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SERVICING-VIDEO-SATELLITE-DEVELOPMENTS

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Ch 5 Reception Guide

Servicing the Mitsubishi HSMX1B

Digital TV the French Way

LCR Bridge Range Extensions

Astra 1D Reception with the Pace SS9000/9200

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Martin Pickering describes a way of providing automatic sclection of the Astra ID services with a Global ADX plus channel expander.

VCR Clinic

Teletopics

Latest satellite and cable TV news, changes at the BBC and other items.



Channel 5 Reception Guide

Squeezing Ch. 5 into the channel 35-37 gap, with lower ERPs than the existing services and sometimes different transmitter sites, is causing many reception problems. Eugene Trundle provides an illustrated guide to the various symptoms that can be experienced, with advice on the best ways of tackling them.

NVQs - The Way Forward

482 Joe Cieszynski, who has had considerable experience with setting up NVQs in the intruder alarm field, feels that they can make a positive contribution to the Brown Goods servicing industry. But there will be huge

difficulties in implementing them, not the least being cost.

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Willow Vale's CD-ROM

How Willow Vale came to produce a CD-ROM catalogue and the version distributed with this issue of Television, and instructions on using it.

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What a Life! Donald Bullock is brought down to earth after a string

of successes with faulty TV sets.

Servicing the Mitsubishi HSMX1 510

John Coombes presents a servicing guide that covers the mechanical and electronic faults you could experience with this VCR.

LCR Bridge Extensions

Ray Porter, M.Sc., C.Eng., MIEE, takes an inexpensive LCR bridge and adds range extensions plus performance improvements to make it ideally suited to the needs of the TV/video workshop.

Coincidences

Andrew Tebbutt on how faults tend to repeat.

Digital TV the French Way

Hugh Cocks has been trying out a Thomson digital receiver-decoder intended for reception of the French satellite pay-TV services.



Satellite Workshop Jack Armstrong's column on satellite receiver servicing.

521 Test Case 413 522 Long-distance Television Roger Bunney reports on DX and satellite TV

reception and news, and describes the principles of wideband aerial design.

N	lext	Month	in Televi	ision

Editor John A. Reddihöugh

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Production Editor Tessa Winford

Consultant Editor Martin Eccles

Publishing Directon Susan Downey

Advertisement Manager Carol Nobbs 0181-652 8330

Advertisement Sales Executive Pat Bunce 0181-652 8339 Fax 0181-652 8931

Editorial Office 0181-652 8120 Fax 0181-652 8956

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Sorry!

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Because of some last minute changes to the page layout in last month's issue there were one or two errors in the contents list and the advertisers' index. Our apologies for any inconvenience caused by this.

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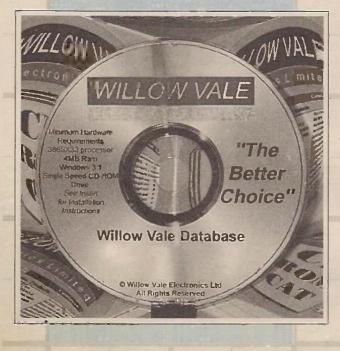
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The **BBC's** Role

The BBC is finding itself in an increasingly ambiguous and difficult situation: the question is just where to draw the line between being an outright commercial broadcasting outfit and being the guarantor of traditional public service broadcasting. Over the past decade or so it has been increasingly successful in developing its commercial side - by promoting its channels, publishing books and other works based on its programmes and selling its material to broadcasters worldwide. This has not impinged on its role as a public service broadcaster, though it has led to complaints from commercial broadcasters and publishers that it has unfair advantages. This has always seemed strange: those who have encouraged it to act commercially have been upset when it has successfully done just that. But the extent and rate of change has changed significantly in recent months.

The BBC is likely to enter increasingly into joint venture and other agreements with commercial broadcasters. For some time it has been involved, through a programme licensing agreement, with the UK Gold satellite channel. But the agreement signed last month with Flextech, the cable and satellite channel provider which is controlled by TCI, the largest US cable TV operator, is a significant step farther. Its purpose in the UK is to run eight new digital pay-TV channels. This has obvious advantages for both parties. Flextech

will be putting up a considerable amount of money which will help fund the BBC's programme making. The BBC desperately needs this if it is to produce an adequate output to remain a force in the modern world of multi-channel broadcasting. Its traditional source of income, the licence fee, is being allowed to increase by only a small annual amount to take inflation into account. The agreement with Flextech will provide the BBC with capital and, subsequently, an income from pay-TV broadcasting. Flextech benefits in gaining access to the BBC's vast store of programme material and being able to take advantage of the BBC's highly regarded programme making capabilities. It seems that Flextech will concentrate on commercial management, while the BBC gains channels and income with editorial control.

The joint venture with Flextech will create eight new channels, which are being called BBC Horizon, BBC Showcase, BBC Style, BBC One, BBC Arena, BBC Learning, BBC Catch-up and BBC Sport initially. Four of them form part of British Digital Television's proposed terrestrial digital TV package.

This raises various questions about the BBC's future. For one, can it retain its basic public service broadcasting role, with no advertising revenue from its own channels? There will be a tendency to suggest that, having ventured

this far into the commercial sphere, it should go the whole hog and join the ranks of the commercial broadcasters. But independence for the BBC means its status under the BBC's charter, with freedom from commercial pressures. It is important to maintain this. It means not only complete editorial independence, but the ability to set and maintain broadcasting standards. Without the contribution to TV made by an established public service broadcaster, there is little to stop standards falling.

In a related move, the Commons National Heritage Select Committee has suggested that the time has come to alter the way in which the BBC is governed. It considers that "gifted or wellintentioned amateur" part-time governors should be replaced by a board of professional managers. How would they acknowledge and nurture the BBC's vital public service role? We could end up with a board of accountants, and a Corporation that's just another old plc. The BBC claims that its governors act as the custodians of the licence payers' interest, and see no need for such a change. These are contrasting views indeed. It looks as if some sort of compromise is possible, in fact desirable, here. But we don't, whatever happens, want the BBC to become just another broadcaster amongst the others, fighting to optimise its profits. Its unique culture must be preserved. It will not be readily recreated once destroyed.

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

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Reports from Simon Bodgett and David C. Woodnott

JVC GR5707

If the symptoms are no functions or some missing, with no E-E camera pictures, the power regulator transistor Q203 is defective. Great care is required when replacing it and reassembling the camera. The usual cause of the trouble is a defective AV lead. S.B.

JVC GRS77

No playback colour, E-E OK was the complaint with this unit. It's a common fault that calls for replacement of the H8B7101 colour processing chip IC8. This is not easy to accomplish, as the main PCB may be covered by two or more flexiprints that have to be removed. After replacing IC8, a $47k\Omega$ preset must be fitted in position R423 and the 320FH VCO set up. S.B.

JVC GRS707

This was a particularly difficult problem that involved a Philipsmade VITC unit which was connected between the camcorder and the viewfinder. The camcorder reself operated normally. So did the VITC unit when it was checked with another GRS707! But when the two were connected and the stop-start button was pressed the pictures went off. This impeded recordings!

I won't go into the amount of the it took to get a circuit diagram the VITC unit, or the time spent cross-checking. What it came down to was earth paths. One was miss-

Camcorner

ing, the one used by the VITC unit. There was an open-circuit earth connection at pin 5 of connector CN803 on the camera operations panel. I doubt whether anyone will get this fault again! S.B.

JVC GRC7

This old-timer suffered from EVF picture flicker in the E-E mode. The obvious diagnosis would have been lack of EVF field lock, but the output signal was also affected. Close examination of the video waveform showed that the field period was not 20msec. The master oscillator crystal X101 was the culprit. **S.B.**

Canon A9E

No autofocus was the complaint. Internal inspection showed that the unit had been dropped. As a result, the infra-red autofocus lens assembly had become detached from the main lens unit.

A single screw secures the AF assembly to the underside of the main lens unit, and part of the moulding had broken away. As a complete new lens unit is an expensive item, we decided to try to rescue the original units. This proved to be possible. With this type of problem, the broken moulding can often be redrilled – there's a section of undrilled plastic at the mounting point.

Use a small drill (a pin vice is helpful) to cut into the previously undrilled section. A slightly longer screw than originally used is required to refit the AF lens unit.

We've carried out the repair with several Canon models that use this type of IR AF assembly. So far, none have failed. A warning to the customer that further impact damage will result in an expensive bill probably encourages greater care than is customary!

Note that this type of unit is used in other makes and models. **D.C.W.**

Sharp VLC73H

It's unusual with this model to find faults other than the common corroded PSU print problem. But this one was different! The playback picture was marred by an overall effect that was similar to the black inversion symptom produced by a worn or incorrectly set up video head. The camcorder's recordings were OK when played back via another machine. It seemed unlikely that the heads were the cause of the fault, but they couldn't be ruled out completely.

After much checking I discovered that an 0-01µF chip capacitor, C427, was open-circuit. It connects pin 5 of the skew jump PCB connector AG to pin 7 of IC402 (3fC signal). A replacement cured this rather misleading fault. D.C.W.

Minolta 406E

Rewind would fail after running for a few seconds. All other functions worked, and rewind search was OK. The cause of the fault was leakage from the 220µF capacitor on the main PCB. A replacement capacitor and PCB clean up restored the unit to normal operation.

The machine is an Hitachi clone. D.C.W.

Sony CCDF375E

The playback fault symptom gave the impression of a defective video head. But the drum was OK. So was the head amplifier assembly, which commonly fails in this and similar models.

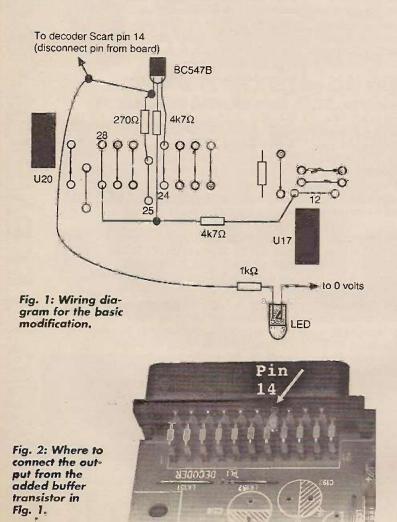
After much checking I discov= ered that the supply to pin 27 of the ATF process chip IC506 was miss-ing (the supply to pin 28 was OK). The cause was C562 and C563 (both 10µF, 16V), neither of which are surface-mounted types. They had leaked and corroded the PCB, effectively disconnecting the supply to pin 27. After cleaning and repairing the PCB, replacement capacitors restored normal operation. **D.C.W**.

Sony CCDFX500E

If the symptom is no playback after one of this series of models has been dropped, check whether the head amplifier connector on the main PCB has become detached from the print. We've had this fault three times recently. D.C.W.

Automatic ADX Control with the Pace SS9000/9200

Martin Pickering describes a simple modification to provide automatic Astra 1D channel selection with these Pace receivers and their clones



n an article last month I described a modification that provides automatic selection of the Astra 1D channels when using a Global Connections ADX-Plus channel expander with an Amstrad SRD400 satellite TV receiver. A more elegant solution is possible with these Pace receivers because, hidden in the menu, there's selection of LNB1 or LNB2. This is not used with single-input tuner receivers. By connecting a $4.7k\Omega$ resistor between link 28 and link 12 on the PCB, this option can be made active. Link 28 will now switch between 0V and 3V depending on the LNB selection in the menu.

Wiring Up

Fig. 1 shows how to add a simple BC547B transistor buffer circuit to provide a 12V output. Connect this to pin 14 of the decoder scart socket (see Fig. 2). Pin 14 is normally connected to chassis, i.e. unused. It should be snapped at its narrow centre point to disconnect it from the board. Solder the wire to the contact above the break.

Note that this conversion can be done without having to remove the PCB from the chassis. I do however recommend that you replace the electrolytic capacitors while you have the covers off. These capacitors die of old age. Failure to replace them results in streaks and lines on the pictures at best, or a modified receiver whose power supply fails when the mains is reconnected at worst. A capacitor kit that contains correctly rated components with instructions is available from SatCure - phone 0589 355 411 or e-mail me at

repairman@netcentral.co.uk

Commercial over!

The LED shown in Fig. 1 is optional. Its cathode can be soldered to the right-hand side of the infra-red sensor housing, so that the light can be seen through the front panel. As an alternative, most 90-channel receivers have a large front panel 'smoked window' that enables the LED to be seen when it's mounted as shown in Fig. 3. There is a small, square solder pad that's connected to 0V. Take great care when you drill the board at this point.

Once you have soldered the extra components in place, check very carefully to ensure that they correspond with the arrangements shown in Figs. 1 and 3. The links on the board are connected directly to the microcontroller chip: a mistake could destroy it.

New Menu Option

Reassemble the receiver and check the second menu screen. A new option, LNB1, should be present.

Make sure that the channel expander unit's silver toggle switch is permanently off. Remove the scart plug from the unit and discard it. Look at the back of the receiver. The channel expander's single connector must be fitted to pin 14 of the decoder socket. That's the fourth hole in the top row, counting from the left (see Fig. 4). This leaves the TV scart socket free for you to use normally should you want to do so. If you use an external decoder, disconnect pin 14 inside the decoder's scart plug and connect the channel expander's control wire to it instead.

Now, each time you go to a channel which you have set for LNB2, the channel expander light will come on and the expander will automatically switch to Astra 1D. Simple! In addition, you can use the timer mode for recording without worrying whether the channel expander will be in the correct mode – it will.

Setting up 60-channel Models

For every Astra 1D channel, press SETUP 1 4 7, then STATUS. This will select the line that says LNB1. Use the channel up key to change this to LNB2, then press STORE twice to store the change.

For encrypted channels, make sure that the internal decoder is selected:

DECODER INT

AV INT

Leave the old channels (which don't need the channel expander on) set to LNB1.

Tune in the Astra 1D channels with the channel expander light on.

Note that when LNB2 is selected the channel frequencies with a standard 10GHz LNB will read 0.995MHz higher than the true frequencies, because the LNB2 input was originally intended to be used with a Telecom Band LNB.

Setting up 90-channel Models

For every Astra 1D channel, press SETUP 1 then STA-TUS until you reach the line that says LNB1. Use the channel up key to change this to LNB2, then press STORE twice to store the change. Most 90-channel models will select the internal decoder automatically. If you don't see any decoder messages, set the decoder as described under 60-channel models.

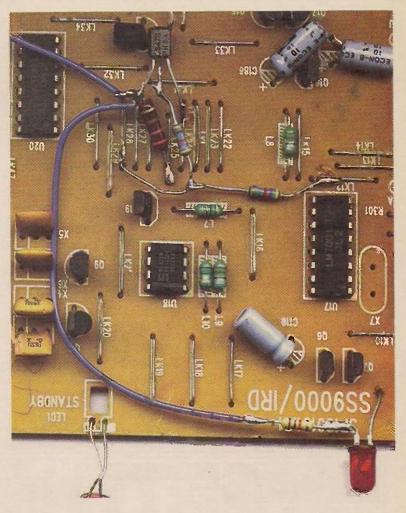
Tune in the Astra 1D channels with the channel expander light on.

when LNB2 is selected with a standard 10GHz LNB the channel frequencies will read correctly.

Clones

The Pace Models SS9000 and SS9200 appeared under various other guises, including the Ferguson SRV1, Grundig GIRD2000 and GIRD3000 and the Nokia SAT1500. It's easy to tell – simply look at the markings on the front edge of the PCB (see Fig. 3).

The Philips STU801 differs slightly from the other modmentioned. Set the old channels (which don't need the channel expander to be on) to LNC2. Press SETUP 1 then STATUS (above VIEW) until you reach the line that says LNC1. Use the channel up key to change this to LNC2,



then press STORE twice to store the change. The operation is the opposite to that for other Pace made receivers. Also make sure that the internal decoder is selected.

LNB Selection

A standard 10GHz LNB is not designed to work at the Astra 1D frequencies or course. Most do, but some give very poor pictures or none at all. An ADX-Plus channel expander is normally set to move all channels up by 500MHz. This brings the Astra 1D frequencies within

Components required

General-purpose npn transistor, BC547B or similar One 270Ω 0.5W resistor One 1kΩ 0.25W resistor Two 4.7kΩ 0.25W resistors One 5mm bright LED Thin insulated multistrand wire

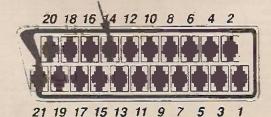


Fig. 4: Where to connect the channel expander's control wire.

Fig. 3: The

completed

modification.

range if a standard LNB is used and the LNB is capable of receiving these frequencies.

If the results are poor, you can fit an enhanced LNB to the dish. This moves all frequencies up by 250MHz. You will have to set each channel frequency 250 higher in the menu. Some Astra 1B channels could move too high however. In this case move the tiny slide switch inside the channel expander and it will now move all channels down by 500MHz.

How Confusing!

Is this all clear? Perhaps not. We'll go over it again.

With a standard 10GHz LNB the Pace receiver will show the correct frequencies in the menu – except for 60-channel versions which read 995MHz high when LNB2 is selected in the menu. An ADX-Plus channel expander can be set to move all frequencies 500MHz higher or lower by means of an internal slide switch. When the ADX-Plus LED is off, the frequencies are not affected. An enhanced LNB moves all frequencies 250MHz higher.

It becomes a matter of juggling the settings in order to bring all channel frequencies within the tuner's range. With a standard 10GHz LNB an upward shift of 500MHz brings the Astra 1D low frequencies within range. With an enhanced (9.75GHz) LNB a downward shift of 500MHz brings the highest Astra 1B frequencies within range.

Having decided which channels need to be shifted in order to bring them into view, you then have to calculate which frequency to select in the menu to find each channel. Alternatively, use the 'scan' function (SETUP 3 6 9).

Don't forget that each channel is polarised either horizontally or vertically. This menu option must also be set.

Tone Insertion

Some Pace receivers with Hitachi BF9 tuners, and some that have had the later Sharp tuner kit fitted, have sufficient tuning range to cover the entire band. There is also, I understand, a new Pace tuner kit that will give almost the full 2GHz tuning range. Such receivers can be used with an enhanced LNB and don't need a channel expander at all.

In this case the conversion described in the present article can be used to control a 22kHz tone inserter which, in turn, can select 'high band' with a Universal LNB.

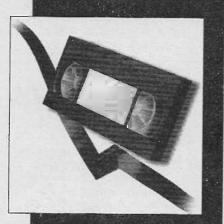
Alternatively, you can duplicate the circuitry shown here but take the control connection from link LK31, which goes high when PAL is selected in the menu and low when MAC is selected. In this case a $4.7k\Omega$ resistor between link 12 and link 31 is not required, since the PAL/MAC selection exists in the menu (link 31 is just behind the links shown in Fig. 1). This second control function can be used to select an external 22kHz tone inserter.

In Conlusion

It's difficult to describe all the possible options. If you have a real problem, you can contact me via the Internet – see e-mail address earlier. Please don't telephone me with questions.

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RESONATORS, THERMISTORS		HITACHI		21C80	16.99	HA11423	2.20	STK4026	9.00	SAA5019 SAA5012	4.30	TDA4605 TDA5380	3.00	Capacitance Meter PG015
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POWER SUPPLY MOD KITS	SOCKET	CPT2087 CPT2158	16.99	GX9700 SHARP	16.99	HA13402 HA13403V	3.25	STK416211 STK41710	8.00	TA7273 TA7279	3.50	TDA8178	4.25	
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		CT3306	16.99	KV1442 KV1882	18.99	LA4475 LA4476	2.99	STK5325 STK5332	7,00	TA8201 TA8207	3.50 3.25	UPC1488 UPC1185	3.50	Transparent Service/Cassett
two minutes walk from Upton Pa	nk lube station	CT3325 CT3425	16.99 16.99	KV2052 KV2066	16.99	LA4495 LA4495	1.95 3.99	STK5353 STK5338	10.00	TA8210 TA8214	3.50	UPC1188	4.00	£6.50 Barriston
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TY80, 2435701. £18.00 £16.60 £16.50 £16.50 £18.00 £39.80 £16.60 £16.60 £18.00 KV1882 KV260%2 KV2060%2 KV2090%52%6 KV21XRTV KV21XRTV KV21XRTV KV21XRTV KV2125256 PE3 KV225256 PE3 KV225256 PE3 KV275256 PE3 L339-416-11 TOSHIRA £19.50 £19.50 £19.50 £19.50 £19.50 51-13914-11 HTTACHE CPT1-1455, 1456, 1476 CPT1-146, 1626 CPT2074, 2078, 2274 CPT2158 CPT2158 CPT2158 CPT2174, 2176, 2178 CPT2476, 2478 2437752 24347022 24347022 CPT24752 CP .£16.50 .£16.50 .£23.50 .£15.80 .£14.50 .£13.50 .£13.50 £16.00 2435121 TX89, 2435701 TX90, 14", T9031, Red Spot TX90, 20°, 19044, While Spot TX100/110°, FST, F6035L TX100/110°, FST, F6045L TX100/90°, 76031, Blue Spot £16.00 £15.00 £19.50 £15.50 £16.50 £16.00 £15.00 £16.50 £18.00 £16.50 £16.60 £16.60 £15.50 £16.90 £39.80 £16.50 £14.00 £14.50 £17.90 £15.50 £15.50 £17.50 £15.50 £15.50 £19.50 £16.50 1-439-416-1 TOSHIBA 150R6B 155R9B 155T9B 175R9B 215R8B A 51F A51F 51KS, 51K7, 59P7. 51F7. 59X5, 68K4 59X5, 68K4 47235901 47235901 47319700. 47328700 901057 TTV 2434002 2434141 243274 2434393 TTT/NOKIA Compact B410° Compact B410° Compact B410° Compact B410° Compact 08/110° Compact 08/110° Compact 08/110° Compact 08/110° Compact 08/110° Compact 80R/90° £14.50 £25.80 £25.80 £23.50 £23.50 MTTSUBISHI CT2145 CT2582 CT2529 334P18505 334P18506 NIKKAI Baby10 NTI4.20 NORDMENDE E118 £15.00 £16.50 £15.00 £23.80 £23.80 £16.80 £16.80 £16.00 £15.50 £19.50 £15.50 . £16.50 £23.80 £18.00 £23.50 £15.00 £14.50 £25.80 £23.50 215T8B £16,80 £15,90 £17,80 £19,80 £14,00 £15,80 £17,90 £55.00 215T8B 1400RB AT2079/09 AT2079/15 AT2079/17 AT2079/23 TFD4048B £35.00 £22.00 £55.00 £55.00 £22.00 £19.80 £15.00 FIDELITY £14.50 £14.50 £14.50 £14.50 £15.50 AVS1600, 2000 . 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Reports from Philip Blundell, AMIEEIE Terry Lamoon Roger Burchett Richard Newman Bob Longhurst and Martin Cleaver

Grundig VS920

If the power supply is dead, check C1626 (47µF, 25V) by substitution.

If the sound is wowy, with the capstan tending to run slow, try replacing the capstan brake lever before spending time testing the servo circuit. **P.B.**

Toshiba V404

If the machine is dead, with the power supply outputs low and pulsing, replace CP008 (100μ F, 25V) and CP007 (10μ F, 50V). P.B.

Matsui TVR151

This is a combined TV/VCR unit, and for a change an easy one to get at and work on. The fault was no tape playing. When the video section was removed it was found to be a standard Matsui unit. After replacing the troublesome mode switch and realigning the mechanism, which is very simple, it worked perfectly. T.L.

JVC HRD860

This VCR's alignment was all out. According to the customer it had happened after he'd rewound a tape. Once the mechanism had been realigned it worked perfectly, but I replaced the reel and tape sensors to be on the safe side – they often cause problems. I've not seen the machine since. so presumably it has been cured, T.L.

Matsui VPA9401 etc

If you get problems on the primary

VCR Clinic

side of the power supply with this and similar models, it's advisable to replace every semiconductor device and check all the passive components. This should guarantee a longlasting repair. **T.L.**

Panasonic NVF65B

If the problem with one of these VCRs is low E-E output, don't assume that the cause is the RF converter. It's more likely to be the M51292FP switching chip IC1300. Replacement should cure the problem. T.L.

Matsui VP Range

If there's no E-E audio, check C5015 for dry-joints. This is becoming quite a common problem. **T.L.**

Ferguson 3V29/JVC HR7200

After replacing the cassette bulb, which was open-circuit, there was still no illumination. Checks around the circuit produced 12.5V readings everywhere, including the earthy end of the cassette switch. Odd, to say the least. The penny dropped after much checking around the mechacon board: sockets 11-13 (supplies from the regulator board) and 71-73 (main solenoid) had been transposed.

Fitting them correctly produced a lit bulb, but there was no capstan drive. The driver transistor, on the separate motor drive board, was dry-jointed.

Finally circuit protector CP2 was open-circuit, hence no reel drive. Any idea which fault occurred first?! R.B.

Philips VR6860

A number of ex-rental VR6860s came my way recently. The BD678 Darlington transistor was faulty in most of the repairable ones. This removes the 12b supply (switched 12V supply to the modulator). Hence no E-E or playback signals – no test signal either.

This one appeared to be another such case, but a quick check on all the symptoms revealed that there was no display either. The PCF 8571P memory chip 7501 was shorting the data and clock lines to chassis. **R.B.**

Ferguson FV31R

There were no E-E or V-V signals. I found that LW03 $(22\mu H)$ was open-circuit. removing the 12V standby supply (U4) to the power splitter. Unfortunately the owner had 'looked at it' and had neglected to refit the insulating washer under the right-hand PCB's mounting screw. The TA8607P FM amplifier chip IQ40 had objected and died. **R.B.**

Sharp VC750

The complaint with this machine was that it "would sometimes go straight to still in playback or record, then quickly shut down". On inspection I noticed that the idler didn't always reach the take-up reel. A more detailed look at the operation revealed that a lever which is directly driven by a cam didn't go over far enough. The cause was broken plastic in the grease on the cam. The debris hadn't come from the machine. R.B.

Hinari VXL6

This machine started to dislike the 47μ F, 16V capacitors that are sprinkled throughout its circuitry. The cause of no erase was C160 short-circuit, with R164 (22 Ω fusible) open-circuit. There was no record because C212 in the head preamplifier can was short-circuit (record 12V line). Just for variety C145 (100 μ F, 10V) went short-circuit, with the result that the 6V supply to IC104 (drum feedback amplifier) was very low. The symp-

tom this time was that the machine unthreaded immediately after threading. **R.B.**

Philips Turbo Deck

There have been reports that in VCRs which use this deck the newstyle head doesn't fit the lower drum spindle. In severe cases, dealers have been replacing the lower drum as well. Here's a tip that may save some money.

When the old head has been removed, try using some rubbing compound on the lower drum spindle. Duraglit or some other metal polish may even work. It's possible that the cause of the problem is slight corrosion because of migration from the old head. If you are careful, the new head should now slide on to the shaft easily, using the special tool. R.N.

Ferguson 3V32/JVC HR7655

This old-timer had been running for years with no problems. Then the ravages of time took their toll. First the record function failed, then the machine refused to play a tape. The second fault was easily cured: a new loading belt was required. I fitted a new economy repair kit, which included the turntable rubbers. The machine then worked extremely well mechanically, and the playback picture was of excellent quality. But there was no E-E signal.

Scope checks showed that video was present at the output from the IF board, and that it arrived at the video processing board. The signal entered pin 7 of the BA7001 chip IC201, but it didn't emerge at pin 4. Voltage checks didn't tell me much, and the control switching was OK. A new chip restored normal results. R.N.

Philips VR838

This VCR wouldn't accept a tape. When a cassette was inserted there was no resistance and the housing flopped about. The coupling gears driven by the main cam and the worm had sprung apart, because the claws of the red plastic lever were weak and wouldn't hold the gears together.

A new L kit was fitted. This cured the main fault, but a new housing was also required – the original one was bent. R.N.

Matsui VX730/Saisho VR3200

The complaint with this machine was intermittent E-E signals. Some careful tapping around the main PCB brought me to the area of the phono input/output sockets. As there were no obvious dry-joints here, waveform checks were necessary. It soon became apparent that the cause of the trouble was the video input socket. Rather than cleaning it and risking a comeback I fitted a new socket. **B.L.**

Mitsubishi HSB82

E-E and playback suffered from pulling and low contrast. The scart output was also faulty. A scope check on the power supply outputs proved that the cause of the pulling wasn't ripple. Without a circuit diagram, the next step was careful heating of components in the video areas. This produced some improvement. The cause of the trouble was eventually traced to C232 (10μ F, 15V), which is just behind the video 1 socket. It's a small, metal-cased, surface-mounted electrolytic capacitor. **B.L.**

Saisho VR1600/Matsui VX880

After a straightforward service I found that there was no playback colour. E-E was OK. Mindful of Panasonic power supply faults, I started off in this area. Bingo! C08 (100μ F) looked stressed. When it was replaced the playback picture had good colour. B.L.

Ferguson 3V35/JVC HRD120

The channel selector LEDs lit up but not the red power LED. Checks in the power supply showed that the switched 9V output was low. The always 9V output was OK. Although the relay produced a healthy click when power-on was operated, the contacts for this line were not very healthy. Carefully cleaning them with fine emery paper and slight bending cured the problem. **B.L.**

Panasonic NVHD610

This VCR came in with a dead power supply. The field engineer had replaced the 1A fuse F1, which had soft-blown. After doing this the power supply was still dcad but various resistors were glowing hot!

On inspection I found that C1117 (0.1μ F, 50V) in the slow_F start circuit had blasted in two, Q1101 (STP3N60FI-M) and IC1101 (TDA4605-3) were shortcircuit while R1114 (0.75Ω) and R1119 (220 Ω) were open-circuit. R1114 is the primary current sensing resistor – R1119 is connected from pin 1 of IC1101 to chassis. Having had this fault before with

Philips VR231 and clones

There has been comment in the magazine about poor picture quality with these machines. While the cause can be worn video heads, there are other possibilities. Here are a few things to check first:

(1) That the tape guides, all heads and the lower drum knife edge are clean.

(2) That the back tension is correct.

(3) That nothing in the tape path causes tape creasing. Check especially the fixed guide between the ACE head and the pinch roller.

(4) That the tape moves across the CTL head correctly and is not riding up or down. Test by selecting reverse search then play. If in doubt, scope the CTL pulses.

If the power supply is the type that uses an SPH4690 IC, add a 33μ H coil (part no. 4822 157 53006) in series with inductor 5204. This should reduce the dots in the dark areas of the picture, and help the auto-tracking system to find the off-tape FM amongst the power supply hash. Watch out for poor electrolytic capacitors as these machines age.

Put the machine in the service mode (method varies with the make and model) and check the X position of the ACE head as laid down in the manual.

If the drum has already been replaced, use the Mylar shims supplied with the new head as a feeler gauge to check that the upper drum to lower drum gap is correct.

When replacing the drum, beware if the old one is tight on the shaft. If the securing screw has been overtightened, the motor shaft can be scored with the result that the new head jams as it is fitted. Make sure that the shaft is clean and undamaged. If there is slight damage, careful application of fine abrasive paper may remove the scoring. Otherwise a new lower drum/motor will be needed. Later video heads have a triangular circlip at the top and bottom of the drum instead of the single-screw fixing. A special tool (part no. 4822 395 90977) is required to release this type of drum.

If the tracking is OK at the top and bottom of the picture but the FM dips at the centre of the screen, the lower drum is probably worn.

As long as the machine is picking up the CTL pulses all right, the auto-tracking should search three times then go into play in the best position it has found. If the off-tape FM is low or the CTL pulses are intermittent, the tracking comes to the wrong conclusion. If it goes past the best position, pressing play when the best place is found during auto-tracking will result in play continuing at that tracking value.

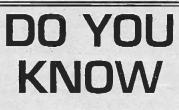
Remember that these VCRs use narrow video heads that are optimised for LP use, not SP. P.B.

these modern machines we had the parts in stock. Service departments wishing to be prepared may wish to order the following: C1117 part no. ECQV1H104JM; R1114 part no. ERX12SJR75; R1119 part no. ERDS2FJ221; IC1101 type TDA4605-3; Q1101 now type STP3N60. M.C.

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TELETOPICS

Satellite Television

Nokia has launched the first digital satellitc receiver to be marketed in the UK, the Mediamaster Model DVB9200S. It's a 'free-to-air' unit able to receive unencrypted DVB transmissions. Ex-patriots who wish to tune in to programmes from abroad are expected to be the main purchasers, at a suggested price of about £530.

The proposed alliance between BSkyB and the German digital TV company DF-1, part of the Kirch group, has been called off. This has upset Rupert Murdoch's plans to enter the German pay-TV market. It has also left the fledgling German digital TV market in disarray. DF-1. the first to start up, has not been a success to date – it is estimated to be costing the Kirch Group DM1m a day. So far it has attracted only some 30,000 subscribers, way behind forecasts. There is at present a lot of jockying between prospective players

Below: The Funke Antennen 47cm dish.



in this field. Eutelsat has confirmed that it will be lunching a commercial multimedia service based on the DVB standard later this year. Several such services are already being operated via Eutelsat, including DirectPC and Net On Air.

A number of plans to offer systems which bring together digital broadcasting and data transmission have been announced recently. SES, the Astra parent company, and chip maker Intel have formed a new company, European Satellite Multimedia Services (ESM), which aims to bring multimedia material to PCs via satellite. The two companies are investing \$15m in the project, with SES holding the major share. ESM will launch a new communications system called Astra-Net, using the Astra satellite system to deliver a wide range of services to home and office PCs at speeds much faster than a standard telephone line. Internet material and Web pages will be included. Phone lines will complete the two-way links. The company points out that with more than sixteen million PCs sold in Europe last year and almost twenty three million households having direct access to Astra there is wide acceptance of the technologies involved.

Philips has developed the CleverCast PC system, which offers high-speed multimedia data broadcasting to PCs. In the USA. PointCast and Microsoft have developed what they call Webcasting technology. PointCast is offering royalty-free licences to publishers with a Web site.

Over six million homes in the UK can now receive Astra satellite TV either directly or via cable: this is the equivalent of one in four homes. According to Astra a further 720,000 homes were added last year.

Funke Antennen has added a 47cm dish to its range of 60 and 90cm models. Efficiency and durability were the main aim in developing the new dish, to meet the need for smaller models suggested by Astra. The dish is made of pre-lacquered steel or aluminium, and can be mounted on a range of different attachments. The connection cable is fed through the head support, which is made of round, hollow aluminium tubing. Funke Antennen has also introduced a new shielded module system for use in setting up small distribution systems. For further information on these products phone +31 (0)411 672 440.

Pace has developed a new satellite radio receiver, Model MSS331-G DMX, for the reception of DMX and Astra Digital Radio channels. A suggested price has not been announced.

Changes at the BBC

The BBC has sold its 738 transmitter sites in the UK to Castle Transmission Services, a consortium headed by Castle Tower of Houston. The BBC is to receive £244m, which it will invest in digital production technology and related operations. As part of the deal, Castle Transmission Services will transmit the BBC's analogue TV and five national radio services for ten years. Now that NTL, which transmits the ITV services, is US owned the entire UK transmitter network is in foreign hands.

The BBC has also entered into a joint venture with Flextech, a media company 51 per cent owned by Tele-Communications Inc., the largest US cable company, to establish eight new digital pay-TV channels in the UK. Flextech is to contribute £20m for a fifty per cent stake in the venture, which is to run for thirty years initially. The BBC will not have to contribute

any cash. Instead, it will provide the programming, while Flextech gains access to the BBC's vast programme library. Some channels will be run jointly by the BBC and Flextech, but with BBC editorial control. There will also be two channels under sole BBC control: these will not carry advertising. Programmes funded by the BBC's licence revenue will always be shown on BBC-1 or BBC-2 first.

Cable Television News

The three largest UK cable TV operators, Telewest Communications, Bell CableMedia and Nynex CableComms, have appointed General Instrument (GI) as their main supplier of digital TV equipment. The groups plan to launch digital services, with many more channels and interactive TV, towards the end of the year. Services such as Internet access, video-ondemand and home shopping are under consideration.

Customers will pay for the services through increased subscriptions. GI is to supply subscriber connection boxes and other equipment. The box requirement is expected to run to hundreds of thousands during 1998, the order being worth around £500m to GI over the next two years.

In a separate move Bell CableMedia and Nynex CableComms are to become part of Cable and Wireless Communications (CWC), which is currently being set up by C&W and already owns Videotron. The deal is a complex one and will leave Bell Canada and Nynex Corporation with 14.2 and 18.5 per cent stakes respectively. Mercury Communications will also be a part of CWC, which will have 1.1m telecoms and 580,000 cable TV customers. Cable and Wireless is to invest £110m on bringing digital TV to its networks.

Product Highlights Sharp has demonstrated a combined SD3006D, which includes

Sharp has demonstrated a combined digital camcorder and still camera, the VicwCam Model VLDX1. It takes digital photographs. processes recorded vidco and photo information separately and can transmit them via an IR interface to a PC or printer. Two separate memories allow a combination of video clips and photos. Launch is expected later this year at around £2,000.

The Mitsubishi HS761VB is the first in the company's new 7 series range of Nicam stereo VCRs, which feature high performance with easy use. New features include insert editing and audio dubbing. The **Excellent** Picture facility has sharpness, noise reduction and detail enhancement adjustments, with preset settings for different programme types. It's an LP machine that uses Mitsubishi's Just Track four-head system for good LP playback and near-perfect still frames and slow-motion playback in the SP mode.

Surround sound. It will be launched later this year at around £500. Toshiba is launching the first UK TV sets that include 5.1 Surround sound. The company's two latest VCRs, Models V857B and V727B, are "Channel 5 ready" – they include an auto-seeking output that finds a free channel, with no interference, for the RF output signal. Prices are £450 and £360 respectively. Mitsubishi and Grundig have

PAL/NTSC playback and 5.1

demonstrated large-screen plasma display TV sets. Grundig's 42in. model includes Dolby Pro-Logic and will sell at around £8,000.

Sony plans to introduce a 28in. widescreen Super Flat Trinitron TV set that also has VGA inputs. It will be launched in the autumn. Other new products announced by Sony include a combined VHS/Video-8 VCR, Model SLVT2000, at £900; a compact Mini DV digital camcorder with 2.5in. flip-out LCD screen, Model DCRPC7 at £2,000; and a digital still camera, Model DSCF1,

Toshiba has unveiled its first European DVD player, Model

New Hameg Scope

The new Hameg HM1507 analogue/digital oscilloscope offers a high specification and performance for its price. In the analogue mode there are two channels with a bandwidth of DC-150MHz, a delay line, and dual timebases to 5nsec/div. The second timebase can free run or be triggered after a delay time. Digital performance includes a 200Ms/sec sampling rate, two 2K x 8-bit memories (one per channel) plus two 2K 8-bit reference memories, pre and post trigger and 100sec-50nsec/div timebase operation. A component tester is included. The HM1507 is available for £1,355 plus VAT from Hameg Instruments, 70-78 Collingdon Street, Luton, Beds LU1 1RX. Phone 01582 413 174, fax 01582 456 416.



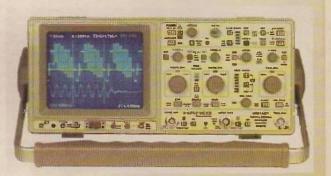
Telecam Electronics Ltd. has added the "International TV Antenna" to its range of aerials and TV signal amplifiers. The aerial has been designed for wideband operation, using a log-periodic configuration for UHF reception. The elements consist of 95 per cent pure silver printed on to a transparent plastic base. A pair of telescopic rods can be added for VHF reception: when not in use the rods can be stowed away in the base. To minimise interaction, the UHF and VHF signals are combined using a balun and a diplexing filter. For further details contact Telecam Electronics Ltd., 1 London Road, Great Shelford, Cambridge CB2 5DB (01223 578 055, fax 01223 578 054).

at £700 – it can store up to 108 images on a 4Mbyte flash memory card.

Hitachi is to launch a camera that records up to half an hour of MPEG-1 video or 3,000 still images on a 260Mbyte PC card. It will cost around £2,000.

Increased Ch. 5 Coverage

Channel 5 has been given approval to use UHF ch. 35 for transmissions from a further nine sites. This will make the service available to an additional two and a half million households. The ch. 35 transmitters will be at Bilsdale (H), Darvel (H), Fenton (V), Hannington (H), Kilvey Hill (V), Ridge Hill (H), Sudbury (H), The Wrekin (H) and Waltham (H), with polarisation as indicated.



Channel 5 Reception Guide



The advent of Ch. 5 transmissions could give rise to a number of reception problems of various sorts. Eugene Trundle's pictorial guide has been devised to enable symptoms to be identified and possible remedies assessed



Picture 1: Patterning produced by a carrier clash.



Picture 2: Random colour patterning caused by spurious beat signals.



Picture 3: The effect of downwards mistuning.

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Now that the new service has started, the problems are here to be solved. To help, we have prepared this picture guide. It illustrates the effects that can be introduced by the new transmissions. The pictures and accompanying text will enable you to analyse what's happening and why, and thus assess what can be done in practical terms to alleviate or eliminate problems.

Carrier Clashes

We'll start, as the Ch. 5 retuners have done, with the two basic requirements: to move the UHF output from VCRs and satellite TV receivers away from channels 37 and, soon, 35 (they were previously reserved for non-TV purposes); and to tune in TV receivers to the new service.

The RF modulators used in VCRs and satellite TV receivers don't have sideband filters. Because of this, their output occupies 12MHz of spectrum space – with a sound carrier at each end giving a spiky marker. The new Ch. 5 transmissions would beat with these signals, producing complex heterodyne frequencies. These show on the screen as herringbone and moiré patterning, see picture 1. If some component of the spurious beating occurs in the colour subcarrier region (4.43MHz after demodulation), the result is random colour patterning, see picture 2. The effect of all this is mutual: if the locally-modulated (VCR etc.) picture is spoilt, the Ch. 5 picture will probably also be spoilt.

Since the Ch. 5 carrier can't be moved, the frequencies used by the local modulators have to be shifted. The most effective way of 'retuning' is to switch the VCR and/or satellite TV receiver to standby, tune the TV sct's number five button to the new Ch. 5 transmission, then switch on the VCR and look for patterning on the Ch. 5 picture. If it's present, tune the VCR's modulator downwards in channel until all signs of interference just disappear. Next select the TV set's VCR channel and, with a tape in the playback mode, retune it to the new VCR output you've set. There should be no patterning. Check the other (BBC/ITV) channels for interference. If necessary readjust the VCR's modulator frequency slightly to clear any patterning present. Retune the TV set's VCR channel to correspond.

If there's also a satellite TV receiver in use, this is where the fun starts! Switch it out of standby while watching the Ch. 5 picture. If patterning is present, leave the TV receiver on Ch. 5 and adjust the satellite receiver's output channel upwards (towards UHF channel 40) until the picture just clears up. Then select the TV receiver's satellite button and tune it for clear satellite TV pictures. Recheck the BBC, ITV and VCR playback pictures. If you are lucky, they will all be clear of interference. If not, careful, progressive tweaking and a lot of patience may do the trick. Other solutions are available where it's impossible to find enough spectrum space for the locally-generated carriers.

You can disconnect the aerial while watching VCR or satellite TV pictures; you can fit a ch. 37 or ch. 35 notch filter in the downlead, perhaps a switchable one; or you can use a channel-changing unit to move the Ch. 5 signal out of the way. You can replace the satellite receiver with one that has a programmable ch. 21-68 modulator, or the VCR with one that has an alternative modulator channel assignment.

Much better is the use of scart leads (not fully-wired ones) to link the TV set to the VCR and satellite TV receiver. Most satellite TV receivers have two or three scart sockets and the ability to route AV signals automatically by using the scart pin 8 switching line: where relevant, stereo sound transfer also now becomes possible. Use of a scart link avoids the need for the terrestrial signals to pass through the satellite TV receiver. They must be looped through the VCR however, for off-air recording.

This leaves us with only one local carrier (VCR output) to worry about. This is not in use, but there may be a clash between the Ch. 5 transmission and something else that's being recorded. The solution is again to retune the VCR, or use one with alternative output channel settings; to disable its UHF modulator: or to change to a newer model which has a modulator that can be switched off, typically by installation software.

Beat patterns similar to those shown in pictures 1 and 2, though probably less severe, can arise from image (channel n + 5 and n + 9) effects in the TV or VCR tuner. While those caused by locally-generated carriers may be alleviated by careful tweaking of output channel trimmers, those caused by BBC/ITV/Ch. 5 service carriers cannot. Relief may be obtained by selective attenuation of the interfering signal, or selective boosting of the wanted one, if this can be done within the constraints of noise on the one hand and trouble elsewhere on the other. If not - and it's a fiddly, fussy business - a channel-changer is the solution.

Beat patterning apart, tuning in to Ch. 5 is a relatively simple process that depends on receiver design – ranging from a rotary tuning knob through seek-and-stab to auto setup in the newest gcar. Where the viewer does it, there's the potential to get it wrong!

Picture 3 shows the effect of downward mistuning, with the picture in black-and-white and lack of detail. This is usually accompanied by a raucous buzz on sound. The other extreme is shown in Picture 4, where the receiver has been tuned too far up band. The result this time is crosshatch patterning in coloured areas, instability, and a 'ringing' effect on vertical edges and outlines in the picture.

Signal-strength Problems

Many of the Ch. 5 transmitters are much less powerful than their long-established BBC/ITV/Ch. 4 counterparts. In some areas the Ch. 5 ERP is only a few per cent of that available with the alternative channels. The result, on screen, is the grain, snow and confetti shown in picture 5. It can vary from hardly perceptible snow to a picture that's barely perceptible because of the snow. If a solution is possible, it consists of increasing the aerial gain. But before you climb the ladder, waving aerials about and dangling amplifiers, take a cool look at the coverage and service area maps. In some places it's just not going to be possible to pull in a sufficiently strong signal to lift the picture clear of the noise.

A long Yagi aerial, narrowly tuned to the channel of interest, has the highest gain. Extra gain can be obtained by adding a masthead amplifier. Tilting the farther end of the array upwards will sometimes add a little to the received signal strength.

In the early days of UHF TV, stacked and phased arrays, with two or more aerials, were used to pull in weak signals -a 3dB increase for a lot of moncy. Maybe this would offer a partial solution where Ch. 5 is required and cost is of not too much concern.

When you are scraping the bottom of the barrel to maximise gain, it's surprising how much the noise figure varies between different makes and types of UHF tuner: switching between TV- and VCR-received pictures from the same transmission will often show this up.

The opposite situation is an overstrong signal. This problem is unlikely to occur with Ch. 5 transmissions, except in locations in close proximity to a newly-estab-



Picture 4: The effect of upwards mistuning.



Picture 5: Grain, snow and confetti because the signal level is low.



Picture 6: Cross-modulation, caused by excessive signal strength.



Picture 7: RF overloading, again caused by excessive signal strength.



Picture 8: Effect of local interference on the picture.

lished, powerful transmitter - perhaps at Croydon, Burnhope, Mouteagle or Lichfield. Excessive signal strength can cause crossmodulation and RF-overload effects. The many possible forms are represented by pictures 6 and 7 respectively, though cross-modulation can produce images similar to those resulting from co-channel interference and carrier beating (see pictures 9 and 1 respectively), while overloading produces a whole raft-full of symptoms in different makes and models in addition to the black-and-white, sideways-pulling effect shown here some sets exhibit a 'wipe-out' effect, or default to a plain coloured raster.

In this sort of situation the need is for signal attenuation. Check on the effect of any local/distant (local/DX or high/low) switch at the back of the VCR, then if necessary try a coaxial attenuator in the downlead. Careful adjustment of the AGC cross-over (RF gain) control in the recevier may help, but it will sometimes be necessary to reposition or change the aerial to overcome this problem.

Signal overloading is more likely to be experienced with reception of the established broadcasters or where extra RF amplification has been added in the acrial line in an



attempt to equalise the signal levels with a weak Ch. 5 transmission. The best solution here, though it's not an easy one, is selective amplification of the Ch. 5 frequency, with or without its own separate aerial array.

Interference Effects

Where reception is poor, as will often be the case with Ch. 5, it is more susceptible to interference of any sort, from local or distant sources. Local interference is represented by picture 8, where streaks of ragged dots and dashes are visible in the lower half of the screen. This type of pulse interference is generally caused by sparking or arcing. On a momentary basis this may come from a thermostat, a mains switch, fluorescent lamp start-up, etc. More prolonged interference can be produced by electric motors of any type, vehicle ignition systems and such like.

The stronger the received signal, the less likely is interference intrusion - in weak signal conditions the receiver's gain will be at maximum, magnifying the effect of any pulse interference present. But the best way to tackle this problem is to suppress the interference at its source: it's seldom possible to do anything at the receiver. The offending item will usually be old, worn and made before the increasingly demanding EMC standards that are now imposed. In practice, suppression very often means replacement.

The interference shown in picture 9 is of an entirely different type. It's the on-screen effect of cochannel reception. This was once the occasional result produced by a high-pressure weather system when viewing BBC/ITV pro-grammes. With the advent of Ch. 5 transmissions it has become, in the transitional period at least, an everyday feature of viewing in some parts of the country. Our picture shows a very severe case. Milder forms produce black, floating venetian-blind effects on the picture, generally with noticeable vertical and/or horizontal bars that mark the line and field intervals of the intruding signal when it carries a different programme.

Co-channel disturbance may upset Ch. 5 reception or reception of one of the established services. It stems from UHF channel sharing by transmitters whose coverage overlaps. It's unlikely to be caused by Ch. 5 transmissions in chs. 37 or 35 except in areas, such as the North Midlands, where two of the new transmitters can be received at one site. In this case the interference will be of the floating black bands type, without the heavy horizontal bar present in our picture – this is caused by scan-phase differences between the two different programme sources. In areas where the Ch. 5 transmissions share UHF channel slots with a BBC or ITV transmission, either of the services may be disturbed.

This is not an easy problem to deal with, particularly as the level of the interfering signal has to be reduced by 43dB or more with respect to that of the wanted signal. The key to eliminating the trouble, if it can be accomplished, is to maximise reception of the wanted carrier while minimising the presence of the intruder. The aerial is the important thing here - its type (for high directivity/narrow beamwidth), alignment and positioning. The Yagi type aerial has greatest directivity and highest gain, but in cases where high gain is not required and the two transmissions come from opposite or nearly opposite directions the bowtie/grid type of array offers good suppression of signals coming from the rear.

Having got on to the subject of aerial types and characteristics, we should perhaps add that the third main type of aerial array, the logperiodic, is no great performer with respect to gain and directivity. Its advantage is wide bandwidth, which is useful where the Ch. 5 transmitter is co-sited with but not in the same group as the existing channels and the signal strength is reasonably good.

Nulling out co-channel interference is almost as much an art as a science.

Multipath Reception

Perhaps better known as ghosting, the effect shown in picture 10 arises when the signal reaching the aerial comes via two or more paths. The longer paths will consist of reflections from walls, trees, pylons or hill sides. Because of this propagation delay. one or more false images, in positive or negative form, appears to the right of the directly received image. It's seldom possible to remove the reflective surface (viewers in North East London would love to demolish Canary Wharf Tower!), so it's again a matter of aerial choice and alignment. The problem is most likely to arise where a Ch.

Picture 9: The

by co-channel

interference.

effect produced

5 signal that comes from a site other than the local BBC/ITV one is received using the existing aerial system.

