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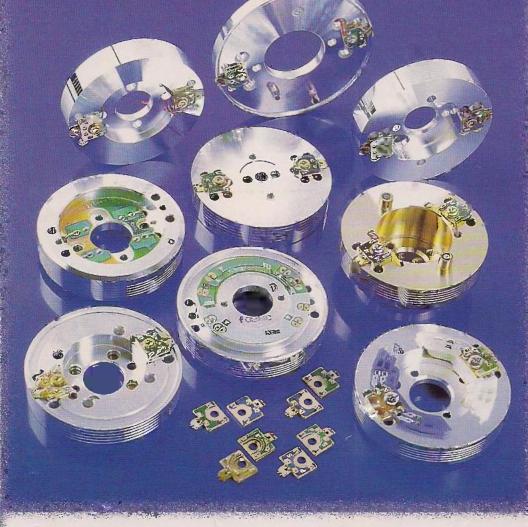
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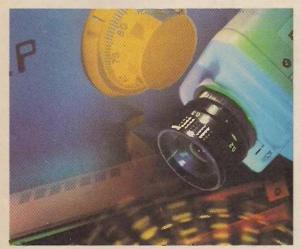
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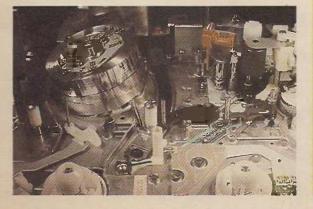
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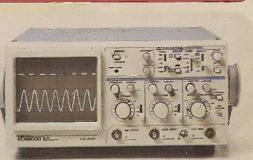
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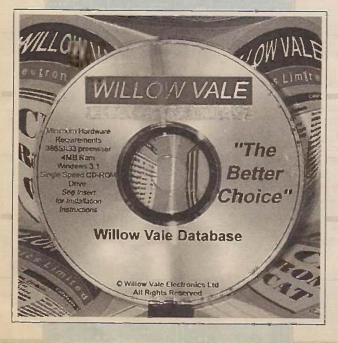
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A Link with the Past

The death of Tony Bridgewater on February 28th, at the age of 89, breaks a link with the earliest days of television. His distinguished career in television engineering started with work on the Baird 30-line mechanical system. As a boy, he had built crystal and then valve radio sets. He subsequently undertook training in telegraphy, and at the age of 18 went to sea as a wireless operator. After that he worked for the Post Office on high-power transmitters. Then, in 1928, he started to work with Baird and was involved in many of Baird's early TV demonstrations.

This led to the first experimental TV transmissions, using a BBC medium wave transmitter after normal radio broadcasting had closed down for the night. There was limited bandwidth of course and to start with, the pictures and the accompanying sound couldn't be transmitted simultaneously – they couldn't be synchronised either. So the transmissions consisted of alternating two-minute periods of vision and sound. Nothing of entertainment value, but at any rate a start.

In 1932 the BBC took over full responsibility for the experimental TV broadcasts and Tony Bridgewater, with two other engineers, joined the Corporation. He went to work at the newly built Broadcasting House in Portland Place, and was in charge of the studio team when the BBC started regular TV transmissions from Alexandra Palace in 1936. By then Baird's system had evolved to 240 lines, while EMI had developed an electronic camera, the Emitron, and the famed 405-line system. In retrospect, it's amazing what was achieved, with minimum funding, during those years in the early Thirties. The foundations of TV broadcasting as we know it today were being laid. One of Tony Bridgewater's early

achievements was the first major outside TV broadcast, when the Coronation procession of George VI was televised as it passed Hyde Park Corner in 1937. This was significant since early TV camera tubes were very insensitive, relying on high studio light levels. But by now the Super-Emitron camera tube had arrived, which was fifteen times more sensitive than the initial Emitron. The broadcast also used a new mobile control room that had been delivered by EMI only days beforehand. Apparently the equipment played up, and the story is that the proverbial thump was required to get it back into action in time as the procession approached. But again it was a start, and soon the boat race and other events were being broadcast regularly - to those 15,000 or so TV sets that were in use in the late Thirties.

TV transmissions from Alexandra Palace ceased on September 1st, 1939: it was felt that the transmitter might have been of help to the German air force for direction-finding purposes. Tony Bridgewater served in the RAF during the war years, working on radar. He returned to the BBC at the end of the war, and assisted with the restart of TV in time for the Victory Parade in June 1946.

From 1946-1962 Tony Bridgewater

was engineer in charge of BBC outside broadcasting. There were many significant events: the Olympic Games; the first cross-channel TV transmission; the Queen's Coronation and her first Christmas TV broadcast from Sandringham; and the funeral of Sir Winston Churchill. During this time Tony Bridgewater organised the first broadcasts from a submerged submarine and from an aircraft in flight.

In 1962 Tony Bridgewater was made Chief Engineer of the BBC. He was involved in the start of BBC-2, which meant UHF transmission, the increase to 625 lines and the start of colour TV in the UK. He retired in 1968, but continued to be involved in various aspects of TV. He was active in the Royal Television Society, being its Honorary Treasurer for twenty years and its Chairman of Council. It was only natural that he would be a founder member of the RTS History and Archives Group.

It is extraordinary that one man's work life should have covered virtually the whole of TV development, from the flickering images of the early experimental days to superb quality colour pictures transmitted at UHF. When he started with Baird, TV was wholly mechanical – Baird didn't even have a video amplifier initially. By the end of Tony Bridgewater's active career TV was moving towards solid-state circuitry. Digital TV was yet to come, but Tony Bridgewater played a part in most of the major developments in TV engineering. He was awarded the OBE in 1965.

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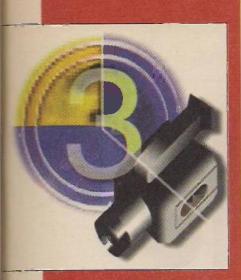
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Reports from Simon Bodgett and D.C. Woodnott

JVC GFS1000

The complaint was that this camcorder would shut down intermittently in the record mode. It did so in the playback mode as well, because the cause of the trouble was dry-joints at R15 in the drum motor drive circuit. The board concerned is mounted above the tripod base and is subject to stress. S.B.

JVC GRAX10

The scribbled fault report said that the picture was out of focus and the sound was too quick. When we tested the machine there was severe capstan motor warble in the playback mode. We decided to tackle this first, and it took some time to narrow the cause of the problem down to a defective capacitor, C116, which decouples the servo non-linear filter to a reference source. Adjusting the viewfinder's optical focus control cured the out of focus picture. S.B.

JVC GRS707

The customer couldn't eject tapes and said that the rewind button was slow to respond. This camcorder's eject function is routed through the main operations panel, and as this is a single unit it had to be replaced. Both faults were then cleared. S.B.

JVC GRM3

There was no camera operation though playback was OK. Obviously a camera head fault. The head has a DC-DC converter module/IC, DD1. Fusible resistor R85 in the feed to this

Camcorner

IC was open-circuit. So it seemed that the chip was faulty. Did it die or was it killed? We shall never know: a replacement IC and resistor restored normal operation. The repair was not an easy one.

There's an interesting anomaly with this model. To operate the autofocus and zoom while service testing, the EVF and the T/W zoom switch must be connected at power up - otherwise the functions don't operate. S.B.

JVC GRS707

Circuit protector CP204 had failed. The replacement held OK until the camera head was reconnected. We eventually traced the cause of the failure to C122 on the YC board - it was leaky. S.B.

Sharp VLE31

A clicking sound from within when the mechanism was operating was the complaint with this camcorder. The offending noise came from the head drum. My first thought was that a foreign body might be lodged between the upper and low drum, but on investigation I found that one of the small screws on the upper drum was loose and was fouling against the lower drum. All was well when the offending part had been adjusted and secured. D.C.W.

Panasonic NVS6B

The reported fault was no digital functions, all other operations being OK. The cause turned out to be a faulty switch on the camera operation assembly (part no. ESU39013).

It's not unusual for one function only to fail with this type of assembly. You get similar problems with other Panasonic models that use similar membrane-type units. D.C.W.

Samsung VPE807 No camera E-E picture with playback OK is a common fault with this model. It can usually be cured by removing and replacing the lithium clock battery. We've never had one come back for a more serious repair after doing this. D.C.W.

Ferguson FC08

We don't see many of these camcorders nowadays. This one had a fault that was always common with them, a poor viewfinder picture. For some reason JVC, which had always provided good viewfinder pictures with previous models, slipped up with this one.

The thing to do is to remove the 'blue' substance around the CRT base and pins. This will usually brighten up the picture to an at least acceptable level. It may still not be considered up to scratch however. The later Model FC28 didn't suffer from this problem despite the fact that its EVF is very similar. D.C.W.

Sanyo VARS12B Adaptor

If one of these units fails to operate, check whether limit resistor R5104 is open-circuit. As yet we have found no external cause for this resistor's failure, nor have any units been returned after its replacement. D.C.W.

Panasonic WVCL350 Camera

These cameras often fail to produce a picture because C52 (100µF, 16V) on the power supply PCB has dried out and fallen in value. In this situation you'll find that the voltage on the 5V line is slightly low.

Although this is the only electrolytic capacitor that normally fails on PSU board, we usually replace the others as well. They all run rather warm'. D.C.W.

Canon UC15E

We were told that this camcorder's cassette housing was permanently open. When we powered it the housing closed, but when a cassette was inserted the housing again refused to close. The cause was failure of the drum to rotate. An inspection showed that there were dry-joints at the upper drum commutation PCB's connections. It's always worth checking for faulty connections on this board: we've had other faults - for example no FG pulses etc. - that were caused by this problem. D.C.W.

Simple video security System

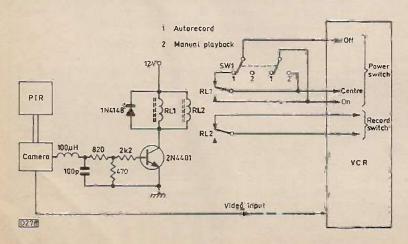
Denis Mott describes a video surveyance system that triggers a VCR to provide evidence of the presence of intruders

During the past two years my home has been attacked by burglars on three occasions, despite PIR flood lights, steel bars on some windows and the obvious burglar alarm. It seems that the modern thief is not deterred by such measures, especially when his aim is to obtain money for the next fix. So I decided that if I can't keep them out, why not try to identify the fellons instead? There were three aims in the system described in this article: simplicity, low cost and reliability.

Equipment Required

Maplin market a range of security cameras, in kit form or complete, all using the latest CCD technology. I chose the monochrome type AY16S, which is a CCD module that requires a 12V supply at 175mA. Its output is 1V peak-to-peak composite video at 75 Ω . The module also has six infra-red LEDs that illuminate the immediate area, giving a good image in total darkness. To reduce the power requirement, in the application described here the IR diodes were removed.

Fig. 1: Singlecamera system:



I needed a two-camera system, one to cover the back of the house and another for the front, each triggered by a PIR. This would automatically switch on a VCR while either PIR is in use.

A VCR with all-electronic control is required – the older mechanical types are not suitable. I used a Sharp VC381. The modifications it requires are described later.

Circuit Description

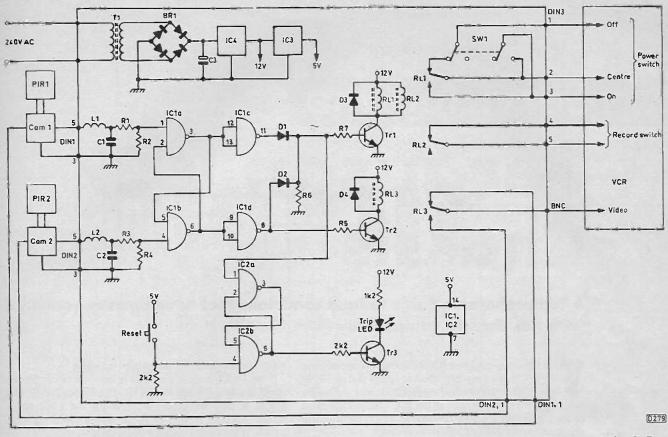
The circuit shown in Fig. 1 is for one camera. It has two relays, one to control the VCR's power switch and the other as a record switch override. SW1 enables the system to be overridden to allow manual control of the VCR for playback viewing.

Fig. 2 shows a two-camera system. TTL logic is used, though CMOS could be used for simplicity. IC1a and b are arranged as a set/reset flip-flop, selecting whichever camera is active. The supply to IC1/2 is reduced from 12V to 5V by IC3. The outputs from the flip-flop are inverted then fed to a two-diode or gate (D1 and D2). The output from this switches Tr1 on, energising RL1 and RL2 to power the VCR and activate the record mode. If camera 1 is activated, the output from IC1a inhibits IC1b. The opposite occurs when camera 2 is activated.

Tr2 is activated from camera 2, operating relay RL3 to switch over the VCR's video input.

An additional pair of IC gates (IC2a and b) operate a visual indicator to show if the system has been activated. This is a refinement and is not necessary. As in the single-camera circuit, SW1 overrides the controller circuit to enable the VCR to be manually operated.

Further cameras could be added, though this complicates the logic and video switching chips instead of a relay would be required to select the video source. Fig. 3 shows a possible arrangement with a PIC54



microcontroller replacing the previous logic circuitry. Relays are still required for simple VCR control.

VCR Modifications

As mentioned earlier, I use a Sharp VC381 in my system. It was modified as follows. First the power switch. Remove the front control panel to gain access to the control switches. Cut the track to the closed contacts when the switch is off (these contacts enable the VCR to power up in the timer mode). Connect two wires to the normally-open contacts and one wire to the unswitched side of the cut track. Then simply solder two wires to the record switch.

Although I've not tried the controller arrangement with any other VCR, the control method should be the same for most of them as they all use strobe signals from a microcontroller chip to detect switch states.

Operation

To make connection easy, I use 5-pin DIN plugs and sockets for the connections to the control box. To trigger the camera select logic, a twin screened cable comes from each camera. This carries the video signal and 12V from the camera's internal power supply. Thus each time a camera is powered from the PIR the select logic is activated. The VCR comes on in the record mode, taking about three seconds to lace up. At power off the VCR shuts down in the normal way and the tape is unlaced.

One desirable item is a date/time code generator to provide evidence for legal purposes. Because of the complexity however the development of this will take some time. If any reader has an already developed circuit that could be added, I would appreciate details.

The system in its present form has been in operation for many weeks now, with an average of four triggerings a night. Up to now the local cats and a dog have been all that we've seen, but it is comforting to know

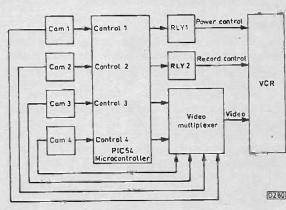


Fig. 2: Twocamera system.

Fig. 3: Suggested arrangement with four cameras.

that the system works reliably.

Contruction

The project was designed and built in a hurry, so I used Veroboard for the circuitry involved. If there is sufficient interest, a PCB and/or a kit could be made available.

Parts li	st for the	e two-ce	amero	a contr	ol unit
R1 8209 R2 4709 R3 8209 All 0.5W	Ω R5	470Ω 2-2kΩ 2-2kΩ	R7 R8 R9	2-2kΩ 2-2kΩ 2-2kΩ	
C1, C2 C3	100pF, 50 1,000µF, 3			D1-D4 Tr1-3 IC1-2	1N4148 2N4401 or similar 74LS00
L1, L2	100µH			IC3 IC4 BR1	7805 7812 50V bridge rectifier
RL1-3 T1	change	ature singl cover relay A mains tr	/S	ner	

Servicing the Ferguson ICC7 Chassis

A comprehensive guide to fault conditions that have been experienced with this chassis, compiled by John Coombes

The Thomson-designed ICC7 chassis first appeared in the UK in the Ferguson Models A51N and A59F, in late 1991. It superseded the IKC2 chassis. An article describing the circuitry used in the ICC7 chassis appeared in the December 1993 of *Television*. The present article summarises our fault experiences to date.

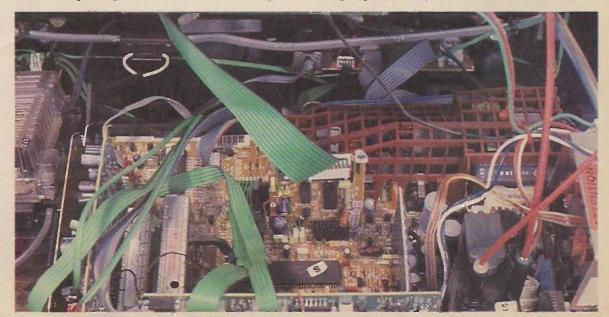
Power Supply

The power supply circuit is shown in Fig. 1. Note that it uses a master-slave regulation system. The master control is provided by the error amplifier transistor TP53 and pulse-width modulator transistor TP54 on the secondary side of the circuit. The output from TP54 drives the TEA2261 slave regulator chip IP01, on the primary side of the circuit, via TP69 and LP42. TP54 receives integrated pulses from the line output stage at its base, while the 13V supply for the emitter of TP53 is also derived from the line output stage. IP01 is responsible for start-up and standby operation. Because of this, you can't use a dummy load (bulb) to test the power supply: since the line output stage will be out of action, the power supply will operate in the standby mode.

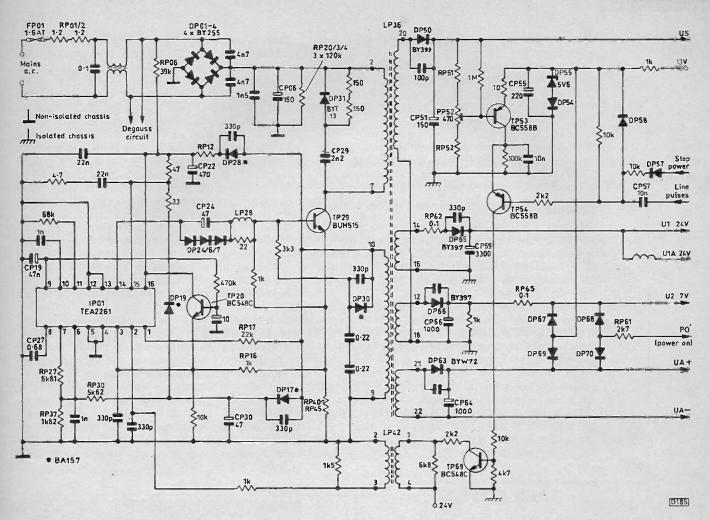
If the 1-6AT mains fuse FP01 is open-circuit or blown, check the four BY255 bridge rectifier diodes DP01-4 for shorts. If they are short-circuit, check the 1.2Ω surgelimiter resistors RP01 and RP02 which could be opencircuit. If the bridge rectifier circuit is OK, check whether the BUH515 chopper transistor TP29 is short-circuit. If it is, you may have to replace IP01 as well to prevent TP29 going short-circuit again. Also replace CP29 (2-2nF) in the snubber network. CP29 can be responsible for repeated failure of TP29. Other possible causes of a dead set with FP01 open-circuit are the BY399 HT rectifier DP50 and the PH9135 degaussing thermistor RP05.

If the set is dead because the power supply doesn't start up, check for voltage at pins 15 and 16 of IP01. No or a low voltage here could mean that the start-up resistor RP06 is open-circuit or high in value. Alternatively DP28 (BA157) could be short-circuit or leaky, IP01 shorted internally or CP22 (470μ F) faulty.

If the primary side of the power supply is OK, check the voltages produced by the various rectifiers on the



TELEVISION



secondary side of the chopper transformer LP36.

DP50 and CP51 should produce 145V for the line output stage (155V in models fitted with a planar CRT). Check whether DP50 and/or CP51 is short- or open-circuit.

DP65 (BY397) and CP59 should produce 24V. This supply is used by the line driver stage, so its absence will mean no line output stage operation. The usual fault here is that RP62 goes open-circuit, possibly because DP65 has gone short-circuit.

DP63 and CP64 provide $\pm 30/40V$ supplies for the audio output circuitry (voltage depends on whether mono or stereo).

DP66 and CP66 produce a 7V supply which is used primarily by the text board.

If all these supplies are correct, it may be necessary to check for short-circuits in the line and/or field output stages.

Failure of the BA157 rectifier DL09 that produces the 65V supply for the field output stage can be responsible for a dead set without tripping. It's in the line output stage. Another cause of a dead set without tripping is failure of the TDA8178F field output chip IF01.

If the set starts to work but does so for only a short period, check the DC conditions around TP54 – there should be 5.9V at its emitter. 5.5V at its base and 0.5V at its collector. TP54 may be faulty – check by replacement. IP01 (TEA2261) can be responsible for intermittent no results. Check by replacement. Another possible cause is CV01 (220 μ F). Again check by replacement.

Common causes of tripping are failure of the 5 6V zener diode DP55 or the BA157 diode DP17 which, with CP30, produces the error voltage input for IP01 (at pin 6). Other possible causes are DF16 (BA157) in the field output stage

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and the BSR51 line driver transistor TL17 being shortcircuit – either can also cause the dead set symptom.

Stuck in Standby

When the power supply starts up but stays in the standby mode the usual cause is a faulty BUH515 chopper transistor (TP29) and/or CP29 (2.2nF) in the snubber circuit. Check them by replacement. If still in trouble, check CP30 (47μ F). Another possibility is loss of TP54's base drive: in this case RL11 (15Ω) could be open-circuit or DL11 (BA157) short-circuit.

If the power supply appears to be OK, check the TA8659/CN chip IV01 by replacement. This IC incorporates the colour decoder and timebase generator sections of the receiver.

Another possible cause is the microcontroller circuit. Check whether the 8MHz crystal QR01 is operative. There should be oscillations at pins 31 and 32 of the microcontroller chip IR01. Either IR01 (type varies with model) or QR01 could be faulty. Another possibility here is TR76 (BC558B).

The Line Timebase

The line output transistor TL19 (type 2SD1546 or S2000AF) could be faulty if the receiver starts up then stops. Other things to check in the line timebase for the dead set symptom are RL21 (value varies with tube type) in TL19's base circuit; the BSR51 line driver transistor TL17 which could be short-circuit; and DL17 and DL18 (both type 1N4148) in TL17's base circuit. Check RP62 (0.1 Ω) in the power supply – it could be open-circuit; and DF16 (BA157) in the field output stage.

Dry-joints on LL19 can kill TL19.

Fig. 1: The chopper power supply circuit used in the Ferguson ICC7 chassis. IV01 (TA8659/CN) is suspect if there is no line drive output at pin 39.

You might find that CL21 in the EW modulator circuit has burnt and gone short-circuit, damaging the PCB, with TL19 also short-circuit. If so replace CL21, CL16 (0.22μ F), RL21, and TL19 (use a 2SD1546), and change RV01 in the protection circuit from $4.7k\Omega$ to $5.6k\Omega$. The values of CL21 and RL21 vary with tube type.

Suspects in the event of intermittent linc timebase operation are TV01 (BC558C), TV02 (BC548C) and DV08 (13V zener diode). The only way to be sure is to replace them.

Geometry Faults

For faulty EW correction with the width control not working the best thing to do is to check IG01 (TDA4950) by replacement. Zener diodes DL48 (10V) and/or DL41 (2.7V) could be leaky or DG01 (8.2V) faulty – check it by replacement. Other possibilities are PG06 (470k Ω) and dry-joints at LG08.

For faulty NS correction, check whether LG84 is dryjointed or RG87 (2.2 Ω) open-circuit, the condition of PG79 (1k Ω), TG76 (BC557B) and TG84 (BD137) which could be leaky, short-circuit or dry-jointed.

Field Faults

The obvious suspect for field collapse is the TDA8178F output chip IF01, but the symptom will probably be no results. Check DF16 and DF17 (both type BA157), also DF18 (BAV21). If the 65V supply is missing, check whether DL09 (BA157) is open- or short-circuit or CL09 (47 μ F) short-circuit.

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Make cheques/postal orders payable to Reed Business Information Ltd. There could of course be no field drive pulse output at pin 31 of the TA8659/CN chip IV01. If so, check that the 13V supply is present across CL14 (1,000 μ F). No voltage here means that DL13 (BY397) is open-circuit. IV01 could be faulty, but the field drive circuitry should be checked first. RF03 (680 Ω) could be open-circuit, or transistors TF25 (BC548B) or TF08 (BC548B) faulty. There should be drive pulses at the base of TF25, and a sawtooth waveform at the base of TF08. The sawtooth waveform depends on the 200V supply being present across CL11 (10 μ F). If it's missing, check whether RL11 (15 Ω) is open-circuit and/or DL11 (BA157) is shorted.

Another thing to check is the plug-socket connections to the scan coils – which could be open-circuit.

If the TDA8178F chip is faulty you can get field collapse followed by the trip mode or the set switching off.

When this chip is replaced you may find that there's field foldover. In this case check the 4.7Ω surfacemounted resistor which is marked on the PCB as link J238.

Other causes of field foldover are DL09 and DF16 (both type BA157), either of which may be leaky, and IF01.

If there is picture shrinking at the bottom, transistor TF25 (BC548B) is suspect – it may be clipping the sawtooth waveform at the base of transistor TF08.

Incorrect field linearity can also be caused by TF08.

Poor Focus

Check for good connection at the lead to the tube base panel and that the focus control PT01 is operating correctly with no arcing. It's always possible that the CRT is faulty.

No Sync

Check whether the coupling capacitor CV37 $(2.2\mu F)$ is open-circuit. If it's OK, IV01 is probably faulty.

No Video

For loss of the luminance and chrominance (a blank raster), check DL42 (1N4148) which could be shorted.

