

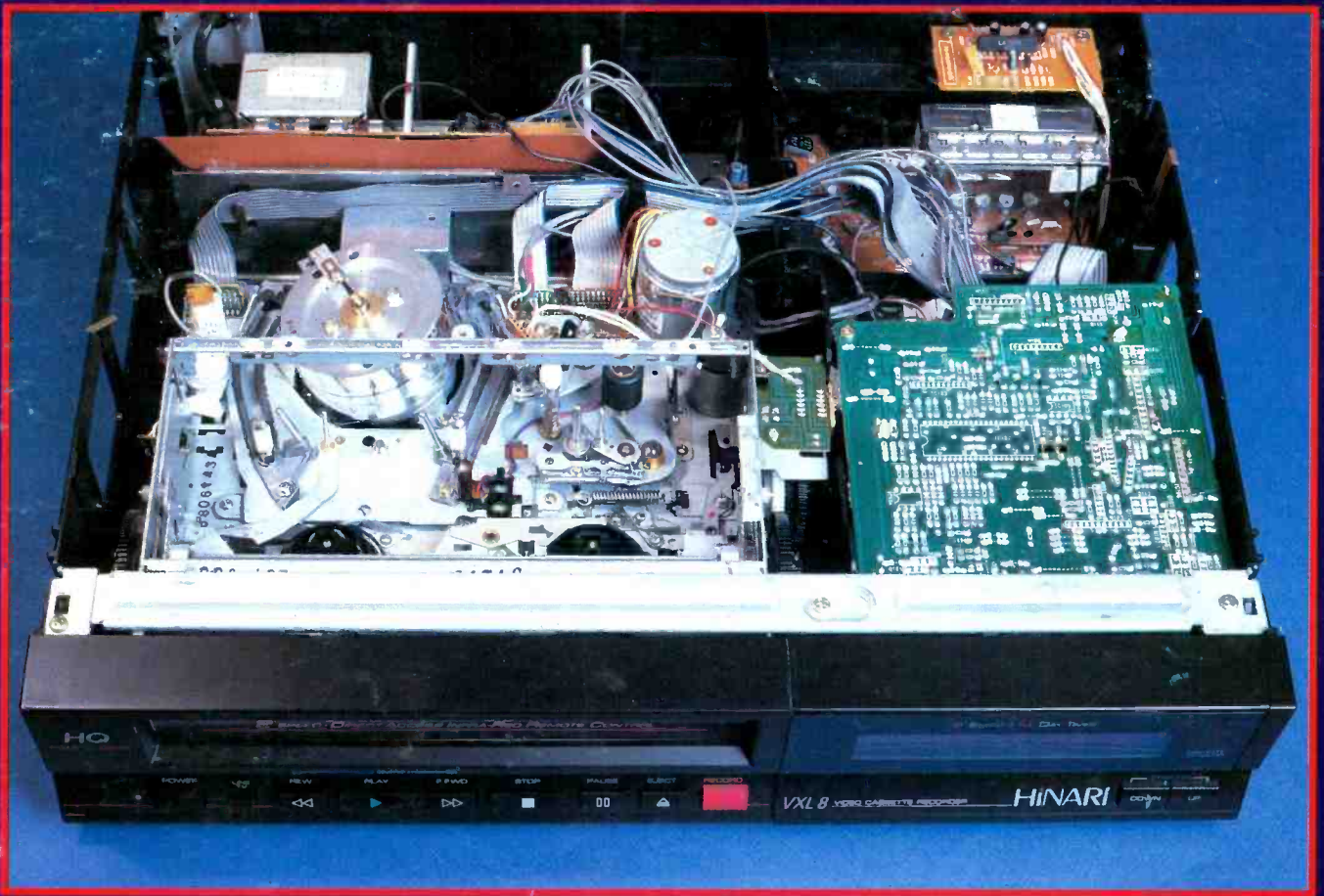
JUNE 1992

£1.95

TELEVISION

SERVICING · VIDEO · SATELLITE · DEVELOPMENTS

FREE TV/VCR SPARES GUIDE



Servicing the Hinari VXL8 VCR
Some TV Field Fault Experiences
Satellite Notebook • DX Filters
TV and Video at the Trade Shows
VCR Clinic • TV Fault Finding
Dish Alignment Aid • DX-TV

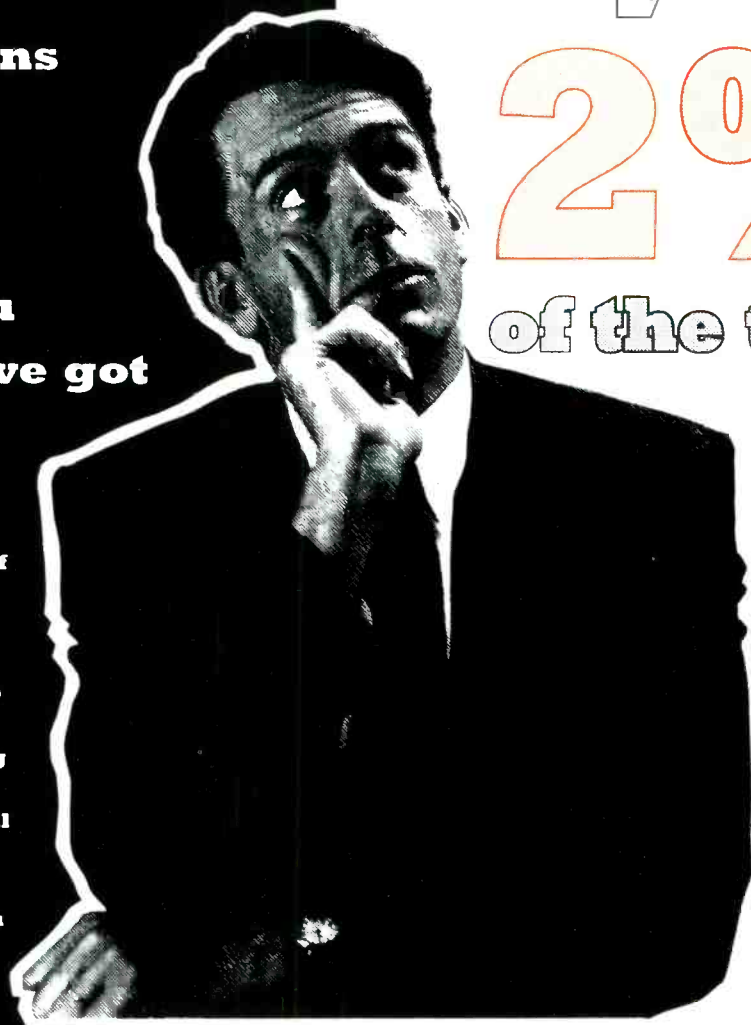


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the widest range of
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equipment to
enable you to keep
abreast with
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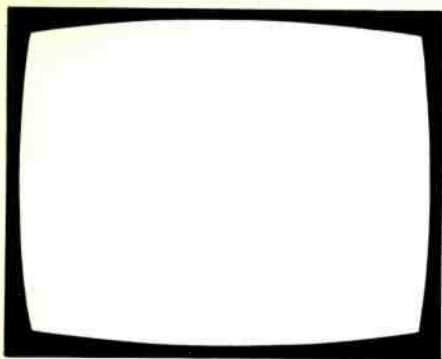
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INDEXES AND BINDERS

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QUERIES

We regret that we cannot answer technical queries over the telephone nor supply service sheets. We will endeavour to assist readers who have queries relating to articles published in *Television*, but we cannot offer advice on modifications to published designs nor comment on alternative ways of using them.

this month

- 553 Leader**
- 554 TV Fault Finding**
Reports from Steve Cannon, Brian Storm, Ed Rowland, Chris Avis, Mick Dutton, Chris Watton, J.K. Potts, Michael Dranfield and John Edwards.
- 558 TV and Video at the Trade Shows** *George Cole*
A look at the new products and developments that should stimulate trade in the 1992-3 season.
- 561 Next Month in Television**
- 562 Servicing the Hinari VXL8** *Graham Rees and Joe Cieszynski*
This VCR, with its budget price and attractive range of features, was sold and rented in large quantities. It has gained a reputation for being difficult to deal with, but most fault conditions have simple causes - provided you know them! This article provides guidance based on considerable experience of these machines and associated models/clones.
- 568 Teletopics**
News, comment and developments.
- 570 Satellite Notebook** *Nick Beer*
Servicing problems with satellite TV installations.
- 571 CD Player Casebook**
Reports from Mike Leach, P.J. Roberts and Nick Beer.
- 572 Letters**
- 574 What a Life!** *Donald Bullock*
Awkward sets and their odd owners.
- 575 Satellite Dish Alignment Aid** *Bas Carter*
This simple meter expander enables much more accurate dish alignment readings to be obtained.
- 576 Filters for DX-TV Systems, Part 1** *Keith Hamer and Garry Smith*
Ways in which interference can occur on a DX channel and basic filtering techniques to provide a cure.
- 578 VCR Clinic**
Reports from Philip Blundell, AMIEIE, Nick Beer, Eugene Trundle, Brian Storm, Ronnie Boag, Graham Rees, John Edwards, Gerald Smith and Michael Dranfield.
- 582 Field Faults in Modern TV Sets** *Steve Cannon*
The field output stage is not the most reliable section of a modern TV set. Some recent fault experiences.
- 583 Microcomputer Notes**
Comments on servicing problems with microcomputers.
- 584 Long-distance Television** *Roger Bunney*
DX conditions and reception and news from abroad, including satellite notes.
- 586 Photostat Service**
- 587 Transistor Junction Breakdowns** *George Wilding*
The causes of junction failure in TV sets and the symptoms they produce.
- 588 Test Case 354**

OUR NEXT ISSUE DATED JULY WILL
BE PUBLISHED ON JUNE 17

Table listing electronic components such as resistors, capacitors, diodes, and integrated circuits. Columns include part numbers, values, and manufacturer codes.

IDLERS & PULLEYS REPLACEMENTS				IDLERS & PULLEYS REPLACEMENTS — Cont.				VIDEO MOTORS			
AMSTRAD		Reference	£1.50	NATIONAL			£3.00	AMSTRAD			£17.00
VCR7000		150280		NV322, NV600, NV688, IDLER UNIT		VXP0463		VCR 7000		REEL MOTOR	
AKAI				NV333, NV366 IDLER ARM		VXL0997	£3.60	FERGUSON & JVC			
VS1-2, VS4-5, VS15	FF-REW IDLER	M1327773	£4.50	NV333, NV366 IDLER UNIT		VXP0401	£0.75	PU 45979, 3V16, 3V22, HR3300, HR3660		CAPSTAN MOTOR	£21.00
VS1-2, VS4-5, VS15	T-UP IDLER	BV327815	£6.00	NV333, NV366 PLAY IDLER		VXP0433	£3.00	PU 55371V, 3V35, 3V36, 3V38, 3V39,		CAPSTAN MOTOR	£19.50
V9700	IDLER	BV321979	£6.00	NV333, NV3000 ACTION GEAR		VXD00016	£0.60	8943, 8944, HRD110, HRD120, HRD121,			
VS125, 126, 155,	IDLER ASSY	MZ366960J2	£11.00	NV333, NV2000, NV3000 LOADING GEAR		VXP0325	£2.00	HRD225			
VS165, 240, 244,				NV7800				PU 46414, 8904, 8922, HR3300, HR3320,		DRUM MOTOR	£19.50
VS245, 247, 248,				NV333, NV2000, NV3000, INTERMEDIATE GEAR		VXG0017	£0.65	HR3330, HR3360, HR3600, HR3660			
VS250, 512, 515, 516				NV333 CAM GEAR		VXG0158	£1.00	PU 51381V, 3V39, 3V30, 8930, HR7200,		REEL MOTOR	£26.50
FERGUSON				NV366 IDLER ARM		VXL0997	£3.60	HR7300			
3V16-22	T-UP IDLER	PU47752	£4.50	NV370, NV430, NV730, IDLER ARM		VXPO521	£1.70	PU 58635V, 3V58, 3V59, 3V64, 3V65,		CAPSTAN MOTOR	£29.00
3V16-22	T-UP IDLER	PU49280	£6.30	NV830, NV850, NV870, NVG7, NVG10, NVG12, NVG18				8950, 8951, FV108, FV11R, FV12L, FV13H, FV20B, FV21R, FV22L, HRD170, HRD180, HRD230, HRD370, HRD430			
3V23, 3V29-30, 3V31-32, 3V35	REEL IDLER	PU48967	£3.00	NV370, NV430, NV870, CAM GEAR		VXD0200	£1.20	PU 58636V, 3V58, 3V59, 3V64, 3V65,		REEL MOTOR	£18.00
3V23	ROLLER ASSY	PU49042A	£4.00	NV730, NV830, NV850				8950, 8951, FV108, FV11R, FV12L, FV13H, FV14T, FV20B, FV21R, FV22L, HRD170, HRD180, HRD230, HRD370, HRD430, HRD530			
3V29-30, 3V31-32, 3V35-36, 3V38-39, 3V49	T-UP IDLER	51402	£1.45	NV730 IDLER UNIT		VXPO581	£2.50	3V43, 3V44, 3V45, 3V48, 3V53,		LOADING MOTOR	£8.00
3V29-30, 3V31-32	T-UP CLUTCH	PU51380	£2.60	NV2000, NV3000 IDLER UNIT		VXPO331	£1.20	3V54, 3V55, 3V56, 3V57, 8945, 8947			
3V35-36, 3V38-39, 3V49	REEL IDLER	PU55374	£2.85	NV2000, NV3000 CAM GEAR		VXD0069	£1.00	8948, HRD140, HRD150, HRD455, HRD565,			
3V35-36, 3V38-39, 3V49	T-UP CLUTCH	PU55373	£2.25	NV7000, 7200, 7800 IDLER UNIT		VXD0016	£1.00	HRD725, HRD755, HRP50, R73AF			
3V58-59, 3V64-65, FV10-11, FV12-13, FV14	IDLER ARM	PU58645	£2.50	NV7000, 7200, 7800 IDLER UNIT		VXP0343	£1.00	MITSUBISHI			
3V42	CLUTCH ASSY	PU55822	£13.50	NV8400, NV8600, IDLER UNIT		VXP0245	£1.20	288P02801, HS300, 301, 302, 310		MOTOR REEL SPOOLING	£33.50
3V44	CLUTCH ASSY	PU57658	£11.50	NV8610, NV8620		VXP0243	£1.20	288P02806, HS303, 304, 320, 330, 700		MOTOR REEL SPOOLING	£31.50
3V42, 43, 48, 53, 56	T-UP CLUTCH	PU56043-1-4	£2.80	NV8620, NV8610, NV8620 PLAY IDLER		VXP0343	£5.50	288P03401, HS303, 700		MOTOR REEL TAKE-UP GEN	£21.00
3V42, 43, 48, 53, 56	SUPPORT CLUTCH	PU56044-1-5	£2.80	NV8620 CLUTCH		VXP0343	£5.50	NATIONAL			
FISHER				NV600 IDLER		VXP0488	£5.80	MYN 135V5L, NV332, NV333, NV340,			
FVHP520, FVHP530	FF-REW PULLEY	H1638531	£1.00	NVG21-25, NVG40-45		VXP0767	£5.80	NV366		REEL MOTOR	£13.50
FVHP615	COMP. IDLER ASSY	F11430420400300	£3.30	ORION				VEM0212, NV730NV770		MOTOR REEL GEN	£30.00
FVHP615	GEAR IDLER ASSY	F11430490400900	£5.50	VH200-201 IDLER		850A200004	£3.50	SANYO			
FVHP840	REEL T-UP ASSY	F11430410400900	£6.50	VH555-700, VH844-900, VH1000-1500, VH1800, VP200, VHS30				4-529V-10800 (RM11), VTC5000, VTC5150		REEL MOTOR	£6.30
FVHP905, 906, 908, FVHP910, 916	GEAR IDLER ASSY	F11430490402400	£6.20	VH355-630, VH635-640, VH893-1440, VH2500-2600, VH2700-4010, VH5010				SHARP			
FVHP975, 990, 999, FVHP5000, 5100	IDLER	F11430420400700	£5.20	PHILIPS				RMOTV 1008GEZZ, VC200, VC381, VC384, VC385, VC386, VC483, VC3900, VC8381, VC9100, VC9300, VC9500, VC9700		REEL MOTOR	£13.50
GOLDSTAR				DV464, VR6462, VR6463, IDLER		52220334	£2.50	RMOTV 1007GEZZ, VC387, VC483, VC486, VC585		REEL MOTOR	£16.50
	IDLER	435038A	£2.50	VR6660, VR6660				RMOTV 1010GEZZ, VC300, VC402, VC471, VC477, VC481, VC482, VC488, VC496, VC500, VC571, VC581, VC582, VC583, VC584, VC5F3, VC8481, VC8581		REEL MOTOR	£16.00
HITACHI				VR6460, VR6520, 6920 IDLER ARM		40340162	£1.70	SONY			
				DB532, VR6542, VR6843 REEL IDLER			£7.50	BHF 1100D, SLC7		CAPSTAN MOTOR	£25.00
				SANYO				CASSETTE HOUSING			
				VHR110, VHR1300, IDLER		1430662T14730	£5.00	3V38, 3V39, 8943, 8944, 8951, 3V35, 3V36, HRD110, HRD120, HRD121, HRD225			
				VHR1500				3V42, 3V43, 3V44, 3V45, 8945, 8947, HRD140, HRD141, HRD150, HRD455, HRD725			
				VTC5000, VTC5150 FF-REW IDLER		1430741T20001	£3.00	8948, 8950, FV108, FV12L, FV13H, FV14T, FV20B, FV21R, FV22L, HRD230, HRD430, HRD530			
				VTC9100, VTC9300 IDLER		1430551T01400	£1.20	3V58, 3V59, 3V64, 3V65, FV11R, HRD170, HRD180, HRD370			
				VTC9300 FF ROLLER ASSY		1430547T00200	£2.20	VIDEO LAMPS			
				VTCM10-20 REEL DRIVE PULLEY		1430662T10350	£5.00	UNIVERSAL VIDEO LAMPS 12V 60mA (300mm WIRES)			£0.30
				VHR2100, VHR2300 IDLER		6130374899	£5.00	PANASONIC VIDEO LAMPS			£0.50
				VTC5000, VTC5150 PULLEY		143-0-662T-01201	£5.20	SONY FLYBACK TRANSFORMERS			
				VTCM10 PULLEY		143-0-662T-10350	£5.50	Part No. Models Price			
				SHARP				1-439-216-00 KV-2002E, 2010E, 2200E, 2015, 1820E, 2010SE, KV-2012ME, 2016ME, 2015ME, 2010ME			£14.00
				VC651, VC681, VC685 IDLER ASSY		NPLYV0107GEZZ	£6.15	1-439-256-11 KV-2704EC, 2704UB, 2704ET, 2704E(A), 2704E			£40.00
				VC7300, VC7700 PLAY IDLER KIT		NPLYV0041 + NDA1V1007	£5.00	1-439-286-21 KV-2215UB, 2217UB, 2215EI, 2215FE, 2212EX, 2215ET			£30.50
				VC381, VC383, VC386, VC831, VC9100, VC9300, VC9500, VC9700		NIDL0005GEZZ	£1.50	1-439-289-21 KV-2705FE, 2705FE, 2705UB, 2705E, 2706UB, 2720EC			£40.00
				VC300, VC387, VC481, VC482, VC483, VC496, VC571, VC585				1-439-303-00 KV-2064EC, 20P51, 20B2ME7, 2056EC, 2060SA, KV-2062E(ESP)			£22.75
				VC780-781, VC785-787, VC793-VC772		NPLTV0111GEZZ	£7.00	1-439-311-00 KV-1440AEC, 1440AS MK2, CPS-14CD3, CPV-14CD2, KTX-1350NF, KTX-1430UB			£22.00
				SAISHO				1-439-332-21 KV-2756, 2730EC, 2730FE, 2764EC, 2752UB, 2752F			£30.00
				VR1100, VR1200, VR1200HQ, VR1600, VR2500, VR3300, VR3500, VR3600		850A20000	£6.50	1-439-333-00 KV-1882EC, 1882UB, 1882F, 1882CH, 1882AEB, 1882AM, KV-1882ME3, 1882HK, 1882AS, 16TR1, 882C(PS), 1770R			£21.50
				SAMSUNG				1-439-363-21 KV-19HT1A, 19FX1MT, 18G2, 1602M7, 1602GE, ADM-16B, KV-2092UB, 2096UB			£22.00
				VT510-511, VT520-610, VT611-616, VT620-621-626		65224704220	£1.50	NATIONAL LINE OUTPUT TRANSFORMER			
				VT510-511, VT520-610, VT611-616, VT620.621, 626		69000250330	£4.50	TLF 146-11B £19.00			
				SONY				TLF 15542F £25.00			
				C6 IDLER KIT ASSY		A 6706391	£3.50	TLF 14568F £26.00			
				C7 IDLER ASSY		X 36533100	£3.80	TLF 14567F £26.00			
				SL-C5, SL-C7 REW PULLEY		A-6706-348-B	£4.00	TLF 14715F £27.00			
				SL-C6 REW PULLEY		A-6706-391-A-B	£3.00	TLF 14749B £20.00			
				CASSETTE DC MOTORS				NATIONAL TRANSFORMERS			
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				12V CCW MOTOR £2.00				GRANDATA LTD			
				13.2V CW MOTOR £2.90				K.P. HOUSE, UNIT 15,			
				13.2V CCW MOTOR £2.90				POP IN COMMERCIAL CENTRE,			
				CASSETTE TAPE HEADS				SOUTHWAY, WEMBLEY,			
				MONO HEAD £0.90				MIDDLESEX, ENGLAND			
				STEREO HEAD £1.50				Tel: 081-900 2329 Fax: 081-903 6126			
				MINI HEAD £2.30							
				AUTO REVERSE HEAD £2.60							

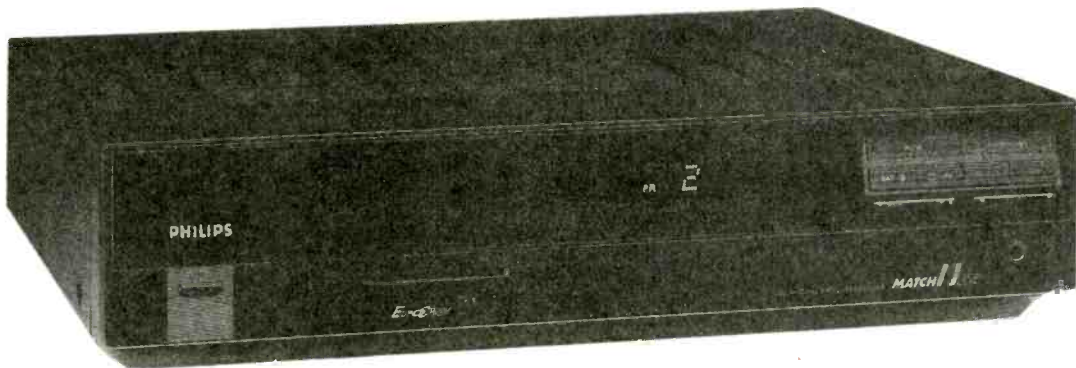
MATCHLINE D2MAC/PAL SATELLITE RECEIVER

STU 901

£499 inc VAT

TRADE DISCOUNT AVAILABLE
ADD £10 FOR POST & PACKING

LIMITED QUANTITY OFFER
ALSO OPERATES AS D2-MAC DECODER FOR USE WITH
ECHOSTAR, CHAPARRAL, DRAKE, PALCOM Etc



PRODUCT PROFILE

- D2-MAC/PAL satellite receiver.
- 98 preselections.
- Menu control for user-friendly operation.
- Full remote control.
- Parental lock.
- Eurocrypt scrambling/conditional access system.
- Internal Smart Card reader for conditional access.
- Headphone Connection.
- Dual-band LNC Switching.
- D2-MAC processing includes :
 - Digital Hifi sound processing
 - Automatic language selection
 - Digital video processing compatible with future High Definition TV broadcasts (HD-MAC)
 - Wide Screen picture processing
 - TXT reception.
- PAL processing includes :
 - 6 mono sound channels (main and multilingual)
 - 3 stereo sound channels
 - PAL encoding.
- Various connection possibilities :
 - 2 Euroconnectors for TV and Video.
 - S-VHS output.
 - 2 Dish antenna inputs.
 - Magnetic polarizer control.
 - Audio outputs CINCH.
 - Terrestrial antenna loop through.
 - PAL Baseband output.

Philips Consumer Electronics



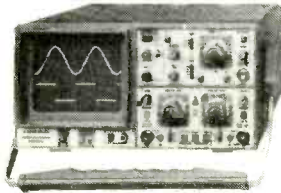
PHILIPS

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



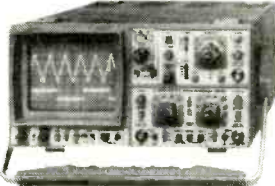
- SPECIFICATION**
- * 2 Channels
 - * Bandwidth: DC - 20MHz
 - * Sens: Ch.1, Ch.2, 1mV/cm
 - * Timebase: 0.1s - 20ns/cm
 - * Triggering: DC - 40MHz
 - * Active TV - Sync - Separator
 - * Variable hold-off
 - * Trigger LED indicator
 - * Calibrator: 1KHz Square wave
 - * Component tester
 - * Plus many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

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

SPECIFICATIONS

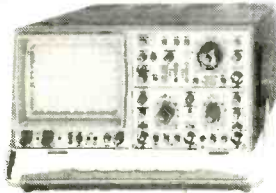
- * 2 Channels
- * Bandwidth: DC - 60 MHz
- * Sens: Ch.1, Ch.2, 1mV/cm
- * Timebase: 2.5s - 5ns/cm
- * Triggering: DC - 80MHz
- * Active TV - Sync - Separator
- * After delay trigger
- * Sweep delay
- * Delay line
- * Trigger LED indicator
- * Calibrator: 1KHz & 1MHz Sq. Wave
- * Component tester

HM604 60MHz UNIVERSAL



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

HM1005 100MHz UNIVERSAL 3 CHANNELS - UP TO 6 TRACES



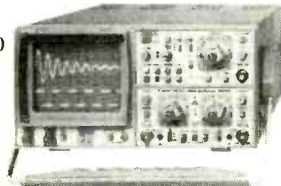
- SPECIFICATION**
- * 3 Channels
 - * Bandwidth: DC - 100MHz
 - * Sens: Ch.1, Ch.2, Ch.3, 1mV/cm
 - * Timebase A: 2.5s - 5ns/cm
 - * Timebase B: 0.2s - 5ns/cm
 - * Triggering DC - 130MHz
 - * After delay trigger
 - * Delay line
 - * Trigger LED indicator
 - * Overscan LED indicator
 - * Active TV - Sync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

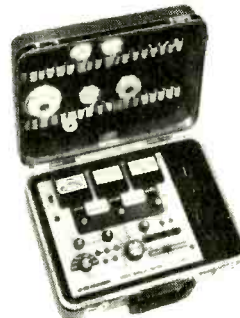
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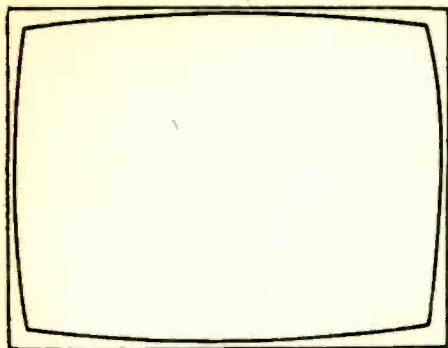
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TELEVISION

Spleen

Each week *The Observer* colour supplement has a spleen section in which a contributor can vent his anger, distaste or whatever on a particular subject. Your editor feels very much disposed this way in connection with the latest item to arrive in the editorial office. It's an Apple Mac computer and the idea is that we, that is Tessa and I, are supposed to use it to take the preparation of each issue of *Television* up to the stage of complete pages stored on floppy disc, leaving the printer to convert the disc data to film and then printing plates. Desk-top publishing it's called. Many, possibly most, publications are now produced by the desk-top method, so *Television* had to follow suit at some point – which is roughly now. I say roughly because it will be say three-four months before we manage to do the whole editorial content of an issue in this way. This issue is our first attempt, and we've managed to assemble just over half the editorial pages in this way. I say "we've managed" but the fact is that the achievement is 99 per cent Tessa's. She had enough trouble – I'm told that that's putting it mildly – trying a year or so ago to instruct John on the use of the wordprocessors we were presented with to get the text on to disc. The difficulty your editor has is that until these computers came along to blight his life he was used to things that worked logically. He is, of course, an electronics-orientated person, and there's nothing simpler and more logical than electronics (most of it, anyway). It's a nice, straightforward subject: electrons move from place to place under the influence of voltage differences and achieve various effects as they do so. Couldn't be simpler.

