

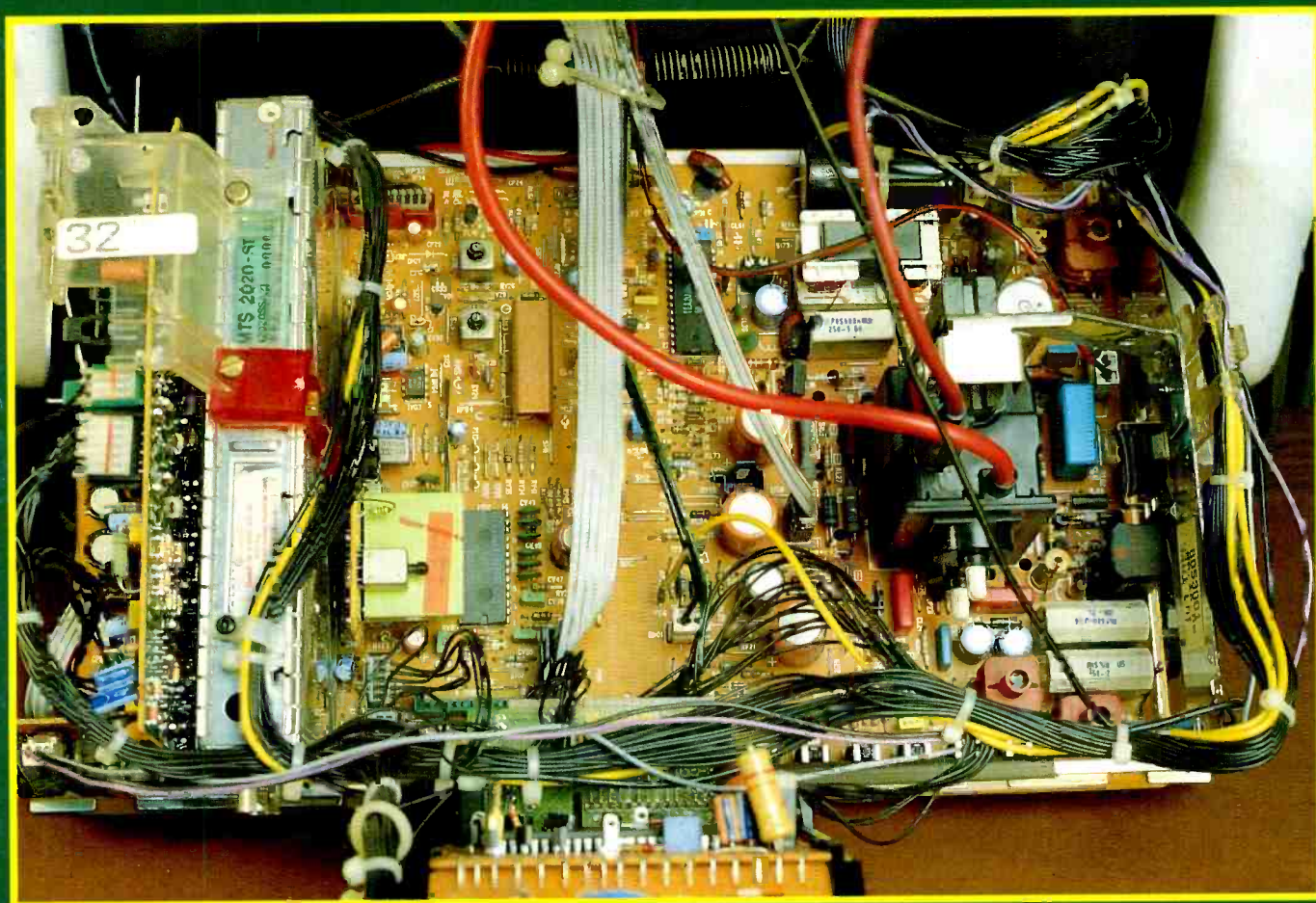
OCTOBER 1992

£1.95

TELEVISION

SERVICING · VIDEO · SATELLITE · DEVELOPMENTS

FREE 32-PAGE CATALOGUE



**Servicing B & O 31XX Series CTVs
NICAM Reception Problems • DX-TV
IBC '92 • Auto Shake Compensation
Pioneer's Video Disc Recorder
VCR Clinic • TV Fault Finding**



REPLACEMENT REMOTE CONTROLS ?

**WE COVER MOST
BRANDS OF TELEVISION
AND VIDEOS**

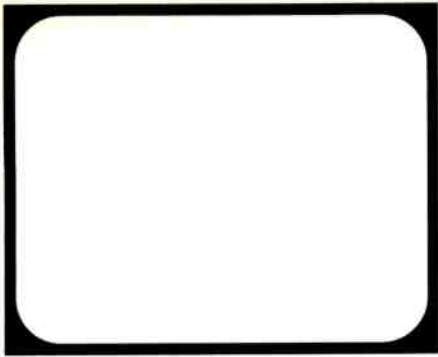


PHILEX PLC 

PHILEX PLC 841 HARROW ROAD LONDON NW10 5NH

**FOR FURTHER INFORMATION, INCLUDING
CUSTOM DESIGNED UNITS CONTACT
PHILEX OR AN AUTHORISED DISTRIBUTOR**

TEL: 081-968 9684 FAX: 081-960 0449



TELEVISION

October
1992

Vol. 42, No.12
Issue 504

On sale September 16th

COPYRIGHT

© Reed Business Publishing Ltd., 1992. Copyright in all drawings, photographs and articles published in *Television* is fully protected and reproduction or imitation in whole or in part is expressly forbidden. All reasonable precautions are taken by *Television* to ensure that the advice and data given to readers are reliable. We cannot however guarantee it and we cannot accept legal responsibility for it.

CORRESPONDENCE

All correspondence regarding advertisements should be addressed to the Advertisement Manager, "Television", Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. Editorial correspondence should be addressed to "Television" Editorial Department, Reed Business Publishing, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

INDEXES AND BINDERS

Indexes to Vol. 39 and 40 are available at £2.00 each from the Editorial office (address above). Indexes to Vols. 37 and 38 are available at £1.50 each. Photostats of the indexes to Vols. 31 - 36 can be supplied at £1.00 each. Make cheques etc. payable to Reed Business Publishing Ltd.

Binders that hold twelve issues of *Television* are available for £5 each from Television Binders, 78 Whalley Road, Wilpshire, Blackburn BB1 9LF. Make cheques payable to "Television Binders".

SUBSCRIPTIONS

An annual subscription costs £23 in the UK, £28 overseas (by surface mail - airmail quote on request). Send orders with payment to Quadrant Subscription Services Ltd., Oakfield House, Perrymount Road, Haywards Heath, Sussex, RH16 3DH.

Subscription hotline for 24-hour ordering with Credit Card number 0789 200 255.

BACK NUMBERS

Some back issues are available at £2.50 each from Television Back Issues, Room L333, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. Make cheques/postal orders payable to Reed Business Publishing Ltd. Telephone Kathy Lambart on 081 652 8116 for details of issues available.

857 Leader

858 Satellite Notebook

Nick Beer

860 Servicing B and O 31XX Series CTVs

This chassis was used in a couple of smart monitor style receivers, Models M20 and MX2000. There's some unusual circuitry, including the step-up chopper. A look at the mechanical aspects of the sets and the circuitry and guidance on common fault conditions.

Nick Beer

864 Teletopics

865 Help Wanted

866 VCR Clinic

Reports from Brian Storm, Jeff Hebert, Steve Cannon, Paul Hardy, Michael Dranfield, Nick Beer, Estelle Sandford and John Edwards.

868 Palmcorder Shake Compensation

Steve Beeching, T.Eng.

Two methods of providing shake compensation for camcorders: the original Panasonic fuzzy giro system and a new electro-optical system devised by Sony and Canon.

869 At the Amsterdam IBC

George Cole

873 Problems with NICAM

Steve Cannon

NICAM is a robust system but there are one or two faults that can cause confusion. Basic fault symptoms, some modifications and a demodulator setting up procedure.

874 Experiments with Video

David C. Woodnott

Some ways of producing pictures in the pre-vidicon era.

876 What a Life!

Donald Bullock

877 Next Month in Television

878 Pioneer's Video Disc Recorder

Gerald Exeter

A look at the technology used in the first video disc system that offers recording and rerecording.

880 Long-distance Television

Roger Bunney

882 TV Fault Finding

Reports from Philip Blundell, AMIEE, Brian Storm, J. Olijnyk, Michael Dranfield, Bob McClenning, N.J. Williams, John Edwards, Graham Richards, Stephen Leatherbarrow, J.G. Grieve and Mike Leach.

887 Letters

890 CD Player Casebook

Reports from Mike Leach, Nick Beer and Ronald Aranha.

891 Test Case 358

**OUR NEXT ISSUE DATED NOVEMBER WILL
BE PUBLISHED ON OCTOBER 21st**

BC107	8p	BD828	50p	R2008B	100p	2N6385	120p	EY86	70p	AN7145	195p	LA2007	150p	NE555	20p	STK41821	800p	STR41090	500p	TD62305AP	200p	LINEAR IC's	
BC108	8p	BD897	50p	R2010B	100p	2N6403	100p	EY87	70p	AN7146	210p	LA2101	170p	NE555	20p	STK4191	850p	STR44111	650p	TD62382	200p	- Cont.	
BC109	10p	BD899	50p	R2010B	100p	2N6403	100p	EY88	70p	AN7154	180p	LA2102	170p	NE555	110p	STK42311	700p	STR44111	650p	TD62382	200p	TA3592A	350p
BC140	20p	BD977	50p	R2800M	52p	T2800M	72p	PC285	60p	AN7168	260p	LA3160	120p	NE567	115p	STK4272	720p	STR50020	650p	TD62705	250p	TA3640	350p
BC141	20p	BDX32	100p	TIP29	15p			PCF80	10p	AN7178	270p	LA3210	100p	NE571	290p	STK4273	720p	STR50092	650p	TD6304F	300p	TA3651	300p
BC142	20p	BDX33	100p	TIP29A	22p			PCF801	11p	AN7222	180p	LA3220	100p	NE572	290p	STK4301	700p	STR50103	650p	TD63050	300p	TA3652	300p
BC143	20p	BDW23	50p	TIP30	25p			PCF802	8p	AN7256	250p	LA3300	100p	NE582	140p	STK4311	800p	STR50103	650p	TD6350P	200p	TA3653	150p
BC144	8p	BDW24	50p	TIP30C	25p			PCF806	115p	AN7310	90p	LA3350	110p	NE552P	140p	STK4331	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC149	8p	BDW83	50p	TIP30C	25p			PCF806	115p	AN7311	90p	LA3360	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC157	8p	BDY92	100p	TIP31A	22p			PCF806	115p	AN7310	90p	LA3361	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC160	30p	BF137	35p	TIP32A	24p			PCF806	115p	AN7311	90p	LA3362	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC171	10p	BF180	30p	TIP32A	24p			PCF806	115p	AN7311	90p	LA3363	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC172	10p	BF181	30p	TIP32A	24p			PCF806	115p	AN7311	90p	LA3364	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC177	14p	BF181	30p	TIP32A	24p			PCF806	115p	AN7311	90p	LA3365	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC178	14p	BF181	30p	TIP32A	24p			PCF806	115p	AN7311	90p	LA3366	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC179	14p	BF195	7p	TIP34	50p			PCF806	115p	AN7311	90p	LA3367	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC182	7p	BF199	9p	TIP34C	60p			PCF806	115p	AN7311	90p	LA3368	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC183	7p	BF200	9p	TIP36C	65p			PCF806	115p	AN7311	90p	LA3369	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC183A	7p	BF240	16p	TIP41A	20p			PCF806	115p	AN7311	90p	LA3370	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC184	7p	BF245	25p	TIP42A	22p			PCF806	115p	AN7311	90p	LA3371	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC184A	7p	BF254	25p	TIP42C	22p			PCF806	115p	AN7311	90p	LA3372	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC212	7p	BF256	18p	TIP47	40p			PCF806	115p	AN7311	90p	LA3373	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC212L	7p	BF257	18p	TIP48	40p			PCF806	115p	AN7311	90p	LA3374	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC217	7p	BF258	18p	TIP51	120p			PCF806	115p	AN7311	90p	LA3375	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC217A	7p	BF259	18p	TIP52	120p			PCF806	115p	AN7311	90p	LA3376	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC232	7p	BF263	25p	TIP53	120p			PCF806	115p	AN7311	90p	LA3377	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC237	7p	BF270	18p	TIP54	120p			PCF806	115p	AN7311	90p	LA3378	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC239	7p	BF273	18p	TIP55	120p			PCF806	115p	AN7311	90p	LA3379	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC300	20p	BF311	21p	TIP106	65p			PCF806	115p	AN7311	90p	LA3380	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC301	20p	BF312	20p	TIP107	65p			PCF806	115p	AN7311	90p	LA3381	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC302	20p	BF313	20p	TIP110	65p			PCF806	115p	AN7311	90p	LA3382	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC303	20p	BF314	20p	TIP111	65p			PCF806	115p	AN7311	90p	LA3383	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC304	25p	BF362	30p	TIP112	65p			PCF806	115p	AN7311	90p	LA3384	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC327	7p	BF367	13p	TIP115	45p			PCF806	115p	AN7311	90p	LA3385	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC328	7p	BF371	17p	TIP116	45p			PCF806	115p	AN7311	90p	LA3386	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC337	7p	BF420	25p	TIP117	50p			PCF806	115p	AN7311	90p	LA3387	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC338	7p	BF421	25p	TIP120	37p			PCF806	115p	AN7311	90p	LA3388	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC441	28p	BF491	99p	TIP121	46p			PCF806	115p	AN7311	90p	LA3389	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC446	8p	BF422	47p	TIP122	46p			PCF806	115p	AN7311	90p	LA3390	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC449	15p	BF493	99p	TIP125	47p			PCF806	115p	AN7311	90p	LA3391	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC461	28p	BF494	99p	TIP126	46p			PCF806	115p	AN7311	90p	LA3392	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC477	18p	BF495	99p	TIP127	46p			PCF806	115p	AN7311	90p	LA3393	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC478	18p	BF496	99p	TIP128	46p			PCF806	115p	AN7311	90p	LA3394	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC516	22p	BF497	99p	TIP131	30p			PCF806	115p	AN7311	90p	LA3395	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC537	22p	BF498	60p	TIP131	30p			PCF806	115p	AN7311	90p	LA3396	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC546	8p	BF517	40p	TIP142	90p			PCF806	115p	AN7311	90p	LA3397	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC549	8p	BF518	40p	TIP146	90p			PCF806	115p	AN7311	90p	LA3398	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC550	8p	BF519	40p	TIP147	100p			PCF806	115p	AN7311	90p	LA3399	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC554	8p	BF520	40p	TIP150	90p			PCF806	115p	AN7311	90p	LA3400	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC555	8p	BF521	40p	TIP151	90p			PCF806	115p	AN7311	90p	LA3401	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC558	8p	BF522	40p	TIP255	42p			PCF806	115p	AN7311	90p	LA3402	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC560	8p	BF523	40p	TIP305A	45p			PCF806	115p	AN7311	90p	LA3403	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC562	8p	BF524	40p	TIP305B	42p			PCF806	115p	AN7311	90p	LA3404	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC563	8p	BF525	40p	TIP305C	42p			PCF806	115p	AN7311	90p	LA3405	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC568	8p	BF526	40p	TIP305D	42p			PCF806	115p	AN7311	90p	LA3406	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC570	8p	BF527	40p	TIP305E	42p			PCF806	115p	AN7311	90p	LA3407	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	150p
BC571	8p	BF528	40p	TIP305F	42p			PCF806	115p	AN7311	90p	LA3408	110p	SA5560	110p	STK4332	410p	STR50115	650p	TD6359P	200p	TA3654	

VIDEO SERVICE KITS

AMSTRAD

VCR7000
Contents
 BELT SET, PINCH ROLLER, REEL IDLER, VIDEO LAMP
 Order Code: SK41 £5.50

FERGUSON & JVC

3V42/43
 HRD455/HR0725
Contents
 BELT SET, PINCH ROLLER, TENSION BAND, CLUTCH MECHANISM, TENSION BAND
 Order Code: SK37 £17.50

Economy Kit Contents
 BELT SET, PINCH ROLLER, SUPPLY CLUTCH, TAKE UP CLUTCH
 Order Code: SK38 £9.50

3V58/59/64/65
 HRD170/180/210/230/300/320/370/400/430/530/700/750
 HRS5000
Contents
 BELT SET, PINCH ROLLER, IDLER ARM, TENSION BAND
 Order Code: SK44 £8.50

3V29/3V30
 HR7200/7300/7350
Contents
 BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES
 Order Code: SK05 £6.00

3V35/36/38/39/49
 HRD110/111/120/121/225
Contents
 BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES
 Order Code: SK04 £5.50

3V31/3V42
 HR7600/7610/7650/7655
Contents
 BELT SET, T/U REEL TABLE TYRE, PINCH ROLLER, REEL IDLER, T/U CLUTCH, T/U IDLER, TENSION BAND, VIDEO LAMP
 Order Code: SK33 £12.00

Economy Kit Contents
 BELT SET, T/U REEL TABLE TYRE, PINCH ROLLER, REEL IDLER TYRE, T/U CLUTCH
 Order Code: SK34 £5.50

3V35/36/38/39/49
 HRD110/111/120/121/225
Contents
 BELT SET, T/U REEL TABLE TYRE, SUPPLY REEL TABLE TYRE, PINCH ROLLER, T/U CLUTCH, T/U IDLER, REEL IDLER, TENSION BAND
 Order Code: SK35 £10.50

Economy Kit Contents
 BELT SET, T/U REEL TABLE TYRE, SUPPLY REEL TABLE TYRE, PINCH ROLLER, T/U CLUTCH, T/U IDLER TYRE, REEL IDLER TYRE
 Order Code: SK36 £6.50

3V29/3V30
 HR7200/7300/7350
Contents
 BELT SET, T/U REEL TABLE TYRE, SUPPLY REEL TABLE TYRE, PINCH ROLLER, REEL IDLER, T/U CLUTCH, T/U IDLER, TENSION BAND, VIDEO LAMP
 Order Code: SK31 £11.50

Economy Kit Contents
 BELT SET, T/U REEL IDLER TYRE, SUPPLY REEL TABLE TYRE, PINCH ROLLER, REEL IDLER TYRE, T/U IDLER TYRE, T/U CLUTCH
 Order Code: SK32 £5.60

3V44/45/48/53/54/55/57
 HRP50/HRD140/150/158/160
 HRD250/257/565/566/755
Contents
 BELT SET, PINCH ROLLER, CLUTCH MECHANISM, TENSION BAND
 Order Code: SK39 £15.00

Economy Kit Contents
 BELT SET, PINCH ROLLER
 Order Code: SK40 £9.50

FISHER

FVHP905/906/907/908/910/911/916/918
Contents
 BELT SET, PINCH ROLLER, IDLER, GEAR IDLER UNIT, TENSION BAND
 Order Code: SK57 £13.00

Economy Kit Contents
 BELT SET, PINCH ROLLER, IDLER TYRE
 Order Code: SK58 £5.00

FV11/15/16/18/620/622/710/711/715/716/720/721/722/725/730/830/840
Contents
 BELT SET, PINCH ROLLER, IDLER, GEAR IDLER UNIT, TENSION BAND
 Order Code: SK68 £12.50

Economy Kit Contents
 BELT SET, PINCH ROLLER, IDLER TYRE
 Order Code: SK69 £3.60

HITACHI

VT11/VT33
Contents
 BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES
 Order Code: SK08 £6.00

VT11/33
Contents
 BELT SET, T/U P REEL TABLE TYRE, SUPPLY REEL TABLE TYRE, PINCH ROLLER, FF/REW IDLER, CLUTCH PLATE, TENSION BAND
 Order Code: SK45 £15.00

Economy Kit Contents
 BELT SET, PINCH ROLLER, FF/REW IDLER TYRE, T/U P REEL TABLE TYRE, SUPPLY REEL TABLE TYRE
 Order Code: SK46 £4.50

VIDEO SERVICE KITS (Cont.)

HITACHI

VT52/61/62/63/64/65/85/86/640
Contents
 BELT SET, PINCH ROLLER, FF/REW ARM, CLUTCH PLATE, TENSION BAND
 Order Code: SK49 £14.00

Economy Kit Contents
 BELT SET, PINCH ROLLER, FF/REW IDLER
 Order Code: SK50 £3.25

VT400/405/410/13/14/15/18/420/25/26/28/430/31/35/38/450/498/510/520/25/26/50/35/36/540/545/46/48/570/75/576/580/85/88
Contents
 TIMING BELT, PINCH ROLLER, FF/REW ARM, CLUTCH BASE, TENSION BAND
 Order Code: SK52 £11.50

VT100/110/111/113/115/118/120/125/128/130/135/138/145/150/175/220/225/250/255/258/260/VTL30
Contents
 BELT SET, PINCH ROLLER, FF/REW ARM, CLUTCH PLATE, TENSION BAND
 Order Code: SK51 £15.00

PANASONIC

NV2000/NV2010
Contents
 BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES
 Order Code: SK03 £6.25

Economy Kit Contents
 NV7000/NV7200/NV7800
Contents
 BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES
 Order Code: SK02 £5.50

NV300/NV330/NV333/NV340/NV366
Contents
 BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRE
 Order Code: SK01 £5.50

NV2000/NV2010
Contents
 BELT SET, PINCH ROLLER, FF IDLER, PLAY IDLER, TENSION BAND, VIDEO LAMP
 Order Code: SK13 £9.50

Economy Kit Contents
 BELT SET, PINCH ROLLER, IDLER TYRE, PULLEY TYRE
 Order Code: SK14 £4.50

NV7000/NV7200/NV7800
Contents
 BELT SET, PINCH ROLLER, IDLER UNIT, PLAY IDLER, TENSION BAND
 Order Code: SK11 £10.00

Economy Kit Contents
 BELT SET, PINCH ROLLER, IDLER TYRE, CLUTCH TYRE
 Order Code: SK12 £4.20

NV300/NV330/NV333/NV340/NV366
Contents
 BELT SET, PINCH ROLLER, IDLER UNIT, PLAY IDLER, TENSION BAND
 Order Code: SK15 £8.00

Economy Kit Contents
 BELT SET, PINCH ROLLER, IDLER TYRE, PLAY IDLER TYRE
 Order Code: SK16 £4.00

NVG7/NVG9/NVG10/NVG11/NVG12/NVG14/NVG15/NVG16/NVG18/NVG30/NVG120/NVG130/NVG400/NVH65 (PX/AC)/AG1810 (PK)
Contents
 LOADING BELT, CAPSTAN BELT, PINCH ROLLER, IDLER, TENSION BAND
 Order Code: SK27 £9.50

Economy Kit Contents
 LOADING BELT, CAPSTAN BELT, PINCH ROLLER, IDLER TYRE
 Order Code: SK28 £4.50

NV332
Contents
 BELT SET, PINCH ROLLER, PLAY IDLER, FF/REW IDLER, TENSION BAND, FF/REW TYRE
 Order Code: SK29 £13.00

Economy Kit Contents
 BELT SET, PINCH ROLLER, PLAY IDLER TYRE, FF/REW IDLER TYRE
 Order Code: SK30 £5.10

NV230/250/260/280/430/450/460/470/650/810/890/AG1200PK/AG1500PK
Contents
 BELT SET, PINCH ROLLER, IDLER, TENSION BAND
 Order Code: SK23 £7.00

Economy Kit Contents
 BELT SET, PINCH ROLLER, IDLER TYRE
 Order Code: SK24 £3.50

NV600/NV688
Contents
 BELT SET, PINCH ROLLER, PLAY IDLER, FF/REW IDLER, TENSION BAND
 Order Code: SK25 £13.00

Economy Kit Contents
 BELT SET, PINCH ROLLER, PLAY IDLER TYRE, FF/REW IDLER TYRE
 Order Code: SK26 £6.50

NV730/NV770
Contents
 SLOT IN BELT, LOADING BELT, PINCH ROLLER, IDLER UNIT, TENSION BAND
 Order Code: SK19 £7.00

Economy Kit Contents
 SLOT IN BELT, LOADING BELT, PINCH ROLLER, IDLER TYRE
 Order Code: SK20 £4.30

NV370/380/480/630/780/830/850/AG2100PK/AG2200PK
Contents
 BELT SET, PINCH ROLLER, IDLER, TENSION BAND
 Order Code: SK21 £7.00

Economy Kit Contents
 BELT SET, PINCH ROLLER, IDLER TYRE
 Order Code: SK22 £3.50

NV777/NV788
Contents
 BELT SET, PINCH ROLLER, IDLER UNIT, TENSION BAND
 Order Code: SK17 £7.50

Economy Kit Contents
 BELT SET, PINCH ROLLER, IDLER TYRE
 Order Code: SK18 £4.00

VIDEO SERVICE KITS (Cont.)

SHARP

VC381
Contents
 BELT SET, PINCH ROLLER, REEL IDLER, TENSION BAND, VIDEO LAMP
 Order Code: SK47 £9.00

Economy Kit Contents
 BELT SET, PINCH ROLLER, REEL IDLER TYRE
 Order Code: SK48 £5.00

VC500/VC571/VC581/VC582/VC583/VC584/VC5F3
Contents
 BELT SET, PINCH ROLLER, REEL IDLER, TENSION BAND
 Order Code: SK60 £9.50

Economy Kit Contents
 BELT SET, PINCH ROLLER, REEL IDLER
 Order Code: SK61 £6.50

VC781/VC7810/VC782/VC7822/VC785/VC786/VC793/VC800/VCA100/VCA102/VCA104/VCA202
Contents
 BELT SET, PINCH ROLLER, REEL DRIVE UNIT, TENSION BAND
 Order Code: SK64 £13.50

Economy Kit Contents
 BELT SET, PINCH ROLLER, REEL DRIVE UNIT TYRE
 Order Code: SK65 £6.25

VC681/VC682/VC684/VC685/VC693/VC699/VC6F3/VC700
Contents
 BELT SET, PINCH ROLLER, REEL DRIVE UNIT, TENSION BAND
 Order Code: SK62 £13.50

Economy Kit Contents
 BELT SET, PINCH ROLLER, REEL DRIVE UNIT TYRE
 Order Code: SK63 £6.25

THIS MONTH SPECIAL OFFERS

PHILIPS

CASSETTE LIFT ASSEMBLY 69120366 £11.00
 DV186, 190, 286, 471, 562, 761, VR6180, 6182, 6185, VR6285, 6290, 6291, 6293, 6362, 6367, 6393, VR6467, 6468, 6470, 6561, 6670, 6760, 6761, 6870, 6970

PRESSURE ROLLER ASSEMBLY

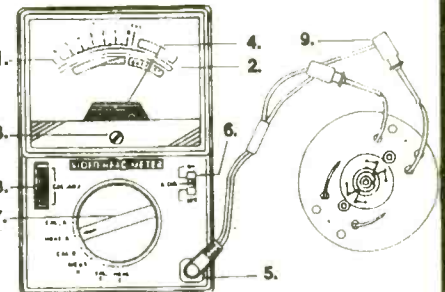
£5.00
 DV186, DV190, DV286, DV486, DV471, DV582, DV571, DV761, VR6180, VR6182, VR6185, VR6285, VR6290, VR6291, VR6293, VR6362, VR6367, VR6390, VR6391, VR6393, VR6467, VR6468, VR6470, VR6561, VR6570, VR6581, VR6670, VR6676, VR6760, VR6761, VR6762, VR6870, VR6970, VR6975, VR8681, 63S87, 68S84, 71S84, 72S88, 92S831

★ ★ JUST ARRIVED ★ ★
 10,000 PC's

★ ★ ALSO ★ ★
 TV REMOTE CONTROLS FOR
 200 DIFFERENT MODELS

ALL AT KNOCKDOWN PRICES
 PLEASE RING FOR DETAILS

VIDEO HEAD TESTER



1. Mechanical Position of Pointer
2. Scale Plate
3. Pointer Adjusting Screw
4. Pointer
5. Measuring Socket
6. Power ON/OFF and Battery Check Switch
7. Range Selector Rotary Switch
8. CAL. ADJ (calibration volume)
9. Measuring Clip

PRICE
 YF-225 VHS £30.00 + VAT
 YF-225B BETAMAX £29.00 + VAT

GRANDATA LTD

K.P. HOUSE, UNIT 15, POP IN COMMERCIAL CENTRE,

SOUTHWAY, WEMBLEY, MIDDLESEX, ENGLAND

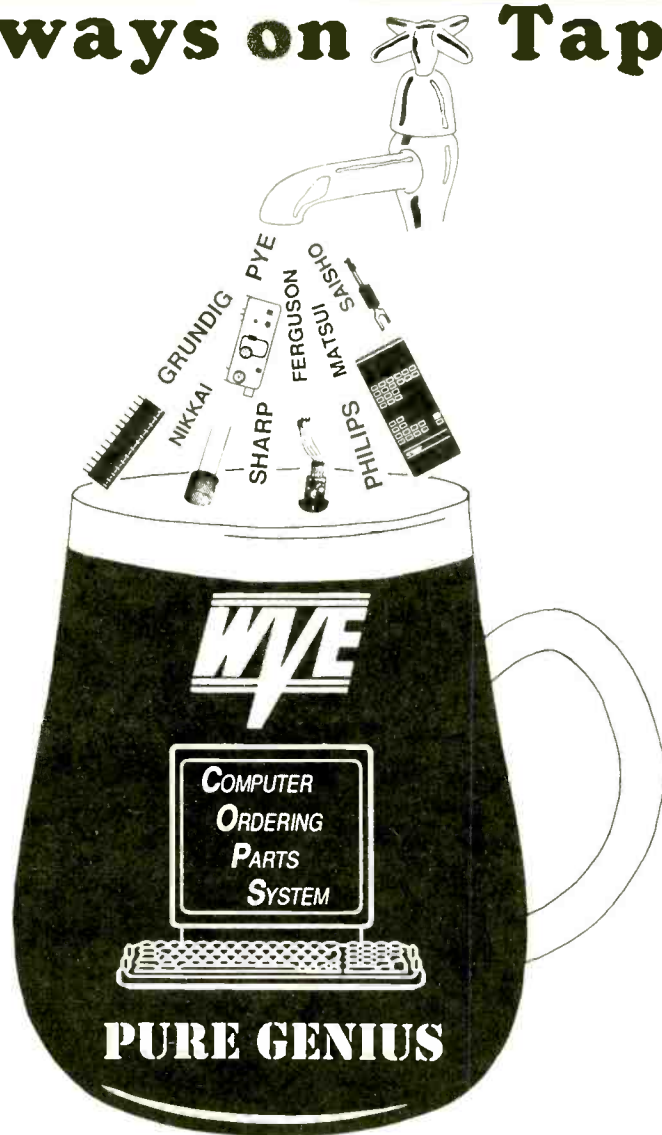
Telephone: 081-900 2329 Telex No: 932 885 (Sunmit)

Fax: 081-903 6126

Access & Visa Card accepted. Open Monday to Saturday.

DRAUGHT COPS

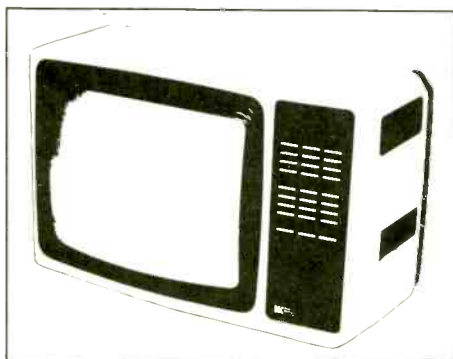
Always on Tap



**See the light
even in the dark
24 hours a day, 7 days a week**

DATA TEXT 90 VIEWDATA TERMINALS

Willow Vale has once again managed to obtain a quantity of this popular unit. These are *ex-contract* units, fully tested and offered with a 90 day guarantee. In addition to its use as a viewdata terminal, the unit can be used as a Teletext receiver [picture disabled] and as a point of sale display.



- **Five Number Auto Dial Memory**
Five telephone numbers can be stored in the units memory and recalled by typing a single number. The number is then dialled automatically. Manual keyboard dial option. Standard viewdata 1200 75 baud modem built in. Pulse dial.
- **Teletext TV Receiver**
The unit incorporates a teletext facility, pages may be selected and saved / displayed on screen. Timed page gather facility.
- **Page Designer**
Viewdata type pages may be made up using the local edit facility and saved to tape, or displayed using the Carousel function.
- **Carousel Function**
Allows previously designed / stored pages to be displayed from the page memory built into the unit. The pages may be displayed in order, for a period of 1.5 seconds to over 2 minutes. Ideal for point of sale displays, etc.
- **Page Store**
There are 10 page stores available in the units memory, these may be used to store viewdata pages or self designed pages.
- **Standard Features**
14" Colour Monitor with full size keyboard, printer socket, tape socket and RS232 socket. Socket for TV aerial and floppy disc. Keyswitch for power on/off.

order code
99090X

£125.00
plus V.A.T.

COPS Enquiries : Dave Allen
0734-860158 Fax 0734-867188

SONY KTX1400 14" TRINITRON COLOUR VIEWDATA TERMINAL

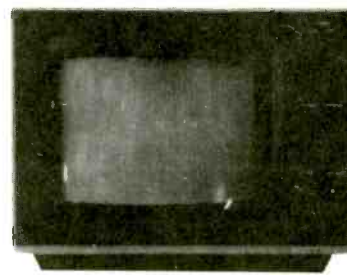


Features

- Maximum 6 number memory
- Autodial (Pulse Dialling)
- Full size Alpha-numeric keyboard
- Socket for Printer and Tape Recorder
- Slider Volume Control
- Carrying Handle
- Memory Protect Switch
- Refurbished/ Tested Units Supplied with Keyboard

Order Code **99140** Our Price **£85.00** + VAT

SONY KTX9100 7.5" (DIAGONAL) COLOUR VIEWDATA TERMINAL



Features

- Portable Viewdata Terminal with Carrying Handle and Full Function Miniature Keyboard
- 6 Memory Autodial with Manual Dial Option Pulse or Tone Dial
- Menu Selectable Functions
- Printer Socket (Din) for Video or Dot Matrix Printer
- Tape Record/Replay Socket (Din)
- External Modem Socket (RS232)
- Refurbished/ Tested Units

Order Code **99910** Our Price **£125.00** + VAT

Also KTX9000 Pulse Dial only

Order Code **99900** Price **£120.00** + VAT

Reading: 0734-876444

Manchester: 061-682-1415

Nottingham: 0602-870789

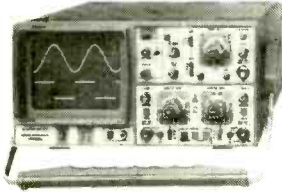
Willow Vale Electronics Ltd

HOW TO INCREASE YOUR PROFITS, IMPROVE YOUR SERVICE, WITH COST EFFECTIVE TEST EQUIPMENT.

HAMEG OSCILLOSCOPES

HAMEG are Europe's top selling DUAL TRACE OSCILLOSCOPES. Select from four superb models. All, with the exception of the HM 1005, incorporate a useful COMPONENT TESTER. Size - all models - 285mm x 145mm x 380mm. Clear display 8cm x 10cm. Mains supply: 110/220/240V AC 50/60Hz. All supplied with 2 PROBES, a COMPREHENSIVE MANUAL and a 2 YEAR WARRANTY.

HM203-7 20MHz STANDARD



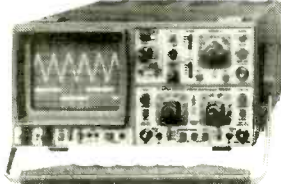
- SPECIFICATION**
- * 2 Channels
 - * Bandwidth: DC - 20MHz
 - * Sens: Ch.1, Ch.2, 1mV/cm
 - * Timebase: 0.1s - 20ns/cm
 - * Triggering: DC - 40MHz
 - * Active TV - Sync - Separator
 - * Variable hold-off
 - * Trigger LED indicator
 - * Calibrator: 1KHz Square wave
 - * Component tester
 - * Plus many features

Price £338.00 + £59.15 V.A.T. FREE Specialist Carrier Delivery

SPECIFICATIONS

- * 2 Channels
- * Bandwidth: DC - 60 MHz
- * Sens: Ch.1, Ch.2, 1mV/cm
- * Timebase: 2.5s - 5ns/cm
- * Triggering: DC - 80MHz
- * Active TV - Sync - Separator
- * After delay trigger
- * Sweep delay
- * Delay line
- * Trigger LED indicator
- * Calibrator: 1KHz & 1MHz Sq. Wave
- * Component tester

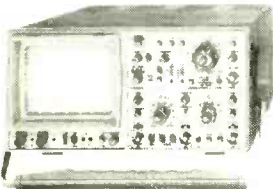
HM604 60MHz UNIVERSAL



Price £610.00 + £106.75 V.A.T. FREE Specialist Carrier Delivery

HM1005 100MHz UNIVERSAL

3 CHANNELS - UP TO 6 TRACES



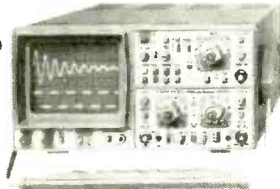
- SPECIFICATION**
- * 3 Channels
 - * Bandwidth: DC - 100MHz
 - * Sens: Ch.1, Ch.2, Ch.3, 1mV/cm
 - * Timebase A: 2.5s - 5ns/cm
 - * Timebase B: 0.2s - 5ns/cm
 - * Triggering DC - 130MHz
 - * After delay trigger
 - * Delay line
 - * Trigger LED indicator
 - * Overscan LED indicator
 - * Active TV - Sync - Separator
 - * Calibrator: 1KHz & 1MHz Sq. Wave

Price £792.00 + £138.60 V.A.T. FREE Specialist Carrier Delivery

HM205-3 20MHz DIGITAL STORAGE

SPECIFICATION

- * Digital Storage
- * Analogue real time (Same as 203-7)
- * Bandwidth: DC - 20MHz
- * Sens: Ch.1, Ch.2, 1mV/cm
- * Timebase Digital: 5s-1µs/cm
- * Triggering DC - 40MHz
- * Active TV - Sync - Sampling
- * Max sampling rate: 2 x 20MHz
- * Memory: 2 x 2048 x 8 Bit
- * Dot joiner
- * Printer/plotter output



Price £610.00 + £106.75 V.A.T. FREE Specialist Carrier Delivery

B.K.'s CRT TESTER REJUVENATOR



Tests and rejuvenates blue, green and red guns separately. Fitted with delta and P.I.L. sockets. Compact size 120 x 65 x 60mm. Supply 240V AC
Price £34.00 + £5.95 V.A.T.

DIGITAL CAPACITANCE METER



* High accuracy.
* 0.1pf-2,000µf.
* LCD display.
* 8 ranges.
* Accuracy +/- 0.5%.
* Full scale +/- 1 digit.
* Inc. protective case.
Price £39.99 + £6.99 V.A.T.

LEADER FM STEREO SIGNAL GENERATOR

At last! A generator specifically designed for testing and fault finding on FM stereo and monaural VHF receivers including stereo multiplex circuits.

FEATURES

- * Carrier frequency 100 +/- 1MHz (adjustable).
- * Output level 0.1mV - 10mV.
- * Pilot signal 19KHz +/- 2Hz.
- * L & R separation over 50dB.
- * External Modulation 50Hz - 15KHz.
- * Pre-emphasis 50µs, 75µs & off.
- * Comprehensive test lead set included.
- * Mains powered.
- * Size: 80 x 200 x 250mm.



Price £299.00 + £52.33 V.A.T.

LEADER HIGH VOLTAGE METERED EHT PROBE

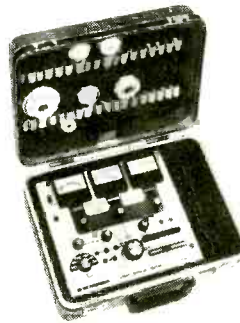


Light weight, easy-to-grip high-impact plastic handle with arc-over protection and no need of extra equipment. An indispensable item in your TV service kit. Measures up to 40kV DC with safety and the greatest of ease. Entirely self-contained. Connect the lead clip to chassis and probe tip to the check point, read the meter for voltage.

A must for the Health and Safety at Work Acts.
Price £66.00 + £11.55 V.A.T.

B & K PRECISION CRT ANALYSER-RESTORER

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



* All CRT's checked identically, including all in-line and one gun types * Tests all three guns of colour CRT's simultaneously under actual operating conditions (model 490) * Exclusive multiplex technique (model 490) * Measure true dynamic beam current that actually passes through G1 aperture to screen * Measures all shorts and leaks - preserving more CRT's * Tests focus electrodes lead continuity finding faults that other testers miss * Uses most powerful restoration method known with minimum danger to CRT * Rejuvenated CRT's guaranteed as new for two years * Obsolescence proof - perpetual set up chart updated and new adaptors developed * Tests and rejuvenates VDU's and oscilloscope tubes * A range of over 40 CRT base adaptors available * Increase profit * Pays for itself in months.

Prices

Model 490 Tri-dynamic three meter instrument inc. 6 common adaptors	£509.00 + £89.08 V.A.T.
Without adaptors	£446.00 + £78.05 V.A.T.
Model 480 Single meter Instrument inc. 6 common adaptors	£375.00 + £62.63 V.A.T.
Without adaptors	£310.00 + £54.25 V.A.T.

SADELTA SIGNAL STRENGTH METERS

The Sadelta Field Strength Meters have been designed to facilitate the dish alignment of satellite TV systems and aerial alignment of VHF/UHF television and radio systems. Signal levels can be accurately measured on the TC402-C and the TC90, allowing the evaluation of signal conditions for satisfactory operation. Both models have a clear LCD direct frequency readout, coupled to a multiturn tuning control enabling precise channel identification.

TC402-C VHF & UHF

FEATURES

- * Three bands:
Low VHF: 45-110MHz
High VHF: 110-300MHz
UHF: 470-862MHz
- * Digital display for direct frequency readout.
- * Built-in monitor loudspeaker AM/FM.
- * Signal measurement from 20µV to 100mV.
- * Powered by eight 1.5 AA batteries.
- * Fully portable with sturdy carrying case.

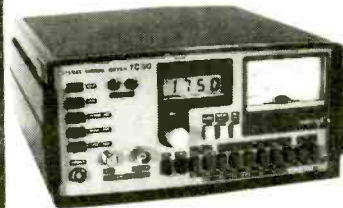


Price £259.00 + £45.33 V.A.T.

TC90 VHF-UHF- SAT.

FEATURES

- * Five bands:
Low VHF: 45-110MHz
High VHF: 110-300MHz
Hyper VHF: 300-470MHz
VHF: 470-862MHz
Satellite: 950-1750MHz
- * Digital display for direct frequency readout.
- * Signal measurement VHF/UHF 20µV to 3V.
- * Signal measurement satellite -70dBm to -10dBm.
- * Audible indication of satellite signal level.
- * Built-in monitor loudspeaker AM/FM (not satellite).
- * Powered by rechargeable battery (complete with charger 220/240V AC).
- * Fully portable with sturdy carry case.



Price £499.80 + £87.47 V.A.T.

BLACK STAR COLOUR PATTERN GENERATOR THE 'ORION' THREE-IN-ONE PAL VHF/UHF - PAL VIDEO COMPOSITE - R.G.B.

The Orion is a compact, bench instrument offering a wide range of patterns and facilities at a truly low cost.

In addition to a switchable sound carrier facility which allows use with the majority of PAL TV systems, the Orion provides highly flexible RGB outputs, ensuring compatibility with most video monitors.

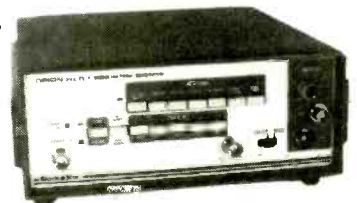
More than 50 pattern combinations can be selected, including those for testing static and dynamic divergence, video amplifier linearity, colour purity, general colour performance, focus etc.

A separate video input to modulate camera signals; fully variable RF and video output levels facilitating AGC testing; trigger output allowing easy triggering of difficult oscilloscope waveforms; external sound modulation input via DIN connector for frequency response testing of TV sound systems; adjustable wide frequency coverage of VHF and UHF TV bands.

Just some of the features making the Orion Pattern Generator an indispensable tool in the manufacture, test, and servicing of televisions, and computer and video monitors.

FEATURES

- * Colour bars, purity, greyscale, crooshatch, dots, focus, etc.
- * VHF/UHF Channels.
- * 5.5MHz, 6.0MHz, 6.5MHz Sound Carriers.
- * Internal/External Sound.
- * External Video Output.
- * Trigger Output.
- * PAL B,D,G,H,I,K.
- * Separate R, G, B and sync. O/P's.
- * RGB @ TTL & 1V.
- * Green @ 0.3V Syncs.
- * Composite Video Output.
- * Variable RF/Video Output.
- * Switchable Video Polarity.
- * Mains powered 220/240V AC 50/60Hz.
- * Size: 98 x 219 x 240mm.



Price £229.00 + £40.08 V.A.T.



U.K. POST PAID, export enquiries welcome. Visa/Access or cheque with order, payable B. K. Electronics. Official Orders welcome from Govt. Depts., colleges, P.L.C.s etc. Large (A5) S.A.E. for technical leaflets of complete range. Credit card orders are accepted by phone, fax or post. Delivery normally within seven days.



B. K. ELECTRONICS
UNITS 1 & 5 COMET WAY, SOUTHBEND-ON-SEA
ESSEX SS26 6TR
Tel.: 0702 - 527572 Fax.: 0702 - 420243

TELE SPARES LTD

DISTRIBUTORS

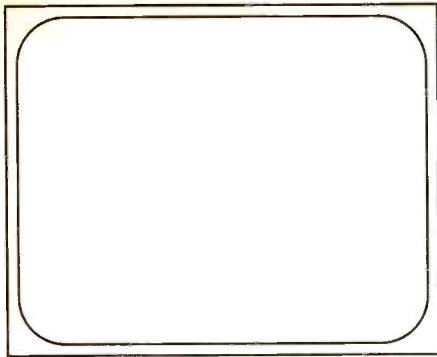
250 COLEMAN STREET
WHITMORE REANS
WOLVERHAMPTON
WV6 0RH

TEL: 0902 745581/2
FAX: 0902 746833

ICs

40014B	0.21	7472	0.20	74LS37	0.20	AN-282	4.47	AN-6135	0.95	AN-7156	2.34
4001B	0.15	7474	0.21	74LS373	0.25	AN-295	NLA	AN-6136	1.00	AN-7160	2.37
4002B	0.15	7475	0.24	74LS379	0.27	AN-302	2.78	AN-620	3.02	AN-7161	2.27
4006B	0.29	7486	0.50	74LS388	0.27	AN-303	2.83	AN-6248	2.63	AN-7163	1.74
4007B	0.12	7486	0.39	74LS393	0.40	AN-305	2.15	AN-6249	0.95	AN-7166	2.87
4008B	0.21	7490	0.21	74LS398	0.40	AN-310	2.05	AN-6250	1.10	AN-7168	2.45
4010E	0.23	7492	0.39	74LS40	0.20	AN-312	3.15	AN-6251	0.94	AN-7169	2.80
4010B	0.24	7493	0.21	74LS42	0.37	AN-315	3.77	AN-6252	3.80	AN-7170	2.83
4011B	0.12	74F175N	0.50	74LS47	0.40	AN-316	2.75	AN-6253	2.85	AN-7173	3.75
4012B	0.12	74F86	0.32	74LS48	0.37	AN-318	5.96	AN-6291	1.97	AN-7177	3.99
4013B	0.20	74HC07	0.39	74LS49	0.37	AN-321	1.18	AN-6300	3.58	AN-7179	1.89
4014B	0.32	74HC377	0.50	74LS490	0.20	AN-321K	NLA	AN-6306	1.43	AN-7205	0.87
4015B	0.32	74LS00	0.20	74LS51	0.20	AN-325K	4.17	AN-6307	3.00	AN-7213	0.82
4016B	0.21	74LS01	0.14	74LS54	0.20	AN-331	3.62	AN-6310	4.16	AN-7218	0.97
4017B	0.24	74LS02	0.14	74LS54	0.37	AN-330	2.26	AN-6310	1.81	AN-7220	1.15
4020B	0.27	74LS03	0.14	74LS55	0.20	AN-331	2.17	AN-6321	5.66	AN-7221	2.03
4022B	0.35	74LS04	0.20	74LS56	0.69	AN-331	2.95	AN-6326	3.20	AN-7222	1.22
4023B	0.14	74LS05	0.14	74LS57	0.25	AN-332K	5.09	AN-6329	3.08	AN-7224	1.15
4025B	0.15	74LS08	0.14	74LS75	0.22	AN-337	5.78	AN-6330	1.63	AN-7225	1.15
4027B	0.14	74LS10	0.20	74LS76	0.27	AN-340	0.59	AN-6331	4.54	AN-7226	1.36
4028B	0.21	74LS107	0.40	74LS78	0.27	AN-345	2.65	AN-6332	3.32	AN-7227	0.62
4029B	0.27	74LS109	0.25	74LS83	0.25	AN-355	0.69	AN-6334	3.16	AN-7254	1.15
4030B	0.17	74LS111	0.14	74LS95	0.54	AN-380	0.29	AN-6341	2.05	AN-7256	1.67
4035B	0.38	74LS112	0.22	74LS96	0.29	AN-381K	1.12	AN-6342	1.36	AN-7273	1.53
4040B	0.23	74LS113	0.22	74LS99	0.29	AN-363	0.4	AN-6344	4.88	AN-7317	0.59
4042B	0.20	74LS114	0.20	74LS91	0.37	AN-366	0.86	AN-6344N	1.39	AN-7317	0.59
4043B	0.29	74LS12	0.20	74LS92	0.50	AN-374P	NLA	AN-6345S	0.82	AN-7320	0.58
4044B	0.26	74LS122	0.24	74LS93	0.29	AN-377	1.15	AN-6345	2.86	AN-7330K	1.15
4046B	0.26	74LS123	0.24	74LS95	0.29	AN-379Z	2.30	AN-6346	2.82	AN-7362	1.19
4049B	0.21	74LS125	0.22	74LS96	0.35	AN-379A	2.93	AN-6347	4.10	AN-7363	0.74
4050B	0.20	74LS126	0.22	74LS97	0.25	AN-379S	3.40	AN-6350	0.73	AN-7411	0.54
4052B	0.26	74LS13	0.22	74S02	0.14	AN-382L	5.74	AN-6356	2.87	AN-7411	0.54
4053B	0.26	74LS132	0.20	74S03	0.13	AN-382K	5.59	AN-6357	4.20	AN-7414	1.83
4056B	0.15	74LS133	0.43	74S04	0.14	AN-382KX	6.30	AN-6358	0.30	AN-7415	0.50
4058B	0.14	74LS136	0.43	74S09	0.20	AN-3830K	6.70	AN-6360	2.03	AN-7420	0.74
4059B	0.14	74LS138	0.27	74S10	0.14	AN-3990K	1.98	AN-6362	2.40	AN-7470	1.12
4070B	0.14	74LS139	0.27	74S12	0.20	AN-3991K	2.53	AN-6363	5.53	AN-7478	0.67
4071B	0.14	74LS14	0.20	74S13	0.20	AN-5010	2.86	AN-6367K	4.94	AN-7492A	0.44
4072B	0.14	74LS145	0.35	74S138	1.19	AN-5011	2.12	AN-6367	2.56	BA-1310	1.22
4073B	0.14	74LS147	1.40	74S139	0.32	AN-5015	2.33	AN-6371	1.54	BA-1310	1.22
4075B	0.14	74LS148	1.22	74S140	0.20	AN-5020	0.91	AN-6371	0.74	BA-1330	0.74
4076B	0.36	74LS15	1.22	74S153	0.29	AN-5025	1.51	AN-6514	5.96	BA-1332	0.62
4079B	0.14	74LS151	0.27	74S156	0.32	AN-5033	3.01	AN-6511	1.15	BA-1335	1.48
4081B	0.14	74LS153	0.27	74S189	0.44	AN-5030	3.40	AN-6540	1.50	BA-1335	1.48
4082B	0.14	74LS154	0.27	74S20	0.20	AN-5033	2.93	AN-6541	1.00	BA-1335	1.48
4093B	0.20	74LS155	0.27	74S21	0.50	AN-5034	3.43	AN-6551	0.54	BA-1380	1.30
4094B	0.39	74LS156	0.27	74S23	0.50	AN-5071	0.37	AN-6552	0.54	BA-1404	1.19
4096B	0.27	74LS157	0.27	74S374	0.54	AN-5111	3.76	AN-6553	0.54	BA-222	0.74
4101B	0.29	74LS158	0.29	74S38	0.22	AN-5109K	1.33	AN-6554	0.85	BA-200	0.54
4502B	0.20	74LS160	0.27	74S40	0.14	AN-5135	4.16	AN-6555	1.58	BA-200	0.54
4503B	0.24	74LS161	0.27	74S51	0.80	AN-5138	3.01	AN-6562	0.59	BA-313	0.50
4508B	0.69	74LS162	0.29	74S64	0.14	AN-5150	4.15	AN-6564	0.85	BA-329	0.51
4510B	0.24	74LS163	0.27	74S74	0.14	AN-5151	3.31	AN-6571	0.92	BA-330A	0.54
4511B	0.36	74LS164	0.27	74S86	0.22	AN-5125	0.50	AN-660	NAL	BA-3306	0.74
4512B	0.29	74LS165	0.59	7905	0.25	AN-5256	0.82	AN-6601	0.74	BA-3308	0.80
4514B	0.54	74LS166	0.35	7906	0.25	AN-5256	0.82	AN-6602	1.46	BA-3309	0.80
4516B	0.29	74LS168	0.89	7908	0.25	AN-5260	2.45	AN-6610	0.65	BA-3320N	0.85
4520B	0.29	74LS169	1.36	7909	0.29	AN-5262	1.15	AN-6612	0.73	BA-335	0.65
4526B	0.29	74LS170	1.45	7910	0.25	AN-5265	1.04	AN-6612S	0.69	BA-338	0.80
4528B	0.29	74LS173	0.50	7912	0.23	AN-5332	4.63	AN-6650S	0.74	BA-3402	0.67
4532B	0.15	74LS174	0.27	7915	0.22	AN-5335	3.53	AN-6651	0.52	BA-3406	0.85
4538B	0.29	74LS175	0.44	7918	0.25	AN-5410	2.90	AN-6652	0.58	BA-3408	0.85
4539B	0.21	74LS181	1.00	7924	0.27	AN-5411	3.23	AN-6677K	4.10	BA-3410	1.10
4543B	0.38	74LS182	1.15	7910.0	0.22	AN-5412	1.15	AN-6678	4.30	BA-3416BL	0.98
4555B	0.29	74LS183	0.88	7915	0.22	AN-5429	3.17	AN-6677	4.92	BA-3416L	1.04
4556B	0.27	74LS190	0.54	7916	0.27	AN-5430	NLA	AN-6838	4.07	BA-343	0.97
4564B	0.24	74LS191	0.44	7919	0.25	AN-5431	1.28	AN-6873	1.30	BA-3502P	1.97
4565B	0.24	74LS192	0.69	7912	0.22	AN-5431N	2.23	AN-6875	1.58	BA-3505	1.28
7401	0.20	74LS193	0.29	7915	0.22	AN-5435	1.05	AN-6876	0.44	BA-3506	1.45
7402	0.20	74LS194	0.37	7912A	0.27	AN-5436	1.00	AN-6879	1.28	BA-3516	1.15
7403	0.20	74LS195	0.37	79M09	0.22	AN-5437	1.00	AN-6880	1.03	BA-3702	1.30
7405	0.21	74LS196	0.43	79M10	0.25	AN-5440	2.33	AN-6884	0.77	BA-3704	1.33
7407	0.20	74LS197	0.43	79M12	0.25	AN-5510	1.98	AN-6886	1.86	BA-3706L	1.34
7408	0.27	74LS20	0.14	79M15	0.25	AN-5512	1.35	AN-6892	0.89	BA-3707	1.27
7409	0.24	74LS21	0.20	79M18	0.27	AN-5515	1.43	AN-6913	0.92	BA-3812	0.82
7412	0.27	74LS22	0.25	79M24	0.25	AN-5520	3.79	AN-6914	0.37	BA-3812L	0.86
7413	0.20	74LS221	0.44	79M05	0.23	AN-5521	1.35	AN-7000	4.15	BA-3822LS	0.74
7414	0.20	74LS240	0.37	79M09	0.26	AN-5610N	3.20	AN-7025	1.15	BA-3824LS	0.67
7419	0.24	74LS241	0.37	7805	0.25	AN-5612	1.21	AN-7070	1.22	BA-401	0.82
74191	0.29	74LS242	0.50	7905	0.40	AN-5612	1.35	AN-7082	1.66	BA-402	0.82
74201	0.29	74LS243	0.37	7906	0.27	AN-5615	1.90	AN-7070	NLA	BA-403	1.77
74123	0.32	74LS244	0.43	7908	0.27	AN-5620X	2.50	AN-7072	1.33	BA-4210	0.89
74125	0.27	74LS245	0.44	7912	0.40	AN-5622	2.27	AN-7073	1.67	BA-4210	0.85
74132	0.50	74LS247	0.92	7915	0.29	AN-5625	2.65	AN-7105	1.50	BA-4224	0.85
7414	0.21	74LS248	1.00	7918	0.27	AN-5629N	3.98	AN-7106	1.53	BA-4232	2.27
74151	0.31	74LS253	0.27	7910.0P	0.25	AN-5630N	2.83	AN-7110	0.84	BA-4232A	0.2
74154	0.54	74LS257	0.32	7912L	0.25	AN-5635	3.40	AN-7111	0.94	BA-4236L	0.88
74155	0.50	74LS258	0.50	79M15	0.25	AN-5700	0.74	AN-7112	0.63	BA-4402	0.59
74156	0.54	74LS259	0.37	AN-103	0.88	AN-5701	1.04	AN-7114	1.25	BA-4403	0.59
7427B	0.29	74LS260	0.27	AN-136B	1.90	AN-5712	1.28	AN-7115	1.28	BA-4405	0.76
74163	0.59	74LS266	0.27	AN-203	1.82	AN-5722	0.89	AN-7117	0.74	BA-4558	0.58
7417	0.27	74LS27	0.20	AN-210	1.21	AN-5730	1.04	AN-7118	1.10	BA-5101	1.36
74173	0.50	74LS273	0.37	AN-214	1.45	AN-5732	0.80	AN-7120	0.89	BA-5102	1.15
74174	0.69	74LS279	0.27	AN-210C	1.21	AN-5733	1.63	AN-7130	0.85	BA-5104	0.80
74175	0.15	74LS28	0.20	AN-217	1.28	AN-5730	1.15	AN-7131	1.19	BA-5111	1.33
7420	0.20	74LS283	0.29	AN-236	2.78	AN-5760	1.07	AN-7141	0.43	BA-5115L	1.33
7421	0.29	74LS290	0.35	AN-240P	0.84	AN-5763					