No Colour

The 4.43MHz crystal QC66 can be responsible for this symptom, also of course the TA8659/CN chip IV01. In some ICC7 series sets there's an S video switch: if it's in the S position, there will be no colour.

For no colour via the scart socket, check CC58 (470 μ F) and LC47.

For loss of one colour, check the relevant BF422/BF423 pair – TT07/TT12 for no red, TT17/TT22 for no green and TT27/TT32 for no blue. IV01 could also be the cause.

Tuning Drift

Check the 33V stabiliser DH04. If this is OK, the tuner unit is suspect.

Sound Faults

Sets with stereo sound have two TDA2030A audio output chips. If there is no sound, check that their LT supplies are present – they are produced by DP63 (BYW72) and CP64 in the power supply. If only one channel is present, check the relevant TDA2030A chip then back through IS04 (TDA6200). For Nicam sound problems check IS03 (CF70123).

'P' on Screen

On odd occasions the letter P may appear at the centre of the screen. This is a very intermittent fault. The microcontroller chip IR01 is responsible.

Help Wanted

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

Wanted: Back cover, volume control knob and speaker for the pre-war HMV Model 904 radio/TV receiver, also operating instructions for the Fiftics Beamec CRT tester/booster and an audio head for the Sanyo VHR3100E VCR. Robin Howells. Please leave message with Clive on 01384 872 744. Wanted: Service manuals for the Luxman K230 cassette recorder and the Tandy Realistic open-reel tape deck TR3000, Model 14-700. Good photocopies OK or will copy and return originals. All reasonable costs reimbursed. Dr. C.N. Barnes, Glebe Farmhouse, Billington, Stafford ST18 9DQ. 01785 780 164.

Wanted: Service manual (photocopy OK) for the Nicolet 3091 digital storage scope. David Lacey, 7 Green Lcach Avenue, St. Helens, Lancs. 01744 753 072.

Wanted: Servicc information and operating instructions for the Philips 22DC670 car radio, and suggestions to cure VHF/FM search running through. Also circuit for the Akai CSF110 cassette deck. Ken Domminney, 7 Chestnut Close, Eastbourne BN22 0SZ. 01323 500 174.

Wanted: Standby transformer for the Matsui Model 1460 CTV, also a side chassis (L) assembly (part no. 7395241) for the Hitachi VT88E VCR. Jim Lynch, WIES, Old School, Balivanich, Benbecula HS7 5LA. 01870 602 035.

Wanted: Switching regulator board for the JVC Model HRC-C3E VCR. Scrap machine or BA1632 IC chip would be helpful. Chris Johnson, 7 Dryden Road, Scunthorpe, N. Lincs DN17 1PW. 01724 855 997.

For disposal: Type 551 oscilloscope in good condition, £35. F. Nedza, 40 Brynhyeryd, Glynneath, Neath SA11 5BA. 01639 720 429.

Wanted: Sound IF module for the JVC C140EG portable (European model), also a circuit diagram or 29-pin module (UK version). Someone has tried to

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convert the sound strip but has broken one of the adjusters. Two 6MHz filters are fitted, but there are four places to fit them and I'm not sure whether they are in the correct position. Only a loud buzz can be obtained. Brian Milne, 22 Aldwych Place, Blackburn, Lancs BB1 9QP. 01254 246 127.

Wanted: Service manual (photocopy OK) for the Period Hi Fi tuner/amplifier Model ST202/PHF8/11. M.L. Richardson, 20 Dale Close, Skegby, Sutton-in-Ashfield, Notts NG17 3AF. Wanted: Circuit diagram (photocopy OK) for the Goodmans 3250 hi-fi system. Mike Wade, 89 Porthcawl Green, Tattenhoe, Milton Keynes, Bucks MK4 3AL. 01908 507 574.

Wanted: Data on converting the SVA1 VideoCrypt decoder to VideoCrypt 2 operation. V. Stanley, 36, Meadow Court, Littleport, Ely, Cambs CB6 1JW. 01353 862 076, fax 01223 441 249.

Wanted: Circuit diagram and any other information (photocopies OK) for the Philips Visiopass 810175X V1-C D2 MAC receiver. W.M. Waldron, 9 Minge Lane, Upton-upon-Severn, Worcs WR8 0NN.

Wanted: TV/satellite signal strength spectrum analyser. Ian Broadbent, 125 East Bawtry Road, Rotherham, S. Yorks S60 4LQ. 01709 700 571.

Wanted: EHT transformer for the Tektronix 502 scope or photocopy of the manual. M. Humphrey, 45 Broadmead, Tunbridge Wells, Kent TN2 5NE. 01892 541 614.

Wanted: Lower drum assembly for the Ferguson FV37H with or without motor. Also service manuals for the JVC video system GXN7E/

HRS10EK/TUS10EK and the GEC Model C1401H. Photocopies OK. L. Miles, 32 Waun Wen, Cwmavon, Port Talbot SA12 9TB. 01639 885 027.

Wanted: STR4090S IC for a Sharp portable and an old Fidelity ZX2000 power panel with EHT transformer or a PCB adaptor board for Model FCC2015BE. Donald Bills, 69 Greenfields Road, Kingswinford, DY6 8EG.

Wanted: Circuit diagram (photocopy OK) for the Lincoln Model 35C and/or help with clearing a field blanking fault (teletext lines at top of picture). J. Magill, 146 West Circular Road, Belfast BT13 3QJ. 01232 719 996.

Wanted: Circuit diagram for the Viglen CA1428-LE colour SVGA monitor. A.B. Taylor, 11 Birch Close, North Hykenham, Lincoln LN6 8LR. 01378 876 885 or 01522 680 865 (after 6 p.m.).

Wanted: MAB8461P/W002 microcontroller chip (part no. 4822 2091 1013) for the Philips 37CS5690 projection receiver. Andrew Gibson, 96 Argyll Street, Dunoon, Argyll PA23 7NE. 01369 702 147. Wanted: Circuit diagram and any mods for the Skyscan K1 satellite TV receiver. Mr Outen, 2 Heol Vaughan, Burry Port, Dyfed SA16 0HF. 01554 833 024.

Wanted: Sinclair Microvision circuit diagram and pin connnection details for the 25-way D-type connnector in the Olivetti DSM2412C PC colour monitor. G. O'Brien, 105 Roxborough Road, Harrow HA1 1NT.

Wanted: LOPT for the Perdio Model P2503 or spares source information. John Stevens, 9 Hodson Close, Whetstone, Leics LE8 6EU. 01162 865 821.

Wanted: Panasonic Model TC800 – scrap set or cabinet parts. Also an RC handset for the Akai VS12 VCR. Leon Electronics, 11 Woodend Close, Three Bridges, Crawley, W. Sussex RH10 1RS. 01293 520 536.

Wanted: B9G, IO and B8A valve bases for restoration of a 9in. Bakelite-case Bush TV set. Also EF50, EB41, EL42, PY31, PL38, PZ30 and EY51 valves. Colin Boggis, 2 Larks Way, Knaphill, Woking, Surrey GU21 2LB. 01483 476 831, fax 01483 797 893.

Wanted: Grundig VS500 VCR, working or not but must be complete. Circuit diagram (photocopy OK) for the Philips Model 37KT2040-25 (K40 chassis). C. Graves, Orchard Cottage, High Street, Spaxton, Bridgwater, Somerset TA5 1BW. 01278 671 225. Wanted: LOPT for the Sanyo CTP3106 (80P B14 chassis). Alan P. Brown, 27 Narromine Drive, Calcot, Nr Reading, Berks RG31 7ZL. 01189 415 553 (evenings/weekends).

Wanted: Copy of the SMPS circuit diagram for the Panasonic NVD48. Graeme Duggan, 31 Cresswell Drive. Red House Farm, Gosforth, Newcastle upon Tyne NE3 2SY. 01912 846 471. Wanted: Manual/circuit diagram for the Hikona Model 1437. Also information on the amplifier IC used in the Rotel Model RX500. Tom Breen, 164 Carrigwood, Firhouse, Dublin 24, Ireland.

Wanted: Grundig/Philips V2000 type VCR, slimline model preferred. Also a Grundig VS200 VCR for spares. Have a Toshiba V8600B VCR for disposal. P. Woodhouse, 80 Edgehill, Off Brant Road, Lincoln LN5 9TZ. 01522 722 888.

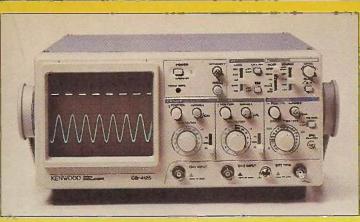
For disposal: Vintage Ch. 1 only Vidor TV set, with service data and some spare valves. Model unknown but similar to the CN377. Tube and LOPT good but EHT reservoir capacitor shorted. Free to good home were it can be restored but must be collected. Dave Hawley, 3 Ashfield Court, 113 The Grove, Ealing, London W5 3SN. 0181 567 3672. Wanted: Manual or circuit diagram for the Toshiba 219V5M multistandard TV set. S.J. Taylor, 30 Bland Road, Leicester LE3 9PB. Wanted: Service information (photocopy OK) to buy or borrow for the Acer 7156L 15in. SVGA monitor. Also scrap or unwanted unit for spares. Paul Burgess, 19 Wareham Green, Clifford Park Estate, Walsgrave, Coventry, W. Midlands CV2 2JL. 01203 617 671. Wanted: 420DKB22 tube (part no. 2351971) for the Hitachi Model CAP162E (NP8C chassis). Would be willing to buy complete set. Dennis E. Andrews, 91 Victoria Avenue,

Bloxwich, Walsall, W. Midlands WS3 3EH. 01922 479 393.

Wanted: Source of silica flour glass abrasive powder and advice on CRT face polishing. Also photocopy of the manual for the Telequipment D31 oscilloscope. R.E. Bailey, 22 Grebe Close, Waterlooville, Hants PO8 9UT. 01705 783 811.

Wanted: Supplier of spares/service data for the Academy TV Model P1402I. A. Robertson, 261 Warrington Road, Abram, Wigan WN2 5RQ. Wanted: Silver bottom tray for the Matsui VP9301. R. Walker, 50 Blanchland Avenue, Newton Hall, Durham DH1 5XP. 01913 860 779 Wanted: 2SK97 6-pin DIL dual FET for the Sansui AU-X1 amplifier, or current spares source. J.A. Duthie. 3 Whitford Gardens, Mitcham, Surrey CR4 4AB. 0181 646 0255. Wanted: Battery pack type VM-BP21, battery pack type VM-BP22 and character generator type VM-CG20E for the Hitachi VM500E camcorder. R.W. Goad, 7 Chipstead House, Chipstead Road, Cosham, Hants PO6 3JJ. 01705 382 918. Wanted: LCD module for the Sony ICF2001 radio. According to the manual the part no. is 1-548-129-00, but the board is marked 1-548-129-21. There is also a Sharp part no., S-801151. A non-working radio might be the answer. Eddie Jones, Roseacre, Llanteg, Narberth, Dyfed SA67 8PU. 01834 831 208.

Wanted: 2SK46A transistor for the Tatung TMR7602 World Band receiver. P.D. Lacon, 24 Victoria Avenue, Winton, Bournemouth, Dorset BH9 2RN. 01202 529 633 Wanted: Power unit for the Mitsubishi HS700B, or the switch-mode power supply transformer. R.G. Coates, 35 Tetbury Hill, Avening, Tetbury, Glos GL8 8LT. 01453 832 720. Wanted: Video PCB, part no. DUNKT 7033 CTV2, for the Sharp Model DV5105H. Phone Ray on 01159 783 751 day, 01159 411 537 evenings. 16 Newstead Grove, Nottingham NG1 4GZ.



This 20MHz Kenwood oscilloscope features automatic trigger-level detection for stable waveforms without complicated adjustments.

Featuring circuitry that synchronises the displayed waveform automatically – removing the need for complex sync adjustments – the dual-channel CS4125 20MHz oscilloscope represents excellent value for money at its normal retail price of £410 including VAT but excluding delivery.

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- When intensity is changed, focusing errors are corrected automatically
- Convenient handle offers choice of tilt angles.
- Probe attenuation switchable between 1/1 and 1/10
- Dimensions, inc. protrusions 343w by 150h by 430mm, weight approx. 7kg.

Specifications

specification	0115
Vertical amplifier	
Sensitivity	5mV to 5V/div, ±3%, 1 to 2mV/div ±5%
Attenuator	1-2-5 steps, 12 ranges, fine adjustment
Input impedance	1MΩ ±2%, approx. 22 pF
Frequency respons	
5mV to 5V/div	DC-20 MHz -3 dB or 10 Hz to 20 MHz -3 dB on AC range
	DC-5 MHz -3 dB or 10 Hz to 5 MHz -3 dB on AC range
Rise time	where the state of the state of the state of the state of the
5mV to 5V/div	Approx. 17.5ns (20MHz)
1mV to 2mV/div	
Crosstalk	-40 dB
Operating modes	CHI: CH1 single-trace CH2: CH2 single-trace
	ALT: alternate CH1 and CH2 display
	CHOP: chopping display of CH1 and CH2
	ADD: Combined waveform of CH1 and CH2
Chopping frequency	
Polarity inversion	CH2 only
Maximum input	800V p-p or 400 V, DC+AC peak
Horizontal amplifie	
Sensitivity	same as vertical axis (CH2)
Input impedance	same as vertical axis (CH2)
Frequency respons	
	X-Y phase matching within 3° at 50kHz
Operating modes	CHI: Y axis, CH2: X axis
Max. input voltage	Same as vertical axis (CH2)
Sweep	
	NORM: trigger sweep
Sweep Modes	NORM: trigger sweep AUTO: auto free-running with no signal
Sweep	NORM: trigger sweep AUTO: auto free-running with no signal 0.5 µs to 0.5s/div ±3% (0.2µs/div uncal.),
Sweep Modes Sweep time	NORM: trigger sweep AUTO: auto free-running with no signal 0.5 µs to 0.5s/div ±3% (0.2µs/div uncal.), 1-2-5 steps, 20 ranges w. fine adjustment
Sweep Modes Sweep time Sweep magnificatio	NORM: trigger sweep AUTO: auto free-running with no signal 0.5 µs to 0.5s/div ±3% (0.2µs/div uncal.), 1-2-5 steps, 20 ranges w. fine adjustment m x10 ±5% (20ns/div uncal.)
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Sweep Modes Sweep time Sweep magnificatio Linearity	NORM: trigger sweep AUTO: auto free-running with no signal 0.5 µs to 0.5s/div ±3% (0.2µs/div uncal.), 1-2-5 steps, 20 ranges w. fine adjustment n x10 ±5% (20ns/div uncal.) ±3% (0.22µs/div uncal.) (x10 ±5%, 20ns/div uncal.) VERT MODE: input signal selected in VERTICAL mode
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Sweep Modes Sweep time Sweep magnificatio Linearity Triggering	NORM: trigger sweep AUTO: auto free-running with no signal 0.5 µs to 0.5s/div ±3% (0.2µs/div uncal.), 1-2-5 steps, 20 ranges w. fine adjustment on x10 ±5% (20ns/div uncal.) ±3% (0.22µs/div uncal.) (x10 ±5%, 20ns/div uncal.) VERT MODE: input signal selected in VERTICAL mode CHI: CH1 input signal CH2: CH2 input signal LINE: commercial power supply
Sweep Modes Sweep time Sweep magnificatio Linearity Triggering Trigger sources	NORM: trigger sweep AUTO: auto free-running with no signal 0.5 µs to 0.5s/div ±3% (0.2µs/div uncal.), 1-2-5 steps, 20 ranges w. fine adjustment m x10 ±5% (20ns/div uncal.) ±3% (0.22µs/div uncal.) (x10 ±5%, 20ns/div uncal.) VERT MODE: input signal selected in VERTICAL mode CHI: CH1 input signal CH2: CH2 input signal
Sweep Modes Sweep time Sweep magnificatio Linearity Triggering Trigger sources External triggering	NORM: trigger sweep AUTO: auto free-running with no signal 0.5 µs to 0.5s/div ±3% (0.2µs/div uncal.), 1-2-5 steps, 20 ranges w. fine adjustment m x10 ±5% (20ns/div uncal.) ±3% (0.22µs/div uncal.) (x10 ±5%, 20ns/div uncal.) VERT MODE: input signal selected in VERTICAL mode CHI: CH1 input signal CH2: CH2 input signal LINE: commercial power supply EXT: EXT. TRIG input signal
Sweep Modes Sweep time Sweep magnificatio Linearity Triggering Trigger sources External triggering Input impedance	NORM: trigger sweep AUTO: auto free-running with no signal 0.5 µs to 0.5s/div ±3% (0.2µs/div uncal.), 1-2-5 steps, 20 ranges w. fine adjustment m x10 ±5% (20ns/div uncal.) ±3% (0.22µs/div uncal.) (x10 ±5%, 20ns/div uncal.) VERT MODE: input signal selected in VERTICAL mode CHI: CH1 input signal CH2: CH2 input signal LINE: commercial power supply EXT: EXT. TRIG input signal e approx. 1MΩ and 22 pF
Sweep Modes Sweep time Sweep magnification Linearity Triggering Trigger sources External triggering Input impedance Max i/p voltage	NORM: trigger sweep AUTO: auto free-running with no signal 0.5 µs to 0.5s/div ±3% (0.2µs/div uncal.), 1-2-5 steps, 20 ranges w. fine adjustment m x10 ±5% (20ns/div uncal.) ±3% (0.22µs/div uncal.) (x10 ±5%, 20ns/div uncal.) VERT MODE: input signal selected in VERTICAL mode CHI: CH1 input signal CH2: CH2 input signal LINE: commercial power supply EXT: EXT. TRIG input signal a approx. 1MΩ and 22 pF 800V p-p or 400V DC+AC peak
Sweep Modes Sweep time Sweep magnification Linearity Triggering Trigger sources External triggering Input impedance Max i/p voltage	NORM: trigger sweep AUTO: auto free-running with no signal 0.5 µs to 0.5s/div ±3% (0.2µs/div uncal.), 1-2-5 steps, 20 ranges w. fine adjustment m x10 ±5% (20ns/div uncal.) ±3% (0.22µs/div uncal.) (x10 ±5%, 20ns/div uncal.) VERT MODE: input signal selected in VERTICAL mode CHI: CH1 input signal CH2: CH2 input signal LINE: commercial power supply EXT: EXT. TRIG input signal e approx. 1MΩ and 22 pF 800V p-p or 400V DC+AC peak AUTO, NORM, FIX: AC coupling
Sweep Modes Sweep time Sweep magnification Linearity Triggering Trigger sources External triggering Input impedance Max i/p voltage Coupling modes	NORM: trigger sweep AUTO: auto free-running with no signal 0.5 µs to 0.5s/div ±3% (0.2µs/div uncal.), 1-2-5 steps, 20 ranges w. fine adjustment m x10 ±5% (20ns/div uncal.) ±3% (0.22µs/div uncal.) (x10 ±5%, 20ns/div uncal.) VERT MODE: input signal selected in VERTICAL mode CHI: CH1 input signal CH2: CH2 input signal LINE: commercial power supply EXT: EXT. TRIG input signal e approx. 1MΩ and 22 pF 800V p-p or 400V DC+AC peak AUTO, NORM, FIX: AC coupling TV-FRAME: TV-LINE:
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Sweep Modes Sweep time Sweep magnification Linearity Triggering Trigger sources External triggering Input impedance Max i/p voltage Coupling modes Calibration o/p Intensity modulati	NORM: trigger sweep AUTO: auto free-running with no signal 0.5 µs to 0.5s/div ±3% (0.2µs/div uncal.), 1-2-5 steps, 20 ranges w. fine adjustment m x10 ±5% (20ns/div uncal.) ±3% (0.22µs/div uncal.) (x10 ±5%, 20ns/div uncal.) VERT MODE: input signal selected in VERTICAL mode CHI: CH1 input signal CH2: CH2 input signal LINE: commercial power supply EXT: EXT. TRIG input signal approx. 1MΩ and 22 pF 800V p-p or 400V DC+AC peak AUTO, NORM, FIX: AC coupling TV-FRAME: TV-LINE: square wave. positive polarity, 1Vp-p ±3%, approx. 1kHz ion
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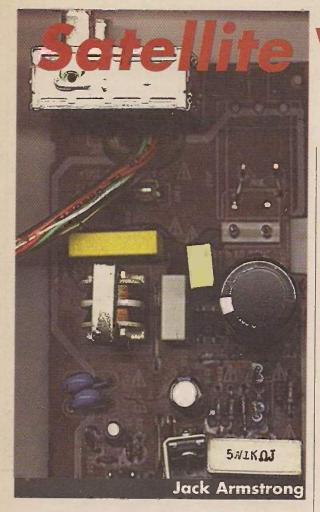
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A Dead Ferguson

From time to time I still see Ferguson SRV1 receivers (the Pace SS9000 clone). The large, buxom lady who brought this one in obviously meant business. She thumped it on the counter and got straight to the point.

"I just collected this from Wossname up Church Street. He said the power thingy's dead. But he's had it for six weeks and can't fix it. If I don't get it back tomorrow 'c's going to go bonkers. It's the football you know."

I took advantage of the pause to tell the lady that it would certainly be ready tomorrow, yes definitely madam, without fail, and no we don't close for lunch.

An hour later I was beginning to regret my rash promise and starting to understand why Wossname had been unable to fix it. Something was definitely wrong with it, and 1 couldn't figure out what. I'd replaced every single component in the power supply, including the horrible little surface-mounted ones, and it still didn't work. The DC voltages around the chopper control chip U23 were correct, but it simply

WORKSHOP

refused to produce any drive output. With the aid of a cup of tea, I compared the board with a scrap one. When I was about to give up I suddenly spotted the cause of the problem. Pins 14 and 15 of U23 are supposed to be joined via a common pad, but someone had run a knife bctween them, neatly dividing the copper pad. Clearly Wossname had assumed that there was a shortcircuit and had removed it. His work was so skilful that an eyeglass was needed to confirm what had been done. A blob of solder cured the fault.

BT SVS300

These receivers seem to have been manufactured by the same Far Eastern company that made the later Amstrad receivers. Certainly the 'repairman' who brought me this one thought so. Unfortunately he'd fitted an Amstrad kit, which is not quite right. In addition the '2R2' resistor he'd used was actually 0.22Ω , so the current sensing circuit was a little unhappy.

Once I'd fitted the correct kit the receiver seemed to work. But it switched to standby each time a vertically polarised channel was selected. I confirmed the fault by watching the menu of a horizontally polarised channel then altering the setting to vertical. Into standby it went. For some reason it was providing a 0V LNB supply instead of 13V. But it worked fine while my scope probe was on one connection of the power supply output socket!

After messing about for what seemed like hours I finally decided on a bodge and fitted a $56k\Omega$ resistor between the power supply H/V select input and chassis. I still don't know what had caused the problem, but my little 'fix' did the trick.

Fishy Business

My brother is the manager of a local trout farm. He brought me a Pace PRD800 that belonged to one of his lads. Apparently it would decode Sky One but no other channel. The card tested OK in another receiver. Suspecting a problem with the

contrast setting, I plugged the

receiver into the mains supply. It didn't light up, and there was a smell of fish! Fearing the worst, I removed the cover. As the receiver was perfectly clean inside I reconnected the power and tried again. This time the display lit up dimly. I could change channel, but there was no picture or sound.

The dim display and fishy smell gave me a clue. I measured the supply to the microcontroller chip and found that it was only 3V. Sure enough C15 (2,200 μ F), the reservoir capacitor in the 5V standby supply, had leaked. Hence the smell and the low DC reading. A replacement restored normal receiver operation, with the card producing clear pictures on all the encrypted Sky channels.

Well Done

Some customers won't settle for medium rare: they like their satellite receivers to be well done. The Pace MSS1000 that arrived by carrier from Birmingham was one of them. I knew it had been cooked when I saw that the rubber feet had disappeared, leaving a sticky mess behind.

The PCB was completely black in places, and as a start I replaced every single electrolytic capacitor in the power supply. This cured the dead condition (actually it was tripping at high speed). So I left the receiver on test. After about an hour the decoder messages disappeared. Liberal application of freezer seemed to pinpoint the PTV111 sync separator chip U29 as being the culprit. Replacement (twice!) failed to clear the fault however. After some thought I replaced all the electrolytics around the chip. As usual it was the very last one, C208 $(1\mu F)$, that put matters right. I really must remember to replace the last one first next time. .

Cowboys!

A dealer brought an Amstrad SRD500 to my workshop last week. It bore a label that said "live", but there was no other information. He was reluctant to explain, muttered something that sounded like "kit" and scurried back to his van. Being cautious, I didn't plug it in but removed the cover instead. Just as well. The white ceramic radiallead surge-limiter resistor had been replaced with an axial-lead type. Its live lead had been pressing against the steel top cover.

I resolved to ask the dealer whether his public liability insurance was up-to-date.

Philips STU824

I've mentioned this model before: it tends to suffer from memory corruption when the power supply fails, and also seems to be prone to dryjoints at the infra-red sensor pins. Memory corruption leads to a variety of symptoms, the most common being that the LNB voltage cannot be changed or that odd things happen in the menu settings.

Martin Pickering of SatČure has asked me to point out that the latest edition of his book Satellite Repair Manual (fourth edition) lists a factory reset code that's actually for an earlier model. Unfortunately there's no reset code for the STU824. The only way to reset it is to download the information from an identical model or replace the 24C16 EEPROM.

Cambridge RD480

It seems that everybody in Scotland owns one of these receivers, possibly because they were produced there. Unfortunately they don't seem to like the moderate warmth of Glasgow. As a result the plastic cases become brittle. The Scotsman who sent me one recently didn't understand that packing involves more than a Sainsburys carrier bag with my address glued to it. The receiver was well and truly smashed when it arrived. Fortunately I still have a few 'unrepairables' in the workshop, and was able to use mouldings from them.