Now you might think that the computer, being an electronic device, would be just as easy to understand, come to terms with and use. That's what I thought, anyway. But the person who designed the memories and processors, logical devices all, is not the person who devised the way in which the user has to tell the computer what he wants it to do. Between the electronics and your editor comes the man-(fiend?) who wrote the programme that determines how the computer will be used. He's not a person who respects the logic of electronics and adopts a simple, logical approach. No. He's someone with a mind entirely of his own. Quirky and idiosyncratic it seems, and very difficult to come to terms with. One trouble of course is that the programmer doesn't know exactly what the user is likely to require, how he goes about his normal tasks – in our case the simple matter of fitting articles together to fill pages. These programmers seem to live in a world quite their own. They come up with some ingenious ideas, no doubt about that, but what the user wants is not ingenious ideas but a simple, logical system that does what's required with the minimum of fuss.

Our Apple Mac uses a programme called QuarkXpress (the name's enough to put you off for life) that's supposed to be user friendly. Great laugh that, for someone. Yes, you can do everything by getting one of about ten million symbols and/or menus on screen and moving things about. But that's just it, moving things about. . . Your TV man likes a nicely locked display on the screen, but Mr. QuarkXpress likes things to "flow", so things move all over the place like quicksilver. You've no sooner got one column as you want it than a great gap appears at the end of the next one. Did I say symbols just then? Oh no, Mr. QuarkXpress wouldn't like us to use such straightforward language as that: they're icons. And the screen is a window. God help us. But this is a minor irritation compared with the strange logic of the Apple Mac. For instance, if it can't accept some editorial matter for some reason it doesn't just ignore the material. It manages to grab and display the title so that you think the article must be stored somewhere though it isn't. Just one of the nice little ways in which it manages to cause confusion.

What's infuriating about all this is that one supposed, simple-mindedly maybe, that the idea of using a computer to do something was to make life easier and, above all, save time. Not a bit of it! It has taken us days and days to do what took a day or so in the past. Because this so-called user-friendly computer is the most fiddly and trying of devices conceivable. You have to mess about for half an hour moving symbols about on the screen, calling up menus, selecting items from them and answering inane questions to do even the simplest thing that before was a matter of snip, snip with a pair of scissors and pop down a piece of pre-glued paper. Who gains from all this? It's certainly not us.

Rage and frustration are a grossly inadequate description of my feelings about the Apple Mac and its QuarkXpress programme. But then maybe it's because I'm an oldie and, as Tessa says, I have the "wrong attitude". Youngsters seem to be able to come to terms with this sort of thing without a second thought. That's it of course. You're not supposed to think logically about what you're doing. Just accept the situation and get on with it. Which is not a way that those of us used to trying to understand things and analyse problems find easy to accept.

Well, that's my bit of spleen. Doubtless it's just because of my lack of experience. If the good and clever Tessa can manage to teach me the tricks I'll be laughing, hopefully. I'll keep you informed.

EDITOR

John A. Reddihough

EDITORIAL ASSISTANT

Tessa Winford

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COVER PHOTO

This month's cover photograph shows an internal view of the Hinari VXL8 VCR. See servicing article on pages 562-7.

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INDEXES

The index to volume 39 of *Television* (issues dated November 1988 to October 1989) has now been printed. Copies are available at £2 each (£1.50 for a second copy ordered at the same time) from the Television Editorial Department, Room L323, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. Indexes for Vols. 37 and 38 are available at £1.50 each. Photostats of the indexes to Vols. 31-36 can be supplied at £1 each. Make cheques/POs payable to Reed Business Publishing Ltd. – please allow 28 days for delivery. The indexes to Volumes 40 and 41 have been compiled and will be available in about two-three months' time.

TV Fault Finding

Reports from Steve Cannon, J.K. Potts, Brian Storm, Ed Rowland, Chris Watton, Mick Dutton, Chris Avis, John Edwards and Michael Dranfield

Panasonic TX25W2A (Alpha 3 Chassis)

This set was dead with the standby LED flickering at switch on. We found that the rectified mains supply was reaching the chopper transistor. But the latter wasn't switching because Q823 was on, removing the chopper's base drive. Q823 was conducting because the optocoupler was turning on. Conduction of the optocoupler is controlled by Q825 on the isolated side of the circuit. This transistor was switched on because C822 was faulty – it read 22k Ω . C822 is one of Panasonic's infamous 0.01 μ F ceramic capacitors.

We've had this fault a couple of times now. Note that these capacitors are used in many sections of the set. As a general tip, if you find that there's an 0.01 μ F ceramic capacitor in a suspect stage in a modern Panasonic receiver it may pay you to check or replace it. This applies to the Alpha 1 and 2 chassis and also the portables. **S.C.**

Philips CP90 Chassis

This set had a very dark picture. Checks showed that the voltage at the contrast control pin of the colour decoder chip was very low. If D6490 was lifted the voltage came back up and a good picture was obtained. This diode provides a link to the beam current sensing circuit connected to pin 7 of the line output transformer. Obviously something was amiss here. The culprit was the 33nF capacitor C2495. **S.C.**

Sony KV211XMTU

This was a weird one: the raster had bowed sides, with only the left-hand quarter of the picture showing. It was a strange sight indeed, with three-quarters of the screen completely black. Curiously the on-screen display was perfect. The EW fault was the giveaway I suppose and, believe it or not, the pincushion correction processing is carried out on the AV interface board! All became clear when the board was hinged down: two whopping dry-joints were obvious at the earthing pins 17 and 18 of the PCB plug and socket CNJ51. Resoldering these restored full scan. **S.C.**

Panasonic Alpha 2 Chassis

Intermittent colour was the complaint with this set. Sure enough we found that after a few hours the colour would sometimes flicker off then back again. Where to start? Close inspection of the picture showed that there was barely enough colour saturation even with the bar graph giving a maximum reading. With the colour set at maximum it became evident that line pairing was present in red areas. It was as if the delay line circuit was giving problems. This proved to be the case: the chroma delay line DL601 was defective, a replacement restoring normal saturation without the intermittency. **B.S.**

Skantic 18051919 (B2 Chassis)

As we'd never seen one of these sets before we were not too keen to take the job on, especially as the fault was a very intermittent one. The owner said that when the set

was switched on it would sometimes crackle very loudly. It could however go for days without the fault occurring, which cheered us no end. It took us quite a while to pin down the cause of the trouble: one end of RN14 (100 Ω) in the power supply was dry-jointed. **E.R.**

Sony KV2704UB

Intermittent shut down that could be instigated by tapping the cabinet was traced to a dry-joint at pin 2 of T602. In the past we've found that these sets can suffer from similar trouble in the line timebase. **E.R.**

Alba CTV10

This 10in. colour portable was dead apart from the relay clicking when the standby button was pressed. The field output chip IC402 was the cause of the trouble. Replacing it, which is no easy task, restored normal operation. **E.R.**

Panasonic TC361GM

This old colour portable came in with a list of faults – only 3in. of field scan, uncontrollable brightness and it would tune in only some channels. A check at the c.r.t. cathodes produced a reading of only 25V, which accounted for the bright screen. The cause of this was the fact that the 200V supply was low. A look at the circuit diagram showed that this supply is also used by the field output stage and feeds the 33V tuning regulator. Thus one component could cause all three faults. When the 200V reservoir capacitor C564 (10 μ F, 250V) was removed a powdery deposit was seen around its base. Replacing it produced a surprisingly good picture for a set of its age. **M.Dr.**

Toshiba 210R6B

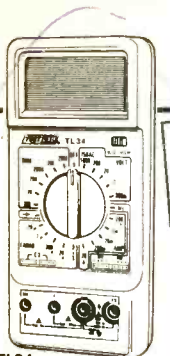
This set was dead with a tripping sound coming from the power supply. When a 60W bulb was connected across C831 the tripping stopped and a steady 125V was recorded. We didn't have a service manual, but 125V seemed about right for the main h.t. rail. Our next check was at the collector of the line output transistor, where no voltage at all was found. Tracing back through the feed components brought us to R444 which was dry-jointed. **M.Dr.**

Fidelity CTV140

For a dead set check whether the voltage at pin 9 of the TDA4600 chopper control chip is pulsing up and down. If it is, suspect a short on the secondary side of the chopper transformer. In most of the sets that have passed through our workshop with this fault D21 has been short-circuit. Replace with a BY299 or an RGP30. **M.Dr.**

Samsung CI3312Z

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poor crimp connection in the degaussing coil plug, as a result of which you get slight burning and carbonising inside the plug. We think that this produces a diode action, passing d.c. into the degaussing coils. Hence the green faces. In the past we've cured the fault by fitting a new plug – old Sony sets are a good source of these two-pin plugs, though releasing the pins is sometimes difficult. As the sets are still under guarantee however we now have a stock of replacement degaussing coil assemblies – Samsung part no. 32479-029-100.

M.Dr.

Philips NC3 Chassis

This set was dead but whistled. As there was no short-circuit across the line output transistor, pin 5 (h.t. input) of the transformer was isolated and the h.t. rail was loaded with a 60W lamp. The power supply then ran happily, so where was the load? Pin 2 of the line output transformer supplies pulses to the green-line tuning circuit and a crowbar thyristor safety trip. Disconnecting this pin produced normal sound and picture. The crowbar thyristor's trip level is set by two series connected 8.2V zener diodes (2581/2) in its gate circuit. One of these had a 200Ω leak. We decided to replace them both.

C.A.

Philips 2A Chassis

The sound was modulated at random by squawks and squeaks that could be reduced by critical adjustment of the volume control. We found that C2151, an 0.1μF capacitor in the damping network across the output of the TDA1013A audio amplifier chip, had only one lead soldered.

C.A.

Ferguson TX9 Chassis (PC1044)

This set wouldn't come out of standby. The unusual cause was quickly found by a fortunate accident. When the chassis was withdrawn the line scan coil plug was inadvertently disconnected and the set came on. The s-correction capacitor checked o.k. and the d.c. resistance of the line scan coils was correct. But there must have been something wrong with them as a replacement cleared the fault.

C.A.

Philips K30 Chassis

Two of these sets have caught us out recently. The first suffered from random tripping, which occurred from cold. Resoldering was carried out at all the points where you get dry-joints – around the line output transformer, the line linearity coil and the socket connectors to the power supply subpanels – but the problem persisted. We eventually traced the cause of the fault to a dry-joint at one leg of C567, although the joint looked perfect.

The second set had intermittent loss of picture. A tap on the chassis anywhere would restore normal operation. This time there was a dry-joint at the socket to the sound panel. The top position, number one, forms a bridge for the 13V rail. One side was dry-jointed.

M.D.

Ferguson TX9 Chassis (PC1044)

This set was brought in because it was dead. When we examined it we saw that work had obviously been done recently as the TDA4600 chopper control chip had fresh solder. The power supply wasn't starting up, but there was approximately 300V at the collector of the chopper

transistor. We've found that the quickest way of dealing with power supplies that use the TDA4600 type chip is to work round the voltages at the pins. The first checks should always be at pin 1, the start-up supply, and pin 5 where remote control shutdown is sometimes applied. In this case both these voltages were correct. Further checks showed that the voltage at pin 4 was high at 4V instead of 2V. This pin senses the chopper transistor's collector current and controls the output from the chip to keep it within limits. The favourite trick here is for the resistor (around 270kΩ) to go open-circuit. This means no voltage at pin 4. The chip then thinks that there's no chopper transistor collector current and tries to turn it on harder. The result is instant destruction of the transistor. In this case the previous repairer had fitted a 100kΩ instead of a 300kΩ resistor, which had the effect of fooling the chip into thinking that the collector current was already high, thus shutting down the power supply. Fitting the correct value solved the problem.

M.D.

GEC C2004 (Decca 171 Chassis)

There was no sync on this set. A check showed that there was no video signal at pin 5 of the TDA2579 timebase generator chip. The cause was a dry-joint at wire link J566 which is fitted to supply video to the sync separator when a teletext panel is not incorporated.

M.D.

Sharp C1420

We've had two of these sets in recently with the STR40090 power supply chip dead and the fuse shattered. In both cases the failure had been caused by arcing between adjacent print tracks, due to excessive flux on the panel. The arcing was between R711 and the junction of R721/R711 and C708/L705.

M.D.

Sharp SV2589

The complaint was that the picture would occasionally develop a red tint. The fault was present when we paid a field visit and we found that just touching the decoder panel cleared it. So we replaced the panel. Next day we had a phone call to say that the fault was still present. We brought the set into the workshop for a soak test. It took three days for the fault to show up. We then noticed that the red cast was over only the top two thirds of the screen and that slight vertical jitter was present. This suggested to us that one of the supplies was being modulated at line rate. Very close inspection showed that C636 (330μF) was dry-jointed. Incidentally it always pays to resolder the diodes attached to the power supply heatsink in this model. They can become dry-jointed, causing all manner of problems.

M.D.

Mitsubishi CT2627

This set would come on from standby and would search for a station, but there was no sound or colour and it was impossible to store a tuning position or turn the set off to standby. The problem was caused by lack of the 12V output from the regulator transistor Q7N1 as the safety resistor R7N5 had gone open-circuit.

M.D.

ITT Digi-3 Chassis

This set had a line fault at switch on. But after only a minute or two there was also a patterning effect – almost as

though the a.f.c. was pulling the tuning very slightly upwards to just the point where the line sync starts to break up. I expected to find a problem with the deflection processor chip. But not so. Closer investigation led me to the signal unit (h.f. module) where I found that C209 (47 μ F) and C234 (10 μ F) were both in trouble. Replacing them provided a complete cure.

C.W.

ITT Monoprint B Chassis

This set wouldn't come on from cold. If the switch was operated a number of times a small raster appeared with a loud noise that sounded a bit like line output transformer arcing coming from within the set. The cause was C707 (2.2 μ F) in the power supply. Once the set had warmed up it worked o.k.

C.W.

Finlux 3024

A good number of these sets are now showing a field fault. The symptom is black bands about one-two inches apart across the screen, worse at the top. The cure is to replace CK8 (0.1 μ F, 63V). This capacitor is a bit tricky to find as it's situated beneath the field output heatsink. A 250V "Liquorice Allsort" type capacitor works fine in this position.

C.W.

Saisho CM159TX

The job card said lack of height and a squeal. This was correct but in addition the lines were paired and there was no sound. It was quickly apparent that C806 (1,000 μ F, 16V) had blown its top, but fitting a replacement didn't cure the trouble. A check on the power supply showed that the h.t. voltage was 175V instead of the 110V it should have been. A closer look revealed more capacitors that had popped, so these were changed. But I still had too much voltage. The cause was traced to C818 (1 μ F, 50V) in the feedback circuit from the transformer. A replacement restored normal operation apart from the sound. The TDA2006 chip was open-circuit. It had obviously suffered from the excessive voltages.

C.W.

Sony KV2715UB (YE2 Chassis)

The complaint was of no colour – the customer mentioned that the colour had gone shortly after a pot plant that stands on top of the set had been watered. I decided to carry out checks around the TDA1365C colour decoder chip. The chroma signal was present at the input and the reference oscillator was working all right. There was a chroma signal at the collector of Q310 in the chroma delay line circuit but no chroma signal at pins 24 and 25 of the chip. The reason for this was that the secondary winding of T302, which provides delay adjustment, was open-circuit. When we removed it there were signs of corrosion at the pins. A replacement cured the problem.

J.E.

Alba CTV2

This set would trip and shut down a few minutes after it was switched on. It's quite common for R69 to be the cause of this symptom. Not on this occasion however. To find out whether the cause of the trouble is in the power supply or the line output stage a good check is to disconnect the 12V regulator IC6. There is then no line drive. When we did this the power supply ran contentedly, but we couldn't find anything obviously wrong in the line output stage. So a

blanket soldering of all the components, including the transformer, was carried out. We then confidently reconnected IC6 and switched on. Yes, you've guessed it, after a few minutes the set tripped.

In desperation all the components in the power supply were checked. Nothing wrong here. I switched on again and prodded various components in the hope that the fault could be instigated in this way. But no, after a few minutes the set tripped off without any help from me. I next tried the can of freezer. Switch on and squirt this then that. No luck until D16 was squirted. The set then tripped! Now D16 is soldered in series with a resistor that's proud of the PCB. When one end of this combination was disconnected from the board the two components parted company. Closer inspection showed that they had been laid against each other then soldered, the joint being very poor. After twisting the leads together and resoldering the network the set worked happily.

J.E.

Hitachi CPT2578 (G8Q Chassis)

The problem with this set was a blank raster and no sound on some channels, with normal operation on others. Reprogramming normally provides a cure, but after doing this channels 4 and 5 remained blanked out. The problem was solved as follows. Select the blanked channel (in this case 4), press the tune/a.f.c. button, then the volume minus button and the store button. This will produce a normal raster. Repeat the procedure with the other blanked channels. Finally press the tune/a.f.c. button.

J.E.

Contec KT8135

This set had a very bright picture with flyback lines. The first anode control R406 had no effect as R474 (390k Ω) on the tube base board was open-circuit.

J.E.

Ferguson TX100 Chassis

The complaint was of distorted sound. We traced the cause to C82 (5.6pF) which is connected between pin 4 of the audio output chip and chassis to prevent h.f. oscillation within the chip. It had gone open-circuit.

J.E.

Samsung CI1338X

Quite a few of these little colour sets have come into the workshop with the same complaint: after about an hour a high-pitched whine comes from within the set. The culprit is the pincushion distortion correction transformer T402 – any pressure on its windings stops the noise. The cure is to remove the transformer, bind the windings with a cable tie and refit it in a bed of Araldite.

J.K.P.

Some Quickies

A few quickies we've had recently:

Sony KV2000 Mk. II: Erratic width and whining from the power supply – the fault clears after about ten minutes. Cause is C612 (3.3 μ F, 15V) on the power supply PCB.

Waltham 1401: Low width and a dim picture, improving slowly over an hour. R812 (150k Ω , 0.5W) had gone low in value.

Grundig ST3022RK (CUC731KT chassis): Failure to start up: D633 (1N4935) was short-circuit.

Ferguson TX90 chassis: Ripple on the picture and no h.t. adjustment possible: transistor TR111 (BC307B) was short-circuit emitter-to-collector.

J.K.P.

TV and Video at the Trade Shows

George Cole

In April most of the major consumer electronics companies gathered in London to show their latest audio and video products to the trade and the press. Despite the recession there was much optimism about the future, not least because of the many new things that will be appearing in the shops this year, including widescreen TV, the Data Discman, CD-I, DCC, Photo CD and the Mini Disc.

Television

One of the highlights was the 16:9 D2-MAC widescreen test transmissions from BSkyB and SES. The ten-day transmissions started on April 5th, lasting from 9 a.m. to 5 p.m. each day, and were designed to help manufacturers demonstrate their widescreen sets. The broadcasts also strengthened rumours that BSkyB plans to start a widescreen channel within a year. They were from the Astra 1B satellite's transponder 29 and used a new encryption system called Videoguard. Like BSkyB's VideoCrypt system, Videoguard requires the use of a smart card for reception.

Philips displayed its new 28in. widescreen Model 8916 (£1,400) along with its existing 36in. Model 8906. Both use 100Hz flicker-free technology. The 8916 has a new, improved picture tube which produces sharper, brighter pictures. Philips used a mixture of live satellite transmissions and LaserDisc recordings to demonstrate widescreen TV, which looked good.

Nokia, which has stuck with 625-line PAL to enable it to offer cheaper widescreen TV, showed three new widescreen sets, the 36in. Model 9291 (£2,350), the 32in. Model 8291 (£1,600) and the 28in. Model 7291 (£1,100). A Nokia representative commented on the number of companies marketing "widescreen VCRs". The company's demonstrations were from satellite and tape, using standard VHS decks. The only difference between a normal and a widescreen VCR is the automatic switching system in the latter to tell the receiver whether the signal is in 4:3 or 16:9 format: you don't need to buy a widescreen VCR to record and play back widescreen pictures - any existing deck will do.

Grundig's Model M169-92 (£3,500) widescreen TV set has 100Hz pictures, a Nicam decoder and a built-in D2-MAC decoder. JVC had a widescreen TV set on show but has no immediate plans to release it in the UK.

Philips also demonstrated HD-MAC, using a 56in. high-definition projection system and signals from a LaserDisc player. The results were disappointing: I suspect that the problem was that a projection system cannot match the sharpness and clarity of c.r.t. pictures. My suspicions were confirmed by the superb HD-MAC pictures produced by a 32in. Hitachi set, also from a LaserDisc. Toshiba demonstrated the Japanese MUSE HD-TV system, which is sold as Hi-Vision in Japan, using a 50in. projection TV set and an 0.5in. HD-TV VCR. But what Toshiba is pushing at present is the Dolby Surround sound system, pointing out that 1991's fifty top video rental titles all feature the system. Toshiba has introduced a range of three TV sets with Dolby Surround, Nicam and Digital Signal Processing (DSP), which can be used to create various acoustic effects such as the sound heard in a stadium or theatre. The range consists of the 25in. Model 2527DB (£750), the 29in. Model 2927DB (£850) and the 33in. Model 3327DB (£1,300).

Virtually every company had new Nicam and portable TV

sets on show. It would take pages to mention them all, so I'll just highlight a few of the more interesting models. Sony demonstrated its new HiBlack Trinitron range, which is claimed to offer better contrast and sharper detail than with previous tubes. According to Sony the panel transmission (the ratio of the light that passes through a screen and is then reflected back) is 50 per cent with most tubes, the figure with HiBlack tubes being 35 per cent. This means that the screen absorbs more room light, reducing reflective glare. Models K VX2152(S) at £550, K VX2552(S) at £630 and K VX2952(S) at £800 feature a HiBlack tube, Nicam, Fastext, twin scart connectors and front-mounted AV and YC sockets. The HiBlack tube is also used in some non-Nicam models. Sony has also released a new Acoustic series which combines the HiBlack tube with a digital comb filter and has an improved sound system. Models range from the 21in. KVA2122(S) at £600 to the 34in. KVA3412(S) at £2,000.

The new Philips Blackline S tube has 36.5 per cent transparency glass and the new Polygon ART gun. Philips also plans to introduce sets with digital noise reduction circuitry this autumn. Mitsubishi's CT21M1BM (£349), CT21M2TX (£399) and CT25M2TX (£459) have a new chassis and picture memory settings for colour, contrast, brightness and sharpness. Mitsubishi is also fitting moulded mains plugs to all its new sets. The Philips Book TV (£250) is shaped like the open pages of a book and is certainly eye-catching.

There were several LCD sets around including the Toshiba LX410 (£600) which has a 4in. screen and multi-standard operation. Sharp demonstrated the 6M10S, a 5.6in. LCD TV set at £900. The largest LCD pictures were produced by the Sharp 9EHC1 which has an 8.6in. screen: these were the best pictures I've ever seen with this type of display. There's a snag however: the 9EHC1 would cost over £2,000 which is considered to be too expensive for the UK market.

VCRs

Aiwa stole the show this year with two incredible VCRs, the HVMG330H and HVM110. The surprise was that these two decks offer multistandard playback and recording in PAL/MESECAM/NTSC 3.58/4.43, also standards conversion from NTSC to PAL and vice versa, for less than £400. The HVMG330H is priced at £399.99 and the HVM110 (without tuner) at £349.99. Many VCRs in this price range will convert an NTSC signal to a quasi-PAL signal that's compatible with most modern TV sets, but only Panasonic's NVW1 VCR at £1,700 offers similar features to the Aiwa models. The two Aiwa VCRs have a digital conversion system that uses interpolation to convert from a 525- to a 625-line picture and "culling" to reduce a 625-line picture to 525 lines. Adjustment for the 50/60Hz field rates is carried out by a RAM field store, while the chrominance signals are demodulated to produce colour-difference video signals which are then encoded in the required form. The head drum speed and tape drive system adjust automatically. Another feature of the two machines is the Super Clear Picture system that adjusts the contrast automatically and is claimed to improve the picture quality. An Auto Picture Cleaning system monitors the playback r.f. signal and adjusts the sharpness.

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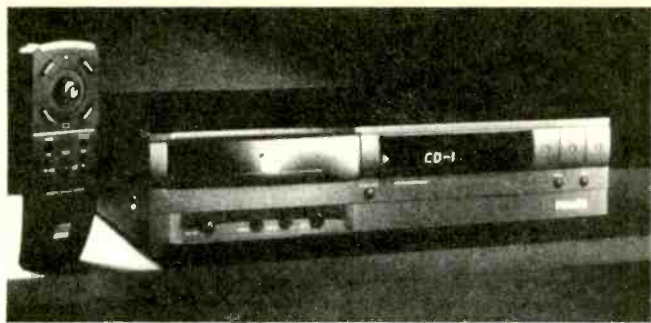
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MANOR SUPPLIES

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The Philips CDI910 CD-1 player now available in the USA.

Two new VCR features, Twin Intelligent Picture Control and One Key Programming, were introduced by Mitsubishi. The former one works in a similar way to Akai's Intelligent HQ. During playback the off-tape signal is analysed and the picture sharpness control and noise reduction settings are adjusted automatically for optimum picture quality. In the record mode the system analyses the tape and determines the optimum frequency response for the tape grade. This process takes around 1.5 seconds. Twin Intelligent Picture Control is used in the HSM37 (£359), HSM57 (£459) and HSM59 (£549). The latter model also offers Quasi-S-VHS and NTSC playback.

The One Key Programming feature is an easy-to-use timer setting system that employs a single remote handset or VCR button and an on-screen menu display. The system works like this. First you press the OK button to set the channel. After four seconds the on-screen cursor moves down to "day". Press the OK button to set the day then four seconds later the cursor moves down to the start time and so on. One Key Programming is a feature of the previously mentioned models and the budget HRM16 (£299).

Toshiba's new budget VCR, Model V212B at £290, features a one year/eight event timer, VISS and five-speed variable picture search. Model V312B at £300 is a four-head machine with long play and the new Toshiba deck that can wind fast forward or rewind an E180 tape in less than two minutes.

JVC showed two VCRs with built in Video Plus+ timer systems. The HRDX22EK is a basic model while the HRD820EK adds Startext. Both are due for autumn release. Sony's SLV325 (£329) and SLV625 (£479) have an instant replay feature that enables users to rewind a scene and watch it in slow motion. Four new Philips models use its Turbo-Drive system that offers fast wind times and a quick-start mechanism. Model numbers are VR422 (£350), VR522 (£380), VR722 (£450) and VR723 (£500). The latter model has Nicam and NTSC playback. Also on show was the VR323 (£330) with Startext. Panasonic demonstrated its S-VHS Model NVFS200B (£900) whose features include Nicam, hi-fi sound, long play, NTSC playback, a timebase corrector and numerous editing features.