MB-8842-113	6.77	SAA-5052	8.30	STK-20381	9.98	STK-5725	4.16	TA-7109AP	2.85	TA-7670	5.64	TC4660	2.16	TD41515	2.63	TD4-2795	2.39	TD4-4605	2.66	UA-7300	1.49	UPC-1366C	1.05
MB-895-1AM	2.27	SAA-5076	12.03	STK-2048H	9.83	STK-5730	4.14	TA-7109AP	2.85	TA-7670	5.64	TC4700Y	1.72	TD41515A	2.10	TD4-2822M	0.67	TD4-4610	7.13	UA-75L	0.98	UPC-1367	4.41
MBL6742H	19.35	SAA-5210	6.20	STK-210	8.20	STK-5735	4.30	TA-7120P	0.37	TA-7676P	1.20	TC4700Y	1.72	TD41515B	2.15	TD4-2822M	0.67	TD4-4603R1	1.49	ULN-2003A	0.38	UPC-1368H2	2.93
MC-13002P	1.36	SAA-5231	5.79	STK-2120	8.09	STK-6431	6.80	TA-7122P	0.63	TA-7678	1.95	TC8000	14.21	TD41516D	2.94	TD4-2841	3.73	TD4-4601D	3.25	ULN-3804A	0.75	UPC-1370C2	1.98
MC-13077P	0.78	SAA-5240	14.36	STK-2125	8.49	STK-6432H	6.87	TA-7129P	0.72	TA-7680AP	3.72	TC8000C	5.26	TD41516E	2.51	TD4-3039B	5.65	TD4-4605K	6.98	UPA-2004C	1.49	UPC-1373H	0.78
MC-1310	1.58	SAA-7210	14.99	STK-2129	8.92	STK-6732	13.53	TA-7130P	0.67	TA-7680AP	3.73	TC8430	0.72	TD41518Q	2.78	TD4-3047	1.75	TD4-4550Q	4.23	UPA-54	0.52	UPC-1378H	0.91
MC-1327APO	1.88	SAA-7220	8.64	STK-2155	13.23	STK-6822	12.11	TA-7136	1.50	TA-7684P	2.50	TC8430S	0.67	TD41520	2.99	TD4-3048	1.34	TD4-4550K	4.23	UPA-56C	0.80	UPC-1379E	1.35
MC-1330	1.82	SAB-3013	2.24	STK-2230	9.14	STK-6922	5.12	TA-7137P	0.87	TA-7684P	2.50	TC8430S	0.67	TD41521	2.78	TD4-3047	1.75	TD4-4550Q	4.23	UPA-57C	NA	UPC-1380C	6.10
MC-1350	2.75	SAB-3022	6.80	STK-2240	9.14	STK-6932	5.72	TA-7143P	0.87	TA-7686P	1.49	TC940	1.00	TD41522	1.13	TD4-3083	2.10	TD4-4550Q	4.23	UPA-58C	0.80	UPC-1382	1.13
MC-1351P	0.99	SAR-1039	1.94	STK-2250	6.94	STK-6942	5.74	TA-7146P	0.98	TA-7688AP	1.90	TC940	1.00	TD41523	1.13	TD4-3083	2.10	TD4-4550Q	4.23	UPA-59C	NA	UPC-1383	3.41
MC-1352	0.49	SAB-3035	6.66	STK-2260	13.68	STK-6972	3.98	TA-71571P	0.98	TA-7688AP	1.90	TC940	1.00	TD41524	2.63	TD4-3300B	5.42	TD4-5600	3.08	UPA-67C	1.01	UPC-1384	3.41
MC-1357P	0.52	SAB-3037	6.77	STK-3041	4.45	STK-6981B	6.75	TA-7169	3.75	TA-7705P	1.26	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600P	3.08	UPA-68C	1.01	UPC-1385	0.78
MC-1358P	0.57	SAB-320	2.47	STK-3041A	4.11	STK-6982	6.72	TA-717AP	1.88	TA-7709	1.65	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-69C	1.01	UPC-1386	1.13
MC-1372P	0.88	SAB-4209	0.75	STK-3042H	5.54	STK-711	9.77	TA-7176AP	1.05	TA-7719	2.63	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-70C	1.01	UPC-1387	0.78
MC-1374P	1.10	SAR-1032P	2.95	STK-3042H	5.54	STK-7216	4.41	TA-7183AP	1.05	TA-7727P	2.63	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-71C	1.01	UPC-1388	0.78
MC-1376P	1.36	SAR-1039	1.94	STK-2250	6.94	STK-7217	4.93	TA-7193P	3.15	TA-7739	1.95	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-72C	1.01	UPC-1389	0.78
MC-1377P	1.44	SAB-3060	2.58	STK-3062	6.03	STK-7226	6.73	TA-7200P	4.04	TA-7741P	1.95	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-73C	1.01	UPC-1390A	2.72
MC-14426P	1.79	SAA-5040	14.00	STK-3062H	5.99	STK-7308	3.99	TA-7201	5.25	TA-7745P	1.94	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-74C	1.01	UPC-1391A	2.72
MC-14493	4.74	SAA-12930C2	8.80	STK-3082	7.14	STK-7309	4.70	TA-7230P	2.80	TA-7750P	0.83	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-75C	1.01	UPC-1392A	5.18
MC-14497	6.72	SAA-12930C3	6.65	STK-3082H	6.44	STK-7310	5.52	TA-7204AP	1.70	TA-7757P	1.13	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-76C	1.01	UPC-1393A	2.72
MC-14559	0.25	SN76530	3.25	STK-3082H	6.44	STK-7312	5.72	TA-7205AP	0.89	TA-7767P	2.32	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-77C	1.01	UPC-1394A	2.72
MC-1458	0.16	SL1431	1.26	STK-3083H	6.44	STK-7314	5.92	TA-7206AP	0.89	TA-7767P	2.32	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-78C	1.01	UPC-1395A	2.72
MC-1498	0.21	SL4375	1.26	STK-3102H	6.44	STK-7348	1.80	TA-7208P	1.40	TA-7769	2.66	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-79C	1.01	UPC-1396A	2.72
MC-1499	0.32	SDA2112	6.30	STK-3152H	10.25	STK-7356	4.93	TA-7210P	4.21	TA-7772P	1.26	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-80C	1.01	UPC-1397	1.35
MC-1499P	0.40	SDA-2010	0.95	STK-3156	5.04	STK-7358	4.82	TA-7215P	7.50	TA-7772P	1.26	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-81C	1.01	UPC-1398	1.35
MC-1723	0.32	SAS-5705	1.20	STK-4017	3.53	STK-7402	6.58	TA-7217AP	1.28	TA-7774	1.83	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-82C	1.01	UPC-1399	1.35
MC-3302	0.40	SAS-580	1.95	STK-4019	4.89	STK-7204	7.78	TA-7220P	2.32	TA-7776	2.25	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-83C	1.01	UPC-1400A	2.72
MC-3340P	0.58	SAS-980	1.43	STK-4021	4.01	STK-7406	8.19	TA-7223AP	1.04	TA-7784P	1.43	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-84C	1.01	UPC-1401A	2.72
MC-3357P	1.00	SAR-1039	1.94	STK-4025	5.38	STK-7408	8.19	TA-7223AP	1.04	TA-7784P	1.43	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-85C	1.01	UPC-1402A	2.72
MC-3359	1.60	SBA-650B	1.49	STK-4026	5.52	STK-7410	8.09	TA-7155P	1.94	TA-7800S	0.56	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-86C	1.01	UPC-1403A	2.72
MC-3361	0.92	SAA-2001	4.30	STK-4028P	5.95	STK-745	4.34	TA-7225P	2.25	TA-791020P	0.52	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-87C	1.01	UPC-1404A	2.72
MC-3373P	0.95	SDA-2002	4.30	STK-4028P	5.95	STK-7554	8.30	TA-7226P	1.72	TA-8105	1.58	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-88C	1.01	UPC-1405A	2.72
MC-5156	6.86	SDA-2003	4.30	STK-4032H	5.61	STK-7561	15.00	TA-7227P	1.66	TA-8105F	1.72	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-89C	1.01	UPC-1406A	2.72
MDA-2062	3.22	SDA-2004	4.14	STK-4036H	5.84	STK-7563F	7.89	TA-7228P	1.21	TA-8105NA	1.72	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-90C	1.01	UPC-1407A	2.72
MEA-2054	3.64	SDA-2006	10.70	STK-4038H	6.59	STK-7563G	9.96	TA-7230P	1.10	TA-8110AP	0.94	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-91C	1.01	UPC-1408A	2.72
ML-218	1.90	SDA-2100	3.75	STK-4042H	6.89	STK-760	4.61	TA-7233P	1.56	TA-8105F	1.64	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-92C	1.01	UPC-1409A	2.72
ML-232	1.90	SDA-1004	1.30	STK-4044	7.65	STK-770	5.99	TA-7237	2.46	TA-8150N	1.61	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-93C	1.01	UPC-1410A	2.72
ML-237B	1.12	SH-1007	1.20	STK-4046	10.83	STK-7726	4.04	TA-7238	2.38	TA-8200	3.59	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-94C	1.01	UPC-1411A	2.72
MM-5456N	2.27	SH-10220	11.45	STK-4048H	12.93	STK-780	6.77	TA-7240AP	1.82	TA-8201	3.72	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-95C	1.01	UPC-1412A	2.72
MN-1218A	1.10	SI-3025	2.47	STK-4060	2.47	STK-8250	9.45	TA-7242	1.56	TA-8208	3.72	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-96C	1.01	UPC-1413A	2.72
MN-1220	4.69	SI-3027	2.47	STK-4060	2.47	STK-8250	9.45	TA-7242	1.56	TA-8208	3.72	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-97C	1.01	UPC-1414A	2.72
MN-1228	3.18	SI-3122V	2.47	STK-4111	5.11	STK-8250H	10.89	TA-7243P	2.29	TA-8207	3.72	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-98C	1.01	UPC-1415A	2.72
MN-1250	4.54	SI-3152V	2.16	STK-4121H	7.89	STK-8260H	13.21	TA-7245	2.31	TA-8210A	3.36	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-99C	1.01	UPC-1416A	2.72
MN-1280A	0.49	SI-3242P	2.01	STK-4121H	6.10	STK-8280H	17.28	TA-7245F	2.32	TA-8210H	3.36	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-100C	1.01	UPC-1417A	2.72
MN-1280P	0.50	SI-7100A	15.03	STK-4122H	5.51	STM-1240	5.34	TA-7248	4.14	TA-8215F	1.58	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-101C	1.01	UPC-1418A	2.72
MN-1280Q	0.52	SI-7115B	14.91	STK-4123H	6.97	STM-1006	2.55	TA-7250AP	1.94	TA-8215F	1.58	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-102C	1.01	UPC-1419A	2.72
MN-1349	1.10	SI-7300	13.73	STK-4123H	6.97	STR-1006	2.55	TA-7250AP	1.94	TA-8215F	1.58	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-103C	1.01	UPC-1420A	2.72
MC-1303P	1.95	SI-7300A	13.73	STK-76023N	2.95	STR-11006	5.25	TA-7251	3.18	TA-8405S	2.97	TC940	1.00	TD41524A	1.75	TD4-3301B	5.42	TD4-5600	3.08	UPA-104C	1.01	UPC-1421A	



TELEVISION

Dead Ends

It's understandable that Philips' president Jan Timmer should have expressed deep feelings about the prospect of the loss of MAC/HDMAC, "Europe's wonderful initiative" as he called it, as the future broadcasting system for Europe. At his recent press conference in Eindhoven he commented that "we have reached the end point technically: we are ready to move from MAC to HDMAC". To have travelled so far along this path, achieved so much technically and spent so much (though the figures are not available) and found that you've come to a dead end is a bitter experience. But it's happened often enough before and will doubtless happen often enough in the years to come. From the very beginning different groups have developed different TV and video systems. Because of the need for some degree of standardisation, only a few can ever be adopted for use. At the start of TV broadcasting in the UK there were the competing Baird and EMI systems. At that time any number of other systems were being developed around the world, particularly in the USA. Only the 525, 625 and 819 line systems came into general use. Colour brought with it another multitude of different solutions to the problem of developing an acceptable system. We all know about PAL, SECAM and NTSC, which are still very much with us: who remembers ART and NIR? Satellite TV brought the subject of system design into the limelight once more. It offered wider channel bandwidth and hence the possibility of enhanced TV systems. Now various proposed digital systems are squeezing enhanced TV back into narrower bandwidths. There's a great deal going on in the world of TV transmission systems at present, as George Cole brings out in his IBC report on a later page. The sad thing about MAC is that such a good system has been around for so long without being convincingly relevant to current broadcasting needs and has in the end been overtaken by events. Jan Timmer seems to blame the European Commission for this situation, on the grounds that it allowed telecom band satellites to be used for TV broadcasting using the current terrestrial signal coding systems. But it was rather the case that the authorities were neatly sidestepped than that they failed to impose a policy. Satellite broadcasting opened a whole new ball game, one that's not amenable to the close supervision possible with terrestrial transmissions.

Philips has been particularly unlucky when it comes to TV/video dead ends. There were the banana and ultra-violet beam-indexing colour tubes, the original laser disc system and the N1500/N1700/V2000 VCR systems. That lot must have cost a pretty penny one way and another. You can't simply put the blame on inability to complete development and bring products to the marketplace quickly. Some technologies just aren't going to make it however well managed the development programme is. One thinks for example of RCA's capacitance video disc, possibly the most costly consumer electronics flop of all time, and of the EVR (electronic video recording) system in which CBS and Rank were involved.

Right now those of us who recall these dead ends must be wondering about CD-I and all those multimedia systems that are being worked on, some because computer and other electronics concerns simply don't know where to go or what to do next. Some of these multimedia ideas have, perhaps unfairly, been described as solutions looking for a problem. We already seem to have one dead end in the CDTV system. The news that Philips has just slashed the price of its CD-I players in the USA from \$1,000 to \$700, less than a year after launching the system there, is not exactly encouraging. Interactive video is of course something that calls for long-term public education. We just don't know what the eventual level of interest will be.

INDEX TO VOLUME 40

The index to volume 40 of *Television* (the November 1989 to October 1990 issues) has now been printed. Copies are available at £2 each from Television, Room L323, Reed Business Publishing, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

COVER PRICE INCREASE

Recent reader research has proved that readers of *Television* would like more editorial pages. Accordingly from next month's issue (November) the number of editorial pages will be increased by a minimum of four a month. Unfortunately this costs money, so *Television's* cover price will be increased to £2.20 from the November issue. But by taking out a subscription (see page 902) you can get the extra pages without paying anything more. The subscription rate will be held at its present level for a limited time.

EDITOR

John A. Reddihough

PRODUCTION EDITOR

Tessa Winford

Please note that the telephone numbers below are for contact with the advertisement departments. Editorial enquiries should be sent to the editor at the address given on page 845 or faxed to 081 652 8956.

ADVERTISEMENT MANAGER

Jan Thorpe
081 652 8114

SALES MANAGER

Shona Finnie
081 652 8115

CLASSIFIED SALES EXECUTIVE

Pat Bunce
081 652 8339
Fax 081 652 8931

ADVERTISING ADMINISTRATION

Kathy Lambert
081 652 8116

ADVERTISING PRODUCTION

Brian Chapman
081 652 8681
Fax 081 652 8917

PUBLISHER

Robert Marcus
081 652 3930

READER HELPLINE

For help if you have difficulty obtaining
Television phone 081 652 8620

SUBSCRIPTION ENQUIRIES

0444 445 566

SUBSCRIPTION HOTLINE

24-hour subscription ordering with credit
card number phone 0789 200 255

COVER PHOTO

This month's cover photograph shows the
B and O 31XX series chassis. See
servicing article on pages 860-2.



REED
BUSINESS
PUBLISHING

Satellite Notebook

Nick Beer

I wonder how many of you have noticed or get calls about an intermittent "fault" with Sky Sports: very occasionally the signal will rescrumble for a second or so then clear. It seems to happen under all conditions, with IRDs and separate decoders and not just with weak signals etc. Those less cynical than I might suggest a software bug as being the most likely cause. But I've noticed that the condition arises mainly with live events: could it be something to do with a hidden copyrighting plan?

CNN on Astra

It was reported some months ago in these pages that CNN now has an Astra transponder. There are satellite installation sales implications here. It may well help with the sale of Astra equipment, especially to up-market households, but what about sales of motorised systems? CNN was probably the biggest plus factor when it came to selling a motorised system. Now that CNN is available from Astra this sales pitch is no longer available. Providing a non-telephile with any other good reason for buying a motorised satellite TV installation is difficult. Experience has shown us that the customer will love his motorised dish once he gets one – it impresses the neighbours, then there are the saucy Italian and Spanish transmissions etc. – but how do you make a convincing case on the sales floor? It's not easy.

Fault Indexes

For some time now various indexes of the fault notes published in *Television* have been available. They are not full listings of all the articles as in the "official" *Television* indexes, providing instead an index by make, model then symptom of the faults reported in these pages. One such listing is produced by Mike Lyons of ECS, Birkenhead. I've used it through three editions and have found that it has saved me hours of time. A new edition is produced every six months or so, covering at least ten years issues of *Television*. An update service is available and there are separate books for TV sets and VCRs. Of particular interest is that our newer CD player and Satellite TV fault reports are now listed. ECS can be contacted on 051 608 2344 – or see the advertisement carried each month.

Operational Improvement

A slightly annoying anomaly I've encountered at home and have had queries about from customers is that when a VideoCrypt decoder is added to a non-IRD receiver such as the Ferguson SRA1S/Pace SS6000 channels that don't have to be decoded tend to scramble when a subscriber channel is

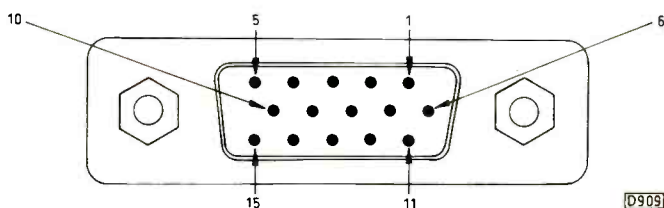


Fig. 1: 15-pin D socket PAL connections: pin 2 video return; pin 3 video switch line; pin 4 baseband PAL video output; pins 8 and 11 chassis.

stepped through. Say for example that we have Sky One on channel 1 and Sky News on channel 2. Going from one to the other gives no problem. With Sky Movies on channel 3, when we go to this the decoder switches in (Ext-V) and the picture clears. Move now to Eurosport on channel 4 and the picture is again scrambled for a few seconds due to the automatic routing of the video signal through the decoder. The same thing will happen with the following two stations.

There's a simple way of overcoming this: to tell all non-decoder locations to use internal as the AV source. This is done via the main menu, on set up 147. A small point perhaps, but it does make channel hopping quicker.

Decoder Connections

On the subject of decoders, Fig. 1 shows the basic PAL connections for the 15-pin D decoder connector used in Amstrad and other early receivers. J.N. Bull and Sendz Components are advertising scart-to-15 D leads if you require them. I recall some months ago not being able to get them for love nor money.

News

One or two points noted during recent viewing. JSTV is now scrambling parts of its service, using VideoCrypt. CNN is now transmitting audio on only the 6.5MHz primary subcarrier. The other subcarriers are unmodulated. Previously there was audio on the 7.02 and 7.38MHz subcarriers, thus anyone who set his receiver for stereo will now be getting a lot of noise on top of weak sound.

BSB Equipment

In commenting on the Marco Polo satellites last month I mentioned that the BSB Squarials are designed for the reception of right-hand circularly polarised signals. Writing on BSB receiver modifications in the latest (August) issue of the British Amateur Television Club's journal *CQ-TV*, Trevor Brown points out that these Squarials can be converted for left-hand circular polarisation if necessary. You have to dismantle the unit, turn over the printed circuit membrane then reassemble it. Trevor's article contains practical information on converting Philips and Ferguson BSB receivers for D2-MAC and other helpful information. BATC membership details can be obtained from Dave Lawton, G0ANO, Grenehurst, Pinewood Road, High Wycombe, Bucks HP12 4DD (telephone 0494 28899).

New Pace Receivers

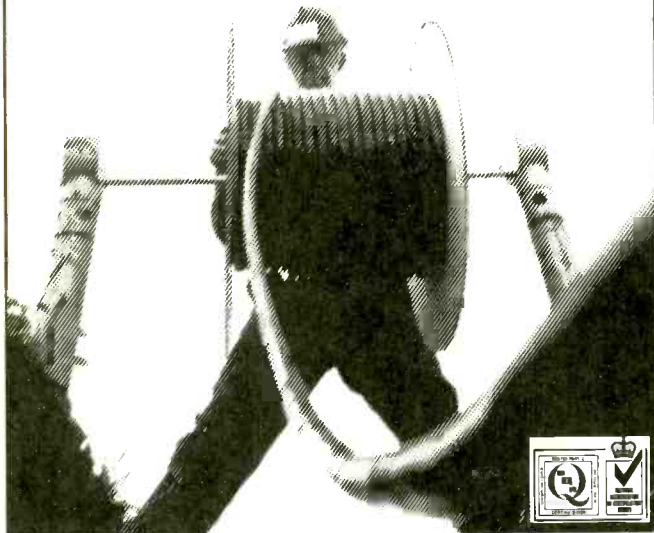
Pace has announced two new receivers that will replace the 9200 IRD. They are newly designed, using ASIC (application specific integrated circuits, i.e. chips designed for the purpose) technology to reduce the component count and thus provide improved quality and reliability at less cost.

Model PRD800 features 120 channel capability, Wegener stereo sound with Panda 1 noise reduction, three scart connectors, on-screen graphics, a built-in dish positioner interface, a u.h.f. modulator that can be tuned from channel 21 to channel 69 and Datastream external remote programming for downloading stored programme information from one Pace receiver to another. Suggested price is around £230.

Model PRD900 at around £250 adds to the above specification 199 channel capability, a dual LNB input, on-screen graphics with a choice of eight coloured backgrounds, favourite channel selection, a blank-screen radio mode and an 8-event/28-day VCR timer.

Buried Alive!

DB SERIES/MATV COAXIALS
15 YEAR PRODUCT GUARANTEE



AVAILABLE FROM

Premier
CABLEVISION
Tel 0242 511511 Fax 228216

ACE
Aerials and Cable Equipment Ltd
Tel 0242 580688 Fax 221888

The Euras System
is the largest
repair tips database
for CD, TV and
video in Europe.

Solutions at your fingertips.

The System
has over 100,000
repair tips for
10,000 models
from 250
manufacturers
and is conveniently
available as
manuals,
stand alone PC
or videotext.
The System now
also boasts
technical service
data for computers
from SAMS
Computerfacts,
available
as manuals.

Euras International Limited
Heston House, 7-9 Emery Rd
Brislington, Bristol BS4 5PF
England
Telephone 0272 724475
Fax 0272 723374

COMPONENTS For TV ★ Video Audio ★ Computer

THIS IS JUST A SMALL SAMPLE OF STOCK
We can supply spares for many makes of equipment.
(Encl. s. please) or PHONE
FOR A PRICE & AVAILABILITY
on your requirements. **0452 526883**

TRANSISTORS & DIODES

2SA564	£1.51	2SC2274	£0.48
2SA608	£0.98	2SC2331	£1.55
2SA673	£0.33	2SC2621	£1.57
2SA683	£0.83	2SC3039	£2.29
2SA715	£1.01	2SC3150	£2.24
2SA844	£0.41	2SC3175	£3.24
2SA984	£0.49	2SD313	£0.49
2SA1011	£1.51	2SD325	£0.71
2SA10156R	£0.74	2SD389	£1.09
2SA1706	£1.69	2SD468C	£0.76
2SB507	£1.23	2SD571	£0.94
2SB772	£1.49	2SD667	£1.18
2SC368A	£1.49	2SD787	£0.94
2SC1096	£0.71	2SD788	£1.18
2SC1383	£0.93	2SD917	£3.52
2SC1384	£0.83	2SD1159	£1.57
2SC1740	£0.68	2SD1266	£2.11
2SC1741	£0.53	2SD1687	£1.58
2SC1756	£1.49	2SD1688	£1.87
2SC1815Y	£0.28	8A157	£0.29
2SC1907	£0.89	BUS608A	£1.43
2SC2080	£0.97	RD9 1EB2	£2.29
2SC2271	£1.10	RB156	£2.29

IC SELECTION

CA741E	£0.26	TA7607	£4.75
CXA1019S	£2.99	TA7668BP	£1.99
HA1137V	£3.61	TBA530	£1.74
HA1123S	£3.55	TBA809	£1.17
HA12006	£6.09	TBA810P	£1.16
HA12413	£5.05	TBA810S	£1.62
LA1385	£3.85	TBA820L	£1.67
LA3160	£2.26	TA2440	£3.49
LA3361	£1.79	TC9490	£3.33
LA4480	£3.86	TD11001B	£2.86
LA4500	£3.89	TD11020	£2.93
LA7851	£3.95	TD11041	£3.45
LM733CN	£2.27	TD1180P	£3.49
M54548L	£5.29	TD11908A	£2.06
MC7805	£0.78	TD2003	£2.84
MC145028CP	£3.78	TD2541	£2.52
NE555CDP	£0.25	TD2593	£3.45
SA1124	£3.88	TD3330	£6.49
SK70229	£8.69	TD43651	£3.48
SK71229	£10.69	TD4420	£3.85
STK41411	£8.79	TD4505E	£7.99
STK4332	£6.29	TD4600-2	£3.35
STK5333	£7.99	TD4601	£2.49
STK5451	£8.29	TD4650	£2.45
STK5481	£6.99	TD48170	£3.53
TA7240AP	£2.36	UPC1277	£4.70
TA7273P	£5.35	UPC1379H	£2.45
TA7280P	£6.88	UPC1397C	£3.34
TA7324	£3.21	14DN476	£19.29

ICP/FICP-N Ranges each £0.84

TOOLS & BATTERY ACCS.

UNIROSS Plug-in Fast Charger for	
AAA/AA Ni-CAD s (Also PP3 at slower rate)	£5.49
UNIROSS C Ni-Cad Battery	£2.09
Crimping Tool £2.45	Junior Hacksaw £0.85

All items subject to availability - Prices can change without notice.

COMPUTER SPARES

AMSTRAD		EPSON	
IC 40010 (C Array)	£19.86	C78010BD031 CPU	£30.24
IC AY289124	£7.06	HA13007 T Array	£4.66
IC HD6645SP	£15.18	SINCLAIR	
IC LA4140	£1.70	IC -0056 ULA (+2)	£16.72
IC LA624	£4.90	IC 40054 ROM (+2)	£16.69
IC WR150J	£6.94	IC ROM4 (48K +)	£7.99
IC SED9-20CAC	£14.93	IC TEA2000	£4.49
Joystick (CPC range)	£6.71	IC TMS4532-15NL4	£1.72
Printer Armature (PCV 9512)	£4.20	IC Z83401 (Spec 1)	£10.46
Cement Resistor 5 6R 5W	£1.85	ZTX650 Transistor	£7.94
Service Manual (CPC64 early)	£8.67	Membrane (DL)	£8.99
Service Manual (PCV8256 8512)	£14.19	Membrane (Spec. 48K)	£4.73
Serv. Manual (PCW9512)	£15.76	Membrane (-28K)	£8.99
ATARI		Speaker (48K +)	£1.74
IC C025913 DM (ST)	£33.24	PCB Power Skt. (Spec 1)	£0.89
IC C024806 (XE L)	£11.40	Power Plug (Spec 1)	£0.29
IC C024947 (XE L)	£4.56	COMMODORE	
THERMISTOR (ST-PSU)	£1.37	IC 6569 VIC (Sp. Offer)	£19.95
CW65 (ST-PSU)	£4.42	IC 8520 CIA	£12.35
PC101 (ST-PSU)	£4.73	IC 8565 VIC	£23.96
PC713V (ST-PSU)	£2.99	IC 251641-02 PL A	£4.06
User Manual (STFM)	£10.00	IC 901225-01 ROM	£6.55
PHILIPS		IC 906114-01 PL A	£9.24
Serv. Manual DM7513	£2.99	Modulator 251916-02	£18.76
Serv. Manual CM8633 (Mk 1)	£4.71	User Manual (C64)	£4.25
OTHER COMPUTER CHIPS		User Manual (C64C)	£4.30
AM26LS31PC	£1.95	XTAL 17.73447MHz	£4.99
6502 CPU	£5.05	AUDIO, TV & VIDEO SPARES	
6818 R. T. Clock	£7.24	AMSTRAD MX200/CDX400 (FUNAI) CASSETTE DOOR	each £3.64
8255A PPI	£2.82	AMSTRAD VCR4500 4600 4700 TVR1-3 BELL KIT	£2.45
TELEPHONE ACCESSORIES		FISHER FVH-P420 520 530 PINCH ROLLER (& HITACHI VTI)	£5.17
BT Plug-in Tone Ringer	£6.95	FERGUSON JVC 3V29 30HR7200 7300 REEL IDLER	£3.55
LJU2 Secondary Skt. & Box	£2.58	PANASONIC NV230 430 465 630 TENSION BAND	£3.67
LJU3 Secondary Skt. (Flush)	£0.15	PANASONIC NV270 etc. IDLER (VXPS21) Genuine	£4.31
Core Cable	per/m £0.15	PHILIPS KATK40 SERVICE MANUAL	£10.00
		SHARP IDLERS (005 or 006) Genuine	each £4.31
		SHARP RQ278 281 284 MAIN BELT	£1.40
		TOSHIBA STU2L MAINS TRANSFORMER	£9.99
		TRIUMPH VR9511S CAPSTAN MOTOR	£34.99

All above are manufacturers original spares

OTHER COMPUTER CHIPS

IC 27C256-200	£2.95
68000CP8 CPU	£11.68
75154PC 4 x line driver	£1.85
64K x 1 DRAM (150ns)	£1.69

We are pleased to serve both the Trade and End User.

DO NOT ADD VAT TO THE PRICES
SHOWN - BUT PLEASE ADD £1.20 P&P

ORDER BY POST OR PHONE
We accept payment
by VISA, Access,
DELTA, SWITCH,
Cheque or P.O.

MARAPET (TVK)
1 HORNBEAM MEWS
GLOUCESTER GL2 0UE

Servicing B and O 31XX Series Receivers

Nick Beer

The chassis covered in this article was used in just two 20in. monitor style sets, Models M20 and MX2000, but for B and O a lot of them were sold. It's of Thomson design and seems to have been a forerunner to the Ferguson ICC5 – indeed the later MX3000/4500/5000 series receivers are very much akin to the ICC5, though with the usual B and O extras and refinements.

The MX2000 was yet another stride forward in presentation, which is nothing unusual for B and O. For its time – it was on sale during the period 1985-88 – the MX2000 was a striking set, monitor style with the on-board controls under a flap the full width of the top of the case. Beneath this there's a contrast screen over the c.r.t. faceplate and then, across the full width at the bottom, a speaker fret. It came complete with a simple metal fold-down semi-ring beneath: this enables it to be tilted when placed on a flat surface. There was a B and O stand of course. It has an optional video shelf and swivels. The cost of the stand was slightly less than what Dixons' customers would pay for the average 20in. set – and it weighs more!

Remote control is standard but teletext was an option, as were the cabinet colours – by this I mean the strip around the top and sides, which form part of the back cover. Because of this arrangement access is excellent once the back cover has been removed. It's secured by four captive screws. There's no compatibility with the MCL2 Link system, as there is with the later MX3000 series.

Mechanical Details

To remove the speaker fret slide a flat-bladed screwdriver behind the fret as it wraps round the right-hand side of the set, viewed from the front, at about 2.5cm from the top and bottom. Slight inwards pressure will release this edge. Slip the fret from left to right to remove it, finally unclipping the left-hand edge by means of rearwards pressure. Take great care not to mark the cabinet with the screwdriver – it's a very easy thing to do. Once the fret has been removed the baffle can be withdrawn. This gives access to the circuitry etc. beneath the c.r.t., including the speakers. You will see eight large, black cross-head screws: when these have been removed the baffle can be pulled out and up – the white tubes that form the baffle require the assembly to be pulled out in this way.

To remove the contrast screen simply slip a tool – carefully – into the small slot at the centre bottom edge and pull outwards. Don't go too fast or you may get a surprise. To refit the screen put the right-hand edge into its slot then bend the screen until the left-hand edge can be similarly fitted. This may seem graunchy but I've never yet known a screen to break.

The remote control is the same as that used with the 02, 77XX series – the lighter brown as opposed to the darker brown one, which had one less button (sound) and no tuning facilities. This means that these sets have frequency-synthesis tuning.

The chassis slides backwards for access. Take care to release lead locks and to guide the chassis under the tube components: the clamp on top of the i.f. screen can catch the degaussing coils on the left and the leads from the c.r.t. base board can become tangled in the strange microcontroller

PCB stack at the rear edge centre of the chassis.

The mains transformer, which provides isolation, is large and is mounted at the front of the set: power input and ancillary circuits are on a small PCB fixed to the front of the set beneath the c.r.t. The IR remote control receiver is across the top of the set. The plastic control lid's hinges break but are available (part no. 3030081). The IR lens in one corner of the lid has a habit of falling out. If it's lost, a new lid will be required at some expense. If not careful glueing will suffice. The set's look is spoilt somewhat without it.

A teletext module can be fitted behind the microcontroller PCB on the main panel. It can be a bit fiddly to fit.

Operation

Just one or two points for the uninitiated. If you don't have the handset you can switch the set on from standby by pressing TUNE + under the flap – the controls are rockers. Pressing this control when the set is on makes it tune up, as you'd expect. If you alter any control settings (volume etc.) do put them back where you found them, otherwise the normal levels will be upset – to avoid problems try to use the handset wherever possible.

The sets have a scart socket which allows integral remote control of suitably arranged B and O VCRs such as the VHS82, which also provides RGB on-screen menus and was a popular machine for pairing with the set.

Circuitry

Fig. 1 shows a simplified block diagram of the set. It emphasises the central role of the TEA2026 chip IL01 which contains the sync circuitry and drives the line and field output stages, the EW modulator driver chip and the chopper. Other outputs it provides include the sandcastle pulses and an audio muting line. For standby operation the BC328-40 switching transistor TP21 removes the supply to this i.c., thereby removing the chopper and timebase drives.

The chopper circuit, see Fig. 2, is unusual, being a step-up regulator, i.e. it receives 110V from the mains rectifier circuit and provides a regulated 145V output which is fed via RP14 to the line output transformer's primary winding. Coil LP01 forms the load for the chopper transistor TP01, which is switched on by a squarewave drive from IL01. It's switched off by negative-going pulses from pin 11 of the line output transformer. RP03 provides excess current sensing and DF25 over-voltage sensing: under either condition the increased voltage at pin 28 of IL01 will remove the drives to the chopper and the timebases. If the voltage then falls below 1.26V the chopper will restart via the soft-start system. If the set trips three times the drives will shut down and will restart only after removing and restoring IL01's supply voltage. PP01 enables the h.t. to be set up by adjusting the feedback to the chopper control circuit in IL01.

The mains transformer has three secondary windings, each of which feed a bridge rectifier circuit. As shown in Fig. 1, the outputs are 110V, 31V and 12.5V.

Another unusual feature, this time shared by the ICC5 chassis, is the thyristor field output stage, see Fig. 3. Thyristor DF08 is switched on once per line by a pulse-

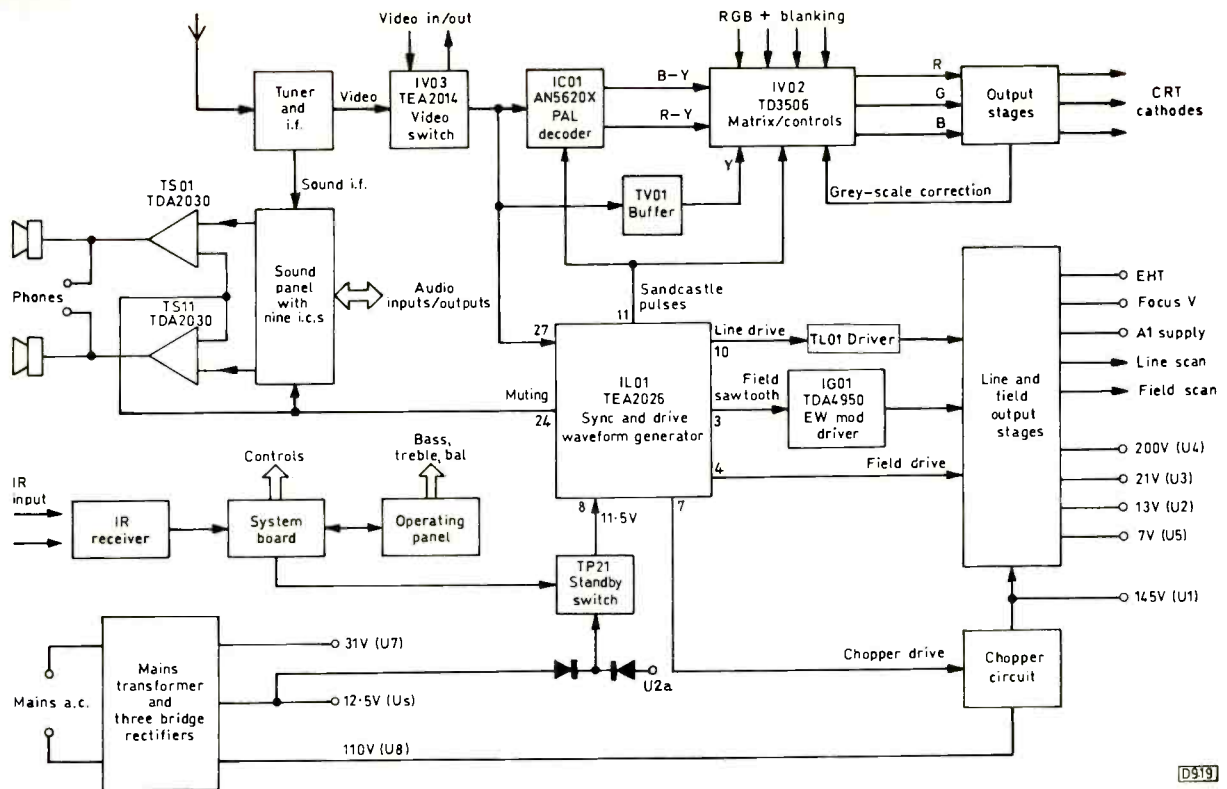


Fig. 1: Simplified block diagram for B and O 31XX series receivers.

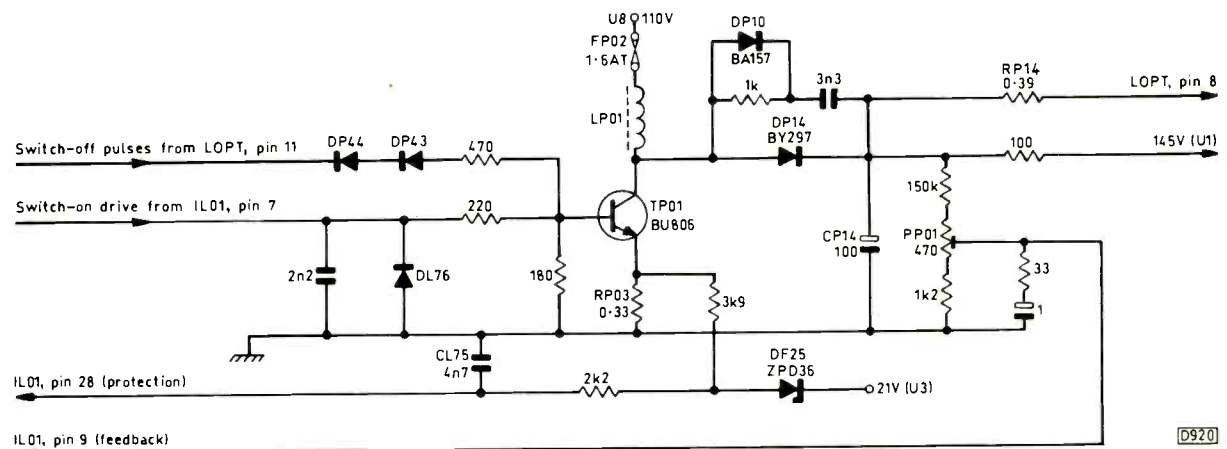


Fig. 2: The step-up chopper circuit, which provides a regulated 145V output from an unregulated 110V input.

width modulated squarewave from pin 4 of IL01. A winding on the line output transformer is used as the thyristor's load, the negative-going flyback pulses at the end of each line switching it off. The pulse-width modulation applied to DF08's gate switches it on at a progressively earlier point in

each line as the field scan progresses. Since the impedance of the field scan coils at line frequency is large they have an integrating effect on the field scan current. Thus the steadily increasing current pulses are smoothed to produce a ramp. During the flyback period DF08 is cut off, DF09 acts as a clamp and a large positive voltage (approximately 190V) is developed across CF10, the result being rapid current reversal through the field scan coils. The aim of this strange circuit is reduced power consumption. If DF08 fails DF09 should also be replaced – they are available as a pair under part no. 8300488.

The sound circuitry is quite complex, using eleven i.c.s in all.

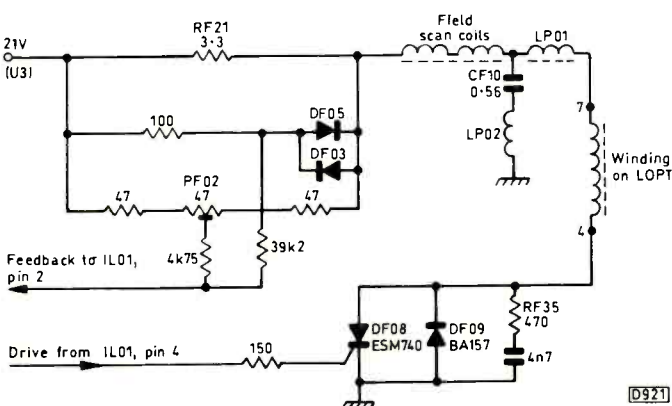


Fig. 3: The thyristor field output circuit.

Remote Control Handset

The remote control handset is quite expensive as a replacement but, being serviceable, repair is worthwhile. Common faults are dry-joints on the output LEDs, causing no or intermittent output, and broken PP3 battery clips. The unit seems to be vulnerable to spillage but because of the

two-board design the damage is usually limited to the upper, contact PCB – the two PCBs push together, with two connectors.

The plastic buttons can be replaced as single items and are very reasonably priced – buttons break and the lettering wears off. The battery cover tends to become loose – many a unit is bound with Sellotape when received for repair. New covers are readily available, as are all spares for these handsets.

The six screws that hold the unit together drop out – refit with screwlock.

Failure of some buttons to work is common and is caused by dry-joints at the sockets on the component PCB. As this PCB is reasonably priced it's not worth spending a lot of time on fault tracing.

Faults List

(1) No or intermittent picture, white raster etc.: Dry-joints are common on the c.r.t. base socket – resolder every pin when you get one of these sets. See also (2).

(2) Intermittent field collapse/distortion: Check for dry-joints on the EW modulator diodes DG05/6. Resolder them whenever one of these sets comes in for repair. It's best to use high melting-point solder. If the fault persists, IG01 (TDA4950) and the loading coil LG02 will overheat.

(3) EW problems: Dry-joints on the EW modulator diodes DG05/6 can cause permanent damage in the EW correction circuit. Check the diodes and the print around them first, then suspect a damaged TDA4950 chip – this i.c. has been known to split open. The loading coil LG02 can develop shorted turns. This is usually obvious, i.e. a molten mass instead of a coil.

(4) Horizontal black stripes at the bottom of the picture: RF35 (470Ω) in the field output stage high in value or open-circuit. This is a critical safety component.

(5) Set goes to standby intermittently: Check the value of CL75. If it's 2.2nF, replace it with a 4.7nF type. This is necessary to prevent noise on the supply activating the protection circuit in IL01. Other causes have been dry-joints on the line output transformer or the transformer's case breaking down with the result that there's arcing to chassis. Also check for dry-joints on the leads soldered through the board in the deflection circuits.

(6) Low/distorted sound: The 6MHz filter QD40 in the sound i.f. circuit defective. This fault is sometimes thermal.

(7) Dead set with no light from the standby LED: RP43 (0.47Ω) open-circuit, the result being no 1.2.5V supply. This is in turn because CR67 (1,000μF) on the microcontroller PCB is leaky or short-circuit.

(8) Dead set, channel number o.k.: The line output stage isn't working. This is usually because its feed resistor RP14 (0.39Ω) is open-circuit, which may well be due to the fact that the BU508AV line output transistor TL02 is short-circuit. But don't be misled by in-circuit readings. The transistor may read short-circuit all round but be o.k., the cause of the problem being a short from the line output transformer to chassis, usually from pin 8. If TL02 has failed it's common to find that there is still a problem after replacing it because the transformer is faulty. In this event

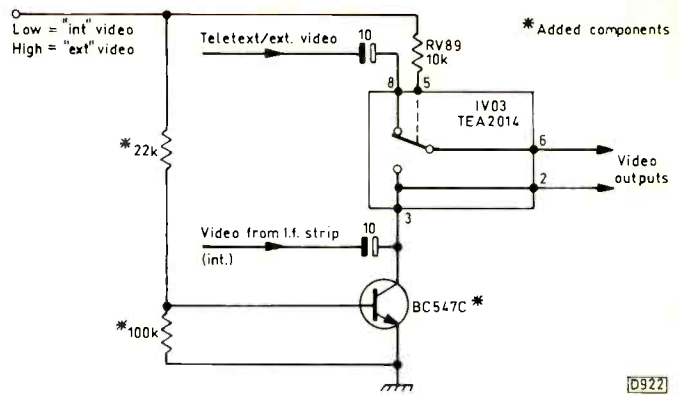


Fig. 4: Modification for the satellite teletext problem.

readings on the transformer are usually inconclusive but bulging or cracks in the case may confirm one's suspicions.

(9) Severely reduced height: See (2), then check the surge limiter resistor RL28 (1.5Ω) in the 13V supply. If it's open-circuit suspect that the TDA4950 chip IG01 is damaged. Check for dry-joints at DG05/6 as in (2).

(10) Buzz from the set, especially in standby: The mains transformer is large and some customers can hear it buzz, especially when the set is on a wooden shelf or something similar. A replacement transformer may help.

(11) Purity errors: Could be caused by stray fields from the mains transformer. Posistor RP41 in the degaussing circuit could be faulty or dry-jointed.

(12) Low gain: Could be due to a defective r.f. (tuner + i.f.) module which is available as a service exchange unit under part no. 8053034, but check the a.g.c. etc. first.

(13) Splashing on vision: Check the soldering at pin 23 (video output) of the r.f. module. See also (14). If necessary replace the r.f. module.

(14) No tuning: Resolder all the r.f. module's earth connections.

(15) No go: The TEA2026 chip faulty because of spikes on the supply. Remove diode DL76 and fit a 15V zener diode (part no. 8300053) between pins 6 and 7 of IL01, on the print side of the panel. The cathode goes to pin 7. This may have been done in production.

(16) No satellite teletext when fed via the scart socket, o.k. via the r.f. socket: The video input from the scart socket is not fed directly to the text decoder, so the following modification should be carried out. Cut the print between pins 1 and 3 of plug VT02 on PCB08 and connect pin 1 to pin 5. Cut the print between RV85 and RV93 on PCB01 and connect the now disconnected end of RV93 to pin 6 of IV03 with a lead. If crosstalk occurs with this modification, add the circuit shown in Fig. 4.

Conclusion

The sets cause few problems to the experienced engineer. Many faults can be dealt with by those without full B and O backing but if the problems relate to the microcontroller system it may be advisable to refer the set to a B and O dealer.

MANOR SUPPLIES

MKV PAL COLOUR TEST GENERATOR
FOR DOMESTIC TV & VCR.

TEST
DEMONSTRATIONS
AT 172
WEST END LANE



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

Price of Kit **£75.00**
Case (10" x 6" x 2 1/4") app **£15.00**
Optional Sound Module (6MHz or 5.5MHz) **£3.90**
Built & Tested in Case including Sound Module **£122.00**
Post/Packing £4.50
Add VAT 17.5% TO ALL PRICES

PAL COLOUR BAR GENERATOR (Mk4)

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

PRICE OF MK4 COLOUR BAR GENERATOR KIT **£35.00**. CASE **£5.80**. BATT HOLDERS **£4.20**
MAINS SUPPLY KIT **£5.80**
(Combined P&P £4.50)

VHF MODULATOR (CH 1 to 4) FOR OVERSEAS **£6.80**.
EASILY ADAPTED FOR VIDEO OUTPUT & C.C.T.V.

ADD
VAT
17.5%

LINE OUTPUT TRANSFORMER TESTER

- ★ Saves time and money.
- ★ Checks short turns.
- ★ Simple to use
- ★ Reliable.
- ★ Battery operated.
- ★ Pocket size.

PRICE **£20.00**
POST/PACKING **£2.50**

ADD
VAT
17.5%

INFRA RED REMOTE CONTROL TESTER

- ★ Pocket size.
- ★ LED + audible indication.
- ★ Simple to use.

PRICE **£20.00**
POST/PACKING **£2.50**

KITS AND PROJECTS

SAW IF AND TUNER UNIT complete and tested for video & audio outputs **£28.50** p.p. **£1.80**.
PAL DECODER KIT (Video to RGB) for Monitors **£27.00** p.p. **£1.80**.
PAL ENCODER KIT (RGB to Video) **£18.50** p.p. **£1.80**.
CRT TESTER & REACTIVATOR KIT For Colour & Mono complete with Case, Panel Meter Indicator - can be adapted for latest CRTs **£40.00** p.p. **£4.50**.

TV & VIDEO SPARES

REMOTE CONTROLS

Replacement for: Ferguson, Hitachi, Philips, Panasonic, Grundig, I.T.T., Sony, Saisho, Granada, Saisho + many others
Phone for make and model no.

PHILIPS SPARES

GII 6 POS touch tune channel selector (replaces old type) **£14.00** p.p. **£1.80**
MANUALS CF1, CTX-E, CTX-S, CP90, CP110, GR1AX, G90AE, 2B, 3A, NC3-CR **£4.50**, 2A **£10.50**, KT3, **£25.00** p.p. **£1.80**
SYSTEM 4 KT4, K40 **£19.80** p.p. **£3.00**
BACK UP BATT. 2.4V **£3.80**, 1.2V **£2.00** p.p. **90p**.
K30, KT4, CTX-EHT Lead **£4.90** p.p. **£1.00**.

THORN/FERGUSON SPARES

9000 Series IF/Decoder tested **£10.00** p.p. **£2.80**.
TX10 Focus control **£8.50** p.p. **£1.80**.
TX9/10 Remote & tuning 1515N **£5.00** p.p. **£1.80**.
TX9/10 Remote & tuning 1508A (incl. SAA5012) **£2.50** p.p. **£1.80**.
TX9/10 Remote & tuning 1536 (incl. SAA5012, SL471) **£3.50** p.p. **£1.80**.
TX10 Stereo Audio Board **£3.50** p.p. **£2.50**.
TX90 Mains TX **£23.00** p.p. **£4.50**.
TX100 Chopper TX **£22.80** p.p. **£2.50**.