The initial fault symptom was a screen that was black apart from the top few centimetres which were white. As this looked like a power supply fault I replaced all the large electrolytics. There was a noticeable improvement, but the picture I now had was obscured by hum bars and interference lines. So I removed all fourteen 1N4003 diodes, by the usual method of cutting each lead flush with the board then poking the remainer through with my soldering iron. It's the only way to avoid damage to the tracks and pads. With new diodes neatly formed and

Jack Armstrong is willing to try to sort out readers' satellite TV receiver problems via e-mail. 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 e-mail facilities you can write to him c/o Television, Room L302, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. Plgase enclose two stamped envelopes.

soldered in place, the picture was almost perfect.

The sound was extremely crackly however, and a loud hiss was apparent in the background. I replaced the middle crystal, the U2829 FM demodulator chip and all the electrolytics around it. After this the sound was much improved, though still with a little sibilance. But as I'd already spent an hour on the job, I decided to call it quits. I've heard worse sound with a receiver straight from the factory.

Test Case 412

Most TV repairs have to be done once. Maybe twice, if they bounce. This is the story of a repair that had to be done several times before we were able to guarantee that the fault had been cured. Such a saga is, unfortunately, not all that uncommon in the workshop.

The set was an old Philips one fitted with the CTX-E chassis. It was about twelve years old. The symptom was straightforward enough. The set had been brought in with the complaint "no results". We found that the 2AT mains fuse had blown violently, for the very good reason that the BUX84 series chopper transistor TR7355 was short-circuit. TechnoCrat replaced the transistor and fuse and left the set to run on soak test – this is our policy with all TV repairs now. When TC returned from his lunch the set was once more dead. The same two components had failed, just as before. Two more replacements were fitted, but before the end of the day they too had failed.

TechnoCrat is suspicious of all replacement semiconductor devices. He reckons that they are the rejects from the production lines. So he went off to the scrap pile and dug out a BUX84 transistor from a chassis he found there. It lasted about a day before sharing the same fate as its predecessors in the set. Plainly something else was amiss – and there were lots of possibilities!

TC started off by replacing C2355, the 470pF capacitor that's connected in parallel with the chopper transistor. Then he resoldered the connections to the chopper transformer T5335. Resistance checks were carried out on all the diodes in the power supply, and on the high-value resistors. These items were all OK. A fault in the line output stage could of course have been the cause of the trouble, so TC disconnected it and in its place connected a 60W bulb as a dummy load across the 40μ F HT (125V) reservoir

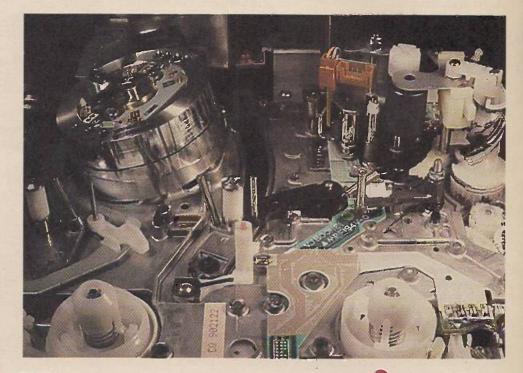
capacitor C2330b. The set was switched on and left to run as before, but this time with an oscilloscope connected to monitor the waveform at the collector of the chopper driver transistor TR7353.

After a few hours the dummy-load bulb began to flicker. This was accompanied by 'twitching' sounds from the chopper transformer. TC rushed over to look at the scope's display. It showed spasmodic, marked variations in the drive waveform's duty cycle. Finally the bulb dimmed, the pulses in the waveform widened and, to avoid loss of another BUX84 transistor, TC switched off.

Subsequently, by watching the scope while twiddling the set-HT potentiometer R3325, TC established that with wider drive pulses the HT should have increased. In the fault condition the opposite was true. TC thought about this vital clue. He decided that the drive pulse generator and HT regulation sections of the circuit were probably working correctly, even when the fault was present. And the fact that the trouble persisted with the dummy load connected seemed to suggest that the cause of the fault was nearby, certainly not in the line output stage.

Well, chopper transformer failure is not unknown with these sets. So the wrecked chassis in the scrap pile was again raided and robbed of its chopper transformer (the scrap set was known to have been working all right before it had been dropped!). Even with this known good transformer in it, the sick set continued to produce its fault from time to time – and indeed blew another BUX84 chopper transistor before the culprit was finally found and consigned to the dustbin. It was neither a large nor an expensive item. What was it? Bear in mind the set's age!

The power supply circuit was shown on page 719 of the August 1994 issue of Television. The solution to the problem is on page 446 of this one.



These VCRs are well worth renovating. With the faults list and recommendations provided by Brian Storm you should be able to clear any incipient troubles

the Panasonic NVG21/25

These now elderly VCRs are well worth renovating, particularly as the picture quality they provide is exceptional. The NVG21 and NVG25, along with their up-market relative the NVH65, were the first models to appear with the compact G mechanism. This helped to reduce considerably the size and weight of Panasonic VCRs. Another contributory factor to this was the introduction of a much smaller switch-mode power supply module. Other features of these models are real-time counter functions and bar-code scanners for timer and clock functions.

Power Supply

Fig. 1 shows the power supply circuit used in these models. The electrolytic capacitors in the switch-mode power supply of any machine that's about ten years old are likely to be reaching retirement age. Always replace the electrolytics in the primary side of the circuit because, as they decrease in value, the voltages on the secondary side of the circuit can increase, with possible damage to the items supplied.

Always resolder the legs of the STR10006C chopper chip Q1001 and the STK5338 series regulator chip IC1001. With both, the solder ages and eventually becomes dry.

On the secondary side of the circuit, electrolytic capacitors C1023, C1018 and C1022 should be replaced.

Here are some fairly common power supply faults:

Bad patterning, no colour and maybe drum servo problems: Replace C1023 (1,000µF, 10V).

White patterning, varies with the setting of the tracking control: Replace C1022 (47μ F, 50V).

Loses the E-E picture when a tape is inserted: Replace C1018 (47μ F, 50V).

Intermittent mains fuse blowing: D1002 (type ERA22-08) in the snubber network is probably leaky.

Clock display goes off intermittently: Replace C1018 (47 μ F, 50V).

Red power LED remains on when the machine is

switched off: Cause is open-circuit print between IC6001 and the base of QR6014

The Mechanism

After attending to the power supply, the next area most likely to require attention is the now familiar G mechanism. In these machines the capstan motor also carries out the functions of a front-loading motor and main loading motor. Because of this the mechanism is driven by a gear train that engages with the capstan motor via a solenoid at the appropriate times. The phasing and integrity of the gears are critical. Faults here can cause numerous symptoms. Here is a list of fairly common mechanism faults:

Cassette housing keeps going out of line with the main mechanism: Replace the cassette mechanism right-side housing assembly (part no. VXA2677) which is probably worn or broken.

Tape damage at bottom edge: The pinch roller is worn or the audio/control head is tilted down.

Tape damage at top edge: Arm P5 is bent or the A/C head is tilted up.

No rewind or fast forward: The centre pulley assembly (part no. VXP0769) is faulty (split).

Intermittent horizontal twitching: The impedance roller is sticking.

Intermittent tape damage (looping): Replace the play

arm unit, part no. VXL1490.

Squeaking noise from the mechanism: Replace worn capstan rotor pressure pad, part no. VXL1500.

Rattling noise in rewind or fast forward: The belt tension roller is worn. Replace it, part no. VXA2674.

Intermittent solenoid operation: Connector loose in plug 1504.

Tape loads but plays fast for a few seconds then the machine cuts out: The mode switch is out of phase with the mechanism by one gear tooth.

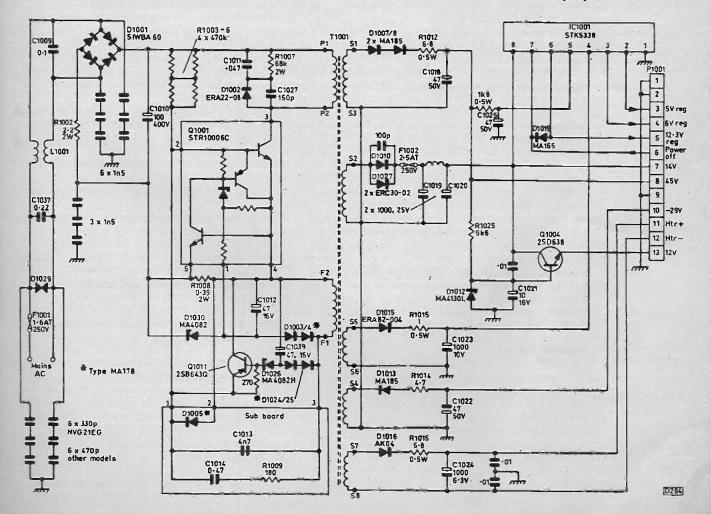
Machine cuts out in the review mode: The mode switch is out of phase with the mechanism by one tooth in the opposite direction to fault above.

A tape is accepted then ejected almost immediately: There's a phase error between the cassette housing rack gear and the drive gear.

Arm P4 broken: This occurs when there's a phase error between the planet and cam gears.

With older G mechanisms it always pays to check the tape path carefully, especially between the audio/control head and arm P5 via the pressure roller.

I recommend checking the A/C head for wear whenever the video head is replaced. A grid of white parallel lines is printed on the flexi-cable beneath the head. This is convenient. The pattern is refleced by the video tape as it passes across the A/C head. Thus any tape Fig. 1: Power supply circuit used in the Panasonic Models NVG21 and NVG25. D1029 is type ENB461D-05A.



curling or deviation is easily observed.

For tape curling or flagging, also check arm P5. It can be twisted or bent by a tight cassette.

The impedance roller should be removed and cleaned and the lower drum cylinder cleaned as necessary, also the entry and exit guides.

Sound Faults

Here's a list of sound faults you could encounter.

No sound and counter not working: C240 (10μ F, 16V) open-circuit.

Muffled or low playback sound: Audio/control head (part no. VBR0125) is worn.

The Panasonic G Deck

John Coombes adds: G deck alignment is very important. Any replacements/resetting should be carried out as laid down in the service manual. This includes refitting the cassette housing, where alignment should be done very carefully.

Pinch roller wear is a common problem. The result can be tape creasing or chewing at the top and bottom, or the tape can loop out causing damage when it's ejected.

A lot of upper drum wear is caused by excessive back tension. The correct setting is around 25g. Check the back-tension band and replace it if necessary. Excessive back tension can also cause line pulling at the top of the picture. If resetting fails to cure this problem, replace the upper drum.

The video heads can cause various problems such as a snowy picture, streaking on peak whites, or possibly poor quality playback because the picture is covered in lines. Sometimes playback of prerecorded tapes is OK but recordings are very poor. The heads can be damaged or even badly marked because a cleaning tape has been used.

The mode switch causes various problems. Examples are incorrect loading/unloading; the tapes being ejected after insertion; no fast forward, or rewind, or visual search in either direction: fast forward visual search instead of playback; tape ejection before rewind is complete. The mode switch has five soldered tags: dry-joints here can cause all sorts of strange faults. Several types of mode switch have been used in the G deck over the years. If you come across one with a metal centre, replace it immediately – this type is prone to trouble.

If the tape doesn't lace up correctly, check the play control arm which may be broken.

Noise in the rewind and/or fast forward mode can be caused by lack of take-up and/or rewind turntable lubrication. Other possible causes are a faulty centre pulley unit and/or the intermediate gear – check by^e replacement.

The G deck can be noisy. This can be a real problem should the SS brake arm unit (VXL1500) become worn at the bottom of the capstan motor. It can break into pieces here when badly worn. If there is a knocking noise, mostly in the playback mode, check the clutch disc and/or the play arm unit. If these are OK, suspect the main pulley and/or intermediate gear. Check that they are clean and free running, and then if Recorded sound is of low amplitude with lack of HF content: Can be caused by excessive record bias. Check the adjustment potentiometer, which can be intermittent.

Noisy and distorted sound: Check whether R4021 (47Ω) is open-circuit.

Video Faults

Most intermittent video faults are caused by dry-joints on the luminance and chrominance sub PCB, where it's joined to the main PCB.

Permanent or intermittent loss of the E-E video, with the sound all right, is usually caused by poor connection at the switch on the video input socket.

necessary by replacement.

A grating noise from beneath the deck is caused by worn or stripped gears, e.g. the ring gear, retainer gear, the three planet gears, the centre gear, sub-cam gear and disc drive along with the main cam gear. The sub-cam and ring gears will have to be replaced if the mode switch is incorrectly aligned and constantly becomes misaligned. Set all the gears and the mode switch very carefully, as laid down in the manual.

A sticking or bent P5 arm can cause tape chewing or damage at the top or bottom edge.

The cassette housing can cause troubles, i.e. a jammed cassette or failure to accept a cassette. First ensure that the wiper arms haven't gone out of alignment, failing to return to the correct position. Check that the main shaft is in the correct position, and that the cog on the side has not been damaged.

Check for a broken opening lever if the tape won't come out of the housing because the blinder panel doesn't open. Then if necessary check that the left/right side panels and slide switch unit operate correctly. If a cassette can't be inserted, check whether the opening lever is broken or whether its spring has stretched or dropped off.

Lower drum assembly wear may not be noticeable in the SP mode. If the machine has an LP mode, wear here can cause picture jitter, field roll or even an intermittently snowy picture on one 'channel'.

Some models have rotary heads for hi-fi sound. If the upper and/or lower drum is worn, the playback sound may give the impression of a helicopter whirling around.

If the top third of the picture is snowy in the review mode, suspect the upper drum.

Ensure that the back tension is set correctly before replacing the upper drum.

If the drum motor keeps running but the VCR won't play, check for a faulty Hall IC in the drum assembly. If this item is faulty, complete drum assembly replacement instead of repair is strongly recommended. But it may be worth checking for dry-joints in and around the direct drive assembly.

I have had very few problems with the capstan motor. On a couple of occasions it has been responsible for the no functions symptom. All inputs and out= puts were OK, also the supply to the motor, but the machine refused to operate. The cause of the mechanism jamming intermittently can be failure of the friction clutch on the capstan motor to slip free – this occurs with some of the earlier models. The cure is to replace the capstan motor. RUSSIAN BORDER GUARD BINOCULARS £1799 Probably the best binoculars in the world! ring for brochure

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Channe

Challenge

Reception of the new Channel 5 transmissions can present severe problems at some locations. Nevertheless Keith Cummins achieved excellent results – at a cost

s I live not far from Fawley, one of the Channel 5 transmitter sites, I decided to ring up a local aerial contractor last January to see if he could tell me what was going on.

"They're running tests, mate" he replied. "It's very weak – we're going to be fitting high-gain aerials and amplifiers everywhere."

- I asked if he knew the channel number and power.
- " about 100W, on channel 37" he said.
- "Doesn't that involve retuning?" I asked.

"I've not heard anything about that" came the reply.

Channel and Power

All this left me very dubious. I tried tuning through the band, and found a weak and grainy Ch. 5 test signal. I also discovered that it was accompanied by a page of teletext which listed all 33 Ch. 5 transmitters, their channel numbers and polarisation. The text kept turning to garbage, but in its more lucid moments I was able to read that Fawley was on ch. 34, with horizontal polarisation. I was particularly uncertain about the suggested 100W, preferring to believe the 1kW quoted by Bill Wright in the November 1996 issue of *Television*.

As my VCR is smart enough to search for channels and tell me their numbers, I set it the task of finding Ch. 5. It did this, confirming ch. 34 and the frequency. This differs from the original Ch. 5 plan described by Harold Peters in the July 1992 issue: at that stage, Fawley was expected to be on ch. 35, at 2kW, with vertical polarisation. Things had obviously changed. Ch. 34 is at the top end of the group A channels; and by using horizontal polarisation, the same as the main local group A transmitter at Rowridge on the Isle of Wight, there was a slim chance that a fortunate few would be able to receive satisfactory pictures from Fawley without the need to change their aerial arrangements.

Local Geography

Apart from the small village of Fawley, the area is known for an oil refinery and a power station, both of which lie on the eastern side of Southampton Water. These two plants are responsible for some nasty ghosting with reception from Rowridge. The power station chimney produces a single, strong ghost signal, while the refinery complicates matters by producing a large number of weaker echoes.

Fortunately at my location the normal group A aerial is broadside to the refinery when aimed at Rowridge, while the dreaded power station chimney is at an angle of about 45° to the aerial's axis. I have an aerial mounted in a carefully chosen position inside my bungalow's garage roof.

Where does Ch. 5 fit in? Finding the exact location of the transmitter proved to be difficult initially. I tried phoning the ITC, NTL and Ch. 5 Broadcasting, but was unable to get any precise information. Then, when driving past the power station one day, I noticed what appeared to be transmitting aerials attached to the north side of the chimney. My wife suggested that I try phoning the power station. Bingo: within five minutes of calling, a helpful gentleman in the control room confirmed that the Ch. 5 transmitting aerial is attached to the chimney. By mounting the directional array on the north side of the chimney, the latter effectively blocks southerly radiation, thus avoiding interference to continental services.

But this means that my Ch. 5 receiving aerial has to be pointed at the prime source of powerful Rowridge ghosting. And I really do mean powerful: Rowridge transmitts at 500kW, compared with Fawley's 1kW. In other words the Fawley signal is 27dB down, the most disadvantageous ratio in the UK.

Plan of Attack

Having set the stage, I'll now outline the approach I adopted to achieve acceptable (actually very good) Ch. 5 reception.

The first thing to consider is the normal reception level from Rowridge, the main group A station here. Once I'd got some idea in terms of numbers, I could do some calculations for the Fawley transmissions. I had to decide upon a reference level, which I took to be 0dB, defined as the signal that a simple dipole would receive at my location from the group A station.

To this, various figures have to be added and taken away. It works out as follows: 0dB + 10dB aerial gain - 6dB (a typical figure) loss because of the inside roof installation. Thus the final figure is +4dB. This is purely arbitrary, but it provides an aiming point when the Ch. 5 situation is assessed.

For the Fawley transmitter the figures look like this: dipole reference -27dB, aerial gain to be calculated, distance factor +14dB. Distance factor? Well Fawley is in this case five times closer to the receiving site than Rowridge. This has to be taken into account, using the familiar square law. Thus the received power is increased by 10 log 5², i.e. approximately 14dB.

If the final figure for Fawley is to be +4dB, as for Rowridge, the aerial gain must be 4 + (27 - 14) = 17dB.

An aerial gain of 17dB is a demanding requirement, and such an aerial will be large. Furthermore we can't tolerate loss because of roof tiles, so the aerial must be mounted outside.

It's tempting to use a smaller aerial with an amplifier. But remember that in this case powerful ghosts of the normal group of four transmissions will be present: they could intermodulate with the weaker Ch. 5 signal. Thus a large aerial is best. Since it's a passive device, intermodulation cannot occur, while its narrow beam width will reduce the amount of unwanted reflected signal energy received via the refinery. This will in turn make the job of the aerial combining unit (diplexer) less demanding.

As Bill Wright pointed out in his excellent and detailed article in the November 1996 issue, you cannot use a splitter to combine the outputs from two aerials without disastrous effects on their directional characteristics. I tried, just to prove the point. While Ch. 5 was not too bad, the remaining channels were, as expected, seriously degraded by the strong reflections introduced via the Ch. 5 aerial.

Thus to do the job properly you must install a suitable combining unit. I used a Triax diplexer which is wideband – except for a stop filter tuned to ch. 34 - at one input, and narrowband (ch. 34 only) at the other input. It has to be specially ordered – you specify the dedicated channel. The ch. 34 input filter introduces a –3dB loss, the wideband input being attenuated by 1dB.

The overall figures are shown in Table 1. Theoretically, they indicate that Fawley is 2dB down on Rowridge. This is acceptable. The figures cannot be all that accurate, but a viable parity of performance is nevertheless indicated. This was borne out by the observed results. The assessment procedure can easily be applied in other localities provided you know the transmitter powers, the distances and local conditions.

The Installation

To obtain the overall performance suggested by the calculations, I used a Triax 100 aerial (group A, highest channel 34) and a Triax 5740 combining unit. There is no perceptible difference in the results achieved with the five channels when viewed on any of the four receivers fed via my distribution system. By introducing 12dB of attenuation at one receiver input, all five channels became noisy to about the same extent.

But this performance doesn't come cheaply. The aerial and combining unit alone cost nearly £80, plus VAT. Then there are the mounting brackets, cable, pole, etc. – and I did all the work myself. When you consider that for less than double this figure you can buy a multichannel satellite system, the economics look rather dubious – though Ch. 5 is free.

Finally I would like to thank David Martin of Aerial Techniques (a regular advertiser) for his advice concerning aerials and diplexers.

Table 1: Assessment of signal levels.													
Parameter Rowridge Fawley													
Radiated power	500kW	1kW											
Reference level (dipole)	0dB	-27dB											
Distance factor	0dB	+14dB											
Aerial gain	+10dB	+17dB											
Roof-tile loss	-6dB	0dB											
Diplexer loss	-1dB	-3dB											
Final signal level	+3dB	+1dB											





Reports from Philip Blundell, AMIEEIE Gerald Smith Terry Lamoon Roger Burchett Michael Maurice Eugene Trundle David Corcoran and Michael Dranfield

Philips VR422

The mechanism was OK but there was no picture or sound (just a blank raster) in any mode. While tracing the video path back from the modulator, I soon discovered that the +12a supply was missing. Safety resistors R3151 and R3147 (both 6.8Ω , part no. 4822 050 26808) were open-circuit. No reason for their failure could be found, and the replacements didn't fail during a soak test. **P.B.**

Toshiba V110

This VCR would only receive channels below 43. Channels above 43 could be stored correctly, but only snow was displayed. Checks in the power supply showed that the voltage at test point BP08 was low at 13V instead of 33V. A new ZTK33B voltage regulator (DP04) restored normal operation. P.B.

Philips VR727

Take care when ordering deck parts for VCRs that use the Philips Turbo deck. Although they look similar, there have been changes in later versions – mainly in the braking system. Instead of using a triggeroperated brake, the main cam operates the brake directly. To do this, the design of the main cam has been changed (the cam has a sun or star shape moulded in to its top surface), the worm shaft is simplified and the trigger components are omitted.

Unknown to me, the machine that

VCR Clinic

caused me problems had had the wrong cam fitted. The deck wouldn't initialise. When a cassette was inserted, the tape threaded up and unthreaded twice, then the machine powered down. A check on the error memory in the service mode showed that the microcontroller chip sensed a threading error, though visually the deck appeared to be operating correctly.

The microcontroller chip senses the threading position by counting the pulses from the 'windmill' optosensor on the threading worm in relation to the moment when the INIT switch closes. Because the wrong cam had been fitted, the INIT switch closed later than it should have done. The microcontroller chip sensed this.

A cam from the N kit instead of the A kit had been fitted. If you find that the marks on the main cam are different, or the threading worm is a different shape from the one originally fitted, check that you've got the correct part no. **P.B**.

JVC HRJ215

This machine had no functions and an erratic display. On checking we found that the 5V supply was low at 2.5V. The cause was a faulty circuit protector (CP1). **G.S.**

Toshiba V204

This machine was dead. The primary side of the power supply was pulsing but wouldn't run. The cause of the fault was the U4614B chopper control chip IP001. G.S.

Mitsubishi HSB330

A rolling E-E picture from cold was the complaint with this machine. The cause was C111, which had fallen in value. G.S.

Toshiba V212

This machine would try to accept a

tape then eject it after a few seconds. The usual cause of this is the loading motor. On this occasion however the cause was tinfoil that had been jammed in the loading area.

There was also a squeal on rewind. We found that the take-up reel was dry – a little oil silenced the squeal.

Next, the playback picture pulled from side to side, as though there was a drum fault. The cause was dust on the plastic cap beneath the drum - it provides information on the drum speed and position, via an optical pickup.

Finally the audio head and pinch roller had to be replaced. G.S.

Sharp VCM20

If there is intermittent loss of response to jog shuttle, or functions are erratic, check for dry-joints at plug and socket AO and OA. G.S.

Saisho VR1600

These machines are now quite old, but still produce good results. This one had the common fault of going into play, the picture freezing, then shutting down. The cause of the problem is usually the limiter post near the take-up reel. When you remove it you'll find that the pin is missing. A replacement will restore full working order. T.L.

Matsui VPA9601

A common problem has appeared with this relatively new model: when the machine goes into the review mode the tape is not taken in and loops. The cause is wear on the plastic slide plate underneath. For a complete repair replace this plate and the idler. T.L.

JVC HRD560

Snowy bars at the top of the picture was the complaint with this

machine. If you get this problem, the thing to check is the loading arms. They usually become loose, or become disengaged altogether. You can tighten them, but for a good repair it's best to replace them. T.L.

Akai VSG815

This model differs from most VCRs in that the front display is in the cassette flap and there's a quite complicated loading mechanism. This seems to be causing problems. Levers at the top of the cassette housing run along the cassette as it's being ejected. Normally there is no problem, but if the cassette has a loose plastic window the lever's downward pressure can push the window out. The lever then gets caught in the cassette, the result being shut down.

It's quite easy to remove the lever and faulty cassette. The real problem comes when the customer tries to remove the cassette himself. If he pulls too hard, there's a danger of damage to the gears and mechanism misalignment, which is not so easy. I feel that Akai should be looking into this. T.L.