Camcorders

Although the VHS format is now a minority part of the camcorder market several new models were on show. The Sharp VLSX80H (£900) is called the Slimcam: its lightweight body is just 80mm wide and it weighs 1.7kg. Features include a twelve times zoom, a colour LCD viewfinder and video light. Hitachi plans to introduce a VHS slimcam, Model VM2500, later this year. Features will include a times eight optical zoom, times 64 digital zoom and video light. Sharp also showed the VLMX7H (£900) which has a conventional zoom lens and wide-angle lens built into

the camera body. It also offers a number of picture effects. Hitachi's VMSP1 and JVC's GRAW1 (both priced at £1,000) have weatherproof housings.

Sony showed a number of new camcorders including the budget Model CCDF385 (£600) which has a remote control handset. The CCDTR60 (£700) is a palmcorder with times ten zoom and remote control while the CCDV6000 (£1,200) has Hi-8 picture quality, manual iris control, RCTC time code writing, times ten zoom, digital special effects and a digital timebase corrector.

Panasonic's budget NVG101 (£599.95) and NVG202 (£699.95) have a newly developed wide-angle lens that gives the equivalent field of view of a 36mm lens on a 35mm SLR camera. The NVS7 (£999.95) is an S-VHS-C palmcorder with a sixteen times digital zoom, digital titling effects and hi-fi stereo sound.

Satellite TV

The Philips STU909 (around £1,500) is a smart-looking motorised satellite TV system that includes D2-MAC as well as PAL reception. Nokia's SAT2200 system (£425 excluding dish) has a PAL/D2-MAC receiver, automatic 16:9 switching, twin scart sockets, Wegener stereo sound and teletext. The SAT5915 (£350 excluding dish) is a stand alone D2-MAC decoder designed for use with PAL TV receivers.

The Sharp VCBS97HM is a VCR with a built-in satellite tuner and decoder. Its tuner is pretuned to the Astra channels. Other features include Nicam, hi-fi sound and VISS. It will be launched in September at around £700. Grundig showed a prototype satellite receiver, Model STR1, whose features include a built-in Videocrypt decoder, a 199-channel tuner, three scart sockets and Wegener Panda 1 stereo sound.

CD-I

The Philips show featured a Compact Disc Interactive (CD-I) arcade that was permanently crowded. Also on display were the sales kiosks that will appear in shops. CD-I was also in the Philips Entechdome, a massive dome that also housed DCC and widescreen TV. Philips knows that systems like CD-I are difficult to put over in words, needing to be seen and used for a full understanding of what an interactive medium offers. For this reason the Entechdome will be taken around major shopping centres throughout the UK this summer. Details of the CD-I launch plans were given in Tele-topics last month.

Photo CD

Kodak's large Photo CD display included a £74,000 photo imaging workstation to transfer the pictures on to a



Philips' first DCC player, Model DCC900.

compact disc. Three Photo CD players were on show. The PCD265 (£299) is a basic model with programmable track/order selection, pan, skip, forward and reverse search, intro-scan, random play and favourite picture select – this allows users to store details of their favourite pictures in the machine's EEPROM. The PCD865 (£369) is a mid-range model while the PCD5865 (£429) is a five-disc carousel version. These last two models have additional features such as twice two zoom and interval control, which enables the user to set the length of time an image appears on the screen. Philips also showed a Photo CD player, although no launch or price details were available.

Photo CD-Interactive was shown by Kodak. This is an enhanced system that will be launched next year. It will enable users to store pictures, text and sound (speech or music) on Photo CD discs. The idea is that users will produce their own personal discs, showing for example a wedding day or family tree. Each image can be accompanied by up to half a minute of sound. Kodak is to offer a sound library service or users will be able to take along their own music, though this is still subject to negotiation with the Performing Rights Society. The Photo CD-I discs are simple to use and work along the same lines as the interactive information booths to be found in shops and building society branches.

The Mini Disc

Sony's Mini Disc, which stores up to an hour of digital audio on a 2.5in. magneto-optical disc, was on display albeit behind glass. Sony says that the system will be launched later this year, but there is some doubt as to whether the first players will offer both record and playback facilities.

Data Discman

Sony also showed the Model DD1EX Data Discman (£350), a hand-held electronic book that plays 3in. CD-ROM discs. These can store up to 100,000 pages of A4 text, 32,000 images or a mixture of both. Sony had two hundred telephone directories on show to demonstrate the amount of data that can be stored on a single disc. The DD1EX has a 3.4in. backlit LCD screen that can display ten lines of thirty characters each. The unit weighs 705g. Sony expects to have about a dozen electronic book (EB) titles available for the system's UK launch and fifty titles by the end of the first year, though no price details were available.

The Data Discman uses six search systems to make it easy to find information. Model DD1EX also has a video lead to enable it to be connected to a TV set for viewing by groups of people. It would be useful if TV and video manufacturers produced EB discs with parts details and other servicing information stored on them – perhaps Sony would start the ball rolling?

DCC

Philips, Technics and Sharp had Digital Compact Cassette (DCC) demonstrations. Philips showed its DCC900 player, Technics the KH3 and Sharp its prototype RTS1. The first models are expected to sell for around £350. The DCC sound quality is very impressive, as are the tape search systems and the software support from the recording companies. It will be interesting to see whether the system can replace the compact cassette as quickly as the CD has replaced (well almost) the LP disc. In fact it will be interesting to see how all these new systems fare in the marketplace.

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● SERVICING THE TATUNG 160-180 SERIES CTV CHASSIS

The Decca-Tatung 160 chassis went into production in 1985 as a value for money, middle of the road design for driving 90° tubes. It remained in production for several years and became popular in the trade, being cheap and easy to maintain. Most of the faults, detailed in the article, are of the stock variety. Later related chassis also covered are the 165, 170 and 180, which brought variations such as remote control and 110° tube drive. The article has been compiled by Eugene Trundle and his colleagues.

● CHANNEL 5 AND ITS PROBLEMS

By the autumn we should know to whom the licence for the fifth and last terrestrial UK TV channel has been awarded. Whoever it is will be in for a tough time, as the licence holder will be responsible for retuning or modifying equipment subject to interference from the Channel 5 transmissions. For a quarter of a century we have taken channel allocations for granted, the four-channel system serving us well. So many readers will probably be rusty about things like co-channel interference and problems with harmonics and image frequencies. Harold Peters goes over the theory and puts together as much information as is currently available on the Channel 5 operation.

● A SCART SWITCHING CIRCUIT

Connecting a satellite receiver, a VCR and a TV set together can cause many problems. Improved results are possible by using scart interconnections, but with stereo sound missing in some uses. As a complete solution K. Wevill devised this scart switching circuit. Its basic functions are to provide switching between a VCR and a satellite receiver's outputs, with the VCR having priority, and enable the VCR to record the satellite receiver's output. Provision is included for feeding a second TV set which works independently of the main one. The source switching for the main set can be either manual or automatic.

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Servicing the Hinari VXL8

Graham Rees and Joe Cieszynski

About six years ago Hinari introduced a budget video range that was aimed at the High Street punter on the lookout for a quick bargain. The relatively low cost of these machines combined with the attraction of many features such as a long-play mode, HQ circuitry and remote control programming made them an instant success in terms of sales. And it was not just the public that made a beeline for them. Some of the large rental organisations considered them to be a good business proposition, renting them out for two or three years and then disposing of them as soon as a major failure occurred, considering it more economical to replace the machine with a new model rather than pay an engineer to carry out a repair and service.

As a result of all this these machines are now around in considerable numbers. In spite of their reputation in the

trade as being something of a bogey to be avoided, they are well worth repairing. We don't deny that fault diagnosis can be difficult. But many "difficult" faults can be traced to specific components, as we shall see.

We shall be referring specifically to the Hinari VXL8 but there are a number of related models. The VXL9 is basically the same with some additional features such as remote control programming. The deck mechanism used in the VXL8 is also used in the VXL12. Variations of the deck mechanism are found in the Sentra Models VX8500LP and VX8600LP, the Amstrad Models VCR6000 and VCR6100 and the Nikkai Model J1, though the PCB layouts in these machines differ somewhat from those in the Hinari models.

Another significant difference between models is the CXP505B microcomputer control chip's programme

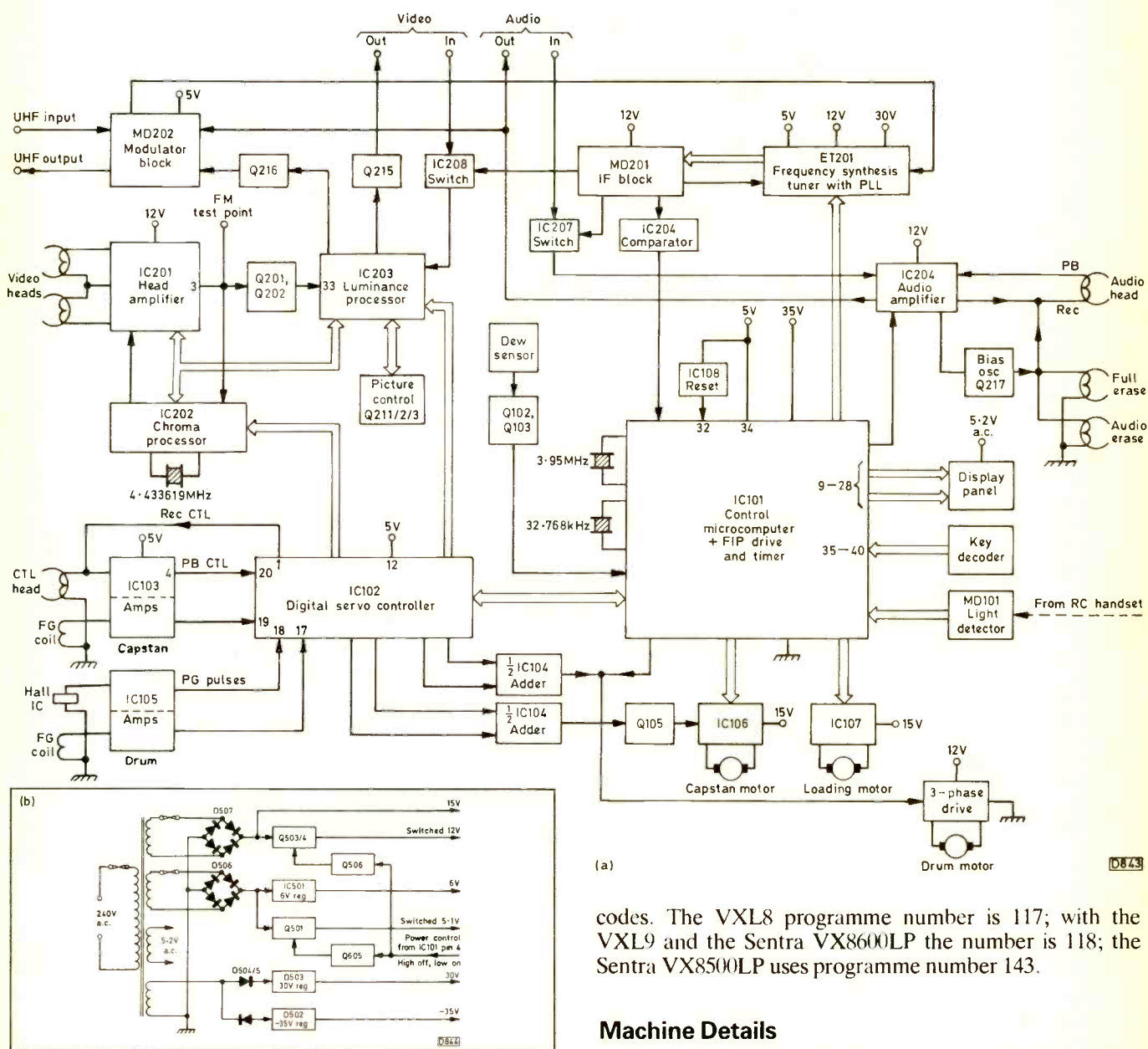


Fig. 1: Block diagram of the Hinari VXL8 and VXL9, showing key voltages, test points and signal paths. (a) Signal processing, servo and control sections; (b) the power supply arrangements.

codes. The VXL8 programme number is 117; with the VXL9 and the Sentra VX8600LP the number is 118; the Sentra VX8500LP uses programme number 143.

Machine Details

Figs. 1-5 are included to help those who don't have a full service manual. Many of the test points and components shown in these diagrams are referred to in this article. Note the differences between the YC boards in the Hinari and

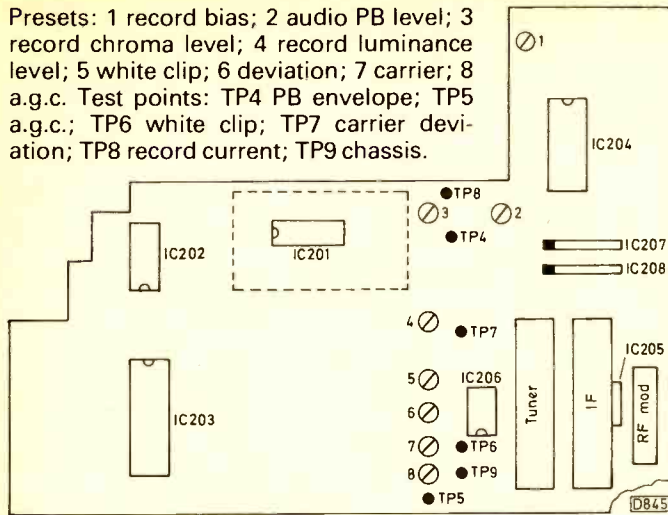


Fig. 2: Luminance-chroma (YC) board layout for the Hinari VXL8/9, viewed from the component side.

Sentra models. Fig. 1 shows an overall block diagram for the VXL8/9; Fig. 2 shows the main items on the Hinari YC (luminance and chroma) board; Fig. 3 shows the same for the Sentra YC board; Fig. 4 shows the servo/CPU board; Fig. 5 shows the board layout in the VXL8/9.

We'll start with electronic faults. On the whole the PCBs are quite reliable, but there are a number of common problems produced by specific components.

Electronic Faults

The first problem we'll consider occurs frequently. Its cause is extremely difficult to track down – it took us some months to fathom this one out. As these machines began to age we received a number of complaints of jumping into the SP mode momentarily while playing an LP recording. On the first few occasions we couldn't instigate the fault so we did the obvious thing and cleaned the CTL head. (For those not familiar with LP operation, the machine selects the playback speed automatically after sensing the frequency of the pulses on the CTL track. Thus if the CTL head is dirty the machine may select the wrong playback speed.)

On some occasions this cured the problem. On other occasions however the customer was soon back with us, complaining about the same thing. We next considered realigning the CTL head. This taught us an important lesson about CTL head alignment. With the VXL8, servo lock will be lost and the machine will jump between the SP and LP modes if the amplitude of the CTL pulses is less than 0.6V peak-to-peak. So on the next few occasions we realigned the CTL head. Within a short while the same machines were coming back again because of LP/SP jumping. We then began to replace the CTL heads, but the fault persisted.

We finally came across a machine that produced the symptom all the time. Only then were we able to scope the CTL pulses and see what the cause of the trouble was. The pulses were riding on a large 50Hz ripple (see Fig. 6). As a result of this the servo was being triggered at different time intervals. The same ripple was present (see Fig. 7) when we scoped the switched 5.1V supply. We suspected the main reservoir capacitor C105 but the culprit turned out to be bridge rectifier D506.

We've now had this complaint with numerous VXL8s and its clones. The cause has always turned out to be either a dirty CTL head or a defective bridge rectifier (D506). So

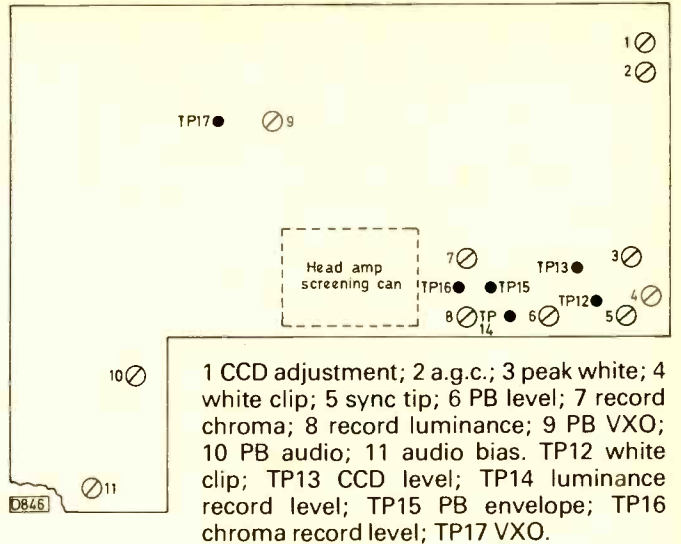


Fig. 3: Luminance-chroma board layout for the Sentra Models VX8500/8600, viewed from the component side.

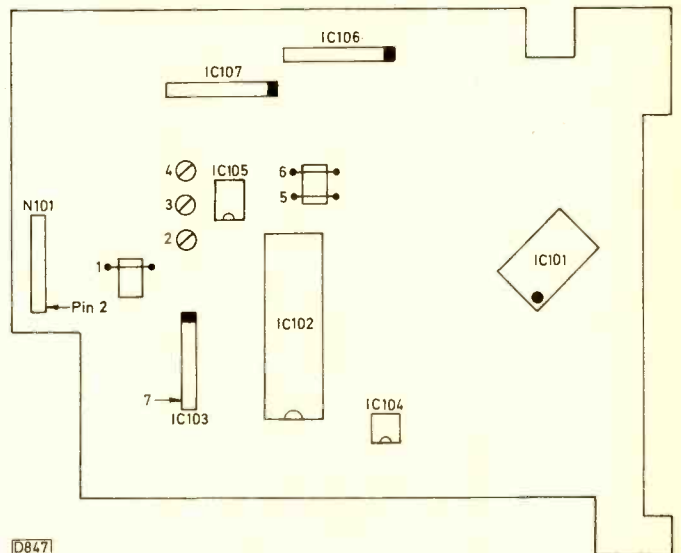


Fig. 4: Layout of the servo/microcomputer control board, Hinari Models VXL8/9. 1 TP3 record CTL; 2 head switching-1; 3 head switching-2; 4 preset tracking; 5 TP1 drum flip-flop; 6 TP2 chassis; 7 IC103 pin 7, playback CTL.

whenever we service one of these machines we clean the head and replace D506 as a matter of course.

Note that D506 has also been responsible for intermittent cutting out due to 50Hz ripple finding its way into the microcomputer control chip.

The most convenient place at which to scope the switched 5.1V supply is at pin 2 of connector N101 at the rear of the servo/control PCB (see Fig. 4). We don't recommend that you place your probe on this pin directly however as there's a possibility of shorting it to pin 3 which carries the unregulated 16V supply. If this occurs the microcomputer control chip IC101 is certain to fail.

Another cause of SP/LP jumping we've come across is interference via the mains supply. The culprit was a flashing fluorescent light in another room.

Erase Fault

When these machines first went into circulation a fairly common fault was failure of the full erase function due to a trapped ribbon cable. The ribbon cable concerned runs along the top of the cassette housing and is sometimes crimped. Although it was not difficult to trace the cause of

the fault it does have a very surprising symptom. Normally the symptoms when the full erase circuit fails are that the original sound track is left on (assuming that you are over recording), the new picture is recorded and background patterning is present. This is not the case with the VXL8.

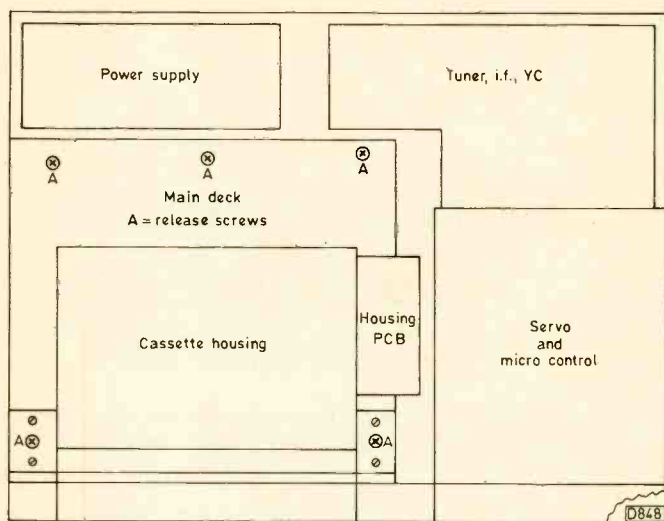


Fig. 5: General layout, Hinari Models VXL8/9.

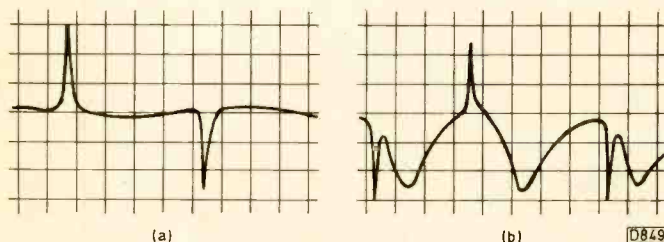


Fig. 6: CTL waveforms. (a) Correct waveform at pin 7 of IC103 (first CTL amplifier output). For reliable operation it should be greater than 1V p-p. (b) Typical CTL waveform when bridge rectifier D506 is defective. Scope settings Y 0.2V/div, X 5msec/div.

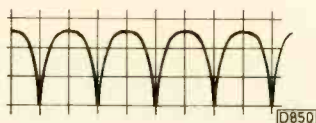


Fig. 7: 50Hz ripple present on the switched 5.1V rail when D506 is defective. Under normal conditions the ripple should be less than 20mV p-p. Waveform taken at pin 2 of connector N101. Scope settings Y 50mV/div, X 10msec/div.

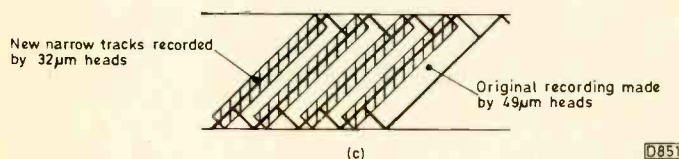
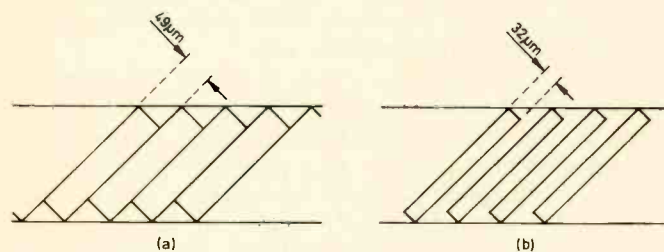


Fig. 8: Standard track pattern for VHS SP recording (a). Track pattern with a machine (e.g. VXL8) that has thinner head cores (b). Effect of over-recording 49µm tracks with thinner heads in the event of failure of the full erase head (c) – the original tracks are only partially removed.

As mentioned earlier, the VXL8 is a budget machine. Thus although it has LP operation there are only two heads. To optimise these for both speeds the cores are 32µm instead of the usual 49µm for VHS. This gives a rather unusual recording pattern on the tape in the SP mode. In effect, a small guard band is left between tracks – see Fig. 8.

When the full erase function fails and a previously recorded tape is re-recorded there's a good chance that the new tracks will be laid down not directly over the original ones but partially in between. When this tape is played back it's actually possible to select which picture you view by using the tracking control! Moving it to the left selects one recording, moving it to the right selects the other one. In some cases the two pictures are of surprising clarity. Some might think this to be impossible. That's what we thought until we saw it for ourselves. For those who can lay their hands on one of these machines to experiment, it's well worth disconnecting the full erase head and over recording a tape just to see the effect. For best results use a tape that has been recorded on a model that has standard thickness heads.

Head Wear

In connection with head wear, we've noticed that the setting of the recording current has a significant effect on picture quality. The manual specifies a recording current level of 120mV (220mV with Sentra models) measured at test point 8 on the YC board (Fig. 2). Experience has shown that with a new head the quality of recordings improves slightly when the recording current is set at around 150mV. As the heads wear however you will begin to experience black/white inversion (streaking) on sharp vertical edges. This can be eliminated by reducing the record current level. Trial and error is the order of the day, but the level may be taken as low as 90mV. This is naturally only a temporary cure as the symptom will reappear with further head wear.

The head drum is very simple to replace. Remove the two screws and lift off the upper drum – no soldering is necessary.

Spares

Like most parts for the VXL8/9, video heads are available from CPC or Wizard. MCES can supply retipped heads and we understand that they will, if asked, retip the drum with standard thickness heads. With these the machine would no longer produce acceptable pictures in the LP mode but the SP picture quality would be improved, something that would not go amiss with these machines.

MCES will also service the u.h.f. tuner, the r.f. modulator and the tuning board synthesiser for the Hinari models.

Microcomputer Faults

As with any VCR the microcomputer control chip, in this case IC101, occasionally causes problems. One in particular we have encountered on a number of occasions. The symptoms are as follows: the power indicator fails to light, the channel indicator works, the machine will accept a cassette and will fast wind forward and backwards but will not play.

A check on the supply rails will reveal that the switched 5.1V and 12V supplies are missing (check at pins 2 and 5

respectively of connector N101 on the servo board). The power-on signal (pin 4 of N101) comes directly from pin 4 of IC101 and to enable the power supply should be low. You will find that this line is floating: shorting pin 4 of N101 to chassis will start up the power supply. Replacing IC101 should be all that's required – as long as you are o.k. at handling surface-mounted devices!

Another problem that can be attributed directly to IC101 is failure to load or unload. Pins 57 and 58 of IC101 control the loading motor via the driver chip IC107. Under the fault condition the logic level at these two pins remains high. Connecting them to chassis should make the motor operate, confirming that the rest of the circuit works.

IC101 was also the cause of no E-to-E signals on one occasion. Playback was correct but in the E-to-E mode the display consisted of a blank grey raster. IC208 on the YC board performs r.f./line video selection in the VXL8: IC207 does the same for audio. We found that pin 3 of these i.c.s didn't go low to select the r.f. input. The logic signal comes from IC101 directly.

Electronic Faults List

Here's a brief summary of other electronic faults we've encountered:

- (1) No ch. 1 display. Pin 39 of IC101 dry-jointed.
- (2) No E-E or playback video. The LA7305 main processing chip IC203 faulty.
- (3) No E-E sound was corrected by replacing the main i.f. can.
- (4) No picture at all, just snow: the tracking control was at one end!
- (5) Capstan motor running fast: C117 was open-circuit resulting in loss of the FG signal.
- (6) Intermittent operation of the capstan and/or loading motor(s). The cause was dry-joints on IC106 and IC107.
- (7) Noise bars rolling through and LP tapes play in the SP mode. Cause was C115 open-circuit, resulting in loss of the playback control pulses.
- (8) Search tuning taking a long time to lock on to the station once found. Defective crystal (F601) on the subpanel mounted on the cabinet above the i.f. module. This panel forms part of the search tune circuitry, overriding the a.f.c. in the search mode and sensing the presence of an off-air signal.
- (9) Rewind o.k. but no play or fast wind – machine will lace up. Capstan motor driver chip IC106 defective.
- (10) We've had a few leaky end sensors. The symptoms are either no play or fast wind but rewind o.k. or vice versa depending on which sensor is faulty. We have, incidentally, discovered that if a sensor were to go open-circuit the machine will operate perfectly until it comes to the end of a tape in fast wind!
- (11) Patterning on playback can be due to loss of earthing between the head amplifier screening cover and the metal bottom plate. The earth connection is made via a small spring and the contact point can become tarnished. Rather

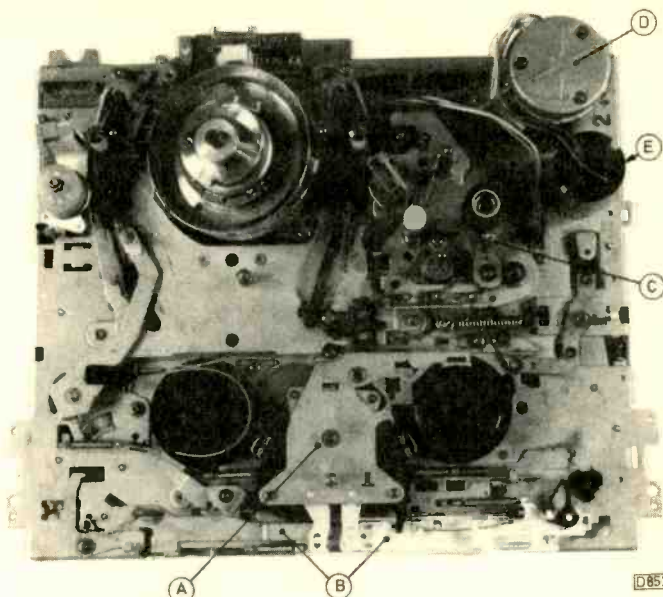


Fig. 9: Upper deck with the cassette housing and head drum removed. The loading arms are in the half-laced position. Key: A forward/reverse drive idler assembly; B slide bars (operating levers); C reverse guide arm; D capstan motor; E loading motor.

