01 via the potential divider network RP07, PP01, RP15. The idea is that the pulse voltage developed across winding 12-11 is related to the voltages developed on the secondary side of the circuit (by DP21 and DP23), determined by the turns ratio of the windings. To put this another way, the d.c. voltage produced by rectifying the output from winding 12-11 is directly related to the power supply's output load, and can thus be used as an error voltage to provide regulation. This error voltage adjusts the duty cycle of the pulse-width modulator within the chip, in turn varying the duty cycle of the output at pin 14 to compensate for load variations.

PP01 is adjusted to produce across CP22 an h.t. voltage that depends on tube size. The manual sets out the correct voltage conditions for various models.

The Standby Mode

When the receiver is switched to standby – more on this later – the power supply switches to a burst mode of operation, with a typical output pulse frequency of 150Hz. It's a standard arrangement with this type of circuit, designed to minimise power dissipation. Because the normal regulation system is no longer in operation, the burst output frequency at pin 14 is not fixed, varying with the mains voltage and the load conditions. The frequency is controlled mainly by the voltage across CP16 – this varies between 10.3V and 13V.

Chopper Transistor Drive

The output stage within IP01 consists of a push-pull Darlington arrangement. RP04, whose value varies with the tube size, limits the current used to drive the base of the chopper transistor TP01 while it's conductive. TP01's base drive circuit consists of LP06, RP06, DP06/08/11 and CP06: it generates a negative bias

(across CP06) that guarantees a fast switch-off. To enhance the reliability of TP01's operation, DP13 generates an additional negative bias across CP04 and CP29. This ensures that TP01's base is negatively biased while the transistor is off. RP21 and RP19 form part of this bias network.

The usual snubber circuit reduces TP01's dissipation at switch off. It consists of RP05, CP05 and DP05. When TP01 is switched off and the usual positive-going pulse occurs at pin 7 of the transformer, CP05 is charged via DP05. When TP01 is switched on, CP05 discharges via RP05.

Protection Systems

The TEA2261 chip incorporates three systems to protect the power supply in the event of a short-circuit or regulation failure. These are as follows:

(1) **Undervoltage:** This comes into operation when the voltage at pin 16 drops below 7.4V, to protect TP01 against underdrive.

(2) **Overvoltage:** Should the voltage at pin 16 exceed 15.7V the power supply shuts down. To restart it the receiver has to be switched off then on again.

(3) **Current limiting:** Pin 3 senses the voltage developed across RP01, which is in series with the chopper transistor TP01. If the current through RP01 is excessive, the voltage at pin 3 will exceed the sensing circuit's threshold voltage. There is actually a double threshold system, as follows:

(a) Should the voltage at pin 3 rise to 0.6V, the drive to TP01 is stopped for as long as the overload is detected. Op amp 1 initiates pulse-by-pulse limitation via the logic circuitry. It also closes switch S1, with the result that CP10, which is connected to pin 8, charges towards 2.55V. This voltage is the 'repetitive overload condition', in which Op amp 3 removes the drive via the logic circuitry. If the overload disappears before the charge across CP10 rises to 2.55V, it will be discharged: this provides tolerance in the event of a transient overload.

(b) Op amp 2 initiates immediate shut down should the voltage at pin 3 reach 0.9V. This provides protection against a heavy overload, e.g. TP01 being leaky or short-circuit.

Transistor TP02 is part of a system that provides protection in the event of a short-circuit across one of the outputs from the power supply. This works as follows.

In normal operation TP02 is forward biased by RP11 and RP18. Its collector voltage is around 0.22V and RP12 is therefore in parallel with RP13, the total resistance at pin 11 being 58k Ω . Pins 10 and 11 of IP01 are connected to the oscillator's timing components, CP13 and RP12/13 respectively.

If there is a short-circuit on the secondary side of the chopper transformer LP03, the voltage fed back to pin 6 of IP01 will not be sufficient to switch TP02 on via RP11/18. With TP02 no longer conductive, the resistance at pin 11 will rise to 221k Ω – since RP12 is in effect open-circuit. As a result, the oscillator's frequency falls to typically 1Hz. In addition, the error amplifier within IP01 produces at pin 7 an output that changes, at this

frequency, between 0V and 4V. TP02 is thus switched on and off at this rate, with the resistance at pin 11 varying between 58kΩ and 221kΩ. In this condition IP01 produces at pin 14 an output which is of 1V peak-to-peak amplitude instead of the normal 3V peak-to-peak, and is at 1Hz. As TP01 will not switch on and off at this frequency and level of drive, the power supply is shut down.

Supplies obtained from LP03

The three secondary windings on LP03 provide the following supplies:

(1) Winding 12-11 produces supplies for the primary side of the circuit, as previously described.

(2) Winding 4-3 feeds the h.t. rectifier DP21 which produces, across its reservoir capacitor CP22, the supply for the line output stage. This voltage varies with tube screen size.

(3) Winding 5-6 feeds rectifier DP23 which produces a 23V supply across CP26. This is used for a number of purposes. It powers the audio output chip JS01 and provides a feed to the 5V regulator and the microcontroller chip's reset circuit. It also supplies pin 8 of socket BR03 and LEDs DK01, DK06 and DD01, which are mounted on the front panel. In addition it provides, via DP12, a start-up supply (VS) for the timebase chip IL01 and the line driver stage. Once the line output stage comes into operation this produces a 25V supply which, via DP19, takes over from the start-up supply, DP12 then being reverse biased.

Standby Switching and the 5V Supply

Pin 20 of the microcontroller chip IR01 produces the standby/on command. It goes high for standby, switching on transistor TL03 (see Fig. 4). As a result, the supply to pin 1 of the TDA8218 timebase chip IL01, is removed. This chip contains the sync and line generator circuitry, the field generator and output stages, and also produces

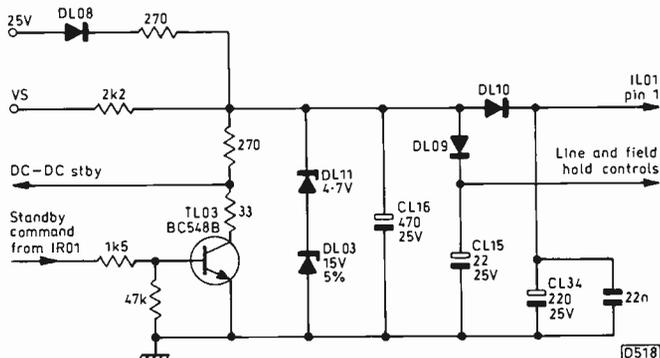


Fig. 4: The standby/on switching circuit that controls the supply to pin 1 of the TDA8218 timebase chip IL01.

the sandcastle pulses. Thus with no supply at pin 1 there is no line or field drive. The line output stage derived supplies are no longer produced and the receiver virtually shuts down. The reduced load is sensed by IP01, which switches to its burst mode of operation.

The chopper circuit continues to produce outputs in

this mode, so beware! The 23V supply enables the f.m. radio option to work in the standby mode. It also feeds the 5V regulator transistor TR82, which provides the supply for the microcontroller chip. In this way the microcontroller chip remains active whether the set is in standby or on.

Signals Circuitry

To cater for the various different standards and combinations of standards required, several different tuners and i.f. modules are used in the TX90E chassis. Some i.f. modules use the quasi-parallel technique, with the output

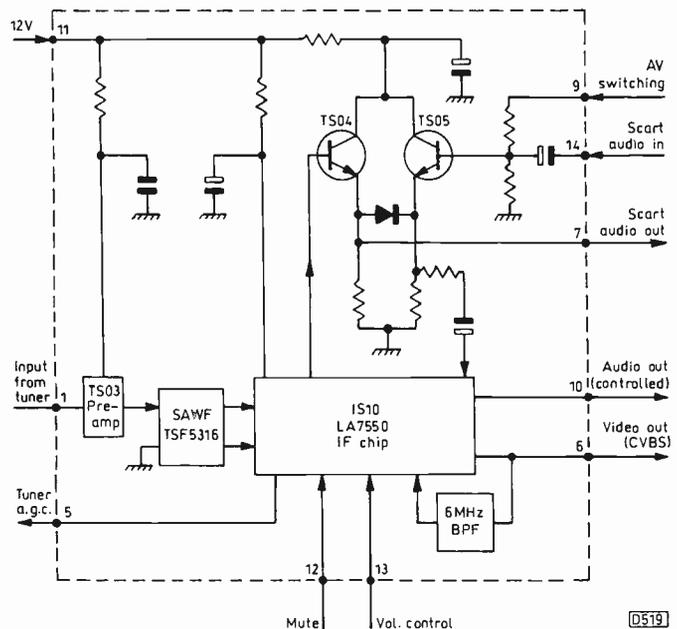


Fig. 5: Block diagram of the i.f. module used in UK models, including the start audio input/output switching circuit.

from the tuner fed via a preamplifier stage to separate SAW filters and then to separate vision and sound i.f. chips.

The i.f. module in UK sets uses the standard intercarrier sound approach, with a single SAW filter following the preamplifier and an LA7550 i.f. chip that demodulates both the vision and sound signals. Fig. 5 shows the idea in mainly block diagram form. The module provides an a.g.c. output for the tuner at pin 5; the i.f. input is at pin 1; the a.f. output is at pin 10; the composite video (CVBS) output is at pin 6; start audio inputs and outputs are provided at pins 14 and 7 respectively, with AV sound switching at pin 9; a volume control input is provided at pin 13 and a mute input at pin 12; finally 12V is fed in at pin 11.

There is no pin 4 connection with this module. In other modules this pin receives an input from pin 34 of the microcontroller chip for standards setting.

The microcontroller chip IR01 sets the tuning via an I2C bus (pin 40 for the data, pin 41 for the clock signal), the tuner incorporating an SDA3202 frequency-synthesis tuning chip with an I2C bus interface.

Next Month

Part 2 next month will start with a look at the video circuitry.

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DIGITAL TV PROPOSALS

The government set out its proposals for digital terrestrial TV (DTT) in early August. These are as follows:

(1) Six 'channels', known as multiplexes, will be made available to broadcasters. These are not channels in the traditional sense, though the bandwidth is the same. Each has a total digital capacity of 18Mbits/sec, which is enough to be able to transmit at least three TV programmes and six stereo radio programmes. These TV and radio programmes, using bit rates that vary, are combined by the system multiplexer into a single data stream that modulates a single carrier.

The receiver/decoder identifies the required programme and selects this from the multiplex. With six 'channels' each with a capacity for three or more TV programmes, an extra 18 TV services at the very

least can be accommodated.

(2) Existing TV broadcasters are guaranteed access to digital frequencies: at least 80 per cent of the programmes transmitted conventionally must also be broadcast in digital form.

(3) Companies applying for licences will run multiplexes instead of individual channels. There will be competitive tendering, with the applications assessed on how fast and widely a broadcaster plans to market digital services and the variety of TV and other services to be offered.

(4) Media ownership rules to remain largely unchanged. But companies can control up to 25 per cent of the available digital capacity and fifteen per cent of the total TV audience excluding BBC viewers. No single company is expected to control more than two or three multiplexes.

(5) Multiplex operators will begin to make payments to the exchequer once their services become profitable. The government may waive payment for the first twelve-year licence period.

(6) Up to ten per cent of the capacity to be made available for non-broadcast use, including telecommunications and interactive services.

If all goes well, DTT services could in theory start in 1997. But agreement on transmission/coding/access standards has yet to be reached.

A number of UK communications, TV and electronics companies and organisations have formed an industry-wide forum to facilitate the introduction of DTT. Members of the Digital TV Group (DTG) include the BBC, ITVA, Channel 4, BT, Motorola, Pace, Sony and NTL. The aim is to co-ordinate development of the technical systems required.

DIGITAL CAMCORDER LAUNCHES

Matsushita and Sony are poised to launch digital camcorders in Japan. The Panasonic model is due for release in the USA in October: Sony is to announce its North American and European launch dates at the Berlin IFA electronics exhibition. As mentioned when we reported Samsung's digital camcorder plans, an international standard for digital camcorders was agreed in 1994 – see Teletopics July for further details.

Matsushita and Sony will be aiming their digital camcorders, which will provide improved picture quality and editing facilities, at the top end of the market, above Hi-8 camcorders. Prices will reflect this up-market positioning, though Matsushita expects prices to fall quite quickly as the market develops and production increases.

SATELLITE TV

SES, owner of the Astra group of satellites, has announced plans to launch a fourth digital TV satellite, 1H. A number of companies have already leased transponders on the first three digital satellites, 1E which is due for launch in October, 1F with a launch date next March and 1G in mid-1997. They include Canal Plus, which plans to start a 24-channel digital TV service this winter, with forty channels available by the end of next year.

APTV, the video arm of Associated Press, and NTL have established the first global MPEG-2 network. APTV began distributing its news feeds digitally on August 1st, via

Eutelsat II F1 using NTL's System 3000 compression technology. The service will be extended to a further five satellites over the coming months.

LASER PROJECTION TV

Temic, a subsidiary of Daimler-Benz, and Schneider Rundfunkwerke have set up a joint venture to develop a laser TV projection system. The aim is to start with large displays for professional applications next year. The system is a combination of the old and the new. RGB signals are used to control the light output from red, green and blue lasers. Dichroic mirrors combine the light which is then projected, à la Baird, by a scanning mirror system.

A polygon mirror with 32 faces, rotating at 1,000 revs/sec, carries out horizontal deflection while a galvanometer scanner is used for vertical deflection. Since the polygon mirror has a deflection angle of only 12°, it's followed by an optical system that increases the divergence. A vario lens enables the image size to be adjusted.

The main development work required seems to relate to the lasers. At present gas lasers are used. The blue one was obtained from a Russian source and apparently runs rather hot. A change to diode-pumped semiconductor lasers is expected by the end of the year. Within two-three years the companies expect to be able to produce displays for the consumer and PC markets, based on "innovative semiconductor lasers and miniaturised deflection systems".

HAMTEXT

The latest issue of *CQ-TV* (no. 171, August 1995), the journal of the British Amateur Television Club, contains details of the Hamtext service being run by GB3HV. It's based on the use of an Aston Electronics teletext encoder that was bought at a boot sale: how it was put into service makes a fascinating story. Anyone interested in joining the BATC should contact Dave Lawton, G0ANO, at Grenehurst, Pinewood Road, High Wycombe, Bucks HP12 4DD – include an s.a.e. – or phone 01494 528 899.

BUSINESS NEWS

BSkyB's pre-tax profits for the year to end June rose 67 per cent, to £155.3m. The increase is attributed to sales growth fuelled by rising subscription revenue. BSkyB is preparing to launch digital satellite TV services but has not yet decided on the timing or the scale of investment. It is also considering participation in digital terrestrial TV.

Philips has taken a controlling interest in Russian c.r.t. manufacturer VELZ, which has been making 20in. tubes under licence to Philips since 1981. Philips reckons that tube production is thirty per cent cheaper in Russia than the west.

SAVOY HILL PUBLICATIONS

Savoy Hill Publications, Seven Ash Cottage, Seven Ash, Easter Close Cross, Near Coombe Martin, North Devon EX34 0PA has issued a new series of lists of vintage audio/radio/TV information the company can supply. Copies of the lists are available free of charge to readers of *Television*. Ring 01271 882 665 to find out what's available – hardware includes many difficult to obtain styli and cartridges.

NEW PHILIPS TV CHIPS

Two interesting new TV processor chips have been announced by Philips. The TDA8366 carries out all functions between the tuner and the tube drive and deflection output stages. Its functions include vision i.f. amplification/demodulation, multi-standard PAL/NTSC colour decoding, picture control, sync separation and timebase drive signal generation. Only one tuned circuit is required, for the vision demodulator. The on-chip chroma trap, bandpass filter, luminance delay and peaking circuits are continuously calibrated against 3.56/4.43MHz crystal frequencies. A programmable EW output has nine different picture alignment conditions. Control is via an I2C bus.

The TDA8366 can be switched to accept CVBS, S video and RGB inputs. It has YUV inputs/outputs for

VIDEO DISC TALKS

The Sony/Philips and Toshiba consortia have been holding last-ditch talks, at main board level, in

an attempt to agree on a common HDCD standard before the launch of the discs, which is expected next summer. The talks were

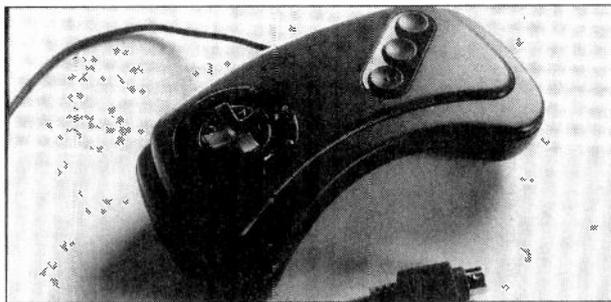
MULTIMEDIA NEWS

Philips Media has launched the first Rainbow CD, which can be played by audio CD, CD-ROM and CDi machines. The price of the Panasonic and GoldStar 3DO players has been reduced to £299. Philips has launched two new CDi machines. Model CDi470 is a compact machine that can be fitted into a mini audio system. Model FW380i is a mini system with a built-in CDi deck. Both models include a digital video cartridge. No price details are currently available.

NEWS FROM WILLOW VALE

Willow Vale Electronics is now stocking the full range of Philips CDi accessories. There are nine prime accessories, the newest being the Game Pad (RRP £24.99) which gives greater control through three

The Black Star range of test and measurement equipment is now available from Willow Vale. It extends from a scope probe at a few pounds to the PVG1000 video monitor tester at £2,275. The equipment



separate speed settings. Other items in the range include the mouse, trackerball and roller controller.

is UK designed and manufactured and technical support is available for all customer queries.

interfacing with a digital chroma delay line chip or a picture improvement processor. It can also be linked to an external PIP processor and teletext decoder. Other features incorporated include interactive black-current stabilisation and white-point adjustment. The device is available in either a 52-pin DIL or a 64-pin quad flat pack and is intended for use in a wide range of sets, including widescreen models.

The TDA8376 offers similar features but excludes the i.f. section, being intended for use by manufacturers who prefer to keep the i.f. processing within the TV tuner. In addition it incorporates picture enhancement features in the luminance channel, including an asymmetrical peaking filter for improved picture sharpness, a selectable coring filter to reduce noise and a black-level stretch circuit to improve definition in dark areas of the picture. It comes in a 52-pin DIL pack.

announced at the opening of the IFA electronics exhibition in Berlin, where the various versions of the discs were being demonstrated.

Satellite Notes

Hugh Cocks

Pace SS9200

This receiver caught us out. We replaced the mains transformer, which had died, also the 4.7Ω resistor R1 by the fuse and the dreaded 1μF capacitor C9. The receiver lived in a local bar, high up on a shelf, and as some papers had accidentally been left on top it had, as usual, got hot. The chopper transistor Q1 measured o.k., but we initially left it out of circuit to check the drive from the TDA8380 chopper control chip U23. This seemed to be normal.

The low-value resistors R13 (0.22Ω), R15 (5.1Ω) and R11 (4.7Ω) all measured o.k. R258 (100Ω), R12 (4.7kΩ) and the large 100kΩ start-up resistor R3 were also all right. So we refitted Q1 and powered the receiver in the usual manner. It remained completely dead. There was no damaged track on the PCB, and the voltage at the collector of Q1 was correct. The diodes in the circuit, also the various electrolytics, were all o.k. Head scratching time. In the end a new chopper drive chip (U23) restored normal operation.

Pace MSS200

I have noticed a couple of small quirks recently with this model. If, in the tuning mode, you scan up the band by pressing the button to the right of 'menu', the receiver gets to around 11.4GHz then jumps to the bottom of the scale, at around 10.7GHz. The jump always happens at about 11.4GHz. There is no trouble when scanning down the band. This only came to light when I was looking for new channels from the Eutelsat Hot Bird.

The other quirk is that if the picture contrast is reduced below three, via the installation menu, the internal VideoCrypt decoder stops working. This shouldn't be a problem normally, as the receiver comes preset at four, which is fine for most TV sets. But it could be a confusing fault to be asked to investigate!

Pace PRD800

We had a strange fault with a fairly late PRD800 receiver that was being used with an Astra 1D LNB. Severe horizontal lines were present at around the Sky Sports/DSF frequency (1,750-1,800MHz), virtually removing any sign of a picture. Sometimes the lines would drift down the band towards Sky Movies. The fault occurred both at the customer's house and in the workshop, ruling out the LNB or microwave interference as the cause of the trouble. I removed the lid from the tuner and probed with my finger. The interference came and went. So it was replacement tuner time!

As it was a late version of the PRD800 the tuner was a 2GHz type, with 221 2077 written on the top. The only tuner I had to hand was an 'old' type, which went with the tuning software (to 1,750MHz) used in early production receivers. I wondered whether the old type might have sufficient tuning range above 1,750MHz when used with a later receiver. Coverage to 2GHz wouldn't be required: the customer would be happy as long as the tuning got beyond CNN at around 1,880MHz.

When I removed the faulty tuner I found that it was iden-

tical to the older one physically except that it had an extra pin. This didn't inspire confidence, but having got this far I thought I might as well carry on with the experiment until it reached a conclusion.

Everything was o.k. when I switched on. The tuning carried on beyond CNN and the top Spanish channels, and reception at the low end of the band was fine. Presumably the tuning stops at around 1,900MHz, but I haven't confirmed this. Nor have I looked too deeply into what the extra pin does. The older tuner costs around £10 less than the newer type, so it might be worth considering it as a replacement if coverage right up to 2GHz is not required.

We've been lucky with PRD series receivers to date. Power supply failures have been few. We persuade customers to keep the receivers as cool as possible, by leaving space above the receiver and not sitting it on top of a warm VCR. Tactfully suggesting that the receiver can get a bit "hot and bothered" if precautions aren't taken usually does the trick. Keeping it cool actually becomes a preoccupation with some of them!

Holiday Lets

We recently installed a dish feeding three Pace MSS200 receivers in three adjacent holiday villas. The owner also wanted to be able to prevent the visitors using the receivers, while at the same time giving them free access to local off-air TV. Our first thought was to install the receivers so that they could be removed, but the idea of phone calls every few weeks because something had been misconnected led us to try to work out a different solution.

The easiest course appeared to be to disable the front on/off and channel up/down buttons, leaving operation solely via remote control. This is actually quite easy. All you need to do is to cut off the plastic moulding at the rear of each control on the front panel, thus removing the contact to the switches on the PCB. All the owner has to do to prevent viewing is to put the receiver on standby and remove the remote control handset. As long as no one brings a remote control handset with them on holiday the system should work! In this sort of situation it's always best to lock the tuning menus with a non-standard (1234) PIN number, thus preventing kids swapping the channels around.

Pace Remote Control Units

It's a great help that MSS remote control units will work with receivers as far back as the SS9000 series, as we never seem to have an SS9000/9200 remote control handset available when receivers are brought in for repair and inevitably have to go into the menu afterwards to tune in something new or organise the channels in a logical manner.

The TV/SAT button on the MSS unit is equivalent to SETUP with the 9000 version, STORE is the same, F is UP, RCL is DOWN and 'i' goes back through the menu. There is more or less direct compatibility with the PRD unit from the button point of view, though I haven't had to use one to tune a PRD model.

Some SS6000 series receivers still survive, though the PCB around the power supply undergoes severe roasting. These had no front-panel buttons, and the remote control units are not compatible with the later series. They also seem to fail more often. So the customer has to use a 'one-for-all' type to obtain reception. For retuning purposes, 'setup' can usually be found on some obscure button on the replacement remote control unit, though some experimentation may be required.

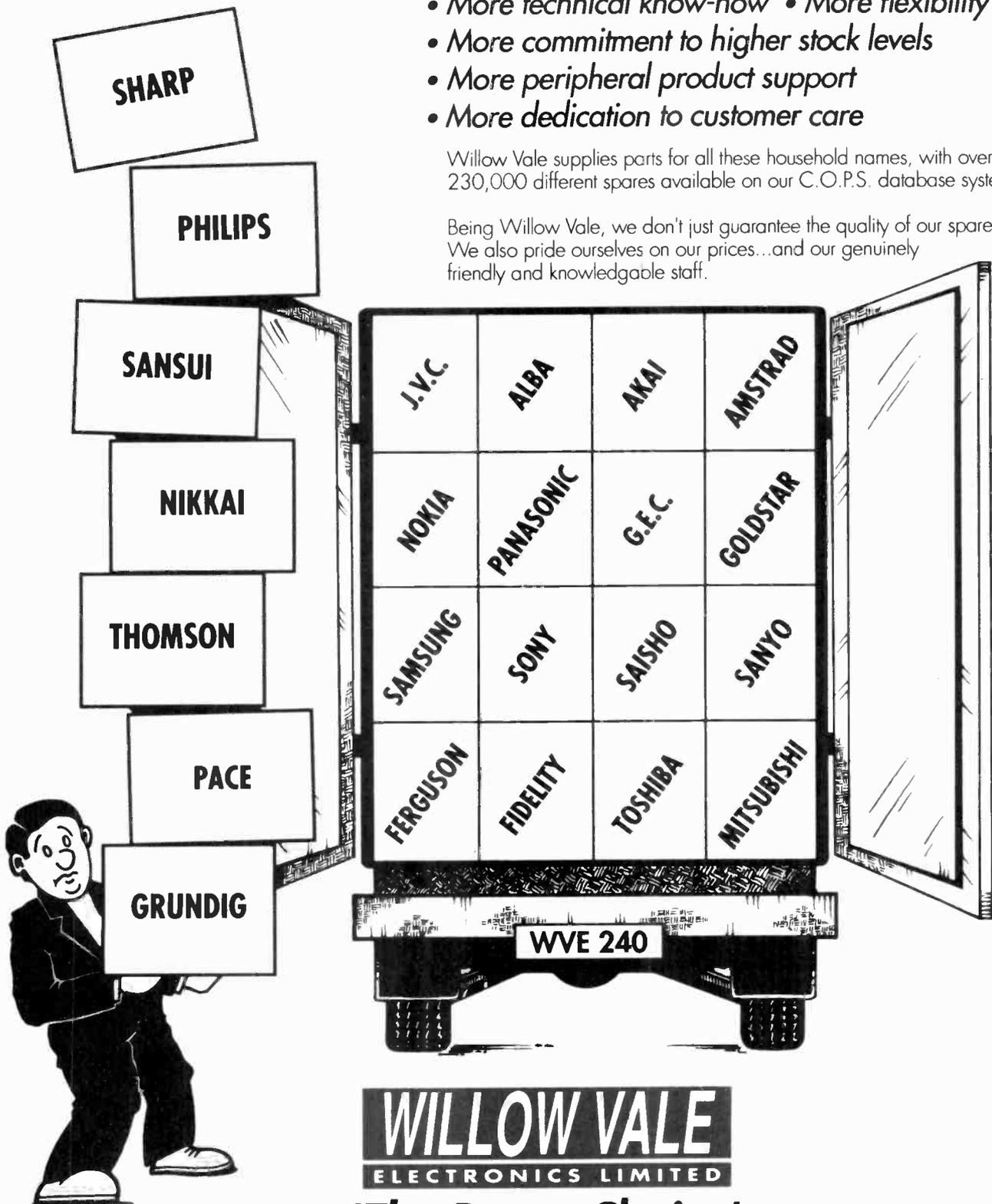
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Ferguson 3V38/JVC HRD110

Playback of this machine's own recordings produced very spotty, weak pictures, though playback of a known good prerecorded tape was o.k. A scope check on the f.m. record signal (at TP122 and TP124) showed that it was very low. The record level preset R213 (1k Ω) was found to be open-circuit. **P.B.**

Grundig VS510

If you get a blank raster in the play and E-E modes, with the sound, the display and the deck all o.k., inspect the DOS (display on screen) board visually for damage. The place to look is just behind where the front, right-hand side top retaining screw goes. If the wrong length of screw has been fitted, CR1550 can be damaged, producing the above symptom. **P.B.**

Hitachi VT420

Each time we thought we'd repaired this machine it would reappear, three or four weeks later, with the same fault: a second or two after switching the machine on it would revert to standby.