IC SELECTION

AN5521	£3.80	SAA5243	£23.50	TA7698P	£6.80	TDA2594	£3.80	TDA4503	£5.80
AN5900	£2.20	SAB3035	£6.80	TBA1205	£1.20	TDA2595	£4.80	TDA4505	£6.80
BA6238A	£2.80	SAB3037	£8.80	TBA750	£2.20	TDA2600	£1.80	TDA4555	£9.80
CNX62	£4.80	SAF1032	£4.50	TBA920	£2.80	TDA2611A	£6.80	TDA4600	£3.85
FRG07	£7.20	SAF1039	£2.20	TBA950	£2.20	TDA2640	£3.20	TDA4601	£2.80
HA11211	£2.80	SL470471	£4.00	TCA2701	£1.80	TDA2653A	£3.20	TDA4610	£6.80
HA11423	£2.10	SL466	£3.20	TCA2801	£6.80	TDA2654	£5.70	TDA5510	£12.50
HAS1385SP	£11.80	SL490	£3.80	TDA1035T	£2.40	TDA2655B	£8.60	TDA5850	£2.80
LA4445	£3.00	SL1430	£1.80	TDA1037	£1.90	TDA2670	£3.20	TDA8153	£7.80
LA7800	£1.80	SL1432	£1.40	TDA1044	£2.90	TDA2680	£3.80	TDA8180 Kit	£7.50
LA7520	£2.80	SN76226DN	£1.80	TDA1060	£3.80	TDA2690	£3.80	TDA8190	£3.80
LA7801	£3.50	SN76705	£9.80	TDA1082	£4.80	TDA2780	£6.80	TDA9403	£3.80
LA7830	£2.80	STK3325	£6.80	TDA1170S	£2.20	TDA3190	£4.20	TDA9503	£3.80
M293B1	£11.80	STK5332	£6.80	TDA1180	£2.20	TDA3300	£6.80	TDA9513	£4.80
M490BB1	£14.80	STK5333	£18.40	TDA1190Z	£2.20	TDA3301	£7.50	TEA1009	£2.20
M491BB1	£9.80	STK5338	£6.80	TDA1432P	£5.70	TDA3330	£6.80	TEA1014	£3.50
M494	£9.80	STK5339	£6.80	TDA1470	£2.80	TDA3300	£6.80	TEA1039	£1.80
MC13002P	£5.80	STK5421	£6.80	TDA1524	£6.80	TDA3505	£4.50	TEA2018A	£2.20
MDA2061	£9.80	STK5422	£8.50	TDA1670A	£3.20	TDA3510	£9.80	TEA2029	£5.80
MDA2062	£3.50	STK5471	£6.80	TDA1701	£3.80	TDA3540	£2.50	TEA2165A	£6.80
ML237	£3.80	STK5481	£5.80	TDA1770	£3.20	TDA3541	£3.50	FMS1000N2LL	£3.80
ML926	£4.80	STK5482	£5.80	TDA1870	£6.80	TDA3561A	£5.80		
MNI5425	£15.80	STK7308	£6.80	TDA1908	£2.80	TDA3562A	£5.80	TMP47C432AP	£13.50
SAA1024	£5.80	STK7348	£10.80	TDA1940	£3.20	TDA3565	£3.80	N180	£13.50
SAA1025	£5.80	STR441	£7.80	TDA1950	£3.50	TDA3566	£5.80	TMP47C434N-3555	£16.80
SAA1124	£3.50	STR450	£6.80	TDA2040	£7.80	TDA3571	£2.80		
SAA1250	£3.80	STR451	£7.80	TDA2150	£3.20	TDA3576	£13.50	TMP47C434N-3559	£15.80
SAA1251	£8.40	STR454	£5.80	TDA2270	£2.80	TDA3640	£5.20		
SAA1293.02	£8.80	STR4211	£6.80	TDA2510	£6.80	TDA3650	£9.80	TUA2000	£8.50
SAA5000	£2.80	STR5412	£6.80	TDA2548	£5.80	TDA3651	£4.20	U4648	£14.80
SAA5010	£5.80	STR50420	£10.80	TDA2576A	£7.80	TDA3652A	£3.80	UC3844N	£4.95
SAA5012	£5.80	STR50103	£5.80	TDA2577A	£4.80	TDA3653B	£3.20	UPC1378	£1.90
SAA5020	£5.80	STR50401	£6.80	TDA2578	£3.80	TDA3654	£3.20	UPC1394	£3.80
SAA5030	£6.80	STR58041	£6.80	TDA2579	£3.80	TDA4442	£6.80	UPC1420	£8.60
SAA5040	£6.80	STR6020	£5.80	TDA2581	£2.40	TDA4500	£5.80	UPC1488	£3.20
SAA5050	£11.80	TA7680AP	£5.80	TDA2582	£2.80	TDA4501	£7.80		
SAA5231	£5.80	TA7681P	£5.80	TDA2593	£1.50	TDA4502A	£13.50	IC p.p. 90p	

VARICAP TUNERS: Grundig 8630 series **£5.50** p.p. **£1.00**. U321, U322/U341/N, ELC1043 (equiv). SC4, VHF NSP203 **£7.80** p.p. **£1.80**. UHF/VHF UV411 **£10.80**, U343 **£10.80** p.p. **£1.00**

LINE OUTPUT TRANSFORMERS p.p. £1.80

AMSTRAD 2200	£21.80	PHILIPS G9	£2.80
DECCA 100	£10.80	PHILIPS KT3	£13.80
FIDELITY ZX2000, CTV140	£15.50	PHILIPS K30	£13.80
FIDELITY ZX3000	£14.50	PHILIPS CTX-E, S	£27.50
HINARI CTV	£24.80	PHILIPS KT4	£22.40
HITACHI CPT1455, 1456, 1476, 1491	£28.80	PHILIPS 2A	£25.80
HITACHI CPT1446/46 PN2432981	£21.80	PHILIPS K40	£27.50
HITACHI CPT2174/76/78	£28.80	PHILIPS 3A, 2B	£23.80
HITACHI P/N2433752	£21.80	PHILIPS CF1	£32.80
ITT Compact B, 110	£19.80	PHILIPS CP90	£28.50
ITT Compact 80, 90P	£17.80	PHILIPS CP110	£24.25
ITT Compact 80, 110P	£22.80	PHILIPS GR1AX	£25.90
ITT Compact 80, 110P FST	£19.80	PHILIPS NC3	£22.50
ITT CV2 20	£9.80	SAISHO/MATSUI 3714002	£21.80
ITT CV2 25, 30, 32	£10.80	SANYO CTF132, 80P Chassis	£39.80
ITT CV2 45, 50, 60	£9.80	SONY KV1882	£35.00
ITT CV2 800, 801, 803	£24.00	SONY KV20926	£34.50
ITT CV2100, 1206, Picos	£18.50	SONY KV2704	£60.00
ITT CV21150, 1175	£22.80	SONY KV2752	£48.00
ITT CV21200, 1201, Mini 2	£18.50	THORN 1590, 91, 1612, 13, 1712	£4.80
ITT CV21204	£11.50	THORN 1690, 1691	£9.80
ITT CV21210/215/17	£17.80	THORN 9000	£9.80
ITT Digi 3, 110P	£19.80	THORN 9600	£9.80
ITT Core 110P, 90P	£19.80	THORN ICC5	£24.00
ITT Core 110P FST	£19.95	THORN TX9	£21.50
ITT TX33267	£22.80	THORN TX10 (Chopper)	£19.80
ITT TX3446	£22.80	THORN TX85	£19.80
ITT Monoprint A, S	£21.80	THORN TX9014	£19.80
ITT Core 110P FST	£19.95	THORN TX9020P	£21.80
LOEWE - Classic M124, M27	£33.00	THORN TX100, 110P Green Spot	£19.80
LOEWE - Contur M27	£33.00	THORN TX100 90P FST Yellow Spot	£21.80
LOEWE - Other (Quote model No.)	£21.80	THORN TX100 FST T6M45L	£25.50
PHILIPS 320	£2.80	POST PACKING LOPTS	£1.80

TRIPLERS: UK UNIVERSAL (best quality) **£7.80**.
CONTINENTAL TVK & BG RANGE (quote exact no.) replacement **£13.80**.
THORN 9000 **£9.80**.
BG2087-642-1001/1006 **£21.80**.
BG2077-642-1002/1003/1004 **£21.80** p.p. triplers **£1.80**.
MAINS TRANSFORMERS: 6.3 Volts CRT boost **£6.80** p.p. **£1.80**.
Mains Isolating 500VA **£51.25** p.p. **£5.25**.
MISC: 455 CRYSTALS for handsets, 4 for **£2.00** p.p. **80p**.
VHF to UHF Converters **£35.00** p.p. **£2.80**.
DEGAUSSING ROD **£33.75** p.p. **£2.80**.
TRANSPARENT VIDEO SERVICE CASSETTE **£6.80** p.p. **£1.80**

HOW TO ORDER: ADD p&p TO ORDER + VAT 17.5% TO THE TOTAL
PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

Telephone 071-794 8751, 794 7346
Fax 071-431 5778



MANOR SUPPLIES

172 WEST END LANE, LONDON NW6 1SD



Teletopics

BSB's SIGN OFF

With the date for the ending of the UK DBS transmissions from the Marco Polo satellites getting ever nearer there has been increasing speculation about what BSKyB will offer those who purchased BSB receiving equipment. Now we know. BSKyB has sent a letter to retailers to say that it will offer customers a choice of either twelve months' free subscription to Sky Movies Plus, the Movie Channel and Sky Sports or a refurbished Amstrad SRX200 satellite TV receiver with separate decoder and the appropriate size dish. With the latter choice, installation will be carried out by TAS and there will be a one-year guarantee. Customers have until October 31st to take up the subscription offer or until December 31st to take up the equipment offer. Those who purchased BSB equipment after December 1990 will not be eligible for the swap deal.

RETRA's president Robin Farmer commented that BSKyB has done "as little as possible, just to cover themselves", and that he was sorry for those dealers who had wholeheartedly supported BSB. Their customers had bought high-tech MAC receivers and would receive only refurbished Amstrad kit in exchange, which is not an exchange of like products.

SATELLITE TV ROUND UP

The Independent Television Commission has formally abandoned efforts to find a broadcaster to take over the five UK DBS channels available at the Marco Polo orbital position. Last April the Commission invited anyone interested to contact it. There were twenty replies, but none came up with a proposition that the ITC considered was likely to be viable. The licence will not therefore be advertised. What an ignominious end to official satellite TV broadcasting in the UK.

The *Financial Times* satellite TV monitor suggests that there were around 58,000 new receiver installations in July. This is little change on the June figure, which may be a good sign as there is usually a drop in July. But the exclusive satellite television coverage of Premier League football has not so far done much for sales.

Supervision Group Ltd., Tower Works, 2 Globe Road, Holbeck, Leeds LS11 5QG (0532 444 195), which claims to be Europe's number one satellite TV distributor, has launched a monthly newsletter. Its aim will be to keep customers up to date with news and views from all quarters of the satellite TV industry. There will be special offers, and a letters and problem solver page is promised.

In the USA Hughes Aircraft is pushing ahead with a project to offer over 150 TV channels by the beginning of 1994, covering the whole country via three satellites. DirecTV, the Hughes subsidiary involved, has entered into an agreement with Digital Equipment to operate the system's billing system. Eddy Hartenstein, DirecTV's president, estimates that the system could have 10m subscribers by the end of the decade. Thomson Consumer Electronics has been given an exclusive deal to produce the first million receivers, which are expected to sell for around \$700. The scrambling equipment is to be provided by a News Corporation subsidiary, News Datacom. Forty-fifty channels are to be devoted to pay-per-view movies, with film showings starting every half hour. Further channels will be assigned to

subscription sports services and to special interest groups and ethnic minorities. Twenty channels will be used to deliver cable TV services to rural areas unlikely to be served by cable networks.

LAUNCHES

Philips has delayed the launch of its digital compact disc system, which was due in September, until later in the year. The reason given for the delay is minor problems experienced during trial production of the players. The new launch will be in the UK, Germany, France and the Netherlands rather than throughout Europe. This is the second time the launch date has been missed – an April launch was initially suggested.

Sony has relaunched its Data Discman in the UK, with a new range of software. This system was also due back in April, but was held back by lack of UK software. The Discman is being sold through Sony Centres and selected independents at around £350. Discs, at £25-£40, are being distributed via bookshop chains and multiple newsagents.

PHILIPS' WOES

A sharp drop in profits at Philips in the second quarter of the year, to some £25m, has been blamed on losses suffered by the consumer electronics division. To preserve market share, selling prices have been reduced by six per cent. A return to profitability in this sector is not expected until 1994. Philips' tube business has also suffered as a result of the conditions in the consumer electronics field.

The DCC launch delay, the move to Apple Computers by Gaston Bastiaens who had headed the CD-I programme, and questions about the future of HDTV in Europe have not helped Philips. In an unprecedented move company president Jan Timmer presided over the company's quarterly press conference. On the HDTV front he made it clear that without financial backing from the EC Philips, which with Thomson had been its major backers, will regard HD-MAC as a lost cause. He blamed the improper use of telecom satellites for TV broadcasting as a major cause of the problems with official DBS services and the resulting delays to the adoption and evolution of the MAC system. Philips and Thomson have been developing a digital TV system for the US market and now seem to see the future of HDTV in Europe in digital terms.

VIDEO NEWS

JVC has launched four new VCRs, three of them with built-in Video Plus timer systems. Model HRD790 at around £300 offers LP, an express timer system that uses three sets of buttons, PDC/Startext capability when used with an optional adaptor, a one year/eight event timer and child lock. Model HRDX22 at £320 includes a Video Plus timer and a multi-brand TV compatible remote control system. At £360 Model HRD820 has a Video Plus timer, LP, a jog/shuttle dial and front AV sockets. Top of the range Model HRD880 at £500 features a Nicam decoder, hi-fi sound and a Video Plus timer that's linked to a built-in PDC decoder.

JVC claims that more and more people want features that offer ease of use, in particular help with timer setting. According to JVC, surveys suggest that fifty per cent of users cannot set the timer and seventy per cent find programming difficult.

Gemstar, which developed the Video Plus system, claims that over 300,000 handsets have been sold in the UK since

the system was launched here last winter. There has been a change in the distribution franchise arrangements, with Acomex taking over from Video Technology Marketing. Acomex is based at 5 Ivory House, Plantation Wharf, London SW11 3TN (071 924 6666).

JVC has developed a new VHS-C cassette that incorporates a built-in safety lock to prevent the tape becoming loose while being carried, thus avoiding the need to check whether the tape is slack before use. The locking mechanism is released automatically when the cassette is inserted in the machine. There's also a safety record slider system of the type used with Video 8 cassettes. No price details have been released.

The technical committee of the British Tape Industry Association (BITA) has released a 14-page document that's designed to standardise video tape comparison tests. It contains information on reference tapes, test equipment and conditions and the measurement of audio and video characteristics. BITA can be contacted on 081 681 1680.

DEVELOPMENTS

Sharp has launched on the Japanese market an ultra-compact LCD video projector, Model XVP1. It uses a 3.6in., 100,386-pixel LCD panel that has a horizontal resolution of 350 lines in the NTSC version and 320 lines in a PAL/SECAM version. Use of a newly developed metal halide lamp and microlenses is claimed to give clear, bright and sharp pictures when projected on to an optional 40in. screen. Screen size can be from 30 to 60in. The XVP1 has built-in speakers and headphone, composite video and S video sockets. Weight is 4kg. No UK launch details have been released.

Researchers at Sony have developed a laser that produces blue light. Since the amount of data that can be stored on an

optical disc is determined by the wavelength of the laser light used to scan it, use of a blue laser could triple the amount of data stored. The laser employs a new material which consists of magnesium and zinc selenide. Only snag is that the laser has to be operated at temperatures well below freezing.

GAMES PLAYERS

Amstrad and Sega have joined forces to produce a range of personal computers that can be used as games machines. Around 200,000 of the machines are expected to be sold in Europe this autumn. Microsoft and Tandy are to launch a multimedia games machine this autumn in the USA. Code named Gryphon, the player will use Microsoft's Windows 3.0 system, play games and educational titles and receive satellite TV programmes. It's expected to sell at the equivalent of around £300.

PC VIDEOCONFERENCING

British Telecom and Motorola are to develop a chip set that will enable personal computers to be used for videoconferencing. PC users will be able to talk to each other and see each other on their screens and send data and images ("window swapping") to each other. Motorola will integrate BT's standards-based video coding technology into a PC multimedia communications chip set capable of simultaneously processing real-time video, still images and data. Manufacture and marketing of the chip set to business partners worldwide is to be undertaken by Motorola, while BT will incorporate the chip set into future video communications products such as slot-in PC cards. PCs using the technology could be available in a couple of years' time at under £1,000.

Doric/Rediffusion Mk. 3. R.E. Bailey, 51 Robin Gardens, Waterlooville, Hants PO8 9XF.

Help Wanted

Can anyone help with a circuit diagram or manual for an ancient but trusty Advance r.f. signal generator, type B4B5? A. Lewis, 74 Dorchester Road, Ipswich, Suffolk IP3 8RH (0473 712 503).

Can anyone supply an Si-1590HD audio output device for a Boots R200 tuner-amplifier? The device was used in Aiwa amplifiers but is not available from them. Tony Whittle, 12 Appleby Road, Intake, Doncaster DN2 6HH (0302 363 250).

Can anyone supply a spare line timebase panel (panel C) for the Sony Model KV1820UB? Also the TLC132A panel for the Toshiba 8600UB VCR? Donald Bills, 69 Greenfields Road, Kingswinford DY6 8EG.

Could anyone suggest a source of parts and a manual for the Technisonic VT101 VCR? It seems to have Daewoo chips in it. It would also be helpful to know of a source of parts for the Datsura Model CDR9009 CTV set. Ivan Walker, 193 Mowhan Road, Mowhan, Co. Armagh, N. Ireland BT60 2ED (086 157 361).

Can anyone supply a line output transformer for the Mitsubishi Model CT1902L? Tim O'Brien, Clareen Drive, Ennis, Co. Clare, Ireland (065 28512).

I'm anxious to borrow service manuals for the following CTV chassis: Philips G8 550 series; RBM T26A;

Can anyone supply a circuit diagram for the Armstrong 625 tuner/amplifier? The fault symptoms are low gain in both channels with hum on the right channel. They are present at the input to the main PCB. Any suggestions? L. Hanran, 15 Wright Street, Townsville, 4811, Queensland, Australia.

Can anyone supply a circuit diagram for the Hinari CT143A/CT180 or just tell me the type no. of the micro used for tuning/channel selection? Please call Colin Boggis on 0483 476 831 or fax on 0483 797 893.

Is it possible to transfer the screens from a BBC B computer to a VCR in colour for the purpose of titling home videos? Phone Alan on 0933 312 358. A. Brown, 14 Ashby Drive, Rushden, Northants.

Can anyone supply a new video head for a Philips VR2324 VCR (V2000 system) or a non-working machine with a good head? D. Hodgkinson, 42 Victoria Avenue, Cliftonville, Margate, Kent CT9 2UB (0843 223 618).

Wanted: A damaged optical block for a Panasonic NVMS2. Customer Superglued the manual zoom lever control button and thus has no access to the macro function. As the trade price of the complete assembly is £200 a means of repair is urgently sought! David C. Woodnott, Spring Cottage, Iron Hill, Dunkirk, Faversham, Kent ME13 9PD (0227 751 594).

VCR Clinic

Reports from Brian Storm, Jeff Herbert, Steve Cannon, Nick Beer, Paul Hardy, Michael Dranfield, Estelle Sandford and John Edwards

Panasonic NVL28

This machine would intermittently play back a mixture of the E-E and off-tape pictures. Not something I've seen before, but this machine sure did it. Checks on the video and E-E switching showed that there were no problems here, and I couldn't see any other likely cause of the fault. But this machine has an extra digital pack for picture-in-picture effects. This was where the cause of the problem lay. Two wires in this pack were shorting intermittently. Trimming them provided a complete cure. **B.S.**

Panasonic NVF75

The E-E picture rolled and pulled though video playback was fine. A scope check on the video output from the demodulator pack produced a nice waveform with plenty of sync pulse depth. This went into the luminance processing chip IC301 where it retained its purity. But the output from the M51292FP switching chip IC3901 on the back panel was a sorry picture indeed. Replacing this chip cured the problem. **B.S.**

Panasonic NVF55

Two of these machines have come in recently with the complaint that they were dead, with no output from the power supply module. Disconnecting the module from the machine then plugging it in again showed that the various supplies were at about twice the correct voltage. Checks around IC1103, which provides a stable reference for the power supply, showed that the earth pin was at about 19V. The print had gone open-circuit around the nearest earthing connection to the screening can. **B.S.**

Panasonic NVJ40

We've had this fault twice recently. At switch on the cassette carriage tried to load though there was no tape. The machine soon powered down as the system control detected that there was a problem. Checks showed that the capstan drive chip was operating at full tilt all the time, irrespective of the control signal at pin 16. The cure is to replace the BA6435 capstan drive chip. **B.S.**

Akai VS485

The E-E sound disappeared after a few minutes. After an hour the E-E video disappeared as well, leaving a blank raster. The culprit was the UPD75216A-OA6 timer chip. Pin 37, the tuner mute line, was at an indeterminate state (1.2V) instead of 0V when a signal was detected. The 1.2V was enough to turn on the digital sound and video muting transistors when they had become warm. A new timer chip cured the fault. **J.H.**

Sony SLV270 Mk II/Grundig equivalent

Once this machine had reached the half-load state no deck operations worked. As the drum didn't rotate, the microcontroller chip wouldn't allow any functions other than eject.

The cause of the problem was the surface-mounted capacitor CC243 which had a 17k Ω leak. Fitting a replacement restored drum rotation and normal operation. We have found that these brown-coloured surface-mounted capacitors fail quite regularly, causing various faults in Grundig machines – this one is a Grundig clone. **J.H.**

JVC HRD540

Playback in the reverse direction is a rare fault with any model. But several of these JVC machines have done exactly this. The sound is backwards: the picture is present with some mistracking bands on it, and there's colour. The play mode is entered but the tape runs in the reverse direction. The cause of the problem is the PU61003 capstan motor: due to an internal fault in its drive chip the forward/reverse line is shorted. In all cases so far a new motor has provided a cure. **J.H.**

Sony SLV615

There was no rewind or reverse picture search, a fault we've had several times with these machines. When rewind was selected the machine rewound the tape for a second then stopped. The same thing happened in the review mode, but every other function was fine. We suspected something optoish, such as an end sensor, reel sensor, etc. So we scoped the outputs from the supply and take-up spool sensors. The low-frequency take-up reel sensor pulses appeared to be perfect, with correct amplitude. Things were different with the output from the supply reel sensor PH001 however. Pulses were present, but at only half the correct amplitude. Switching the scope to d.c. input showed that the pulses were still well above 0V at their lowest level. After fitting a new opto-sensor (part no. 8-759-144-33) the machine was back in good working order. **S.C.**

Panasonic NVG45

This machine had an intermittent fault. The capstan would start to run fast in all modes, including lacing and unlacing. When the fault was present in the play mode the machine was toggling between SP and LP. We suspected a fault in the capstan FG pulse feedback circuit and sure enough found that the FG signal was going missing at pin 3 of IC2104 on the sub-main servo part of the PCB. The only components in the feed here are R2184 and C2185. Scope checks at the resistor showed that the signal was present at one side but not the other. It's a surface-mounted component, with a value of 1k Ω . We cured the fault by fitting a standard eighth watt resistor. **S.C.**

NEC N9055K

This machine would shut down and display the error signal (a flashing square in the fluorescent display). We gave the machine a clean up and changed the idler after which it would record and play back its own tapes. But the recordings were incompatible with another machine: the sound was out of sync and there were multiple noise bars on the screen. The cause of this was that the exit guide didn't locate fully in its V block because the tape guide had slipped out of position in

the guide casting. The entry and exit guides were both replaced. After realignment the machine performed perfectly. I've since learnt that this is a common problem with these machines but it was new to me. **P.H.**

Hitachi VT520

This machine played its own recordings perfectly but with prerecorded tapes the chroma was at best noisy and at worst non-existent. Checks around the chroma processing chip IC301 showed that the chroma signal was of about the right amplitude but very noisy. Matters weren't helped by several mistakes in the circuit diagram: the playback not the record voltages are the ones in brackets while pin 18, the search switching line, should be at 1.5V or so in play and 0V in search. I felt that the f.m. entering the chroma processing was poor but it looked fine. Luckily I had another head amplifier, but substitution made no difference. And so to the video heads. Strange though it may seem, the cause of the problem was the lower drum assembly/rotary transformer/drum motor. **N.B.**

Panasonic NV688

This ageing LP VCR was pretty dead: there was no clock display and the machine didn't work, though the LP and power LEDs were permanently on. The cause of the problem was that the regulated 6V supply, from which the 5V supply is also developed, was missing. There was voltage at the emitter of the regulator transistor Q1201 and the correct base bias was present, but there was no output at its collector which was dry-jointed. Q1201 is miles away from the power supply area, being mounted on the back of the DD unit. **N.B.**

Sharp VCA100H

This VCR was noisy in review, had low sound output and intermittently poor playback sync. The noise was caused by a barrelled pinch roller, which also caused severe tape riding in all modes. The other two faults were caused by a very worn audio-control head. **N.B.**

Ferguson FV50

This machine wouldn't accept a cassette. Removal of the carriage enabled me to check that the mechanism was working all right and that the problem was due to the carriage itself: the main cam had broken off its mount. **N.B.**

Hitachi VT130

Intermittent stopping of the capstan and drum motors is a fault we've had on a couple of occasions with these machines. Because of the intermittent nature of the fault it took us some time to get to the bottom of the problem the first time round. We found that tapping the luminance-chroma subpanel would instigate the fault, giving us the clue to its cause – the fact that the 4.43MHz reference oscillator signal is also used by the servo circuits. A scope check at pin 32 of the servo chip IC601 showed that the 4.43MHz signal went missing when the Y/C panel was flexed or tapped. After much searching and soldering we decided to replace the HT4539B chip IC301, which is the source of the 4.43MHz signal. It's a hybrid chip that contains some surface-mounted components and has a crystal stuck on top. We didn't attempt to replace the crystal but think it's the cause of the trouble since no

amount of panel tapping stops the oscillator when the crystal is cooled. Those without an account with Hitachi can obtain the chip from Willow Vale. **M.Dr.**

Sharp VCA615HM

Many odd, intermittent faults with the Sharp VCA range of VCRs can be cured by replacing the mode switch, which is a very easy job. This particular machine proved to be a real time waster however. After we'd replaced the mode switch everything worked fine until fast forward or rewind was pressed. In these modes the reel idler didn't move far enough towards the reel discs to engage. After much checking we discovered that in addition the brakes were not being released from the reel discs. Both of these operations are controlled by a lever off the master cam. By turning the master cam back a bit the brakes came off and the reel idler engaged with the reel disc. So it seemed that the loading motor was overshooting its correct position. Then the penny dropped. Although the new mode switch looked exactly like the old one in fact the rotating part was a different colour. When we prised open the two switches we found that they had different track patterns. After fitting the right switch – a yellow one for the VCA615 – the machine functioned correctly. **M.Dr.**

Akai VS23

This machine came in with a power supply fault – hum on sound and unstable vision. The cause was ripple on the 5V line from the chopper power supply. Replacing C7 (100µF, 10V), C6 (220µF, 10V) and C60 (100µF, 25V) which were all low in value cured the trouble. Beware of a misleading indication however. A finger placed across pins 2 and 3 of the NJM2352 chopper chip IC1 may seem to provide a cure and lead you to look elsewhere, as I did. All this does is to increase the chopper frequency, making the electrolytics more effective.

Repeated failure of TR12 (2SD1292) in the voltage doubler circuit that produces the -35V supply for the display digitron is caused by shorted turns in choke L8. When you replace TR12, always replace L8 at the same time. **M.Dr.**

Ferguson FV30

This machine worked all right with its own recordings and could be set up for near perfect f.m. with an alignment tape, but on all other prerecorded tapes there was rolling as though the TV set was tuned to the wrong channel. If the microcontroller chip IT01 has been changed you will have to follow the instructions in the manual on resetting the head switching pulses. BT08 has to be shorted to chassis for one second: this starts an internal program within IT01 to set up the chip for the deck. It's quite hard to find BT08, which is at the right-hand side of IT01 on the component side. There's a convenient chassis pin next to it. Surprisingly enough doing this cured the fault. **E.S.**

Akai VS23

The E-E and playback pictures suffered from severe vertical jitter, with line tearing and a ragged hum bar across the centre of the screen. A check on the voltages at the power supply output plug P1 showed that pin 4 was at 17V instead of 9V. The 2SA1286 transistor TR7 turned out to be leaky all round. When this had been replaced the picture was steady but a slight hum bar was still visible. Replacing C4 (47µF, 25V) and C6 (220µF, 10V) cured this final problem. **J.E.**

Palmcorder Shake Compensation

Steve Beeching, T.Eng.

A problem that users have with mini camcorders is that they are difficult to hold still. This can be particularly noticeable with a zoom to telephoto. Zoom ratios of 8:1 are available with these lightweight camcorders – newer models can enhance the zoom electronically to 64:1 (with a considerable reduction in the resolution!). Shake compensation is a means of overcoming this problem, and some interesting information came my way recently from Japan on a new technique developed jointly by Sony and Canon.

The Original Panasonic System

The first shake compensation system was developed by Panasonic for the company's Model NVS1. It achieved improved picture stability by zooming out a small percentage of the scene. In fact about fifteen per cent of the picture area is lost in order to give the compensation circuitry an operating margin. Fig. 1 indicates how the system works.

There are four motion detection zones in the CCD imager's picture area. These are shown as small rectangles in Fig. 1, the outside rectangles (two fields are shown) representing the imager's total picture area. The two fields show the effect of shake with movement in the direction indicated. The shake compensation zoom removes part of the top and right-hand side of the picture on the first field and part of the bottom and left-hand side on the second field, thus stabilising the image. This action occurs when the compensation circuitry is enabled. The smaller, broken-line rectangle in the two fields is the picture area after compensation. Provided the picture shift due to shake is small enough for this smaller rectangle to remain within the larger picture area the system works.

Fuzzy logic is used to determine movement priorities within the detection zones. The system must try to coun-

teract efforts to compensate for normal movement within the scene. The technique is referred to as a fuzzy giro: it's an electronic giro stabiliser.

Each motion detection zone is further split into thirty small points. From these the motion detector chip can deduce the amount and direction of shift due to camera shake. The accuracy achieved is better than half a pixel, which is very small. Detection is a digital process carried out between two successive fields, with one of the fields stored in memory. Fig. 2 shows the system in block diagram form.

After calculation of the movement vector in both direction and amplitude the real-time picture from the imager is read into a field store memory with correction applied to the timing pulses to compensate for any shift. Priority is given to vertical movement to avoid applying compensation when someone walks across the scene, otherwise the system could attempt to correct for normal horizontal movement not caused by shake. The fuzzy logic algorithms take care of this.

There remain some problems however, one being the reduced resolution when the anti-shake circuit is switched in and the picture is electronically zoomed, another the limit

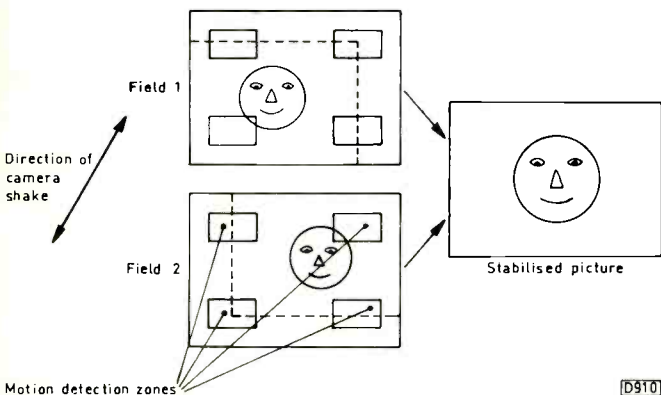


Fig. 1: Panasonic fuzzy giro shake compensation.

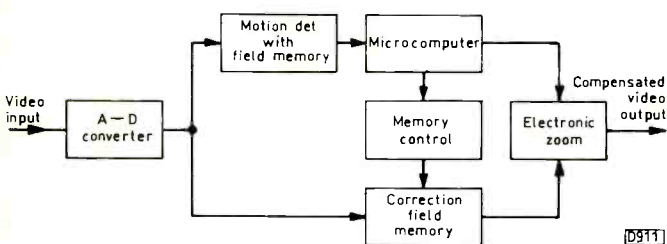


Fig. 2: Block diagram of the fuzzy giro system.

Fig. 3: Cross-sectional view of the variangle lens that's the basis of the new Sony/Canon shake compensation system.

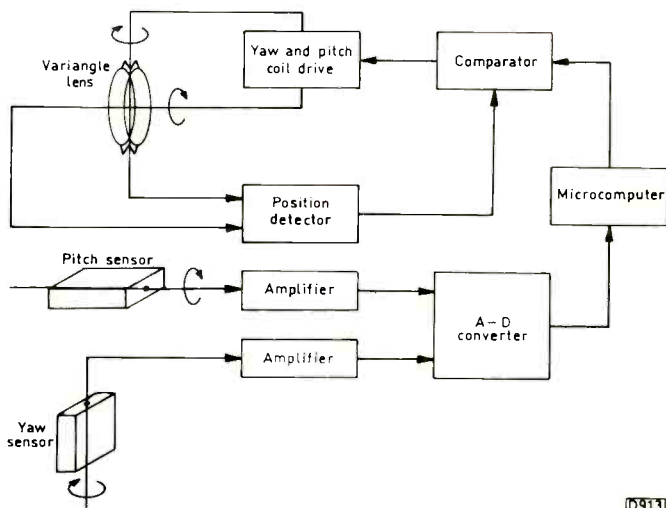
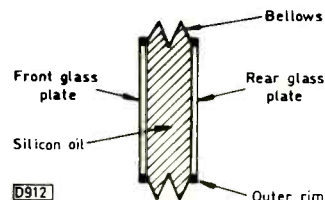


Fig. 4: Block diagram of the variangle lens system.

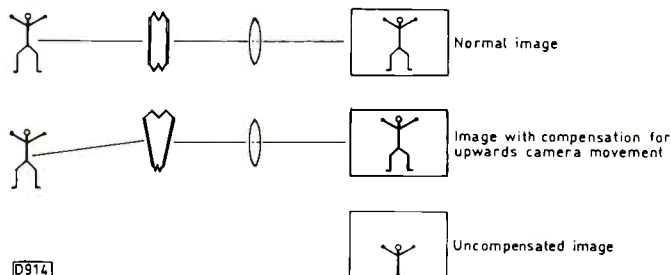


Fig. 5: How the variangle lens system works.

set by the fifteen per cent error margin between the original picture and the zoomed picture. In addition for the detectors to work there must be picture information: low-resolution scenes, blank walls, misty landscapes and so on can impair reliable operation. With the original system tilting the camera up or down rapidly results in a sequence of abrupt still pictures. Different algorithms that differentiate between shake and tilt in the newer NVS5 have largely eliminated this problem however.

Sony-Canon System

A new technology just announced by Sony and not yet available in the UK consists of a section, called an optical shake compensation mechanism, that's mounted in front of the lens. Since it has been developed by Sony and Canon we can expect both firms to use it.

Compensation is provided by a device called a variangle lens or prism. Fig. 3 shows a cross-sectional view. It consists of two glass plates, with reinforced metal outer rims, connected by bellows. The space between the plates is filled with silicon oil, which has a refractive index of 1.5 – the same as glass. Though the device is in fact a lens it acts like a variable prism. Tilting the glass plates with respect to each other deflects the optical path.

The variangle prism provides the compensation while

two piezoelectric angular-velocity sensors carry out movement detection. Fig. 4 shows a block diagram of the system. One sensor detects pitch (vertical movement) while the other detects yaw (horizontal movement). Thus the direction and amount of shake are known. This information is fed to a microcomputer chip which decides what to do about it. Two actuator coils, under the control of the microcomputer, twist and tilt the variangle lens. The drive provided by the coils is in the opposite direction to the shake movement, thus providing compensation.

Fig. 5 shows an example. If the camera is tilted upwards slightly in error due to camera shake the scene moves downwards within the picture area. The variangle lens drive then tilts the lens downwards, maintaining the correct position of the scene within the picture area. The amount of compensation provided is 1.5° for vertical and horizontal shake.

The system has the following advantages. First, it doesn't depend on sensing movement within the scene: instead, physical gyroscopic movement is detected by inertia. Secondly full resolution is maintained as the picture isn't artificially or electronically zoomed, and the full picture area is maintained.

From my point of view as the unit is apparently self-contained it should be replaced, if a fault occurs, as a module. Just how we'll establish that someone's anti-shake compensator is intermittent has yet to be determined!

At the Amsterdam IBC

George Cole

This year's International Broadcasting Convention was held in Amsterdam at the beginning of July. There were many developments in the TV field to be seen and of more general concern were questions about the future of HD-MAC, the European high-definition system.

PAL Plus

PAL Plus has been around for a while now but seems to be gaining support. Developed by a consortium of European terrestrial broadcasters and equipment manufacturers that includes the BBC, NTL, ZDF, SRG, ARD, IRT, Thomson, Philips, Grundig and Nokia, it's an enhancement of the PAL system offering 16:9 widescreen pictures, digital stereo sound, improved picture quality and compatibility with existing PAL sets. There are some 170 million PAL TV receivers in use worldwide, 100 million of them in Europe. PAL Plus transmissions can be received by these existing sets though there's some reduction in picture quality.

PAL Plus was developed as a defensive measure: terrestrial broadcasters were worried about viewers zapping from widescreen satellite TV channels to terrestrial ones and finding the quality of the latter disappointing. At present PAL Plus is not intended as a rival to the D2-MAC satellite TV transmission system, but at this point in time it's difficult to know how things will develop.

The first PAL Plus demonstration was given at the 1990 IBC: the public saw the system for the first time in 1991. Second generation PAL Plus equipment and receivers were being demonstrated at this year's IBC. The picture and sound quality are impressive and the system shows that there's still plenty of potential left in PAL. A number of test transmissions have been carried out in Germany, and the plan is for a PAL Plus service to begin in 1995. It would be

introduced on a country-by-country basis, with the number of PAL Plus broadcasts depending on the number of sets sold, i.e. if ten per cent of homes have a PAL Plus receiver, ten per cent of programmes would use the system.

Technical Details

Various papers delivered by members of the PAL Plus group explained how the system works. Special processing is required to ensure that the PAL Plus signal remains largely compatible with the existing PAL system. Fig. 1 shows a simple PAL Plus encoder block diagram: the encoder's output can be displayed on any type of PAL receiver. Fig. 2 shows how two types of displays are produced, for 4:3 aspect ratio PAL sets and 16:9 aspect ratio PAL Plus sets. First, the 576 active lines of the source signal are vertically low-pass filtered and sub-sampled to produce 432 new lines, i.e. three-quarters of 576. A 4:3 aspect ratio set displays these lines with a black band at the top and bottom. High-pass filtering and further sub-sampling produce another 144 active lines which fit at the top and

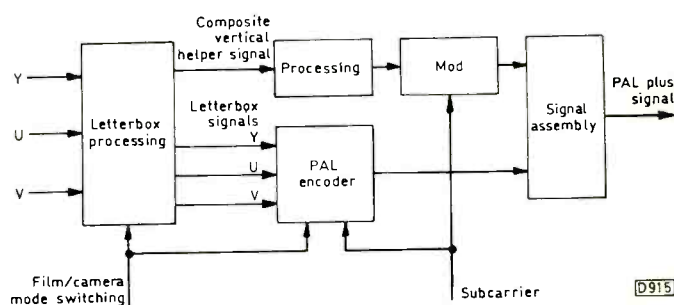


Fig. 1: PAL Plus encoding block diagram.

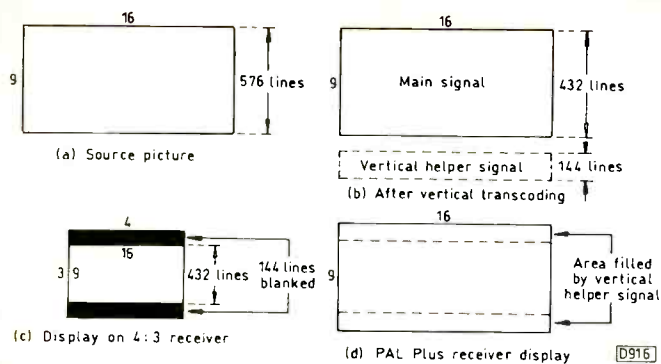


Fig. 2: Letterbox processing.

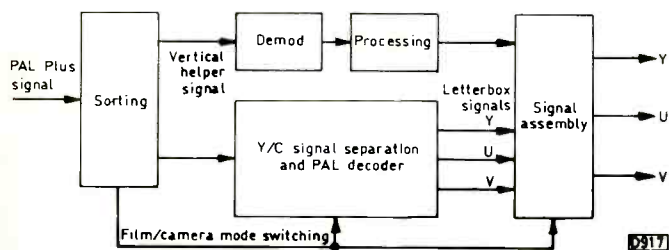


Fig. 3: PAL Plus decoder, basic block diagram.

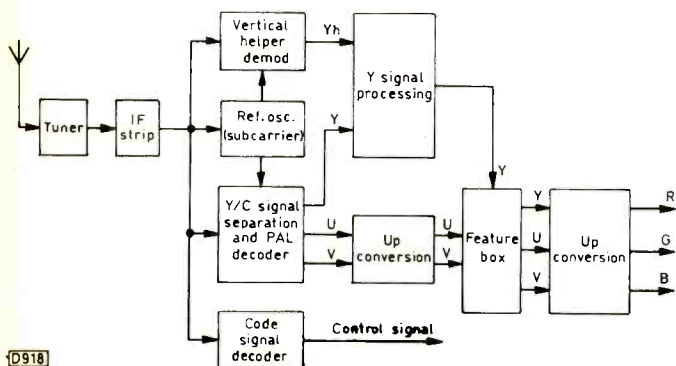


Fig. 4: Signals section of a PAL Plus receiver.

bottom of the picture. With a 4:3 aspect ratio set these lines are in the blacked out areas at the top and bottom of the screen, giving a letterbox effect – the technique is known as letterbox processing. A vertical helper code signal is added in line 23. A PAL Plus TV set senses this signal which tells it to use the 144 extra “vertical helper” lines to fill the top and bottom of the screen so that a full 576-line display is seen.

The vertical processing system varies with the picture source. When the picture comes from a TV camera the processing is done on a field basis to reduce motion effects. When a film source is used the processing is done on a frame basis. Various steps are taken to hide the vertical helper section of the display from 4:3 viewers, including band limiting and a compansion system. It was possible to see the helper however with some programme sources: it appeared as a flickering line within the black band.

Fig. 3 shows the elements of a PAL Plus decoder.

Colour Plus

One of the problems with PAL pictures is occasional cross-colour and cross-luminance effects. PAL Plus includes a system called Colour Plus to reduce these effects by separating the luminance and chroma (Y and C) signals. It relies on the fact that there’s a high correlation between the brightness and colour information carried by two succes-

sive fields.

The phase of the colour subcarrier on any two lines that are 312 lines apart, e.g. lines 2 and 314, differs by 180°. This fact enables simple addition and subtraction to be used to separate the Y and C signals. Field one plus field two gives a cross-talk free luminance signal with a full 5MHz resolution while field one minus field two provides a cross-talk free chrominance signal.

The Colour Plus system works well with film and video sources where there isn’t excessive motion or colour saturation. Video sources with fast movement and high colour saturation are processed without Colour Plus. The PAL Plus group is now working on a ghost-cancellation system.

The PAL Plus Receiver

The front end of a PAL Plus receiver is just like a conventional PAL set, see Fig. 4, but the signal processing is more complex. In a PAL Plus set four types of signals have to be processed, the Y/C signal, the vertical helper signal, the code signal and the subcarrier. The vertical helper signal is demodulated to baseband then processed while Colour Plus or normal PAL decoding is carried out in the central 432 lines of the picture. The additional 144 lines are produced by vertical interpolation.

There are problems with a PAL Plus signal from a conventional VCR. The helper signal will have been modulated on to the chrominance carrier, but VCRs use a colour-under system to squeeze the chroma signal into a narrow gap in the 0-1MHz region. Unfortunately this process degrades the helper signal, resulting in poor playback picture quality.

The PAL Plus group has suggested two possible solutions to this problem. The first is to decode the PAL Plus signal to baseband YUV (luminance plus U and V chrominance) with a 16:9 aspect ratio and 576 lines, then encode to the PAL Y/C standard with the 16:9 information recorded on the control track. A voltage signal fed to pin 8 of a scart connector would tell the receiver that the picture has an aspect ratio of 16:9. This system is used for D2-MAC. With the second proposal the helper signal is demodulated and recorded in the Y channel. During playback the helper signal is fed to the TV set via the scart connector’s Y pin. The recorded C signal would contain only chrominance information.

The PAL Plus group is also working on standardisation of the signal that automatically tells the TV set whether the programme source is in 4:3 or 16:9 form. The proposal is to insert a data burst in the first half of line 23, with the main energy centred around 2.5MHz to allow recording by a VCR. There would be around twenty user bits that would tell the receiver the aspect ratio, the type of programme source (e.g. film or video), etc.

PAL Plus Problems

Charles Sandbank of BBC Engineering explained why the PAL Plus group had opted for the letterbox format rather than extra side panels for 16:9 sets. The problem with side panels is that all the action has to be put in the centre of the screen, which defeats the whole object of widescreen TV. Another problem lies in stitching the side panels on to the main picture without viewers seeing the joins or noticing differences in noise, colour etc. Mr. Sandbank pointed out that continental viewers are used to letterbox pictures, the main problem being in the UK where limited broadcasts are made on Channel 4.

A paper delivered by Paul Gardner of the ITC addressed

this problem. He explained that 68 per cent of UK households have at least one TV set with a screen size of less than 20in. As captions and subtitles can't be displayed in the black bands these add to the difficulty. Research carried out by BARB showed that over a third of viewers don't like letterbox pictures. Mr. Gardiner proposed a temporary measure that would help "educate" viewers to accept black bands. This would involve cropping 4:3 picture sources to 504 active lines and down-converting 16:9 sources to the same number of lines, the result being a 14:9 aspect ratio. The picture loss with a 4:3 set would be reduced from 12.5 per cent with the existing letterbox system to just six per cent of full screen height with 14:9. In practice most of the black bands would be masked by overscanning. 16:9 sets would display narrow bands at the sides of the screen. Mr. Gardiner added that 14:9 broadcasts would not affect existing studio production practices – all productions would remain in 4:3 or 16:9 form.

Another problem with PAL Plus is in designing a digital sound channel for countries like Germany that use dual-carrier f.m. stereo sound with system B/G. The system B/G channel bandwidth is 7MHz, which compares with 8MHz for the UK system I. With system I the main sound carrier is at 6MHz above the vision carrier whereas with system B/G the vision-sound carrier spacing is 5.5MHz. Thus with system I there's a 2MHz gap for sound use whilst with system B/G the gap is only 1.5MHz. The UK has a Nicam digital sound channel at 6.552MHz above the vision carrier. Nicam is also used by system B/G countries like Spain where the carrier is at 5.85MHz above the vision carrier. It has so far proved to be impossible to add a digital sound carrier to the German system however because its second f.m. sound carrier is spaced 240kHz above the main carrier. One answer may lie in the use of a new low-bit rate coding system that can be squeezed into the tight gap. Such systems are unlikely to become available until several years after the launch of PAL Plus however. This could mean that German viewers would be faced with the choice of two types of PAL Plus receiver: early ones without digital sound and later ones with it.

D2-MAC

European broadcasters, equipment manufacturers and cable and satellite operators have drawn up an action plan that's designed to increase the number of D2-MAC services. The plan, which is being considered by the Council of Ministers, has the following elements:

- (1) To increase the number of 16:9 satellite TV D2-MAC services to around thirty by 1996.
- (2) To increase the number of cable TV networks that carry 16:9 D2-MAC signals.
- (3) To increase the number of 16:9 programmes produced.

To implement these objectives the plan asks for an 850m ECU subsidy. EC telecom ministers have proved to be hostile to this subsidy however. D2-MAC supporters have pointed out that without a subsidy there will be no D2-MAC and thus no HD-MAC.

HD-MAC

HD-MAC was much in evidence at the Convention, with live broadcasts from Wimbledon attracting lots of viewers.

The pictures looked good, apart from occasional blurring on some fast-moving objects. In a back room of the Eureka 95 stand visitors were shown work that's being undertaken for phase 3 of the HD-MAC project, to start in 1993. The Group has been improving the motion-compensation algorithms, but it was difficult to see how this improved matters as there were no side-by-side comparisons. There was also a multi-channel sound system that cleverly squeezed three extra channels into the space occupied by the conventional stereo channel.

There was much criticism of Europe's step-by-step approach to HDTV, with consumers moving from PAL to D2-MAC and then to HD-MAC. Some conference speakers felt that Europe should go straight to HD-MAC; others said that Eureka 95 should be abandoned and a move made to digital TV instead.

Terrestrial MAC

MAC was originally conceived as a satellite TV system – terrestrial channels couldn't handle its wide bandwidth. But work by Thomson, France Telecom and the French research centre CCETT has produced terrestrial D2-MAC and HD-MAC transmissions. The D2-MAC signal uses one terrestrial channel while HD-MAC uses two. Field trials were carried out in Rouen and Grenoble in September 1990 and at Nemours near Paris in May and July this year. In the earlier trials 80 per cent of receiving sites could pick up the D2-MAC signal. In the Nemours trial SECAM/D2-MAC simulcasts were broadcast and compared. The SECAM signals were on channels 32, 34, 49, 52 and 55, with D2-MAC on channels 31 and 53. The Eurocrypt system was used with the D2-MAC transmissions. Results were said to be promising, the D2-MAC transmissions proving to be more robust than the SECAM ones. No information was provided on the results of the experimental HD-MAC transmissions.

Digital TV

There was much talk about digital TV, and a terrestrial HDTV system was on show. Many delegates felt that Europe and Japan had been overtaken by the USA, which has opted for digital terrestrial HDTV services. On paper at least digital TV offers a number of advantages over analogue systems such as PAL and HD-MAC. These include greater resistance to noise and interference, easier interfacing with computers and digital telephone systems, easier standards conversion, squeezing more channels into a given bandwidth, and the prospect of multimedia programmes and computer data being sent directly to TV sets. Critics argue that digital TV transmission systems are untested, that there is no evidence that consumers will want multimedia services and that it will take ten-fifteen years for digital TV services to become viable.

Despite this a number of digital TV systems are being developed.

Spectre

A paper presented by A.G. Mason and N.K. Lodge of National Transcommunications (NTL) provided an update on the IBC's Spectre (special purpose extra channels for terrestrial radiocommunication enhancements) programme, which aims to broadcast digital TV signals in the channel spaces left empty to avoid interference between analogue TV transmissions. A digital signal requires less power than an analogue signal, typically around -30dB, so digital-

analogue simulcasts are possible. Spectre TV transmissions should offer a wide range of advantages including good quality, widescreen video, digital audio, teletext and over-the-air subscriber addressing. Quite a tall order for what is being planned as a low-bit system!

Spectre uses a discrete cosine transform (DCT) signal compression system to reduce the data rate from 216Mbits/s to 12Mbits/s. It works by removing redundant and repetitive information within a frame and between frames. The transmission system is OFDM (orthogonal frequency division multiplex), which spreads the digital signal over hundreds of carriers – the NTL system uses 400. This makes the system resistant to interference. Incidentally the digital audio broadcast (DAB) system uses a similar multicarrier method to reduce mobile radio interference.

NTL has been conducting test transmissions using the Stockland Hill and Beacon Hill transmitters, which are 50km apart, with Stockland Hill transmitting the actual digital TV signals while Beacon Hill contributes OFDM interference in the form of random noise. Video and audio signals are fed to a video codec and multiplexer, where they are digitised and compressed. Error correction bits are then added, producing a bit rate of 13Mbits/s. A bit rate of 256kbits/s is used for the digital stereo audio signal. The signals are fed to the OFDM modulator which modulates them on to the 400 carriers, each of which are 15.625kHz apart. The final steps involve mixing the digital signal with a u.h.f. carrier and feeding this to a high-power amplifier.

Spectre is a versatile system. The codec can work over a range of bit rates and the OFDM modulator can use a variety of digital modulation techniques. The digital transmissions were picked up by a survey vehicle with a 10m telescopic aerial. It seems that the results showed great promise: further work is planned.

Vadis

The video-audio digital interactive system (Vadis) is a pan-European project with 34 members from fourteen countries. They include the BBC, NTL, BT, Thomson, Philips, RAI, the German Bundespost, Nokia and Olivetti. Work began in April 1991 and has been designated Eureka 625, the aim being to develop a digital TV system with a low bit rate, i.e. less than 10Mbits/s. The work is also part of the second audio-visual coding studies set up by the ISO/IEE, commonly called MPEG 2. A number of compression algorithms, most of them hybrid DCT systems, are at present being evaluated by the Vadis group. Bit rates are in the 4-9Mbits/s range. The group plans to draw up draft technical specifications next year.

Sterne

The French research centre CCETT is developing Sterne (system de television en radiodiffusion numerique), a terrestrial digital TV system that will operate at around 5Mbits/s for SECAM-quality pictures and 30Mbits/s for HDTV quality. The group hopes to have developed a prototype for demonstration this autumn, with improved systems next year.

dTTb

A number of European project groups, including Spectre and Sterne, have formed dTTb (digital terrestrial television broadcasting), which hopes to develop a standard digital coding system and has received a 2.7m ECU grant from the Race (research and development in advanced communica-

tions technologies) project for a feasibility study. The dTTb group is exploring some interesting possibilities, including the following.

Hierarchical broadcasting: A single digital channel could have several picture quality levels, for example HDTV, enhanced TV and standard quality. TV sets would automatically select the best picture quality for their display capability. An HDTV set for example would select the highest quality while a portable might select standard.

Graceful failure: Digital systems tend to fail quickly, but the hierarchical approach means that a TV set could move from one level to another depending on the reception conditions.

Single-frequency transmissions: National TV channels could be transmitted using a single frequency, freeing the broadcast spectrum for other uses.

Simulcasts: Digital channels could be broadcast along with analogue ones, allowing analogue systems to be phased out in due course.

HD-Divine

The system that caused the greatest stir however was HD-Divine (digital narrow-band emission), a digital HDTV terrestrial system developed by a consortium of Scandinavian companies. HD-Divine reduces the video data rate from 900Mbits/s to just 24Mbits/s. The video signal is fed to an encoder which digitises it and compresses it using a DCT-type system. Four audio channels, each with a bit rate of 128kbits/s, and a 64kbits/s data signal are then mixed with the video signal in a multiplexer. This takes the bit rate to 25Mbits/s. Adding error protection bits gives a final bit rate of 27Mbits/s. HD-Divine uses a 16-QAM (quadrature amplitude modulation) system and OFDM transmission. The signal can be accommodated in an 8MHz u.h.f. channel.

The HD-Divine pictures were very sharp and clear, but they were being sent from a van parked at the back of the convention centre and the u.h.f. modulator was out of action. The feeling was that the group would have to show that the system worked well in a real-life situation. Even so its achievement is very impressive. The Scandinavians claim that an HD-Divine service could be up and running within ten years, and want their work to be integrated into a Eureka project. They also suggest that HD-MAC should be abandoned. Not surprisingly this suggestion didn't go down too well in some quarters. The general feeling at the IBC however was that the window of opportunity for MAC is closing fast: even some of its strongest supporters are now working on alternative systems.

Other Highlights

Sharp showed an HDTV LCD projector, Model XHL100, which produced stunning 101 x 508cm pictures with 3.6m pixels. Its price in Japan is around £35,000. NTL displayed System 2000, a digital compression system that operates between bit rates of 4 and 12 Mbits/s, enabling several TV channels to be transmitted in the space normally occupied by one. NTL said that the system could be used by satellite and cable TV operators to offer additional channels. The first units are expected to be available by the end of the year. Pioneer showed its video disc player/recorder, which is the subject of a separate article elsewhere in this issue.

Problems with NICAM

Steve Cannon

NICAM: Near Instantaneous Companded Audio Multiplex. What a mouthful! But it just trips off the tongue after you've repeated it a couple of dozen times. Customers are usually most impressed when you can tell them after they've asked what NICAM stands for. Shop staff have also been known to be impressed. Not many people know exactly how the system works, and it's not the purpose of this article to do so. Suffice it to say that the left and right stereo audio signals are converted to digital form then combined and compressed, nearly instantaneously, thus forming the "near instantaneous companded audio multiplex" which is transmitted on a separate subcarrier using DQPSK (digital quadrature phase-shift keying) modulation. Those wanting a more detailed account of the system should refer to Eugene Trundle's articles in the September-November 1990 issues of *Television*. Demodulation and decoding is done by one or two chips and their peripheral components, so a detailed knowledge of the system – the elaborate coding used etc. – is not essential for fault finding purposes.

I'm sure everyone will agree that NICAM is a vast improvement on f.m. sound. I was rather dubious before I heard it, not knowing whether it would be a real benefit or just another of the gimmicks that we are so used to with modern electronic products. But after using a Panasonic TX28A1 receiver to listen to the NICAM test transmissions when they were being broadcast on Channel 4 I had to admit to being truly impressed. Thankfully so was the customer, who paid for the set in cash there and then.

Faults

Most of the complaints we've had have been about intermittent crackling or popping, the sound reverting to f.m. and the NICAM indicator(s) going out. Hooking a frequency counter to the relevant VCO and adjusting the trimmer capacitor for the correct read-out has usually cured the problem, regardless of the make of set. We've occasionally had dry-joints on the crystal oscillators, but I can count on one hand the number of times when we've had an actual component failure. Several manufacturers have issued

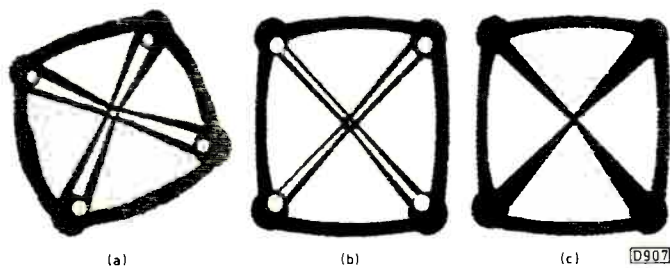


Fig. 1: Adjustment waveforms for the Panasonic Alpha 2 and 3 chassis. (a) Incorrect, (b) and (c) correct.

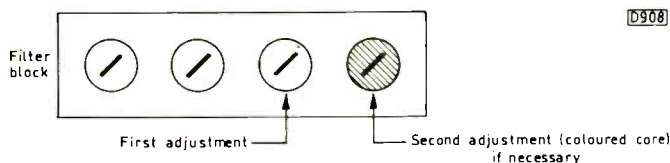


Fig. 2: Filter block adjustment.

modification sheets which have been helpful.

One very curious fault that comes to mind relates to Finlux 3000 and 3600 series receivers. During reception of a NICAM broadcast you could hear a 750Hz tone very faintly. This really did have us stumped but Finlux, being very much on the ball, issued a modification sheet very promptly. You remove the screening can that covers ICr9 in the 3000 chassis or ICr4 in the 3600 chassis, connect a shorting link from pin 2 of ICr9/ICr4 to the chassis print at the top of the NICAM module, refit the screening can and finally connect a shorting link from the negative side of Cr54 in the 3000 chassis or Cr49 in the 3600 chassis to the chassis earth print, again at the top of the panel.