Ferguson FV81

Our customer complained that the clock reset itself to 3:00 a.m. every night. These machines use a signal to set the clock each night, but there's a set-up sequence when the machine is first powered. This was odd, as the customer had owned the VCR for two years. What had happened was that he'd switched the machine off when he went away on holiday.

The correct sequence from first power up is:

Do not set the clock.
 Tunc in to BBC-1 and leave the machine on this channel.

(3) Switch to standby.
(4) At 3:00 a.m. the clock will set itself by mill set its set i

itself. It will remain OK while still powered. T.L.

Matsui VX990/Saisho VR2500

It's common to find that there is no output from the 12V regulator circuit. Not so common to find that the transistor is OK but the zener diode is short-circuit, as was the case with this machine. R.B.

Ferguson FV26D

There was no display, though commands were accepted and the relevant LEDs lit up. The cause of this was traced to IC1 (type UPD75212ACW-015) on the memory PCB. The owner had had a go – there were odd screws everywhere. R.B.

Ferguson 3V45

Odd symptoms occur when the 5.1V zener diode D408 is leaky. In this machine the drum immediately took off backwards at high speed, and there was just a quick burst from the capstan motor. A replacement put that right.

But the remains of the backtension band were jammed in the carriage. This prevented the arm coming into contact with the tape. I know that the machine had been used like this. What had the owner been watching?! R.B.

Hitachi VT120

This machine showed the cassette-in symbol at all times and the carriage wouldn't stay up. All functions were normal, including eject. But you had to be quick about getting the cassette out before the carriage took it back in again. For once the sensors were OK. I followed the wiring from the plug (socket on the main board) and found a dry-joint at R906. Resoldering this cured the problem. **R.B.**

Panasonic NVG12

This machine would sometimes unlace immediately because the drum failed to rotate. The reason for this was a **dry**-joint at the motor drive plug/socket. **R.B.**

Ferguson FV70B

The customer complained that there was a flickering picture and intermittent loss of sound. I found that the tape path was slightly out of alignment. Resetting this cured the fault, M.M.

Ferguson 3V32/JVC HR7655

I had serviced this machine about three months previously, and had been called back because of what looked like dirty heads. Cleaning them seemed to cure the problem, I was then called back again. The heads appeared to be dirty once more, but if the machine was left to cool down the picture would be restored. The fault could be induced by going into the search mode.

I took the machine back to the workshop and left it running until the fault appeared. I then scoped the drum flip-flop waveform which, instead of being a square wave, was a series of pulses. As the amplified drum pick-up pulses were OK, I froze the BA853 chip IC7 and found that the fault cleared. So a new BA853 chip was obtained from JVC and fitted.

Imagine my horror when the machine produced exactly the same symptoms (the chip costs over £40 trade). I subsequently tweaked R57, which sets the drum pick-up pulse level at IC7. Fortunately this cured the problem. A long soak test proved that everything was OK.

It's possible that the drum pick-up pulse head may be starting to fail. Only time will tell. M.M.

Ferguson 3V32/JVC HR7655

After carrying out a service I found that the display wasn't working. Checks showed that its -28V supply was missing. This is derived from the timer/tuner board, where zener diode D233 was found to be short-circuit. A replacement brought the display to life. M.M.

JVC HRJ205

A loop of tape was left when you tried to eject a cassette. The cause of this can be a faulty mode switch or capstan motor. As the mode switch is cheap and readily available I decided to change it first. Fortunately this cured the fault. M.M.

Ferguson FV71LV

We were told that this machine was found to be dead after a thunderstorm. When I tested it the power supply was tripping. The cause of this was RP18 (1.5Ω), which had risen in value to approximately 8.8Ω . A replacement stopped the tripping and brought the machine back to life. M.M.

JVC HRD610

When a tape was inserted this machine would start to lace up then stop and switch off. I tried this several times: each time the point at which the machine stopped varied. When I removed the mode switch I found that it was starting to break up. A replacement put matters right. M.M.

Sanyo VHR7700E

If the machine goes off within a split second of being switched on and there are no functions, check transistor Q5402 on the main PCB (CP1). You'll probably find that its base-emitter junction is leaky. From the dissipation point of view the device seems to be hard pressed. I've found that the higher-rated 2SD1207 is a more reliable replacement. E.T.

Sony SLVE200/250

We've had intermittent tape looping at eject with a couple of thesc machines. The cause is excessive capstan brake friction, something that also affects certain Sanyo models. With the Sony machines this is best dealt with by replacing the brake-lever assembly complete and cleaning the periphery of the capstan flywheel. E.T.

Orion D1094

This note applies to the above VCR, to the **Tatung** Models DVR634VN, DVR832V, TVR734VN, TVR932V, and probably others – the problem is with the Orion deck. Symptoms are intermittently stopping short of full cassette eject or when the cassette is half way in, and intermittent deck functions like load and play. The cause is a dirty or tarnished mode switch. You can clean it, but replacement is better. E.T.

Panasonic NVL20/25

An intermittent fault that's difficult to diagnose is spasmodic deck shut down because the capstan motor stops during play or record. The cause is usually dry-joints where P2001 is soldered to the main PCB – they are not obvious to the naked eye, but a times eight magnifier shows them well enough. It's a good idea to replace C1122 (330 μ F, 10V) in the power supply while you are about it – use a 105°C type. **E.T.**

Tatung TVR6122

The reported fault was tuning drift. In addition we found that when a new channel was selected it took several seconds to arrive. The stabilised tuning voltage supply was low because the 2SA1038 transistor Q1001 in the 50V supply line was faulty. It's mounted at the top edge of the PSU-stabiliser board. E.T.

Samsung SI124

The symptoms were no RF output from the modulator and no video from the scart socket, though RFthrough was OK, the deck worked and its functions were displayed on the fluorescent panel. We found that the IN4001 diode D110 in the 5V supply on the main PCB was open-circuit. The nearby diode D109 can also fail, producing various puzzling function and servo faults. E.T.

Thorn VR182LV

This machine was dead, with no outputs from the power supply. Full

HT was present across C5003 on the primary side of the circuit. Resistance checks showed that regulator IC5003 on the secondary side was short-circuit, though a replacement failed to cure the fault. D5004 (1SS244) on the primary side was then found to be leaky. A new diode restored the machine to working order. **D.C.**

Matsui VX6600

If the E-E sound is OK but the picture goes to blue mute when the channel is changed, the problem being worse from cold, replace C17 $(0.1\mu F, 50V)$ on the 1F PCB. M.Dr.

Panasonic NVJ30

Playing slow was the complaint with this machine. On inspection we found that the real-time tape counter was counting up on its own, even with no tape in the machine! It must have been counting pulses from the power supply. Replacing C22 (330μ F, 10V) in the power supply cured both symptoms. It had dried out. M.Dr.

GoldStar GSE2000IQ

This machine wouldn't accept a tape. If a tape was held in the cassette housing, the loading motor would shuffle backwards and forwards. The culprit turned out to be R537 ($100k\Omega$), which was opencircuit. We discovered this thanks to the low input impedance ($20k\Omega$) of our analogue meter – while taking voltage measurements the tape loaded. M.Dr.

Alba VCR6200 etc

We've seen a number of these machines under different names, for example the Akura VX150, all with the same fault – the BA6209N loading motor chip burnt out. Sometimes the PCB is badly scorched. The cause of the fault is the loading motor going short-circuit intermittently. Sometimes the bearing seizes up.

Replace the motor with a different type, part no. MOTOR4305, from SEME. But note that you have to reverse the leads. as it's wired in the opposite polarity. Replace the BA6209N chip with the uprated BA6209, which has a small heatsink tab. M.Dr.

Sanyo VHR390E

The symptom with this mid-mount machine was cyclic noise bars, which is caused by a capstan phase problem. As a start we cleaned the audio/control head, but this made no difference. So we scoped the control amplifier output at pin 26 of the BU2890DK chip IC351. No problem here. There is also a control pulse output to the microcontroller chip, at pin 15. This was also OK. When we scoped the pulsewidth modulator output at pin 44 however we could, by changing the. scope's timebase speed, resolve two waveforms. One looked like serial data. A replacement BU2890DK chip – it's a 44-pin flatpack type – cured the fault. M.Dr.

Fisher FVHP725

This VCR produced an over-modulated picture, with inversion on the whites. Playback of a prerecorded tape was OK, so this ruled out the modulator. The video coupling capacitor C050 ($1,000\mu$ F, $6\cdot3$ V) turned out to be dead short. This item is on the video in/out jack socket PCB at the rear of the machine. I seem to recall having had a similar problem with an Amstrad machine. M.Dr.

Akai VSF600

This Nicam machine was brought in because playback of prerecorded tapes was bad. Its own recordings were satisfactory. I decided to realign the mechanism and, going to the ACE head to adjust its X setting. I found that it was loose. Playback of all tapes was perfect once it had been reset.

When I queried this the customer said that someone else had replaced the ACE head some months previously. Whoever had done this must have forgotten to tighten up the screws, and really should have applied some Locktite paint. Still, we all make mistakes occasionally. T.L.

Matsui VXA1100

This VCR chewed tapes, usually when they were being rewound. Once we'd opened it and inserted a test tape we soon saw what was wrong. When the machine was stopped in the rewind mode the brakes failed to come on. The best thing to do when you get troubles with these machines is to replace the mode switch. I did this and lo and behold the VCR had been cured. T.L.

Matsui VP9401

Odd mechanical functions is something we've had with several of these machines. The thing to do is to carry out a visual check on the little brake lever coupling that sits under the cassette housing. When its securing clip wears or breaks, it becomes loose. The result is half actions etc. Replace it if it has come adrift. **T.L.**

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Auto Channel Expansion for the Amstrad SRD400

Martin Pickering, B.Eng., describes a simple modification that provides automatic switching to Astra 1D channels with this satellite receiver

The Amstrad SRD400 satellite receiver has proved to be a reliable workhorse since it was introduced over six years ago. Despite its age technologically, and its 48-channel limitation, it still provides excellent sound and picture quality. In fact the only limitation of any significance is its tuning range.

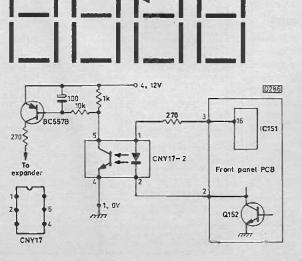
The Problem

With the advent of the Global Communications ADXplus channel expander, even this limitation can be overcome. You can use the expander to watch the programmes from Astra 1D along with the best: it will shift the entire band of frequencies 500MHz higher. But the ADX has to be selected manually when you want it to do this, which is a drawback.

The only switching operation that can be readily used with the SRD400 is the TV/SAT button. This selection can't be stored on a per-channel basis however. The ideal solution would be to allocate a specific number of

Fig. 1: The display LED segment used to obtain the conol action.

Fig. 2: Circuit of the modification.



channels to Astra 1D programmes and to have the ADX switch on automatically when each of these channels is selected. This article explains in detail a simple, low-cost solution.

The Solution

My initial thought was that it would be simple to use a number-display segment that lit up for only a specific range of channels. As shown in Fig. 1, the top left segment of display three was selected. It's ideal, since it lights for only channel 40 through to 48.

But a glance at the circuit diagram showed that the LED segments are multiplexed. They are actually pulsed by the display driver chip which, in turn, receives from the microcontroller chip serial data that would be difficult to interpret. In addition, the common cathode of each seven-segment display is strobed. There is no steady DC voltage, or even some usable pulses with respect to the 0V reference.

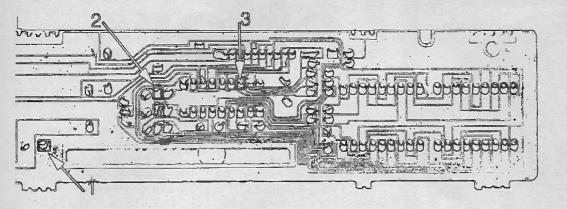
Luckily the old bonce, now sans hair, remains cool and immediately (well, seven months after the original idea to be truthful) came up with a solution. An optocoupler hooked across the relevant LED segment would provide a pulse output that could be smoothed and used to control the ADX expander. This is what the modification does.

Realisation

Since every Amstrad SRD510 power supply uses a CNY17 (or equivalent) optocoupler, I wasn't short of these. Fig. 2 shows the modified circuitry. The optocoupler's LED is connected between pin 16 of the LED display driver chip IC151, on the front panel, and the centre leg (collector) of the pnp strobe transistor Q152. With the emitter of the optocoupler's transistor connected to chassis, and a $1k\Omega$ resistor connected between its collector and the 12V supply, the goal was achieved.

The pulses from pin 5 of the optocoupler are fed via a $10k\Omega$ resistor to the base of a BC557B pnp transistor (almost any pnp transistor will do), with a 100μ F capac-

SATELLITE



itor to provide smoothing. The collector of the pnp transistor is connected via a 270Ω resistor to the channel expander unit.

The handful of components required cost very little, and can easily be assembled on a piece of Veroboard or similar stripboard. Keep the assembly small. After attaching wires for its connections, insulate it and tuck it away beneath the decoder board.

The sketch of the SRD400's front panel shown on the left in Fig. 3 indicates where to solder three of the connecting leads. Chassis (0V) in point 1; the collector of Q152 is point 2; IC151 pin 16 is point 3. The 12V supply is obtained from point 4 on the small regulator board that's bolted to the heatsink – see right-hand side of Fig. 3.

A minor drawback is that the chosen segment will

light when you are tuning the receiver. To overcome this nuisance, disconnect the lead and switch the ADX on while tuning. Once the channels have been tuned in and stored, switch the ADX off and reconnect the control wire. It will then switch on automatically for channels 40-48 only.

The system will also work with the Amstrad SRX200, the later version of which has 48 channels, but you will have to hunt for the 12V supply (it's at one of the ICs near the back of the receiver). The front panel connections are similar.

If you want a ready-made board with instructions, at just £4.95, please phone me on 0589 355 411 or send an e-mail note to

repairman@nctcentral.co.uk

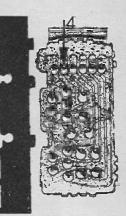


Fig. 3: Where to make the four connections.

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A Cautionary Tale

This is a cautionary tale on removing damaged parts.

can. You can send them typed, handwritten, or a

disc. Address them to the Letters Editor, Television,

A Matsui TV set was brought in because it was dead. When I examined it I found that the line driver transistor and transformer were both open-circuit. When they had been replaced I switched the set on and could hear and see the EHT rise to a fiendish level - well in excess of 30kV. It arced down to the PCB and also the tube base, where a firework display fit for November 5th started up. By the time I managed to switch the set off, it had already expired. Needless to say, this Matsui was now deceased, defunct - had shaken off its mortal coil. I removed the parts I had fitted, as they were OK, and boxed the set up.

I told the customer what had happened and explained that the set was a write off. I asked him to collect it and said that there would be no charge. He was not very happy. When he asked for an insurance estimate, which I refused, he was even more unhappy. He took the set and left the shop.

Two days later I had a visit from PC Wopsey (a very attractive policewoman).

"I've come to arrest you on suspicion of theft of parts from a TV set. Would you please

Letters

accompany me to the station to make a statement."

Well, I was gobsmaked. I explained the situation and what had happened. She said she was sorry but that as a complaint had been made (the customer had taken the set elsewhere and had been told that two small parts were missing) she had to follow it through. She then told me that if I were to go to the Police Station at 2pm and give a voluntary statement I would not be arrested.

I agreed of course and went to make my statement. I also handed her a transistor and transformer to replace the ones I had taken out.

The matter has now obviously been dropped, but what a waste of time and resources. The moral is DON'T LEAVE OUT PARTS! If you take any out, hang on to them just in case.

I hope that this is a one-off experience. It won't happen to me again, anyway. S. Woodbridge-Smith, Argyle TV & Video, Plymouth.

Digital Transmissions

We all know about digital signals – teletext, Nicam, RDS satellite, etc. But are they as good as claimed?

We go out on many service calls, and find that Nicam stereo is a growing problem. Customers update their VCRs and TV sets, but the Nicam signal drops out because the signal is poor or there's ghosting. The TV picture, though not good, is perfectly watchable. Even a good picture with a slight ghost can cause problems.

We've had similar difficulties with the RDS used for car radios – no station ID, and the real time clock won't run hence no clock display. I hate to think what will happen with the digital radio transmissions planned for the future. With FM radio you can still hear the programme when the signal level is very low and the digital signal has said bye-bye.

Teletext also causes problems, when the TV pictures are OK to watch but there's no text or so many errors you don't bother. How do you explain this to the customer?

Digital services are good so long as the signal is strong and is correctly tuned in. But they are not the best thing since sliced bread! In fact they are of no use to the customer when the signal level is low though acceptable results are still obtained with analogue signals.

From a worried and disappointed bits and bytes man! Geoff Chadwick, Bebington, Wirral.

Future of the Trade

Michael Maurice's article (January issue) was certainly food for thought, though a bit pessimistic. Having read it and decided against topping myself after all, I decided that a better course of action might be to come up with something more positive on the subject. (1) With the rapid product development currently taking place, we can look forward to making pots of money (provided the manufacturers don't get involved in price wars) by selling the following: digital TV receivers, be they set-top units or dedicated TVs, and VCRs; widescreen TVs (this is at present a very small market, but soon people may start to feel deprived); DVD equipment; interactive TV equipment, etc., etc.

(2) As long as TVs contain a power supply and a line output stage, and as long as VCRs and CD players contain cheap plastic cogs and levers, there will no shortage of servicing work.

(3) The ridiculous belief of manufacturers that a basic VCR must cost less than those of its rivals cannot go on indefinitely. We must be reaching the point where it is no longer viable to manufacture and sell on price rather than quality.
(4) If the quality of products continues to fall and manufacturers continue to build down to a price, this should at any rate keep those of us in the service side busy.
(5) Finally, the worlds of computers and home entertainment are going

to become more closely linked. This is inevitable, as discs can be used for audio, video and computing and a monitor can be used for computer or TV display purposes. How long before we see the first TV/Video/ CD/radio/cassette/fax/modem/CD-ROM/security/ansaphone/teasmade, and who will have to fix it?

So my message for 1997 is: don't panic, there is work in this trade for many years to come. But some adaptation may be required, particularly by those who normally turn a deaf ear when ROMS, RAMS, nand gates etc. are mentioned. Shane Humphrey, LCGI, Bideford, Devon.

I heartily agree with Michael Maurice's article (January issue) on the future of the trade. The abolition of resale price maintenance in the Sixties dealt a severe blow to the trade. The shop where I worked went out of business, after thirty years, largely because a discount store opened in the same street. What dealt the final blow however was the advent of solid-state receivers. Before that receivers needed service every six months or so on average. So a repair workshop was essential, and even with increased price competition a business stood or fell on its service. When the reliability of sets improved to the point that many of them would work for five years or more without a fault, not only did the income from servicing fall by about 90 per cent, it also meant that any Tom, Dick or Harry could enter the market with little by way of servicing back-up and the accompanying cost.

Unil about fifteen years ago my business supported a staff of three and we were very busy. Now there is hardly enough work for me – in fact this year my expenditure exceeded my income. I'm fortunate in being able to supplement my income by going into the Bed and Breakfast business. But not everyone is blessed with a pleasant rural location or the facilities to do this.

Several engineers have started up on their own in this area in recent years. Most have failed, as there is just not enough work to go round. This is a rural area of course. Perhaps things are different in towns and cities. But I certainly wouldn't want to try and set up a business here now. Peter Nutkins, Charmouth, Dorset.

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Sky can have 'em

We have made very little money out of servicing satellite receivers. The main reason for this is the fact that people are reluctant to spend realistic money on having repairs carried out to items that, because of Sky promotion and free units offered by multiples as part of package deals etc., are now considered to be of little or no value. So I was very interested to read John Hopkins's letter (December issue) on Sky's free service arrangement.

It has always been my policy to bury bureaucrats under mountains of often meaningless paperwork, this being one of the most effective ways of keeping them off my back. So I'm extending this philosophy to Sky. If it wants to promote free units and service them, making it uneconomical for service organisations such as mine to become involved, then so be it. As far as I'm concerned, they can have the lot.

Now, when a customer presents a satellite unit for repair, before he's even had time to tell me that there's nothing much wrong with it and that it shouldn't cost much and should be ready by tea time, 1 slap a preprinted handout into his hand. It explains the procedure, which was so clearly outlined by John Hopkins, for contacting Sky.

If Sky wants them it can have them – receivers, IRDs, LNBs, sparklies, the lot. Every satellite grizzler who walks through our door is now directed straight to Sky. *Bernie Hinton*,

West Ewell, Surrey.

Demagnetisation

I read Peter Graves's letter (December isssue) about Test Case 406 with a great deal of agreement. I, too, would never pass DC through any tape head. In fact I remember that in the days of amateur construction of reel-to-reel recorders the switching of bias oscillators had to be arranged to provide a gentle rise and decay of the signal applied to the head. This was usually done by including an electrolytic capacitor on the load side of the bias oscillator HT switch.

The main point of this letter however is to pass on a tip that could prove helpful when the problem is stubborn magnetisation of tape-path components. I've wound a hefty coil of thirty turns of insulated 1.5mm copper wire, using a broom handle as a mandrel. Three layers, each of ten turns, are manageable. The coil is energised from a Weller soldering pistol of the type that has a wire bit fed from a transformer in the body. Remove the soldering bit and fit the coil in its place. The coil will be selfsupporting if the lead-out wires are not too long, but the wires could always be supported by a short piece of dowel.

I use the same approach as when degaussing a CTV tube – switch on well away from the magnetised object, then bring the 'gun' in close and sweep it around. Finally, move it well away again before switching off. The few seconds it takes to do this will not overheat the coil or the transformer to any appreciable extent. The results are excellent, and the device can be used to degauss watches and VCRs as well. Head testing for continuity remains a problem. A bench-top tester that uses the head as part of a tuned circuit could possibly be built, i.e. when the head is connected an audio oscillator is formed, showing whether the head is OK. Constructional article someone? J. LeJeune, Nottingham.

Poor Circuit Diagrams

I recently purchased a service manual from Comet for the Goodmans 5160TT TV receiver. Unfortunately the circuit diagram was unreadable. On ringing them to ask for a better copy I was told that (a) it is the best they had and they are all the same: (b) the charge was only £1.29 (the £3.50 handling charge was tactfully overlooked); (c) it's an old model anyway, hardly worth repair; and (d) there's a microfiche, but I can't have one!

It seems a shame that, while Comet makes an effort to support the trade, it falls down badly in this respect. If a microfiche is available, excellent copies can be produced. If the charge is £5 instead of £1.29, so be it. An unreadable copy is useless, a waste of time and effort. Colin Boggis, Woking, Surrey.

CORRECTION

In the TV Tuning Aid article (February issue page 264) the connection between pins 3/12/13 and 5/6 of IC2 was omitted in Fig.1. Without this connection the oscillator will not run.

Our apologies for any difficulties this omission may have caused.

Pace's MSS100 Technology

J. LeJeune concludes his description of the technology used in this advanced, budget-priced satellite receiver

n this second, concluding article on the Pace MSS100 receiver we'll look at audio signal processing, the graphics chip, the modulator, the microcontroller system and the scart socket arrangement.

Audio Processing

Fig. 5 shows in block diagram form the audio section of the signals processing chip U500. A simple *RC* high-pass filter, augmented by a scries-tuned trap resonant at 4.433MHz, extracts the audio subcarriers from the tuner's baseband video output for feeding to pin 23 of U500. The input goes to two gain-controlled amplifiers, one for each of the two demodulators (for left and right audio). The AGC range is 40dB, the amplifiers providing a constant 1V peak-to-peak output.

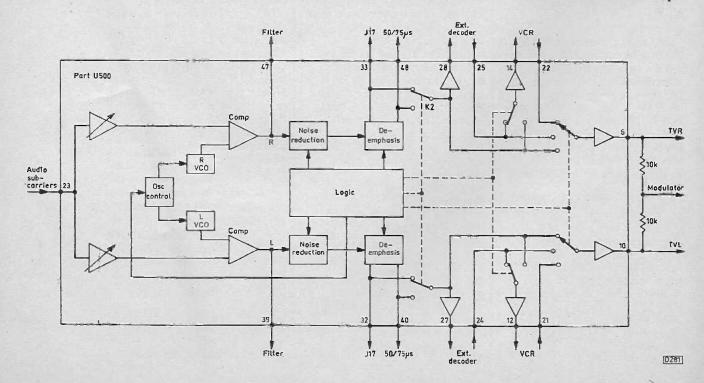
The opcration of the two demodulators resembles that of a phase-locked loop, but is more accurately described as a locked-oscillator phase detector. Each uses a voltage-controlled oscillator (VCO) which is set to operate at the required subcarrier frequency. The outputs from these VCOs are the reference inputs to a pair of comparators, the input FM signals being the other inputs. The comparators generate error signals which are directly proportional to the original modulation. This is the basic demodulation process.

Once the VCO frequency and the centre frequency of the FM subcarrier coincide, the VCO is locked to the incoming FM. Filtering of the L and R audio is carried out by RC networks connected to pins 39 and 47 of the chip. This is important, as it removes any 180kHz beats that might arise between the adjacent subcarriers.

The demodulated audio signals are passed to a noise reduction system. This can be set to recover Panda compressed audio by selecting Panda de-emphasis. Audio without noise reduction compression can be selected by an internal bypass switch (not shown in Fig. 5).