We eventually found that when the machine was in the fault condition its syscon microcontroller chip IC901 was being reset (pin 49) at two-second intervals. Reset pulses were being generated by IC801 on the VS tuning board because its A12V supply had negative blips riding on it. These dipped to 6.5V. The culprit was the STK5372H regulator chip IC851 in the power supply: the 12V section was flipping its top, as it were. **E.T.**

Mitsubishi B11/B12/B16/B21/B27/B31 etc

Various symptoms, as follows, can have a common cause: dead with no clock display and no functions; the tape symbol running as though a tape is rewinding though there's no tape in the machine; cutting out in picture search. Check the standby 5V supply, which comes from regulator Q971. This is on the underside of the machine, on the PCB deck, not in the power supply. The voltage has to be precise (5V \pm 1V). If it drops below this figure the microcontroller chips IC5A0 and IC8A0 can cause the symptoms described above. **G.W.**

JVC HRD830

This machine was dead with no clock, no functions and the chopper transformer buzzing. We found that zener diode D28 on the secondary side of the power supply was short-circuit while the mains rectifier's reservoir capacitor C12 on the primary side was open-circuit. Replacing these items restored normal operation. **G.S.**

Nokia VR3783

There was no clock display and no functions worked. A check at CN511 in the power supply showed that the output voltages were all o.k. So we moved on to the secondary rails on the main PCB, where PR541 was found to be open-

circuit. Replacing this item restored the always 5V supply and normal operation of the machine. **G.S.**

Nokia VR3615

This machine was dead with no clock display and no functions. Checks showed that Q803 was short-circuit, removing Q801's gate bias. Replacing Q803 restored normal operation. **G.S.**

Toshiba V309

There were no functions and the dew symbol was present in the display. A check on the dew line input to microcontroller chip IC601 showed the voltage to be correct at 4.6V. Replacing the chip put matters right. **G.S.**

Samsung SI3260

This one made us long for the gift of hindsight. It was dead, with no AL5V supply at pin 5 of CN601. This is derived from the AL6V (or AL5.8V, depending on which page of the manual you look at) line via the 1N4148 diode D602, which was faulty.

But the repair bounced. When the machine came back it shut down after loading a tape. There was also the strange symptom that operating the on/off button removed the channel number from the display but not E-E reception! Checks showed that power control pin 11 of the TC4094 expander chip IC606 was stuck at 1.8V. A new TC4094 restored correct power supply switching, but the shutdown after loading still occurred. We eventually found that there was a hairline crack near a plastic locating peg hole on the top PCB. **C.A.**

Fidelity VR910/Amstrad VCR9140

After staying on for a few seconds this machine would turn itself off. The power supply outputs were all o.k., but we found that there was no 5V output from the 7805 regulator IC01 on the main PCB. A new 7805 chip put that right. **C.A.**

Ferguson FV31R

This machine was dead but didn't appear to have destroyed its power supply. We then found that it would power up via a variac at 235V or less. For the machine to get going, a start-up supply must be developed across CP14 before the 12V supply is developed across CP38. If not, the start-up oscillator TL16/17 quickly dies. Zener diode DP21 had changed its zener point from 9.1V to 11V. As a result the voltage across CP38 was incorrect, locking up the power supply. As a replacement we used the heftier BZX61 1.3W type. **C.A.**

Akai VS967 etc

We have replaced many failed fluorescent displays in this series of VCRs, and have carried out Akai's modifications to the display power supply circuit, around L404. After

carrying out these repairs this machine's display was almost invisible. A check on the display filament voltage produced a reading of only 1.3V d.c: the modification usually reduces this voltage from 5V to about 3.5V. So what had gone wrong? We eventually discovered that with this particular coil (L404) the 'centre tap' was not at the centre of the winding but at an approximately 2:1 ratio. Correct operation was obtained when the cut connection to C447 was restored and the connection to the opposite end of L404 was cut and linked to the middle pin. Was this just a freak case caused by an incorrectly wound coil? Perhaps, but it might be worth noting for future reference. C.A.

Ferguson FV22

No E-E sound was the unusual fault with this machine. The relevant signal processing chip is IC1 (M51496P). Voltage checks showed that pin 9 was at 9V instead of 2.1V. We eliminated mute line problems by removing Q2, which carries out muting by linking the signal at pin 6 to chassis. The cause of the fault lay elsewhere however: the 6MHz filter CF2 was the culprit. S.L.

Philips VR6585

This machine bounced back on me after I'd rebuilt the deck, which is the Panasonic G type. The customer complained of sideways picture movement. Small displacements were apparent, just about discernible on my 14in. monitor. The effect was very much more noticeable on the customer's large-screen set.

I checked the previous work, then investigated the drum circuit. Well, to be truthful I started off here. This didn't get me anywhere and, having woken from my stupor. I then noticed that the fault was worse from cold. So I reached for the freezer. This led me to the non-polarised, 4.7µF electrolytic capacitor C255, which turned out to be low in value. Two 10µF electrolytics in parallel improved the situation but didn't cure the fault completely. As the lower drum was a little noisy I removed it and applied a drop of penetrating oil to the bottom bearing. This finally cured the problem. S.L.

Panasonic NVJ35B

This machine gave every indication of capstan motor failure. There was very noisy operation and sluggishness whilst loading, and if loading was completed there was severe warble in play. Operation even sounded 'metallic', as if bearing failure had occurred.

A colleague had fitted a new motor, but to his dismay this had no effect on the symptoms. Now electrolytics are often a problem with Panasonic equipment, so we carried out some checks in the power supply and discovered that C22 (330µF, 10V) was very low in value. Several other capacitors were checked as well and found to be wanting. S.L.

Mitsubishi HSM57

If the problem with one of these machines is that the fast forward/rewind brake stays on, clean all the graphite grease off the plate beneath, using solvent cleaner. Do not regrease it. T.L.

Ferguson FV74

If you get a power supply burn up, especially involving RP18 and RP21, the following components must be replaced: IP01 (U4614B); TP01 (TE02537F); RP18 (1.5Ω

safety type); and RP21 (2.2kΩ safety type). Check whether any of the following diodes on the secondary side of the supply are short-circuit: DP41, DP51, DP61, DP62, DP71. They are all type BA157. This should cure the problem. T.L.

Akai VSG64EK

You sometimes get a paused picture when you put one of these machines into play. If you inspect the mechanics you will probably find that the tape is on the wrong side of the capstan shaft. If this is the case, replace item 49 on the cassette lift. When ordering this item use part no. ZG387348J2, not the part number given in the manual. T.L.

Hitachi VT33

The cassette would be ejected a few seconds after being loaded. On investigation I found that the supply side was being loaded but the take-up side wasn't going down. The cassette flap wasn't opening because the flap lock release arm had lost its tension. I was able to retension the arm after removing the cassette holder, saving the cost of a new carriage. D.A.C.

Panasonic NVF77B

This top-of-the-range Nicam machine came along without any fault description. When I switched it on, the drum spun until the machine switched itself off. On investigation I found that several deck parts were damaged and the timing of the cassette carriage and associated parts had slipped. The following items had to be replaced: the pinch roller down gear (part no. VDG0483); the pinch cam (VDG0421); the pinch lift arm (VML1874); the pinch cam cap (VMX1353); and the pull-out sector gear P5 (VDG0597).

This model is fitted with the G2 deck. For mechanical adjustments and assembly work the G2/G-REV service manual (order no. VRD8901M101) is required, the NVF77B manual being almost totally devoted to the electrical side.

Normal operation was obtained on reassembling the machine, but I hadn't found the cause of the breakdown. I was eventually told that a cassette had failed to load correctly. So I tried every cassette I could lay my hands on, a total of 45. They all loaded correctly. Then I managed to obtain the original cassette that hadn't loaded, a brand new Scotch E240.

It looked o.k., so I tried loading it. The take-up side loaded, but the supply side stuck on the bend before its vertical descent. I isolated the mains like lightning! I then removed the cassette loading assembly, but couldn't find anything wrong with it – or the cassette. It seemed sensible to obtain and fit a new L side plate (VMD1787) and cassette holder unit (VXA3840). When this had been done the rogue cassette loaded as smooth as silk!

The manual and parts were obtained from SEME. The parts were surprisingly cheap: everything except the cassette holder cost less than £1 per item. D.A.C.

Saisho VCP100

This playback only machine had no fast forward or rewind operation – the play mode was o.k. On inspection I found that the idler was trying to turn the spool carriers but the brakes were not being released. Further investigation showed that the mode motor was stopping prematurely. I looked at the mode switch suspiciously and, while selecting rewind, gave its sliding contact a helpful prod. Off came the

brakes as the cam rotated fully. This ruse worked twice more, so I removed the mode switch and gave it a squirt of switch cleaner. Operation was faultless when I reinstalled it, but to be on the safe side I fitted a replacement. **J.E.**

Akai VS23

This machine had had previous unsuccessful treatment elsewhere. The tape speed in the play mode was too fast, the symptoms being no line lock and muted sound. Our first check was to see whether capstan FG pulses were present at pin 21 of the BU2735AS chip IC503. They weren't. On tracing the path of the pulses from the capstan motor to IC503 we found that they were present at pin 2 of IC502 but not at pin 3 of IC507. As the resistor in between, R625, was o.k. it seemed that IC507 was faulty at its input. Closer examination showed that its pins had all been freshly soldered. All was then clear – it had been fitted the wrong way round! Putting this right produced the correct playback speed – and a sigh of relief! **J.E.**

Toshiba V109B

The clock display was normal and the machine had a fully laced up tape inside. When any tape function was selected the correct symbol appeared in the display but the mechanism remained lifeless. There was a power supply fault, which was cured by replacing the STK7253 regulator chip. Once this had been done the machine unlaced and ejected the tape normally.

While I was checking the tape functions the capstan suddenly made such a whirring and grating noise that I immediately pressed the stop button. This problem was cured by removing the capstan then cleaning and lightly lubricating the shaft. I wondered whether the capstan had seized, causing the demise of the regulator. We'll never know! **J.E.**

Matsui VX1100

The bias oscillator worked intermittently. If you went straight into record after switching on it worked, but if you came out of record then went back after a few minutes it didn't. The problem was that C5017 wasn't being fully discharged, so that when the oscillator tried to start up again the change in voltage wasn't enough to get it to run. I replaced most of the components in the circuit to no avail then, in desperation, connected a 3.3k Ω resistor across C5017. This provided a complete cure. **D.B.**

Ferguson FV71L

This machine was dead. Fortunately the only thing that was wrong was that RP18 had failed. A replacement restored the power. **D.B.**

Mitsubishi HSB52

The report said that this machine wouldn't play and chewed tapes. On investigation I found that the idler assembly didn't move far enough for take-up drive. The idler should have a spring which is held in by a circlip. It was missing. A new idler cured the fault. **D.B.**

Ferguson FV41R

This machine was dead with no clock display. Checks showed that there were problems around the microcomputer

chip IT01 – and that one of our less qualified friends had got his paws on the machine. The crystal associated with IT01 had been replaced with a 17MHz instead of a 4MHz type. Fitting the correct type still didn't bring the machine to life, but unplugging the on-screen display panel did. Replacing IA21 finally got the machine running correctly. **D.B.**

Ferguson FV68TX

There was no hi-fi recording, though playback of prerecorded hi-fi tapes was o.k. We suspected the TEA5712 chip in the head amplifier, but fitting a replacement made no difference. Luckily another VCR of the same type was in the workshop. Swapping the drum assembly over proved that this item was the cause of the trouble. **D.B.**

JVC HRJ205

There was no E-E tuner operation, with just a blank raster. Unfortunately the construction of this unit makes fault diagnosis in this area very difficult. Replacing the tuner and i.f. strip restored normal pictures and sound. **D.B.**

Akai VSG64

This machine had been to the workshop on several occasions because of a jammed mechanism. As we'd already carried out the usual modifications we decided to plump for a complete mechanism block. Akai appears to be the only manufacturer that supplies a block like this, complete except for the drum and audio-control head assemblies. We fitted this and set up the head alignment – and haven't seen the machine since. **D.B.**

Nokia VR3784

There were no E-E or playback signals at the scart 1 connector. A check on the waveforms at the scart PCB showed that the VD OUT AV signal was not present at pin 9 of CN861. On tracing back I found that the print at one side of C1602 had lifted. **R.B.**

JVC HRD540

When the rewind or fast forward button was pressed the tape loaded up fully and went into the selected mode, but at the visual search speed. Replacing the end sensors cured the problem. **R.B.**

Nokia VR3783

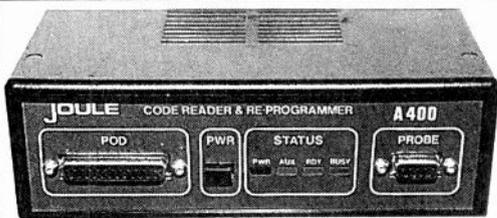
This machine wouldn't slow down and stop in rewind, breaking tapes. Refitting the LED tower plug to the sensor PCB cured the fault. **R.B.**

Samsung VIK310

This machine spilled tape out in play. In addition fast forward operation was noisy. On investigation we found that a piece of paper had jammed in the teeth of the take-up reel. Removing it restored correct operation. **R.B.**

Nokia VR3761

When this machine powered up it would switch off instantly to standby. Normal operation was restored when we replaced the 2SC4484S transistor Q5402 on the PWA board. It was short-circuit all ways round. **R.B.**



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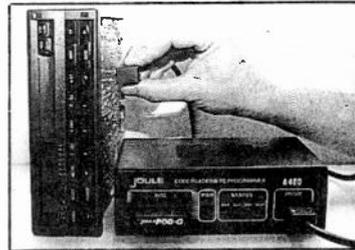
Full technical backup via a telephone helpline is offered to all registered users. There is also a scheme in place where any radios not currently included within the system will be decoded free of charge and a free copy of that software will be supplied.

Decoding a radio is simple – remove the base plate, place the probe on the PCB, press a key and the code is instantly displayed. Changing the code or fully re-programming is just as easy.

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Works on any IBM or compatible PC from an Amstrad 1512 to a 486.

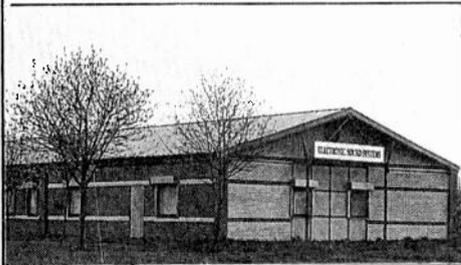
As well as its ability to decode and re-code, the advanced design of the A-400 permits total re-programming of eeproms, lending itself for use in the servicing of television receivers etc.



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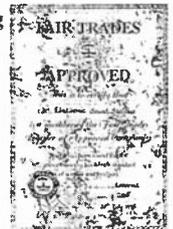
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BUT18AF	1.13	TDA1035b	1.56	TDA2005	2.40	TDA3541	1.84	TDA5600	4.60
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STK5338	4.89	TDA1097	4.73	TDA2320	.78	TDA3640	5.80	TDA8173	2.95
STK5339	3.88	TDA1151	.49	TDA2510	4.40	TDA3651	2.41	TDA8175	4.12
STK5342	4.88	TDA1154	.49	TDA2530	3.99	TDA3771	4.50	TDA8190	2.80
STK5372H	7.57	TDA1180p	1.55	TDA2540	1.06	TDA3803A	4.75	TDA8196	1.68
STK5421	4.49	TDA1190z	.79	TDA2541	1.70	TDA4050B	3.80	TDA8380	2.50
STK5422	3.72	TDA1220b	.80	TDA2542	1.09	TDA4280 U	4.15	TDA8443	3.65
STK5451	3.88	TDA1270	1.79	TDA2543	2.06	TDA4400	1.69	TDA8702	2.95
STK5464	2.98	TDA1412	.35	TDA2545a	1.19	TDA4420	1.19	TDA9403	1.99
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Long-distance Television

Roger Bunney

Several spectacular thunderstorms occurred during the heat-wave that dominated July and early August. With lightning that flashed horizontally across the sky, and very high humidity levels, there was a feeling of Sporadic E in the air! And indeed SpE has been active, with several major openings. There was transatlantic reception on one July evening.

The heat didn't give tropospheric conditions much of a lift. There was enhancement to the south west, with Spanish signals in channels E25, E34 and E37. More general reception occurred on the 24th, with signals from France and the Benelux countries received in the south east and signals from Spain in the south west.

The Delta Aquarid meteor showers came on cue, with a peak in visual effects very late in the night of the 28th, continuing into the early hours of the 29th. A clear sky helped the display.

The SpE log for the period is as follows:

- 5/7/95 TVE (Spain) chs. E2, 3; RTP (Portugal) E3, 4; RTS (Serbia) E3; RV (Radio-Video, Italy) E2; +PTT (Switzerland) E3.
- 6/7/95 RTS E3; RAI (Italy) IA; TVE E2; RUV (Iceland) E3, 4.
- 7/7/95 TVE E2-4; TVE-2 E2; RTP E3; North America A2-5.
- 8/7/95 SVT (Sweden) E2, 3; NRK (Norway) E3.
- 9/7/95 Russia R1; RAI IA, B.
- 10/7/95 SVT E2-4; NRK E3; TVE-2 E2; RAI IA, B.
- 11/7/95 SVT E2; many unidentified signals in chs. R1-4.
- 12/7/95 C+ (Canal Plus, France, scrambled) L2.
- 13/7/95 RAI IA, B.
- 14/7/95 JTV (Jordan) E3; TVE E3.
- 15/7/95 TVE E2-4; TVE-2 E2; RAI IA; RTP E2, 3; RTS E3; TVR (Romania) R2; SLO (Slovakia) E3; unidentified Arabic signals in chs. E3 and 4.
- 16/7/95 TVE-2 E2; TVE E2-4; RTP E3; RAI IA, B.
- 19/7/95 NRK E2; SVT E2, 3.
- 20/7/95 TVE E2-4; RAI IA, B; RV E2; C+ L2, 4.
- 21/7/95 TVE E2-4; RAI IA, B; RV E2; C+ L2; RUV E4; mystery A2 signal.

- 22/7/95 TVE E2-4; RTS E3, 4; RAI IA, B; C+ L2; RV E2; SVT E2, 3; NRK E2, 3; TVR R3; ORF (Austria) E4; TVP (Poland) R3; ARD (Germany) E2; Russia R2; RM (Moldova) R2; Czech Rep. (Nova TV) R1, 2; SLO R2.
- 23/7/95 LTV (Lithuania) R2; SVT E3.
- 24/7/95 OKI (Russia) R1; RTS E4; TVP R2.
- 29/7/95 RV E2; RAI IA; NRK E3, 4.
- 30/7/95 TVE E3, 4; RAI IA, B; HRT (Croatia) E3, 4; C+ L2; ARD E2; SVT E2; TVP R2; MTV (Hungary) R2; +PTT E2.

My thanks to Garry Smith (Derby), Roger Fussell (Torpoint), Peter Schubert (Rainham), Cyril Willis (King's Lynn) and Iain Menzies (Aberdeen) for sending in reception reports to add to my own log here at Romsey, Hants.

Garry Smith has noted, slightly to the west of the TVE direction, a rolling-effect picture frame that can sometimes be locked, not unlike a 525-line System M signal. Channel A2 and A4 transmitters have been previously listed, near Cadiz and Madrid respectively, in use by the US forces network. They provided 525-line NTSC signals at 2kW, but have never been seen and are thought to be off-air. Can anyone comment on this mystery?

The North American signals on the 7th, with programme material (chs. A2-4), were received by Cyril Willis, starting at 2220BST and lasting for about half an hour. The programme was the same in each channel, but with different adverts. At 2244 a weak ch. A5 video signal was detected at scanner level. Sesame Street came in at 2247 on ch. A2. The sound channel provided confirmation of the programme content. Picture quality was very poor.

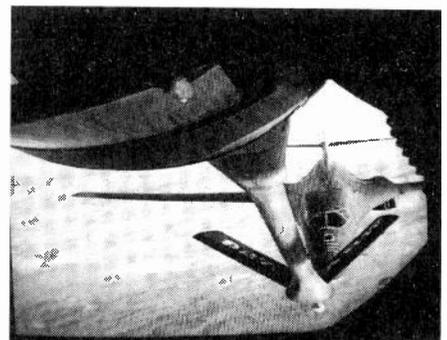
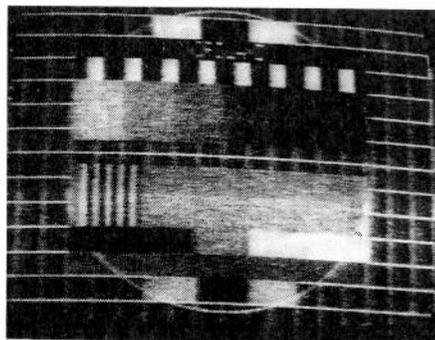
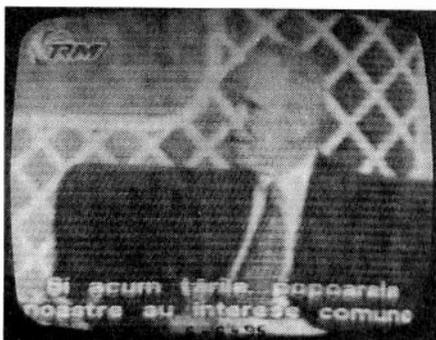
To sum up, a relatively busy month with lots of signals. Good to note that they came from a wider geographical spread than earlier in the season. I wonder whether anyone will see African signals this year? The best time to look is around 1700-1900BST, on chs. E2 and 3.

News Items

Sweden: The government has given the go-ahead for a new national TV network to be called M4. Licence applications are to be submitted in early 1996.

Malaysia: The fourth terrestrial TV service, Metrovision, started operations on July 1st, initially within a 50km radius of Kuala Lumpur and the Klang Valley. Programming is mainly English-language, sourced from the UK and the USA. If successful, Metrovision will expand nationwide.

Taiwan: A fourth national TV service, The People's Broadcasting Corporation, is to start test transmissions by the



Left: RM (Moldova) ch. R2, received by Ryn Muntjewerff in the Netherlands via an SpE path. Centre: The Nordland regional test pattern used by NRK (Norway), another example of SpE reception, this time by Garry Smith in Derby. Nordland regional transmitters use chs. E2-4. Right: Something different, Airforce News via the Orion 1 satellite, showing in-flight refuelling of a US bomber. Photo from John Locker.

summer of 1996, with full operation building up over the following twelve months. Other national and regional services are likely to follow.

Gambia: The first TV service is due to start this autumn, using a 5kW Band III transmitter at Banjul. Another two 2kW transmitters will follow, at Soma and Bansang.

Greece: Legislation now going through parliament will enable many of the two hundred private, unlicensed TV broadcasters to be closed down. The intention is to allow only five nationwide networks, with foreign investment in any one not exceeding 25 per cent.

Germany: Local TV channels have been given the go ahead. The first will operate at Stuttgart, with a v.h.f. transmitter. Another is likely to start in Cologne.

UK: Racal is marketing its Raicats system, which provides video transmission using narrow-band transceivers, cellphones and telephone lines.

France: The Lille-Bouigny France-2 transmitter is now using Nicam sound.

DAB: The Rotterdam ch. E7 transmitter has closed to make way for a local DAB transmitter. A DAB service has been in operation in Berlin since June, using a transmitter at Scholzplatz. A second transmitter will be in operation during the Berlin Radio/TV exhibition. These transmitters operate at up to 1kW, in ch. E8 (around 199.5-210MHz).

Russia: Tele-Express now uses ch. R31, with a 20kW transmitter at the top of the Ostankino Tower. It covers an area with a radius of 80km.

Netherlands: The Dutch Nederland-3 transmitters are all now using the PALplus 16:9 test pattern, with the identification 'NOZEMA NED 3' at the top and 'PALplus 16:9' at the bottom. Programme transmissions are to start in September.

Palestine: TV services are now being transmitted from Jericho (ch. E21), Jerusalem (E23 and E37), Bethlehem (E23), Ramallah (E25) and Gaza (E31).

Satellite Sightings

The Clarke belt seemed to be quieter during July than in recent months. Although there was considerable military activity in Bosnia, this didn't result in any observable increase in satellite use. At my location however trees have now cut out reception to the east of Eutelsat II F3 (16°E).

Kopernikus DFS-3 at 23.5°E has certainly carried uplinks from the Bosnian area. Colin Paton (Greenock) reports that ITN took a feed at 12.417GHz (vertical) on the 24th: it included shots of military preparations. The uplink was prefaced with "Roy Rogers Engineering"(!) and originated from Vitak. Colin had to carry out careful skew adjustment to minimise sparklies, as the signal level was marginal.

One reason why fewer uplinks from the area are seen is that an SNG unit which employs digital compression is now in operation. It's signals will not, of course, be resolved by analogue receivers. I noticed an EBU lease via Eutelsat at 7°E distributing one such link, the caption reading "DIGITAL KU BAND SNG EBU IN ZENICA-BOSNIA 625 PAL -dBMTONE SNG BROADCAST SERVICES". This news item used sound-in-syncs, requiring a sync inserter to stabilise the picture.

Ian Waller (Lincoln) mentions that Intelsat 603, at 34.5°W, still carries the occasional EBU feed from the former Yugoslavia. Ray Carman (Reigate) also comments on the general lack of news feeds in recent months: he too feels that several old favourites have probably gone digital. He's seen feeds from the Yugoslavian area via Orion 1 (37.5°W), Eutelsat I F4 (25.5°E) and Kopernikus 2 (28.5°E).

Car racing enthusiasts had a field day on the 23rd, when the Diehard 500 from Talladega, Alabama was relayed in its

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entirety via Intelsat K at 21.5°W, using the 11.557GHz vertical transponder. Golf from St Andrews was being carried simultaneously, using the 11.496GHz horizontal transponder.

Ian Waller reports that the digital revolution has reached the French overseas regions, the French RFO service now using digital compression at 3.73GHz via Telecom 2A (8°W). The Canal Plus C band signal via Telecom 2B is no longer seen: Ian wonders whether this has also gone digital. Sudan TV has moved from Intelsat 505 (57°E) to Intelsat 502 (21°W). The UK forces' SSVC output is now being carried by TDRS at 41°W, using 3.72GHz and with scrambling as via Intelsat 601 (27.5°W). TDRS must be a lot cheaper, and with a much wider footprint than Intelsat Ian feels that the latter downlink will eventually be terminated.

Julian Redwood (Christchurch), another C band enthusiast, has been monitoring the Russian Raguda satellites. He received a strong 3.466GHz signal from Raguda 26 at 12°E, with data on an 8.900MHz carrier. Another downlink, at 3.650GHz, carries no audible sound or data.

Horse racing (Goodwood, BBC-1) was a feature on Saturday the 29th, via Intelsat at 34.5°W, using the 10.972GHz vertical transponder with captions originated on site. A check at the same time (mid afternoon) revealed the Guardian Irish Holidays Open in Dublin via Orion 1 at 37.5°W - yet more golf! Meanwhile more horses via Intelsat 601 (27.5°W) though, unusually, with a French commentary and overlay captions. This was interspersed with "BT TEST TXN" captions and colour bars - does anyone know what this was about? The frequency was 11.481GHz (horizontal).

I suspect that 'AYA-2 ISRAEL' is the name of an uplink company. It preceded a CBS news feed from Tel Aviv on the 19th, via Eutelsat II F3 at 16°E. With the receiver left tuned to

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12-539GHz, Golf from St Andrews appeared next.

Intelsat has been starting up early on recent mornings, with a GMTV production crew reporting from southern Spain. Picture quality is excellent though the sound, with my equipment anyway, has at times been poor. On checking the GMTV show one morning I found a strong audio carrier at 6-6MHz. But the audio itself seemed to be narrow band and at the extreme h.f. side of the carrier. A most odd effect.

Many Spanish services via Hispasat (30°W) are not scrambled at present. They include TeleDeporte, TeleNoticias/Antena Tres Satellite and Telesat Cinco. The idea is to encourage Spanish viewer uptake. Check at 12-149GHz upwards.

MMDS Update

Few readers, unless they live in Southern Ireland, will have had direct experience of MMDS (Multichannel Microwave Distribution Systems), which first started in the USA for local, terrestrial distribution of TV services including subscriber-based ones. There are at present nearly two hundred MMDS services in operation in the USA. Two main bands are in use in various parts of the world, 2-5-2-7GHz and 2-3-2-5GHz.

Mass-production of 2-5GHz receiving equipment has now been established in Taiwan and China. As a result the equipment, which is widely advertised, is cheap. The usual package consists of small parabolic aerial with an integral converter which produces an output, at v.h.f. or u.h.f., for connection to the TV set via a subscriber unit. Polarisation is normally vertical or horizontal.

At 2-5GHz any obstruction will block the signal, so line-of-sight reception is required. With current technology up to fifty channels can be transmitted at powers between 1-100W. Given

good local topography and a high mast, ranges of up to 40 miles (60km) can be achieved. Directional or omnidirectional aeriels may be used for transmission.

MMDS has become popular since it's easy to set up and operate and the equipment is cheap. American consultants estimate that an MMDS system covering a typical metropolitan area with a population of 50,000 would cost \$15m to set up: the cost of a cable distribution system with the same coverage would be around \$50m.

In regions such as the Arabian Gulf, tropospheric ducting and other weather-related phenomena affect signals in the 2-5GHz band. Experiments using the 12GHz band, with f.m. video, are therefore being carried out. In Hong Kong, where high rainfall, islands, hilly terrain and high buildings cause problems, tests are being carried out to decide between 2-5GHz a.m. and 12GHz f.m. Interference levels can be high in urban areas: at Brighton Beach, New York, an LMDS (Local Microwave Distribution System) operating at 27-5-29-5GHz is being used to overcome this problem.