In some situations aerial realignment may provide at least a partial cure. In others a new aerial may be required, perhaps a log-periodic or grid type where the reflections come from the back of the array. In difficult cases it is not unknown for the aerial to be aligned for reception of the reflected rather than the direct signal, or to use a nearby wall as a shield. With time and trouble, two aerials stacked and carefully phase matched can help. As with co-channel problems, this is an art as well as a science.

The solution is most often to use a separate aerial for Ch. 5 reception. The aerial's gain, directivity and beamwidth are important, and it must be correctly aligned with the new transmitter. Its output must then be spliced into the existing downlead using a channel-pass filter or diplexer.

Picture 11 shows a more subtle multipath reception effect, once known as 'ringing'. The intruding image appears as a single halo close to the right of vertical edges look at the elephant's ears. In short, sharp doses the effect can actually seem to improve the sharpness of the picture - it's used deliberately for this purpose in some domestic VCRs. As a fault condition, caused by slight mistuning or a single close reflection, it can make small captions hard to read, reduce the definition of finc, repetitive detail, and play havoc with teletext and Nicam reception.

Reflections of this type can also be caused by feeder damage, poor downlead connections or mismatching, or faults within the receiver (defective delay lines, SAW IF filters etc). These problems do not just affect Ch. 5 reception of course.

Where the problem arises before the feeder, its cause is likely to be reflection from a very close object. This is common in lofts. A small aerial reorientation will usually cure the problem.

Another form of multipath reception doesn't necessarily show up as multiple images. Instead it attenuates the signal on one or perhaps two channels only, giving the snowy effect shown in picture 3 it was once known in my neck of the woods as 'suck-out'. Viewers may suspect an imbalance in the signal levels from co-sited transmitters. The cause however is a

reflected, out-of-phase signal – from the ground, a nearby aerial, wall, chimney, steel joist or whatever – that partially cancels a wanted, direct signal. In the odd, extreme case it may be necessary to use vertically-stacked, phased arrays. Usually however slight repositioning of the aerial will cure the problem. Beware of this possibility when you install a new Ch. 5 aerial close to an existing BBC/ITV one.

Data Corruption

Very close reflections that give rise to virtually unnoticeable picture defects can nevertheless badly upset the decoding of data pulses such as those used for teletext and P.888 subtitles. Where the temporal ghost spacing is comparable to the data rate (145nsec for a positive echo, 290nsec for a negative one) the zeros and ones run together, blurring the distinction between them. This makes discrimination and decoding a hit-and-miss affair.

Except in very bad cases, the heavily Hamming-protected header line at the top of the page comes through unscathed. Minor corruption is indicated by blanks in the text. As conditions worsen, incorrect symbols and attributes occur. Both effects are shown in picture 12. In practice, their severity varies between channels.

The same situation can occur with Nicam reception, whose data rate is 728kbits/sec. In this case the symptoms are crackling and dropout of the stereo sound, with intermittent reversion to the mono FM signal, again varying in severity between channels.

The other defects described in this guide can all upset teletext and Nicam reception. Except in the special case of close reflections, the data decoding problems are usually accompanied by obvious picture defects of the sorts shown in the other off-screen shots. When the picture problem has been cured in one of the ways already described, correct teletext and Nicam operation should, hopeful= ly, be restored.

In Conclusion

This off-screen fault guide has been prepared to help you pinpoint the causes of the several strange effects that could arise from the new terrestrial TV service, giving you some clues to go on. No doubt many specific cases and cures will be reported in these pages over the coming months for us all to share.



Picture 10: Ghosting, caused by multipath reception.



Picture 11: Ringing, another effect produced by mulitpath reception.

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*** U A BARGAINS SEE PA 2 ***

Picture 12: Teletext corruption caused by multipath signals.

Meanwhile the pictures here, used on the shop or service reception counter, may help your customers to identify and describe fault symptoms when they report them.

Go forth, with ladders and twiddlers in hand, and don't be afraid to charge a reasonable rate for your professional services. Whatever you make won't be a fraction of that creamed off by other interested parties who didn't have to face angry viewers, climb ladders in the rain, and do the near impossible. Joe Cieszynski feels that NVQs could make a positive contribution to the Brown Goods servicing industry, while recognising that there will be many problems in implementing them

NVQS The Way Forward

n his forum article "NVQs – A Nightmare" in the March issue Steve Beeching outlined the Domestic Appliances NVQ system which is about to be imposed on the domestic servicing industry in the UK, and drew attention to various problems that could or will arise. I would like to add some further comments on this important matter.

Some readers may recall an article I wrote in the June 1994 issue of *Television*. It was intended as a forewarning of things to come, based on my experience of implementing NVQs in intruder alarm installation and maintenance. The domestic servicing industry can learn much from the experience of others who have had NVQs in place for several years now. Bear with me as I start with a brief case study of the Intruder Alarm Systems NVQ, so that I can go on to point out not just the pitfalls but also the positive advantages of NVQs.

The Intruder Alarm NVQ

I can still recall my first impressions of these NVQs as I contemplated the sheer volume of assessment required

Perhaps suppliers could make available dummy accounts, with which candidates could place orders without the parts ever being dispatched. to achieve even a level 2 (basic) qualification. I felt that the industry had created a qualification that would be far too bureaucratic and expensive to implement. Four years and many hours of hard work later, this view has been borne out. I was recently invited to attend a meeting of the security industry's

Training Managers Forum, where with a unified voice the industry was calling for a major review of its NVQs.

The majority of colleges did not take up the security NVQ, because they couldn't see how it could possibly be implemented within a college context. As a result, the industry lacked places to send its trainees – because the funding bodies (TECs) that hold the purse strings of further education will fund only courses which lead to an NVQ. A few colleges, including mine, did however take up the challenge. We managed to implement a very effective training and assessment programme – by using a great deal of creativity and imagination.

College Implementation

We were able to assess alarm engineers to the standards required by moving the assessment out of the workshop and into other areas of the building, such as motor vehicle body repair, refrigeration, gas appliance servicing, etc. Thus fault location for example is in a genuinely real environment with real customers, real hazards and real documentation. Thanks to strong support from the security industry, we have live digital communicators that signal a central monitoring station, while BT has given us a REDCARE communication link. Thus the systems on which candidates work are as real as anything they will encounter when employed, with the added bonus that we can control the assessment and introduce problems, both technical and administrative, to ensure that the full requirements are covered.

The security industry is so impressed with what we and an few other colleges have been able to achieve that it accepts our assessments as real and not simulated. It has been acknowledged that these few colleges are the only ones to have made any headway at all in implementing NVQs for this industry.

Industry Implementation

Companies have found that the cost of carrying out assessments themselves is prohibitive, especially in the current situation where workforces are minimal and overstretched. Supervisors, on whose shoulders the burden of assessment is supposed to rest, are far too busy to run around with a clipboard ticking hundreds of boxes just to see one candidate achieve a level 2 NVQ.

Implications for Domestic Servicing Industry

What then are the implications for the domestic servicing industry?

First, remember that funding for the current C&G 2240 Electronics Servicing course will be cut when the NVQ comes on stream. So unless the NVQ is somehow made accessible through colleges, we will be left with no option but to discontinue most training in domestic electronic servicing. People who wish to undertake such training would find themselves having to attend other, more general electronics courses in order to learn the fundamental electrical/electronic theory, and perhaps resort to books or distance learning packages to pick up



specialised TV, VCR, Audio or other theory.

Will it be possible to make the NVQ more accessible through colleges? Steve Beeching suggests that this would be very detrimental to the industry, because an NVQ is an assessment of competence in carrying out set tasks rather than a training course. He suggests that colleges could take this as an opportunity to train cowboys to "wave soldering irons" (shouldn't his be branding irons?!) in the air. But it's a fact that the majority of lecturers in colleges came from the industry, and that many like myself - take steps to keep up to date not only with developments in theory but also the practical side of modern servicing. So a college that is aware of the operation of a modern service department could possibly, with the type of support from industry we've had in the security business, be able to create suitable conditions to train and assess many skills to the required standards.

Support from Industry

What sort of support would be needed from industry? Equipment is one thing. NVQs quite rightly require that training is done with modern equipment. But colleges cannot afford to buy a range of Nicam TVs and VCRs, camcorders, CD players and so on in addition to the service information required. If industry wants training to this level, it must be prepared to help with the provision of such equipment, either on a permanent or loan basis.

Component suppliers could also assist. Steve highlights the difficulty of simulating spares ordering. Perhaps suppliers could make available dummy accounts, with which candidates could place orders without the parts ever being dispatched. We would be going beyond simulation into the real thing with the use of catalogues/CD-ROMs and placing orders by phone, letter and computer link. For the supplier there's the spin-off that people are being trained to use their catalogues, leading to possible future customers – security equipment manufacturers have benefited a lot from the support they have given our college over the years.

Assessing on Site

The main difficulty will be in assessing a candidate's interaction with customers. From my experience in assessing security engineers, there's no substitute for the real thing. To use other students or college lecturers in role-play is simply not the same. So this will mean assessing on site, which is a wonderful idea until we examine the consequences.

Suppose that an assessor is to be paid to shadow a candidate for a morning. This may cost up to ± 100 in assessor's fees. And how can we be sure that customers will be happy to allow an assessor to enter their premises? If

he's introduced as an assessor, the customer may feel that an unqualified engineer has been sent out to service his equipment. Furthermore when a customer with a grievance, or just a plain awkward one, is encountered, he might try to use the assessor to intervene, thus altering the outcome. This whole business is a real minefield, though a tactful assessor can handle some of these difficulties. I've had some very interesting experiences with on-site assessment – perhaps one day I'll write a book called "Confessions of an NVQ Assessor"!

Experience

Steve points out that the NVQ is intended for engineers who have had enough experience to undergo assess-

ment. This implies that he/she has been involved in servicing for several years, otherwise the necessary skills and experience would not have been acquired. In one sense this is correct, but when we take into account the funding restrictions we find there's an expectation that all students will have attained level 2 within two years. Admittedly they then have until the age of 25 to attain level 3, but this is not of much help to

If industry wants training to this level, it must be prepared to help with the provision of such equipment, either on a permanent or loan basis.

someone who enters the industry later in life. There is currently very little funding for the assessment of existing engineers.

Assessment in Industry

This brings us to how existing engineers are to be assessed. The idea is that every company will have its own assessment facility. To achieve this however a company will have to pay a few hundred pounds to have someone trained to be an assessor – to attain what is known as the D32 and D33 certificates. Someone else must then be trained to be an internal verifier (D34 certificate). His job is to check on the assessors constantly. At this point, for a fee, the company can attain centre approval and the assessment of the other engineers or trainees can begin.

The problem here is that in the domestic servicing industry most of the firms are small and have not the time. manpower or money for all this. Perhaps they could buy in an assessor. This might be possible, but who would it be? It's highly unlikely that a trained assessor from a rival company would be acceptable, so the assessor would have to be a freelancer or someone from a college or other training establishment. However this is done, the cost would run into hundreds of pounds – provided the candidate is successful in every assessment on the first attempt. In reality then will existing engineers bother to undergo NVQ assessment? After all the majority already have a qualification, and there's currently no advantage in acquiring an NVQ.

Standards

Now to Steve's point about the danger of colleges lowering standards. This is a bit unfair, because companies could do just the same. There is evidence that this has, in isolated cases, happened in the security industry. But because this industry has an adequate team of external verifiers who make regular checks on all assessment centres, such practices do not go unnoticed for long. We should however remember that it is very tempting for an assessor who is a member of a particular company to pass work that is not to standard, because he is too busy to keep repeating assessments or is under pressure from above to get people through – the company can then boast that it has a fully qualified staff. A system in which the assessor is not independent must, I feel, be fundamentally flawed.

Personal Note

Personally I've become something of a convert to the NVQ system, having seen it at work in the security industry. The principle that someone is not considered to he qualified until he has proved himself in all practical aspects of the job is sound. On-site assessments take into account many things that will never occur in a college or training establishment. And the fact that each candidate is tested on all aspects of the job and not just his technical knowledge is a real step in the right direction.

In the security industry, NVQ has brought together for the first time installers, manufacturers and colleges. Perhaps this has had a greater impact on the industry than the NVQ itself, because there is the opportunity for the industry to make colleges more aware of its needs. Colleges can in turn provide what the industry wants, and the whole programme can be underpinned by support from the manufacturers (and other related industries, such as BT and monitoring stations) who provide not just equipment but also technical support, product specific training, software. etc.

To be fair to the Brown Goods manufacturing industry, support of this type is already in evidence. Our college has received much support from two manufacturers in particular – so much so that we are now all set to "go NVQ". If the introduction of the NVQ in our industry results in an increase in such relationships throughout the country, this can only be of benefit to everyone.

In Conclusion

The main problem with the NVQ is that it is simply too expensive to implement. In the end, a compromise will perhaps be necessary, with the majority of assessment performed in colleges (but still to modern industrial standards) and a smaller amount of on-site assessment to test skills such as customer relations.

Let's hope that in three years' time we will be able to show a far better performance than just 85 successful candidates, though with the heavy emphasis on assessing things other than fault diagnosis I wonder whether this will be possible.



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Book Reviews

John Edwards, published by Butterworth Heinemann Limited under the Newnes imprint. 240 pages 156 x 234mm. £14.99.

This book is a companion to Television IC Data Files, by the same author, which we reviewed in the January issue. Its aim is to provide workshop technicians and field service engineers with a convenient reference to signal processor and microcontroller chips commonly encountered in TV and video equipment. For each chip there's a pin layout diagram which also tells you the conditions and voltages to be expected at each pin. Just the information you need to check a suspect chip quickly.

It's handy to be able to refer to the clear, well laid out pages of this book instead of having to search through a service manual or a complex circuit diagram for the information you require. And it could save you the cost of many an expensive manual. The measurements and data provided in the book were all taken by the author under actual working conditions.

The book can be obtained from:

Customer Services Department, Heinemann Publishers Oxford. PO Box 382. Halley Court, Jordan Hill, Oxford OX2 8RU.

You can phone orders to 01865 314 301 or fax 01865 314 029. The book should prove to be a worthwhile investment. J.A.R.

The Communications Miracle, by John Bray. Published by the Plenum Publishing Co. Ltd., New Loom House, 101 Back Church Lane, London E1 1LU at £17.50.

In this book John Bray traces the history of electronic communications from the pre-birth era when the fundamentals of electrical and electromagnetic phenomena were first being discovered, in the 1700s, right through to the present world of digital satellite and fibre-optic communications.

The book has been well researched, and the author draws heavily on the personal experience he gained during over forty years spent with the British Post Office (later British Telecom), primarily as a rescarch engineer. Amongst other things he was involved in the development of microwave radio relay systems, international agreements on RF allocations through the CCIR, and the building of the Goonhilly Downs carth station for the first Telstar transmissions in 1962.

In the author's words, the book is aimed at "the innovators of tomorrow, in the hope that the innovators of yesterday provide inspiration to them to match the communications needs of the future". It succeeds in bringing out both the romance of the story of communications and the pioneering spirit of the men who played key roles in the tremendous developments that have taken place over the years. The book is well set out, with short chapters that keep the story moving along briskly.

Overall, this is a worthwhile read for anyone who is in any way involved in the electronics communications indusuy. J.C.

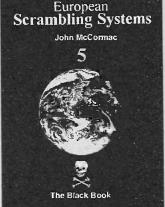
Television Microprocessor IC Data Files, compiled by European Scrambling Systems - The Black Book. Fifth edition, by John McCormac. Published by Waterford University Press. £34.

John McCormac's first Scrambling Systems book appeared over eight years ago. Such is the pace of change that we are now into the fifth edition. During these years TV signal encryption has become more and more complex, as programme providers have put increasing effort, research - and

desperation - into attempts to prevent unauthorised viewing of their output. But within quite short periods pirates have, through ingenious electronic wizardry, found ways of getting round the latest encryption techniques, then selling illegal cards/decoders on the open market.

The author presents an accurate, factual account of the TV encryption techniques at present in use across Europe. The first simple encryption (SAVE) simply reversed the video polarity. Then an integrated sinewave was added to the video signal. This technique was used for the first UK film channel, Premicre, and for several months when Red Hot Dutch first hit the air waves.

In addition to covering the basics,



John McCormac charts the history and progress - the various techniques, who used them and when. There are many circuit diagrams throughout the book: a massive section is simply entitled "Decoder Building Blocks" - enough said!

Simple analogue encryption moved to more devious schemes - line shuffle, addressable subscription bases and smart cards. This is the history of Sky TV's scrambling. VideoCrypt 1 and 2 and the many card issues are all covered in detail. The Sky problems make an absorbing read. There's "Black Tuesday - the death of the 09 card", and how a card hack data bank at a Web site was used with the Pheonix/Season interface - you need to read the book to get to grips with all this.

The section that deals with microwave TV distribution systems (MMDS) will be of specific interest to readers in Ireland. John comes up with aerial and downconverter designs and other electronic hardware to enable the 2-5GHz signals to be resolved.

Personally I find the text rather hard going where it concentrates on computer technology - algorithms and so on. But those who have grown up with the technology should be more at ease. Despite this, the story is fascinating and, like pirate radio in the late Sixties, exciting.

Something I'd like to see in the next edition is a page numbered index: at present it takes quite a time to check through the book to find the information you want. It's nevertheless an excellent reference work which I can highly recommend. £34 may sound expensive, but that's what you have to pay for such a specialised work. You can obtain it from Swift Television Publications (phone 01793 750 620) or Baylin Publications (phone 01836 582 785). Add 10 per cent for orders from continental Europe, 30 per cent for orders from elsewhere in the World (the book is heavy to send by air mail). The book has some 580 pages in soft card covers. R.B.



Satellite Notebook

LNB Problems

The winter months produced an abundance of LNB problems. After a time the O ring beneath the plastic feed cover seems to compress a little. As a result, water gets into the feed, more often than not killing the LNB. The same compression seems to occur with the rubber ring that seals the cover plate.

For long-term reliability with a new installation it's a good idea to remove the feed cover and smear some grease around the O ring. This should prevent the ingress of water – the cover can normally be removed by twisting it off the feed. Removing the main cover and doing the same here will invalidate the warranty however.

I notice that the latest universal LNBs from Cambridge have a packet of silica gel inside the main cover to absorb moisture, so manufacturers are aware of the problem. These LNBs seem to be identified by a warranty seal. Presumably the thinking behind this is that the silica gel will absorb moisture during the warranty period! H.C.

Pace SS9200 Decoder Problem

A customer complained that "your card is invalid" was displayed on the TV screen, and that the same thing happened when he tried the card in a friend's decoder. Suspecting that the card had been killed by an intermittent high-voltage supply to the decoder board, I cut the centre leg of Q16. This removes the 27V supply to the BD139 switching transistor, so that it can't reach the card – the supply is no longer required.

The supply was probably

intermittent because of poor contact between the decoder board and the pins that come up from the main board. These were cleaned and their soldered contacts to the main PCB were checked. So far the new card is OK! H.C.

BT SVS250

If the decoder stops decoding and the "please insert card" message disappears after a few minutes, replace the 1 μ F, 50V capacitor C45 on the decoder PCB. It's next to the PTV111 chip. **M.Dr.**

Pace PRD800

This receiver produced a blank blue screen. Voltage checks showed that the LNB was being supplied with only 3-5V. The LNB voltage was OK at the power supply, where 20V was present, so back to the tuner. The voltage was also OK at C91, beside the tuner, but was low at the other side of the 1Ω resistor R543, which was also cold. So it had to be this. R543 had in fact gone high in value, a replacement restoring normal reception. B.L.

Amstrad SRD510

After a power supply repair I was greeted with pulling and a low video level. As the customer hadn't mentioned this, I decided that either I was to blame or there was a cold electrolytic capacitor somewhere. The latter proved to be the case. Gentle heat pinpointed the cause of the trouble as being the 10µF coupling capacitor C6, which is one of a cluster of electrolytics near the tuner. A replacement cleared the fault.

Incidentally I've modified my daughter's old Baby Bliss Volumair hand-held hair-styling blower, which is a two-speed 195W unit. The hot end consists of long plastic prongs for hair combing. Taping them together provides a long hotair tube, which is ideal for short periods of localised heating. I've had no overheating problems, and although the modification is probably not recommended I've yet to find anything better. It's still OK after a year's use. **B.L.**

Pace PRD800

No remote control operation and intermittent loss of the picture and sound were the complaints with this receiver. The remote control problem was an easy one: there were poor solder joints around the IR module. The other fault had been caused by the cat, which slept on the receiver. Over a long period of time, the PCB had become coated with a blanket of hair which restricted the ventilation. As a result, the large $100k\Omega$ resistor in the power supply (R2) had changed value. P.H.

Dish Problem

This was an interesting problem. Although the customer had replaced his receiver and fitted a new 9.75GHz LNB the pictures were poor. When I used a spectrum analyser to check that the dish was correctly aligned I found that the signal from the LNB was poor. So another one was tried, with the same results.

On examining the dish, I noticed that a small area just behind the end of the LNB bracket appeared to be in better condition than the rest of the dish. It transpired that the customer had also replaced the LNB holder, which was now too short to achieve the correct focal point. As the old dish was an obscure type a new one was installed. All was then OK. **P.H.**

Reports from Hugh Cocks Michael Dranfield Bob Longhurst Pete Haylor and Hugh Allison

Luck

A recent job brought home to me how lucky some customers are. The job sheet said "no sound and vision". A check showed that there was no signal output from the LNB, which was fitted to an outhouse gable end. After climbing up the roof to the dish I found that the LNB tested OK. But when the wind blew the whole wall moved with the dish!

The installer had fitted the bracket to the edge of the sloping roof brickwork, just two rows from the top of the wall and six inches from the edge. The only thing that held the wall together was a good strong rendering. When the bracket was removed the bricks fell away from the rendering as the coach bolts wcre removed.

The dish is now fixed to good solid brickwork, with extra brackets just in case. **P.H.**

Some Channels Poor

The complaint was that some channels were poor, others OK. A spectrum analyser check showed that the only good signals were from Astra 1D: the others were almost nonexistent.

The cable run was 30m, the property being a newly-built farmhouse. We found that the cable had been tightly clipped inside the mortar courses. This had altered the cable characteristics, especially at 90° bends. A complete rewire was required. **P.H**.

Pace PRD800 Plus

The customer complained about "intermittent lines on the picture". They had been getting worse over the past few weeks. The connection between his satellite and TV receivers was via coaxial cable.

In the workshop, with video output via a scart connector, the picture was excellent. The culprit was our old friend Q105, which drives the UHF modulator. It's situated near U10 in the middle of the board, and is a BC846B surfacemounted npn device. With later production boards Q105 seems to develop problems and die, the cause being excessive current. If you are really stuck for a surface-mounted transistor a BC547 will do, with careful soldering and leg bending!

In early production runs Q105 had a single 220Ω emitter load resistor, R559. With later boards there are two parallel resistors with values of 150Ω and 330Ω . Pace recommend removing the 330Ω resistor in such receivers, and that this modification

Experiments with LNBs

It isn't often that this magazine publishes an item about doing things against the rules, but here goes. Some years ago I 'inherited' a 2m dish. This was in the pre-Astra days, and the dish was several years old then. It will come as no surprise that the LNB was an ancient device with a noise figure of 2.9dB. I was quite happy with this until, at a friend's house not long since, I noticed that he had totally noisefree UK Gold pictures from a 90cm dish – I was having to watch the channel through a swarm of white bees...

I bought a non-working Marconi Blue Cap LNB for 50p at a radio rally. A touch of Superglue to refix the dielectric resonant oscillator (DRO) soon had it working again. This LNB produced noise-free UK Gold, and I was once again happy - until 1 visited another friend who was using the same type of LNB with a steerable 90cm dish. He was getting fairly noisy pictures from Intelsat 601's CMT channel. Because it's a half transponder power channel, this is generally thought to require a 2m dish. Yet I couldn't get a locked picture and there was no sound. Out of ignorance I tried swapping over the LNBs, but my friend still had the better picture. I think most Blue Caps have a noise figure of about 1-4dB.

Then, at the last British Amateur

should be carried out whenever a receiver comes into the workshop, for whatever the reason. All models suffixed "+" seem to have the additional resistor fitted. The affected PCBs have the last three figures of their part numbers ending in 204, 214 or 224 (look near the card reader). H.C.

VH-1 Germany

A German customer said he was very keen to receive the new VH-1 Germany channel, which is transmitted by transponder 27 (11-612 GHz, horizontal polarisation) aboard Astra 1B in the evening (Nickelodeon is transmitted during the day). The transponder was previously used for TV3 Denmark, with MAC signals. He reported that Nickelodeon Germany was OK, but when it changed to VH-1 the picture was scrambled - all other channels remained fine. The receiver was a Pace SS9200, which I told him to bring along to be tested.

On test the SS9200 gave good results with Nickelodeon, but immediately the transmission changed to VH-1 the picture scrambled itself, the sound remaining OK. The remedy was Television Convention, a member told me about the differences between an offset and a prime-focus LNB. I wandered around the flea market there until I found some duff prime-focus LNBs for sale. Having sussed out the loose DRO problem, I went through the duff LNBs until I found one that rattled. I bought it, Superglued the DRO back in position, then fitted the LNB to the dish. Bingo, I had noise-free CMT. This particular LNB is supposed to have a noise figure of 1dB.

At a more recent rally I came across a very up-to-date but duff dual-band offset LNB with a noise figure of 0.7dB. Since the Telecom band appealed to me and the LNB rattled, I bought it. A touch of Superglue had it up and running, the intention being to mount it alongside the 1dB primefocus LNB to see what could be seen on Telecom. I was amazed to find that at the lower frequencies the 0.7dB offset LNB outperformed the 1dB prime-focus LNB.

So, we get improved results by moving from a 2-9dB prime-focus to 1-4dB offset LNB, then to a 1dB prime-focus LNB and finally to an 0-7dB offset LNB. Sure. I'm talking about repaired rubbish, and I do appreciate that there are massive performance spreads between supposedly similar LNBs with the same noise figure. What I am suggesting is that if it's cheap enough the wrong LNB may well be worth a try. H.A.

simple. 1 went into the tuning menu and switched off the internal VideoCrypt decoder (AV SOURCE – INT DECODER – NONE). VH-1 was then clearly rcceived. It appears that because VideoCrypt data is transmitted the decoder thinks it has to decode the picture. German viewers, who usually don't have VideoCrypt IRDs, are not affected. What a funny old world we live in!

It's very difficult to disable the VideoCrypt decoder with some models. The Pace MSS100 can provide a clamped video output at its decoder socket: linking pins 19 and 20 (video in/out connections on the scart connector) and selecting DEC-V on this channel will effectively bypass the decoder. If you have an old Luxcrypt decoder (the old Dutch system, now defunct) this could be used to clamp/de-emphasise a baseband video signal from the receiver, then send it back in via the decoder socket.

I've acquired a mass of these Luxcrypt decoders in the past few months – they are being dumped by their Dutch owners as a result of the move to digital reception. I find them a useful source of scart plugs and mains adaptors if nothing else! **H.C.**

Your Free WVE CD-ROM

We are pleased to present with this issue, for readers in the UK, a special version of the Willow Vale Electronics CD-ROM catalogue. Here's the story of how this came about.

Willow Vale Electronics Ltd. (WVE) has been at the forefront of the consumer electronics industry in the UK, distributing genuine manufacturers' spares, tools and test equipment, for more than 35 years.

In 1985 WVE decided to increase the range of products it handled. A wide range of accessories to support and enhance the operation of consumer electronic products was added. Then, in 1992, the company diversified into audio and security products as well. And more household names were added to the already impressive list of WVE's principal distributorships.

But this led to a problem: how to make available to WVE's trade customers all the information they might require, in an acceptable and comprehensive form, on this enormous range of products? Just think of the size of the problem. What was required was a catalogue that listed all key UK spare parts for the branded models produced by virtually every major manufacturer in the world over an eight-year period. And it had to be arranged so that WVE's customers could easily find exactly what they want.

WVE decided to use the very latest technology, and make it a 'multi-media experience', by producing inhouse a CD-ROM disc that covered the entire product range.

This was released, to customers who qualified, in December 1995. Every copy was snapped up. WVE was the first independent distributor in the industry to make use of the exiting new CD-ROM format for this purpose.

The original disc contained some 400,000 descriptions and 340,000 part numbers. It listed 280,000 products, with 3,000 colour pictures and sound, and was a runaway success.

Issue 2 of the disc was released in July 1996, with a run of 2,000 copies, and was again snapped up by the trade.

In January this year WVE faced the problem of making its revolutionary information technology available to

the wider trade. This is where *Television* came in. The result is the CD-ROM disc attached to our front cover. It comes with the compliments of Willow Vale, supported by Philex Plc who sponsored the sleeve.

This special edition of the disc, issue 4, contains 587,000 product descriptions and 351,000 part numbers. 300,000 products are featured, with sound and 3,000 colour pictures.

Confidentially is the key to this development.

Existing or new Willow Vale account holders will, provided their account details are current, be given a password to gain access to the trade prices on-screen. This password will be allocated the first time connection is made with Coplink via the CD-ROM's database. It's the only way in which trade price access is available.

Non-trade readers will see only WVE's retail prices, excluding VAT.

If you are a WVE account holder who has not used COPS or Coplink, or you wish to set up an account, you will find the telephone number you need on page 72 of the WVE 1996/97 General Spares Catalogue. Trade customers without an account can use an on-screen application form to apply, and will be able to see the correct trade prices as soon as the application is approved and the password has been released.

This version of the WVE CD-ROM also includes video film extracts from a range of VCR and TV servicing tapes that demonstrate servicing techniques. For those readers who use WVE's COPS viewdata facility, there is direct access to the company's mainframe computer.

It is vital to follow the installation steps carefully (see opposite page), as no liability can be held against Willow Vale or *Television* magazine should a disc be installed incorrectly. Your computer system must be IBM compatible, running Windows '95 or 3.1, with as a minimum a 486 DX33 processor and 4Mbytes of RAM with a CD-ROM drive.

How to Use Your CD-ROM

EQUIPMENT REQUIRED

IBM Compatible PC running either Windows '95 or Windows 3.1, with a minimum of a 486 DX33 processor, 4Mb of RAM and a CD-ROM drive.

INSTALLATION INSTRUCTIONS

Boot up the computer and run Windows, ensuring that no other program is running that could affect the installation.

Windows 3.1

From Program Manager Select the Run option from the File menu. Type the following in the space provided:

D:\setup

where D: represents the drive letter of your CD-ROM drive. Now Click on 'OK'

Windows '95

From the Start Button, select Run, and type in the details as above in the space provided.

The installation program will now run.

You will be asked to confirm the drive and directory, in which the program files should be placed. You may alter the default details if you wish, but if you already have a previous copy of the CD you should install the program to the same directory as the original.

IMPORTANT: LOADING SHARE.EXE

On versions of Windows prior to Windows for Workgroups/WIN '95, share.exe has to be installed prior to running the database for the first time, otherwise the program will not run. Using the DOS edit program or similar, add the following line to the config.sys file in the root directory of your hard drive:

INSTALL=C:\DOS\SHARE.EXE /L:500

where C:\DOS is the path to your MSDOS directory and should point to the directory where share.exe resides.

If you've added the above line, the computer MUST be re-started for the command to take effect.

RUNNING THE PROGRAM

The default mode when the program is first run is RETAIL, i.e. the prices shown are our retail prices, and access to our mainframe is available only for CREDIT CARD orders and retail enquiries. If you do not have an account with Willow Vale and are a bona-fide member of the Radio and TV trade, then you may apply for an account and password which, when verified by COPLINK**, will give access to trade prices.

To use the CD and COPLINK as a retail catalogue, just enter your name and address and credit card details in the "Account Details' form which is shown when the program is first run.

**COPLINK

COPLINK is a direct computer to computer ordering and enquiry system requiring the use of a modern with a recommended communication speed of 14400 baud. The database contains its own communication facilities to our mainframe computer.

Except during periods of essential maintenance, COPLINK is available 24 hours a day seven days a week.

EXISTING/NEW ACCOUNT HOLDERS

Provided your account details and password are correct, access to trade information will be available after your first successful connection to COPLINK via the database. This is the ONLY way that trade access can be provided. If you are a Willow Vale account holder and have not previously used COPS or COPLINK then you will find the phone number for password registration on page 72 of the 1996/97 General Catalogue.

TRADE AND RETAIL MODE

The retail mode database has the following options disabled:

Coplink Menu: Mailbox, Logon Setup, Set Order Defaults.

Edit Menu: Access Code Entry.

Messages may still be sent to Willow Vale in retail mode, but you should include your name and address or phone/fax number for us to reply to you.

All retail orders will be subject to a post and handling charge of £2.00 + VAT, irrespective of order value.

WHAT TO DO IF THE DATABASE DOESN'T WORK

The package is supplied with extensive help files which are designed to guide you through the operation of the database. Additional information is given in "Readme" files which are in the root directory of the CD. Please study all the information supplied first, since your problem may well have a simple (and documented) answer.

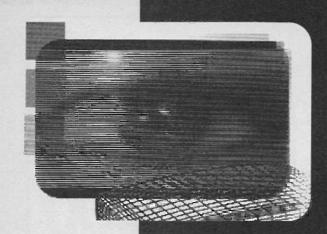
Account holders may phone the help line number given in the catalogue if unable to resolve a problem with the database.

DISCLAIMER

The software is supplied 'as is' and is provided subject to the conditions of supply and use stated in the installation program. If you do not agree to the conditions, do NOT install the software. Installation of the software will be deemed to indicate your acceptance of the terms and conditions.

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Reports from Philip Blundell, AMIEEIE Terry Lamoon Bob Longhurst Denis Foley Chris Watton Eugene Trundle Michael Dranfield Giles Pilbrow Graham Colebourn and Michael Maurice

Ferguson ICC8 Chassis

This set was dead with the line output transistor short-circuit. When a replacement had been fitted the set was still dead, because there was no line drive – the BSR51 line driver transistor TL17 was short-circuit. The set worked when a new BSR51 had been fitted, but after only a few minutes' use the line output transistor was overheating and in danger of again failing.

Checks around TL17 showed that its collector was at 50V instead of 23V. The collector supply comes from the U1 24V rail, which was also at 50V, though the other three supplies from the chopper circuit were all normal. How could this be?

The 24V supply and the line output stage derived 65V supply meet at the field output stage, where DF16 (BA157) was found to be short-circuit. Thus the two supplies wcrc shorted together. As the 65V supply was providing more current than usual, the voltage had fallen to 50V. P.B.

Grundig CUC3400 Chassis

If there's no raster but the sound and EHT are present, check for first anode (G2) voltage at the relevant pin of the CRT base socket (thank you Grundig for marking the pins on the PCB). If the voltage is missing, suspect an internal leak in the socket. Check it by replacement. **P.B.**

TV Fault Finding

Philips GR1-AX Chassis

The complaint was that this set would shut down completely every two to three hours. It was put on test and sure enough shut down after the allotted time. Switching it off then on again restored normal operation. I removed the back and tried tapping around various parts, but there was no reaction to this. When a visual inspection was carried out however I found that the line scan coil connector was badly dry-jointed. The set worked perfectly once the connector had been cleaned and resoldcred. Puzzles: why didn't it respond to tapping, and why didn't it fail more often?! T.L.

Matsui 1482

The picture produced by this set would all of a sudden go bright and smeary. So I tapped around on the CRT base panel. This produced a dramatic effect. The cause of the trouble was a shorting wire on the ribbon connecting cable. It was possible to carry out a repair to the cable. T.L.

Sony KV1421

The display produced by this 14in. portable consisted of a blue screen with flyback lines. A new TDA3505G video matrixing/control chip put matters right. T.L.

Hitachi C2564TN

When this set was powered there was partial field collapse, a very bright screen then tripping. It's quite a common fault. You'll find that the 1Ω safety resistor R609 is opencircuit because IC601 is faulty. Replace them. IC601 is the TDA8178 field output chip. R609 is in the rectifier circuit that produces the 27V supply for IC601. T.L.

Akura CX26

There was intermittent loss of the picture to a blank raster. The teletext panel has a mass of tinned copper wire links. Desoldering and resoldering the lot solved this problem. B.L.

Hitachi G7P Mk II Chassis

There was tuning drift between channels 23-33 and nothing above channel 36 could be tuned in. We first suspected a tuner fault, but there was only some 7V across the 33V regulator ZD101. The cause of this was none of the usual suspects (regulator, feed resistors etc.). It was the HD401304R12S chip IC101. A clue was provided by the fact that the on-screen tuning bar swept the whole band. **B.L.**

Beko 12220

When this set was powered it tripped off. With a 60W bulb as the load, we found that the HT was 125V. Further checks brought us to the BY299 diode D801 which was short-circuit. A replacement restored normal operation. If D801 fails at switch on the LOPT is suspect. **B.L**.

Texet TX2045VR

This set wouldn't power up. The start-up resistors and C806 were OK, and the STR5412 chip appeared to be all right. D805 (1N4937) was short-circuit however while C808, a 1kV, 4,700pF blue disc capacitor, had split its case. Replacing these two items and fitting a new STR5412 chip for good measure provided a complete cure. **B.L.**

Sony AE1 Chassis

When this set was switched to standby it produced a motorboating groan. This was caused by the main metal plate across the PCB. It was dry-jointed. Resoldering the lugs put matters right. **B.L.**

Sanyo E4-A21 Chassis

There was intermittent loss of the picture, with the sound remaining OK. When the fault occurred, winding up the first anode preset produced a blank raster with reduced height. In the fault condition the voltage at the collectors of the RGB output transistors rose from 140V to 180V.

Checks around the TDA3566 colour decoder chip IC202 showed that the amplitude of the sandcastle pulses, which come from the TDA4505M multifunction chip IC101, was varying. I then found that the supply at pin 7 of IC101 was 10V instead of 12V. This took me back to the L78M12-RA 12V regulator chip IC362, whose input was perfect. A new 12V stabiliser cleared the fault.

Incidentally the set in which we had this fault was an Akai Model CT2158. B.L.

Contec KT8135

If the set is dead, check/replace the $330k\Omega$ start-up resistors R501 and R502. **B.L.**

Tatung C Chassis

If the line scan produces a folded picture for the first five minutes, or there's a vertical white bar down the centre of the screen, check R413 (18Ω , 0.5W) which tends to go high in value. It provides the 18V feed to the line driver stage.

Replace it then ensure that the HT voltage is correct – 115V with 14 and 20in. models, 109.5V with 15 and 21in. models.

We've had this fault with several models, including the Goodmans 2050R. D.F.

Bush 1452T/Alba CTV841

The picture was rolling and jumping and the top half was distorted. We replaced the field output and jungle chips, and several electrolytic and tantalum capacitors in the field timebase, before we eventually traced the cause of the fault to R413 in the field feedback/correction circuit. It had risen in value from $6.8k\Omega$ to $125k\Omega$. **D.F.**

Toshiba 175T9B

The power supply was producing an odd whine. The cause was traced to C749 (680nF, 2kV) which was short-circuit. It's connected across the line output transistor. C.W.

Sony KV2090 (XE4 Chassis)

This set was intermittently dead, though the power supply continued to work with the HT, 7V and 14V rails OK. The line drive was disappearing, and once this had happened the set wouldn't come on again until it was switched off then on. Tapping the PCB gave the We've had a number of these sets in recently and have found that the following faults are quite common.

Hitachi C1709T (G7PS Mk 2 Chassis)

If the set is dead with the standby LED alight, one of the $82k\Omega$ start-up resistors R902 and R903 is probably open-circuit. As they sometimes go open-circuit intermittently it's wise to replace them both. If these resistors are OK, check for a short across the HT line. This can easily be done by checking, on the ohms range, between the collector of the line output transistor and its heatsink. If a short-circuit is recorded here, it's likely that the 130V protection diode ZD903 has gone short-circuit. The usual cause of ZD903's failure is R909 (39k Ω) changing value.

The small electrolytics in the power supply should be replaced without testing them. They can be responsible for poor starting and false tripping.

If the power supply is providing an output but the set won't go, check for line drive at the collector of the line driver transistor. It's absence usually means that the 'X-ray' pro-

impression that dry-joints were present, but a blanket resoldering job didn't improve the situation.

Eventually gentle probing revealed that C513 (0.0027μ F) had an internal connection problem. It's connected to pin 15 (line oscillator) of the TDA2579 timebase generator chip IC501. C.W.

Hitachi CTP2508

This set was dead though there was 320V at the collector of the chopper transistor Q901 and 7.7V at pin 9 of the TDA4601 chopper control chip IC901. A scope check at the base of Q901 showed that start-up was attempted but lasted for only a few pulses, indicating an overload. We found that the RU2M 20V supply rectifier D911 read about $100k\Omega$ in the wrong direction.

Dry-joints were evident at the chopper transformer. As the set has separate speakers, we didn't try the sound until later. We then found that the LA4270 audio output chip had a hole in it. C.W.

Finlux 1111W

This set had been in on a number of occasions, the fault being lack of height – about half an inch at the top and bottom according to the customer. We'd not seen the fault however. What we had done was to replace the height control and carry out some resoldering in the field output stage, but still the customer complained that the fault would occur at odd times.

Then the set came in because it was dead with a shorted line output

tection circuit is operating. If you suspect this, short-circuit the base and the emitter of the line output transistor and connect a 40W bulb between this point and the transistor's collector. Connect a 100 Ω resistor across C701, then power the set while monitoring the HT voltage. If this is OK at approximately 112V – the voltage varies a bit, but should be less than 130V with a bulb as the load – check ZD701, ZD702, R717 (100k Ω), R716 (51k Ω) and R715 (270k Ω).

If the HT voltage is low rather than high, check C905 (100μ F). If it is only 30-40V, but might rise to 130V intermittently, check Q905 (BF423).

If there's no picture but the sound is OK, the line output stage is working and the CRT's heaters are alight, first check whether the on-screen display is working. If it is, check the LVA532S AV switching chip IC1302 for the scart input. Video goes in at pin 6 and should come out at pin 4. If there are no on-screen graphics, the field output stage is suspect. C.W.

transformer. Although this is not uncommon with these sets, we checked for a possible cause and discovered that the HT was at 166V instead of 138V, quite high in fact. Checks in the power supply showed that the set-HT potentiometer was duff – any movement changed the HT from the correct level to 166V. So at last we'd found the cause of the field fault: as the HT rose, the width increased and the height decreased.

We also replaced the 1μ F, 63V electrolytic capacitor in the feedback circuit associated with the chopper control chip. C.W.

Matsui 1460

Field collapse was the problem with this portable. The 35V supply to the field output transistors was present and correct, and there was a good sawtooth waveform at the field hold control. A few cold checks soon brought us to R323 (1.8Ω) which was open-circuit. C.W.

Hitachi C2146/2546/2846

Nicam reception problems with this range of sets can be caused by a production problem in the form of a solder bridge between pins 24 and 25 of the Nicam decoder chip IC4201. The effect is intermittent stereo sound reception or a time delay between selecting a programme and getting a Nicam caption and stereo sound. E.T.

Philips 2A Chassis

Lack of height with cramping and centre crossover distortion was the

problem with one of these sets. After rather a lot of checks we traced the cause to R3573 in the field feedback circuit. With 110° sets its value should be $51k\Omega - in$ our faulty set the resistor measured 120k Ω . With 90° sets the value should be 2.7k Ω . M.Dr.

Granada/Salora Ex-rentals

If you get one of these sets with the problem that channels 1-4 cannot be tuned in, enter the service mode – the Hitachi CPT2656 manual describes how to do this – and switch off bit zero, the little dot. All channels are then available for tuning and storing. M.Dr.

Ferguson TX100 with Teletext

No line or field sync with one of these text sets was cured by replacing the SAA5030 video input processing chip on the text panel. There should be a video input at pin 16, with a video output at pin 12 to the sync separator. The video output at pin 12 was missing. **M.Dr.**

Saisho CT149TXA

This 14in. text portable was dead. After replacing the usual parts – the STR50103A chip etc. – the set remained dead, as can happen. The power supply is extremely simple, consisting of about eight components. We replaced them one by one, including the chopper transformer. The culprit turned out to be the 103V HT supply reservoir capacitor C506 (100 μ F, 160V) which was open-circuit.

This is one to watch out for with any set that uses an STR type chopper chip – we would have expected just a low output, not a dead set. M.Dr.

Hitachi CPT2488 (Salora K Chassis)

The picture was slow to appear and when it did the centre was blanked for several minutes. The cause was C574 (100μ F) in the field output stage. I wouldn't recommend using freezer to prove the point, as this results in the sudden demise of the field output chip! **G.P.**

JVC AV25F1EK

When teletext was selected the screen would blank for a second then a normal picture would return. The cause was IC004, type PCF84 C81P/064, on the text PCB. **G.P.**

Hitachi C2114R

This set would cut out after about half an hour. We found that the

protection thyristor Q703 was being fired because transistor Q704 (BF423) in the excess-current protection circuit became leaky when warm. G.P.

Sanyo CBP2180A

The symptoms with one of these sets were field non-linearity (very squashed two inches from the top of the picture), crooked verticals and intermittent colour. All were caused by a dry-joint at pin 2 (chassis connection) of the 12V regulator IC552. As a result the 12V supply was high at 14V. **G.P.**

Mitsubishi CT29B2STX, CT25A2STX, CT21A2STX

If the line output transistor Q522 is short-circuit, the four small electrolytics in the power supply should be replaced using high-temperature (105°C) components. They are as follows: C905 (470 μ F, 35V), C906 (47 μ F, 50V). C909 (2.2 μ F, 50V) and C920 (100 μ F, 25V). Note that the transistor type varies with screen size. With a 21in. tube it's type 2SD1877, part no. 260P606010; with a 25in. tube it's type 2SD1878 (part no. 260P607010) while with a 29in. CRT it's type 2SD1879 (part no. 260P608010). G.P.

Bush 2057NTX

When this set was switched on at the mains there was a rather large crackle of EHT but no picture. The HT was found to be over 170V instead of 115V because C910 (10µF) and C909 (47µF) in the power supply had dried up.

On advancing the tube's first anode control a blank, unmodulated line appeared and the set wouldn't go to standby. The standby fault was caused by Q907 (2SC2335) which was short-circuit. Replacing ZD402 (12V, 1W) and R442 (3.952. 1W fusible) brought back the signals, while the field scan was restored by replacing the TDA3563B field output chip IC401. G.P.

Philips CP90 Chassis

There was field collapse with an uncontrollably bright line because the 163V video HT supply was missing. Safety resistor R3623 ($8\cdot 2\Omega$) was open-circuit. The 163V supply also provides bias for the field output transistors. **G.P.**

GoldStar CIT2190F/Matsui 2091

If the TDA1170N field timebase chip IC301 has failed, C302 (100µF, 35V) must also be replaced. Otherwise 1C301 could fail again. G.P.

Aiwa VXT1010K

This combined TV/VCR wouldn't start up from cold. We found that C524 (47μ F, 10V) in the power supply had dried up. G.P.

GoldStar CIT2168F (PC04A Chassis)

A black screen with normal sound was the result of failure of the TDA1170N field timebase chip IC301. In addition R320 (10 Ω , 1W) in the supply to IC301 had burnt out. The correct current through R320 is 170mA.

To curc slight foldover at the top of the picture we replaced the 27V supply's reservoir capacitor C423 and the bootstrap capacitor C302 – they are both $100\mu F$, 35V components.

Note that great care should be taken when removing the back from these sets to prevent damage to the loudspeaker terminals. The only plug and socket available to disconnect the loudspeakers is placed inaccessibly under the CRT rim, and the chassis will not slide out until a front screw is removed. **G.C.**

Hitachi C2544TN, C2564TN, C2844TN, C2864TN

I've had two of these sets with intermittent loss of the sound and picture. When the fault is present, the red standby LED is lit and blinks once every two seconds. This indicates that the failure is in the main chopper power supply circuit.

In both cases the cause was traced to a cracked joint at one end of the ferrite bead link FB911, which feeds unregulated HT to the chopper transformer. It's located near the front of the power panel, but its connections are obscured by the plastic divider rail. G.C.

Toshiba 217D9B

The cause of intermittently excessive picture brightness was traced to a cracked solder joint at the line output transformer's auxiliary earth pin. This connection earths the lowvoltage end of the voltage divider network that includes the first anode potentiometer. G.C.

Philips 14PT156B

This fairly new portable produced perfect sound but no picture. The screen was black. When the setting of the first anode control was advanced there was a thin line across the screen, denoting field collapse. The field output chip was deprived of its supply because the fusible 4.7Ω resistor R3449 was open-circuit.

The current through a temprary 15Ω ballast resistor seemed to be acceptable at 120mA and restored the picture. So a new 4.7 Ω resistor was fitted and the first anode control was returned to its orignal setting. G.C.

Beko 16228NX

The picture and sound would disappear soon after this 28in. Nicam set was switched on, leaving either a blank screen or traces of chroma. If teletext was selected the sound would return but there was no text! The vidco signal path was being interrupted by a cracked joint at the 470nF polyester capacitor C208 in the IF module. It feeds the signal from pin 11 of IC201 to pin 8 of the vidco preamplifier IC202. G.C.

Philips CP110 Chassis

This set came in dead with the chopper transistor short-circuit. After replacing this, the TEA1039 chopper control chip and a few other items I disconnected the feed to the line output stage, connected a bulb as a dummy load and switched on. The lamp glowed for a fraction of a second then went out – the power supply had tripped.

Further checks showed that the cause of the fault lay in the optocoupler circuit. This was narrowed down to the standby switching. In the standby mode the BD438 transistor Tr7727 switches on, supplying more current to the optocoupler. The outputs from the power supply then fall. In fact in standby the transistor was supplying too much current. When its collector was disconnected the voltage at this point was found to be 32V instead of 8-10V. Although there was no measurable leak, a new BD438 transistor cured the problem. M.M.

Fidelity CTV2000

The chassis used in this set appears to be a modified version of the ZX3000, with a slightly different layout. The set was dead apart from a pop from the loudspeaker. A quick check in the power supply showed that it was producing an HT output, but this didn't reach the line output stage. The cause was R97, whose legs were too large to fit correctly in the holes. As a result it had never been soldered properly. Enlarging the holes and resoldering R97 cured the fault. M.M.

Ferguson D59F

This set would switch on but appeared to be stuck in the AV1 mode. After replacing the EEPROM IR02 and setting it up 1 was rewarded with a good working set. M.M.

Mitsubishi CT2964STX

The reported fault was that the sound would fade and disappear. If you turned the volume up the fault would right itself. Sometimes a tap on the side of the cabinet would restore the sound. I removed the IF can and inspected it, but someone had got to it first: all the joints were OK. So attention was turned to the audio module, which contains the Nicam and mono sound processing and the audio output stage. Here I found that Q3005 had all three legs dry-jointed. Resoldering this transistor cured the fault. M.M.

PHILIPS PSU SERVICE KITS AS A CONVENIENT COST EFFECTIVE METHOD OF REPAIRING FOLLOWING POWER SUPPLIES





We welcome letters from our readers and try to publish as many as we can. You can send them typed, handwritten, or on disc. Address them to the Letters Editor, Room L302, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

Channel 5 Reception

Having pretuned most of my receiving equipment to avoid channels 35-37, I was looking forward to receiving the Channel 5 test signal (on ch. E37) one sunday. In this area we receive good, strong signals from both Wenvoe (HTV Wales/S4C) and Mendip (HTV West/C4 UK), the transmitters using groups B and C/D respectively. In addition there are relay signals from Machen and Chepstow, both group A. I am using two high-gain Yagi aerials for the main transmitters, with a diplexer to combine the signals. Just after the diplexer, there is a two-way mixer where I add the outputs from two satellite receivers (channels E22 and E25). The mixer's unamplified output then supplies the house with ample signals, without any co-channel interference. The only problem occasionally encountered is a slightly low BBC-2 Wales signal, possibly due to the fact that its channel (E51) is close to the changeover frequency of the diplexer.