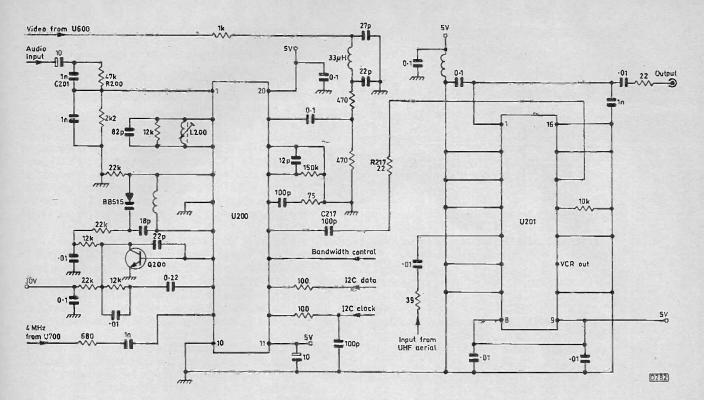
De-emphasis is provided by external components, J17 for the left- and right-channels at pins 32 and 33 respectively. 75µsec de-emphasis is provided at pins 40 (L) and 48 (R): the 50µsec de-emphasis can be switched in internally, by parallel connection of an on-chip $44k\Omega$ resistor at each of these pins.

De-emphasis is followed by switched selection of internal/external audio by a four-input, three-output cross-wire matrix. This enables de-emphasised satellite audio to be fed to the decoder, VCR and TV scarts. The audio outputs



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Fig. 5: Simplified block diagram of the audio signal processing arrangements in the STV0056 chip.



at pins 6 (R) and 10 (L) can be level-controlled. They are fed to the TV scart socket and, after summing, to the modulator. Switching can be set by the pin 8 levels at the respective scart connectors. Volume controlled audio is also available via phono socket outputs at the rear of the receiver.

Control of U500

The video/audio processor chip U500 is controlled by the clock and data lines from the microcontroller chip U700. U500 doesn't have an independent crystal oscillator, relying on a 4MHz signal at pin 35. This is generated by U700 and buffered by Q700. In addition, an accurate 22kHz tone signal for switching a universal LNB is fed in at pin 29.

A one per cent tolerance $273k\Omega$ resistor connected to pin 50 sets the current-bias reference for some of the internal amplifiers and also controls the roll-off frequencies for filters employed in the audio sections of the chip. If this resistor changes value, the operation of U500 will stop.

Colour Graphics

The video output at pin 9 of U500 is fed via buffer amplifier Q600 to the VCR scart socket and to pin 10 of the colour graphics chip U600 (see Fig. 2 last month). U600 generates background screen colour for the menus and onscreen messages: as an alternative, the graphics can be superimposed on the picture.

U600 has its own crystal oscillator to generate the colour subcarrier frequency. It employs a 17-734MHz (four times the subcarrier frequency) crystal which is connected to pins 16 and 17. The oscillator has an accuracy of a few Hz.

An LC oscillator with external components connected to pins 1 and 2 runs runs at around 7MHz to generate the character pixels. When the graphics have to be synchronised with the picture, character generation also depends on line and field sync inputs at pins 18 and 19. These come from the timing generator circuit in the VideoCrypt decoder – from pins 5 and 6 respectively of U300. U600 generates its own sync pulses for graphics on a plain background.

Graphics insertion into a plain background or the pic-

ture is a simple switching function, the switches being controlled by signals on the data bus from U700/U701 (the microcontroller and memory chips). A potential divider network connected to pin 9 of U600 sets the white level of the characters. Video leaves U600 at pin 8, passing to the the modulator via buffer transistor Q601.

Spare data processing capacity in U600 is used to provide port expansion facilities for U700, generating control lines for pins 8 (external AV) and 16 (RGB switching) of the TV scart socket.

The Modulator

The modulator circuit, see Fig. 6, uses two Philips surface-mounted ICs. The TDA8722 chip U200 is an amplitude modulator while the TDA8725 chip U201 is an active UHF combiner.

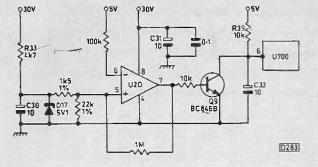
U200 contains its own phase-locked loop for tuning purposes. The PWM tuning signal at pin 7 is fed to an integrator and amplifier-inverter circuit based on Q200. The reference signal for the PLL is the 4MHz signal generated by U700. It's divided down internally to 31.25kHz, the frequency at which the PLL comparison is made. The carrier oscillator tuned circuit is connected to pins 4 and 6 of U200. A programmable divider within U200 converts the carrier frequency to 31.25kHz, under the control of the tuning data from U700.

The audio input is pre-emphasised by C201 and R200 and passed to pin 1. The audio subcarrier oscillator is connected to pins 2 and 3 - coil L200 can easily be tuned to 5-5MHz for system B and G TV receivers.

U200's UHF output appears at pin 15 and is fed via C217 and R217 to pin 14 of U201. The TDA8725 was designed principally for VCR use, but is ideal for satellite receiver applications. Mixed terrestrial and satellite RF emerges at pin 1 of U201, passing to the UHF output socket.

The Microcontroller

The Z86C21 microcontroller chip used in the MSS100 is a member of the Zilog Z8 family. It's a custom-masked microcontroller which is linked via the I2C bus to the 32K EEPROM U701. U700's functions are as follows: Fig. 6: The modulator circuit, which is based on two Philips surfacemounted ICs. Fig. 7: The reset circuit.



(1) To decode the IR remote control commands.

(2) To generate a 4MHz reference signal for internal use and use in other sections of the receiver.

(3) To perform AFC correction to compensate for small-LNB drift.

(4) To control the video and audio switching in U500 as determined by the RC handset, the level at pin 8 of the scart sockets and the VideoCrypt decoder.

(5) To monitor the LNB supply voltage and produce the LNB "short" message.

(6) To control the graphics chip U600.

(7) To operate LNB on/off and selection.

(8) To operate the data downloading system via the VCR scart socket.

(9) To supply various control and reset signals to the VideoCrypt decoder.

The output at pin 1 of the IR receiver chip IR700 is normally high (5V). When an IR command is received, it passes negative-going pulses to pin 12 of U700.

The crystal that controls U700's 4MHz reference oscillator is connected between pins 2 and 3. A buffer transistor feeds the 4MHz signal at pin 2 to pin 9 of the tuner and pin 35 of U500.

More functions than U700's pins can provide are required. As mentioned above, the problem is solved by using spare processing capacity in U600 - to provide control lines for pins 8 and 16 of the TV scart socket and, in export models, bandwidth control in U200.

U700's reset pin 6 is held low during mains power up and power down. This prevents spurious data being generated as the 5V supply rises or falls. Such data could affect the receiver settings in the EEPROM chip U701.

Fig. 7 shows the reset circuit. The action is based on U2D. When its input pins 5 and 6 are at approximately 5V its output pin 7 is low. When one input pin is low and the other high, the voltage at pin 7 is high. At switch on, the voltage at pin 6 rises comparatively rapidly while the voltage at pin 5 rises slowly. Thus the voltage at pin 7 is high, Q9 is conductive and pin 6 of U700 is held low. Once C30 has charged sufficiently via R33 to produce 4.8V at pin 5 of U2D, pin 7 goes low, Q9 switches off and the reset line rises as C33 charges via R39. In this way the reset line is initially held low at power up.

When the receiver is switched off, the 5V at pin 6 of U2D declines rapidly while the voltage at pin 5 will be held for a short time by C30. C31 will also retain sufficient charge to maintain operation of U2D. Thus pin 7 will be high, Q9 will switch on and discharge C33 and the reset

line will be low.

The reset line is also connected to transistors Q314 and Q315 in the card-reader circuit to connect/disconnect the 27V supply to the card.

The Scart Sockets

There are three scart sockets (see Fig. 2), decoder, VCR and TV.

The RGB outputs from the decoder are looped-through directly to the TV scart, but can be used by a TV set only when pin 16 of the socket is high. This can be achieved via software, with U700 using the port expansion capacity of U600 (pin 12). AV switching at pin 8 of the TV scart socket can be controlled by U700's software via pin 15 of U600.

The VCR scart socket has no provision for S video switching. Instead, pins 10 and 12 are used for uploading/downloading the EEPROM's contents. This is controlled by pins 31 and 32 of U700. The on-screen menus are not present at the VCR scart socket.

The decoder scart socket carries switching protocols at pins 8 and 16. Pin 8 is high when the decoder is active, signalling pin 33 of U700 which tells U500 to set its audio and video matrix switches in accordance with the user settings in the menu system. The video input to the decoder comes from pin 8 of U500 via the buffer transistor Q605. The return video at pin 20 of the socket goes to pin 4 of U500.

Miscellaneous Points

The MSS100 responds to standard Pace MSS series IR codes which, as far as we know, don't cause problems with much if any other IR-controlled equipment.

When the low-power standby mode is in use, the LNB is without power and the receiver consumes a meagre 10W.

The light weight, low power consumption and slim dimensions of this receiver make it ideal for use where space and AC power are limited. It has become a great favourite with the caravanning fraternity in my area, in particular as its small footprint matches that of many 34cm colour portables.

We have had very few faults with the MSS100. Loss of RC operation can however occur when the copper track near the IR sensor chip breaks.

Take care over cabinet removal. Pace issued a technical bulletin on this subject a while back, probably after complaints about the cover fixing. Details of this also appeared in *Television* – see page 518 of the May 1996 issue.

Failure of C3 was a common problem in early receivers – the type used went low in value and as a result the chopper chip U1 died dramatically. An alternative type from a different source is used in later receivers. The onset of C3 failure is normally indicated by hum on sound and possibly shading or hum bars on the picture.

Remember that downloading memory data from one MSS100 to another is done via the VCR scart socket, not the external decoder scart socket. The latter has been the custom in other models that have this feature.

The Pace Prima is based on the MSS100. It differs in having a single scart socket to feed a TV set.

The use of a single LSI 'satellite jungle' chip is a growing trend in budget analogue receiver design: it simplifies the design problems and reduces the component count.

The elegant simplicity of the MSS100's design makes current digital satellite TV receivers seem exceedingly complicated and expensive. Such is the rate of development however that today's up-to-the-minute technology is tomorrow's dinosaur.

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	8C109C	10p	BD437	28p	BU137	150p	BUV61	1000p	MJ11016	300p			AN210 AN211	165p 150p	AN6344	440p	BA343	60p	BA7022	350p
	BC142	20p	BD439	40p	BU184	100p	BUV90	176p	MJ11033	800p			AN217P	95p	AN6346 AN6350	350p 610p	BA401 BA402	60p 50p	BA7107 BA7212S	475p 200p
	BC147 BC149	8p 8p	BD441 BD533	40p 50p	BU205 BU206	70p 100p	BUW11A	200p 225p	MJ15015	250p	BY164 BY179	40p 35p	AN252	150p	AN6356	300p	BA514	160p	BA7604N	100p
	BC160	30p	BD535	38p	BU208	70p	8UW12A	150p	MJ15022	250p	BY206	11p	AN271	230p	AN6360	320p	BA518	150p	BA7752	250p 150p
	BC172 BC177	10p 14p	BD537 BD538	40p 40p	BU208AT BU209B	200p 200p	BUW13A BUW32A	200p 500p	MJ15024 MJ15025	400p 700p	8Y227	19p	AN2778	400p	AN6353 AN6357N	375p K 400p	BA524 BA526	180p	BA8504	S 155p 350p
	BC179	14p	BD645	50p	BU209	90p	BUW49	550p	MJE350	800	BY299	18p	AN301 AN302	330p 650p	AN6371	350p	BA532	100p	CA3140E	38p
	BC182L BC183	70	BD649	50p 40p	BU226 BU312	120p 90p	BUW81A BUW84	160p 75p	MJE2955T MJE3055T	65p 65p	BY448 BYT11	20p 25p	AN304	360p	AN6550 AN6551	100p 50p	BA536 BA546	150p 160p	CNX82A CNX83A	80p 80p
	BC184	7p 7p	BD677	380	8U326A	75p	BUX10	150p	MJE13005	60p	BYV96E	30p 25p	AN316 AN337	350p 600p	AN6554	80p	BA614	70p	CX139A	750p
	BC212	7P	BD679	40p	8U406D 8U407	85p	BUX12 BUX20	150p 350p	MJE13009 MJE15028	100p 200p	BYX10	15p	AN362	140p	AN6605 AN6612	35p 60p	8A631 8A656	280p 110p	CX145 CX150B	725p 326p
	BC213 BC213L	7p 7p	8D681 BD682	45p 45p	8U407D BU408	75p 60p	BUX21 BUX22	450p	MJE15030	200p 250p	IN4001 IN4002	3p 3p	AN366	150p	AN6651	450	BA681A	350p	CX187	825p
Libba Top Dirac Top Libba Libba <thlibba< th=""> <thlibba< th=""> <thlibba< <="" td=""><td>BC214L</td><td>7p</td><td>8D707</td><td>50p</td><td>BU409</td><td>85p</td><td>BUX37</td><td>220p</td><td>MJE18004</td><td>125p</td><td>IN4004</td><td>3p</td><td>AN3211K AN3215K</td><td>375p 350p</td><td>AN6671K</td><td>425p 600p</td><td>BA683A</td><td>300p</td><td>CX867 CX868</td><td>575p 526p</td></thlibba<></thlibba<></thlibba<>	BC214L	7p	8D707	50p	BU409	85p	BUX37	220p	MJE18004	125p	IN4004	3p	AN3211K AN3215K	375p 350p	AN6671K	425p 600p	BA683A	300p	CX867 CX868	575p 526p
	BC239	7p 7p	BD711 BD736	50p 50p	BU413 BU414B	175p 250p	BUX40 BUX41	210p 200p	MJF18204 OC28	3500	IN4006 IN4007	4p	AN32368	4500	AN6780S AN6870	80p 450p	BA715	46p	CX79258	
ICCUT ICCUT <th< td=""><td>BC301</td><td>200</td><td>BD828</td><td>50p</td><td>BU426A</td><td>70p</td><td>BUX47A</td><td>220p</td><td>OC35</td><td>350p</td><td>IN5400</td><td>9p</td><td>AN3312 AN3313</td><td>360p 300p</td><td>AN6878</td><td>650</td><td>BA728</td><td>55p</td><td>CX20106</td><td>A 75p</td></th<>	BC301	200	BD828	50p	BU426A	70p	BUX47A	220p	OC35	350p	IN5400	9p	AN3312 AN3313	360p 300p	AN6878	650	BA728	55p	CX20106	A 75p
Increase 7 p BOTT	BC303	20p	BD897 BD899	50p	BU500 BU500D	100p 225p	BUX55 BUX80	800p 180p	S2000A3 S2000AF	175p 175p	IN5402 IN5403	8p	AN3331k	460p	AN6880 AN6882	75p 300p	BA843 BA1310	130p 160p	CX20187 CXA1001/	700p
LCAR Top DUMAGE Top UNRAFI	BC327 BC328	7p	BDX33	60p	BU505D	90p	BUX84	50p	S2055AF	200p	IN5405	11p	AN3794 AN38148	326p 450p	AN6888	150p	BA1330	120p	CXA1019	S 225p
BACK BAD DUNCE Top DUNCE DUNCE <t< td=""><td>BC338</td><td>70</td><td>BDX44</td><td>100p</td><td>BU506</td><td>100p</td><td>BUX86</td><td>30p</td><td>TIP29</td><td>16p 22p</td><td>IN5407</td><td>12p</td><td>AN3822#</td><td>600p</td><td>AN6913 AN700</td><td>650p</td><td>BA1350 BA1355</td><td>130p 125p</td><td>CXA1044 CXA1081</td><td>BP 475p 276p</td></t<>	BC338	70	BDX44	100p	BU506	100p	BUX86	30p	TIP29	16p 22p	IN5407	12p	AN3822#	600p	AN6913 AN700	650p	BA1350 BA1355	130p 125p	CXA1044 CXA1081	BP 475p 276p
LEGAT 256 COUNT 1000 Partial 2500 Count 2500 <th< td=""><td>BC477</td><td>8p 18p</td><td>BDX54C BDX62C</td><td>75p 150p</td><td>BU506DF BU508A</td><td>120p 70p</td><td>BUZ71</td><td>750</td><td>TIP29E</td><td>40p</td><td>RGP10 RGP15</td><td>25p 25p</td><td>AN3990k AN3991k</td><td>300p</td><td>AN7025K</td><td>90p</td><td>BA1360</td><td>160p</td><td>CXA1081</td><td>S 300p</td></th<>	BC477	8p 18p	BDX54C BDX62C	75p 150p	BU506DF BU508A	120p 70p	BUZ71	750	TIP29E	40p	RGP10 RGP15	25p 25p	AN3990k AN3991k	300p	AN7025K	90p	BA1360	160p	CXA1081	S 300p
LCS4 Se DOSEC TPS DOSEC TPS DOSEC TPS DOSEC DOSEC DOSEC TPS DOSEC DOSEC <thdosec< th=""> <thdosec< th=""></thdosec<></thdosec<>	BC518 BC537 BC546	250	BDX64C	175p	BU508AP	H 80p 90p	BUZ72A BUZ72AF	100p	TIP30C TIP31A	25p 22p	SR2M		AN5011	226p	AN7062 AN7072	300p 250p	BA1604 BA2266A	125p	CXA1191 CSA1209	M 250p
LCCS0 Sp LDCS7 TOP LDCS8 TOP TOP <thldcs8< th=""> <thldcs8< th=""> <thldcs8< <="" td=""><td>BC547 BC548</td><td>8p</td><td>BDX66C BDX67C</td><td>176p 275p</td><td>8U508DR</td><td>130p</td><td>BUZ73AF</td><td>60p</td><td>TIP32</td><td>240</td><td>Contraction of the local sector</td><td>ETS</td><td>AN5025 AN5033</td><td>250p 400p</td><td>AN7105</td><td>170p</td><td>BA3308</td><td>700</td><td>F15764N</td><td>250p</td></thldcs8<></thldcs8<></thldcs8<>	BC547 BC548	8p	BDX66C BDX67C	176p 275p	8U508DR	130p	BUZ73AF	60p	TIP32	240	Contraction of the local sector	ETS	AN5025 AN5033	250p 400p	AN7105	170p	BA3308	700	F15764N	250p
LC250 Sp LC350 LC350 <thlc350< th=""> <thl350< th=""> <thl250< <="" td=""><td>BC550</td><td>8p</td><td>BDX77</td><td>175p</td><td>BU508VF</td><td>100p</td><td>BUZ80</td><td>200p</td><td>TIP32C</td><td>28p</td><td>14 PIN</td><td>5p</td><td>AN5070</td><td>125p</td><td>AN7110 AN7111</td><td>76p 100p</td><td>BA3402 BA3406A</td><td>90p</td><td>HA1125 HA1137V</td><td>120p V 150p</td></thl250<></thl350<></thlc350<>	BC550	8p	BDX77	175p	BU508VF	100p	BUZ80	200p	TIP32C	28p	14 PIN	5p	AN5070	125p	AN7110 AN7111	76p 100p	BA3402 BA3406A	90p	HA1125 HA1137V	120p V 150p
Liczs B0 B00000 228 FY44 Y04 Y0	BC557 BC558	8p 8p	BDX88C BDW24	150p 56p	BU536 BU546	100p	BUZ83 BUZ90A	200p 180p	TIP33C TIP34	60p 65p	18 PIN	9p	AN5111	450p	AN7114	120p	BA3422	350p	HA1197	130p
LCC30 2005 BUYES Disker 1200 IFTLD 2205 Disker Disker <thdisker< th=""> Disker <thdisker< th=""></thdisker<></thdisker<>	BC560	8p	8DW94	500	BU606D	225p	BY448	20p	TIP35C	66p	22 PIN 24 PIN	12p 13p	AN5138	VK 350p	AN7116	90p	BA3506A	70p	HA1201	225p 125p
BC/70 BC/70 <th< td=""><td>BC639 BC640</td><td>20p 20p</td><td>BDY56 BDY58</td><td>225p 500p</td><td>BU626 BU705</td><td>120p 130p</td><td>IRF120 IRF130</td><td>225p 475p</td><td>TIP41A TIP41C</td><td>20p 22p</td><td></td><td></td><td>AN5151</td><td>200p 675p</td><td>AN7130</td><td>100p 75p</td><td>BA3520 BA3621</td><td>225p</td><td>HA1338</td><td>200p 300p</td></th<>	BC639 BC640	20p 20p	BDY56 BDY58	225p 500p	BU626 BU705	120p 130p	IRF120 IRF130	225p 475p	TIP41A TIP41C	20p 22p			AN5151	200p 675p	AN7130	100p 75p	BA3520 BA3621	225p	HA1338	200p 300p
LEC771 160 Brist 306 BUSC 700 IFE25 300 ATT40 1700 BA3263 300 H1328 200 LD721 120 BF18 70 BUSC 700 IFE25 BC ATT40 1700 BA3263 300 H1328 200 LD124 200 BF185 27 BUSC 700 IFE25 BC ATT40 1700 BA3263 300 H1328 200 LD131 220 BF180 300 IFE30 1700 IFE2 BC ATT40 1700 BA3263 1700 HA1382 1200 LD131 220 BF240 1500 IFE30 1100 IFE60 IFE60 ATT40 1100 BA328 1100 HA1382 1200 H1337 200 BA4754 1200 BA4754 1200 BA4754 1200 BA4754 1200 HA1382 1200	BCY34	200p	BDY92	100p	BU706F	150p	IRF230	550p	TIP42C	220	and the second second		AN5215 AN5222	100p 200p	AN7133N	325p	BA3708 BA3812L	75p 80p	HA1367 HA1377	300p 120p
Libb Job Libb Libb <thlibb< th=""> <thlibb< th=""> <thlibb< th=""></thlibb<></thlibb<></thlibb<>	BCY71 BCY72	16p 16p	BF167 BF181	30p 18p	BU801 BU806	70p 70p	IRF250 IRF330	375p 600p	TIP48 TIP50	40p 60p	2V7 to 39V		AN5256	150p	AN7140 AN7141	170p 70p	BA3822L BA3824L	S 80p S 75p	HA1384 HA1388	600p 320p
Lib 122 256 B2260 166 BUSTO 1160 18750 1900 AA7147 1500 BA423 600 AA7147 1500 BA423 600 AA7147 1500 BA423 600 AA7147 1500 BA423 600 BA4336 COOP AA7147 1500 BA423 600 BA4336 COOP AA7147 1500 BA4336 COOP AA7144 1500 BA4336 COOP AA7146 1400 BA4336 COOP AA7146 1400 BA4336 COOP AA7146 1400 140116 1500 1601 1500 170110 600 170111 400 1700 1701 1500 1701111 1500 AA7156 1200 AA7156 1200 AA71121 1200 1411121 2200 1411121 2200 1411121 2200 1411121 2200 1411121 2200 1411121 2200 1411121 2200 1411121 2200 1411121 2200 1411121 2200 <th>BD124P</th> <th>50p</th> <th>BF195</th> <th>7p</th> <th>BU807F</th> <th>760</th> <th>IRF350</th> <th>750p</th> <th>TIP52</th> <th>80p</th> <th></th> <th>9p</th> <th>AN5262 AN5265</th> <th>175p 80p</th> <th>AN7145</th> <th>195p</th> <th>BA4110</th> <th>75p</th> <th>HA1392</th> <th>120p 170p</th>	BD124P	50p	BF195	7p	BU807F	760	IRF350	750p	TIP52	80p		9p	AN5262 AN5265	175p 80p	AN7145	195p	BA4110	75p	HA1392	120p 170p
BD 158 300 BF320 1600 IFF107 650 750 720	BD132 BD133	25p 50p	BF200 BF225	16p 30p	BU810 BU824	110p 450p	IRF510 IRF620	150p 150p	TIP102 TIP105	70p 65p		ors	AN5352 AN5411	600p	AN7147 AN7148	160p 140p	8A4220 8A4234L	60p 70p	HA1396 HA1397	650p 200p
BD136 200 B2565 125 B2565 125 ALACSS ALA	BD136	20p	BF245	25p	BU826A	160p	IRF540	200p	TIP107	65p	7805	25p	AN5421 AN5429	150p 420p	AN7154	180p	BA4402	45p	HA1406	120p
BD164 200 B/237 150 BU1910 1100 1001 Also <	6D138 8D139	20p	BF256 BF258	12p 18p	BU903 BU910	110p 80p	IRF611 IRF620	150p 160p	TIP111 TIP112	40p 35p	7808 7812	25p 25p	AN5435	125p	AN7158 AN7160	310p 350p	BA4405 BA4412	80p 50p	HA11211 HA11215	170p 350p
Stree Store Store Store Store Antise 2000 Antise 2000 Bastistic 750 Hall25 1000 BD177 Stop B2311 21p BUSS0 17p 100 Antised 2000 Antised 22p BAStold 100 Hall24 37p BD177 Stop B2311 21p BUSS0 17p 100 Trop 7506 30p Antised 22p BAStold 1100 HAll243 37p BD184 GOP B2323 200 BUSS0 1000 HT121 31p 750 Antisel 2000 ANTISE 22p BAStold HS0p HAll243 100 BD184 GOP BF387 31p BUSS0AF 22p IRF840 1600 TT1717 30p 7218 30p Antisel 2000 ANTISE 24p Antisel	BD144	90p	BF259	18p	80920	100p	IRF640	350p	TIP115	30p	7818	25p	AN5512 AN5515	100p 160p	AN7163	175p	BA5102	140p	HA11221	180p
BD177 300 BF311 21p BU4260A 12p BF420 150p TH121 30p 7868 30p AM5611 200p AM1710 2800 BA3602 110p TH1121 30p BD1181 46p BE327 20p BU2500A 130p TH123 30p TH124 30p AM5613 200p AM1717X 850p BA3606 BB0p HA1142 50p BD181 46p BE327 30p BF327 13p BU2500AF 22p HA1142 50p BD187 50p BF337 13p BU2520AF 22p HA11440 25p HA11440 25p BD201 33p BF371 13p BU2520AF 22p HA11440 25p HA11440 25p BD201 33p BF371 13p BU2520AF 22p HA11420 25p HA11400 25p HA11400 25p HA11707 13p HA11707 HA11707 HA11707 <td< td=""><td>8D166</td><td>30p</td><td>BF270</td><td>18p</td><td>BU930</td><td>130p</td><td>IRF650</td><td>200p</td><td>TIP117 TIP120</td><td>30p 37p</td><td>7905</td><td>25p</td><td>AN5521</td><td>100p</td><td>AN7168 AN7169</td><td>200p 225p</td><td>BA5115L BA5204</td><td>75p 200p</td><td>HA1123</td><td>100p</td></td<>	8D166	30p	BF270	18p	BU930	130p	IRF650	200p	TIP117 TIP120	30p 37p	7905	25p	AN5521	100p	AN7168 AN7169	200p 225p	BA5115L BA5204	75p 200p	HA1123	100p
B51122 COD B5236 200 BU2506D 1300 HF320 1500 HF3210 1500 HF32	BD177 BD179	32p	BF336	20p	BU2508A	130p	IRF730	150p	TIP122	30p	7912	30p	AN5601 AN5612	(750p 200p	AN7171K	4000	BA5402	1800	HA11251	120p
BD187 300 BF387 13p BU2520AF 2250 FF540 160p TP131 30p 78L05 24p AN1622 27p AN1718 BD0 BA1184 240p TA11484 240p TA11718 250p AN7213 470p BA1133 170p FA11705 250p AN7213 470p BA1337 776p FA11706 200p FA11706 200p FA11706 200p FA11706 200p FA117176 800p AN7213 470p BA1481157 776p FA11484 240p AN7520 576p AN7720 876p FA11705 570p FA11716 570p FA11716 570p FA117167 570p FA117176 570p FA1171755 FA1171755 FA1171755	BD182	60p	BF338	20p	BU2508D	130p	1RF820 1RF830	150p	TIP126 TIP127	40p 35p	7918	30p 30p	AN5615	300p	AN7173K AN7177	450p 375p	6A5408 8A5413	180p 225p	HA11414 HA11423	300p
BD203 42p BF423 22p BP324 42p BF423 23p ANS218 32p ANS210 32p ANS210 32p ANS216 32p AN	BD187 BD201	30p 33p	8F367 BF371	13p 17p	BU2520D	F 225p F 225p	IRF9140	1000p	TIP131	30p	78L08	24p 24p	AN5622 AN5625	275p 400p	AN7205	35p	BA6109	110p	HA1148	58N 400p
BD222 31p BF455 12p BUF405A 200p IHF9530 400p TTP142 110p 78L24 24p ANSS60 SOOP AN7220 88p BA3138 130p HA11711 250p BD223 31p BF4452 50p BUH315D 17p IHF9541 250p RF9541 250p BA149L5 700p HA11711 250p BD234 32p BF472 28p BUH515D 250p IHF9541 250p IH744 75p BA1722 175p BA208 175p HA11715 250p HA11716 200p HA11717 250p HA11717 250p HA11717 250p HA11717 250p HA117717 250p HA117717 250p HA117718 700p AN7222 175p BA208 175p HA117718 700p AN72720 70p AN7276 275p BA208 175p HA11741 350p H759 HA11741 350p H759 HA11744 330p H75	BD203	42p	BF422	21p	BU2525A	F 325p	IRF9511	150p	TIP136 TIP137	40p 65p	78L15	24p	AN5633	350p	AN7216 AN7218	175p 80p	BA5125 BA5137	76p 55p	HA1170	400p
BD223 COD BF471 226 BUH515 2005 IFF145 SOD 791 12 335 AN224 750 BA6154 600 HA1776 4807 BD235 226 BH472 236 AN224 750 BA6208 756 HA1776 4807 BD235 226 BH473 300 BH473 300 AN722 1750 AN7254 1200 AN7254 1200 </td <td>BD222 BD225</td> <td>31p 31p</td> <td>BF458</td> <td>12p 19p</td> <td>BUF405A BUH315</td> <td>200p</td> <td>IRF9530 IRF9531</td> <td>400p 200p</td> <td>TIP141</td> <td>65p</td> <td>78L24 79L05</td> <td>24p 35p</td> <td>AN5640 AN5700</td> <td>500p 90p</td> <td>AN7222</td> <td>76p</td> <td>BA6146</td> <td>150p</td> <td>HA11713</td> <td>3 250p</td>	BD222 BD225	31p 31p	BF458	12p 19p	BUF405A BUH315	200p	IRF9530 IRF9531	400p 200p	TIP141	65p	78L24 79L05	24p 35p	AN5640 AN5700	500p 90p	AN7222	76p	BA6146	150p	HA11713	3 250p
BD225 226 BF479 300 BUHS17 2765 IRF9620 1900 IRF174 300p IA030K 1000 AN7254 1500 BA6218 S5p HA11724 S5p BD238 300 BF495 169 BUH715 425p IRF9620 2000 TP1515 600 AN7254 1000 AN7254 1200 AN7315 1200	BD233	30p	BF471	280	BUH515	200p	IRF9541	200p	TIP145	50p	791.12	35p	AN5710	100p	AN7224	75p 175p	BA6154 BA6208	60p	HA1171	5 480p 3 700p
BD2237 21p Br435 15p BUH/15 425p Introductor 1215 500 AN5730 160p AN7570 60p BA2222 1300 HA11745 330p B02289 30p B7595 16p BUT11AF 35p IfF360 100p AN7572 120p AN7573 30p BA2227 30p HA11745 350p B02441A 40p BF617 30p BUT18 80p IRFP140 200p Interstand AN7573 320p AN7532 220p AN7532 <td>BD235 BD236</td> <td>28p 30p</td> <td>BF479 BF494</td> <td>30p 18p</td> <td>BUH517 BUH5170</td> <td>275p 175p</td> <td>IRF9620 IRF9622</td> <td>150p 200p</td> <td>TIP150</td> <td>80p</td> <td>LM309K LM317T</td> <td>100p</td> <td>AN5720</td> <td>70p</td> <td>AN7258</td> <td>260p</td> <td>BA6218</td> <td>85p</td> <td>HA1174</td> <td>INT 950p</td>	BD235 BD236	28p 30p	BF479 BF494	30p 18p	BUH517 BUH5170	275p 175p	IRF9620 IRF9622	150p 200p	TIP150	80p	LM309K LM317T	100p	AN5720	70p	AN7258	260p	BA6218	85p	HA1174	INT 950p
BD240 40p BF615 30p BUT12 80p IRFE230 200p TPL760 100p ANT312 Top ANT312 Top BA2239 130p HA11751 320p BD241A 40p BF760 40p BUT18 80p IRFP140 280p TPL76A 200p ANT312 40p BA2338 130p HA118371 70p BD245 50p BF760 40p BUT186 300p TPL760 200p ANT323 200p ANT32 210p HA1183 700 ANT32 210p HA1183 700 ANT32 210p ANT32 210p ANT32 210p	80238	24p	BF595	16p	BUT11A	55p	IRF9640	375p	TIP2955	60p	78H08KC	8000	AN5730 AN5732	160p 120p	AN7310	60p	BA6222	1300	HA1174	5 330p
BD2243 500 BF763 400 BUT18 800 IRPF140 2800 IED AN7390 2400 AN7390 1000 BA6239A 1300 HA118371 700 BD244 500 BF763 400 BUT18 800 IRPF130 3000 TPL/781A 800 AN7392 2000 AN7392 2000 BA6239A 1300 HA118371 700 BD2454 500 BF871 22p BUT58A 1000 IRPF240 3000 2N2365 15p AN7392 2000 BA6239A 1300 HA118071 700 BD2656 45p BF961 35p BUT56 300p IRPF230 2005 20p AN7411	BD240 BD241A	40p 40p	BF615 BF617	30p 30p	BUT12 BUT13	80p 310p	IRFBC30 IRFBC40	200p 400p	TIPL760 TIPL762A	100p 200p		800p	AN5753	130p	AN7312 AN7315	70p	BA6229 BA6235	130p 50p	HA1175	1 1500p 2 325p
BD248A Gop BF871 22p BUTSA 100p IRP325 400p 3mm AN3836 430p AN7410 150p BA228 140p HA12003 160p BD285 45p BF960 38p BUTSA 50p IRP350 325p 2N2846 40p PHED 5p AN7410 150p BA228 140p HA12003 160p BD267 45p BF961 35p BUTS0 130op AN7410 150p BA228 140p HA12003 160p BD267 45p BF961 35p BUTS0 130op IRP460 775p 2N2905 20p AN7410 150p BA2290 AF 200p HA12016 120 BD276 50p BF0232 5op BC0232 76p BUV18 860p IRF9240 500p N313 140p AN8275 250p AN8275 250p AN8275 250p AN8270 310p HA12013 140p HA12014	BD243A BD244	50p 60p	BF763	40p	BUT18AF	80p	IRFP150	300p	TIPL791A	80p			AN5790 AN5791	240p 225p	AN7362 AN7363	200p	BA6239/ BA6247	130p	HA1184	700p 220p
BD267 46p BD269 BF961 35p BP328 BUT50 1300p IRFP420 IRFP450 400p AV205 20205 2020 20p IRFP520 Interview IRFP420 20205 IRFP420 20p IRFP420 Interview IRFP420 20205 IRFP420 20p IRFP420 Interview IRFP420 20205 IRFP420 20p IRFP420 Interview IRFP420 20205 IRFP420 20p IRFP420 Interview IRFP420 2000 IRFP420 2000 IRFP4200 2000 IRFP420 2000 IRFP420<	80248A 80265	60p 45p	BF871 BF960	220	BUT56A BUT76A	100p 80p	IRFP250 IRFP350	400p 325p	2N2646 2N2904	40p 20p	RÉD		AN5862	K 225p	AN7410 AN7411	150p 50p	BA6248 BA6259	140p 170p	HA1200	3 150p
BD311 100p BF0252A 60p BUV20 650p IRFP2340 500p PN3019 28p FED 5p AN0132 130p AN8053 200p BA6302 150p Ha12026 123 BD315 100p BF90 SB BVV21 400p PRP2240 500p PN3019 28p FED SP AN8053 200p BA6302 150p Ha12026 123 PA0133 120p AN8053 200p AA8370 100p BA6302 120p Ha12028 120p HA12028 120p HA12028 120p HA12028 120p HA12028 120p HA12024 120p HA12024 120p HA12024 120p HA12044 50p AN877 100p BA6307 140p HA12044 50p AN870 160p AN8370 1000p BA6322 250p HA12044 50p AN8270 160p AN8373 160p AN8372 250p AN8372 250p AN3273 50p	BD267 BD269	45p 45p	BF961 BF964	38p	BUTS0 BUT92	1300p 1200p	IRFP460	400p 775p	2N2905 2N2908	18p	GREEN Smm	8p	AN608P AN620	125p 250p	AN7415	70p	BA6290/	1 200p	HA1201	5 120a
BD317 150p BR100 14p BUV24 350p IRF220 65p 2N3055 38p AN8377 400p BA6321 250p HA12045 2800 BD331 40p BR103 37p BUV25 10p IRF242 275p 2N3055 50p AN8377 400p BA6321 250p HA12045 2800 BD331 40p BR103 37p BUV25 100p IRF242 275p 2N3055H 50p AN8377 400p BA6328 250p HA12047 450 BD332 40p BR103 35p BUV25 100p IRF242 275p 2N3444 45p RECTANGULAR AN8300 600p BA222 65p BA6334 75p HA12058 320p BD362 60p BU108 80p BUV27 125p MJ2550 55p 2N3441 175p IEDa AN8310 200p BA6411 220p HA12083 320p HA12088 320p	BD311	1000	BFQ252	A 60p	BUV20 BUV21	650p 400p	I IRFPC50	600p	2N3019 2N3053	28p 18p	YELLOW	8p	AN6135	1200	AN8053 AN8276	200p 250p	BA6302/	4 150p 120p	HA1202	6 125p BNT 140p
BD331 40p BH303 85p BV/25 100p IRF244 275p 2N3440 45p RECTANGULAR AN6270 400p BA222 65p BA6334 75p HA12058 3200 BD331 60p BU105 80p BUV27 125p M12501 100p 2N3441 175p LEDa AN6306 600p BA225 100p BA6410 220p HA12058 320p BD362 60p BU108 100p BUV27 125p M12955 56p 2N3442 85p An6306 380p BA225 100p BA6411 220p HA12058 320p BA6411 230p HA12116 130 An6306 380p BA311 40p BA6411 230p HA12116 130 AN6320 180p BA311 50p BA64118 140p HA12411 130 B0370 30p BU109 80p BUV37 10p N13077 90p FED BA6311 80p	BD315 BD317	150p	8R100	99p 14p	BUV23 BUV24	475p 350p	IRFRC20 IRFZ20	250p 65p	2N3054 2N3055	38p	GREEN	sh	AN6250 AN6247	50p 200p	AN8377	400p 350p	BA6321	250p 250p	HA1204	5 280p
BD362 60p BU108 100p BUV28 110p MJ2955 55p 2N3442 85p 5mm x 2.5mm AN6310 200p BA314 40p BA64111 250p HA12116 130 BD370 30p BU109 80p BUV37 178p MJ3000 100p 2N3771 85p 5mm x 2.5mm AN6310 200p BA301 55p BA6418N 100p HA12111 130 AN6320 180p BA301 55p BA6418N 100p HA12411 175	BD332	40p	BR303	85p	BUV26	160p	IRFZ44 MJ2501	275p 100p	2N3440 2N3441	45p 175p		ULAR	AN6300	400p 600p	BA222 BA225	65p 100p	BA6334 BA6410	76p 220p	HA1205	8 320p 8 375p
190271 100 BIII10 900 BIIVA6A 750 MIRKO 1000 203/72 900 BCD 09 AMADDA 000 0409 040400 000	BD362 BD370	60p 30p	BU108 BU109	100p 80p	BUV28 BUV37	110p 176p	MJ2955 MJ3000	55p 100p	2N3442 2N3771	85p 85p	6mm x 2.	Smm Se	AN6310 AN6320	200p 180p	BA314 BA301	40p 55p	BA6411 BA6418	250p 100p	HA1241	1 175p
2010 500 BU113 1000 BUM47 1200 M14032 1750 2N3773 1000 YELLOW 80 ANOJEN 2300 BA313 600 BA6993 1500 HA12413 70				90p 100p 60p	BUV46A BUV47 BUV48A	75p 120p 175p	MJ4032	175p	2N3773	100p	YELLOW	8p	AN6326 AN6332	N 250p	BA313	60p	BA6993	150p	HA1241	3 70p