MMDS started in China some five years ago. There are now eight channels in operation in Beijing, using 50W transmitters and with nearly a quarter of a million subscribers. MMDS services are being set up in Africa. The 2-5 and 2-1-2-2GHz bands are being used in the Czech Republic: similar frequencies are in use in Ireland and Iceland. Hungary and Romania have opted for 10GHz and 12GHz. Australia is an expanding market at present. A well-engineered 2-5GHz system is in operation in Amman, Jordan.

At the 1990 CEPT (European Conference of Postal and Telecommunications administrations) the 40-5-42-5GHz band was allocated for European MMDS services. It seems that at present only the UK is thinking about MMDS at this frequency. Belgium and Slovenia are reported to be testing 27-5GHz MMDS, based on prototype US equipment. The conclusion one comes to is that there is little chance of a European or global MMDS standard for many years!

The future lies with digital technology of course. At Rapid City, high in the Black Hills of South Dakota, the Decathlon MMDS company has been transmitting ten channels compressed into a 6MHz block since the autumn of 1994, apparently with complete success. Given a 2GHz bandwidth, there's potential for several hundred TV channels, including video on demand, home selling and other interactive services. National or international connections could be introduced via satellite links at the transmitter.

I would be particularly interested in hearing from readers in Ireland with practical experience of MMDS services.

Satellite News

Intelsat 706 came into operation in early July at 53°W, carrying fourteen Ku and 26 C Band transponders. It covers N/S America, the Caribbean and western Europe. PAS-4 is about to be launched into a slot above the Indian Ocean, giving telecom/TV coverage of eastern Europe, Africa, the Middle East, Asia and parts of Australasia. It has sixteen C and 24 Ku band transponders. AsiaSat-2 is also due for launch shortly.

News Corporation and Globo of Brazil are to establish a direct-to-home satellite TV operation covering Latin America and the Caribbean. It will compete with the DirectTV Latin American service, which is to offer 140 TV channels across the area with Spanish/Portuguese programming.

Rupert Murdoch is to offer his Christian Channel Europe via Astra 1C, sharing a transponder with Sky Travel, Sky Sports 2 and a soap programme. BSkyB has postponed its plan to offer a hundred digital channels by next March, apparently because supplies of digital set-top decoders are unlikely to be adequate.

Toshiba Service Briefs

The following update notes from Toshiba Technical are based on bulletin CDH55, which was issued in August.

CTV RECEIVERS

Model 210T6B

Distorted sound: If the unregulated 12V supply at pin 9 of M582 has risen to 27V, replace Q809 (BC557B). Part no. is 23114546.

Model 215T8B

Set is stuck in standby: If the voltage at pin 7 (reset) of the M34300N583SP microcontroller chip QA01 is low at 2.4V and the reset chip Q805 is o.k., replace QA01 – part no. 23318387.

Models 285T8B/BU

Stuck in standby very intermittently. The Nicam and bilingual LEDs may just glow: The power supply is in the over-current trip mode, with the h.t. at less than 20V. Increase the value of C845 from 22 μ F to 100 μ F (50V).

Note that a similar symptom, intermittent start-up, has previously been reported. The remedy for this is as follows: change R818 to 15k Ω , 3W; replace the 22 μ F, 16V capacitor in parallel with diode DF80, but mounted on the print side of the panel, with a 100 μ F, 16V type; add a 5.1k Ω 1/8W resistor in parallel with D812, on the print side of the panel. The three components required are available as kit 23305114.

Models 2100RB 2100TB 2101/2/3TB

Intermittent partial field collapse with black bands on the picture: The output from the μ PC7812H 12V regulator IC408 is falling to 8V. Replace IC408, part no. 23318218.

VCRs

Models V204B V254B V404B V454B (Cat 1)

No colour, video streaking in playback: CV21 (0.015 μ F) at pin 21 of IV001 is leaky or, if an additional 27pF capacitor is fitted between pins 21 and 25, it may be touching an earthed section of the print. Replace CV21 or reposition the extra capacitor as necessary.

Machine is dead with the power supplies o.k.: Replace the ST24C04/CB1 EEPROM chip IT003, part no. 70011892. Clues are no data at pin 6 with the d.c. voltage incorrect at 0.8V instead of 4.8V.

Models V204B V254B V404B V454B V804B V854B

Clock is inaccurate: The main microcontroller's 8.000020MHz oscillator is out of specification (the timer and clock are inside the main not the display micro). Adjust

C552, using a non-metallic tool. Refer to the service data for Models V804B/V854B, page 2-47. In Cat 1 models there is no test pin TP501: use pin 63 of IT001 (it's best to connect a piece of wire to this pin to link with a frequency counter probe) and remove the mechanism to gain access to C552.

Models V212B V213B V312B V412B V423B V513B

No display, won't turn on, capstan runs continuously: Replace the U2559B regulator IT25 which is holding the 5V supply low. Part no. 70010977.

Tape speed slow: The capstan motor bearings are seizing up. Replace the motor, part no. 70011046.

Model V411B

Audio buzz in playback: Cause is a poor earth connection from the ACE head at connector BS01 on the main signal PCB. The connection can be repaired.

Model V703B

Dead with no display: This can happen when the a.c. clock generator IC801 in the power supply has stopped. You will probably find that the chip is o.k., the 75k Ω , 0.5W feed resistor R802 being open-circuit.

Models V804B V854B

Machine is dead: The STRD6802 chip IC803 is probably short-circuit. D803, type S1WBA60, may also be short-circuit. Replace IC803 with kit part no. 70903970. If D803 has to be replaced the part no. is 70011880.

CAMCORDER

Model AI420BK

The machine appears to be in the cue (forward search) mode intermittently, but the drum runs too fast and the picture is lost: There are two possible causes. Either C519 (10 μ F, 16V) is faulty or pins 11 and 12 of the FG/CTL amplifier Q502 are dry-jointed. Replace the capacitor or resolder the pins.

SATELLITE RECEIVER

Model TS540

VideoCrypt channels remain scrambled: This can happen if the picture contrast has been set too low via the customer menu, reducing the video input to the decoder. The cure is to reset to factory default 4. Advise the customer.

NEW PUBLICATION

A pocket-sized version of the *Toshiba Technical Repair Data Book*, designed for the field service engineer, is available from Toshiba (U.K.) Ltd. at £5, part no. TTRD95.

LNB Developments – and Hot Bird

Martin Pickering, B.Eng.

Two new types of LNB (Low Noise Block) downconverters have appeared during the past year, the 'enhanced' and the 'universal' type. Before we look at them I'll go over a little history to set the background.

The polarisation-switching LNB, originally manufactured by Marconi as the 'Blue Cap', employed voltage sensing to determine which polarisation was required for reception. The supply voltage fed to the LNB was either 13V for vertical polarisation or 17V for horizontal polarisation. The LNB's frequency range was sufficient for reception from the Astra 1A and 1B satellites.

Other manufacturers followed suit, and many different types of 'standard' switching LNBs became available. The use of HEMTs (High Electron Mobility Transistors) enabled noise figures below 1dB to be achieved. The original Blue Cap had a noise figure of around 1.8dB, I believe. A few years ago this was considered to be excellent.

When Astra 1C came along it used a lower frequency range than 1A. Some early LNBs and receivers found it a struggle to cope with these frequencies, and many were replaced as owners upgraded. When Astra 1D began to broadcast using even lower frequencies, in January this year, existing receivers couldn't cope without modification or the use of an external converter. The 'enhanced' LNB was born, and new receivers had tuners and software to match.

Frequency Ranges

The local oscillator in a 'standard' LNB runs at 10GHz. In the frequency conversion process this is subtracted from the 'block' of frequencies received from the satellites to produce the i.f. output (first i.f.). An 'enhanced' LNB has a 9.75GHz local oscillator. Thus the frequencies in the i.f. band sent down to the receiver are 250MHz higher than with a 'standard' LNB. The i.f. bandwidth is also wider. An older receiver will still be able to cope with these frequencies, but the top channels will be missing or poor unless the receiver has an extended-range tuner. In addition, the receiver's frequency display will be 250MHz too low.

An older receiver's effective tuning range can be increased by using an external frequency converter such as one of those produced by Global and Ventana. Since they introduce a frequency shift of either 500MHz or 750MHz, the receiver's frequency display will again be wrong. And if a 'standard' LNB is in use, there is no guarantee that the

Astra 1D channels will be watchable: these LNBs were not designed to work with the lower frequencies.

Future Proofing

Technology advances at such a rapid rate that nothing is ever certain. One LNB manufacturer, Continental Microwave, has adopted the following approach however.

Astra 1E and 1F will transmit at even higher frequencies. Although it is theoretically possible to manufacture an LNB that will operate across a very wide frequency spectrum, it's unlikely that the resultant performance would be at the optimum possible. Furthermore the design of a tuner capable of providing good performance over such a wide range would be very difficult. The solution to this is the 'universal' LNB. Polarisation switching is conventional, 11.5-14V for vertical polarisation and 16-19V for horizontal polarisation. The novel feature is the use of two local oscillators, with band switching to obtain the output from the appropriate frequency converter stage. A 22kHz tone controls the switching: when it's present, the higher satellite frequency band is selected.

The lower band selects an input of 10.7-11.7GHz from the satellite(s), using a 9.75GHz local oscillator to convert this to an i.f. of 950-1,950MHz. The upper band is 11.7-12.75GHz, which is converted to 1,100-2,150MHz by using a 10.6GHz local oscillator.

Consequently the receiver must incorporate a tuner with a range of 950-2,150MHz and provide both 13/17V polarisation switching and a switchable (on/off) 22kHz tone. When this tone is present, it's superimposed on the LNB supply voltage. It's filtered out within the LNB and used to switch to the upper band. The tone amplitude is specified as 0.6V, with a tolerance of $\pm 0.2V$.

If you are planning to buy a receiver, make sure that it includes 22kHz tone switching. You will then be future-proof for the next few years – or will you? Actually, no. The new satellites will relay many digital channels, which means that these broadcasts will not be compatible with existing receivers and decoders. It's unlikely that an add-on unit will make an old receiver compatible with the new, digital transmissions, because of phase-shift problems with the signal handling. Amstrad however has provided an external connection facility in its new Surround sound model.

Digital receivers are being produced by Pace, but cannot be bought in the UK at present. Since Astra is not yet providing any digital broadcast signals this is no great problem!

So the best you can do by way of future proofing is to buy a 'universal' LNB, such as the Continental Microwave UA type. They will become readily available in the near future. This type of LNB works in exactly the same way as an 'enhanced' type until it receives a 22kHz tone, when it

About the Author

Martin Pickering was previously Technical Manager at Eurosat Midlands. He is currently running his own repair business and can be reached at INTERNET:100613,2105@compuserve.com

selects the higher band. It's therefore compatible with any receiver that will work with an 'enhanced' LNB.

As an interim measure, a separate 22kHz tone switching unit can be used with an older receiver to provide the tone needed to set a 'universal' LNB to the higher band. The GEN22 Plus, manufactured by Global Communications (UK) Ltd., is available from suppliers such as Satellite Solutions.

Hot Bird

Another future proofing step is to provide for reception from the Eutelsat cluster of satellites at 13°E as well as the Astra satellites at 19.2°E. This calls for an 80cm (minimum) dish and two LNBs.

When I installed my own system I fitted an LNB at the end of the arm and lined it up with Eutelsat II F3 at 16°E. I then removed the LNB, fitted a Lenson 'multi LNB holder' and attached an LNB at each side of the arm. A spectrum analyser was used to get the best compromise between the noise floor and signal peaks. Some installers find that a better compromise is to align the dish for 13°E but, depending on the type of dish, interference as a result of side-lobe reception could be worse.

Ideally the receiver should have two inputs, one for each LNB. Various LNB switching units are available however. The 'TwinSat' from Davenham Satellites (phone no. 01606 49 085) detects the LNB voltage going off then on and switches to the other LNB each time this happens. With most receivers, pressing standby twice will achieve this. If your receiver has 22kHz switching and you are not using a 'universal' LNB you can connect up a µVH6 switching unit, which is made by Global Communications (UK) Ltd. For channels which you set to 'tone', the µVH6 will select the second LNB.

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Test Case 394

As the summer days shorten, the service department's workload starts to increase. We find that the peak time for repairs is mid-December. Technocrat for one was glad of the upturn, not only because of the company's bonus scheme. A bigger pile of repairs means a larger number of problems however. One particular VCR that found its way on to his bench proved to be as big a problem as the previous four together! It was an Hitachi VT410.

The reported fault was poor sound treble response. A check with the workshop test tape – Jaws 3, acquired because it had been chewed by a Sharp video!! – showed that this was indeed the case. The sound was rather muffled and woolly, as if the audio head was dirty. There's no hi-fi sound with this model. Technocrat (TC) took off the top cover to clean the head. To his surprise, he found that it was not only clean – it was also brand new. Someone had obviously been there before him, though there was no record of any work having been carried out on the machine in our workshop.

TC looked at the path of the tape past the audio/control (AC) head. As it was a fraction high, he adjusted the head level until the tape passed centrally between the outer visible edges of the audio and the control faces of the head. This did nothing for the quality of the sound from the Jaws tape, though it did raise the sound level a little. If the head had been replaced and its height was incorrect thought TC, there was a good chance that the other aspects of its alignment were incorrect. In particular, incorrect azimuth alignment will cause loss of treble

response with tapes recorded by other machines. But rather than twiddle the balance screw, TC decided to make a test recording and play it back. If the cause of the problem was a tilted audio head, it wouldn't be present with playback of the machine's own recordings. Clever, eh?

So a recording was made, on a blank tape, and played back. This gave TC no joy: the sound reproduction still lacked treble output. There followed some weary – and wearying, for those working at nearby benches – tests on the playback audio amplifier, using an audio generator. The roars, squawks and squeals began to unsettle everyone. But the results were inconclusive, as were the effects of replacing various capacitors around the audio amplifier chip IC402.

As the audio generator was wound up to 8kHz for the twentieth time, and the workshop rang with the sound, Sage slammed down the CD player he was trying to work on and strode over to TC's bench. He took with him a JVC alignment tape, which he thrust into the troublesome Hitachi machine. He set it to play the 6kHz section and adjusted the AC head's azimuth adjustment screw. The 6kHz note rose to a crescendo. Sage removed the alignment tape and replaced it with Jaws 3, which now sounded perfectly normal. With a look at TC that defies description in print, he turned the monitor's volume setting down and returned to the CD player on his bench.

After that TC used headphones to continue his tests. Although playback of Jaws and other prerecorded tapes was now satisfactory, there was still a lack of treble response with the machine's own recordings. So there must have been two separate faults, one of which was still present. Could this have also been to do with the recent head change? Sssh . . . For the solution, turn to page 892.

What a Life!

Donald Bullock

It was my birthday. Greeneyes had been nice to me, and had tidied the workshop. The morning was bright and pleasantly warm. In fact life was good, and I settled down happily to sail through a perfect day.

Mr Soaker's Sharp

Then I saw old Mr Soaker heading towards the door, carrying a video recorder. Could be troublesome, old Soaker. There was a time when I would back away, but not this morning. Deep down, I felt that Soaker had to be good. The world was at peace, and so was I.

"Never been right since you last did it" he rasped. "You need a proper chap here. Somebody younger – and smarter."

I smiled. Really, I told myself, he was as good as gold. Soaker's machine was a Sharp VCH81, the all-singing, all-dancing digital hi-fi Nicam wonder that frightened me to death last year after he'd washed it thoroughly in sheep dip. Now he was complaining that it jammed.

"What have you done to it this time?" I asked.

"Don't start giving me any old buck" he warned, patting his pockets to locate his cigarettes. "I want this bloody thing right." Then he stumped off.

I opened the recorder and removed a packet of Silk Cut from the carriage. Then I inserted a cassette and tried the machine. It lobbed the cassette back at me. I soon discovered that the gearing had slipped. As a result the microswitch operated at the wrong time, activating the eject mechanism. When I'd reset this and refitted the carriage I tried again, only to find that there was scarcely any capstan movement.

I settled down to examine the motor, which has an i.c. stage on a tiny panel built into it. The input voltages were right, so why wasn't the thing working? I ran it for a while and felt the housing. It was hot. A new motor assembly was obviously required. A check with the SEME catalogue showed the price as £21.60 complete, plus VAT. So I rang Mr Soaker, took some of his good-natured flack, and assured him that I'd have

his machine working in no time. I then ordered the motor and a few other spares, by phone. I was told that the motor was a special order and would take seven to ten days. When the other spares arrived the invoice said that the motor could no longer be supplied.

I then found that CPC had one in stock (part no. VSMT235). But the price was £41.95 plus VAT. So back to Mr Soaker to explain the situation. His reply was, well raucous to say the least. Now I was a rogue as well as a fool. He told me he'd think it over.

Eventually, after telling me that cheats never prosper, he accepted and we ordered the motor.

Wrong Colour

As I stood smiling at life's adversities I noticed Toby Jugg swaying as he approached the door, with a colour portable under his arm. He'd taken to the bottle some years ago, and I hoped he wasn't in one of his funny moods.

"Mornin' Mr Bull" he said thickly. "This 'un's got an orange picture. Same colour as an orange."

We plugged the set in and a purple picture appeared.

"See" said Toby, "orange. But it comes right after an hour." Then he made his departure.

The set was quite new looking. An Akura CX4, one I didn't know. It was obvious that the green gun wasn't doing its bit. When I investigated I found that the 4.7kΩ flashover protection resistor R512 on the base panel, in series with the drive to the green gun, was dry-jointed. It had been poorly soldered at the factory, making contact only when hot. This took about an hour.

A Batch of TVs

Time to turn to the TV sets awaiting attention. The first was an ITT Ideal 3325. "Off tune with a buzz on sound" it said on the ticket. Steven was standing nearby. "Did a couple of those a few days ago" he said. "Remove the large r.f. can and check for dry-joints. It's best to use a magnifying glass – some will look only slightly suspect. Then apply some switch cleaner to the plug and socket connections. This treatment works

every time." He was right.

The next set was an Hitachi CPT2210 (NP81CQ chassis) with field collapse. We've had that one before. Replacing the 220µF, 50V field scan coupling capacitor C610 restored the raster.

Another Hitachi set was next in line, this time a CPT1473 (NP82C-2 chassis). When I opened it up I found that both mains fuses were blackened and broken. The degaussing posistor TH901 was also blackened. I took it out and it rattled. A replacement, along with new fuses, brought the set back to life. Then I resoldered and washed the joints where the two panels are connected: we've found in the past that a build up of fluff here can affect the grey scale.

Gladys's CD Player

At this point Gladys Grunter barged in with a CD player, a Soundwave CD3000. She always seems to be in a rage about something.

"It's dead" she announced. "Power light thing comes on, but none of the little number things. Last time you did my telly it wasn't right. Had to get Snoddy's to fix it. They charged fifty quid and took six weeks."

"Er, why not give them a chance with your CD player?" I ventured.

"I did. They've got no number things in stock. Said you've got plenty and they're cheap."

"Good old Snoddy's" I said.

When Gladys had left I opened the player and looked hard at the panel. I'd never come across this make before and had no circuit diagram, but I noticed a 2,200µF, 16V electrolytic (C101) that was leaking a little. On test it proved to be virtually open-circuit. All that was required was a new electrolytic. Come to think of it, this wasn't the first time we'd had to replace a capacitor of this value for the same trouble – in various makes.

When Gladys returned she was glowering. I handed her the player and charged her fifteen quid.

"Good God!" she exploded. "Fifteen quid for a couple of numbers! What Snoddy's said about you was right. You'll not see me again."

As she went out I noticed that the blue sky had turned grey. A nasty breeze sprang up, and rain began to tap at our windows. Then Pluto, who delivers our parcels, bowled in with Mr Soaker's motor assembly from CPC.

I wondered whether to stop and fit it in the machine. But by now I'd had enough.

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IR Detector Cards

Ian Adshead

Today's workshops are full of expensive, high-tech test equipment. It's a change therefore to come across an inexpensive, reliable and really useful item that can be used in the service department, on the shop floor and in customers' homes. This is the infra-red detector card manufactured by ECS of Tamworth. It's main use is to check the operation of one of today's most common household gadgets, the infra-red remote control handset. It is also useful for checking other infra-red sources, such as VCR tape detectors and CD lasers. I've been using one of these cards for some time now and have found it invaluable.

The sensor itself is actually a small

area of active material which is mounted on a card and then sealed in a plastic pouch. This makes it water and dirt proof and well able to stand up to life in the workshop or an engineer's toolbox or pocket.

Use of the sensor is simplicity itself. Just hold the active area about a centimetre (half an inch) in front of the infra-red source. If any light is being emitted, the active area will reflect an orange glow.

If the card has been stored for some time in a dark toolcase or pocket, the reflected image will be dull. All is not lost however. To return the card to its original brightness capability, simply expose it to ordinary daylight or fluorescent lighting for about thirty seconds and all will be well. This rejuvenation lasts for some time, and can be repeated as often as required with no

harm being done to the card.

The card I have been using is the IR5, which is exactly the same size as a credit card. A key fob version, the IR6, is also available from ECS and distributors.

Infra-red devices are nowadays used in cars, computers, cash tills, remote controls, alarms, cameras and machinery of various types. An infra-red detector has therefore become an almost essential piece of test equipment for the professional service engineer. It is also very helpful for the shop assistant who is often the first person to encounter the possibly faulty remote control unit a customer has just brought in.

Further details can be obtained from Electronic Consultant Services, 6 Nethersole Street, Polesworth, Tamworth B78 1EE – phone no. 01827 330 392, fax 01827 331 041.

Service Notes: Hitachi Models CPT2196/2198

John Coombes

These sets are fitted with the Hitachi G8Q chassis. An unusual feature of this chassis is the chopper arrangement in the power supply. There are two chopper transistors connected in series: a bipolar npn device (Q902) and a power f.e.t. (Q901). Q901 is switched on and off by the output from the UC3844 chopper control chip IC901. Feedback for regulation purposes is via an optocoupler (OC941), from the secondary to the primary side of the circuit. This is driven by a differential amplifier (Q941/2), with Q942 sensing the h.t. voltage at its base. These are both npn transistors.

Receiver comes on in standby: This normally only happens from cold and the set can be operated with the remote control unit. The cause is thermistor TH902 in the start-up network. It goes high-resistance.

No results: A number of faults can cause this symptom of course. If the 2.5AT mains fuse FS901 has blown violently, check the 0.1 μ F mains filter capacitor C901. An intermittently faulty on/off switch can also cause this. If FS901 is open-circuit, check the following items:

The degaussing thermistor TH901.

Chopper transistor Q901 (SGSP222) which could be short-circuit and/or the UC3844 chopper control chip IC901 – by replacement.

Diodes D905 (BYD33D) and/or D907 (BYV10-40).

Chopper transistor Q902 (SGSIF344) and zener diode ZD902 (ZTE2S1) for shorts.

R910 (0.5 Ω , 7W) which is in series with the chopper transistors and could be open-circuit.

Q903 (BC558B) and/or D906 (1N4148).

C908 (220 μ F, 35V) which could be short-circuit.

If FS901 is o.k., check zener diode ZD901 (27V) which could be open- or short-circuit, then if necessary zener diode ZD902 (ZTE2S1). If this item is faulty, IC901 (UC3844) should also be replaced. Other items to check if necessary are Q903 (BC558B) and D906 (1N4148). If one of these has failed, thermistor TH902 could be at fault. There could be dry-joints around the chopper transformer T901 – ensure in particular that pins 3 and 9 are not cracked. Problems with T901 can cause the intermittent no results symptom, as can dry-joints at D933 (BYV28-100). Bear in mind that there may be a short-circuit on the secondary side of the chopper transformer, particularly in the line output stage. See later.

If the surge limiter resistor R901 (3.9 Ω , 6W) is open-circuit, check the mains bridge rectifier D901 (LB156LFB). One of the diodes is probably short-

circuit. It's just possible that one of the associated 4.7nF protection capacitors C902-5 might be short-circuit.

There could be a fault on the secondary side of the chopper circuit. Check the following items:

Rectifier diodes D931 (BYR29-800) and D933 (BYV28-100) which could be short- or open-circuit.

The 0.2 Ω safety resistor R932 which could be open-circuit.

That the 7812 regulator IC932 is receiving an input. If it is but there is no 12V output, replace IC932. An alternative possibility here is that C937 (1 μ F, 50V) is short-circuit.

On very rare occasions we have found that the cause of the trouble is shorted-turns on the chopper transformer T901.

Power supply shuts down and starts to pulse: This fault can be present at switch on from cold. It can also be very intermittent. The cause is operation of the over-voltage circuit because of a fault in the regulation feedback circuit. Check the optocoupler OC941, its drive transistor Q941 (BC558B) and the BZV10 zener diode ZD941. Use only Hitachi sourced components in these positions, otherwise the fault may recur.

Power supply pulsing: The set pulses and the channel LED flashes. This means that the power supply won't start up. Replace R915 (10 Ω) and D902 (BYD33D).

Receiver pulsing in the standby mode: This can occur in standby or from cold when the set is first switched on. To prevent any further trouble replace R941 (100k Ω), VR941 (2.2k Ω), zener diode ZD941 (BZY10) and the optocoupler OC941.

No results – line timebase dead: The most likely thing here is a short-circuit BU508A line output transistor (Q702). Alternatively the EW modulator diodes D704 (BY228) and/or D705 (BYW96D) could be short-circuit. Another item to check is R728 (18 Ω , 7W) in the h.t. feed to the line output stage – it could be open-circuit.

The fault could be in the line driver stage. If there is no voltage at the collector of the line driver transistor Q701 (2SC2271), the driver transformer T701 could be dry-jointed or open-circuit, Q701 could be short-circuit or the feed resistor R714 (2.7k Ω , 6W) could be open-circuit.

If the line output transistor fails shortly after replacement, the 12V supply may be low because R932 (0.2 Ω) has gone high in value.

Here are some other things to check in the line output stage:

The line output transformer T702 which may be short- or open-circuit or split with e.h.t. arcing.

The line scan coils which could have shorted turns.

C654 (680nF), C715 (9.1nF) and C716 (270nF) for shorts.

If the problem is that the tube's heaters are out, the supply winding on T702 or safety resistor R721 (1 Ω) could be open-circuit.

If the waveform at the base of the line driver transistor Q701 is incorrect or missing, check the voltage at pin 10 of the TDA2579 timebase generator chip IC701. If this is low or missing, check C701 (100 μ F, 16V). If the voltage is o.k., check IC701 by replacement. Replace it if the sandcastle pulse output at pin 17 is missing.

If still in trouble, check the safety resistor R720 (2 Ω) which could be open-circuit.

For intermittent no results check R719 (220k Ω) which could have changed value. It must be a 1 per cent tolerance type. This is in the trip circuit.

Intermittent focus or bright raster with flyback lines: The first anode control, which is built into T702, may be faulty.

Dark picture: Can be caused by the first anode control (part of T702). Alternatively R881 (470k Ω) could be high in value or the spark gap/capacitor C881 (10nF) could be leaky – check it by replacement.

Blank or bright raster: The cause is usually a faulty TDA3562A colour decoder chip (IC501). First check that the 12V supply is present at pin 1. If not check L504 and C525 (2,200 μ F, 16V).

Loss of line hold: IC431 (M51551P) on the i.f. panel PC272 is the usual cause.

Weak sync on channel change: Check the 0.2 Ω safety resistor R932 in the feed to the 12V regulator – it can go high in value.

Field collapse: The first thing to check is the 9V supply to pin 9 of the TDA3654 field output chip IC601. If this is missing or low, check D703 (BYD33J), the 1 Ω safety resistor R715 and C718 (220 μ F). If R715 is open-circuit, IC601 could be shorted internally – you may have to check it by replacement. If necessary check C606 (4.7 μ F). Another possibility is open-circuit field scan coils or dry-jointed connections to them.

If all this is o.k., check that the TDA2579 timebase generator chip IC701 is producing a field drive output at pin 1. If not, replace it.

Loss of one colour: Check whether the relevant BF459 output transistor is open-circuit or dry-jointed – Q851 red, Q861 blue, Q871 green. If these are o.k., check the outputs from the TDA3562A colour decoder chip IC501 – pin 13 red, pin 15 green, pin 17 blue. Replace IC501 if one of these is missing.

No colour/poor colour: The usual cause is IC501 (TDA3562A). If the d.c. conditions are incorrect however, check the relevant peripheral components. The chroma delay line DL501 could be open-circuit or dry-jointed. If necessary check the condition of VR501's carbon track. This is a 1k Ω preset.

Snowy picture/noisy sound: The tuner unit or the aerial socket is the usual cause. Check whether water has entered the tuner via the download, causing corrosion and damage to the circuitry.

If these points are o.k. but there is just a snow storm on the screen, check the following items:

R1531 (22k Ω , 1W) which may be open-circuit.

IC1503 (ZTK33B) which may be short-circuit.

ZD1502 (BZX79B20) which may be short-circuit.