Alas the Channel 5 results were very disappointing, with severe ghosting that caused colour dropout and distorted sound. This made me think about yet another potential problem awaiting many Ch. 5 viewers who are served by more than one transmitter.

Locally, Ch.5 is being broadcast

Letters

from only the Mendip transmitter, using channel E37. Most viewers, particularly in South Wales, already receive both main transmitters - a quick glance out of the window confirms the presence of two aerials on most rooftops. The problem is that the outputs from these aerials are likely be combined using a diplexer which, until now, has been the best solution. Ch. 5 is being transmitted from Mendip as a Group B channel however. It will thus be filtered out from the Mendip transmissions by the diplexer. The Wenvoe aerial will meanwhile receive Ch. 5 off-beam (about 90° out), producing a ghostly signal.

I checked out two other installations, both with diplexers. Both produced a similar result: heavy ghosting, which fluttered with the wind and rain, and sometimes noise caused by insufficient signal. What can be easily or cheaply done to cure this problem?

Well, we could scrap the diplexer and mix the two aerial outputs together, though this would probably result in ghosting on all channels with the possible exception of Ch. 5! Or we could dispense with the Wenvoe aerial altogether, thus losing or severely spoiling reception of the Welsh channels. The cheapest way to receive the lot might be to have two separate aerials with two separate downleads, then change the aerial when you change channel (not recommended for couch potatoes!).

We might need to change the Mendip aerial from a group C/D to a wideband type as well. Or we could do nothing and forget about Ch. 5. If anyone has a cheap, simple solution suitable for widespread use, I'd like to hear it.

Whatever is done, retuning your VCR won't fix it. By the way, I forgot to retune the VCR in the bedroom from channel E36. There were no interference problems however. The VCR completely obliterated the Ch. 5 signal. I have read that some companies are making Ch. 5 notch filters to remove the channel from aerial systems where interference problems cannot be resolved, but is anybody making a bandpass filter for Ch. 5? This could be used to pass channel 37 from the Mendip aerial to the output from the diplexer. Or how about a triplexer with a special E35/37 input? Or a two-input TV tuner?

The easiest solution may be to wait until Ch. 5 appears as yet another channel on a digital multiplex, satellite or cable system. Ian Martin, Newport.

Samsung VIK310 Series VCRs

Have you ever wondered why so much damage is done when there's a fault in the power supply in Samsung VIK310/320/350 VCRs, especially when zener diode D606 fails? We have done some extensive tests on a scrap machine we have in stock and have discovered the root cause of the problem: the excess current trip is set at far too high a threshold – so high that a 1Ω wirewound resistor connected between the 16V rail and chassis will not shut the power supply down.

The trip threshold is set by the current that flows through R107 $(0.47\Omega, 2W WW)$. We have found that with this resistance value only a dead short across one of the secondary side rails will shut down the power supply. If a 1Ω resistor is used in position R107 the power supply will shut down nice and gently in the event of an excesscurrent condition. This may not however be the optimum value to use - the value would have to be calculated using the information in the manufacturer's data sheet for the STR11006 chopper chip. Perhaps Samsung would like to investigate this problem. Michael Dranfield, Buxton, Derbyshire.

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BC107 BC108	8p 8p	BD434 BD435	30p 31p	BU126 BU128	65p 125p 125p	BUV48AF BUV48C BUV50	325p 250p 425p	MJ4502 MJ10012 MJ11015	300p 300p 250p	4N35	50p	AN203	210p 165p	AN6341 AN6342	200p 325p	BA338 BA340	80p 75p	BA7007 BA7021	200p 180p
BC109 BC109C BC140	8p 10p 20p	8D436 8D437 8D438	30p 28p 36p	BU133 BU137 BU180	150p 100p	BUV61 BUV70	1000p 200p	MJ11016 MJ11032	300p 800p	DIODES		AN210 AN211 AN2140	150p 170p	AN6344 AN6345	440p 400p 350p	BA343 BA336 BA401	60p 175p 60p	BA7022 BA7025L BA7107	350p 100p 475p
BC142 8C143	20p 20p	8D439 8D440	40p 40p	BU184 BU204	100p 65p	BUV90 BUV93	175p 375p 200p	MJ11033 MJ15003 MJ15004	800p 250p 300p	BY127 BY133	Sp Sp	AN217P AN228	95p 280p	AN6346 AN6350 AN6352	610p 450p	BA402 BA511	50p 145p	BA7212S BA7252S	200p 150p
BC147 BC149	8p 8p	BD441 BD533 BD534	40p 50p 38p	BU205 BU206 BU207	70p 100p 150p	BUW11A BUW11AF BUW12	226p 125p	MJ15015 MJ15016	250p 350p	BY164 BY179 BY184	40p 35p 32p	AN252 AN259 AN262	150p 250p 140p	AN6356 AN6359	300p 500p	BA514 BA516	160p 150p	BA7604N BA7751L	100p S 150p 250p
BC159 BC160 BC171	8p 30p 10p	BD535 BD536	38p 380	BU208 BU208A	70p 75p	BUW12A BUW12F	150p 250p	MJ15022 MJ15023	250p 400p	BY206 BY207	11p 20p	AN271 AN274	230p 250p	AN6360 AN6362 AN6363	320p 400p 375p	BA518 BA521 BA524	150p 100p 240p	BA7752 BA7755 BA7767A	150p
BC172 BC177	10p 14p	BD537 BD538 BD643	40p 40p 50p	BU208AT BU2088 BU208D	200p 200p 130p	BUW13A BUW32A BUW48	200p 500p 550p	MJ15024 MJ15025 MJE340	400p 700p 25p	BY227 BY228 BY298	19p 28p 15p	AN2778 AN278 AN301	400p 60p 330p	AN6367N AN6368	K 400p 275p	BA526 BA527	180p 95p 100p	BA8504 BA15218 CA3140E	350p 60p 38p
BC178 BC179 BC182	14p 14p 7p	BD645 BD647	50p 50p	BU209 BU225	90p 120p	BUW49 BUW50	650p 400p	MJE350 MJE520	80p 30p	BY299 BY329-120	18p 0 150p	AN302 AN303	650p 250p	AN6371 AN6387 AN6550	350p 480p 100p	BA532 BA534 BA536	220p 150p	CNX62A CNX82A	80p 80p
BC182L BC183	7p 7p	BD649 BD675	50p 40p 40p	BU226 BU312 BU325	120p 90p 55p	BUW81A BUW84 BUW85	150p 75p 85p	MJE2955 MJE3055 MJE1300	T 65p	BY448 BYT11 BYT13-100	20p 25p 0 30p.	AN304 AN315 AN315	360p 210p 350p	AN6551 AN6552	50p 45p	BA546 BA612	160p 120p	CNX83A CX136	80p 600p 750p
BC183L BC184 BC184L	7p 7p 7p	BD676 BD677 BD678	38p 40p	BU326A BU406	75p 60p	BUX10 BUX11	150p 200p	MJE1300 MJE1300	5 60p 7 100p	BYV96E BYW96E	25p 36p	AN316 AN337 AN360	600p 100p	AN6554 AN6555 AN6605	80p 50p 35p	BA614 BA618 BA631	70p 55p 280p	CX139A CX141 CX145	750p 725p
BC212 BC212L	7p 7p	BD679 BD680	40p 40p 45p	BU406D BU407 BU407D	85p 55p 76p	BUX12 BUX20 BUX21	150p 350p 450p	MJE1300 MJE1502 MJE1502	8 200p 9 200p	BYX10 BYX55/600 IN4001	15p 25p 3p	AN 362 AN 363 AN 366	140p 150p 150p	AN6612 AN6650	60p 45p	BA656 BA658	110p 350p	CX150B CX175	325p 325p 825p
BC213 BC213L BC214	7p 7p 7p	BD681 BD682 BD705	45p 50p	BU408 BU408D	60p 75p	BUX22 BUX23	450p 900p	MJE1503 MJE1503	0 250p	IN4002 IN4003	3p 3p	AN610 AN3211	160p K 375p	AN6651 AN6652 AN6671K	45p 45p 425p	BA681A BA682A BA683A	350p 300p 300p	CX187 CX804A CX867	775p 575p
BC214L BC237	7p 7p	BD707 BD709 BD711	50p 50p 50p	BU409 BU412 BU413	85p 175p 175p	BUX37 BUX39 BUX40	220p 450p 210p	MJE1800 MJF1800 MJF1820	4 175p	IN4004 IN4005 IN4006	3p 3p 3p	AN3215 AN3231 AN3236	K 300p	AN6676 AN67805	600p 80p	BA684 BA685	400p 400p 45p	CX868 CX877 CX79258	525p 300p 3550p
BC238 BC239 BC300	7p 7p 20p	BD736 BD826	50p 50p	BU414B BU415A	250p 170p	BUX41 BUX42	200p 200p	OC28 OC29	350p 250p	IN4007 IN4148	4p 2p	AN3310 AN3312	K 325p 350p	AN6870 AN6875 AN6878	450p 150p 65p	BA715 BA718 BA728	45p 55p	CX20015 CX20106	A 600p A 75p
BC301 BC302	20p 20p	BD828 BD839	50p 55p	BU426A BU433 BU500	70p 120p 100p	BUX47A BUX48A BUX55	220p 150p 800p	OC35 OC36 S2000A3	350p 250p 175p	IN5400 IN5401 IN5402	9p 8p 8p	AN3313 AN3320 AN3331	300p K 450p K 450p	AN6879 AN6880	225p 75p	BA806 BA843	220p 130p	CX20109 CX20181	140p 7 700p
BC303 BC304 BC327	20p 25p 7p	BD897 BD899 BD977	50p 50p 50p	BU500D BU505	225p 90p	BUX80 BUX81	180p 160p	S2000AF S2055A	175p 175p	IN5403 IN5404	8p 8p	AN3792 AN3794	300p 325p	AN6882 AN6884 AN6888	300p 200p 150p	BA1310 BA1320 BA1330	160p 75p 120p	CXA1001 CXA101 CXA101	9P 150p
BC328 BC337	7p 7p	BDX33 BDX37	60p 100p	BU505D BU505D BU506	90p 90p 100p	BUX84 BUX85 BUX86	50p 50p 30p	S2055AF S2530A TIP29	200p 100p 15p	IN5405 IN5406 IN5407	11p 12p 12p	AN3814 AN3821 AN3822	K 600p	AN6889 AN6913	100p 60p	BA1332 BA1350	60p 130p	CXA104 CXA104	4P 550p 4BP 476p
BC338 BC441 BC446	7p 28p 8p	BDX44 BDX47 BDX540	100p 60p 75p	8U506D 8U506D	70p F 120p	BUX87 BUX98A	50p 350p	TIP29A TIP29C	22p 25p	IN5408 RGP10	12p 25p	AN3830 AN3990	K 800p K 300p	AN700 AN7010k AN7025k	650p 250p 90p	BA1355 BA1356 BA1360	125p 100p 160p	CXA108 CXA108 CXA108	1M 250p
BC477 BC516	18p 22p	BDX620 BDX630	C 150p C 175p	BU508A BU508A BU508A	70p F 95p	BUZ71 BUZ71AJ BUZ72A	75p 100p 100p	TIP29E TIP30 TIP30C	40p 25p 25p	RGP15 RGP30 SR2M	25p 16p 60p	AN3991 AN5010	к 400р	AN7060 AN7062	175p 300p	BA1404 BA1604	120p 125p	CXA1082 CXA119	AS 1000p 1M 250p
BC537 BC546 BC547	25p 8p 8p	8DX640 8DX65 8DX660	80p	BU508D BU508D	90p F 115p	BUZ72AI BUZ73A	100p 150p	TIP31A TIP31C	22p 27p			AN5011 AN2020 AN5025	80p 250p	AN7072 AN7081 AN7105	250p 200p 170p	.BA2266/ BA3306 BA3308	250p 60p 70p	CSA120 FT5754 FT5764	A 600p
BC548 BC549	8p 8p	BDX671 BDX71	C 275p 70p	BU508D BU508V BU508V	110p	BUZ73AI BUZ76A BUZ90	60p 110p 200p	TIP32 TIP32A TIP32C	24p 21p 28p	I.C. SOC 8 PIN	4p	AN5033 AN5034 AN5070	400p	AN7106	135p 75p	BA3312 BA3402	60p 90p	HA1124 HA1125	125p 120p
BC550 BC556 BC557	8p 8p 8p	BDX77 BDX870 BDX880	175p C 175p C 150p	BU526 BU536	75p 100p	BUZBOAI BUZB3	200p 200p	TIP33 TIP33C	50p 60p	14 PIN 16 PIN 18 PIN	5p 6p 9p	AN5071 AN5111	100p 450p	AN7111 AN7112 AN7114	100p 45p 120p	BA3406/ BA34168 BA3422	L 120p 3L 80p 350p	HA1137 HA1151 HA1197	W 150p 175p 130p
BC558 BC559	8p 8p	BDW24 BDW93	55p 50p	BU546 BU503	125p 125p 228p	BUZ90A BUZ91A BY448	180p 400p 20p	TIP34 TIP34C TIP35C	85p 60p 65p	20 PIN 22 PIN	10p 12p	AN5132 AN5135 AN5135	NK 400p	AN7115 AN7116	110p 90p	BA35056 BA3506	140p	HA1199	130p 225p
BC560 BC637 BC639	8p 20p 20p	BDW94 BDY29 BDY56	50p 225p 226p	BU606D BU608D BU626	120p 120p	BYT11 IRF120	25p 225p	TIP36C TIP41A	65p 20p	24 PIN 28 PIN 40 PIN	13p 13p 15p	AN5150 AN5151	400p	AN7117 AN7120 AN7130	65p 100p 75p	BA3516 BA3520 BA3521	120p 130p 225p	HA1202 HA1319 HA1338	125p 200p 300p
BC640 BCY33	20p 200p	BDY58 BDY90	500p 125p	8U705 8U706D 8U706F	130p F 175p 150p	IRF130 IRF140 IRF230	475p 550p 550p	TIP41C TIP42A TIP42C	22p 20p 22p	ZENER L		AN5210 AN5211 AN5222	675p	AN7131 AN7133	90p N 325p	BA3704 BA3706	200p 75p	HA1339 HA1367	A 350p 300p
BCY34 BCY70 BCY71	200p 16p 16p	BDY92 BF137 BF167	100p 35p 30p	BU724A BU801	100p	IRF240	425p 375p	TIP47 TIP48	40p 40p	400 mW 2V7 to 39	atts	AN5250	160p	AN7134 AN7140 AN7141	300p 170p 70p	BA3822	LS 80p	HA1377 HA1384 HA1388	
BCY72 BD115	16p 30p	BF181 BF183	18p 20p 7p	BU806 BU807 BU807F	70p 60p 75p	IRF330 IRF340 IRF350	600p 325p 750p	TIP50 TIP51 TIP52	60p 80p - 80p	1.3 Watt 2V7 to 39	6	AN5260 AN5260 AN5260	2 175p	AN7142 AN7145	80p 195p	BA3920 BA4110	300p 75p	HA1369 HA1392	210p 120p
8D124F 8D131 8D132	50p 25p 25p	BF195 BF199 BF200	8p 16p	BU8080 BU810	F 300p 110p	IRF450 IRF510	650p 150p	TIP54 TIP102	85p 70p 65p	VOLTAG	E	AN531 AN535	600p 600p	AN7146 AN7147 AN7148	210p 180p 140p		85p 60p	HA1394 HA1396 HA1397	650p
BD133 BD135 BD136	50p 20p 20p	BF225 BF240 BF245	30p 16p 25p	BU824 BU826 BU826A	450p 120p 160p	IRF520 IRF530 IRF540	150p 300p 300p	TIP105 TIP106 TIP107	65p	REGULA 7805	25p	AN541 AN542 AN542	150p	AN7149 AN7154	160p 180p	BA4236 BA4402	L 110p 45p	HA1398 HA1406 HA1112	120p
BD136 BD137 BD138	20p 20p 20p	BF254 BF255	15p 12p	8U902 8U903	110p 110p	RF610 IRF611	150p 150p	TIP110 TIP111	40p 40p 35p	7806	25p 25p	AN543 AN543	275p 125p	AN7158	240p 310p 350p	BA4405 BA4412	80p 50p	HA1121 HA1121	1 170p 5 350p
BD139 BD140	20p 20p 90p	BF256 BF257 BF259	18p 18p 18p	BU910 BU912 BU920	80p 100p 100p	IRF630	200p 150p 400p	TIP112 TIP112H TIP115			25p 25p 25p	AN543 AN551 AN551	2 100p	AN7161 AN7163	N 375p 175p	BA5101 BA5102	350p 140p 75p	HA1121 HA1122 HA1122	1 180p
BD144 BD157 BD166	38p 30p	BF262 BF270	25p 18p	BU922 BU930	110p 130p	IRF642 IRF650	200p 200p	TIP116 TIP117	30p 30p 37p	7824	25p 25p 30p	AN552 AN552	550p 1 100p	AN7168	200p	BA5115	L 75p	HA1123	5 100p 4 375p
BD175 BD177	30p 30p	BF273 BF311 BF336	15p 21p 20p	80932	175p 250p A 130p	IRF720	160p 150p 175p	TIP120 TIP121 TIP122	35p 30p	7908	30p 30p	AN560	1K 750p	AN7170 AN7171	260p K 400p	BA5208 BA5402	AF 110p 180p	HA1124	17 375p 51 120p
BD179 BD181 BD182	32p 45p 60p	BF337 BF338	20p 20p	BU2508	AF 130p	IRF740 IRF820	150p 150p	TIP125 TIP126	30p 40p	7915	30p 30p	AN561 AN561	3 200p 5 300p	AN7173	K 450p	BA5408	180p	HA114 HA114 HA114	4 300p 23 110p
BD184 BD187	60p 30p	BF367	30p 13p	BU2508 BU2520 B112520	DF 150p AF 225p		225p 200p 1000p	TIP127 TIP130 TIP131	36r 301 301	78105	30p 24p 24p	AN562		AN7178 AN7205	180p 35p	BA6104 BA6109	250p 110p	HA114 HA114	35BN 400p
BD201 BD202 BD203	38p 42p	BF422	18p 21p	BU2525	AF 325	IRF9511	150p	TIP136	30p 40p 65p	78L15	24p 24p 24p	AN563	3 350p	AN17210		BA6125	66p	HA117	3 400p 6 280p
BD204 BD222 BD225	42p 31p 31p	8F455	26p 12p 19p	BUF40	iA 200 ;	IRF9530	150p 400p 200p	TIP162	110	78L24	24g 35g	AN564	0 500p	AN7220 AN7222	85p 76p	BA6146	160p	HA117	13 250p
BD232 BD233	31p 30p	BF462 BF471	50p 28p	BUH31 BUH51	5D 175	IRF9540	300p 200p	TIP142 TIP145	75 50 70	79L12	35p 35p 35p	AN570 AN571	1 150p 0 100p	AN7224	75p	BA6154	60p	HA117	16 480p 18 700p
BD234 BD235	32p 28p 30p	BF479	30	BUH51	7 275	IRF9620	200p 225p 200p	TIP147	80 90	LM309K	100	AN572	0 70	AN7254	150	BA6209 BA6218	85p 85p	HA117 HA117	41NT 950p
BD236 BD237 BD238	210	BF495 BF595	160	BUH71 BUT11	5 425i	IRF9630	325p 375p	TIP151 TIP2955	60) 5 50)	2 LM323K 78H08K0	350	AN573 AN573	0 1601 2 1201	AN7310	60	BA6222	2 130p	HA117	45 330p 49 350p
BD239 BD240 BD241	30p 40p A 40p	BF615	30	BUT12	AF 55 80 310	IRFBC3	200p	TIPL760) 100	> 79HGKC	2001 8001	AN575 AN575 AN575	3 130	AN7312 AN7315	70	BA6229	; 50p	HA117	52 325p
BD243 BD244	A 50p	BF760	40	BUT18 BUT18	80 AF 80	IRFP140	250	TIPL76	A 200	LEDS		AN579	0 240	AN7362	2001	BA623	A 130	HA118	47 700p 02 220p
BD245 BD246	A 50	BF871	22	BUT56	A 100	IRFP250	4000	2N2646 2N2904	40	RED	5		2K 225	AN7410	150	BA6248	3 140g 170g	HA120 HA120	05 180p
BD265 BD267 BD269	45	BF961 BF964	35	BUT90 BUT92	1300	IRFP450) 400p) 775p	2N2905 2N2906	20	GREEN	/ 84 81	AN608 AN620	P 125	AN741	5 70	BA6290	A 200	HA120	16 120p 17 100p
BD278 BD311	50g 100g	BFO2	32 751 52A 601	BUV18 BUV20	650 650 400	IRFP924	10 500p	2N3019	28	RED YELLOW		AN613 AN613	130 130 15 120	AN8053 AN8275	200	p BA630	A 150	HA120	26 125p 38NT 140p
8D314 8D315 8D317	160	BFR91	99)) 14	BUV23 BUV24	475	IRFRC2	0 250	2N3054	40	BREEN	8	AN62	0 50 7 200	AN837	7 400	p BA632	1 250 8 250	HA120	45 280p 47 450p
BD331 BD332	401	BR103	3 37	BUV28	110 150 125	p IRFZ44	275 276 100	2N3440	175	P RECTA	NGULAR	AN62 AN63 AN63	0 600	BA222 BA225	65 100	p BA533	4 75	HA120	58 320p 88 375 p
BD361 BD362 BD370	60j 30j	BU10	8 100 9 80	p 8UV28 BUV37	110 175	p MJ295 MJ300	5 55	2N3442 2N377	2 85	p 5mm x	2.5mm 6	AN63 AN63	10 200 20 180	BA301	40 55 80	BA641	BN 100	HA124	11 175p
BD371 BD410	30 50	BU11	0 90 1 100	P BUV48 P BUV47	120	p MJ403	2 175	p 2N3773	3 100	YELLOV	8	AN63	26N 250	D D D D D D D D D D D D D D D D D D D	60 80	p BA699	3 150	D HA124	13 70p
ED433	28	0012	+	00440							-	-	The other Designation of the local division of the local divisione		1 1 1				

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Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price
HA13001	110p	LA2211	350p	LA7054 LA7060	350p 150p	LC7881B LC7881M	135p 325p	MC1455 MC1488	45p 35p	SA820221 SA83012	525p 675p	STK2250 STK3041	650p 370p	STK5468 STK5471	300p 330p	STR7001 STR9005	600p 400p	TA72678	260p
HA13002 HA13006 HA13007	5 400p	LA2800 LA3120 LA3150	360p 200p 200p	LA7096 LA7113	200p 275p	LF347 LF353	110p 48p	MC1489 MC1496	35p 65p	SAB3013 SAB3017	200p 320p	STK3042 STK3044	375p 500p	STK5472 STK5473	375p 480p	STR9012 STR10006	450p	TA7270 TA7271	170p 220p
HA13108	3 280p	LA3160	120p	LA7116	126p 1300p	LF355 LF357	60p 70p	MC3302 MC3401	50p	SAB3021 SAB3029	450p 525p	STK3062 STK3082	500p	STK5474 STK5476	500p 350p	STR11006 STR12006	400p 450p	TA7272 TA7273	260p 300p
HA13118 HA13119	3 140p	LA3210 LA3226	65p 60p	LA7210 LA7212	60p 150p	LF398 LH2426S	300p 600p	MC3423P MC3488A	100p	SAB3035 SAB3036	600p 725p	STK3102 STK3106	II 530p 2500p	STK5477 STK5478	450p 380p	STR13006 STR15006	500p	TA7274 TA7279P	210p 325p
HA13127 HA13128	350p	LA3246	75p 140p	LA7214 LA7220	150p 125p	LM301 LM311	26p 35p	MC34063/ MN1220T	AP 300p 800p	SAB3037 SAB3042	700p 825p	STK3122 STK3152	III 725p	STK5479 STK5481	300p 520p	STR16006 STR17006	500p	TA7280 TA7281	190p 200p
HA13130) 450p	LA3301 LA3361	110p 100p	LA7222 LA7224	110p 150p	LM319 LM324	165p 30p	MN1226 MN1228	450p 600p	SAB3064 SAB3209	130p 225p	STK3156 STK4017	500p 400p	STK5482 STK5483	285p 440p	STR20005 STR20012	450p 450p	TA7282 TA7210	160p 200p
HA13139 HA13150	600p	LA3365 LA3370	70p 70p	LA7225 LA7292	250p 275p	LM335Z LM339	120p 35p	MN1276 MN1280	1300p 70p	SAB3210 SAB6456	250p 125p	STK4019 STK4021	480p 380p	STK5486 STK5487	450p 525p	STR20015 STR30110	450p 330p	TA7283 TA7284P	200p 400p
HA13151 HA13403	876p	LA3373 LA3375	70p 300p	LA7294 LA7295	200p 160p	LM348 LM358	50p 45p	MN3004 MN3005	600p 2000p	SAB8048 SAB8051	225p	STK4024 STK4025	II 550p 530p	STK5488 STK5490	480p 450p	STR30115 STR30120	275p 400p	TA7288 TA7291P	220p 200p
HA13406 HA13408	5W 400p	LA3376 LA3380	80p 300p	LA7297 LA7305A	120p	LM380 LM381	80p 150p	MN3011 MN3101	4000p 110p	SDA2003 SDA2004	450p 325p	STK4026 STK4028	480p 550p	STK5632 STK5720	450p 400p	STR30123 STR30125	450p 550p	TA7292P TA7294P	325p 450p
HA13412 HA13426	600p 500p	LA3390 LA3400	250p 250p	LA7308 LA7311	70p 200p	LM382 LM386	130p 60p	MN3102 MN3207	110p 375p	SDA2005 SDA2007	700p 300p	STK4032 STK4034	X 925p	STK5725 STK5730	450p 450p	STR30130 STR40090	250p 350p	TA7299 TA7302P	200p 75p
HA13432 HA13441	400p 450p	LA3410	90p 150p	LA7320 LA7323	120p 325p	LM387 LM389N	100p 105p	MN3208 MN6030B	950p 350p	SDA2008 SDA2112	400p 450p	STK4036 STK4038	470p 680p	STK6316 STK6324B	300p 500p	STR40115 STR41090	600p 400p	TA7303 TA7307	70p 100p
HA17524 KA2102	100p	LA3430 LA3600	135p 60p	LA7330 LA7331	350p 250p	LM393 LM431	45p 50p	MN6163A MTA001N	700p 600p	SDA2120 SDA2131	200p 226p	STK4040 STK4042	11 800p	STK6327 STK6328A	1200p 800p	STR43111 STR44115	950p 550p	TA7310 TA7312	100p 120p
KA2130 HA2131	150p 110p	LA3605 LA3607	10 0 p 125p	LA7332 LA7340	225p 300p	LM710 LM723	45p 40p	NE555 NE556	20p 40p	SDA2208 SDA4212	450p 775p	STK4044 STK4046	800p 950p	STK6431 STK6607	360p 400p	STR45111 STR50020	550p 450p	TA7313 TA7314	70p 175p
KA2206 KA2209	150p 125p	LA4030 LA4031	180p 140p	LA7376 LA7391	150p 550p	LM741DIL LM741ME		NE558 NE565	80p 110p	SDA5241 SDA5243		STK4048 STK4050		STK6722 STK6732	725p 1000p 900p	STR50092 STR50103/ STR50113	550p 260p 500p	TA7315 TA7317P TA7320P	200p 120p 200p
KA2210 KA2212 KA2213	230p 65p	LA4032 LA4051	140p 150p	LA7520	200p 200p	LM747 LM1017	55p 200p 350p	NE567 NE571	115p 290p	SDA5343 SDA5640 SDA5642	1450p 200p 450p	STK4060 STK4065 STK4101	510p 650p 500p	STK6822 STK6922 STK6932	500p	STR50115 STR51041	500p	TA7322 TA7323	130p 80p
KA2214	130p 100p	LA4100 LA4101	85p 80p	LA7535 LA7545	175p 160p	LM1035N LM1040N LM1203	850p 225p	NE592 NE5532P SAA1000	85p 140p 350p	SGSF444 SGF5465	500p 500p	STK4111 STK4112	500p	STK6962 STK6972	278p 490p	STR50213 STR53041	500p	TA7234 TA7325	75p 90p
KA2224 KA2244 KA2261	50p 75p 100p	LA4102 LA4110 LA4120	100p 120p 270p	LA7550 LA7555 LA7620	275p 150p 500p	LM1203A		SAA1004 SAA1005	650p 325p	SLA4031 SLA7020	750p	STK4121 STK4122	480p 560p	STK69818 STK6982	600p	STR54041 STR55041	350p 500p	TA7326 TA7328	200p
KA2263 KA2264	100p 100p	LA4138	105p 60p	LA7680 LA7681	675p 650p	LM1881N LM1886	375p 250p	SAA1006 SAA1008	300p 450p	STA301A STA341M	200p	STK4131 STK4132	480p	STK6982H STK7216	600p 420p	STR56041 STR58041	550p 325p	TA7330P TA7331P	80p 80p
KA2284 KA2309	75p 175p	1A4142	65p 65p	LA7710	250p 90p	LM1889 LM1894N	300p 200p	SAA1010 SAA1024	400p 250p	STA401A STA403A	220p 270p	STK4133 STK4141	# 750p	STK7217 STK7225	400p 500p	STR59041 STR60001	350p 525p	TA7333 TA7335	100p 86p
KA2401 KA2412	150p 225p	LA4160 LA4162	100p	LA7801 LA7802	100p 300p	LM1895N LM2901N	275p 35p	SAA1025 SAA1025	250p 400p	STA405A STA431A	280p 250p	STK4142 STK4147	530p	STK7226 STK7251	600p 500p	STR80145 STR81145	475p 450p	TA7336 TA7337P	180p 175p
KA2912 KA2913/	125p	LA4178 LA4180	150p 150p	LA7805	260p 250p	LM2902N LM2903N	40p 40p	SAA1027 SAA1029	400p 150p	STA432A STA434A	220p 270p	STK4151 STK4152	680p 850p	STK7253 STK7308	450p 350p	STR0120 STRD1206	425p 500p	TA7339P TA7341	176p 250p
KA2914/ KA22427	A 200p	LA4182 LA4190	180p 300p	LA 7820 LA 7823	100p 200p	LM3900 LM3909	40p 100p	SAA1042 SAA1043	325p	STA435A STA441C	2700 220p	STK4161 STK4162	650p 550p	STK7309 STK7310	400p 470p	STRD1406 STRD1706	450p	TA7342P TA7343	70p 120p
KIA6213 KIA6210	S 60p AH 400p	LA4192 LA4200	140p 130p	LA7824 LA7830	130p 200p	LM3911N LM3914	200p 160p	SAA1044 SAA1056	400p 300p	STA451C STA456C	280p 240p	STK4164 STK4171	900p	STK7348 STK7356	400p 425p	STRD1806 STRD1816	4000	TA7347P TA7348P	120p 125p
KIA6281 KIA6283	K 150p	LA4201 LA4260	120p 230p	LA7831 LA7832	175p 130p	LM3915 LM3916	160p 270p	SAA1057 SAA1058	375p 225p	STA471 STA901M		STK4172 STK4181	680p	STK7358 STK7402	440p 560p	STRD1906 STRD3035	300p	TA7349P TA7354P	175p 65p
KIA6299 KIA7227	CP 200p	LA4261 LA4265	300p 125p	LA7835 LA7837	150p 160p	LM8363 LM8560	320p 175p	SAA1060 SAA1061	375p 250p	STK0025 STK0029	420p 360p	STK4182 STK4191	700p	STK7404 STK7406	400p 650p	STRD4412 STRD4420	550p	TA7357 TA7358	340p 85p
KIA7313 L149V	300p	LA4270 LA4282	300p 350p	LA7838 LA7850	200p 225p	LM13600 LM13700	150p 125p	SAA1062 SAA1063	250p 250p	STK0039 STK0040	600p 520p	STK4192 STK4211		STK7408 STK7410	675p 1500p	STRD4512 STRD5441	400p 560p 450p	TA7359P TA7361	90p 125p
L165V L200	250p 200p	LA4420 LA4422	140p 130p	LA7851 LA7910	200p 150p	LM18293 M491BB1	500p 600p	SAA1064 SAA1070	275p 550p	STK0049 STK0050	510p 440p 520p	STK4211 STK4221 STK4231	li 1200p	STK7458 STK7554 STK7561	1250p 600p 650p	STRD5541 STRD6008 STRD6009	575p	TA7362 TA7364P TA7366P	150p 175p 65p
L272 L272M	200p 110p	LM4425 LA4430	130p	LA7913 LA7930	90p 350p 200p	M49481 M5265P M50115P	700p 200p 320p	SAA1073 SAA1075 SAA1086	325p 350p 175p	STK0059 STK0060 STK0070	820p 1100p	STK4241 STK4241	1050p	STK7562 STK7563	1000p 800p	STRD6018 STRD6602	450p	TA7368P TA7373F	35p 150p
L290B L291B L292	225p 300p 750p	LA4440 LA4445 LA4446	200p 200p 170p	LA7940 LA7953 LA9200	300p 300p	M50117P M50119P	500p 525p	SAA1089 SAA1101	325p 700p	STK0080 STK011	580p 330p	STK4272 STK4273	500p 550p	STK7573 STK7576	400p 1500p	STRD6601 STRM6545	650p	TA7374 TA7376P	175p 100p
L2938 L293C	225p 325p	LA4450	120p	LB1205	170p 150p	M50422P M50461	750p 350p	SAA1124 SAA1130	200p 550p	STK015 STK016	440p 760p	STK4301 STK4311	500p 650p	STK7703 STK8050	1000p 750p	STRM6546 STRM6549	5 900p	TA7378P TA7401	60p
1293D	225p 250p	LA4466	225p 300p	LB1258 LB1268	100p 70p	M50784 M50786	300p 500p	SAA 1250 SAA 1251	280p 380p	STK025 STK050	650p	STK4332 STK4352	365p 500p	STK8250 STK8260	500p 1200p	STRS5741 STRS5941	750p	TA7402P TA7403	200p 325p
L294 L295	475p 450p	LA4475 LA4476	225p 225p	LE1274 LB1290	85p 120p	M50790 M51014L	600p 120p	SAA 1271 SAA 1274	400p 280p	STK077 STK078	520p	STK4362 STK4372	450p 490p	STK8280 STK73405	1850p	STRS6307 STRS6308	600p 600p	TA7404 TA7405P	150p 200p
L297	525p 400p	LA4480 LA4485	225p 300p	LB1292 LB1405	110p 70p	M51143A M51161	300p	SAA1290 SAA1293	750p 550p	STK080 STK082	550p 540p	STK4392 STK4412	500p 460p	STK73410 STK7340	500p	STRS6309 STRS6707	600p 1000p	TA7411A TA7415P	350p
L465A	525p 400p	LA4496	250p 250p	LB1407	130p 200p	M51161P M51162P	250p 250p	SAA1294 SAA1300	800p 200p	STK084 STK085	600p 900p	STK4432 STK4773	600p 820p	STK73605 STK73907	700p	STRS6708 TA7054	700p 190p	TA7417A	350p
L497B	525p 400p	LA4498 LA4500	275p 200p	L81412 L81415	300p 100p	M51164A M51166P	300p	SAA1310 SAA1350	200p 275p	STK086 STK0100	800p 900p	STK4793 STK4803	800p 640p	STK78617 STR370	2400p 300p	TA7061 TA7062	115p 200p	TA7607 TA7608	200p 360p
L702N L2720	325p 150p	LA4508	220p 200p	LB1416 LB1426	85p 125p	M51182L M51191L	110p 85p	SAA1351 SAA1900	750p 5 475p	STK0100 STK420	1200p 400p 500p	STK4813 STK4833 STK4843	800p 700p	STR371 STR380 STR381	400p 350p 390p	TA7066 TA7075P TA7089	120p 300p 300p	TA7609 TA7611 TA7612	170p 210p 300p
L2722 L4960	175p 325p	LA4520	100p 170p	LB1450 LB1515	110p 270p	M51231P M51308S		SAA3004 SAA3006 SAA3007	400p P 225p P 130p	STK430 STK433 STK435	400p 375p	STK4853 STK4853	720p 730p 700p	STR383 STR384	410p 350p	TA7102P TA7119	500p 150p	TA7613A TA7514	
L6203 L6210	600p 250p	LA4555	200p 120p 150p	LB1620	210p 220p 80p	M51310A M51316P M51320	P 900p 300p 200p	SAA3008 SAA3010	P 200p	STK436 STK437	430p 460p	STK4873 STK4893	850p 1000p	STR440 STR441	800p 1200p	TA7120 TA7124	55p 250p	TA7616 TA7621	300p 300p
L6221A8 L6506 LA1130	5 300p 300p 240p	LA4558	125p 130p	LB1630 LB1639 LB1640	300p 150p	M51356P M51358P	400p 150p	SAA3027 SAA3049	P 375p	STK439 STK441	500p 680p	STK4913 STK5314	900p 475p	STR442 STR450A	1600p 700p	TA7130P	85p 60p	TA7622 TA7628	420p
LA1135 LA1145	120p 200p	LA4571	175p 175p	LB1641	76p 150p	M51365P M51366P	350p 360p	SAA4700 SAA5000	425p 200p	STK443 STK457	700p 470p	STK5315 STK5322	500p	STR451 STR452	800p 600p	TA7140 TA7141	100p 825p	TA7629 TA7630	220p 200p
LA1150	150p 90p	LA4597	125p	LB1645	100p 200p	M51381P M51384A	200p P 750p	SAA5010 SAA5012	220p 400p	STK459 STK460	560p 660p	STK5323 STK5324	600p 450p	STR453 STR454	500p 1300p	TA7150P TA7157	250p 100p	TA7632 TA7640	400p 90p
LA1177 LA1180	130p 75p	LA4700	325p 350p	LB1649 LB3500	190p 125p	M51387P M51392P	600p 300p	SAA5020 SAA5030	440p	STK461 STK463	600p 950p	STK5325 STK5326	750p	STR455 STR456	550p 470p	TA7172P TA7193	150p 320p	TA7641 TA7644B	140p 480p
LA1185 LA1186	150p 35p	LA5005	400p 90p	LC4966	65p 500p	M51393A M51395A	P 450p	SAA5040 SAA5040	B 400p	STK465 STK501	720p 550p	STK5330 STK5331	300p	STR457 STR470	600p 400p	TA7200 TA7205	200p 150p	TA76545	100p
LA1201 LA1205	75p 75p	LA5511	200p 50p	LC7060 LC7120	600p 350p	M51397A M51436P	350p	SAA5041 SAA5042	550p 425p	STK561 STK563	450p 415p	STK5332 STK5333	1000p	STR1096 STR1195	275p 350p	TA7207 TA7208	150p 125p	TA7659P TA7660P TA7666P	400p 325p 100p
LA1207 LA1210	120p 140p	LA5522	\$0p 45p	LC7130 LC7131	300p 260p	M51496P M51533	275p 300p	SAA5050 SAA5051	650p 400p	STK583 STK760	500p 600p	STK5335 STK5336	350p	STR1229 STR2005	325p 400p 400p	TA7210 TA7214 TA7217	200p 220p 145p	TA7668 TA7672	100p 400p
LA1222 LA1230	80p 130p	LA5524	150p 80p	LC7132 LC7137	400p 450p	M51544 M51848	150p 150p	SAA5052 SAA5054 SAA5230	500p 500p 850p	STK770 STK772 STK772B	400p 650p 480p	STK5337 STK5338 STK5339	500p 295p 400p	STR2012 STR2013 STR2015	300p 550p	TA7220 TA7222	220p 90p	TA7676A TA7679	
LA1235 LA1240	130p 80p	LA5530	150p 65p	LC7181 LC7185 LC7191	350p 350p 300p	M54523P M54563P M58484	200p 200p 500p	SAA5230 SAA5231 SAA5240	300p	STK780 STK795	575p 450p	STK5340 STK5342		STR2024 STR2105	575p 600p	TA7223 TA7225	210p 300p	TA7680A	P 200p
LA1245 LA1260 LA1261	110p 75p 75p	LA5537	65p 45p 175p	LC7207 LC7215	275p 160p	M51516 M51518	260p 200p	SAA5243 SAA5244	PE 800p	STK 1039 STK 1040	460p 840p	STK5343 STK5353	3800	STR2124 STR3105	675p 525p	TA7226 TA7227	290p 170p	TA7687A TA7688	P 100p 150p
LA1265	125p 130p	LA5658	225p 250p	LC7217	350p 250p	M51995P M51977P	250p 300p	SAA5246 SAA5246	AP 950p	STK 1049 STK 1050	700p 650p	STK5361 STK5362	375p 400p	STR3113 STR3115	225p 400p	TA7230 TA7232	100p 95p	TA7698 TA7699	400p 600p
LA1267 LA1354	150p 225p	LA5667	200p 300p	LC7230 LC7267	700p 550p	M52307P M54646A	900p	SAA5250 SAA5351	P 750p 375p	STK 1060 STK 1070	700p 850p	STK5372 STK5373	260p 375p	STR3123 STR3125	400p 480p	TA7233 TA7237	120p 300p	TA7705 TA7709P	300p 160p
LA1363 LA1364	90p 200p	LA6339	35p 50p	LC7351	200p 200p	M83708 M83712	276p 140p	SAA7000 SAA7020	550p 600p	STK1080 STK2025	940p 620p	STK5391 STK5392	375p 500p	STR3130 STR3135	500p 250p	TA7238 TA7240	400p 160p	TA7719P	200p 125p
LA1365 LA1368	120p 220p	LA6510 LA6515	160p 150p	LC7432 LC7522	425p 350p	MB3713 MB3714	130p 225p	SAA7210 SAA7220	P 1300p PA 650p	STK2028 STK2029	500p 480p	STK5421 STK5422		STR3212 STR3214	275p 275p	TA7241 TA7242	165p 190p	TA7750 TA7757	200p
LA1369 LA1385	200p 170p	LA6520	175p 250p	LC7535 LC7537/	300p	MB3715 MB3722	250p 200p	SAA7274 SAA7280	P 1450p	STK2030	875p 700p	STK5431 STK5434	550p	STR3215 STR3315	275p 275p	TA7243 TA7245	320p 225p	TA7769	130p 150p
LA1503 LA1805	120p 175p	LA7007	400p 220p	LC75371	450p 750p	MB3730 MB3731	350p 220p	SAA9050 SAA9057	475p	STK2048 STK2058	IV 1600p	STK5436 STK5441	400p	STR40904 STR4142	450p	TA72458P TA7248P TA7250B	0 200p 575p 325p	TA7784 TA7792P TA7796P	250p 250p 75p
LA1810 LA1851	130p 300p	LA7018	45p 100p	LC7565	300p	MB3732 MB3735	240p 400p	SAB0600 SAB0601	600p 525p	STK2101 STK2110	550p	STK5443 STK5446 STK5451	350p	STR4211 STR4512 STR5015	370p 400p \$00p	TA7250B TA7251BP TA7256P	325p 325p 225p	TA8101N TA8105N	230p
LA2000 LA2001 LA2101	150p 200p	LA7033	130p 400p	LC7800		MB3756 MB3759 MB3771	160p 200p 110p	SAB0602 SAB1009 SAB1016		STK2125 STK2129 STK2139	580p 750p 6 75 p	STK5461 STK5462	500p	STR5100 STR5214	550p 475p	TA7259P TA7262P	225p 400p	TA8110A TA8119P	P 110p 70p
I LA2110	270p 150p 190p	LA7046	280p 300p 130p	LC7818 LC7820 LC78211	280p 325p 1 250p	MB3771 MB3773 MB8719	110p 360p	SAB1046 SAB2015	P 350p	STK2155 STK2230	900p 470p	STK5464 STK5466	1 300p	STR5315 STR5412	575p 350p	TA7263P TA7265AP	325p	TA8122A TA8127N	N 250p
LA2200 LA2205	150p	LA7053		LC78227		MC1391	120p	SAB2016	P 150p	STK2240		STK5467	400p	STR6020	325p	TA7267	220p	TA8132A	