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Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price
HA1300	110p	LA2211	350p	LA7054	350p	LC7881B	136p	MC1455	45p	SAB2022	525p	STK2250	650p	STK5468	300p	STR7001	600p	TA72678P	120p
HA13002 HA13006	400p	LA2800 LA3120	350p 200p	LA7060 LA7096	150p 200p	LC7881M LF347	325p 110p	MC1488 MC1489	35p 36p	SAB3012 SAB3013	675p 200p	STK3041 STK3042	370p 375p	STK5471 STK5472	330p 376p	STR9005 STR9012	400p 450p	TA7269 TA7270	260p 170p
HA1300 HA13108	280p	LA3150 LA3160	200p 120p	LA7113 LA7116	276p 125p	LF353 LF355	48p 60p	MC1496 MC3302	65p 50p	SAB3017 SAB3021	320p 450p	STK3044 STK3062	500p 500p	STK5473 STK5474	480p 500p	STR10006 STR11006	450p 400p	TA7271 TA7272	220p 260p
HA13117 HA13118	3 140p	LA3161 LA3210	40p 65p	LA7123 LA7210	1300p 60p	LF357 LF398	70p 300p	MC3401 MC3423P	45p 100p	SA83029 SA83035	525p 600p	STK3082 STK3102	550p	STK5476 STK5477	350p 450p	STR12006 STR13006	450p 500p	TA7273 TA7274	300p 210p
HA13119 HA13127	7 350p	LA3226 LA3246	60p 75p	LA7212	150p 150p	LH2426S LM301	600p 26p	MC3488A MC34063	AP 300p	SAB3036 SAB3037	725p 700p	STK3106 STK3122	2500p	STK5478 STK5479	380p 300p	STR15006 STR16006	500p	TA7279P TA7280	325p 190p
HA13128 HA13130	450p	LA3300 LA3301	140p 110p	LA7220 LA7222	125p 110p	LM311 LM319	35p 165p	MN1220T MN1226	600p 450p	SAB3042 SAB3064	825p _130p	STK3152 STK3156	11 900p 500p	STK5481 STK5482	520p 285p	STR17006 STR20005	600p 450p	TA7281 TA7282	200p 160p
HA1313	600p	LA3361	100p 70p	LA7224 LA7225	150p 250p	LM324 LM335Z	30p 120p	MN1228 MN1276	600p 1300p	SAB3209 SAB3210	225p 250p	STK4017 STK4019	400p 480p	STK5483 STK5486	440p 450p	STR20012 STR20015	450p 450p	TA7210 TA7283	200p 200p
HA13150	876p	LA3370 LA3373	70p 70p	LA7292 LA7294	275p 200p	LM339 LM348	35p 50p	MN1280 MN3004	70p 800p	SAB6456 SAB8048	125p 225p	STK4021 STK4024	380p	STK5487 STK5488	525p 480p	STR30110 STR30115	330p 275p	TA7284P TA7288	400p 220p
HA13403	5W 400p	LA3375 LA3376	300p 80p	LA7295 LA7297	160p 120p	LM358 LM380	45p 80p	MN3005 MN3011	2000p 4000p	SAB8051/ SDA2003	450p	STK4025 STK4026	530p 480p	STK5490 STK5632	450p 450p	STR30120 STR30123	400p 450p	TA7291P TA7292P	200p 325p
HA13408 HA13412	600p	LA3380 LA3390	300p 250p	LA7305A LA7308	350p 70p	LM381 LM382	150p 130p	MN3101 MN3102	110p 110p	SDA2004 SDA2005	325p 700p	STK4028 STK4032	550p	STK5720 \$TK5725	400p 450p	STR30125 STR30130	550p 250p	TA7294P TA7299	450p 200p
HA13426 HA13432	400p	LA3400 LA3401	250p 90p	LA7311 LA7320	200p 120p	LM386 LM387	60p 100p	MN3207 MN3208	376p 950p	SDA2007 SDA2008	300p 400p	STK4034 STK4036	470p	STK5730 STK6316	450p 300p	STR40090 STR40115	350p 600p	TA7302P TA7303	75p 70p
HA1344* HA17524	260p	LA3410 LA3430	150p 135p	LA7323 LA7330	325p 350p	LM389N LM393	105p 45p	MN6030B MN6163A	700p	SDA2112 SDA2120	450p 200p	STK4038 STK4040	880p	STK6324B STK6327	1200p	STR41090 STR43111	400p 950p	TA7307 TA7310	100p 100p
KA2102 KA2130	100p 150p	LA3600 LA3605	60p 100p	LA7331	250p 225p	LM431 LM710	50p 45p	MTA001N NE555	20p	SDA2131 SDA2208	225p 450p	STK4042 STK4044	800p	STK6328A STK6431	800p 850p	STR44115 STR45111	550p 550p	TA7312 TA7313	120p 70p
HA2131 KA2206	110p 150p	LA3607 LA4030	125p 180p	LA7340 LA7376	300p 150p	LM723 LM741DIL	40p 18p	NE556 NE558	40p 80p	SDA4212 SDA5241	776p 726p	STK4046 STK4048	950p 1280p	STK6607 STK6722	400p 725p	STR50020 STR50092	450p 550p	TA7314 TA7315	175p 200p
KA2209 KA2210 KA2212	125p 230p	LA4031 LA4032	140p 140p	LA7391 LA7520	550p 200p	LM741ME LM747	55p	NE565 NE587	110p 115p	SDA5243- SDA5343	1450p	STK4050 STK4060	510p	STK6732 STK6822	1000p 900p	STR50103. STR50113	500p	TA7317P TA7320P	120p 200p
KA2213	65p 130p	LA4051 LA4100	160p 85p	LA7530 LA7535	200p 175p	LM1017 LM1035N	200p 350p	NE571 NE592	290p 85p	SDA5640 SDA5642	200p 450p	STK4065 STK4101	650p 500p	STK6922 STK6932	500p 525p	STR50115 STR51041	500p 500p	TA7322 TA7323	130p 80p
KA2214 KA2224	100p 50p	LA4101 LA4102	80p 100p	LA7545 LA7550	160p 275p	LM1040N LM1203	650p 225p	NE5532P SAA1000	140p 350p	SGSF444 SGFS465	500p 500p	STK4111 STK4112	500p	STK6962 STK6972	275p 490p	STR50213 STR53041	500p	TA7234 TA7325	75p 90p 200p
KA2244 KA2261	75p 100p	LA4110 LA4120	120p 270p	LA7555 LA7620	150p 500p	LM1203AN LM1875T	330p	SAA1004 SAA1005	650p 325p	SLA4031 SLA7020M		STK4121 STK4122	480p 550p	STK6981B STK6982	600p	STR54041 STR55041	350p 500p	TA7326 TA7328	110p
KA2263 KA2264	100p 100p	LA4138 LA4140	105p 60p	LA7680 LA7681	675p 650p	LM1881N LM1886	375p 250p	SAA1006 SAA1008	300p 450p	STA301A STA341M	200p 180p	STK4131 STK4132	480p (600p	STK6982H STK7216	420n	STR56041 STR58041	550p 325p	TA7330P TA7331P	80p 80p
KA2284 KA2309	75p 175p	LA4142 LA4145	65p 65p	LA7710 LA7800	250p 90p	LM1889 LM1894N	300p 200p	SAA1010 SAA1024	400p 250p	STA401A STA403A	220p 270p	STK4133 STK4141	II 420p	STK7217 STK7225	400p 500p	STR59041 STR60001	350p 525p	TA7333 TA7335	100p 85p
KA2401 KA2412	150p 225p	LA4160 LA4162	100p 110p	LA7801 LA7802	100p 300p	LM1895N LM2901N	275p 35p	SAA1025 SAA1026	250p 400p	STA405A STA431A	280p 250p	STK4142 STK4147		STK7226 STK7251	600p 500p	STR80145 STR81145	475p 450p	TA7336 TA7337P	180p 175p
KA2912 KA29134	126p 175p	LA4178 LA4180	150p 150p	LA7806 LA7808	260p 250p	LM2902N LM2903N	40p 40p	SAA1027 SAA1029	400p 150p	STA432A STA434A	220p 270p	STK4151 STK4152	680p 650p	STK7253 STK7308	450p 350p	STR90120 STRD1206		TA7339P TA7341	175p 250p
KA2914/ KA22427	1000	LA4182 LA4190	180p 300p	LA 7820 LA 7823	100p 200p	LM3900 LM3909	40p 100p	SAA1042 SAA1043	326p 675p	STA435A STA441C	270p 220p	STK4161 STK4162	650p 550p	STK7309 STK7310	400p 470p	STRD1406 STRD1706	450p	TA7342P TA7343	70p 120p
KIA6213 KIA6210	AH 4000 I	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	400p	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	210p 280p	STK4172 STK4181	680p	STK7358 STK7402	440p 560p	STRD1906 STRD3035	300p	TA7349P TA7354P	175p 65p
KIA6299 KIA7227	CP 200p	LA4261 LA4265	300p 126p	LA7835 LA7837	150p 150p	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	45p 300p	LA4270 LA4282	300p 350p	LA7838 LA7850	200p 225p	LM13600 LM13700	150p 125p	SAA1062 SAA1063	250p 250p	STK0039 STK0040	600p 520p	STK4192 STK4211	700p	STK7408 STK7410	675p 1500p	STRD4512 STRD5441	560p	TA7359P TA7361	90p 125p
L165V L200	250p 200p	LA4420 LA4422	140p 130p	LA7851 LA7910	200p	LM18293 M491881	500p 600p	SAA1064 SAA1070	275p 550p	STK0049 STK0050	510p 440p	STK4211 STK4221	II 1200p	STK7458 STK7554	1250p 600p	STRD5541 STRD6008		TA7362 TA7364P	150p 175p
L272 L272M L290B	200p 110p 225p	LM4425/ LA4430 LA4440	130p	LA7913 LA7930 LA7940	90p 350p	M494B1 M5265P	700p 200p	SAA1073 SAA1075	325p 350p	STK0059 STK0060	620p 820p	STK4231 STK4241	10500	STK7561 STK7562	650p 1000p	STRD6009 STRD6018	450p	TA7366P TA7368P	65 p 35 p
L2918 L292	300p 750p	LA4445	200p 200p 170p	LA7953 LA9200	200p 300p 300p	M50115P M50117P M50119P	320p 500p 525p	SAA1086 SAA1089	175p 325p 700p	STK0070 STK0080 STK011	1100p 580p 330p	STK4241 STK4272	500p	STK7563 STK7573	800p 400p	STRD6602 STRD6601	650p	TA7373F TA7374	150p 175p
L293B L293C	225p 325p	LA4460 LA4461	120p 120p	LB1205	170p	M50422P	750p	SAA1101 SAA1124	200p	STK015	440p	STK4273 STK4301	550p 500p	STK7576	1500p 1000p	STRM654	5 900p	TA7376P TA7378P	100p 60p
L2930 L293D	225p 260p	LA4466	225p 300p	LB1216 LB1258	150p 100p 70p	M50461 M50784	350p 300p 50 0p	SAA1130 SAA1250	550p 280p	STK016 STK025	760p 650p 1600p	STK4311 STK4332	650p 365p	STK8050 STK8250	750p 500p	STRM6549 STRS5741	800p	TA7401 TA7402P	250p 200p
L294 L295	475p 450p	LA4475	225p 225p	LB1268 LB1274 LB1290	85p 120p	M50786 M50790 M51014L	600p 120p	SAA1251 SAA1271 SAA1274	380p 400p 280p	STK050 STK077 STK078	520p	STK4352 STK4362 STK4372	500p 450p 490p	STK8260 STK8290 STK73405	1200p 1850p	STRS5941 STRS6307 STRS6308	750p 600p	TA7403 TA7404	325p 150p
L297 L298	525p 400p	LA4480 LA4485	225p 300p	LB1292	110p 70p	M51143AL M51161	110p 300p	SAA1290 SAA1293	750p 550p	STK080 STK082	550p 540p	STK4392 STK4412	500p 450p	STK73410 STK7340 I	350p	STRS6309 STRS6707	600p	TA7405P TA7411AP TA7415P	200p 150p 350p
L465A	525p	LA4495 LA4496	250p	LB1407 LB1409	130p 200p	M51161P M51162P	250p	SAA1294 SAA1300	800p 200p	STK084 STK085	600p 900p	STK4432 STK4773	600p 820p	STK73605 STK73907	375p 700p	STRS6708 TA7054	700p	TA7417AP	225p 350p
L497B L702B	525p 400p	LA4498 LA4500	275p 200p	LB1412 LB1415	300p 100p	M51164AL M51166P	80p 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	LA4505 LA4508	220p 200p	LB1416 LB1426	85p 125p	M51182L M51191L	110p 85p	SAA1351 SAA19005	750p	STK0100II STK420	1200p 400p	STK4813 STK4833	800p 700p	STR371 STR380	400p 350p	TA7066 TA7075P	120p 300p	TA7609 TA7611	170p
L2722 L4960	175p 325p	LA4510 LA4520	100m	LB1450 LB1615	110p 270p	M51231P M51308SP	200p	SAA3004 SAA3006F	400p	STK430 STK433	500p 400p	STK4843 STK4853	720p 730p	STR381 STR383	390p 410p	TA7089	300p 500p	TA7612 TA7613AP	210p 300p 90p
L6203	600p 250p	LA4550 LA4555	100	LB1620 LB1622	210p 220p	M51310AF M51316P		SAA3007F SAA3008F	² 130p	STK435 STK436	375p 430p	STK4863 STK4873	700p 850p	STR384 STR440	350p 800p	TA7119 TA7120	150p 55p	TA7614 TA7616	170p 300p
L6221AS	300p 300p	LA4557 LA4558	150p 125p	LB1630 LB1639	80p 300p	M51320 M51356P	200p 400p	SAA3010 SAA3027	300p	STK437 STK439	460p 500p	STK4893 STK4913	1000p 900p	STR441 STR442	1200p 1600p	TA7124 TA7130P	250p 86p	TA7521 TA7622	300p
LA1130 LA1135	240p 120p	LA4570 LA4571	130p 175p	LB1640 LB1641	150p 75p	M51358P M51365P	150p 350p	SAA3049F SAA4700	550p 425p	STK441 STK443	680p 700p	STK5314 STK5315	475p 500p	STR450A STR451	700p 800p	TA7137 TA7140	60p 100p	TA7628 TA7629	110p 220p
LA1145	200p 150p	LA4581 LA4597	175p 125p	LB1642	150p 100p	M51366P M51381P	360p 200p	SAA5000 SAA5010	200p 220p	STK457 STK459	470p 560p	STK5322 STK5323	500p 600p	STR452 STR453	600p 500p	TA7141 TA7150P	825p	TA7630 TA7632	200p 400p
LA1170	90p 130p	LA4620 LA4630	400p 325p	LB1649	200p 190p	M51384AP M51387P	600p	SAA5012 SAA5020	400p 350p	STK460 STK461	660p 600p	STK5324 STK5325	450p 370p	STR454 STR455	1300p 550p	TA7157 TA7172P	100p 150p	TA7640 TA7641	90p
LA1180 LA1185	75p 150p	LA4700 LA4705	350p 400p	LB3500 LC4968	126p 65p	M51392P M51393AP	300p 350p	SAA5030 SAA5040/	440p 280p	STK463 STK465	950p 720p	STK5326 STK5330	750p 850p	STR456 STR457	470p 600p	TA7193 TA7200	320p. 200p	TA7644BP TA76545P	65p
LA1186 LA1201	35p 75p	LA5005 LA5112	90p 200p	LC7011 LC7060	500p 600p	M51395AP M51397AP	425p	SAA50408 SAA5041	550p	STK501 STK561	550p 450p	STK5331 STK5332	300p 180p	STR470 STR1096	400p 275p	TA7205 TA7207	150p 150p	TA7658 TA7659P	100p 400p
LA1205 LA1207	75p 120p	LA5511 LA5512	50p	LC7120 LC7130	350p 300p	M51436P M51496P	350p 275p	SAA5042 SAA5050 SAA5051	425p 660p	STK563 STK583	415p 500p 600p	STK5333 STK5335 STK5336	1000p 350p	STR1195 STR1229	350p 325p	TA7208 TA7210	125p 200p	TA7660P TA7666P	325p 100p
LA1210 LA1222	140p 80p	LA5522 LA5523	45p 150p	LC7131 LC7132	260p 400p	M51533 M51544	300p 150p	SAA5052	400p 500p	STK760 STK770	400p	STK5337	350p 500p	STR2005 STR2012	400p 400p	TA7214 TA7217	220p 145p	TA7668	100p 400p
LA1230 LA1235	130p 130p	LA5524 LA5527	80p 150p	LC7137 LC7181	450p 350p	M51848 M54523P	150p 200p	SAA5054 SAA5230	500p 850p	STK772 STK7728	650p 480p	STK5338 STK5339	295p 400p	STR2013 STR2015	300p 550p	TA7220 TA7222	220p 90p	TA7676AP TA7679	475p
LA1240 LA1245	80p 110p	LA5530 LA5531	65p 65p	LC7185 LC7191	350p 300p	M54563P M58484	200p 500p	SAA5231 SAA5240F	300p A 760p	STK780 STK795	575p 450p	STK5340 STK5342	350p 245p	STR2024 STR2105	575p 600p	TA7223 TA7225	210p 300p	TA7680AP TA7681AP	200p 100p
LA1260 LA1261	75p 75p	LA5537 LA5655	45p 175p	LC7207	275p 160p	M51516 M51518	260p 200p	SAA5243F SAA5244	1 800p	STK1039 STK1040	460p 640p	STK5343 STK5353	380p 400p	STR2124 STR3105	675p 525p	TA7226 TA7227	290p 170p	TA7587AP TA7688	150p
LA1265 LA1266 LA1267	125p 130p	LA5658	225p 250p	LC7217 LC7218	350p 250p	M51995P M51977P	250p 300p	SAA5246	7500	STK1049 STK1050	700p 650p	STK5361 STK5362	375p 400p	STR3113 STR3115	225p 400p	TA7230 TA7232	100p 95p	TA7698 TA7699	400p 600p
LA1354	150p 225p	LA5667 LA5700	200p 300p	LC7230 LC7267	700p 550p	M52307P M54646AP	900p 400p	SAA5250F SAA5351 SAA7000	376p	STK1060 STK1070	700p 850p	STK5372 STK5373	260p 375p	STR3123 STR3125	400p 480p	TA7233 TA7237	120p 300p	TA7705 TA7709P	300p 150p
LA1363 LA1364	90p 200p	LA6339 LA6355	35p 50p	LC7351 LC7364	200p 200p 425p	MB3708 MB3712	275p 140p	SAA7020	550p 600p 1300p	STK1080 STK2025	940p 620p 500p	STK5391 STK5392 STK5421	375p 500p	STR3130 STR3135	500p 250p	TA7238 TA7240	400p 160p	TA7719P TA7727P	200p
LA1365 LA1368 LA1369	120p 220p 200p	LA6510 LA6515 LA6520	150p 160p 175p	LC7432 LC7522 LC7535	425p 350p 300p	MB3713 MB3714 MB3716	130p 225p	SAA7210 SAA7220 SAA7274	A 550p	STK2028 STK2029	480p	STK5421 STK5422 STK5431	450p 375p	STR3212 STR3214	275p 275p	TA7241 TA7242	165p 190p	TA7750 TA7757	200p 200p
LA1385	170p	LA6531	260p	LC7537A3	N 400p	MB3716 MB3722	250p 200p	SAA7280P	1460p	STK2030 STK2038	875p 700p	SIK5434	550p 570p	STR3215 STR3315	275p 275p	TA7243 TA7245	320p 225p	TA7769 TA7772P	130p 150p
LA1503 LA1805	120p 175p	LA7007 LA7011	400p 220p	LC7537N LC7560	450p 750p 300p	MB3730 MB3731	350p 220p	SAA9050 SAA9057	450p 475p	STK2048 STK20580	950p / 1600p	STK5436 STK5441	500p 400p	STR4090A STR4142	450p	TA7245BP	575p	TA7784 TA7792P	250p 250p
LA1810 LA1851	130p 300p	LA7016 LA7018	46p 100p 130p	LC7565 LC7582E	300p 300p 175p	MB3732 MB3735	240p 400p	SAB0600 SAB0601	600p 525p	STK2101 STK2110	1050p 550p	STK5443 STK5446	675p 350p	STR4211 STR4512	370p 400p	TA7250B TA7251BP	325p 325p 225p	TA7796P TA8101N	75p 230p
LA2000 LA2001 LA2101	160p 200p 270p	LA7019 LA7033 LA7042	130p 400p 280p	LC7800 LC7815H LC7818	175p	MB3756 MB3759 MB3771	160p 200p	SAB0602 SAB1009E SAB1016	825p 225p 600p	STK2125 STK2129	580p 750p	STK5451 STK5461 STK5462	390p 500p	STR5015 STR5100 STR5214	500p	TA7256P TA7259P	225p	TA8105N TA8110AP	140p
LA2110 LA2200	150p 190p	LA7045	300p 130p	LC7820 LC7821N	280p 325p 250p	MB3773 MB3719	110p 110p 360p	SAB1046F SAB2015F	350p	STK2139 STK2155 STK2230	675p 900p 470p	STK5462 STK5464 STK5466	500p 300p 500p	STR5315 STR5412	475p 575p 350p	TA7262P TA7263P TA7265AP	400p 325p 300p	TA8119P TA8122AN TA8127N	70p 260p 100p
LA2205	150p	LA7053	130p	LC7822N	160p	MC1391	120p	SAB2016P	150p	STK2240	740p	STK5466	400p	STR6020	350p 325p	TA7265AP TA7267	220p	TA8127N TA8132AN	200p