Tuning drift: Check the tuner by replacement. If this fails, check IC1503 (ZTK33B), either by replacement or by applying a touch of freezer to see if normal operation is restored.

Blank screen/no sound: If the receiver appears to be in the AV mode, the cause could be drift due to the tuning/remote control system. Try reprogramming, as set out in the manual. If this doesn't work, replace IC1501 (SAA1293H) and IC1502 (MDA2062), then reset the programming. If IC1501 shows no signs of life, check for 5V at pin 40. If this supply is missing, check whether C1504 (100 μ F) is short-circuit then IC1504 (7805) by replacement. The 4MHz crystal X1501 is the other possibility – check it by replacement.

Loss of memory: Check that there is an l.t. supply at pin 3 of the MDA2062 memory chip IC1502. If this is missing, R1519 (27k Ω , 1W) is probably open-circuit.

No display/part display only: The display unit may be faulty. If not, check IC1501 (SAA1293H) by replacement. If an individual segment is only partly alight, check whether one of the eight 100 Ω resistors R1506-R1513 is open-circuit.

Remote control unit faults: The first thing to check with any remote control unit is whether the batteries are exhausted or inserted the wrong way round. If they are leaky, be sure to clean out all the liquid to prevent short-circuits.

If the batteries are o.k., the things to check with early remote control units are as follows: whether the TLN115 LED is dry-jointed, and whether the crystal (X1) is dry-jointed or has broken legs.

In later remote control units the crystal is contained within the SAA1250 chip. Check this i.c. for dry-joints or by replacement.

C2 (470 μ F) could be open-circuit or dry-jointed.

If one or two buttons don't function correctly, suspect the rubber sheet. It can be replaced.

15/80H	3.83	2SC2073	0.77	2SD639	0.60	BC2528	0.07	BF470	0.33	BY399	0.11	HA13119	2.05	MJE18004	1.80	STK7358	5.81	TD1519A	2.74	TD48178FS	3.81
1N4001	0.04	2SC2078	0.86	2SD667	0.38	BC258	0.09	BF493	0.36	BYD141	0.26	HA13403	3.59	MJE2955	0.68	STR40090	6.28	TD1520B	2.48	TD48180	4.87
1N4002	0.07	2SC2120	1.23	2SD669A	0.64	BC300	0.48	BF494	0.12	BYD30D	0.43	HA1377	2.62	MJE2955T	0.68	STR4211	12.63	TD1521	3.36	TD48190	2.91
1N4003	0.05	2SC2166	1.29	2SD716	1.46	BC301	0.28	BF757	0.28	BYD33J	0.27	HA51338SP3	7.69	MJE3055	0.52	STR441	28.40	TD1524A	1.88	TD48305	7.21
1N4004	0.07	2SC2229	0.28	2SD718	2.21	BC303	0.24	BF758	0.43	BYD33M	0.21	HM6232	10.46	MJE3055T	0.74	STR451	23.50	TD15530	4.79	TD48380	2.53
1N4005	0.00	2SC2230	1.66	2SD734	0.26	BC307	0.16	BF759	0.38	BYV10-40	2.55	HM6232	9.57	MJE340	0.50	STR50020	9.02	TD15540	8.12	TD49050	2.13
1N4006	0.06	2SC2235	0.36	2SD762	1.80	BC307B	0.04	BF760	0.26	BYV95B	0.19	JOB	0.00	MN650	5.98	STR50103	4.10	TD1670A	2.98	TEA1014	1.87
1N4007	0.06	2SC2236	0.36	2SD820	5.06	BC307C	0.15	BF762	0.30	BYV95C	0.21	KA2206	1.32	MPSA406	0.35	STR54041	4.36	TD1675A	3.85	TEA1039	2.14
1N4148	0.06	2SC2240	0.16	2SD837B	1.12	BC308	0.16	BF788	0.52	BYV96D	0.27	KA2223	0.60	MPSA42	0.23	STR5412	3.68	TD1701	2.65	TEA2018A	1.70
1N5061	0.00	2SC2271	0.67	2SD856	1.03	BC308A	0.09	BF869	0.25	BYW56	0.31	KA2263	0.55	MPSA43	0.15	STR58041	6.41	TD1770A	30.29	TEA2029C	5.69
1N5062	0.51	2SC2274	0.35	2SD863	0.35	BC308C	0.06	BF870	0.29	BYW95C	0.65	KA8301	1.46	MPSA45	0.26	STR59041	6.67	TD1872A	4.83	TEA2031A	3.40
1N5400	0.07	2SC2314	0.38	2SD869	5.18	BC309	0.04	BF871	0.41	BYW96E	0.94	KBLO8	1.42	MPSA56	0.12	STR6020	5.38	TD1905	2.12	TEA2164	2.96
1N5401	0.14	2SC2335	1.12	2SD870	3.81	BC309C	0.14	BF879	0.11	BYX55600	0.23	KIA6210AH	6.15	MPSA92	0.18	STR6020KIT	15.05	TD1908A	2.14	TEA2165	4.27
1N5402	0.12	2SC2458	0.14	2SD871	5.08	BC327	0.10	BF960	0.30	BYX71600	1.45	KSR1001	0.14	MR854	0.65	STR60420	11.16	TD19150	1.86	TEA2165A	9.58
1N5404	0.13	2SC2482	0.35	2SD880	0.36	BC327B	0.17	BF966	0.26	BZ703C120	0.62	KSR1004	0.14	MR856	0.11	STR60440	2.30	T6064V	2.63	TD2002	1.12
1N5406	0.12	2SC2570A	0.30	2SD882	0.43	BC328	0.07	BF966	0.26	BZV10	1.34	KSR2001	0.14	NE545B	0.40	T6076V	5.04	TD2003	0.90	TEA5115	2.91
1N5408	0.09	2SC2581	3.08	2SD888B	6.43	BC337	0.14	BF970	0.30	BZV85CV1	0.15	KSR2004	0.14	NE555N	3.20	T9053V	0.93	TD2004	2.57	TC106D	0.82
1N914	0.04	2SC2603	0.25	2SD965	0.67	BC337L	0.22	BF994A	0.78	BZX6110	0.19	L200CV	2.19	NE556	0.43	T9064V	1.51	TD2005	1.63	TC106M	0.75
2N2222	0.22	2SC2625	2.94	2SD973	0.38	BC338	0.06	BF990	0.59	BZX6112	0.12	LA1230	1.95	NE592N	1.91	T9064V	1.51	TD2006	1.06	TC225M	1.02
2N2222A	0.23	2SC2655	0.31	2SH115	7.69	BC368	0.11	BF990A	0.68	BZX61120	0.09	LA1503	1.29	NE646N	4.45	TA7109AP	3.23	TD2006	1.06	TC226D	0.68
2N2369A	0.18	2SC2705	0.22	2SK1117	3.06	BC369	0.17	BF991	0.60	BZX6113	0.11	LA4261	2.29	OA200	0.22	TA7205AP	1.68	TD2030H	0.74	TC226D	0.68
2N2907	0.20	2SC2724	0.19	2SK192A	6.36	BC372	0.43	BF991A	0.92	BZX6120	0.19	LA4270	2.73	OA90	5.23	TA7217AP	1.46	TD2030V	0.74	TC106D	1.95
2N3053	0.38	2SC2979	2.74	2SK794	6.41	BC461	0.31	BF991B	0.92	BZX6127	0.19	LA4282	8.89	OC71	1.03	TA7222P	1.28	TD2040H	0.11	TLL11	0.64
2N3055	0.50	2SC3117	0.60	3SK88	2.57	BC517	0.14	BFY51	0.39	BZX6133	0.19	LA4422	1.36	PG00A	0.33	TA7227P	2.29	TD2170	7.08	TIP110	0.36
2N3440	0.35	2SC3153	2.40	7AL5247	0.62	BC546A	0.07	BR100	0.21	BZX6156	0.11	LA4440	1.80	PC814	1.29	TA7233P	1.97	TD2270	2.45	TIP12H	0.95
2N3442	1.00	2SC3156	6.61	7805	0.78	BC546B	0.12	BR103	0.53	BZX6162	0.07	LA4462	2.99	PIC16C57XTSO	6.61	TA7240P	2.74	TD2540	1.12	TIP121	0.42
2N3707	0.12	2SC3179	0.82	7806	0.60	BC547	0.11	BR303	1.22	BZX6175	0.09	LA4460	2.31	R2M	0.67	TA7250	4.07	TD2541	0.72	TIP127	0.47
2N3773	1.34	2SC3182	2.49	7808	0.72	BC547A	0.04	BRX44	1.46	BZX618V2	0.19	LA4461	1.71	R4050	3.04	TA7250BP	3.74	TD2576A	5.95	TIP23	0.65
2N3819	0.55	2SC3199	0.43	7809	0.69	BC547B	0.11	BRX49	1.43	BZX619V1	0.09	LA4475	2.99	R4051	4.80	TA7270P	1.59	TD2577A	2.99	TIP37	0.48
2N3904	0.32	2SC3225	0.60	7812	0.52	BC548A	0.11	BRY55	1.20	BZX7910	0.30	LA4476	2.99	RB156	2.40	TA7271P	1.13	TD2578A	2.91	TIP2955	0.94
2N3906	0.00	2SC3242	0.19	7815	0.35	BC548B	0.06	BRY56	0.43	BZX7912	0.10	LA4508	2.77	RC4558	0.48	TA7273P	4.10	TD2579A	4.91	TIP29C	0.31
2N4123	0.30	2SC3310	2.12	78L05	0.82	BC548C	0.06	BSR50	0.75	BZX7915	0.09	LA4700	4.27	REG8ABY10	17.56	TA7274P	2.74	TD2581	4.27	TIP29E	0.47
2N5296	0.69	2SC3311	0.29	78M05	0.35	BC549B	0.11	BSS38	1.77	BZX7930	0.11	LA6358S	0.60	RGPI10G	0.26	TA7280P	2.74	TD2581Q	2.99	TIP3055	0.94
2SA1013	0.35	2SC3330	0.26	79M05	0.35	BC550	0.15	BT139600	1.29	BZX7936	0.10	LA6510	2.94	RGPI15G	0.33	TA7281P	2.98	TD2582	2.05	TIP30C	0.37
2SA1015	0.11	2SC3355	0.96	7915	0.82	BC550C	0.09	BT151500R	1.44	BZX7947	0.07	LA7520	4.80	RGPI15J	0.24	TA7288P	2.04	TD2593	0.76	TIP310	0.13
2SA1015GR	0.11	2SC3358	0.69	AA119	0.36	BC556A	0.06	BT151800	1.15	BZX7956	0.05	LA7800	2.41	RGPI15M	0.44	TA7299P	2.65	TD2594	2.21	TIP31C	0.77
2SA1016	0.26	2SC3420	0.55	AA143	0.13	BC557	0.05	BU104	1.43	BZX7962	0.08	LA7801	1.41	RGPI30M	0.30	TA7317P	3.44	TD2595	3.19	TIP32A	0.41
2SA1020	0.44	2SC3423	0.60	AC127	0.52	BC557A	0.15	BU205	1.07	BZX79C3V9	0.09	LA7820	2.71	RM11C	1.71	TA7609P	2.19	TD2600	4.66	TIP32C	0.40
2SA1029	0.26	2SC3502	0.45	AC151	0.52	BC557B	0.06	BU208A	1.44	BZX79C5V1	0.05	LA7820	1.88	S2000A	1.98	TA7609AP	4.55	TD2611A	0.64	TIP35C	1.39
2SA1048	0.19	2SC3656	0.18	AC153K	0.40	BC558B	0.08	BU208AT	1.25	BZX83C6V2	0.13	LA7835	1.80	S2000A3	1.54	TA7698AP	4.60	TD2611AQ	1.32	TIP36C	1.37
2SA1286	0.60	2SC3679	4.45	AC187K	0.53	BC560C	0.06	BU208D	1.61	BZ78810	0.11	LA7837	1.63	S2000AF	1.68	TA7769P	3.01	TD2653A	2.99	TIP41C	0.43
2SA1370	0.43	2SC3788	0.77	AC188	0.40	BC635	0.19	BU326A	1.36	BZ78811	0.11	CT1732	4.70	S2055AF	2.02	TA7784P	2.25	TD2655B	19.93	TIP42A	0.35
2SA1489	2.40	2SC3795	1.97	AC188K	0.82	BC636	0.14	BU406	0.69	BZ78812	0.07	LED3G	0.10	SA129302	8.20	TA7784P	3.93	TD2655C	3.93	TIP42C	0.35
2SA1706	0.52	2SC3795B	2.63	AD149	1.52	BC637	0.11	BU406D	1.02	BZ78813	0.11	LED3R	0.10	SA129303	10.25	TA8201	3.93	TD2655D	19.93	TIP42A	0.35
2SA562	0.17	2SC3807	0.84	AF124	0.75	BC639	0.09	BU407	0.53	BZ78824	0.11	LM1203	10.47	SA5012	3.34	TA8205	3.93	TD2655E	6.75	TIP42C	0.35
2SA564	0.33	2SC3883	5.92	AF125	0.82	BC640	0.06	BU407D	0.98	BZ78827	0.11	LM1303N	0.88	SA5243PE	10.87	TA8205AP	4.50	TD2655F	12.29	TIP42C	0.35
2SA608	0.24	2SC3892A	4.91	AF126	2.23	BC649	0.40	BU426A	1.03	BZ78833	0.11	LM324AN	1.48	SG2644A	11.57	TA8210H	5.28	TD2656	2.98	TIP42C	0.35
2SA673	0.12	2SC3953	0.72	AF127	0.77	BCY71	0.27	BU500	1.41	BZ78836	0.11	LM339N	0.50	SGSIF344	7.28	TA8215H	5.73	TD2656A	0.96	TLO71CP	0.69
2SA684	0.43	2SC4106	2.05	AF139	0.29	BU131	0.26	BU500DF	1.35	BZ78839V	0.03	LM340T5	0.41	SL1430	1.92	TA8216H	8.01	TD2656A	5.30	TLO72	1.03
2SA733	0.18	2SC4242	2.31	ANS265	1.76	BD132	0.26	BU500DF	1.35	BZ78847V	0.06	LM358	0.60	SL1431	2.40	TA8221H	7.69	TD2656A	3.90	TLO72CP	1.03
2SA769	1.29	2SC4517	4.70	ANS417	1.46	BD135	0.33	BU508A	0.95	BZ7885V1	0.13	LM358B	0.42	SL1432	6.19	TA8221H	6.56	TD2656ATF	3.34	TLO74	1.15
2SA844	0.26	2SC4517A	2.52	ANS512	1.01	BD136	0.20	BU508AF	1.08	BZ7886V2	0.11	LM380N	1.03	SL1471	1.70	TA8221L	7.19	TD2656B	3.40	TLO74	1.15
2SA872	0.35	2SC458	0.12	ANS515	1.29	BD137	0.46	BU508AP	1.39	BZ7886V2	0.27	LM386G	0.57	SN76705AN	1.70	TA8410L	4.27	TD2656B	6.41	TMP47C432AP8188	15.19
2SA872A	0.35	2SC4742	4.70	ANS521	1.66	BD139	0.18	BU508PH	1.92	BZ7888V1	0.11	LM3914N	2.74	ST3431M	3.35	TA8691N	7.01	TD2656B	11.31	TMP47C432AP8189	15.19
2SA916	0.57	2SC536	3.00	ANG610	0.94	BD140	0.24	BU508D	1.88	CARB	9.95	LM393N	1.19	ST4411C	2.82	TA8550B	0.26	TD2660	5.92	TMP47C432AP8189	15.19
2SA933	1.00	2SC539	0.56	AN7161N	3.47	BD203	0.45	BU508DF	1.88	CA001	0.21	LM741	2.96	ST4122H	7.70	TA8550C	0.3				

TELEVISION

TV/VCR SPARES GUIDE

The following list gives spares department addresses and telephone numbers or, where these are the same, service department or head office addresses and telephone numbers. Also included are details of various spares distributors.

Aiwa UK Ltd., PO Box 443, West Drayton, Middx UB7 0NZ.
0181-899 5820 or 5838
Fax 0181-899 0055.
See also CPC and Willow Vale.

Akai UK Ltd., Haslemere Heathrow Estate, 12 Silver Jubilee Way, Parkway, Hounslow, Middx TW4 6NQ.
0181-897 6388
Fax 0181-759 6118.
See also CPC and Wizard.

Akura. Spares available from Akura Components Ltd., 44 Deerdykes View, Westfield, Cumbernauld, Glasgow G68 9HW.
01236-457 022
Fax 01236-457 053.

Alba Radio Ltd., 12 Thames Road, Barking, Essex IG11 0HZ.
Spares for Alba, Bush, some Goodmans and Hinari models and some Brother microwave.
0181-557 9085
Fax 0181 507 2132
See also CPC, Willow Vale, Wizard.

Ambassador. Brand name used by Sentra Electronics.

Amstrad. Spares available from CPC, Chas Hyde & Son Ltd., Willow Vale, Wizard and Amstrad PLC, Brentwood House, 169 Kings Road, Brentwood, Essex CM14 4EF.
01277-236 111
Fax 01277-209 559.

Autovox. See Comet Group plc.

Baird. See CPC.

Beko (UK) Ltd., 40 Caxton Way, Watford Business Park, Watford, Herts WD1 8QZ.
01923-818 121
Fax 01923-819 652/3.

Beon Corporation, 6-10 Badenheath Place, Westfield Industrial Estate, Cumbernauld, Glasgow G68 9HX.
01236-728 845
Fax 01236-738 477.

Beovision/Beocord. Bang and Olufsen UK Ltd., Unit 630, Wharfedale Road, Winnersh, Wokingham, Berks RG41 5TP.
01734-692 288
Fax 01734-694 477.
See also CPC.

Binatone Electronics plc., Binatone House, 1 Beresford Avenue, Wembley, Middx HA0 1YX.
0181-903 5211
Fax 0181-903 5521. Trade only.

Blair's Electrical Services, 13 Belgrave Road, Dresden, Stoke-on-Trent ST3 4PR.
01782-599 377
01782-599 378.

Blaupunkt. Merrivale Television Services, 1 Lockside, Tatbank Road, Oldbury, Warley, W. Midlands B69 4NS.
0121-544 6250
Fax 0121-552 1503. Trade only.

Bush. See Alba Radio Ltd. Also CPC, HRS and Willow Vale.

Cambridge. Spares available from SEME.

Canon UK Ltd., Photo Division, Brent Trading Centre, North Circular Road, Neasdon, London NW10 0JF.
0181-459 1266
Fax 0181-459 4202.
See also CPC.

Cathay. Spares available from Diamond Television.

Commodore. Spares available from CPC.

Comet Group plc., Service Dept., Unit 5, City Park Ind. Estate, Gelderd Road, Leeds LS12 6DR.
01132-311 024
Fax 01132-311 463.

Connexions UK plc., Unit 3, Travellers Close, Travellers Lane, Welham Green, Herts AL9 7LE.
01707-272 091
Fax 01707-269 444.

Contec CTVs sold by Dixons. Spares available from Partmaster.

CPC plc., Component House, Faraday Drive, Fulwood, Preston, Lancs PR2 4PP.

01772-654 455
Fax 01772-654 466.
Authorised spares distributor for Aiwa, Alba, Amstrad, Bush, Citizen, Commodore, Ferguson, Fidelity, Finlux, GEC, GoldStar, Goodmans, Hinari, Ingersoll, ITT, Logik, Luxor, Matsui, Nokia, Orion, Osume, Pace, Philips, Pye, Saisho, Salora, Samsung, Sinclair, Skantic, Sony, Toshiba and Triumph.
Compatible spares available for Akai, Baird, Bang and Olufsen, Canon, Crown, Daewoo, Decca, Dual, Fisher, Fujitsu, Funai, Grundig, Hantarex, Hitachi, JVC, Kenwood, Marantz, Mitsubishi,

NEC, Nikkai, Panasonic, Pioneer, Questar, Sansui, Sanyo, Schneider, Sentra, Sharp, Solavox, Tashiko, Tatung and Telefunken.

Crown. Spares available from Key Electronics. See also CPC and HRS.

Daewoo Electronic Sales UK Ltd., Unit 640, Wharfedale Road, Winnersh Triangle, Wokingham, Berks RG41 5TP.
01734-272 272
Fax 01734-699 000.
Note: Daewoo brand products only, not OEM products. For the latter, refer to the original distributor.
See also CPC and Willow Vale.

Dansai TV and video spares available from NEI.

Decca. See Tatung (UK) Ltd., CPC and Wizard Distributors. Spares for chassis up to and including the 110/115 series available from D&S Electronic Services, Building 15, Unit 4, Stanmore Industrial Estate, Bridgnorth, Salop WV15 5HR.
01746-766 641.

Definition. Spares available from Wilts Grove Ltd.

Denon. Hayden Laboratories Ltd., Hayden House, Chiltern Hill, Chalfont St Peter, Gerrards Cross, Bucks SL9 9UG.
01753-888 447
Fax 01753-880 109.

Diamond Television, 15a Rodbourne Road, Rodbourne, Swindon, SN2 2AG. Spares for Cathay products, Murphy TVs with model numbers starting CTV, the Murphy VCR7101, Sansui SV77 VCR and Osaki VCR31/2/3 plus mechanical parts for the VCR35, also spares for the Seiko and Venturer audio ranges.
01793-497 591
Fax 01793-431 687.

Doric. Some spares available from Granada Rental Services.

Dynatron. Pre 1981 sets see Philips Service, post 1981 sets spares from SEME.

Elftone Electronics Ltd., 4 Beresford Avenue, Wembley, Middx HA0 1YZ
0181-902 6222
Fax 0181-903 5011.

Etron. Brand name used by Nikkai Imports Ltd.

Expert. Sets use Tatung, GEC, or Luxor chassis.

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Good people to deal with

CPC, Faraday Drive,
Fulwood, Preston, Lancashire.

Ferguson Ltd., Spares Department, Crown Road, Enfield, Middx EN1 1DZ.
0181-344 4412
Fax 0181-344 4452. Trade only. See also CPC, HRS, Chas Hyde, SEME, Willow Vale and Wizard.

Fidelity. Spares available from SEME, HRS, CPC, Wizard and Willow Vale.

Finlux. Spares available from NCS and CPC.

Finlandia. Spares available from Granada Rental Services.

Fisher. Spares available from Sanyo UK Sales Ltd., Sanyo House, Otterspool Way, Watford, Herts.
01923-222 244
Fax 01923-818 251.
See also CPC.

Fujitsu General, 154 Great North Road, Birchwood Industrial Estate, Hatfield, Herts AL9 5JN.
01707 272 841
Fax 01707 273 111. Spares available from CPC and HRS.

GEC. Spares available from CPC, HRS, SEME, Willow Vale.

General. See Fujitsu General.

GoldStar. LG Electronics UK Ltd., LG House, 264 Bath Road, Slough SL1 4DT.
01753-691 888
Fax 01753-693 061.
See also CPC, Granada Rental Services and Willow Vale.

Goodmans. See Alba Radio Ltd. or Comet Group plc. depending on model. Also CPC.

Granada Rental Services, Unit 37, Roman Way Industrial Estate, Preston, Lancs PR2 5BD.
01772-651 551
Fax 01772-655 801.
Spares for Finlandia, Granada, Grundig, Hitachi, Salora TV, Sanyo, Sony, Tashiko.
Trade only.

Granada. Spares available from Granada Rental Services.

Grundig International Ltd., Mill Road, Rugby, Warwickshire CV21 1PR.
01788-577 155
Fax 01788-562 354. Account holders only supplied.
See also CPC, Granada Rental Services and Willow Vale.
Spares for VCR4000 and SVR4004 ranges available only from Willow Vale.

Harwood. Spares available from Key Electronics.

Hinari. Spares available from CPC, Chas Hyde, SEME.

Hitachi Sales (UK) Ltd., Hitachi House, Station Road, Hayes,

Middx UB3 4DR.
0181-569 1975
Fax 0181-569 1441.
See also CPC, Chas Hyde, HRS, Granada Rental Services, Willow Vale and Wizard.

HMV. Sets use Ferguson or Fidelity chassis.

HRS Electronics Ltd., Electron House, 100 Great Barr Street, Birmingham, B9 4BB.
0121-766 6668
Freefax orderline 0800-212 179
Truedata orderline 0121-753 0600.
Wide range of video, audio and television spares including Bush, Crown, Ferguson, Fidelity, GEC, Hitachi, Nikkai, Pace, Philips, Pye, Saisho, Sanyo, Sharp, Tatung, Toshiba and many more. Also all leading domestic appliance brand spares. Trade only.

Chas Hyde & Son Ltd., Prospect House, Barmby Road, Pocklington, Yorks YO4 2DP.
01759-303 068
Fax 01759-303 620.
Sole non-account distributor for Sanyo and Hitachi.
Approved component distributor for Ferguson, Matsui, Philips and Saisho.
Other spares available for various brands including Amstrad, JVC, Samsung, Sony and Toshiba. Trade only.

Indesit. Spares no longer available from manufacturers/agents.

ITT. Spares available from NCS. See also CPC and Wizard.

JVC (UK) Ltd., JVC House, JVC Business Park, Priestley Way, Staples Corner, London NW2 7BA.
0181-450 3282
Fax 0181-452 2534. Trade only. See also CPC, Chas Hyde and Willow Vale.

Kenwood. See Trio-Kenwood (UK) Ltd.

Key Electronics, Unit 5, Bow Mills Industrial Estate, Brighthouse Road, Hipperholme, Halifax HX3 8EF.
01422-203 676
Fax 01422-203 674.
Spares for Crown, Harwood, Kyosho and Ssangyong products.

Konica, Plane Tree Crescent, Feltham, Middx TW13 7HD.
0181-751 6121
Fax 0181-755 0681.

Korting. Some spares available from Telefaults, St Michael's Road, Pitts Hill, Turnstall, Stoke-on-Trent ST6 6LS. Spares for other brands available.
01782-813 757
Fax 01782-835 762.

Kyoshu. Spares available from

Key Electronics.
Lloytron Electronics Ltd., Service Dept., Laltex House, Matthews Street, Ardwick, Manchester M12 5DT.
0161-272 8833
Fax 0161-272 8844.

Logik. Brand name used by Dixons. Spares available from Partmaster, CPC, HRS.

Loewe-Opta. Spares available from Wizard.

Longreach Marketing Ltd., Riverside Business Park, Lower Bristol Road, Bath, Avon BA2 3DW.
01225-444 894
Fax 01225-448 676. Distributors of satellite equipment.

Luks Industrial Company UK Ltd., 1/3 Mollins Court, Westfield, Cumbernauld, Glasgow G68 9HP.
01236-457 989. Ext.18.
Fax 01236-457 919.

Luxor. Spares available from NCS, CPC and Willow Vale.

Manhattan. Eurosat Distribution Ltd., Oxgate Lane, London NW2 7JA.
0181-452 6699
Fax 0181-452 6777.

Marantz Hi Fi UK Ltd., Kingsbridge House, Padbury Oaks, 575/583 Bath Road, Longford, Middx UB7 0EH.
01753-680 868
Fax 01753-680 428.
See also SEME and CPC.

Matsui. Brand name used by Currys and Dixons. Spares available from Partmaster. Also CPC, Chas Hyde, SEME and Wizard.

Metz. No UK source of spares. Manufacturers address: Metz Werke GmbH 2 Co., D8510, Furth, Germany.

Minoka. Spares available from Luks Industrial Co. UK Ltd.

Mitsubishi Electric (UK) Ltd., Travellers Lane, Hatfield, Herts AL10 8XB.
01707-276 100
Fax 01707-278 859.
See also CPC, Willow Vale and Wizard.

Morphy Richards. Spares available from R and M Technical Services.

Murphy. Spares available from Diamond Television for TV sets beginning with CTV and the VCR7101. Some sets fitted with Fidelity chassis. Older sets fitted with Rediffusion chassis. Earlier sets fitted with Rank chassis (some spares available from HRS).

National, National Panasonic. See Panasonic.

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01793-556 002
Fax 01793-556 015.
Account holders only.

NEC. Spares available from
SEME and CPC.

NEI, Network Spares Division,
Unit 6, Southfork Industrial Park,
Dartmouth Way, Leeds LS11 5JL.
0113 277 4310
Fax 0113 277 4312.
Trade only.

Nikkai. See NEI, CPC, HRS,
SEME, Willow Vale and Wizard.

Nokia. Spares available from
NCS, CPC and Willow Vale.

NordMende. Spares available
from Ferguson Ltd. and Blair's
Electrical Services.

Olympus Optical Co. (UK) Ltd.,
2-8 Honduras Street, London
EC1Y 0TX.
0171-253 2772
Fax 0171-251 6330. Trade only.

Orion. Sole UK spares
distributor CPC.

Osaki. Brand name used by
Rumbelows. Spares available
from Granada Rental Services.
Spares for models
VCR31, VCR32, VCR33, also
mechanical parts for the VCR35,
are available from Diamond
Television.