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Part	Price	Part	Price	Part	Price	Part	Price		Price		Price	Part	Price	Part 2SA1177	Price 25p	Part 2SB561	Price 30p	Part 2SC738	Price
TA8164P TA8184P TA8189P	100p 350p 130p	TDA1180 TDA1185 TDA1190 TDA1200	80p	TDA2760 TDA2780 TDA2791 TDA2795	400p 600p 275p 200p	TDA4661 TDA4670 TDA4680 TDA4685	225p 475p 475p 475p	TDA8391 TDA8391 TDA8405 TDA8405	450p	UPC1004 UPC1009 UPC1018 UPC1020	950p 170p	2SA771 2SA773 2SA777 2SA777	90p 50p 35p 100p	2SA1179 2SA1182 2SA1184	20p 20p 120p	2SB562 2SB564 2SB566	20p 15p 90p	2SC739 2SC761 2SC762	150p 110p 150p
TA8200AH TA8201AK TA8205 TA8207K	325p 300p 260p 175p	TDA1220 TDA1235 TDA1236	75p 300p 240p	TDA2822 TDA2824 TDA2840	M 60p 85p 200p	TDA4700 TDA4714 TDA4716	A 750p C 350p C 450p	TDA8410 TDA8411 TDA842	625p 550p 500p	UPC1025	60p H 2 75p 230p	2SA781 2SA786 2SA794	150p 25p 50p	2SA1185 2SA1186 2SA1198	500p 40p	2S8596 2S8598 2S8600	50p 30p 500p	2SC783 2SC790 2SC792 2SC805	85p 50p 380p 225p
TA8210 TA8211AH TA8214K	300p 200p 260p	TDA1251 TDA1270 TDA1327	150p 150p 200p	TDA3047 TDA3048 TDA3082	2000	TDA4718 TDA4725 TDA4800	750p 350p	TDA8429 TDA8433 TDA8433	550p 600p	UPC1026 UPC1028 UPC1031 UPC1032	90p H 150p	2SA798 2SA812 2SA814 2SA816	30p 15p 60p 70p	2SA1201 2SA1202 2SA1204 2SA1204 2SA1206	225p	2SB601 2SB605 2SB631 2SB632	60p 25p 40p 45p	2SC828 2SC829 2SC839	20p 15p 20p
TA8215 TA8216H TA8217P	300p 300p 120p 500p	TDA1405 TDA1410 TDA1412 TDA1506	50p 220p 35p 276p	TDA3083 TDA3190 TDA3301 TDA3310	100p B 280p	TDA4810 TDA4814 TDA4850 TDA4850	A 300p 475p	TDA844 TDA844 TDA844 TDA844	2 200p 3 350p	UPC1035 UPC1043 UPC1043	C 110p C 125p	2SA817	20p 20p 20p	2SA1207 2SA1208 2SA1209	25p 70p 100p	2SB633 2SB641 2SB647	80p 12p 20p	2SC867 2SC870 2SC897	900p 100p 175p
TA8220AH TA8221AH TA8225H TA8225L	600p 475p 475p	TDA1508 TDA1510 TDA1510 TDA1512	175p 170p 180p	TDA3410 TDA3420 TDA3501	150p 200p	TDA4852 TDA4860 TDA4866	400p 200p 325p	TDA845 TDA845 TDA845	400p 200p 3 350p	UPC1161 UPC1167 UPC1170	110p 125p 150p	2SA837 2SA839 2SA841	200p 110p 20p	2SA1210 2SA1215 2SA1216	600p 550p	258648 258649 258573 258676	45p 35p 100p 85p	25C9008 25C930 25C936 25C936	30p 16p 300p 15p
TA8227 TA8229K TA8400P TA8410K	250p 200p 200p 200p	TDA1514 TDA1515 TDA1516 TDA1517	A 200p G 350p	TDA3502 TDA3504 TDA3505 TDA3505	300p	TDA4881 TDA4935 TDA4940 TDA4940	300p 325p	TDA846 TDA849 TDA854 TDA854	350p 250p	UPC1173 UPC1176 UPC1176 UPC1180	C 120p	2SA854	20p 25p 30p 45p	2SA1217 2SA1220 2SA1221 2SA1221 2SA1222	75p 70p	2SB688 2S 8703 2SB705	90p 90p 200p	2SC944 2SC945 2SC950	140p 10p 40p
TA8410P TA8432 TA8605N	200p 200p 350p	TDA1519 TDA1519	200p A 200p 275p	TDA3507 TDA3510 TDA3520	450p 350p 650p	TDA4944 TDA4950 TDA5030	250p 120p A 150p	TDA870 TDA870 TDA873	3 500p 3 900p 3 225p	UPC1851 UPC1186 UPC1187	12 400p 80p 150p	2SA872 2SA872 2SA879		25A1226 2SA1227 2SA1232 2SA1232	250p 180p	2SB707 2SB716 2SB718 2SB727	200p 20p 60p 100p	2SC959 2SC980 2SC982 2SC983	225p 40p 20p 120p
TA8606N TA8607P TA8611AN TA8615N	350p 320p 250p 480p	TDA1521 TDA1522 TDA1524 TDA1526	200p	TDA3530 TDA3540 TDA3541 TDA3560	200p	TDA5140 TDA5330 TDA5331 TDA5331	T 300p	TDA873 TDA873 TDA874 TDA874 TDA874	5 176p 0 625p 1 550p	UPC1188 UPC1191 UPC1191 UPC1191	300p	2SA885 2SA886 2SA887	35p 46p 20p	2SA1238 2SA1239 2SA1240	30p 30p 45p	2SB733 2SB734 2SB737	75p 35p 20p	2SC1000 2SC100 2SC1008	20p 950p 20p
TA8628N TA8631 TA8632N	350p 500p 550p	TDA1534 TDA1540 TDA1541	2000p 420p 750p	TDA3561 TDA3561 TDA3562	300p A 300p 260p	TDA5500 TDA5600 TDA5660	400p 450p P 250p	TDA880 TDA880 TDA904	BT 325p 9T 350p 5 400p	UPC1210 UPC1211 UPC1222 UPC1222	5V 125p 130p	25A899	40p	2SA1242 2SA1244 2SA1244 2SA1244	120p	258739 258744 258750 258753	22p 55p 60p 100p	2SC1010 2SC1012 2SC1012 2SC1012	75p 170p
TA8644N TA8646 TA8653N TA8659AN	425p 375p 1500p 900p	TDA1542 TDA1543 TDA1552 TDA1553	300p 0 350p	TDA3562 TDA3562 TDA3564 TDA3564 TDA3563	350p 325p	TDA5700 TDA5700 TDA5700 TDA5700	200p 400p	TDA910 TDA940	2C 250p 3 180p 0 760p	UPC122 UPC122 UPC123	V 225p SHA 45p 200p	2SA904 2SA907 2SA909	20p 650p 500p	2SA1248 2SA1249 2SA1255	35p 100p 20p	2S8754 2S8764 2S8765	80p 30p 70p	2SC1030 2SC1040 2SC1040	150p 250p 20p
TA8690N TA8691N TA8701AM	700p 450p	TDA1555 TDA1557 TDA1558	Q 375p Q 350p Q 350p	TDA3560 TDA3560 TDA3569	280p 350p 300p	TDA5800 TDA5820 TDA5833	600p 370p 200p	TDA950 TDA951 TDA980	3 150p 3 300p 0 300p	UPC123 UPC123 UPC124 UPC124	3 120p 1H 150p	2\$A913 2\$A914	100p 90p	2SA125 2SA125 2SA125 2SA125 2SA125	30p 30p	2\$8772 2\$8774 2\$8775 2\$8776	26p 50p 100p 110p	2SC105 2SC105 2SC106 2SC106	250p 85p
TA8718N TA8720 TA8739P TA8872N	550p 525p 460p 450p	TDA1560 TDA1571 TDA1572 TDA1572	300p	TDA3570 TDA3580 TDA3580 TDA3590	400p 750p	TDA5850 TDA5930 TDA6100 TDA610	226p 0 150p	TEA065	2 160p 31 80p 5 300p	UPC124 UPC127 UPC127	5V 130p 0H 250p 4V 250p	25A916 25A921 25A922	30p 40p A 25p	2SA126 2SA126 2SA126	1 150p 2 110p 3 280p	2SB788 2SB791 2SB794	35p 130p 40p	2SC1070 2SC1079 2SC1080	65p 300p 225p
TAA550 TBA120S TBA396	25p 40p 70p	TDA1578 TDA1578 TDA1579	170p A 210p 200p	TDA359 TDA359 TDA360	1 360p 2A 350p 10 375p	TDA611 TDA620 TDA660	0 225p 750p 2 700p	TEA100 TEA100	2 650p 7 120p	UPC127 UPC127 UPC128 UPC128	8 240p 8V 230p	2SA934 2SA935	30p	2SA126	5 200p 3 50p	2SB795 2SB810 2SB816 2SB817	45p 15p 160p 175p	2SC109 2SC109 2SC110 2SC110	3 120p 5 180p
TBA520 TBA530 TBA540 TBA560	120p 100p 90p 90p	TDA1591	275p 200p	TDA360 TDA361 TDA364 TDA364	1 450p 350p 5 400p	TDA661 TDA661 TDA700 TDA700	2-2 900p 170p T 120p	TEA101 TEA101 TEA101	5P 110p 7 280p 9 130p	UPC129 UPC131 UPC131	B 320p 3H A 100p 5C 70p	2SA939 2SA940 2SA940	140p 50p 60p	2SA128 2SA128 2SA129	6 60p 9 60p 0 150p	2SB819 2SB822 2SB824	60p 40p 60p	2SC111 2SC111 2SC112 2SC112 2SC116	280p
TBA800 TBA810A TBA820	40p S 40p 55p	TDA 1600 TDA 1600 TDA 1670	275p A 400p A 230p	TDA365 TDA365 TDA3652	2 200p 2 500p TX10800p	TDA702 TDA702 TDA705	0T 175p 1T 200p 0 200p	TEA102 TEA103 TEA103	4 150p 5 200p 9 180p	UPC131 UPC133 UPC133 UPC135	0HA 80p 5V 320p	2SA950 2SA951	18p	2SA129- 2SA129	4 450p 5 500p	2S8825 2S8826 2S8827 2S8827 2S8828	135p 75p 200p 200p	2SC116 2SC116 2SC116 2SC116 2SC116	2 30p 4 600p
TBA920 TBA920 TBA950 TBA930	35p 100p 100p 60p	TDA1701	300p 250p	TDA365 TDA365 TDA365 TDA365 TDA371	4 90p 40 120p	TDA705 TDA705 TDA705 TDA705	3 200p 5 200p	TEA106 TEA106 TEA106	0 225p 1 176p 2 250p	UPC135 UPC136 UPC136	2C 4505 0C 2005 2C 2505	2SA95 2SA95 2SA95	60p 30p 185p	2SA130 2SA130 2SA130	2 300p 3 400p 4 110p	2SB829 2SB835 2SB857	200p 75p 80p	2SC116 2SC117 2SC117	6 100p 0 180p 2 150p
TC5020 TC5081AI TC5082P	200p 80p 170p	TDA1872 TDA1904 TDA1905	A 276p 80p 80p	TDA372 TDA372 TDA372	0 175p 4 500p 5 500p	TDA707 TDA707 TDA721	2 175p 7 175p 1 150p	TEA106 TEA106 TEA106	4 260p 7 150p 8 350p	UPC136 UPC136 UPC136	3C 300 4C 350	2SA96	120p 30p	2SA130 2SA130	7 100p 9 50p	2S8861 2S8863 2S8865 2S8882	110p 220p 25p 180p	2SC117 2SC119 2SC121 2SC121	5 210p 2 35p
TC9125B TC9125B TC9130P TC9134	230p 410p 150p 750p	TDA1910	225p	TDA373 TDA374 TDA375 TDA375	0 480p 0 400p	TDA722 TDA722 TDA723 TDA723	2 200p 0A 225p	TEA108 TEA110	7 40p 1 425p	UPC136 UPC137 UPC137	6C 130 0C 300 3 85	2SA96 2SA97 2SA97	65p 25p 35p	2SA131 2SA131 2SA131	7 30p 8 20p 9 25p	258885 258891 258892	45p 35p 26p	2SC121 2SC121 2SC121	4 15p 5 25p 6 20 0 p
TC9135P TC9137P TC9138A	125p 500p 150p	TDA1950 TDA2002 TDA2002	0 175p 2 50p 3 65p	TDA376 TDA376 TDA377	0 350p 5V 225p 1 460p	TDA723 TDA724 TDA724	3 150p 0 175p 1 250p	TEA151 TEA200 TEA201	0 500p 4A 80p	UPC137 UPC137	8 180 9C 170	2SA98	60p 25p	2SA132 2SA132	1 80p 7 130p		30p	2SC122 2SC123	6 75p 7 250p
TC9142 TC9143 TC9145 TC9145 TC9148	320p 300p 150p 200p	TDA200	5 150p 5 70p	TDA378 TDA379 TDA380 TDA380	1 300p 0 350p	TDA725	0 500p 6 500p	TEA201 TEA202 TEA202	9 200p 58 75p 8 326p	UPC138 UPC138 UPC139	4 425 7C 250 4 120	2SA99 25A99 2SA99	30p 50p 60p	2SA134 2SA134 2SA135	6 20p 8 45p 2 100p	2S8950 2S8951 2S8953	180p 190p 90p	2SC125 2SC127 2SC127	2 850p 8 110p 9 30p
TC9149 TC9150 TC9151P	225p 425p 425p	TDA200 TDA200 TDA201	3 100p 9 160p 0 160p	TDA381 TDA382 TDA382	0 200p 5 225p 7 200p	TDA726 TDA727 TDA727	2 425p 2 170p 3 80p	TEA202 TEA202	9A 650p	UPC140 UPC140	3CA 650	2SA10	05 25p 06 90p	2SA135 2SA135 2SA135	6 100p 7 65p 8 130p	2SB985 2SB986 2SB100	30p 40p 9 110p	25C131 25C131 25C132	2 40p 8 10p 5 400p
TC9152 TC9153 TC9154A TC9156	425p 300p 225p 300p	TDA203	0 80p 0H 100p	TDA384	2 400p 3 200p	TDA727 TDA729 TDA728	5 75p 2 50p 4 100p	TEA203 TEA211 TEA211	7 200p 4 200p 7 450p	UPC142 UPC142 UPC147	1CA 650 3CA 550 0 200	2SA10 2SA10 2SA10 2SA10	09 200p 10 225p 11 80p	25A135 25A136 25A136	9 45p 0 45p 2 25p	258101 258101 258101	0 25p 2 65p 5 60p	2SC132 2SC132 2SC134	7 20p 8 15p 2 15p
TC9158P TC9162 TC9163	450p 276p 375p	TDA204 TDA205 TDA205	8 600p 1V 450p 2V 525p	TDA385 TDA385	7 350p	TDA731	0 800	TEA216	4 1750	UPC148	4CA 300	p 2SA10 2SA10	13 100p 15 10p	2SA137 2SA137	1 100p	2SB101 2SB101 2SB102	7 40p 8 130p 0 120p	25C134 2SC134 2SC135	5 15p 6 100p 8 270p
TC9167P TC9167P TC9172P TC9174P	400g 100g 300g 325g	TDA214	7 250p 8 350p 1 375p	TDA406	2 500p 0 500p	TDA735	0A 700 0 650 9 300	TEA220 TEA37 TEA37	2 275 7DP 160 85 175	UPC150 UPC151 UPC151	5C 400 3HA 70 4CA 200	2SA10 2SA10 2SA10 2SA10	18 100p 20 30p 21 35p	2SA138 2SA138	2 120p 5 180p	2SB100 2SB100	6 40p	2SC136 2SC136	0 70p 4 25p
TC9176P TC9177P TCA9940	500r 225r	TDA217	0 260p 0 200p 0 250p	TDA409 TDA410 TDA417	2 350p 0 225p 3AF 325p	TDA736 TDA736 TDA737	1 175p 0V 600p	TEA504	0 650p	UPC152	OCA 250	p 2SA10 p 2SA10	26 90p 29 60p	2SA138	7 75p	258109	8 80p 9 75p 9 40c	25C138 25C138 25C138	2 40p 3 25p 4 20p
TCEP100 TD62308 TD62382 TD62506		TDA250	1 400p 2 175p 3 200p	TDA419 TDA420 TDA421	0 180p 0 360p 0 260p	TDA777 TDA811 TDA811	0 2269 4 2259 5 2009	TEA51	4A 200 5 220 6 220	2SA329 2SA467 2SA473	75 40 29	p 2SA10 2SA10 2SA10	37 50p 38 40p 48 25p	2SA140 2SA140 2SA142	3 30p 8 35p	2SB113 2SB113	13 50p 14 65p	2SC139	4 15p 8 55p
TD6304A TD6306P TD6350P	P 300 350 200	TDA250	5 300p 6 500p	TDA428	0 320p 2 360p	TDA812 TDA812	08 550	TEA55	0 325	2SA484 2SA489 2SA489	80 50 45	p 2SA10 2SA10 2SA10 2SA10	52 150 60 1200 61 3000	2SA144 2SA144 2SA145	12 110p 13 130p 50 30p	2SB114 2SB114 2SB114 2SB114	10 45p 13 40p 11 75p	2SC140 2SC140 2SC140	3 500p 7 50p
TD6359P TDA1001 TDA1002	300 200 200	TDA250 TDA251 TDA251	7T 450p 0 450p 4A 500p	TDA429	0 200p 0 175p 0 120p	TDA813 TDA813 TDA813	5 225 6 225 7 200	TEA55	0 85 30 165	2SA495 2SA496	40	p 2SA10 2SA10	73 375	2SA146	2 26p	2SB110 2SB110	3 370p	2SC141 2SC142	9 50p 6 700p
TDA 1003 TDA 1005 TDA 1010 TDA 1010 TDA 1011	A 175 A 80	TDA253	0 450p 2 120p	TDA44	26 170p 27 200p	TDA813	IBA 2001 IBB 2001	TEA55	1 200 20 300 30 225	2SA509 2SA537 2SA539	35 170 20	p 2SA10 p 2SA10 p 2SA10	80 125 81 80 82 80	2SA140 2SA140 2SA140 2SA140	8 150p 9 300p 9 226p	2SB11 2SB12 2SB12	5 50p 2 45p 3 45p	2SC14 2SC14 2SC14	1 400p 14 275p 15 350p
TDA1012 TDA1013 TDA1015	120 A 110 85	TDA254	1 120p 2 110p 3 210p	TDA44 TDA44 TDA44	37 300; 39 220;	TDA814 TDA814 TDA814	0 200 3 160 5 120	TEA56 TEA57 TEA60	01 550	2SA550	150 30	p 2SA10 p 2SA10	84 100 85 75	25A149	2 260	2SB12 2SB12	05 401 23 601	2SC14 2SC14 2SC14	7 70p 9 120p
TDA1016 TDA1020 TDA1022 TDA1023	110 330	DA254	5 120p	TDA44	12 240r 13 250r	TDA810	0 125 0 170 2 250	P TEA62 TEA63 TEA63	00 225 00 500 10T 425	2SA57 2SA603 2SA603	850 100 200	p 2SA10 p 2SA10 p 2SA10	93 180) 94 190) 95 300)	2SA15 2SA15 2SA15 2SA15	16 2800 19 200 23 451	2S812 2S812 2S813	74 40; 32 300; 18 40;	2SC14 2SC14 2SC14	4 250p 70 120p 72 40p
TDA1024 TDA1025 TDA1025	150 320 175	D TDA254 D TDA255 D TDA255	9 300p 5 175p 6 230p	TDA44	50 225 52 250 53 275	TDA81 TDA81 TDA81	74 300 75 300	p TEA64	15B 525 20 360	2SA614	150	p 2SA11 p 2SA11	02 130	p 2SA15	38 55 40 50	2SB13 2SB14	32 350 8 100	2SC14 2SC15 2SC15	74 45p 01 70p 05 55p
TDA1029 TDA1039 TDA1038 TDA104	3 500	DA255	8 500 4V 350 5A 100	TDA44	31 350 32 350 30 300	TDA81	795 750 35 300 30 200	p TL431 p TL494 p TLO61	45 100 40	2SA63	5 50 60 60	p 2SA11 p 2SA11 p 2SA11	05 2501 06 1601 11 901	2SA150 2SA160 2SA160	99 220 00 250 01 200	2SC37 2SC38 2SC38 2SC38	10	2SC15)9 35p 14 35p
TDA104 TDA104 TDA104	110 110 200	P TDA257 P TDA257 P TDA257	7A 200 8A 200 9A 250	TDA45	01 400 02 550 03 300	TDAS1 TDAS1 TDAS1	2 275 6 150	P TL071	80 38 80 55	2SA64 2SA67	3 25 3 15	p 2SA11 p 2SA11	15 30 20 40	p 2SA16	26 90 40 100	2SC45	4 15	2SC15 2SC15 2SC15	20 45p 41 110p 45 120p
TDA1044 TDA1053 TDA1054 TDA1054	3 300 1 160 7 60	p TDA259 D TDA259 D TDA259	0 170; 11 110; 110 150;	TDA45	05E 300 05K 450 05M 500	TDA82 TDA82 TDA82	13 275 148 225 15H 300	p TLO84 p TMP470 p TPU27	70 -434N 1250 32 1200	2SA67	8 26 3 25 1 25	p 2SA1 p 2SA1 p 2SA1	24 60 27 50 33 120	p 2SA16 2SA16 2SA16 2SA16	67 175 68 180 71 310	2SC46 2SC46 2SC49	0 101 1 15 5 45	2SC15	58 35p 59 55p
TDA105 TDA1060 TDA1060	B 40 140 2 140	P TDA259 P TDA259 P TDA259	3 110 4 300 5 200	TDA45 TDA45 TDA45	10 270 32 200 55 400	p TDA82 p TDA83 p TDA83	17 225 03 360 04 800	p 17PU27 p UC352 p UC384	4 100 2N 125	2SA70	5 70 5 140	p 2SA1 p 2SA1 p 2SA1	41 200 42 100 43 15	p 2SA16 2SA17 2SB17	60 40 06 26 5 45	2SC49 2SC51 2SC53	7 85 5 100 5 30	2SC15 2SC15 2SC15 2SC15	71 50p 73 25p 76 550p
TDA106 TDA107 TDA107 TDA107 TDA107	2 150 4 280 7 250	p TDA26 p TDA26 p TDA26	1A 100 6 250 30 300	TDA45	57 450 60 270 65 200	p TDA83 p TDA83 p TDA83	40 200 41 250 49A 350	p UC384 p UPC20 p UPC25	4 100 C 220 4 130	p 25A71 p 25A71 p 25A71 p 25A71	1 280 5 50 9 50	p 2SA1 p 2SA1 p 2SA1	45 40 46 200 51 30	p 2SB32 p 2SB33 p 2SB33 p 2SB47	4 40 7 160 4 250	2SC53 25C60 2SC61	6 20 5 100 9 100	2SC15 2SC15 2SC15 2SC15	80 600p 83 25p 86 540p
TDA108 TDA108 TDA108	2 275 3 95 5 170	p TDA264 p TDA265 p TDA265	10 220 3A 225 54 200	TDA45 TDA45 TDA45	66 325 58 225 70 300	p TDA83 p TDA83	51 225	p UPC55	6H 80 1 220 4 60	p 2SA72 2SA72 2SA73	5 80 6 20	p 25A1	53 30 54 22 56 90	p 2SB51 p 2SB52 p 2SB52	1 55 5 65 7 130	2SC64 2SC64 2SC64 2SC68	4 10 7 300 1 250	2SC16 2SC16 2SC16 2SC16	19 170p 23 50p 24 60p
TDA108 TDA109 TDA109 TDA109 TDA115	2 100 7 475 1 40	p TDA26	70 150 30 100 10-1 400	D TDA46 TDA46 TDA46	00 200 00 160 01 120	p TDA836 p TDA836 p TDA836	2AN 1200 2N3 1200 6N2 1500	p UPC57 p UPC57 p UPC59	5C2 90 7 64 2 95	p 2SA74 2SA74 2SA74 2SA74	0 90 2 450 7A 429	p 2SA1 p 2SA1 p 2SA1	62 30 63 15 69 500	p 25853 p 25853 p 25853	1 400 6 80 7 90	p 2SC68 p 2SC70 p 2SC71	3 35 8 100 0 15	2SC16 2SC16 2SC16 2SC16	26 56p 27 15p 28 75p
TDA115 TDA117 TDA117 TDA117	4 50 0 85 0N 85	P TDA27	21 200 30 200 40 300	DA46 TDA46 TDA46	05 220 10 370 50 425	p TDA83 p TDA83 p TDA83	72A 450 80 200 85 275	p UPC59 p UPC59 p UPC10	6 190 01 220	p 2SA76	4 200	p 2SA1	173 60	p 25854 p 25854	6 45 9 50	p 25C73 p 25C73	0 350 2 40	p 2SC16	67 450p 69 100p

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Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price
2SC1675 2SC1678	90p 80p	2SC2258 2SC2259	30p 60p	2SC2710 2SC2712	50p 20p	2SC3244 2SC3246	45p 50p	2SC3781 2SC3782	150p 75p	2SD287 2SD291	250p 250p	2SD879 2SD880	60p 40p	2SD1311 2SD1313	65p 1000p	2SD1756 2SD1758	275p 75p	25K240 25K241	140p 30p
2SC1683 2SC1684 2SC1685	100p 30p 30p	2SC2261 2SC2267 2SC2270	700p 90p 60p	2SC2714 2SC2716 2SC2719	20p 50p 25p	2SC3259 2SC3260 2SC3261	350p 220p 230p	2SC3783 2SC3787 2SC3788	300p 100p 60p	2SD313 2SD315 2SD325	25p 75p 30p	2SD882 2SD889 2SD892A	25p 35p	2SD1326 2SD1327	200p	2SD1760 2SD1761 2SD1762	80p 60p	2SK246 2SK300	30p 25p
2SC1729 2SC1730	900p 10p	2SC2271 2SC2274	25p 15p	2SC2721 2SC2721 2SC2724	120p 15p	25C3262 25C3262 25C3263	280p 280p	2SC3789 2SC3789 2SC3790	75p 120p	2SD325 2SD330 2SD348	65p 300p	2SD892A 2SD894 2SD895	75p 35p 100p	2SD1328 2SD1330 2SD1347	60p 50p 70p	2SD1762 2SD1763/ 2SD1764	50p 60p 70p	2SK301 2SK303 2SK304	40p 40p 25p
2SC1735 2SC1740	70p 10p	2SC2275 2SC2278	50p 70p	2SC2738 2SC2749	200p 350p	2SC3264 2SC3269	390p 50p	2SC3795 2SC3798	140p 220p	2SD350 2SD357	320p 40p	25D896 25D898B	200p 225p	2SD1348 2SD1350	65p 150p	2SD1765 2SD1769	70p 110p	25K312 25K315	750p 70p
2SC1741 2SC1755 2SC1756	35p 90p 35p	2SC2283 2SC2290 2SC2291	700p 1800p 40p	2SC2750 2SC2751	300p 270p	2SC3270 2SC3271 2SC3277	50p 75p	2SC3807 2SC3808 2SC3811	120p 70p	2SD358 2SD359	40p 50p	2SD900 2SD905	400p 450p	2SD1376 2SD1378	60p 60p	2SD1773 2SD1776	160p 70p	2SK320 2SK323	120p 130p
2SC1758 2SC1760	30p 70p	2SC2298 2SC2307	35p 300p	2SC2752 2SC2767 2SC2769	75p 300p 400p	2SC3279 2SC3280	280p 30p 200p	2SC3831 2SC3831 2SC3832	80p 250p 135p	2SD361 2SD362 2SD371	100p 100p 240p	2SD916 2SD917 2SD921	130p 300p 320p	2SD1379 2SD1380 2SD1382	100p 100p 60p	2SD1783 2SD1785 2SD1789	100p 160p 210p	2SK332 2SK359	175p 40p
2SC1775 2SC1781	10p 20p	2SC2308 2SC2312	10p 300p	2SC2773 2SC2774	700p 500p	2SC3281 2SC3284	200p 600p	2SC3833 2SC3851	250p 100p	2SD380 2SD381	650p	25D923 25D946	360p 120p	2SD1384 2SD1390	50p 350p	2SD1796 2SD1802	180p 75p	2SK363 2SK364 2SK367	50p 40p 40p
2SC1789 2SC1809 2SC1810	100p 40p 250p	2SC2314 2SC2316 2SC2320	70p 150p	2SC2785 2SC2786 2SC2787	40p 20p	2SC3293 2SC3298 2SC3299	85p 50p	2SC3852 2SC3853 2SC3855	80p 220p	2SD382 2SD386 2SD388	75p 70p	2SD947 2SD950	100p 300p	2SD1391 2SD1392	250p 85p	2SD1806 2SD1812	75p 60p	25K369 25K373	30p 40p
2SC1815 2SC1819	10p 70p	2SC2324 2SC2328	10p 120p 4 50p	2SC2791 2SC2792	10p 500p 220p	2SC3300 2SC3303	120p 400p 100p	2SC3857 2SC3858	220p 500p 550p	2SD389 2SD400	150p 60p 14p	2SD951 2SD957A 2SD958	200p 520p 60p	2SD1395 2SD1396 2SD1397	80p 120p 100p	2SD1815 2SD1825 2SD1827	100p 60p 120p	2SK374 2SK386	45p 600p
2SC1826 2SC1827	60p 60p	2SC2310 2SC2315	25p 175p	2SC2793 2SC2808	700p 40p	2SC3306 2SC3307	130p 600p	2SC3866 2SC3868	275p 100p	2SD401 2SD402	50p 120p	2SD965 2SD970	35p 170p	2SD1398 2SD1399	120p 300p	2SD1843 2SD1846	100p 350p	2SK389 2SK400	115p 700p
2SC1829 2SC1833 2SC1834	500p 27p 50p	2SC2329 2SC2230 2SC2331	480p 300p 50p	25C2810 25C2812 25C2814	360p 40p 40p	2SC3309 2SC3310 2SC3316	150p 125p 280p	2SC3870 2SC3883 2SC3884	200p 210p 200p	2SD414 2SD415 2SD424	45p 55p 350p	2SD972 2SD973 2SD973A	40p 60p 70p	2SD1400 2SD1402 2SD1403	280p 120p 225p	2SD1847 2SD1849 2SD1850	350p 280p 325p	2SK405 2SK414 2SK415	450p 550p 500p
2SC1841 2SC1844	12p 50p	2SC2333 2SC2334	200p 80p	2SC2824 2SC2825	75p 900p	2SC3317 2SC3326	350p 50p	2SC3885 2SC3885	250p	2SD426 2SD427	150p 350p	2SD982 2SD985	90p 120p	2SD1405 2SD1405	80p 60p	2SD1853 2SD1856	40p 40p	25K423 25K427	75p 50p
2SC1845 2SC1846	15p 35p	2SC2335 2SC2336/		2SC2826 2SC2827	200p 130p	2SC3327 2SC3328	60p 50p	2SC3886. 2SC3890	150p	2SD438 2SD467	35p 15p	2SD986 2SD998	120p 70p	2SD1407 2SD1408	60p 125p	2\$D1857 2\$D1858	75p 40p	25K430 25K511	200p 450p
2SC1847 2SC1855 2SC1856	45p 85p 25p	2SC2344 2SC2347 2SC2353	150p 35p 120p	2SC2832 2SC2834 2SC2837	300p 280p 250p	2SC3330 2SC3331 2SC3333	20p 25p 120p	2 SC3892/ 2 SC3893 2 SC3895	400p 225p 400p	2SD468 2SD471 2SD476	15p 20p 100p	2SD1010 2SD1012 2SD1020	40p 40p 40p	2SD1409 2SD1411 2SD1412	170p 85p 75p	2SD1863 2SD1864 2SD1877	35p 85p 175p	2SK513 2SK526	325p 160p
2SC1865 2SC1870	700p 700p	2SC2360 2SC2361	120p 150p	2SC2839 2SC2853	40p 70p	2SC3345 2SC3346	100p 130p	2SC3896 2SC3897	400p 400p	2SD525 2SD526	50p 70p	2SD1021 2SD1022	120p 250p	2SD1413 2SD1415	60p 190p	2SD1878 2SD1879	160p 275p	2SK531 2SK534 2SK537	350p 700p 900p
2SC1871 2SC1875	425p 220p	2SC2382 2SC2365	50p 280p	2SC2873 2SC2877	60p 120p	2SC3352 2SC3353	200p 280p	2SC3907 2SC3927	250p 250p	2SD545 2SD549	18p 120p	2SD1024 2SD1027	850p 850p	2SD1417 2SD1425	125p 260p	2SD1880 2SD1881	360p 350p	2SK538 2SK539	350p 1100p
2SC1881 2SC1890 2SC1895	70p 15p 500p	2SC2369 2SC2371 2SC2373	100p 25p 210p	2SC2878 2SC2879 2SC2882	20p 3200p 60p	2SC3355 2SC3356 2SC3358	50p 120p 50p	2SC3940 2SC3943 2SC3944	40p 75p 80p	2SD551 2SD554 2SD555	300p 225p 500p	2SD1030 2SD1031 2SD1036	75p 70p 600p	2SD1426 2SD1427 2SD1428	135p 160p 180p	2SD1884 2SD1886 2SD1887	300p 450p 300p	2SK544 2SK552	30p 250p
2SC1904 2SC1906	125p 15p	2SC2383 2SC2389	50p 45p	2SC2883 2SC2898	60p 200p	2SC3376 2SC3377	300p 50p	2SC3950 2SC3953	120p 60p	2SD556 2SD558	225p 200p	2SD1046 2SD1047	200p 180p	2SD1430 2SD1431	280p 200p	2SD1894 2SD1895	300p 225p	2SK553 2SK555 2SK556	225p 320p 500p
2SC1907 2SC1909	20p 260p	2SC2407 2SC2408	110p 120p	2SC2899 2SC2909	50p 60p	2SC3378 2SC3379	120p 1200p	2SC3955 2SC3964	70p 100p	2SD560 2SD571	50p 20p	2SD1051 2SD1055	130p 60p	2SD1432 2SD1433	400p 400p	2SD1910 2SD1911	280p 300p	2SK557 2SK559	400p 800p
2SC1913 2SC1914 2SC1921	90p 30p 15p	2SC24121 2SC2440 2SC2458	50p 200p 10p	2SC2910 2SC2911 2SC2912	25p 80p 120p	2SC3381 2SC3383 2SC3393	130p 80p 80p	2SC3972 2SC3973 2SC3975	250p 210p 210p	2SD575 2SD592 2SD596	530p 25p 25p	2SD1060 2SD1062 2SD1063	130p 150p 200p	2SD1438 2SD1439 2SD1441	100p 165p 220p	2SD1913 2SD1929 2SD1930	50p 50p 50p	25K560 25K566	580p 475p
2SC1922 2SC1923	175p 10p	2SC2459 2SC2466	50p 55p	2SC2921 2SC2922	650p 480p	25C3397 25C3399	20p 50p	25C3987 25C3996	220p 600p	2SD600 2SD601	30p 40p	2SD1064 2SD1065	250p 160p	2SD1442 2SD1445	80p 200p	2SD1933 2SD1939	75p 76p	2SK606 2SK612	70p 80p
2SC1929 2SC1940	180p 110p	25C2486 25C2492	275p 50p	2SC2923 2SC2928	75p 550p	2SC3400 2SC3401	35p 50p	2SC3997 2SC3998	1400p 1000p	2SD602 2SD612	60p 50p	2SD1069 2SD1073	150p 350p	2SD1446 2SD1450	300p 60p	2SD1941 2SD1944	500p 50p	25K684 25K685 25K699	950p 1150p 100p
2SC1941 2SC1942 2SC1944	27p 350p 350p	2SC2470 2SC2481 2SC2482	65p 120p 20p	2SC2929 2SC2934 2SC2937	280p 75p 250p	2SC3402 2SC3405 2SC3409	40p 130p 400p	2SC4006 2SC4020 2SC4023	100p 280p 325p	2SD613 2SD617 2SD633	70p 300p 70p	2SD1088 2SD1094 2SD1110	150p 375p 225p	2SD1451 2SD1452 2SD1453	200p 275p 140p	2SD1958 2SD1959 2SD1978	80p 210p 50p	25K719 25K724	300p
2SC1945 2SC1946	360p 1600p	2SC2483 2SC2484	120p 185p	2SC2939 2SC2944	400p 300p	2SC3416 2SC3417	30p 90p	2SC4029 2SC4043	350p 45p	2SD636 2SD637	10p 15p	2SD1111 2SD1113	20p 225p	2SD1455 2SD1457	250p 165p	25D1984 25D1991	450p	2SK725 2SK726	550p 425p
2SC1947 2SC1953	450p 45p	2SC2485 2SC2491	400p 200p	2SC2958 2SC2962	50p 800p	2SC3419 2SC3420	120p 80p	25C4046 2SC4056	40p 350p	25D638 25D639	15p 20p	2SD1128 2SD1133	200p 65p	2SD1458 2SD1459	50p 80p	2SD1994 2SD1996	300p 45p	2SK727 2SK739	475p 400p
2SC1957 2SC1959 2SC1962	70p 10p 175p	25C2498 25C2500 2SC2502	SOp 25p 140p	2SC2979 2SC2987 2SC2988	160p 250p 150p	2SC3421 2SC3422 2SC3423	45p 75p 60p	2SC4059 2SC4064 2SC4106	550p 140p 200p	2SD640 2SD655 2SD651	350p 18p 60p	2SD1135 2SD1138 2SD1140	75p 40p 40p	2SD1468 2SD1487 2SD1494	40p 225p 200p	2SD2006 2SD2010 2SD2011	75p 250p 60p	2SK758 2SK769 2SK786	300p 500p 200p
2SC1967 2SC1969	1300p 160p	2SC2503 2SC2512	600p 20p	2SC2995 2SC2999	60p 50p	2SC3425 2SC3446	65p 150p	2SC4107 2SC4124	175p 250p	2SD666 2SD667	25p 20p	2SD1142 2SD1145	350p 25p	2SD1496 2SD1497	300p 230p	2SD2012 2SD2018	50p 65p	25K787 25K791	800p 225p
2SC1970 2SC1971	100p 400p	2SC2517 2SC2519	120p 60p	2SC3001 2SC3019	1400p 320p	2SC3447 2SC3456	130p 200p	2SC4125 2SC4137	400p 40p	2SD669 2SD673	35p 350p	2SD1148 2SD1153	175p 30p	2SD1497- 2SD1505	90p	2SD2033 2SD2061	80p 100p	25K792 25K793	300p 300p
2SC1972 2SC1973 2SC1975	600p 150p 120p	2SC2527 2SC2534 2SC2535	300p 1S0p 300p	2SC3020 2SC3022 2SC3025	1450p 1850p 500p	2SC3457 2SC3459 2SC3460	125p 180p 130p	2SC4138 2SC4157 2SC4159	200p 400p 100p	2SD676 2SD717 2SD718	250p 180p 85p	2SD1159 2SD1160 2SD1163/	65p 150p A 220p	2SD1506 2SD1508 2SD1509	50p 60p 100p	2SD2086 2SD2125 2SD2136	250p 180p 85p	25K794 25K796	315p 600p
2SC1980 2SC1983	30p 75p	2SC2538 2SC2540	100p 1900p	2SC3026 2SC3030	550p 300p	2SC3461 2SC3466	275p 225p	2SC4161 2SC4169	125p 60p	2SD722 2SD725	240p 200p	2SD1164 2SD1168	75p 270p	2SD1511 2SD1519	100p 250p	2SD2144 2SD2151	35p 175p	2SK809 2SK812 2SK817	850p 150p 325p
2SC1984 2SC1985	150p 100p	2SC2542 2SC2545	300p 55p	2SC3037 2SC3038	125p 125p	2SC3468 2SC3481	70p 300p	25C4199 25C4204	700p 60p	2SD726 2SD731	275p 260p	2SD1169 2SD1173	280p 350p	2SD1521 2SD1525	70p 600p	2SD2255 2SD2331	175p 250p	25K851 25K872	550p 1 650p 1
2SC1986 2SC2001 2SC2002	100p 15p 15p	2SC2546 2SC2547 2SC2550	25p 65p 50p	2SC3039 2SC3040 2SC3042	80p 260p 300p	2SC3482 2SC3486 2SC3502	275p 275p 50p	2SC4231 2SC4235 2SC4236	250p 550p 550p	2SD732 2SD734 2SD741	250p 15p 120p	2SD1185 2SD1186 2SD1189	280p 400p 55p	2SD1526 2SD1541 2SD1545	100p 350p 275p	2SD2333 2SD2340 2SJ48	200p 225p 425p	25K875 25K903	475p 500p
2SC2003 2SC2004	20p 20p	2SC2551 2SC2552	70p 60p	2SC3052 2SC3057	30p 150p	2SC3503 2SC3504	50p 120p	2SC4237 2SC4242	650p 120p	2SD743 2SD757	130p 120p	2SD1191 2SD1192	120p 90p	2SD1546 2SD1548	350p 400p	2SJ56 2SJ74	700p 60p	2SK904 2SK951 2SK952	500p 275p 275p
2SC2022 2SC2023 2SC2026	110p 180p 30p	2SC2553 2SC2555 2SC2582	200p 120p 90p	2SC3068 2SC3070 2SC3071	60p 35p 25p	2SC3505 2SC3506 2SC3507	240p 250p 650p	2SC4278 2SC4288/ 2SC4300	175p 650p 200p	2SD760 2SD762 2SD763	70p 100p 140p	2SD1196 2SD1197 2SD1198	150p 150p	2SD1554 2SD1555	170p 170p 300p	2\$J76 2\$J77	220p 350p	2SK955 2SK956	750p 600p
2SC2027 2SC2027 2SC2036	200p 50p	25C2563 25C2568	200p 120p	2SC3073 2SC3074	100p 200p	2SC3509 2SC3514	750p	2SC4301 2SC4304	550p 225p	2SD768 2SD772	180p 200p	2SD1207 2SD1210	60p 40p 280p	2SD1556 2SD1565 2SD1571	75p 170p	2SJ79 2SJ103 2SJ109	225p 75p 200p	25K962 25K1023	700p 550p
2SC2037 2SC2053	60p 120p	2SC2570 2SC2571	30p 350p	2SC3075 2SC3077	150p 120p	2SC3518 2SC3519	120p 250p	2SC4313 2SC4381	1000p 225p	2SD773 2SD774	20p 30p	25D1211 2SD1213	120p 220p	2SD1572 2SD1575	100p 200p	2SJ113 2SJ114	1050p 1150p	2SK1038 2SK1057	450p 8 600p
2SC2055 2SC2058 2SC2060	150p 20p 40p	2SC2577 2SC2578 2SC2579	110p 170p 110p	2SC3086 2SC3089 2SC3101	150p 130p >750p	2SC3526 2SC3528 2SC3531	45p 750p 225p	2SC4382 2SC4386 2SC4387	300p 275p 425p	2SD777 2SD784 2SD786	400p 650p 100p	2SD1218 2SD1223 2SD1225	75p 75p 70p	2SD1576 2SD1577 2SD1579	200p 250p 120p	2SJ116 2SJ117 2SJ119	1200p 550p 700p	25K1058 25K1081 25K1082	800p 700p 450p
2SC2061 2SC2068	75p 60p	2SC2580 2SC2581	175p 225p	2SC3112 2SC3114	35p 40p	2SC3549 2SC3552	200p 270p	2SC4408 2SC4429	50p 275p	2SD787 2SD788	20p 30p	2SD1227 2SD1229	40p 250p	2SD1589 2SD1590	60p	2SJ162 2SJ175	680p 200p	25K1102 25K1117	375p 250p
2SC2071 2SC2073	140p 40p	2SC2588 2SC2590	600p 40p	2SC3116 2SC3117	75p 120p	2SC3568 2SC3577	200p 275p	2SC4431 2SC4467	90p 175p	2SD789 2SD792	20p 400p	2SD1237 2SD1238	300p 300p	2SD1591 2SD1593	310p 125p	2SJ182 2SJ200	150p 625p	25K1118 25K1120	225p 550p
2SC2075 2SC2078 2SC2085	60p 95p 100p	2SC2591 2SC2592 2SC2603	50p 200p 10p	2SC3122 2SC3148 2SC3149	50p 145p 180p	2SC3584 2SC3591 2SC3595	200p 200p 220p	2SC4468 2SC4517 2SC45174	250p 250p 300p	2SD794 2SD795A 2SD798	33p 140p 175p	2SD1244 2SD1246 2SD1247	25p 20p 40p	2SD1595 2SD1608 2SD1609	100p 210p 45p	2SJ307 2SK19 2SK33	175p 45p 40p	2SK1190 2SK1191 2SK1217	350p 800p 700p
2SC2086 2SC2092	60p 100p	2SC2610 2SC2611	60p 30p	2SC3150 2SC3151	100p 175p	2SC3597 2SC3599	75p 140p	2SC4531 2SC4532	450p 1400p	2SD799 2SD809	150p 45p	2SD1251 2SD1254	180p 55p	2SD1632 2SD1637	400p 50p	2SK40 2SK55	50p 100p	25K1221 25K1275	200p 275p
2SC2094 2SC2097	1200p 2300p	2SC2621 2SC2625	70p 190p	2SC3152 2SC3153	130p 175p	2SC3600 2SC3606	175p 100p	2SC4542 2SC4742	500p 275p	2SD811 2SD819	450p 300p	2SD1283 2SD1264	90p 55p	2SD1647 2SD1649	40p 260p	25K68 25K73	100p 75p	2SK1296 2SK1299	350p 450p
2SC2099 2SC2118 2SC2120	2500p 1100p 10p	25C2626 2SC2630 2SC2631	600p 1800p 20p	2SC3156 2SC3157 2SC3158	350p 200p 260p	2SC3607 2SC3608 2SC3616	150p 65p 45p	2SC4744 2SC4745 2SC4747	350p 675p 375p	25D820 25D821 25D822	250p 550p 290p	2SD1265 2SD1266 2SD1267	75p 180p 55p	2SD1650 2SD1651 2SD1656	160p 150p 250p	2SK97 2SK106 2SK107	200p 40p 40p	2SK1317 2SK1338	900p 250p
2SC2122/ 2SC2131	300p 550p	2SC2632 2SC2634	35p 10p	2SC3159 2SC3164	200p 270p	2SC3636 2SC3642	280p 225p	2SC4782 2SC4769	350p 300p	2SD826 2SD829	30p 375p	2SD1271 2SD12714	55p 225p	2SD1663 2SD1866	350p 60p	2SK109 2SK117	150p 50p	2SK1341 2SK1342 2SK1350	500p 500p 200p
2SC2141 2SC2153	60p 40p	2SC2636 2SC2637	40p 120p	2SC3169 2SC3170	150p 300p	2SC3657 2SC3659	400p 600p	2SC4770 2SC4820	250p 225p	2SD836 2SD836A	50p	2SD1272 2SD1273	200p 50p	2SD1667 2SD1668	120p 120p	2SK118 2SK125	50p 100p	25K1356 25K1356 25K1357	225p 350p
2SC2166 2SC2168 2SC2188	80p 120p 70p	2SC2640 2SC2653 2SC2654	1800p 100p 180p	2SC3173 2SC3175 2SC3178	180p 160p 125p	2SC3668 2SC3675 2SC3678	120p 100p 280p	2SC4826 2SC4924 2SC4927	70p 300p 500p	2SD837 2SD838 2SD841	55p 500p 110p	2SD1274 2SD1275 2SD1276	80p 50p 60p	2SD1669 2SD1677 2SD1680	85p 300p 225p	25K133 25K147 25K152	650p 160p 40p	2SK1358 2SK1377	400p 150p
2SC2200 2SC2209	250p 50p	2SC2655 2SC2656	75p 550p	2SC3179 2SC3180	70p 175p	2SC3679 2SC3680	140p 380p	2SC5002 2SC5003	450p 350p	2SD844 2SD850	200p 170p	2SD1277 2SD1279	190p 600p	2SD1683 2SD1684	45p 70p	2SK161 2SK163	30p 40p	25K1400 25K1404	250p 290p
2SC2216 2SC2221	50p 650p	2SC2660 2SC2665	100p 200p	2SC3181 2SC3182	200p 120p	2SC3685 2SC3687	450p 300p	2SC5044 2SC5129	250p 500p	2SD856 2SD858	48p 250p	2SD1288 2SD1289	175p 250p	2SD1706 2SD1707	325p 400p	2SK168 2SK170	40p 50p	2SK1461 2SK1462 2SK1487	220p 425p 250p
25C22284 25C2229 25C2230	60p 15p 80p	2SC2668 2SC2671 2SC2681	10p 100p 170p	2SC3198 2SC3199 2SC3202	30p 40p 25p	2SC3688 2SC3692 2SC3715	550p 150p 480p	2SC5149 2SD188 2SD198	400p 350p 140p	2SD863 2SD864 2SD866	23p 200p 120p	2SD1291 2SD1292 2SD1293	280p 60p 70p	2SD1708 2SD1710 2SD1718	375p 200p 275p	2SK184 2SK192 2SK193	35p 45p 40p	2SK1507 2SK1529	475p 700p
2\$C2233 2\$C2235	100p 60p	2SC2682 2SC2688	70p 27p	2SC3209 2SC3210	120p 550p	2SC3717 2SC3729	120p 450p	2SD199 2SD200	195p 180p	2\$0866A 2\$0867	140p 350p	2SD1297 2SD1302	300p 20p	2SD1729 2SD1730	230p 275p	2SK195 2SK197	150p 140p	2SK1537 2SK1544	400p 900p
2SC2236 2SC2237 2SC2238	20p 540p 450	2SC2690 2SC2694 2SC2705	60p 3500p 50p	2SC3211 2SC3212 2SC3225	220p 260p	2SC3746 2SC3747 2SC3748	100p 120p	2SD201 2SD213 2SD234	260p 250p	2SD868 2SD869 2SD870	260p 150p 140p	2SD1306 2SD1308 2SD1309	45p 80p 140p	2SD1732 2SD1739 2SD1740	325p 225p 126p	2SK212 2SK214 2SK216	35p 170p 200p	2SK1767 2SK2038 2SK2039	275p 295p 750p
2SC2240	45p 15p	2SC2705 2SC2706	250p	25C3225 25C3242	50p 30p	2SC3748 2SC3752	100p 250p	2SD234 2SD257	90p 195p	2SD870 2SD871	140p 260p	2SD1309 2SD1310		2SD1748		25K223		25K2039 25K2134	300p

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LIFADO REPLACEMEN

Price

		REPL	-ACE	IVIEN
Model	Price	Model	Price	Model
AKAI		VHSAN3 VHSAY3	800p 1200p	HRD250, HRD2 3V32, 8942, HP
VS105, 112, 115, 116, 120 201, 202, 205, 220, 240, 24 248, 250, 301, 303, 304, V	14, 245, 247, SP8,	VHSBH1, VHSCH1 VHSBP1	2100p 850p	FV20B, 26, 30,
VSP82 VP7100, VS9300, V\$9500 VP7200, VS9700, V\$9800	1000p 650p 1200p	VHSBY3 VHSD52 VHSEH2 VHSDH2	2800p 1600p 1600p	HRD370, HRD4 FV13H HRD530, HRD7
VS1 VS2	1250p 1200p	VHSEH2, VHSDH2 VHSEY1, VHSEY2 VHSFS1, VHSFS2 VHSFG2, VHSFG4, VHS	1400p 1300p	HRD530, HRD7 HRD910, FV14 GRC1, GRC2, 3
VS3 VS10	1350p 1350p			BR9060, HRD3 641, 660, 670, 1 HRFC100, SR3
VSP1 VS33.35, 37, 38, 38EOG N 66, 785, 786, 787, 758, 851	2100p (KII, 53, 55, 5, 867	VHSTJ1, VHSTJ2, VHST VHSYJ2 VHSVH4, VHSWH1, VHS	700p	HRD950, HRD9 FV46
VS73,35,37,38,38EOG N 66,765,766,767,768,86 VSF30,33,4,400,410,42 441,450,455,480,490,4 VS651,54,55,VXS450,	0, 430, 440.	VHSYHZ VHSWJI VHSXJ3	1600p 700p	HRS5000, HRS FV395.BRS600
V\$G51, 54, 55, VX\$450, VX\$470 V\$512, V\$515, V\$516	2250p 2250p	GRUNDIG VS410, 415, 435, 450, 45	56, 460, 500.	FV22L FV42 VR182LV VR20
VS462, 465, 467, 467EOG 15EK, 15EOH, 300, 301, 3 VSF320, 330, 340, 350, VS	2, VSF12,	VS410, 415, 435, 450, 45 505, 510, 520, 521, 530, BARCELONA, MVS5400 500, 555100, 5110	546 1600p 0, 440, 500, 0, 9100	VR182LV, VR20 FV67HV, FV68T R2000 SERIES
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VSA1100, 1110, 650, VSF 550, 560, 580, 590, 600, 6	500, 510, 50,	MADRID, SE5140, VS54	0. 3000p	HRJ600EG, HR HRJ605UK, HF HRJ300, HRJ3 HRJ316EG,HR
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VSF200, 210, 220, 221, 22 260, 261, 262, 265, 270, 2	2, 230, 240, 75, 280,	VS170 MVS660, SE6160, VERC	4800p	VX500E, 800A. 7738
VSF290, 510, 550, VSG20 206, VSG21, 211, 212, 213 VSG21720G 22, 24, 25	, 204, 205, 5, 705, 411	VS6690	3500p	VCRL3, VX730 VX735, VX755
415, 417, VSP 100, 100EN VSP88, 88KC, 8111, VSP	4, 110, , VSR100,	MV\$710, 720, 910, SE7 V\$710, 716, 720, 800, 8 V\$922, 9291, GV210, 21	120, 9120, 10, 910, 920,	VX735A, VX76 VX600 VX900
100EDG, 100EM, 110, VS VSR9	X400 1250p 1300p	MV2105, 2115, SE2120 HINARI	1700p	MITSUBISHI HS303, HS304
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ALBA		VT35, VT350, VT38, VT3 VT100, 110, 111, 112, 1	39 2300p 13, 115, 118,	HSB10, HSB20 HS300, HS301 HS273, HS550
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VCR4500, VCR5200, VCR TVR1	900p	921 VT3000 VT4000, VT4200, VT500	650p	I HSB11, HSB21
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50/5	11000	VT660E VT570, VT575, VT580, 1	2600p VT585, VT588,	AG6840 NV100, NV200 NV630
VBS3500, 7100, 7500, 760 VBR330 VBS7000, VBS7100, VBS	1800n	VTF70 VT540, 545, 546, 548, V VTM598, 640, 645, 646	3100p TD660, 666,	AG5150, AG52
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FVHP725, FVHP830, FVH FVHP990 FVHP975	P980 2500p 2700p 2400p	VTM841, 845, 930, 931, VTF770, 774, 775, 860, 865	935 2600p 861, 4100p	NVJ30, NVHJ NVG30, 31, 40
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FVHD250, 270, 370, FVH FVHP250	2700p	VTM220, VTM220E, VTI VTS390E J.V.C. & FERGUSON	5150p	NVSD22, NVS NV730, NV730 4 HEAD
FVHP132, 1400, 1440, 32 440, 445	0, 3550p 4800p	HR2200 3300 3320 33	30, 3350, 3360,	4 HEAD NV365 NV21 HO, NV
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OUISY40.		3V00, 8902, 8903, 8909 8922 FV31, FV41R	1000p 1500p	NVM7, NVMC NVF70
RC405P GSE0121, R02011, R02 R02051	031. 1950p	FV37, FV43H, HRD860 BR7000E, BR7000S, BF	3100p 37030,	NVJ45, NVJ4 NVSD40 NVF75, NVF7
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CSI, DS2 VHSAH1	1600p 1100p	HRD300, 400, 580, 600 640, 650	, 620, 2000p	NVSD1 AG7330, AG7
VHSAH3	2400p	HR4100 HRD750, HRD830, HRE	1000p 3300p	AG7450
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R182LV, VR202LV	1950p
V67HV, FV68TX, FV77 2000 SERIES	3800p 4500p
V61LV, FV62LV, FV67HV	4000p
P160L, VR172L	1950p
IRJ200, HRJ205	3300p
RJ605UK, HRJ610EK	7100p .
RJ300, HRJ305, HRJ315, RJ316EG.HRJ318E	3750p
RJ615, HRJ715, HRJ815	9200p
DEK, HRJ415, HRJ416	5850p
AATSUI	7708
/X500E, 800A, 810A, 820, 80A 738	1200p
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HSM20, HSM55	2250p
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NATIONAL PANASONIC AG1000, 1050, NV250, 260, 26 AG6010, AG6015 AG6840 NV100, NV200, NV370, NV380 NV500, NV465 AG5150, AG5250, NVF65, NVH VVF07, NVH65	80, 450, 1600p 2500p 2400p 725p 3400p 175, 3200p 4200p 2300p V/L21, 42
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NATIONIAL PANAS ONIC AG1000, 1050, NV250, 260, 26 AG6010, AG6015 AG6010, AG6015 AG6010, AG6015 WV300, NV200, NV370, NV380 WV300, NV200, NV465 AG5150, AG5250, NVF65, NV- WV780, NV465 AG5150, AG5250, NVF65, NV- WV781, NV465 AG5100, AG0, 130, NV10, 20, 7 WV5020, NV450, A, 12, 30, 35 NV33, NV40, 130, NV10, 20, 7 AV5020, NV5025, NV50 NV300, NV430, NV41, 2, 30, 35 NV300, NV431, NV433, NV510, 20, 7 AG5020, AG2200 NV430, NV431, NV433, NV510, 20, 7 NV502, NV5025, NV5025, NV503 NV730, NV306, NV770 AHEAD NV366 NV21 HO, NV 180, NVD48 NV7810, NV8301 NV810, NV8301 NV830, AV830, NV970 AG6024, NVG31, 46, NVL23, 3 NV610, NV850 NV615, NV502 NVG15, NV500 NV645 NVG16, NV500 NV630 NV6300, AH5610, AG6820 AG5800, AH5610, AG6820 AG5800, AH5610, AG6820 NV67	10,450, 1600p 2500p 2400p 7250 3400p 7250 3200p 4200p 2300p 4200p 2300p 4200p 2300p 4200p 2300p 4200p 2300p 4200p 2300p 4200p 2300p 4200p 2300p 4200p 2300p 4200p 2300p 4200p 2300p 4200p 2300p 2300p 2300p 2400p 2502 4200p 2502 4200p 2300p 4200p 2300p 4200p 2300p 4200p 2300p 2300p 2300p 2500p 2000p 2500p 2600p 200p
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NATIONIAL PANAS ONIC AG1000, 1050, NV250, 260, 26 AG6010, AG6015 AG6010, AG6015 AG6010, AG6015 WV300, NV200, NV370, NV380 WV300, NV200, NV465 AG5150, AG5250, NVF65, NV- WV780, NV465 AG5150, AG5250, NVF65, NV- WV781, NV465 AG5100, AG0, 130, NV10, 20, 7 WV5020, NV450, A, 12, 30, 35 NV33, NV40, 130, NV10, 20, 7 AV5020, NV5025, NV50 NV300, NV430, NV41, 2, 30, 35 NV300, NV431, NV433, NV510, 20, 7 AG5020, AG2200 NV430, NV431, NV433, NV510, 20, 7 NV502, NV5025, NV5025, NV503 NV730, NV306, NV770 AHEAD NV366 NV21 HO, NV 180, NVD48 NV7810, NV8301 NV810, NV8301 NV830, AV830, NV970 AG6024, NVG31, 46, NVL23, 3 NV610, NV850 NV615, NV502 NVG15, NV500 NV645 NVG16, NV500 NV630 NV6300, AH5610, AG6820 AG5800, AH5610, AG6820 AG5800, AH5610, AG6820 NV67	0,450, 1600p 2500p 2500p 2400p 725p 3400p 725p 3200p 4200p 2300p 4200p 2300p 4200p 2300p 2300p 2300p 200p 2500p 2400p 2500p 260
NATIONIAL PANAS ONIC AG1000, 1050, NV250, 260, 26 AG6010, AG6015 AG6010, AG6015 AG6010, AG6015 WV300, NV200, NV370, NV380 WV300, NV200, NV465 AG5150, AG5250, NVF65, NV- WV780, NV465 AG5150, AG5250, NVF65, NV- WV781, NV465 AG5100, AG0, 130, NV10, 20, 7 WV5020, NV450, A, 12, 30, 35 NV33, NV40, 130, NV10, 20, 7 AV5020, NV5025, NV50 NV300, NV430, NV41, 2, 30, 35 NV300, NV431, NV433, NV510, 20, 7 AG5020, AG2200 NV430, NV431, NV433, NV510, 20, 7 NV502, NV5025, NV5025, NV503 NV730, NV306, NV770 AHEAD NV366 NV21 HO, NV 180, NVD48 NV7810, NV8301 NV810, NV8301 NV830, AV830, NV970 AG6024, NVG31, 46, NVL23, 3 NV610, NV850 NV615, NV502 NVG15, NV500 NV645 NVG16, NV500 NV630 NV6300, AH5610, AG6820 AG5800, AH5610, AG6820 AG5800, AH5610, AG6820 NV67	10,450, 1600p 2500p 2500p 2400p 725p 3400p 2250p 4200p 2300p 4200p 2300p 4200p 2300p 4200p 2300p 1700p 2000p 2000p 2500p 2600p 2500p 2
NATIONIAL PANASONIC AGTOOL 1050, NV250, 260, 26 AGTOOL 1050, NV250, 260, 26 AGTOOL 1050, NV250, 260, 26 AGB20, AG5015, 30 AG5010, AG5015, 30 AG5010, AG5015, 30 AG5010, AG5015, 30 WV30, NV200, NV380, NV380 WV30, NV465 AG5150, AG5250, NVF65, NV- WV781, NV483, NV410, 20, N NV300, NV4133, NVL10, 20, N NV300, NV4133, NVL10, 20, N NV300, NV433, NVL10, 20, N NV300, NV433, NV10, 20, N NV300, NV433, NV410, 20, N NV300, NV430, NV433, NV50 NV300, NV430, NV433, NV502, NV5025, NV550, NV5025, NV550, NV5025, NV550, NV5025, NV5025, NV550, NV5025, NV5025, NV550, NV5025, NV550, NV550, NV5025, NV550, N	0,450, 1600p 2500p 2500p 2400p 725p 3400p 2250p 4200p 2200p 4200p 2300p 4200p 2300p 4200p 2300p 1700p 1450p 1850p 2400p 25,28, 1600p 1850p 1800p 1850p 2200p 25,28, 1600p 1850p 1800p 1850p 2200p 2250p 2260p 2250p 2260p 2250p 2260p 2250p 2260p 2250p 22600p 2260p
NATIONIAL PANAS ONIC AG1000, 1050, NV250, 260, 26 AG6010, AG6015 AG6010, AG6015 AG6010, AG6015 WV300, NV200, NV370, NV380 WV300, NV200, NV465 AG5150, AG5250, NVF65, NV- WV780, NV465 AG5150, AG5250, NVF65, NV- WV781, NV465 AG5100, AG0, 130, NV10, 20, 7 WV5020, NV450, A, 12, 30, 35 NV33, NV40, 130, NV10, 20, 7 AV5020, NV5025, NV50 NV300, NV430, NV41, 2, 30, 35 NV300, NV431, NV433, NV510, 20, 7 AG5020, AG2200 NV430, NV431, NV433, NV510, 20, 7 NV502, NV5025, NV5025, NV503 NV730, NV306, NV770 AHEAD NV366 NV21 HO, NV 180, NVD48 NV7810, NV8301 NV810, NV8301 NV830, AV830, NV970 AG6024, NVG31, 46, NVL23, 3 NV610, NV850 NV615, NV502 NVG15, NV500 NV645 NVG16, NV500 NV630 NV6300, AH5610, AG6820 AG5800, AH5610, AG6820 AG5800, AH5610, AG6820 NV67	0,450, 1600p 2500p 2500p 2400p 725p 3400p 2250p 4200p 2200p 4200p 2300p 4200p 2300p 4200p 2300p 1700p 1450p 1850p 2400p 25,28, 1600p 1850p 1800p 1850p 2200p 25,28, 1600p 1850p 1800p 1850p 2200p 2250p 2260p 2250p 2260p 2250p 2260p 2250p 2260p 2250p 22600p 2260p