Another modification, this time issued by Hitachi, relates to the C21 P819 series NICAM receivers. The symptom is the classic NICAM one: crackling and NICAM dropping out. Crystals X4001 and X4002 on the NICAM panel have to be replaced.

Setting Up

We've had to adjust the NICAM demodulators in some Panasonic sets fitted with the Alpha 2 and 3 chassis. The symptom is again crackling or popping NICAM sound. Unfortunately the procedure given for setting up the NICAM decoder in many manufacturers' manuals is rather sketchy. Panasonic however has issued an excellent supplementary sheet covering NICAM demodulator adjustment. It could be useful with any decoder of the same design. The adjustment is to suit local reception – our relay transmitter here is notoriously bad, transmitting the signal with a ghost. As a result we had terrible problems when teletext first started. With improved text decoders and i.f. strips we now get only a few letters per page corrupted instead of a few letters per sentence. Because of this problem with our local transmitter we may have had more difficulties than other dealers with NICAM decoders.

The setting up procedure for these Panasonic sets isn't too complicated but does call for the use of a dual-beam oscilloscope. It differs slightly depending on the chassis. The procedure with the Alpha 2 chassis (Models TX24A1, TX28A1, TX24W1, TX28W1 and TX21V1) is as follows:

(1) Tune to a NICAM transmission and set the scope to the X-Y or external Y input mode.

(2) Connect one scope probe to pin 19 (channel B input) and the other to pin 20 (channel A input) of the NICAM demodulator chip IC2502. Observe the trace. Fig. 1(a) shows the incorrect condition.

(3) Adjust the carrier frequency VCO trimmer C2546 to obtain the waveform shown in Fig. 1(b), i.e. the waveform is now on a level instead of a slanted axis.

(4) The filter block T2501 (see Fig. 2) next has to be adjusted. It's most important that the correct core is adjusted. Adjust the core next to the coloured one until the trace is as shown in Fig. 1(c). If this cannot be achieved, adjust the coloured core to obtain the same result.

The relevant models with the Alpha 3 chassis are the TX25A2, TX28A2, TX33A2, TX25W2, TX25W2A and TX28W2. The procedure is as given above but in step (3) the trimmer is C2044 and in step (4) the filter block is T2001.

Thank goodness for mod sheets!

Experiments with Video

David C. Woodnott

Do you ever wonder how you got yourself into this business and why you're now doing what you are? Having always been fascinated by the idea of television, I suppose I should not be surprised to find myself in later life happily running my own small business engaged in a rather specialised aspect of our common endeavour – camcorder and camera servicing.

Flying-spot Principle

From my earliest days as an apprentice with a national rental company (now trading under another name) in the late Fifties I was interested in the idea of building some form of closed-circuit TV. At that time however there was really virtually nothing with which a keen amateur constructor could build a TV camera. There were certainly no cheap secondhand vidicons. But I remembered reading about the idea of using a TV set to produce a blank raster which would scan a transparency mounted in front of it, the light in turn falling on a photocell acting as a pickup device. The resultant video signal would hopefully produce a picture on a suitable monitor. That was the theory, anyway.

Early kitchen table experiments were only moderately successful but did prove that the principle worked. A rather insensitive photocell and my inexperience both caused problems. The basic set-up I was using is shown in Fig. 1. It consisted of a small 9in. TV set, such as a Bush or Ferguson model, suitably modified to produce the required scanning raster. The "camera" consisted of a photocell followed by several stages of amplification and a modulator which, I hoped at the start, would produce an r.f. output somewhere in Band I. Blanking pulses were generated and fed to the TV set. Sync was optional! Initially I relied on the monitor's timebases operating in the free-running mode. In later "improved" versions sync pulses were stripped from an off-air transmission and added to the video signal, as shown. Instead of a transparency a photographic negative could be scanned. This called for signal inversion in the electronics to produce the correct display.

The arrangement worked reasonably well and created much interest in the workshop. A later version was used in the early Sixties to provide advertising in a showroom window. This method of producing TV pictures is known as flying-spot scanning and is, at least in principle, the same as the film-to-video transposition system used by the broadcasters – though they don't use scrap TV sets and home-made pick-up arrangements!

Use of a VCR 97

At about this time probably my biggest failure occurred. I had decided to build a purpose-made scanner unit to produce better-quality pictures. It used an electrostatically scanned and focused c.r.t., type VCR97, to produce the raster. These tubes were available as ex-government surplus at the time and provided a cheap way of experimenting. Much time was spent in building the unit. Then the great day arrived: time to see just how well it worked!

All was ready. The newly built scanner produced a nice bright, well-focused raster which was locked to off-air sync pulses. The photocell and the video and modulator circuits produced an r.f. output. The family's 17in. Murphy set was being used as the monitor, while my parents were out at work. A transparency was carefully positioned. A glance at the monitor showed – nothing! What was wrong? Everything was checked and rechecked but there was still no picture, only the stubborn, locked, blank raster. Suddenly the penny dropped! What had I overlooked in building my new unit? The c.r.t. produced a bright green raster but the photocell was completely insensitive to green light. Ah well, back to the drawing board. I went back to using the 9in. Ferguson set for the raster, the green disaster subsequently becoming part of an oscilloscope. Back to square one, though a valuable lesson had been learnt.

Using a Photomultiplier

I soon got to thinking about improving the picture quality and system noise level. After all the photocell was an industrial device, designed for other purposes – certainly not television! At this time I came across a gem of a book by Ian Sinclair, later to achieve fame through his inexpensive computers and other inventions. One of the projects it contained was a flying-spot scanner. The circuitry was much as I'd been using but the pick-up device was something completely different – a photomultiplier. Where could I get one? After much searching through the ads in *Practical Wireless and Practical Television* I found a supplier of secondhand 931A photomultipliers.

In appearance the device is similar to a 6V6GT valve, with an octal base and a glass envelope. Its light-sensitive area is at one side, like a photocell. To use it a special can had to be made to screen all except the light-sensitive aperture. Basically the multiplier is a photocell-type pickup incorporating additional concentric anodes that are operated at increasing potentials with respect to each other, the voltage difference between each anode being around 100V. As a result it provides a higher-level video output signal. The principle of secondary emission, something to be avoided with normal valves, is used to generate this higher-level output. With each electrode being held at

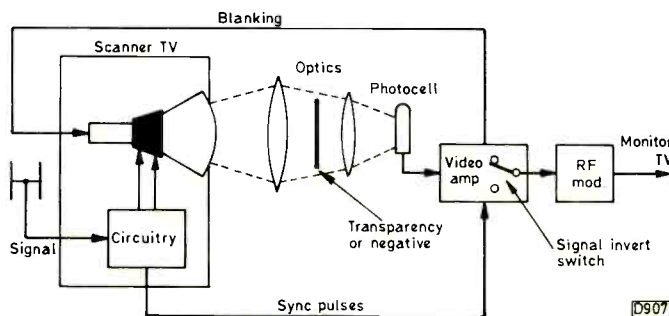


Fig. 1: Basic flying-spot scanner system used in David Woodnott's early experiments.

a progressively higher voltage, an increasing secondary electron flow is produced at each "stage" (secondary electrons are those emitted from a surface bombarded by "primary electronics"). I found that the device not only provided a much improved signal level but also reduced the system noise. Various other improvements were made over a period of time, but the technique had its limitations. Cheap vidicon tubes were still not even on the horizon at the time, so what next? My aim was to emulate a video camera tube without actually having one. A tall order!

Projection TV

In the early Sixties it was probably quite common for keen young engineers to be given work that older, more sensible chaps shied away from. In my case I was given anything to do with projection TV, something that was considered to be beastly - designed to bite and maim. Projection sets did after all employ an e.h.t. voltage that was far in excess of that used by any other TV receivers of the era. So I suppose that some reticence was understandable. But the result was that I became something of an expert at servicing these beasts.

Various makes were encountered, mainly Philips, Ferranti and Decca, and in addition there was the "in-house" type that was manufactured by Plessey. All used a Fresnel screen and back-projection to give a large, flat but faint picture. In their day these projection sets were the only way of producing large-screen pictures. The heart of the projection system was a Schmidt folded-optical unit. It was a large, heavy box with optical adjustment control by means of three main threaded knobs. The c.r.t. was generally a Mullard MW6-2, a small-screen tube that was operated with

an e.h.t. of 25kV. This was derived from an r.f. oscillator that drove what looked like a line output stage: there was a pentode output valve and a special output transformer that contained three EY51 valves in a voltage multiplier arrangement. The beam current was high at around 1mA and e.h.t. regulation was always a problem, causing defocusing with bright scenes. A dark room (curtains closed) was needed to get reasonable picture quality, an arrangement that was not ideal for servicing!

But my new-found interest in projection TV fitted in well with my wish to produce real TV pictures. A marriage of projection TV and the flying-spot scanning technique seemed to be the way, though rather cumbersome, of achieving my aim. The projection TV set was used as the scanner, projecting its raster on to my bedroom wall. The photomultiplier was positioned to look at the same wall area.

The monitor set eventually produced a semblance of an image of my younger brother sitting, terrified, in the darkened room. His distress was to be expected I suppose, considering the effects of the full brightness beam on his eyes. He soon departed, mumbling something about elder brothers being "cracked".

I had both succeeded and failed in my endeavours. A true television picture had been produced without a camera tube, but the need for anyone being "televised" to sit in a darkened room before the dazzling glare of an MW6-2 tube was not likely to generate much enthusiasm in a prospective TV star. I felt, I think, like a latter-day John Logie Baird. Having achieved this "success" my interest gradually waned until, some years later (in the early Seventies), cheap vidicon camera tubes became available. But that's another story!

TRANSISTORS		2SA1020		0.38		BA718		1.65		STK4362		6.10		TDA3560		3.00	
BC108B	0.07	2SA1106	1.20	BA515	3.15	STK4432	8.80	TDA3561	2.25	AKAI VS1	1.45	VIDEO BELT KITS JJ'S IDLER TYRES, ONLY £1.80 A PACK MINIMUM = 3 PACKS UK'S NUMBER ONE MAIL ORDER COMPANY					
BC182B	0.07	2SA1123	0.49	BA1330	1.50	STK4773	8.80	TD3551A	2.25	AKAI VS250	8.15						
BC184A	0.07	2SA1156	1.45	BA350	2.10	STK4813	9.30	TDA3562A	3.20	AMSTRAD VCR6100 1.95 VCR6000 2.00 VCR7000 1.45		FERGUSON/JVC 3V00HR3530 1.68 3V23 7700 0.70 3V247200 0.80 3V35HRD110 0.78 3V29 Loading 0.30 3V35 Loading 0.30					
BC212B	0.06	2SA1198	0.50	BA51402	2.30	STK4873	9.00	TDA3592A	3.10								
BC327	0.07	2SA1286	0.78	BA5109	2.10	STK5431	6.30	TDA3653C	2.75	HITACHI VT8000 0.50 VT9000 0.45 VT11 1.15 VT52 1.85 VT110 2.45 VT11 Loading Belt Pair 0.60 VT9300 Loading 1.30		PANASONIC NV305 1.20 NV2000 1.50 NV7000 0.90 NV330 1.56					
BC5488	0.07	2SB173	0.90	BA6209	2.80	STK5451	6.30	TDA4100	3.25								
BD131	0.25	2SB173	0.90	BA6209	2.80	STK5451	6.30	TDA4127	4.50	SANYO VTC500E 0.70 VHR2300 1.85		SHARP VC381 1.15 VC481 1.35 VC8000 1.45					
BD132	0.25	2SB407	1.45	BA6219	3.15	STK5481	4.50	TDA4500	3.45								
BD204	0.40	2SB434	1.85	BA6222	3.65	STK5490	5.00	TDA4503	3.05	SONY SLC57 1.30 C6 1.50 SLC9 2.15		HINARI V20H 2.55 VKL3 1.85 VKL25 1.30					
BD707	0.45	2SB509	0.95	HA1392	2.25	STK5730	5.85	TDA4505B	3.00								
BD711	0.48	2SB554	6.89	HA11235	1.55	STK5732	14.80	TDA4555	5.50	GOLDSTAR GVH1240 2.05 VCP400 8.10		DIODES IN4001 0.03 IN4002 0.03 IN4003 0.03 IN5401 0.50 IN5407 0.10 IN5408 0.10 FVHP615 2.50 FVHP990 3.00 VHR2500 2.50 VHR3700 2.50 VR6460 2.50 VR6711 2.50					
BF420	0.18	2SB716	0.28	HA11714	3.80	STK7226	7.80	TDA4555	5.50								
BF459	0.18	2SB717	0.70	HA11720	2.80	STK7251	12.00	TDA4555	5.50	VOLTAGE REGU 7805 3.21 7806 3.21 7809 0.30 7812 0.33 7820 0.32 7824 0.35 7905 0.35 7912 0.40 7918 0.40 7924 0.45 78210 0.38 78215 0.38 79205 0.40 79212 0.42 79215 0.40		PINCH-ROLLERS 3V29HR7200 2.50 3V35HRP110 2.50 HR7700 Roller 3.00 VT1107 2.50 VT8000 2.50 VT100125 2.50 FVHP615 2.50 FVHP990 3.00 VHR2500 2.50 VHR3700 2.50 VR6460 2.50 VR6711 2.50					
BF493	0.16	2SB793	0.35	K22213	1.45	STK8250	5.60	TDA4555	5.50								
BU108A	1.00	2SB856	0.42	KA2401	0.75	STR380	4.90	TDA4555	5.50	IC's AN265 4.50 AN366 1.50 AN5011 2.95 AN5012 1.75 AN512 2.25 AN5612 2.75 AN6554 1.00 AN8884 1.60 AN7115 1.40 AN7168 2.50 AN7362 1.60		IC's STK2155 9.75 STK2230 4.75 STK2349 8.25 STK2259 7.45 STK3040 4.50 STK3042 4.75 STK4026 5.80 STK4028 6.80 STK4060 5.60 STK4121.2 7.00 STK4161.2 8.50					
BU124	1.35	2SB1015	0.80	LA1235	3.65	STR456	5.90	TDA4555	5.50								
BU205	0.68	2SB1016	3.78	LA4175	1.50	STR1066	3.70	TDA4555	5.50	IC's AN265 4.50 AN366 1.50 AN5011 2.95 AN5012 1.75 AN512 2.25 AN5612 2.75 AN6554 1.00 AN8884 1.60 AN7115 1.40 AN7168 2.50 AN7362 1.60		IC's STK2155 9.75 STK2230 4.75 STK2349 8.25 STK2259 7.45 STK3040 4.50 STK3042 4.75 STK4026 5.80 STK4028 6.80 STK4060 5.60 STK4121.2 7.00 STK4161.2 8.50					
BU208	0.70	2SC124	0.60	LA4440	1.18	STR12006	5.90	TDA4555	5.50								
BU208A(T)	0.90	2SC388	0.35	LA4508	2.25	STR20015	5.90	TDA4555	5.50	IC's AN265 4.50 AN366 1.50 AN5011 2.95 AN5012 1.75 AN512 2.25 AN5612 2.75 AN6554 1.00 AN8884 1.60 AN7115 1.40 AN7168 2.50 AN7362 1.60		IC's STK2155 9.75 STK2230 4.75 STK2349 8.25 STK2259 7.45 STK3040 4.50 STK3042 4.75 STK4026 5.80 STK4028 6.80 STK4060 5.60 STK4121.2 7.00 STK4161.2 8.50					
BU326A	0.75	2SC496	0.30	LA4700	4.40	STR40090	5.30	TDA4555	5.50								
BU406	0.78	2SC710	0.18	LM318	1.15	STR58041	4.80	TDA4555	5.50	IC's AN265 4.50 AN366 1.50 AN5011 2.95 AN5012 1.75 AN512 2.25 AN5612 2.75 AN6554 1.00 AN8884 1.60 AN7115 1.40 AN7168 2.50 AN7362 1.60		IC's STK2155 9.75 STK2230 4.75 STK2349 8.25 STK2259 7.45 STK3040 4.50 STK3042 4.75 STK4026 5.80 STK4028 6.80 STK4060 5.60 STK4121.2 7.00 STK4161.2 8.50					
BU406D	0.90	2SC711	0.35	LM384	1.25	STR59041	6.40	TDA4555	5.50								
BU407	0.55	2SC711	0.35	LM384	1.25	STR59041	6.40	TDA4555	5.50	IC's AN265 4.50 AN366 1.50 AN5011 2.95 AN5012 1.75 AN512 2.25 AN5612 2.75 AN6554 1.00 AN8884 1.60 AN7115 1.40 AN7168 2.50 AN7362 1.60		IC's STK2155 9.75 STK2230 4.75 STK2349 8.25 STK2259 7.45 STK3040 4.50 STK3042 4.75 STK4026 5.80 STK4028 6.80 STK4060 5.60 STK4121.2 7.00 STK4161.2 8.50					
BU500	1.00	2SC790	0.75	LM1818	2.25	TA7119	1.30	TDA4555	5.50								
BU508A	0.80	2SC828	0.20	LM6402	4.60	TA7203	1.75	TDA4555	5.50	IC's AN265 4.50 AN366 1.50 AN5011 2.95 AN5012 1.75 AN512 2.25 AN5612 2.75 AN6554 1.00 AN8884 1.60 AN7115 1.40 AN7168 2.50 AN7362 1.60		IC's STK2155 9.75 STK2230 4.75 STK2349 8.25 STK2259 7.45 STK3040 4.50 STK3042 4.75 STK4026 5.80 STK4028 6.80 STK4060 5.60 STK4121.2 7.00 STK4161.2 8.50					
BU508D	0.85	2SC1047	0.50	M5148	3.25	TA7208	1.85	TDA4555	5.50								
BU536	1.05	2SC1162	0.30	M50115	2.50	TA7227	1.85	TDA4555	5.50	IC's AN265 4.50 AN366 1.50 AN5011 2.95 AN5012 1.75 AN512 2.25 AN5612 2.75 AN6554 1.00 AN8884 1.60 AN7115 1.40 AN7168 2.50 AN7362 1.60		IC's STK2155 9.75 STK2230 4.75 STK2349 8.25 STK2259 7.45 STK3040 4.50 STK3042 4.75 STK4026 5.80 STK4028 6.80 STK4060 5.60 STK4121.2 7.00 STK4161.2 8.50					
BU807	0.78	2SC1358	3.50	M51182	2.50	TA7230	1.60	TDA4555	5.50								
BU111	0.55	2SC1387	0.75	M5450	4.40	TA7236	2.75	TDA4555	5.50	IC's AN265 4.50 AN366 1.50 AN5011 2.95 AN5012 1.75 AN512 2.25 AN5612 2.75 AN6554 1.00 AN8884 1.60 AN7115 1.40 AN7168 2.50 AN7362 1.60		IC's STK2155 9.75 STK2230 4.75 STK2349 8.25 STK2259 7.45 STK3040 4.50 STK3042 4.75 STK4026 5.80 STK4028 6.80 STK4060 5.60 STK4121.2 7.00 STK4161.2 8.50					
BU111A	0.70	2SC1413	2.30	M54515	2.70	TA7237	3.88	TDA4555	5.50								
BU111AF	0.85	2SC1454	3.10	M58485	9.00	TA7267	1.45	TDA4555	5.50	IC's AN265 4.50 AN366 1.50 AN5011 2.95 AN5012 1.75 AN512 2.25 AN5612 2.75 AN6554 1.00 AN8884 1.60 AN7115 1.40 AN7168 2.50 AN7362 1.60		IC's STK2155 9.75 STK2230 4.75 STK2349 8.25 STK2259 7.45 STK3040 4.50 STK3042 4.75 STK4026 5.80 STK4028 6.80 STK4060 5.60 STK4121.2 7.00 STK4161.2 8.50					
BU12A	0.85	2SC1473	0.85	M83730	1.60	TA7335	1.75	TDA4555	5.50								
BU756A	0.80	2SC1518	1.45	M88851	5.25	TA7358	1.80	TDA4555	5.50	IC's AN265 4.50 AN366 1.50 AN5011 2.95 AN5012 1.75 AN512 2.25 AN5612 2.75 AN6554 1.00 AN8884 1.60 AN7115 1.40 AN7168 2.50 AN7362 1.60		IC's STK2155 9.75 STK2230 4.75 STK2349 8.25 STK2259 7.45 STK3040 4.50 STK3042 4.75 STK4026 5.80 STK4028 6.80 STK4060 5.60 STK4121.2 7.00 STK4161.2 8.50					
TIP31	0.20	2SC1881	2.00	MC14493	8.50	TA7401	3.50	TDA4555	5.50								
TIP31A	0.22	2SC2644	0.20	LA7520	2.20	STR50103	3.25	TDA4555	5.50	IC's AN265 4.50 AN366 1.50 AN5011 2.95 AN5012 1.75 AN512 2.25 AN5612 2.75 AN6554 1.00 AN8884 1.60 AN7115 1.40 AN7168 2.50 AN7362 1.60		IC's STK2155 9.75 STK2230 4.75 STK2349 8.25 STK2259 7.45 STK3040 4.50 STK3042 4.75 STK4026 5.80 STK4028 6.80 STK4060 5.60 STK4121.2 7.00 STK4161.2 8.50					
TIP32A	0.23	2SC2660	1.65	SA45010	5.40	TA7611	1.05	TDA4555	5.50								
TIP32C	0.26	2SC2688	0.60	SA45012	4.00	TA7654	1.05	TDA4555	5.50	IC's AN265 4.50 AN366 1.50 AN5011 2.95 AN5012 1.75 AN512 2.25 AN5612 2.75 AN6554 1.00 AN8884 1.60 AN7115 1.40 AN7168 2.50 AN7362 1.60		IC's STK2155 9.75 STK2230 4.75 STK2349 8.25 STK2259 7.45 STK3040 4.50 STK3042 4.75 STK4026 5.80 STK4028 6.80 STK4060 5.60 STK4121.2 7.00 STK4161.2 8.50					
TIP41C	0.22	2SC3153	3.10	STA441	2.50	TA8214	3.25	TDA4555	5.50								
TIP42A	0.20	2SC3182	3.40	STK043	8.75	TA8215	3.45	TDA4555	5.50	IC's AN265 4.50 AN366 1.50 AN5011 2.95 AN5012 1.75 AN512 2.25 AN5612 2.75 AN6554 1.00 AN8884 1.60 AN7115 1.40 AN7168 2.50 AN7362 1.60		IC's STK2155 9.75 STK2230 4.75 STK2349 8.25 STK2259 7.45 STK3040 4.50 STK3042 4.75 STK4026 5.80 STK4028 6.80 STK4060 5.60 STK4121.2 7.00 STK4161.2 8.50					
TIP42C	0.23	2SC3883	2.80	STK050	19.00	TA1002	1.85	TDA4555	5.50								
TIP110	0.45	2SD128	2.20	STK080	5.85	TA1015	1.05	TDA4555	5.50	IC's AN265 4.50 AN366 1.50 AN5011 2.95 AN5012 1.75 AN512 2.25 AN5612 2.75 AN6554 1.00 AN8884 1.60 AN7115 1.40 AN7168 2.50 AN7362 1.60		IC's STK2155 9.75 STK2230 4.75 STK2349 8.25 STK2259 7.45 STK3040 4.50 STK3042 4.75 STK4026 5.80 STK4028 6.80 STK4060 5.60 STK4121.2 7.00 STK4161.2 8.50					
TIP142	0.45																

What a Life!

Donald Bullock

Old Abe dropped in again the other day. He's a rustic who lives in a shed close to the banks of the Severn, along with a growing crop of old TV sets, a screwdriver or two and a tube of Superglue. His dwelling doesn't run to a bathroom or a sink, and he hasn't changed his cloths in all the years I've known him. So his aroma precedes him. If there's anything he's better at than bottling it's long-distance walking and doffing his cap to anyone who wears a tie. But he pays his way.

Brother Terry, who lives almost a mile away, saw him striding past and telephoned to warn me. "Your buddy Abe is closing in on you" he joyously announced, "he's got one of his sets wrapped up in his horse blanket and tied with binder twine. Better get the kettle on."

Abe's Pye T194

Abe soon put in an appearance. He greeted me and started to unpack his parcel. Out came yet another monochrome portable, this time a 14in. Pye T194 (Philips TX chassis).

"Me brother gave 'im to me. Says 'e's gone wrong once too often, keeping 'im broke. Now 'e's mine and I'm going to give 'im to the Merry Widow. Aaarh, I likes 'er!" And he doffed his cap. "I've 'ad a quick look at 'un" he added.

As I put the set on the bench its back fell off. I plugged it in, switched on and found that the field scan had collapsed to about a fifth of an inch high. "If you plugs the aerial in and turns that knob down" said Abe, "you sees little cowboys roamin' about in that little bar o' light".

I quickly checked the field output transistors. One of them had recently been replaced. It was the other one, TS521 (BC338), that was virtually open-circuit. A new one brought back full height. Then the picture started to twist around. I switched off quickly and looked at the smoothing. The main block had been pulled out of the board and pressed back in.

I looked at Abe, did some sums, resoldered the capacitor, tested the set and boxed it up. As I was about to speak Abe put three tenners and a fiver on the bench.

"I knows, thirty five pounds ain't it?" he said. "That's what it cost me brother at Snoddies when it went like it the other day."

"Abe" I said, "what can I do with you? It ought to be fifteen pounds. I was going to make it twenty because of your bloody meddling, but you're always straight, pay up without a word and walk eight to ten miles here and as many back with your sets under you arm. Pick up two of those tenners before I start thinking about the price of Bell's whisky. I've got a thirst brewing."

A Metal Box with Dials

Our next caller was Jeremy Chamberlain, a farmer who lives close by. He's pretty big in farming circles and sometimes appears on the BBC, putting forward the farmer's view. He was carrying a metal box with dials. Said it was a Marconi moisture meter, Model TF933C.

"What does it do, Jeremy?" I asked.

"Measures the moisture of my grain" he said. "According

to the instructions it's a Wheatstone bridge. I put the grain in this little pillbox thing, screw it down tightly with this thumbscrew and read the results on the dials. Only it doesn't work."

"Er . . . doesn't it then?"

But he'd gone, leaving me baffled by his machine. Sir Charles Wheatstone, who invented the famous bridge, lived round the corner. But he died in 1875, when I was a young blade. I wished that Jeremy had brought the thing along earlier. It ran off two PP3 batteries and they'd been left in when exhausted. As a result the battery clips had suffered. So I ordered some new ones.

John Berryman's Samsung CTV

John Berryman's big van then drew up. He's the cheerful undertaker from a nearby village. "You look well Don. How's Greeneyes?"

"We're both fine John" I said, "and expect to last for some time. You'll have to be patient."

"Looks like rain out there" John said, "and this blessed Samsung's just died. What can you do about it?"

"Can't do much about the weather" I whipped, "as for the set - well, you're the undertaker." Fierce wicked like.

He left me with the set, a C1210R which is similar to the Alba CTV10. Actually it's the Nikkai Baby 10 chassis. Very neat and tidy it is. I pressed the power button and the LED came on. Pressing the standby button produced a relay click but apart from this the set remained as dead as a door-nail.

I'd no circuit diagram. Oh for the days when a dozen circuits would enable you to repair almost any set put on the bench! And we could mend most of them without having to get the circuit out. I opened the Samsung and found that the fuses were o.k. A check showed that there was 16V across the main smoothing block. This voltage was present at the relay's output and then passed to the AL2711K chip IC402, a huge three-pinned device that lives in its own boxy heatsink. The second pin is connected to chassis, so I hoped to find a decent h.t. voltage on the remaining pin. There was 2.9V.

The Logic of It

With masterful logic I decided that either the chip was failing to deliver or something was dragging down its output. I open-circuited L402, which feeds its output to the other circuits. The voltage fell to zero, so I had to stop and think. From a study of the chassis it was soon apparent that the chip was wide open and that the 2.9V had actually come via R408 which is in parallel with the chip and L402. To prove that the chip was the cause of the problem I bridged it with a 5Ω, 10W resistor and momentarily switched on. Up came a writhing raster. A new AL2711K chip did the trick.

Ferguson TX100 Chassis

Just as I was pulling a Ferguson 22G2 (TX100 chassis) on to the bench I heard a clapping sound outside. I looked out to see a vision of poetry in motion. It was Miss Dream again. She was carrying a set that looked like the one I'd just repaired.

After the pleasantries and a promise to have it ready that evening she swept off. I put the set aside for attention later. After the experience I'd just gained it would be a piece of cake.

I switched the Ferguson set on and it squealed at me. It

was otherwise dead. With the back off it was clear that the noise was coming from the line output stage. As I had an output transformer in stock I decided to try it. Up came the picture and the set screamed no more. I wasn't too bad an engineer after all I thought.

Miss Dream's Portable

As I picked up Miss Dream's portable the storm began. Rain peppered down, lightning flashed and the mains supply started to blink. Her set was a Samsung C1212R. I looked reassuringly at my remaining AL2711Ks, reckoning that I'd shortly be needing one. But when I opened the set up I found a totally different chassis that was quite new to me. And I didn't have the circuit for this one either. There seems to be no end to service data problems these days, especially with the variety of cheap sets around. We can hardly add the price of a manual to the bill with each new set we get.

The fuses were once more all right. They always are! I looked for h.t. at the main smoothing block then traced along to the emitter of Q131, a 2SB948A transistor used as a regulator. There was 18.5V at its base but nothing at its collector, so I disconnected its load. As this didn't restore its collector voltage I checked the transistor. It was good.

Its base is controlled by Q130 which was biased off with over 17V at its base. I traced this state of affairs back to the TMP47C433AN microcontroller chip IC105. Without a circuit diagram there was little I could do apart from check for a good waveform across its crystal oscillator. This was excellent.

Microcontroller Fault

A quick phone call to Samsung proved helpful, as it always does. I put the phone down with the knowledge that the chip should have an input voltage of 4.5V at pin 42 and that there should be a 4.7V output at pin 8. The first voltage was present but not the latter. At this point son Steven announced that we had a replacement - one of a complimentary pack that Toshiba had kindly sent us yonks ago when we contacted its technical department about a problem we'd then had.

When I fitted the chip the set sprang to life. But there was no brightness. Advancing the first anode voltage potentiometer on the line output transformer a little produced a bright screen with a large row of noughts across it! None of the front controls worked, and I then found that the set would come on from cold without pressing the standby button.

I carefully checked the chip I'd taken out with the one I'd put in. The numbers were identical except for what I'd thought had been a batch number under the big one. The chip that had come out had 3842 on it while the one I'd fitted had a different number in this position. Samsung confirmed that this was the programming software number. Steven managed to get the correct one locally, and this proved the point. The set now worked perfectly, with a striking picture.

It was getting towards the end of the day, and we appeared to be in for a wet and windy night. Our last caller was Miss Dream, who was delighted to find that her set had been done. She paid up and made to clip-clop out.

"You're my favourite man today" she cooed.

Then Jeremy Chamberlain phoned. "Any luck with the meter?" he asked.

"Not yet Jeremy, probably tomorrow" I said. "But if you're wondering about your grain, I can help you there. It's wet Jeremy, very wet."

next month in

TELEVISION

TWO FREE CATALOGUES

There are two free catalogues with next month's issue, one bound in and one loose, from Technical Information Services and East Cornwall Components.

● SATELLITE TV INSTALLATION GUIDE

D.J. Stephenson's guide to satellite TV installation is a comprehensive, non-mathematical coverage that makes everything clear, from site surveying through dish alignment and cabling requirements to tuning and trouble-shooting. It's complete with a look table that gives elevation and azimuth settings for the seventeen most frequently required satellites at over fifty locations in the UK.

● VHS TAPE PATH ALIGNMENT

This is something that's frequently done but often done incorrectly. It seems to have become common practice to move the V blocks to provide compensation for tracking problems. It's worth knowing why alignment should be carried out according to the book and exactly how to do so. Joe Cieszynski explains it all.

● SERVICE BRIEFS - PHILIPS

Guidance on various modifications and servicing problems for the Philips range of CTV sets, VCRs and CD players.

● ALL ABOUT CERAMIC RESONATORS

Ceramic resonators are nowadays widely used as the passive element in oscillator and filter circuits, being smaller and cheaper than the traditional quartz crystal while sufficiently stable. Ray Porter's thorough treatment of the subject compares the properties of various types of filters, describes the piezoelectric effect as applicable to ceramic resonators, shows typical circuits with explanations of how they work and concludes with hints on fault finding.

● REPLACING 3in DISC DRIVES

Replacement 3in. disc drives for Amstrad PCW machines are becoming increasingly scarce and expensive. They can be replaced with a 3.5in. 1Mbyte drive at about half the cost. Gus Cusick explains how to do it.

PLUS ALL THE REGULAR FEATURES

ORDER YOUR COPY ON THE FORM BELOW:

TO

(Name of Newsagent)

Please reserve/deliver the November issue of TELEVISION (£2.20), on sale October 21st, and continue every month until further notice.

NAME

ADDRESS

Pioneer's Video Disc Recorder

Gerald Exeter

One of the big attractions at this year's International Broadcasting Convention was the first video disc player/recorder to be shown in Europe, the Pioneer VDR-V1000P. VDR stands for video disc recorder.

Optical disc systems like the Compact Disc and Laser Disc have a number of advantages compared with tape systems, including fast access and no wear. As the disc is read by a laser which is not in physical contact with it, functions such as pause and freeze frame can't damage the disc or the player. But until now tape has offered one major benefit, the ability to record as well as play back. What's more the record, playback, erase, record, playback cycle can be repeated many times. The audio CD and Laser Disc are read-only systems. This hasn't stopped CD players and discs selling well, but is one of the reasons why Laser Disc players haven't been similarly successful. Although the Laser Disc offers superior picture quality to the VHS system, consumers are prepared to forgo quality for the convenience of being able to record TV programmes. But disc recording systems are now beginning to appear in the audio and video markets. Will they eventually replace today's tape systems?

Write-once Recording

For some time now WORM (write once, read many times) disc systems have been available in the professional and industrial markets. These enable the user to record, but once this has been done the information can't be changed. There are two main sizes of WORM discs, 5.5in. which hold around 800Mbytes of data and 12in. which store up to 2Gbytes. Music studios also use CD-R (CD recordable) discs for test pressings.

Some WORM discs are coated with a reflective alloy such as Tellurium. Recording is carried out by a process called ablative coating: heat from a high-power (typically 17mW) laser melts the coating, the cooling process leaving a series of raised edges or pits which for playback are read by a low-power (around 2mW) laser. Other WORM discs use organic dyes which are heated to form pits.

WORM discs are useful for archive material such as medical records and legal documents, but they can't be used for material that needs to be changed or updated. For this we have to turn to another recording technology.

Erasable Discs

Erasable discs work like tape and can be used and re-used. Several erasable disc systems have emerged, the most promising being the magneto-optical type. This is the technology used by the VDR-V1000P and also by Sony's Mini Disc system.

Magneto-optical discs store information in the form of a series of magnetic flux reversals. With digital information a north pole facing upwards represents one, downwards zero. On a blank disc all the north poles face downwards. During the recording process the specially coated disc is bathed in a magnetic field. Heat from the laser traversing the disc raises the temperature of the coating above its Curie point. When this happens the drive magnet changes the polarity of the bit. The modulation switches the laser on and off, a one

being written each time the laser is switched on.

Playback relies on the Kerr effect, which results in the reflected beam from a polarised light source (the laser) being twisted either clockwise or anticlockwise. The beam is passed through a polarising filter, which either blocks or passes it depending on whether it's twisted one way or the other. The player thus reads the recorded information.

Some magneto-optical systems use a direct over-write system: the laser is kept in a constant state while the magnetic field is modulated instead. The advantage of this is that erasure and recording can take place during a single pass.

The information can be stored on the disc in digital or analogue f.m. form.

The VDR-V1000P

Pioneer launched its first VDR in the NTSC markets last autumn. The VDR-V1000P is the PAL version. It's aimed at professional users such as broadcasters and video production houses.

The recorder consists of a large unit that's divided into two sections. The top section contains the recording and playback system while the bottom section has various controls and a large display screen. Overall dimensions are 436 x 321 x 649mm: the unit weighs 42kg and the power consumption is 120W.

The video signal is recorded as f.m. in analogue component (luminance plus two colour-difference signals) form, the luminance bandwidth being 4.8MHz. This is less than the full PAL bandwidth, but Pioneer points out that it was necessary to strike a compromise between price and performance. Later models may have an extended bandwidth. The signal-to-noise ratio for the Y (luminance) component signal on frame 20,000 is claimed to be 46dB, the corresponding figure for the chrominance signal being 50dB.

The VDR-V1000P's picture quality is very good, with sharp detail and rich colours. There are inputs for component (Y/C), analogue RGB and composite video, also stereo PCM sound. Time-code sockets and an RS422 computer interface are also provided.

Recording and Editing

The VDR-V1000P uses 12in. magneto-optical discs which are housed in a protective caddy. They are coated with a mixture of iron, terbium and chromium. The writing laser power is 15mW, the read laser power being 2.5mW. Apparently the disc can be re-recorded around a million times: Pioneer says that it would take over 60 years to repeatedly over-write the disc, and that's without viewing the recordings!

In order to provide freeze-frame facilities the constant angular velocity (CAV) system is used. Each disc holds up to 32 minutes of full-motion video or 92,000 fields, to which there's individual access. Time-lapse and audio-only recordings can also be made.

Video signal recording is as follows. AD conversion is the first process: the Y signal is sampled 720 times per line while the two colour difference signals (R - Y and B - Y) are sampled 120 times per line. The signals are then time

compressed. This involves feeding the data into a RAM and reading it out at a faster speed. For the Y signal the compression ratio is 1:1.2, the colour-difference signal compression ratio being 1:7.2. Sync and time-code information are added before DA conversion and recording on the disc in f.m. form.

The video information is arranged on the disc in sectors. To give fast access each sector contains address data which has been added to the video information. This address data consists of 137 bits arranged as follows: 52 bits for clock pulse generation – these bits are a series of ones; 3 bits for block synchronisation; 5 bits for the sector number; a 3-bit gap; an odd track consisting of 18 data bits and 16 error-correction bits; another 3-bit gap; an even track that's again made up of 18 data and 16 error-correction bits; and finally another 3-bit gap.

The VDR-V1000P uses the Video-8 PCM recording system for the sound. It's an 8-bit system that improves the performance by means of noise-reduction compansion and non-linear quantisation. Before AD conversion the audio signal is compressed to 1:2. Sampling is then done at 31.25kHz, with 10-bit quantisation. This sampling rate provides a frequency response of 20Hz-15kHz. Before recording the 10-bit words are converted to 8 bits using a non-linear encoder. DA conversion and expansion take place during playback.

Each audio data block consists of 107 bits arranged as follows: eight 8-bit data words; two 8-bit P and Q parity words; one 16-bit error detection word; one 8-bit address word; three sync bits.

The access time is 0.3sec but even this isn't fast enough for real-time editing. A two-head system (see Fig. 1) is used to get round this problem. The two heads offer the following

facilities:

(1) Two or more sequences from different parts of the disc can be played back without seams. The user simply keys in the time codes for the required sequences, after which the VDR-V1000P plays them as if they were all joined together on video tape. Thus users don't need a second machine for editing and there's no loss of picture quality.

(2) The ability to play back a sequence while recording on another part of the disc.

(3) The ability to rerecord information from one part of a disc on another part without signal erasure. This makes it possible to mix video sources, add titles and captions, etc.

Future Developments

The VDR-V1000P will be available next January at around £25,000. Each disc will cost some £800. Pioneer plans to expand the playing time and may even market a multi-standard machine. But more interesting is the long-term plan to produce a version for the domestic market. The discs will need to be much cheaper – a Pioneer executive suggested a price as low as £8 – before a home system becomes feasible. If you think that this is maybe a bit unrealistic, just think for a moment of the cost of the first broadcast VCRs. Whoever thought then that VCRs would find their way into people's homes?

Acknowledgements

My thanks to Pioneer Japan and to Andrew Wilson, general manager of Pioneer UK's Industrial Systems Division, for their help in the preparation of this article.

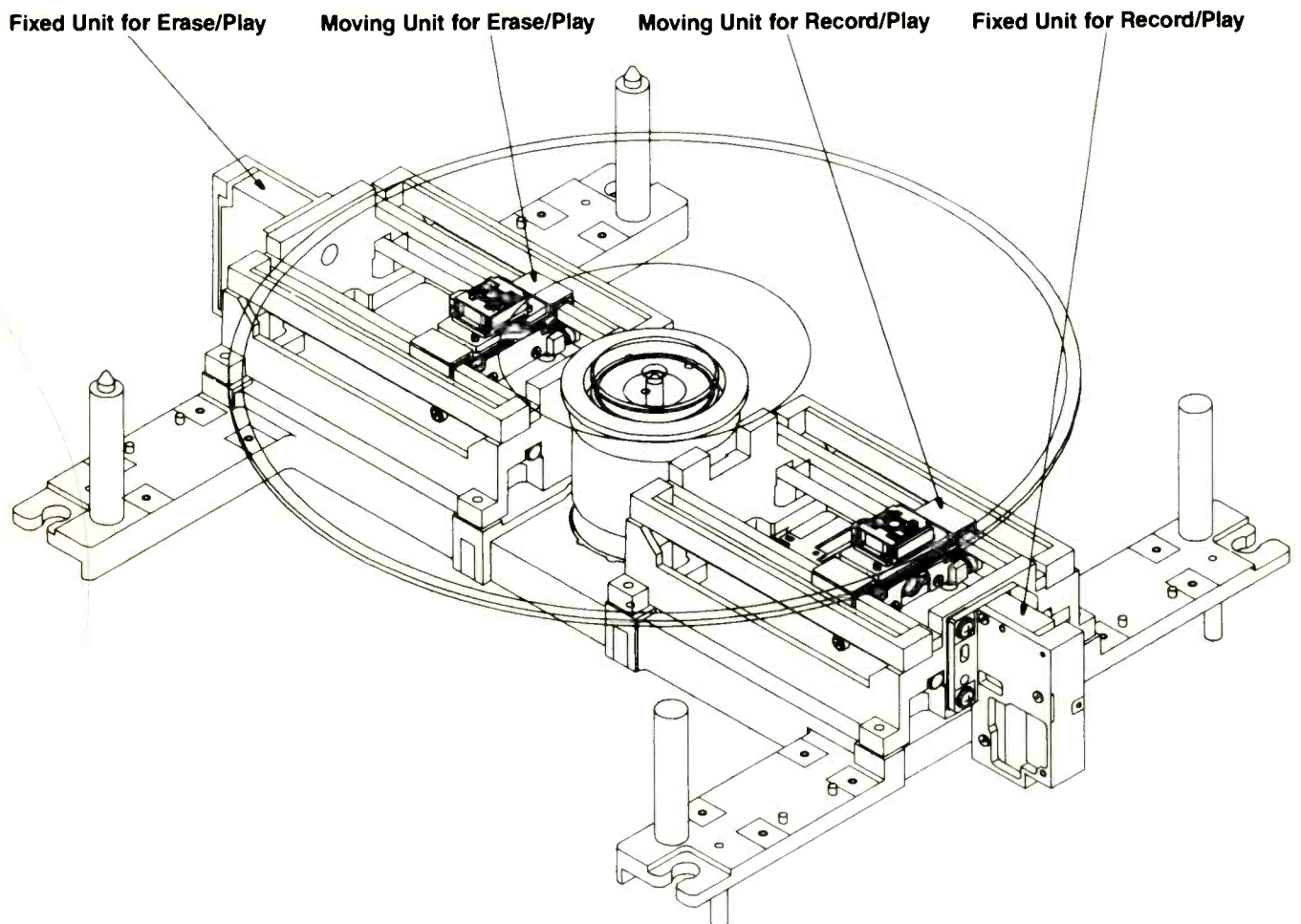


Fig. 1: Optical head arrangement.

Long-distance Television

Roger Bunney

There was a reasonable amount of Sporadic E activity during June/July considering our position in solar cycle 22 and the relatively high peak. July didn't produce such high drama as the North American opening on June 22nd, but it was certainly an active month.

Excellent weather during early July brought with it tropospheric reception in the Midlands and the south and east of the UK on the 6/7th, with Band III/u.h.f. signals from Germany, Denmark, France and the Benelux countries. Of interest was the stability of many of the signals, strong with little fading. The 18th produced Spanish signals in the south west. Roger Fussell (Torpoint) commented that it was the best Spanish opening he'd ever seen, with signals on chs. E2, 3, 4, 5, 8, 9, 11, 23, 31, 33, 34, 37, 42 and 49. On the 28th he logged TVE Madrid ch. E24 at 0620 BST. Poignant this: I well recall the excitement when the late Doug Bowers received this station at Torpoint in the late Sixties. In those early days of u.h.f., with the first surplus valved tuners costing 29/6d from Laskeys and transistor tuners with AF139s just beginning to appear, this was dramatic news.

The 17th produced suspected auroral activity, with characteristic rumbling noises in Band I from a northerly direction. Cyril Willis noted this at around 2000 BST. Unfortunately no pictures were seen.

The extensive SpE log is as follows:

- 5/7/92 RUV (Iceland) chs. E3, 4; SVT (Sweden) E2, 3, 4; NRK(Norway) E2, 3, 4; YLE (Finland) E4; DR (Denmark) E3,4; CIS (Russia) R2; +PTT (Switzerland) E2, 3; CST(Czechoslovakia) R1; C+ (France) L2; RAI (Italy) IA,B; ARD (Germany) E2; TVE (Spain) E2, 3.
- 6/7/92 CIS R1, 2, 3; DR E3, 4; SVT E2, 3, 4; NRK E2, 3, 4; ARD E4; TVP (Poland) R1, 2; ORF (Austria) E2a; C+ L2, 3; RTP (Portugal) E2, 3; TVE E2, 3; TVE-2 E2. RAI IA, B.
- 7/7/92 NRK E2; SVT E2; DR E3; TVE E2, 3.
- 8/7/92 ARD E3; TVE E2, 3, 4; RTP E3; C+ L2; CIS R1, 2.
- 9/7/92 TVE E2, 3, 4; RAI IA, B; C+ L3; DR E4; HTV (Yugoslavia)E3; SVT E2, 3, 4; CIS R2.
- 10/7/92 NRK E2, 3, 4; RUV E4.
- 11/7/92 RAI IA.
- 12/7/92 TVE E2; RAI IA; SVT E2; DR E3, 4.
- 13/7/92 TVE E2.
- 16/7/92 CIS R1; TVE E3.
- 17/7/92 TVR (Romania) R1; HTV E3; RAI IA.
- 18/7/92 RAI IA, B; TVA (Italy) IA; TVE E2, 3, 4; SVT E2.
- 19/7/92 RAI IA, B; TVA IA; SVT E2.
- 20/7/92 TVE E2, 3; RAI IA, B; HTV E3, 4; +PTT E2; TVP R1; ARD E2; CST R1; CIS R1, 2; MTV (Hungary) R1; SVT E2, 3, 4; YLE E3, 4; NRK E2, 3, 4; RUV E4; RTE (Ireland) ch.B; unidentified ch. A2 signal.
- 21/7/92 TVE E2.
- 22/7/92 TVE E2, 3, 4; RAI IA; +PTT E2; CST R2; DR E3.
- 23/7/92 RAI IA; HTV E3, 4.
- 24/7/92 RAI IA.
- 25/7/92 CST R1; RAI IA; TVE E2, 3, 4.
- 26/7/92 TVE E2, 3, 4; RAI IA; RTP E3; NRK E2; RUV E4.
- 27/7/92 NRK E2; TVE E4.

- 28/7/92 TVE E2, 3, 4.
29/7/92 TVE E2, 3, 4.
30/7/92 TVE E2.
31/7/92 NRK E2; TVE E3.

Mystery reception time. Gary Smith (Derby) received a ch. E4 test card with the identification ISR-P. Can anyone help identify this? Garry also noted RUV using an electronic test pattern with a small dark central circle, not unlike the W. German patterns of the mid-Sixties. And yours truly received an unidentified programme on ch. E4 at 1500 BST on the 23rd, consisting of an English lesson. The signal came from the south east, was slow fading and weak, eventually fading out. Any ideas?

An active month then. My thanks to the following for sending in logs and reception reports: Roger Fussell (Torpoint), Iain Menzies (Aberdeen), Peter Schubert (Rainham), Garry Smith (Derby), Simon Hamer (Powys), Cyril Willis (King's Lynn) and David Oliver (Birmingham).

In the early Sixties a company called Fringevision, of Marlborough, Wilts, manufactured aerials and aerial parts. Does anyone have one of this company's catalogues?

News Items

CIS: The Moscow Independent Broadcasting Company (MIBC) plans to join forces with Ted Turner (CNN) in operating a commercial service with transmissions on ch. R6. A licence has been applied for.

Hungary: Passage of the Broadcasting Bill has been postponed, delaying at least three planned TV channels.

Czechoslovakia: Two independent channels. Perfex and Medium 5, have been given a three-year licence in the Slovakian Republic. They will use channels previously used by TA3 and to start with share equipment. Nearly twenty applicants are seeking licences to transmit over the OK3 network in the Czech Republic.

Poland: The following independent stations are now reported to be on air: TV-Es Poznan ch. E32; Telewizja Nezalezna Lublin ch. R55 (10kW e.r.p.).

Hong Kong: Legislation allowing pay-TV has been passed. The first operator will have a monopoly for the years 1993-6. Cable technology is favoured by the government.

Brunei: Peter Bacon reports in *Six News* that the transmitter at Libang, his local one, operates during 0800-1530 weekdays and slightly longer at the weekends. Its carrier frequency is not locked and tends to drift, generally being ± 5 kHz of ch. E2. It has been measured as low as 48-2495MHz. This East Malaysian station is obviously the one that's been seen during recent F2 openings. Peter goes on to report that there are two transmitters to the south of him, which suggests Indonesia, their carriers being measured at 48-2396MHz and 48-2605MHz.

The Netherlands: The Dutch government is offering ten-year licences to the current broadcasting groups if they will amalgamate their operations to provide a three-channel public service.

Sweden: The new TV4 network has opened studios in Stockholm, Goteborg, Malmo, Sundsvall and Vasteraas. Others are planned.

In brief: The Finnish third network FUBK test pattern now carries the identification YLE TV3. Egyptian TV has started regular teletext transmissions.

ATV Contest Dates

The BATC tells us that ATV contests will be held on the dates listed below. It's more likely therefore that ATV

signals will be seen during these periods, either at 70 or 24cm. The former is the easier frequency (435MHz) to receive since a.m. video is normally used, it lies within the range of many tuners and Group A aerials work reasonably well. All times are GMT.

International ATV: 1800 12/9/92 to 1200 13/9/92. All bands, fast scan.

Autumn ATV: 0001-2359 15/11/92. All bands, slow and fast scan.

Winter ATV: 1800 12/12/92 to 1200 13/12/92. All bands, fast scan.

Satellite TV

The Olympus satellite at 18.5°W has been reorientated to provide wider European coverage and is carrying various experimental transmissions. The BBC is testing DAB over the RAI transponder – tests will continue until late spring next year.

The Intelsat 603 craft is now operational at 34.5°W, replacing 506 which has been moved to 50°W. At the time of writing the all Ku band Intelsat K craft is still testing at 21.5°W – no TV signals have been seen to date though Brightstar is to use four channels for European-American links.

The Eutelsat II F4 craft is in operation at 7°E. ECS I F4 is to move to 35°E.

NTL has developed a video noise reduction system for HD-MAC signals, enabling a 60cm dish to be used when a 1m one would previously have been required. A sort of video Dolby.

Turkey: the Avrasya service for central Asian CIS states has been launched via Intelsat 507 at 57°E.

The US company Natropolis International has introduced a red laser beam feedhorn alignment system. The Laser Focus Finder fits inside the feedhorn's throat. When activated it produces a beam that's used to centre the feedhorn precisely. C and Ku band versions are available.

Ian Waller (Lincoln Satellite) has successfully received the 11.76 and 11.82GHz (horizontal) Conus beam transmissions from the PanAmSat PAS-1 satellite at 45°W. Just visible results were obtained using a 1.7m dish. This Ku band beam is aimed at the US eastern seaboard, with coverage extending virtually to the Rocky Mountains: in theory back radiation to W. Europe is nil!

Amstrad MP3 Receiver Unit

It was with considerable interest that I learnt from Brian Renforth about an outboard receiver unit available from Greenweld Electronics (27 Park Road, Freemantle, Southampton S01 3TB – 0703 236 363). It's admirably suited to conversion for use with a TV-DX receiving set-up – though once powered it will immediately work as a Band I/III/u.h.f. system B/G receiver.

During a visit to Greenweld I found a large pile of brand new, boxed Amstrad MP3 v.h.f./u.h.f. receivers at the giveaway price of £14.95. The unit is referred to as the "computer modulator/converter MP3". It's a complete, cased r.f./i.f./video unit that's intended to provide both composite video and RGB outputs via a 6-pin DIN socket for direct connection to an Amstrad CPC464 or 6128 computer using the CTM644-2 monitor/VDU.

A five-turn potentiometer is used to tune the v.h.f./u.h.f. varicap tuner. In addition there are band changing, colour, contrast and volume controls. A coiled wire with plug is intended to obtain a 12V d.c. supply from the computer – the unit consumes around 160-180mA from an external 12V

What you've all been waiting for...!

- ✓ Multi-standard TVs & VCRs
- ✓ Satellite Equipment
- ✓ Signal Strength Meters
- ✓ TV DXing Equipment
- ✓ Rotators
- ✓ Masthead Amplifiers
- ✓ Filters
- ✓ Accessories

It's now available!

Write in for your copy today!

Building on our success story over the past decade, we are proud to present our latest catalogue, now regarded as a reference work in its own right for both the trade and enthusiast markets.

We've got it all listed, from satellite equipment to TV-DXing, from SECAM/PAL transcoders to Canal Plus decoders, from an F-plug to a multi-standard video recorder, from a VHF/UHF signal strength meter to an NTSL/PAL/SECAM teletext TV.

We've even developed a full facility manually tuned enthusiasts satellite DXing receiver to find those weak transponders. And we've stocked all those little bits and pieces that no-one else keeps.

Send £1 for our glossy brand new 34 page catalogue, which you will receive back by return of post.



11 Kent Road, Parkstone, Poole Dorset BH12 2EH
Tel: 0202 738232 Fax: 0202 716951

Aerial Techniques

source. Audio output is from an integral speaker, though the RGB DIN socket output pins can be disconnected and one pin used instead for an audio feed to a monitor or amplifier. As supplied the MP3 is intended for use in W. Europe, having 5.5MHz system B/G sound, but Greenweld provide two 6MHz ceramic filters so that the unit can be converted for system I operation if required.

My initial thoughts are that a small Aztec modulator could be fitted internally to provide a u.h.f. output and that the 6-pin DIN socket could be used to connect an outboard tuning potentiometer, with possibly an in-built meter to measure the tuning voltage and thus give a channel reading. The internal baseband video with buffer stages should enable an inverter stage to be added, giving selection of negative- or positive-going video. This would enable French TV pictures to be displayed.

I'm not sure about the quality of the tuner, but the Toshiba EG613/EGG522F MOSFET tuner which is available from Sendz Components could be fitted instead. Brian Williams reports that this high-gain, very low-noise tuner is "bomb proof" – unless, as he does, you live next door to the Wenvoe transmitter! It should be easy to incorporate selectivity switching for wide/narrow i.f. bandwidth operation. If the composite video output is used the RGB circuitry could be disconnected to minimise the current drain.

The unit has a grey plastic case and measures 330 x 250 x 50mm. It looks like good news for an efficient, low-cost outboard TV-DXing tuner system. We hope to be able to feature modification details shortly. Even without modification Brian Renforth and Brian Williams report good results with weak tropospheric signals. At the time of writing supplies at Greenweld are plentiful, but a check on availability might be sensible before ordering.