Osume. Spares available from
CPC.

Pace Micro Technology Ltd.,
Victoria Road, Saltaire, Shipley,
West Yorkshire, BD18 3LF.
01274-532 000
Fax 01274-537 128. Spares
available from HRS, CPC, SEME,
Willow Vale and Wizard.

Panasonic (UK) Ltd., Panasonic
House, Willoughby Road,
Bracknell, Berks RG12 8FP.
01344-860 133
Fax 0344-861 598.
Account holders only.
Non-dealer orders handled by
SEME Ltd., School Lane,
Buckingham, Bucks MK18 1HD.
01280-823 523
Fax 0280-814 916.
See also Willow Vale and CPC.

Partmaster, PO Box 60, Hemel
Hempstead, Herts HP2 7TZ.
01442-888 444.
Fax 01442-888 145
Spares for Dixons/Currys ranges
- Matsui, Logik, Prinz, Saisho.

Philips Service, PO Box 97, City
House, 420/430 London Road,
Croydon CR4 4QX.
0181-686 5414
Fax 0181-681 0796. Account
holders only supplied. See also
CPC, Granada Rental & Retail

Ltd., HRS, Chas Hyde, SEME,
Willow Vale, Wizard.

Pioneer High Fidelity (GB) Ltd.,
Pioneer House, Hollybush Hill,
Stoke Poges, Slough SL2 4QP.
01753-789 789
Fax 01753-789 534.
See also SEME and CPC.

Prinz. Brand name used by
Dixons. See Partmaster.

Proline. Brand name used by
Comet Group plc.

Pye. See Philips.

Questar. See CPC.

R and M Technical Services,
97-99 Worton Road, Isleworth,
Middx TW8 0JW.
0181-560 6644
Fax 0181-560 5853.
Spares for Morphy and Roberts
Radio models.

Radionette. See Tandberg.

Roadstar (UK) Ltd.,
Roadstar House, Tavistock
Industrial Estate, Ruscombe Lane,
Twyford, Berks RG10 9NJ.
01734 321 032
Fax 01734 343 011.

Roberts Radio. Spares available
from R and M Technical Services.

Saba. Spares available from
Blair's Electrical Services.

Saisho. Brand name used by
Dixons. See Partmaster, CPC,
HRS, Chas Hyde, SEME, Willow
Vale and Wizard.

Salora. Spares available from
NCS, CPC and Granada Rental
Services.

Samsung Euro Service Centre,
Unit C, Stafford Park 12,
Shropshire TF3 3BJ.
01952-207 171
Fax 01952-293 459.
See also CPC, Chas Hyde, Willow
Vale and Wizard.
Agents in N. Ireland Michael
Black, 33 Somerton Industrial
Park, Dargan Crescent, Dunrue
Industrial Estate, Belfast BT3 9JP.
01232-370 587.
Fax 01232-370 852.

Sansui. Spares available from
Willow Vale Electronics Ltd., CPC
or Diamond Television for VCR
Model SV77.

Sanyo UK Sales Ltd., Sanyo
House, Otterspool Way, Watford,
Herts WD2 8JF.
01923-222 244
Fax 01923-818 251.
See also Chas Hyde, CPC, HRS
and Willow Vale.

Schneider. Spares available
from Wizard and CPC.

Seiko. Audio spares from
Diamond Television.

Selec. Spares available from
SEME.

SEME Ltd., Unit 2, Saxby Road
Industrial Estate, Melton
Mowbray, Leics LE13 1BS.
01664-481 818
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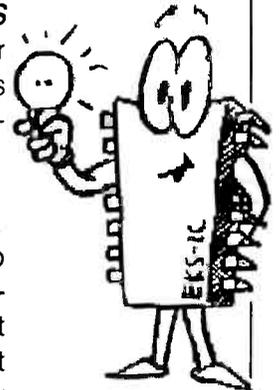
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Part 1

Bill Wright

One can find an often surprisingly large number of TV sets in use in many private houses. As well as the obvious TV locations, you may find a set in Dad's study or workshop, the gazebo, the granny flat and even places where, only a few years ago, TV watching would have been regarded as highly eccentric. Even some small properties, especially those where there are a number of adult children with their own partners and offspring, seem to have an astonishingly large number of TV sets tucked into every possible nook and cranny. The last count was nine TV sets and four VCRs in the terrace house of one of our customers.

Our customers cover the spectrum from the rich in large, detached houses to a hard-pressed grandfather of 45 whose property seems to have turned into a multi-occupancy doss house and crèche. They have one problem in common: how to get good reception, including satellite TV and VCR playback, on all their tellys. You can solve it for them.

Initial Approaches

It may be that you have been asked to fit a simple aerial for the set in the bedroom of say child number three. It's not unscrupulous salesmanship to see this as an obvious opening for the sale of a distribution system. Such people may have around £3,000 worth of electronics, none of which is working at anything like its full potential simply for want of a TV

already installed. In this case the customer will already be aware of the idea and its possibilities, and would be very happy if the system could be made to work reasonably well. The opportunity for a sale very often arises when such a customer moves house and is determined to have the system working properly at the new address. If the new house is being built to the customer's specification, the opportunity exists to install a really excellent system, with all the cables hidden and ducting provided for future expansion. Get in at the planning stage: if possible, use the site electricians to install the cables, following your plans, as part of their first fix.

A Cheap and Cheerful System

Before we consider the design of good systems that obey all the rules of correct r.f. distribution practice, we'll take a look at the sort of typical cheap and cheerful system you may encounter. Later we'll describe the way in which it was redesigned. I'm not saying that cheap and cheerful methods are necessarily wrong – I spent too many years installing fixed-price aerials for national rental chains to take that highfalutin attitude. Often the customer's price limit or scale of priorities precludes anything other than the most basic installation. If, after all, the sole requirement is VCR reception on the monochrome portable in the kitchen so that Grandad's

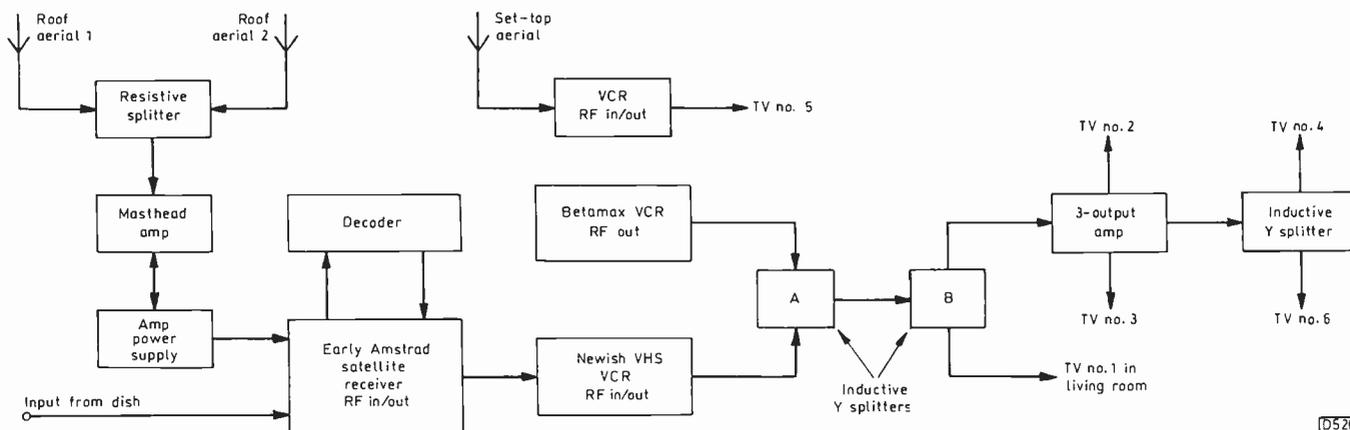


Fig. 1: Mr Clutter's original distribution system.

distribution system costing a few hundred pounds. Carried out properly, a distribution system generates a lot of customer satisfaction and frequently leads to further recommendations. The existing hotchpotch of aerials, cheapo amplifiers, splitters and loose cables is likely to cause a lot of irritation. Point out that a proper distribution system would mean an end to interminable, ear-splitting MTV in the living room: to add weight to your suggestions, make sure that the family teenagers are present during the discussion!

You may find that a cobbled-up distribution system is

sudden craving for a bacon sandwich doesn't cause Grandpa to miss the long-awaited exhumation of Mr Jordache from under the patio, there's nothing wrong with a splitter at the back of the VCR, five metres of coaxial cable, a hole in the plasterboard wall with a screwdriver and off, sharpish, to the next call. In this article however we are primarily concerned with the other end of the market: those who want it all and want everything to work well. This section of the market is rapidly expanding.

Fig. 1 shows the system we found recently at the home of

Mr and Mrs Clutter. Although Mr Clutter is a 'general dealer', he can't bear to part with certain things. As a result the house is, well, rather over-stocked. To make matters worse, the Clutters are technofreaks who acquire gadgets of all kinds, never quite master their use, then leave them about gathering dust. Huge piles of all sorts of things stand on every horizontal surface, and Mrs Clutter long ago gave up all pretence at domestic tidiness. I was never able to work out quite who was who amongst the other occupants of the house, but there seemed to be plenty of them.

I initially felt that this wasn't going to be a promising call. The feeling was strengthened when I saw the densely-packed, dust-covered pile of assorted consumer electronics in the corner of the living room. A massive TV set, a prehistoric Amstrad satellite receiver with outboard decoder, two VCRs, assorted bits of hi-fi and other apparently disused items gave the impression that making even the simplest connection at the rear would need help from Pickfords.

Despite my initial impressions, I began to warm to Mr Clutter when he interrupted my nervous preamble – "your TV system is a load of old rubbish and we'll have to start from scratch . . ." with an airy wave of his lager can and words to the effect that he was more than ready to pay out some serious money to get the system sorted out. He'd had bad service from the satellite installer, the local TV shop and the local aerial rigger. The problems had been going on for years, and he was thoroughly fed up with it all. I didn't at the time know that I'd come highly recommended. I arranged to commence work on the following Thursday, by which time Mr Clutter would have "sorted out the telly and that" – presumably with a JCB – and would even have moved enough stuff out of the loft so that I would be able to squeeze in there.

Mr Clutter's TV system is not a particularly hair-raising example. It is typical of a set-up that, rather than being installed at the outset, had evolved over a period of about twenty years. As requirements had changed, bits had been added piecemeal. There is some out-and-out bodgery, certainly, but the faults were mainly because the basic principles of r.f. distribution had been ignored. I'll list these principles, then we'll look at how the system cheerfully disregards them. Later I'll describe the alterations that were subsequently made.

First however a word about test equipment. It's not possible to do this kind of work professionally without the right gear. A really good signal-strength meter is the minimum requirement. A spectrum analyser is highly desirable: it's not a luxury, and will pay for itself over and over again.

Basic Principles of UHF TV Distribution

(1) The off-air signals, both satellite and terrestrial, should be as strong, clean and consistent as possible.

(2) Each signal source (TV channel) should, if necessary, be adequately filtered before being combined with other signals. This will prevent its accompanying noise causing interference to the other signals.

(3) The level of a signal that passes through an active device must be within the device's correct operating range.

(4) Each channel's signal level should be equal or, if appropriate, sloped to allow for differential cable loss.

(5) Channel allocation must obey the following rules:

(a) No two signals on the same channel.

(b) No two signals on adjacent channels.

(c) No two signals five channels apart, if possible.

(d) No two signals nine channels apart, if possible.

(e) If strong local TV broadcasts are, for some reason, not carried by the system, the relevant channels should not be used by the system.

(6) Very strong unwanted local signals, such as those from police repeaters, should be filtered out at all inputs.

(7) If the system is to include v.h.f./i.m. radio, the output from the v.h.f. aerial should be passed through a bandpass filter. Examine the filter's output closely for any high-level, possibly intermittent, signals.

The Clutters' Off-air Reception

Reception from the nearby high-power u.h.f. transmitter was badly affected by screening and ghosting at Mr Clutter's location. The only way of achieving half-decent reception was to use a more distant transmitter, which produced rather weak signals and Tyne Tees instead of Yorkshire ITV. This was the reason for the two aerials, whose outputs were connected together via a resistive splitter. The signals available from the two transmitters were on channels 23-33 and 41-51: since the aerial for reception from the distant transmitter could contribute a lot of ghosting to reception of the local transmissions, a diplexer would have been far better than a splitter.

The following amplifier was having a hard time. From the distant transmitter the input level on three of the four channels was about -14dB/mV , which is reasonable for the feed to a two-stage masthead amplifier. Because the aerial was a cheap one, the channel 33 signal was at about -18dB/mV – badly designed aerials usually have very poor gain across the top few channels of the group. The amplifier was also receiving the output from the other aerial however. Because of the reception conditions from this transmitter, the signal levels on each channel varied widely and unpredictably. When, at times, the signal level on one of these channels exceeded about $+12\text{dB/mV}$, the cross-modulation introduced by the masthead amplifier was wondrous to behold, especially on the channels coming in at about -12dB/mV , which of course were the signals without the ghosting. . .

The masthead amplifier was a very cheap one without input filtering of any kind, all signals from long-wave to cellphones being cheerfully accepted. I didn't know it at the time, but about 75m from the house a police transmitter using the 450MHz band was in operation. Every so often it was providing the unfortunate amplifier with about 20dB/mV for a few seconds.

All this added up to a really horrible r.f. mess. No distribution system can work properly with an aerial input like this.

The other off-air reception was from Astra, via an Amstrad dish fitted with the old blue-cap LNB. The output from the u.h.f. aerials was looped through the Amstrad satellite receiver. As is customary, the outboard decoder was adding a slight degree of patterning on the lower Group A channels.

Mr Clutter showed me his 'calmer-downer', which turned out to be a 12dB attenuator that some previous expert had advised should be added at the input to the Amstrad receiver "when the weather was bad".

A modern VCR followed the Amstrad satellite receiver. Its output was fed to a Y splitter, whose other leg introduced to the system the output from a Betamax VCR. This machine had long ago lost the ability to record, so mercifully it had no aerial input.

At the output from this splitter, marked A in Fig. 1, all the

various signals are for the first time present together on the same length of coaxial cable. This is the r.f. spectrum which was being fed to the three-output distribution amplifier, eventually finding its way to the TV sets. Let's take a closer look at splitter A's output.

Channel 'Planning'

The first thing to consider is the question of channel allocations. The r.f. output frequencies of the three items that incorporate modulators – the two VCRs and the satellite receiver – would have been tweaked to minimise mutual interference. 'Minimise' is the word, not 'eliminate'. The family knew, and accepted, that when the satellite receiver was on there would be wavy lines on BBC-2, and that if Mr Clutter decided to use his Betamax machine for playback both satellite and BBC-1 reception would be snarled up. The Clutter household accepted these things like the rest of us accept supermarket queues and contraflow.

Noise

Every active device adds thermal noise. With a distribution system this noise is additive: the more sources of noise there are, the higher the noise floor. And the higher the noise floor, the harder it is to achieve a signal-to-noise ratio that will produce apparently noise-free pictures.

It doesn't need much noise to degrade a TV picture. Thermal noise that's 30dB below the signal has a visible effect. A spectrum analyser will show this clearly, or you can set up a little experiment to demonstrate the point. Connect together the arrangement shown in Fig. 2. Adjust the variable attenuator, with the power to the masthead amplifier switched off, to obtain a just grain-free picture. Switching on the masthead amplifier will then introduce noise. The effect is virtually indistinguishable from that produced by using the attenuator to reduce the signal level. What you have done is to reduce the

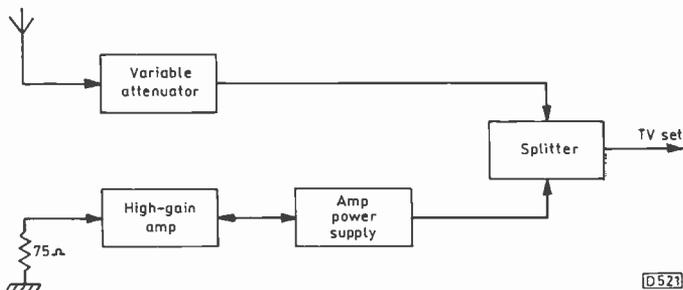


Fig. 2: Test set-up to demonstrate that lifting the noise floor has the same effect on the picture as reducing the signal level.

signal-to-noise ratio by adding noise from the amplifier rather than decreasing the signal level. The result is the same. Designers of good-quality masthead amplifiers strive for a good, low noise figure. For a more dramatic demonstration connect something noisy, such as a cheapo distribution amplifier, prior to the masthead amplifier. This is pure thermal noise, with no modulation: it makes TV pictures look 'snowy' or 'grainy'.

The noise contributed by unwanted signals, e.g. co-channel interference or cross-modulation, is even more pernicious. Unwanted signals that are quite tiny can have a disastrous effect. Noticeable patterning will be produced by a co-channel TV signal at -46dB.

To come to the point noise, both thermal and in the form of modulation, was present at splitter A, being contributed by the two VCRs, the satellite receiver and the masthead amplifier. The three-output distribution amplifier would add more noise. No great harm would be done if all the signals were well above this rather high noise floor. But because nothing had been done to set the signal levels, the signal-to-noise ratio for each channel was a matter of chance. The practice of cascading, or 'daisy-chaining', a satellite receiver and a VCR is of course almost universal. It usually does no harm. The problems start when more and more equipment is allowed to add noise, and where signal levels are incorrect.

The Distribution Amplifier

The level of the signals at the input to the distribution amplifier was very low. Splitter B was an inductive Y type. With this type of splitter, unlike the resistive type, it's necessary to distinguish between the input and the two output ports. Very little signal passes between one output port and the other. Unfortunately, because the output ports were female and the input port male, Mr Clutter had fitted the input port to the living room TV set's aerial input socket directly. The feed to the distribution amplifier was thus severely attenuated.

Since the amplifier produced very high gain at each output, the measured signal level at each output was quite acceptable. But because of the poor signal-to-noise ratio the picture quality was very poor. Just because the meter reading is o.k., don't assume that the picture will be noise free!

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Next month we'll describe the design and installation of the new system.

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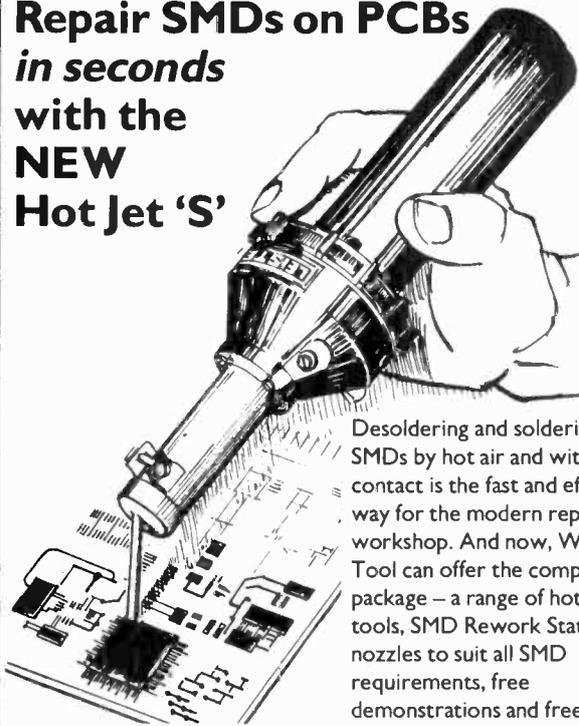
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Satellite Workshop

Jack Armstrong

This area of Yorkshire is farming country. So I wasn't surprised when a strong smell of cow entered my shop, closely followed by a burly fellow wearing wellington boots. He held an Amstrad VS1000 between his thumb and forefinger, and placed it on the counter with a look of distaste. "Canst' fix it ba t'morra, lad?" he enquired. "Video's all raht but t' satellite's gone funny."

I thought I'd ask for more details. "What do you actually see on the screen?"

"Nowt" he replied firmly.

I decided not to press him further and handed him the collection slip.

The first job I had lined up was an Amstrad SRD510. A note on top said "goes off when tapped". Not very helpful, since it didn't say what went off! With this model there's no 'off': it's either 'on' (green LED) or in standby (red LED). So I wasn't sure what I was looking for. I plugged it in and tapped it. The red LED remained on. I pressed the standby button then tapped the receiver again. The green LED stayed on. It seemed best to leave the receiver to warm up. So I started, reluctantly, on the VS1000 satellite receiver/VCR.

The Amstrad VS1000

The VCR section played my test tape without problem. The satellite receiver produced a completely blank screen however. A check showed that it produced no LNB voltage. So I began to strip the unit down.

This model is a pain to work on. The tuner board is in two halves that are plugged together, and sits beneath a fully screened decoder board. I must have removed a dozen screws before I got the beast out. The first thing I noticed was that the F connector in the tuner housing was loose, though its centre connection was still intact. I soldered the body of the socket to the housing. The 13/17V LNB supply comes from a seven-legged regulator that seldom fails. So I checked the 3.3Ω resistor R515. Sure enough, it was open-circuit.

After replacing R515 I put the unit together again and connected it up. I saw the "Please Wait" message, on a scrambled picture, for about five seconds before it all faded to a blank screen.

With the help of my old Hameg scope I traced the cause of the problem to CV42 (47μF) on the decoder board. It sits between two hot transistors and had dried out. As I was refitting the decoder after replacing the capacitor I noticed a charred mess near the centre of the board. This turned out to be R537. Despite its appearance, it measured exactly 680Ω. The only reason I could see for the overheating was a capacitor next to a TO220 transistor that's mounted flat on the board. The capacitor's sleeving had split, and its metal body was touching two legs of the transistor. The value was either 22 or 33μF (I don't have the service manual), so I fitted a new 33μF capacitor.

When it was reassembled the receiver worked perfectly. I

made a note to tell the farmer not to mess with the connections while it was plugged into the mains supply.

The SRD510

Back to the SRD510, which still remained on even when thumped. I began to wonder whether it would be worthwhile continuing with it. You can buy these receivers second-hand for less than fifty quid. When I removed the screws and took off the cover the inside looked very brown.

I connected the LNB feed and tuned my TV set to the receiver's output. Considering the appearance of the components, the picture was very good. C54, which is normally green, had turned jet black. Since this capacitor is the cause of many intermittent problems, I removed the board to replace both C54 and C55. Having done that, I reconnected the receiver to check the picture. The screen was blank! As I flexed the board, to look underneath, the picture returned. So there seemed to be a dry-joint or a cracked track.

The scope showed that a good baseband signal entered the graphics chip until the board was flexed. The signal level then became very low. A check at the opposite side of R60 showed that there was no change in the signal level, but replacing this resistor made no difference. I checked the signal at the positive leg of C55 and discovered that the d.c. voltage here rose to 10V when the fault occurred. A clue!

A little poking about revealed that wire link J64, next to C55, was bent over on to an adjacent track. Easing the wire up with the tip of my iron solved the problem. I just hope that this was what the customer meant by "goes off". As a precaution, I added the earth lead as recommended in the *Satellite Secrets Revealed!* book available from Davenham Satellites (1 Firths Fields, Davenham, Northwich CW9 8JB - 01606 49 085) for £19.95 inclusive of postage. Solder it between the corner of the little metal screening box at the front of the power supply to the pin marked 0V to the right of the card holder. The power supply connector is often poor, and bypassing the earth line in this way can eliminate a lot of intermittent faults.

Unfortunately I couldn't charge much for the repair as the receiver wasn't worth a lot and there was always the risk of argument if the fault I'd fixed wasn't the one in question!

A Maspro SRE90S

Another set in for repair was an old Maspro SRE90S. The customer had complained that the pictures had been sparkly for several months. She added that the fault had appeared quite suddenly. When I connected the receiver up, the poor pictures it produced gave the impression that the tuner was faulty. Black and white sparklies were predominant on the weaker channels. Now my bench has several test points fed from a Global Mini Magic. As it happened, another receiver was on soak test at the time. So the LNB was receiving its power supply from that receiver.

I noticed that as I disconnected the LNB feed from the Maspro receiver the picture remained, because the signal was still being capacitively coupled to the tuner. Strangely however the picture was almost free of sparklies. As I moved the connector until it was in contact with the tuner's input, the sparklies increased. This suggested that the signal was too strong for the tuner rather than too weak.

I tested the theory by connecting a 100m reel of cable in series with the input. The picture was much better. On a hunch, I fitted a Global Astra 1D filter in line. Perfect pictures! Clearly the additional signal from the Astra 1D satellite was swamping the tuner, with the result that its a.g.c. reduced the gain.

Servicing Matsui and Saisho VCRs

Part 2

Jack Barclay

In this concluding part we'll take a look at the electronics used in later models, then at the new centre-loading machines, and end with a short faults guide and a useful parts list.

Models VX1000, VX2000 and VX2500

These machines are similar electrically. The power supply is conventional, again using an STK5342 main regulator chip. Last month's comments on the basic power supply also apply to these models therefore.

Syson and Timer

These models were the first in the Matsui range to use surface-mount technology. The syson/timer circuit employs an 80-pin flatpack microcontroller chip (IC1001) that's superglued to the board! Fortunately it has proved to be reliable, but take good care if you have to remove it.

You will find either an OEC0020 or an OEC0026 in the IC1001 position. They are not interchangeable. The latter uses the off-tape control pulses to provide a real-time counter. It also requires a different remote control unit, which has a separate timer rec. button.

If the machine is dead but the power supply is working normally, check by substitution the orange trimmer capacitor in IC1001's oscillator circuit – note that there are actually two oscillators.

This chip feeds the fluorescent display on the front PCB directly. It also scans the keys on this board and takes in information from the infra-red remote control receiver. The supplies to the chip are +5V and -30V. The former is derived from the AT6V line via diode D1002. When this diode goes open-circuit, the result is a dead machine.

The outputs from the mode switch, the rec. tab switch and the FL switch are fed to IC1001 via a resistor network. Very odd faults occur when these resistors fail. The reason for the use of this strange circuit appears to be to reduce six control lines to two to feed IC1001. Fault finding in this area is tedious and difficult. Fortunately I've had only one failure here, when one of the resistors was physically broken.

Pin 75 of IC1001 is the standby/power on switching output. It goes to the power supply via Q1007. When this transistor goes open-circuit the machine appears to be on (indication in the display) but there are no functions, the switched outputs from the power supply remaining off. Q1007 is a digital transistor: replace it with the same or a suitable equivalent type.

Pins 14 and 15 of IC1001 control the BA6247 loading motor drive chip IC1003, which can fail. It usually self-destructs, the result being a large hole in its front. Replace-

ment will normally restore correct operation. Its failure can also be caused by the loading motor.

Tuning data is stored in the memory chip IC1005. I've never had to replace this item. The tuning voltage is derived from the pulse-width modulated output at pin 55 of IC1001. An active filter produces the voltage to control the tuner. More on this later.

Servo Control

The servo circuitry is mostly contained in the OEC6014C chip IC2001, which is more reliable than its OEC9011 predecessor. It does fail on occasions however.

If there's no motor operation, check IC2001's supplies first then for 4-43MHz at pin 22. This signal comes from the YC board.

Pin 39 is a good point at which to check the control pulses in the playback mode. If the capstan or drum motor is running at the wrong speed, check C2008/9 in the former case and C2010/1 in the latter. An odd condition occurs when either C2023 or C2024 fails. There appears to be a lack of control pulses. A check at pin 39 will show whether the control pulses are low or missing. Disconnecting the plug from the control head will alter the rate of the displayed bars.

Outputs from IC2001 feed the capstan and drum motors directly.

A fault I've had is no switching pulses from the lower drum. Replacement of the lower drum is the only solution.

Tuner, RF Converter and IF Strip

The r.f. and i.f. sections are conventional. An r.f. booster/converter provides the tuner's r.f. input. Its supplies are AT5V for the booster section and switched 5V for the converter section. Note that the video signal passes through a filter before it reaches the r.f. converter. I've had this filter fail, the result being weak video through the converter.

The microcontroller chip IC1001 produces a pulse-width modulated tuning output which is passed via active filter IC6002 to the tuner's BT pin. Tuning drift is a common fault. Check R6045 (33k Ω) which can go high in value or open-circuit – in the latter condition there's no tuning voltage at all. Before condemning R6045 as the cause of tuning drift, check that the a.f.t. is switched on for the channels that drift – it has to be actively selected, whilst presetting the tuner.

The tuner is the usual cause of low gain or no tuning (but first check the voltage at its BT pin). The i.f. strip, which is on the YC board, has proved to be reliable, the only faults being caused by IC6001. In the event of intermittent faults, it pays to check for dry-joints at the connections to the main PCB.

Video Processing

This is carried out on the YC board, which has a lot of surface-mounted resistors and capacitors. These are again glued to the board prior to being soldered.

The main video processing chip, IC4001, is a standard 36-pin DIL LA7390 type. There is no pin that determines whether this chip is in the E-E or play mode: the circuit relies on subtle d.c. voltage differences. I've had little cause to delve into this circuit. The cause of intermittent luminance recording was traced to failure of a chip resistor, and I once had to set up the carrier and deviation controls after a phantom twiddler had got at them.