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Model	Price
NVFS 100 NVFS1	5000p 4850p
N.E.C. N9011, 9012, 9013E, 9014E 9015, 9016, 901A, 902A, 90	, 9014G, 33, N9034,
N-2011, 9012, 9013E, 9014E 9015, 9016, 901A, 902A, 90 9040, 9053, 9054, 9055, 90 9065, 9066, 906, 9077, N9096, DX1000, 1600, PX1 N911A, 914C, 915A, 916A, 916A	200 1150p
N911A, 914C, 916A, 916A, 916A, 9120 PVC600, 740, 744, 754, 763 PV2300, 2400, 760, 794, 77	
774	16500
N380, N381, N830, N831, M NB34, N835, N836 82611AH1 (FOR MODEL D DX4000, N9610, NS7000	700p x3000), 3000p
N895 N9052, N9530, DX2000 VCP1	3150p 3400p 1700p
PVC2300, 2400, 740, 744, 7 764 DS6000	1400p 3500p 3500p
D5600 VH3, VH555, VH600, VH70 VH900, VH1000 (ALL MODELS) VH1, VH2A	0, VH844,
VH1000 (ALL MODELS) VH1, VH2A D1000, D1100	1100p 700p 1600p
VII, VII24 D1000, D1100 D1000X, O1500X, D4500, V D1200, D2000X, D5000 VR6460, VR6520, 64 VR60,	
VR6420, VR6520, 64VR60, VR6420 VR6711 4 HEAD VR6440	725p 1800p 2500p
VR6441, VR6540, VR6541, VR6642 DV761, VR512, 522, 5229, VR6760, VR6761, VR6762, 7172	1300p 83SB7.
VN6920	2750p
410V2, 4S811BVR412, 419 6490, 6880	
20DV1, 20DV2, 20RW7, 21 21DV3, 2SB01, 02, 11, 12,	4850p DVI, 21DV2, 30DV2.
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323, 501, 6180, 6182, 6185 6291, VR6293, 6362, 6367, 6470	, 6290, 6487, 6468, 4600p
6542.6643 VR601	5448, 6449, 1250p 1800p
49586, VR6548, VR6648, VR6843 SAISHO	2750p
VR100, 605, 705, 805, 905, 1200, 1600 VR3300X VR3600X VR36	1000, 1100, 1200p 50X.
VR3800 VR3200, VR3500 VR2000, VR3300, VR3600	1400p 1400p 1400p
VR2500 VRS5000X, VX6000A, VXI SALORA	2650p
SALUTA 8500, 6600 SV7300, SV8200, SV8300, SV9200 SV7400, SV8400 SV8100	1600p
SV7400, SV8400 SV8100	1600p 1200p
SV501, SV611, SV6910 SV800, SV810	3450p 1500p 2800p 1500p
SV8100 SV900, SV9900 SV601, SV611, SV6910 SV800, SV810 SV8700, SV8710, SV8750 623N, SV8900, SV6900, S SV8870, SV8910 SV8810, SV8910	V8850, 1750p
SV88110, SV8910 823N, SV8920 923N SV8500, SV8700	3500p
SV8420 SV8620	1550p 2400p 2100p
SV9300 SV8830 SV8720 SV8520	2500p 2200p 2250p 1900p
SAMSUNG SV8500	1500p
SVX301, VB900, 910, VVT 5600, VX510, 511, 520.610 627, 717, 614, 519, 629, 7	510, VT320, 5, VX626. 10, 712, 720,
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VTC5000, 5400, 600, 6000 VPR5000, VTC 1500, VTC 21 VTCM25, VTC2000, 51 5300, 5400,	M 10, 11, 20, 00, 5150,
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VHR3200, 3270, 3100, 311 3300, 3400, 3310, VHRD5 VHR1500, VHR2500, VHR	10, 3150, 00 1500p 3330 2100p
VHR7900	3000p
	2700p R, 240, 250, 7500,
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TLS2000 VHR5300, VHR6500,	4250p VHR7400 4500p 2150p
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VC5000, 6200, 6300, 7700, 7750, 8000, 83 VC793	00 1800p 3000p 6 2200p
7700, 7750, 8000, 83 VC793 VC473, VC785, VC78 VC699, VCA501, VC/ VC585, VC685 VC90ET VC90ET	6 2200p A602 2800p 2000p
VC800, VCH851, VCH VCH882 VCH80, VCH81, VFH VCA33, VCA36, VCA	2700p 815 2800p
VCA46, VCA49	43, VCA44, 1500p 2200p
VCA55, VCA63 VC570	2800p
SONY DSR-19R FOR SL-1 DSR-21 R FOR SL-1 DSR-35R FORC20, C SL-1E2 PM, SLC244 SLF11, 30PF, 35, 60 SLT20ME, 30ME, SL DSR-43R FOR SLC7 SL5100, SL3000 1 P C128E5 SL37E	ME 3100p 3-C9 2600p
DSR-35R FORC20, C SLF1E2 PIN, SLC24F SLF11 30PF 35 60	30, C40, SLF1UB, S, 33E, 34, 44PS, PS, SLK85
SLT20ME, 30ME, SL DSR-43R FOR SLC7	100 1500p RANGE, SL5000,
SL3000, SL8000, SL8	DOGO CLOSE
SLV201, SLV202 SLK95, SLT50ME SLV275, SLV373VB, SLV412, SLV427, SL DSR49R, SLHF100P, SLHF100UB	SLV410, V474 2200p
SLHF100UB SLV656, SLV715, 72	3850p
SLHF100UB SLV656, SLV715, 72! SLV777, SLV815, SL' SLV353UB CCDF340E, CCDF500 CCDV95E, CCDSP5E SLV801, SLV802 SLV310, SLV315, SL' SLV335	V825 4800p 2600p DE. CCDV90E
CCDV95E, CCDSP5E SLV801, SLV802	4800p 3550p
SLV310. SLV315, SL SLV335 SLV210, SLV212, SL SLV285, SLV300 SLV125, 213, 225, 24 SLVX1, 20, 3 SLV363, SLV416, SL	V325, 1600p V270, SLV273,
SLV285, SLV300 SLV125, 213, 225, 25 SLVX1, 20, 3	1150p 52, 255, 262, 280, 1750p
CIVYES	27500
SLVX75, SLVX90, SI SLV282, SLVX30, SI SLHF100P, SLHF100 SLVE7, SLVE8, SLVE	VX95 3000p VX35 2025p UB 3850p
	9 5150p 5150p VE600, SLVE700,
SLVE800 TOSHIBA	<u>3450p</u>
V63 V9680 V8600, V9850, V870	1600p 3400p 0 3000p
V21, V31, V32, V33, V53, V9600	V50, V51, V52,
V55, V57	700p V77, V80, V81,
V71, V73, V74, V75, V82, V83, V841V85, V88 DV90, 96, 97, NM3,	
DV90, 96, 97, NM3, 199, 200, 202, 205, 2 93, 94 V5470, V5480	
V600 V880MS	2350p 2600p
V700G V500G, V509G V9680	2500p 2900p
1/200C 1/201 1/205	V306, 2550p 1700p /140, V210, V211,
	1500p 3850p 1200p 1250p
V312, V322, V412	2600p
V659E V650 V660E	/610UK, V611,
V312, V403T, V4130 V703W, V813G V95G	9200p 5200p 8000p
GRAND	
· Carlo Carlo Carlo Carlo	-900 2329
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ROLLERS/VCR BELT KITS

Model

Price

Model	Price	Model	Price
AKAI	Frice	FVHP20	165p
V\$10, V\$9300, V\$9500, V5 VP7100, VP77	165p	FVHD140, 40, 55, FVHP FVHS10, 30	1, 10, 25, 30, 40, 4000, 1350p
V\$1, V\$2, V\$3, V\$4, V\$5, 1 V\$12, V\$15	165p	PINCH ROLLER ASSEN	
V\$105, 112, 115, 118, 120, 126, 155, 165, 205, 220, 244 V\$247, 248, 250, 512, V\$5), 244, 245.	GHV51, 1221, 1232, 123 1243, 1244, 1245, 1248, GHV1247, 1248, 1250,	.165p
VSX9 VS201, 301, 303, 304, 603,	165p	1295, 1296, 1392, 1393, GHV 1891, 1900, 2145, 3	3000, 3010, 4400,
VSP82, VP58, VP82 VS125, VS155, VS165, VS2	165p 20, VS240, VS250.	4410. 51, 8000, 8200. G 8430GHVP1240, 1241	HV8210, 8215,
V\$512 V\$22, 23, 25, 35, 37, 38 , 53	165p . 66, 75, 422, 425,	1291, GHVP1295, 1296, 4200, 4300, 4301, 4305, 4315, 4316, 4320, 4321,	VCP4000, 4100, 4130, VCP4306, 4310, 4311,
426, 427, 462, 465, 467, VS485, 765, 788, 767, 788, VS477, VS4850	865. 867, 965, 967,	GSE1290, 1291, 1295, 1 1910, 20005, 2000	1296, 1297, 1891, 165p
VSA77, VSA650, VSF10, 11, 12, 15, 180, 190 221, 222, 230, 240, 30, 33	. 200, 210, 220,	HITACHE VT7, 11, 14, 15, 17, 18,	
VSF330, 4, 500, 550, VSP8	105-	39, 88, 330, 680, 4200, V75000, 5030, 5500, 65	
VSF260, 261, 262, 265, 270 290, 340, 350, 410, 420, 434 VSF441, 440, 450, 456, 480	, 274, 275, 280,	8300, 8500, 8700, 930, 1 VM600	165p
560, 580, 590, 599, 600,	, 430, 437, 010,	VT8, 52, 57, 61, 62, 63, 110, 111, 113, 115, 118, VT120, 122, 125, 128, 1	a state of the sta
VSG20, 21, 23, 24, 25, 30, 3 55, 60, 64, 65, 70, 73, 74, 73 VSP110, VSX560, VSX580 V\$17, 20, 22, 23, 24, 25, 26	5. 165p	168, 170, 175, 220, 225, VT250, 255, 258, 260, 4	
55, VSA77	775p	415, 416, 418, 420, 425 VT426, 428, 430, 431, 4	35. 438, 450, 498, 510,
PINCH ROLLER ASSEMBL' VS422, 425, 426, 427, 482, 765, 766, 767, 768, 865,			40, 545, 546, 548, 570,
867, 965, 967, VSA650, VS 180, 190, 200, 210, 220,	F10, 11, 12, 14, 15,	575, 576, 580, 585, 588 VT640, 830, VTF660, 66 780, 785, 860, 861, 865,	5, 70, 770, 774, 775,
221, 222, 230, 240, 30, 300, 330, 4, 500, 510, 600,		VTL30, 1000, 2000, VTL 622, 625, 626, 630, 635	
VSR110, VSX100, 400. 450 PINCH ROLLER ASSEMBL	1	VTM636, 640, 645, 646, 727, 728, 730, 731, 735,	
VSS99 ALBA	165p	821. 822, 825, 830, 831,	
VCR3000X, VCR4000 VCR5000, VCR6000 VCR161, VCR222	165p 165p 180p	VTM835, 838, 840, 841, 925, 930, 931, 935, VTS80, 85, 890, 895VM	and the second second
VCR7000, VCR7800, VCR80 VCR8800		3280, 500, VMS7200 VT3000	165p 165p
VTV10 AMSTRAD	165p	VT410, 420, 428, 430, 4 530, VTF770, 780,	50, 498, 518, 520, 622.
VCR1000, 2000, 4500, 4600 6100, 6200, 8600,		PINCH ROLLER ASSEN	ABLY
VCR8602, 8603, 8604, 8700 8804, 9000, 9005,		VTF360, 355, 350, 351, 355, VTF360, 365, VTM140,	250, 255, 260, 265,
VCR9244, 9340, DD8900, 8 TVR1, 2, 3, 4 VCR7000	165p 165p	211, 212, 215, 220, 221, VTM230, 231, 235, 284	
DD8900, DD8904, VCR6000 8600, 8502, 8603, 8604,	6100, 6200,	HINARI V20H, VXL5, VXL6, VX	
VCR8700, 6800, 900>9, 914 9340	700p	H13V, VTV100, 200 VXL2, VXL3	165p 165p
PINCH ROLLER ASSEMBL		VXL4, VXL20, VXL35 VTV100, VXL10, VXL11 VXL90	165p I, VLX9, 700p
TX3650, UF20, VCR3000, V VCR9500 PINCH ROLLER ASSEMBL	300p	PINCH ROLLER ASSEM	IBLY
2554966 DD9900, 9904, TX3650, UF	20, 22, 24,	J.V.C. HR2200, 3300, 3330, 33	
VCR3000, 3002, 9500 VS1004 VS1104	165p 165p	7700	185p 50, 7600, 7610, 7650,
FERGUSON 3V00, 3V01, 3V15, 3V22, 3V		7655 HRD110, 111, 120, 121,	165p 140, 141, 142, 143,
8900, 8901, 8902, 8903, 89 8912, 8922, 8923, 8924, 89 3V29, 3V30, 3V31, 3V32, 3V	25, 8929 165p	150, 152, 156, 157, 158, HRD160, 220, 225, 250, 566, 725, 755, HRP50, 5	257, 445, 455, 565,
8933, 8940, 8941, 8942 3V35, 3V38, 3V38, 3V39, 3V	165p /42. 3V43, 3V44,	BRS611, 811 HRD520, 540, 550, 560.	165p 580, 600, 610, 620,
3V45, 3V48, 3V49, 3V53, 31 3V57, 3V58, 3V59, 3V65, F	/10. EVIL EV12.	637, 640, 641, 650, 660, HRD670, 720, 730, 740,	770. 820. 830, 840,
FV14, 8943, 8944, 8945, 89 3V52 8950, 8951, FV10B, 11R, 13	165p	860, 870, 880, 910, 960, HRD980, HRDX20, 22, 3 215, 300, 315, 316, 318	25, HRJ200, 205. 210,
22L, 26D, 31R, 32L, FV33H,	395, 41R, 42L,	HRJ400, 405, 407, 410,	411, 415, 418, 507,
50B, 51R, 52L, VC141L FV37H, FV44L, FV46T, FV4 FV57H	165p	600, 605, 610, 615, 715, HRJ97, HRS4700, 5800 SR3200, 330, 368	186p
3V35, 3V36, 3V38, 3V39, 31 8944	1100p	HRD170, 171, 180, 210, 320, 321, 330, 337, 350,	
PINCH ROLLER ASSEMBL 3V42, 3V43, 3V44, 3V45, 3V 3V55, 3V56, 3V57, 8945, BS	/48, 3V53, 3V54.	HRD370, 400, 430, 440, 700, 750, 950, HRS5000, 5500, 8000, 9	A CONTRACTOR OF A CONTRACTOR
PINCH ROLLER ASSEMBL	350p	9060, BR\$600, 605, 747, 777,	920, 925 165p
PINCH ROLLER ASSEMBL FV31R	165p	HRS10 BP5000, HRD110, 111,	120, 220, 225.
FV41L, FV42L PINCH ROLLER ASSEMBL 3V58, 3V59, 3V64, 3V65, FI		455 PINCH ROLLER ASSEM HRD140, 141, 142, 143,	
20, 21, 22, 26, 30, 32, 33 FV39, VC141L	875p	160, 565, 566, 725, 755, HRP50	1350p
PINCH ROLLER ASSEMBL FV43H, FV44L, FV45X, FV4	5T 700p	PINCH ROLLER ASSEM HPD 1520, \$10, 520, 52	ABLY 1, 522, 525, 527, 560,
PINCH ROLLER ASSEMBL FV61, FV62, FV67, FV68, FV FV74, FV77	/ /70, FV71, FV72, 775p	600, 610, 620, 637, 641, HRD650, 720, 830, 840, HRS5800	910, HRJ205, 350p
PINCH BOLLER ASSEMBL		PINCH ROLLER ASSEM	ABLY
FVHP420, 520, 530 FVHP615, 618, 620, 622, 71	165p 0, 711, 715, 716,	190, 210, 211, 217, 227 HFD230, 271, 300, 310,	320, 321, 330, 337,
720, 721, 722, 725, 730, FVHP810, 830, 840	165p	350, 400, 430, 440, 441, HRD470, 500, 530, 700,	750, 950, HR\$5000.
FVHP905, 906, 907, 908, 91 918, 970, 975, 980, 990, FV	0, 911, 916, 916, HP 5000, 5006, 165p	5500, 9000 PINCH ROLLER ASSEM HRD540, HRD550, HRD	
5050, 5075, 5100 VBR330, VBS3500, 7000, 7 9000, 9900		HRD860, HRD960 PINCH ROLLER ASSEM	700p ABLY
FVHD230, 250, 270, 370, 21 250, 300, 310, 1100,		HRJ600, HRJ605, HRJ8 HRS9200	
FVNP1200, 1250, 130, 132, 1410, 1440, 1500, 200,	1340, 1340, 1400,	MATSU! VX6000, 730, 735, 750,	
FVHP320410, 420, 430, 440 FVSP290S, 495, 2905 FVHD140, FVHD40, FVHD5	165p	VS888 VX1000, VX2000, VX25 VX6000A	165p 500, VX3000. 180p
TYND ING, FYNDAU, FYNDS	3, FYRE 1, FYRE10,	VX6000A MITSUBI5HI HS12, 5300, 5424, 5600	
GRANDAT	A LTD	4512, 5300, 5424, 5800 27, 31, 32, 41, 51, 52, 8 HSE12, 16, 17, 21, 22, 3	2.
Tel: 0181-90	0 2329	82. HSM1000, 110, 120 0, 16, 170, 190, 210, 23	, 15 , 25, 250, 27, 33, 34.
E DADA OF	0400	35, 36, 37, 370, 380, 45	,~3U, 3

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T410, 420, 428, 430, 450, 498, 518, 520, 522 Tra10, 220, 222, 230, 450, 248, 518, 520, 522, 30, VTF770, 780, TMS98, 622, 722, 740, 748, 753 650p NNCH ROLLER ASSEMBLY TF150, 153, 150, 155, 250, 265, 80, 285, 350, 351, 355, 7TF360, 365, VTM140, 141, 145, 145, 210, 11, 212, 215, 202, 221, TM230, 231, 235, 284, VTS330 165p IMA B1
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875p 700p 8750 x6000, 730, 735, 750, 755, 765, 800, 850, \$888 165p 180p MITSUBISH HS12, 5300, 5424, 5600, HSB11, 12, 16, 21, 27, 31, 32, 41, 51, 52, 62, HSE12, 18, 17, 21, 22, 27, 31, 32, 41, 51, 52, 82, HSM1000, 110, 120, 15 0, 16, 170, 190, 210, 22, 25, 250, 27, 33, 34, 35, 36, 37, 370, 380, 45, 450, 5 4, 55, 556, 57, 58, 59, 68, HSMS2, 9, HSS11, 14, 15, 17, 19, 25, 5500, HV F125, 150, 303, 85, SV8900, 8930 S50p

INICH ROLLER ASSEMBLY PART NO: 948D020010 NSE11, 12, 16, 17, 21, 22, 27, 31, 32, 41, 51, 52, 5300, 5424, 5600, HSB11, 12, 16, 21, 27, 31, 32, 41, 51, 82, 82, HSM 1000, 110, 120, 150, HSM16, 170, 18, 190, 210, 23, 25, 260, 27, 30, 33, 34, 35, 36, 37, 370, 38, HSM380, 40, 45, 450, 80, 54, 55, 555, 57, 58, 59, 60, 68, HSM52, 9, HSM21, 18, 19, 2, HSS111, 12, 14, 51, 17, 19, 21, 25, 5600, HWP125, HVF150, 303, 85, SV8900, HS301, HS302, HS306, HS700, HS301, HS302, HS306, HS306, HS700, HS301, HS319, HS317, HS308, HS317, HS308, HS307, HS318, HS319, HS337, HS308, HS307, HS308, HS300, 10. HSB20, 30. HSE 10, 40. 30.70 165; NATIONAL PANASONIC NV100, 180, 300, 330PX, 332, 333, 340, 366, 600, 688, 77, 788, 3321 AG6010, 6015, 6100, 6200, 6400, 6800, 1657 1650 750 156 p 7250 150 a60, 456, 470, 480 7250 150 a60, 456, 470, 480 7250 150 a50, 570, 780, 780, 810, 830, 550, 870. 730 270, 780, 850, 850 7300 700, 780, 850, 850 NV300, 7200, 7800, 8500, 850 158, 3170, 8200. 8300, 8400, 8500, 8500 1500 NV300, 7800, 7800, 1500, 1500, 2100, 2200, 6500, 6510, 8110, 8100, 1650, 9100, 2200, 6500, 9100, 2200, 6500, 9100, 7810, 7810, 7810, 7810, 7810, 7810, 7810, 7850, 7810, 7850, 7810, 7850 7450 NVR3, NVG120 NVG9, NVG120 AG6840, 6720, 7150, **7330**, 7350, 7355, 7850, NVH85, 75, NVJ30, NVL20, 23, 25, 28, NVG300, NVF65, NVF70, NVF55 INVFS 100, NVG 19, 20, 25, 33, 40, 50, NVR010 1850 100, NVG 19, 20, 25, 33, 40, 50, NVV8000 NV048, NVD80, NVG21 NVG25 165p NV37002X NV5D40, NVHD101, NCHD90, NV5D30, NV5D40 NV5D40 1125p PINCH ROLLER ASSEMBLY AG5150, 5750, 5700, 6024, NVD38, 49, 50, NVF55, 63, 70, 75, 77, NVF51, 100, 200, 88, 90, NVG 19, 20, 21, 22, 52, 28, 300, 33, 40, 45, 46, NVG50, NVH65, 75, 77, NVJ30, 33, 35, 37, 40, 42, 45, 47, NVE5, 25, 25, 28, NVW 1 360p PINCH ROLLER ASSEMBLY N.E.C. N.E.C. N830, 831, 832, 833, 895 165p PVC2200, 2400, 740, 744, 746, 760, 764, 765 165p DX1000, 1600, 1800, 2000, 3000, N9012, 9013, 9014, 9016, 9033 N9034, 9053, 9054, 9055, 9056, 9066, 9096, 9110, 9120, 9510, 9820, N9530, 9610, PX 1200 185p D542060, DX1000, N9077 185p N.E.C. D\$6000G, DX4000, N9077 NS7000 165p ORION VH1, VH2 165p VC150, 180, VH3, 33, 200, 201, 205, 212, 250, VH1, VH2 (14) V(150, 180, VH3, 33, 200, 201, 205, 212, 250, 254, 278, 300, 303, 312, VH404, 455, 700, 702, 712, 770, 780, 844, 950, 1000, 2948, 3330, 312, VHE2A, VF2A, WEA, 303, 312, VHE2A, VF2A, WEA, 301, 301, 300, 358, 360, 362, 400, 416, 512, VH500, 520, 532, 535, 536, 600, 630, 635, 640, 666, 730, 735, 744, 774, 790, VH500, 520, 550, 828, 833, 900, 830, 940, 942, 974, 1012, 1040, 1050, VH1600, 1070, VH1100, 1120, 1204, 1440, 1500, 1660, 1800, 2004, VH1251, 1230, 2404, 2004, 2500, 2500, 2700, VH2560, 2370, 3950, VH2561, 2320, 2202, 225, 245, VR821, 925, 1032, 2349, 2559, 2957, 2967, 2966, 2979, 2983, VTV300, VXL20, 25, 30 VRL20, 75. 30 PHILIPS VR6460 VR6920 VR2020, VR2021, VR2022, VR2023, VR2024 VR6711 VR6540 165p 165 165p 165p DV856, 586, VR702, 703, 6485, 6585, 6589 5785, 6880, 6948 161 VR445, VR6642, VR6542, VR6643, VR6843, 1650 VR63-9, VR58-32, VR58-32, VR58-32, VR58-33, VR58-33, VR58-33, VR58-39, S42-59, 2000, 232-42, 2330, 2300, 2330, 2300, 2330, 2300, 2330, 2300, 2330, 2300, 2330, 2300, 2330, 2330, 2330, 2330, 2330, 2330, 2330, 2330, 2330, 23300, 2330, 2330, 2330, 2330, 2330, 2330, 2330, 2330, 2330, 23 185p PRESSURE ROLLER ASSEMBLY PS403-4205 DV196, 150, VR21, 215, 212, 212, 223, 266, 291, 292, 311, 312, 313, VR3210, 221, 322, 322, 323, 33580, 466, VR201, 202, VR201, 322, 303, 306, 6180, 612, 6185, 625, 6290, 612, 6185, 625, 6290, 612, 6185, 6290, 612, 6185, 6290, 612, 6185, 6290, 612, 6185, 6290, 612, 6185, 6290, 612, 6185, 6290, 612, 6185, 6290, 612, 6185, 6290, 612, 6135, 6290, 612, 612, 612, 6290, 612, 613, 620, 612, VR6291, 6293, 6362, 5367, 6390, 6391, 6393, 6467, 6468, 6470, 6581 VR6570, 6581VR6670, 6678, 6710, 6760. PR38 165p VR501 PR38 1 SANYO VHR1100, 1110, 1150, 1200, 1300, 1500, 2100, 2300, 2370, 2500,

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 3800, VHRDS00, 7000
 1350p

 PINCH ROLLER ASSEMBLY
 1350p

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 1350p

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 VC200, 381, 383, 384, 385, 386, 388, 390, 333, 800, 230, 800, 7300, 775, 785, 772, 581, 582, 583, 584, 585, 584, 1, VC5F3, VC5V20E, VCA1031
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 180p
 SAMSUNG SV716, 717, VB510, 520, 610, 616, 617, 619, 520, 626, 627, 629, 900, V910, V1510, 520, 611, 616, 621, 626, 900, V310, V1310, 520, 616, VX617, 619, 626, 627, 629 VX701, 971, 8220, V88225, V1710, 713, 750, 770, 971, 8220, V88225, V1710, 713, VX720, 730, 750, 770, 790, 825, 8225, 970, 971, 972, 8220, PX800, 981, 862, S19000, 9001, SX7120, 7121, 7220, 7221, 7230, S72301, V4720, 7121, 7220, 7221, 7230, SX7301, VK8220, SA/301, VK520, VPX31 165p VX3880 165p VX3880 2321, VX380 2321, VX30, SV80, SX3230, 3231, 3260, 3261, VX30, 31, 32, 356, 337, 320, VXX321, 326, 330, 331, 36, 337, 350, 351, 356 165p PX990, 991, 992, \$11230, 1240, \$VX4000, X1930, 351, 352, 311230, 1240, 3VA4000, 503, 504, 500, SX1230, 5X1230, 5X1231, 1260, 1261, 1586, V11560, VPK43, VX1230, 1260, 1261, VX1560, 1561, 165p 1850_ SONY
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 SLC5, 6, 7, SL3000, 8000, 8080, 8200, SLJ 10, SLC54, 20, SL300, 8000, 8080, 8200, SLJ 10, SLC54, 20, 24, 30, 33, 44, SL4F100, SLF1, 11, SL7200, SLF4005, SLF300, SLF1, 115, SL7800, SLF4005, SLF300, SL7300HE, SLT500HE

 SLK88, 95, SL730ME, SLT500HE
 165p SL7201, 802, 201, 302, 401, 402, 801, 602
 002 103p SLV210, 270, 273, 275, 300, 353, 373, 410, SLV210, 270, 275, 275, 370, 353, 373, 410, 415, 474, 655, 715, SLV257, 777 185p SLV275, 282, 315, 325, 353, 363, 373, 410, 415, 416, 474, 625, 656, SLV715, 725, 727, 757, 777, 815, 825, SLV230, 50, 55 185p SLV125, 213, 225, 252, 255, 262, SLV20, 20, 3 185p 20 3 1650 20,3 165; SLV215, 216EE, 275, 282, 315, 325, 353, 383EE, 373, 333, 410, 415, SLV416EE, 474, 494EE, 555UC, 559, 575UC, 579, 585HF, 589HF, SLV50W, 615, 625, 656, 676UC, 688HF, 656HF, 715, 725, 727, 757, SLV707B, 777, 815, 825, SLV7, 8, 9SLVX30A5, SLVX53AF, SLVX50A5, SLVX50H, SLVX65BF, SUV50A5, SLVX50H, SLVX65BF, SUV50A5, SLVX50H, SLVX65BF, SUV50A5, SLVX50H, SLVX65BF, SLVX50A5, SLVX50H, SLVX50BF, SLVX50A5, SLVX50H, SLVX50BF, SLVX50BF, SLVX50F, SLVX50BF, SLVX50BF, SLVX50F, SLVX50BF, SLVX50BF, SLVX50F, SLVX50BF, SLVX50F, SLVX50F, SLVX50BF, SLVX50F, SLVX50F, SLVX50BF, SLVX50F, SLVX50F, SLVX50BF, SLVX50F, SLVX5F, SLVX5F, SLVX5F, SLVX5F, SLVX5F, SLVX5 1250p PINCH ROLLER ASSEMBLY PART NO: \$37277701 \$1,7210, 212, 270, 273, 275, 285, 300, 310, 335, 425, 427 \$100, 212, 270, 273, 275, 285, 300, 310, 335, 2407, 370, 3700, VHR3100, 3200, 3300, 3310, 3400, 3700, 3800, VHR500, 700 1350p PINCH ROLLER ASSEMBLY

Model Price SL100, 200, SLC20, 30, 33, 34, 40, 44, 80, 88, 8, SLF1, 70, 25, 30, 35, 45, SLF80, 65, 73, 90, SL550, SLT0, 30, 50, SLS45, 55, SLO1700, SL5550, SLT0, 30, 50 PINCH ROLLER ASSEMBLY VCR BELT KITS MK41 V GR DELL AKAI VP7100, V\$3900, V\$9500, V\$9700, V\$9800 120p V\$1, V\$2, V\$3, V\$5, V\$12, V\$15, VP85100p V\$10 V\$10 V\$20, V\$105, 112, 115, 116, 120, 125, 126, 155, 165, 205, 220, V\$24, 240, 244, 245, 247, 248, 250, 512, 515, 516 300p VS22. VS23, V525. V535, VS37, V538. V553, VS55, VS66 VS4, VS6, VS8, VS9 VSA77 VSS99 80p 120p 140p 105p ALBA
 VCR40000
 130p

 VCR5000, VCR6000
 103p

 VCR161, VCR222
 100p

 VCR3000X, VCR4000X, VCR3000, VCR30000, VCR30000, VCR3000, VCR3000, VCR30000, VCR3000, VCR30000, VC AMSTRAD TVR123, VCR46C0, VCR4700, VCR5200 110p VCR3c00 1109 VCR1000, 2000, 6000, 5100, 6200, 8600, 8602, 8603, 8604 VCR500, 8704, 8714, 8800, 8804, 9000, 9005, 8244, 9340, DD8900, DD8904, TVR4 1109 TX3560, UF20, 22 24, VCR3000, 3002, 4000, 8600 756 76p 105p VS1004 VS1004 SLAUPUNKT RTV100 RTV202, RTV222, RTV224 RTV202, RTV220 RTV322, RTV248 STV326, 307, 309, 310, 311 200p 90p 150p 1000
 RTV2322, RTV248
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 RTV306, 307, 309, 310, 311, 312, 328, 414, 434, 444, 707
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 RTV211, RTV214
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 RTV211, RTV214
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 RTV315, RTV32657p

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 FT

 RTV317, RTV333, RTV338, RTV404, BTV404
 FT
 135p 140p 60p RTV424 85p
 RTV4/24

 FERGUSON

 S292, 3V00, 3V01, 3V16, 3v22, 8900, 8901,

 S902, 8903, 8904,

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 3V23, 8930, 8931, 8933,

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 120p 65p 75p 75p 3V31, 3V32, 8941, 8942 3V35, 3V36, 3V38, 3V39, 3V49, 8943, 76p 3V42, 3V43, 3V44, 3V45, 3V48, 3V53, 3V54, 3V55, 3V57, 3142, 3143, 3144, 3145, 3146, 3133, 3154, 3155, 3157, 8945, 8947, 8948, 559, 3158, 3143, 3144, 3159, 3164, 3165, 8950, 8951, FV10, FV11, FV12, FV13, FV14, FV20, FV21, FV22, FV26, FV32, FV39, VC141L 55p FV31R 110p 110r FV61L, FV62, FV87, FV68, FV70, FV71, FV72, FV74, FV77 50r FV43H, FV44L, FV46T, FV57H FV37H 100p 80p FV3/H 3V52 FV41R, FV42L FIDEUTY HQS200, VCR1000, 2000, 600, 6000, 6100 VCR100 55p 100p 180p 160p 100p VTR1000, VTR1001 TX3650, VCR3000, VCR3002,
 TX3850, VCR3000, VCR3000, 75p

 VCR9500
 75p

 FISHER
 245p

 VBS5000
 245p

 VBS5000
 245p

 VHP305, FVHP300, FVHP420
 60p

 FVHP816, BIG, 820, 822, 710, 711, 715, 720, 721, 712, 720, 712, 712, 720, 712, 715, 720, 712, 715, 720, 712, 715, 730, 75p
 75p

 FVHP305, 806, 907, 908, 910, 911, 915, 918, 918
 75p
 75p

 VBS3900
 100p
 75p

 FVHP305, 905, 907, 908, 910, 911, 915, 918, 918
 918
 75p

 VBS3900
 75p
 74HP305, 900, 900, 910, 911, 915, 918, 918
 918

 VBS3900
 100p
 75p
 74HP30, 750, 74HP40, FVHP35, FVHP1F, FVHP10, 100, 1200, 1200, 1200, 1300, 320, 2000, 210, 230, 300, 310, 320, 2000, 1410, 1440, 1500, 2000, 200, 201, 250, 300, 310, 320, 2000, 5003, 5050, 5075, 5100, 975, 980, 300
 85p

 FVHP5000, 5003, 5003, 5075, 5003, 5075, 5100, 975, 980, 301
 95p
 95p

 GEEC.
 150p
 VCR9500 75p G.E.C. 150p 100p 80p 4005 V4004 V4007
 V4007
 80p

 GOLDSTAR
 GHV1221, 1232, 233, 1240, 1241, 1242, 1243, 1243, 1243, 1243, 1243, 1244, 1245, 1260, 531, 630, 6310, 8216, 5200, 8310, 8216, 5200, 8310, 8216, 5200, 8301, 8216, 520, 1269, VCP4000, 4200, 4300, 4301, 4315, 4320, 4321, 4325, 4326, 4304, 4311, 4315, 4320, 4321, 4325, 4328, 4326, 4314, 4315, 4320, 4321, 4325, 4328, 4326, 4310, 4311, 4315, 4320, 4321, 4325, 4328, 4320, 4311, 4315, 4320, 4321, 4325, 4328, 4326, 4310, 4311, 4315, 4320, 4321, 4325, 4328, 4326, 4310, 4311, 4315, 4320, 4321, 4325, 4328, 4326, 4310, 4311, 4315, 4320, 4321, 4325, 4328, 4326, 4321, 4325, 4328, 4326, 4321, 4325, 4328, 4320, 4321, 4325, 4328, 4326, 4321, 4325, 4328, 4321, 4325, 4328, 4321, 4325, 4328, 4321, 4325, 4328, 4328, 4321, 4328, 4388, 4388, 4388, 4388, 4388, 4388, 4388, 4388, 4388, 4388, 4388, 4388, 4388, 4388, 4388, 4388, 4388, 4388, GRANADA VHSVI, VHSAH3 VHSVI, VHSM1, VHSXH1 VHSVH2 VHSDH3, VHSCH 1 VHSDP1 VHSDS2 VHSAY3 VHSAY3 VHSEY2, VHSEY2 VHSEY2 VHSC1 GRANADA 100p 60p 50p 150p 135p 110p 125p 125p 125p 100p 70p 100p

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VCR	BELT KITS/	VIDEO LAMPS	& S	WITCI	HES	
Model Price	Model Price	Model Price Mode		Price	Model	Price
GRANADA VHSDP1, VHSFV2 80p	323, 535, VR20DV1, 20DV2, 20RW7, 21DV1, 21DV2, 21D, V3, 25801, 25802, 11, 12, 302,		Price	(SWITCHES	
VHSTJ1, VHSTJ2 150p VHSTJ3 65p VHSWJ1, VHSWJ2 120p	303, 305, 31DVI, 31DV2, 31D, V3, 3SB11, 3SB12, 3SB13, 72SB8, VR30DV2, 35B02, 35B03, 63587, 715B4, 715B5, 71588,	Code UNIVERSAL VIDEO LAMP 9V VL01	250	GRUNDIG		
VHSXJ3 85p VHSYJ2 80p VHSFJ2 140p	VR865B2, 915B2, 925B3, VR6180, 6182, 6185, 6285, 6290VR6291, VR6293, 6362, 6367,	80mV (310mm WIRES)	-	PART NO: USED ON:	29703, 29102 C7500,C7500TT,C85	00.C8502.
VHSFS1, VHSFS2 130p VHSFG1, VHSFG2, VHSFG3,	VR6390, 6391, 6393, 6467, 6468, 6470, 6581, 6570, 6581, 6670, VR6676, 6710, 6760, 6761, 6762, 6870, 6970, 6975, VR68SB4, 86SBI,	PANASONIC VIDEO LAMPS VL02	30p		C8712.C8714,C8894	,M68-190,
VHSFG4, VHSF83 180p GRUNDIG MVS400, 440, VS400, 410, 415, 435, 440, 441,	92553 85p VR44599, VR4458920, VR4458922, VR6443,	SHARP VIDEO LAMPS VL02	30p		M68-190/99,M70-19 ST66-1602,T55-340,	
450, 458, 460 55p V\$180, 200, 220, 226, 262, 265, 267, 2X40800, 0850, 0880,	6843, 6843, VR6943 100p VR3260, 6349, 6448, 6449, 6548, 6648, 4958620, 6443695, 49586 110p		135p	PRICE:	140p	
1600, 2000, 2080, 2200, 2280, MVS200RC 90p	4958620, 6448695, 49586 110p VKR6850, VKR6855 70p VR501 110p	VIDEO LAMPS AIWA, AKAI, ALBA, AMSTRAD, VL05 1	100p	MATSUI/SAIS	HO MATSUI-2190, SAIS	HO-
VS150 180p VS310, 311, 315, 320, 326, 340, 345, 380, 385, 445 85p	VKR6800, VKR6810, VKR6820 70p SE4104, VR231, 2310, 2319, 231, 232, 2329,	BLAUPUNKT, FERGUSON,			PST21 30TX	
V\$150 75p LC290N, LC295SN, SVS 180, VS 170 70p V\$ 160, BARCELONA, FLORENZ, GV4000,	237, 23, 241, 2410, 2419, 242, 243, 245, 2469, 247, 2479, 251, 252, 256, 257, 258, 33 , 19, 332, 3329, 333, 337, 339, 3419, 342, 343,	FIDELITY FISHER, FUJITSU,		PRICE: PHILIPS	140p	
4000, 4001, GV4002, 400, 401, 4010, 402, 403, 404, 405,	3469, 347, 3479, 35, 1, 352, 357, 358, 422, 4229, 432, 437, 442, 4229, 432, 437, 444, 44,	FUNAI, G.E.C., GOLDSTAR, GRANADA, GRUNDIG, HINARI,		USED ON:	K30, K35, K40, KT3,	KT4
406, 407, 4092, 410, GV411, 412, 414, 415, 416, 417, 4192, 4200, 420, 430, 434, 435, GV437, 440, 450, 4592, 460, 464, 470, 500,	5, 4159, 447, 4479, 451, 452, 457, 458, 459, 512, 522, 5229, 6379, 642, 547, 722, 7229, 723, 7379, 747, 8389, 948, 9489 70p	HITACHI, ITT, JVC (HRD		PRICE:	£0.95	
501, 5050, 5095, GV5105, 511, 530, 5395, 540, 560, 5695, MV4005, 4105, SE4100, 4104, 4120, 5102,	SAISHO VR2000, VHL3 90p	SERIES), MATSUI, MITSUBISHI,		PART NO:	(POWER SWITCH +	REMOTE
5104, 5106, TVR37001 70p HINARI	VR3800, 3200, 3300, 3500, 3600, 3650, VRS4400, 5000 75p	NEC, ORION, NATIONAL, PHILIPS, SAISHO, SALORA,		USED ON:	SWITCH) KV1612, MK1, KV16	12. MK2.
VXL2 80p VXL7, VXL8, VXL9, VXL10, VXL11, VXL19, VXL90, VCR34, VTV 100,	VR3400 100p SAMSUNG SV716, 717, V1616, V~621, V1626, VX618,	SAMSUNG, SANYO, SHARP,		0000 011.	KV1614, KV2052, KV	/2056,
200 180p VXL4, VXL35, VTV300 70p	VX517, VX619, X626, VX627, VX629, VX714 85p	SIEMEN, SONY, TELEFUNKEN,			KV2062, KV2068, KV KV2216, KV2252, KV	
VXL5, VXL6 160p VXL3, VXL20 90p HITACHI	V8520, 510, 610, 616, 617, 619, 520, 626, 627, 629, V1510, 520, V1611, 616, 621, 626, VX510, 511, 520, VT320, 5600 100p	THOMSON, TOSHIBA AKAI, GRANADA (VHSTJ2), VL01	25p		KV2704 KV2705,KV	
VT11, 14, 16, 17, 19, 33, 330, 34, 35, 350, 38, 39, 88, 165, 5030 85p VT5000, VT5500, VT18 120p	VX510, 511, 520, VT320, 5600 100p VB900, VB910, V1900, V1510 110p PX980, 981, 982, SE9001, SV9001, SVX307,	HITACHI (VT3000), ITT (VR3912,	zəp		KV2752PE3, KX20P KX20PS2, KX27PS1	
VT7000, VT8000, VT8030, VT8040, VT8300, VT8500, 8700 60p	319, 322, VB750, 770, 8220, 8225, V1770, 790, B220, 8225, VK8220, VPX31, VX750, VX770,	VRP3833), JVC (HR2200, 3300,		PRICE:	1.50p (POWER SWITCH +	REMOTE
VT680, VT6500, VT6800, VT9300, VT9500, VT9700, 9900 75p VT52, VT57, VT61, VT62, VT63, 64, 65, 85, 86,	790, 8220, 8225, SE9000, 9001 90p \$vX301, 303, 305, SX7301, V8710, 971, V1710, 730, 750, 970, VX710, 712, 720, 730,	3330, 3660), MITSUBISHI		PART NO:	SWITCH	REMOTE
640 90p VT3000 120p VT100, 110, 111, 113, 115, 118, 120, 125, 128,	970, 971, 972 100p VX9880 110p	(HS200), TELEFUNKEN (VR510, 519, 610),THOMSON (VK300,		USED ON: PRICE:	KV2022, KV2024	
130, 135, 138, VT145, 150, 168, 770, 175, 220, 225, 250, 255,	SX7121 95p SANYO	305, 306, 3301), FERGUSON		PART NO:	(POWER SWITCH 2	
258, 260, VTL30 90p VM500 VM600 90p J.V.C.	VTC5000, 5150, 6000, 6500, VTCM10, 11, 20, 21, 30, 31, 50 75p VTC5300, VTC5350, VTC5400,	(3V00, 16, 22, 24, 3292, 8900,		USED ON:	KV1400, KV1440, KV KV2060	V2040,
HR3300, HR3330, HR3360, HR3660, HR4100 130p	VPR5800 80p VTC5500 70p	8901, 8902, 8903, 8909, 5912, 8922, 8925)		PRICE:	125p	
HR7200, HR7300 70p HR7350, HR7600, HR7610, HR7650. HR7655 75p	VTC9100, VTC9300 140p VTC1100, 1300, 1500, VHR1100, 1110, 1150,	BLAUPUNKT,ORION (VH1, 2A),VL02	30p	PART NO:	(POWER SWITCH 2 REMOTE SWITCH)	1 mm +
HS7700 75p HRD110, 111, 120, 121, 220, 225, BP5000 90p	1200, 1300, VHR1500, 2370, MVR220 90p VHR2100, VHR2300, VHR2500,	NATIONAL (NV200,2010, 3000,		USED ON: PRICE £2.00	KV2020	
HRD140, 141, 143, 150, 152, 157, 158, 160, 190, 250, 257, 310, HRD455, 565, 566, 725, 755, HRP50 55p	VHR2700 100p VHR3100, 3110, 3150, 3300, 3310, 3400,	7000, 8150, 8200, 8400, 8600,		PART NO:	2 PIN (FUNCTION S	WITCH)
HRD170, 171, 180, 210, 21 1, 217, 230, 300, 320, 321, 330, 337, HRD350, 370, 400, 430,	3500, 3700, 3800, VHRD500, 700, TLS1000, TLS1001 80p VHR120, 130, 14, 141, 143, 14, 150, 151, 153,	8610, 8620), SHARP (VC2300, 6000, 6200, 6300, 7300, 7700,		USED ON:	KV1612, MKK, V161 KV2052, KV2056, K	
440, 44 1, 500, 530, 700, 750,950, HR\$5000, 5500, 8000, 9000, BR9080, BR\$600, 605, 920, 925 50p	154, 15, 16, 171, VHR194, 220, 23, 235, 240, 244, 250, 251, 274, 297, 310, 330, VHR335,	8300)			KV2215, KV2216, K	V2252,
HRD227, 520, 52 1, 522, 527, 600, 610, 620, 637, 641, 650, 830, HRD840, HRDX20, 22, HRJ200, 205, 300, 305,	290, 4100, 4105, 4150, 4200, 430, 4300, 4350, 474, VHR4770, 5080, 5100, 5200, 5300, 5350, 5700, 6850, 7100, VHR7200 7250, 7260, 7300,	AKAI IVS10), GRANADA VL06	40p		KV2256, KV2704, K KV2706, KV275PE3,	Second States and the state
SR330, HRS10 80p HRD840, 550, 560, 580, 590, 640, 660, 670,	7400, 7500, 7520, 7530, 7530, VHR7540, 7700, 774, 7800, 7810, 8000, 8100, 8200,	(VHSXJ3), TT (VR3993,3994),			KV2756PE3	35p
720, 730, 740, 770, HRD820, 860, 870, 880, 910, 960, 980, HRDX20, 25, HRJ2 10, HRJ215, 315, 316, 318, 400, 405, 407, 410.	8250, 8500, VHR8800, 8801, VHRD4400, 4410, 4500, 4600, VHRD4610, 4710, 4890, 670075p VMD66, VMD68P 80p	JVC (HR2650, 7600, 7610, 7650, 7655), TELEFUNKEN (VR530,		REPLAC AKAI M132773	M32773	IT01
411, 415, 416, 507, HRJ6 10, 615, 715, 97, HRS4700, 5800, SR3200, SRS368E 60p HRJ600 40p	VTR1000 70p VTC6010 75p	535, 539, 550, 630, 650),		COLOCTAR	MZ366960J2	IT02
LOGIX VR955 180p	SHARP VC200, 381, 384, 385, 386, 388, 390, 393, 838, VC200, 381, 384, 385, 386, 388, 390, 393, 838,	THOMSON (V309, 316, 357,		GOLDSTAR HITACHI	VXP0521 6861471	IT03
MATSUI VX600, 730, 735, 750, 755, 765, 850, 6000, V\$888 75p	9100, 9300, 9500, VC9700 100p VC7300, VC7700, VC7750, VC7800, VC2000 110p	VK309, 411,TX8000), FERGUSON (3V31, 8941, 8942)			6861482 6886971	IT04 IT05
VX1000, VX2000, VX2500, VX3000, VX6000 100p	VC8300 115p VC300, 387, 471, 473, 481, 482, 483, 486, 488,	AUTHENTIC (N850), DECCA VL07	40p	JVC/	PU 48967B	-IT06
VX800 70p MITSUBISHI HS200 200p	496, 8481 80p VC402, 500, 571, 573, 581, 582, 553, 584, 585, VCSF3, VC8581 80p	(VR8300), GRANADA (VHSTJ3,		FERGUSON	PU 51380 PU 51402A	IT07 IT08
HS300, 301, 302, 307, 310, 337, 338, 347, 349, 411, 412, 421, 480, HS810, 20, 30, HSE10, 20,	VC108, 405, 408, 550, 800, 651, 674, 681, 682, 682, 682, 684, 685, 693	WJ1, WJ3), ITT (VR3913, 3914,			PU 55373	IT09
H\$303, H\$304, H\$306, H\$307, H\$330, H\$400, H\$700 110p	VC700, 750, 783, VC6F3, VC6V3 70p VC208, 671, 772, 779, 780, 781, 782, 785, 786, 787, 793, 800,VC7810, 7822, VCA100, 102,	3963) JVC (HT7200, 7300, 7350, 7700) TELEFUNKEN (VR450,		NATIONAL	PU 55374 VXP 0329	IT10 IT11
HS318, HS319, HS410 110p HSM1000, 16, HSM23, 25, 33, 34, 35, 37, 54, 55, 57, 58, 59, 68 55p	103, 104, 131, 140, 170, 202, 03, VCA234, 501, 502, 602, 5011, VCB311, 361, VCD801,	520, 529, 540, 549, 620, 640, 920,		PANASONIC	VXP 0343 VXP 0344	IT12 IT13
N.E.C. N830, N831, N832, N833 100p	802, VCH851, 852, 882, VCM73, VCT72 75p VCA10, 103, 105, 106, 113, 11613, 211, 234,	1920), THOMSON (V4100,			VXP 0401	IT14
N895 80p PVC2300, PVC2400 180p DX1000, 1600, 1800, 2000, 3000, N9012,	244, 254, 30, 33, 35, VCA36, 37, 40, 43, 454, 48, 50, 505, 51, 52, 53, 54, 55, 56, 57, 58, VCA60, 605, 615, 67, 68, 1031, VCB320,	VK308, 309, 312, 410), FERGUSON (3V23, 29, 30, 8923,			VXP 0433 VXP 0463	IT15 IT16
9013, 9014, 9016, N9033, 9034, 9053, 9054, 9055, 9056, 9066, 9096, 9110, 9120, N9510, 9520, 9530, 9610 85p	VCBS97, VCD805, VCD806, 810, 815, VCH80, 81, 85, 865, 910, VC51000,	8924, 8929, 8930, 8931, 8940)			VXP 0521	IT17
NATIONAL PANASONIC NV300, NV330PX, NV332, NV333 NV340,	VCT212, 310, 410, 610, VCT1314, VCTS312, 313, VC790ET 80p VCC10 70p	GRANADA (VHSAY3),SHARP VL08	45p	SANYO	VXP 0581 1430662T15620	IT18 IT19
NV366 100p NV777, NV788 100p NV2000, NV2010, NV3000 100p	SONY SLC6, SLJ10, SLT6ME 140p	{VC200, 381, 384, 385, 386, 388,		SHARP	NIDL005GEZZ NIDL0006GEZZ	IT20
NV7000, NV7200, NV7800 95p NV8600, NV8610, NV862 145p NV230, 250, 280, 430, 431, 433, 450, 460, 465,	SLC5, SLC7, SLJ7, SLJ9, SLT7ME 140p SLC9, SL8000, SL8080, SLT50 165p SL8000E, SL8080E, SL8200, SL8600 175p	390, 393, 9300, 9500, 9700)			NPLY0107GEZZ	1121
470, 550, 730, NV770, 810, 870, 890, 970, AG 1000, 1050 110p	SL8000C, SL8080C, SL8200, SL8800 175p SLV255, 125, 213, 225, 262, SLVX1, 20, 3 95p	PANASONIC		PRICE 20p EACH		
NV370, NV380, NV480, NV630, NV780, NV830, NV850 70p NV600, NV688, AG6010, AG6015 100p	TOSHIBA V56, V57 85p	MODE SWITCHES NV2000, 2010, 7000, 7200, 7800 (VS5004	18)	16p EACH FOR	A PACK OF 5 FOR EAC	
NVG7, 9, 10, 11, 12, 14, 15, 16, 18, 30, 130, 400, NVH70 50p NVFV1, NVM10, 3000, 3300, 40, 7, 9000,	V33, V31, V32, V51, V52, V53, V9600, V9680 85p V61, V63, V66, V66, V67 150p	NV230, 260, 430, 810, 870, 2300, 4300		ISP EACH FOR	A PACK OF 10 FOR EA	CH MUUEL
9900, NVMS1, 4 70p NVM 1, NVM3, NVM5 70p	DV806, DV80D, V71, 73, 74, 75, 77, 81, 83, 85, 86 80p	(VSS0110)	£2.25	G	RANDATA LTD	
PHILIPS VR6460, VR6920 170p VR6540 100p	V108, 109, 110, 120, 130, 140, i99, 209, 210, 211, 220, 221, 411, V421, 509, 510, 611, 659, 660, 711, 880 120p	NV830 (VSS0091) 4 NV300, 333, 340, 366, 688, 777, 778	£2.10	and the second	I: 0181-900 232	
VR6442, VR6542 70p VR2025, VR2580 100p QV186, 190, 286, 291, 292, 468, 471, 562, 571.	V91 G, V95G 115p V212, 213, 22-2, 3i2, 322, 403, 412, 413, 610,		£3.75		x: 0181-903 612	
761, VR201, 202, 203, 211, 2115, 212, 213, 223, 311, 312, 313, 3210, 3219, 322, 32, 29,	703, 813 50p VCP81E 110p	NVG21, 25, NVH65, NVD80 (VSS0175A)	£2.00			