TV Fault Finding

Reports from Philip Blundell, AMIEE, Brian Storm, Stephen Leatherbarrow, Michael Dranfield, Bob McClenning, N.J. Williams, Graham Richards, J.G. Grieve John Edwards, Mike Leach and J. Olijnyk

Philips 2B Chassis

Here are some faults encountered on later 2B chassis sets: no sound, EEPROM X2402 faulty; protection crowbar firing, check whether the print by pin 1 of the line output transformer is open-circuit; 140V supply normal with a 60W dummy load but low with a bright picture, transistor 7685 (BC547) leaky. **P.B.**

Philips FL1.1 Chassis

This set gave a chirp at switch on then shut down with the standby, on and stereo lights lit. There was 0.7V at TP56, which indicated that the hardware protection circuit was operating via the PROT (protection) line – this line monitors the sound, line output, beam current and EW modulator circuits. Scope checks showed that the fault was in the EW correction circuit, where transistors 7542 and 7540 were short-circuit. There's a mistake on the circuit diagram here: transistor 7542 is drawn as a pnp device but the type number shown is BC848C. The correct type is given in the parts list – BC858C. **P.B.**

Panasonic TX21T1 (Alpha 2 Chassis)

This set displayed the classic field collapse symptom – a white line across the screen. As checks around the TDA2579 timebase generator chip IC501 showed that it was not producing a field drive output it was replaced. This made no difference. The guilty component was sulking quietly nearby. Need you ask? – a leaky 0.01 μ F capacitor, C403. It's in the field feedback circuit. A replacement restored full field scanning. **B.S.**

Panasonic TC21M1R

The symptoms with this set were no video with faint, unsynchronised lines in the background. Good video came out of IC601 but it was attenuated going through board H, where the video switching and sync separator are to be found. Checks around the sync chip IC521 showed that the sync pulses leaving pin 14 were poor. The 180pF ceramic capacitor connected to this pin turned out to be leaky, a replacement restoring the excellent picture. **B.S.**

Grundig GSC100 Chassis

There was lack of height plus bad foldover. A check on the +D supply input at pin 6 of the field timebase module showed that the voltage here was only 13.1V instead of 18.6V. This supply is obtained by rectifying line flyback pulses. Di627 is the rectifier diode and C628 (2,200 μ F, 40V) the reservoir capacitor. C628 was obviously suspect but a replacement made no difference. Neither did a new diode. Yet the voltage across C628 was low at 13.6V. There's little else here apart from the 1AT fuse Si627. A check showed that it was dropping 0.5V along its length. So we replaced the fuse. This cleared the fault and the voltage across C628 rose to 18V.

A check on the old fuse showed that it had a resistance of 1 Ω . As a check we fitted a 1 Ω resistor across the fuseholder.

Although the voltage dropped slightly the set still worked all right. Just to make sure that I wasn't dreaming I refitted the old fuse. This brought back the original fault. Certainly an odd situation. The customer paid rather more than the cost of his new fuse. **M.Dr.**

Samsung CI3312Z

The complaint with this set, which we'd sold four months previously, was that it wouldn't come off standby. Checks showed that the power supply was running but the 2SD288 12V supply switch transistor Q802 wasn't being turned on. We traced the circuit back to RQ11 which was o.k. then pin 41 of the PCA84C640 microcontroller chip RIC01. The voltage here wouldn't go low to switch the set on. By shorting this pin to chassis we were able to switch the set on but there was only a snowy raster, no on-screen display and no tuning. Clearly the microcontroller was in trouble. Pin 39 (serial clock) and pin 40 (serial data) were both dead. Disconnecting them from the EPROM RIC02 made no difference, neither did replacing RIC01. When the 10MHz clock crystal RX01 was replaced however the set sprang to life. **M.Dr.**

Ferguson TX90 Chassis (20in. Version)

This set came in dead. We found that the 1-6AT fuse had blown and that the R4050 line output transistor was leaky. These items were replaced but the set then tripped rapidly. In this chassis the trip measures the 175V RGB output h.t. supply, killing the line drive if the voltage is excessive. The first thing we did was to measure the boost voltage, which was correct at 115V. As the e.h.t. was heard to rustle up between the on/off tripping we next checked this. The reading was around 40kV. No wonder the set was protesting! Only one component could be responsible for this, the 5.6nF line flyback tuning capacitor C194. When we removed it we found that it was open-circuit. A replacement restored normal operation. **M.Dr.**

Ferguson TX85 Chassis

It's quite common to get one of these sets in with a field linearity fault, usually top foldover and cramping. The thing to check is transistor TR7, which is type TIP112H or T0167V. It's the lower transistor in the field output stage and is a Darlington device, so it should be checked by substitution. **M.Dr.**

Sony KVM19TV

This set displayed all the symptoms of a very worn tube. There was red flaring on peak whites and so little green emission that the on-screen display could be seen only in the dark. According to the customer the fault had occurred suddenly however, so the chances of the tube being faulty were pretty low. Checks at the tube base showed that the first anode voltage was pretty low at around 200V. The source of this supply was traced back to the main PCB. This brought us to the safety resistor R852 (1k Ω) which was open-circuit. As no shorts could be detected a replacement

was fitted. It failed at switch on. Attention was next turned to the associated RGP01-17 rectifier diode D852. Although it tested all right, when we removed it from the panel we found that there was a thin burn line across its underside. It had evidently been tracking across. Replacing D852 and R852 restored an excellent picture. **M.Dr.**

Toshiba C2090B1

This set presented us with a bit of a problem as we had no manual. The basic chassis is the Rank T24, but this model has electronic tuning and memory – and guess where the fault lay! When a channel button was pressed the relevant LED lit up but went out again as soon as the button was released. Also no signals appeared. When the electronic tuning button was depressed however stations could be tuned in but couldn't be stored.

As a start voltage checks were made on a couple of large wirewound resistors on the tuning PCB. One, RE22, had $-6V$ at one side and $-0.5V$ at the other side. It was stone cold. A zener diode and electrolytic capacitor were connected to the $0.5V$ side, with their positive terminals connected to chassis. There was also a chip. So this was a negative rail and the chip must have been a memory as these need a high negative voltage to write in data. At the $-6V$ side of RE22 there was a $22\mu F$, 160V electrolytic (CE21) and a diode. Clearly the setmaker wouldn't fit a 160V device if it had only $-6V$ across it! This seemed to be where the fault lay. The diode was o.k. but when CE21 was removed from the board we found that it had a white, powdery deposit on its base. A check showed that it was open-circuit. A replacement cleared the fault, leaving RE22 with $-125V$ at one side and $-24V$ at the other side. As time was pressing I didn't get to find the source of the voltage. **M.Dr.**

Solavox 141/Nikkai TLG88/99/etc

The fault symptoms with this 14in. portable were no colour and the height reduced by two inches at the top and bottom. We decided to check the output from the 12V regulator IC103 and found that this was correct. Only 10V was present at the other end of the following filter resistor R104 however. The circuit gives the value of this resistor as 5Ω (1W) but when we removed it we found that it was marked 3.3Ω . A check showed that its value was nearer 12Ω . A replacement cured the fault. **M.Dr.**

ITT 80 110° Chassis

No signals, no raster and the digital channel display fading or pulsing were the symptoms with this set. We found that the voltage on the 12V line was very low, varying between 4V and 5V. As the regulator chip was very hot an overload was likely. A long foray along the various paths followed by the 12V supply eventually brought us to C307 ($10\mu F$, 16V) which had a bad but varying leak. It's a red tantalum type on the decoder panel. **S.L.**

Ferguson TX90

No colour is usually a very easy fault to cure these days. This one tripped us up however. The job was given to an apprentice who checked the supply to the UPC1365C decoder chip then, finding it to be correct, replaced the chip and its reference oscillator crystal. There was still no colour however. Scope checks were then carried out on the waveforms around the decoder chip. We found that the line pulse at pin 23 was low in amplitude and a little distorted.

Replacing the BAV20 diode D103 in the feed with a 1N4148 gave us unlocked colour but thankfully restored the correct pulse amplitude. Another new crystal put matters right, the first one being faulty. **S.L.**

Hitachi CPT1474R

This set was dead. We suspected IC901 as the voltages at pins 2, 3, 4 and 5 were all drastically low but the culprit turned out to be the BZX79C2V7 zener diode ZD910 which was almost short-circuit. **J.G.G.**

Philips CP90 Chassis

When servicing these sets I'd recommend replacing the 1kV 1.5nF line output stage tuning capacitor C2619 with the beefier 2kV version, Philips part no. 4822 122 32501. **J.G.G.**

Ferguson TX85 Chassis

If you find that the 800mA mains fuse FS1 has blown, replace the TIPL791A chopper transistor TR6, its TEA2018A driver chip IC4 and the three 1N4001 diodes D8, D10 and D23. If R101 ($1.2k\Omega$) in the snubber circuit has ruptured replace the associated 1nF capacitor C75 and uprate FS1 to 1.25A. **J.G.G.**

Philips GR1-AX Chassis

If the set won't retune or reprogramme the volume, colour etc. and store the new values the store-lock facility has been accidentally set. To unlock it, select ch. 38 then press the store and control buttons simultaneously. **J.G.G.**

Philips G90 Chassis

If the action of the contrast control becomes very limited check whether C2560 ($33nF$), which is connected to pin 7 of the line output transformer, is leaky. This removes the standing bias for the beam limiter.

Random failure of the BUT11AF chopper transistor is commonly due to the CNX83 optocoupler. **B.McC.**

Fidelity ZX4120 Chassis

We were puzzled by occasional failure of the 0.68Ω surge limiter resistor R98 in the 16V rectifier circuit in one of these sets. The rectifier is fed from a tapping on the chopper transformer's output winding. Amongst other things it feeds a 12V regulator. After much experimentation to check whether there was an excessive current drain we realised that the input voltage from the transformer was too high! The cause of the problem was the 120V supply's $100\mu F$ reservoir capacitor C87. It was unbalancing the outputs from the chopper transformer so that too much appeared in the 16V circuit. **B.McC.**

ITT Monoprint B Chassis

This set originally came in because it was dead. The mains rectifier's 5.1Ω surge limiter resistor R652 was open-circuit, the 115V supply rectifier D733 (BYW36) was short-circuit and the line output transformer was faulty. When these items had been replaced I was presented with another fault. The cause of intermittent start up and tripping when cold was traced to C707 ($2.2\mu F$, 63V) in the power supply. It's the reservoir capacitor for an 8.5V feed to the chopper control chip IC701. When we checked it with the component tester

ECONOMIC DEVICES 32 TEMPLE STREET, WOLVERHAMPTON, WV2 4AN

15R04	3.63	25C15730	0.25	25D669	0.53	BC141	0.25	BD201	0.38	8FR79	0.37	CD4053	0.19	M51515L	1.95	SG264A	9.48	T9064	0.82	TDA1060	2.39	TDA4601D	2.34
15R5R	3.72	25C1675	0.08	25D669A	0.52	BC147A	0.05	BD203	0.45	8FR90	0.59	CD4066	0.29	M51521L	0.54	SG613		T9065V	4.12	TDA1082	4.12	TDA4605	2.92
17052	3.10	25C1685	0.13	25D716	1.39	BC148	0.05	BD232	0.27	8FR90A	0.59	CD4069	0.17	M51521B	0.36		18.24	T9063P	1.10	TDA1093	1.15	TDA4950	1.18
17053	2.31	25C1740	0.11	25D718	1.14	BC148A	0.05	BD234	0.24	8FR91	0.58	CD4070	0.13	M5231L	0.53	SGSIF344	5.04	T9122BP	0.61	TDA1101	0.49	TDA4720A	1.47
17088	2.31	25C1741	0.16	25D734	0.23	BC148B	0.03	BD237	0.29	8FR96	0.47	CN822A	0.84	M53216P	1.28	SKE2202	0.63	T9146P	1.25	TDA1170N	0.96	TDA4720S	6.80
17089	3.28	25C1815	0.13	25D762	0.62	BC149	0.03	BD238	0.10	8FR92A	0.84	CR3CM	1.54	M54532L	1.24	SKE4F104	0.23	T9176P	1.24	TDA1170N	1.19	TDA8140	2.31
17127	1.71	25C1826	0.69	25D774	0.23	BC149C	0.03	BD239	0.28	8FR95	0.31	CRD2AM	2.69	M54543L	1.21	SKE4F210	0.89	T9193AP	3.26	TDA1170S	0.85	TDA8153	4.95
1N4001	0.03	25C1827	0.74	25D787E	0.25	BC157	0.12	BD241	0.39	8FR950	0.31	CV12E	2.44	M54544L	1.46	SKE5F310	1.63	T9193P	3.26	TDA1180	1.84	TDA8170	2.55
1N4002	0.06	25C1845	0.20	25D837	0.90	BC159	0.05	BD243	0.37	8FR951	0.33	CX109	6.84	M54548L	2.45	SL1430	1.36	T9205	0.96	TDA11902	3.96	TDA8180	5.19
1N4003	0.03	25C1846	0.28	25D841	1.24	BC160	0.40	BD243A	0.41	8R100	0.13	DTA124EF	0.12	M54644BL	1.96	SL1431	1.65	T9205A	0.91	TDA1200	0.86	TDA8190	2.78
1N4004	0.06	25C1923	0.13	25D856	0.64	BC161	0.26	BD243C	0.31	8R101	0.95	DTA144EF	0.41	M54648L	5.04	SL1432	1.53	T9205P	1.00	TDA1210	1.73	TDA8503	1.56
1N4005	0.05	25C1942	2.31	25D869	2.47	BC167	0.40	BD244A	0.33	8R103	0.37	ER1400	2.08	M54898AP		SL1437	1.65	T9207P	1.63	TDA1270	0.74	TEA1002	5.14
1N4006	0.05	25C1959	0.10	25D870	2.60	BC171B	0.13	BD244C	0.20	8R303	1.20	HA11235	3.71	SL490	14.69	SL490	1.77	T9210P	1.45	TDA1470	0.00	TEA1009	1.20
1N4007	0.05	25C1969	1.80	25D871	4.95	BC177	0.13	BD245C	0.68	8R444	0.99	HA11244	3.71	M58485P	5.78	SN29764AN	1.77	T9217AP	3.63	TDA1470P	0.00	TEA1014	1.61
1N4148	0.03	25C1983	0.99	25D880	0.33	BC178	0.10	BD246C	0.75	8R556	0.41	HA1124A	0.70	M83730	1.89	SN7474N	0.36	T9217AP	1.40	TDA1506	4.45	TEA1039	1.88
1N4448	0.05	25C2001	0.13	25D882	0.29	BC182	0.05	BD278A	0.54	8SS38	0.17	HA11243	1.96	M83731	1.98	SN76013ND	0.75	T9222	1.24	TDA1510	1.38	TEA2018A	1.46
1N5061	0.25	25C2029	0.33	25D898B	2.39	BC182A	0.12	BD317	1.40	8T120	1.24	HA11420	2.83	M83732	2.22	SN76227M	1.03	T9222A	1.20	TDA1512	2.29	TEA216A	2.40
1N5402	0.05	25C2073	0.49	25D904	6.07	BC182L	0.05	BD318	1.12	8T129	3.16	HA1166K	6.73	MC13002	3.71	SN76666N	1.65	T9230P	1.30	TDA1516	3.23	TIC106D	0.53
1N5404	0.07	25C2078	0.58	25D909	0.36	BC182BL	0.05	BD380	0.39	8T139600	1.01	HA11713	1.31	MC13002P	4.65	SN76705AN	1.55	T9230P	1.72	TDA1518	3.05	TIC106M	0.67
1N5406	0.11	25C2141	1.43	74L500	0.20	BC183	0.05	BD433	0.26	8T151500R	0.78	HA11714	1.65	MC1310P	0.82	SR2M	0.66	T9233P	1.30	TDA1518	2.02	TIC45	0.57
1N5408	0.10	25C2166	0.92	7805	0.23	BC184	0.08	BD434	0.28	8T151800	1.11	HA11745	5.26	MC1327AP	1.57	ST4341M	0.67	T9240AP	1.00	TDA1670A	2.02	TIC45	0.57
1N914	0.03	25C2168	0.87	7805T022	0.23	BC184L	0.03	BD435	0.36	8U205	1.03	HA13001	1.30	MC1330AP1	1.22	ST4401	2.23	T9240P	2.15	TDA1701	4.71	TIL100	0.50
1S1555	0.21	25C2236	0.25	7808	0.24	BC184LC	0.09	BD436	0.31	8U208A	0.92	HA13108	2.67	MC1350P	1.76	ST4411C	2.39	T9241	2.23	TDA1770	2.49	TIP110	0.33
1S2076	0.28	25C2271	0.21	7812	0.35	BC204	0.35	BD437	0.31	8U208D	0.85	HA13118	1.85	MC1352P	1.40	STK0029	5.70	T9243P	2.28	TDA1870	2.54	TIP12	0.30
2N2219A	0.26	25C2274	0.21	7815	0.24	BC207B	0.22	BD438	0.16	8U2326A	0.50	HA13119	1.63	MC1358P	1.23	STK0039	5.52	T9243P	2.28	TDA1904	1.17	TIP12H	0.33
2N2222	0.16	25C2274K	0.13	7818	0.39	BC212	0.04	BD441	0.69	8U406	0.43	HA13403	3.96	MC14493P	3.79	STK0040	7.18	T9267P	1.96	TDA1905	0.91	TIP20	0.55
2N2905	0.20	25C2314	0.28	7905	0.41	BC212B	0.05	BD442	0.40	8U406D	0.33	HA1374A	2.89	MC14528BCP		STW0059	9.46	T9270	1.50	TDA1908A	1.10	TIP21	0.40
2N2926B	0.35	25C2335	0.07	7912	0.33	BC212L	0.05	BD510	1.30	8U407	0.51	HA1377	1.36	2.15	STK025	9.37	T9270P	1.50	TDA1940	3.89	TIP26	0.44	
2N3053	0.34	25C2458	0.08	AA119	0.34	BC213	0.10	BD529	0.93	8U407D	0.94	HA1388	1.87	STK043	0.00	T9271P	1.90	TDA1950	2.01	TIP32	0.44		
2N3054	0.95	25C2482	0.25	AA143	0.12	BC214	0.05	BD530	1.01	8U426A	0.64	HA1389	2.44	STK3042	8.82	T9273	3.43	TDA2002	0.62	TIP37	0.46		
2N3055	0.42	25C2547E	0.23	AC127	0.10	BC214L	0.08	BD535	0.41	8U426E	2.06	HA1392	1.56	MJ802	2.60	STK3062	4.82	T9274P	2.15	TDA2003V	0.63	TIP255	0.79
2N3442	1.12	25C2565	3.67	AC141K	0.44	BC237	0.04	BD536	0.46	8U500	1.06	HA1397	2.56	MJE13005	0.79	STK4131	7.56	T9280	2.11	TDA2004	1.23	TIP29C	0.29
2N3702	0.10	25C2570A	0.28	AC176K	0.29	BC237A	0.07	BD675	0.29	8U508A	0.90	HA1398	2.56	MJE2955	0.66	STK4141	8.00	T9281	2.09	TDA2005	1.24	TIP29E	0.39
2N3704	0.13	25C2577	1.50	AC187	0.15	BC238	0.10	BD677	0.29	8U508AF	1.10	HA1452	0.95	MJE3055	0.49	STK4142	9.27	T9299	1.93	TDA2006	1.02	TIP305S	0.69
2N3713	1.23	25C2581	2.38	AC187K	0.31	BC237B	0.04	BD707	0.49	8U508B	0.85	HM6232	5.77	MJE340	0.38	STK4162M	9.92	T9313AP	0.60	TDA2009	2.23	TIP30C	0.16
2N3819	0.33	25C2632	0.28	AC188	0.29	BC238B	0.05	BD839	0.49	8U508DF	1.36	HM6251	5.69	ML2378	1.23	STK4171		T9317P	0.77	TDA2020	2.29	TIP31	0.00
2N3904	0.10	25C2655	0.24	AC188K	0.65	BC239	0.03	BD901	0.45	8U508V	1.13	HM7103		ML923	3.82		10.56	T9325P	1.63	TDA2030	0.00	TIP31A	0.25
2N4444	2.60	25C2671	0.19	AD149	0.50	BC252B	0.16	BD902	0.56	8U526	1.36		13.66	MM1405VXK		STK4181 II		T9343AP	0.69	TDA2030H	0.71	TIP31B	0.29
2N6292	0.60	25C2688	0.29	AD161	0.99	BC300	0.38	BD911	0.53	8U536	1.59	ICH281	1.20	11.41		STK4181A	12.47	T9358P	0.75	TDA2030V	0.66	TIP31C	0.28
2SA1015	0.08	25C2785	0.16	AD162	0.92	BC301	0.23	BD912	0.68	8U608	1.54	KA2101	0.58	MM1435VX		STK4181A		T9358SP	0.66	TDA2040	1.63	TIP32A	0.38
2SA1016	0.17	25C2791	4.25	AF124	0.74	BC302	0.35	BDV65B	1.12	8U705	1.56	KB08L	0.45	12.75		STK4181A	12.09	T9367AP	0.89	TDA2170	2.47	TIP32C	0.36
2SA1020	0.30	25C3150	1.06	AF127	0.58	BC303	0.26	BDW84C	0.94	8U806	0.79	KSR1004	0.08	MM1435VX		STK4332	5.38	T9369P	1.90	TDA2270	3.91	TIP33	0.57
2SA1020D	0.30	25C3153	2.21	AF139	0.28	BC307	0.05	BDW93C	1.06	8U806A	0.94	L2000V	1.09	9.98		STK4332	1.65	T9370P	1.00	TDA2525	3.54	TIP33A	0.89
2SA1095	5.71	25C3156	3.61	AF239	0.41	BC307A	0.05	BDW94C	0.45	8U807	0.40	LA1201	0.84	MM650	2.27	STK437	7.96	T9370P	1.81	TDA2530	0.41	TIP33C	0.95
2SA1102	1.73	25C3182	3.13	AF279	0.33	BC307B	0.05	BDX32	1.65	8U826A	1.53	LA1230	1.56	MM650A2	0.22	STK4392	5.31	T9370AP	1.04	TDA2540	0.36	TIP34	1.15
2SA1143	0.17	25C3225	0.33	AL102	2.48	BC308	0.05	BDY20	2.06	8U908	1.13	LA1385	1.40	MPSA66	0.11	STK441	9.73	T9376P	4.13	TDA2541	1.46	TIP34C	0.86
2SA1175	0.49	25C3795	1.27	AN425	5.78	BC308A	0.11	BF115	2.06	8UK444	2.04	LA1361	0.37	MPSA83	0.08	STK459	7.73	T9380AP	4.39	TDA2650	2.47	TIP41A	0.20
2SA1186	3.42	25C380	0.12	AN3821K	7.01	BC308C	0.05	BF179	0.30	BUT11	0.87	LA4140	0.35	MPSU10	2.54	STK461	8.99	T9389AP	5.77	TDA2576A	4.65	TIP41B	0.39

SPECIAL OFFERS - ENDS 31/10/92 OR WHILE STOCKS LAST

BC 639	0.10	STK 5481	4.50
BD 433	0.23	TDA 1060	1.07
BU 908	0.97	TDA 2004	1.10
BU 406D	0.85	TDA 2600	2.97
CO AXIAL AERIAL PLUG X25	3.75	TDA 3560/3561A	3.21
2N2222	0.08	TV FAULT FINDING GUIDE	8.99
SEMICONDUCTOR DATA BOOK	8.50	'F' CONNECTOR (SCREWTYPE) x25	3.00

2SA1208	0.25	25C388A	0.57	AN5265	1.30	BC327	0.09	BF184	0.40	BUT11A	0.69	LA4182	0.75	MR854	0.13	STK4843		TA7705P	1.38	TDA2577	4.71	TIP41C	0.35
2SA1265	1.89	25C458	0.08	AN5435	1.24	BC327B	0.17	BF185	0.28	BUT11AF	0.82	LA4192	1.10	MSM5840H		11.19	TA7769P	1.39	TDA2577A	2.76	TIP42A	0.2	

AIWA	Part No.	Price	3-V-57	Part No.	Price	3-V-57	Part No.	Price	HITACHI	Part No.	Price	JVC	Part No.	Price	Remote Control	Part No.	Price
AV-66			Video Head	VID 2573	£17.29	Cassette LED	VID 1981	£1.48	VT-11	VID 2504	£15.37	HR-3300	VID 2511	£9.81	IR 8947	IR 8947	£15.75
Video Head	VID 2546	£14.53	Pinch Roller	VID 1813	£3.05	Tension Band	VID 1376	£2.31	Video Head	VID 1788	£3.05	Video Head	VID 1756	£3.05	Repair Kit	VID 1915	£21.69
Pinch Roller	VID 1755	£3.05	Belit Kit	VID 7540	£3.05	Take Up Reel Table	VID 1295	£7.83	Pinch Roller	VID 7538	£3.05	Belit Kit	VID 7506	£1.56	Cassette Housing	VID 1315	£20.61
FF/REW Idler Arm	VID 1001	£3.54	Clutch Mechanism	VID 1083	£14.56	Supply Reel Table	VID 1294	£25.43	FF/REW Idler Arm	VID 1020	£1.48	Take Up Reel Table	VID 1025	£5.11	N-9013901499339034		
Idler Replacement Set	VID 1005	£1.81	Capstan Motor	VID 2188	£44.62	FVH-P980K/KV	VID 2501	£24.43	Clutch Plate	VID 1211	£9.81	FF/REW Idler Arm	VID 1025	£5.11	9013901499339034	VID 2695	£19.51
Idler	VID 1005	£1.81	Loading Motor	VID 2167	£13.69	Video Head	VID 1818	£2.97	Capstan Motor	VID 2147	£18.02	Unloading Idler	VID 1027	£7.83	Pinch Roller	VID 1828	£2.97
Capstan Motor	VID 2160	£24.27	Front Loading Motor	VID 2168	£10.23	Pinch Roller	VID 7568	£2.64	Capstan Motor	VID 1981	£1.48	FF Rubber Tyre	VID 1029	£1.56	Belit Kit	VID 7501	£3.13
Tension Band	VID 1423	£3.54	Cassette LED	VID 1388	£2.06	Belit Kit	VID 1093	£4.62	Tension Band	VID 1379	£2.31	Unloading Idler	VID 1029	£1.56	Reel Drive Pulley	VID 1265	£7.09
Reel Table Rubber Tyre	VID 1335	£9.99	Front Loading Motor	VID 7920	£18.42	Idler	VID 1094	£1.46	Repair Kit	VID 7922	£15.77	Rubber Tyre	VID 1207	£27.90	Cassette LED	VID 1981	£1.48
CTL Unit	VID 2637	£59.75	Repair Kit	VID 1315	£20.61	Clutch	VID 1981	£1.48	FF/REW Idler Arm	VID 1020	£1.48	Capstan Motor	VID 2119	£24.60	Pinch Roller	VID 1757	£2.97
			Cassette Housing	VID 1315	£20.61	Cassette LED	VID 1377	£2.97	Pinch Roller	VID 1788	£3.05	Drum Motor	VID 2120	£24.60	Video Head	VID 2520	£9.38
						Tension Band	VID 1296	£10.31	Belit Kit	VID 7538	£3.05	Cassette Lamp	VID 1943	£3.05	Pinch Roller	VID 1757	£2.97
						Supply Reel Table	VID 1296	£10.31	FF/REW Idler Arm	VID 1020	£1.48	Repair Kit	VID 7911	£5.45	Idler	VID 7600	£1.73
									Clutch Plate	VID 1211	£9.81	Take Up Reel Table	VID 1028	£1.56	Idler	VID 1054	£3.05
									Capstan Motor	VID 1981	£1.48	FF/REW Idler Arm	VID 1020	£1.48	Idler	VID 1055	£3.05
									Tension Band	VID 1379	£2.31	Rubber Tyre	VID 1029	£1.56	Idler	VID 1221	£1.23
									Repair Kit	VID 7922	£15.77	Capstan Motor	VID 2119	£24.60	Intermediate Gear	VID 1216	£1.23
									FF/REW Idler Arm	VID 1020	£1.48	Supply Reel Table	VID 1025	£5.11	Driving Gear	VID 1217	£0.57
									Clutch Plate	VID 1211	£9.81	Take Up Reel Table	VID 1025	£5.11	Cassette Lamp	VID 1948	£10.23
									Capstan Motor	VID 1981	£1.48	Take Up Reel Table	VID 1025	£5.11	Tension Band	VID 1337	£3.38
									Tension Band	VID 1379	£2.31	Take Up Reel Table	VID 1025	£5.11	Repair Kit	VID 7901	£10.69
									Repair Kit	VID 7922	£15.77	Take Up Reel Table	VID 1312	£11.33	Take Up Reel Table	VID 1310	£7.38
									FF/REW Idler Arm	VID 1020	£1.48	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Clutch Plate	VID 1211	£9.81	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Capstan Motor	VID 1981	£1.48	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Tension Band	VID 1379	£2.31	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Repair Kit	VID 7922	£15.77	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									FF/REW Idler Arm	VID 1020	£1.48	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Clutch Plate	VID 1211	£9.81	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Capstan Motor	VID 1981	£1.48	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Tension Band	VID 1379	£2.31	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Repair Kit	VID 7922	£15.77	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									FF/REW Idler Arm	VID 1020	£1.48	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Clutch Plate	VID 1211	£9.81	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Capstan Motor	VID 1981	£1.48	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Tension Band	VID 1379	£2.31	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Repair Kit	VID 7922	£15.77	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									FF/REW Idler Arm	VID 1020	£1.48	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Clutch Plate	VID 1211	£9.81	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Capstan Motor	VID 1981	£1.48	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Tension Band	VID 1379	£2.31	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Repair Kit	VID 7922	£15.77	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									FF/REW Idler Arm	VID 1020	£1.48	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Clutch Plate	VID 1211	£9.81	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Capstan Motor	VID 1981	£1.48	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Tension Band	VID 1379	£2.31	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Repair Kit	VID 7922	£15.77	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									FF/REW Idler Arm	VID 1020	£1.48	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Clutch Plate	VID 1211	£9.81	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Capstan Motor	VID 1981	£1.48	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Tension Band	VID 1379	£2.31	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Repair Kit	VID 7922	£15.77	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									FF/REW Idler Arm	VID 1020	£1.48	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Clutch Plate	VID 1211	£9.81	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Capstan Motor	VID 1981	£1.48	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Tension Band	VID 1379	£2.31	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Repair Kit	VID 7922	£15.77	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									FF/REW Idler Arm	VID 1020	£1.48	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Clutch Plate	VID 1211	£9.81	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Capstan Motor	VID 1981	£1.48	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Tension Band	VID 1379	£2.31	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Repair Kit	VID 7922	£15.77	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									FF/REW Idler Arm	VID 1020	£1.48	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Clutch Plate	VID 1211	£9.81	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Capstan Motor	VID 1981	£1.48	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Tension Band	VID 1379	£2.31	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Repair Kit	VID 7922	£15.77	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									FF/REW Idler Arm	VID 1020	£1.48	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Clutch Plate	VID 1211	£9.81	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Capstan Motor	VID 1981	£1.48	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Tension Band	VID 1379	£2.31	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Repair Kit	VID 7922	£15.77	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									FF/REW Idler Arm	VID 1020	£1.48	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Clutch Plate	VID 1211	£9.81	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Capstan Motor	VID 1981	£1.48	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Tension Band	VID 1379	£2.31	Take Up Reel Table	VID 1310	£7.38	Supply Reel Table	VID 1310	£7.38
									Repair								

we found that it lost all capacitance when cold. **N.J.W.**

Hitachi CPT2508 (G7P Mk II Chassis)

The usual cause of a dead set with the 2.5AT mains fuse F901 open-circuit is the 4.7nF, 1kV disc capacitor C919 in the chopper transistor's snubber network. Use the correct type from Hitachi as others are unable to handle the spikes present at the collector of the BUT11AF chopper transistor. If you use the wrong capacitor you'll end up with a blown TDA4601 chip (IC901), BUT11AF transistor (Q901) and the two 150k Ω and 120k Ω resistors R931 and R932. For no start up check the 82pF capacitor C911 connected between pins 2 and 3 of the TDA4601 chip. **N.J.W.**

Mitsubishi CT1902

This set had a blank raster with no sound and field collapse. We found that the 0.5 Ω , 2W safety resistor R560 was open-circuit. It feeds 14V to the 12V ripple filter. **G.R.**

Hitachi CPT1474R

This set tripped at switch on. The tripping stopped when we disconnected the line output transistor's collector. Checks on the line output transformer then produced 30 Ω readings between all pins and chassis. This was our third Hitachi line output transformer failure in a fortnight. **G.R.**

Boots 1411R (Tatung 190 Chassis)

This set was dead. We quickly found that the cause of the fault was the two start-up resistors R882 and R883 which are both 15k Ω , 0.5W. One of them was open-circuit and the other read 18.5k Ω . The set worked perfectly when they had been replaced. **G.R.**

Goodmans TV20RC

This one came from another dealer with a ticket that said "no sound". The two transistors in the audio output stage receive their supply from the 103V line via R601 (560 Ω , 1W) which was open-circuit. When this had been replaced we found that there was also no picture. R430 (10 Ω) in the 180V supply to the RGB output transistors was open-circuit. **G.R.**

Sharp SV2588H

At switch on the e.h.t. rustled up for a second or two then the relay switched to off, leaving the set dead. Overriding the relay gave us a blank raster with no sound. A supply was clearly missing but we didn't have a manual. After careful physical examination we found that both D712 and D713, which are twin-diode stand-up encapsulation types, were dry-jointed. Correcting this restored normal operation. We've since had the fault again, so it looks like one for the notebook. **G.R.**

Ferguson TX10 Chassis

The customer's complaint was that the picture was intermittent. It would sometimes disappear a few minutes after switching the set on while at other times the set would be o.k. for days. Fortunately when we tested the set the fault appeared quite quickly and we were able to see that the tube's heaters went out. The cause of this couldn't be proved however as movement of either the c.r.t. base panel

or the main panel would produce the fault. We decided to resolder pins 1 and 6 of the c.r.t., take a wire direct from pin 6 to R729 (2.2 Ω) which we renewed, and take another wire from R729 to the line output transformer, the idea being to ensure that there was no chance of an open-circuit in the heater supply path. A very long soak test proved that all was well. **J.E.**

ITT CVC800 Chassis

After a time any channel that was selected would drift in and out of tune. As the 33V supply to the tuning circuit was varying slightly we replaced the ZTK33 regulator. This made no difference. The supply is derived from the 90V line whose reservoir capacitor C514 (10 μ F, 100V) was leaky. **J.E.**

NEI 1551TX

This set was dead because thermistor R802 which provides the start-up supply for pin 9 of the TDA4601 chopper control chip was open-circuit. The maker's part number is 154214. If you shake one of these faulty thermistors you'll find that it rattles in the same way that degaussing circuit pistors do. **J.E.**

Hitachi CPT2260 (Salora J Chassis)

There was a very bright picture and the contrast and brightness controls had no effect. The culprit was CH5 (2.2 μ F, 350V) on the tube base panel – it was open-circuit. **J.E.**

Bush 2020 etc

After completing the now common power supply rebuild in one of these sets we noticed that there was bad patterning and what looked like a very mild form of field cramping in the centre of the screen only. The cause turned out to be the 1,000 μ F, 16V l.t. supply reservoir capacitor C806. We decided to fit a component with a slightly higher working voltage (35V) and after doing this the fault had cleared.

Two days later the set came back with the complaint "no results". When we switched it on a loud whistling sound came from either the chopper or the line output stage. After about half a minute there was a loud crack and smoke appeared to come from somewhere in the line output stage. I almost burnt my finger on the h.t. reservoir capacitor C810 (220 μ F, 160V). A check across this capacitor under the fault condition showed that the voltage was over 200V instead of the correct 110V. Yet another capacitor in the TDA4601 power supply had dried up, this time C818 (1 μ F, 50V). It's the reservoir capacitor for the chip's negative feedback voltage. Fitting a replacement cured the fault and all was well again. **M.L.**

Some Quickies

Toshiba C2226: The cause of incorrect field linearity was C309 (2.2 μ F, 50V).

Telefunken 711 chassis: The picture was reduced all round because one of the EW modulator diodes was open-circuit. We thought it best to replace them both.

Ferguson 1790 chassis: The MC13002 chip IC2 which incorporates most of the circuitry in this 12in. monochrome portable was the cause of no field scan.

Toshiba C2226: There was no field scan at switch on. The field then took about half an hour to reach full amplitude. The cause was C317 (2.2 μ F, 50V).

Samsung CI347F: This set was dead due to failure of Q403 (SC2229) and Q402 (2SC2120). **J.O.**

Letters

SERVICING INDUSTRY'S PROBLEMS

Reading Donald Bullock's articles always brings a smile to my face, not as much because of his grief with certain customers but to how well I can relate to him. I used to have the use of a shop with a workshop but lost both through no fault of my own. I now work from home and the abuse from some customers has to be experienced to be believed. My best example to date was a phone call at five minutes past midnight on Christmas morning, demanding instant service. No prizes for guessing my reply, but I have this feeling that we may have lost a customer. Phone calls at that time of the morning are guaranteed to set your heart racing, as you always fear the worst.

There are definite advantages to working from a shop. The problem of getting people to collect their equipment is common: your workshop ends up looking like a store-room. A sharp reminder letter, after several telephone calls, may get the items removed, generally followed by the loss of that customer.

I don't do "cheap" repairs. Whatever the equipment requires it gets, my interest being in keeping the equipment in proper working order so that, as far as possible, costly recalls are avoided. When people phone and begin to dictate prices and terms before we even know what the problem is we usually politely refuse the job because we know, from hard experience, that trouble won't be far behind. I don't know about others in this trade, but much of the equipment we see now is in a very bad way, being brought to us only when it has sung its death throes. How many dead items have you brought back to life only to feel your heart drop to your boots at the sight of the collection of faults that didn't actually stop the thing working and were never mentioned or estimated for? Try to get paid for these or, if you feel that it's your lucky day, give it back with only the breakdown repaired. "My tele/video etc. didn't have these faults before it came to you. . ." – what a familiar ring.

Large retail chains that sell their goods at a small profit in the interests of a large turnover (not profit) must take their share of the blame for making this industry appear cheap. How can you charge £35 to repair a midi system that cost only £49 in the first place? We must also take our share of the blame for advertising free quotes, call outs and estimates. No wonder that the public expects to pay next to nothing for repairs.

We are a skilled, constantly changing and upgrading industry. Let's not sell ourselves completely down the river.

*E.A. Barker,
Cheam, Surrey.*

THE MICROVITEC CUB

I found the article on servicing the Microvitec Cub (August) both helpful and interesting – we deal with quite a few of them. I'd like to add the following points however.

Arthur Rumbelow quotes the model numbers to which his notes are applicable. Whilst the same basic board is used in all the models mentioned, the 1441 and 1442 have a different tube base panel to suit the high-resolution c.r.t. with which they are fitted. The only change that this calls for to Arthur's notes is that the high-resolution tube's cathode pins are 8 for red, 12 for green and 4 for blue (see page 719). A number of components in this area differ because of the two types of tube.

I've not experienced the BR103 problem mentioned though I know someone who has and considers it to be a stock fault!

When the complaint is that the screen is blank but the little red light is on I usually start with the first anode supply preset VR932 (VR837 in the high-resolution version) on the tube base panel. These presets seem to fail at the slightest provocation – the damage can often be seen without having to remove the control. The associated resistors R934 (180kΩ) and R933 (150kΩ), which are R838 and R840 respectively in the high-resolution version, often need attention as well. The preset seems to be a little bit too small for the job it does. I use the standard RS 2.2MΩ horizontal preset (part number 187-804) as a replacement – it fits in the same pin holes. I've never had recurrence of the problem after making this change and now usually carry one or two of them in the tool box, as well as having a back-up stock!

The 1.5Ω resistor R15 that's connected in series with the chopper transistor's emitter can fail of its own accord (Arthur suggests that it fails when the chopper transistor itself goes). I usually fit a 3W type as a replacement rather than the specified 2W type, again without further problems.

Arthur mentions blown mains fuses due to failure of the degaussing resistor Th1. We've had several of these fail – in one case the fuse didn't blow but there was the classic "funny colours" report because of no degaussing action. I fit the more usual Philips type 96009 which is a plug-in replacement. It's sold as a "degaussing resistor white" by advertisers in *Television*. We've had no further problems after fitting this type.

These monitors are very reliable considering the hammering they get. Faults are encountered relatively frequently only because there are a large number of them around. There is, incidentally, not only a linear or TTL input version. Some of these monitors can accept a PAL input. They have a small decoder panel with a TDA3301 decoder chip, a 4551 CMOS switch and two TDA1908 audio output chips, the result being a "triple standard-PAL interface". The inputs can be (a) PAL composite video; (b) TTL RGB plus sync; (c) linear RGB (1V p-p video across 75Ω) plus sync. When link TL1 on the subpanel is set to position 2 the sync can be with the green signal instead of via a separate lead. The two audio circuits (sometimes only one is fitted) each provide a nominal 2W output with an input of 100mV across 47kΩ.

*Peter M. Delaney,
Wargrave, Berks.*

Thanks to Arthur Rumbelow for his excellent article on the Microvitec Cub (August). My monitor has failed twice in recent years with different symptoms but the same cause. On the first occasion the degaussing stopped, giving a psychedelic picture. On the second occasion there was a blank raster and low e.h.t., indicated by a very small crackle when the set was powered. In both cases the cause was the degaussing resistor Th1. Apparently it dies quite often.

I had considerable difficulty in obtaining the correct replacement – finally Computer Factory at Westcliff-on-Sea supplied me with their only spare. (See note about a suitable alternative in P.M. Delaney's letter – editor).

*Phil Hughes,
Theydon Bois, Essex.*

Thank you for the very interesting article on the Microvitec Cub. I'm responsible for maintaining thirty BBC workstations that use these monitors and have experienced many of the faults described. One point I would like to add is that it's worth upgrading the resistors in the first anode

supply network (R933, R934 and R236) to 2W as the 1W types fitted commonly fail. Use of 1W resistors means that they are just about at their limit. With three resistors in series across 1kV there's some 300V across each of them, which is around their maximum rating. 2W resistors will tolerate this voltage. To date I've not had a single failure after fitting 2W replacements.

*Ian Reichenfield,
Camberley, Surrey.*

The description of the operation of the self-oscillating chopper circuit used in the Microvitec Cub (August, page 718) was based on the original version of the circuit as developed by Siemens. There's an important difference with the circuit as used by Microvitec.

PHOTOSTATS SERVICE

Newer readers may have missed important servicing features that have appeared in *Television* over the past few years. We have therefore in operation a photostat service to make this information readily available. Photostats of the following servicing features, listed in alphabetical order, can be supplied at the prices shown. Please send requests to: Television Editorial Department, Room L323, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. Cheques/POs should be made payable to Reed Business Publishing Ltd. There are two standard prices, see below.

Feature	Price
B and O L/LX2500/2800 chassis	A
Decca 80/100 chassis	A
Decca 120/130 chassis	A
Ferguson FV31R VCR	A
Ferguson TX10 chassis	A
Ferguson TX100 chassis	A
Finlux 1000 series chassis	A
Fisher FVH-P520 VCR	A
Mitsubishi CT2227	A
Mitsubishi Euro-4 chassis	A
Mitsubishi HS304 VCR	A
Panasonic D1 VCR deck	A
Panasonic G VCR deck	B
Panasonic NV333/366 VCRs	A
Panasonic NV370/830/850 VCRs	A
Panasonic NV730 VCR	A
Panasonic NV777/780 VCRs	A
Panasonic NV2000/2010/3000 VCRs	A
Panasonic U3 chassis	A
Panasonic U4 chassis	A
Panasonic U5 chassis	A
Salora F chassis	A
Salora G and H chassis	B
Salora J chassis	A
Salora K and L chassis	B
Sanyo CTP7130/1/2	A
Sony KV2252/2256/2752/2762	B

Prices, A = £2.50, B = £3.50
Please allow 14 days for delivery.

It's true that the sawtooth developed across R15 will trigger thyristor TY1, thus switching off the chopper transistor TR2. But this happens only during the start-up sequence, with a low mains supply or a fault condition. In normal operation TY1 is triggered by the sawtooth developed across the 2.2nF capacitor (C16, not given a component reference number in Fig. 1, page 719) between its gate and cathode. This capacitor charges via the 390Ω resistor R10 (also not given a reference number) and transistor TR1. It discharges via the gate-cathode junction of TY1. When TR2 switches off, the voltage at pin 4 of the chopper transformer goes negative and TY1 switches off, ready for the next cycle of operation. D8, D10 and D11 limit the negative voltage to protect TY1.

Regulation depends on the rate at which C16 charges via R10 and the constant-current generator TR1. TR1 senses the output voltage conditions at its base, i.e. the voltage developed across C12. Any variation in this voltage will alter TR1's conduction and hence the charging of C16.

*R. Blenheim,
London W4.*

BACK INJURY

This is a call to all in the TV trade – engineers, shop managers, installers, shop staff and debt collectors. Lifting a TV set can be dangerous and can cause back damage. If you have at any time hurt your back while carrying out your duties we'd like to hear all about it – and any views that you may have on the subject. You could be entitled to substantial compensation. Please write to the address below.

*H.J. and P.B. Todd,
c/o 37 Northdene, Chigwell, Essex IG7 5JS.*

VIDEOCRYPT CONNECTOR

In his August issue *Satellite Notebook* Nick Beer mentioned the metallurgic reaction problem with the connector of the VideoCrypt decoder module used in the Ferguson SRV1 and other satellite TV receivers based on the Pace SS9000 and suggested "that Ferguson is unaware of the modified connector". Not so! The root cause and full extent of the problem and the effectiveness of any suggested remedial work had to be investigated before we could review our position and take any action that affected our then current stock. As a result of this investigation the later version of the connector is now being supplied automatically against our existing part number.

*Bernie Hinton, Regional Technical Manager,
Ferguson Limited, Enfield, Middx.*

CORRECTIONS

An error occurred in the editing of my article on the Electricity at Work Act. Under the heading "appliance testing" it should have stated that where applicable (class II appliances) the earth continuity and the insulation resistance between live and neutral and earth/any exposed metal part must be checked. Reference to earth continuity was omitted in the article as published and a "not" was inserted in the reference to class II appliances.

In the letters section last month, page 804, Mr. T. Giddings is quite wrong. The de-emphasis switch in the VideoCrypt decoder concerned was off, as it should have been. Switching it on would have made matters worse of course.

*N. Beer,
Bideford, N. Devon.*



OMEGA SATELLITE LTD.

INSTALLATION THROUGHOUT UK MAINLAND

We have moved to:

**UNIT U3, TIDY'S YARD, DITCHLING INDUSTRIAL ESTATE, DITCHLING
COMMON, DITCHLING, HASSOCKS, W. SUSSEX BN6 8SG.**

0444-244999 Trade Lines

Comprehensive trade catalogue available on request. All your satellite requirements covered.

Phone us for prices & details.

We stock satellite receivers:

**AMSTRAD, PACE, CAMBRIDGE, CHAPPERAL, ECHOSTAR,
DRAKE, MASPRO, UNIDEN**

**FERGUSON
B.S.B. SYSTEM
£30.00**

**BASIC SATELLITE
SYSTEM FROM
£50.00**

Dish/LNB/Receiver

**SATELLITE SYSTEMS
WITH BUILT-IN
DECODER FROM
£120.00**

Dish/LNB/Receiver

**FULLY MOTORISED
SYSTEMS FROM
£319.00**

Dish/LNB/Receiver/Positioner etc

DISH PACKS FROM £10.00

L.N.B. FROM £15.00

**BASIC RECEIVERS
FROM £30.00**

**F TYPE CONNECTORS
FROM 6p each
CABLE 100m FROM
£12.00**

All prices exclude V.A.T./Delivery and are subject to availability

CD Player Casebook

Reports from Mike Leach,
Ronald Aranha and
Nick Beer

Hinari DK100

This large, flat music centre appeared on the bench with a no CD operation fault. When it was switched to the CD position the laser would smack hard against the end stop, after which nothing else happened. I was eventually able to gain access to the CD unit, which uses a Philips laser and chips – these machines are not easy to work on as they have to be upside down most of the time. As I didn't have a circuit diagram I thought at first that the fault might be rather involved, but after a few quick checks in the power supply I soon found what the cause of the problem was: there was no input to the 5V regulator and thus no 5V supply to the CD player section. I traced back to the function switch which, in the CD position, feeds the 14V supply to the 5V regulator. This switch was faulty and couldn't be cleaned or repaired. Just a small amount of pressure on the switch would restore the 14V feed to the regulator, after which the CD player section worked normally. A complete new switchbank was required. **M.L.**

Bush MS265CD

The CD section of this midi system didn't work at all. We found that the laser unit was stuck at the outside of its travel and wouldn't move towards the centre of the disc to read the TOC. I took the side off the machine and broddled around the power supply, looking for dry-joints etc. or even open-circuit fuses, but everything seemed to be in order in this department.

One thing I had noticed was that the disc didn't sit evenly in the door – this machine uses a door rather than a tray. It was difficult to locate the disc and shut the door. When I looked a little more closely I realised that the two plastic studs on which the disc sits were broken. One of these studs opens a leaf switch inside the machine when the door is closed, giving an indication to the microcontroller chip that a disc has been inserted. This was in fact the cause of the trouble. When I opened the switch manually the laser unit moved to the centre of the disc and read the TOC, the player working normally. A new door was required. **M.L.**

Sony D350 Discman

This Discman really took us for a ride. It can be operated with a 9V adaptor, a 3.2V rechargeable battery or two 1.5V dry cells for which a separate case that can be attached to the Discman is provided. There were no problems whatsoever with the 3.2V battery or the dry-cell pack, but when the 9V adaptor was connected the display said "no disc". Strange!

Checks around the MC34063M step-down d.c.-d.c. converter IC401 showed that the voltage at pin 7 dropped when the player carried out focus search and spindle rotation. Now pin 7 is the excess current sensing input. When excess current is detected pin 8 switches off the regulator transistor Q401. Since the machine worked all right with batteries it was obvious that there was false excess current detection. Q403 is used to detect excess current. Its collector output is coupled to Q402 after a delay that's determined by the values of R407 (10k Ω) and C427 (1 μ F). The reason for

introducing this delay may be to take into account the initial surge (focusing and spindle rotation). C427 aroused our suspicion – it's a chip capacitor. A suitable replacement was obtained from a defective panel in a CCD-TR55 camera. It was carefully extracted from the PCB and fitted in place of C427. The 9V adaptor was plugged in, a disc was loaded and the top cover was closed. The machine read the TOC within two seconds and when play was selected the machine worked normally. **R.A.**

Sony FHE939

The CD section of this CDPH6600 music system had difficulty reading the TOC with some discs, especially those that were scratched. Also the scanning used to get stuck when some tracks were played and skipping was sometimes noticed. A check on the r.f. waveform showed that the eye pattern was at 1.2V peak-to-peak, which was quite normal. The scope was next connected to point TE and an EF balance check was carried out. While the waveform was symmetrical around the zero axis its amplitude was only 0.2V peak-to-peak instead of 2.5V p-p. A new KSS240A laser block solved the problem. With the KSS240A most of the adjustments, such as focus bias and EF balance, are carried out at the factory. So replacement is a simple task. **R.A.**

Sony FHE636CD

This portable music system came in because of a CD problem. When a disc was placed in the tray and the open/close button was pressed the tray would go in, focus search would start and the disc would rotate for a few seconds. It would then stop. This suggested that the TOC was read, but the fluorescent display showed 00 tracks and 00 00 as the total playing time. When the play button was pressed the disc didn't rotate and the play symbol didn't appear in the display. In fact the machine responded to only the open/close button.

Attention was turned to the UPD78134GF system control chip IC305. As the voltages and waveforms at the various pins all seemed to be normal we fitted a new chip. The TOC was then read and the display showed the number of tracks and the playing time correctly. The play and other CD commands also worked. **R.A.**

Sony FHB170CD

The display said "no disc" despite the fact that there was a disc in the tray. There was no focus search after loading, the objective lens just lying idle. A check showed that the search voltage was present across the focus coil, so we measured its resistance. It was open-circuit. Fortunately the machine was under guarantee, a new KSS240A laser block curing the problem. **R.A.**

Sony CDPS39

According to the ticket the fluorescent display sometimes indicated "no disc". A disc was inserted and the drawer closed. The machine then read the TOC and played the music without any problems. When we carried out further

tests we found that skipping occurred on a few discs, especially towards the end of the track. A check on the eye pattern at the r.f. test point showed that its amplitude was only 0.7V peak-to-peak. So a new laser unit was installed and the relevant adjustments were carried out. This increased the eye pattern amplitude to 1.1V p-p. There was now no skipping but the machine was kept on test.

At first switch on next day the display said "no disc"! When the tray was ejected and closed again the machine read the TOC. We consulted the customer who claimed that the machine had been sent to the Service Centre three times for the same problem whilst under guarantee and that the symptom would reappear, especially after a long rest. Careful inspection showed that the FOK signal was generated in the fault condition and the spindle motor drive was present but the motor wouldn't spin. A slight jerk on the disc would put matters right. A new spindle motor eliminated the problem. **R.A.**

Philips AZ8492 (RCD-1D Mechanism)

This radio/cassette/CD player would occasionally fail to play a disc. Sometimes it would read the TOC then do no more. On other occasions it wouldn't do anything. The laser came on and focus was achieved, but things went no further because the spindle motor was tight. Unfortunately it's not available as a separate unit, so a complete new RCD-1D mechanism had to be obtained. **N.B.**

Test Case 358

It's usually not difficult to fix a set which is completely dead. Customers often assume that a major and expensive repair is required when a set stops while something like intermittent loss of colour or tuning drift must be only a small problem which is cheap and easy to repair. In practice it's usually the other way about of course.

The set featured this month was quite dead, but its repair turned out to be a lengthy business. It was a 14in. Hitachi portable, Model CPT1456, fitted with the NP84CQ Mk II chassis. A quick check showed that its 2.5A mains fuse FS901 had blown violently. When a new fuse had been fitted the set worked perfectly well. It continued to do so throughout an assault on its main PCB with a screwdriver handle. Assuming that a mains surge had been responsible for the blown fuse our technician pronounced the little set fit and well and sent it on its way.

A few days later it was back on the bench. The new fuse had blown, again quite violently. A new fuse once more brought the set back to life: it showed no signs of distress in operation. After a conflagration with the other workshop worthies the technician fitted a new mains filter capacitor, thoroughly tinned and resoldered all the connections to the chopper transformer T901 and replaced the start up resistors R902 and R903. He checked the connections inside the mains plug and suggested to the set's owner that it be given its own mains socket – it shared a three-way 13A adaptor with

a table lamp and a hi-fi outfit. All this work had to be done free of charge of course, because of the 90-day repair guarantee we give. As the set ran perfectly well for the rest of the day it was once more returned to its owner.

Within a week it was back in the workshop again, with a note taped to it. The contents of the note couldn't possibly be printed in this magazine, but you won't find it hard to appreciate their general drift. F901 had again failed for no discernible reason. The technician – in this workshop everyone has to rework their own bounces – once more set to work with his soldering iron. He fitted a new STR421 chopper chip and carried out a solder-up around the line output stage, walloped the PCB with the screwdriver, heated and cooled the little diodes and transistors in the power supply with his hairdryer and freezer aerosol, and replaced the mains rectifier and chopper clamp diodes D901 and D906. As he'd lent the owner another set so that this one could be soak tested he put it to run alongside his bench.

It worked all right for the next three days, but on day four there was a loud buzz and a muffled splat when he switched the set on in the morning. Sure enough the 2.5A mains fuse had gone again. This time Workshop Sage suggested a test: the mains fuse was temporarily uprated to 3.15A, a 2.5A fuse was added in the supply to the chopper chip and a 2A fuse was added in the 103V feed to the line output stage. The set was then put back on soak test. A few days later it failed again. Only one of the three fuses had blown – the least expected one! Which one was it and what was the cause? See next month for the answer and another item in the Test Case series.

ANSWER TO TEST CASE 357 – page 814 last month –

A most peculiar fault afflicted Victor the Video's post-production facility. A tape which had been overdubbed with new sound played perfectly in the machine that had been used to carry out the dub and also in another new VHS machine. But when it was played back in the camcorder originally used to make the recording the sound contained, faintly audible under the newly-added sound, mumblings and mutterings from the original sound track.

Logical thinking, aided perhaps by his lunch-time pint of lager, enabled our technician to work out the solution to this conundrum. No doubt you've also sussed out the cause. The audio head setting in the camcorder was wrong. Thus the correctly-positioned erase and record heads in the Panasonic edit deck didn't plough their new furrow along the exact line of the original recording. The result of this misalignment was not evident in the Panasonic machine or the new JVC machine that had been tried. The camcorder's head scanned its own original track however, which hadn't been fully erased during the dubbing process. Plainly the audio head in the old GEC VCR used as a test was also somewhat skew-whiff – the effect of Victor's screwdriver maybe?

All we had to do was to adjust the camcorder's head setting, using an alignment tape. V the V declined our offer to do the same with his old GEC machine.