One complaint you may get is inability to play certain prerecorded Disney and other tapes. The cause is the anti-copying signals included on the tape. To overcome this problem, change IC4001 to type LA7390N.

With very tricky faults the best course is to obtain a replacement PCB from Mastercare. They come pre-aligned.

The video processing board is connected to the pre-rec head amplifier PCB which is mounted on the drum assembly. This PCB usually comes with a new drum. Before replacing it or the drum, check that the PCB is the correct type. If the original had no Y and C record level presets, the replacement shouldn't have them either (see later versions). I've had one i.c. failure on this board. The type varies with the model.

With the exception of the stereo machines, the external inputs are selected by switches in the relevant rear-mounted phono sockets. For poor or no E-E audio or video it pays to check these sockets.

Audio Processing

The audio processing and the bias and erase oscillator circuitry in the VX1000 and VX2500 are mounted on the main PCB. The circuitry is straightforward: the only problems I've had have been caused by liquid spillage.

Model VX2000 has linear stereo. The entire audio circuitry is on a separate board, along with the bias and erase oscillator.

The earlier Model VX6600 has Nicam as well as linear stereo sound. This section has proved to be trouble free: the entire audio department – the Nicam circuitry, amplifiers and the bias oscillator – is on a single plug-in PCB.

The audio/control head can wear, giving poor sound on one or both channels.

Stereo models have extra switches at the front to enable either or both channels to be selected for playback, and another switch for selection of internal, external or simulcast sources for recording.

As there are so many variations in this area, if problems do arise it's almost essential to obtain the relevant service manual.

With later VX1000 and VX2500 machines there's a tendency for the audio section of the audio/control head to go open-circuit.

Later Versions

There are several versions of Models VX1000, VX2000 and VX2500, with differences that make certain PCBs (and circuit diagrams of course) incompatible. Models VX1000 and VX2500 were upgraded, with new PCBs, scart sockets and a new type of drum which has the motor's rotor and stator mounted on the assembly. These later boards are not interchangeable with the earlier ones. The front operation board and head amplifier board were also changed.

You should find a little white sticker on the back of all these machines. It bears the manufacturer's version and a letter. Quote this letter when ordering spares. Hopefully the sticker won't be missing.

Models VX2700 and VP9301

The VP9301 was Matsui's first Video Plus model. Apart from this feature it's identical to the VX2700. Both models introduced the change to centre loading with Matsui machines. Otherwise they are very similar to the VX1000, the deck and the electronics having much in common. In the VX2700 the syscon/timer microcontroller chip IC1001 is

an OEC0026. In the VP9301 it's changed to type OEC0037 to take into account the Video Plus feature.

Models VX1100, VP9401 and VP9501

These models are totally different from the earlier ones covered in these articles. Their construction doesn't make for easy servicing. A jig is available, but servicing can be carried out without it. The jig consists of extension leads that enable the power supply and the deck to be separated from the main PCB. I find it easier to work on the main PCB when it's plugged into the deck directly however. The jig part numbers are JG104, JG105 and JG106.

The power supply in these machines is conventional. These are the major differences: the main regulator chip is now an STK5343; the AT12V line becomes AT10V; and the 6V and 12V regulator transistors, along with IC501, are mounted on a common heatsink.

The syscon, servo and timer circuits are contained in an 84-pin flatpack chip, IC1001. I've not had a failure here so far. The circuitry has been simplified: there are no resistor networks between the deck switches and the chip, single 10kΩ resistors connecting each switch contact to the chip directly.

The loading motor drive chip IC1004 is changed to type BA6886-V1. Like its predecessor, it can self-destruct.

The r.f. converter, tuner and i.f. strip are contained in a single r.f. block. The test switch is external to this can: in normal operation it earths pin 3. There are no circuits for this r.f. block, which should be replaced as a complete unit.

The head preamplifier section is now on the main PCB. Most of the video processing is carried out by an LA9397 chip. The presets are on the main PCB, at the rear left behind the mechanism. There's access to the head switching point preset through a hole in the operation board. In theory these controls should never require adjustment. Should you get a blank raster in the E-E mode however, check the setting of the video a.g.c. preset VR4002 before delving into the video circuits. I've found this adjustment to be incorrect on a couple of occasions, possibly as a result of board mishandling as it is removed from the case.

Since the new syscon/servo/timer chip can't handle the fluorescent display drive directly, an MN12510 chip (IC601) is used as a drive interface. It also scans the front key pad. This chip also receives the output from the infrared remote control receiver chip. Communication between IC1001 and IC601 is via four clock and data lines.

IC601 has its own oscillator circuit, with X601, C602 and C603. Failure of this circuit can give the impression that the machine is dead, but it will take in a tape (preferably a prerecorded one) and play it, thus ruling out the power supply, IC1001 and associated circuits. I've had a few problems with IC601, but check first for oscillation at pins 2 and 3. If there is a digital signal superimposed on the oscillation, check for dry-joints on the earthy side of the oscillator circuit. If the oscillator is running correctly, IC601 is suspect.

Model VP9501 Differences

Model VP9501 is similar to the VP9401 but has four heads and an auto set-up facility. This works by using teletext data to identify the channels. The identification is fed, in the form of converted data, to IC1001. Connect an aerial to the machine, then connect it to the mains supply. If you have a satellite receiver, switch it on and tune to Sky 1. The machine will then preset all channels in the correct order,

and display the correct time. In poor-signal areas the setting up can be done manually.

The circuitry for this facility is on a sub-panel that's soldered to the main PCB vertically. It's to the right of the main PCB. IC851 and IC852 take care of most of the text processing, with just a few peripheral components. Clock and data lines feed the information to IC1001.

In Conclusion

So there you have it! This completes our servicing notes on these machines, which were on sale until quite recently. Though basic, the machines give reasonably good results when working well. Servicing shouldn't give the competent service engineer too many problems.

FAULTS LIST

The following list is based on my experience of these machines to date. Others may well be able to add to it. If so, write in.

Mechanical Faults

Tape looping on eject: Replace the mode switch.

Tape chewing at the bottom edge: Check the pinch roller and clutch.

Wow and flutter: Check the back tension, pinch roller and capstan motor.

Carriage fails to lower fully: Check the loading belts and the link gear on the right-hand side of the carriage.

Jammed mechanism: Check the loading belts first then, if necessary, the mode switch.

Tracking errors: Check the erase head wiring. Ensure that it isn't trapped beneath the drum.

Mechanism fails to load or unload fully: Check the timing relationship between cam 1 and cam 2, also the mode switch.

Electronic Faults

Dead machine: Check the power supply outputs. If there's no power, check the STK5342 regulator chip and the AT6V regulator. If the power supply is o.k., check the orange trimmer associated with the timer or main syscon chip.

No capstan drive, no drum drive or both: Check IC2001, type OEC9001 in earlier machines, OEC6014 in later models.

Picture unable to track, control pulses missing: Check the control head for continuity.

Inability to go into the timer record mode: You may be using the wrong type of handset. Check this.

No sound: Check the audio section of the AC head.

One half of the playback picture is missing: Check for PG pulses from the drum motor.

Slow running capstan motor: Check the back tension then

suspect the capstan motor.

No video output, or weak video from the r.f. modulator: Check the filter network PF4201.

No tuning, or tuning drift: Suspect R6045 in the voltage converter circuit. Check the tuner if necessary.

No on-screen display: Check L4801 and L4802.

No erase/bias oscillator output: Check the leads to the erase head and the continuity of coil T5001.

No colour: Check whether X4001 on the YC board is dry-jointed. If necessary check IC4001.

Failure to play prerecorded tapes: Replace IC4001 with new version (suffix N).

No switched supplies (Models VX1000, VX2000 and VX2500): Check Q1007.

Poor picture and/or sound in the E-E or record modes: Check the switched phono auxiliary input sockets at the rear.

USEFUL PART NUMBERS

The following are Mastercare part numbers.

Front loading unit	89000200
Capstan motor	1510S98021
Front loading belt	850P600313
Front loading belt (VX2700 on)	850P600438
Loading motor belt	850P600317
Reel belt	850P600316
Mode switch	0520U44002
Pinch roller assembly	850A400073
Gear loading S assembly	850A30035
Gear loading R assembly	850A30036
Clutch assembly	850A20027
Reel sensor	0002300140
OEC9011 chip	197D49011A
OEC6014 chip	195D46014B
OEC0020 chip	154F50020D
BA6247 chip	107S06247V
STK5342 regulator	123S953420
Orange trimmer capacitor	0100614T08
Audio-control head (stereo)	1523D91011
Audio-control head (mono)	1523D91010

Letters

PHILIPS' SPARES POLICY

I would like to warn other repairers about something that Philips Service is doing, since it could cause any one of us to be put on the spot and possibly create adverse publicity.

After giving a customer an estimate for repairing a Philips CTV receiver that seemed to require a new line output transformer, we were mildly surprised when he rang back to say that we could go ahead but he must have the old transformer back as Philips would be getting it for examination. Apparently they had agreed that, subject to the transformer being genuinely faulty, they would pay him some compensation as the set was only eighteen months old.

More power to his elbow if that's true, we thought, and with some apprehension proceeded with the job, hoping that our diagnosis was correct. We bought a new transformer from Willow Vale Electronics for just under £30, and the set was soon working again. Then we had a little thought. . .

Suppose the customer asked Philips the price of the transformer? Would it be similar to ours, more or less? We decided to check it out and rang the Philips Consumer Help Desk, pretending to be an ordinary person in the street. "I've just had my telly repaired" we said, "how much is a line output transformer for my Philips blabla TV?" "Just a moment" the Philips lady replied, "um, £27.55 plus VAT." "Is that the price to a repairer or to the public?" "Anyone who has an account with us" she replied. So we asked her "wouldn't a repairer put a retail mark-up on this price?" Her astonishing reply was "oh, but not much. They might charge about £30. They'd be getting the repair charge you see."

Aaargh!!! (us choking). So we're expected to sell Philips parts for them as a free charity service. After getting that reply a customer would feel he was getting ripped off.

The job has gone out and so far so good, but I don't relish the thought of possibly having to defend our meagre profit margin of 25 per cent. It's only a month since we were attacked in the local paper after declining to take on a repair job because it was not an economical proposition. The newspaper can make a profit, but not us. It turned out that the prospective customer was disabled, so we were

made out to be "unhelpful to a wheelchair bound person". At least it hasn't affected our busy business, with a large customer base, that goes back over forty years.

I feel that there are problems enough in this life, without Philips adding to ours unthinkingly.

*Claire Watson,
Forest Hall Repair Centre,
Newcastle upon Tyne.*

HOT BIRD RECEPTION

I had recently upgraded my father's satellite installation so that it could pick up the Astra 1D signals. This left over the old LNB. For my reward he bought me my August copy of *Television*, so that I didn't have to fork out for it.

His interest had been drawn to the Hot Bird article. As the old LNB was still on top of the piano, where I'd left it two weeks previously, I decided to remove it and make up a simple bracket to see if we could get the signals.

When I measured the old Amstrad and the new Marconi LNB I found that the neck diameter was in each case 30mm. So two 28mm half-moon saddles could be used, slightly expanded. I placed the LNBs back-to-back, then bolted them in place. When I changed over the cable from the Astra to the Hot Bird position, turned on the receiver and tuned in, there was a good picture.

Why use a spectrum analyser when two 28mm saddles will do the trick?

*Tim Asquith,
Tonbridge, Kent.*

AMSTRAD SPARE

In the July issue, under the heading "Hinari VXL8/Amstrad VCR6000 etc.", your contributor to VCR Clinic stated that the rubber pad (damper), item 41 in the mechanical assembly exploded view of the VCR6000, 6100, 8600, 8700, 8800, 8900 etc., is not available separately. I would like to reassure readers that the genuine part is available from Amstrad Spares under part number 153091.

The Amstrad spares telephone number (trade only) has recently changed to 01277 236 111. The fax number remains 01277 209 559.

*Colin Humphrey,
Technical Support Department,
Amstrad, Brentwood, Essex.*

ADVICE TO NEWCOMERS

I've been forced, after seventeen years in the trade, into retirement for medical reasons (not related to the trade). Looking back on my experiences, I

started to think about what I would say to young and not so young people entering it today.

My advice to future engineers would be to remember that getting your qualifications doesn't mean that you know it all. You must be prepared to keep on learning. The trade changes from year to year, advances in the technology being much faster than they used to be. And be willing to share your knowledge. Remember, that's how we all learn. Above all, enjoy it.

As for me, at the grand old age of thirty three I'll be permanently retired but continuing with my hobby of restoring valve radios. If anyone has any valves, knobs, diagrams, valve data books or anything relating to pre-1965 radio sets I'd like to hear from them. I'm willing to travel.

May I wish readers all the best for the future. I know I'm going to miss the trade.

*Steve Tayler (ex Steve's TVs),
6 Wilmore Crescent,
Leicester LE3 1SW.*

A VIDEOTAPE PROBLEM

Various tape problems have been mentioned recently. Here's another one. I use a Sony SLV777 for hi-fi sound recordings, and until recently have used only Scotch EXG+ tape. A special offer of JVC High-energy Magnetite tape then attracted my eye and pocket. For some reason, when this tape (batch nos. 3BZBD and 2-T9QD) is used with my Sony VCR there's an irritating 'purring' sound in the right channel output only. This occurs with recordings made at any time of day and on any channel.

As a check I've recorded repeats of the same programmes, using Scotch tape. Result: no purring, even at high volume levels. I have also tried other tapes. With Comet HQ tape there was no purr; with Fuji Super HG tape there was slight purr; and with BASF Vision tape there was slight but definitely audible purr. I have not been able to try Sony tape.

Various suggestions have been made, from "replace the drum" to "it's an unfortunate combination of machine and tape". I understand that a modification for what sounds like the same problem is available for another model.

Any comments, anyone? Could there be some additional, unpublicised signal in the transmissions? Meanwhile, I continue to get excellent quality vision and Nicam sound with the proven tapes.

*R.J. Goodman,
Wandsworth, London SW18.*

Hitachi VM1200E

This full-size VHS machine would load a tape then, shortly afterwards, return to the stop mode. Investigation showed that the capstan motor didn't rotate. When a clear service cassette was loaded everything appeared to be o.k., with the capstan turning normally. With an ordinary tape loaded however the fault was back. A check on the capstan motor revealed that it was quite happy to work off load, but didn't provide sufficient torque when a tape was loaded. A new motor cured the problem. **D.C.W.**

Canon A10E (Sony FL Mechanism)

This neat model, which uses the Sony FL mechanism, naturally from time to time suffers from similar faults to those experienced with Sony camcorders. This one produced a symptom we'd not seen before however. A tape would load half way, stick, then be ejected. We checked the mechanism with the mode box, but it appeared to be faultless.

If loading was attempted with a tape inserted the fault would occur: the tape would become taught across the head then cease to move. The cause was simply that the brakes within the cassette were not being released. We found that the release pin was missing from the base assembly (L) RL. Its part no. is X39406751. A replacement cured the fault – but it took a while to decontaminate the video heads! **D.C.W.**

Panasonic NVMS90B

The cause of intermittent loss of the camera picture or hi-fi sound or any other odd complaints from customers could be abrasion of the flexible cable between the main CBA and the hi-fi head amplifier module, near the main CBA end. In a recent case the edge of the chassis had a rough casting flash on it. This had worn into the insulation, shorting several tracks together. We were lucky: only Q3507 (2SB970X) and the flexible cable (part no. VWJ0394) had to be replaced. It could have been a lot worse. **T.B.**

Panasonic NVMS40B

If the complaint is that the camcorder intermittently stops and the cassette door opens, or the door flies open by itself when there is no tape in the machine, you will probably find that the eject switch SW6516 has almost collapsed. A new switch will put matters right (part no. EVQQ-FR2K). Since the switch costs only 44p, it might be worth replacing this item each time one of these machines comes in for attention. In every MVM40B we've seen the switch shows signs of imminent failure. Any mods, Panasonic? **T.B.**

JVC GRAX5

The fault report said "damaged in raid, repair if viable". Obviously this one was just short of a car boot sale. I replaced some cabinet parts and it worked fine. **S.B.**

Panasonic NVMS90B etc

This note applies to the NVMS90B and other machines that use a similar deck. If the mechanism fails to shuffle at

power up, with the drum running and everything else apparently o.k., check that the screws which hold the VTR section into the case are in the right holes. Our Ordinary Assistant Fixer (OAF. . .) had by mistake put the one with the soft plastic spacer in the top hole, seizing the loading motor worm gear. **T.B.**

JVC GRS70

There was no viewfinder display in either play or record. In fact there was no E-E signal from the camera, playback of a known good tape being o.k. We found that R24 on the camera processing board was open-circuit. That was an unusual one. **S.B.**

Ferguson FC23

"No record picture unless you bash it" the customer said. The iris was sticking because oil from the zoom motor had trickled down on to the iris vanes while the machine had been in storage. With this model I can strip the lens and clean the iris vanes: a bit of a bodge, but it doesn't upset the lens alignment. **S.B.**

JVC GRC1

This one wouldn't eject a cassette, which was not surprising as the loading motor was knackered. **S.B.**

Grundig VSC45

We were asked to check out the unit, the complaint being picture disturbance when the capstan motor runs. Replacing the idler drive pulley and the power regulator transistors restored normal operation. **S.B.**

Sony CCDTR55

There was no picture from the camera section. Another iris vane strip down and clean job. Sony had put too much oil in the zoom motor. This is not uncommon. **S.B.**

JVC GRAX5

Code A04 would appear in the viewfinder. This suggested that the drum was jamming intermittently. Not so however: pin 9 of IC102 was dry-jointed. So I resoldered it and tidied up some joints on i.c.s that M. Oron had previously replaced in a failed attempt to rectify the fault. **S.B.**

JVC GRS70

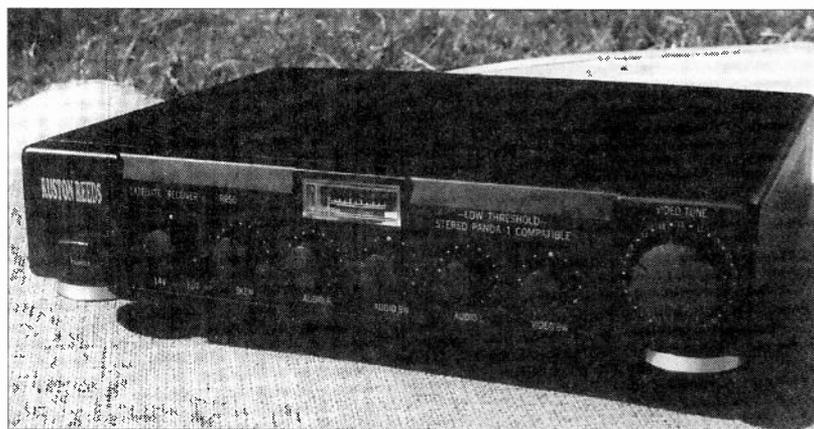
A strobing pattern of horizontal lines appeared in the viewfinder in both the record and VCR modes, and was being recorded on the tape. This was an easy one: we replaced the deck d.c.-d.c. converter. **S.B.**

Sony TR105E

There was a tape stuck inside, with no functions and no eject. No capstan motor operation either. A new motor restored normal operation. **S.B.**

Sat Receiver Review: The RR50 Mk 2

Roger Bunney assesses the RR50, a manual receiver that's ideal for the sat-zapping enthusiast.



Satellite receivers for the consumer market nowadays tend to be controlled by subtle remote handsets. Once the receiver is programmed, and assuming just Astra reception, operation is simple. But what if you are an enthusiast/sat-zapper whose main interest lies in tuning to the various satellites present across the Clarke Belt? Retuning and adjusting a remote-controlled receiver is tiresome and slow. Manual tuning is the answer, but not many receivers with this facility are currently available. The RR50 Mk 2, available from Aerial Techniques, is one such set.

Receivers with manual control are primarily intended for sale in developing countries such as India, where interest in satellite TV reception is high but incomes are low. Such receivers are rugged and strong, made to withstand rough conditions in a tropical climate.

For my own personal reception I use an IR-controlled Echosphere LT730, a fine receiver that works extremely well, and several manually-controlled receivers. For 95 per cent of the time I use a couple of somewhat modified Echosphere SR50 manual receivers. They enable signals, both weak and strong, to be tuned in rapidly, with both main and fine tuning and no on-screen menus to obscure the picture. It's possible to tune through the full range of vertically-polarised FSS band channels in about fifteen seconds, stopping off at any interesting signals that appear, then go over to the horizontally-polarised channels. No IR scanning receiver can provide this rapid access to the band.

The Works

I've recently had for trial an RR50 Mk 2 receiver, which is produced by a well-established manufacturer in Taiwan. It's a slimish, ruggedly built receiver housed in a black, mild-steel metal case, with a lovely array of knobs across the front. They provide precise signal tuning and optimisation. If you are familiar with the Echosphere SR50, you'll find that this is a very similar beast.

The controls, from left to right across the front, are as follows: an on/off switch; a rotary 14/18V switch; a

polarity skew control (mechanical); audio right subcarrier tuning (5-8.5MHz); audio bandwidth adjustment (150-350kHz); audio left subcarrier tuning (5-8.5MHz); video bandwidth adjustment (12-26MHz); and main tuning (950-1,750MHz) via a large knob. I found the centrally-placed S meter ineffective with strong signals – the needle swing is perhaps one scale division from no signal to a high-level signal.

The rear panel sports, from left to right, an LNB input F socket, which also provides 13/18V at 250mA for the LNB; a video baseband/MAC signal slide switch that controls the output from a phono socket; a C/Ku band switch which in effect provides video polarity switching; a preset S meter adjustment (rotate for f.s.d.); a pair of video phono output sockets offering a baseband/MAC output (upper) and a clamped, de-emphasised video output (lower); left and right audio output sockets (audio de-emphasis is at 50µsec); a bank of four push connectors (see below); an r.f. output adjustment (approximately chs. E30-40); a slide switch for system B/G (5.5MHz) or system I (6MHz) audio with the modulated r.f. output; a test pattern on/off switch; and finally a pair of Belling-Lee/IEC coaxial male and female aerial sockets for the r.f. output and terrestrial TV diplexing. Three of the push connectors are for a three-wire mechanical polariser, the fourth providing an a.g.c. output – this offers a signal-level measurement point. There's also a mains input socket, with a 2m connecting cable provided.

Internally, the components are comfortably spread out on a large PCB. There are only three voltage stabilisers, which are on a long, shaped PCB-mounted heatsink. This runs warm to touch, though I was using a Chaparral LNB which draws 300mA instead of the designed-for 250mA. The large mains transformer also runs warm to touch with a 240V a.c. mains input.

Performance

The tuner is a very compact unit providing, I assume, single conversion from the 1GHz LNB input to a 70MHz second i.f. Selectivity is extremely good and relatively

stable – there is hard a.f.c. on the tuning voltage line.

My main interest was in the image frequency rejection and overload handling capability. With a single-conversion tuner a very strong signal can appear as a weaker signal at twice the i.f. from the main signal. Using, as a test, Hot Bird signals and a 1.5m dish, I found no sign of image frequency interference. This is very impressive. There were no signs either of low-level signal cross-modulation hash at the top end of the tuning range, i.e. above the 1,750MHz cut off. This can occur with some receivers, for example the Echosphere SR50, when the tuner cannot handle the overloading produced by a multiplicity of high-level signals. Full marks then on the r.f. performance.

If the signal from a transponder is not centrally tuned and the video bandwidth is progressively reduced, the slightly mistuned signal will suddenly disappear into snow. This is a function of the a.f.c. operation. It might be helpful to provide an extra tuning line without a.f.c.

Once the controls are understood, operation is easy. Merely turn the large knob on the right-hand side! The manual provided is very clearly laid out and the explanations are in simple English. I wasn't happy about the a.f.c. action (see above), and feel that the S meter is a bit pointless. The receiver threshold is quoted as 7dB. Weak signal performance is enhanced by the i.f. bandwidth reduction facility: this sweeps away the noise, though there is inevitably some video quality reduction at the same time.

Use of a very low-noise LNB will help with low-level signals. The receiver handles both high- and low-level signals without overloading.

Though there's a video output for feeding to a decoder, there's no video return socket. Thus an outboard modulator will have to be used, or the signal fed via a VCR, where decoding is required. This is a shortcoming with all manual receivers. It wouldn't be costly to provide a video return path at the manufacturing stage.

Calibration is nominal. You'll need to produce your tabulation sheet for frequency readout. The large knob is marked 1, 3, 5 and so on up to 30, with dots in between.

A super-DX version of the RR50 Mk 2 is available, with a built-in threshold extension board. This cleans up very noisy signals. I've fitted the same board in one of my Echosphere SR50 receivers: the results with very weak signals are remarkable.

Although the receiver is intended mainly for the Asian market, where C band reception is the norm, it would have been nice to have had a ferrite (magnetic) polariser output instead of the mechanical only output. An outboard polariser interface unit for conversion to a two-wire magnetic polariser feed is available, but this adds to the expense.

In Conclusion

I like the receiver. It handles well, and I was very impressed with the overall performance. As a manual tuning enthusiast, I would be more than happy to have one of these receivers for day-to-day use at home. My thanks to Aerial Techniques for the extended loan of the test receiver – and for letting me take it apart.

The RR50 Mk 2 is available from Aerial Techniques, 11 Kent Road, Parkstone, Poole, Dorset BH12 2EH – telephone no. 01202 738 232, fax 01202 716 951. The price of the unmodified receiver is £199, including VAT. With the threshold-extension board built in the price rises to £329. Carriage (overnight delivery) is £9 in the UK – phone or fax for carriage to overseas destinations.

Next Month in TELEVISION

FREE TV FAULTS BOOK

Don't miss next month's issue which will include a free, 72-page cover-mounted TV fault finding book. We have taken some popular chassis and summarised common fault know-how relating to them.

For tax/customs reasons the book will be available to UK readers only.

VCR SIGNAL PROCESSING

An important new series, which will cover the luminance and chroma signal processing carried out in VCRs, starts next month. The aim of this series, by Joe Cieszynski, is to explain in a practical manner what the circuitry does and why. Adjustments and, where possible, fault symptoms relating to specific circuits will be discussed.

PACE PRD SERIES MOD FOR 22kHz SWITCHING

Universal LNB oscillator switching was not really thought out when the popular Pace PRD series satellite receivers were being designed four or so years ago. It's not difficult to update them by adding 22kHz tone switching however, as John Woolman explains – with full circuit and Veroboard layout details.

TACKLING DEAD LINE OUTPUT STAGES

Line output stage failure is one of the most common TV faults, which is not surprising in view of the demands made on the stage. Ray Porter outlines line output stage operation, failure mechanisms and how to go about diagnosis.

AT THE BERLIN IFA

The Berlin Internationale FunkAusstellung (Radio Show as we used to call it) is the premier European consumer electronics showcase. This year's show was particularly significant, with the new HD video disc systems, flat-screen displays and other developments being demonstrated. George Cole reports.

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TV Fault Finding

**Reports from Philip Blundell, AMIEEIE,
Glyn Dickinson, Nick Beer, John Edwards,
Roger F. White and Tony Ashworth**

Philips G110 Chassis

If you find that the chopper transistor is short-circuit it's best to fit the SBC7020 kit (part no. 4822 310 20489) rather than try to repair the power supply using hit-and-miss methods.

I've had quite a few G110s in which dealers have tried fitting the kit but hit problems. These are usually of their own making.

The leaded diodes 6602, 6603, 6604, 6605 and 6617 have their wires tightly crimped to the print: the usual method of removal, by heating and levering with a soldering iron, will result in damaged print. The best way to remove them is to cut their wires close to the holes on the top side of the board. The diodes will then fall away. Use desoldering braid to remove the solder and the remainder of the wire.

Take care when replacing surface-mounted diode 6637. Each diode has its anode and cathode marked with an 'a' and a 'k', but it's easy to confuse diode 6637's cathode marking with the collector marking of transistor 7656 and end up with the diode fitted back to front.

Be economical with the solder when fitting surface-mounted devices (SMDs), and don't have your iron too hot. SMDs are easily damaged by heat, and it's easy to make solder bridges that cause short-circuits. If the power supply is dead after you've fitted the kit, make sure that you haven't introduced a solder bridge between the anode of 6670 and one end of 6669.

Check the values of resistors 3615, 3616, 3619, 3652, 3653 and 3654.

Disconnect the line scan coil plug and fit a dummy load. Start up the power supply gradually, using a variac: check that the 140V line doesn't rise excessively as the input voltage is increased.