L

VIDEO	SER	VICE KITS	
AMSTRAD VCR700 Contents			
BELT SET, PINCH ROLLER. RE Order Code: SK41	EEL IOLE		£5.9
FERGUSON & JVC			
3V42/43 HRD455/HRD725			
Contents BELT SET, PINCH ROLLER,		Economy Kit Contents BELT SET, PINCH ROLLER	
CLUTCH MECHANISM, TENS BAND	SION	SUPPLY CLUTCH, TAKE UP CLUTCH	
	£15.00	OROER CODE: SK38	£9.0
3V58/59/64/65 HRD 170/180/210/230/300/320/	(370/400/	430/530/700/750	
HRS5000 Contents			
BELT SET, PINCH ROLLER, ID Order Code: SK44	LER ARM		£7.0
3V29/3V30			
HR7200/7300/7350 Contents			
BELT SET, PINCH ROLLER, TE Order Code: SK05	ENSION	BAND, IDLER TYRES	£5.0
3V35/36, 38/39/49 HRD110/111/120/225			
Contents BELT SET, PINCH ROLLER, TI	ENSION	RAND INIER TYPES	
Order Code: SK04	LINGIUM		£5.0
3V31/3V42 HR7600/7610/7650/7855			
Contents		Economy Kit Contents	
BELT SET, T/U REEL TABLE TYRE. PINCH ROLLER. REEL		BELT SET, T/U REEL TABLE TYRE, PINCH ROLLER, REEL	
IDLER. T/U CLUTCH. T/U IDLI TENSION BAND, VIDED LAN		IDLER TYRE. T/U IDLER TYRE. T/U CLUTCH	
Order Code: SK33		ORDER CODE: SK34	£5.0
3V35/35/38/39/49 HR0110/111/120/121/225			
Contents		Economy Kit Contents	
BELT SET. T/U REEL TABLE TYRE. SUPPLY REEL TABLE		BELT SET. T/U REEL TABLE TYRE. SUPPLY REEL TABLE	
TYRE. PINCH ROLLER. T/U CLUTCH. T/U IDLER. REEL		TYRE, PINCH ROLLER, T/U CLUTCH, T/U IDLER TYRE, RE	EL
IDLER. TENSION BAND Order Code: SK35	£10.00	IDLER TYRE ORDER CODE: \$K36	£5.5
3V29/3V30			
HR07200/7300/7350		Frances Wit Contacts	
BELT SET. T/U REEL TABLE		Economy Kit Contents BELT SET. T/U REEL IDLER	
TYRE. SUPPLY REEL TABLE TYRE. PINCH ROLLER. REEL		TYRE. SUPPLY REEL TABLE TYRE. PINCH ROLLER. REEL	
IDLER. T/U CLUTCH. T/U IDL TENSION BAND. VIDEO LAN		IDLE TYRE. T/U IDLER TYRE. T/U CLUTCH	
Order Code: \$K31	£10.00	ORDER CODE: SK32	£5.0
3V44/45/48/53/54/55/57 HRP50/HRD140/150/158/160			
HRD250/257/565/566/755 Contents		Economy Kit Contents	
BELT SET. PINCH ROLLER. CLUTCH MECHANISM TEN.	SION	BELT SET. PINCH ROLLER	
BAND		OPOER CODE. CKAD	
Order Code: SK39	£ (3.00	OROER CODE: SK40	-£9.5
FVHP905/906/907/908/910/91	1/916/91		
Contents BELT SET. PINCH ROLLER.		Economy Kit Contents BELT SET, PINCH ROLLER.	
IDLER. GEAR IDLER UNIT. TENSIDN BAND		IDLER TYRE	
Order Code: SK57	£13.00	ORDER COOE: SK58	£5.0
FVH P615/618/620/622/710/73 730/830/840	3/715/71	5/720/721/722/725/	
Contents BELT SET, PINCH ROLLER.		Economy Kit Contents BELT SET. PINCH ROLLER.	
IDLER. GEAR IOLER UNIT. TENSION BAND		IDLER TYRE	
Order Code: SK68	E11.00	ORDER CODE: SK69	£3
HITACHI VTII/VT33			
Contents BELT SET, PINCH ROLLER, T	TNSION		
Order Code: SK08	LINGTUN	weater necta tinga	£5.
UNIVE	RSA	L TRIPLER	
Price	e: £5	.00 each	
AMSTR	RAD	MODE KIT	
Price	: £2	.75 each	

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VIDEO CERVICE KITS (Cont.)

	VIDEO SER	VIC	E KITS (Cont.))
	VT11/VT33			
	Contents BELT SET. T/UP REEL TABLE TYRE, SUPPLY REEL TABLE TYRE, PINCH ROLLER. FF/REW IDLER. CLUTCH PLATE. TENSION BAND		Economy Kit Contents BELT SET. PINCH ROLLER. FF/REW IOLER TYRE. T/UP RE TABLE TYRE. SUPPLY REEL TABLE TYRE	EL.
		13.00	ORDER CODE: SK46	£3.75
	VT52/51/62/53/64/65/85/86/640 Contents BELT SET, PINCH ROLLER, FF/REW ARM, CLUTCH PLATE, TENSION BAND	14.00	Economy Kit Contents BELT SET, PINCH ROLLER FF/REW IOLER	
	Order Code: SK49 E VT400/405/410/43/14/15/18/420/		ORDER CODE: SK50	£3.00
	510/520/25/26/530/35/36/540/54 Contents TIMING BELT. PINCH ROLLER.	5/46/48	/570/75/576/580/85/88	
	TENSIDN BAND Order Code: SK52			£9.75
	VT100/110/111/113/115/118/120 175/220/225/250/255/258/260/V Contents	n. 30		
	BELT SET. PINCH ROLLER. FF/ TENSION BAND Order Code; SK51	REW AJ		E14.00
	PANASONIC NV2000/NV2010		NV7000/NV7200/NV7800	
	Contents BELT SET. PINCH ROLLER. TENSION BAND. IDLER TYRES Order Code: SK03	£5.00	Contents BELT SET. PINCH ROLLER TENSION BAND. IDLER TYRE ORDER CODE: SK02	ES.00
	NV300/NV330/NV333/NV340/N Contents	V366		
	BELT SET. PINCH ROLLER. TEN Order Code: SK01	ISION	BAND. IDLER TYRE	25.00
	NV2000/NV2010			
	Contents BELT SET. PINCH ROLLER. FF IDLER. PLAY IDLER. TENSION BAND, VIOEO LAMP		Economy Kit Contents BELT SET. PINCH RDILER. IDLER TYRE. PULLEY TYRE	
	Order Code: SK13	£6.00	ORDER CODE: SK14	£3.50
	NV7000/NV7200/NV7800 Contents		Economy Kit Contents	
	BELT SET, PINCH ROLLER, IDLER UNIT. PLAY IDLER. TENSION BAND		BELT SET, PINCH ROLLER IDLER TYRE, CLUTCH TYRE	
		£8.50	ORDER CODE: SK12	£3.25
	NV300/NV330/NV333/NV340/N Contents	V366	Economy Kit Contents	
	BELT SET, PINCH ROLLER, IOLER UNIT. PLAY IDLER. TENSION BAND		BELT SET, PINCH ROLLER IOLER TYRE. PLAY IDLER	
			ORDER CODE: SK16	63.25
	NVG7/NVG9/NVG10/NVG11/N NVG18/NVG30/NVG120/NVG1 AG1810 (P/K)		400/NVH65 (PX/AC)/	
	Contents LOADING BELT. CAPSTAN BELT. PINCH ROLLER. IDLER		Economy Kit Contents LOADING BELT. CAPSTAN BELT. PINCH ROLLER. IDLER.	
	TENSION BAND	£5.00	TYRE	£3.00
	NV332 Contents		Economy Kit Contents	
	BELT SET. PINCH ROLLER, PLAY IDLER, FF/REW IDLER,		BELT SET, PINCH ROLLER PLAY IDLER TYRE, FF/REW	
	TENSION BAND, FF/REW TYR		IDLER TYRE ORDER CODE: SK30	£5.10
	NV230/250/260/280/430/450/46			
	AG1200PK/AG1500PK		Economy Kit Contents	
	BELT SET, PINCH ROLLER, IDLER. TENSION BAND		BELT SET, PINCH ROLLER	
	Order Code: SK23	£6.00		E3.25
	NV600/NV688 Contents		Economy Kit Contents	
	BELT SET, PINCH ROLLER, PLAY IDLER, FF/REW IDLER.		BELT SET, PINCH ROLLER PLAY IDLER TYRE, FF/REW	
	TENSION BAND		IDLER TYRE	£6.00
	Order Code: SK25	.12.00	UNDER CODE, SK20	10.00
5	NV730/NV770 Contents	-	Economy Kit Contents	7
	SLOT IN BELT. LOADING BELT PINCH ROLLER. IOLER UNIT. TENSION BAND		SLOT IN BELT. LOADING BEI PINCH ROLLER, IDLER TYRE	
-		£5.00	ORDER CODE: SK20	£3.00
	NV370/NV380/480/630/780/830 Contents	/850/ A	G2100PK/AG2200PK Economy Kit Contents	
1	BELT SET, PINCH ROLLER. IDLER. TENSION BAND	es an	BELT SET, PINCH ROLLER IDLER TYRE ORDER CODE: SK22	62.75
		2.4.00	SHOLI GOUL SHE	
	NV777/NV788 Contents BELT SET, PINCH ROLLER,		Economy Kit Contents BELT SET, PINCH ROLLER	
	IDLER UNIT, TENSION BAND Order Code: SK17		IDLER TYRE ORDER CODE: SK18	£4.00
111		-		

VC381 Contents Economy Kit Contents BELT SET. PINCH ROLLER BELT SET. PINCH ROLLER. REEL IDLER. TENSION BAND. VIDEO LAMP REEL IOLER TYRE EB.00 ORDER CODE: SK48 Order Code: SK47 £3.25 VC500/VC571/VC581/VC582/VC583/VC584/VC5F3 Economy Kit Contents BELT SET. PINCH ROLLER Contents BELT SET. PINCH ROLLER. REEL IDLER. TENSION BAND REEL IDLER Order Code: SK60 £9.50 DRDER CODE: SK61 £5.00 VC781/VC7810/VC7822/VC785/VC786/VC793/VC800/ VCA100/VCA102/VCA104/VCA202 Contents BELT SET. PINCH ROLLER. Economy Kit Contents BELT SET. PINCH ROLLER REEL DRIVE UNIT TYRE REEL DRIVE UNIT. TENSION BAND E13.50 DRDER CODE SK65 Order Code: SK64 £3.75 VC681/VC682/VC684/VC685/VC693/VC699/VC6F3/VC700 Economy Kit Contents BELT SET. PINCH ROLLER REEL DRIVE UNIT TYRE BELT SET. PINCH ROLLER. REEL DRIVE UNIT. TENSION BAND Onder Code: SK62 £13.50 ORDER CODE: SK63 £5.00 FOR MORE DETAILS OF OVER 500 TYPES OF SERVICE KITS PLEASE RING US! **BACKUP BATTERIES** REPLACEMENT PHILIPS NI-CAD BACKUP BATTERIES Replaces Ferguson Part No: 00E6-067-001, used on TX10, L2V 90p **Replaces Phillips Part Nos** 138-10138, 138-10313. 1.2V – 90mAh Replaces Philips Part Nos: 75p 138-1229 2 4V - 90mAh £1.35 REPLACEMENT FERGUSON NI-CAD BACKUP BATTERIES Replaces Ferguson Part Nos:00E6-066-001, 2.4V Used on: 3V35, 3V56, 3V58, 3V65 150p

VIDEO SERVICE KITS (Cont.)

SHARP

REPLACEMENT LINE OUTPUT TRANSFORMERS

Order Code LOT01 Description Price HITACHI 2433752 1500p ORIDN 3714002 FIDELITY ZX300 FE TX100 90 DEG 1500p 1500p 1500p LOT02 LOT03 LOT04 LDT05 SABA 490007182 FE TX90 WHITE ITT D307/37 EQ BLAUPUNKT 210 1500p LOT05 LOT06 LOT07 LOT08 LOT09 LOT10 LOT11 LOT11 LOT12 LOT13 1600p 1600p 1600p 1600p 1600p 1600p 1600p GRUNDIG 2922010 ITT CVC800/1/3 ITTD218/37 EQ NORMENDE 5255 SABA 81000 200 SABA 81000 200 SALORA T236 EQ SABA 811-50-24 SABA 770223500 TELEFUNKEN AT1 TELEFUNKEN EQ SALORA FM0218B NORMENDE 5255 UT CVC 1150/1 LOT13 LOT14 LOT15 LOT16 LOT17 LOT18 LOT19 LOT20 LOT21 1650p 1600p 1600p 1450p 1400p 1600p 1600p ITT CVC 1150/1 ITT COMPACT 80 FE TX100 GREEN HINARI CT4/5 5113 15000 LOT21 LOT22 LOT23 LOT24 LOT25 LOT26 LOT26 LOT27 LOT28 LOT29 1500p 1400p 1500p SELECO 6320410 BLAUPUNKT 8667 ITT COMPACT B1 ITT CT3326 MUL 1600p 1600p 1600p 1450p 1500p ITT D066/37 EQ ITT 3546 EQ LUXOR 5810110 SABA 849380920 HITACHI 2434141 CP 1600p LOT29 LOT30 LOT31 LOT32 LOT33 LOT34 LOT35 LOT36 LOT37 1500p 1600p 1600p 1200p FE TX100 110 D HANTAREX 28021 SHARP C3700 EQ 1500p 1600p 1600p HITACHI 2432981 CP 13000 HITACHI 2432981 CP FERGUSON 0003-508-002 Fits Chassis TX99 41cm + 51cm Used On: 51K2, 51J8, 51J7, 41H3, 41H3, 41H2, 51K3 1650p LOT38 PANASONIC TLF14567F Used On: TC2043, TC2243, TX300 PANASONIC TLF14568F 1850p LOT39 LOT40 £15.00 PANASONIC TLF14568F Used On: TX2231, TX2244 PANASONIC TLF14584 Used On: TC2210, TC2160, TX1752, TX2112 TX2112, TX2162, TXC22 2000p LOT41 PANASONIC TLF14586F TC1651, TC2051, TC2061, TC2253, TC2263, TX5500 £18.00 LÖT42 HINARI 1600n 1 OT43 Used Dn: CT15 HITACHI 2434274 LOT44 1250p CPT2174, CPT2176, CPT2178, 2434274 We stock line output transformers for over 100 different models. Please ring 0181-900 2329 for more information.

Satellite PSU Repair Kits Experience shows that 50% of all receiver power supplies 'bounce' unless the correct precautionary measures are taken when being serviced. A kit of all recommended parts is supplied for the most popular GF 6 models, which when fitted should overcome this. MAKE & MODEL ORDER CODE PRICE PACE PROSOD, PROSOD SATPSUT 650p PACE S\$9000, 9200, 9010, 9210, 9220 SATPSU2 650p AMSTRAD SRD510, SRD520 SATPSU3 650p SATPSU4 AMSTRAD SRD500 650p SATSPU5 AMSTRAD SRX340, SRX345, SRX350 650p SATPSUS 650p PACE 0100/150 CHURCHILL D2MAC SATESIT 650p PACE MSS100 SATESUS 7300 PACE MSS200/300 APPOLL SATPSUS 9000 12300 PACE MSS500/1000 SATPSU10 8350 SATPSU11 FERGUSON SRD4 ECHOSTAR SR5500 SATPSU12 1*73*5p ECHOSTAR 6500/7700/8700 SATPSU13 31250 AMSTRAD SRUGDO SATPSU14 31250 SATPSU15 7750 MIMTEC (Surensen) AMSTRAD SR0700/SR950/SRX108/301 SRX501/1002/2001/SR02000 SAT250 SATESUIS 730p PACE 9000 SWITCH MODE TRANSFORMER Order Code: PACE 9000 Price: 800p PACE PRD800/PRD900 SWITCH MODE TRANSFORMER Order Code: PRD800 Price: 550p SATELLITE TUNERS PACE PRD800/MSS200 2Ghz Order Code: TUNER 01 Price: 1650p + VAT PACE PRD900/MSS1000 2Ghz Order Code: TUNER 02 Price: 1650p + VAT $\star \star \star \star$ JUST ARRIVED **** POWER SUPPLY REGULATOR **ALBA CTV10 TRAVELLER NIKKAI BABY 10 ORDER CODE: BABY 10** PRICE: 1200p + VAT **Audio Control Head** AMSTRAD ORIGINAL NO: 150751 Used on: AMSTRAD TVR1, 2, 3, VCR4600, 4600MKII, 4700. FUNALVS2, VCR4600, 4800, 5200, 5600, 6600, VIP3000, 5000 Also fits: FIDELITY, FUNAL HINARI, PROLINE, SCHNEIDER, TOWADA, UNIVERSUM ORDER CODE: AHD1 PRICE: 1350p AMSTRAD ORIGINAL NO: 153134 Used on: AMSTRAD DD8900, 8904, VCR2000, 6000, 6100, 8600, 8602, 8603, VCR8604, 8700, 8704, 8714, 8800, 9005, 8244 Also fits: ANTECH, BONDSTEC, CASIO, CROWN, FIDELITY, GOLD-HAND, GRANADA, HINARI, MARQUANT, DMEGE, PROFEX, SCHNEIDER, SEG, SENTRA, SHINTOM, TASHIKO, TATUNG, TOWADA, UNIVERSUM ORDER CODE: AH02 PRICE: 1450p **Replacement Audio Control Video Sound** Head for National Panasonic PRICE PART NUMBER MODELS 875p VBR 0091 NVG7 etc NV300, NV340 etc VBR0050 8750 VBROOGT NVTTI etc 875n VBR0103A NV250, NV450 etc. 6250 VBR0125 6250 8 way Preprogrammed Universal Remote Control A single remote control to operate Televisions, Videos and Satellite Receivers. Plus Auxiliary Options! - Replaces up to 8 remotes with one - Simple 4 digit satup routine
 - Controls 1000s of models - Teletext functions with Fastext
 - Clear (large key) tayout - Code Search Facility - Stylish and easy to operate - Replace broken or lost remotes · Original remote not required Order Code: 8 WAY PRICE: 14.50p + VAT Cassette DC Motors MOTOR TYPE SV MOTOR SV MOTOR 12V CW MOTOR PRICE HEAD TYPE MONO HEAD 170p 170p 170p 12Y CCW MOTOR 170p 13.2 CCW MOTOR

IKAJ	V\$35, V\$53, V\$55,	-	
	V\$\$5, V\$75	CHIS	3200p
RANADA	VHSDP1 VHSYJ2	CH05 CH01	1100p 2800p
OLDSTAR	GHV1290P, 1291P, 1295P, 9400,	GANT	10000
	73401, GSE1295P, GSE1891P, 200010, 200510, VCP4200, 4300.		
	4301, 4305, VCP4308, 4311, 4315.		
	4316, 4320, 4321, 4325 GHV51, 1221, 1232, 1240, 1241,	CH25	2000p
	1242, 1244, 1246, 1248, GHV8000,		
	8200 3V38, 3V39, 8943, 8944, 8951,	CH26	_ 2900p
ERGUSON & J.V.C.	3V35, 3V35, 8343, 8344, 83511, 3V35, 3V36, 3V49, HRD 110, 111,		
	120, 121, 225 3V42, 3V43, 3V44, 3V45, 3V48,	CHOI	2800p
	3V53, 3V54, 3V55, 3V57, 8945,		
~	8947, 8948, HRD 140, 141, 150, 157, 158, 160, 250,		
	HR0257, 455, 565, 566, 725, 755	CH02	2800p
	8948, 8950, FV108, 12L, 13H, 14T, 208, 21R, 22L, 26, 395, HRD230,		
	430, 530	CH03	2900p
	3V58, 3V59, 3V64, 3V65, FV11R,		
	8950, 8951, HRD 170, HRD 180, HRD 370	CH04	2800p
	FV31R	CH19	4300p
	HR0515, 529, 527, 540, 550, 580.		
	600, 610, 620, 660, 570, HRD830, 840, 850, 860, 4950, 6600, FV37H	CH20	22000
	HR0540, 580, 830, 860, 910, 960.	- 11	
	HRD970, HRDX20, FERGUSON FV57H	CH27	2400p
LT.	VR3605, VR3905	CHOT	28000
	VR3916, 3926, 3946, 3948, 3976, 7985, 3995, 3997, 6948	CHOZ	28000
	3986, 3995, 3997, 6948 VR3916, 3926, 3946, 3948, 3976,	01946	
	3985, 3995, 3997, 6948	CH02	28000
ATTONAL PANASONIC	NV730 NR30EG NR31EG NR31EG NR32	CHOS	43000
LEC.	N830EG, N831EG, N831EG, N832, N833EG	CHOT	2800p
3.00	N895	CH02	2800p
WILIPS	CASSETTE LIFT ASSEMBLY (691)	20366)	
	0V186, 190, 286, 471, 562, 761, VR6180, 6182, 6185, 5285, VR6290		
	6291, 6293, 6362, 6367, 6393, 8487 6468, 6470, VR8581, 6670, 6760,		
	6468, 6470, VR8581, 6670, 6760, 6761, 6870, 6970	CH05	1100p
	VR6443	CH22	2900p
	VR6448	CH23	2500p
	49586	CH24	2500;
SHARP	VCA100, VCH851, VCH852 VCA103, 103GV, 106, 106GVM,	CH22	2900ç
	2546VM	CH23	2500s
	VCS211, 244, 5055, 605, VC8230,	-110	
	VCD806G, 8106, VCT212, 310, 410G, 610	CH24	2500
TELEFUNKEN	VR2970	CHI02	2800;
THOMSON	V329, 321, 323, 326, 4200, 4300	CH01	2800;
	V342, 343, 352, 353, 360, 364, 368, 4210, 4230, 4250, 4400, V5500,	-	-
	4210, 4230, 4260, 4400, V3604), 6000, 8540	CHO2	2800;
TOSHIBA	V55, V57	CHOT	2800
	V65, V66	CHOZ	2800
Service Aids			0010
DESCRIPTION	VOLUME	CODE SP01	PRICE 160p
VIDEO HEAD CLEANER	75ML 126ML	SP01 SP02	150p
SILICONE GREASE	200ML	SP03	210p
FREEZE IT	170ML	SP04	310p
FREEZE IT	400ML	SP16	900p
FOAM CLEANER	400ML	SP05	180p
ANTI-STATIC AEROKLEANE	150ML 135ML	SP06 SP07	190p 220p
AERO DUSTER	139ML 150ML	SPOR	3100
AERO DUSTER	400ML	SP17	550p
PLASTIC SEAL	200ML	SP09	2500
GLASS CLEANER	250ML	SP10	160
EXCEL POLISH 80	250ML 250ML	SP13 SP18	230p
ADHESIVE 120	400ML	SPIS	190;
LABEL REMOVER 130	200ML	SP20	240;
REFURB 140	400ML	SP21	240;
TUBE SILICON GREASE	SO GRAMMES	SP11	2100
TUBE SILICON SEALAN		SP22 SP23	280;
TUBE SILICON SEALAN		SP23 SP12	2800
DRIVE CLEANER	200ML	SP24	150
SCREEN CLEANER	200ML	SP25	150g
COMPANYING CADE WIT		SP26	2100
COMPUTER CARE KIT			
All the above	items are manufactured b e then one Servisol Product, p		

TUBE HEAT SINK COMPOUND	25 GRAMMES	SP12	1500	
DRIVE CLEANER	200 MIL	SP24	150p	Ha
SCREEN CLEANER	200ML	SP25	150p	rem
COMPUTER CARE KIT	-	SP26	2100p	mou
All the above items If you purchase more then age will be 300p for 5 cans Cassette Tape Head	one Servisol Produc charged as follows 450p for more th	t, postage l s:		
HEAD TYPE	and the		PRICE	
MONO HEAD			50p	
STERED HEAD			110p	1000
MINIHEAD			150p	1.000
AUTO REVERSE HEAD			2000	
				201 a. t.

Soldering Accessories		
DESCRIPTION	CODE	PRICE
ANTEX SOLDERING IRONS 25 WATT 240 VAC (X\$25W 240V)	S101	900p
15 WATT 240 VAC (XS15W 240V)	\$102	900p
25 WATT SPARE ELEMENT 15 WATT SPARE ELEMENT	S103 S104	450p 450p
SOLDERING STAND & SPONGES	0101	
SOLDERING STANO (MADE BY ANTEX)	S108	350p
SPARE SPONGE	\$109	55p
SOLDER		-
18 SWG 500 GRAMMES 20 SWG 500 GRAMMES	\$110 \$111	500p 650p
22 SWG 500 GRAMMES	S112	700p
DESOLDERING AIDS		
SOLDER MOP STANDARD GAUGE 1.2MM X 1.5M SOLDER MOP 1.2MM X 10M	\$107 \$113	80p 400p
DESOLDERING PUMP	\$105	320p
SPARE NOZZLE	S106	60p
FAULT FINDING GUIDE	B00	KS
Satellite Fault Finding Guide	Issue	1.
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range of 24 different bra		
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pages covering 58 different		
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reviewing, featuring stock fa	ults ar	nd
installation tips.		
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and base information.		-
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SEMICONDUCTOR COMPARIS		
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REPLACEMENT I		4515 01 24 4515 01 46	LOT137 1600p	094-01021/0.6	LOT59 1750p LOT186 1825p	CD PICK UPS Models & Description 0	rder Code	Price
Part No. AKAI	Code Price	4515 03 01 4515 03 02	LOT169 1500p LOT180 1550p	094-01038/0.7 094-01052/0.8	LOT245 1900p LOT186 1825p	алча х.соо7 К	SSS151A	1900p
45150344	LOT58 1650p	4515 03 04 4515 03 05	LOT169 1500p LOT180 1550p	094-01057/1.1	LOT285 1450p LDT189 1650p	CXL60, CXL66G, CXL90, CXN3100, CXN320, CXN3300, CXN360, CXN400, CXN430, CXN540,	\$\$152A	1600p
	LOT278 1600p LOT72 1600p	4515 03 06	LOT168 1550p	610.018.6620 610.018.6637	LOT215 1800p	CXN550G, CXN990, CXN999, CXNV20, CXSL70, DXZ9100M, FDN636, FDN636, FDN939, LCX60, LCX66G, LCX70M, LCX80, M7400, M75, NSX300, NSX300, NSX400, NSX430,		
D 050/37 D 053/37	LOT27 1450p LOT207 1550p	4515 03 08 4515 03 09	LOT22 1500p LOT178 1500p		LOT39 1850p		S\$152A	20000
D 056/37 D 059/37	LOT56 1650p LOT200 1600p	4515 03 10 4515 03 13	LOT168 1550p LOT30 1500p	RTRNF 1783 BMZZ RTRNF 1783 CEZZ	LOT202 1800p LOT202 1800p		S220A	2000p 2500p
D 069/37 FCM 2015 AL	LOT56 1650p LOT78 1500p	4515 03 14 4515 03 15	LOT174 1700p LOT22 1500p	RTRNF 1786 BMZZ RTRNF 1786 CEZZ	LOT211 1850p LOT211 1850p	XP5.XP7 K	S\$331A	34009
FERGUSON 00 D-3-508-001	LOT38 1850p	4515 03 18 4515 03 19	LOT192 1550p LOT30 1500p	RTRNF 2000 BMZZ	LOT214 1750p	AXAI C073, DC93 C026, C028, C027, C032, C036, C037, C052, C055, C057, C0650, C0669, C0750, C079, K0750, C079, C079	SS151A	1900p
00 D-3-508-002	LOT38 1650p	4515 03 20	LOT190 1850p	RTRNF 2002 CEZZ	LOT307 1450p LOT307 1450p	CDM480, CDM600, CDM670, CDEN770, CDM959, MX550, MX570, MX650, MX670, MX750, MX950 K	SSZ10A	2000p
00 D-3-508-003 00 D-3-515-001 PL1		4515 03 22 4515 03 24	LOT196 1550p LOT194 1550p		LOT308 1425p LOT307 1450p		SS151A	1900p
00 0-4-208-001 00 D-4-208-002	LOT79 1800p	4515 03 25 45 15 03 26	LOT22 1500p LOT198 1550p	RTRNF 2005 BMZZ RTRNF 2006 BMZZ			S152A SS210A	1600p 2000P
00 D-4-235-002 00 D-4-235-002 HTT	LOT240 1250p LOT81 1600p	45150328 45150329	LOT27 1460p LOT193 1550p	RTRNF 2007 BMZZ RTRNF 2023 BMZZ		DCD825, DCD890, DCD895, DN2000F K	55240A	2600p
	LOT81 1600p LOT38 1650p	4515 03 30 4515 03 31	LOT179 1550p LOT207 1550p	SONY 3753100	LOT275 1700p	GOLDSTAR C0952A, C0952AJ, C0952AJ, C0952SJ, FFN101KL, FFN101WL, FFH222AL, FFH272L, FFN333L, FFN33X, FJ408, FR606L K	S\$210A	20009
00 H-0-701-2400 06 D-3-083-001	LOT182 1550p LOT82 1400p	4515 03 34 4515 03 35	LOT56 1850p LOT193 1550p	1-439-243-00	LOT91 1700p	CD320AL, CD630SA, FFH212AA, FFH212E K	SS2108	2000p
06 D-3-083-002	LOT82 1400p	4515 03 38	LOT27 1450p	1-439-243-11 1-439-243-12	LOT91 1700p LOT91 17D0p		IOPM3	2150p 2000p
06 D-3-084-001 06 D-3-087-001	LOT23 1400p LOT23 1400p	4515 03 40 4515 03 41	LOT200 1600p LOT56 1650p	1-439-243-31 1-439-243-32	LOT229 1700p LOT229 1700p	KRCD100, RR1500CO, RR3100CD, RR4000CD, RR610CD, RR700CD	IS210B SS220A	2000p 2500p
06 D-3-088-001 06 D-3-093-001	LOT84 1450p LOT204 1600p	4515 03 43 4515 03 44	LOT196 1550p LOT56 1650p	1-439-243-41 1-439-244-00	LOT229 1700p LOT48 1800p	CDP65 K	SS331A PTIMA5	3400p 3600p
06 D-3-095-001 06 D-3-095-002	LOT87 1450p LOT87 1450p	4515 03 46 4515 03 50	LOT201 1550p LOT27 1450p	1-439-244-11	LOT48 1800p	HITACHI	OPME	2150p
06 D-333-512-001 FETX 100 90 DEG	LOT204 1600p LOT04 1500p	4515 03 51 4515 03 75	LOT27 1450p LOT56 1850p	1-439-244-21 1-439-244-31	LOT48 1800p	FX-10	(\$\$210A (\$\$2108	2000p
FETX 90 WHITE FETX 100 100 DEG	LOT06 1650p LOT34 1500p	4516 16 01 MITSUBISHI	LOT22 1500p	1-439-256-00 1-439-256-11	LOT45 1800p LOT45 1800p	J.V.C. 1990-1992, LATE 1987-1588 - XLE3008K, XLE31BK, XLE518K, XLE5008K, XLME918K, XLV1018K,		
GRUNDIG		731003	LOT51 1650p	1-439-256-21 1-439-256-22	LOT45 1800p LOT45 1800p	XV211BK, XLV222BK, XLV311BK, XLV3338K, X.Z1010TN, XLZ411BK, XLZ444BK, XLZ5558K, XLZ511EK CDRADIO CASSETTE: MINI SYSTEMS - MODELS 1990-1992	OPTIMA3	4000p 5000p
29201.008.01 29201.014.01	LOT153 1750p LOT140 1850p	276-16399 334 B 07803	LOT50 1700p	1-439-276-21 1-439-280-00	LOT230 1700p LOT92 1700p	CA-C33, CA-MX30BK, CA-MX33BK, UX-A5, UX-A6, XL-M309, XL-M403BK, XL-M408, XL-M409, XL-M504BK, XL-M505TN, XL-M508, XL-M509, XL-M705TN, XL-V131BK, XL-V151TN, XL-V21BK.		
29201.015.01 29201.017.01	LOT149 1400p LOT60 1250p	334 B 078030 334 B 08104	LOT50 1700p LOT74 1600p	1-439-280-13	LOT92 1700p LOT46 1800p	XL-V241TN, XL-2428K, XL-V251TN, XL-V2528K, XL-Z1050TN, XL-Z551TN, XL-Z552BX (1994 ONWARDS - CAE488K, CAMCG7, CAMXG9, CAS20BK, CAS30BK, VAS50, CAS60R9K,	OPTIMA5	3600p
29201.018.01 29201.018.02	LOT163 1300p LOT61 1700p	334 B 08108 334 P 19506	LOT295 1600p LOT51 1650p	1-439-286-00 1-439-286-11	LOT46 1800p	MXS20, MXS30, MXS60, PCX105, PCX130, PCX95, RCX230, RCX320, RCX520, RC		
29201.019.01 29201.019.02	LOT62 1250p LOT62 1250p	334 P 18507 5908-05008A-AA	LOT75 1800p LOT70 1500p	1-439-286-12 1-439-286-13	LOT46 1800p LOT46 1800p	XLMC100/M, XLMXG7, XLMXG9, XLV163TN, XLV1648K, XLV174, XLV263TN, XLV264BK, XLV2748K, XLZ464BK, XLZ574, XLZ874, XLX874, XTMXG9, XTMXG9, XT560	PTIMA6S	3300p
29201.022.01 29201.022.02	LOT63 1700p LOT168 1800p	D 108/37 DCF1577	LOT49 1800p LOT273 1700p	1-439-286-21 1-439-288-00	LOT46 1800p LOT228 1750p		CSS152A	1600p
29201.022.03	LOT185 1750p	DCF2077A	LOT272 1550p LOT279 1550p	1-439-288-12 1-439-289-00	LOT228 1750p LOT47 1800p	DP1030, DP1510, DP2010, DP2030, DP3010, DP3030, DP3050, DP4030, DP491, DP5010, DP5030, DP5040, DP520, DP7030, DP7040, DP7050, DP7030, DP300, DP3000, DP3000, DP3000, DP3000, DP3000, DP30000, DP300000, DP300000, DP30000, DP300000, DP300000, DP300000, DP300000, DP300000, DP3000000, DP300000, DP3000000, DP3000000, DP3000000, DP3000000, DP3000000, DP300000000000, DP300000000000, DP3000000000000000000000000000000000000		
29201,022.04 29201.022.04A	LOT185 1750p LOT165 1750p	KFS 50226B MSH-1FBW08	LOT78 1500p	1-439-289-21	LOT47 1800p LOT47 1800p		(SS210A	2000p
29201.024.01 29201.024.04	LOT65 1700p LOT164 1800p	NIKKAI BABY10	LOT67 1450p	1-439-289-22 1-439-289-31	LOT47 1800p	DP1050, DP2050, DP3060, DP501, DP5060, DP722, DP75, DP85, DP89, M77A, PD3060,	KSSZ20A	2500p
HINARI 154 138 K	LOT24 1500p	ORION 3714002	LOT02 1500p	1-439-294-00 1-439-294-11	LOT93 1550p LOT93 1550p	DPC321, DPC521, DPC531, DPC531K, DPC721, DPC731	CSS331A RH8136A	3400p 4500p
51 13914 1 51 14184 1	LOT24 1500p	PANASONIC TEF 14512 F	LOT39 1850p	1-439-294-21 1-439-303-00	LOT269 1550p LOT94 1700p	PANASONIC		
CF 44 A HM51-1411834-1	LOT24 1500p LOT24 1500p	TLF 14520 F TLF 14521 F	LOT40 1500p LOT39 1850p	1-439-303-11 1-439-303-31	LOT94 1700p LOT94 1700p	SLP177A, SLP202A, SLP212A, SLP27A, SLP37TA, SLP37TA, SLP47TA, SLP47TA, SLP302A, SLP304A, SLP302A, SLP304A, SLP302A, SLP304A, SLP302A, SLP304A, SLP302A, SLP304A, SLP3	591-30209	5500p
HITACHI		TLF 14567 F TLF 14568 F	LOT39 1850p LOT40 1500p	1-439-303-32 1-439-311-00	LOT94 1700p LOT95 1850p	SAD30, SLCH9, SLP100, SLP100, SLP200, SLP202, SLP212, SLP230, SLP303, SLP300G, SLP400C, SLP555, SLP777, SLP999, SLPA10, SLP220, SLP255, SLP125,		
2424593 2432101	LOt44 1250p LOT79 1800p	TLF 14584 F	LOT41 2000p	1-439-311-11	LOT95 1550p	SLPJ26, SLPJ27, SLPJ37, SLPJ45, SLPK25, SLPK28, SLPS50, SLP570, SLPS700, SLPS840, SLPS800 1 PHILPS	SOAAD70A	2350p
2432461 2432611	LOT169 1500p LOT80 1800p	TLF 14586 F TLF 15606 F	LOT42 1800p LOT256 2500p	1-439-311-13 1-439-311-31	LOT95 1550p LOT95 1550p		4822-691	3100p
2432651 2432761	LOT80 1800p LOT169 1500p	TLF 70012 TLF 70012 F	LOT78 1500p LOT78 1500p	1-439-311-32 1-439-331-22	LOT95 1550p LOT96 1550p	CD480, CD482, CD500, CD502, CD582, CD583, CD584, CD610, CD820, CD830, CD780,	691-30209	5500p
2432981 2432981	LOT37 1300p	TLF 70012A TLF 70018	LOT78 1500p LOT274 1550p	1-439-331-41 1-439-332-00	LOT98 1550p LOT99 1700p	AS440, AS445, AS540, AS540, AZ8048, AZ8040, CD070, CD080, CD091, CD153, CD155, CD690, CD710, CD720, CD732, CD740, CD750, CD910, CD920, CD935, FW17, FW21,		
2432982 2433011	LOT37 1300p LOT171 1650p	TLF 70018 F TLF 70161	LOT274 1550p LOT278 1550p	1-439-332-11 1-439-332-21	LOT9 1700p LOT99 1700p	FW26, FW330, FW360, FW360, FW3801, FW40, FW41, FW46, FW56, FW66, FW68	CDM12.1 CDM12.4	2200p 2200p
2433012	LOT171 1650p	TLF 70162	LOT72 1800p	1-439-332-41	LOT100 1700p	ALBOND	OPTIMASS	2000p 3300p
2433014 2433212	LOT171 1550p LOT168 1500p	TLF 70162A TLF 70162B	LOT72 1600p LOT72 1600p	1-439-332-42 1-439-332-52	LOT101 1700p LOT100 1700p	PIONEER PDN400, PDN410, PDM500, PDN1510, PDM600, PDM510, PDM700, PDM710, PDM730,		
2433291 2433301	LOT172 1700p LOT246 1600p	TLF 70162G TLF 77001 B	LOT72 1800p LOT274 1550p	1-439-333-00 1-439-333-11	LOT270 1550p LOT270 1550p	PDT303, PDT403, PDT503, PDX940M, PDX950M, PDZ560T, PDZ72T, PDZ73T, PDZ81M, PDZ82M, PDZ83M, PDZ960M, XDZ53T, XDZ54T	KSS151A	1900p
2433441 2433442	LOT188 1900p LOT191 1600p	PHILIPS 4822 140 10142	LOT142 1800p	1-439-333-12 1-439-363-11	LOT270 1550p LOT268 1650p	N32, N90M, PD101, PD201, PD32, PD41, PD4500, PD4700, PD52PD5700, PD65, PD5500, PD6700, PD7700, PD8700, PD9700, PD7204, PDCP3204, PDCP5207, PD,4001, PD15007, PD15001, PD15004,		
2433451 2433452	LOT81 1600p LOT82 1400p	4822 140 101145 4822 140 10146	LOT134 1450p LOT112 1700p	1-439-363-21 1-439-387-11	LOT268 1550p	POMA39: PDM450, PDM550, PDM530, PDM530, PDM750, PDM5917, PDP7107, PDP7207, PD97104, PDP20M, PDS501, PDS501, PDS701, PDS7016, PDS901, PDT310, PDT310, PDT, PD2747, PD284M, PD2970M, PXA1348, S125C07, S13SC07, S30SC0M, S30SC07, S54504, S54504, S54507,		
2433453 2433455	LOT82 1400p LOT234 1600p	4822 140 10151 4822 140 10161	LOT102 2150p LOT103 1250p	1-439-387-21	LOT311 1600p		PEA1030	5300p
2433521	LOT234 1600p LOT25 1600p LOT22 1500p	4822 140 10171 4822 140 10176	LOT104 2150p LOT114 1150p	1-439-416-11 1-439-416-12	LOT255 1750p LOT255 1750p	PDT303, PDT403, PDT503, PDX940M, PDX950M, PDZ560T, PDZ72T, PDZ73T, PDZ81M.	PWY1009	4800p
2433581 2433721	LOT83 1600p	4822 140 10194	LOT105 1750p	1-439-416-21 1-439-416-23	LOT255 1750p LOT255 1750p	SAMSUNG	HOPM3	2150p
2433751 2433752	LOT01 1500p LOT01 1500p	4822 140 10198 4822 140 10201	LOT115 1750p LOT104 2150p	1-439-416-41 1-439-416-51	LOT255 1750p LOT255 1750p	CD1200, CD1310, SCM-6000, SCM6900	KSS210A SOHIOTAN	2000g 3600g
2433752 2433891	LOT250 1600p LOT23 1400p	4822 140 10236 4822 140 10246	LOT118 1750p LOT111 1760p	1-439-430-21 154125A	LOT271 1550p LOT275 1700p	SANYO DCF53, DC755, DCX502, DCD701, DCX702, DCX802, DCX891, DCX891N, MCDZ10.		
2433892 2433893	LOT84 1450p LOT23 1400p	4822 140 10247 4822 140 10254	LOT105 1750p LOT107 1600p	TOSHIBA		PART No. 6142186865 DCFS5, WED1460K, 660K, MCD230L, 80F, PART No. 6142205006	614218 614220	2300p 5800p
2433952 2434002	LOT33 1200p LOT200 1600p	4822 140 10263 4822 140 10269	LOT117 1750p LOT210 1650p	37010 37011	LOT131 1450p LOT131 1450p	DCX1000MD, DCX1003, DCX900MD, DCX903, DCX915 DCD10, DCD11U, DCD20, DCD30, DCD30AT, DCD6, DCD8U, DCMS1, DCX110, DCX120,	KSS210A	20000
2434141 2434274	LOT33 1200p LOT44 1280p	4822 140 10271 4822 140 10274	LOT208 1650p LOT123 1600p	37012 37013	LOT131 1450p LOT131 1450p	DCX210, DCX220, DCX993, DCX994, MCDMS40L, MCDMS50L, MCDMS660L, MCDZ1L, MCDZ2L, MCDZ3L, PAST No. 6142391303	614239	3300p
2434453	LOT86 1600p	4822 140 10282	LOT122 1600p	37014 37015	LOT131 1450p LOT131 1450p	DCD12_PART No. 6450066966	645005 KSS2108	3700p 2000p
2434455 2434 593	LOT234 1600p LOT44 1250p	4822 140 10283 4622 140 10294	LOT104 1450p LOT125 2150p	37016 37017	LOT131 1450p LOT131 1450p	SHARP CD-111, CD-301, CD-302, CD-304, CD-310, CD C3, CD-L700, CD-L800, CD-U1, CD-U10, CD-X10,		
2435062 2435121	LOT295 1600p LOT87 1450p	4822 140 10306 4822 140 10325	LOT110 1600p LOT132 1300p	37018	LOT131 1450p LOT131 1450p	CD X12, CD-X15, CD-X16, CD-X17, CD-X20, CD-X9, CKL650, CMS95CD, DX-150, DX-160, DX-450, DX-460, DX-451, DX-650, DX-660, DX-999, OX-A3, DX-N45, DX-R554, DX-R75, DX-R75, DX-R750,		
2435131 2435141	LOT251 1600p LOT282 1450p	4822 140 10326 4822 140 10328	LOT122 1850p LOT124 1450p	37019 1810951	LOT55 1700p	DX-R77, DX-R770, DX-R820, DX-R840, DX-2160, DX 21000, DX-21500, GFCD55, QT-30CD, QT-33CD, QT-35CD, QT-		5750-
2435301 2435671	LOT88 1450p LOT89 1600p	4822 140 10349 4822 140 10353	LOT106 1450p LOT284 1450p	2433751 2433752	LOT01 1500p	OT-SOCD, OT-SOCD, OTBOCD, PART No. RCTRH8124AFZZ	RH8122A RH8124AF RH8130AF	5750p 2900p 2900p
2436201 2436202	LOT109 1450p LOT109 1450p	4822 140 10356 4822 140 10367	LOT284 1400p LOT286 1400p	23236023 23236052	LOT281 1550p LOT131 1450p	CDS360E, 360H, 370, 450H/E, CMS150CDH, CMSR400CDH, CP150, CPR400, CPS360, 370.	RH8136AF	4500p
2432101-2	LOT79 1800p	4822 140 10369	LOT109 1450p	23236098 23236198	LOT288 1400p LOT288 1400p	SONY	KSS240A	2600p
2433451H 2433453H	LOT81 1600p LOT82 1400p	4822 140 10381 4822 140 10384	LOT128 1450p LOT127 2150p	23236255	LOT289 1500p LOT129 1500p	KSS121A	K55121A K55151A	3500p 1900p
2433891H 2433892G	LOT23 1400p LOT84 1450p	4822 140 10395 4822 140 10406	LOT116 1750p LOT73 1500p	23236424 23236425	LOT288 1400p	K55210A	KSS210A KSS210B	2000p 2000p
LT.T. 4515 01 08	LOT113 1400p	4822 140 10421 4822 140 17078	LOT109 1450p LOT103 1250p	23236428 3122113837011	LOT289 1500p LOT131 1450p	KSSZZDA	KS5220A KS5331A	2500p 3400p
4515 D1 15 4515 D1 16	LOT136 1600p LOT139 1875p	SANYO 094-00020/0.9	LOT113 1400p	150F6D TFE 4039 AD	LOT131 1450p LOT293 1550p		KSS360A	2800p
4515 01 17 4515-01 19	LOT139 1675p LOT169 1500p	094-00035/0.2 094-01020/0.7	LOT162 1350p LOT59 1750p	TFB 4048 AD TFB 4048 BO	LOT281 1550p	SLP200, SLP230, SLP250, SLP333, SLP555, SLP777, SLP999, SLPA10, SLPC20, SLP325,	SOAD70A	2350p
	101100 (900p		and the second				1000	