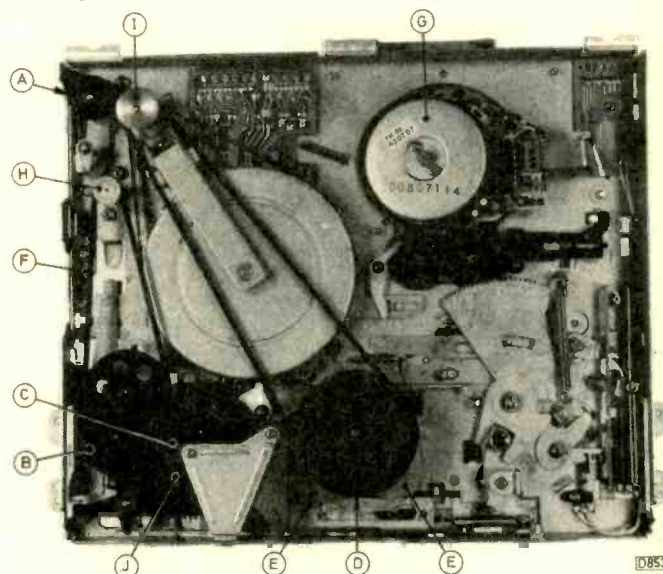


Fig. 10: View of the lower deck. Key: A cassette lift drive pulley; B loading gears; C main cam; D spool drive pulley; E forward/rewind spool drive gears; F loading belt; G drum motor; H loading motor pulley; I capstan motor pulley; J mode switch (beneath cam).

than simply clean the contact we solder a lead from the cover to the copper earth terminal at one of the screw holes for the bottom plate.

The Mechanics

Figs. 9 and 10 show the deck. These photographs should be helpful in identifying the various items referred to in the following notes.

As with any VCR the cassette housing has to be removed before any work can be carried out on the tape transport mechanism. This is not as simple with the VXL8 as with some other machines because the cassette lift is driven by the capstan from the underside of the deck. The simplest approach is to take the entire deck, including the cassette housing, out of the machine then remove the housing.

Deck removal is straightforward. It's usually secured by three screws (on certain clones there are five) which are easy to locate. Once the deck has been removed the housing can be released by taking out two small screws on either side and removing the cassette lift belt. It's often helpful to keep the cassette housing plugged in as this will enable you to operate all the mechanical functions normally – as long as a cassette is loaded into the housing and the lift is down.

There's a small PCB with three microswitches on its underside at the top right-hand side of the cassette housing. These switches are linked to the microcomputer control chip IC101 for correct operation of the cassette lift. We've found it useful to check the logic conditions at these switches on occasions when we've had a machine with the lift either inoperative or not working correctly. Fig. 11 shows the PCB layout: with an operational housing the conditions at the pins marked are as follows:

Pin	lift up	lift down
1	low	low
2	low	high
3	low	low
4	low	high
5	high	low
6	high	low
7	low	high

If these conditions are incorrect the cause is most likely to be a dirty switch contact.

Wow on Sound

Wow on sound, perhaps during only the first quarter of an hour of a tape and more pronounced in the LP mode, is one of the most common complaints with these machines. There are several possible causes, e.g. the pinch roller slipping or the capstan motor binding, but experience has shown that excessive take-up torque is the most common cause. Excessive take-up torque can also lead to the tape riding up or down the capstan with the result that one edge of the tape is chewed. As set up by the manufacturer the take-up torque is unusually high, around 200g-cm. It can be reduced to around 100g-cm by dismantling the take-up clutch assembly, taking about one and a half turns off the tension spring then cleaning the assembly, including the two felt pads, with isopropyl fluid.

The clutch is beneath the spool drive pulley (itemised in Fig. 10). To remove it you must first take out the spool drive pulley and the forward and reverse drive gears. Take care not to mix up the two gears when reassembling them as they are different. The clutch can now be extracted. A gentle pull on the smaller black gear will separate the clutch assembly, but take care that the spring doesn't launch itself into orbit at this point! Fig. 12 shows the

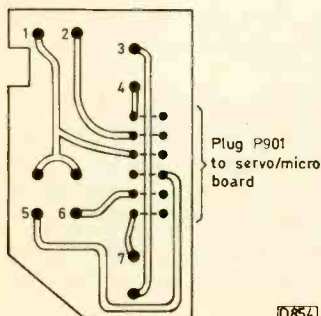


Fig. 11: Cassette lift microswitch PCB. See text for logic conditions at the pins. The pin numbers shown relate to solder joints on the PCB and are included for identification only. The pins on plug P901 are twin terminals, shown here linked by broken lines.

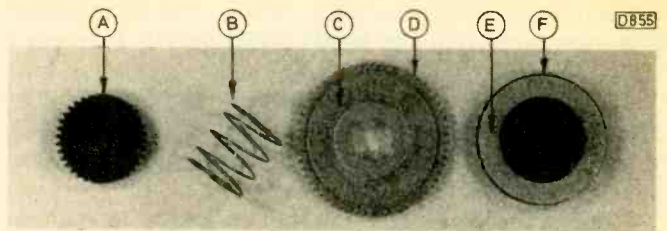


Fig. 12: Dismantled clutch assembly. Key: A upper gear; B tension spring; C clutch plate; D central gear; E friction pad; F lower gear.

dismantled clutch.

We must point out that this is not an official Hinari modification. We've carried it out on a considerable number of these machines however without any comebacks.

Naturally a torque gauge must be used to check the take-up torque. This is simple if you have the cassette type. If however you use, like us, the type that fits over the take-up spool you'll find that the cassette housing frame gets in the way. To save having to remove the housing Graham looked to the resources of his garage to construct an extension shaft for the gauge, see Fig. 13. The idea is simple but is very effective: we've found it to be an invaluable time saver not only with Hinari but with most other VHS machines.

Whilst on the subject of torques, the back tension torque should measure around 40-45g-cm with the VXL8 when checked with a back-tension cassette.

Miscellaneous Mechanical Faults

Another problem we've had on a number of occasions is where the machine refuses to go into fast wind or rewind after coming out of the play mode though you can hear the motors running. The fault is often intermittent. It's caused by seizure of the operating levers at the front of the deck. Fig. 14 shows these levers in closer detail. There are two white nylon gear levers operated by slide bars located centrally between the supply and take-up spools. These gear levers are slotted to locate on to pins on the slide bars. The fault occurs when the pin in the left-hand gear lever sticks in the slot.

We used to rectify the fault by dismantling the gear assembly and widening the slot on the left-hand lever fractionally, using a needle file. More recently however we've noticed that the pivot on the left-hand gear lever (D in Fig. 14) has a very small amount of play when this fault is experienced. We now feel that filing the slot simply counteracts the effect without removing its cause. So we've taken to replacing the left-hand gear lever which we obtain from CPC under part no. HN62D085909305. Should you encounter this fault condition you should inspect this whole area, looking for signs of wear.

A problem we've had on a couple of occasions is where the reverse guide arm located near the pinch roller (see Fig. 9) is bent, probably due to abuse by the owner. This results in the tape riding up or down the capstan, crinkling

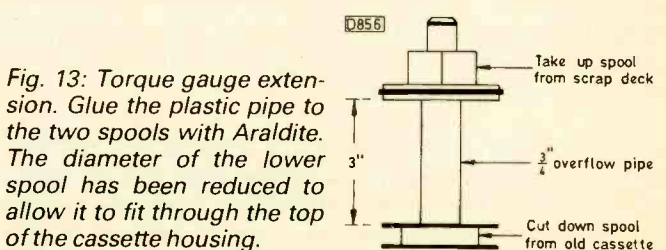


Fig. 13: Torque gauge extension. Glue the plastic pipe to the two spools with Araldite. The diameter of the lower spool has been reduced to allow it to fit through the top of the cassette housing.

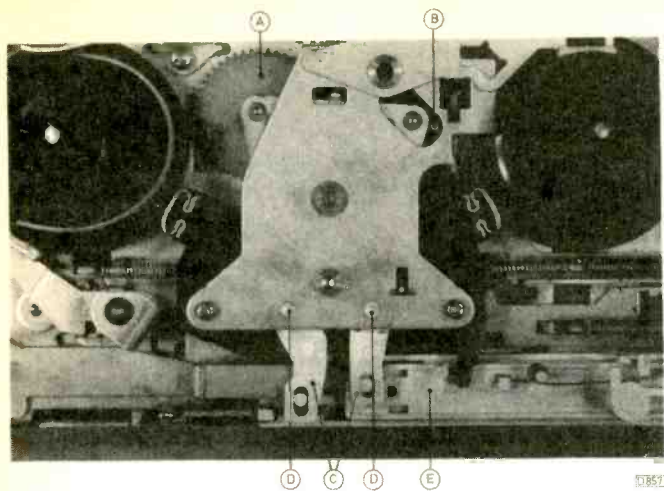


Fig. 14: Operating levers and drive-gear assembly. Key: A reverse drive gear; B forward drive gear; C gear levers; D gear lever pivots; E slide bars/operating levers.

the tape edge. Straightening this is not a simple task and care must be taken not to score the polished surface as this will impair tape travel. It may be necessary to replace the guide, perhaps with one from a scrap deck.

The mode switch causes very little trouble, unlike some decks. Should you need to get to it you'll find it beneath the large cam in the loading gear assembly. It takes the form of four wiper contacts that are secured to the underside of the cam. As the cam rotates, the contacts move over a PCB with copper segments, making and breaking different switch outputs.

Dismantling the switch is not difficult, but you must ensure that the deck is in the fully unloaded position before you start. First remove the loading belt pulley wheel and the gear next to it, then the metal plate that secures the main cam. This gives less chance of the cam rotating by accident. As you remove the one metal and two plastic brackets that locate on to the upper side of the cam, note carefully which grooves they locate into. Also note the position of the cam.

You may well get away with not having to remove the cam in the event of intermittent problems due to dirty mode switch contacts: a spray of switch cleaner under the cam will penetrate to the wipers and copper segments. This method may avoid the problems that can arise when resetting the timing of the loading gears.

In Conclusion

As with many of the smaller importers, Hinari was never number one when it came to technical support. Service information is basic and the circuit diagrams are small and difficult to follow unless enlarged using a photocopier. When Hinari went into liquidation all technical support other than spares ceased, leaving the service industry with yet another headache. We are familiar with these Hinari VCRs only because our company sold so many of them. It's hoped that the information in this article will be helpful to others who come across these machines and in particular those who may have shied away from them till now. We would encourage readers who have encountered other faults on Hinari VCRs to write in: one thing Graham and I have learnt is that you never know everything about a particular piece of equipment.

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Teletopics

CHANNEL 5

The Independent Television Commission has now advertised for applicants to run the Channel 5 franchise. It has set a closing date of July 7th for the applications and hopes to award the licence by the beginning of November. The licence will have a ten-year period.

Applications must include detailed proposals for retuning or modifying VCRs and other domestic equipment such as satellite receivers that are liable to suffer interference from Channel 5 transmissions. This sounds reasonable enough, but when one refers to the code of practice issued by the ITC doubts begin to arise. For a start it's written in fine legalese, with lots of double negatives. There seems to be plenty of scope for argument about what exactly a Channel 5 franchisee would be expected to do. One point suggests to this reader that only those who install Channel 5 receiving equipment would be eligible for retuning etc. That couldn't be, surely? But from reported comment it seems that there is confusion about several vitally important aspects of the retuning requirements. The ITC appears to be trying to avoid full responsibility by asking potential franchisees for proposals which would be open to "public consultation". This is something that will have to be carefully watched.

A franchisee would be expected to start the service by January 1st, 1995, achieving thirty per cent coverage of the UK population within the first year and the estimated full potential coverage of 74 per cent within six years, using 33 designated transmitting sites. There are detailed requirements about the quality, originality and coverage of the programmes. Despite the snags, several substantial groups have expressed an interest in running the service. These include a consortium consisting of TV-am, Time Warner and the Daily Telegraph group (they'd call it The Entertainment Channel) and Five TV, a consortium led by Moses Znaimer, the founder of City TV in Toronto.

The ITC adds the comment that issuing an invitation to apply for the licence doesn't mean that one will necessarily be awarded. The Broadcasting Act of 1990 requires the ITC to do all it can to ensure that a service is set up, but "whether or not an award is made will depend on the Commission's consideration, in accordance with the Act, of the applications received".

Meanwhile across the Channel the French fifth service La Cinq has closed down after being declared bankrupt by the Paris commercial court.

While on broadcasting matters, NTL has extended Nicam transmissions to the East Midlands and East Devon, for Central TV and TSW respectively. These areas will be the first to be served by European all solid-state high-power u.h.f. transmitters. NTL estimates that over 85 per cent of UK viewers can now receive Nicam transmissions.

TRADE SCENE

The latest figures from BREMA show a fall in CTV deliveries during 1991 of 3.5 per cent, to a total of 3,350,000 sets, the lowest level since 1983. For only the second year (the first was in 1988) small-screen sets outsold large-screen ones. VCR figures remained level at around

2,160,000 units. Camcorder deliveries rose by forty per cent, to 500,000, bringing the household penetration to seven per cent. There was a slight increase in CD player deliveries to around 2,300,000.

According to the European Laser Disc Association (ELDA) sales of Laser Disc players in Europe doubled from 50,000 in 1990 to 100,000 in 1991. A further increase is expected in 1992.

SATELLITE TV

The Astra organisation has released figures on the European satellite TV market. These indicate that the total number of UK homes that can receive one or more of the Astra channels is now over 2,682,000, with 2,192,000 homes receiving the signals from dishes while 490,000 are served by cable. Germany is the largest European satellite TV market – over 13,120,000 homes there receive Astra. The total figure for Europe is 34,177,000. According to the *Financial Times* satellite TV monitor there was a further increase in UK dish installations in March, when some 94,000 dishes were installed.

CNN is now broadcasting via Astra 1B, using transponder 28. Astra has launched an initiative aimed at promoting awareness and demand for TV sets and VCRs with integrated Astra receivers – they will be marked with a "satellite ready" logo. Thames Television and BBC Enterprises intend to start a satellite TV channel via Astra. It's hoped that the service, which will make extensive use of Thames and BBC library material, will start as early as September.

The ITC has issued an invitation to any person or organisation to express an interest in providing domestic satellite services (DSS) via the Marco Polo craft, which will cease to carry BSkyB services at the end of the year. There are legal problems here however. Under the terms of the Broadcasting Act, 1990 DSS licences are issued for a fixed term of fifteen years. But Marco Polo's transponders are not expected to remain operational beyond the year 2001. So any alternative user must be in a position to provide an alternative satellite for the remaining duration of the licence!

SES, which owns the Astra operation, has joined the Eureka 95 HD-MAC project. It will become a member of Project Group 4 (transmission) and will provide transponder capacity for widescreen and HDTV transmissions (SES and BSkyB broadcast D2-MAC widescreen TV pictures during the recent Brown Goods and Cable and Satellite shows). The European Commission has agreed to provide Ecu850m (about £600m) to encourage broadcasters, satellite TV operators and manufacturers to establish widescreen TV services as a first step towards full HDTV, though final approval of the five-year package rests with the council of ministers. The aim is to have at least thirty satellite TV services broadcasting 16:9 format pictures by 1996.

Cambridge Computer has launched a dual-output LNB for domestic satellite TV installations using either offset or prime-focus dishes, enabling two satellite receivers to be operated independently from a single dish. Called the Cambridge Gemini, the new LNB is Astra compatible. The company has produced for dealers and installers a video that explains the use of the new LNB. For details apply to Cambridge Computer Ltd., 1 Crompton Way, North Newmoor Industrial Estate, Irvine, Scotland KA11 4HU (0294 222 100).

Wolsey TV systems, a division of AB Microelectronics (Abercynon, Mid Glamorgan CF45 4SF – 0443 740 331),

has introduced the NEAT 2000 system for use with SMATV signal distribution systems. It enables the SMATV operator to decode the many and varied signals at the head end individually and then distribute them in a common format. Viewers have a smart-card operated unit to give them access to the various channels. The smart card is easily programmed and can give viewers access to programmes in various ways, e.g. pay per programme, period payment or subscriber account. The NEAT (Novel Encrypted Access sysTem) 2000 system consists of an encryption unit which is connected between the output from the SMATV receiver or decoder and the input to the VSB modulator, set-top decryptors with IR channel selection and a controller to link the smart card and customer database.

TRADE NEWS

HRS Electronics, Garretts Green Lane, Birmingham B33 0UE (021 789 7575) has added to its range of spares etc. a number of genuine JVC video maintenance kits for models HR7200/7300 onwards. HRS has now dropped all carriage charges: any order, however large or small, is now dispatched from the company's Birmingham base as a priority carriage free.

Soldering and desoldering specialist Ungar (Eldon Industries UK Ltd., Clifton Road, Shefford, Beds SG17 5AB - 0462 814 914) has introduced a new version of its SM1000 surface-mount rework station. The new version incorporates a miniature colour CCD camera on a rotatable mount to provide a clear, close-up view for accurate device positioning and ease of inspection after reflow. The SM1000 is a self-contained, ESD-safe unit with a long-life, hot-air heater system with closed-loop temperature control. Top and bottom heaters warm both sides of the board rapidly and accurately without over heating. Components are automatically removed immediately on reflow.

At the annual RETRA conference in Torquay president Robin Farmer warned of a potential shortage of trained service engineers. He blamed the higher rates that computer and photocopier firms are able to pay and called for more realistic in-guarantee labour rates.

The Cable Television Association forecasts the creation of a further 24,000 jobs in the expanding cable television and telecommunications industry by mid-1995. Cable companies plan to invest up to £6bn in the industry. The number of cable subscribers is expected to rise from the present 300,000 to over 500,000 by the end of the year.

NEW CATALOGUE

A new catalogue has been published by Aerial Techniques, 11 Kent Road, Parkstone, Poole, Dorset BH12 2EH (0202 738 232). It lists a wide range of aerials and associated equipment for all needs. A number of multistandard TV sets and VCRs are listed and there's a useful, up-to-date world television systems chart. Copies are available by return of post for £1.

TAPES AND DISCS

Researchers at The Netherlands Organisation for Applied Scientific Research have been considering the life of compact discs and videotapes. They think that CDs may cease to produce sound after about thirty years because of oxidation of the pits in the metal surface. Videotapes gradually become demagnetised: random checks in Dutch

video archives have shown blue-tinged and striped images after as little as three years. The CD-ROM is also believed to have only a limited life span.

TDK has released a one-hour VHS tape (HS-E60) that's intended for camcorder users who wish to make tape copies for friends and relatives. Price is £1.99. Fuji's Super HG Double Coated P5-120 8mm tape gives two hours' playing time in the standard mode, four hours in the long-play mode. It's priced at around £9. Sony has brought out a two-hour metal evaporated Hi8 tape at around £21. TDK has also announced a two-hour Video 8 tape.

US HDTV

Fox Television Stations Inc. has signed an agreement to acquire advanced television (ATV) equipment from Harris Corporation, the leading US supplier of TV and radio transmitters and radio studio equipment. Fox has thus become the first station group in the USA committed to using new HDTV technology. The agreement is for the installation of ATV transmitters immediately after a standard has been adopted by the FCC. Several systems are being evaluated for the FCC by the independent Advanced Television Test Centre in Alexandria, Virginia. These are all now digital systems, following the withdrawal of a Philips/Thomson analogue system (this consortium still has a digital system in the running). The FCC will thus have to decide between four digital TV systems: the decision is expected some time next year.

LCD DEVELOPMENTS

The reason for the costliness of LC displays is the low production yields. A great advance has been announced by NEC who claim to have achieved a yield of well over fifty per cent for thin-film transistor (TFT) colour LCDs. An eighty per cent yield is the near-term aim. The company is despatching over 10,000 10in. panels a month and hopes to reduce the price to a tenth of the present equivalent of around £2,500 within three years. Meanwhile Matsushita has increased the size of its largest high-resolution colour TFT LCDs to 15in. They have 3,110,000 pixels arranged in a 1,152 x 900 matrix.

Citizen Watch has developed an LC display measuring 0.7in. across for use in camcorder viewfinders. It has a response time of around 50msec, making it fast enough to capture movement clearly.

VIDEOPHONES

A Silicon Valley start-up company, Integrated Information Technology (IIT), has developed a set of two chips to carry out data compression for videophone use. It enables a frame of video to be sent via a standard analogue telephone line in a tenth of a second. The chipset can be programmed by IIT to conform to any of the major videophone standards. At present the chipset costs around £150, but this is expected to fall as production increases. The chips are being manufactured by Hewlett-Packard and National Semiconductor.

British Telecom is developing, with Olivetti, a videophone for use with personal computers, enabling on-screen displays to be transmitted between PCs. BT hopes that digital videophony, when available, will boost the use of ISDN services. British Telecom is also working on telephone-computer equipment with IBM to allow users to interchange computer displays. A picture of the sender can be displayed in a corner of the screen.

Satellite Notebook

Nick Beer

After last month's look at motorised B and O systems, let's consider some fault conditions we've encountered recently.

My Orthomode's Sprung a Leak!

A local hotel has been a customer of ours for some years, renting a number of TV sets. The proprietor is notorious for trying to keep his costs down. This was a prime consideration when we were asked to look at the satellite TV system that had been installed there by a specialist company some years ago.

We offered to provide a preliminary assessment after explaining that we wouldn't be able to assist if a receiver was defective. The system is very simple, see Fig. 1. I was somewhat apprehensive because, due to inadequate spacing between channels, there have always been problems with the signal distribution system at the hotel. We have often been called because of complaints of snowy pictures or patterning and have had to advise that the distribution system be sorted out, something that's never been done. The owner's son once told me that "there's nothing wrong with the aerial system – it's all properly wired on a ring main..."

Anyway, the complaint was of no MTV signals. This is the only horizontally polarised channel and the input goes to receiver four. There's no electrical polarisation control as two LNBs and an orthomode transducer are used. I found that there was a d.c. supply to the LNB for the horizontally polarised signal but no output from it. When I disconnected it from the orthomode transducer my hand was doused in what seemed like a gallon of water. The orthomode transducer and LNB aperture had been full of water. As the LNB for the horizontally polarised signal was the lower leg of the assembly – see Fig. 2 – it acted like a drain. The cause of the problem was a leak in the joint across the top of the orthomode transducer.

The dish is mounted in a gap in the hotel's roof, with access via a dormer window. It's easy to work on – once you manage to get there.

Rebuilt LNBs

We've not had many LNB failures and are unlikely to as we service only systems that we have ourselves sold. I have however had one or two defective Nokia branded LNBs of the types supplied with the Salora 5902 system. The usual version is the very short one which, for a separate LNB, I've always considered to be pretty neat and compact. When there has been failure we have offered chargeable customers the

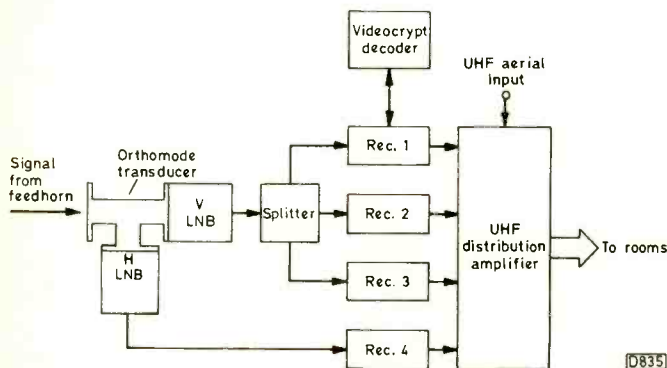


Fig. 1: Block diagram of the hotel's receiving system, with dual LNB assembly.

choice of either a new one or a rebuilt one from MCES of Manchester. The latter option has invariably been selected, and neither our customers nor ourselves have been disappointed with the outcome and the cost saving. At the time of writing the trade price for the service is £28.79. MCES also provides a rebuild service for Marconi blue cap LNBs, at £30.55 for a unit with a minimum gain of 52dB or £35.25 for a higher gain (minimum 58dB) unit. The same prices apply with the Marconi compact LNB. They include VAT and post/packing. An excellent proposition.

Interfaces

Some months ago I came across an interesting device that's available from Eurosat in Exeter. It's an interface that enables a dual-voltage Marconi type receiver – the type that's most frequently used these days – to control a head end/dish with an electromagnetic, skew-type polariser. It can be of use when a receiver is replaced but the dish kit is to be retained – for example when someone upgrades to an integrated receiver-decoder or where a receiver is not worth repair due to a major fault, spillage, etc. A number of systems use electromagnetic polarisers, for example some of those that have been marketed by Grundig and Salora/Luxor.

I've found that the device doesn't work satisfactorily with Fuba polarisers. This is a problem with early 55cm and all 85cm Salora 5902 systems which use Fuba kits. I've not tried it with the Maspro polariser used in the later 65cm Salora systems. It did work well with a Panasonic system.

The unit has an internal switch to give two current levels. There are two potentiometers, one to set the horizontal and the other the vertical current. The difficulties I had with the Fuba polarisers were as follows: either one polarity only could be clearly obtained or, with both polarities set, some vertical channels were very weak. Eurosat is aware of the problem. We are also advised that there's a version which works the other way, enabling a receiver with an electromagnetic polarisation output to control a Marconi LNB.

Intruders

When Astra first started transmissions we installed a number of Luxor 9570 Mk II receivers with 60cm prime-focus dishes. This was from necessity rather than choice, as equipment was at that time in short supply. These systems have proved to be less than impressive – the dishes are a bit too small here in North Devon. We have since offered our customers an upgrade to an 85cm Fuba dish, using the original LNB and servo-motor polariser, and this has usually provided a cure for any reception problems.

We've had one or two polariser failures: the motors become tight and, intermittently, fail to move fully into place. The last time we had a failure that was actually repaired the polariser had to be purchased complete, at an incredible price – in most recent cases the estimate has been refused! It's possible to replace the device with an electromagnetic type and a suitable interface, provided account is taken of any 5V supply switching.

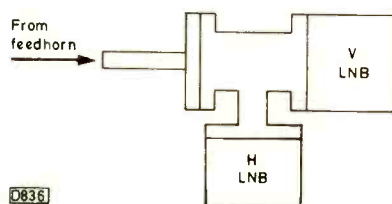


Fig. 2: The LNB/orthomode transducer assembly, with vertical and horizontal polarisation LNBs.

The most common problem we've had with the external parts of these systems has been blockage of the open-ended feedhorn. The usual cause is spiders and their nests. I clean them out, spray some smelly demoisturising lubricant (RS) into the horn and then fit a cap over the end to prevent resettlement by these squatters.