		1.2	L	INE	AR		s/J	AP/	AN	ESI		RA	NS	ST	OR	S			
Part	Price		Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price
TA8164P TA8184P TA8189P TA8200AP	100p 350p 130p 1325p		80p	TDA2760 TDA2780 TDA2791 TDA2795	275p	TDA4661 TDA4670 TDA4680 TDA4685	225p 475p 475p 475p	TDA8391 TDA8395 TDA8405 TDA8415	675p 450p 550p 650p	UPC1004 UPC1009 UPC1018 UPC1020	C 130p 950p 170p 200p	2SA771 2SA773 2SA777 2SA778	90p 50p 35p 100p	2SA1177 2SA1179 2SA1182 2SA1184	26p 20p 20p 120p	2SB561 2SB562 2SB564 2SB566	30p 20p 15p 90p	2SC738 2SC739 2SC761 2SC762	15p 150p 110p
TA8201A1 TA8205 TA8207K	300p 250p 175p	TDA1220 TDA1235 TDA1236	75p 300p 240p	TDA2822	M 60p 85p	TDA4700 TDA4714 TDA4716	A 750p C 350p	TDA8416 TDA8417 TDA8421	625p 550p 500p	UPC1023 UPC1024 UPC1025	60p H 2 75p	2SA781 2SA786 2SA794	150p 25p 50p	2SA1185 2SA1186 2SA1198	200p 500p 40p	2SB596 2SB598 2SB600	50p 30p 500p	2SC783 2SC790 2SC792	150p 85p 50p 380p
TA8210 TA8211AH TA8214K	300p 1 200p 260p	TDA1251 TDA1270 TDA1327	150p 150p 200p	TDA3047 TDA3048 TDA3082	100p 130p 200p	TDA4718 TDA4725 TDA4800	A 500p 750p 350p	TDA8425 TDA8432 TDA8433	500p 550p 600p	UPC1026 UPC1028 UPC1031	95p 90p H 150 p	2SA798 2SA812 2SA814	30p 15p 60p	2SA1201 2SA1202 2SA1204	40p 26p 225p	2SB601 2SB605 2SB631	60p 25p 40p	2SC805 2SC828 2SC829	225p 20p 15p
TA8215 TA8216H TA8217P	300p 300p 120p	TDA1410 TDA1412	60p 220p 35p	TDA3083 TDA3190 TDA3301	100p B 400p	TDA4810 TDA4814 TDA4850	A 300p 475p	TDA8440 TDA8442 TDA8443	300p 200p 350p	UPC1032 UPC1035 UPC1043	C 110p	2SA816 2SA817 2SA825	70p 20p 20p	2SA1206 2SA1207 2SA1208	60p 25p 70p	2SB632 2SB633 2SB641	45p 80p 12p	2 SC839 2SC867 2SC870	20p 900p 100p
TA8220AH TA8221AH TA8225H TA8225L	1 600p 1 600p 475p 475p	TDA 1508 TDA 1510	275p 175p 170p 180p	TDA3310 TDA3410 TDA3420 TDA3501	160p	TDA4851 TDA4852 TDA4860 TDA4866	400p 400p 200p 325p	TDA8444 TDA8451 TDA8452 TDA8453	200p 400p 200p 350p	UPC1158 UPC1161 UPC1167 UPC1170	110p 125p	2SA836 2SA837 2SA839 2SA841	20p 200p 110p 20p	2SA1209 2SA1210 2SA1215 2SA1215	100p 120p 600p 660p	2SB647 2SB648 2SB649 2SB673	20p 45p 35p 100p	2SC897 2SC9008 2SC930	175p 30p 15p 300p
TA8227 TA8229K TA8400P	250p 200p 200p	TDA16144 TDA15154 TDA15160	A 450p A 200p C 350p	TDA3502 TDA3504 TDA3505	450p 300p 275p	TDA4881 TDA4935 TDA4940	200p 300p 325p	TDA8461 TDA8490 TDA8540	950p 350p 250p	UPC1173 UPC1176 UPC1178	200p C 120p H 250p	2SA844 2SA847 2SA854	20p 25p 30p	2SA1217 2SA1220 2SA1221	100p 75p 70p	2SB676 2SB688 2SB703	85p 90p 90p	2SC936 2SC941 2SC944 2SC945	15p 140p 10p
TA8410K TA8410P TA8432	200p 200p 200p	TDA1519 TDA15194	250p 200p 200p	TDA3506 TDA3507 TDA3510	450p 350p	TDA4942 TDA4944 TDA4950	325p 250p 120p	TDA8702 TDA8703 TDA8708	275p 500p 900p	UPC1180 UPC185H UPC1186	2 400p 80p	2SA861 2SA872 -2SA872A	45p 25p 50p	2SA1222 2SA1226 2SA1227	50p 250p 250p	2SB705 2SB707 2SB716	200p 200p 20p	2 SC950 2 SC959 2 SC980	40p 225p 40p
TA8605N TA8606N TA8607P TA8611A	350p 350p 320p 250p		276p 250p 110p 200p	TDA3520 TDA3530 TDA3540 TDA3541		TDA5030 TDA5140 TDA5330 TDA5331	A 250p T 300p	TDA8730 TDA8732 TDA8735 TDA8740	225p 400p 175p 625p	UPC1187 UPC1188 UPC1191 UPC1197		2SA879 2SA884 2SA885 2SA885	30p 100p 35p 45p	2SA1232 2SA1237 2SA1238 2SA1239	180p 25p 30p 30p	2SB718 2SB727 2SB733 2SB734	60p 100p 75p 35p	2SC982 2SC983 2SC1000 2SC1001	20p 120p 20p 950p
TA8615N TA8628N TA8631	480p 350p 500p	TDA1526 TDA1534 TDA1540	225p 2000p 420p	TDA3560 TDA3561 TDA3561	260p 300p A 300p	TDA5332 TDA5500 TDA5600	7 150p 400p 450p	TDA8741 TDA88081 TDA88091	550p 325p 350p	UPC1198 UPC1210 UPC1215	H 200p 150p V 125p	2SA887 2SA893 2SA896	20p 15p 25p	2SA1240 2SA1242 2SA1244	45p 80p 120p	2SB737 2SB739 2SB744	20p 22p 55p	2SC1008 2SC1010 2SC1012	20p 225p 75p
TA8632N TA8644N TA8646 TA8653N	550p 425p 375p	TDA1543	760p 250p 300p	TDA3562 TDA3562 TDA3563	TF 300p 350p	TDA5660 TDA5700 TDA5701	200p 200p	TDA9045 TDA9080 TDA91020		UPC1222 UPC1225 UPC1227	V 225p	2SA899 2SA900 2SA904	40p 45p 20p	2SA1245 2SA1246 2SA1248	55p 80p 35p	2\$8750 2\$8753 2\$8754	60p 100p 80p	2SC1013 2SC1014 2SC1030	170p 140p 150p
TA8659A1 TA8690N TA8691N	1500p 900p 700p 450p	TDA15520 TDA1553A TDA15550 TDA15570	AQ 375p 375p	TDA3564 TDA3565 TDA3566 TDA3567	275p	TDA5708 TDA5709 TDA5800 TDA5820	400p 450p 800p 370p	TDA9403 TDA9500 TDA9503 TDA9513	180p 750p 150p 300p	UPC1228 UPC1230 UPC1237 UPC1238	200p HA 70p	2SA907 2SA909 2SA912 2SA913	650p 500p 70p 100p	2SA1249 2SA1252 2SA1253 2SA1253	100p 20p 30p 30p	2SB764 2SB765 2SB772 2SB774	30p 70p 25p 50p	2SC1048 2SC1047 2SC1050 2SC1051	250p 20p 280p 250p
TA8701A! TA8718N TA8720	275p 550p 526p	TDA16580 TDA15600 TDA1571	350p 675p 300p	TDA3569 TDA3570 TDA3580	300p 378p 400p	TDA5832 TDA5850 TDA5930	200p 175p 225p	TDA9800 TDA9821 TEA0652	300p 250p 160p	UPC1241 UPC1242 UPC1245	H 150p H 150p V 130p	2SA914 2SA915 2SA916	90p 30p 30p	2SA1257 2SA1258 2SA1261	30p 70p 150p	2SB775 2SB776 2SB788	100p 110p 35p	2SC1061 2SC1069 2SC1070	86p 175p 65p
TA8739P TA8872N TAA550 TBA120S	450p 450p 25p 40p	TDA1572 TDA1574 TDA1576 TDA15784	175p 125p 170p 210p	TDA3586 TDA3590 TDA3591 TDA3592	300p 360p	TDA6100 TDA6101 TDA6111 TDA6111 TDA6200	Q 120p Q 225p	TEA0653T TEA0655 TEA0665 TEA1002	80p 300p 300p 650p	UPC1270 UPC1274 UPC1277 UPC1278	V 250p 240p	2SA921 2SA928A 2SA933 2SA934	40p 25p 30p 30p	2SA1262 2SA1263 2SA1264 2SA1265	110p 280p 280p 200p	258791 258794 258795 258810	130p 40p 45p 15p	2SC1079 2SC1080 2SC1096 2SC1098	300p 225p 40p 120p
TBA396 TBA520 TBA530	70p 120p 100p	TDA1579 TDA1589 TDA1591	200p 275p 275p	TDA3601 TDA3502 TDA3611	0 375p 225p 450p	TDA6600 TDA6610 TDA6612	2 700p 2 1100p	TEA1007 TEA1009 TEA1015P	120p 100p 110p	UPC1288 UPC1297 UPC1298	V 230p CA 325p	2SA935 2SA937 2SA939	40p 20p 140p	2SA1283 2SA1284 2SA1286	50p 60p 60p	2SB816 2SB817 2SB819	160p 175p 60p	2SC1106 2SC1114 2SC1115	180p 415p 280p
TBA540 TBA560 TBA800	90p 90p 40p	TDA1596 TDA1598 TDA1600	200p 250p 275p	TDA3640 TDA3645 TDA3651	400p 200p	TDA7000 TDA7010 TDA7020	T 120p 175p	TEA1017 TEA1019 TEA1024	280p 130p 150p	UPC1316 UPC1318	300p	2SA940 2SA942 2SA949	50p 60p 70p	2SA1289 2SA1290 2SA1293	50p 150p 110p	2SB822 2SB824 2SB825	40p 60p 135p	2SC1116 2SC1124 2SC1161	290p 270p 110p
TBA810A: TBA820 TBA820M TBA920	\$ 40p 55p 35p 100p	TDA1602A TDA1670A TDA1675 TDA1675		TDA3652 TDA3652 TDA3653 TDA3654		TDA7021 TDA7050 TDA7052 TDA7053	T 200p 200p 120p 200p	TEA1035 TEA1039 TEA1045 TEA1060	200p 180p 300p 225p	UPC1330 UPC1335 UPC1350 UPC1352	V 320p 115p	2SA950 2SA951 2SA952 2SA953	18p 60p 30p 60p	2SA1294 2SA1295 2SA1301 2SA1302	480p 500p 260p 300p	2SB826 2SB827 2SB828 2SB829	76p 200p 200p 200p	2SC1162 2SC1164 2SC1165 2SC1165	30p 600p 750p 100p
TBA950 TBA990 TC5020	100p 60p 200p	TDA1771 TDA18704 TDA18724	250p 200p 275p	TDA3654 TDA3710 TDA3720	Q 120p 300p 175p	TDA7056 TDA7057 TDA7072	200p 225p 175p	TEA1061 TEA1062 TEA1064	176p 250p 250p	UPC1360 UPC1362 UPC1363	C 200p C 250p 190p	2SA954 2SA957 2SA958	30p 185p 60p	2SA1303 2SA1304 2SA1306	400p 110p 110p	2SB835 2SB857 2SB861	75p 80p 110p	2SC1170 2SC1172 2SC1173	180p 150p 33p
TC5081AF TC5082P TC5090A	170p 230p	TDA1904 TDA1905 TDA1908/ TDA1908/		TDA3724 TDA3725 TDA3730 TDA3740	500p 500p 400p 480p	TDA7077 TDA7211 TDA7220 TDA7222	176p 150p 100p 200p	TEA1067 TEA1068 TEA1080P TEA1087	150p 350p 170p 40p	UPC1363 UPC1364 UPC1365 UPC1366	C 350p 250p	2SA963 2SA965 2SA966 2SA968	120p 30p 25p 55p	2SA1307 2SA1309 2SA1315 2SA1317	100p 50p 100p 30p	2SB863 2SB865 2SB882 2SB882	220p 25p 180p 45p	2SC1195 2SC1212 2SC1213 2SC1213 2SC1214	210p 35p 10p 15p
TC9125BF TC9130P TC9134 TC9135P	750p 125p	TDA1940 TDA1941 TDA1950	180p 300p 175p	TDA3750 TDA3755 TDA3760	400p 425p 350p	2TDA7230 TDA7231 TDA7233	A 225p A 80p 150p	TEA1101 TEA1330 TEA1511	425p 65p 150p	UPC1370 UPC1373 UPC1377	C 300p 85p C 200p	2SA970 2SA979 2SA984	25p 36p 25p	2SA1318 2SA1319 2SA1320	20p 25p 45p	258891 258892 258895	35p 25p 60p	2SC1215 2SC1216 2SC1222 2SC1222 2SC1226	25p 200p 15p
TC9137P TC9138AF TC9142 TC9143	500p 150p 320p 300p	TDA2002 TDA2003 TDA2004 TDA2005	50p 65p 150p 150p	TDA3765 TDA3771 TDA3780 TDA3780	460p 400p	TDA7240 TDA7241 TDA7245 TDA7250	175p 250p 300p 500p	TEA2000 TEA2014A TEA2018A TEA2018A	500p 80p 200p 200p	UPC1378 UPC1379 UPC1382 UPC1384	C 170p 110p	25A985 25A988 25A991 25A992	60p 26p 30p 30p	2SA1321 2SA1327 2SA1329 2SA1346	80p 130p 200p 20p	2SB908 2SB926 2SB941 2SB950	70p 30p 60p 180p	2SC1226 2SC1237 2SC1247 2SC1252	75p 250p A 35p 850p
TC9145 TC9148 TC9149	150p 200p 225p	TDA2006 TDA2007 TDA2008	70p 120p 100p	TDA3800 TDA3803 TDA3810	350p A 500p 200p	TDA7255 TDA7258 TDA7262	500p 600p 425p	TEA20258 TEA2028 TEA20288	75p 325p 375p	UPC1387 UPC1394 UPC1397	C 250p 120p 350p	2SA993 2SA995 2SA999	50p 60p 30p	2SA1348 2SA1352 2SA1353	45p 100p 100p	2SB951 2SB953 2SB975	190p 90p 100p	2SC1278 2SC1279 2SC1308	110p 30p (350p
TC9150 TC9151P TC9152 TC9153	425p 425p 425p 300p	TDA2009 TDA2010 TDA2020 TDA2030	160p 150p 120p 80p	TDA3825 TDA3827 TDA3840 TDA3842		TDA7272 TDA7273 TDA7274 TDA7275	170p 80p 60p 76p	TEA2029A TEA2029C TEA2031A TEA20317	350p	UPC1403 UPC1406 UPC1420 UPC1420	HA 70p	2SA1005 2SA1006 2SA1008 2SA1009	25p 90p 125p 200p	2SA1356 2SA1357 2SA1358 2SA1359	100p 65p 130p 45p	2SB985 2SB985 2SB1009 2SB1010	30p 40p 110p 25p	2SC1312 2SC1318 2SC1325 2SC1325	40p 10p 400p 20p
TC9154AF TC9156 TC9158P	225p 300p 450p	TDA2030H TDA2040 TDA2048	1 100p 140p 600p	TDA3843 TDA3845 TDA3856	200p 325p 400p	TDA7282 TDA7284 TDA7302	50p 100p 450p	TEA2114 TEA2117 TEA2130	200p 450p 350p	UPC1423 UPC1470 UPC1474	CA 550p 200p HA 75p	2SA1010 2SA1011 2SA1012	225p 80p 86p	2SA1360 2SA1362 2SA1370	45p 25p 50p	2SB1012 2SB1015 2SB1016	55p 60p 130p	2SC1327 2SC1328 2SC1342 2SC1343	15p 15p 200p
TC9162 TC9163 TC9164 IC9167P	275p 375p 400p 100p	TDA2051V TDA2052V TDA2054N	/ 450p / 525p / 110p	TDA3857 TDA3950 TDA4001 TDA4050	325p	TDA7310 TDA7313 TDA7318	550p	TEA2164 TEA2260 TEA2261	175p 225p 225p 275p	UPC1484 UPC1488 UPC1498 UPC1505	H 200p	2SA1013 2SA1015 2SA1016 2SA1018	100p 10p 30p 100p	2SA1371 2SA1376 2SA1380	100p 30p 75p	2SB1017 2SB1018 2SB1020	40p 130p 120p	2SC1345 2SC1346 2SC1358	15p 100p 270p
TC9172P TC9174P TC9176P	300p 325p 500p	TDA2107 TDA2148 TDA2151 TDA2151	250p 350p 375p 260p	TDA4052 TDA4060 TDA4092	150p 500p 500p 350p	TDA7330 TDA7350 TDA7359 TDA7360	A 700p 650p 300p 700p	TEA2262 TEA37170 TEA37185 TEA5030	P 160p	UPC1513 UPC1514 UPC1515	HA 70p	2SA1020 2SA1021 2SA1023	30p 35p 60p	2SA1381 2SA1382 2SA1385 2SA1386	100p 120p 180p 400p	2581039 2581066 2581068 2581077	65p 40p 160p 180p	2SC1359 2SC1360 2SC1364 2SC1368	15p 70p 25p 76p
TC9177P TCA9940 TCEP100	226p 100p 100p	TDA2220 TDA2270 TDA2320	200p 250p 80p	TDA4100 TDA4173 TDA4180	225p AF 325p 145p	TDA7361 TDA7370 TDA7374	175p V 600p V 800p	TEA5040 TEA5101A TEA5110	650p 176p 175p	UPC1520 UPC1521 UPC1536	CA 250p HA 120p C 550p	2SA1026 2SA1029 2SA1036	90p 60p 60p	2SA1387 2SA1396 2SA1399	75p 120p 25p	2SB1098 2SB1099 2SB1109	80p 75p 40p	2SC1382 2SC1383 2SC1384	40p 25p 20p
TD623084 TD62382 TD62506 TD62705	P 200p 200p 200p 250p	TDA2501 TDA2502 TDA2503 TDA2504	400p 175p 200p 200p	TDA4190 TDA4200 TDA4210 TDA4260	180p 360p 250p 250p	TDA7770 TDA8114 TDA8115 TDA8115	225p 225p 200p 350p	TEA5114A TEA5115 TEA5116 TEA5170	220p 220p 200p	2SA329 2SA467 2SA473 2SA483	75p 40p 29p 90p	2SA1037 2SA1038 2SA1048 2SA1051	50p 40p 25p 300p	2SA1400 2SA1423 2SA1428 2SA1441	150p 30p 36p 110p	2SB1123 2SB1133 2SB1134 2SB1135	50p 50p 65p 60p	2SC1393 2SC1394 2SC1398 2SC1399	20p 15p 55p 100p
TD6304A8 TD6306P TD6350P	300p 350p 200p	TDA2505 TDA2506 TDA2507	300p 500p 450p	TDA4280 TDA4282 TDA4283	320p 360p T 450p	TDA8120 TDA8124 TDA8134	8 550p 250p 225p	TEA5500 TEA5501 TEA5550	325p 225p 150p	2SA484 2SA489 2SA490	80p 50p 45p	2SA1052 2SA1060 2SA1061	15p 120p 300p	2SA1442 2SA1443 2SA1450	110p 130p 30p	2SB1140 2SB1143 2SB1151	45p 40p 75p	2SC1400 2SC1403 2SC1407	500p 500p 50p
TD6359P TDA1001 TDA1002 TDA1003	300p 200p 200p 150p	TDA25077 TDA2510 TDA25144 TDA25144	450p	TDA4290 TDA4400 TDA4420 TDA4421	200p 175p 120p 300p	TDA8135 TDA8136 TDA8137 TDA8138	225p 225p 200p 200p	TEA5560 TEA5570 TEA5580 TEA5581	130p 85p 185p 200p	2SA493 2SA495 2SA496 2SA505	25p 40p 30p 120p	2SA1069 2SA1073 2SA1076 2SA1077	150p 375p 230p 300p	2SA1459 2SA1462 2SA1469 2SA1475	40p 25p 100p 95p	2SB1162 2SB1163 2SB1168 2SB1168	400p 370p 50p 40p	2SC1413 2SC1419 2SC1426 2SC1426	150p 50p 700p 50p
TDA1005/ TDA1010/ TDA1011	A 176p	TDA2530 TDA2532 TDA2540	450p 120p 85p	TDA4425 TDA4427 TDA4431	170p 200p 150p	TDA8138 TDA8138 TDA8139	A 200p B 200p 200p	TEA5591 TEA5620 TEA5630	200p 300p 225p	2SA509 2SA537 2SA539	36p 170p 20p	2SA1080 2SA1081 2SA1082	125p 80p	2SA1488 2SA1489 2SA1490	150p 300p 225p	2SB1185 2SB1202 2SB1203	50p 45p 45p	2SC1429 2SC1431 2SC1444 2SC1445 2SC1446	400p 275p 350p
TDA1012 TDA1013/ TDA1015	120p 110p 85p	TDA2541 TDA2542 TDA2543 TDA2544	120p 110p 210p	TDA4433 TDA4437 TDA4439 TDA4440	150p 300p 220p	TDA8140 TDA8143 TDA8145	200p 180p 120p	TEA5640E TEA5701 TEA6000	760p 650p 400p	2SA544 2SA550 2SA562 2SA564	650p 150p 30p 15p	2SA1083 2SA1084 2SA1085 2SA1085	20p 100p 75p	2SA1491 2SA1492 2SA1493	300p 260p 500p	2SB1204 2SB1205 2SB1223	45p 40p 60p	2SC1446 2SC1447 2SC1449 2SC1450	55p 70p 120p
TDA1016 TDA1020 TDA1022 TDA1023	140p 110p 330p 130p	TDA2545 TDA2546/ TDA2548	200p 120p 200p 200p	TDA4442 TDA4443 TDA4445	180p 240p 250p 220p	TDA8146 TDA8160 TDA8170 TDA8172	200p 125p 170p 250p	TEA6100 TEA6200 TEA6300 TEA6310T	350p 225p 600p 425p	25A504 25A571 25A603 .25A606	650p 100p 200p	2SA1091 2SA1093 2SA1094 2SA1095 2SA1095	100p 180p 190p 300p	2SA1494 2SA1516 2SA1519 2SA1523	450p 280p 20p 45p	2SB1243 2SB1274 2SB1282 2SB1318	40p 40p 300p 40p	2SC1454 2SC1470	200p 250p 120p 40p
TDA1023 TDA1024 TDA1025 TDA1025	150p 320p 175p	TDA2549 TDA2555 TDA2556	300p 175p 230p	TDA4450 TDA4452 TDA4453 TDA4480	225p 250p 275p	TDA8173 TDA8174 TDA8175	250p 280p 300p 300p	TEA6414A TEA6415B TEA5420	425p 525p 360p	2SA608 2SA614 2SA628	15p 160p 20p	2SA1102 2SA1103	80p 130p 130p 140p	2SA1535 2SA1538 2SA1540	176p 55p 50p	2581375 2581382 2581468	45p 350p 100p	2SC1472 2SC1473 2SC1473 2SC1474 2SC1501	16p 45p 70p
TDA1029 TDA1035 TDA1038 TDA10418	200p 160p 500p 260p	TDA2557 TDA2558 TDA2574V TDA25754		TDA4480 TDA4481 TDA4482 TDA4500	280p 350p 350p 350p	TDA8178 TDA8179 TDA8185 TDA8185		TEA8172 TL431 TL494 TL061	125p 45p 100p 40p	2SA634 2SA636 2SA639 2SA640	50p 50p 60p	25A1104 2SA1105 2SA1106 2SA1111	250p 160p 90p	2SA1598 2SA1599 2SA1600 2SA1601	220p 220p 250p 200p	2SC182 2SC372 2SC380 2SC388A	75p 25p 10p 60p	2SC1505 2SC1507 2SC1509 2SC1514	55p 45p 35p 35p
TDA1041 TDA1044 TDA1047	200p	TDA2577A TDA2578A TDA2579A	A 200p A 200p A 250p	TDA4501 TDA4502 TDA4503	400p 550p 300p	TDA8191 TDA8192 TDA8196	425p 275p 150p	TL054 TL071 TL074	80p 38p 80p	2SA642 2SA643 2SA673	50p 25p 15p	2SA1112 2SA1115 2SA1120 2SA1123	150p 30p 40p	2SA1625 2SA1626 2SA1640	40p 90p 100p	2SC394 2SC403 2SC454	60p 26p 15p	2SC1515 2SC1520 2SC1541 2SC1545	60p 45p 110p
TDA1048 TDA1053 TDA1054 TDA1057	200p 300p 180p 60p	TDA2582 TDA2590 TDA2591 TDA25910	130p 170p 110p	TDA4505 TDA4505 TDA4505 TDA4505	E 300p K 450p	TDA8205 TDA8213 TDA8214 TDA8214 TDA8215	1250p 275p 8 225p H 300p	TL083 TL084 TMP47C-43 TPU2732	55p 70p 1260p 1200p	2SA677 2SA678 2SA683 2SA684	35p 26p 25p 25p	2SA1123 2SA1124 2SA1127 2SA1127 2SA1133	40p 60p 50p	2SA1652 2SA1667 2SA1668 2SA1668	70p 175p 180p 310p	2SC458 2SC460 2SC461 2SC495	10p 10p 15p 45p	2SC1545 2SC1567 2SC1568 2SC1569	120p 40p 35p 55p
TDA 1059 TDA 1060 TDA 1062	3 40p 140p 140p	TDA2593 TDA2594 TDA2595	110p 300p 200p	TDA4510 TDA4532 TDA4555	270p 200p 400p	TDA8217 TDA8303 TDA8304	225p 350p 600p	TPU2735 UC3524 UC3842N	900p 100p 125p	2SA699 2SA705 2SA706	100p 70p 140p	2SA1135 2SA1141 2SA1142	130p 200p 100p	2SA1673 2SA1680 2SA1706	426p 40p 25p	2SC496 2SC497 2SC515	25p 85p 100p	2SC1570 2SC1571 2SC1573	40p 50p 25p
TDA1068 TDA1072 TDA1074	75p 150p 280p	TDA2600 TDA2611A TDA2616	250p 100p 260p	TDA4556 TDA4557 TDA4560	370p 450p 270p	TDA8305 TDA8340 TDA8341	500p 200p 250p	UC3843 UC3844 UPC20C	125p 100p 220p	2SA708 2SA711 2SA715	50p 280p 50p	2SA1143 2SA1145 2SA1146	15p 40p 200p	2SB175 2SB324 2SB337	45p 40p 150p	2SC535 2SC536 2SC605	30p 20p 100p	2SC1576 2SC1580 2SC1583	550p 600p 25p
TDA1077 TDA1082 TDA1083 TDA1095	250p. 275p 95p. 170p.	TDA2640 TDA2653A TDA2654	200p	TDA4565 TDA4566 TDA4568 TDA4570	200p 325p 226p 300p	TDA8349 TDA7350 TDA8351 TDA8360	275p 225p N3 800p	UPC554 UPC555 UPC556H UPC571	130p 60p 80p 220p	2SA719 2SA720 2SA725 2SA725	50p 20p 80p 20p	2SA1151 2SA1152 2SA1153 2SA1153	30p 150p 30p 22p	2SB474 2SB492 2SB511 2SB525	250p 80p 55p 65p	2SC619 2SC641 2SC644 2SC647	100p 80p 10p 300p	2SC1586 2SC1617 2SC1619 2SC1623	540p 340p 170p 50p
TDA1087 TDA1092 TDA1097	60p 100p 475p	TDA2658 TDA2670 TDA2690	300p 150p 100p	TDA4580 TDA4600 TDA4600	650p 200p	TDA8361 TDA8362A TDA8362A	N3 900p N 1200p I3 1200p	UPC574 UPC575C2 UPC577	60p 90p 64p	2SA733 2SA740 2SA742	15p 90p 450p	2SA1156 2SA1162 2SA1163	90p 30p 15p	2SB527 2SB531 2SB536	130p 400p 80p	2SC681 2SC683 2SC708	250p 35p 100p	2SC1624 2SC1626 2SC1627	60p 65p 15p
TDA1151 TDA1154 TDA1170 TDA1170	40p 50p 85p V 85p	TDA2710- TDA2721 TDA2730 TDA2740	200p 200p 300p	TDA4601 TDA4605 TDA4610 TDA4650	120p 220p 370p 425p	TDA8356N TDA8372 TDA8380 TDA8385		UPC592 UPC595 UPC596 UPC1001	95p 190p 190p 220p	2SA747A 2SA748 2SA764 2SA769	425p 60p 200p 80p	2SA1169 2SA1170 2SA1173 2SA1174	500p 500p 60p 25p	2SB537 2SB544 2SB546 2SB549	90p 22p 45p 50p	2\$C710 2\$C711 2\$C730 2\$C732	15p 15p 350p 40p	2SC1628 2SC1634 2SC1667 2SC1669	75p 50p 450p 100p
TDA1175	175p	TDA2750	350p	TDA4660	425p 370p	TDA8385 TDA8390	A 650p	UPC10040		2SA765 2SA770	200p	25A1175	25p 30p	258545 258560	26p	250735	40p 40p	2SC1603	15p