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VIDEO RECORDER POWER SUPPLY REPAIR KITS	• Maximum R		CM3900A DIGITAL MULTIMETI	ER
PHILIPS		and Resistance Overload Protected	Features:	
For ES7047 Chassis: CP110		es for Function and Range Operation	Large LCD Display	
Order Code: VCRPSU1 Price: 675p	Supplied in Wallet with Test Probes		Height 18mm	
PANASONIC		2V/20V/200V/500V	Maximum Reading 1999 + Unit	
For ES 7054 Chassis: HSM	AC Voltage	200V/500V	· Single Manual Rotary Switch for	Function and Range Operation
Order Code: VCRPSU2 Price: 1125p	• DC Current :		• Auto Power off (approx 15 min)	and a second a personality
For ES 7053 Chassis: JSM		kΩ/20kΩ/200kΩ/2MΩ	Diode Test Function	
Order Code: VCRPSU3 Price: 900p	Order Code:			
For ES 7050 Chassis: KSM		ORANGING DIGITAL MULTIMETER	All Ranges Overload Protected	
Order Code: VCRPSU4 Price: 1500p	Features:		Supplied with Test Probes	
For ES 7051 Chassis: LSM		play with Decimal Point	 DC Voltage: 200mV/2V/20V/200V/ 	
Order Code: VCRPSU5 Price: 1500p		Bargraph display	 AC Voltage: 200mV/2V/20V/200V/ 	700V
For ES 7055 Chassis: MSM	Override Inc		 DC Current A: 200µA/20mA/200m 	A/2A/20A
Order Code: VCRPSU6 Price: 1650p		ch for Function Selection	 AC Current A: 200µA/20mA/200m 	A/2A/20A
For ES 7052 Chassis: NSM		off (approx 15 mins)	 Resistance Ω: 200Ω/2kΩ/200kΩ/2M 	AΩ/20MΩ/200MΩ
			Order Code; CM3900A	Price: 2900p
		y with Indication	CM3920 DIGITALMETER WITH TEM	
NEW NATIONAL PANASONIC VCR SERVICE KITS This Service Kit consists of the parts for the upperside of the G		nd Continuity Test with Buzzer	Features:	
		verload protected	Temperature Measurement	
deck, G rev. deck and G2 deck.	Low Battery		Diode and Transistor HFE Test	
Suitable for the following models:		th Test Probes	Large LCD Display	
AG5150, AG5250, AG5700, AG6024, NVF55, NVF55F, NVF65,		320mV/3.2V/32V/320V/600V		
NVF75, NVF77, NVJ30, NVJ33, NVJ35, NVJ36, NVJ37, NVJ40,		320mV/3.2V/32V/320V/600V	• Height 18mm	
NVJ42, NVJ45, NVJ46, NVJ47, NVJ48, NVL20, NVL21, NVL23,		A: 320µA/3200µA/32mA/320mA/10A	Maximum Reading 1999 + Unit	
NVL25, NVL28, NVW1, NVFS100, NVFS200, NVFS88, NVFS90		A: 320µA/3200µA/32mA/320mA/10A	Single Manual Rotary Switch for	runction and Hange Operation
This kit consists of the following:		320Ω/3.2kΩ/32kΩ/320kΩ/3.2MΩ/32MΩ	Auto Power off (approx 15 min)	
Pinch Roller Unit, Mode Switch, PS Pull Out Gear, Sub Loading	Order Code:		Diode Test Function	
Arm Unit, Pinch Cam, Pinch Cam Cap, PS Unit, Cut Washer,		TAL CAPACITANCE METER	All Ranges Overload Protected	
Connection Gear, Cut Washer	Features:		Supplied with Test Probes	
Order Code: SK134 Price: 1100p	· 3.5 LCD Disp		DC Voltage: 200mV/2V/20V/200V/	1000V Accuracy ±0.5%
This Service Kit consists of the parts for the lowerside of the G	· Height 18m		 AC Voltage: 200m V//2V/20V/200V/ 	
deck, and the G rev. deck.	Maximum R		· DC Current A: 2mA/20mA/200mA	
Suitable for the following models:		9 Ranges from 200pF-20000µF	• AC Current A; 200mA/20A	
AG6024, NVF55, NVF55F, NVJ30, NVJ33, NVJ35, NVJ36, NVJ37,	Measuring f	rom 1pF-20000µF	 Resistance Ω: 200Ω/2kΩ/200kΩ/2M 	10/20M0/201M0
NVJ40, NVJ42, NVJ45, NVJ46, NVJ47, NVJ48, NVL20, NVL21,		al Rotary Switch for Function and Range Operation		
NVL23, NVL25, NVL28, NVW1	· Zero Adjust		Capacitance: 2nF/20nF/200nF/2µF	
This kit consists of the following:	Order Code:		Order Code: CM3920	Price: 4100p
Main Cam Gear, Ring Gear, Sub Cam Gear, Timing Belt, Centre				
Gear, Play Arm Unit, Clutch Disk, Loading Gear (take up), Centre	REPLACEM	ENT IDLERS & PULLEYS		
Pulley Unit, Loading Gear (supply), Loading Cam Gear, Cut	Make	Models		Description
	Hitachi	VT11, 14, 17, 19, 33, 34, 35, 38, 39, 52, 57, 61, 62, 63,	64, 65, 85, 86, 330.	
Washer, Retainer Gear Unit, C Ring, Detent Arm Order Code: SK135 Price 1000p		350, 640, 165, 5030	,,,,,	FF Rew Idler 6886792
	Order Code			Price 100p
TRANSPARENT REPAIR/ADJUSTMENT CASSETTE	Make	Models	A REAL PROPERTY OF	Description
This transparent videocassette replaces a normal videotape dur-	Hitachi	VT680, 6500, 6800, 9300, 9500VT9700, 9900		Play Idler 6861482 6861481
ing measurements, adjustments and inspection. The mechanical	Order Code			Price: 1800
parts come Into sight and become accessible.				
Order Code: Tool23 Price: 500p	Make	Models		Description
VOLTAGE TESTER	Blaupunkt	RTV301, 306, 307, 309, 311, 312, 315, 316, 317, 319, 3		Idier
A terminal screwdriver incorporating continuity and voltage	Goldster	GHV1221, 1232, 1240, 1241, 1242, 1243, 1244, 1245,	1246, 1247, GHV1248,	idler
detection supplied complete with batteries on blister card.		8000, 8200, 8210, 8215, GVHP51, VCP4100, 4130		
With Eusoslot and instructions for use.	Grundig	MVS400, 440, VS400, 410, 440VS450, 460		Idler
Order Code: Tool11 Price: 220p	National	NV230, 250, 260, 280, 370, 380, NV430, 431, 433, 450,		Idler Arm VXP 0521
SPRING HOOK		650, 730, 780, NV810, 830, 850, 870, 890, NVG7, 9, 10), 11, 12, 14, 15, 16, 18,	
Spring Hook, to unlock springs in audio tape recorders and VCR's		30, 130, 400, AG1000, AG1050, 1200, 1500, 1810, AG	2100, 2200, NVH65, 70	
Order Code: Tool20 Price: 265p	Philips	VR6460, VR6520, VR6920		idier Arm 40340162
SATMETER	Order Code	IDL08		Price 100p
The Satmeter is a professional portable satellite strength meter	Make	Models		Description
designed for the installation and maintenance of satellite TV sys-	Amstrad	VCR7000		Idler 150280
tems. The Satmeter can be used as stand alone meter with pow-	Sharp	VC200, 381, 383, 384, 385, 386, VC388, 390, 393, 3300	0, 8381, 9100, 9300, 9500, 9700	Idler NIDL0005GEZZ
ering the LNB as well as in loop. Through operation with	Order Code			Price: 100p
satellite RX powering the LNB.	Make	Models		Description
Acoustical signal : On signal strength	Philips	VR6540		idier
LED indicator Vertical/horizontal	Sharp	VC300, 387, 402, 471, 473, 477, VC481, 482, 483, 486.	488, 496, 500, 571, 573	Idier
		581, 582, 583, 584, 585, 8481, 5F3, 5W20E		NIDL0006GEZZ
Frequency range : 900 to 2050 MHz	Order Code			Price: 100p
Input impedence : 70 OHM	Make	Modeis		Description
Power amplifier : 18 DB	Akai	VS10		Reel idier
Detection range : -60 to -10 DBM			2030 2031 2040 2041 0043	Reel Idier PU48967
Max. Input Single : -10 DBM	Ferguson	3V23, 3V29, 3V30, 3V31, 3V323V35, 8923, 8924, 8929, HR7200, 7300, 7350, 7600, 7610, 7650, 7655, 7700	, 0300, 0331, 0340, 0341, 0342	
Order Code: Tool22 Price: 8500p	J.V.C.			Reel Idler PU48967
DIGITAL MULTIMETERS	Order Code			Price: 175p
CM2300 DIGITAL MULTIMETER	Make	Models	0000 0001 0000 0010	Description
Features:	Ferguson	3V39, 3V30, 3V31, 3V32, 3V353V36, 3V38, 3V39, 3V49	9, 0930, 8931, 8933, 8940,	Tale Halds - 61 Paten
• 3.5 LCD Display	1110	8941, 8942, 8943, 8944		Take Up Idler PU 51402
Height 12mm	J.V.C.	HR7200, 7600, 7650, 7655, 7300, 7350, 7610, HRD110	, 111, 120, 121, 225	Take Up Idler PU 51402A
Max Reading 1999	Order Code			Price 100p
HV Indication for High Voltage	Make	Models		Description
Single Manual Rotary Switch for Function and Range Operation	Ferguson	3V39, 3V30, 3V31, 3V32, 3V353V36, 3V38, 3V39, 3V49	3, 8930, 8931, 8933, 8940	
All Ranges Overload Protected		8941, 8942, 8943, 8944		Take Up Clutch PU 51380
10A DC Current Test	J.V.C.	HR7200, 7600, 7650, 7655, 7300, 7350, 7610		Take Up Clutch
DC Voltage 2V/20V/200V/500V				PU 53462A PU 51380
AC Voltage 200/500V	Order Code		·	Price: 200p
DC Current 200mA	Make	Models		Description
Resistance 2kΩ/20kΩ/200kΩ/2MΩ	Philips	DB532, VR6520, 6843, 644		Reel Idler
Supplied with test probes	Sharp	VC600, 651, 681, 682, 684, 685, 693, 699, 700, 783, 6F	R, 6V3, 6F3	Idier Assembly
Order Code: CM2300 Price: 975p				NPLYV0107GEZZ
CM2400T DIGITAL MULTIMETER WITH TEMP MEASUREMENT	Order Code			Price: 615p
Features:	Make	Models		Description
• 3.5 LCD Display	Philips	VR6843, 6943, 44SB9, VR44SB920, 44SB922, 6943		Reel Drive Unit
Height 12mm	Sharp	VC772, 780, 781, 782, 785, 786, VC787, 800, 793, 799,	7810, 7822, VCA100, 102.	
Maximum Reading 1999		104, VCA131, 140, 170, 202, 203, 234, 501, VCA602, 5		Idler
10A DC Current Test		852, VCH882, VCM73, VCT72, VC782MK11		NPLTV0111GEZZ
DC Voltage 200mV/2V/20V/200V/1000V	Order Code			Price: 700p
AC Voltage 200/750V	Make	Models		Description
AC voltage 200/750v DC Current 0.2mA/200mA/20mA/200mA/20A	N.E.C.	N911, 915, 916, 917, 9012, 9013N9014, 9016, 9033, 90	034 9053 N9054 9055 9056 9066	
		9096, N9110, 9120, 9510, 9520, 9530, N9610, DX1000		idler Arm Assembly
Resistance 200Ω/2kΩ/20kΩ/200kΩ/2mΩ Supplied with Text Backare	Order Code		, 1000, 2000, DA3000, FA1200	Price: 270p
Supplied with Test Probes	Make	Models & Description		
Temperature measurement				
Continuity Test	Philips	Pressure Roller Assembly P\$403-40205		222 5250 10405
Diode Test and Continuity Check		DV186, 190, VR211, 2115, 212, 213, 223, 286, 291, 292		
All Ranges Overload Protected		471, 562, 582, 571, 761, 201, 202, VR203, 302, 303, 30		
Order Code: CM2400T Price: 1450p		6390, 6391, 6393, 6467, 6468, 6470, 6561, 6570, 6581		
CM2900 PACKET DIGITAL MULTIMETER		86B1, 63S87, 68S84, 71SB4, 71SB5, 72SB8, 72SB8, 9		
Features:		2SB02, 2SB11, 2SB12, 30DV2, 31DV1, 31DV2, 31DV.	33SB02, 3SB03, 3SB05, 3SB11, 3SB12	, 3SB13
* 3.5 LCD Display	Toshiba	V91, V95 Pressure Roller Assembly - PS403-40205		
Compact and Lightweight Pocket Size	Order Code	PR232		Price: 300p
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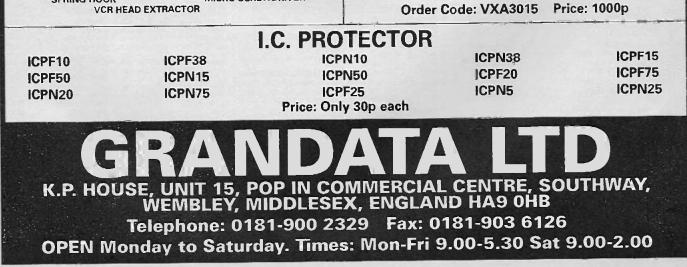
			REMOTE C	ONTRO	IS			
Description	Code	Price	Description	Code	Price	Description	Code	Price
AKAI		1000	пт	Dates		SALORA	RC190	750p
RC-V10A	RC876	750p	IFB13, 14, 15	RC143	800p	SERIES L 86173	RC882	750p
RCV 37 B	RC891	750p	FS4	RC148	750p	SANYO	10002	1000
V25A	RC896	750p	RG305	RC305 RC306	675p 750p	RC218, RC222, RC228, RC238	RC140	700p
DECCA			RG306	RC307	750p	JXGE	RC878	800p
RC70	RC894	750p	FS9/1-10/1 VS5 RUK	RC308	750p	JXDE	RC884	750p
		-	VS5 HUK VS4-1	RC308	750p	VHR2300	RC890	750p
FISHER	RC879	750p	MULTICONTROL (17C20)	8C311	7500	RC628	RC865	750p
RC905B	160/5	7500	and the last of the second	10011	Toop	SHARP		
GRANADA		750	LOEWE	RC146	800p	G0121CESA, 123CESA, 204, 251	RC140	700p
UNIVERSAL TEXT	RC309	750p	DC11	NU 140	ouoh	SONY		
MK4 TEXT, 70155G, 70115G, 70133G	RC880	750p	MATSUI	00000	700-	RM604, RM605, RM606	RC140	700p
95288E	RC882	750p	010270601 ~	RC889	750p	32 CHANNEL	RC140	700p
94490D	RC884	750p	VX770	RC892	750p	RM613	RC141	750p
GRUNDIG			NOKIA			RM632, RM636	RC160	675p
TP160E	RC107	900p	SATELLITE	RC550	750p	TATUNG	00077	7500
TP200, TP300	RC380	750p	ORION		1912	FXA	RC877 RC883	750p 750p
TP400	RC401	675p	RC53	RC892	750p	RC70	RC894	750p
TP590-600	RC600	750p	PANASONIC			FX70 FASTTEXT TELEFUNKEN	NC034	1.30p
TP390, TP510	RC610	750p	EUR51200	RC200	800p	FB632	RC632ST	750p
TP621	RC612	800p	TC2200	RC204	750p	FB639	RC639	750p
TP630, TP650	RC650	750p	VSQ0357/NV730	RC202	750p	THORN/FERGUSON	110000	, 50 p
TP666	RC660	750p	TN01621	RC203	750p	3V35-42	RC342	650p
TP661	RC661	750p	PHILIPS			3V31-32	RC344	750p
HITACHI			RC5002,5154	RC134	750p	3V57-58	RC628	750p
CLE800-CLE830	RC140	700p	KT3 NON TEXT	RC135	750p	TX10 TEXT	RC732	575p
A617402/655602	RC1920	800p	69117032	RC178	800p	TX10 STEREO TEXT	RC738	575p
A512120/230	RC900	750p	69117194	RC180	750p	TC9-90-100	RC740	675p
A514790	RC901	750p	RC5991-UNIV	RC300	580p	3V55, FV11	RC783	750p
A5088470	RC902	800p	RC38	RC301 -	750p	TX100 FASTTEXT	RC789	650p
A518612	RC903	750p	KT3 TEXT	RC5301	750p	TX100 ST, FASTTEXT	RC789	650p
SCL002	RC904	750p	RC5352	RC5352	750p	PROFESSIONAL	RC790	650p
C2096	RC905	800p	RC5375	RC5375	750p	TOSHIBA	RC950	750p
A511940	RC906	750p	RC5 STANDARD	RC300	580p	CT937 CT9117	RC951	750p
655602H	RC1920	800p	RC5903	RC5903	700p	013117	116351	1000
WE STOCK		OTE	CONTROLS FO	DR OVER 5	.000	DIFFERENT MODE	ELS	6
RIN	G FOF	MO	DELS NOT LIST	TED ABOV	ÉON	0181 900 2329		
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RC140	700p			RC740		675p	600p	
RC160	675p		600p	RC789		650p	600p	
RC300	580p		540p	NC/09		8305	Book	
RC732	575p		540p					ن من
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	WAY DE	DEDD(GRAMMED UNIVER	SAL INFRA RE	DRE	MOTE CONTROL		
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SET-UP BY LIBP	RARY REV	IEW				ENT FOR LOST/BROKEN HE	NOTES	-
			ORDER CODE : 2	WAY PHICE: 925				
VCR AL	IGNIM	ENT	KIT		PAN	ASONIC SIDEPLAT	E	
	LIGINIV	IL IN I	IXI I					TC
CONTAINS:			OFT OF & ALLEN	REPLACE	MENT	FNATIONAL PANASONIC	SIDEPLA	IC .
SET OF 7 HEAD & TAPE	PATH ALIG	NERS	SET OF 8 ALLEN			(VXA 3015)		
KEYS						(*// 0010)		1. 18 83
• RCA TYPE AUDIO & CONTRO	LHEAD		• 0.77mm	FITS THE FOLL	OM/IN	G MODELS:		
POSITIONING TOOL	in start of the start		• 0.90mm	THUSTHEIDE		C MODELO.		
RCA ADJUSTMENT TOOL FO	R TAPE		• 1.27mm	NATIONAL PA	NASO	NIC		
GUIDE POSTS			 1.50mm 	INATIONAL PA	NACUL		NICODO N	VCOF

NATIONAL PANASONIC NVD80, NVFS1, NVG18, NVG20, NVG21, NVG22, NVG220, NVG25,

NVG28, NVG300, NVG50, NVH65, NVH75

BLAUPUNKT RTV640, RTV740, RTV910, RTV920

Order Code: VXA3015 Price: 1000p



1.60mm

2.00mm

2.40mm

3.00mm

CIRCLIP PLIERS

MICRO SCREWDRIVER

TELEVISION May 1997

GUIDE POSTS RCA TYPE BACK TENSION TOOL

3 REVERSIBLE SCREWDRIVERS

SPRING HOOK

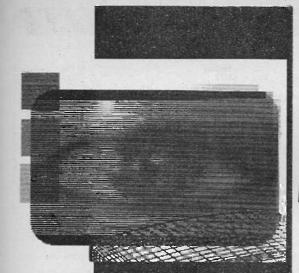
· VCR ADJUSTMENT TOOL

VARIOUS USES

TENSION ADJUSTMENT TOOL FOR

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Reports from Philip Blundell, AMIEEIE John Pitt-Francis Graham Thomson Christopher Nunn and John Edwards

Compaq 420T

This monitor produced a red screen. A quick check showed that there was no voltage at the collector of the red output transistor. The cause was an open-circuit coil, L404 (4 μ H). Fitting a coil from a similar monitor solved the problem. P.B.

Dell Ultrascan D1526TX-H5

The slightest tap on the CRT base panel produced loss of bluc in the display. This made location of the offending dry-joint very difficult. It was found at R320, a $33k\Omega$, 2W resistor in the blue drive circuit. J.P-F.

Mitac M1420-01N-E

The RGB processor chip U701 was found to be responsible for no red in the display. We proved this by swapping over its red and blue drive inputs (pins 6 and 4 respectively) – the blue parts of the display then dropped out instead. A new LM1203N chip restored an excellent display. J.P-F.

Raster-OPS GDM1950

There was no green content in the display. The cause of this was traced to Q202, which was short-circuit emitter-to-base, and R207 which was well cooked. When these two items had been replaced, also Q201 and R208 for good measure, we had an excellent 21in. display.

This chassis, of Sony origin, has the best circuit I've come across for convergence. The screen is divided

Monitors

into fifteen sectors, with an H and a V control for each. They really work and don't interfere with each other. Wondcrful! J.P-F.

Philips 7CM5279/20T

No line drive is a common problem with these monitors. The cause is loss of the supply to the line driver FET. This supply is provided by a BC640 constant-current source transistor, Tr7519, which is in the habit of going short-circuit. As a result, its feed resistor R3512 (47Ω safety) goes open-circuit. **G.T.**

Philips 7CM5279/20T

Field collapse was the problem, or to be more precise there was a narrow, wedge-shaped raster. The monitor had been elsewhere for repair, and persons unknown had cracked the small connection PCB on top of the scan coils. When this had been repaired we had a normal picture. G.T.

Acer 7015

There was intermittent line tearing, mainly when the monitor was cold. When we checked with heat and tins of freezer the culprit was revealed. It was C908 (10 μ F, 160V) in the power supply. Its value had fallen to 1.8 μ F. C.N.

Daewoo CMC1414ADE

This monitor came to us with the complaint that it was dead. On checking we found that there was HT, but it was very low at only about 30V. Heating the power supply brought the monitor back to lifc. As I almost got to the end of my supply of freezer I came across the culprit, which was C014 (1 μ F, 50V). Its value had dropped to 0.68 μ F. C.N.

IBM 6322-002

No picture correction via the touch pads at the front was the complaint with this monitor. The cure was to replace C418 (22μ F, 63V) in the EW correction circuit. It had a slightly swollen appearance but measured OK. C.N.

Commodore 1960

The power supply was OK but there was no line output stage operation. The cause of this was a carbonised hole that surrounded one leg of L403. Fortunately the inductor itself was still intact. Scraping away the burnt board area and adding a wire link across the hole restored normal operation. J.E.

Escom EM1448RPD

This monitor was dead with the SGSF444 line output transistor shortcircuit. When I fitted a replacement the monitor performed normally. But the transistor was running very hot – too hot. It ran a little cooler when I replaced C414 (100μ F) in its base circuit (the original capacitor checked out OK when tested). With monitors tending to be on all day every day, some of the line output transistor heatsinks fitted leave much to be desired. J.E.

Thorn 8513002

There was no picture because the tube's heater supply was open-circuit. The action required was to resolder the relevant pins on the line output transformer. J.E.

Sony CPD15F13/Gateway 2000 Series

Intermittent picture break up was the complaint. The fault would either rectify itself, or the monitor would revert to standby. I found that the line output stage was littered with dryjoints. After a thorough resoldering operation I gave the monitor a long test run. This proved that it was now OK. J.E.

Opus CM1448M

A sizzling noise came from the power supply and there was line tearing with ragged edges on the display. This was all caused by the 330μ F, 250V HT reservoir capacitor C808 which was open-circuit. J.E.

What a Life!

Mostly faulty TV sets this time. A string of successes was followed by a nasty that brought Donald Bullock back to earth

• ver the years the items we have been concerned with in our trade have become ever more complex. What's more, they are sold at prices which twenty years ago would have been unbelievable – unthinkable even ten years ago.

People no longer bring us faulty radios to repair, unless the equipment is fairly modern and incorporates a twin cassette recorder. Even then they make it clear that they are unwilling to pay more than peanuts. New ones are just so cheap! We no longer have to turn stacking units and and hi-fi systems away. Their owners buy new. Portable colour TV receivers are going the same way. So are basic VCRs.

A week or two ago a couple of teletext sets were brought in for repair estimates. Neither had serious faults, and we kept our estimates low. Yet the customers turned into Scotch mist on hearing them. People don't even pick the sets up. These days more and more are left on our hands.

Steven's Expertise

"'E shuts down every now and again Mr er.. er.. hnnn hnnn" said the lean little man with the Panasonic video recorder. "But if I taps 'im here he tries to come on. hnnn hnnn."

It was an NVL20B, and the dusky patch on its top smelt of Guinness. But he was quite right. When I opened it up the capstan soon stopped, followed by the rest of the mechanism.

Steven had been watching. "I've had a lot of experience of this one" he said. I stepped back and he tapped around plug I on the main panel. The capstan immediately sprang to life. In no time he'd resoldered pin 15. "Plug I feeds the capstan motor" he said.

Mr Mincing

Then I saw Mr Mincing carrying a 14in. Ferguson TX90 from his car. I don't like Mr Mincing. Too loud and familiar. "Don't go away" I said to Steven. "Handle old Mincing as best you can and think up a few ideas on the Fergie while I make the tea." Then I hurriedly departed.

"Wherr's 'c gone?" bawled Mincing. "Miserable old bugger. 'Fraid I'll bite 'im he is."

Steven took the set and found that the problem was field collapse. It was the usual dry-joint trouble. When he'd done the necessary resoldering he had a picture. But it was distorted, with vertical strips of shading that varied with the setting of the brightness and contrast controls.

"I 'en't watching that" bawled Mincing. "I wants 'im right.

Steven busied himself in the power supply, and soon found that the 22μ F, 50V boost reservoir capacitor C189 had fallen in value to only 0.01 μ F. A replacement cured the fault.

"That 'ent gonna cost much, I know" Mincing commented. "Them resistor things cost almost nothin'."

"Twelve pounds twenty five" said Steven, boxing up the set. As Mincing gulped at the air, Steve added "five bob for the capacitor. the rest for our time and suffering.

Monitors and TVs

Mrs Twog lumbered in as we were drinking our tea. "Car" she said. "Hoolp... hoolp...

"Car" she said. "Hoolp... hoolp... ah."

Steven went to her car and returned with a Supertron colour monitor.

"Dead" said Mrs Twog. "See you tomorrow. Hoolp... hoolp... ah." When we put it on the bench it was dead all right. So we opened it up and Steve went around it with his DC meter. When he touched the base of the chopper transistor the set chirped and sprang to life. The 330k Ω bias resistor R902 was open-circuit – a replacement restored normal operation.

"Hoolp... hooolp... ah" said Steven, "next please!"

He didn't have long to wait. Old Miss Porcelain called in with her Alba portable colour set.

"Hwuh... hwuh... oh, Mr Burper, it made such an unpleasant smell then went 'phff'. Now there's no picture. Hwuh... hwuh... hwuh" she said.

We pursed our lips and smiled sweetly. When she went we pulled her set on to the bench. I switched it on and the standby light glowed, but the set was otherwise dead. After opening it up I found that one of the pins of L401 was sitting in a large scorched hole in the PCB. The cure was to remove all traces of carbon and resolder the coil with a jumper. After that the set produced a particularly good picture.

A Satellite Receiver

C.C. Kilby, our next caller, is an expressionless accountant from a nearby town. The C.C. stands for Complete Control. Kilby won't break down and smile, or even be himself. Dealing with him is heavy going.

Hc opened his briefcase and took out a Pace SS9200 receiverdecoder which was actually dressed up as the Nokia SAT1500. "This instrument failed in use. Hweh.. hweh.. hweh" he said drily. "I'd be obliged if you would repair it. Settlement in cash, of course. Hweh.. hweh.. hweh.." Then he walked off as though freshly starched.

His receiver was dead and the 1A mains fuse had gone to its Maker. We soon discovered that the chopper transformer T2 was faulty, with all four pins on the primary side shorted together. We ordered and fitted a replacement, and also replaced the BUT11A chopper transistor Q1 and its 1μ F, 16V base drive coupling capacitor C9. That completed the job.

When C.C. Kilby came to collect his receiver he was clearly pleased, and I fancied that the germ of a smile touched his face. But Steven insisted that he was suppressing a cruel attack of wind.

The Muck Bros

The Muck brothers, Hawley and Malc, are a pair of jolly farmers. They staggered in with a huge 59cm Goodmans set. Model 2575.

"Have a look at thisun, boys. Kuh!" said Malc. "We don't want to spend too much, mind. If it's more than ninety quid. say, ring us first on this joker."

He waved a mobile phone at us and we took the number he gave.

"We'em off to the market for a few hours. Kuh."

We got them to bounce the set on to the bench, and as they left we removed its back and switched on. A few thin wisps of smoke rose from the main panel. Steven studied them. He homed in on the spot and found that link 13, which carries some spikey chopper transformer voltages, was dry-jointed and getting burnt up about it.

It was another case of clearing the carbon and resoldcring the joint. When this had been done we switched on and were rewarded with a good picture.

We rang the Muck Bros on their mobile phone and were answered by a bellowing bull. "Tell Hawley and Male that their set's done" I said, "at something less than ninety."

Mr Thick's Solavox

Mr Thick comes from the Severnside village of Elmlode. He came in carrying a Solavox TV set. Steven looked at it and started to gibber, but I stood there resolutely and faced Mr Thick with great dignity.

"It works when you plug it in Mr Pullet, but it's dead" he announced. "Huh!"

"You don't say" I replied, drawing up a job card and filling in his name. "Phone number?" I asked.

"Elmlode 456. Huh" he said. I racked my brains for the local code, then looked at him.

"What's Elmlode, Mr Thick?" "What do you mean, 'what's

Elmlode' huh, Mr Pullet." "Never mind" I said.

"Any more questions, Mr Pullet?"

I waived him out and put his set on the bench. It was a Solavox 22R19. When I opened it up I found that it contained an ITT Compact 80 chassis. I shouted the news to Steven, who cheered up and came over.

The set was dead but the standby light was on. There was no HT supply. On further investigation we saw that there was a dry-joint at one end of an 0.01μ F, 1.6kVcapacitor in the line output stage and that one of its leadout wires had burnt away. We replaced it and switched on, but there were still no results. So we dived for the line output transistor, which sure enough had shrugged off its mortal coil. After fitting a replacement we switched on and a good picture came up.

"You know, Steven, I reckon this is not such a bad trade after all" I said. "We've fixed several sets with no effort at all. We're so clever we can now take all these faults in our stridc. Yep, that'll be it." I reckoned without Mr Sly.

The Bush 2114

Mr Sly appeared out of thin air. He's an enquiry agent-cum-bailiff, and is the only man I've come across who can swivel his eyes in opposite directions. He was carrying a Bush Model 2114.

"If I as much as look at it it whines" he said. "Nyahh."

We nodded understandingly and promised to look into it.

When we switched the set on we found that in addition to the whining there was no vision and the raster covered only the lower two-thirds of the screen. We noticed that two electrolytics, C806 (1,000 μ F, 16V) and C830 (220 μ F, 25V), had blown their tops. We replaced them, checked the associated rectifiers and switched on. They blew their tops once more.

After fitting replacements we studied the board. C808 ($1,000\mu$ F, 16V) and the HT reservoir capacitor C810 (220μ F, 160V) both had bulging tops. All these electrolytics are reservoir/smoothing capacitors on



The Muck brothers staggered in with a huge 59cm Goodmans set . . .

the secondary side of the power supply.

It seemed clear that the outputs were high because something was amiss on the primary side of the circuit. We eventually found that C818 (1 μ F, 50V) had fallen in value to 0.5 μ F.

We replaced C808, C810 and C818 and switched on. This time the set no longer whined and we were able to tune in a picture. But there was no sound.

C606 (1,000 μ F, 25V) and C607 (470 μ F, 25V) in the audio output stage had both gone very low in value. Replacements failed to restore the sound, and further checks revealed that the 1 Ω safety resistor R811 in the power supply had blown. A replacement went open-circuit immediately, so we replaced the TDA2006 audio output chip IC601.

It took us some hours of bench time to get the set working properly.

About half an hour later, as we were about to pass the set OK, it banged and showered the bench with electrolytic innards. Steven looked at the set, then at me.

"What was that you said about us being so clever and taking the sets in our stride?" he asked.

"I don't recall saying anything of the kind" I retorted. "It was you who said that."

Servicing

the Mitsubishi HSMX1

John Coombes presents a servicing guide that deals with the mechanical and electronic sections of this VCR

ost of the mechanical faults you get with this VCR can be cured with the aid of the Mitsubishi service kit part no. 789C014010. Unfortunately it doesn't include a capstan pulley. When faulty this item can be responsible for no eject, the tape being jammed in the machine or even no rewind/fast forward. When they first occur these faults may be intermittent – until the pulley breaks completely. Other symptoms are tape chewing and half loading.

The Service Kit

The item you are most likely to need in the service kit is the pinch roller. It can break, with the result that the tape is jammed in the machine or won't go in. If the roller's surface becomes highly polished, you may get tape creasing at the top and/or bottom.

To replace the pinch roller you have to remove the cam pinch, on which the pinch roller travels. Clean this, removing all the thick, black grease.

Clean the spindles and loading motor, and regrease with PG641 (part no. 859D55030). This will prevent intermittent play – cutting out for no apparent reason.

If the machine won't load and go into play the cause may be the grease on the pinch or a faulty loading motor. The latter can be checked by slightly rotating with a finger. If the motor is free with no resistance, it's OK. If there's slight resistance, replace the motor.

The next item in the kit to replace is the tape tension regulator arm. It can be responsible for the tape stopping just after the start of playback. Alternatively tape movement may continue but because of the loss of the pad there's no playback. Check this by reseating the pad. This should restore normal playback.

The capstan brake can wear. The result will be poor still pictures, or there may be a squeak at the start of recording. These faults can also be caused by a defective reel belt, which can also be the cause of a jammed tape.

The tape tension brake band can cause bent verticals, hooking at the top of the picture or up and down movement of the playback picture.

If the supply/take-up brakes wear they won't work in the rewind and/or fast forward modes.

The final item in the kit is a lever brake. Replace it to

prevent picture noise at the start in the slow rewind mode. This item is not present in all models.

Mechanical Faults

Noisy rewind/fast forward: Check that the take-up and supply turntable reel spindles are lubricated and free running. If necessary check the gear reel units. Remove, clean and relubricate them. This usually cures the problem.

Poor playback/lines on the picture: Misaligned guide poles can cause this. Reset and seal the screw with Loctite paint. Also ensure that the guide pole arms aren't bent. If so, replace the complete guide pole.

Noisy playback/stills: On rare occasions the cause can be a faulty drum motor bearing. In this case replace the complete drum assembly. Alternatively the cause may be the earthing brush on the drum spindle. To prevent any further noise, ensure that it's greased.

Intermittent clicking noise during playback: This can be a very intermittent fault. Its cause is the spring in the gear idler unit. Check by replacement. Clean all the mechanical components here and lubricate the spindles.

Poor sound/muffled sound: Ensure that the audio/control head is clean and not clogged with oxide. If the AC head is OK in this respect, check whether the pinch roller is worn - if it is, the tape will slide and slip. The audio/control head could be faulty.

No erase: We've always found that the head is dirty. When worn it may keep on getting dirty. Only replacement will cure this.

Mechanism jams: We've had this fault on rare occasions because the gear arm TU-G2 has cracked or lost its teeth.

Mode switch faults: The mode switch S570 can be responsible for many problems – no play, no eject or no fast forward and rewind. The condition may be very intermittent. Be sure that the VCR is in the eject mode when you replace the mode switch.

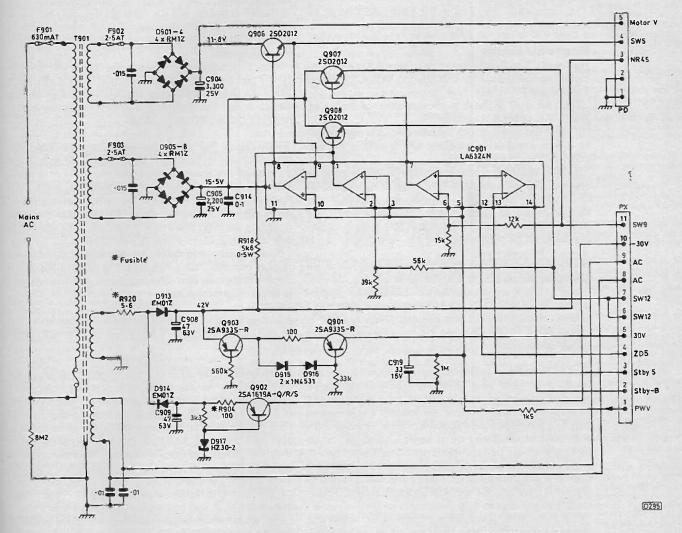


Fig. 1: The power supply circuit used in the Mitsubishi Model HSMX1B VCR.

Intermittent pause in playback: This can be a very intermittent fault. We've found that the capstan motor is usually the cause.

Cassette housing faults: If the front loading door arm A or B jams and breaks, the front door won't open and the tape will be trapped inside the VCR.

The cause of the cassette tape not seating correctly on the take-up/supply spools can be a bent or damaged bottom cassette plate.

If the cassette housing doesn't load or unload the tape, check the front loading gear for wear, and the gear and/or drive gear for cog damage or being split.

If the tape is jammed in the cassette housing or fails to

Transisto	r voltage	s	
Transistor	С	В	Е
Q901	32	41	41.6
Q902	-30	-30.7	-40.6
Q903	42	41.6	42
Q906	11.8	5.8	5.1
0907	15.5	9.9	9.3
Q908	15-5	13-2	12.6

load, check the front loading arms for a break or displacement.

Picture jitter: A worn lower drum or a faulty audio/control head can cause this. Another thing to check is for a faulty tape tension band brake or maybe a bent tension arm.

Tape looping out because a reel disc doesn't rotate: We've had this fault with many different Mitsubishi VCRs. It's caused by the pulley gear being incorrectly seated, because the split washer has been pushed down past the slot on the shaft that holds the reel gear unit. If you wish to prove the point, swap with the washer on top of the belt pulley.

Video head faults: The most common problem is a snowy picture because the heads are dirty (clean them) or faulty. One head may be clogged, with the result that there is a picture on part of the screen, the rest being snowy. Check also for poor connections at plug/socket GB. If the lower drum is badly worn, the video heads can clog prematurely.

If the heads are OK, check back through the video head amplifier. The first step is to ensure that the XRA7254S

IC901 Voltages					
Pin	V				
1 2 3 4 5 6 7 8 9 10 11 12 13 14	$\begin{array}{c} 13.2\\ 5.1\\ 5.1\\ 15.4\\ 5.1\\ 5.1\\ 5.1\\ 9.9\\ 5.8\\ 5.1\\ 5.1\\ 5.1\\ 0\\ 5.1\\ 5.1\\ 5.8\end{array}$				

VIDEO

chip IC201 is receiving its 5V supply – if not, check back to source. IC201 could be faulty: check the DC conditions before trying a replacement.

This of course brings us to the electronic side of the machine.

Electronic Faults

No results: The first thing to check is the 630mAT mains input fuse F901, see Fig. 1. If this has blown, the power transformer T901 could have shorted turns.

The next thing to check is whether either of the 2-5AT fuses F902 or F903 is open-circuit.

If F902 has blown, check the four RM1Z bridge rectifier diodes D901-904, transistor Q906 (2SD2012) and C904 (3,300µF) for shorts.

If F903 has blown, check the RM1Z bridge rectifier diodes D905-908, transistor Q907 (2SD2012) and C905 (2,200 μ F) for shorts. Q907 could be dry-jointed. If necessary, go on to check Q908 (2SD2012) and C914 (0.1 μ F), then the LA6324N chip IC901 (check its DC conditions or by replacement).

No display – power supply fault: Check for -30V at pin 10 of plug/socket PX. If this voltage is missing, the first things to check are whether Q902 (2SA1619A) is opencircuit, D917 (HZ30-2) is short-circuit or R904 (100 Ω safety) open-circuit. It's possible that Q902 or D917 is leaky. D914 (EM01Z) could be open-circuit or C909 (47µF) short-circuit.

Tuner/IF faults: A broken RF input or output socket is a common problem with all VCRs. The sockets can be physically damaged as a result of plug removal and replacement, or may become dry-jointed. The symptom may be a snowy picture, a flickering picture or just a complete snow storm. Don't try to repair a damaged socket, fit a replacement. See also converter/booster faults below.

If the sockets are OK and the picture is snowy the tuner (TU01) could be faulty. Check its LT and tuning supplies. If there is no tuning voltage, R08 and/or R09 (both $10k\Omega$) could be open-circuit.

Check for poor or dry-jointed connections within and external to the tuner. Take great care not to use too much solder or too hot an iron inside the tuner – otherwise you may create shorts.

Tuning drift: Check IC8A2 (type µPC574J) which could be faulty.

Colour/luminance faults: Luminance faults are generally caused by a defective BA7255BS chip (IC2A0) and/or associated components. The low-pass filter LPF2A0 (part no. ELB-4M089N) could be open-circuit. Check for dryjoints in this area.

For loss of colour the LA7333 chip IC6A0 is suspect. First check that its DC supply is present. If not, check back to source. The 4-43MHz crystal X6A0 could be faulty or dry-jointed. Check for dry-joints around IC6A0 and the chroma delay line DL6A0 (type CF873). Also check all relevant connections and plugs/sockets.

No or low playback sound: Check the audio/control head which could be worn or dirty. Clean the head then try a test recording/playback. If the sound is still low or muffled, replace the head. Use an alignment tape to set up the new head, and seal the screws with Loctite paint to prevent movement.

If the head is OK, the LA7295 audio processor chip IC310 is suspect. Make sure that its 12V supply is present at pin 8, then check the DC conditions around the chip. If

incorrect voltages are present, replace it.

No E-E sound: Check whether the audio signal is present at the RF converter and the NJM2233BL chip IC311. If IC311's 5V supply is missing (pin 2), check back to source. IC311 or IC310 (LA7295) could be faulty – check by replacement.

It may be necessary to check the M51496P IF chip IC101 and its associated components. If all is OK here, check the signal path through the NT/VPS/SIF PCB. The 6MHz crystal filters CF51 and/or CF53 could be faulty, or Q51 (2SC2058S) open-circuit.

Timer faults: The cause of no timer display is usually in the power supply, but D8Z1 (RD4.7EB) could be leaky or the display's filament open-circuit.

If this is all OK the 64-pin microcontroller chip IC8A0 (type μ PD75216AGF663-3BE) is suspect. Before trying a replacement, ensure that the 4-19MHz crystal X8A0 is operating correctly and that IC8A0's supply is present. If this is missing, check Z8A0 (GP1U72RM).

IC8A0 can be responsible for no display, intermittent display operation, some segments not being alight or the display being very dim. The display may be flickering or giving wrong information.

Loading faults: The TA7291S loading motor drive chip IC4A2 can be the cause of no loading or incorrect operation.

Servo faults: If the drum or capstan speed is incorrect the usual cause is the associated drive or control chip. The capstan and drum servos are within the BU2820S chip IC4A0. Check the DC conditions around this chip. If necessary check it by replacement. When the drum speed is excessive because IC4A0 is faulty it may be impossible to lock the picture on the TV screen. When the capstan speed is incorrect because IC4A0 is faulty there will be noise bars on the screen.

If the drum and capstan are operating greatly out of tolerance the VCR may just cut out and power down.

The drum motor is very reliable, the main problem being a worn lower drum.

A faulty capstan motor can cause noise bars and there may also be poor sound (wow). If the capstan spindle is seizing because of lack of lubrication there will be poor or no operation. The capstan drive chip could be faulty -it's part of the capstan motor assembly.

Low amplitude or no control pulses from the AC head will produce a jittery or rolling picture. The first thing to do is to clean the head. If the head is OK, check IC4A0.

RF converter/booster faults: Physical damage is the main problem with the booster-converter CU01. The usual problem is a snowy picture because the sockets are broken or dry-jointed to the PCB. If water reaches the booster via the downlead the result can be corrosion and a snowy picture. The only solution to this is to replace CU01. If there is also corrosion on the main PCB repair may not be worthwhile. See also tuner/IF faults.

Remote control unit faults: The most likely cause of failure is poor battery connections or low output from the batteries. LED1 could be dry-jointed. The leads to the CSB393PB crystal X1 could be dry-jointed or broken. If these items are all OK, suspect the M50560-248FP chip IC1 – check it by replacement.

If any one function fails to work, suspect a faulty button assembly. This is not listed as a spare in the service manual. THERE IS ONE DANGER YOU CAN'T SEE, HEAR, SMELL OR FEEL- IT'S RADIATION. THERE ARE OVER 10,000 SHIPMENTS OF RADIOACTIVE MATERIAL IN THE UK EVERY YEAR BY ROAD AND RAIL! WOULD ANYBODY TELL YOU OF A RADIATION LEAK?

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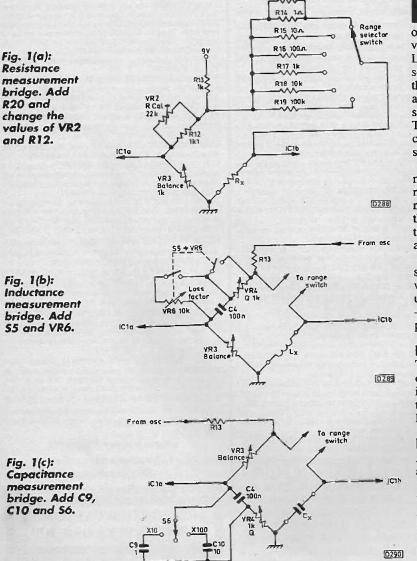
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LCR Bridge Extensions

An inexpensive LCR bridge can be modified to make it better suited to service department use. Ray Porter, M.Sc., C.Eng., MIEE describes the action required



t can be difficult in a service department equipped with an oscilloscope component tester and a multimeter to check suspect components where the value of a resistor is less than 1Ω . the value of a capacitor is very large or an inductor has a low Q. A professional LCR bridge or meter can cost more than an oscilloscope, and is therefore not a very high-priority item on the equipment list. This article describes a way of adding ranges to an LCR bridge that costs less than £50, so that it covers most service department requirements. The bridge is available from Maplin. Although the extra components cost only a few pounds, the result is a reasonably accurate and versatile bridge.

Table 1 shows the LCR bridge ranges before and after modification. In addition the accuracy of inductance measurements with low-Q coils is improved, measurement becomes possible with very lossy inductors, and the frequency used for bridge excitation is selectable at the industry standards of 100Hz and 1kHz, with 10Hz available for use on the highest capacitance range.

Fig. 1 shows the LCR bridge's configurations for measuring L, C and R as supplied, also the modifications, with the switching details omitted for clarity. The circuits used for null detection, bridge excitation and obtaining a -5V supply are shown in Fig. 2. Fig. 3 shows the frontpanel drilling details. The modifications are as follows.

Null Sensitivity Increase

The LED brightness and null sharpness are not adequate on all ranges. An improvement by a factor of about ten is obtained by changing the LED to a high-brightness type and reducing the value of R5 from 33Ω to 10Ω . See Fig. 2(a).

Resistance Range Modifications

As supplied the bridge, when balanced, has its upperarm resistance ten times that of the lower arms, see Fig. 1(a). Increase the value of VR2 from $2\cdot 2k\Omega$ to $22k\Omega$ and the value of R12 from 110Ω to $1\cdot 1k\Omega$. Each range is now reduced by a factor of ten, so the lowest range becomes $0-1\Omega$. When the bridge is balanced with VR3 set to full-scale, each arm is now equal. This also makes the null as sharp as is possible theoretically.

Add R20 (18 Ω) in parallel with R14 to compensate for

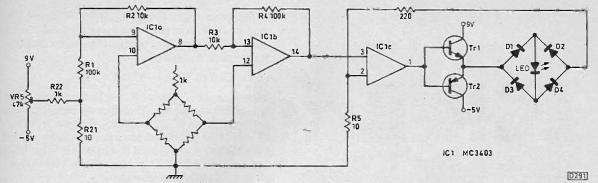


Fig. 2(a): Null detector circuit. Add VR5, R21, R22. Replace R1-R5 and the LED.

track and switch resistance on the 1Ω range.