A problem in the line output stage can blow up the power supply – this will be proved by the line output transistor being short-circuit. Any arcing that occurs in the mains plug, the on/off switch or the degaussing resistor can also upset the power supply. Either way, before you return the set give it a soak test in standby and with the picture – for as long as you dare! **P.B.**

Philips CP110 Chassis

Our workshop had a number of lightning-damaged CP110s during the summer storms. Here's a list of the common faults:

Dead set: The BUT11AF chopper transistor and its TEA1039 control chip short-circuit, with R3659 (100Ω) and R3658 (120Ω) burnt.

Channel display keeps going to 'E': Microcontroller chip 7840 faulty.

No display, with the 140V line low at 60-80V: The 6V

regulator transistor 7738 (BC558) open-circuit.

Display goes to F1 a few seconds after switching the set on: Transistor 7739 (BC548) short-circuit. **P.B.**

Matsui 1420A etc

We've had a number of these sets with the STR50103 chopper chip, the SR2M over-voltage avalanche diode and the 5-6Ω surge limiter resistor all faulty. Be careful when you apply the mains supply after replacing these items. If the line output stage appears to be in distress, switch off at once or you'll get a repeat performance. The faulty component may be the line output transformer, which often has a pinhole in it, or the scan coils. The latter are not readily available on their own: it's wise therefore to save the deflection yokes from scrapped sets. **G.D.**

Hinari CT6

A poor picture was the complaint with this set. It was dull and incorrectly clamped. We found that R425 (150kΩ) in the beam limiter circuit had gone high in value. **G.D.**

Ferguson TX100 Chassis

"Goes off after a few minutes" it said. And for once it did! The h.t. dropped, and the set appeared to trip. This was not because of an overload: the cause was a high-resistance connection on the chopper transformer, which had to be replaced. **G.D.**

Doric Mk 4 Chassis

These well-made, but engineer unfriendly, sets turn up from time to time. This one would occasionally switch off from cold, and sounded a little unhappy when it did work. The cause was R5 in the power supply. It's a 68kΩ, 1W resistor which should be a wirewound type – if you can get one! **G.D.**

Ferguson TX90 Chassis (20in)

After replacing the line output transformer, the line output transistor and the power regulator transistor we found that the e.h.t. was spectacularly high. The cause of this was the 5-6nF flyback tuning capacitor C194, which was open-circuit. **G.D.**

Matsui 2580/2590

After a power supply rebuild the set still wouldn't come on, though the outputs on the secondary side of the chopper transformer were all present. Several of the outputs are applied to further regulators however. The problem was caused by TR803 (BD139-16) in the 24V regulator being open-circuit. **G.D.**

Sony KV1460 (GP1 Chassis)

This set was dead, with the h.t. fuse blown and the SR2M over-voltage protection diode D610 short-circuit. We also

replaced the STR50115 chopper chip IC601 as this type of i.c. often fails when hot. The power supply now worked, but there was no line drive. The μ PC1377C timebase generator chip IC501 had to be replaced as well. **G.D.**

Ferguson TX100 Chassis

The picture would pulsate on high-brightness scenes, especially when the set was cold. The cause was C117 (100 μ F, 16V) which couples the drive to the chopper transistor TR6. **G.D.**

Hinari HIT51

This set wouldn't come out of standby, though we found that it could be persuaded to come on by earthing the opto-coupler D111. Replacing the latter restored normal operation. **G.D.**

Samsung CI3351A (P68AM Chassis)

Intermittently dead, usually when hot, was the complaint with this portable. There would be no standby LED illumination, though it would sometimes come on later. The cause of the problem was obviously on the primary side of the power supply, but the symptoms were rather illogical. We traced the cause to C808, a 330pF 2kV disc capacitor, in the snubber circuit. When removed and checked it read perfectly! **N.B.**

Panasonic TX24A1 (Alpha 2W Chassis)

There was a brief burst of life when this set was switched on. It then went to standby, leaving three coloured blobs at the centre of the screen. To assist with fault finding I disconnected the standby switching to the power supply, then found that the 12V supply in some parts of the decoder etc. was missing. The cause of this was L303 (10 μ H) in part of the 12V feed being open-circuit. With the standby switching disconnected the set displayed its true symptom: a raster but no sound or vision. **N.B.**

Sony KVX2121U

There was an intermittent crackle, quite loud, on the sound. Something was clearly arcing, but when I examined the set I found that someone had already had a go at resoldering everything in the audio output stage. The dry-joint was actually at a bridge rectifier. Always resolder the chassis connections that have lightning symbols by them, as dry-joints here cause the same problem. Dry-joints on the audio op amp chip IC251 are also common, causing loss of one or both channels. **N.B.**

Sharp 12P-41H

A set with no picture, the c.r.t. heaters being alight but the e.h.t. missing, is quite common. The line output transformer is the cause: you can often see burning around the e.h.t. overwinding. Unfortunately the transformer is no longer available. **N.B.**

Panasonic TX28A1 (Alpha 2W Chassis)

There was chrominance in the display but no luminance. With a modern set the luminance signal path can be quite involved, what with S connectors and YC processing for colour transient improvement (CTI). The latter area was where our luminance signal went missing – within the

TDA4565 CTI chip on its subpanel. A replacement restored the full display. **N.B.**

Toshiba 2100RB

This set was apparently dead, though the standby LED was pulsing. Checks showed that the cause of the problem was on the primary side of the supply, but quite what it could be was a bit puzzling until I started to carry out scope checks and found that everything, including the start-up supply, had a 100Hz ripple on it. The cause of the problem was the mains bridge rectifier's reservoir capacitor C820 (120 μ F, 400V), which was completely open-circuit. **N.B.**

Hitachi CBP226

The picture was over bright, which made the very low-emission c.r.t. look even worse. But the customer insisted on having the set repaired. The cause was not a first anode supply problem – there were no flyback lines. Instead the cathode voltages were low at around 120V instead of 200V, because the 22 μ F, 250V reservoir capacitor for the supply to the RGB output stages was virtually open-circuit. **N.B.**

Sanyo CTP6144

There was no colour in the display. Replacing the TDA3565 colour decoder chip restored normal operation. **N.B.**

Salora 20L37

Intermittent line cogging, which was worse when the set was cold, was the problem here. After a bit of prodding around I discovered that the line frequency preset's wiper was making high-resistance contact with the track. **N.B.**

Panasonic TC1480T (Z3 Chassis)

Failure to start is a common problem with these sets. Check the 330k Ω resistor R802 which provides bias for the chopper chip. It tends to go open-circuit. **N.B.**

Hitachi CPT1471

This set would intermittently go dead, sometimes a few minutes after switching on or at other times after many hours' use. Just prior to the occurrence of the fault the set would make a sound that was not unlike arcing in the line output transformer. But the transformer checked out o.k. when tested. A slight increase in the h.t. voltage occurred just before the shut down. Replacing the STR6020 chopper chip IC901, using plenty of heatsink compound, cured the fault. **J.E.**

Panasonic TX2450 (U5W Chassis)

The only sign of life was a high-pitched squeal from the line output stage. When the line output transistor's collector (Q551, 2SD1441RL) was disconnected the power supply produced the correct 150V h.t. voltage. We checked the line output transistor and the supplies derived from the line output transformer. As no defects were evident a new transformer was fitted. This restored normal operation. **J.E.**

Solavox 141

There was no tuning, just a snowy screen. A check showed that the tuner's VT pin was deprived of its tuning voltage. We

noticed that R1010 (470k Ω) on the front tuning panel was very discoloured. When we tested it the reading was well above 5M Ω . Normal tuning was restored after replacing it. **J.E.**

NEI 1451

The cause of intermittent failure to switch on was traced to thermistor R802. When we removed it the board beneath was scorched. A good clean up, a new thermistor and some resoldering in the power supply area cured the problem. **J.E.**

Matsui 1466

This set produced low, distorted sound. The cause was traced to the 10k Ω bias resistor R353 in the audio output stage. It was open-circuit. **J.E.**

Sony KV2704

Originally several attempts were required to switch this set on. Subsequently it became lifeless. Though the power supply was trying to deliver the h.t. (135V) it managed only 39V. The cause of the trouble was the h.t. reservoir capacitor C623 (33 μ F, 250V), which was open-circuit. **J.E.**

Amstrad CTV2110

This set was stuck in standby. It would try to start then go back to standby. So I tried it with a low input from a variac. This time the set came to life, but with field collapse. ZD403, a 12V zener diode, was short-circuit and R435 (5.6 Ω) open-circuit. When I switched back on after replacing these items I found that there was no 110V line regulation. The cause of this was traced to C409 and C410, which are both 47 μ F. **R.F.W.**

Philips GR1-AX Chassis

The complaint was of lines on the picture when the set had been on for about an hour. The fault was apparent on only some scenes. It consisted of a band of bright white lines, about two inches wide. The cause was C2523 (6.8 μ F) which decouples the supply to the line driver transistor. **R.F.W.**

Panasonic TX21V1 (Alpha 2 Chassis)

This set was dead because the line drive was missing. We found that R851 (2.2 Ω) in the supply to the line driver transistor was open-circuit. **R.F.W.**

Beko 11221T

Although this set was dead the power supply and the line output stage were working. But the latter wasn't providing enough output to produce a picture. A defective line driver transformer was eventually found to be the cause of the trouble. **R.F.W.**

Philips CP90

This set was stuck in standby because the microcomputer chip wasn't happy. As diode D6934 was leaky the chip's clock didn't run correctly. **R.F.W.**

NEI 1461 (Indiana 100 Chassis)

The symptoms were lack of height and a flashing, off-tune picture. Because of the tuning problem I went to the 33V

regulator first and found that it's output was low at 26V. A replacement restored correct tuning and height. **R.F.W.**

Hitachi C2564TN/C2864TN (G10Q Chassis)

No teletext with just a page number at the top of the screen and a Fastext menu at the bottom is very easily solved – you don't even have to take the back off! The data capture window needs to be adjusted, which is done in the service mode.

To enter the service mode, press the volume + and – buttons (both of them) on the TV set while switching on from the mains switch. Press the two VCR record buttons on the remote control handset twice. The 'tube' menu should now be displayed. To select the text service mode, press the text button. The two blue buttons can now be used to adjust the data capture window.

Adjustment in the downward direction normally seems to be required. To optimise the adjustment, count the number of presses required between the points where the text appears and disappears then set to the mid-point. Values can be stored in memory by pressing the remote control unit's diamond button.

To leave the service mode, simply use the remote control unit to put the set in standby. Further details of the service mode can be found in the technical information book for the G10Q chassis, part no. X830798. **T.A.**

Sony KVE2922U

Intermittent loss of colour, with a flashing picture, can be caused by dry-joints on the tags of the screening can that surrounds the digital comb filter circuitry on PCB B1. **T.A.**

Matsui 1402

The complaint with this portable was no tuning. Voltage checks at the tuner revealed that the a.g.c. voltage was missing. It comes from pin 11 of IC251. Disconnecting pin 11 failed to produce any voltage because R261 (47k Ω) was open-circuit. **T.A.**

Sony KV2562U (AE2 Chassis)

If you find that the BUZ91A chopper transistor Q601, which is a f.e.t. type, is short-circuit, always check the values of resistors R610 (180k Ω) and R604 (150k Ω). Failure of these resistors will result in the demise of the new chopper transistor at switch-on. **T.A.**

JVC AV21H1EK (JX Chassis)

The complaint with this set was loss of the picture. There was just snow. There were also no on-screen menus. The cause of the fault turned out to be dry-joints at the 5V regulator IC522. **T.A.**

Sony KVX2902U (BE3B Chassis)

Checks showed that there was no line drive. When the set was switched on, all the supply rails came up briefly then went low again (the standby condition). I found that the protection line (pin 9 of CN001) was going high, but disconnecting it failed to produce any line drive though it did allow the set to remain on longer, which helped with fault finding. The drive comes from pin 57 of the TDA8366 chip IC301 on board A, but replacing it made no difference.

Attention was turned to the control circuitry. IC301 is

AN 5320 = 285	STK 435 = 350	TDA 1558Q = 365	
AN 5612 = 121	STK 439 = 399	TDA 2577 = 899	
AN 5700 = 075	STK 463 = 799	TDA 3500 = 499	
AN 7120 = 125	STK 463 = 799	TDA 4504B = 790	
BA 841 = 150	STK 563 = 400	TDA 4800 = 650	
BA 1335 = 100	STK 1040 = 635	TEA 5101 = 209	
BA 7767 = 180	STK 1050 = 630	TEA 8170 = 299	
CA 3189E = 200	STK 1070 = 845	U 4646B = 1499	25v
HA 11223 = 135	STK 2129 = 599	U 4647B = 1480	100uf → 5/0.60
HA 11724 = 750	STK 2155 = 895	ZN 427E = 1299	22uf → 5/0.75
HA 13117 = 345	STK 2250 = 625	UPC 1488 = 190	50v
IRF 840 = 250	STK 3102/2 = 899	2SA 874 = 020	10uf → 5/0.45
KIA 6283 = 250	STK 4048/V = 1500	2SA 1249 = 090	22uf → 5/0.60
L 297 = 500	STK 4142/2 = 650	2SA 1516 = 350	33uf → 5/0.65
LA 4108 = 280	STK 4152/2 = 610	2SB 554 = 340	47uf → 5/0.70
LA 4162 = 090	STK 4162/2 = 515	2SB 775 = 100	100uf → 5/0.75
LA 7837 = 499	STK 4181/2 = 735	2SB 1156 = 350	220uf → 5/1.50
LM 1011 = 180	STK 4853 = 699	2SC 1185 = 225	63v
LM 1889 = 300	STK 4893 = 999	2SC 1454 = 699	0.47uf → 5/0.40
M 104B = 799	STK 5332 = 180	2SC 1827 = 65	1uf → 5/0.40
M 206B1 = 1210	STK 5372/H = 415	2SC 2732 = 399	2.2uf → 5/0.45
M 490BB1 = 1299	STK 5471 = 325	2SC 3405 = 210	2uf → 5/0.48
M 710B1 = 610	STK 5490 = 450	2SD 818 = 300	3.3uf → 5/0.48
M 51172 = 260	STK 7410 = 899	2SD 1279 = 699	10uf → 5/0.50
M 1521 = 290	STK 8250 = 500	2SD 1887 = 435	22uf → 5/0.52
M 58657P = 599	TA 7140 = 100	BC 639 = 020	33uf → 5/0.55
MDA 2061 = 799	TA 7207 = 140	BC 640 = 020	47uf → 5/0.60
MDA 2062 = 300	TA 7336 = 180	BC 877 = 050	100uf → 5/0.68
NE 612N = 095	TA 7401 = 250	BD 682 = 043	330uf → 5/1.65
SAA 1251 = 699	TA 7628 = 200	BD792 = 060	1000uf → Each/0.75
SAA 1293-3 = 515	TA 8200 = 350	BF 680 = 050	
SAA 1351 = 925	TA 8205 = 300	BFR 90A = 055	
SAA 5010 = 425	TA 8207 = 165	BFW 61V = 250	
SAA 5235 = 715	TA 8210 = 300	BU 208A (TOSH) = 325	
SAA 5243P/L = 1540	TA 8214 = 300	BU 208A (ST) = 085	
SAB 3035P = 545	TA 8215 = 300	BU 508DF = 089	
SAF 1039P = 2099	TA 8718 = 699	BU 508AF (PHIL) = 125	250v
SAJ 111 = 825	TBA 2800 = 250	BU 508AF (SAN) = 199	22uf → Each/0.70
SDA 3002 = 1115	TD 6104P = 115	BU 2508AF = 250	1uf → 5/1.00
SL 442 = 1510	TDA 1022 = 530	BU 2525AF = 410	4.7uf → 5/1.50
SL 1020A = 325	TDA 1170S = 135	BUX 82 = 315	10uf → 5/1.70
STA 451 = 395	TDA 1515AQ = 200	BUX 71 = 095	22uf → Each/0.40
STK 0040 = 500	TDA 1552Q = 499	BUZ 90A = 399	33uf → Each/0.56
STK 0050 = 400	TDA 1553Q = 475	BUZ 91A = 350	47uf → Each/0.65
STK 0060 = 799	TDA 1557Q = 450	MJ 15015 = 295	100uf → Each/1.28
		MJ 15025 = 700	350v
		MJE 18004 = 185	4.7uf → 5/100
		MJF 18004 = 185	10uf → 5/060

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controlled by data from the microcontroller chip. Replacing the CAT24C16J-TE13 memory chip IC002 cured the fault, but exactly why this did the trick is not clear. The chip was functioning, as it remembered whether the set had been switched off in the standby or on modes, and the set produced an error code when IC002 was removed. The part no. is 8-759-252-11). T.A.

Matsui 1436

There was no green in the display, though the green cathode voltage seemed to be about right at 130V. A bright green raster was produced when we briefly earthed the green cathode. After doing this, the green content had returned to the picture! We eventually found that the 3.3kΩ flashover protection resistor R505, which is connected between the cathode and the collector of the green output transistor, had risen in value. T.A.

Matsui 2890/Saisho CM2880TX

Here's a fault that can catch you out with these sets. The symptom is that the set goes to standby intermittently when warm. The cause is the standby transformer T101, which goes open-circuit intermittently to produce the fault. The part no. is 040535009C. T.A.

Saisho CM2080T

There were various odd symptoms when this set was switched on from cold. Field roll for example, the set coming on at full volume or going into the text mode. These problems would all clear if the set was switched off and on

once it had warmed up. The cause was rather unusual: C462 (1µF, 160V), which decouples the supply to the primary winding of the line driver transformer, had dried up.

Because the line drive waveform was distorted at switch on, the pulse fed back from the line output stage to the power supply for synchronisation purposes was also distorted. As a result there were low voltages for a few seconds. This was enough to upset the microcontroller chip and generate the strange symptoms. T.A.

Matsui 1466

If you find that the set is dead, with the channel display appearing for a few seconds then going off again, check the start-up resistors R502 and R503 in the power supply. The fault occurs when one or both go open-circuit. They are both 330kΩ resistors. T.A.

Ferguson D51ND (ICC9 Chassis)

The line output transformer was short-circuit. The replacement ran very hot, producing a dark picture with reduced width. The culprit turned out to be DL61 (1N4001), which had gone high-resistance. It acts as a switch, feeding a 7.5V supply to the line driver stage when the line output stage gets going. T.A.

Panasonic Alpha 2 Chassis

Failure of the 2SD1441RL line output transistor Q551 is not uncommon in these sets. When you get this problem, always resolder the line driver transformer T531 - otherwise the replacement transistor may fail after a short time. T.A.

Grundig GRD150/250 Series Sound Mods

Steve Beeching, T.Eng.

A number of upgrades were carried out during the production of the Grundig GRD150/250 series of satellite receivers to improve the sound quality.

Sibilance (over-emphasised 's' sounds) was the first problem to receive attention. A news reader reciting "simple Simon stood staring across the seas" for example would be particularly bad – it would come out as "sssimpl Sssimon sssstood sssstaring acrosssss the sssseasss".

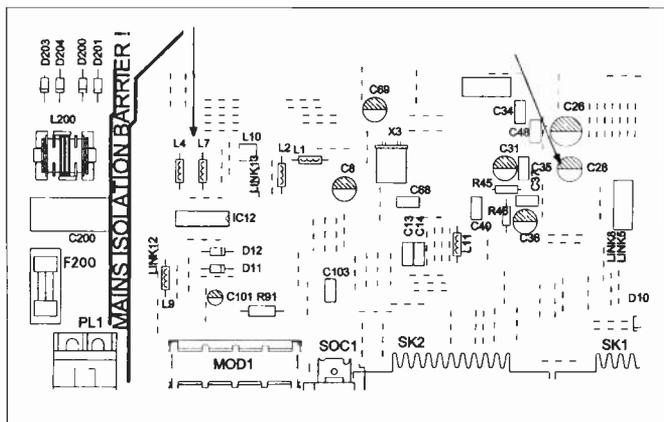
To deal with this problem diodes D600 and D601 were added to the circuit during the very first production runs. Initially each 'diode' actually consisted of two separate 1N4148 diodes connected in series, added across the print. Later the PCB design was altered to accommodate two BAV99 surface-mounted diodes (this device has two series-connected diodes in a common encapsulation). D600 is between pins 23 and 27 of IC1 (STV0020) while D601 is between pins 27 and 29. In each case the cathode connection is to pin 27.

There were also problems with audio reception from the Telecom 2B satellite. Some alterations to the f.m. carrier filters were introduced. The values of inductors L4 and L7 were changed from 1.5µH to 4.7µH, resistors R49 and R50 were changed from 470Ω to 820Ω, capacitors C44 and C46 were changed from 39pF to 68pF while C45 was changed from 68pF to 39pF.

To establish whether these upgrades have been carried out, check the values of L4 and L7. If they are 4.7µH, the other items will have been upgraded.

Transient Distortion

There continued to be a problem with transient distortion. Any sudden loud sounds could be subject to distortion –



Help Wanted

The Help Wanted column is intended to assist readers who require a part, circuit etc. that's not generally available. Requests are published at the discretion of the editor. Send them to the editorial department - do not write to or phone the advertisement department about this feature.

Wanted: Service manual/circuit diagram (photocopy would do) for a 28in. TV set, Model CTV28 or 70GTX92, with the brand name 'Best'. M. Shafiq, Hi Tech Services, 4 Leighton Road, Old Trafford, Manchester M16 9NX. 01706 621 015.

Wanted: Element sections and reflector grids for the Triax Unix 44/92 aerial. D. Robinson, 1 Sycamore Farm Cottage, Lower Bassingthorpe, Grantham, Lincs NG33 4ED. 01476 585 760.

Wanted: Any information on operating the LA VT1000 Televideo tuner, which was marketed in the UK by Kingsbrook Marketing Co. Ltd. I can find no trace of this company. David Hawkins, 5 Talbot Lodge, West End Lane, Esher, Surrey KT10 8NE. 01372 467 264.

Wanted: Circuit diagrams for the Logik VR950 VCR and the Matsui Model 1481B. Also back issues of *Television* or photocopies of TV/VCR Clinic fault reports. I am coming to the end of a long prison sentence and have successfully completed C & G 224 parts 1/2/3. But getting information is difficult in my situation. R.E. Hill H09447, HM Prison Haverigg, Nr. Millom, Cumbria LA18 4NA.

Wanted: TA7193AP chip - used in the Huanyu and Olympic portables. John Pitt-Francis, Otter Vision, 6 Mount View, Feniton, Honiton, Devon EX14 0EB. 01404 850 126.

Wanted: A French format VCR (Secam and a.m. sound). Condition not important provided the electronics are o.k. Telesonic Services, Regent House, Week St. Mary, Holsworthy, Devon EX22 6UJ. Phone/fax 01288 341 254.

Wanted: Sharp IX0714CEZZ and IX0738CEZZ chips or a complete 5P-SR1 chassis. R. Peters, 25 Horsepit Lane, Pinchbeck, Spalding PE11 3YB. 01775 766 300.

Wanted: Four 32 + 32µF electrolytic capacitors for the Serviscope Model S31. Peter Ward, Petgra, Forest Corner, Ringwood, Hants BH24 3JW. 01425 475 445.

Wanted: Manuals or service sheets for the Telefunken 615-02 chassis and the Grundig 2 x 4 and 2 x 4 Super VCRs. R.J. Bartlott, 27 Trelawny Road, St. Agnes, Cornwall TR5 0TP. 01872 552 896.

Wanted: Circuit diagram or manual for the Hitachi CPT0652 combi set (radio/tape/6in. TV). F. Dron, 14 Malton Road, Woolton, Liverpool L25 8QX. 0151 428 5205.

Wanted: Circuit diagram or manual for the Grundig STR20bGB. A copy will do. Also for the STR22 if possible. T. Wells, 2A White Conduit Street, Islington, London N1 9EL.

Wanted: Teletext board or V board for the Sony Model KVM16TU. D. Stodell, 59 Lucien Road, Tooting Bec, London SW17 8HS. 0181 767 4304.

Wanted: Chopper transformer (T3, part no. 7346) for the Fidelity CTV14 (S or R, also used in the CTV20). Willing to buy a complete set for the part. R. Parsons, Trevena, 490 Coventry Road, Hinckley, Leics LE10 0NJ. 01455 616 648.

Wanted: Any books dealing with the development of colour TV in the USA and the UK during the Fifties, in particular *25 Years of BBC Television* which is a technical reference to BBC Television Engineering from 1936 to

1961. Bob Netherway, G0PDV, 28 Snowdon Road, Fishponds, Bristol BS16 2EJ. 0117 939 0380 or 0421 378 100 (mobile).

For disposal: About 140 issues of *Practical Television* dated from 1953-71, also Fifties and Forties radio and television servicing books by F.J. Camm etc. Bob Kerr, 26 Howe Road, Kilsyth G65 0LE. 01236 824 140.

Wanted: Service manual (photocopy would do) for the ITT Model CT3448, and an MAB8461PW084 chip for an ITT teletext decoder, type 6911 1154. A complete decoder would do if reasonably priced (it's of the Fastext variety using Philips chips). Symon McCabe, 14 Trevelthan Road, Illogan, Redruth, Cornwall TR16 4DX. 01209 211 964.

Wanted: Teletext panel for the JVC JX chassis (Model AV25F1EK), working or not. Mervyn Quilter, 23 Bearsdown Close, Eggbuckland, Plymouth PL6 5TX. 01752 702 247.

Wanted: Operating instructions (photocopy would do) for the Sanyo VHR251E VCR (with on-screen assist system). S. Tranmer, 33 Walton Street, Anlaby Road, Hull, Humberside HU3 6JB. 01482 564 343.

Wanted: Circuit diagram and connection details for the scart panel used in the Ferguson TX100 chassis. The panel has serial no. T1655C and there is a white ticket on the back saying 01V6 1655 005. T.K. Munn, 35 Hollows Avenue, Foxbar, Paisley PA2 0RA.

Wanted: Any make of £1 coin operated TV meter. Any condition, any quantity considered. Also v.h.f.-u.h.f. TV upverters. Gwilym Jones, Einion Electronics, Bridge Street, Llanfair Caereinion, Welshpool, Powys SY21 0RZ. 01938 810 539.

Wanted: Auto tuner panels F1780GE and F1779GE, in working condition, for the Sharp VC750HM VCR. Also a remote control unit for the Sony SLF30 VCR. Ron A. Bruce, 11 New Zealand Way, Rainham, Essex RM13 8JP.

Wanted: Photocopy of page 6 of the Toshiba 255T7B service manual. M. Marti. 180 Putteridge Road, Luton, Beds LU2 8HJ.

Wanted: Does anyone know of a source of spares and information for a TV set branded BPL - Model 9002 ECR/11. A. Roberts, Enterprise TV, 261 Warrington Road, Abram, Wigan WN2 5RQ. 01942 865 621.

Wanted: A42-556X, 560EGB-22, 560GAB-22 and A66-540X (30AX) tubes in good condition. Also a LOPT (part no. 29201-011-01M/3703B22) for the Grundig GSC100 chassis and a circuit diagram for the Murphy B831 radio (photocopy will do). R.E. Norgan, 24 Hankinson Road, Winton, Bournemouth, Dorset BH9 1HJ. 01202 529 181.

Wanted: MCX144R111 Toshiba chassis. If available please fax (011) 331 8530 with a priced invoice so that payment can be arranged. Arthur George, PO Box 5327, Rivonia 2128, South Africa.

Wanted: LOPT for the Mitsubishi Model VS503B/VS506B projection TV set. Part no. 334B07006. Purchase of complete set considered. John Howes, 146 London Road, Southborough, Tunbridge Wells, Kent TN4 0PJ. 01892 528 682/537 288.

Wanted: LCD panel for a Zenith SlimSport 286 portable computer, Model IWL-286-4. A scrap machine with a serviceable screen would do. John Howard, 111 Robinet Road, Beeston, Nottingham NG9 1GP. 01159 222 579.

Wanted: Does anyone have on video the BBC colour TV installation films broadcast during trade transmissions in the late Sixties and early Seventies? I also wish to acquire an old dual-standard colour set, Thorn/BRC 2000 chassis or a Bush model. S. Nicholson, 77 Deerlands Avenue, Parson Cross, Sheffield S5 7WS. 01142 403 980.

Wanted: Nicam and/or text PCB for the Hitachi Model

CT2864TN (G10Q chassis). G.C. Roberts, Knowle TV and Video, 351 Barston Lane, Solihull B91 2SX. 0121 704 9688.

Wanted: LOPT type FB191K for the Amstrad Model CTV1600. W. Shorthose, 1 Barraclough Lane, Barton on Humber DN18 5BB. 01652 635 556.

Wanted: Does anyone know of a suitable pattern replacement remote control unit for the Proline Model TN2800 TV set? A. Robertson, Enterprise TV, 261 Warrington Road, Abram, Wigan WN2 5RQ. 01942 865 621.

Wanted: Remote module and parts to convert a Sony KV2060 to KV2062, or would be interested in a complete KV2062 plus service manual. David Robinson, 1 Sycamore Farm Cottage, Lower Bassingthorpe, Grantham, Lincs NG33 4ED. 01476 585 760

Wanted: FCA030 or HFT683 LOPT for the Matsui Model MB10. W. Richards, 11 Golden Grove, Rhyl, Clwyd LL18 2RR. 01745 330 990.