One customer I visited had been told that a defective LNB and polariser were the cause of the sparklies that troubled him. The actual cause of the trouble was a spider that wandered around the feedhorn. The chap who'd called previously hadn't gone up to the dish to check anything – it had been raining heavily!

CD Player Casebook

*Reports from Mike Leach,
P.J. Roberts and Nick Beer*

Philips CD303

We've had a plague of dry-joint problems recently. An example was this CD303. It uses the early type of light-pen laser which has been very reliable over the years. The symptoms were very distorted sound on both channels while the display would flicker very badly and sometimes go out completely. The trouble seemed to arise only when the machine was warm. Its cause was dry-joints around the regulators in the power supply – in fact all the regulators looked as if they needed soldering. Also one of the smoothing electrolytics (1,500 μ F, 35V) looked distressed and in need of being changed. When this work had been completed the player worked perfectly during a couple of hours' soak test. **M.L.**

Sanyo DCDJ1

This midi system produced similar results to the Philips machine. It would start to play all right, then the display would go out and the whole CD player section would shut down. The cause was dry-joints on regulator IC115 on the bottom board of the system. Other areas of the board also required attention, so this could be one to watch out for. **M.L.**

Sharp DXR750E

The fault with this machine was failure to read any discs, not even the TOC. Focus was found and the disc rotated but the tracking servo wouldn't lock. When I dismantled the machine I found that the pick-up was half way along the sled rails and wouldn't return to the inner part of the disc. This was due to the sled motor having seized as the lubricant in the bearings had hardened with age. Although you can lubricate the motor's bearings with light oil I don't recommend doing this. It's better to replace the motor (part no. RMOTV0334AF00). After fitting a new motor and sled belt the machine operated normally, playing the test disc perfectly. **P.J.R.**

Ferguson CD07/8

The player would accept a disc, read the TOC and commence to play any section of the track selected, but after about two-three minutes the tracking servo would go open, resulting in loss of sound. We also found that the r.f. signal (eye pattern) at the test point (BH01 Mk 1, BB05 Mk 2) became progressively noisy during the ten-fifteen seconds before the sound cut out. The cause was traced to a faulty sled motor. We removed it, connected it to a 1.5V cell and, with the spindle gripped between the thumb and forefinger, found that it would stop in one place, indicating that there was a dead spot on the commutator. A new motor (part no. 00X6644116) restored normal operation.

Note that there are two versions of this machine. They are easy to recognise: the Mk 1 has a latching on/off switch while the Mk 2 doesn't. The PCBs are different and so are the mechanics. But the sled motors are the same in both machines. **P.J.R.**

Sansui SAP990

The fault with this portable radio/cassette/CD player was that the CD section would skip and sometimes fail to read the disc at all. I've found that with some KSS150 type pick-ups the plastic moulding is tight to the mechanism (opposite side of the pick-up with respect to the slide bar). To cure this, file a small amount of material from the lower part of this moulding and relubricate before reassembling.

Carrying out this modification freed the mechanism but the unit would still intermittently fail to read the disc. Studying the machine's operation I noticed that focusing was intermittent. The cause was traced to a break in the lead that supplies the focus coil. A replacement lead completed the service. **P.J.R.**

Pioneer PDX303

The symptoms with this machine were a scraping noise whilst playing a disc and intermittent skipping. The cause was traced to the four rubber mountings at the base of the CD mechanism. They had perished, but in doing so some had become hard while the others had gone soft. The net result was that the CD mechanism sat at an angle, and in consequence the disc scraped on the drawer.

When you look at the rubbers you'll see that one of them is different. When replacing them the odd one out must be fitted at the rear right of the CD mechanism, looking from the front of the player. Part numbers are as follows: float rubber F, PEB320; float rubber R, PEB321 – this is the one that goes at the rear right.

With new rubber mountings fitted the player worked to specification and played the test disc without trouble. **P.J.R.**

Toshiba SK3461

The CD player section of this all-in-one hi-fi ensemble had an exceptionally intermittent fault. It would work perfectly for weeks but would then cut out when running or fail to work correctly from cold, the symptoms being distorted then no sound and finally no display or disc rotation. The cause of the trouble was loss of master clock oscillation due to dry-joints at the 8.4672MHz crystal XTL801. Even though the crystal moved freely in its dry solder I couldn't instigate the fault in this way. Resoldering provided a cure. **N.B.**

Letters

AN ANALOGUE WORLD

There's been a lot of comment in your pages recently about HDTV, MAC, aspect ratios etc. To some extent the hype regarding these seems to be another example of technology for the sake of it. The point being missed is who really wants them? It often seems that the only people who ever look really critically at the performance of TV sets, VCRs and transmission systems are engineers. The vast majority of the public watch television for its entertainment (!) value and wouldn't know a grainy picture with cross-colour if you spent half an hour explaining it to them. As an example of this, how many of us have been called out to a set with a clapped out tube, about $20\mu\text{V}$ of signal going into it and a dicky tuner control unit only to be told by the owner "it's the sound me duck".

I've been working with ultra-high resolution displays for years now – $1,280 \times 1,024 \times 24$ bits some ten years ago – and have seen what at first appear to be beautiful pictures on them, entirely noise free. Once you've got used to them however and have got over how "real world" they are you begin to realise that in fact they aren't anything of the sort. The images are altogether too clean and not of the real world: they lack the warmth and visual equivalent of audio ambience. I sincerely believe that these parameters are a function of the mind and are not quantifiable and thus not amenable to being reproduced by electronic reconstruction of a signal.

As a couple of examples of this I would quote cheap-end American soaps and the CD system. The soaps I refer to are ones made by local US TV companies for regional showing rather than networking and are now tending to put in an appearance here late at night. These programmes are invariably shot on tape rather than film. Studio scenes shot on sets with fiddleable lighting look o.k., but if the camera goes outdoors the pictures take on an altogether unreal look. Film suffers from no such shortcoming: the naturalness and ambience of the real world scene are captured in a way that's pleasing to the eye, though I suspect that what I really mean is pleasing to the mind.

The CD system suffers in an audio equivalent way. Now I'm not knocking CD: it's a wonderful system and has marvellous convenience. In fact when I heard CD for the first time I had to rush out and get my own player. I've spent some time replacing a lot of my vinyl records with CDs and now rarely play a record. But, having both the vinyl and CD of an album for comparison, I am in agreement with the audiophiles who loathe CD in that the sound from vinyl is superior in ambience and real worldliness. The CD sound is too clean, if you like.

Like it or not we live in an analogue world, and I'm sure that the most natural way to produce inputs for our analogue senses is by using well-designed analogue circuitry. The old Bush A823 chassis with its analogue circuitry and delta-gun tube to this day gives, when properly set up, a more natural-looking picture than most of today's sets with all their digital jiggery-pockery.

Finally a word on aspect ratios. While it may be true scientifically that the aspect ratio of the human field of vision is 16:9 or greater, the perceived aspect ratio certainly isn't. If you go to the cinema and see a widescreen film the screen doesn't, unless you are sitting right at the front, fill your entire field of vision. Indeed the cinema tends to fill first in the middle, where people's minds dictate that they

should sit in order for the screen to appear the width it would be with a squashed aspect ratio. It's worth looking around at all the rectangular structures that have been designed over the centuries: it's amazing how many have an aspect ratio of approximately 4:3. This cannot be by chance. It must be because they look pleasing and natural that way to human sight.

Try this simple experiment. Hold your two index fingers two feet in front of your face at eye level, then move your fingers slowly apart. You will find that when they are about three feet apart you'll no longer be able to see them as fingers – they merely give the impression of something moving. They could be pens, sausages, screwdrivers or almost anything. If you don't believe that you really can't "see" them get a colleague to hold something like a pencil at the same position then, whilst still looking straight ahead, try to tell him what colour it is. If you repeat the experiment in the vertical direction you'll find that the perceived aspect ratio of your vision is approximately 4:3.

At the end of the day the proponents of this new widescreen technology have got to convince people that they want one of these monsters in their house. I'm sure that most people would agree that as a piece of furniture widescreen TV sets look grotesque. I think that the setmakers are going to have a long, up-hill struggle with this one – except with certain engineers who are certain to think that it's a wondrous piece of technology!

*Geoff R. Darby, Proprietor Monitech,
Northampton.*

FILM ASPECT RATIOS

I would like to make the following observations with respect to David Looser's letter (April) on HD and widescreen TV. When 20th Century Fox made the first Cinemascope picture "The Robe" back in 1952 some companies, such as Paramount, opted for the Vistavision (1.85:1) format – the first film in this format was "White Christmas". MGM tried Vistavision with "High Society" but then reverted to the Cinemascope format. Columbia, United Artists and Universal amongst other US film makers all adopted the 2.35:1 format – 2.55:1 if the print had four-track magnetic stereophonic sound. The 2.35:1 ratio became the standard release format in America however. Other formats came and went during those early days.

J. Arthur Rank released some films in Vistavision but used Cinemascope for major productions. London Films also adopted the 2.35:1 format. I grant that a lot of Rank's quickie productions, e.g. the Carry On films, were released in what appeared to be 4:3 aspect ratio, but these were shot using a safe action area suitable for semi-widescreen display, i.e. 1.85:1. There was no action at the top and bottom of the picture in these prints. The idea was that the screen could still be filled with pictures in cinemas that didn't have the widescreen format while those that did could safely crop the top and bottom of the pictures. Film makers like Columbia later released what were known in the industry as 2 to 1 prints, made from Cinemascope originals, so that cinemas without wide screen and/or Cinemascope lenses could show their films. These left a gap at the top and bottom of the screen. They soon enough stopped making these prints and by the early Sixties it was hard to get any newly released film that wasn't a squeezed print: hence most cinemas had by the early Sixties installed Cinemascope. From then on most Hollywood films were in the 2.35:1 format and the British weren't far behind. I installed Cinemascope in the cinema where I worked as a

lad because we could no longer get up-to-date American films in the 2:1 format. Thus I stand by what I said about almost every film made in the forty years since 1952 being made in the 2.35:1 format. During the Fifties cheap quickies and a number of long and best forgotten art films were not in this format, but from the Sixties onwards almost all feature films that were a box office success were in the 2.35:1 format.

David says that widescreen pictures look silly on a small screen. That's surely a matter of opinion. However a TV projector that gives good quality pictures is now available here in New Zealand. It uses a liquid-crystal display to provide the image, a projector lamp as the light source and a single lens for displaying the pictures on any home movie screen. In this case the image size is limited by the power of the lamp and the focal length of the lens. These units sell for less than the large c.r.t. Mitsubishi sets distributed here. Widescreen versions of some films are now available in the UK on VHS tapes as collectors' items. Tapes in this format are very common in the USA. I understand that the laser discs of films now available in the USA are in the letter-box format, and that the demand there for films in their original format is very high and is growing in the UK.

My original point was why not agree in principle to transmit all films in their original format on HDTV? Receiver manufacturers could build in a zoom function to enable viewers to fit the picture as they prefer on the 2.35:1 screen. Note that 2:1 is the safe-action area for Cinemascope/Panavision: hence the screen could be limited to 2:1 without losing too much, as is the case with 16:9. On such a set an ancient 4:3 aspect ratio film would have a gap to the left and right of the picture: the zoom feature would enable the viewer to crop the top and bottom if this was preferred. Both 4:3 and 2.35:1 films would thus be transmitted correctly, the viewer having the choice to crop or not. Now is the time to make this decision.

Finally I agree with David about big c.r.t.s. I don't want such a set but would like one of the small-footed single-lens TV projectors or, better still, a wall-mounted display unit of the type recently developed. I suggest that David takes a look at an NEC lap-top computer with a VGA (high-definition) liquid-crystal display for an idea of how like-screened TV sets will soon provide flat, wall-mounted displays. Oh, and mic booms and cables don't get seen with professionally made TV/films, the mic seen fleetingly in "There's No Business Like Show Business" excepted!

John W. Dagg,

Masterton, New Zealand.

MICROWAVE OVEN DANGERS

As a qualified service technician and Senior Lecturer at Manchester College of Arts and Technology responsible for the introduction of a nationally recognised examination in microwave oven servicing I'm very concerned about Ian Rees' article on an h.v. tester (April) and its implications. Contrary to all the manufacturers' recommendations to service technicians it suggests that carrying out measurements in the high-voltage/high-current circuit is a valid form of testing, and that the use of a home-constructed test device with little advice on design safety considerations is acceptable.

Under no-load conditions the h.v. supply (soon to be replaced with a switch-mode version) in a microwave oven rises to a peak of around 6kV. Under certain conditions it's capable, even when the oven is switched off and disconnected from the mains, of providing approximately

2.5kV at 700mA. If an oven is repaired by an inexperienced or unqualified technician or someone with limited knowledge of manufacturers' built-in safety factors it's possible that the above conditions could be present even though the oven shows no outward signs of the dangers introduced and otherwise works satisfactorily. When the voltage exceeds 60V a current of around 30mA is sufficient to kill. For microwave ovens these figures are exceeded twenty times in current terms and at least forty times in voltage terms. The capability in power terms means that if direct contact is made the recipient will be severely burnt and has a zero survival factor.

The experienced technician is well aware of the dangers and is conversant with an alternative safe strategy for testing this circuit. It employs a low-voltage a.c. supply to feed the magnetron's heaters and might be considered safe but is in fact far more likely to result in death if used by an untrained amateur.

Your unsuspecting readers should be made aware of these lethal dangers.

Mike Perkins,

Sale, Cheshire.

CORRECTION

A correction is required to the test mode instructions for the Akai CDM512 I gave last month (CD Player Casebook, page 497). With the player in test mode 3 you have to press the track forward key to close the tracking servo. You press stop to reset to mode 0, and you can move the pick-up backwards and forwards by using the search keys. My apologies to readers – these things do happen...

P.J. Roberts, GIVUV,

Fishponds, Bristol.

HELP WANTED

Wanted: Line output transformers for the Skantic Honnor mono portable Model 1746 and Pye 173 mono chassis. All costs met. H.S. Downing, 16 Mayfield Crescent, Lower Stondon, Henlow, Beds SG16 6LF. 0462 850 244.

Wanted: Main board for a Granada Colourette C11G21/Kuba Porta-Color or a complete set. Keith Parker, 20 Herbert Road, New Southgate, London N11 2QN. 081 889 3779.

Wanted: New or secondhand LOPT for a Panasonic TX3300. John Latham, 57 Rosehill Road, Rhyl, Clwyd LL18 4ES. 0745 345 377.

Wanted: Any information (circuit diagram etc.) for a Technics Model RS276US free-standing cassette deck. Phil Hughes, 32 Purlieu Way, Theydon Bois, Essex CM16 7EH. 0992 813 484.

Wanted: Complete power supply for a Panasonic NV780 VCR. Bill Myson, Box 603, Marondera, Zimbabwe.

Wanted: Type 250AMB22 10in. colour tube for an Amstrad CTV1000 portable (Amstrad part no. 1400084). Colin Boggis, 2 Larks Way, Knaphill, Woking, Surrey GU21 2LB. 0483 476 831.

Wanted: LOPT for the Panasonic Model TC381G. Michael Mills, Knavesmire Television, 90 Tadcaster Road, York. 0904 708 575.

Wanted: Colour delay line DL2 for the Amstrad VCR9000. It's of Mitsubishi manufacture and is part no. EFD-BRD124A13P. Normal sources no longer have any stock. Perhaps someone has one in an old machine? D.W. Cunnick, 19 Bridgend Road, Aberkenfig, Bridgend, Mid-Glamorgan CF32 9BN. 0656 720 321.

What a Life!

Donald Bullock

Carl Pople of Willow Vale called in the other day. His days in the trade started at about the same time as mine, only instead of repairing sets he was a Mazda rep handling valves and tubes. Valves gave way to transistors and, subsequently, TV sets became so cheap that the replacement tube market was no longer viable for either Mullard or Mazda. We talked of the astonishing changes that have occurred in the trade since those early days, and a couple of hours slipped by in no time. Then it was back to the present and as Carl went on his way I turned to a Turkish manufactured Hikona colour portable, Model 1437. The ticket simply said "dead".

The Hikona Colour Portable

Well we're expected to mend everything that's thrown at us, so I got stuck in. The set has a stylish, well laid out chassis and, unbelievably, there was an equally pleasing service sheet. An isolated power supply is used: it was failing in its task of delivering a regulated 110V h.t. supply.

There was plenty of voltage at the mains bridge rectifier's output. It reached the collector of the chopper transistor Q901 via the transformer, but the circuit wasn't oscillating. Checks showed that the two transistors Q902/3 in the control circuit were starved of voltage while Q901's base was floating. All this was because the 56k Ω , 3W wirewound resistor R908, which should have supplied 16V, was open-circuit. A replacement brought excellent results, the well-produced circuit sheet and tidy layout having made this set a joy to work on.

Mrs Tuff's Logik VR950 (Samsung VI611)

As I boxed up the Hikona set Mrs. Tuff, all two hundred-weight of her, came in with a Logik VR950 VCR. She's a welder in a foundry and has a chin like Desperate Dan.

"It's wonky" she bellowed.

"Er, what exactly is the matter with..."

"Told yer, it's wonky."

So I wrote "wonky" on the ticket and, as she left, I put the machine on the bench. It played back all right, so I tried making a recording. After a minute the E-to-E picture started to pattern and pull and the sound became grouchy. Then everything buzzed off. Wishing that it had idler trouble instead, I got to work and soon graduated from the tuner to the power pack where I set out to check the voltage on the 33V zener diode ZD3. Not only did it have a substantial leak, it was running warm. I fitted a replacement, checked its voltage and current conditions and soak tested the machine for a while. As it behaved properly I phoned Mrs. Tuff to ask her to come and collect it.

A Sharp VCA131HM

Meanwhile Russ Breeze strode in with his Sharp VCA131HM VCR. It had tape transport trouble – play, rewind and fast forward were all unreliable. I've had drive belt and idler trouble with this model and decided to check the belt first. Sure enough it was slack. After cleaning off the pulley wheel I fitted a replacement. This improved the performance, but play was still sluggish. So I took out the idler

and fitted a new tyre. This provided a complete cure. I replaced the cover which, as with so many machines, is secured by four screws: it saves time to remember that they are pairs of different lengths – the short ones secure the sides while the long ones go in the back.

The Surgeon's ITT CT2600

As Russ was digging into his pocket a smart car with an even smarter driver pulled up. It was Miss Dream, a local surgeon's daughter.

"I've brought dad's television set along for repair" she breathed, "only it's so large. Can anyone give me a hand?" Russ's day was made.

When he got the monster on to the bench it turned out to be a 26in. ITT set, Model CT2600 – CVC1210 chassis. Apart from a ticking noise the set was dead to the world. A quick check showed that there was 330V across the mains bridge rectifier's reservoir capacitor C658, so I frowned at the line output stage. The BU208A line output transistor T501 on its heatsink to the left of the transformer was short-circuit while the BD135 EW modulator driver transistor T562 was wide open. R503 (100 Ω) in the scan-correction network had suffered from the effects of heat, but this is often the case. I replaced these three items and switched on, hoping to hear the rustle of e.h.t. But none came. So I applied a finger to the encapsulated line output transformer. It was hot. A new one from Hoopwell completed the repair.

A Solavox ITT

The very next set to arrive on the bench was fitted with the same chassis, only this time it bore a Solavox badge (Model 22T09). The line output transformer was the problem with this one as well. Meanwhile a Manager's Service Special brochure from CPC offered an HRS version of the transformer at half price. I faxed an order and it arrived the next day. Fitting it put the set to rights.

An Unpleasant Experience

I was getting on swimmingly the other day when, at about 1 p.m., Mr. Snide phoned from New Close. He said that he'd only just moved into the area and that his large colour set was producing poor pictures on two of the channels. In addition he had a monochrome portable with a dim picture. He didn't know where I was to be found, so could I call along now?

I took his address and telephone number and told him that we'd be along. In fact I rarely do house calls these days, but my son Paul sometimes gives me a hand with them. He said he'd go right away.

"We don't know whether his main set or the aerial is at fault" I said. "He's new to the area. I suggest you use the monochrome portable to test the aerial. If it's o.k., we'll attend to the set. If not I'll give him the telephone number of a good rigger. In any case, I've agreed to look at the portable."

Paul came back an age later to say that the address wasn't right. After I'd phoned and got the correct address Paul set out again. After a good while he came back with the portable and reported that the other problem was due to the aerial.

The portable was a Pye T173 (Philips TS7 chassis). It must be at least twenty years old now, though it's a stylish set. I'd serviced one or two of these sets before and was sure I had the circuit, but finding it took quite a while. The obvious thing to do was to check the tube's first anode voltage. It should be around 200V but was much less. Further checks showed that one of the resistors in the supply network had risen substantially in value. Fitting a replacement cured the

trouble, so I replaced the chassis and set up the picture. It was now nearly tea-time. I decided to phone the customer.

"First your big set. We've found that the trouble is due to an aerial fault. I've looked out the number of a local rigger and I'm jotting it down to send back with your portable. We've done that too. I can get it back now and if you're happy we'll charge a total of £25 for our calls, diagnosing the trouble with the big set and repairing the portable."

"Fine" he said.

When Paul arrived at his house the customer took the portable, refused to pay and phoned me.

"What's all this business about £25?" he demanded.

"It's what we agreed" I replied.

"You were talking to my son" he said. "I don't pay for

service calls, and I'm going to pay you £10 for the portable – that's all it's worth."

I tried to put my case but he would have none of it. I offered to unrepair his set and cancel the bill but he wouldn't hear of that. I finally offered to accept £15, but he flatly refused to pay. Then I remembered his aerial and the rigger I'd recommended. "The rigger will expect payment if you call him to your house."

"He won't get it: where I come from we don't pay for house calls."

So I phoned the rigger and warned him. Paul finally came back with £10 and we split it. What a distasteful time we'd spent at the hands of a form of life I'd not come across for a long, long time.

Satellite Dish Alignment Aid

Bas Carter

There are probably many multi-satellite receiver owners who cannot justify the purchase of expensive test gear to set up their installations and instead have a receiver with test meter terminals, expecting these to be the answer to accurate dish alignment etc.

Such terminals present a problem however. When using them one discovers that a meter reading of some 6.2V is obtained with the dish pointing away from any satellite. This no doubt consists of a collection of noise voltages. When the dish is then focused on a medium-power satellite the voltage rises to around 6.7V. With a large meter scale such as the Avo Model 8's this increase of 0.5V represents, on the 10V range, a needle movement of only some 0.75mm. This is hardly conducive to dish alignment accuracy, even when the meter is in front of one's nose.

In order to overcome the problem I have devised the simple circuit described in this article. It expands the 0.5V change by some twenty times, which means that with no signal the Avo's 10V scale will read zero while with maximum signal it will read 10V. Thus a very definite needle movement that's easily observed is obtained with even a small dish movement.

Because of the fairly high receiver test terminal output impedance, the input impedance of the expander unit also has to be of a high order. There also had to be a degree of gain control that doesn't affect this high-impedance requirement.

The circuit adopted, see Fig. 1, uses an operational amplifier chip connected as a non-inverting amplifier with a gain of twenty. The input impedance is of the order of several hundred MΩ. Feedback determines the gain.

The problem of the standing voltages was overcome in a simple way – by using an adjustable voltage obtained from a

9V battery. The reason for using a battery is the relatively steady voltage it provides. Any variation would be amplified, giving rise to misleading results. The current drain through the 100kΩ potentiometer is extremely small and should be of no concern – but don't forget to disconnect the battery when the unit is not in use.

As the unit's current consumption is so small only a very basic power supply circuit is used. It has proved to be quite adequate. Diode D3 is included to prevent the meter from being driven in the reverse direction should R1 be adjusted incorrectly or the test meter leads to the receiver become disconnected. When adjusting R1, take care that the voltage is only just backed off: it may be best to leave 0.1V showing.

The setting up procedure is very simple. First adjust R2 for maximum feedback, i.e. with the slider at the pin 6 of the chip end of its track. Position the dish so that it's not pointing at a satellite, i.e. there's no input signal. Then adjust R1 for minimum voltage or say 0.1V as suggested above. Turn the dish so that it is pointing at a medium-power satellite, say Astra, then readjust R2 for a reading of say 8V on the 10V scale. Adjust the dish for maximum voltage. If this proves to be the most powerful signal you can receive, R2 can then be adjusted for the full 10V deflection, giving a scale movement of some 20:1 for an 0.5V change of input signal from the receiver's test terminals.

Use

Once you've completed all the dish adjustments, such as polar arm to N-S, elevation, declination etc. to enable the Clarke belt to be tracked accurately, it's time to take to the armchair with your remote control unit. With the unit still connected to the test meter terminals the dish can be very accurately positioned by the actuator – just a short dab on the E-W remote control buttons will produce an appreciable movement on the meter scale, giving positive indication of correct dish alignment.

Although the voltage readings quoted in this article were obtained from my particular receiver I would expect other models to give similar results. I have in fact tested the unit with a low-voltage variable power supply to simulate various signal/no-signal conditions and have found that it will cope with a wide range of different voltage conditions.

The unit has been found to be a very useful aid to satellite dish alignment.

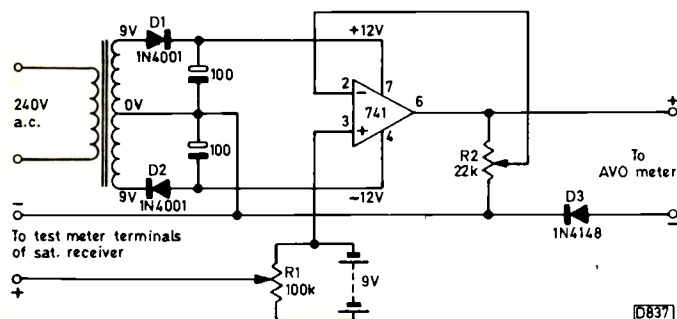


Fig. 1 Circuit of the dish alignment aid.

Filters for DX-TV Systems

Part 1

Keith Hamer and Gary Smith

This article describes remedies for interference experienced with DX-TV reception, especially when a mast-head amplifier is used to boost the signal. Some enthusiasts suffer needlessly for the sake of not adding a simple filter.

Types of Interference

Interference is always a problem with DX-TV reception. In fact the DX signals themselves constitute interference so far as the domestic viewer is concerned. Sporadic E propagation occurs intermittently throughout the summer months, bringing Band I TV signals from transmitters hundreds or even thousands of miles away from the receiving site. When BBC-1 was confined to the 405-line system (Band I) complaints about interference were common during the summer. Towards the end of 1969 BBC-1 and ITV transmissions started at u.h.f. (Bands IV and V). This meant that all those nice clear u.h.f. channels were suddenly snapped up, adding to the problems of the DX-TV enthusiast. For the DXer, local TV transmissions constitute interference. Some enthusiasts put up with it but others endeavour to reduce the effects by adding notch filters or by adjusting the receiver's i.f. selectivity.

The 405-line system was finally closed down on January 3rd 1985. Many enthusiasts eagerly awaited the event, anticipating Band I and III channels clear for DX reception. Unfortunately this wasn't to be. Private mobile radio was introduced in Band III, and during the early Eighties Citizens' Band radio emerged. Until it became legalised, it was disconcerting to hear "one nine for a copy" blasting out all over Band I from a ten-year old's a.m. CB rig. Even when legal rigs were used many DX-TV enthusiasts suffered from severe interference. Some CB operators illegally continued to use a linear amplifier, often referred to as a burner, to boost the output from their rigs. A 100W transmitter on your doorstep can cause quite a few problems! Fortunately the craze passed its peak many years ago: when interference is still encountered it tends to be intermittent.