Add the amplifier offset nulling circuit $\overline{VR5}$, R21 and R22 – see Fig. 2(a). There is already track and drilling for VR5. The measurement accuracy with low-value resistors and inductors and high-value capacitors is improved when VR5 is set as follows:

(1) Select resistance range 1 and connect a 1Ω resistor, any tolerance, in position Rx.

(2) Set VR3 to the fully clockwise position and short pins 10 and 12 of IC1 together.

(3) Adjust VR5 until the LED is extinguished.

(4) Remove the short from IC1, change Rx to $1k\Omega \pm 1\%$ and select range 4.

(5) Adjust VR2 until the null occurs with VR3 set to exactly 100 per cent, i.e. a scale reading of 10.

Optimise the common-mode rejection of IC1a and IC1b by fitting 1 per cent tolerance components in positions R1-4 – see Fig. 2(a). This will give best accuracy when measuring small capacitors and large inductors.

Adding High C Ranges

This modification, see Fig. 1(c) adds $1,000\mu$ F and $10,000\mu$ F ranges to the capacitance ranges. It involves adding C9, C10 and S6.

Measure the end-to-end resistance of VR3, using a digital meter. Calculate the error between this reading and 1k Ω . If the value of VR3 is greater than 1k Ω , C9 and C10 must for best accuracy be selected to be of smaller than their nominal values of 1µF and 10µF, and vice versa if the value of VR3 is less than 1k Ω . Choose values that have the same error as calculated for VR3, i.e. if VR3 is 980 Ω , C9 must be 1.02µF and C10 10.2µF.

The types I used for C9 and C10 were marked $\pm 5\%$, but ten 1µF capacitors in parallel produced a reading of 10µF within 1 per cent when checked with a professional meter, so fitting in accordance with marked values should produce a reasonably accurate result without special selection.

C9 and C10 can be mounted on stripboard at the bottom of the case, but move the battery through 90° first to allow room for S6.

Frequency Range Selector

Increase the value of R9 and R10 in the Wien bridge oscillator circuit – Fig. 2(b) – from to $10k\Omega$ to $150k\Omega$. Reduce the value of C1 and C2 from 10nF to 1nF. This makes the oscillator run at 1kHz instead of the original 1-5k Ω . Fit S4, then add C5-C8, to give the 100Hz and 10Hz frequencies. Increase the value of the output cou-

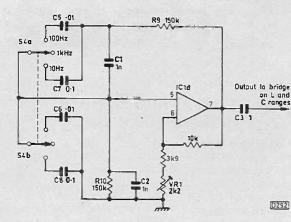


Fig. 2(b): The Wien bridge oscillator circuit. Add C5-C8. Replace C1, C2, C3, R9 and R10.

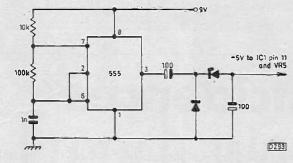


Fig. 2(c): The -5V supply circuit.

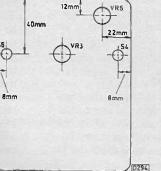


Fig. 3: The front panel, showing the drilling positions for the added components.

pling capacitor C3 from 100nF to 1µF.

Check, with a meter or earpiece connected to pin 7 of IC1, that the oscillator starts up in each range. Tweak VR1 if necessary. Too much adjustment will distort the sinewave output but doesn't affect the bridge null point noticeably.

Adding Loss Factor Control

The loss factor control is used when the Q control VR4 – Fig. 1(b) – hasn't sufficient range to achieve a null with

PROJECT

Range	L	RΩ A	RΩ B	C*
1	100µH	10	1	100µF
2	1mH	100	10	10µF
2 3	10mH	1k	100	1µF
4	100mH	10k	1k	100nF
5	1H	100k	10k	~10nF
6	10H	1M	100k	1nF

B the resistance ranges after modification.

Items req	uired		
LCR bridge	Maplin YB82D	R1, 4 R2, 3	100kΩ 1% 10kΩ 1%
C1, 2 C3	1nF ceramic 1µF Maplin WW53H	R5	10Ω
C5, 6	10nF ceramic	R9, 10	150kΩ
C7, 8 C9	100nF ceramic 1µF Maplin WW53H	R12 R20	1-1kΩ 18Ω
C10	10 x 1µF Maplin WW53H	R21	10Ω
S4	DPDT centre-off toggle	R22	1kΩ 22kΩ horiz. preset
S5/VR6 S6	10k Ω pot with DP switch SPDT centre-off toggle	VR2 VR5	47kΩ horiz. preset
LED	Maplin UK19V red	Knob fo	or S5/VR6

inductors that have a low Q. It consists of S5 and VR6. The original inductance measurement bridge with Q control is called a Hay bridge. It provides inductance measurement according to

 $Lx = C4 Rsw VR3/1 + (2\pi f C4 VR4)^2$

where Rsw is the value of R14-R19 as selected and f is the oscillator frequency. Therefore the measured value is affected by oscillator frequency changes, which is not ideal. It is eliminated when the loss factor control instead of Q control is used in a Maxwell-Wien bridge circuit. S5 disables VR4 and introduces VR6 across C4. Inductance is now given by

Lx = C4 Rsw VR3.

Tips on Bridge Use

The modifications described here increase the usefulness and overcome some of the shortcomings of the bridge's original design. But don't expect the performance of the modified bridge to equal that of an instrument many times its price.

Sometimes the LED isn't extinguished completely at a null, and sometimes inductance measurement requires several trial settings of VR6 before a null can be found using VR3.

The accuracy of readings at full scale is good, and in general within a few per cent of that obtained with a professional instrument. The resistance of the test leads causes some additional errors at the lowest part of the 1Ω range however, as might be expected. Measurement of capacitor values above $4,700\mu$ F requires the use of the 10Hz oscillator in order to see the null.

Coincidences

The saying "lightning never strikes in the same place twice" is common enough, but in this trade I feel it should be "lightning never strikes in the same place once". We're all familiar with stock faults. But how often have you replaced a component in one type of set, say a field timebase chip or a mains switch, only to have the same fault in a different set at your next call or soon afterwards? Here are a few examples of what I mean.

Tape Ejection

My first call one day was to a Sanyo VHR244E, the complaint being that it would not eject the tape. On inspection it was easy to see why. The eject button had come off its mounting and was not contacting the tactile switch on the main board. You used to get a similar problem with the Baird/DER clones of the Ferguson 3V30.

If you are dexterous enough with a hot iron you may be able to remount the button in the Sanyo machine, but a replacement front panel provides a more lasting repair.

Different Symptom, Similar Cause

At the next call the cause of the trouble was similar but the symptom was different. The VCR was a Goodmans GVR3400 (Bush VCR185). It would accept a tape but then immediately ejected it. After a detailed inspection I discovered that the eject button was resting on the switch on the pancl behind it. I presume that as a result of constant use the plastic hinge had lost its springiness – I've seen this fault in quite a few of these machines (and their clones) that have had odd symptoms (intermittently going off etc.) because either the eject or the power button is stuck.

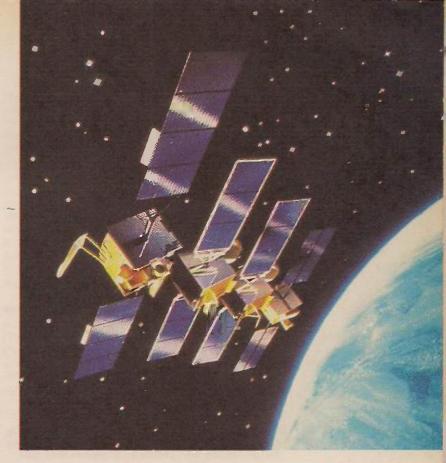
No Record

Then off to another town, to two different VCRs with very similar faults. The first was an Orion D1094 whose mode switch had recently been replaced to prevent the usual jiggery-pokery you get with these machines. Since the replacement however the machine wouldn't record – it would immediately go into the play mode, whether the tape inserted was with or without its safety tab. It transpired that when the mechanism had been removed to replace the mode switch the lever that operates the record safety switch had not been positioned correctly.

While on the subject of these machines, here's another point to note. If, after replacing the mechanism, you have no sound, a playback picture that looks as if the heads need cleaning, or another obscure fault, check that the plugs and sockets which connect the mechanism to the main board are seated correctly. I've had faults caused by plug and socket problems with new machines.

The final coincidental call was to a Philips VR2574, the onc with the JVC deck. It had recently been returned from the workshop and had identical symptoms to the Orion machine. When it had been in the workshop its reel sensor had been replaced. To do this, you have to remove a PCB on the underside of the mechanism. When he'd replaced it the engineer had not resoldered the record safety switch tags.

I could go on about such coincidences, and am sure that other readers will have had similar experiences. Andrew Tebbutt



Hugh Cocks tries out a Thomson digital TV receiverdecoder for the French services via the Astra 1E satellite. Reception of other services is possible, though there are problems with standards

Digital TV the French way

have installed several digital satellite TV receivers for the Dutch channels since describing this in the January issue. More recently a Frenchman called in to ask if it was possible to install a Canal Plus digital IRD for him. Fortunately he left it with me for a couple of days for test purposes prior to the installation. After my first encounter with the Dutch unit I felt that this was essential.

The Thomson Digital IRD

The IRD is made by Thomson for the Canal Plus 'Numerique' (digital) service via the Astra 1E satellite and is called the 'Mediasat' box. It uses the 'Mediaguard' controlled-access system – the Dutch and Italian digital services use the Irdeto system. With the French IRD the access module is not connected externally via a rear slot. All these digital services use MPEG-2 signal compression.

The receiver is of similar dimensions to the Pace DVR500 previously installed. It has a digital clock on the front as well as two smart-card slots. The clock sets itself to French time once a transmission has been found. There is no UHF modulator, which I understand is normal for the French market, though there are telephone modem and PC sockets in addition to the normal scart sockets.

Incidentally in French a computer is an 'ordinateur'. This caused a bit of panic initially – I've a limited French

vocabulary, and had not come across the term before. But I found the French instruction manual easier going than the Dutch one. Canal Plus actually supplies two books, one for installation and the other for day-to-day use. This is quite helpful: once you've got the unit up and running you can put the installation book to one side and use the other one – plus a dictionary in my case.

Installation

The installation menu enables a PAL or Secam output to be selected. PAL wins hands down in coping with onscreen graphics – direct comparison using a PAL/Secam receiver is possible (for Secam read Streakham!).

The LNB menu is preset to the standard 10.6GHz local oscillator frequency used with universal LNBs with 22kHz tone switching. The default frequency is set at 11.778GHz with vertical polarisation. Canal Plus uses this transponder frequency, also 11.817 and 11.856GHz, all with vertical polarisation. The receiver's tuner hops between the transponders depending on which programme has been selected. Other LNB types and default frequencies can be entered.

A standard F socket accepts the signal from the dish. There's a second socket for IF loop through to an analogue receiver if used (the Pace DVR500 docsn't have

this facility).

The signal-strength menu consists of five blocks. Anything below 3, displayed in red or yellow, is not considered adequate. Once 3 is reached the display goes to green. Our installation, with a 1m dish and Cambridge Gold universal LNB, reached the dizzy heights of 3.5 blocks.

On-screen Results

After coming out of the installation menu and waiting thirty seconds or so about twenty channels in the Canal Plus package appeared. The viewing card subscription was valid for only the basic channels, not the premium film ones – these appeared as a name on the screen, but reception was not possible. The charge for the basic channel tier is just under 100 Francs (FFr) a month.

When the channel is changed you see an on-screen identification of the programme together with the time it finishes – this is similar to the Pace Dutch receiver. There is also a 'mosaic' channel, which shows most of the programmes at once, and a channel marked 'pilote'. This one is intended to provide a lot of programme information, but wasn't fully up and running during my test. Pilote could be found on ch. 198 or by pressing a dedicated button on the remote control unit. A further facility is called 'grillc'. This wasn't working but scemed to be similar to pilote.

Picture quality was similar to that previously experienced with the Dutch Pace receivers. Colour is good, with absence of chroma noise, but sound and vision synchronisation could be variable with speech. After a channel change parts of the picture would sometimes go into 'blocks' for a second or so. I didn't find this annoying. A 'freeze frame' facility is possible by disconnecting the cable from the dish!

One channel was showing a football match during the evening of my brief encounter with the receiver. Some motion disturbance could be seen if the ball and players moved very fast. In a scene of general rapid movement, with the camera panning as well, the arca of 'dead' green on the pitch lacked definition during the pan.

Overall the pictures were pleasing to the eye, but there was the lip sync problem on occasions.

Once found, the channels can be sorted into a favourite list. This appears to be best done after bandscanning (see later).

The radio stations in the package come as a list on chs. 42 and 43. They include several French national stations, also a host of pop. jazz and classical stations. Selection is made from the list. Audio quality is excellent, as you would expect. Chs. 42 and 43 can be put into the favourite channel listing on lower numbers if required.

Pay Per View

To be able to watch a pay per view (PPV) programme the receiver's modem socket has to be connected to a telephone line. You then insert a French bank/credit card in the second slot at the front of the receiver. This card must be a smart type, not the 'dumb' type with a magnetic strip used in the UK and elsewhere at present. The next step is to use the remote control unit to select the PPV menu. This lists the PPV channel numbers and the films on offer. Once your PPV choice has been made and the modem has made contact with your bank's computer, the appropriate sum is deducted from your bank account.

Basic operation is not affected if the modem connection is not made. At the time of my test some films were being offered on a PPV basis, though they seemed to be

free when I came across them. Presumably the system wasn't in operation at the time. From what I saw on the screen, the charge would be 29FFr a film.

PC Software Downloading

This facility didn't seem to be working either – the service had been in operation for only a few weeks. According to the Canal Plus book, you connect your PC (micro-ordinateur) to the receiver and a menu lists available software for downloading. Some if not all has to be paid for via the bank card arrangement before downloading starts.

Bandscanning

The receiver can be made to scan the entire frequency range and list all the MPEG services found. This process can take up to half an hour. While it's in progress, indication is given on screen of the number of Canal Plus and other channels found (two separate lists) and there's a 0-100 per cent black horizontal bar. But it's a tedious business.

Once the scan had been completed, the lists contained over fifty MPEG TV channels, though we can receive only the vertical Astra 1E/F channels here. Those in more fortunate locations will get even longer lists.

The lists don't seem to be permanently held in the receiver's memory – after disconnecting the unit for the night, all stored information had been lost by the morning. A brief power cut of several minutes was tolerated.

Reception of Other Services

The Canal Plus booklet mentions that reception of CNN and some German channels is possible (we can't receive CNN as it's on the Astra 1E horizontal digital channel at 11.837GHz).

But having the name of a channel on a list and being able to view it are, in the MPEG digital world, two quite different things! The Dutch channel names were listed, but selecting the numbers on the remote control unit produced just a blank screen. This is not surprising, as the smart card and access system are totally different. The Dutch radio channels could be received, not as a list on a channel number as with the French ones but each as a separate channel number – received as sound with a blank screen.

I had more success with the German ARD/ZDF package at 12.168GHz with vertical polarity (though the receiver docsn't give you any frequency information). ARD, ZDF, Pro 7 and others were scen, also several test patterns. Several blanked out (identification only) numbers included ARD studios across Germany, e.g. ARD Studio Hamburg. Presumably these are used for link transmissions and are encrypted. RTP International (Portugal) seemed to be batched with the German stations, but reception lasted for just a few seconds before being blanked out altogether.

As I understand it the ARD and ZDF channels use clear MPEG coding. But it wasn't possible to view them unless the Canal Plus smart card-was in its slot.

One of the strangest programmes seen consisted of a tape of the film Four Weddings and a Funeral. It was actually an approximately seven-minute loop of the tape, together with a time-code display. At the end of the seven minutes the tape jumped back. Occasionally the film would stop in mid flight. If this happened during a scene with movement, the largest moving area would judder. Everything else stayed still. In this frozen state the scene looked 'surreal', for want of a better description. The film was present on several different channels. I also had enough time (just) to scan the Eutelsat slot at 13°E for digital signals, using an old 10.95-11.7GHz LNB. Despite this item being 'non-digital', the results were encouraging. The main problem with MPEG bandscanning is lack of indication of the received frequency, together with uncertainty as to whether the signal is clear or encrypted.

The following channels were found at 13°E. VH1 science fiction channel. MTV with the sound available for only two seconds then muted, the picture remaining OK. VH1 with World Radio Network sound (clear) at another position. Bloomberg TV (financial news and information). And several positions for the Italian Telepiu PPV weekend football service – these had music and a caption to remind customers to insert their smart cards before the match. Channels with identification but no access included BBC Prime and the main Telepiu channels.

The main problem at present is the lack of transmission standard information. For example, is VH1 science fiction a clear MPEG channel, and if so why does the sound mute after two seconds? If it is clear, it can't be to exactly the same specification as the German clear channels. I thought it was transmitted using the Irdeto conditional access system, but so are the Dutch channels and the receiver wouldn't pick these up.

In Conclusion

It seems a lifetime from 405 lines at VHF to MPEG. But they do have something in common – bandwidth. There are around six MPEG channels per Astra 27MHz transponder, which works out at around 4.5MHz per channel, not dissimilar to the space taken for a 405-line VHF transmission!

Incidentally the Pace DVR500 digital receiver I wrote²⁰ about in January seems to have been superseded by the DVR501. This has a scart socket above the RF modulator, but otherwise appears to be physically identical to the DVR500.

A colleague recently installed a DVR501 to receive the Italian Telepiu TV service via Eutelsat. Good pictures were received, and there were menus in Italian and English – but the Italian instruction book caused problems. The DVR501 is now used for the Dutch services as well, so maybe there are also Dutch menus – there weren't initially. But reception of clear MPEG channels still appears to be blocked.



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

Wanted: Circuit diagram/operating instructions for the Panasonic UF400 and Rank Xerox X295 fax machines. Will reimburse. D. Williams, 16 Heol Elli, Llanelli, Carms. SA15 1LX. 01554 759 035.

Wanted: Cassette deck for the Amstrad VCR4600 Mk. 2. Phone Steve on 0181 537 6631.

Wanted: Can anyone supply a current name and phone number for NAD speakers? L.D. Rudham, 46 The Vineyard, Richmond, Surrey TW10 6AN. 0181 940 0888. Wanted: Salvaged abstimmplate (tuner control) panel 27504-086 for the Grundig VS200 VCR. David Martin, 21 Church Street, Bishop's Stortford, Herts CM23 2LY. 01279 506 212, fax 01279 466 389.

Wanted: Main PCB for the Saisho/Orion VXL12 VCR. J. Dewar, 31 Stancliffe Road, Bedford, Beds MK41 9AP. 01234 359 479.

Wanted: Technical information or parts to help with the repair of a Radofin Tele-Sports 3 TV game dating from the 70s. Russ Phillips, 103 Victoria Street, Maltby, Rotherham, S. Yorkshire S66 7JE. 01709 818 425.

Wanted: Circuit diagram and/or information on spares/manual availability for the Soundwave Model CTV1405R. Roger Dowling, 393 Blackfen Road, Sidcup, Kent DA15 9NJ. 0181 303 1721.

Wanted: Service manuals for the JVC HRD725ES or Ferguson 3V43E VCR and Sanyo M9996L cassette recorder, also a function switch for the Sanyo M9616L cassette recorder. R. McGrath, 41 Belvedere Place, Dublin 1, Ireland.

For disposal: Television magazines from 1956 to 1964, a

few odd ones missing, then 1965 to 1990 complete. Any offer. M.N. Hussain, 26 Chetwynd Road. Chilwell, Notts NG9 5GD. 01159 228 708.

Wanted: Pinout information and operating voltages for the Brimar D13/47GH oscilloscope tube. Roger Chacksfield, The Old Telephone Exchange, South Town Road, Medstead, Alton, Hants GU34 5ES. 01420 563 760.

Wanted: A 325572-01 40-pin programmable logic array chip for the Commodore 1541 5.25in. disc drive, information on where it can be obtained, or any suggestions on a replacement or something that could be used in its place. G. Cannon, 16 St. Cuthbert's Road, Holy Cross, Wallsend, Tyne and Wear NE28 7JF. 01912 620 712.

Wanted: On/off switch mounting plate and knob for the Ferguson Model 20G2 (TX100 chassis). Roger Walton, 44 Johnson Street, Cleethorpes, NE Lincs DN35 7NA. 01472 362 071.

Wanted: LOPT for the Saisho Model CM215TS - or a set for breaking. John Martin, 161 Francis Close, Ewell, Epsom, Surrey KT19 0JT. 0181 224 8401.

Wanted: Front hinged cassette holder for the GEC R9002H Stardeck radio cassette player. T.A. Carrick, 12 Saint Aubyn Crescent, Newquay, Comwall TR7 2RQ.

Wanted: A copy of *Radio and Television Servicing 1986-*87, a mains/battery switch for the older Philips T8 chassis, and a Hosiden type slider switch as used in Sanyo radio/cassette players sold in the Seventies. W. Milne, 20 Graham Road, Wimbledon, London SW19 3SR. 0181 543 9542.

Wanted: Amstrad SRD600 or D2MAC chips and CCU300 processor chip. Terry Dactill, 01772 463 775.

Wanted: Video heads for the Grundig 2 x 4 (not Super) V2000 type VCR. Also an 8in. colour tube for the Sony Model KV9000UB. R.J. Bartlett, 27 Trelawny Road, St. Agnes, Cornwall TR5 0TP. 01872 552 896.

Wanted: LOPT for the Technisonic Model 1451 colour portable and a circuit diagram (photocopy OK). T.N. Casey, 17 Sparkbridge Road, Harrow, Middx HA1 1TJ. 0181 248 7880.

Wanted: IF can for the ITT CVC40 chassis – scrap one will do. J. Boyd, 98 St. Quivox Road, Prestwick, Ayrshire KA9 2ER. 01292 475 175.

Wanted: Wish to buy CRT reconditioning plant with one or more ovens. Bogdan Tataeu, str. V. Alecsandri, 19 Bis, Ploiesti, COD 2000, Romania.

Satellite Workshop



Pace MSS1000

I sometimes come across repair attempts that are beyond belief. A good example arrived recently in a Range Rover and was carried into my workshop gently by a portly gentleman in tweeds, with a big dog. He told mc that his MSS1000 had "died", and that his local repair shop had failed to fix it despite having it for six weeks. He had finally managed to snatch it back after a long argument that ended when his German Shepherd bitch lost her patience because she was hungry.

I didn't ask for the gory details, but remained behind the counter, keeping good English oak between me and the bitch. I promised to do my best, and the animal towed her rotund master back to his vehicle.

The MSS1000 was a mess inside. The power supply had been 'repaired', but not with the proper kit. The electrolytics appeared to me to be underrated, but I left them alone because they were sticking proud like mushrooms and I didn't want to risk more damage to the tracks.

The display panel was amazing.

It had been snapped in two, then someone had soldered about forty wires across in a futile attempt at repairing it. I fitted a replacement I had in stock. Yes, honestly! - 1 keep one for each model, mainly for testing purposes, because the display panel contains a second microcontroller chip which must talk to the one on the main board for the unit to work. The panel is flimsy and tricky to fit, but with good foresight Pace devoted a page in their service manual to sketches and an explanation of the procedure. It's quite easy after reading this.

When the mains supply was connected to the unit it sprang to life and worked perfectly, though the pictures were a little streaky. I decided to leave it at that, because the panel alone costs over £40. But I offered to upgrade the electrolytics if the owner would pay extra. He declined, on the grounds that he'd already paid the previous 'engineer' for an estimate and was short of funds.

Pace MSS500

This receiver came from a shop with a report that said, helpfully, "dead". Someone had aready fitted a power supply repair kit, quite neatly, and the DC voltages were all correct. But the receiver didn't work. Closer inspection revcaled that the display panel had melted copper tracks! Clearly the original power supply fault had caused more widespread damage.

After fitting a replacement display panel the receiver worked perfectly. This was a rather expensive 'power supply' repair, but I've come across several of these receivers in which the tuner, the microcontroller chip, the audio processor and the decoder chips have also been destroycd, so the owner was lucky.

The very same day another MSS500 arrived. Fortunately it didn't need a display panel! The faults were a whistling power supply and a lack of decoder messages. The whistling was cured by resoldering the large $1k\Omega$, 5W ceramic resistor R7, which was dry-jointed, and replacing every electrolytic capacitor in the power supply area. This also cured severe streaking on the pictures, but there were still no decoder messages.

When I checked the installation menu I found that the contrast had been set at its maximum level of 8. So I reduced it to the correct value, 4, but the pictures were now very dull. The next step was to use my scope to trace through the video path, with the aid of the Pace service manual. It took me about ten minutes to discover that the BC856B surface-mounted transistor Q58 was faulty. A replacement cured the contrast problem. and the decoder messages rcappeared. Note that other transistors in this area can cause problems. I had a report from Holland that Q62 (BC846B) can fail.

Echostar SR800

Some satellite 'installers' seem to lack any sort of formal training. In fact some even seem to be incapable of reading the user instructions. Here's an example. I was sent an Echostar SR800 that was "under warranty". The chappie who sent it was under the impres= sion that I'd repaired it for him about nine months previously. I hadn't, but that's another story. The complaint was "no channel display on the front panel". For those who are not familiar with this model, I should explain that it doesn't have a number display!

I returned the unit with a curt note and an invoice for carriage. Blow me if it didn't come back next week with a label that said "U/G, picture still too bright". I used the menu to adjust the video deviation from 16 to 21MHz, which is best for Astra. The picture then looked less bright. I'm now awaiting payment for my pro forma invoice before I send the receiver back again. I may have to charge for storage too!

Interference

A local installer asked me to help him with a Pace Apollo receiver. His customer was complaining about interference on the terrestrial and the satellite channels, and he'd "tried everything". As the receiver produced excellent pictures in the workshop. I agreed to go with him

2

to the customer's house – but only after he agreed to my normal rate of $\pounds 1$ per minute.

"That doesn't worry me" he said, "you'll have it sorted out in five minutes!" My charge includes driving time, but I decided not to mention that until we'd completed the forty mile round trip.

The interference was clear to see at the customer's house: the terrestrial TV picture had a ghost picture in the background. I advised the installer to replace the standard 10GHz LNB with an enhanced one, which has a 9.75GHz local oscillator. This would lift the satellite channels by 250MHz, out of the range of terrestrial signals. I also suggested that he should move the acrial cable away from the LNB cable, since the two cable runs were actually touching.

The interference on the satellite channels disappeared when I removed the aerial plug from the receiver. Adding a -6dB attenuator before refitting it cleared most of the patterning. Moving the two cables apart would surely clean up the rest.

A week later the installer confirmed that my diagnosis had been correct, as be begrudgingly paid me. I still don't understand why he needed me to tell him how to do his job. This was simple stuff. How on earth does he cope with multi-point distribution systems?

Pace MSS100

I thought the pretty girl was bringing me her bathroom scales to repair. But no, it was a Pace MSS100 that wouldn't light up. The power supply was tripping. It didn't take long to trace the cause to the UF5402 rectifier D11 in the 17V supply, on the secondary side of the chopper circuit.

The unit appeared to have been 'investigated' by Wossname up Church Street, because the cover had been removed by prising with a large screwdriver and the aerial connection had disappeared inside. I pushed the tiny contact tube out, and ran solder down the outside to prevent it being pushed back in. When the damaged cover had been repaired and the missing screws had been replaced the receiver was as good as new.

That reminds mc. Most of the receivers that are brought in for repair have at least one screw

Jack Armstrong is willing to try to sort out readers' satellite TV receiver problems via email. Mention *Television*. You can reach him via the Internet at:

jackarm@netcentral.co.uk

One fault per message – state make/model and fault symptoms/history. If you have no email facilities you can write to him c/o Television, Room L302, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. Please enclose two stamped envelopes,

missing. Will the person who is collecting screws please send me some?

Echostar SR5500

Alex Hoyle of Trackdown Consultants has finally obtained a number of remote control handsets for the Echostar SR5500. Several people had contacted him while he was without stock. You can reach him, for this and other handsets, on 01608 678 057.

Test Case 413

Spring is here again, and once more Sage has abandoned the workshop and headed for the sunshine. The Isle of Man this year apparently, for a thrash on the narrow-gauge railways there. Happy days! Back at the ranch however the others have to repair the VCRs Sage normally handles. One of them gave Television Ted more than its fair share of trouble.

It was an Hitachi VTF860E (UKN) with a real nasty. The machine would run happily in playback for several hours before the problem arose. When it did, the picture broke up into a mass of lines, rather like the effect produced by a misadjusted line hold control, while the sound wavered in pitch and the speed indicator flicked between SP and LP. The drum and capstan speeds were obviously very wrong.

Ted tried slowing the drum with his finger. This restored a somewhat wobbly picture, in colour, even though the capstan speed continued to vary. So the problem was not confined to the drum. Nevertheless there was probably a common cause – time to check out the servo department.

IC601 (type HD49741ANT) is the heart of the servo section in this machine. It produces control voltages for the two drive motors. These voltages depend on the inputs IC601 receives from the motor FGs, the drum PG and the control track head. So these inputs and the chip's supply (A5V) were all checked. They were all present and correct. Ted's next move was to scope the subcarrier input at pin 42 of the chip, where he found a good sinewave. This input operates the reference clock for the digital counters on which servo operation is based. Ted froze the chip: the fault remained. He heated it to heaven knows how many hot degrees with a hairdryer. Still the fault remained. As the operation of both motors was affected, and the chip's external conditions were all correct as far as he could see, Ted ordered a replacement chip and put the machine aside.

It didn't take long to arrive. When it had been fitted, the machine worked fine – as it always did to start with. Ted set the machine to run on test for a day. He was not pleased when, after a few hours, the monitor's display consisted of a mass of horizontal lines, with the sound pitch varying – just as before in fact.

After lunch, during which the machine had been switched off, Ted connected a meter to pin 12 (drum control voltage output) of IC601. The voltage, with the machine operating normally, was 2.3V. When he slowed the drum by hand, the voltage dropped in an attempt to achieve compensation. Armed with this information, Ted waited until the fault returned. He was surprised to find that there was little change in the control voltage despite the fact that the drum's speed had now increased. As he slowed the drum with his finger, the control voltage dived towards 1V. It was as if the servo was working properly and the drum motor was faulty. But why did the capstan run erratically when the fault was present? Some strange tie-up within the chip maybe. Even so, Ted wasn't going to bet the price of a motor on it. He swapped the entire drum assembly, motor and all, with one from another similar machine. In went the Mary Poppins tape and on went the play key. Ted returned to a recalcitrant Daewoo TV receiver.

They had got through Chim-Chimney, Twopence, Spoonful of Sugar, Supercalifragilisticexpealiallydocious and most of the other tracks before the fault cropped up again: Mary and Bert were lost in a basketwcave of lines, and their voices wavered up and down. So it was not the drum motor! What was the cause of the problem? For the solution, turn to page 528.

Long-distance Television

DX and satellite TV news and reception. Wideband aerial design for SpE reception in Band I. Roger Bunney reports

February was wet and windy, with poor reception conditions to match. I've now moved to the new house, but have not been able to get around to installing the aerials. So monitoring has been minimal. I've not even been able to assess the interference situation here. As it's a new housing estate, I fear that the ch. E2/R1 spectrum will be filled with 49MHz baby alarms, radiocontrolled garage door systems and the like.

This test pattern is often received in the UK during SpE openings. On this occasion however it was received by John Locker via Eutelsat II F4 at 7°E. Peter Schubert reports that only poor tropospheric reception, mainly from the Netherlands, was possible during the month at his Rainham location. Cyril Willis (King's Lynn) also received Dutch Band III signals on several days. He mentions slight tropospheric lifts on February 22nd and March 3rd, though there were no identifiable signals. So I don't appear to have missed much.

Interesting news from Ryn Muntjewerff in Holland however.



He has at last identified a Sporadic E signal he received back in June 1995, on ch. E3. It was from a commercial station in Turkey and had the logo 6 in the top left-hand corner. Ryn says that this is the 65th country from which he has received TV.

Satellite Sightings

David Gilroy mentions that the France 3 signal from Telecom 2B at 5°W is very strong. Check at 12.732GHz: the audio is at 5.8MHz and it's a Secam colour signal. The channel recently carried the full France v. England rugby match, the UK networks offering only recorded highlights during the evening.

I'm still at the planning stage at my new location. Because of the soft ground, a pole-mounted dish with H-to-H motor drive and a 1.2m 'reference' reflector is under consideration. My vintage 1.5m dish with stand has had to be set aside until the ground has settled. It may then be used for C band reception. A few years ago such a small dish would not have been considered feasible for C band reception, but with low-noise LNBs, threshold extension etc. practical results are possible.

Speaking of C band, Bandula Gunasekera (Sri Linka) reports that he has received only one new channel during the first weeks of 1997, an Iraqi programme via AsiaSat-2 at 3.644GHz (extended C band). He mentions that an increasing number of downlinks are going digital and looks forward to the upcoming launch of AsiaSat-3. Many AsiaSat channels are to move to the new satellite, hopefully with better signals.

John Locker in the Wirral is also on the move. His dish system is up and running however and gives him reception from as far east as 68°. He is just able to resolve signals from PAS-4, almost at the horizon. He mentions that the Russian GALS satellite at 36°E is now producing three visible channels, all with different programming in Secam. There's a strong carrier at 12.702GHz. Incidentally John is also into UFOs. He'd like to hear of any odd sightings. Write in to me via the magazine.

Roy Carman (Sandown, Isle of Wight) has sent in a very long satellite reception list. For local reasons, his dish is mounted on a 5m high garden mast with an upper cross-piece arm to which guy wires are attached. The bottom of the mast is concreted into the ground. He is using a 1.2m offset Channel Master dish which is tracked with an 18in. Echostar arm. The SWM wideband LNB with Racal polariser feed an Echostar 8700 receiver. On the same mast he has a fixed 80cm Lenson Heath dish for Astra reception. His main dish gives reception across an arc from 53°E to 53°W.

Roy comments that an increasing number of feeds are going digital, though he still receives many analogue signals. Favourites in recent months have been PAS-3R at 43°W and Hispasat at 30°W, though many of the latter's signals are now digital. On January 28th -3R carried Ajax v. AC Milan via a new transponder operating at 12.592GHz with vertical polarisation. He's seen another new transponder at 12.575GHz vertical, so far with colour bars only.

Because of my move I missed all the Ramadan ceremonies from Mecca. Apparently Eutelsat II F2 at 10°E carried various religious ceremonies for most of the day – the feed was for TGRT (Turkey).

The recent football trial from Winchester was featured in a news feed carried by Telecom 2C (3°E) for the BBC's lunchtime news. 2C often carries BBC regional news feeds from the Corporation's SNG trucks, with 12.583GHz horizontal a commonly used transponder. The ITN South of England News Bureau also used a satellite link for the trial, with the UKI 131 truck relaying via Eutelsat I F4 (25°E) at 11-134GHz horizontal - this satellite is in inclided orbit. Telecom 2C is often used for the OB sections of Noel's Houseparty last on February 15th at 12.524GHz vertical with sound in syncs.

There was lots of skiing and mountain activity during February as the Winter Sports season continued. The old RTP transponder (11.656GHz vertical) aboard Eutelsat II F2 at 10°E was pressed into service for an OB with Ski jumping at Trondheim. Despite the increase in the number of digital transmissions, the good old analogue signals keep going.

News Items

The RSGB has applied to the Radiocommunications Agency for eleven FM repeater station licences within the 50MHz band. The stations would be at Shaftesbury, Portsmouth, Fleet, Nottingham, Amersham. Stoke-on-Trent, Huddersfield, Barkway, Tenby and Winter Hill. The 50MHz band is now in official use in Holland.

A new Earth station has been opened in the Czech Republic for the Premiera TV channel. It will uplink via the DFS Kopernikus satellite, giving direct connection to main terrestrial transmission and cable head-end sites. New Earth stations for the various Arabsat craft have been brought into operation at Riyadh and Tunisia.

Next time you visit Sainsbury's, check for a new dish on the roof. BT Global Satellite Services has won the contract to provide a corporate video hook-up for the 364 Sainsbury's stores, providing a nationwide demonstration and information service which uses digital compression (Scientific Atlanta's PowerVu MPEG system). Safeways has a similar satellite video arrangement but is understood to use the MAC format. The German Mascom 9500 autoselecting digital receiver is to undergo an upgrade before it is launched in Germany. The receiver can self-programme and produce rapid MPEG picture displays simply by tuning to the correct frequency. Most such receivers, for example the Nokia/Kirch D box, require specific FEC and bit rates to be accurately programmed in before pictures can be resolved. As soon as we have more information on this interesting receiver we'll pass it on.

North Sea Reception

l received an interesting letter from John Thierjung recently. Some ten years ago he asked about aerials for reception in the North Sea. The widely used mushroom wideband marine aerial with integral preamplifier suffers from low gain, is expensive and usually works only up to 30-50km from the coast. In addition, as it's omni-directional co-channel interference is a problem. A Yagi works well but requires continuous rotator adjustment and can snap in half.

I suggested a Triax BB grid type UHF system. Although the fourstack version is rather cumbersome. it produces excellent results with its fairly wide beamwidth. Reception in the North Sea is possible at up to 120km in winter and in excess of 300km in summer - it's common to view Danish TV as far out as Aberdeen. John considers that a two-stack system povides a good compromise between gain, beamwidth and a physically safe installation. The BB grid fourdipole per aerial assembly arrangement also restricts the vertical beamwidth and helps to reduce the ducting and low-signal (wave-top scatter) reflection that can mar reception. Interesting to know that a wideband preamplifier will also enable the BB grid system to work in Band III.

John now works in Thailand and is involved with satellite reception. The equipment prices he quotes are interesting. A 10ft C/Ku band dish sells for the equivalent of £295. A locally made version sells for £220. or £165 for an 8ft dish. Gardner 20K C band LNBs start at £45, while a 24in. Superjack arm costs just £40. The dish prices include the polar mounts and stands!

Several receivers have been tested by John. He found that the Strong 700XT Mk 2 is the best performer, particularly with its



threshhold extension switched in. Equally impressive is its rugged power supply, which can handle the voltage supply swings that are experienced locally – between 175V and 220V AC.

Despite the relative cheapness of satellite receiving equipment, quadband LNBs are not available in The source of this test pattern received by Jöhn Locker via Eutelsat II F4 at 7°E has not been identified. Any ideas?



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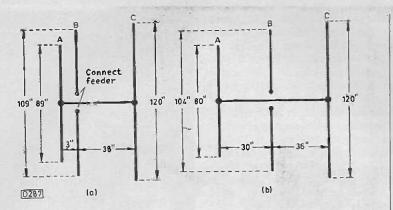


Fig. 1: Wideband aerial designs for Band I. (a) A wideband dipole (elements A and B) with a reflector (C). (b) A three-element Yagi array with a single director (A), dipole (B) and reflector (C). The designs give coverage of the 48-70MHz spectrum. Use 75Ω coaxial feeder cable.

Thailand. We look forward to hearing more about life in SE Asia.

Band | Aerials for SpE

Sporadic E reception places less stringent demands on the aerial than say weak tropospheric reception. SpE signals can be very strong. So a high mast system is not necessary, though it's best to have the aerial above chimney-pot height. A low-height aerial, say 10ft, is ideal for reducing local interference, which can be considerable nowadays. Though a single dipole will work, its bandwidth is limited - Band I extends across 48-70MHz, and a single dipole certainly won't cover the 22MHz efficiently.

Roy Carman's mast-mounted dish system at Sandown, Isle of Wight.

Over the years I've made many wideband Band I acrials, ranging from dipole systems to fiveelement Yagis. The bandwidth of a dipole can be increased by mounting two elements close to each other to form a wideband dipole - see Fig. 1(a), left-hand side. This is the Antiference Trumatch principle. One of the simplest systems I'vc used is the crossed wideband dipole arrangement - two wideband dipoles mounted 90° apart, with one aligned north-south and the other east-west. Rudimentary directional pick-up is achieved by switch selection of the output from one or the other wideband dipole. This at least saves the cost of an acrial rotor.

An improvement is obtained by adding a reflector behind the wideband dipole, as shown in Fig. 1(a).

• The main problem with a wideband system is to minimisc the reactive variation across the bandwidth while maintaining the correct 75Ω resistance at the feeder cable connection point. The Antiference Tru-match design works very well in this respect, in both Band I and Band III. I've used variations on this principle in many of my own designs.

A resonant aerial element is narrowband. To create a wideband aerial, two or more elements resonant at different frequencies within the required bandwidth have to be combined. This is the principle used in the designs shown in Fig. 1. With the three-element wideband Band I Yagi aerial design shown Fig. 1(b), the reflector's length corresponds with a point at the LF end of the required bandwidth, the dipole is resonant at midband while the director is cut for HF resonance.

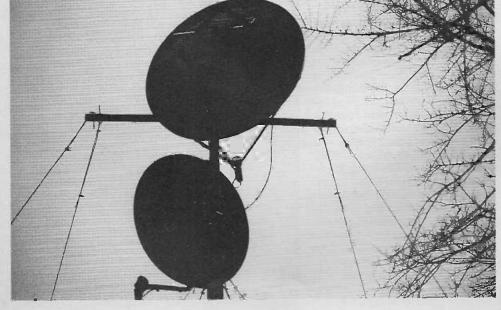
If you examine a UHF Yagi array, you'll see that the directors nearest to the dipole are closely spaced and that the spacing increases with each director towards the front of the array.

Directors contribute to the aerial's gain by reducing its horizontal beamwidth. This enables the aerial to be made highly directional.

Close director spacing adjacent to the dipole ensures tight inductive coupling and optimum in-phase signal transference. The spacing may be as little as 0.1 wavelength. The reflector-to-dipole spacing is wider, perhaps 0.2 wavelength. All element spacings affect the forward gain, directivity, front-to-back pickup ratio and matching to the feeder.

A wideband Band I aerial with an unfolded dipole will give adequate matching to the feeder when up to three elements are used, as with the designs shown in Fig. 1. With a greater number of elements the dipole's centre impedance will become too low. Use of a folded dipole increases the impedance by a factor of four, though the element spacings must be altered to compensate for this impedance change.

The two wideband aerial designs shown in Fig. 1 are easy to make, using half inch OD alloy tubing with a one inch standard aerial mast as the boom. Aerial hardware such as dipole insulators and element clips can be obtained from HS Publications, 7 Epping Close, Mackworth Estate, Derby DE3 4HR (01332 381 699). Complete aerials can be supplied by Aerial Techniques (01202 738 232) – see advertisement on page 523.



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Answer to Test Case 413 - see page 521 -

Apart from introducing, in the last paragraph. the longest word ever printed in *Television* (even though the Norwegian for IF amplifier is, apparently, mellomfrekvensforsterker and for VCR videokassettopptakeren), this month's conundrum shed an interesting light on an area that seldom causes trouble nowadays: the servo electronics. Since the problem affected the speed of both the drum and the capstan motors, there had to be a common cause. But it was difficult to see what this could be once the servo control IC had been replaced and its 5V supply line was found to be stable.

The search for the cause of the fault might have gone on forever, but Ted remembered an almost identical playback problem with a Panasonic VCR whose owner had switched it, at the front panel, to NTSC operation. There was no obvious NTSC/PAL switch here, but maybe the syscon section was producing a fault command. While searching through the circuit diagram, Ted found a control line marked NTSC/PAL (with a bar over PAL). Sure enough, when the fault occurred the line went high. Linking it to chassis restored normal operation.

NTSC servo switching is governed by pin 9 of the expander chip IC751 in the syscon section. This is where the cause of the trouble lay. When the chip was subjected to heat and freezer the fault came and went. There was, it seemed, an intermittently open-circuit internal connection to pin 9. Tilpasning kompleksiteten!

NEXT MONTH IN TELEVISION

Grundig Satellite Receivers

Start of a new series in which Steve Beeching will be taking a look at the technology used in the Grundig E series and Omni chassis. The receivers have also appeared in the Matsui, JVC and Philips ranges.

Servicing the Sony SLV757

John Coombes presents an extensive fault guide for this VCR, covering the mechanical and electronic problems you could encounter.

Satellite Polarity Checker

This handy unit, designed by Michael Dranfield, enables the LNB supply provided by a satellite receiver to be checked in seconds. Three colour LEDs indicate whether the output is at 13V, 17V or in excess of 22V. A must for the satellite equipment installer/repairer.

Servicing Amstrad PCW Disc Drives

The disc drives used in Amstrad PCW series word processors are now getting old and giving trouble. They can usually be restored to good working condition however. D.F. Wheatley tells how.

Amstrad SRD600 Mod for Astra 1D

Martin Pickering describes a way of providing automatic Astra 1D selection with the Amstrad SRD600 and the Global ADX plus channel expander.

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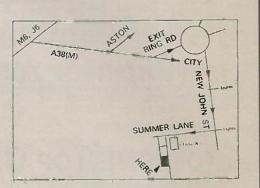
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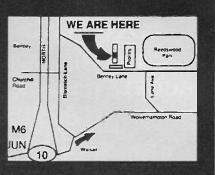
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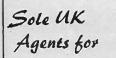
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£30.00 £30.00	PANEL-MAIN-VSR1500 P/P £5.00ea POWER SUPPLY-VSR1500	£3.00 £5.00	VIDEO RM933E VIDEO PLUS £30.0 CLE874B £5.0	
£25.00	POWER SUPPLY & REG - TYPE STK 5343-VP9501	£8.00	CLE883A = IR8512, CPT2196, CPT2578 £8.0 TV MODEL C2558 (IR1820)-CLE883A £10.1	
1.30,00	POWER SUPPLY-SWITCH MODE-1500	£3.50	MATSUI 1500 €5.0	
£20.00 £30.00	ORION		VSR1500 £40 VX3000 £30	00
£20.00 £10.00	MODULATOR-VIDEO MDLK 6B513A MODULATOR-MDF33 UB360D	£2.50 £3.00	3000/ORION - TV AND VIDEO £2.0	00
£20.00	PHILIPS		RC = PACE 900, FERGUSON, SONY, GRUNDIG £5.0 MITSUBISHI	
£12.00 £15.00	DECODER-TEXT-K40-KT3	£10.00	RM35 - VIDEO \$5.0 RM45 - VIDEO \$7.0	
£5.00 25p	IF PANEL FOR CP90-CP110 INFRA-RED RECEIVER - HAND SET TESTER	£5.00 £1.00	NOKIA RC202 £44	60
£2.00 £10.00	SOLDER IRON 25W-240V TRANSFORMER-3111-268-30050	£6.00 £3.00	ORION TV AND VIDEO \$24	
£20.00	VIDEO REPAIR KIT-31037289	£10.00	VIDEO WITH LCD = 1992/93 MODELS £5.0	
£5.00	TEXAS		PANASONIC EUR51142 £10.	
£5.00 £4.00	NICAM BOARDS MK II	110.00	TC1632, TC1642, TC2232 EACH £8.0 TX2034, TX2044, TX2200, TX2234 EACH £8.4	
£4.00	TUNERS	67.04	TX2244, TX2300, TX2636, TX3300 EACH £8.4 RC201 - TV - REPLACES TNO1411/2 £8.4	00
5.00	IF TERC8-022A TBJZ4-00ZA-ALPS SATELLITE SXT2302180968	£7.00 £3.00	PERDIO	
£5.00 £5.00	SATELLITE WITH BASE BAND MIN SXT2302234	£4.00	PHILIPS	
£7.00	SMALL UHF/VHF	£3.50 £4.00	NEW TYPE UNIVERSAL £10. RC4001 £10.	
	VHF/UHF - TEKE4-112A 4944	£3.00	SANYO UNIVERSAL VIDEO £3.	.00
£10.00	U321. U341. U342, U343 EACH U344, U411, U412, U944 EACH	£5.00 £5.00	SIEMENS	
£10.00	U743, U744 EACH AMSTRAD	£3.00	THORN	
£10.00	UE33-BOI	£3.00	9000, 9600, TX9, TX10, TX100 TEXT AND NON-TEXT EACH £100	.00
£15.00	FERGUSON IF2105-RE	15.00	L.O.P.T.	
£10.00	MTP2011-AP00 UHF - ICC5	£5.00 £5.00	36061, 36162, 36362, 36383, 36481 EACH £10, 36482, 36761, 36831, 36832, 36922 EACH £10,	
£5,00 £5,00	VHF-ICC5	£5.00 £4.00	36943, 36962 EACH £10. 2432211, 2432351, 2432491, 2432851 EACH £10.	
15,00	TX98. T99. TX100 EACH	£4.00	2432871.2432981,2432984.2433752 EACH £10.	00.
£4.00	ORION 1500 – UE33 BO9	£4.00	2434451, 2434492, 2434494, 2435012 EACH £10.	.00
NS £5.00 50p	PANASONIC SMALL UHF/VHF	£3.00	2435013, 2435016, 2435062, 2435063 EACH £10: 2435064, 2435066, 2435085, 2435121 EACH £10:	00
£4,00	SANYO		2435372, 2435701, 2436771, 2436773 EACH £10. 2436792, 2436795, 2436797, 3216001 EACH £10.	
£5.00 £5.00	UHF/VHF TDO 124EB SHARP	£4.00	3220029, 3714016, 47003481 EACH £10. AT2076/78, AT2076/88, AT2078/25 EACH £10.	
£4.00	TUNER AND IF 1310587 PA1 UK TATUNG	£3.00	AT2077/81 £15.	00
	UNIVERSAL 205 OR EQUIVALENT	£8.00	DST85B235/47328700 & /40153200 EACH £10.	.00
£9.00 £9.00	WITH AERIAL SOCKET	20.00	DST88N234/400086AD, & /47805200L EACH £10. DST88N234/47320041, & /47317590 EACH £10.	.00
£7.00	MOTORS MOTOR - CASSETTE TYPE		DST186N243/473058-00 £10. TFB3035D, TFB3069D, TFB4023AD EACH £10.	
19.00	12V WITH SPEED CONTROL AMSTRAD	50p	TFB4039AD, TFB4066AD EACH £10. FERGUSON	
	LOADING-6000	£3.00	TX9 £4.	.00 .00
£15,00 £12,00	CANON 12V MOTOR	50p	TX85, TX86 EACH £8.	.00
50p	HITACHI CAPSTAN - ACE G4-B to ACE G40-B	£10.00		.00
£5.00	MICROWAVE TURNTABLE MOTOR	£10.00	FSTY260482 £10. LOPT BLUE SPOT & GREEN SPOT EACH £10.	.00
00.8811 00.012	MATSUI CAPSTAN VSR1500 I/C NO. M56730 ASP	£15.00	LOPT RED SPOT £6.	.00 .00
£15.00 £15.00	MITSUNI MOD MRF7-UF32	£5.00	PANASONIC TC2203, TLF 1456B EACH 115.	
£20.00	MOD TMUG3-103A MITSUBISHI	15.00	TLF1457B, TLF701/6 EACH £15.	
£8.00	CAPSTAN-HSE41-I/C M51782ASP	£4.00	TOSHIBA TFB 3035D, TFB 4023AD, TFB 4032BD EACH £10.	
£10.00	ORION MOTOR	50p	TFB 4038AD. TFB 4110AD EACH £10.	.00 .00
25p 10p	HGA1124A 50p SGSIF344 £L00 HM6264 SN96551NL £3.00	TDA2611A TDA2613	£1.00 TDA3654 £1.00 TEA1060 £2 £1.00 TDA3654Q £1.00 TEA2014A 6 £1.00 TDA3710 £3.00 TEA2029C £3	1,00 50p
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