Wanted: Drum motor and rotary transformers for the Akai VS120EK, or a scrap machine. K.M. Twamley, 25 Davena Drive, Weoley Castle, Birmingham B29 5UL. 0121 426 4471.

Wanted: Circuit diagram for the Fidelity CTV14R (ZX2000 chassis). Good photocopy would do. T.R. Norgan, 6 St. Mirrens Close, Easthowe, Bournemouth B4 5HU. 01202 772 175.

Wanted: Echostar 4500 channel programming guide and Rockdale AP100 user manual. Photocopies will do. T. McCormack, 920 Manchester Road, Castleton, Rochdale OL11 2SR.

Wanted: Front control panel for the Fidelity Model CTV14R – the earlier type with the vol., colour, contrast and brightness controls in the lower part. H. Keighley, 117 Bradford Road, Riddlesden, Keighley, W. Yorks BD20 5JH. 01535 603 012.

Wanted: Mains transformer and service manual for the Binatone 01/6900 call time clock radio, also a remote control unit and an r.f. converter for the Salora SV6910/Akai VS422 VCR. P. Redpath, 47 Corbett Road, Waterlooville, Hants PO7 5TA.

Wanted: Circuit diagram or any information for the H/H slave a.f. power amplifier type TPA25M. Would buy complete amplifier. Raymond McAteer, 23 Mount Street, Garvagh, Co. Londonderry BT51 5AA. 01266 558 230.

Wanted: Back issues of *Television* from 1980 to 1990. Zylbering Eytan, Kibutz Revadim, 79820, Israel.

Wanted: Service manual for the Inno-Hit VCR Model SV1231, serial no. 621A901113, made in Korea. Does anyone know the manufacturer or a source of spares? Pepe Sammut, 8/5 Silver Street, Randwick, Sydney, NSW, 2031, Australia.

Wanted: Circuit diagram and mains transformer for the Funai VT14NT Mk 3 TV/VCR combination, also a circuit diagram for the Dainichi CTV1402 TV receiver. M. Law, 18 Vernon Street, Worksop, Notts S80 2JX. 01909 482 923.

Wanted: Circuit diagrams (photocopies will do) for the Blaupunkt Model FC8000 hi fi and GoldStar Model MV80 midi hi fi. Peter Hancox, PO Box 1175, Swakopmund, Namibia. Fax 0926 4641 2249.

Catalogues

A new technical books catalogue, edition 25, is available from Mauritron Technical Services, 8 Cherry Tree Road, Chinnor, Oxfordshire OX9 4QY, telephone 01844 351 694, fax 01844 352 554. An addition to the catalogue is Mauritron's Computer Monitor Circuits Volume 1, which is available at £39.95 (order code MP286). The book contains circuit diagrams and servicing information for a wide range of models.

North London spares importer-distributor Philex Plc has just published its 1995 Remote Control catalogue. Details of some 155 units covering 157 brands are included. A particularly useful feature is the cross-referenced remote control unit/TV, VCR, satellite receiver listing of over 12,000 models. For a copy of the catalogue, apply to Philex Plc, Philex House, 110-124 The Broadway, West Hendon, London NW9 7BP. Telephone 0181 202 1717, fax 0181 202 0014.

A recent addition to the Philex range of remote control units is the Optim-8 preprogrammed remote handset. It has a learning capability that enables it to reproduce the key functions of most IR remote control units. If the original remote control unit has certain key functions that do not appear on the Optim-8, it can be preprogrammed to override an existing key function. Up to 120 individual commands can be learnt from other remote control units. The recommended retail price of the Optim-8 is £39.95.

Answer to Test Case 394

– see page 867 –

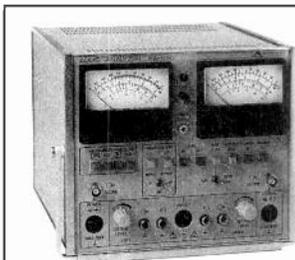
Hush! Sage is still listening for a rumble from the CD player's motor bearings and giving Technocrat filthy looks. TC, his ears like roast chops beneath the headphones, continued to investigate the remaining sound fault with the Hitachi VT410 VCR. He now knew that the audio head, a new one fitted by person(s) unknown, was clean and correctly aligned – mechanically anyway – and that the problem was lack of h.f. audio response with the machine's own recordings. These produced the same lacklustre results when played back by another machine. So the cause of the fault lay somewhere in the audio recording section.

It seemed unlikely that the sound recording amplifier's h.f. response had any shortcomings, and after his previous tribulations TC wasn't inclined to try any more frequency-response tests – even if Sage hadn't removed the a.f. generator as a firm hint. What else has a bearing on the recording process? The h.f. bias level of course.

In this particular model it's set up by preset RT401 to produce a specific reading across a resistor in series with the audio head. TC found that the setting was much too high. Once it had been reset to the correct level, all was well with whatever tapes the machine played back, whether they were recorded by the machine itself or by another machine. Whoever had trod in the replacement head (Wild West Video Repairs?) had a lot to answer for!

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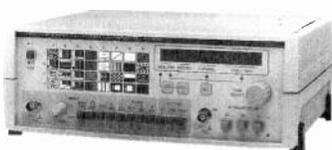
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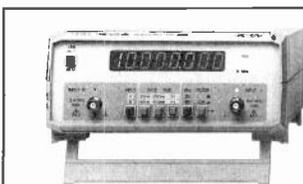
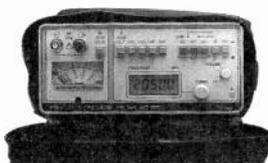
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TV & Satellite Level Meter

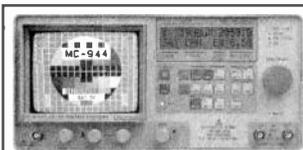
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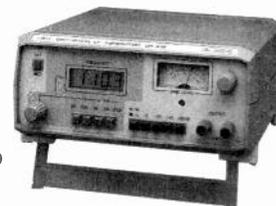
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ble audio subcarriers, etc. Full autocorrection for superb, unequalled accuracy! RS-232 as standard. £ 1895

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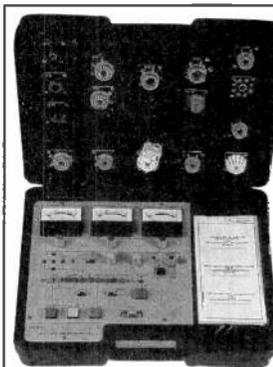
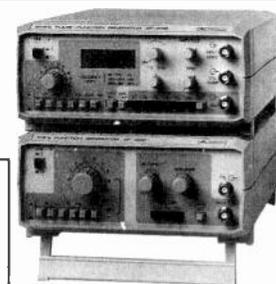
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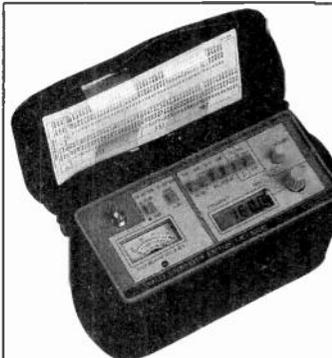


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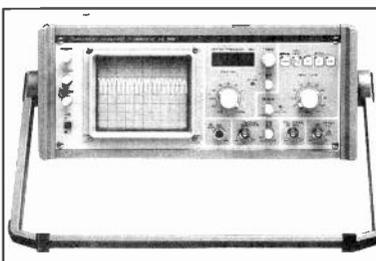
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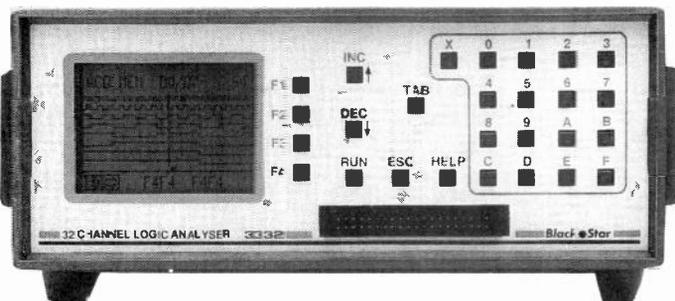
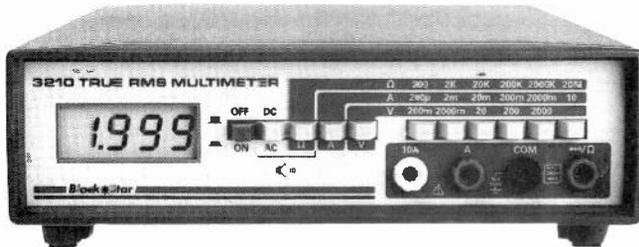
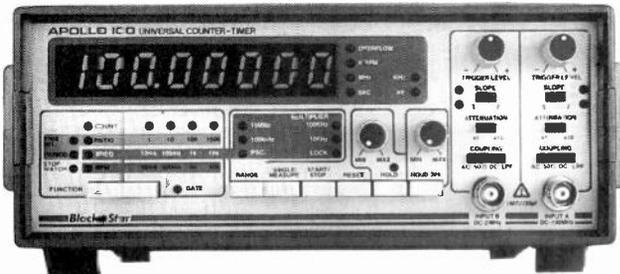
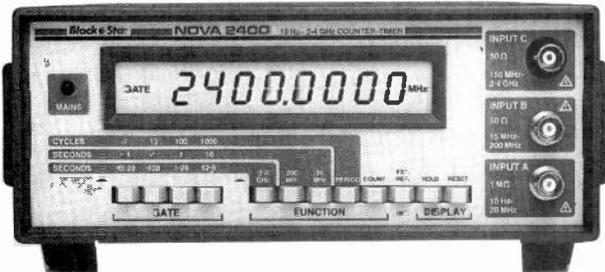
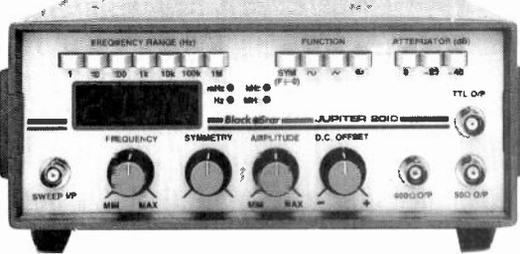
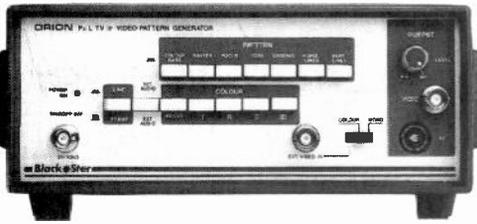
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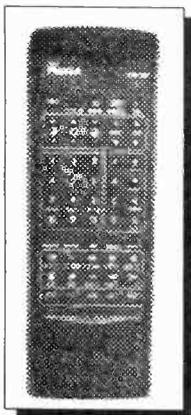
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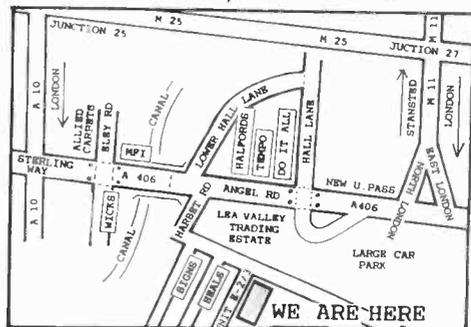
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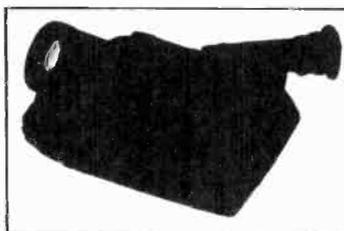
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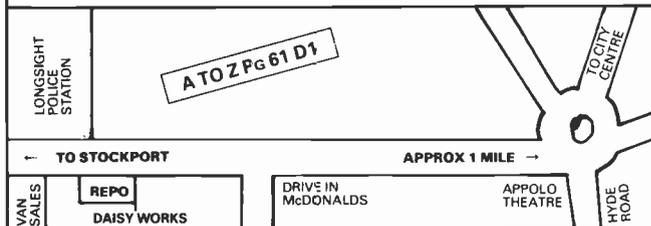
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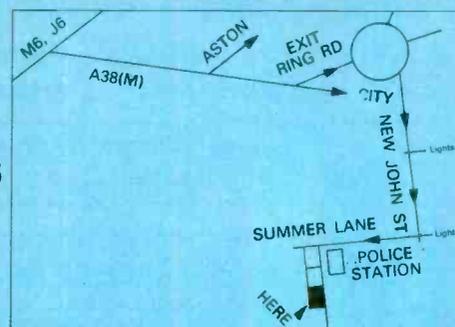
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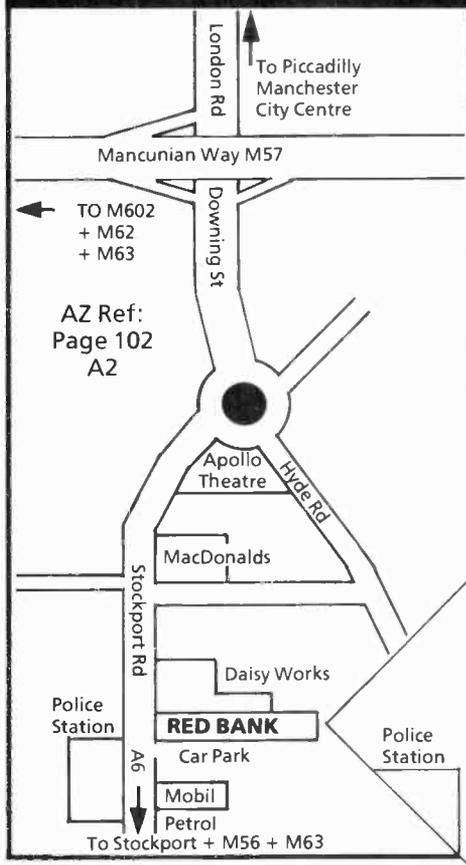
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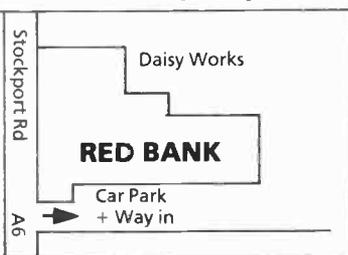
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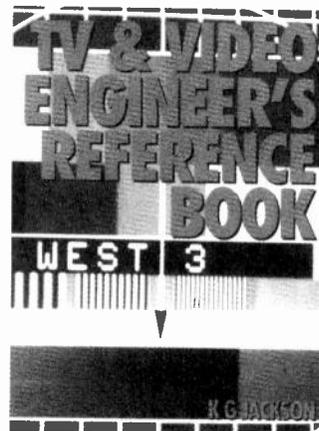
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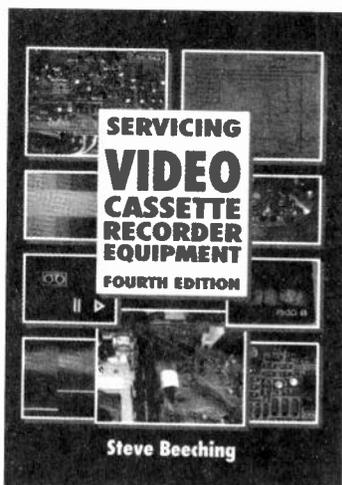
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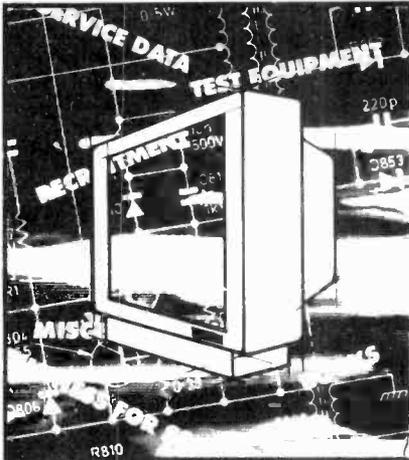
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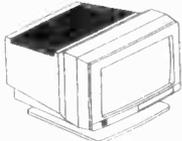
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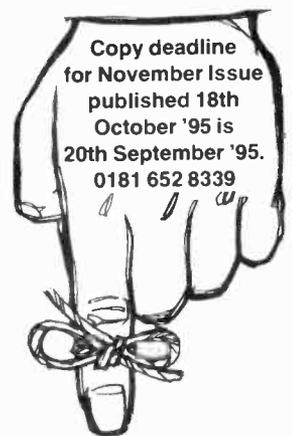
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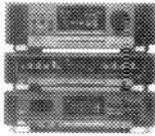
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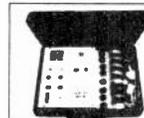
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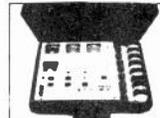
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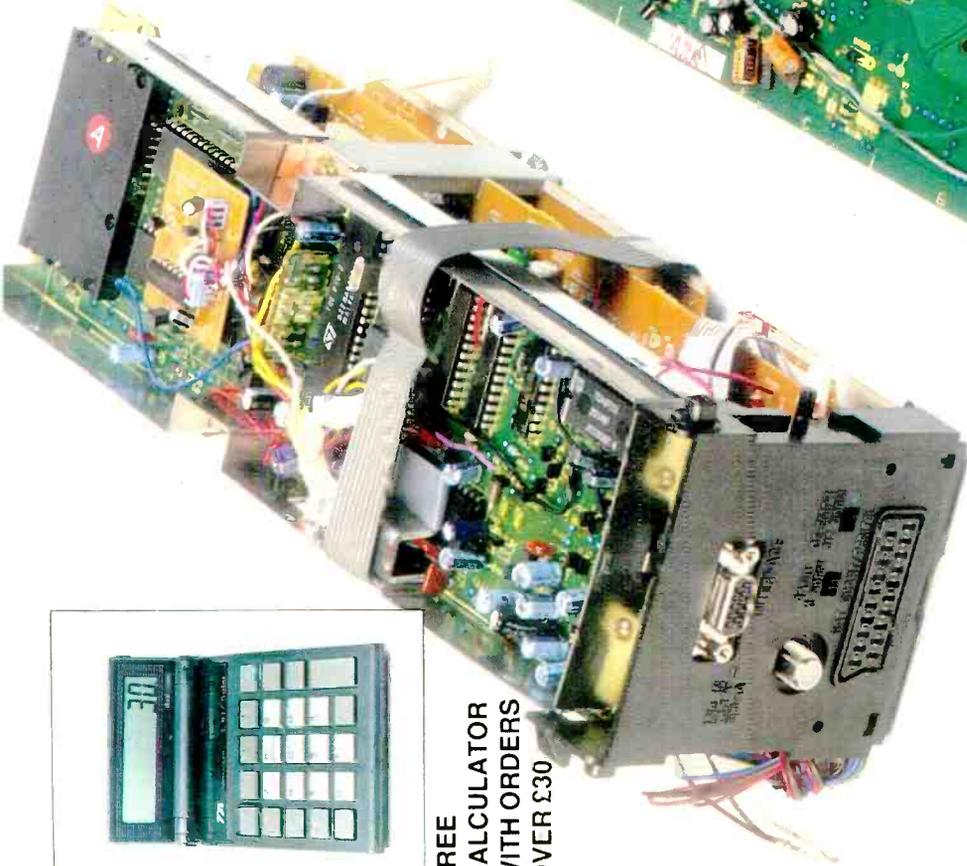
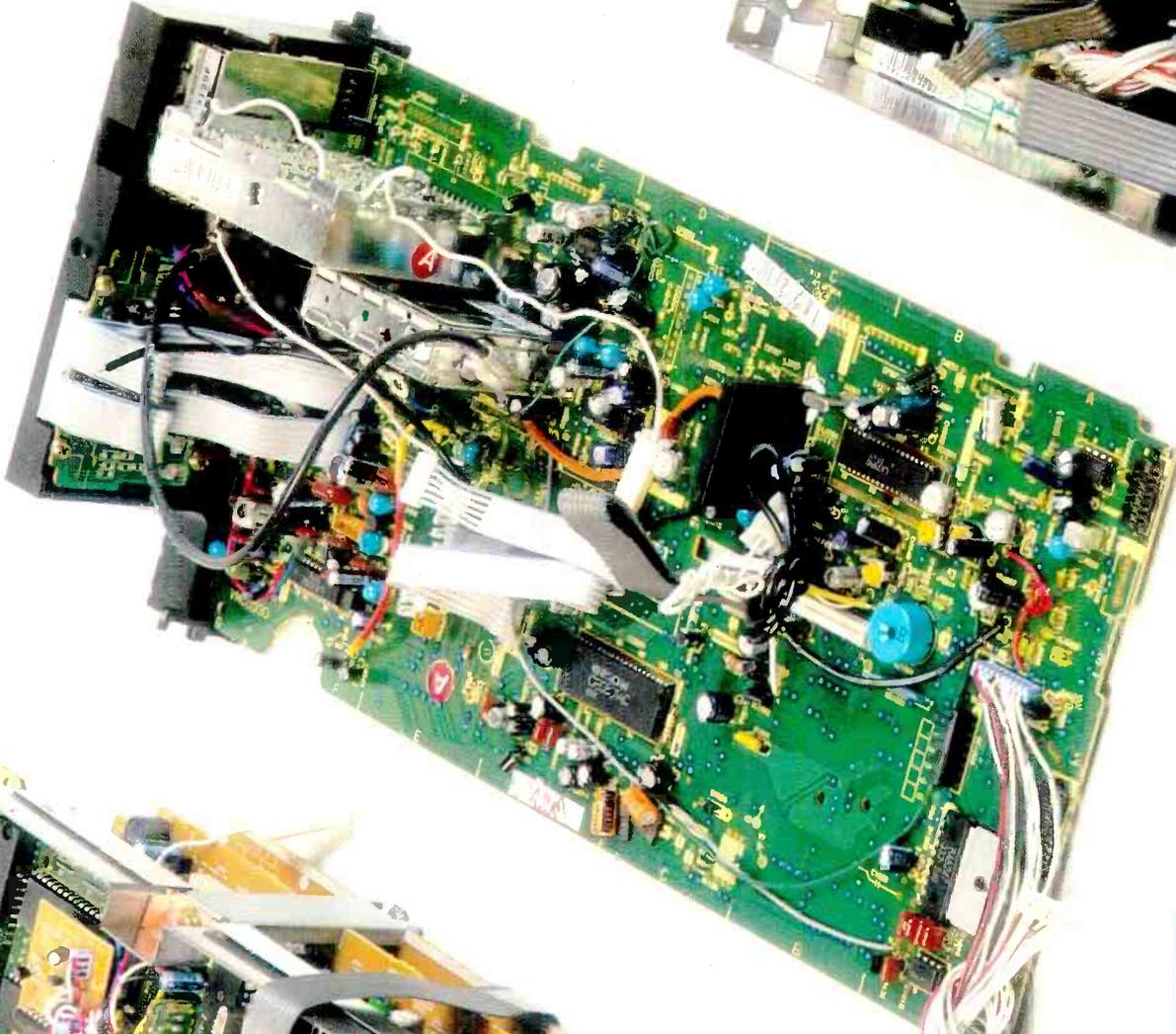
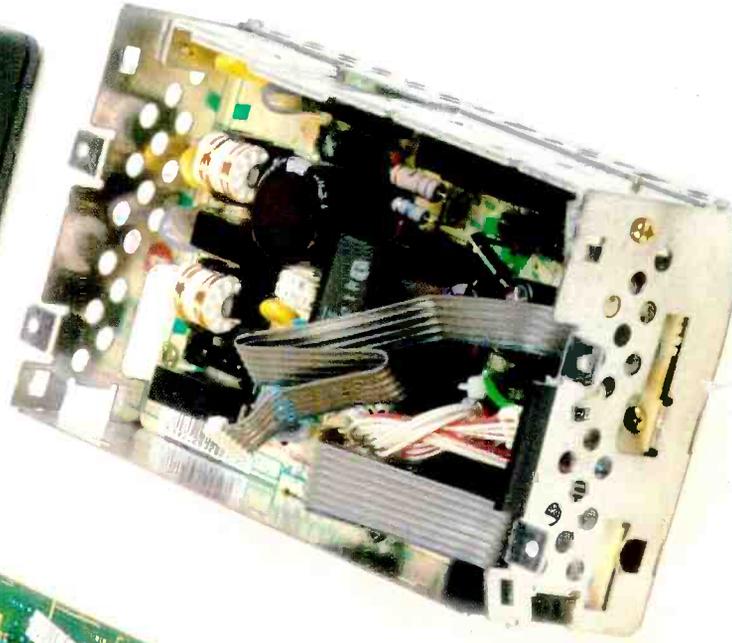
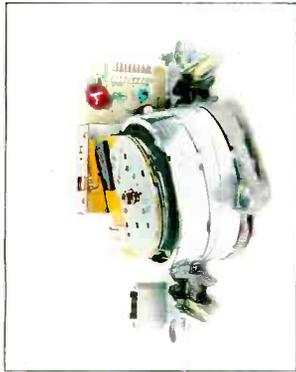
ADVERTISERS' INDEX

J.J. Components.....	889
Aerial Techniques.....	863
Alban Electronic Ltd.....	893
Alberice Meters.....	897
AZ Electrics.....	898
Autogard.....	861
Besco.....	906
Blackstar.....	899
Broughframe.....	861
Bull Electrical.....	896
Campion Wholesale TV Ltd.....	903
Central TV Wholesale.....	902
Centrevision.....	903
Coastal Aerial Supplies.....	901
Colour Trade.....	905
Cricklewood Electronics.....	877
CTV (Midlands).....	902
CTV (N.E.).....	905
East London Components.....	844
East London Wholesale.....	903
Economic Devices.....	872-3
Electronic Consultant Services.....	867
Electronic Sound Systems.....	861
Express TV.....	895
Gogglebox.....	906
Grandata Ltd.....	834-843
Hardy, J.W.....	895
Harrison Electronics.....	894
HCTV.....	904
HST.....	902
Manor Supplies.....	853
Maplin Electronics.....	849
Marapet.....	844
Muter, Ulrich.....	911
OSAN.....	847
Philex.....	IFC
P.V. Tubes.....	844
Red Bank.....	907
Repo TV.....	903
SEME Ltd.....	898
Senz Components.....	IBC & BC
Smart. B., Crawley Ltd.....	901
Star Vision.....	901
Stewart of Reading.....	895
Swift.....	894
Telnet.....	877
Teleplace.....	901
Teleprice Ltd.....	907
Transworld Satellite.....	877
Tree, W.....	905
Turner & Lyon.....	898
TV Live.....	864
Vista Electronics.....	897
Welwyn Tools.....	877
West Midlands TV.....	906
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2434002 36962 2435062 AT 2078/25 2436797 AT 2076/78 2433752 AT 2077/81-£15 2433952 AT 2076/88 2434141 2434451 TFB 3035D 2434494 - £12 TFB 3069D 2434492 - £12 TFB 4023AD 2434274 TFB 4039AD 2434393 TFB 4066AD 2432981 FCC 2115BE 2435372 TLF 14567F 2435701 TLF 14568F 2432351 2432211 2432984 2432491 2432871 Y260482 2432851 2435121 3220029 3714016 3216001 47003481	REMOTE LEADS TX100 Start to Start Front Panel all pin connected £4 £2.00 1 1/2 metres	SUPER HIGH CAPACITY BATTERY VA310 9.6V 700 mA £3	BG 2087-642-1005 Triplers £7.00 BG 2032-642-3002 £7.00	
2434002 36962 2435062 AT 2078/25 2436797 AT 2076/78 2433752 AT 2077/81-£15 2433952 AT 2076/88 2434141 2434451 TFB 3035D 2434494 - £12 TFB 3069D 2434492 - £12 TFB 4023AD 2434274 TFB 4039AD 2434393 TFB 4066AD 2432981 FCC 2115BE 2435372 TLF 14567F 2435701 TLF 14568F 2432351 2432211 2432984 2432491 2432871 Y260482 2432851 2435121 3220029 3714016 3216001 47003481	REMOTE LEADS TX100 Start to Start Front Panel all pin connected £4 £2.00 1 1/2 metres	SUPER HIGH CAPACITY BATTERY VA310 9.6V 700 mA £3	PERDIO PV 1188 Handsets £3.00	
2434002 36962 2435062 AT 2078/25 2436797 AT 2076/78 2433752 AT 2077/81-£15 2433952 AT 2076/88 2434141 2434451 TFB 3035D 2434494 - £12 TFB 3069D 2434492 - £12 TFB 4023AD 2434274 TFB 4039AD 2434393 TFB 4066AD 2432981 FCC 2115BE 2435372 TLF 14567F 2435701 TLF 14568F 2432351 2432211 2432984 2432491 2432871 Y260482 2432851 2435121 3220029 3714016 3216001 47003481	REMOTE LEADS TX100 Start to Start Front Panel all pin connected 			



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