Published on the third Wednesday of each month by Reed Business Publishing Ltd, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. Filmsetting by Trutape Setting Systems, 220-228 Northdown Road, Margate, Kent. Printed in England by BPC Magazines Division, Carlisle Web Offset, Cumbria. Distributed by IPC Marketforce, Kings Reach Tower, Stamford Street, London SE1 9LS (071 261 5000). Sole Agents for Australia and New Zealand – Gordon and Gotch(Asia); Ltd: South Africa – Central News Agency Ltd. "Television" is sold subject to the following conditions, namely that it shall not, without the written consent of the Publishers first having been given, be lent, resold, hired out or otherwise disposed by way of Trade at more than the recommended selling price shown on the cover, excluding Eire where the selling price is subject to currency exchange fluctuations and VAT, and that it shall not be lent, resold, hired or otherwise disposed of in a mutilated condition or in any unauthorised cover by way of Trade or affixed to or as part of any publication or advertising, literary or pictorial matter whatsoever. ISSN0032-647X.

AZ ELECTRICS



INTEGRATED CIRCUITS	BA318 £2.50	HA1377 £2.00	LA7830 £2.50	MC14518BCP £2.00	SAS590 £3.50	STK7356 £6.50	TA7343 £1.75	TDA1506 £8.50	TDA3565 £3.00	UPC1394 £1.70
AN103 £1.60	BA328 £1.10	HA1388 £4.00	LA7911 £1.30	MC14518BCP £2.00	SL1430 £2.80	STK7358 £6.50	TA7350 £2.10	TDA1510 £3.20	TDA3571B0 £5.50	UPC1420A £7.00
AN140 £2.50	BA333 £1.40	HA1394 £4.00	LM1011N £3.00	MC1458UPC1458 £1.95	SL1431 £1.60	STK7372 £4.75	TA7358 £1.50	TDA1510A £3.20	TDA3580 £3.00	UPC1458 £1.95
AN240P £1.80	BA341 £2.75	HA1397 £5.40	LM1017/M192B1 £2.30	MC3359 £1.10	SL1432 £1.10	STR1996 £3.60	TA7607 £3.50	TDA1512 £2.75	TDA3581 £3.00	UPC1513HA £2.00
AN253P £1.80	BA343 £1.20	HA1398 £5.50	LM1035 £5.75	MC3359 £1.10	SL4710P £2.20	STR4000.0 £5.50	TA7607AP £2.40	TDA1515A £2.50	TDA3581A £6.50	UPC1520CA £2.48
AN3821K £6.75	BA3505F £2.75	HA1405 £2.00	LM1036N £3.70	MC3359 £1.10	SL4710P £2.20	STR4211 £5.95	TA7614 £2.50	TDA1522 £1.50	TDA3584 £2.80	UPC339C £0.70
AN3822 £7.50	BA3704 £2.75	HA1457 £2.10	LM1120N £3.30	ME2050 £4.60	SL917B £4.00	STR440 £5.00	TA7628P £2.40	TDA1670A £3.00	TDA3810 £2.80	UPD4011 £1.75
AN5015 £3.30	BA4210 £2.50	HA44219 £2.70	LM13600 £5.00	ME2050 £4.60	SL917B £4.00	STR451 £4.95	TA7629 £4.00	TDA1701 £3.00	TDA3950 £3.00	UPD4066 £1.95
AN5033 £5.00	BA4220 £2.00	HD14081 £0.25	LM1868N £1.50	ME2050 £4.60	SN7670N £1.25	STR454 £4.85	TA7629P £2.75	TDA1702A £3.00	TDA440 £2.00	
AN5132 £3.95	BA4236 £2.75	HD4559 £0.70	LM1894N £5.75	ML2328 £4.50	SSA1075 £5.90	STR50020 £7.90	TA7630P £2.00	TDA1770A £2.60	TDA4420 £4.45	
AN5265 £1.35	BA4402 £1.90	K42210 £2.30	LM317 £1.00	ML237 (BT76018) £1.00	SSA1250 £3.50	STR51033A £5.50	TA7640 £2.00	TDA1905 £1.40	TDA4422 £3.95	
AN5512 £1.95	BA5102 £2.45	L7806 £0.80	LM339 £0.80	ML2388 £7.50	SSA212 £12.00	STR5412 £5.95	TA7658 £2.00	TDA1908A £1.75	TDA4500 £3.80	
AN5521 £5.50	BA5204 £2.75	L7808 £0.80	LM339N £0.75	ML2388 £7.50	ST1195 £5.50	STR58041 £6.75	TA7668 £2.00	TDA1940 £1.80	TDA4501 £4.00	
AN5730 £3.20	BA524 £3.00	L7812 £1.00	LM384 £1.20	ML2388 £7.50	ST4401A £3.75	STR6020 £4.90	TA7680 £4.80	TDA1950 £2.50	TDA4503 £4.50	
AN5750 £2.00	BA5402 £2.40	L7815 £0.80	LM384N £0.80	ML2388 £7.50	ST4441C £3.00	STR6050 £14.15	TA7681AP £5.75	TDA2020 £1.40	TDA4505 £6.75	
AN5760 £2.00	BA5406 £2.50	L7818 £0.80	LM399N £0.80	ML2388 £7.50	STK0029 £4.30	STR6930 £2.00	TA7687 £2.00	TDA2003 £1.30	TDA4510 £4.40	
AN5900 £1.50	BA6134 £2.50	L7824 £0.95	LM595CN8 £2.50	ML2388 £7.50	STK082 £12.00	TA4180 £3.00	TA7688A £6.85	TDA2004 £1.70	TDA4600 £2.60	
AN6266 £4.00	BA6109 £1.80	L7905 £0.80	LM640325-2003 £1.00	MM53108N £1.25	STK2029 £6.50	TA4193 £5.00	TA7698AP £7.50	TDA2005 £1.70	TDA4600.2 £2.60	
AN6332 £4.40	BA6124 £2.75	L7912 £0.80	LM641 £0.80	MM53108N £1.25	STK2125 £10.00	TA4194 £5.50	TA7705P £1.50	TDA2005S £2.95	TDA4601 £2.10	
AN6341 £2.75	BA6154 £2.50	L7915 £0.80	LM641 £0.80	MM53108N £1.25	STK2250 £9.20	TA4301 £4.50	TA7709 £2.50	TDA2006V £1.95	TDA4610 £4.50	
AN6344 £5.50	BA6208 £2.75	L7918 £0.80	LM748CN 8 PIN £1.25	MM5402 £1.90	STK3041 £5.70	TA4345 £4.40	TA7738 £2.50	TDA2020 £3.50	TDA4611 £2.50	
AN6346 £4.50	BA6209 £3.20	L7924 £0.80	LM748N £2.00	MM5405N £3.50	STK40090 £8.00	TA4350 £6.00	TA781010P £1.75	TDA2030 £1.10	TDA4611 £2.50	
AN6359 £5.50	BA6222 £3.10	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4121 £9.75	TA4350 £6.00	TA781010P £1.75	TDA2030 £1.10	TDA4611 £2.50	
AN6360 £3.75	BA6229 £1.85	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4141 £9.00	TA4350 £6.00	TA781010P £1.75	TDA2030V £1.75	TDA4611 £2.50	
AN6362 £4.25	BA6238 £1.95	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN6367 £5.50	BA6239 £1.95	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN6372 £2.20	BA6259 £3.00	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN6551 £0.60	BA6301 £2.00	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN6571K £5.50	BA6302A £1.80	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN6677 £5.25	BA6304 £1.70	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN6884 £2.75	BA6305 £1.75	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN6912 £2.00	BA681 £0.90	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN7111 £1.50	BA7001 £1.90	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN7112 £3.00	BA718 £1.80	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN7116 £1.20	BA728 £1.10	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN7143 £1.65	BA7767S £5.00	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN7148 £1.70	BT76018 £3.50	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN7158 £4.00	CNX62A £1.50	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN7160 £6.00	HA11215A £3.50	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN7169 £3.50	HA11223 £3.75	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN7173K £4.50	HA11225 £2.10	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN7205 £1.95	HA11226 £3.75	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN7213 £1.10	HA11235 £3.10	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN7218 £1.20	HA11244 £1.75	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN7220 £1.60	HA11414 £2.50	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN7222 £2.10	HA11701 £3.10	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN7273 £7.80	HA11713 £8.90	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN7274 £1.40	HA11714 £3.50	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN7275 £1.90	HA11715 £3.20	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN7273 £2.00	HA11747A £12.75	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN7310 £1.10	HA11749 £7.00	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN7311 £1.75	HA11750 £3.50	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN7315 £1.75	HA12005 £3.80	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN7324 £4.50	HA12017 £2.00	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN7410 £2.10	HA12026 £3.50	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN7415 £1.40	HA2413 £1.20	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN7420 £3.20	HA3300 £1.80	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
AN7818F £1.60	HA3402 £6.50	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
BT1403 £1.00	HA3403 £4.00	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
BT1320 £2.50	HA3500 £3.00	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
BA1332 £1.00	HA1368R £2.55	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	
BA3018 £1.50	HA1374 £6.00	L8185 £2.60	LM748N £2.00	MM5405N £3.50	STK4142 £10.00	TA4350 £6.00	TA781010P £1.75	TDA2040 £2.00	TDA4611 £2.50	

TRANSISTORS

2N373 £1.90	2SA1095 £5.50	2SA1102 £1.90	2SA1112 £0.95	2SA1124 £0.35	2SA1220 £1.10	2SA1386 £4.70	2SA1674 £0.40	2SA673 £0.20	2SA942 £0.35	2SC1413A £2.50
2N377 £1.90	2SA1095 £5.50	2SA1102 £1.90	2SA1112 £0.95	2SA1124 £0.35	2SA1220 £1.10	2SA1386 £4.70	2SA1674 £0.40	2SA673 £0.20	2SA942 £0.35	2SC1413A £2.50
2N377 £1.90	2SA1095 £5.50	2SA1102 £1.90	2SA1112 £0.95	2SA1124 £0.35	2SA1220 £1.10	2SA1386 £4.70	2SA1674 £0.40	2SA673 £0.20	2SA942 £0.35	2SC1413A £2.50
2N377 £1.90	2SA1095 £5.50	2SA1102 £1.90	2SA1112 £0.95	2SA1124 £0.35	2SA1220 £1.10	2SA1386 £4.70	2SA1674 £0.40	2SA673 £0.20	2SA942 £0.35	2SC1413A £2.50
2N377 £1.90	2SA1095 £5.50	2SA1102 £1.90	2SA1112 £0.95	2SA1124 £0.35	2SA1220 £1.10	2SA1386 £4.70	2SA1674 £0.40	2SA673 £0.20	2SA942 £0.35	2SC1413A £2.50

Complete your tools with Antex Soldering Irons

The art of accurate soldering is to maintain the bit temperature at the optimum level.

Antex fixed setting, thermally balanced, high efficiency irons maintain constant tip temperature and offer a wide range of soldering bits to suit your

18 BROOKWOOD ROAD, SOUTHFIELDS, LONDON SW18 5BP.

TEL: 081-877 3492/877 3518 FAX: 081-877 3518

TRANSISTORS Cdrnt

2SD1391	£4.20	2SD845	£2.70
SDC1397	£3.75	2SD868	£3.50
2SD1398	£2.67	2SD869	£3.00
2SD1426	£4.50	2SD870	£3.50
2SD1432	£5.00	2SD895	£2.00
2SD1453	£1.60	2SD898	£2.75
2SD1455/2SD1730	£3.10	2SD898B	£2.75
2SD1486	£4.00	2SD900B	£2.00
2SD1497	£2.60	BC107B	£0.10
2SD1497-02	£5.95	BC109	£0.10
2SD1497-06	£5.95	BC109B	£0.10
2SD1650	£3.50	BC115	£0.16
2SD1877	£2.30	BC118	£0.12
2SD639	£1.05	BC147A	£0.07
2SD667	£3.00	BC159	£0.09
2SD725	£3.70	BC171	£0.10
2SD757E	£2.30	BC172	£0.07
2SD811	£2.95	BC172C	£0.09
2SD836	£1.10	BC182L	£0.09
2SD837	£0.80	BC183	£0.09

TD8180 ORIGINAL

TRANSISTORS

BC184	£0.09	BF422	£0.15
BC184	£0.09	BF458	£0.22
BC184	£0.09	BF459	£0.22
BC184	£0.09	BF469/BF471	£0.25
BC214A	£0.07	BF471	£0.25
BC214B	£0.07	BF472	£0.25
BC237	£0.09	BF870/BF472	£0.25
BC238	£0.07	BU108	£0.12
BC307	£0.12	BU126	£0.10
BC308B	£0.07	BU208	£0.10
BC327-25	£0.07	BU208A	£0.10
BC328-40	£0.05	BU208D	£0.15
BC337	£0.07	BU208T	£0.10
BC372	£0.95	BU326A	£1.00
BC392	£1.50	BU306	£1.00
BC441	£0.25	BU406	£1.70
BC461	£0.25	BU406D	£1.50
BC477	£0.07	BU407	£0.50
BC548	£0.07	BU426A	£1.00
BC549	£0.07	BU500	£1.00
BC557	£0.30	BU508A	£1.00
BC559B	£0.07	BU508AF	£1.70
BC639	£0.07	BU508D	£1.00
BC640	£0.30	BU806	£0.75
BD131	£0.50	BU807	£0.75
BD132	£0.40	BU111	£0.95
BD137	£0.35	BU111AF	£1.95
BD237	£0.22	BUW84	£1.65
BD238	£0.22	BUX84	£0.64
BD243B	£0.30	SD12659	£0.75
BD243C	£0.40	T9064V	£2.28
BD244	£0.30	TIP110	£0.45
BD244C	£0.30	TIP112	£0.45
BD278A	£0.80	TIP29	£0.30
BD434	£0.80	TIP30	£0.45
BD508	£0.80	TIP31	£0.30
BF195	£0.07	TIP32	£0.30
BF196	£0.15	TIP41	£0.27
BF197	£0.15	TIP42C	£0.40
BF198	£0.07	TIP47	£0.98
BF199	£0.14	TIP791A	£1.20
BF244	£0.22	ZTR64A	£0.55
BF259	£0.22	ZTX650	£0.70

DIODES AND THYRISTORS

BA157	£0.01	FB2506	£1.50
BR100	£0.10	IN4001	£0.06
BR101	£1.40	IN4002	£0.06
BR103	£0.75	IN4004	£0.10
BR303	£1.50	IN4005	£0.10
BRV56	£0.75	IN4006	£0.10
BT116	£2.50	IN4007	£0.08
BT128P	£4.00	NA148	£0.50
BT129P	£4.50	NA508	£0.25
BT151/800R	£1.75	KBLO8	£1.95
BY126	£0.20	DA91	£0.20
BY127	£0.08	OT112	£2.20
BY133	£0.20	RG15G	£0.45
BY164	£0.90	RG15J	£0.55
BY164/SKB202	£0.90	RG15K	£0.35
BY179	£1.10	RG15K	£0.70
BY179/SK2.08	£1.10	RH1	£1.30
BY184	£0.65	RM11C	£0.45
BY189	£2.00	SS264	£0.50
BY190	£0.55	SSE613	£12.00
BY223	£2.00	SKB.02	£0.60
BY206 (BYB96R)	£0.55	SKB.06	£1.20
BY210/800/BV95	£0.55	SKB2.02	£0.90
BY227	£0.20	SKB2.08	£1.10
BY228	£0.50	SKE1M15	£0.65
BY229	£1.15	SKE2G2/02	£0.75
BY299	£0.50	SKE2G3/04	£1.30
BY96D	£0.30	SKE4F104	£0.45
BY96D	£0.35	SKE4F106	£0.45
BYV55	£0.55	SKE5F310	£2.20
BYV96E	£0.50	SR2M	£0.50
BYX10	£0.50	T9053V	£1.40
BYX55-600	£0.55	T9064V	£2.28

ASK FOR SEMICONDUCTORS NOT LISTED

VIDEO HEADS

AMSTRAO

3HSSR-VCR7000 (Saisho/Orion)	£16.00
PSF1-VCR4500 5200 9000	£15.00
PSF2-VCR4600 4700	£14.00
PSF3-VCR6000	£17.00

FERGUSON

3HSSV-2 Head universal	£7.50
3HSSVA-3V42, 44, 45, 46 etc	£20.00
3HSSV-3V32 HR7/655	£25.00
3HSS4VC-3V48 HRD505	£26.00
3V48, 58, 59, 65, FV10, 11, 12, 13, 14, 20, 21, 26	POA

HITACHI

3HSSHA-VT8000, 9000 series	£15.00
3HSSHB-VT11, 33 etc	£15.00
10082-VT120 220	£22.00
10081-VT130 135	£25.00

PANASONIC

3HSSN-2 Head universal	£7.50
3HSSUN-NV100, 370, 380/Philips VR6460	£9.00
3HSSUN-NV230, 470, 480, G9, 10, 11, 15PX	£17.80

VIDEO HEADS Continued

3HSSU3N-NV430, 460	£14.70
3HSS3N-NV777, 330	£18.50
3HSS-INB-NV730	£19.00
3HSS-INA-NV366	£24.00
NVG30, 33, 40, 45, 46, 130, & most other Panasonics	POA

SANYO

3HSSSY-VHR1100, 1110, 1300	£18.00
3HSS3SY-VHR1500	£32.00

SHARP

3HSSSP-VC9300, 9500, 9700, 381, 481, 482, 483, 486 etc	£15.50
3HSSSPB-VC581, 583, 651, 670 etc	£14.50
VC7000, 8000 series (Brass)	£42.00

OTHER MAKES

Alba 4000, Goldstar 8000, Sentra 8000, Solavox 1000	£16.50
Fisher FVHP510, 520, 530, 615, 710 etc	£18.00
Fisher VBS7000, 9000 etc	£25.00
Hinari VXL2, 4, 3, 20, 25	£16.00
Hinari VXL5, 6, 20H	£15.00
Mitsubishi HS306, 710	£23.90
Orion VC150, 180, VH1, 2, 3 etc	£16.00
Saisho VR100, 605, 705, 805, 905	£16.00
Samsung Universal 2 Head	£18.50

ASK FOR VIDEO HEADS NOT LISTED
The above heads are new.

BELT KITS

A range of belt kits in stock from 60p to £2.40. Makes for most models available including: Alba, Akai, Amstrad, Ferguson/JVC, Fisher, Funai, GEC, Goldstar, Granada, Grundig, Hinari, Hitachi, Mitsubishi, NEC, Orion, Panasonic, Philips, Saisho, Samsung, Sanyo, Sharp, Sony, Tensai, etc - Please state model and make.

CLUTCH BASE

Hitachi 520 at £4.50

LINE OUTPUT TRANSFORMERS

LOPT Hitachi 2174, 76, 78	£17.50
LOPT Hitachi CPT1476	£18.00
LOPT Hitachi CPT2276 etc	£19.00
LOPT Matsui 1440	£18.00
Decca 100	9.50
ITT CVC20	12.50
ITT CVC25/30/32	9.50
ITT Compact 80 Series 110	16.75
ITT Compact 80 Series 90	19.75
ITT CVC45	18.00
ITT 1109F	14.00
ITT CVC1204	11.50
ITT CVC800/1/3	21.50
ITT CVC1100	16.50
ITT CVC1150/1175	20.00
ITT 6325	18.50
ITT 3546	18.50
ITT 1200/1	20.00

Other ITT transformers available

Fidelity all models up to 20" ZX3000	15.50
Fidelity Panel for ZX2000	1.00
Fidelity 22" ZX3000	18.50
Hinari CT4/5 & TVA1	14.75
Philips KT3	12.95
Thorn TX100 Green Spot 110	16.75
Ferguson TX90 LOPT specify size/screen	17.75
Ferguson 3V35/36 Mains Transformer	23.00
Ferguson 3V44/44/45 Mains Transformer	18.85

TRIPLERS

Universal Tripler	4.75
Universal Tripler with focus unit	9.50
Decca 120/130 series tripler	8.50
Thorn TX10 Focus Unit Kit	10.00
Trip Grundig CUC2401 etc	£17.00

OTHER GRUNDIG TRIPLERS IN STOCK
Hitachi and Matsui LOPTs in stock

VIDEO MOTORS

A range of Reel Motors made by Ferguson, Hitachi, Sanyo, Sharp & Panasonic are available, please state model and make. We stock capstan motors - makes include Ferguson/JVC, Hitachi and Sharp. Also available are Ferguson Mode Control Motors, please state make. Mode Motor Assembly 3V35-49 at £12.50

Sharp Reel Motor Pulley only £1.20

Replacement of plastic pulley on a number of Sharp Reel Motors with the above metal pulley gives better rewind/FF performance



IDLER ASSEMBLIES

FERGUSON

Take up Clutch (Mechanical models)	£5.00
3V29/30 Take up Idler	£2.00
3V29/30 Take up Clutch	£2.85
3V29/30 Reel Idler	£3.00
3V35 Reel Idler	£3.00
3V35, 36, 38, 39 Take up Clutch	£2.85
3V58, 59, 64, 65, FV10, 11, 12, 13, 14 Idler Arm	£1.80
Clutch Assembly 3V44, 45, 48, 49, 52, 53, 54, 55	£11.50
Clutch Assembly 3V42, 43	£14.00

FISHER

FVHP615, 905, 910 Idler Assembly Original	£5.00
FVHP615 Gear Idler Assembly	£4.35
FVHP905, 910 Gear Idler Assembly	£5.00
FVHP520 530 Idler	£3.00
FVHP520, 530 Pulley	£0.70

HITACHI

VT11, 33 etc. Original Idler Arm	£2.50
VT11, 33 etc. Idler Replacement	£1.75
VT9300, 9500 etc. Play Idler	£3.65
VT9300, 9500 etc. F/F Idler	£2.95
VT9300, 9500 etc. Idler	£2.95
VT8000, 8500 etc. F/F Rew Idler	£2.95
VT8000, 8500 etc. Play Idler Assembly	£3.00
VT8000, 8500 etc. FF/Rew Pulley	£0.70
VT11, 33 etc. Clutch Assembly	£8.00
VT400, 500, series clutch/base complete	£3.50

PHILIPS

VR6460 6920 Idler Arm (Original)	£3.00
DV464, 6462, 6463, 650 etc. Idler Mod. Kit (Original)	£6.75
VR6542 Reel Drive Pulley	£6.50
VR6843 Reel Drive Pulley	£9.00

PANASONIC (All Original)

NV370 Idler Arm Unit VXP0521 Gen.	£3.00
NV8600, 8610 Play Idler VXP0243	£0.95
NV332, 777, 788 Idler Unit VXP0463	£3.00
NV600, 688 Idler VXP0515	£3.00
NV333, 366 Idler Arm 2 Unit VXL0997	£10.50
NV8400, 8600, 8610 etc. VXP0245	£0.95
NV333, 366 etc. Idler VXP0401-NV700, 7200, 7800 Idler VXP0344	£0.90
NV2000, 3000 Play Idler VXP0331	£1.10
NV2000, 3000 Idler Unit VXP0329	£1.10
G Mech. Play Gear VXL1490	£1.90
Back Tension Bands	From £1.50
All Panasonic Maintenance Kits	POA

QUOTE PANASONIC PART No. FOR PARTS NOT LISTED

SANYO

Idler VHR1100, 1300, 1500	£5.50
Idler VHR2100, 2300, 2500, 2700	£5.50
Reel Drive Pulley Unit	£5.00
VTC5000, 5150, 6500	£5.00
Idler Reel Assembly	£2.25
VTC5000, 5150, 6500	£2.25

SHARP

Idler VC9300, 9500 etc.	£1.75
Idler VC481, 581 etc.	£1.95
Idler (original) VC9300, 481, 581 etc.	£3.50
Idler Assembly (original)	£6.50
VC651, 681, 685	£6.50
Idler Assembly (original) VC780, 781, 785, 787, 793, VCT72	£6.50

AMSTRAO

4500, 4600 MOD KIT INCLUDES PINCH ROLLER AND IDLER CLUTCH	£5.00
Limiter Post Assembly	£1.75
Makes & Models: Hinari VXL4, Matsui VX730, 735, 735A, 755, 770, 800A, 810, 820, 880, 990, Saisho VR1100, 1200, 1200HQ, 1600, 2500, 3200, 3300, 3300X, 3500, 3600, 3700	

REMOTE CONTROLS

Bush, Ferguson, Grundig, ITT, Philips, Pye, Sony, Hitachi, Matsui, Logik, Panasonic, Saisho, Salaria, Samsung, Tashiko, Tatung, Toshiba, Various models TV & Video From £10.00

MANY HITACHI TV REMOTE CONTROLS NOW IN STOCK

SONY REMOTE CONTROL RUBBER PADS.

STATE MODEL FOR PRICE. Universal Remote Control £25.00

TV ON/OFF SWITCHES

ITT, Philips, Decca, Thorn, Fidelity, Grundig, Sony and Hitachi. State model for price.

SONY PUSH SWITCH 70p



MAINTENANCE KITS

Available for Alba, Amstrad, Ferguson, Fisher, Goldstar, Goodmans, Granada, Hinari, Hitachi, JVC, Matsui, Mitsubishi, Nikkai, Panasonic, Philips, Saisho, Salaria, Schneider, Sentra, Sharp, Sony, Tashiko, Toshiba.

PINCH ROLLERS

A range of Pinch Rollers is in stock, most of them £2.80. Makes include Akai, Amstrad, Ferguson, Fisher, Funai, GEC, Goldstar, Grundig, Hinari, Hitachi, ITT, JVC, Marantz, Mitsubishi, NEC, Nordmende, Orion, Panasonic, Philips, Samsung, Sanyo, chneider, Sharp, Sony, Tensai, Thomson, Toshiba etc. Please state model and make. Philips Pinch Roller for models VR6180, 6185, 6285, 6362, 6367, 6467, 6468, 6470, 6561, 6670, 6760, 6761, 6870 £5.00 Panasonic G Mech. ass. complete £9.00

BACK-UP BATTERIES

Philips 1, 2V Back up Battery	£1.75
Philips 2, 4V Back up Battery	£2.80
Ferguson TX10	£2.00

OTHER SPARES

AMSTRAD PORTABLE PC'S FROM £149 (PPC1512SD), £179 (PPC1512DD), £179 (PPC1640SD), £209 (PPC1640DD), MODEMS £30 EXTRA. NO MANUALS OR PSU.

HIGH POWER CAR SPEAKERS. Stereo pair output 100w each. 4ohm impedance and consisting of 6 1/2" woofer 2" mid range and 1" tweeter. Ideal to work with the amplifier described above. Price per pair £30.00 Order ref 30P37R

MICROWAVE CONTROL PANEL. Mains operated, with touch switches. Complete with 4 digit display, digital clock, and 2 relay outputs one for power and one for pulsed power (programmable). Ideal for all sorts of precision timer applications etc. **Now only £4.00 ref 4P151.**

FIBRE OPTIC CABLE. Stranded optical fibres sheathed in black PVC. Five metre length £7.00 ref 7P29R

12V SOLAR CELL. 200mA output ideal for trickle charging etc. 300 mm square. Our price £15.00 ref 15P42R

PASSIVE INFRA-RED MOTION SENSOR.

Complete with daylight sensor, adjustable lights on timer (8 secs - 15 mins), 50' range with a 90 deg coverage. Manual override facility. Complete with wall brackets, bulb holders etc. Brand new and guaranteed. **Now only £19.00 ref 19P29**

Pack of two PAR38 bulbs for above unit £12.00 ref 12P43R

VIDEO SENDER UNIT Transmits both audio and video signals from either a video camera, video recorder or computer to any standard TV set within a 100' range! (tune TV to a spare channel). 12v DC op. £15.00 ref 15P39R Suitable mains adaptor £5.00 ref 5P191C

FM TRANSMITTER housed in a standard working 13A adapter (plug is mains driven). £26.00 ref 26P2R

MINIATURE RADIO TRANSCEIVERS A pair of walkie talkies with a range of up to 2 kilometres. Units measure 22x52x155mm. Complete with cases. £30.00 ref 30P12R

FM CORDLESS MICROPHONE. Small hand held unit with a 500' range! 2 transmit power levels reqs PP3 battery. Tuneable to any FM receiver. Our price £15. ref 15P42AR

12 BAND COMMUNICATIONS RECEIVER. 9 short bands, FM, AM and LW DX/local switch, tuning 'eye' mains or battery. Complete with shoulder strap and mains lead. **Now only £19.00!! Ref 19P14R.**

CAR STEREO AND FM RADIO. Low cost stereo system giving 5 watts per channel. Signal to noise ratio better than 45db, wow and flutter less than .35%. Neg earth. £19.00 ref 19P30

LOW COST WALKIE TALKIES. Pair of battery operated units with a range of about 200'. Our price £8.00 a pair ref 8P50R

7 CHANNEL GRAPHIC EQUALIZER plus a 60 watt power amp! 20-21KHz 4-8R 12-14v DC negative earth. Cased. £25 ref 25P14R

NICAD BATTERIES. Brand new top quality. 4 x AA's £4.00 ref 4P44R. 2 x C's £4.00 ref 4P73R. 4 x D's £9.00 ref 9P12R. 1 x PP3 £6.00 ref 6P35R

TOWERS INTERNATIONAL TRANSISTOR SELECTOR GUIDE. The ultimate equivalents book. Latest edition £20.00 ref 20P32R

CABLE TIES. 142mm x 3.2mm white nylon pack of 100 £3.00 ref 3P104R. Bumper pack of 1,000 ties £14.00 ref 14P6R

GÖT A CARAVAN OR BOAT?

NEW 80 PAGE FULL COLOUR LEISURE CATALOGUE

2,500 NEW LINES FREE WITH ORDER ON REQUEST

OR SEND £1.00

GEIGER COUNTER KIT. Complete with tube, PCB and all components to build a battery operated geiger counter. £39.00 ref 39P1R

FM BUG KIT. New design with PCB embedded coil. Transmits to any FM radio. 9v battery req'd. £5.00 ref 5P158R

FM BUG BUILT AND TESTED SUPERIOR 9v OPERATION. £14.00 ref 14P3R

COMPOSITE VIDEO KITS. These convert composite video into separate H sync, V sync and video. 12v DC. £8.00 ref 8P39R

SINCLAIR C5 MOTORS 12v 29A (full load) 3300 rpm 6"x4" 1/4" O/P shaft. New. £20.00 ref 20P22R

As above but with fitted 4 to 1 inline reduction box (800rpm) and toothed nylon belt drive cog £40.00 ref 40P8R

ELECTRONIC SPEED CONTROL KIT for c5 motor. PCB and all components to build a speed controller (0-95% of speed). Uses pulse width modulation. £17.00 ref 17P3R

SOLAR POWERED NICAD CHARGER. Charges 4 AA nicads in 8 hours. Brand new and cased £6.00 ref 6P3R

ACORN DATA RECORDER ALF503 Made for BBC computer but suitable for others. Includes mains adapter, leads and book. £15.00 ref 15P43R

VIDEO TAPES. Three hour superior quality tapes made under licence from the famous JVC company. Pack of 5 tapes. New low price £8.00 ref 8P161

PHILIPS LASER. 2MW HELIUM NEON LASER TUBE. BRAND NEW FULL SPEC £40.00 REF 40P10R. MAINS POWER SUPPLY KIT £20.00 REF 20P33R READY BUILT AND TESTED LASER IN ONE CASE £75.00 REF 75P4R.

12 TO 220V INVERTER KIT As supplied it will handle up to about 15w at 220v but with a larger transformer it will handle 80 watts. Basic kit £12.00 ref 12P17R. Larger transformer £12.00 ref 12P41R

VERO EASI WIRE PROTOTYPING SYSTEM Ideal for designing projects on etc. Complete with tools, wire and reusable board. New low bargain price only £2.00 ref B2P1

HIGH RESOLUTION 12" AMBER MONITOR 2v 1.5A Hercules compatible (TTL input) new and cased £22.00 ref 22P2R

VGA PAPER WHITE MONO monitors new and cased 240v AC. £59.00 ref 59P4R

25 WATT STEREO AMPLIFIER c. STK043. With the addition of a handful of components you can build a 25 watt amplifier. £4.00 ref 4P69R (Circuit dia included)

BARGAIN NICADS AAA SIZE 200MAH 1.2V PACK OF 10 £4.00 REF 4P92R, PACK OF 100 £30.00 REF 30P16R

FRESNEL MAGNIFYING LENS 83 x 52mm £1.00 ref BD827R.
12V 19A TRANSFORMER. Ex equipment but otherwise ok. Our price £20.00
ULTRASONIC ALARM SYSTEM. Once again in stock these units consist of a detector that plugs into a 13A socket in the area to protect. The receiver plugs into a 13A socket anywhere else on the same supply. Ideal for protecting garages, sheds etc. Complete system £25.00 ref B25P1 additional detectors £11.00 ref B11P1
IBM AT KEYBOARDS Brand new 86 key keyboards £15.00 ref 15P612

AMSTRAD MP3
UHF/VHF TV RECEIVER/CONVERTER
CONVERTS COLOUR MONITOR INTO A TV!
£9.00

286 MOTHER BOARDS. Brand new and tested complete with technical manual. £49.00 ref A49P1

UNIVERSAL BATTERY CHARGER. Takes AA's, C's, D's and PP3 nicads. Holds up to 5 batteries at once. New and cased, mains operated. £6.00 ref 6P36R

IN CAR POWER SUPPLY. Plugs into cigar socket and gives 3,4,5,6,7,5,9, and 12v outputs at 800mA. Complete with universal spider plug. £5.00 ref 5P167R

RESISTOR PACK. 10 x 50 values (500 resistors) all 1/4 watt 2% metal film. £5.00 ref 5P170R

CAPACITOR PACK 1. 100 assorted non electrolytic capacitors £2.00 ref 2P286R

CAPACITOR PACK 2. 40 assorted electrolytic capacitors £2.00 ref 2P287R

QUICK CUPPA? 12v immersion heater with lead and cigar lighter plug. £3.00 ref 3P92R

LED PACK. 50 red leds, 50 green leds and 50 yellow leds all 5mm. £8.00 ref 8P52R

AMSTRAD 1640DD BASE UNITS

BRAND NEW AND CASD

TWO BUILT IN 5 1/4" DRIVES

MOTHER BOARD WITH 640K MEMORY

KEYBOARD AND MOUSE

MANUAL

OUR PRICE JUST

£79!!!!

IBM PRINTER LEAD. (D25 to centronics plug) 2 metre parallel. £5.00 ref 5P186R

COPPER CLAD STRIP BOARD 17" x 4" of 1" pitch 'vero' board. £4.00 a sheet ref 4P62R or 2 sheets for £7.00 ref 7P22R

STRIP BOARD CUTTING TOOL £2.00 ref 2P352R

50 METRES OF MAINS CABLE £3.00 2 core black precut in convenient 2 m lengths. Ideal for repairs and projects. ref 3P91R

4 CORE SCREENED AUDIO CABLE 24 METRES £2.00. Precut into convenient 1.2 m lengths. Ref 2P365R

6 1/2" 20 WATT SPEAKER Built in tweeter 4 ohm £5.00 ref 5P205R

WINDUP SOLAR POWERED RADIO! FM/AM radio takes rechargeable batteries complete with hand charger and solar panel. 14P200R



PC STYLE POWER SUPPLY Made by AZTEC. 110v or 240v input. +5 @ 15A, +12 @ 5A, -12 @ 5A, -5 @ 3A. Fully cased with fan, on/off switch, IEC inlet and standard PC flyleads. £15.00 ref F15P4

ALARM FIRE SENSORS Standard 12v alarm type sensor will interface to most alarm panels. £16.00 ref 16P200

MODEMS FOR THREE PHONES!!

Fully cased UK modems designed for dialup system (PSTN) no data or info but only £3.00 ref 3P145R

TELEPHONE HANDSETS

Bargain pack of 10 brand new handsets with mic and speaker only. £3.00 ref 3P146R

DATA RECORDERS

Customer returned mains battery units built in mic ideal for Computer or general purpose audio use. Price is £4.00 ref 4P100R

SPECTRUM JOYSTICK INTERFACE

Plugs into 48K Spectrum to provide a standard Atari type joystick port. Our price £4.00 ref 4P101R

ATARI JOYSTICKS

OK for use with the above interface, our price £4.00 ref 4P102R

BENCH POWER SUPPLIES

Superbly made fully cased (metal) giving 12v at 2A plus a 6V supply. Fused and short circuit protected. For sale at less than the cost of the case! Our price is £4.00 ref 4P103R

BULL ELECTRICAL
250 PORTLAND ROAD HOVE SUSSEX
BN3 5QT TELEPHONE 0273 203500
MAIL ORDER TERMS: CASH PO OR CHEQUE
WITH ORDER PLUS £3.00 POST PLUS VAT.
PLEASE ALLOW 7 - 10 DAYS FOR DELIVERY

FAX 0273 23077

SPEAKER WIRE

Brown twin core insulated cable 100 feet for £2.00 REF 2P79R

DISC DRIVES

Customer returned units mixed capacities (up to 1.44M) We have not sorted these so you just get the next one on the shelf. Price is only £7.00 ref 7P1R (worth it even as a stripper)

MICROSCOPE 1200X MAGNIFICATION

Brand new complete with shrimp hatchery, shrimps, prepared slides, light etc. £29.00 ref J29P4.

LIGHT ALARM SYSTEM

Small cased alarms that monitor a narrow beam area for sudden changes in light level. Complete with siren that sounds for a preset time when unit is triggered. £7.00 ref J7P1

JOYBALLS

Back in stock popular Commodore/Atari equiv (replace standard joystick) £5.00 ref J5P8

720K 3 1/2" DISC DRIVE

Brand new units made by JVC complete with tech info just £19.00!! ref J19P2

CAR BATTERY CHARGER

Brand new units complete with panel meter and leads. 6 or 12v output. £7.00 ref J7P2

CUSTOMER RETURNED SPECTRUM +2

Complete but sold as seen so may need attention £25.00 ref J25P1 or 2 for £40.00 ref J40P4

CUSTOMER RETURNED SPECTRUM +3

Complete but sold as seen so may need attention £25.00 ref J25P2 or 2 for £40.00 ref J40P5

HEX KEYBOARDS

Brand new units approx 5" x 3" only £1.00 each ref CD42R

PROJECT BOX

5 1/2" x 3 1/2" x 1" black ABS with screw on lid. £1.00 ref CD43R

SCART TO SCART LEADS

Bargain price leads at 2 for £3.00 ref 3P147R

SCART TO D TYPE LEADS

Standard Scart on one end. Hi density D type on the other. Pack of ten leads only £7.00 ref 7P2R

OZONE FRIENDLY LATEX

250ml bottle of liquid rubber sets in 2 hours. Ideal for mounting PCB's. Fixing wires etc. £2.00 each ref 2P379R

QUICK SHOTS

Standard Atari compatible hand controller (same as joysticks) our price is 2 for £2.00 ref 2P380R

VIEWDATA SYSTEMS

Brand new units made by TANDATA complete with 1200/75 built in modem infra red remote controlled qwerty keyboard BT approved Prestel compatible, Centronics printer port RGB colour and composite output (works with ordinary television) complete with power supply and fully cased. Our price is only £20.00 ref 20P1R

AC STEPDOWN CONVERTOR

Cased units that convert 240v to 110v 3" x 2" with mains input lead and 2 pin American output socket (suitable for resistive loads only) our price £2.00 ref 2P381R

CURLY CABLE

Extends from 8" to 6 feet! D connector on one end, spade connectors on the other ideal for joysticks etc (6 core) £1.00 each ref CD44R

COMPUTER JOYSTICK BARGAIN

Pack of 2 joysticks only £2.00 ref 2P382R

BUGGING TAPE RECORDER

Small hand held cassette recorders that only operate when there is sound then turn off 6 seconds after so you could leave it in a room all day and just record anything that was said. Price is £20.00 ref 20P3R

NEW SOLAR ENERGY KIT

Contains 8 solar cells, motor, tools, fan etc plus educational booklet. Ideal for the budding enthusiast! Price is £12.00 ref 12P2R

286 AT PC

286 MOTHER BOARD WITH 640K RAM FULL SIZE METAL CASE, TECHNICAL MANUAL, KEYBOARD AND POWER SUPPLY £139 REF 139P1 (no i/o cards or drives included) Some metal work req'd phone for details.

35MM CAMERAS Customer returned units with built in flash and 28mm lens 2 for £8.00 ref 8P200

STEAM ENGINE Standard Mamod 1332 engine complete with boiler piston etc £30 ref 30P200

TALKING CLOCK

LCD display, alarm, battery operated. Clock will announce the time at the push of a button and when the alarm is due. The alarm is switchable from tone to a cock crowing. £14.00 ref 14P200R

HANDHELD TONE DIALERS

Small units that are designed to hold over the mouth piece of a telephone to send MF dialing tones. Ideal for the remote control of answer machines. £5.00 ref 5P209R

AMAZING TALKING COINBOX!

Fully programmable talking lockable coinbox BT approved, retail price is £79 ours is just £29! ref J29P2

ANSWER PHONES £15

Customer returned units with 2 faults one we tell you how to fix the other you do your self! £18 ref J18P2 or 4 for £60 ref J60P3 BT approved (retail price £79 95!! each)

COMMODORE 64 MICRODRIVE SYSTEM

Complete cased brand new drives with cartridge and software 10 times faster than tape machines works with any Commodore 64 setup. The original price for these was £49.00 but we can offer them to you at only £25.00! Ref 25P1R

90 WATT MAINS MOTORS Ex equipment but ok. Good general purpose unit £9.00 ref F9P1

HI FI SPEAKER BARGAIN Originally made for TV sets they consist of a 4" 10 watt 4R speaker and a 2" 140R tweeter. If you want two of each plus 2 of our crossovers you can have the lot for £5.00 ref F5P2

VIDEO TAPES E180 FIFTY TAPES FOR £70.00 REF F70P1

360K 5 1/4" Brand new drives white front. £20.00 Ref F20P1

EMERGENCY LIGHTING SYSTEM

Fully cased complete with 2 adjustable flood lights. All you need is a standard 6v lead acid battery. Our price is just £10 ref J10P29

AMSTRAD 464 COMPUTERS

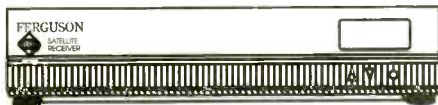
Customer returned units complete with a monitor for just £35! These units are sold as faulty and are not returnable.

IN SUSSEX? CALL IN AND SEE US!

SOME OF OUR PRODUCTS MAY BE UNLICENSABLE IN THE UK

CONVERT YOUR FERGUSON BSB RECEIVER TO PAL & D2MAC

FOR **£49.00**



FEATURES

■ 60 Fully programmable channels with Remote Control ■ On Screen Graphics with Live Programme Information ■ Pre-set for most popular PAL, D2MAC and DMAC Transmissions ■ Selectable LNB Type ■ External 12 volt switch facility

D2MAC


■ Superb digital quality sound ■ Preferred Language facility ■ Covers all D2 and DMAC Audio channels ■ Background / Foreground sound mix facility ■ Switchable 16:9 with optional panning ■ Outputs in RGB, Video, Audio, UHF

PAL

■ Fully Tunable Audio per channel ■ Videocrypt (Sky) decoder interface ■ 14 / 18 Volt LNB switching ■ Outputs in Video, Audio, and UHF

ON SCREEN MENUS

A total of 15 different on screen menus make programming exceptionally easy. Shown below are a selection, mostly from the D2MAC menu structure.

MAIN MENU 1. VIDEO Tuning 2. AUDIO Select 3. PICTURE Format 4. MODE Select 5. LNB Type 6. PICTURE Cont / Col 7. STORE & Exit VIEW To Exit	MODE Selection 1. D2MAC 2. DMAC MODE 1 3. DMAC MODE 2 0. PAL MENU To Return VIEW To Exit	VIDEO TUNING EUROMUSIC CHANNEL 01 FREQUENCY 11727MHZ USE < > To Adjust MENU To Return VIEW To Exit
D2MAC AUDIO SELECT 0. BACKGROUND 4. RFI SERVICE MONDIAL 5. RFI EN EUROPE 6. VICTOR 9. SOFTSCRAM MENU To Return VIEW To Exit	RECEIVER SETUP PREFERRED LANGUAGE Enter / Cancel to Change ENGLISH MIX UP : 1.Red 2.Blue 3.Green DOWN : 4.Red 5.Blue 6.Green 8.LO Minus 9.LO Plus 0 To Store VIEW To Exit	 Antenna 2 12.034 Ghz France 19 deg W

INTEGRATING WITH OTHER EQUIPMENT

The modified receiver can be fed from an existing Astra system / antenna by utilising an I.F. splitter. It is also possible to connect both Astra and DBS antennas with an electronic A/B switch. The receiver's external switch feature will allow automatic selection of either antenna on any of its 60 channels.

PRICES

CONVERSION KIT...Comprises a fully assembled and tested PAL/MAC sub assembly PCB, plug in software upgrade, assembly instructions and new user manual. **£49.00**

EXCHANGE CIRCUIT BOARD...Ferguson SRB1 circuit board complete with PAL, D2MAC and DMAC modules fitted. **£69.00**

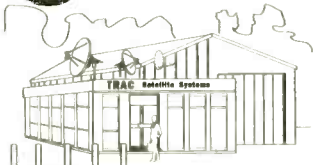
COMPLETE RECEIVER WITH DBS ANTENNA... Fully modified, Brand New Ferguson SRB1 Receiver with choice of new squarial or Marconi compact antenna. **£149.00**

D2MAC REPLACEMENT CHIP... Simple plug in chip to convert Ferguson BSB Receiver to single channel but fully tuneable D2MAC receiver. **£19.00**

STOP PRESS...If you have a DECCA or TATUNG BSB receiver, we can now convert it to D2MAC. Cost is £59.00 and the receiver must be returned to TRAC.

TRAC SATELLITE SYSTEMS

0642 468145
452555
FAX 0642 440927



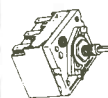
Commerce way Skippers Lane Middlesbrough Cleveland TS6-6UR

WHERE CAN YOU BUY 38,000 DOMESTIC APPLIANCE SPARES ?

GENUINE AND PATTERN AVAILABLE
FROM JUST ONE SOURCE !!



TO FIT THE FOLLOWING BRANDS



AEG
AIRLUX
ATAG
ARISTON
BAUKNECHT
BELLING
BENDIX
BOSCH
BRAUN
CANDY
CARLTON
CARMEN
CREDA
CREDA CORVETT
DEDETRICH
DELONGHI
ELECTROLUX
ENGLISH ELECTRIC
FAGOR
FRIGIDARE

GOBLIN
GORENJE
HOTPOINT
HITACHI
HOOVER
INDESIT
ITT/NOVA
KENWOOD
KEW
KIRDY
MIELE
MORPHY RICHARDS
MOULINEX
NEUPOL
NEVADA
NILCO
NILFIST
NUMATIC
OSTER/SUNBEAM
PANASONIC

PRESTIGE
PHILIPS
QUALCAST
ROLLS
ROSIERES
ROTEL/SPINNEY
ROWENTA
ROYAL
RUSSELL HOBBS
SERVIS
SOVEREIGN
SWAN
TEFAL
TOWER
TRICITY
VAX
VORTICE
WESTINGHOUSE
WHIRLPOOL
ZANUSSI



TRADE ENQUIRIES ONLY
ALL AVAILABLE FROM

DATAPART LTD
WHY NOT GIVE US A TRY ?
BROWN GOODS CATALOGUE AVAILABLE

SALES DESK
021 766 5551
24 HOURS

ELECTRON HOUSE
100 GREAT BARR ST
BIRMINGHAM B9 4BB

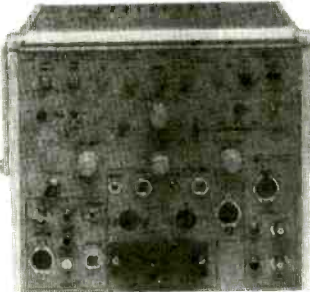
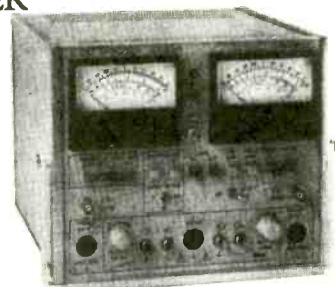
FAX FREE
0800 373 459
24 HOURS

PROMAX

ELECTRONIC TEST EQUIPMENT

AUDIO ANALYSER AA-930

Six measuring instruments in one, to assist in the repair of audio equipment. Contains a LF generator, stereo AC millivoltmeter, stereo wattmeter, azimuth adjustment, distortion meter and wow and flutter meter.



AUDIO TESTER CU-900

Designed to check such audio items as CD players, cassette recorders, headphones, microphones, loudspeakers and amplifiers. Testing made easier by front panel plug and socket layout.

For Audio service engineers

ALBAN ELECTRONICS LIMITED

4U St Albans Enterprise Centre, Long Spring
Porters Wood, St Albans, Herts., AL3 6EN
Tel: 0727 832266 - Fax: 0727 810546

ESSENTIAL VIDEO KIT

TOTAL VALUE (INC. CASE) £60.86 + VAT

OFFER PRICE
£39.95
+ V.A.T

CONTAINS



IN THIS SUPERB **RAACO** CASE

90 HIGH QUALITY JAPANESE IDLER TYRES

COVERING:

ALBA, AMSTRAD, FERGUSON, FIDELITY, FISHER, GOLDSTAR, HINARI, HITACHI, MATSUI, NEC, NIKKAI, PANASONIC, PHILIPS, PYE, QUESTAR, REDIFFUSION, SAISHO, SAMSUNG, SEISMO, SHARP, TOSHIBA.

15 HIGH QUALITY JAPANESE LOADING BELTS

COVERING:

FERGUSON 3V29 to 3V64, HITACHI VT11 to VT64
SHARP 600 SERIES

10 HIGH QUALITY JAPANESE REEL TABLE TYRES

COVERING:

FERGUSON AND HITACHI

PLUS: ✧ AMSTRAD MOD KIT
✧ IDLER SPRING (SHARP ORIG)
✧ METAL MOTOR PULLEY (SHARP ORIG)
✧ MOTOR PULLEY (ALBA ETC.)