Today the main sources of constant interference to DX-TV reception occur at around 50MHz in Band I and on channel E9 in Band III. The 50MHz interference comes from 6m amateur radio activity and government-approved devices such as 49MHz walkie-talkies and baby alarms. Mobile radio transmissions around channel E9 can often be a nuisance, particularly when a full-bandwidth TV receiver is used, because they can encroach on channels E8 and E10. A further problem is caused by Italian private radio stations which often use Band I frequencies for their studio-to-transmitter links. A check during an SpE opening will show how popular Band I is for such links. Pirate UK radio stations have for many years used Band III frequencies for the same purpose.

Unless elaborate measures are taken most DXers have to live with these forms of interference. There are however certain types of interference that can be easily avoided with a little care or removed by the use of simple filtering.

The sources of interference mentioned so far are examples of in-band interference. To summarise, the main sources nowadays are Band III mobile radio, 6m amateur activity, cordless telephones and baby alarms. Home computers and compact disc players are amongst the latest causes of Band I/III interference, which may occur at several different frequencies. Such interference can appear suddenly without

warning, showing on the screen as a blank carrier. Partially readable text may be seen with computer interference. This type of interference tends to be local, originating from a neighbour's house or a nearby office block. Unfortunately it's not easy to remove such interference by means of simple filtering: suppression at source seems to be the only realistic answer to the problem, though aerial repositioning or resiting may in some cases help. CB interference can also fall into the in-band category when a poorly adjusted installation produces harmonics at around 55MHz.

Interference is also experienced from out-of-band sources. This occurs when high-level signals find their way into other bands and is particularly noticeable when an amplifier is used as part of the DXing system. Local u.h.f. transmissions may find their way into Band I for example, while CB breakthrough can affect frequencies around channels IA and E3. Another example is interference from the f.m. radio band swamping the lower Band III channels E5-7. In most cases a simple filter connected to the amplifier's input will provide a cure.

Use of Preamplifiers

Most DXers use a mast-head amplifier to boost very weak signals that may produce just visible results under flat conditions. The temptation here is to opt for the amplifier that has the highest gain figure. More important however for successful results are a very low noise figure and high signal-handling capability. All too often a high-gain, wideband mast-head amplifier is installed to amplify signals right across the 40-860MHz spectrum. The idea of using a single amplifier and downlead may seem attractive on grounds of cost and neatness but all too often produces disappointing results.

Most commercial mast-head amplifiers use bipolar transistors, which have a non-linear characteristic. As a result cross-modulation occurs when very high signal levels are present, the symptom being that local signals appear at other frequencies. For example the local u.h.f. transmissions may appear throughout other u.h.f. groups, with lines, mixed pictures and distorted sound. For this reason it's impossible for some enthusiasts who live close to a main transmitter to use a mast-head amplifier successfully. Fortunately there are ways of reducing the effect, as we shall see.

Some amplifiers are better than others in this respect. The thing to look for is the signal-handling figure, which is often expressed in mV. The higher the figure, the less susceptible the amplifier will be to cross-modulation. To summarise, select an amplifier with the lowest noise figure rather than the highest gain, and a large signal-handling capability. Wideband and grouped mast-head amplifiers are available: select one that matches the aerial's bandwidth in order to minimise problems with out-of-band signal sources. For best results, amplify each band separately.

Thought needs to be given to amplifier siting. Mast-head mounting provides the best signal-to-noise ratio, but experience shows that this is more noticeable with Band III and u.h.f. operation than in Band I. A low-noise amplifier fitted at the receiver end of the downlead will of course provide an improvement. Use of mast-head amplifiers may be ruled out if you live close to a main transmitter. In this case try using amplifiers at the receiver, with appropriate filtering.

Use of a mast-head amplifier for Bands I and II is questionable at any location because this is the part of the DX-TV spectrum most vulnerable to unpredictable forms of interference. Some of this may be only temporary but can be alarming when it first occurs. For this reason it's best to have access to the amplifier's input so that experimental filtering can be added when the need arises. It can be frustrating to say the least to have to raise and lower the aerial repeatedly to experiment with filters, so for convenience the amplifier for Bands I and II is best mounted at the receiver end of the cable – losses at these frequencies are relatively minor. In addition you'll be able to watch the screen and monitor the difference a filter makes in comfort.

Preliminary checks

Before an attempt is made to effect a cure it's important to establish exactly how the interference is entering the system. When a DXer lives close to a main transmitter the use of a mast-head amplifier is usually the cause of the problem.

The same cross-modulation effects can occur where a mast-head amplifier feeds a distribution amplifier. In this case the mast-head amplifier may be able to cope with the incoming signals but its output may overload the distribution amplifier. Prove this by feeding the receiver directly instead of via the distribution amplifier. If this removes the cross-modulation, the distribution amplifier is the cause of the problem.

Cross-modulation sometimes occurs only when the aerials are pointed in certain directions. The same checks apply. Disconnect the distribution amplifier and note the effect. If the cross-modulation persists, it's the mast-head amplifier that is being overloaded.

Basic Filters

Having looked at the types of interference commonly encountered with DX-TV installations it's time to consider filters.

In its basic form a high-pass filter is simply a capacitor and an inductor arranged to provide an easy path for signals above a certain frequency and a difficult one for signals below this frequency. Generally speaking, without getting too involved with impedances etc., the capacitor provides an easy path for the h.f. signals and a difficult one for l.f. signals while the inductor provides an easy path at l.f. and a difficult path at h.f. Thus the capacitor is used in series with the signals while the inductor is used as a shunt path to earth, see



Fig. 1 (left): Basic high-pass filter.

Fig. 2 (right): Basic low-pass filter.

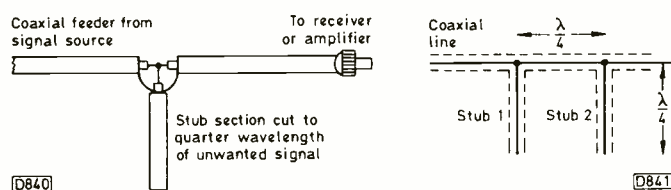


Fig. 3 (left): Basic stub filter.

Fig. 4 (right): The double-stub filter.

Fig. 1. The coil and capacitor form a tuned circuit. Thus the values of C and L (number of turns, spacing, diameter etc.) must be carefully selected so that the filter becomes effective at the required frequency.

With a basic low-pass filter, see Fig. 2, the capacitor provides an h.f. short-circuit and the coil an h.f. impedance. Thus only l.f. signals are passed on.

With either type of filtering multiple tuned circuits are sometimes used to provide a steep cut-off action. High- and low-pass filters can be used together to obtain a bandpass characteristic.

Use of Diplexers and Triplexers

Diplexers and triplexers are basically high- and low-pass filters connected together to provide band selection and separation. In the days of 405-line TV, diplexers were often used to combine the Band I and Band III signals so that, for convenience, a single coaxial download could be used. For Bands I and III a simple diplexer consists of a low-pass filter for the Band I input and a high-pass filter for the Band III input.

As the name suggests, triplexers have three inputs. Where a u.h.f. input is present, this is fed via a high-pass filter before being combined with the v.h.f. signals. Sometimes an additional low-pass filter is used in the v.h.f. section to block the passage of u.h.f. signals.

It's possible to use one leg of a diplexer or triplexer as a simple filter for connection to an amplifier's input. To remove f.m. breakthrough on the lower Band III channels for example, use the diplexer's Band III leg to limit the amplifier's response below these frequencies.

The SAC triplexer type F/1013 appears to be the most versatile device for filter experiments – its weatherproof housing enables it to be used outdoors. There are three inputs: Band I (this works successfully up to the f.m. frequencies), Band III and u.h.f. It can be connected to provide the following main functions: u.h.f. bandpass; Band I/II low-pass; Band III high-pass; Band III bandpass.

The Quarter-wave Stub

The quarter-wave coaxial stub filter, see Fig. 3, can be effective for removing unwanted signals at an amplifier's input. It will provide a cure where f.m. breakthrough is a problem in Band I. In many locations a coaxial stub filter will help to clear the Band II TV channels such as R3 and IC of interference.

The operation of a stub filter is based on the fact that a length of coaxial cable cut to a quarter of the offending signal's wavelength presents a very low impedance. The free end is simply left open-circuit. Incorporation of a stub filter at an amplifier's input will greatly attenuate an unwanted signal while allowing all other signals to pass unaffected by its presence.

The cable's velocity factor has to be taken into account when calculating the length of a section of coaxial cable to be used as a stub filter. Don't let the thought of complex mathematics deter you however. Simply work out the approximate length in centimetres using the formula $7,500/f$, where f is the offending frequency in MHz, then add a small bit extra to the calculated length before cutting. The coaxial stub can then be trimmed while its effect is observed on the screen or radio.

In extreme cases a double stub filter, see Fig. 4, may be required. This has a second quarter-wave stub filter section spaced a quarter wavelength from the first one. The result is a steeper-sided notching action, also a deeper notch – up to -70dB as opposed to -30dB with a single stub.

VCR Clinic

Reports from Philip Blundell, AMIEE, Eugene Trundle, Brian Storm, Ronnie Boag, Graham Rees, Nick Beer, John Edwards, Michael Dranfield and Gerald Smith

Ferguson FV32

This machine was confused: it continually tried to unlace, even though it was fully unthreaded. It wouldn't accept or eject a cassette. The clock and signal circuits worked all right and all the supplies were present, though it looked as if work had been carried out on the power supply PCB recently. Metering between the mode select switch and connector BT04 revealed that the ribbon cable from the deck to the system controller was open-circuit. The ribbon cable's part number is 556 555 00.

P.B.

Philips VR202

This machine worked perfectly in the play mode but on E-to-E or record two vertical bars were superimposed on the picture. These bars were not present at the output from the i.f. strip but were present at the output from the 4053 video switching chip IC7550. When we removed IC7550 we found that the /PBV (playback switching) line was pulsing in the E-to-E and record modes. The SAD1009 chip was faulty.

P.B.

Mitsubishi HSB11

This machine would sometimes fail to carry out a deck command. It would usually fail when asked to play or eject, and would then switch off. A new mode switch was fitted but the fault persisted. One morning the machine wouldn't switch on – the mechanism didn't do its usual shuffle. The loading motor had almost seized solid. A new one solved the problem.

P.B.

Philips DMP2/3 decks

If the complaint is of intermittent failure to carry out a timer recording or to playback when the tape is fully rewound, check that the spool brakes are working effectively. The right-hand spool can rotate during the threading process. This activates the end-of-tape sensor, aborting the play or record command. Replacing the brake rollers usually does the trick, but in a well-worn machine the reel spools and counterforce brake will also need to be replaced. Philips recommends that both reel friction settings are checked, following the procedure laid down under sections 2.1 and 2.2 in the deck service manual.

P.B.

Sanyo VHR3300

A common fault with this machine – we've had it four times so far – is failure of IC1001, a route-switching chip, on circuit board VD1. The symptoms are no E-to-E vision signal, with wavy lines and patterns on the monitor's screen, the E-to-E sound being unimpaired. You'll find that a video signal enters this LA7223 chip at pin 7 but the output is not present at pin 1.

E.T.

Fisher FVHP905/6/7

Failure of the reel idler on these and similar models is very common. The symptoms are: slow, laboured rewind; no fast forward or rewind; failure to wind the tape into the cassette when unloading; or no take-up. These symptoms can also be

caused by the drive pulley (item 4 in the exploded diagram in the manual) being very tight on its shaft. Sometimes you discover this only after you've spent much time replacing the idler assembly.

E.T.

Panasonic NVJ40

This machine came in with tuning problems. Sometimes no stations could be tuned in, but more often the mid-band stations were crammed at one end. Attention was focused on the plug-in demodulator pack and IC7652 (AN5043). This provides the tuner unit with the relevant tuning voltages etc. The voltage at pin 3 of IC7652 was low and varying, so I replaced C7666 (0.01 μ F) which decouples this point.

B.S.

Panasonic NVL25

In spring attention turns to clearing my soak test bench. Two residents here were both NVL25s with complaints of intermittent operation. This is often a cue to resolder X6101, the main system control and servo crystal. It didn't help with these two machines however. After a few hours the capstan motor would sometimes cog and judder to a halt. Any attempt at approaching these machines with test gear provided a complete cure until the following day. I decided to remove the main PCB and inspect it for any suspect wiring or soldering. As I came to withdraw the capstan motor plug P2001 I thought that it came out rather easily. When I turned to the other machine I found that, sure enough, the plug wasn't fully inserted. Refitting the plug provided a complete cure with both machines.

B.S.

Panasonic NVD80

This all-singing, all-dancing digital machine came in woe-fully quiet. Quite dead in fact. When the mains supply was connected the switch-mode power supply would give a quick whistle then die. There were no apparent shorts or overloads on the secondary side of the PSU. So attention turned to looking for the most singed and discoloured capacitor on the primary side. C1045 (47 μ F, 35V) won hands down. A replacement got the show back on the road.

B.S.

Panasonic NVG21

This machine appeared to be completely dead. There were no mechanical operations, no displays and no noises except for the characteristic power supply start-up squeal. When the PSU can was removed and disconnected all the supplies were found to be present and correct. The regulated 5V and 6V rails were extremely low however when the power supply was connected to the rest of the circuitry. There was no excessive loading on either rail: the STK5338 multiregulator chip was faulty.

N.B.

Panasonic NVMS70

This basic S-VHS-C camcorder uses the later Panasonic mechanism with two exit guides that follow each other to and fro like a train and then return to their respective sheds via a set of points which are automatically triggered when the first one passes. All very clever and a delight to watch. In this example however the tape was stuck because the first

guide had returned home but the points hadn't moved, so the second guide was stuck. A new spring (part no. VMB2087) and arm (VML2359) cured the trouble. **N.B.**

Panasonic NV370

This machine worked fine as long as the TV set was on the AV channel, but when you switched to a TV channel the VCR cut off the loophrough. The cause was loss of the regulated 12V supply to the r.f. amplifier. D1106, a 13V zener diode in the regulator circuit on the power supply panel, was short-circuit. **N.B.**

Mitsubishi HS337

This machine would intermittently go to standby. The cause of the problem was dry-joints on transistor Q942 in the 5V switched supply on the bottom PCB. **R.B.**

JVC HRD520/HRD830

The channels drifting off tune has been a problem with these machines. The cause is Q2 on the tuner panel overheating. Replace it with a 2SD1207ST. **R.B.**

Fisher FVHP906

The problem with this machine was no functions. At switch on the power light lit then, after six seconds, the machine went to standby. In addition there was no loading motor shuffle. If you get these symptoms check for the presence of the 12VSW supply at pin 2 of PA902, and the power control condition at pin 4. If the 12V line is low and pin 4 is at 4.5V, change the STK5466ST chip IC901. **R.B.**

Hitachi VT11

No E-to-E or playback sound and vision was traced to a faulty coil, L2, inside the r.f. converter. **R.B.**

Fisher FVHP710

There were various intermittent symptoms with this machine as follows: failure to accept tapes, the counter zeroing, and no functions. The cause was dry-joints at plug PV903 on the power supply panel. **R.B.**

Hitachi VT120

This machine came in with a threaded up tape stuck inside it. If the power switch was pressed it would power up for about three seconds then revert to standby. The first thing to do was to check the power rails. They were all o.k. After several attempts to switch the machine on we noticed that a slight thud occurred when the power button was pressed. It appeared to come from the underside of the deck. On further examination we found that it came from the capstan motor. When its pulley was touched the capstan motor began to rotate and the tape unlaced. Subsequent checks showed that the capstan motor had a dead spot. **M.Dr.**

Saisho VR3400

This newer-generation machine came in with the symptoms of dirty heads. We cleaned the heads, the drum and the entire tape path then inserted a tape and pressed play. The tape laced up around the drum but the pinch roller failed to pull in on to the capstan. After a lot of messing about I

found by accident that the machine has a quick-start function, similar to Akai machines. All that was necessary was to push the play button twice! **M.Dr.**

Mitsubishi HSB27

We've had the following fault on several of these machines. When the tape is inserted it's loaded very fast, i.e. snatched out of one's hand. Then when play is pressed the machine acts as though it's in the search mode. In addition the fast forward and rewind modes operate a lot faster than normally. The cause of the trouble is no capstan FG. Replace the capstan motor and PCB assembly.

We've also had this fault with the more recent Model HSMX1B. **G.R.**

Mitsubishi HSB27

We've had this fault on three occasions: the machine cuts out approximately 45 minutes after the beginning of a tape. The cause of the fault is low-amplitude take-up reel pulses. They can be checked and compared with the supply reel pulses at the collectors of Q5A4 and Q5B4. The cure is to replace the photo-interruptor. It's possible to replace this item without dismantling the bottom PCB. **G.R.**

Hitachi VT140

This machine would accept a tape and carry out all functions correctly except that it wouldn't eject a tape when asked to do so. When eject was selected the capstan spun normally but the belt and the main pulley of the clutch plate assembly appeared to be seized. Slight movement of the carriage was seen as it attempted to rise, then after a few seconds the system control gave up and the tape was lowered back down to the loaded position. All the mechanical operations, including carriage up/down, are driven by the capstan motor and the capstan drive belt via the self-contained clutch plate unit. Replacing this unit (part no. 6896951) and fitting a new belt (part no. 6351554) cured the fault.

The clutch plate unit has also been responsible for symptoms such as very slow rewind and fast forward and scraping noises during play and fast forward. **J.E.**

JVC HRD140/Ferguson 3V44

Here's a nice simple one for a change. In the event of no power indication and no drum rotation check circuit protector CP4 for being open-circuit. **J.E.**

Toshiba V300

There was intermittent bad wow on playback and record. We found that IC501 was thermally sensitive, a replacement providing a complete cure. **G.S.**

Fisher FVHP905-FVHP910

White interference flashes on the playback picture can be cured by fitting a screening plate between the power supply and the drum assembly. The plate is available from Sanyo/Fisher under part no. SM0349. **G.S.**

Panasonic NV430

If the machine won't come back out of the reverse search mode until stop is selected check the AN3821K capstan motor drive chip IC2002 on the servo panel **G.S.**

ECONOMIC DEVICES 32 TEMPLE STREET, WOLVERHAMPTON, WV2 4AN

15/80H	3.72	2SC2565	3.67	AN5265	1.76	BC307	0.05	BDW94C	0.45	BUW84	0.90	LA4220	1.25	MN1435VXB		STK4171		TA7313AP	0.60	TDA1950	2.01	TEA1002	5.14
15/85R	3.72	2SC2570	0.28	AN5435	1.24	BC307A	0.05	BDX32	1.65	BUX84	0.33	LA4261	1.60		9.98		10.56	TA7325P	1.63	TDA2002	0.82	TEA1009	1.20
17089	3.28	2SC2570A	0.28	AN5512	1.82	BC308A	0.11	BOY20	2.06	BUX85	0.74	LA4270	2.04	MN650	2.22	STK4181H		TA7343AP	0.69	TDA2003	0.63	TEA1014	1.49
17127	1.71	2SC2632	0.28	AN5521	1.60	BC308C	0.05	BF115	0.39	BUZ71	0.50	LA4282	2.06	MPSA42	0.27		12.47	TA7361P	2.11	TDA2004	1.23	TEA1039	1.60
1N4002	0.06	2SC2655	0.29	AN5612	2.26	BC327	0.09	BF123	0.17	BY127	0.09	LA4400	2.95	MPSA50	0.11	STK433	6.19	TA7535SP	0.66	TDA2005	1.24	TEA2165	3.69
1N4004	0.06	2SC2671	0.65	AN5900	1.23	BC327B	0.17	BF127	0.13	BY133	0.05	LA4422	1.07	MPSU10	2.54	STK4332	5.38	TA7607AP	1.89	TDA2006	1.02	TIC106D	0.53
1N4005	0.05	2SC2791	4.25	AN6310	4.55	BC328	0.06	BF179	0.30	BY164	0.52	LA4440	1.52	MPSU80	2.21	STK4352	1.65	TA7609P	1.90	TDA2020	2.29	TIC106M	0.67
1N4006	0.05	2SC3153	2.21	AN6326	3.50	BC337L	0.21	BF184	0.40	BY176	0.63	LA4445	0.94	MR818	0.33	STK437	7.96	TA7628P	1.45	TDA2161	2.88	TIC45	0.57
1N4007	0.05	2SC3156	3.61	AN6341	2.23	BC338	0.05	BF185	0.28	BY179	0.99	LA4460	1.30	MR854	0.13	STK4392	5.31	TA7630	1.82	TDA2170	3.16	TIP10	0.50
1N4448	0.05	2SC3182	1.73	AN6552	0.61	BC368	0.11	BF194	0.14	BY184	0.29	LA4461	1.25	MR856	0.14	STK441	9.73	TA7640AP	1.04	TDA2270	3.91	TIP110	0.33
1N5402	0.05	2SC3225	0.33	AN6610	0.74	BC369	0.13	BF195	0.07	BY199	0.18	LA4500	1.68	NE5458	3.10	STK459	7.73	TA7676P	4.13	TDA2522		TIP112	0.33
1N5404	0.07	2SC3715	3.79	AN7110	2.99	BC372	0.43	BF196	0.14	BY206	0.12	LA4505	1.73	NE555	0.21	STK461	8.99	TA7680AP	4.39		14.78	TIP120	0.55
1N5408	0.10	2SC458	0.08	AN7161	2.48	BC354A	0.05	BF197	0.24	BY207	0.17	LA4508	2.05	NE555N	0.23	STK5211		TA7681AP	5.72	TDA2524	0.41	TIP121	0.40
1N914	0.03	2SC536	0.05	AN7171K	3.48	BC546B	0.05	BF198	0.08	BY210400	0.18	LA4520	1.04	NE556	0.41		12.63	TA7698AP	5.72	TDA2525	3.54	TIP126	0.51
1S1555	0.21	2SC876A	5.52	AU107	7.72	BC547	0.10	BF199	0.03	BY224600	4.95	LA4520	3.42	NE646N	2.10	STK5315	6.39	TA7705P	1.37	TDA2530	0.41	TIP132	0.44
1S2076	0.28	2SC945	0.08	AU113		BC547B	0.10	BF200	0.37	BY226	0.15	LA5512	3.30	OA47	0.24	STK5322	6.58	TA7769P	1.39	TDA2532	0.41	TIP137	0.46
2N2219A	0.26	2SD1051	0.46		12.99	BC549	0.05	BF245	0.50	BY227	0.12	LA5512	0.46	OA90	0.09	STK5325	4.12	TA8210H	4.93	TDA2540	0.36	TIP29	0.40
2N2222	0.16	2SD1138	0.71	BA145	0.10	BC556	0.05	BF245A	0.18	BY228	0.36	LA7042	2.48	OA91	0.14	STK5326		TA8215	3.46	TDA2541	1.46	TIP2955	0.79
2N2905	0.20	2SD1207	0.21	BA157	0.10	BC556B	0.05	BF245B	0.37	BY229	1.64	LA7223	2.46	PH425	0.66		10.31	TA8691N	5.47	TDA2560	2.47	TIP29C	0.29
2N2926G	0.35	2SD1265	0.71	BA158	0.07	BC557	0.05	BF255	0.05	BY229600	1.23	LA7520	2.00	PT8504	5.65	STK5331	3.51	TA8550	0.25	TDA2576A	5.77	TIP29Q	0.75
2N3054	0.85	2SD1273	0.79	BA159	0.29	BC557B	0.05	BF256	0.23	BY229800	0.88	LA7800	1.24	R2540	1.00	STK5332	2.38	TA8700	1.65	TDA2577	4.71	TIP29E	0.77
2N3055	0.74	2SD1275	0.66	BA157	0.05	BC558	0.08	BF257	0.34	BY255	0.14	LA7801	1.24	R2540X	1.86	STK5333	2.88	TA8726	1.34	TDA2577A	2.76	TIP3055	0.39
2N3442	1.12	2SD1308	0.69	BA5102A	1.23	BC558A	0.05	BF258	0.03	BY298	0.12	LA7820	1.52	R25M	0.86	STK5372	3.71	TBA120	0.55	TDA2578A	2.47	TIP30A	0.24
2N3773	0.99	2SD1397	1.44	BA536	1.52	BC558B	0.05	BF259	0.30	BY299	0.12	LA7830	0.99	R4050	1.85	STK5421	2.52	TBA120AS	0.81	TDA2579	2.70	TIP30A	0.16
2N3819	0.10	2SD1398	1.63	BA6109	1.38	BC560C	0.20	BF324	0.10	BY476A	0.66	LC1720	2.72	RA051	2.22	STK5422	5.28	TBA120T	0.57	TDA2581	2.14	TIP31	0.25
2N3904	0.40	2SD1427	2.81	BA6209	1.27	BC637	0.14	BF327	0.32	BY713	0.74	LM1303N	0.85	RB156	1.65	STK5466	6.28	TBA120U	0.46	TDA25810	1.65	TIP31A	0.31
2N4444	2.60	2SD1432	4.74	BA6219	1.48	BC639	0.17	BF338	0.38	BYD33G	0.34	LM1877	1.40	RG1P0	0.27	STK5471	4.64	TBA1440	1.47	TDA2582	2.02	TIP31B	0.29
2SA1015	0.08	2SD1453	1.49	BA6222	1.16	BC640	0.08	BF355	0.46	BYV96C	1.13	LM1881N	6.80	RG1P1	0.41	STK5476	4.85	TBA2800	0.66	TDA2590	2.50	TIP31C	0.28
2SA1020Y	0.30	2SD1497-02		BA656N	0.81	BC879	0.37	BF362	0.99	BYV96D	0.85	LM317T	0.46	RG3P0M	0.29	STK5481	4.37	TBA395	0.66	TDA2591	1.15	TIP32A	0.35
2SA1095	5.71		6.85	BA511	0.28	BC880	0.36	BF392	0.15	BYW19	0.07	LM324N	0.29	RM11C	0.29	STK5482	4.08	TBA396	0.61	TDA2592	0.72	TIP32C	0.36
2SA1102	1.73	2SD1497-06		BAV18	0.07	BD131	0.26	BF422	0.13	BYW56	0.16	LM339N	0.14	S2000AF	1.15	STK6962	2.22	TBA520	0.82	TDA2594	2.14	TIP33	0.57
2SA1175	0.49		6.85	BAV21	0.11	BD132	0.20	BF423	0.09	BYX55600	0.20	LM358	0.21	S2055AF	2.14	STK7216	5.36	TBA530	2.45	TDA2595	2.06	TIP33A	0.89
2SA1186	3.42	2SD1541	3.30	BAW62	0.03	BD135	0.21	BF450	0.18	BZV85C68	0.41	LM358N	0.21	S2530A	2.20	STK7226	7.94	TBA540	1.91	TDA2600	3.05	TIP33C	0.95
2SA1208	0.25	2SD1577	3.25	BAX14	0.27	BD136	0.19	BF458	0.30	CA1310E	0.75	LM380N	0.79	SAA1004	1.10	STK7308	4.70	TBA5400	0.74	TDA2611A	0.62	TIP34	1.15
2SA473	0.49	2SD1876	4.47	BB105B	0.23	BD137	0.43	BF459	0.28	CA3094	2.97	LM386	0.45	SAA1174	4.95	STK7348	4.49	TBA560C	0.66	TDA2611AQ		TIP34C	0.86
2SA562	0.16	2SD1877	2.46	BC107	0.13	BD139	0.28	BF469	0.33	CD4001	0.13	LM8560B	3.50	SAI1250	1.45	STK7356	5.42	TBA651	0.98		1.68	TIP41A	0.29
2A634	0.52	2SD234	0.91	BC107B	0.19	BD140	0.23	BF479	0.63	CD4016	0.13	M104	6.07	SAI251	3.40	STK7358	5.30	TBA750Q	4.95	TDA2640	3.71	TIP41B	0.30
2A673	0.08	2SD313	0.41	BC108	0.14	BD150	1.10	BF597	0.15	CD4017	0.16	M192B1	2.47	SAI2393	6.50	STR1096	3.94	TBA800	0.49	TDA2652		TIP41C	0.35
2A684	0.33	2SD350A	3.71	BC108B	0.37	BD189	0.39	BF758	0.31	CD4021	0.41	M21C	1.20	SAI1351	7.99	STR4006	6.63	TBA810P	1.61		13.96	TIP42A	0.29
2A733	1.36	2SD401	0.94	BC108C	0.13	BD190	0.29	BF759	0.33	CD4052	0.21	M293		SAI3027P	6.19	STR4211	4.20	TBA810S	0.41	TDA2653A	2.64	TIP42C	0.35
2A769	0.99	2SD468C	0.41	BC109	0.11	BD201	0.38	BF762	0.33	CD4053	0.19		14.63	SAA5000A	2.48	STR440	6.19	TBA820	0.53	TDA2680	4.95	TIP47	0.49
2A940	0.64	2SD476	0.94	BC117	0.13	BD225	0.48	BF869	0.24	CD4069	0.17	M490		SAI5010	3.02	STR441	7.10	TBA820M	0.33	TDA2841	2.97	TIP1791A	1.64
2A966Y	0.28	2SD613	0.61	BC139	0.31	BD232	0.27	BF870	0.30	CD4070	0.13		14.92	SAI5012	3.21	STR451	5.78	TBA920	0.49	TDA3190	0.82	TIS43	0.14
2A970	0.13	2SD621	5.37	BC140	0.20	BD233	0.26	BF960	0.26	CD4528	0.37	M491	7.70	SAI5050	4.54	STR50020	3.71	TBA950	1.63	TDA3190P	1.07	TIS91	1.02
2A984	0.20	2SD636	0.13	BC141	0.25	BD234	0.43	BF966	0.56	CN626A	0.84	M494	8.57	SAB3013	2.67	STR50103	5.77	TBA970	4.00	TDA3300B	5.96	TL011CP	1.32