TO ORDER

CHEQUE/P.O's/ACCESS/VISA

IRWIN ELECTRONICS

Unit 200, JC Albyn Complex, Burton Road, Sheffield S38BX. Phone:- Sheffield (0742) 739622

AN3215K	£4.50	AN7163	£2.95	LA3210	£0.95	MB3730	£2.20	STK5337	£7.25	TA7271P	£2.50	TEA1017	£2.75	2N3055	£0.50
AN3319K	£2.95	AN7166	£3.70	LA3370	£2.50	MB3731	£2.75	STK5338	£4.50	TA7280P	£2.95	TEA1039	£2.95	2N3773	£2.00
AN3320K	£4.95	AN7168	£2.70	LA3375	£2.50	MB8941	£5.75	STK5421	£6.50	TA7281P	£2.75	TEA1042	£3.75	2N3819	£1.50
AN3331K	£5.75	AN7171K	£3.50	LA4108	£2.20			STK5422	£6.50	TA7290P	£2.95	TEA1060	£2.20		
AN3792	£2.95	AN7172K	£2.95	LA4137	£1.95	SAA1124	£2.50	STK5451	£5.50	TA7317P	£2.20	TEA1080P	£2.50	2SA769	£0.95
AN3821K	£5.95	AN7173K	£3.50	LA4145	£1.70	SAA5030	£3.50	STK5481	£5.95	TA7607AP	£2.20	TEA2018A	£1.00	2SA1106	£2.75
AN3822K	£6.95	AN7178	£2.50	LA4160	£2.20	SAA5042	£8.00	STK5482	£5.95	TA7611AP	£2.20	UPC575C	£1.95	2SA1111	£0.95
AN3830K	£6.50	AN7310	£1.95	LA4162	£2.50	STA301A	£3.95	STK5730	£4.25	TA7628P	£1.95	UPC1025H	£2.30	2SA1122	£2.60
AN5010	£5.50	BA7004	£1.95	LA4170	£1.75	STA401A	£4.50	STK6732	£11.75	TA7640AP	£1.30	UPC1188H	£2.75	2SA1265	£2.40
AN5030	£4.50	BA5108	£2.20	LA4182	£2.20	STA441C	£2.75	STK7309	£6.50	TC9106BP	£4.95	UPC1191V	£1.20	2SA1294	£3.95
AN5033	£4.25	BA6208	£1.95	LA4190	£1.75	STK0039	£4.75	STK7348	£4.95			UPC1197C	£1.60	2SA1302	£3.25
AN5135K	£5.95	BA6209	£1.95	LA4192	£1.75	STK0400	£6.25	STK7404	£6.95	TD0A1101A	£1.40	UPC1230H	£2.50	2SA1303	£3.80
AN5151N	£6.50	BA6229	£2.20	LA4261	£2.30	STK0049	£6.50	STK8050	£9.50	TD0A1110A	£1.40	UPC1237H	£1.20	2SA1306	£0.95
AN5266	£1.20	BA6239A	£1.80	LA4261	£2.30	STK433	£5.25	STK8250	£8.95	TD0A1015	£1.50	UPC1263C	£2.30	2SA1516	£2.50
AN5265	£1.75	BA6302A	£1.80	LA4270	£2.20	STK435	£5.50	STK8260H	£12.50	TD0A1170N	£1.50	UPC1277H	£2.50		
AN5410	£3.95	BA7005	£2.20	LA4280	£2.20	STK437	£7.50	STR450	£5.20	TD0A1170S	£3.60	UPC1278H	£2.50		
AN5435	£2.20	BA7751AL	£1.95	LA4282	£2.20	STK457	£7.50	STR453	£5.20	TD0A1510	£1.95	UPC1318AU	£2.50	2SR850	£0.50
AN5510	£2.75	HA1339A	£3.50	LA4440	£2.50	STK459	£7.75	STR454	£5.20	TD0A1515A	£2.50	UPC1363C	£2.75	2SR856	£0.50
AN5515N	£2.75	HA1374	£2.95	LA4446	£2.20	STK463	£9.50	STR455	£5.20	TD0A1516Q	£3.50	UPC1364C	£4.20	2SR859	£0.50
AN5560	£2.95	HA1377	£2.20	LA4460	£1.80	STK465	£9.95	STR457	£5.20	TD0A1518Q	£2.95	UPC1365C	£2.95	2SR863	£0.60
AN5610N	£4.50	HA1388	£2.95	LA4461	£1.80	STK1050H	£7.25	STR458	£5.20	TD0A1522	£1.95	UPC1373H	£2.95	2SR864	£0.60
AN5615	£2.95	HA1392	£2.20	LA4465	£2.30	STK1070H	£9.75	STR459	£5.20	TD0A1522	£1.95	UPC1373H	£2.95	2SR868	£1.80
AN5620X	£3.50	HA1394	£2.50	LA4466	£2.30	STK1202H	£7.50	STR459	£5.20	TD0A2002	£0.80	UPC1387C	£1.95	2SR8817	£2.95
AN5622	£3.20	HA1396	£2.50	LA4476	£2.50	STK2029	£6.50	STR459	£5.20	TD0A2005	£1.95	UPC1391H	£1.50	2SR8863	£2.95
AN5635N	£3.50	HA1397	£2.50	LA4477	£2.50	STK2038H	£9.50	STR459	£5.20	TD0A2005M	£2.50	UPC1403CA	£6.75	2SR8965	£1.95
AN5700	£1.75	HA1398	£2.50	LA4495	£2.95	STK2046H	£9.75	STR459	£5.20	TD0A2005M	£2.50	UPC1420CA	£5.20	2SR91015	£1.00
AN5750	£3.75	HA11211	£2.30	LA4498	£2.95	STK2046H	£9.75	STR459	£5.20	TD0A2005M	£2.50	UPC1420CA	£5.20	2SR91015	£1.00
AN5760	£2.20	HA11219	£1.75	LA4500	£2.50	STK2129	£8.95	STR459	£5.20	TD0A2005M	£2.50	UPC1420CA	£5.20	2SR91015	£1.00
AN5790	£2.95	HA11223W	£2.95	LA4505	£2.80	STK2139	£8.00	STR459	£5.20	TD0A2005M	£2.50	UPC1420CA	£5.20	2SR91015	£1.00
AN5836	£2.95	HA11228	£1.95	LA4508	£2.50	STK2155	£9.50	STR459	£5.20	TD0A2005M	£2.50	UPC1420CA	£5.20	2SR91015	£1.00
AN5900	£2.20	HA11235	£1.95	LA4700	£3.50	STK2230	£6.50	STR459	£5.20	TD0A2005M	£2.50	UPC1420CA	£5.20	2SR91015	£1.00
AN6290	£1.50	HA11244	£2.95	LA4700	£3.50	STK2250	£9.50	STR459	£5.20	TD0A2005M	£2.50	UPC1420CA	£5.20	2SR91015	£1.00
AN6296	£2.75	HA11251	£2.50	LA7031	£2.60	STK2250	£9.50	STR459	£5.20	TD0A2005M	£2.50	UPC1420CA	£5.20	2SR91015	£1.00
AN6297	£3.50	HA11251	£2.50	LA7032	£2.95	STK3041	£6.50	STR459	£5.20	TD0A2005M	£2.50	UPC1420CA	£5.20	2SR91015	£1.00
AN6310	£3.50	HA11716	£4.75	LA7032	£2.95	STK3042	£6.50	STR459	£5.20	TD0A2005M	£2.50	UPC1420CA	£5.20	2SR91015	£1.00
AN6320	£2.95	HA11724	£8.00	LA7033	£4.95	STK3044	£5.75	STR459	£5.20	TD0A2005M	£2.50	UPC1420CA	£5.20	2SR91015	£1.00
AN6326N	£2.95	HA11745	£7.50	LA7035	£4.95	STK3044	£5.75	STR459	£5.20	TD0A2005M	£2.50	UPC1420CA	£5.20	2SR91015	£1.00
AN6327	£3.50	HA11747A	£7.50	LA7042	£2.80	STK3062	£6.75	STR459	£5.20	TD0A2005M	£2.50	UPC1420CA	£5.20	2SR91015	£1.00
AN6332	£4.75	HA11747AN1	£7.50	LA7223	£1.95	STK3082H	£6.95	STR459	£5.20	TD0A2005M	£2.50	UPC1420CA	£5.20	2SR91015	£1.00
AN6337	£3.95	HA11781N1	£3.95	LA7520	£3.25	STK3102H	£5.75	STR459	£5.20	TD0A2005M	£2.50	UPC1420CA	£5.20	2SR91015	£1.00
AN6340	£2.75	HA11788	£4.50	LA7755	£3.20	STK4101	£5.75	STR459	£5.20	TD0A2005M	£2.50	UPC1420CA	£5.20	2SR91015	£1.00
AN6342N	£3.50	HA11827N	£8.50	LA7800	£1.50	STK41025	£6.50	STR459	£5.20	TD0A2005M	£2.50	UPC1420CA	£5.20	2SR91015	£1.00
AN6343	£4.75	HA12005	£3.20	LA7801	£1.50	STK4121H	£6.95	STR459	£5.20	TD0A2005M	£2.50	UPC1420CA	£5.20	2SR91015	£1.00
AN6346N	£3.75	HA11827N	£8.50	LA7806	£1.50	STK4122H	£6.95	STR459	£5.20	TD0A2005M	£2.50	UPC1420CA	£5.20	2SR91015	£1.00
AN6350	£7.50	HA12047	£3.50	LA7808	£2.20	STK4122H	£6.95	STR459	£5.20	TD0A2005M	£2.50	UPC1420CA	£5.20	2SR91015	£1.00
AN6356	£3.85	HA13001	£1.90	LA7910	£1.75	STK4131H	£6.75	STR459	£5.20	TD0A2005M	£2.50	UPC1420CA	£5.20	2SR91015	£1.00
AN6357N	£4.50	HA13007	£4.50			STK4141H	£7.50	STR459	£5.20	TD0A2005M	£2.50	UPC1420CA	£5.20	2SR91015	£1.00
AN6359N	£5.00	HA13108	£2.95	LB1403	£1.50	STK4141H	£7.50	STR459	£5.20	TD0A2005M	£2.50	UPC1420CA	£5.20	2SR91015	£1.00
AN6360	£2.60	HA13117	£2.75	LB1405	£1.50	STK4142H	£7.30	STR459	£5.20	TD0A2005M	£2.50	UPC1420CA	£5.20	2SR91015	£1.00
AN6362	£4.50	HA13119	£2.50	LB1406	£2.20	STK4151H	£7.50	STR459	£5.20	TD0A2005M	£2.50	UPC1420CA	£5.20	2SR91015	£1.00
AN6363	£4.50	HA13119	£2.50	LB1406	£2.20	STK4152H	£7.85	STR459	£5.20	TD0A2005M	£2.50	UPC1420CA	£5.20	2SR91015	£1.00
AN6367K	£3.85	HA13128	£3.50	LB1649	£2.50	STK4161H	£7.95	STR459	£5.20	TD0A2005M	£2.50	UPC1420CA	£5.20	2SR91015	£1.00
AN6387	£5.50	HA13403V	£5.50	LC4066B	£2.95	STK4162H	£7.95	STR459	£5.20	TD0A2005M	£2.50	UPC1420CA	£5.20	2SR91015	£1.00
AN6394	£5.20	KA2206	£1.75	LC4066B	£2.95	STK4172H	£8.95	STR459	£5.20	TD0A2005M	£2.50	UPC1420CA	£5.20	2SR91015	£1.00
AN6671K	£4.95	KA2210	£2.40	LC7132	£4.50	STK4181H	£8.95	STR459	£5.20	TD0A2005M	£2.50	UPC1420CA	£5.20	2SR91015	£1.00
AN6676	£5.95	KA2213	£1.30	LC7815	£2.95	STK4191H	£9.50	STR459	£5.20	TD0A2005M	£2.50	UPC1420CA	£5.20	2SR91015	£1.00
AN6677	£4.95	KA2214	£1.50	LC7818	£2.95	STK4192H	£9.50	STR459	£5.20	TD0A2005M	£2.50	UPC1420CA	£5.20	2SR91015	£1.00
AN6873	£2.95	LA1130	£2.50	MC5718L	£1.95	STK4332	£4.50	TA7222AP	£1.30	TD4600-3	£2.95	BU426A	£1.00	2SD1086H	£2.95
AN6875	£3.50	LA1132	£2.50	MC5718L	£1.95	STK4332	£4.50	TA7222AP	£1.30	TD4600-3	£2.95	BU426A	£1.00	2SD1086H	£2.95
AN7105	£2.50	LA1170	£1.75	MS218P	£0.95	STK4793TP	£9.50	TA7230P	£2.20	TD4605	£3.50	BU500	£1.00	2SD1148	£1.90
AN7106K	£2.50	LA1185	£1.60	MS1102L	£2.95	STK4803	£8.50	TA7232P	£1.95	TD4650P	£4.50	BU508A	£1.00	2SD1207	£1.20
AN7143	£2.50	LA1240	£1.95	MS1104L	£3.20	STK4833	£9.50	TA7233P	£2.50	TD4700	£2.95	BU508B	£1.00	2SD1276	£1.20
AN7147	£2.50	LA1260	£2.95	MS1538P	£1.75	STK4843	£8.95	TA7240AP	£2.95	TD47250	£4.95	BU508D	£1.00	2SD1397	£2.00
AN7148	£2.50	LA1266	£2.95	MS1539AP	£4.50	STK4853	£9.50	TA7241AP	£2.95	TD47250	£4.95	BU508E	£1.00	2SD1398	£2.00
AN7149	£2.50	LA1266	£2.95	MS1539AP	£4.50	STK5315	£6.75	TA7242AP	£2.95	TD47255	£4.95	BU508F	£1.00	2SD1426	£2.95
AN7158N	£3.95	LA2400	£1.20	MS4543L	£1.75	STK5315	£6.75	TA7250BP	£2.95	TEA1002	£1.95	BU508G	£1.00	2SD1427	£2.95
AN7161N	£3.50	LA3011	£1.75	MS4544L	£2.75	STK5325	£6.75	TA7251BP	£2.95	TEA1009	£1.80	BU508H	£1.00	2SD1457	£1.95
AN7161 NFP	£3.50	LA3160	£0.95	MB3712	£1.50	STK5332	£3.50	TA7270P	£2.50	TEA1014	£2.20	BU508I	£1.00	2SD1887	£3.75

T. POWELL
15 PADDINGTON GREEN,
LONDON W2 1LG
Tel: 071-723 9246
Fax: 071-262 0591

VIDEO HEADS

AMSTRAD 4500/5200/9000	£18.00	2SR850	£0.50	2SC1403A	£4.50
AMSTRAD VCR 7000	£21.00	2SR856	£0.50	2SC1413A	£2.80
HITACHI VT114/33	£16.00	2SR863	£0.60	2SC1414	£2.80
HITACHI VT8000/9000	£16.00	2SR864	£0.60	2SC1427	£2.80
HITACHI VT7					

TUBES TUBES TUBES

THIS MONTH ONLY

14" and 16" tubes at silly prices

Tubes to replace all the following:

	£		£		£
37-554	19	34JLL	49	370LHB	49
37-550	19	34JRD	49	370NJB	49
37-573	19	34JRH	49	37SX101Y	19
37-590	29	34KFC	49	38EAC	29
37-592	29	37ADA	49	38EAE	29
42-556	29	370BDB	49	38EAD	29
42-570	29	370BVB	49	38EAP	29
42-590	29	370EFB	19	38JDB	29
42-592	29	370EGB	19	38JRD	29
AXM37-001	49	37GDA	49	42AGA	29
AXT37-001	29	37GGA	29	420CSB	29
AXM42-001	29	370GRB	49	420CZB	29
AXT42-001	29	370GUB	29	420DVB	29
34EAC	49	370GYB	29	420DYB	29
34EAD	49	370HFB	29	420EDB	29
34EAE	49	370HUB	29	420EFB	29
34JAE	49	37JGA	29	420EGB	29
34JAN	49	370JMB	49	420ERB	29
34JCD	49	370KRB	49	420GAB	29
34KFC	49	370KSB	49	420GUB	29
34JFQ	49	370LGB	49	420GYB	29

Comprehensive range of new and rebuilt tubes always available

Ring IRENE or JANE
for prices

Callers Welcome



Carriage and VAT
extra



EXPRESS TV
The Mill, Mill Lane,
RUGELEY, Staffs WS15 2JW
Tel: 0889-577600
Fax: 0889-575600

RADIO CODE RE-PROGRAMMER MK2

ATTENTION ALL SERVICE DEPARTMENTS

For those of you who still do not have the equipment to decode radios, give us a call.

Plug our decoder into your IBM or compatible computer and decode radios in a few seconds.

You can start with a basic system for as little as **£395.00 + VAT**.

All leads, connectors, layouts and operating instructions supplied.

All enquiries to:

Electronic Sound Systems

62 High Northgate, Darlington, Co. Durham.

Tel: 0325 484089 — Mobile: 0860 221 099

or Fax: 0325 465921

SONY TUBES RE PROCESSED WITH ORIGINAL SONY GUNS

HIGH TEMPERATURE RE-PROCESSING of Sony, Mullard 45AX, 30AX, In-line, PiL, Mini (22.5) Neck and FST Tubes.

3702B22	£48.00	A51-231X ITT	£46.00	A51EAL00X Philips	£58.00
370KRB22 Toshiba	£48.00	A51-570X Mullard	£46.00	A51EBS00X	£58.00
370LHB22 Hitachi	£48.00	A51-580X Mullard	£46.00	A51JAR00X Toshiba	£64.00
400EFB22 Sony	£58.00	A51-590X Mullard	£46.00	A51JK00X Sony	£74.00
510YXB22	£58.00	A56-540X Mullard	£48.00	A51JUH10X Sony	£74.00
520SB22 Sony	£64.00	A56-701X ITT	£48.00	A53JBW00X Sony	£64.00
560EGB22 Hitachi	£54.00	A66-540X Mullard	£56.00	A59EAK00X Philips	£64.00
560DYB22	£54.00	A67-701X ITT	£56.00	A64JK10X Sony	£95.00
570HB22 Sony	£64.00	A34EAC00X Philips	£48.00	A68JMT10X Sony	£95.00
680DB22 Sony	£85.00	A34JBU10X Sony	£64.00	A68JYK10X Sony	£95.00
680EB22 Sony	£85.00	A44JEX10X Sony	£78.00	AXM37-001	£48.00
		A44JF210X Sony	£78.00	AXT37-001	£44.00
		A49JHT00X Sony	£64.00	AXM51-001	£46.00
		A49JLV10X Sony	£74.00	AXT56-001	£52.00

For tube types not listed please enquire
All Tubes Guaranteed 12 Months

All prices quoted are excluding VAT
Exchange CRT is required

Callers welcome. Please phone first.
Nationwide Delivery Available.

Very low Delivery Charge for Deliveries within M25 Area

BRAND NEW TUBES AT COMPETITIVE PRICES WHILE STOCKS LAST

AXM37-001 A34EAC00X 3702B22 510SKB22 510UDB22 510XCB22 510YTB22 510ZCB22
370LHB22 370KRB22 510VB22 510SLB22 510VHB22 510XTB22 510YUB22 A56-540X

D.I.Y. Television Tube Polishing Kit

Contains everything you need to Polish scratches and small chips on your CRT screens
All you require is an electric drill. Written instructions are provided. Guaranteed to work.
Worldwide Delivery Total Price £63.00 includes P&P and VAT Available from Luton only

Your local stockist are:

WEST ONE

Distributors Ltd.
Chesham, Bucks.
Tel. 0494 778197

WELL VIEW

114-134 Midland Road,
Luton, Beds, U.K. LU2 0BL.
Tel. 0582 402499

WELL VIEW

Southampton, Hants.
Tel. 0703 449783

LOEWE SELECO SONY FERGUSON NICAM DIGITAL STEREO module £65.00

CROWN FINLUX AND MANY OTHER TVs & VCRs Fitting instructions inc

We have a full range of spare parts for Loewe CTV & VCR + manuals

MAB8048	£8.00	SAFETY RESISTOR	
MAB8049	£8.00	0.22R	£0.15
CCV2070 LO	£10.00	2.2R	£0.15
S2000AF	£1.60	BC237	£0.05
ER5911	£6.00	BC327	£0.12
		TA8662N	£8.00
		CF70123	£10.00

SPECIAL OFFER - LIMITED STOCK

Metal coax plug	£0.12
Radio cass mains lead FIG 8	£0.60
Sony KSS 150, KSS 210 CD laser	
5V 1A regulator	£0.30 (78 series)
Y splitter	£0.80
Cass motor - CCW 2400 6V	£2.50
Hinary capstan and loading motors	
Finlux RC 1002 IR RC handset	£700
Other handsets avail/repair	POA

**LOEWE - CROWN- HINARY ETC
TRADE REPAIRS UNDERTAKEN.
ALL LOEWE CTV S MANUALS £8.00**

We can supply TV-AUDIO-VCR for EXPORT/HOME "A" & "B". Good "B" grade audio available
MIDI + CD + RADIO CASSETTE POA

Please phone Pat or John

**H&H ELECTRONIC SERVICES TEL: 081-890-3010 / 081 943 3630 FAX: 081-943-3701
CRESCENT COURT 102 VICTOR ROAD TEDDINGTON MIDDX.**

Install it Yourself!

You can with the help of this *completely revised and updated 3rd Edition.*

Satellite Television Installation Guide Only £12 (plus post)
by John Breeds

- Gives a step by step guide on how you can set up a motorised dish in less than five minutes!
- Written in clear non-mathematical terms on large A4 format, plus lavish use of diagrams throughout.
- Provides a fully illustrated, concise learning program covering the theory and practice of satellite technology.
- Shows you how to quickly carry out a site survey for fixed and multi-satellite systems.
- Gives frequencies, polarisations, transponder numbers, programmes and radio sub-carrier details of all main satellites across Europe
- Includes dish angle settings for the whole of Europe
- Includes diagrams and tables of dish size for your site, and EIRP footprints for all popular satellites.
- Explains how to avoid intermodulation patterning, and get the best possible pictures.
- Covers fault finding methods and shows you how to avoid 'sparklies'.
- Contains an easy to follow guide on latest rules for planning permission.
- Adopted by the Confederation of Aerial Industries as the study manual for approved City & Guilds satellite courses.
- Acclaimed by the Press and Trade as the best work of its kind. 'A giveaway at only £12 (plus postage)!'

Save money, read this book first!
Swift Television Publications
17 Pittsfield, Cricklade, Swindon SN6 6AN Tel or Fax 0793 750620

Please send me _____ copies of **Satellite Television Installation Guide** at £12 each. Postage per book UK add £1. Europe add £2. Rest of World add £8.

I enclose cheque/PO for £ _____ made payable to Swift Television Publications or please debit my Access/Visa card.

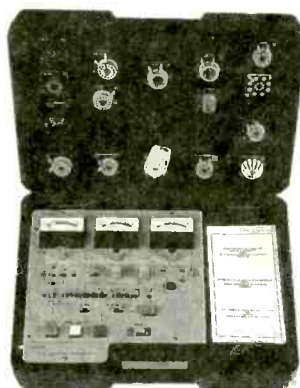
No _____ Postcode _____
Expires _____



PROMAX

ELECTRONIC TEST EQUIPMENT

CRT RESTORERS RT-501B / TA-903



The most popular range of workshop and field service CRT restorers now available in England. Designed for the measurement, analysis and regeneration of all commercial monochrome and colour picture tubes. Nineteen sockets and reference list available.

For TV service specialists

ALBAN ELECTRONICS LIMITED

4U St Albans Enterprise Centre, Long Spring
Porters Wood, St Albans, Herts., AL3 6EN
Tel: 0727 832266 - Fax: 0727 810546

FILL IN THE GAPS...

Due to the huge demand from readers for back issues of TELEVISION magazine we have run out! To overcome this we will shortly be publishing a hardback book of the first three issues of TELEVISION from 1991 (January - March).

The book will contain 92 pages of pure editorial from these three issues, so all the TV Fault Finding and VCR clinics will be complete and uninterrupted.

The availability of the books is strictly limited and they are only available on a first come first serve basis so if you want to fill any gaps in your back issues or if you would simply prefer to keep concise hardback copies of Television for reference please register now for a priority copy.

You do not need to send any money yet you are simply registering to avoid disappointment.

Please return the form below to: Kathy Lambert, TELEVISION (Back Issues), Room L332, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

ONLY £19.95 plus postage & packing

Please register me for priority copy of the TELEVISION Back Issue Book January-March 1991

Name: _____

Address: _____

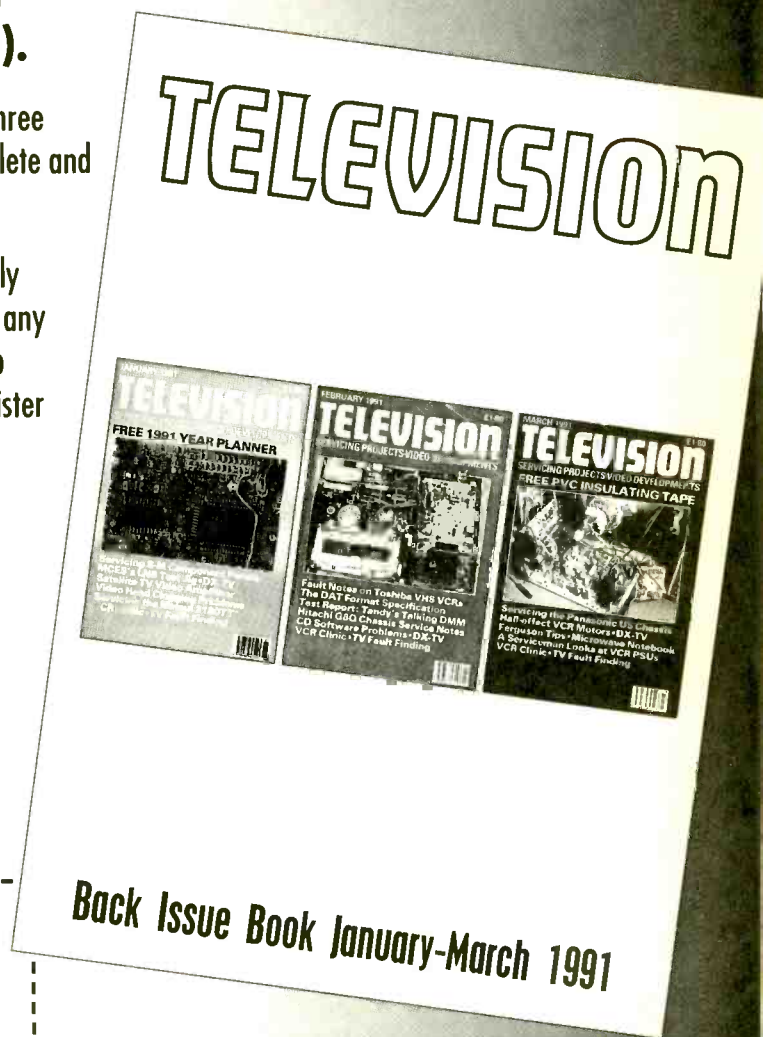
Postcode: _____

Telephone No: _____

Please return this form to: Kathy Lambert, TELEVISION (Back Issues), Room L332, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.



TVIS 10/92



TELEVISION

MAKE YOUR INTERESTS PAY!

Train at home for one of these Career Opportunities

Over the past 100 years more than 10 million students throughout the world have found it worth their while! An ICS home-study course can help you get a better job, make more money and have more fun out of life! ICS has over 100 years experience in home-study courses and is the largest correspondence school in the world. You learn at your own pace, when and where you want under the guidance of expert 'personal' tutors. Find out how we can help YOU. Post or phone today for **FREE INFORMATION** on the course of your choice. (Tick one box only!)

Electronics <input type="checkbox"/>	TV, Video & Hi-Fi Servicing <input type="checkbox"/>
Basic Electronic Engineering (City & Guilds) <input type="checkbox"/>	Refrigeration & Air Conditioning <input type="checkbox"/>
Electrical Engineering <input type="checkbox"/>	Car Mechanics <input type="checkbox"/>
Elec. Contracting/Installation <input type="checkbox"/>	Computer Programming <input type="checkbox"/>
GCSE/GCE/SCE over 40 examination subjects to choose from <input type="checkbox"/>	

Name: _____

Address: _____

P. Code _____



International Correspondence Schools, Dept. EGSA2
312/314 High Street, Sutton, Surrey SM1 1PR. or
041-221 7373 (24 hours).

BROUGHFAME LTD

How to expand your TV Rental business with no capital outlay

(AND STILL KEEP THE PROFIT)
HOW CAN I FIND OUT MORE?

Just ring or write to Henry Jones at the address below. He will be delighted to answer your queries and give you full details of the Rental Finance Plan.

39 SOUTH STREET • TARRING
WORTHING • WEST SUSSEX • BN14 7LG
TEL: WORTHING (0903) 821020
FAX: WORTHING (0903) 821194

YOU'VE SEEN SCART SPLITTER BOXES

They add the signals together putting one on top of the other, alter input and output signal levels and result in very poor quality.

YOU'VE SEEN MECHANICAL PUSH BUTTON SCART BOXES

You have to walk to them every time to use them (not so good if all your other equipment is remote controlled!), they don't allow you to view and record the same signal (if they claim to, the signals are added together like the SCART splitters) and mechanical switches become 'noisy' when the contacts start to tarnish, resulting in poor quality.

NOW SEE THE ONLY REAL SOLUTION!

periswitch

automatic audio/visual switching system

A fully automatic, electronic switching, active video and audio central SCART connector system requiring NO remote control and NO mechanical switches. Fit it, forget it and stay seated! all signals perfectly preserved and routed according to your choice.

DON'T WASTE YOUR MONEY ON 'SCART BOXES' WHICH CAN'T DO THE JOB

FORGET THE REST - FIT THE BEST

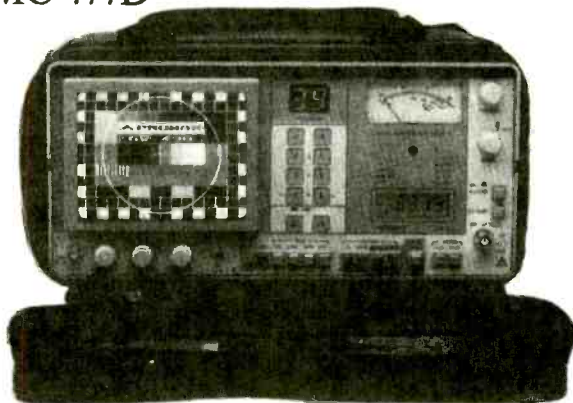
HOOPWELL LTD.
UNIT B9, LARKFIELD TRADING ESTATE,
LARKFIELD, MAIDSTONE, KENT. ME20 6SW

0622 - 882285



ELECTRONIC TEST EQUIPMENT

TV/FM LEVEL METER MC-477D



- Frequency range: 47 - 860 MHz
- Functions: TV, spectrum, analysis, synchronism
- Simultaneous display of picture and measured level
- 39 memory channels, set by user
- Autocorrected meter reading for higher accuracy

For TV/FM, SAT TV, SMATV and Cable TV installers

ALBAN ELECTRONICS LIMITED

4U St Albans Enterprise Centre, Long Spring
Porters Wood, St Albans, Herts., AL3 6EN
Tel: 0727 832266 - Fax: 0727 810546

NEW SUPPLY NEW SUPPLY NEW SUPPLY

LINCOLN HOUSE TRADING COMPANY

EX-RENTAL TV & VIDEO

*OFF THE PILE Direct from rental – guaranteed completely un-engineered)**

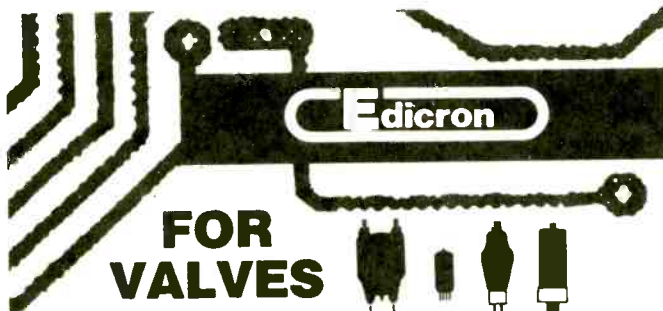
WORKING/SERVICED (Non soak tested)

REFURBISHED (Working/ soak tested/cosmetics/handsets/VCR books)

- BASIC NON THORN TVs FROM.....£10.00
 - FERGUSON BASIC TVs FROM.....£20.00
 - FERGUSON TX TEXT FROM.....£35.00
 - FERGUSON STEREO TEXT FROM...£40.00
 - FST TVs FROM.....£65.00
 - TOP LOADER VIDEOS FROM.....£35.00
 - FRONT LOADER VIDEOS FROM.....£45.00
- ALL PRICES PLUS VAT.
DELIVERY ARRANGED AT NORMAL CHARGE

* ONLY THE COIN METERS HAVE BEEN REMOVED

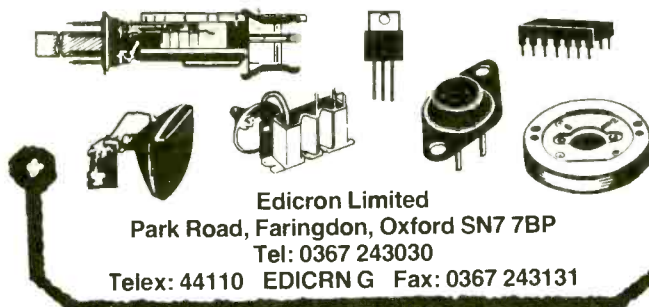
PHONE BOB ON COVENTRY (0203) 470807
FOR ALL DETAILS.



Edicron, having over 30 years experience of supplying electronic components and exporting to some 40 countries worldwide, offers:-

- High quality products
- The best prices
- Rapid delivery
- Technical back-up
- Comprehensive stocks
- No minimum quantities

To find out **more** about what Edicron can offer you – or for details of any of the products shown below – ring, fax, telex or write to us today.



Beat price rises today

With four extra pages of technical information each month, **TELEVISION** is going to cost slightly more from the shop after this issue.

For a short time, we are keeping the subscription price unchanged. So if you subscribe now you can get your issues despatched straight from the printers **AND SAVE MONEY TOO.**

So for the latest information on tv, video and satellite repairs, post the coupon today. Or call the subscription credit card hotline on **0789 200 255.**

Post to Television Subscriptions, Oakfield House, Perrymount Road, Haywards Heath, Sussex RH16 3DH

TELEVISION SUBSCRIPTION FORM

Please send me **Television**

for One Year at a cost of £24

Two years at a cost of £45

Three years at a cost of £65

I enclose a cheque/ PO. payable to Reed Business Publishing for £ _____

OR

Please debit my credit card account, to Reed Business Publishing for £ _____

Amex Barclaycard/ Access

Visa Diners Club

□□□□ □□□□ □□□□ □□□□

Expiry Date _____

Name: _____

Mr. / Mrs. / Miss. (Initials must be supplied)

Job Title: _____

Company: _____

Address: _____

Post code: _____

SIGNATURE _____ Date _____

Please tick here if you don't wish to receive marketing promotions from other companies

Code TVA

Post to Television Subscriptions, Oakfield House, Perrymount Road, Haywards Heath, Sussex RH16 3DH

NEW CONTRACT ENABLES US TO OFFER YOU B-GRADE STOCK ALL TESTED & WORKING AT LOW PRICES

EXAMPLE:

LONG PLAY VIDEOS	£119	21" FST TEXT CTV	£145
VIDEO PLAYER	£95	10" MAINS/BATT COL PORTABLES CTV	£95
20" REM/CONTROL TV	£119	MICROWAVE OVENS	£55
20" TEXT CTV	£139	VARIOUS BOXED HI FI	

ALL BOXED WITH INSTRUCTIONS

GOOD SELECTION OF LATE MODEL VIDEO MAKES INCLUDE HITACHI, SONY, AKAI, JVC etc.

200 MIDI SYSTEMS BOXED	£18.00 each
200 toasters	£2.50 each

WORKING PORTABLE TVS	£45 each	EX/RENTAL SCRAP VIDEOS	from £5 each
EX/RENTAL TVS	from £3 each	FST TVS	from £45 each
EX/RENTAL VIDEOS	from £20 each	COLOUR PORTABLE TVS	from £20 each

ALL PRICES NEGOTIABLE - QUANTITY TO CLEAR AMSTRAD 100 SAT/RECEIVERS

W. TREE TRADE WAREHOUSE

UNIT 1, SUNSHINE MILLS, WORTLEY ROAD, LEEDS LS12 3HT
Telephone: 0532/638804; 633421 Fax: 0532/310275

ASK FOR MAURICE OR ROB

ELECTRONICS WORLD

+ WIRELESS WORLD

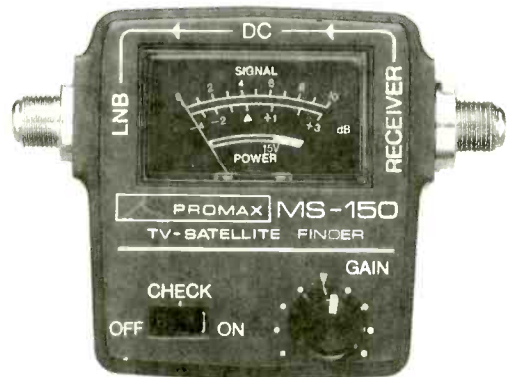
SIX PAGES OF ELECTRONIC CIRCUIT DESIGN EVERY MONTH

Subscribe today and save £10

Simply phone our credit card hotline on 0789 200 255 for a special subscription price of £20 for 12 issues*.

PROMAX ELECTRONIC TEST EQUIPMENT

SATELLITE FINDER MS-150



- Described by "What Satellite" as their "star buy"
- * Frequency range 950 to 1750 MHz
- * Acoustic indicator of meter reading level
- * Checks and uses the receiver's LNB voltage
- * Robust compact construction
- * £60 (includes U.K. VAT, post & packing)

For satellite TV installers

ALBAN ELECTRONICS LIMITED

4U St Albans Enterprise Centre, Long Spring
Porters Wood, St Albans, Herts., AL3 6EN
Tel: 0727 832266 - Fax: 0727 810546

NOW OPEN

FOR YOUR CONVENIENCE

SHERGILL TV/VIDEO

WHOLESALE

We have a wide range of TVs/Videos to choose from

WORKING COLOUR TVs.....	From £15.00	WORKING FRONT LOADER VIDEOS	From £50.00
WORKING TELETEXT TVs.....	From £45.00	UN-TESTED TVs.....	From £5.00
WORKING PORTABLE TVs.....	From £45.00	UN-TESTED VIDEOS.....	From £20.00
WORKING TOP LOADER VIDEOS	From £35.00		

ALL PRICES + VAT

HUGE DISCOUNT FOR BULK ORDER. ALL ABOVE SUBJECT TO AVAILABILITY

CAN DELIVER BIG/SMALL ORDER THROUGHOUT UK

Tel: 0922 37220. Fax: 0922 645333

Mobile: 0831 406041

**120-122 MILTON STREET, PALFREY, WALSALL
WEST MIDLANDS (Off Broadway West)**



**CAMPION
WHOLESALE LTD.**

**QUALITY USED T.V.
& VIDEO
COMPLETE RANGE OF
T.V.'s AND VIDEOS
MOST MAKES AND
MODELS AVAILABLE**

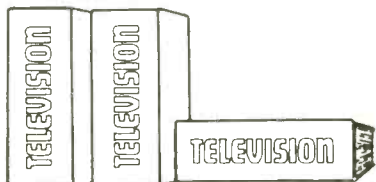
**STOCK ARRIVING DAILY
T.V.'s from £3.00
Videos from £30.00
Prices Ex-VAT**

**Free Delivery Service
to most areas of the U.K.**

**UNIT 80, BARRACKS ROAD,
SANDY LANE INDUSTRIAL ESTATE,
STOURPORT-ON-SEVERN,
WORCESTERSHIRE DY13 9QB
Just 10 Mins from
M5 Junct. 6 Worc's North**

**For your export
requirements contact us.**

**0299-879642 or 879643
FAX: 0299 827984**



BINDERS

Binders that hold twelve issues of *Television* are available for £5 from

**Television Binders,
78 Whalley Road,
Wilpshire, Blackburn
BB1 9LF.**

Make cheques out to "Television Binders".

SERVICING · VIDEO · SATELLITE · DEVELOPMENTS

**CREWE
WHOLESALE
TV LTD.**

WE HAVE SLASHED OUR PRICES.

**WORKING TV'S FROM £15.00.
WORKING TEXT TV'S FROM £45.00
TAKE 5 £45.00 — TEXT ONLY £200.00.**

*LARGE SELECTION OF WORKING
AND UNTESTED STOCK.*

**WORKING TOP LOADING VIDEOS
FROM £40.00.
WORKING FRONT LOADING VIDEOS
FROM £50.00
WORKING LONG PLAYING STEREO
VIDEOS ONLY £70.00**

**AT LEAST 1 DELIVERY, TO EACH
UNIT, PER WEEK.**

CALL NOW FOR NEW PRICE LIST.

**CREWE — OPEN 9.30 TO 5.30
MONDAY-FRIDAY**

TEL: 0270 582924.

★ UNTESTED STOCK ONLY ★

**BLACKBURN — OPEN 10.00 TO 4.00
WEDNESDAY-FRIDAY
TEL: 0254 264489**

AERIALS

**FOR TV & FM RADIO, PLUS
1000's OF MASTS,
BRACKETS, LASHING KITS,
CLAMPS, PLUGS, CABLES,
OUTLETS, DIPLEXERS ETC.**

AMPLIFIERS

**FOR DISTRIBUTION
SYSTEMS AND DOMESTIC,
MAST HEAD OR SET BACK.
WE HAVE ONE OF THE
LARGEST RANGES,
AVAILABLE FROM STOCK**

MAIN DISTRIBUTORS

**FOR ANTIFERENCE,
LABGEAR, WOLSEY
FRINGE, TRIAX, TELEVES,
VOLEX-RAYDEX, KUBLER
+ MANY MORE**

**COASTAL
AERIAL
SUPPLIES**

**UNIT X2 Rudford Industrial Estate
Ford, Arundel**

0903 723726

**NO MINIMUM ORDER VALUE
NEXT DAY DELIVERY ACROSS UK
CARRIAGE FREE ON ORDERS £100+**



**ANGLIAN T.V.
WHOLESALE**

**EX-RENTAL TVs & VCRs
THORN AND GRANADA**

**NEW 'B' GRADE —
MAJOR BRANDS
COMPLETE, BOXED & MINT
STOCK CHANGING DAILY**

**Secondhand Guaranteed
TV, Video**

**Spares available
TESTED & UNTESTED
STOCK AVAILABLE**

**BEST POSSIBLE PRICES
EXPORT ENQUIRIES
WELCOME
RING FOR DETAILS**

**20 RASH'S GREEN
IND ESTATE
DEREHAM, NORFOLK
TELEPHONE
(0362) 691611**

**FAX: 0274
722229**

**BESCO LTD
EX-RENTAL TV's
& VIDEOS**

**NEW 'B' GRADE
MAJOR BRANDS
TV - VIDEO - HI-FI**

PORTABLES ● FST's ● NICAM ● FASTEXT
SONY ● HITACHI ● PANASONIC ● ETC

Huge selections. Complete range.

All makes and models available.

★ New Stocks Every Day ★

VHS Video from £30
Television from £3

PICK YOUR OWN VHS VIDEOS
Lots of 10 £20.00 each

Working Ex-Equipment Panels

IF	Converger	Decoder	Line Scan	Power	Frame
T20/22X	5	14	18	17	14
T26 X	5	16	20	17	X
Philips G11 14.50	5	12	20	20	11.50

All prices include Postage & Packing. But + VAT

★ IF THE PANEL YOU REQUIRE IS NOT LISTED PLEASE ASK ★

BRADFORD

Springmill St
Manchester Rd, BD5 7RL
Ring Tony (0274) 308186

MANCHESTER

Unit 3, Mersey Rd.
North Ind Est., Failsworth
Ring David (061) 683 4612

Visa/Access welcome
Prices are Plus VAT & Based on Quantity
OPEN 6 DAYS 9-5

**THINKING OF
BEATING THE
RECESSION**

*Renting Televisions is
not old fashioned good
stock ideal for Rental
From £17.50.*

*Tel For Details And
advice 0302-323834.*

GENERAL FACTORS.
*Unit 28, Carr Grange
Works, Hyde Park,
Doncaster.*

*We have been Renting
T.V.'s For over 14
years.*

WESTERN
TRADE
SERVICES

**TV & VIDEO
WHOLESALE
FOR
DEVON & CORNWALL**

EST 14 YEARS

SUPPLIERS OF EX-RENTAL TV & VIDEO'S
THORN & NON THORN
REMOTE TEXT & VIDEO HAND UNITS
SUPPLIED WHERE NECESSARY
ALL PRICES SUBJECT TO VAT

**DELIVERIES THROUGHOUT DEVON
CORNWALL TWICE WEEKLY**

GIVE US A RING OR CALL IN
**2A BARTON HILL ROAD,
TORQUAY, DEVON**

TEL: 0803 312222 FAX: 326767

BRITAIN'S LARGEST INDEPENDENT

PRESTON

439 Oakshott Place,
Walton Summit Ind. Estate
Preston (M6 Junc. 29)
Tel: 0772-312101



BIRMINGHAM

208 BROMFORD LANE
ERDINGTON,
BIRMINGHAM B24 8DL
Tel: 021-327 3273
Fax: 021-322 2011

TV & VIDEO WHOLESALERS

CARDIFF

Unit J7,
Colchester Trading Estate
Colchester Avenue
Cardiff CF3 7AP
Tel: 0222-471485



**FOR THE BEST BARGAINS
THIS MONTH**

Contact our manager on
081-961 5005

LONDON

The Royal London Estate,
Unit 2, 29-35 North Acton Rd
London NW10
Tel: 081-961 5005



**'B' GRADE
AVAILABLE**



**AUTUMN EXTRAVAGANZA:-
STARTS THIS MONTH
BUY NOW FOR CHRISTMAS
SAVE £'S ON TOP QUALITY
TESTED TV'S & VIDEOS**



**CALL IN AT YOUR LOCAL BRANCH TODAY AND SEE OUR RANGE
OF EX-RENTAL AND B GRADE STOCK**

EXPORT ENQUIRIES WELCOME

TELEPRICE

LIMITED

STOP PRESS
FARNBOROUGH
MOVING SOON
PHONE HEAD OFFICE
FOR FURTHER DETAILS
0793 421141

SWITCH ON!
*TO QUALITY
EX-RENTAL TV
& VCR. PLEASE
RING FOR DETAILS*

AINTREE

UNIT 2, RACECOURSE IND. EST.
ORMSKIRK ROAD, AINTREE
LIVERPOOL L9 5AL. TEL:
051 530 1285 IAN MAC

LEEDS

UNIT F2, COPLEY HILL
TRADING EST., WHITEHALL
RD, LEEDS LS12 1HS. TEL:
0532 422774 LES CORKE

AVONMOUTH

5 PORTVIEW ROAD
AVONMOUTH, BRISTOL
BS11 7LQ. TEL:
0272 235093 KARLA REALE

GLASGOW

9 COLQUHOUN AVENUE
HILLINGTON IND. EST.
GLASGOW G52 4BN. TEL:
041 883 2610 IAN DORAN

NOTTINGHAM

UNIT 8, ASCOT PARK
INDUSTRIAL ESTATE
SANDIACRE, NOTTINGHAM. TEL:
0602 491385 JOHN JEYS

SUNDERLAND

9A/B, 94 CARRMERE RD
LEECHMERE IND. EST.
SUNDERLAND SR2 9TE. TEL:
091 523 5554 BRIAN CADE

SOUTH LONDON

22 FRANTHORNE WAY,
OFF RANDESDOWN ROAD, BELLINGHAM,
LONDON SE6 3BS. TEL:
081-695 0877 JAMES MAYE

FARNBOROUGH

40 INVINCIBLE ROAD
FARNBOROUGH
HANTS GU14 7QU. TEL:
0252 540814 COLIN GORDON

KG
Marketing Limited

Specialists in
Stock Liquidation

17 Princes Row
Birmingham B4 7QU

Tel: 021 333 4023
Fax: 021 333 4071

TV WHOLESALE

★ **QUALITY EX RENTAL TV's & VIDEOS** ★

REGULAR SUPPLIES OF BRANDED NAMES OF
VIDEO'S & 'COLOUR TV'S AT VERY COMPETITIVE
PRICES

WORKING VIDEO'S TOP LOADERS FROM £35.00
FRONT LOADERS FROM £45.00
WORKING TV'S FROM £20.00
PORTABLES FROM £40.00

UNTESTED/NON WORKING
PRICES ON REQUEST

QTY DISCOUNTS AVAILABLE
EXPORT ENQUIRIES WELCOME

DIRECT LOADS CAN BE ARRANGED

5 minutes from Spaghetti Junction
2 minutes from City Centre

ALL PRICES + V.A.T.

COLOUR TRADE

ESTABLISHED 1973 - WHOLESALE ONLY

**NEW 'B'
GRADE**

ONLY

LATEST
NICAM
FASTEXT
F.S.T.

**MAJOR BRANDS
TV - VIDEO - HiFi
SATELLITE**

COMPLETE BOXED - WITH STAND
- HANDSET - BOOK - ETC - MINT

Phone 021-359 7020



FAX 021-359 6344



221-222 BRIDGE ST WEST, HOCKLEY,
BIRMINGHAM B19 2HU

Approved
Thorn Television
Distributor for
West Midlands

C.T.V.

UNIT 5, THE PHOENIX BUILDING, RUSHOCK TRADING ESTATE,
DROITWICH ROAD, NEAR KIDDERMINSTER

TELEPHONE: 0299-251522 0836-585829/0860-809673 (24 HR)

**SUPPLIERS OF HIGH QUALITY EX-RENTAL
TELEVISIONS AND VIDEOS**

LARGE STOCKS ALWAYS AVAILABLE

ALL AT COMPETITIVE PRICES

Also available: 'B' Grade Products, Audio, Microwaves
and Complete Range of Televisions and Videos

OPEN: MON-FRI - 9.30-5.30

TEL: 0299-251522
0836-585829/0860-809673 (24 HR)

Fax: 0299-251543

EXPORT ENQUIRIES WELCOME

D.S.D. DISTRIBUTION

*Wholesale in T.V., Video, Audio, Hi Fi, Calculators,
Watches, Key Boards, Microwaves, Crockery, Telephones,
Vacuum Cleaners, and other Domestic Appliances Etc . . .*

ASK FOR JOB LOTS

**GRAND T.V. + VIDEO SALE
ANY MIXED VIDEO'S IN 10s
ONLY £580 + VAT**

**VIDEO'S IN STOCK INCLUDE
3V35/6, 3V43, 3V45, 3V53, FV31/2**

PLUS MANY OTHER MODELS.

**LARGER + SMALLER QUANTITIES
ALSO AVAILABLE.**

SPEAK TO DAVE!

**SERVICE MANUALS
ALSO FOR SALE**

**3V35, 3V31/2, 3V43, 3V53
ONLY £5 EACH**

**UNIT 1, EAGLE WORKS,
SPRINGCROFT ROAD, HALL GREEN,
BIRMINGHAM, 11**

TEL 021-778 5652

MOBILE 0860-642972

**100 14" Portables Just Arrived
Returned TV & Video Packages**

- 12 x Amstrad TVR1+2 Televideos..... £425
- 9 x Amstrad TVR3 Televideos £850
- 10 x ITT 25-28" FST £595
- 6 x ITT 21" FST £305
- 30 x Toshiba 21-28" FST £1275
- 10 x Hinari Televideos £680
- 27 x Mitsubishi 21-28" FST £1150
- 10 x Spectrum +2+3 Computers £300
- 11 x Mitsubishi VHS Videos £625
- 18 x Hitachi VHS Videos..... £1000
- 20 x Akai VHS Videos £1190

**PLUS MANY MORE BARGAINS
TOO MANY TO MENTION**


B GRADE STOCK RETURNED GOODS

- | | |
|------------------------------|-------------------------------|
| 14" Portables from £70 | 14" Portables from £25 |
| 20" Remote CTV from .. £105 | Front load VHS from £50 |
| 20" Fastext from £140 | Midi Hi-Fi's from £20 |
| L/P VHS from £120 | 21" CTVs from £40 |
| 10" Mains/bat from £90 | Radio Cassettes from £15 |

GOGGLEBOX
DISCOUNT ELECTRICAL WAREHOUSE

TEL: LEEDS
0532-310359
ASK FOR ROBERT

ALL ABOVE PRICES PLUS VAT AT 17.5%



TV'S VIDEOS WHOLESALE

● COMPLETE BOXED — WITH STAND —
— HANDBOOK — BOOK — ETC — MINT



LATEST NICAM FASTEXT F.S.T.

NEW 'B'
GRADE

TV — VIDEO — HI-FI
SATELLITE

● ONLY MAJOR BRANDS ●

TEL: 0703 777254
FAX: 0703 788723
14 PARK ST, SHIRLEY

SOUTHAMPTON S01 3NR

LANCASHIRE TRADE DISTRIBUTORS

43-45 FORTON AVE, BOLTON, LANCASHIRE, BL2 6JE

CONTACT STEVE WINDSOR 0204 373217

**LANCASHIRE'S NEWEST SUPPLIER
OF QUALITY EX-RENTAL
TV + VIDEO AT VERY
COMPETITIVE PRICES**

OPEN MON-FRI 9AM-5.30

TELETEXT	FROM £40	BEST DISCOUNT FOR QUANTITY	FRONT LOADING VCRS FROM £55
REMOTES	FROM £20		
BASICS	FROM £15		

WE CAN DELIVER

**RING STEVE
0204 373217
PRICES SUBJECT
TO
VAT**

CENTRAL TV



EX-RENTAL

● SUPERB RANGE OF TV'S & VCR'S
● THORN & GRANADA

● DIRECT LOADS
AVAILABLE FROM SOURCE

EXPORT ENQUIRIES WELCOME

'B' GRADE
SWITCH ON TO
TOP QUALITY BRANDS
OF

PHONE
TODAY

FOR BEST
RESULTS

ALL SIZES OF SCREEN TV AVAILABLE, BOTH IN FAST
TEXT & DIGITAL NICAM STEREO

VIDEOS: CURRENT MODEL

Single, Twin Speed, Nicam S-VHS

CAMCORDER

C FORMAT, FULL SIZE, 8mm
MICROWAVES ● PORTABLE ● HIFI ●
SATELLITE ● VIDEOCRYPT ●

PORTABLE £90

FULL REMOTE, BOXED

CTV LONDON
Eley Estate, Nobel Road
Edmonton N18
TEL: 081-807 4090
FAX: 081-884 1314

CENTRAL TV WHOLESALE
DISTRIBUTION LTD
369 Stratford Road, Sparkhill
Birmingham B11
TEL: 021-772 1591
FAX: 021-766 6383



Contact us if you are looking for
good clean working stock of TVs,
VCRs, HiFis and graded stock.

Also brand new portable 14"
R/C-CTV with 12 months
guarantee

Tel: 021 772 2733 or 0836-520036
Fax: 021 766 6100.
EXPORT ENQUIRIES WELCOME.

Vast range of spares — eg video
heads, remote controls, flaps,
trims, motors, lopts, ICs, service
manuals, VHF/UHF televerters etc.

Wiltsgrove Ltd

TV video & component distributors
28-29 River Street, Digbeth, Birmingham B5 5SA

Chromavision
TVs, VCR WHOLESALER

WHOLESALERS OF THORN & GRANADA STOCK
Trailer loads arriving direct from source every week — ONE
AND ONLY APPROVED DISTRIBUTOR OF THORN STOCK IN
MANCHESTER FOR THE NORTH WEST.

TVs FROM £5-500

HITACHI: BASIC — PYE — PHILIPS — BASIC R/C — TOSHIBA
BASIC
TVs BASIC TX9/TX10 — MKIII/IV — ITT R/C — GRUNDIG
TELETEXT TX9/10 — PHILIPS TEXT — FST — R/C — TEXT etc

VCRs from £20-£500

FERGUSON 3V20 8740 3V35 3V43 3V53 8947
VCRs SANYO R/C PHILIPS GOODMAN SAMSUNG
GOLDSTAR TOSHIBA HITACHI GRUNDIG etc

LOW LOW!!!! PRICES!!!!

Friendly service — DELIVERY SERVICE AVAILABLE
EXPORT ENQUIRIES WELCOME...
95 Langworthy Rd, Salford Manchester. Tel: 061 736 6333 0831 536337

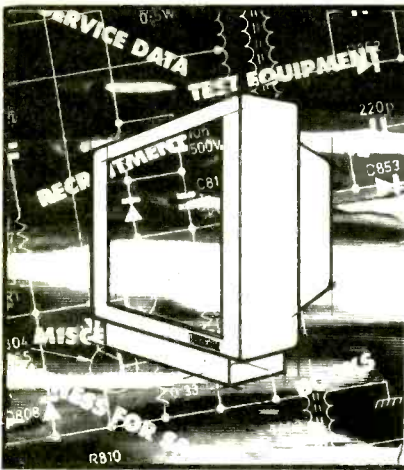
TELEVISION CLASSIFIED

No other consumer magazine in the country can reach so effectively those readers who are wholly engaged in the television and affiliated electronic industries. They have a need to know of your products and services.

The prepaid rate for semi display setting is £12.00 per single column centimetre (minimum 3 cm). Classified advertisements £8.40 per line, box number £22.00 extra. All prices plus 17½% VAT. All cheques, postal orders etc., to be made payable to Reed Business Publishing. Advertisements, together with remittance, should be sent to the Television Classified Room L327, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.



PHONE 081-652 8339 FAX 081-652 8931



SPARES & COMPONENTS

MITSUBISHI/SALORA/LUXOR VIDEO PCB'S

PWB-MAIN	928839502 240A35801	32.90
PWB-MAIN	928823002 240A17801	32.90
PWB-SIGNAL	928815302 240B65501	23.50
PWB-SIGNAL	928816702 240B69601	28.80
PWB-AUDIO	925817002 240B68201	17.83
PWB-CONTROL	928815401 240B65501	17.63
PWB-CONTROL	928815801 240B89001	17.63
PW-8-H	926817701 240B70401	5.88
TUNER	928805903 240A48801	11.75
PRESETTER	928808505 240C34201	3.53
LUXOR 9213	928810102 240C84301	3.53
LUXOR 9213	928805805 240B48101	5.88
LUXOR 9213	928808102 240B53001	1.18
LUXOR 9214	928808602 240B51101	14.10
LUXOR 9214	928808807 240B51101	14.10
SERVO	928810301 240B54301	9.40
PRESETTER	928807702 & 1 240B48801	7.05
PCB ASSY	928806701 240B51201	14.10
PCB ASSY	928811302 240B6701	5.88
PCB ASSY	928818901 240B69101	9.40
PCB ASSY	928821002 240B82501	5.88
PCB ASSY	928819801 240B75501	3.53
TIMER	928815501 240B85701	4.70
PCB ASSY	928806202 240B50801	3.53
PCB ASSY	928806601 240B48301	3.53
AUDIO	928808303 240B48501	5.88
PRESETTER	928811104	3.53
PCB ASSY	928811005 240C98101	3.53
PCB ASSY	928812401 5000201	3.53

AMSTRAD

PRICES INCLUDE VAT, POST AND PACKING EXTRA.

P.C.B.'s		
4600 Video and Audio PCB	£17.63	
4600 Systems Control/Servo PCB		
Display and Control PCBs	£29.38	
4600 MkII Video and Audio/Timer/Control PCB Assy	£40.82	
4700 Video and Audio/Timer/Control PCB Assy	£40.82	
VCR100 Video and Audio/Timer/Control PCB Assy	£40.82	
Timer and Channel Display PCB Assy	£17.63	
5200 Audio Tuner PCB	£15.28	
5200 Video PCB	£14.10	
8900 Display PCB	£21.15	
4600 Mk II/4700 Power Supply	£4.70	
CTV2200 PCB No.3 (Part 270087)	£3.53	
CTV2200 PCB No.4 (Part 270088)	£4.70	
TVR1 Control Panel/Preset PCB	£7.05	
TVR2 Main TV PCB	£37.60	
TVR3 Main TV PCB	£43.48	

MECHANISMS

4600 Video Cassette complete mechanism (no drum or video heads)	£29.38
4600 Video Cassette complete mechanism (with drum no video heads)	£35.25
9000 Cassette Housing Assy.	£15.28

MOTORS

4600/4700 Capstan Motor	£11.75
7000 Loading Motor MCB2B01	£3.53
9000 Loading Motor MCB9B02	£3.53

TUNERS

5200 Varicap Tuner Type 1810829	£7.05
7000 Tuner ENV87358C2	£7.05
CTV1400 Tuner ENV87509F2	£5.88
CTV2200 Tuner UE2-B31F	£5.88

PARTS OFF PCB'S AND MECHANISM.

PHONE FOR PRICING

ALL ITEMS ARE BRAND NEW AND GUARANTEED

*** SAME DAY DESPATCH ***

Write or Phone for FULL catalogue.

HANDSETS		
VCR4600/4600MkII	£11.75	
VCR4700	£17.63	
VCR5200	£11.75	
VCR6100 Barcode	£29.38	
TS90/99 Tower System	£11.75	
VCR9000 (Old Type) Handset	£11.75	

L.O.P.T.		
CTV1000	FB182K	£11.75
CTV1401/9	3714002	£14.10
CTV2000	FB171/FB171K	£9.40
CTV2200	3722002	£14.10
TVR2	1810951	£13.51
TVR3	181297	£13.51
PC12-HRCD/D	MSH1FCT31	£14.10

CONVERTERS		
4700 RF CONVERTER	£5.88	
5200 RF CONVERTER	£7.05	

DISHES, FEEDS, LNB'S ETC. AVAILABLE. PHONE FOR LIST.

Harrison Electronics

CENTURY WAY, MARCH, CAMBS PE15 8QW.
FAX: (0354) 51416. TEL: (0354) 51289

THRIFTY SPARES (WALES)

C/O CENTREVISION, SLOPER ROAD, LECKWITH, CARDIFF CF1 8AB

WE KNOW YOUR MONEY DOESN'T GROW ON TREES SO LET SECOND-HAND SPARES HELP YOUR BUSINESS BLOSSOM AMSTRAD, FERGUSON, HITACHI, IIT, PANASONIC, SHARP, TOSHIBA ETC.