SPECIAL OFFERS - ENDS 30/06/92

BC639	0.12	BU406D	0.33	S2055AF	1.65
BC640	0.05	BUT56A	0.55	2N3055	0.42
BD243C	0.31	BR103	0.37	2SC2671	0.19
BU508D	0.85	TA7227P	1.50	TDA2582	1.61
BU208D	0.85	TDA7240A	1.48	STR50103A	4.50
BU326A	0.50	TIP31A	0.25	VCR FAULT FINDING GUIDE	6.99

2SB11010	0.33	2SD637	0.12	BC142	0.26	BD237	0.29	BF970	0.68	CR3CM	2.40	M50115AP	2.43	SAB3021	10.19	STR5412	5.06	TCA270S	1.00	TDA3330	4.09	TL071CP	0.36
2SB546	0.51	2SD667	0.25	BC147	0.04	BD238	0.10	BF991	0.58	CRO2AM	1.78	M51102L	1.72	SAB3035	6.23	STR58041	5.67	TCA440	1.89	TDA3541	0.92	TL494	1.12
2SB616		2SD716	1.07	BC147A	0.05	BD239	0.28	BF992A	0.84	CV12E	2.44	M51231P	1.40	SAF1032P	3.87	STR6020	5.07	TCA800	1.60	TDA3560	5.83	TMP47C432AP	
	10.60	2SD718	1.14	BC148	0.05	BD241	0.39	BFX85	0.31	CX109	6.84	M51393AP	4.50	SAF1039	2.29	STR6020KIT		TCA800Q	1.60	TDA3561	5.75		11.24
2SB643S	0.20	2SD725	3.34	BC148A	0.05	BD243	0.42	BFY50	0.30	DTA124EF	0.12	M51521L	0.54	SDA2112	12.96		5.77	TCA910	1.17	TDA3561A	3.21	TMP47C434N	
2SB688	1.24	2SD734	0.23	BC148B	0.03	BD243A	0.41	BFY51	0.33	DTA144EF	0.41	M5218L	0.36	SG264A	9.48	T6041V	0.92						

Field Faults in Modern CTV Sets

Steve Cannon

Despite the fact that modern field output stages use few components they are notoriously unreliable. In the vast majority of sets an i.c. is used to drive the field scan coils and, as we all know, ninety per cent of the faults that occur are down to the chip. It would be interesting to find out just how many TDA2600s had to be replaced in the Philips G11 chassis. All right, so many failed because of problems with the h.t. reservoir capacitor, but many must have failed of their own accord. The TDA3652 is another apparently unreliable field output device. What happens when you replace the chip but this doesn't cure the fault? You would expect to have to follow a fairly simple fault-finding routine. If only life was that easy! It seems at times that the simpler the circuit the longer it will take to repair. This could well be Punkie's Third Law of Electronic Servicing (see February 1992 for the first two!). Anyway, here are one or two examples of naughty field faults recently encountered.

Salora G Chassis

The first set was a Salora 1G3J (G chassis) which had been waiting a week or so for a TDA1170S field timebase chip – surprisingly, we'd had difficulty finding a supplier of this device. A quick, five-minute job was expected: just fit the new chip. When we'd done this however the fault was still present. The symptoms were no field scan at all in the lower part of the screen and an elongated scan in the upper part. A classic field output chip fault, you would have thought.

Out came Mickey and in we delved, determined to find a fault in the field output stage. The voltages around the chip seemed to be mostly o.k., though the voltage at the output pin 4 was to cock as was to be expected. The supply was rock steady at 20V, with no ripple present. The field drive waveform looked fine and a check at the field oscillator pin produced a healthy-looking field sawtooth waveform.

Checks on relevant electrolytics were the next step logically. The 1,000 μ F field scan coupling capacitor caught my eye, as did the associated 1 Ω resistor that completes the path to chassis. Definitely suspect material here, or so I thought. But the resistor measured 0.9 Ω and a replacement electrolytic proved its innocence. So much for my beady eye. There were only two other electrolytics in the surrounding area: these were quickly bridged, but no difference did this make. Diodes next, maybe? With a fault like this logical fault-finding may as well go out of the window. The 1N4002 flyback boost diode was o.k., also the nearby 1N4148 diode.

The pool of suspect components was rapidly diminishing and silly thoughts like faulty scan coils started to enter my head. What if something was mucking up the field drive via a control or an external line? The height control is fed via a high-value resistor that goes to the Ipsalo circuit. It seemed very unlikely that this supply had anything to do with the fault, so my thoughts turned elsewhere. What other lines are linked to different parts of the set's circuitry? There's a service switch line and a connection to the sandcastle pulse line. These both leave the main panel via plug B. Maybe it was worth disconnecting this plug as a quick check? When the set was turned back on after disconnecting plug B we had, would you believe it, a full raster! The picture wasn't up to much, with so many feeds missing, but full field scan was definitely there.

I switched the set off rather quickly, as I didn't want to run the risk of causing a second fault as a result of operating the set with the plug disconnected. It struck me that the fault had to be to do with either the sandcastle pulse or the service switch line. I started by disconnecting resistor RB104, which leads off to the service switch circuit. This produced full scan with a perfect picture. Over to the signals panel. There was not much of relevance here, just the switch and a 1N4148 diode (DA4). The former looked all right physically, and when operated did have some effect, so attention turned to the diode. Mickey reassuringly produced a continuous wail when it was checked on the diode range. We fitted a new diode, set up the picture and sent the set on its way.

Sony KVM2131

The next set in this saga of frustrating field faults was a Sony KVM2131 (BE1 chassis). Complete field collapse was the symptom. After checking the supply to the UPC1488H field output chip we fitted a replacement, expecting this to provide a cure as we've had several faulty i.c.s of this type. This time of course it was the one in ten case when a new chip doesn't restore correct field scanning. If all else fails, use the scope. So the saying goes. Our first check was made at the field drive input pin. This seemed to be a fairly logical place to start. In fact it was a very good place as there was a distinct lack of the field drive waveform. It comes, or should come, from a good old TDA2579A timebase generator chip, IC551 here. Definitely a suspect: we've had this chip fail a good few times in most makes of set. There was no field drive output at pin 1 and the d.c. voltage here was high at 5V. Good enough grounds to replace the chip, but time after time I get the nagging feeling in the back of my mind that it will be a waste of time. It was a total waste of time. So now we'd replaced two chips without achieving a remedy for the fault.

The next check was made at the TDA2579's field oscillator pin, where a nice, healthy 50Hz waveform was present. This meant that a decision had to be made: was there a fault in the driver stage or was a fault in the output stage loading the driver? I decided that the latter was more likely and as a start checked the d.c. voltage at the drive input pin of the output chip. It should be 1V but was only 1mV. Now between the 5V at the timebase generator chip's output and the nothingness (if you see what I mean) at the input of the output chip there are just a 4.7k Ω series resistor and an 0.01 μ F capacitor (C501) to chassis. The resistor gave a perfectly correct reading but the reading across the capacitor was about 150 Ω . There are other capacitors connected to this point, but I decided to remove C501 and check it out of circuit. It once more read 150 Ω . What a good do! When a new 0.01 μ F ceramic disc capacitor had been fitted the set was back in the land of the living.

Problems with Panasonics

Exactly the same type of ceramic capacitor is used throughout on the Panasonic range of sets: when faulty these capacitors usually measure between 100 Ω and 1k Ω . They've given us a good number of faults.

Mention of Panasonic brings us to the final set, a TX25T2 (Alpha 2 chassis). This time the top inch of the picture was

folded over. It definitely looked like a faulty capacitor type of fault, if you know what I mean. I considered the field output chip briefly, but it was one of those cases where I felt strongly that chip replacement would do no good. So after checking its supply I left the chip well alone and concentrated on the peripheral components. After getting nowhere with obvious checks – the flyback boost supply components and the scan coupling capacitor – I started to think about those 0.01 μ F ceramic disc capacitors. There was one right next to the TDA2579 timebase generator chip, connected to the field feedback pin. My hopes were rising and I soon had it out for checking. It measured open-circuit, but a new one was fitted just in case. The field remained as folded as ever.

I'd a feeling that I had been led a merry dance by this fault on a previous occasion. In fact I could recall ringing the

faulty component on the circuit diagram. But for some reason I'd not noted it in my book. Then it came back to me: the set had been a TX24T1. When this manual was found the marking was still there: C452, 1,200pF, which is part of a field linearity network. Out it came and in went a new one, all in a flash. Trying the set out was going to be a formality. My face must have been a picture when I switched it on again. Yes, the foldover was still there.

A new line of lateral thinking was needed. Dump it in the skip, maybe? No. Let's have no more of this capacitor business and go for the chip instead I thought. If that doesn't cure it, then dump the set. Thank goodness: a new AN5521 cured the fault, which was just as well really because the skip was full to brimming.

This just shows that even when you're sure a new chip won't cure the fault it's worth trying a replacement.

Microcomputer Notes

In the April issue I. Field suggested the use of non-original power supplies with microcomputers, for example replacing a series regulator with a switch-mode circuit. I would strongly advise against this course of action.

One of the features of the small linear regulators Mr. Field dislikes so much is that they incorporate short-circuit, thermal overload and safe operating area protection. This means that should the computer they are powering develop a short-circuit across the relevant rail, due to a bad memory chip or a shorted decoupling capacitor for example, the regulator will fold back, limiting the power available to burn out print. A 30A PSU will do no such thing and the likely result in the event of a short-circuit is burnt print at best and a potentially nasty fire at worst. Some machines use multilayer print with the power and earth rails internal to the PCB structure: in this event failure with a non-limiting supply could be catastrophic.

Indeed a few years ago I had to deal with a professional graphics system in which a decoupling capacitor on a memory board went short-circuit. The machine was located remotely from its operator, in another room, and by the time it was realised that something was amiss the system was well on fire. Some thousands of pounds worth of damage was done and, yes, fibreglass burns quite well once it gets going.

In addition it should not be assumed that the supplies which appear on the surplus market have universal application. On the contrary they have usually been designed to do a specific job in a specific piece of equipment. While a supply that's designed to provide a primary line at 30A may regulate correctly down to almost zero load many will not and will provide their correct specified output only when loaded close to their design maximum. Further the output filters may not work correctly with severely reduced loads, resulting in h.f. noise that can wreak havoc with the operation of digital circuitry.

Unlike Mr. Field I've found industry-standard linear regulators to be generally very reliable, with failure resulting in full output from the device very rare. Mr. Field should also bear in mind that if he examines his switch-mode power supplies carefully he'll often find that only the 5V rail is regulated within the switch loop, linear regulators being used for the auxiliary 12, -12 and -5V rails.

Now to the Amstrad PCW9512 printer problem mentioned by other contributors. A cracked armature is extremely common with these machines. The reason for the poor print

quality is that a considerable proportion of the forward energy imparted to the armature to strike the hammer and propel it and its inertia weight on to the daisy wheel goes into operating the crack. Unfortunately the crack, which occurs across the bend in the plastic arm at the corner of the iron insert, cannot be seen unless the armature is removed. Replacement of the armature is however a very simple matter with just one reservation that wasn't mentioned.

Behind the armature there's a very light bias spring which has a tendency to fly. Be very careful not to lose this spring when changing the armature, and make sure that it's relocated correctly behind the armature. The printer won't work or set up correctly without the spring.

A word of advice when working on the printer with these machines: heed the warning, at the front left corner of the printer, about unplugging it. Disconnecting or reconnecting the printer whilst the unit is powered results in instant death of the interface chip.

Finally, while on the subject of Amstrad printer interfaces I've had a number of PCW9512s that refuse to recognise that a printer is connected – this is evidenced by the message at the top of the screen after system boot. Before you start to try and tear out the interface chips at either end (I've seen some attempts at this and it's not a pretty sight...) try scoping the RTD line at pin 6 of CP12 within the printer. For some odd reason a 680 Ω resistor was placed in series with this line when the printer was designed. What seems to happen is that the interface chip becomes a little weak at its output and has difficulty in providing sufficient output current to charge the printer cable's capacitance quickly enough. The 680 Ω resistor aggravates this situation. The net result, when observed on a scope at the point mentioned, is that there's fairly severe rounding of the corners of the leading edges of the data pulses on this line. To provide correction, reduce the value of the 680 Ω resistor (R719) a little until the pulse edges become square again. The printer will then once again "see" the printer.

Although this is, strictly speaking, a technical bodge, so was putting the resistor there in the first place, whatever the reason for so doing. It is in general not good practice to include resistors in series with logic lines in computers. I've never had this repair/modification cause any other problems with the operation of the computer or printer and have never had one back at a later date because of total failure of the chip. It seems to me to be a much simpler job to carry out this modification than to replace the chip.

Geoff R. Darby

Commodore 64

The owner of this machine had convinced himself that repair would be expensive. There was no operation and no

output from the modulator, though the LED lit up when the power switch was operated. How nice to be able to perform the odd miracle! There was no 9V a.c. supply at fuse F1 as the relevant wire in the power input plug had never been soldered to its pin.

Roger Burchett

8/3/92 DR (Denmark) ch. E3; TVE (Spain) E2.
 27/3/92 ARD (Germany) E2; +PTT (Switzerland) E2, 3; DR E3.
 28/3/92 SVT (Sweden) E2.

Long-distance Television

Roger Bunney

March was an extreme disappointment after two relatively active months at the start of the year, with few signals being received via any propagation mode.

Tropospheric propagation improved on the 4-5th, bringing signals from Germany, France and the Benelux countries, also some Irish signals, into the UK at both v.h.f. and u.h.f. A second, rather better opening occurred on the 19th. It brought signals from Germany, Luxembourg and the Benelux countries and, of greater significance, ducting produced signals from Spain in the midlands – during the late afternoon-evening a cold front approached from the Atlantic and it seems that ducting occurred along the advancing edge of this front, being particularly strong in the mid-evening then fading out. In Northampton Spanish transmitters were logged on chs. E3, 5, 7, 11, 22, 35, 39, 45, 46 and 65. Elsewhere signals were also logged on chs. E31, 34, 37, 39 and 49. There have been no reports of auroral reception.

F2 and SpE activity was also quiet. The F2 log is as follows:

8/3/92	Unidentified African ch. E2 signals at 1135-1210 and 1250-1428.
12/3/92	Dubai and Iran ch. E2.
15/3/92	Unidentified African ch. E2 signals at similar times to the 8th, signing off at 1428 GMT. Ryn Muntjewerff suggests Sierra Leone? Plus Iran ch. E2.
18/3/92	Similar to the 15th.
22/3/92	Dubai and Iran ch. E2.

While we must hope for improved SpE conditions when the season arrives, the fact that the recent Australian season was a poor one is not a good omen. With the sunspot peak now passed it's unlikely that the coming season will break any records. The log is as follows:

An extremely empty month then. My thanks to the following for sending in reception reports: Simon Hamer (Powys), Roger Fussell (Torpoint), Peter Schubert (Rainham), Mark Baldwin (Northampton), Brian Williams (Penarth), David Glenday (Arbroath), Tim Anderson (St. Leonards) and Ryn Muntjewerff (Holland).

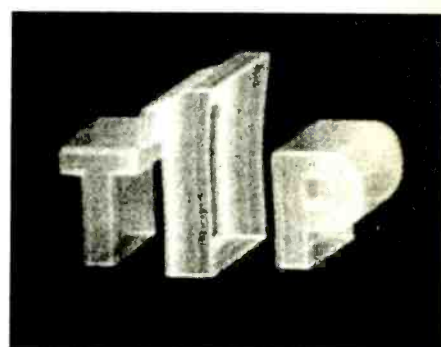
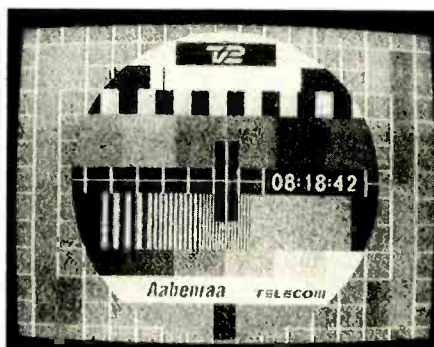
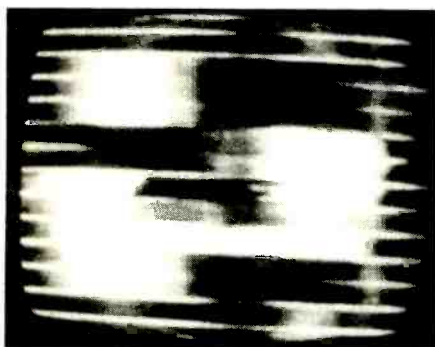
A letter from Anthony Mann (Perth, Western Australia) describes conditions there during the past couple of months. The SpE season was a disappointment, the best conditions being around the 22nd-24th of November when the solar flux dropped to 140, producing some double-hop reception from New Zealand. February produced several intense F2 openings however: he described the one of the 8th, which lasted for five hours, as the best in forty years. During this opening Anthony logged strong European ch. E2 signals from Scandinavia, Germany and the UK for several hours. The German Grunten transmitter was received at particularly high levels. Anthony now uses an Icom R7000 scanner which gives very accurate carrier measurements, though at certain frequencies around 48MHz it reads 0.0001MHz high. He logged thirteen F2 openings during February.

Anthony's ability to make more accurate carrier measurements raises some interesting points. For example, he has received signals that he would previously have logged as coming from Malaysia on 48.2396 and 48.2605MHz. These would seem to come from a different latitude which, by elimination, suggests the heavily populated Indonesian island chain between six and ten degrees south. The test patterns are of the FUBK type, programmes not starting until 0930/1000 GMT or later. Other reports with frequency measurements, from Sydney and New Zealand, provide apparent confirmation. These conclusions are of significance in the UK where, during recent F2 openings, a weak ch. E2 FUBK pattern has been seen from around 1000 GMT, long before IRIB (Iran) goes on air. Tim Anderson has on several occasions logged this mystery pattern. So it seems likely that the country of origin could be Indonesia.

Anthony concludes by mentioning that during an afternoon TE opening on March 7th he received AFKN-2 (Korea) ch. A2 for three hours. There were also signals on chs. A3, C1, C2 (China), E2, R1 and R2.

News Items

Thailand: Petri Popponen reports, via the BDXC News, on the current situation following a recent visit. The Channel 3



Left: Anthony Mann snapped this ch. E2 FUBK test pattern via F2 layer propagation on February 8th at 1206 GMT. First thoughts are Grunten, Germany or Iran. An impressive catch. Centre: Tim Anderson caught this Danish second network test pattern during the excellent January tropospheric conditions. Right: Another good tropospheric catch, this time by Ryn Muntjewerff: the Polish first network logo on ch. R8.

service operates many transmitters around the country, including two ch. E2 outlets at Nakhom Ratchasima and Song Khla and three ch. E3 transmitters at Chiangma, Sukho-tai and Bangkok. In the capital the names of the services and the channels they use are related, e.g. Channel 3 operates on ch. E3, TV-11 on ch. E11 and so on. TV-9 operates a ch. E2 relay at Udonthani and ch. E4 relays at Chiang Rai, Nakhon and Song Khla. TV-3 opens at 1400 local time on weekdays and at 0800 during the weekend. The logo '3' is present in one or other of the lower corners during programmes – but not on Commercials. Most of the Bangkok channels have an f.m. English-language sound track in Band II, e.g. with TV-3 it's on 105.5MHz.

Czechoslovakia: TV10 Plzen is back on air on ch. R27. A new independent TV company ZLIN-TV has started test transmissions on ch. R51 from Zlin (formerly Gottwaldov) for about an hour a week. Another independent company based in Bratislavia is awaiting a licence from the authorities. A new 100kW e.r.p. transmitter is in operation at Doma-zlice/Vrani, on ch. R41.

Hungary: Transmission of the Russian first TV channel in the Budapest region has ceased.

Digital TV: Several European broadcasters and setmakers are pushing the EC for funds to finance research and development into digital TV broadcasting. Recent progress in developing digital compression techniques in the USA is acting as a stimulus. Development of a European DTV system is expected to take six years. NTL/ITC are working on a system known as Spectre: test transmissions are expected later this year.

In brief: AFKN-TV (Korea) is to move from ch. A2 to a u.h.f. channel, with a higher e.r.p. to maintain coverage... The start of a second Cyprus Broadcasting Corporation service has been postponed... Mozambique is to allow independent radio and TV services to operate... Bahrain TV now relays the Egyptian Space Channel (ESC) for thirteen hours a day on ch. E44.

Satellite TV

First our congratulations to Ian Waller (Lincoln Satellite) who has successfully received Ka band (20GHz) TV signals from the Olympus satellite. These consisted of a 525-line NTSC and a 625-line PAL vision feed. Ian reports that the Japanese Superbird B1 and Arabsat 1C were successfully launched by Ariane on February 26th. Arabsat is at 31°E. Transmissions commenced on March 30th, with CNN, Saudi TV1 and 2, Omani TV and four Indian TV channels in Band C. Signals are at reasonable strength for UK reception provided a 3m dish is used.

The use of dish aerials has now been legalised in Pakistan, but an annual fee equivalent to nearly £50 is required. CNN and the various downlinks from Asiasat 1 (Star TV) can now be viewed.

Maurice Hillier (Romsey), recently back from Hong Kong, produced the weekly programme guide for Star TV (HutchVision), which can be received over much of Asia. The five Band C channels carried are Star Plus, BBC World Television Service, Prime Sports, MTV (Music Television) and a channel with a Chinese name/logo. All these channels provide a 24-hour service. The only TVRO installations in Hong Kong are for Band C (4GHz). A typical one consists of a fixed 2.1m dish, an LNB plus feedhorn, a stereo receiver, cable and plugs. According to the firm that advertises this the cost installed on a non-cement base is \$22,500HK, which is something like £1,730.

Good news for Ku band enthusiasts: there could be two Orion satellites with 34 transponders in orbit by 1995, at 37.5

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Aerial Techniques

and 47°W.

A new satellite TV service has been proposed for Sri Lanka/South India, to commence this August, probably using straight PAL.

The EBU Euronews channel is expected to come into operation next January. Based in Lyons, France, the service will offer news material gathered from European broadcasters.

The Sportscast service for pubs and clubs closed down in mid-March – the scrambled service was not expected to break even for at least another five years. Its Telecom transponder, at 16°E, is now being used for news feeds, Starbird news and corporate links. The service had recently changed from B-MAC to the use of Videocrypt scrambling.

Efforts are being made to establish a Hungarian Broadcasting Company satellite TV service: there were Ku band test transmissions in late March via Eutelsat II F3 at 16°E.

As mentioned in Teletopics last month, Eutelsat and SES are jointly investigating the potential for interference between transmissions from Eutelsat II F3 at 16°E and Astra at 19.2°E with 60cm dish reception.

A rumour suggests that RTL+ (Luxembourg) is to start a service aimed at Switzerland via the Intelsat craft at 60°E.

Canal Plus is shortly to change to Nagravision scrambling. The French government has decided that the new Telecom 2a satellite will use D2-MAC.

DX TV Operation

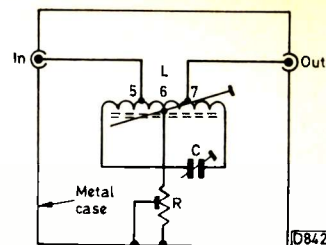
During the last couple of months we've covered the basics of SpE reception in Bands I and II. This month we'll

deal with one or two queries that have arisen.

A common question is how to photograph DX pictures? With a bit of practice it's quite easy. Forget the simple preset focus/frame speed convenience camera: you'll need something better, though it needn't be too expensive. For many years I used a Russian Zorky camera obtained from Technical and Optical. It was cheap, versatile, had a focal-plane shutter and, very important, had shutter speeds extending to a fifteenth of a second and a variable aperture widening to around f2.8. Use of a shutter speed slower than a complete TV frame (1/25th sec) removes the problem of dark bands/shading caused by incorrect illumination of the negative.

If you can focus down to three feet or less, more of the screen occupies the negative. This helps to get good machine prints, since with processing based on average brightness the black around the edge can lead to over-expo-

Fig. 1: Band I notch filter. L consists of 11 turns on an 0.25in. former with dust core, approximately 26g, spaced over 1in. and tapped at turns 5, 6 and 7. R is a 470/500Ω miniature carbon preset. C is a 30pF maximum miniature trimmer.



sure. For the same reason I photograph in a slightly darkened rather than pitch black room. Use a semi-fast film, e.g. 200 ASA – from my experience the Superdrug quality is o.k. Don't use a flashlight – this will give you a picture of the tube phosphor! Use a shutter speed slower than 1/25th sec and an aperture of around f3 or wider. Take frame centring into account: if the viewfinder is an above rather than through the lens type adjust the shot to suit by slightly lifting the lens.

Last year my Zorky died. As a replacement I obtained for £38 a second-hand Praktica MTL5 from a large trade-in camera store. This East European camera focuses down to 18in. at f1.8 and has a focal-plane shutter that enables you to view and focus through the lens prior to taking the DX picture. These high-quality cameras are relatively cheap even when new. You tend to find them in the local chemist rather than the High Street camera retail giants. Look out for Zenith/Zorky/Praktica cameras. Most of the imported Japanese cameras have the same features but usually at a higher price.

Further questions relate to interference. In the days of Band I TV in the UK the usual interference came from the local BBC transmitter. A basic notch filter would often remove it completely. Nowadays the main complaint is about 49MHz baby alarms that operate across ch. R1, a prime DX channel. As to what can be done about this the answer is very little – several frequencies in the 49MHz band have been allocated to these alarms. If a single source has been identified it may be possible to phase out the interference by using a second reference aerial and an attenuator, but any slight movement of the main DX aerial or the alarm will call for realignment of the phasing system. This is effective but time consuming. If you know the owner you may be able to persuade him to switch the device off when it's not in use.

It's possible to use a fixed aerial with its elements at 90° to the interference source. This can be very effective. I achieved a reduction of over 35dB with interference from a single VDU. This of course means that the receiving aerial is permanently fixed in a single direction – I was very lucky in this respect as the direction was due east. In an urban environment baby alarm interference will be high. Despite the low powers used, the signals can be received at high levels over a distance of at least half a mile. Unfortunately the units are left on the whole time. Here in Romsey ch. R1 has been almost useless for eighteen months – only very strong DX signals can be resolved.

A simple notch filter is effective in removing 50MHz amateur band interference, providing a -30dB notch in the response. Details are shown in Fig. 1. L and C are tuned to the unwanted frequency, then R is peaked for maximum attenuation. Note that tuning is very sharp and critical – the notch can easily be missed.

Many TV-DXers now video record their reception. An advantage is the use of the freeze-frame facility as a possible help with unidentified signals. And you can of course play back good openings when conditions are dead.

If you have any other problems with DX reception drop me a line c/o the magazine and I'll try to sort them out.

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.

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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
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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 28 days for delivery.

Transistor Junction Breakdowns

George Wilding

Four main factors can contribute to the breakdown of a transistor junction. These are (1) high operating voltage, (2) excessive dissipation/temperature rise and, with a switching transistor, (3) high-voltage pulses at switch off due to highly inductive loading and (4) excessive reverse voltage.

Where there's excessive loading on a transformer driven by a switching transistor the latter will pass a heavier than normal current. There will therefore be excessive temperature rise. This can also occur if the pulse generator or driver stage produces an incorrectly shaped drive pulse so that optimum transition from cut off to saturation is not achieved. When a transistor is saturated (fully on) its collector-emitter voltage is very low: maximum dissipation in the transistor occurs between the two extremes of being cut off and saturated.

The base-emitter junction of a transistor can be grossly overrun for a limited period without damage since the physical nature of the junction will maintain the base-emitter voltage at about the normal figure. Excessive reverse bias will not be so limited however, resulting in instant destruction of the junction.

In practical terms we can add to this list of the causes of junction failure intermittent dry-joints, especially in line output and chopper stages, since these will in effect switch a semiconductor device off and on at a rapid rate. Similarly severe sparking or corona discharge from adjacent points can break down the junctions of an already highly-stressed transistor.

Failure of field output transistors is far less frequent than with line output or chopper devices due to the greatly reduced scan current and the fact that at 50Hz the loading is predominantly resistive, so that only relatively small flyback voltages are generated. Series regulator and audio output transistors also tend to be far more reliable: although their dissipation may be considerable, they are not subject to high-voltage pulses.

RGB Output Transistors

The situation with video output transistors in colour sets is rather different. Though free from pulse and inductive load considerations the failure rate is significant. Colour drift is often caused by collector-base leakage that increases with temperature. The most common failure however is a short- or open-circuit junction due to a tube flashover. Although a protection resistor is included in series between the transistor and the tube's cathode its value has to be low. Otherwise it would accentuate the effect of the tube's input capacitance, thus reducing the h.f. response of the video output stage.

AGC Problems

Modern receivers use chips for i.f. amplification, with integral a.g.c. Many of the monochrome portables in service have a discrete component i.f. strip however, with a gated a.g.c. detector/amplifier transistor. This device is switched on by a delayed pulse from the line output transformer so that it samples the video waveform during the back porch period following the sync pulse. The video signal is thus sampled at a known level and the effect of noise is greatly reduced. These gated a.g.c. transistors have a much higher failure rate

than that of transistors used for i.f. amplification.

The most common fault with an a.g.c. transistor is an open-circuit collector-base junction. When this happens with an npn transistor its collector voltage will rise to that on the positive supply line. If the gain-controlled transistor is an npn device with forward a.g.c. it will be driven into saturation and be unable to respond to the input signal. The screen will thus display a noise-free blank raster. Because the controlled transistor's base, collector and emitter voltages will be very similar it will give the impression that its collector-base junction is either short-circuit or very leaky. This is very misleading since the fault is really an open-circuit junction in another transistor.

Effects of Junction Breakdowns

Forward and reverse voltage checks across a transistor's junctions provide a useful and generally dependable guide to its condition – allowances have to be made for peripheral shunt components when making in situ tests of course. But minute and undetected collector-base leakage can, especially with a power transistor, make it useless. This arises because the leakage is equivalent to increased forward bias. The collector current is then increased by the normal transistor amplifying action. Junction temperature then rises, accentuating the effect. With collector-base leakage a transistor's collector voltage will fall: the higher the collector circuit resistance, the greater the change will be. This applies of course with an npn transistor fed from a positive supply line. With a pnp transistor fed from a negative supply line the effect of collector-base leakage will be a higher, i.e. positive-going, collector voltage. Whatever the circuit configuration however the clue is that the collector and emitter voltages will move towards one another. When the collector-base junction is short-circuit rather than leaky all three transistor electrode voltages will be similar.

With a short-circuit base-emitter junction the base and emitter voltages will of course be the same. Since there will be no collector current the collector voltage will equal the supply line voltage. With an open-circuit collector-base junction the collector voltage will again be at rail potential – unless the collector is connected to a potential-divider network – while the emitter voltage will be low since only base current can flow through any emitter resistor present. The base voltage will be the usual barrier potential above the emitter voltage, i.e. 0.6V for a silicon device. With an open-circuit base-emitter junction there will be no collector current. Thus the collector voltage will be at the supply potential: the base voltage will be slightly higher than usual because of the absence of input loading.

Table 1: Voltage changes due to junction breakdown with an npn transistor.

Junction breakdown	V _b	V _c	V _e
b-e o/c	H	H	L
b-e s/c	L	H	L
c-b o/c	L	H	L
c-b s/c	All similar		

Table 1 summarises the effects produced by a junction breakdown in the case of an npn transistor, assuming that collector and emitter resistors are present in the circuit. The voltages will be either higher (H) or lower (L) than normal. As the base and emitter voltages are normally low, the change will be small but significant. Similarly if a transistor's collector voltage is normally high, implying low collector circuit resistance, the change will not be great when a transistor is cut off.

Incorrect Biasing

Excessive or insufficient forward bias also gives unmistakable signs, the former producing a low collector voltage and the latter a high collector voltage. Such bias changes can be caused by a variety of factors. The most common are as follows: transistor or component defects in a previous or following stage where d.c. coupling is used; leaky input/output coupling or decoupling electrolytics; a changed value emitter or, with a.c. coupling, base bias resistor; or a dry-joint in a bias providing or d.c. negative feedback circuit.

Test Case 354

Philbert swung his van out of the service department yard and headed south for Walmington-on-Sea. It was to be a ten-mile round trip for a single service call, but the customer was a rental one and they are treated like royalty. This one, Mr. Tate, had no satellite TV pictures: Philbert pressed his foot to the floor...

The offending item was a Tatung satellite TV receiver, an Early Bird Model TRX1801. It produced no signals, didn't light up and had removed the terrestrial off-air TV signals until Mr. Tate had plugged the aerial straight into his TV set. Philbert found that the satellite TV box was cold, which meant that there was certainly something wrong with it! He removed the cover, checked that the only fuse he could find (F802, 250mA) was intact and confirmed that the mains supply was reaching the box. We find that it's not really practical to diagnose faults and repair equipment in the home these days. So Philbert scooped up the receiver, took it to the van and departed after leaving an identical loan box.

Next morning the little black box presented itself on the bench. Now the TRX1801 is very basic and simple, both in its features and circuitry. The power supply section consists of a mains transformer with three secondary windings, each feeding a rectifier circuit. Two full-wave rectifiers produce nominally 16V and 7.8V outputs which are converted to stabilised 12V and 5V lines by a couple of three-leg L-series regulator chips. Most of the load is carried by the 12V regulator IC802. Being a linear regulator it dissipates quite a lot of heat, aided by an aluminium heatsink. We quickly found that this i.c. had failed. There was plenty of voltage at the input but nothing at the output, and it was cold. The PCB in the area of the power supply looked very scorched, especially around IC801 and the mains transformer, but enquiries in the workshop indicated that this was normal.

A new 12V regulator chip was fitted, and after reassem-

bly the set was left to run on test. Hooked to the workshop dish, it entertained the staff for most of the day with no sign of trouble. Philbert was to return it on his way home that evening. When he got there Mr Tate was very glad to have it back. From the station point of view the loan set's keys didn't correspond with those on his own set, while sparklies were present on some programmes, probably because the loan set's polarisation settings were not spot-on for the LNB in use. There the matter should have ended. It didn't, of course.

About a week later Mr. Tate was back on the phone. Same thing again: no signals, no indicator display and when are you coming? Straight away, Mr. Tate. The long-suffering Philbert was summoned from darkest Northfield and directed to Walmington – via the workshop in order to pick up a 12V regulator chip in case the previous replacement had failed.

Sure enough it had. With the entrails of the satellite TV box spread over Mrs. Tate's carpet, Philbert soldered in another chip, well anointed with heatsink compound, and bolted it down on its metal heat spreader. This time the regulator took ten days to break down, whereupon the receiver appeared once more in the workshop. Different makes of regulator had been fitted, so it seemed unlikely that the replacements were responsible for the failures. It was also unlikely that the receiver was drawing excessive current from its power supply – there is seldom in any circuit excessive dissipation without some other symptoms being present. And anyway the only sign of overheating within the receiver was around the power supply. So what was the trouble with this little Tatung? It was inside the box. For the answer and another test case item, see next month's issue.

ANSWER TO TEST CASE 353 – page 512 last month –

Croydon Aerodrome! Analogue meters! Here we are, well into 1992, and last month's test case was as full of nostalgia as a museum. Mind you for all his venerability it was the curator, Workshop Sage, who came up with the solution to the problem.

The picture displayed by the afflicted Philips K30 set suffered from a form of jitter that suggested e.h.t. variation. But it happened only at high brightness levels: the greater the beam current, the more the e.h.t. voltage jittered. The implication was a faulty component in the e.h.t. circuit. There are only a few, mainly connected in series. Apart from the diode-split line output transformer there are several components, associated with beam sensing and limiting, on the earthy side of the supply and the link from the transformer to the tube's final anode connector. A voltage check eliminated the components on the earthy side of the circuit. The e.h.t. link consists of a highly-insulated lead incorporating two 22kΩ resistors in series – they live in a moulded bulge at the lead end that hooks into the tube. It was these resistors that were at the root of the trouble. They had gone high in value – virtually open-circuit when checked with an ohmmeter. But with lots of kilovolts and a current approaching one milliamp they played coy. This situation is sometimes betrayed by a pungent smell from the region of the cavity connector or a bulge or burn mark in the cap end of the lead. A new e.h.t. lead restored stable pictures.



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10082-VT120, 220		£27.00
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PANASONIC		
3HSSN-2 Head universal		£7.50
3HSSU1-NV100, 370, 380/Philips VR6460		£11.00
3HSSU2-NV230, 470, 480, G9, 10, 11, 15PX		£21.00
3HSSU3N-NV430, 460		£13.00
3HSS3N-NV777, 330		£18.50
3HSS4NB-NV730		£19.00
3HSS4NA-NV366		£24.00
NVG30, 33, 40, 45, 46, 130, & most other Panasonics		POA

SANYO		
3HSSSY-VHR1100, 1110, 1300		£18.00
3HSS3SY-VHR1500		£34.00

SHARP		
3HSSSP-VCR9300, 9500, 9700, 381, 481, 482, 483, 486 etc.		£15.50
3HSSSPB-VCS81, 583, 651, 670 etc		£15.50
VC7000, 8000 series (Brass)		£42.00

OTHER MAKES

Alba 4000, Goldstar 8000, Sentra 8000, 1000	Solavox	£21.00
Fisher FVHP510, 520, 530, 615, 710 etc.		£18.00
Fisher VBS7000, 9000 etc.		£25.00
Hinari VXL2, 4, 3, 20, 25		£18.00
Hinari VXL5, 6, 20H		£15.00
Mitsubishi HS306, 710		£30.00
Orion VC150, 180, VHI, 2, 3 etc		£18.00
Saisho VR100, 605, 705, 805, 905		£18.00
Samsung Universal 2 Head		£24.25
T o s h i b a		
V71, 73, 74, 75, 81, 82, 83, 84, 85, 87		£20.00
Toshiba V93		£21.00

ASK FOR VIDEO HEADS NOT LISTED

The above heads are new.

BELT KITS

Belt Kits for most models are stocked. Some examples are:		
AKAI		
VS1.2.5	1.20	
VS4.6.9.15	1.10	
Ask for models not listed.		
AMSTRAD		
TVR1.2.3, VCR4600, 4700, 5200	1.90	
Ask for models not listed.		
FERGUSON/JVC		
3V003V16V22 etc.	1.60	
3V29V30	1.20	
3V35363839	1.20	
3V42434445485354	1.10	
5557	1.00	
Ask for models not listed.		
PHILIPS		
VR6367/6465/66/67/65V/6760V	2.25	
VR6460/6920/6520	2.40	
Ask for models not listed.		
SANYO		
VTC5000/5150/6500	0.65	
VHS1100/1300/1500	1.00	
840	1.00	
715/16720/21V725/830V	1.10	
FVHP905/906/907/908/910/911/915/916	1.20	

GRUNDIG

VS400410/444050V	0.65	
460	0.65	
VS180200/220/262V	2.20	
265267	2.20	

Many other belt kits in stock. Examples are Alba, Funai, GEC, Goldstar, Granada, Grundig, Hinari, ITT, Mitsubishi, NEC, Orion, Saisho, Samsung, Schneider, Sony, Tensai etc.

NEW LINES

LOPT Hitachi CPT1476	£18.00
LOPT Hitachi CPT2276 etc	£19.00
LOPT Matsui 1440	£18.00
Trip Grundig CUC2401 etc	£17.00

OTHER GRUNDIG TRIPLERS IN STOCK

LINE OUTPUT TRANSFORMERS

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 CVC800/13	21.50
ITT CVC1100	16.50
ITT CVC1150/1175	20.00
ITT 6325	18.50
ITT 3546	18.50
ITT 12001	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
Rank Bush T20A	11.50
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
Sony - Please state model for price	
Universal Tripler	4.75
Universal Tripler with focus unit	9.50
Decca 120/130 series tripler	8.50
Thorn TX10 Focus Unit Kit	9.00

Hitachi and Matsui LOPTs in stock

VIDEO MOTORS

REEL MOTORS		
Ferguson 3V2930		£20.00
Ferguson 3V58, 59, 65, FV10, 11, 12, 13, 14, 20, 21, 22		£17.25
Ferguson FV260		£14.50
Hitachi 8000, 8300, 8500		£8.50
Sanyo VTC5000, 5150, 5400, 5300, 6500		£7.50
Sharp VC9300, 9500 etc. Original		£15.00
Panasonic NV333, 366 Original		£13.20
All other Panasonics		POA
CAPSTAN MOTORS		
Ferguson 3V35, 36 Original		£22.50
Ferguson/JVC (Mechanical models)		£20.00
Hitachi VT11 Original		£30.00
Hitachi VT33 Original		£32.00
Hitachi VT64 Original		£19.75
Hitachi VT8000 series Original		£34.50
Hitachi VT9000 series Original		£34.50
Sharp VC7000 series Original		£30.50

MODE CONTROL MOTORS

Ferguson 3V42, 43, 44, 45, 48, 49, 52, 53	£6.00
Ferguson 3V58, 59, 65, FV10, 11, 12, 13, 14, 20, 21, 22, 26	£4.50
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 performance.



IDLER ASSEMBLIES

FERGUSON		
Take up Clutch (Mechanical models)		£5.00
3V2930 Take up Idler		£2.00
3V2930 Reel Idler		£2.85
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		£14.00
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. FF Idler	£2.95
VT9300, 9500 etc. Idler	£2.95
VT8000, 8500 etc. FF 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

PHILIPS

VR6460, 6920 Idler Arm (Original)	£3.00
DV464, 6462, 6463, 650 etc. Idler Mod. Kit	£4.50
VR6542, 6843 Reel Idler	£6.50
VR6542 Reel Drive Pulley	£7.75
VR6843 Reel Drive Pulley	£9.50

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, 300	



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. 40hm 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 30P7R.

2KV 500 WATT TRANSFORMERS Suitable for high voltage experiments or as a spare for a microwave oven etc. 250v AC input. Now only £4.00 ref 4P157

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

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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

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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 5P191R

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

MINIATURE RADIO TRANSCIEVERS 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 LWDX/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 equivalent 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

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NEW 80 PAGE FULL COLOUR LEISURE CATALOGUE
2,500 NEW LINES FREE WITH ORDER ON REQUEST

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

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FM BUG BUILT and tested superior 9v operation £14.00 ref 14P3R

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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 mph reduction box (800rpm) and toothed nylon belt drive cog £40.00 ref 40P8R.

SINCLAIR C5 WHEELS 13" or 16" dia including treaded tyre and inner tube. Wheels are black, spoked one piece poly carbamate. 13" wheel £6.00 ref 6P20R. 16" wheel £6.00 ref 6P21R.

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.

12 VOLT BRUSHLESS FAN 1/2" square brand new ideal for boat, car, caravan etc. £5.00 ref 5P206

ACORN DATA RECORDER ALF503 Made for BBC computer but suitable for others. Includes mains adaptor, 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 KITS as supplied it will handle up to about 15 w 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 12v 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. 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

ALARM TRANSMITTERS. No data available but nicely made complex radio transmitters 9v operation. £4.00 each ref 4P81R. 12V 19A TRANSFORMER. Ex equipment but otherwise ok. Our price £20.00

GX4000 COMPUTERS. Customer returned games machines complete with plug in game, joysticks and power supply. Retail price is almost £100. Ours is £12.00 ref B12P1

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 XT KEYBOARDS. Brand new 86 key keyboards £5.00 ref 5P612

IBM AT KEYBOARDS Brand new 86 key keyboards £15.00 ref 15P612

386 MOTHER BOARDS. Customer returned units without a cpu fitted. £22.00 ref A22P1

BSB SATELLITE SYSTEMS

BRAND NEW

REMOTE CONTROL

£49.00 REF F49P1

286 MOTHER BOARDS. Brand new but customer returns so may need attention. Complete with technical manual £20.00 ref A20P2

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.

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

MIRACOM WS4000 MODEMS

V21/23

AT COMAND SET

AUTODIAL/AUTOANSWER

FULL SOFTWARE CONTROL

STONE AND PULSE DIALLING

£29

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

TWEETERS 2 1/4" DIA 8 ohm mounted on a smart metal plate for easy fixing £2.00 ref 2P366R

COMPUTER MICE Originally made for Future PC's but can be adapted for other machines. Swiss made £8.00 ref 8P57R. Atari ST conversion kit £2.00 ref 2P362R.

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

ALARM PANELS 2 zone cased keypad entry, entry exit time delay

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BARGAIN STRIPPERS

Computer keyboards. Loads of switches and components excellent value at £1.00 ref CD40R

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 Atan 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

SPEAKER WIRE

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

MAINS FANS

Brand new 5" x 3" complete with mounting plate quite powerful and quite. Our price £1.00 ref CD41R

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 7P19R (worth it even as a stripper)

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 1/2" 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

SPECTRUM +2 LIGHT GUN PACK

complete with software and instructions £8.00 ref 8P58R/2

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 any thing that was said. Price is £20.00 ref 20P3R

IEC MAINS LEADS

Complete with 13A plug our price is only £3.00 for TWO! ref 3P148R

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 voice to a cock crowing! £14.00 ref 14P200 R

HANDHELD TONE DIALLERS

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

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

ATARI 2600 GAMES COMPUTER Brand new with joystick and 32 game cartridge (plugs into TV) £29.00 ref F29P1 also some with 1 game at £19.00 ref F19P2

BEER PUMPS Mains operated with fluid detector and electronic timer standard connections. Ex equipment. £18.00 ref F18P1

90 WATT MAINS MOTORS Ex equipment but ok (as fitted to above pump) 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 F175 TAPES FOR £70.00 REF F70P1 360K 5 1/4" Brand new drives white front. £20.00 Ref F20P1



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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
510YXB £58.00	A56-540X Mullard ... £48.00	A51JUH10X Sony £74.00
520SB22 Sony £64.00	A56-701X ITT £48.00	A53JBW00X Sony £64.00
560EB22 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
	A44JFZ10X Sony £78.00	AXT37-001 £44.00
	A49JHT00X Sony £64.00	AXM51-001 £46.00
	A49JLV10X Sony £74.00	AXT56-001 £52.00

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Tel. 0703-449783

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20AX 22"	only £29
KT3 20" Mullard	only £39
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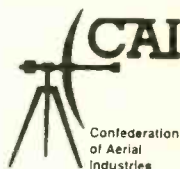
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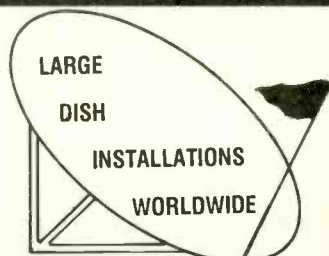
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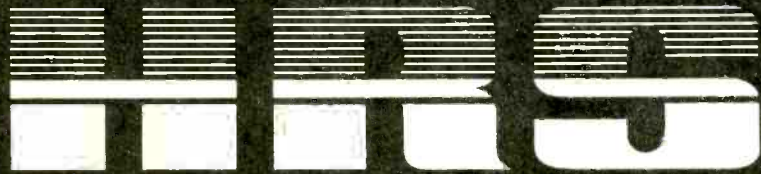
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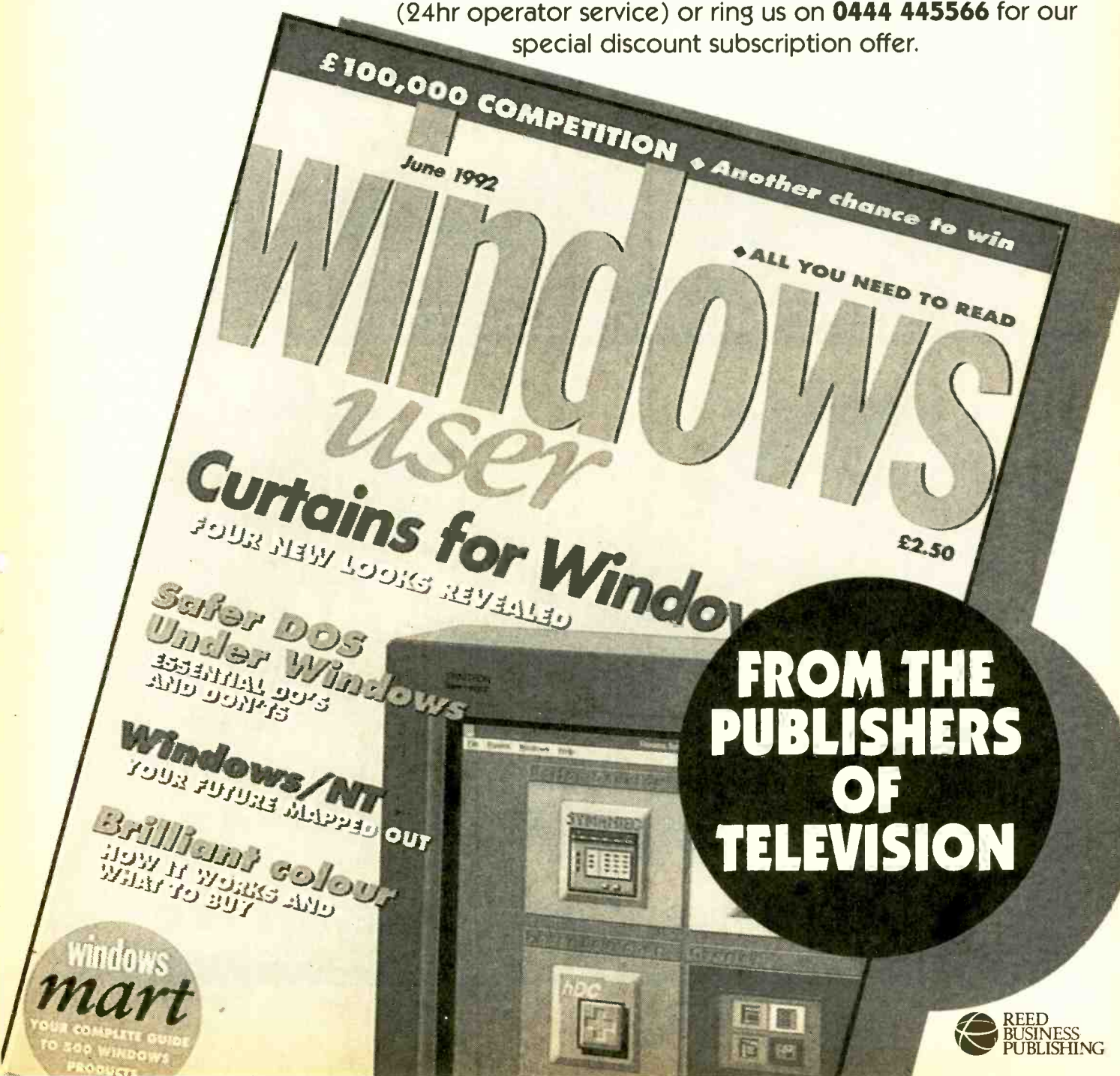
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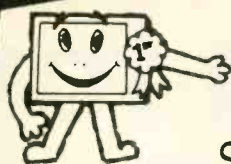
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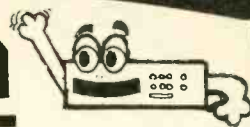
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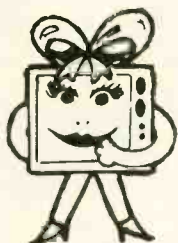
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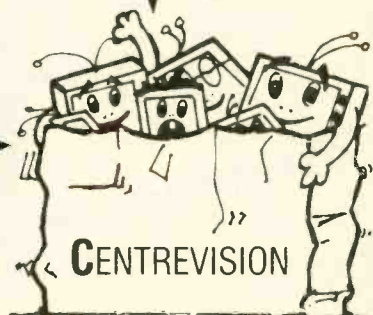
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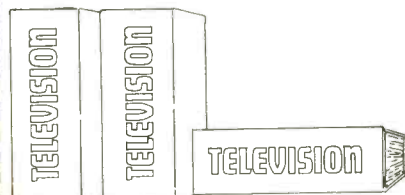
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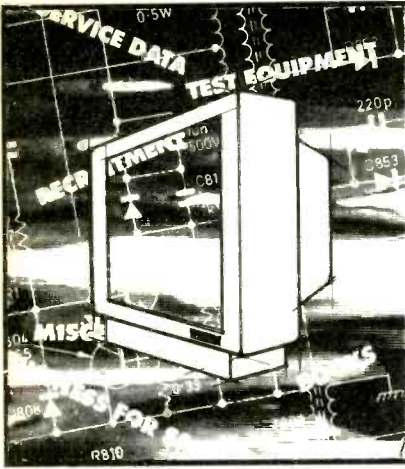
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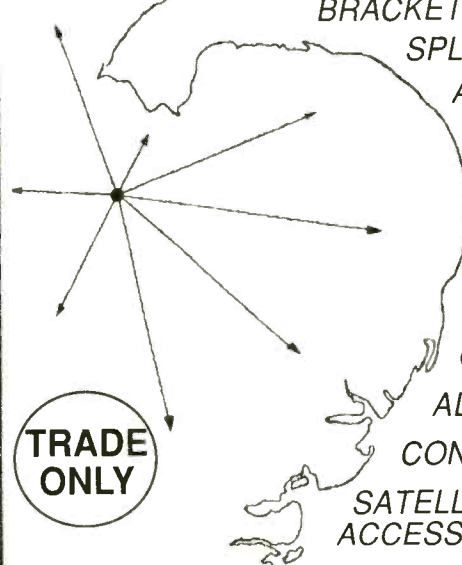
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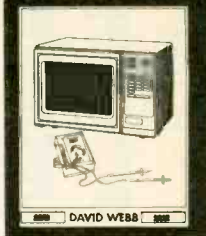
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