0222 344218

EXAMPLE VIDEO PRICES

MIXED BOOSTER	£12.80
SERVO PANEL	£15.50
LOADING MOTOR ASS	£10.50
BOTTOM BOARD	£20.50
MODULATOR	£15.50
MECH COM	£15.50
DRUM ASS	£12.80
CAPSTAN MOTOR	£15.50
POWER PANEL	£15.50
TUNING BOARD	£18.00

DORIC SPARES

MK3A LINE SCAN (STATE TUBE)	£10.00
MK3A POWER PANEL	£8.00
MK3A IF VIDEO ETC	£22.50
MK4 LINE SCAN	£15.50
MK4 MANUAL TUNER HEAD 90 OR 110	£12.50
MK4 IF PANEL	£7.50
MK4 VIDEO	£5.00
MK4 REMOTE BOARD	£5.00
MK4 TEXT BOARDS	£10.00
MK4 FRONT ASSEMBLY	£10.00
MK4 TRIPLES	£5.50
MK4 CRT TUBE CALLERS ONLY	£23.00

ALL ABOVE PRICES VAT INC

MANY MAKES OF TV USED - SPARES ALSO IN STOCK - OPENING HOURS 9am-1pm - 2pm-5.30pm

POSTAGE & PACKING £2.50 ORDERS OVER £50 P&P FREE

DON'T DELAY PHONE 0222 344218 TODAY - 24 HOUR

RCS VARIABLE VOLTAGE D.C. BENCH POWER SUPPLY
1 to 24 volts up to 1/2 amp. 1 to 20 volts up to 1 amp. 1 to 16 volts up to 1/2 amp D.C. Fully stabilised. Twin panel meters for instant voltage and current reading. Overload protection. Fully variable. Operates from 240V A.C.
Compact Unit size 9.5" x 5.2" x 3ms
NEW MODEL. Up to 38 volts DC at 6 amp. 10 amps peak. Fully variable. Twin panel meters. Size 14.1/2" x 11" x 4.1/2". £96 inc VAT Carr £6

£45 inc VAT
Post & Ins. £4

RADIO COMPONENT SPECIALISTS
337 WHITEHORSE ROAD, CROYDON
SURREY, U.K. Tel: 081 684 1665
List, Large SAE. Delivery 7 days. Callers Welcome Closed Wed.

TELEVISION TUBE RE-GUNNING PLANT FOR SALE
Equipment is used in excessive to our Requirement Training will be available if required. For further details please write to:

WELL-VIEW
114/134 Midland Road, Luton, Beds, LU2 0BL
Telephone 0682-402499

SURPLUS/REDUNDANT ELECTRONIC COMPONENTS WANTED
I/Cs - Tuners - Transistors - Valves - Diodes etc. any quantity considered - immediate payment.

ADM Electronic Supplies
Tel. 0827 873311. Fax 0827 874835

WANTED
Regular supply of working ex-rental Colour TV's. Videos/Hi Fi. second-hand Video Tapes & CD's.

Tel. 0792 641142
Cash on collection

SERVICE DATA

J.W. HARDY

CHECK OUT OUR NEW PRICE LIST

(SEE SEPTEMBER ADVERTISEMENT FOR MAIN ACCESSORIES LIST)

COAX CONNECTORS (In Line)			
F-Coaxial Connectors			
F-Screw on CT100/R65	each 0.30	PD1U/11 or 15dB Tap Iso	9.73
F-Screw on CS6	each 0.30	PD2U 20, 26 or 38dB Tap Twin Iso	7.67
F-Crimp Bonded Ring CT100/R66	each 0.25	PD1U 15dB Tap Terminated Iso	6.79
F-Crimp Bonded Ring CT125/F6	each 1.26	PD2U 15dB Tap Terminated Iso	7.67
F-Crimp Bonded Ring CT167/F6	each 2.95	PD2U/RS1 Five Way Splitter Iso	5.27
Crimping F Foot for Above	40.89		
F-Crimp Loose Ring CT100	each 0.22	Back Box Surface	
F-Crimp Socket to Plug	each 1.22	Single Pattern Box 19mm Depth	0.53
F-Coupler Socket to Socket	each 0.63	Single Pattern Box 30mm Depth	0.59
F-Coupler Plug to Plug	each 1.00		
F-Push on Socket to Plug	each 0.63	AMPLIFIERS (Mast Head)	
F-Terminating 75 ohm Plug	each 0.74	Telesat Mast Head Amplifiers	
Bulk Purchase Prices		Multi-4 Dist Amp Inc PS	7274.32.70
F-Screw on CT100/R65	per 100 16.45	Multi-3 Dist Amp Inc PS	7273.32.70
F-Screw on CS6	per 100 16.45	UHF Pre-Amp 15dB	7271.12.53
F-Crimp Bonded Ring R66	per 100 14.16	UHF Pre-Amp 26dB	7056.13.63
F-Crimp Loose Ring B50	per 100 11.75	UHF Cascade Amp 26dB	7080.10.14.10
F-Coupler Socket to Socket	per 100 28.32	40, 860MHz Pre-Amp 26dB	7065.14.69
F-Terminating 75 ohm Plug	per 100 21.15	UHF-B Pre-Amp 29dB	7265.4.15.86
		UHF-C Pre-Amp 29dB	7268.00.15.86
		UHF-DD Pre-Amp 29dB	7268.00.15.86
		Power Supply 12V DC 23mA	7261.12.29
		Power Supply 12V DC 80mA	7262.16.32
COAX CONNECTORS (Wall Plates)			
SCS = Standard Coax Socket			
F = F Coaxial Socket			
Domestic Flush Sockets			
Single Socket with Single Coax Feed	SCS 1.60	Q140 UHF Pre-Amp 14dB-40dBmV	13.40
Single Socket with Single Coax Feed Iso	SCS 2.00	Q150A UHF-A Pre-Amp 15dB-32dBmV	13.98
Double Socket with Dual Coax Feed	SCS 3.18	Q150B UHF-B Pre-Amp 15dB-32dBmV	13.98
Double Socket with Dual Coax Feed Iso	SCS 3.58	Q250 UHF-DD Pre-Amp 26dB-36dBmV	14.92
Double Socket with Dual Coax Feed SCSF 6.11		Q261 UHF Cascade Amp 26dB-36dBmV	32.95
Double Socket with Dual Coax Feed SCSF 6.11		Q300A UHF-A Pre-Amp 29dB-40dBmV	16.33
Domestic Surface Mount Sockets		Q300B UHF-B Pre-Amp 29dB-40dBmV	16.33
Single - with Single Coax Feed	SCS 1.27	Q300C UHF-DD Pre-Amp 29dB-40dBmV	16.33
Twin - with Single Coax Feed	SCS 1.83	P20 Power Supply 12V DC 22mA	12.46
Twin - with A-B Switch Coax	SCS 2.43	P80 Power Supply 12V DC 80mA	25.71
Double - with Dual Coax Feed	SCS 1.88		
Telesat Domestic Flush Sockets		AMPLIFIERS (Multi-Outlet)	
9003.00 - Single	SCS 3.90	Telesat Multi-Outlet Amplifier	
9115 - Single	F 4.21	Frequency 40-860MHz	
9118 - Diplexed TV/Sat	SCS F 16.50	1-Way in 1 out 12-24V Supply	7391.03.23.27
		1-Way in 1 out 11dB-30dBmV	7291.21.20
		2-Way in 2 out	7292.22.27
		3-Way in 3 out	7293.27.85
		4-Way in 4 out	7294.00.37.60
		6-Way in 6 out - 1	7296.00.47.00
		8-Way in 8 out - 1	7298.00.56.40
		Wolsey Multi-Outlet Amplifier	
		Frequency 40-350MHz (Note See Description)	
		1-Set UHF 1 in 1 out 11dB-30dBmV	16.95
		Booster 23 V.U. 1 in 2 out 23dB-39dBmV	41.38
		2-Set UHF 1 in 2 out 7dB-26dBmV	16.95
		3-Set UHF 1 in 3 out 12 9dB-26dBmV Max	20.69
		3-Set UHF FM 2 in 3 out 12 9dB-27dBmV Max	31.82
		4-Set UHF 1 in 4 out 12 9dB-26dBmV Max	21.69
		4-Set UHF FM 2 in 4 out 12 9dB-26dBmV Max	31.82
		8-Set UHF FM 2 in 8 out 13 8dBmV Max	77.77

NEW EDITION OF TELEVISION SERVICING

1991-92

ISBN 0 951 3897 7 7

£85.00 3.5Kg Book

Akai CT 2568 CT 2579N CT 2869 CT 2870N CT 2879N CT 2158 CT 2190	Boots CTV1414 1414R 1010 1010	Bush 2921 2921T 3014 3114 3114T 3214S 4414 CTV 100	Fidelity CTV 920 Finlandia C51HZE D59HZ5 D66HZ5 Finlux 3815 3821	Grundig CUC 4400 CUC 4401 CUC 4410 CUC 4500 CUC 4511 CUC 5300 CUC 5820 CUC 5835 CUC 5836 CUC 5860 CUC 5880 CUC 5891	Hitachi C 14 P218 C 1709 C 2118R C 2118T C 2519TG CPT 2196 CPT 2198 CPT 2578 CPT 2596 CPT 2598A Indianna 100MKJ & MKJI ITT/Nokia 219R 219T 29 26 29 2560 2860 3570 5551 5581 5581 UK 6351 6361 6387	ITT/Nokia 6856 6887 7161 JVC AV 21F1EK AV 25F1EK AV N280EKT Logic 6392 Luxor 6392 Matsui 219R 219T 1420B 1435 1435B 1435C 1440 1440B 1445 1455 1480B 1481	Matsui 1481B 2180 2180TTA 2185 2899N NEI 1451R 1451TX 1551TX 2131R 2131TX TX 21T1 TX 21V1 TX 24A1 TX 25W2 TX 28W2 TX 28A1 TX 33A1G TX 1100G TX 1485 TX 1785 TX 1786 2155 2156T Orion P1408 P2004 P2005	Orion 14ARXG 14AT 14VR Osaki 3214S Osume CTV 1474R Panasonic TC 21R1 TX 21T1 TX 21V1 TX 24A1 TX 25W2 TX 28W2 TX 28A1 TX 33A1G TX 1100G TX 1485 TX 1785 TX 1786 Perdio P1408 P2004 P2005	Perldo P2101 P2102 STX 400 Philips 2070 2080 1021 1220 2331 2341 2554 2752 5560 5664 5668 5782 5764 5772 8840 8841 9666 9672 9763 9765	Philips 9637 9763 9765 9768 9772 Pioneer SD 21AVI SD 25AVI SD 28AVI Pye 1240 1242 1528 2425 2525 26 A 42 28 D 81 Saisho CM 215TS CM 2080T CT 141 CT 141B CT 143 CT 144B CT 144R	Saisho CT 146TX CT 149TXA FST 212TA Samsung C 1210R C 1212R C 13312Z C 15012Z C 15013T C 15332T C 15322Z Salora 21 D 61 21 D 81 25 D 61 26 A 42 28 D 81 Sanyo CBP 2572 CBP 2573 CBP 2872 CBP 2873 CBP 2558 CBP 2559 CBP 2162	Sharp C 1430H C 1431H C 3720 DV 51083H DV 59083H DV 66083H SV 2588H Sony KV D2512 KV D2912 KV X2132 KV X2532 KV X2932 KV A2112 KV A2112U KV A2512 KV 2522 KV 2922 KV D3412U Ssangyong 0014	Tatung A Series Toshiba 218 R9B 218 R9B2 216 T9B 216 T9B2 217 D9B 217 D9B2 218 D9B 219 R9B 219 T9B 256 T9B 329 T7B 1400 RBT 1400 RBW 1400 TBT 1400 TBW 2100 RBT 2100 TBT 2500 TBT 2501 TBZ 2505 DBT 2805 DBT
---	--	---	---	--	--	--	---	--	--	--	---	--	---

VIDEO SERVICING 1989-90

Improved Layout, Larger Circuits & Colour Index

TWO 336 Page Volumes. ISBN 0 951 3897 2 6

£138.00

Alwa VR900 HVG-55	Fidelity VR900 Finlux VR 3300 VR 3400 VR 425 VR 427 VR 467 VR 485 VR 765 VR 767	Hinari VXL-10 VXL-12 VXL-90 VCR-34H VTV-100 VTV-200 VTV-300 Hitachi GHV 1290i GHV 1296i GHSE 1296i VCP 4300i Goodmans VTV 300 VCP 500 VCR-8000 TX 1101 PX 1101 PX 2200 PX 2201 VCR 2500 DX 3300 Granada VHS-FY1 VHS-GY2 VHS-GY4 VHS-FS4 Grundig VR-500 VR-520 VR-540 VR-550 TVR-4500 TVR-4510 TVR-5510 HR-D320 HR-D700EK HR-D750 HR-D830	Logik VR945 VR950 VR955 VR960 VR960A V1805K V1805U V1905K V4000 UNIC Orion VCR-LA1 VCR-L1 VR-MDTT1 VCR-X1 VCR-L2 VR-MDTTST2 VCR-LADST2 VR-LDST2 VR-LD2 VR-LD3 VCR-M3 VCR-LD3 VCR-MD3 VXL 12 VTV 300 D 1200 VTV 300 VCR-34H Osaki VCR-34H Panasonic NV-L20 NV-L28 NV-J30 NV-J34	Nordmende V1005M VR-6182 V1005MI V1405U V1805K V1805U V1905K V4000 UNIC Philips VR-6180 VR-6182 VR-6185 VR-6295 VR-6470 VR-6490 VR-6548 VR-6648 VR-6670 VR-6870 Pioneer VR-525 VR-727 Pye DV186 DV190 DV 286 DC 571 Saba VHR-4150 VHR-4350 VHR-D4410 VHR-D4610 VHR-5200 VHR-5240 VHR-5350 VHR-D5450 Saisho VXL 12 VXL 12X VP 3000 VRS 3200 VR 3300X VR 3400 VR 3500 VR 3650 VR 3700 VR 3800 VRS 4000 VRS 4200	Saisho VRS 4400 VRS 5000 VRS 5000X VRS 5500 Salora SV-6800 SV-6900 SV-6910 SV-9900 Samsung VI-710 VI-711 VI-730 VI-750 VI-770 VI-790 VI-970 Sanyo VHR-4150 VHR-4350 VHR-D4410 VHR-D4610 VHR-5200 VHR-5240 VHR-5350 VHR-D5450 Sentra VX 8500LP VX 8600LP Sharp VC-A100 VC-A105 VC-A111	Sharp VC-A131 VC-A140 VC-A170 VC-T310 VC-A510 VC-A501 VC-A502 VC-T510 VC-793 VC-D801 VC-A5011 D 805 Sony SLV 201 SLV 301 SLV 401 Tatung TVP1311 Telefunken VR-4935 VR-4945 Thompson V-610 V-630 Toshiba V-109B V-209B V-300B V-309B V-500B V-509B V-700B V-700H
--------------------------------	---	--	---	--	--	--

£20.00 off
Video Servicing 1989-90

With this Voucher
While Stocks Last

or
Satellite Servicing
at HALF PRICE

When ordered with Video Servicing
1989-90

Save £27.50

Cut out and return coupon with order.
One voucher per set.
VALID UNTIL 1ST DEC 1992

tv0992

TELEVISION SERVICING 1989-90
Covers 749 Models **£65.00**

SATELLITE SERVICING 1987-90
Covers 127 Models. ISBN 0 9513897 6 9 **£55.00**

**PLEASE NOTE OUR
NEW ADDRESS & PHONE NOS.**

All Books Contain:
CIRCUIT DIAGRAMS. SCOPE
READINGS. VOLTAGE TABLES.
ESSENTIAL PART NUMBERS.
ALIGNMENTS & ADJUST-
MENTS. TROUBLE SHOOTING
GUIDES

**If ordering several
books please ring
for credit details**

**POST, PACKING &
INSURANCE**
1 Book £4.00
2 or more Books £7.00
Note: Video Servicing
1989-90 is a TWO volume
set and is therefore
£7.00 delivery.

Television Servicing 1987-88
If you would like a copy of this
edition please contact us as
we are considering a reprint.

U-VIEW 4 South Parade, Bawtry, Doncaster,
Yorkshire, England. DN10 6JH
Tel: 0302 719997 Fax: 0302 719995

Technical Information Services



76 Church St, Larkhall, Lanarkshire, ML9 1HE

Phone/Fax (0698) 884585; Between 12 noon & 1pm or After 5pm (0698) 883334

Send a large SAE for your FREE QUOTE & CATALOGUE



£2.00 P&P on orders below £20.00, £2.50 from £20.00 to £30.00, Post free over £30.00

We have "THE WORLDS LARGEST COLLECTION" OF

SERVICE MANUALS SHEETS & CIRCUITS

Covering: CTV, VCR, COMPUTERS, RADIO, HI-FI, TEST/DOMESTIC
EQUIPMENT, SATELLITE, CD's, ETC...

Now selling circuits for any VCR we have at £8.95 inc. p&p

Not to mention that We are the Sole Suppliers of Various Fault Finding, Repair &
Technical Guides

A few selected titles

Practical TV Repairs 2nd Ed.	£16.95	Video Techniques *New Ed*	£16.95
Refrigeration Pocket Book	£14.95	CTV Servicing by G.King	£16.95
Servicing Mono TV's	£17.95	Spectrum Repair Guide	£5.00
The PAL System	£9.50	Buy-Sell-Repair Used TV's	£9.95
BBC Micro A B + & peripherals	£25.00	Buy-Sell-Repair Used VCR's	£9.95
TV & Video Technology	£14.95	Microwave Servicing	£9.95
Europ'n Scrambling Sys *New Ed*	£29.00	TV & Video Engineers P/Book	£14.95
Hi-Fi Servicing Guide	£9.95	Newnes Data Com P/B 2nd Ed	£12.95
Practical Radio Serv' & Repair	£12.95	Newnes Electr Assembly P/B	£14.95
Data Ref' Guide 3rd Ed	£5.95	VHS Common Faults	£3.95
Electronic Test Equip' H'book	£8.95	Practical Digital Elec's H'book	£6.95
Serv'ing Personal Comp's *New Ed*	£25.00	Oscilloscopes How to Use/Work	£14.95

INTEGRATED SYSTEMS from TIS

10 Giant binders of all main CTV Circuits, PCB's & Waveforms to end 1989	£275.00
12 CTV Repair Manuals covering stock & standard faults to end 1989, worth £144.40	£119.00
All CTV binders & Repair Guides, PLUS over £100.00 of additional data	£425.00
7 Giant binders of most VCR Circuits, PCB's & Waveforms to 1991 (Vol.7 Latest)	£219.00
35 Fault-Finding Guides covering all models in the 7 giant binders	£79.95
All the CTV binders & Repair Guides PLUS VCR binders PLUS fault finding, etc.	£599.00
TVAR complete, 1990 & 1991 editions covering CTV's, VCR's, CD's, Satellite, etc.	£89.45
Data Reference Manual (models, makes & chassis identified) FREE with any above system	



!!ANY SERVICE MANUAL FOR £7.50!!

How? We are selling ANY 20 manuals for only £150.



No catches! Order as you need them (no time limit), or as one lot of all those expensive manuals you couldn't previously afford. No hidden expenses like post & packing (that's included in the price). Note: The £150 is payable in one sum, not per manual.

CLASSIFIED CLASSIFIED CLASSIFIED CLASSIFIED CLASSIFIED

SERVICE MANUALS



Available for most equipment, TV, Video, Audio, Test, Amateur Radio, Kitchen, Computers etc etc. We have probably the largest range of Service information available anywhere. If you need a manual give us a call. Originals or photostats supplied as available.



MAURITRON SERVICES (TV)

8 Cherry Tree Road, Chinnor, Oxfordshire, OX9 4QY.

Tel:- (0844) 351694. Fax:- (0844) 352554.

TV & VIDEO TRADE REFERENCE MANUALS

VIDEO RECORDER EQUIVALENTS.

Lists all known models & their alternatives.

Fully Cross referenced for fast and easy use. Order MP143.

TELEVISION CHASSIS GUIDE

Listing thousands of Models (Colour & Mono) & their Chassis Designations.

Enables you to identify any chassis for any TV from the model number. Order MP18.



The above 2 books contain the most COMPREHENSIVE REFERENCE DATA available anywhere for the TV & Video Trade. Order yours today.

Hundreds of other Technical and Repair books available. Send A5 size SAE for your FREE catalogue today.

All orders please add £2.35 post & packing.

E.C.S. INDEXES!

THOUSANDS SOLD WORLDWIDE

Edition 8 of the complete indexes now published containing approx 7,500 Faults listed in 12 Years of Television magazine.

Indexes are alphabetically listed by Make, Model, Fault, Ref and are now available for just:

£8.00 For Television & Satellite Faults
£8.00 For Video, Camcorder & CD Faults

Or £15.00 for both sets complete with chassis & similar model guides. *Please add £1.50 (UK), £3.00 (Overseas) to total order to cover post & packing.*

A LOW COST UPDATE SERVICE IS ALSO AVAILABLE. FULL DETAILS DESPATCHED WITH ORDER.

To secure your copy/s please make Cheques/Postal Orders payable to:

E.C.S.

31 Prenton Road West,
Prenton, Birkenhead,
Merseyside L42 9PY

SERVICE MANUALS

For most U.K. European, Far East & USA types of CTV - MTV - VCR - CAM - SAT - M/WAVE - AUDIO including "Unusuals" - and all at reasonable prices.

VCR circuits also available separately for most models

Some examples from thousands of VCR manuals available.

These are all complete at £10 each

PANASONIC NV-FS100, L20, NV-MC10, MC20, MC30, MS50,
ORION D500, D1000/1100, D1200, D1500, D2000,
FERGUSON FV11R, FV12L, FV13H, FV14T, FV20B, FV30B.

+ MANY OTHER BARGAINS

Write or telephone with your requirements.

All U.K. orders subject to £1 P&P. No VAT

D-TEC

PO BOX 1171, FERNDOWN, DORSET BH22 9YG.

Telephone: 0202 870656

WANTED

D.S.D. DISTRIBUTION
SERVICE MANUALS
FOR SALE - £5 EACH

3V35, 3V31/2, 3V43, 3V53

UNIT 1, EAGLE WORKS,
SPRINGCROFT ROAD,
HALL GREEN,
BIRMINGHAM, 11

TEL 021-778 5652 MOBILE 0860-642972

FOR SALE

GERMAN SERVICE SHEET
SPECIALISTS

Our connections are world-wide. We furnish any kind of German, European and Japanese service sheet or manual. Thousands of different sheets and manuals in stock. For any enquiries:

DÖNBERG ELECTRONICS
Schoolmasters House, Rannafast,
Co. Donegal, Republic of Ireland.
Phone: 075 48275

WANTED

Regular Supply of Ex-Rental
Colour TVs and Videos.

*Cash on Collection -
Quick Service*

Tel. 0742 312832

VIDEO RECORDERS
LOWEST PRICES EVER

Phone for Details
Bill Eades

SOUTH LONDON TV
081-543-5437

CLASSIFIED CLASSIFIED CLASSIFIED CLASSIFIED CLASSIFIED

TV & VIDEO

Suppliers of ex-Rental TV & Videos to the trade. TVs from top makes Hitachi, Toshiba, Philips, Ferguson and Grundig.

Standard working TVs from £25
 Remote Control models from £30
 Teletext Models from £45
 Working Sharp front loading VHS Videos from £55

All prices are plus VAT at 17.5%

BENTRONICS LTD

500 Thornton Road, Thornton, Bradford BD13 3JD

Tel: 0274 832195 or 0831 582736

Fax: 0274 830339



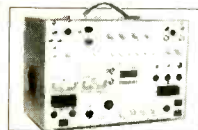
Nationwide Delivery Service Available



TEST EQUIPMENT

MÜTER · AT2 · BMR 95 · BMR 700

AT 2, Audi-Multi-Tester, 16 test-circuits for loudspeakers, tuners, amplifiers, headphones, tape recorders, mikes, boosters.



car radios, CD-players, measurement of millivolt, drift, watt, performance; with generator, radio, signal tracer/injector, 13 volt supply etc.



BMR 95



BMR 700

Regenerating Computers & Measurers for CRT's with cathode protection, gas clean-up aid, short repair; exhausted CRT's becomes bright and sharp again even if all other machines do not succeed.

United Kingdom: P & E Services, Llandudno, Tel. (0492) 549246, Fax 547880.

Ireland: Dönberg Electronics, Ranafast, Co. Donegal, Tel./Fax (075) 48275.

New Zealand: TDON Ltd., Onehunga, Auckland, Tel. 668-907, Fax 668-499

Germany: Ulrich Müter, Oer-Erkenschwick, Fax (02368) 57017.

TELNET

LARGE STOCK OF PRE-OWNED TEST EQUIPMENT FOR DISPOSAL.

CALIBRATED TO RECOMMENDED STANDARD (not ex-government)

1. OSCILLOSCOPES -

HEWLETT PACKARD
 1740A/1741A/1744A/1P2C
 PHILIPS
 3211/3217/3226/3240/3261

GOULD OS 4200
 TELEQUIPMENT
 D34/DM64/D75
 TEKTRONIX 7603/7313/2215

Some Trolleys available for scopes

2. LEVEL METERS/OSCILLATORS -

WANDEL + COLTERMANN
 PS6/PS60/PS12 (Oscillators)
 SPM12/SPM60 (Level Meter)

SIEMENS D200B (Level Meter)
 HEWLETT PACKARD
 6518 (Level Meter)

3. LOGIC ANALYSERS - Hewlett Packard 1615A (with Pods)

4. FREQUENCY COUNTERS -

RACAL 9903/9905/9502/SA520

ADVANCE TC 17A

5. DIGITAL MULTIMETERS + AVOS -

FLUKE
 8010A/8050A/8600A/8800A
 SOLARTRON 7045/LM 14202
 GOULD Alpha III/Alpha IV

AVO
 Model 7 + Model 8
 GEC Selectests
 (similar to AVOS)

6. POWER SUPPLIES - FARNELL L301/

LT301/L305/E350/L30F/L1210C Also Wayne Kerr Weir/Solarton

ALSO Many other items such as RMS Voltmeters (H.P.), Pen Recorders 6 way (Philips), Pulse Generators, Broadband Sampling Voltmeter (H.P.), Power Meters, Electronic Voltmeters, Mains Isolators, Psophometers etc.

ALL GUARANTEED FOR 3 MONTHS

SEND S.A.E. FOR LIST OF T/EQUIP AND PRICES OR FAX LIST AVAILABLE WITH PRICES (VAT TO BE ADDED). LOW COST DELIVERY CAN BE ARRANGED IF REQUIRED.

TELNET

UNIT 8, CAVANS WAY,
 BINLEY INDUSTRIAL ESTATE,
 COVENTRY CV3 2SF

(Premises situated close to Eastern Bypass in Coventry with easy access to M1, M6, M40, M69)

Telephone: 0203-650702 Fax: 0203-650773

ALSO AVAILABLE C GRADE RADIO CASSETTES, CAR RADIOS, PERSONAL STEREOS - SEND FOR PRICE LIST

A KEY PART OF MICROWAVE

MICROWAVE OVEN COMPONENT PARTS

AWI Ltd., Samuel Whites Estate, Medina Road, Cowes, Isle of Wight PO31 7LP
 Tel: (0983) 296121. Telex: 86736 Sotex G. Fax: (0983) 296122

TRANSFORMERS

TV LINE OUTPUT TRANSFORMERS

PHONE 081-948 3702 FAX: 081-332 0583

ALBA · AMSTRAD · BUSH · DECCA · DORIC · BLAUPUNKT · FERGUSON · FIDELITY · GEC · GRUNDIG · GRANADA · HITACHI · HINARI · INDESIT · ITT · KIMARA · NIKKAI · MATSUI · MURPHY · OSAKI · NORDMENDE · LOEWE · OPTA · REDIFFUSION · PYE · PHILIPS · SANYO · SAISHO · SHARP · SONY · SOLOVOX · SUSUMU · TANDBURG · TELEFUNKEN · THORN · TRIUMPH · HUANYU · GOLDSTAR · BINATONE

FULL RANGE OF KONIG: VIDEO HEADS, BELT KITS, IDLERS, PINCH ROLLERS, TENSION BANDS. LARGE RANGE OF REMOTE CONTROLS IN STOCK

TIDMAN MAIL ORDER LTD · 236 SANDYCOMBE ROAD ·

RICHMOND · SURREY · TW9 2EQ.

Approx. 1 mile from Kew Bridge.

Mon-Fri 9 am to 12.30 pm &

1.30-4.30 pm

Sat 10 am to 12 noon

RECRUITMENT

WANTED

Experienced TV/Video Engineer to work full time on all makes. Excellent salary. References must be supplied. Apply to:

Mr. D. Day, M.T. SERVICES,
 Cutmaple Trading Estate,
 Sible Headingham, Halstead,
 Essex CO8 1UP
 TEL: 0787 88148

WANTED EXPERIENCED VIDEO AND TELEVISION ENGINEERS

Please read the small print before applying

Must have first class qualified engineering skills and experience. Able to work on own initiative and lead a small dedicated team to a better future.

Must be willing to work hard for good rewards. Ideal position for person who would like to improve his/her position with dynamic company dedicated to first class service.

Modern well equipped workshop in pleasant village of Hampton Hill. References will be required and taken up.

Apply in writing with full CV to:

AUDIO VISUAL MAINTENANCE LIMITED
 28 Windmill Road, Hampton Hill, Middx TW12 1RH

Tel:

081-652-8339

Fax:

081-652-8931

LINEAGE

AVO MULTIMETER Model 8, £45.00. 500 volt meters £30.00. Prices plus VAT and p & p. Send SAE for lists of Surplus Instruments & Scopes etc. A.C. Electronics, 17 Appleton Grove, Leeds LS9 9EN. Tel: 0532 496048.

METERS RECONDITIONED £1.00 slot meters for TV rental. £4.95. 50p slot £2.95. Audiotech Tel: 0790 3245.

SKY VIDEOCRYPT decoder service sheets with colour decoding tracks £15. Amstrad satellite tunable audio £18. E.M.O. Ramsbottom, Lancashire, BL0 9AG 0706 823036.

OCHRE MILL Technical Services. Grundig TV spares for most models to 1985, fast, friendly, helpful, sensible prices. Gt Lype Farm, Charlton Nr. Malmesbury, Wilts SN16 9DR. Tel: 0785 814643.

AVO MULTIMETER Model 8, £45.00. 500 volt meters £30.00. Prices plus VAT and p & p. Send SAE for lists of Surplus Instruments & Scopes etc. A.C. Electronics, 17 Appleton Grove, Leeds LS9 9EN. Tel: 0532 496048.

METERS RECONDITIONED £1.00 slot meters for TV rental. £4.95. 50p slot £2.95. Audiotech Tel: 0790 3245.

HITACHI MULTISYSTEM (CMT 2091) and Japanese basic Television wanted working or "complete" large or small quantities. Telephone Simon (0922) 694759 (evenings) or Mr Khalifa, Dubai (0109714) 369848.

SKY VIDEOCRYPT decoder service sheets with colour decoding tracks £15. Amstrad satellite tunable audio £18. E.M.O. Ramsbottom, Lancashire, BL0 9AG 0706 823036.

PRIVATE RETAILER has excellent part exchange colour televisions and videos to clear. Tel: 0494 814317.

BUSINESS FOR SALE. Established, profitable, TV, Video and Audio Sales and Service business in beautiful Harrogate, North Yorkshire. In busy area. Immaculate shop with excellent modern workshop facilities. Three year renewable lease. Very low rent. £22,000 plus stock at valuation. Telephone (0423) 521689.

OCHRE MILL Technical Services. Grundig TV spares for most models to 1985, fast, friendly, helpful, sensible prices. Gt Lype Farm, Charlton Nr. Malmesbury, Wilts SN16 9DR. Tel: 0785 814643.

STUDY ELECTRONICS on the BBC Micro. An interactive approach to learning. Four program titles available. 'Introduction to Electronics', 'Principles of Electronics Mathematics', 'Digital Techniques' and now programming for 'Electronics'. Programs include theory, examples, self test questions, formulae, charts and circuit diagrams. User inputs and calculated outputs. £29.95 each + £2.00 p&p. Cheque or Postal Order to E.P.T. educational software, Pump House, Lockram Lane, Witham, Essex, CM8 2BJ. Please state BBC 'B' or Master series and disc size.

WANTED: KT66, KT88, PX4, PX25 transistors etc. If possible send a written list. Prompt reply and payment. Billington Export, Unit F2 Oakendene Industrial Estate, Near Horsham, West Sussex. RH13 8AZ. Callers Strictly by appointment only. Phone 0403 865105 Fax 0403 856106 Telex: 923492 TRAG.

WANTED PHILIPS VR2840 (1984) preferably working. Also Philips VR2220 working or not. Phone Forshaw (0709) 881951 daytime or 02226 753413 evenings.

MCDONALD SERVICING Books 1968 to 1986. Sinclair DM350, PFM200. 40KV PROBE (Heathkit). AVO T1169. Radio and TV Mags, Data Books, Service Manuals. Large quantity of components and useful bits. £150 buyer collects. Tel: 0302 711269.

SEMICONDUCTORS 100 assorted Japanese transistor chips diodes £5.50 per bag incl. Tel: Morris 0782 212695.

DISPOSAL OF WORKSHOP Test equipment. Various Tektronix oscilloscopes from £60. AVO meters from £35. X-Y plotter. Marconi LCR bridge, quantity of valves. Tel: 0543 450347.

TUBES

REBUILT CRTs

VDU - MONITOR - TV

Image Burn-In Removed From Screen Phosphors

B.S.I. Certification

N.G.T. ELECTRONICS LTD.

120, Selhurst Road, London SE25 6LL

PHONE: 081-771 3535

Britain's Oldest Established Tube Rebuilder

TV TUBE REBUILDER

What ever make or type. Give us a call. Polish Service available. Discount offered on quantities & Regular orders. Also new tubes in stock at special low prices. Typical Types A51JAR, A51EAL, A59JMZ, A59EAK equipment.

M.B. ELECTRONICS

Unit 6, Guild Hall Ind Estate, Kirksandell Ind Estate,

Doncaster DN3 1QR.

Tel: 0302-891208

MISCELLANEOUS

RADIO CODE RE-PROGRAMMER MK 2

ATTENTION ALL SERVICE DEPARTMENTS.

For those of you who still do not have the equipment to decode radios, give us a call. Plug our decoder into your IBM or compatible computer and decode radios in a few seconds. You can start with basic system for as little as £395.00 + VAT. All leads, connectors, layouts and operating instructions supplied. All enquiries to:

Electronic Sound Systems

62 High Northgate, Darlington, Co Durham

Tel: 0325 484089, Mobile: 0860 221099

or Fax: 0325 465921

CAR RADIO CASSETTES

Do you turn away work on car radio cassettes because they have security codes.

Most radio cassettes can be decoded just by replacing the eeprom (memory IC) with that of a known code, or sending the original for re-coding.

All popular makes including Philips, Ford, Pioneer, Clarion, Grundig, Blaupunkt, Fisher, JVC, Alpine, Volvo, etc.

Send now for introductory offer, one of each of most popular eeproms + comprehensive eeprom/radio decoding list. Offer includes Philips X2402P; Ford MN010; Blaupunkt Boston CC20 9346: **£17.63**

Original eeprom re-coding service **£10.00**

Radio's sent for decoding from **£20.00**

Inc. of VAT and p&p
25% Discount to all account holders (conditional)

RADIO DECODING EQUIPMENT

We will beat any genuine written quotation for supplying a computer or software to decode radio cassettes, ring us first.

For technical or general information phone **0543 572 523 or 0831 806 574.**

C.D.H. ELECTRONICS
3 Common Walk, Huntington, Cannock, Staffs WS12 4NB

C.D.H. ELECTRONICS

WHY BUY SECONDHAND GOODS?

Double your profits with brand new goods.

Please state your requirements. **BULK BUYER ONLY.**

Write to:

M.E. P.O. Box 2739
West Bromwich, West Midlands B70 6E

TRAINING

Looking for a home study course, in the fundamentals of electronics? Whether you are a beginner, or an old hand requiring a refresher, the

DIRECT PERSONAL LEARNING

course, could be right for you. Contact: **K. Sparrow** etc... 11 Claydon Green Whitchurch BRISTOL Avon BS14 0NG
Telephone: (0275) 835669

TELEVISION CLASSIFIED LINEAGE

advertisements can be submitted on this coupon with a cheque made payable to Reed Business Publishing. Television Classified Room L327, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. The charge is £8.40 per line plus 17½% (minimum £33.60 + VAT.)

For Issue Dated or next available. Total insertions Total of Cheque £.....
Name Address
Post Code Tel Num Signature



Debit my Access/
Visa Card (delete)



Expiry Date

VAT Reg. No. 238 8937 10

Customer Technical Adviser

At Sony, we put as much effort and imagination into caring for our customers as we put into developing our products. It's an approach that continues to yield consistent business results - making us one of the most successful and popular names in the electronics industry.

To maintain and develop our performance, we are now looking for an experienced and articulate individual to join our Technical Training and Information Department at Thattham.

As a Customer Technical Adviser, you will provide a friendly and highly professional information service to the public. This involves dealing with letter and telephone enquiries of a technical nature which could range from model performance or interfacing through to compatibility between products.

c. £15k

Thattham, Berks

You will also provide market feedback to our Product Quality department, and ideally will have

the ability to cover for the Trade Technical Advisers - a role that requires a thorough knowledge of the circuitry of Sony products. Training will be provided if necessary.

It's a challenge that calls for a C&G 224 or equivalent, effective communication skills, and the ability to remain cool under pressure. Good letter-writing skills are essential, and you must have the tact and diplomacy to promote a good company image at all times.

The rewards include a competitive salary dependent on experience and benefits including Sony Healthcare insurance, 25 days' holiday, and discounts on Sony products. To apply, please send your CV, quoting ref 196, to Maggie Swann, Sony (U.K.) Limited, Sony House, South Street, Staines, Middlesex TW18 4PF. Tel: 0784 467446 (24 hours) for an application form.

SONY

SOFTWARE

User Friendly

SOFTWARE

FOR IBM COMPATIBLE PC'S RUNNING ON MSDOS
FOR THE BUSY TV/VCR SHOP/SERVICE DEPT
RECEIPT/INVOICE PROGRAM £89 + VAT + P&P

**OUR TV/VCR RENTAL PROGRAMME
IS NOW AVAILABLE**

Phone or write for details:

TBR Software 369 Chepstow Road
Newport, Gwent. NP9 8HU
Tel. 0633 282556

FOR SALE

TV's FROM £15.00 WORKING

VCR's non working £20. TVs/Videos working stock Hitachi,
Panasonic, Sanyo, Sharp, Toshiba. New 20" VHF/UHF
multisystems TV's £175. VHS/UHF Converters £9.99 Min 25.

SECAM TRANSCODER

4 wire connection suitable for any UK TV
P.O.A. Wanted regular supply of TVs and Videos

JOMILL ENTERPRISES

173 Dalston Lane, Hackney, London E8 1LA
TEL/FAX 081-533 2229/081-986 4710

ADVERTISERS INDEX

A-Z Electronics	892-893
Aerial Techniques	875
Alban Electronics	903
Anglian TV Wholesale	905
Antex Electronics	892
Apex Wholesale & Retail	911
Besco Ltd	906
B.K. Electronics	853
Broughlame Ltd	901
Campion TV	905
Central TV Wholesale	912
Chromavision	912
Coastal TV	905
Colourtrade of Birmingham	909
Crewe TV W/S	905
CTV	909
Datapart Ltd	895
DSD	910
East London Components	856
Economic Devices	884-885
Edicron	902
Electronic Sound System	898
Electronic Computer Workshop	856
Electronics World & World	903
Euras International Ltd	859
Express TV Supplies	898
General Factors	906
Gogglebox	911
Grandata Ltd	846-851
Hoopwell Ltd	901
Hussain Central TV Ltd	907
ICS Intertext Group	901
Irwin Electronics	896
J & N Bull Electrical	894
JJ Components	881
KC Marketing	909
Lancashire Trade	911
Lincoln House Trading	902
Manor Supplies	863
Marapet (EEM)	859
Omega Satellite Ltd	889
Philex PLC	1FC
Premier Cablevision	859
Prumax Instruments	895, 897, 899, 901
PV Tubes	856
Sendz Components	
Shergill TV	904
Stewart of Reading	897
Swift Television Publications	899
T Powell	897
Tele Spares Ltd	854-855
Teleprice Ltd	908
Trac Satellite Systems	895
Vista Electronics	892
Western Trade Services	906
W T Shipping	899
W Tree Trade Warehouse	903
Well-View	898
Willow Vale Electronics	852
Willsgrove Ltd	912

TX90 REMOTE PANEL IC TMS1000 AND M293 £12 LNB's WITH FEED HORN AND POLARIZER 10GHz TO 12.75GHz 1.5 db s.n. £35. SEND FOR DATA.		SATELLITE RECEIVERS 19 C.H. with Hand Set £40 32 C.H. Postage £5.00		SEND FOR DATA D2 MAC SATELLITE RECEIVER, LNB AND DISH. £50 (£10 Post)	
SATELLITE RECEIVERS — New Ferguson BSB Chassis with Tuner, Modulator etc £10 Hand Set £1.50 £4 Post		60cm SATELLITE DISH £35 Postage £5.00		Replaces 90% of Philips Handsets Philips Video KTY Handset with LCD display AV5661 AV5659 £6	
SMALL SATELLITE TUNERS (950 to 1750MHz) L.F. frequency 400MHz..... £9.00 each VHF/UHF S BAND TUNER..... £3.00 NEW PLASTIC CASE 32 C.H. SAT-RECEIVER (no hand set)..... £35 (Post £5) NEW METAL CASE SAT-RECEIVER, 32 C.H. WITH DOLBY & CHANNEL C (no hand set)..... £35 (Post £5) DAM MAINS CHASSIS AMSTRAD MONITOR C..... £110 UNIVERSAL TRIPLER, NEW TYPE..... £4.00 VIDEO LEADS..... £0.00 AMSTRAD Line O.P. Transistors with Diode 2SD453..... £1.00 HITACHI & GEC FRAME, Thick Film..... £1.00 VIDEO LAMPS, Long Lead..... £2.40 HITACHI & GEC FRAME, Thick Film..... £6.00 FIDELITY SPLIT DIODE..... FCC 2215AE..... £20 FCC 2015DE..... £10 FCC 2215BE..... £10 K30 FRONT PANEL TEL-TEX TYPE..... £5.00 NEW G11 LINE OP PANEL..... £8.00		CAMCORDER SANYO NP22 6v 1300mah Rechargeable Battery Pack £6.00		PB500 Panic and Button Transmitter 180MHz £1.00 G11 CAP 250V, 470M £1.35	
PHILIPS YEARS AHEAD THE CREDIT CARD CALCULATOR Solar Powered..... £3.75 NEW PHILIPS SBC 1833 Solar & Battery Powered Calculator..... £8.00 THORN PANEL TX9 REC & REMOTE PANELS with Mains Trans..... £5.00 TX10 REC & REMOTE PANELS with Mains Trans..... £5.00 TX100 FRONT PANEL..... £3.00 TX10 TUBE BASE ON PANEL..... £2.00 TX10E..... £5.00 THORN PANEL No.515-353, 548.02, 564.01, 509/102, 515/173, 508/161..... £5.00 THORN TX STEREO SOUND O.P. PANEL (I.C. TA7227P)..... £1.00 THORN VIDEO AERIAL AMP O1 M4-597-001..... £6.00 ULTRASONIC TRANSDUCER..... 15p IN LINE 12-35 VOLT SUPPRESSOR 4.000 MRD..... 20p		SATELLITE UNIT Video Out/Audio Out, L and R Polariser ± 35MA and Decoder Socket £15 in case		Gas Soldering Irons Variety Nickel Cadmium Batteries from Telephone Type to Sub-C 50p per cell. Mainly in packs of 6 to 8. New Type £10.00	
FERGUSON BSB SATELLITE RECEIVERS We can convert all Ferguson BSB 1 Satellite Receivers to the ASTRA system for £50. Or can supply module, size 2" by 1 1/2" which will easily mount inside receiver. Also can convert BSB to 2D MAC. Only Ferguson receiver.		Philips Stereo Headphones No. SBC 3140 £4.00 144MHz Changed Over Relay Aerial 50p THICK FILM HITACHI HM9205A £4.00 TX90 FERGUSON BATTERY MAINS CONVERTOR £8 each		PHILIPS UNIVERSAL BATTERY TESTER SBC 1695 £5.00 GEC 20AX POWER SUPPLY Mark 1 and 2 £10.00 ONE I.C. K35 Decoder £10.00 PHILIPS Desk Calculator £7.00 REGULATED PWK. SUP. 500mA 1.5V-12V DC switched + & - £5.00 ITT Tuner & IF. Cam HF-module 2 UK £20.00 KTS-K30 IF £5.00 STR5481 £5.00 TX100 Push Button Unit 16 CH £10.00 CAR ADAPTOR fused 3 Amp Long Lead with plug for TV etc 25p 500 off, 15p Each WIRE PIPE stud detector £4.00 MICROWAVE leak detector £4.00 WIRE & PIPE detector £4.00	
NICAM UNIT — Ferguson made for ICC5 Chassis — home market and export — has circuit diagram and can be converted to most sets — £15.		TX9-TX100 FRONT PANEL £5 WITH REMOTE £10 NON REMOTE 8 push button £10		SALORA 19" RACK MOUNT SAT RECEIVER with Variable Tuning £30.00 Post £5.00 STEREO SOLAR RADIO VHF AND MW £13.00 COST £25 PHILIPS METERS £9 G11 470 MFD 250V £1.35 CASSETTE SCART MAINS Socket, Print LEADS 30p Type 20p TELEPHONE EXT. LEAD 3 Metre 30p LEAD SCART TO D PLUG 50p BRIDGES RECTIFIER Mixed BR-31 to 34 2 Amp to 5 Amp 8 for £10.00 TX90 MOD 3714B The Sweep Tuning System TX9139/001 £12.00 T6070V TX9 Transistor £1.00 1 METRE SCART LEAD £1.00 VIDEO SCART TO SCART ALL PIN, LONG LEAD £3.00 ALL PINS TX90 TX925 TX100 Mains Switch with Stand-by and Lead 50p each UNIVERSAL VIDEO-RECORD KIT STEREO This kit may also be used to connect a mono to stereo. £10. UHF Modulator MPS18010 30p	
LARGE Focus Pots. Fits Pye, GEC, ITT, Decca 75p BSB SAT/REC HALF COMPLETED. CHASSIS, TUNER AND MOD £5 + Post £3		PHILIPS NEW TYPE U/V HANDSET £10		DECODER C-CAM PHILIP MADE for K40 CHASSIS IC No. TDA 3590 £5.00 R.G.B. CONVERTER £20.00 TV - Video - Hi-Fi Video in - R.G.B. out in black metal case with black knobs 56420A 20A/600V THYRISTOR £1.75 LCD VIDEO AMSTRAD HANDSET for models 1990 £8 each ITT BG2032-642A TRIPLER £5.00 ITT/NOKIA RF IF MODULE £20 COAX PLUG TO PHONO LEADS £1 SCART TO SCART LEAD £1 TV GAMES AERIAL VIDEO COMBINER SWITCH £1.50 MIXED 20 BRIDGE RECTIFIERS (1 Amp to 5 Amp) £1.50	
G11 OPT Panel £3.00 G11 Tip Switch £30.00 G796-2000 £1.00 G11 Decoder Panel £2.00 GR Push Button Unit £2.00 GR Con Panel New Back Type £4.00		MIXED TOSHIBA HAND SETS FIVE FOR £12		SECURITY FLASHING LIGHT WITH RED & AMBER LENSES & MAGNETIC FACILITIES £1.00 EACH DAMAGED AMSTRAD 1640 Colour Monitor Chassis £6 + post £3	
Have you got Acid Rain in your garden? PIAFTER Video Power Supply for Amstrad. Last year mod. Mains Transformer for Amstrad Video £5.00 £1.50 25p (£1 post)		LATEST VIDEO For Latest Philips, GEC, Pye and Hitachi. Front panel with memory chip and push button and pots and LEDs. £6.00 NEW		FERGUSON CHASSIS IKC-2000 £20 IKC-2705 PAL/SECAM/NTSC £20 TX89 £20 TX99 £20 GEC HITACHI DECODER PANEL TB4810AS, TB4120, HA1215A, UP1365 £10 SCART TO SCART LEADS 10 FOR £5 VIDEO MOTORS 5 Mixed AMSTRAD £5.00 SATELLITE TUNER UNIT 2427611 with Base Band, Video Out £15.00 TX10 8 way button unit £6.00 THORN TX90 Remote chassis 14" Complete £12.00 MSH1FC F09 £9.22	
SPLIT-DIODE 243795 £20 2432964 2432971 2432901 2435016 2435952 2434993 2432211 19048A DST185B243 TFB 906091 K41 L.O.P.T. K45 L.O.P.T. K30 2433452 2432964 £10 EACH DST 81N243 TFB4023AD £10.00 MSH1FB1P131 £12.00 MSH1FBW27 £12.00 DST186N243 £10.00 TOSHIBA DST 186N243 £10 TFB-1023AD £10 CP90 Philips Split Diode £10.00		L.O.P.T. SPLIT-DIODE PHILIPS £10 EACH		TRANSFORMERS 2435701 £10 2435012 £10 FERGUSON 470R3481 £10 AMSTRAD TVR3 LPTS £10 TFB3069D EQU TFB40X9AM AT 2106/60 AT 2076/55 AT 2428/11 AT 12076/71T AT 21055 AT 2180/15 AT 21076/35 RCOST CT3325 AT 21076/38 OT1341 AT 21076/51 TH1058KA Orion CVC 520 2076/51 CVC 501 2432401 2433451 SHARP MSH1FC F09 £10 EACH FIT MOST SETS New Thorn Hand Set Type u/v (£10) BRIDGE RECTIFIERS 10 FOR £1.00 4 Amp for Video Power Supply VIDEO MOTOR for VT568 type VC62DD5 AMP/TUNER IF for VT568 Hitachi & GEC £9.00	
SATELLITE TUNER 950MHz-1750MHz £5.00 TTT PANEL CMC 301 CMC 113 CMC 302 CMC 115 CMC 303 CMC 964 £5.00 VIDEO LEADS 4 for £1 SEL ITT 1FB254F2 Front Panel £15.00 DECCA — GEC — ITT 6 push button £5.00		BURGLAR ALARM £2.00 with siren 9 VOLTS RELAYS 35p 5V-12V-24V-48V Large and Small 25 Way Plug and Socket with Case £1.50		KIKUSYI 20 MHz OSCILLOSCOPE (5020) £200 40 MHz OSCILLOSCOPE (5042) £250 60 MHz OSCILLOSCOPE (7060A) £1000 DELAY PROGRAMMABLE 12V1 AMP POWER SUPPLY WITH MAINS PLUG £4 PHILIPS HALOGEN LIGHT. NEW. NO ON/OFF SWITCH. NO HANDLE WITH CORD. BLACK IN COLOUR £5 PHILIPS HAND SET G11 TEXT IN RED G11 HAND SET PHILIPS RC5 G11 TEXT ULTRASONIC £10 HAND SET £12.50 ULTRASONIC £10 EASY CONTROL £10 TRV3 Amstrad Cassette Mechanisms. New with 2 motors and sound head. £15. TVR3 Power Supply. £5. Amstrad Television Tuner UHF. Small. Fits most Amstrads. £6.	
SENDZ SEE BACK PAGE		PHILIPS SBC 522 RGB1 GENERATOR £90 PHILIPS SBC 850 ANALOG MULTIMETER £11.50 PHILIPS SBC 521 RF SIG GENERATOR £90.00 FERGUSON TX100 — IK2 and IK7 MANUAL £1 each		FERGUSON ICC5 STEREO O.P. PANEL IC5 TDA8405 TDA8421 TBA1204 £10 Burglar Alarm Has time delay to set £2 Mains Transformer 240v In 110v to 120v out 1 amp post £3	

SENDZ COMPONENTS

TO ORDER SEE BACK PAGE

Product Code	Price	Description	Price	Part Name	Price	Part Name	Price
LA11440	£1.00	K35 Decoder	£8.00	Voltage Regulators	30p	CV 8617	10p
TAA4750	50p	K35 Sound OP	£4.00	+5V/1A78POS5C	Y 716	Y 716	10p
IAA41485	£1.00	Thick Film Daughter K13 33122-17-43991	£3.00	-8V/79M08c	Y 729	Y 729	30p
UPC1373	50p	12 CH. K30 Tex Rec Front Panel with L.C.	£5.00	+6V/78M06c	Y 730	Y 730	10p
M58657P	£1.00	Plug In	£1.00	LM 317T	Y 861	Y 861	20p
M4911B1	£3.00	Fidelity Tube Base with transistor & focus pot	£1.50	LM 337	Y 933	Y 933	30p
M5041/550	£1.00	Transformer CVC 32 LOPT	£6.00	LM 342/18	Y 969	Y 969	50p
M58658P	£1.00	TX10 Tube Base on Panel	£3.00	LM 347/5.0	Y 997	Y 997	30p
Receiver TX100 Panel		1000 L.O.P.T. Green Spot		+12V/1M 340712	Min 12 volt Relays	R 1038	75p
L.C. No. SA83035		TX100 Thorn		+18V/MC78M18	R 1038	R 1039	40p
MA168440P/D066		Universal Tripler with small focus pot. Green type	£7.00	+24V/78M24	R 2009	R 2010	50p
SA11080		Black Triplers		MC 7724cp	R 2010	R 2010	50p
PCF8571P		KT3 Triplers	£6.00	MC 7825	R 2029	R 2029	50p
		S.T.C. Universal Tripler	£6.00		R 2210	R 2210	60p
		Rank T25LE Tripler	£3.50		R 2257	R 2257	50p
		Rank 11 TCP A-823	£2.00		R 2265	R 2265	50p
		TU 25 30k Rank	£3.00		R 2305	R 2305	40p
		11 TEZ Rank	£3.00		R 2322/2323	R 2323	80p
		G9 Philips	£4.00		R 2396	R 2396	50p
		GEC 2110	£4.00		R 2461	R 2461	80p
		3500 Thorn	£3.00		R 2030	R 2030	50p
		8500 Thorn	£3.00		R 2433=HID 124	R 2540	30p
		9800 Thorn	£7.00		R 2737	R 2737	£2.00
		9500 Thorn	£4.50		R 2738-TIP41	R 2738-TIP41	40p
		9600 Thorn	£4.00		R 2775-TIP41c	R 2775-TIP41c	40p
		2040 GEC	£3.50		R 3129-TIP47	R 3129-TIP47	40p
		GEC TVM25 Tripler	£2.00		T 608SV	T 608SV	50p
		Universal Tripler	£5.00		R 4050	R 4050	£1.00
		G8 Tripler	£5.00		S 3008B	S 3008B	80p
		CVC32-32	£5.00		25D999B	25D999B	80p
		Decca 80100	£4.50		25C 742	25C 742	£1.00
		Grundig TVK 52	£2.50				
		IFHQ Pye 731	£3.00				
		IFHQ	£4.00				
		D22 for Pye 18" colour portable	£4.00				
		LPI 1193/63	£4.00				
		BG 10041	£3.25				
		ERO Tripler print type with focus P07					
		BG2087	£5.00				
		GEC 8 touch unit assy complete with all L.C.s + pots	£4.00				
		G11 E.W. Transformer	50p				
		G11 E.W. coils	£1.00				
		G11 Transient Suppressors 245V	20p				
		G11 Sean Coils	£5.00				
		G11 100k tuner pots	12 for £1.00				
		K13 IF panel	£6.00				
		K13 line OSE transformer	£1.00				
		K13 K30 infra-red receiver head	£1.00				
		K30 Drawer unit with IC's (home)	£10.00				
		K30 drawer unit with IC's (export)	£10.00				
		K13 AE Sockets	£8.00				
		K13 receiver panel	£8.00				
		K13 line driver transformer	50p				
		Oye, K30, GEC, etc. Pre-mains stand-by switch	£1.00				
		Decca 80/100 IF panel	£5.00				
		NPN PNP 80V 6 Amp TO66 O.P. Trans. pair 25p					
		5 button touch tuner BBC1/2 ITV/1/2 video with ie SAS 540T/570T	£7.00				
		Control panel 5 sliders + mains lead	£1.50				
		G11 8 touch button unit replaces old P.B.U.	£24.00				
		Tube base + base unit for S20 Euro chassis	£4.00				
		CEC Line O/P Trans. & Rec Stick for Portable	£3.00				
		CVC 2025/3035/40 decoder panel	£10.00				
		CVC 2025/3035/40 decoder panel (untested)	£5.00				
		CVC 4045 IF panel	£5.00				
		40K Transducer	50p				
		PHILIPS NES11N	£1.20				
		LN337M Reg.	30p				
		20 GEC Black Spark Gaps	£1.00				
		K13 Front Panel Control Assy.	£2.50				
		BTW 3050	50p				
		THORN CASSETTE HOUSING PAS26805U	£18.00				
		LITHIUM BATTERY BR-2/3 Volts	20p				
		TUNER, SAT 2000 KHC	£8.00				
		MIXED FUSES 1 1/4 AND 20mm and Black Print Type 100 off £2					
International Rectifier EHT Diodes G77011V34 6KV		3 for 8p					
6A/800V Stud Diodes	20p	BTW 92800R	£3.00				
6A/100V Stud Diodes	20p	25A473 PNP C/P	10p				