25C1972 600p 25C2573 300p 25C302 1450p 25C345 125p 25C4573 125p 25C1975 120p 25C1975 120p 25C1975 120p 25C1975 120p 25C1975 120p 25C1975 120p 25C1980 30p 25C333 300p 25C333 300p 25C333 300p 25C3461 275p 25D1748 85p 25D1164 75p 25D1748 180p 25D1748 25D1749 25D1748 25D1749 25D1749 </th <th></th> <th></th> <th></th> <th></th> <th>S</th> <th>OR</th> <th>ST</th> <th>NSI</th> <th>RA</th> <th>T</th> <th>ESE</th> <th>AN</th> <th>AP</th> <th>J</th> <th></th> <th></th> <th></th> <th></th> <th></th>					S	OR	ST	NSI	RA	T	ESE	AN	AP	J					
Sector Bio	Part Price	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part
Sectory Soctory Soctory <t< td=""><td>2SK240 140p 2SK241 30p</td><td>75p</td><td>2SD1758</td><td>1000p</td><td>2SD1313</td><td>40p</td><td>2SD880</td><td>250p</td><td>2SD291</td><td>75p</td><td>2SC3782</td><td>50p</td><td>2SC3246</td><td>20p</td><td>2SC2712</td><td>60p</td><td>2SC2259</td><td>80p</td><td>2SC1678</td></t<>	2SK240 140p 2SK241 30p	75p	2SD1758	1000p	2SD1313	40p	2SD880	250p	2SD291	75p	2SC3782	50p	2SC3246	20p	2SC2712	60p	2SC2259	80p	2SC1678
Sector Book Sector Book <th< td=""><td>2SK246 30p 2SK300 25p</td><td>60p</td><td>2SD1761</td><td>150p</td><td>2SD1327</td><td>35p</td><td>2SD889</td><td>75p</td><td>2SD315</td><td>100p</td><td>2SC3787</td><td>220p</td><td>2SC3260</td><td>50p</td><td>2SC2716</td><td>90p</td><td>2SC2267</td><td>30p</td><td>2SC1884</td></th<>	2SK246 30p 2SK300 25p	60p	2SD1761	150p	2SD1327	35p	2SD889	75p	2SD315	100p	2SC3787	220p	2SC3260	50p	2SC2716	90p	2SC2267	30p	2SC1884
2 2 7 3	2SK301 40p 2SK303 40p 2SK304 25p	A 60p	2SD1763A	50p	2SD1330	35p	2SD894	65p	2SD330	75p	2SC3789	280p	2SC3252	120p	2SC2721	25p	2SC2271	900p	2SC1729
1 1	20p 25K312 750p 25K315 70p	70p 110p	2SD1765 2SD1769	65p 150p	2SD1348 2SD1350	200p 225p	2SD698B	320p 40p	2SD357	220p	2SC3798	50p	2SC3269	350p	2\$C2749	70p	2SC2278	10p	2SC1740
1 1 2 1 3 2 1 3 2 1	SK320 120p SK323 130p	70p	2\$D1776	60p	2SD1378	450p	2SD905	50p	2SD359	70p	2\$C3808	75p	2SC3271	270p	2SC2751	1800p	2SC2290	90p	2SC1755
SECT/P 109 SECT/P 109 SECT/P 109 SECT/P 100 SECT/P 100 <t< td=""><td>SK332 175p SK359 40p</td><td>160p</td><td>2SD1785</td><td>100p</td><td>2SD1380</td><td>300p</td><td>2SD917</td><td>100p</td><td>2SD362</td><td>250p</td><td>25C3831</td><td>30p</td><td>2SC3279</td><td>300p</td><td>2SC2767</td><td>35p</td><td>2SC2298</td><td>30p</td><td>2SC1758</td></t<>	SK332 175p SK359 40p	160p	2SD1785	100p	2SD1380	300p	2SD917	100p	2SD362	250p	25C3831	30p	2SC3279	300p	2SC2767	35p	2SC2298	30p	2SC1758
Schule 400 Schule 300 Schule 300 <t< td=""><td>25K363 50p 25K364 40p 25K367 40p</td><td>180p</td><td>2SD1796</td><td>50p</td><td>2SD1384 2SD1390</td><td>360p 120p</td><td>2SD923 2SD946</td><td>650p 50p</td><td>2SD380 2SD381</td><td>250p 100p</td><td>25C3833 25C3851</td><td>200p 600p</td><td>2SC3281 2SC3284</td><td>700p 500p</td><td>2SC2774</td><td>300p</td><td>2SC2312</td><td>20p</td><td>2SC1781</td></t<>	25K363 50p 25K364 40p 25K367 40p	180p	2SD1796	50p	2SD1384 2SD1390	360p 120p	2SD923 2SD946	650p 50p	2SD380 2SD381	250p 100p	25C3833 25C3851	200p 600p	2SC3281 2SC3284	700p 500p	2SC2774	300p	2SC2312	20p	2SC1781
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Schule Ope Schule Top Schule Stop	SK374 45p SK386 600p	60p	2SD1825	120p	2SD1396	520p	2SD957A	60p	2SD389	500p	25C3857	400p	2SC3300	500p	2SC2791	120p	2SC2324	10p	2SC1815
15153 276 25233 200 25213 400 25213 120 25233 200 20133 200 <td< td=""><td>SK389 115p SK400 700p</td><td>100p 350p</td><td>2SD1843 2SD1846</td><td>120p 300p</td><td>2SD1398 2SD1399</td><td>35p 170p</td><td>2SD965 2SD970</td><td>50p 120p</td><td>2SD401 2SD402</td><td>275p 100p</td><td>2SC3866 2SC3868</td><td>130p 600p</td><td>2SC3306 2SC3307</td><td>700p 40p</td><td>2SC2793 2SC2808</td><td>25p 175p</td><td>2SC2310 2SC2315</td><td>60p</td><td>2SC1827</td></td<>	SK389 115p SK400 700p	100p 350p	2SD1843 2SD1846	120p 300p	2SD1398 2SD1399	35p 170p	2SD965 2SD970	50p 120p	2SD401 2SD402	275p 100p	2SC3866 2SC3868	130p 600p	2SC3306 2SC3307	700p 40p	2SC2793 2SC2808	25p 175p	2SC2310 2SC2315	60p	2SC1827
Schell 150 Schell 150 <t< td=""><td>2SK405 460p 2SK414 550p 2SK415 500p</td><td>280p</td><td>2SD1849</td><td>120p</td><td>2SD1402</td><td>60p</td><td>2SD973</td><td>55p</td><td>2SD415</td><td>210p</td><td>2SC3883</td><td>125p</td><td>2SC3310</td><td>40p</td><td>2SC2812</td><td>300p</td><td>2SC2230</td><td>27p</td><td>2SC1833</td></t<>	2SK405 460p 2SK414 550p 2SK415 500p	280p	2SD1849	120p	2SD1402	60p	2SD973	55p	2SD415	210p	2SC3883	125p	2SC3310	40p	2SC2812	300p	2SC2230	27p	2SC1833
155186 150 255187 150 25528 350 25588 350 25588 150 255187 150 255187 750 155186 55 252288 130 252288 130 25248 130 250187 130 155186 55 252288 130 25238 130 250187 130 255187 750 25238 130 25238 130 250187 130 255187 750 25238 130 25238 130 250187 <td< td=""><td>SK423 75p SK427 50p</td><td>40p</td><td>2SD1853</td><td>80p</td><td>2SD1405</td><td>90p</td><td>2SD982</td><td>150p</td><td>2SD426</td><td>250p</td><td>2SC3885</td><td>350p</td><td>2SC3317</td><td>75p</td><td>2SC2824</td><td>200p</td><td>2SC2333</td><td>12p</td><td>2SC1841</td></td<>	SK423 75p SK427 50p	40p	2SD1853	80p	2SD1405	90p	2SD982	150p	2SD426	250p	2SC3885	350p	2SC3317	75p	2SC2824	200p	2SC2333	12p	2SC1841
Schem Bip Schem Job Job <t< td=""><td>SK430 200p SK511 450p</td><td>75p</td><td>2SD1857</td><td>60p</td><td>2SD1407 2SD1408</td><td>120p</td><td>2SD986 2SD998</td><td>35p</td><td>2SD438 2SD467</td><td>330p 150p</td><td>2\$\$3890</td><td>60p 50p</td><td>2SC3327 2SC3328</td><td>200p 130p</td><td>2SC2826 2SC2827</td><td>55p 125p</td><td>2SC2336/</td><td>15p 36p</td><td>2SC1845 2SC1846</td></t<>	SK430 200p SK511 450p	75p	2SD1857	60p	2SD1407 2SD1408	120p	2SD986 2SD998	35p	2SD438 2SD467	330p 150p	2\$\$3890	60p 50p	2SC3327 2SC3328	200p 130p	2SC2826 2SC2827	55p 125p	2SC2336/	15p 36p	2SC1845 2SC1846
Schem 700 35:228 400 SS255 500 20102 120 Zohling 700 Schem 35:228 400 35:238 400 25:288 400 25:187 700 25:112 250 25:113 450 Schem 420 35:288 200 35:288 400 25:181 700 25:118 130 Schem 35:288 700 35:128 130 35:118 130 35:138 130 35:138 130 35:138 130 35:138 130	SK513 325p SK526 160p	85p	2SD1864	85p	2SD1411	40p	2SD1012	20p	2SD471	225p	2SC3893	25p	2SC3331	280p	2SC2834	35p	2SC2347	85p	2SC1855
ISCUTT 4250 ISCUTZ 600 ISCUTZ 2500 250000 250000 250000 <	SK531 350p SK534 700p SK537 900p	160p	2SD1878	60p	2SD1413	120p	2SD1021	50p	2SD525	400p	2SC3896	100p	2SC3345	40p	2SC2839	120p	2SC2360	700p	2SC1865
15:0180 160 25:0187 3:00 25:0138 700 25:01031 700 25:0147 1000 25:0188 3000 25:0180 0:02 25:0137 0:00 25:0188 3000 25:0186 3000 25:0186 3000 25:0186 3000 25:0186 3000 25:0186 2000 25:0186 2000 25:0186 2000 25:0186 2000 25:0186 2000 25:0186 2000 25:0186 2000 25:0186 2000 25:0186 2000 25:0181 2000 <td>SK538 350p SK538 1100p</td> <td>360p</td> <td>2SD1880</td> <td>125p</td> <td>2SD1417</td> <td>850p</td> <td>2SD1024</td> <td>18p</td> <td>2SD545</td> <td>250p</td> <td>2\$C3907</td> <td>200p 280p</td> <td>2SC3352</td> <td>80p</td> <td>2SC2873</td> <td>50p 280p</td> <td>2SC2362 2SC2365</td> <td>425p 220p</td> <td>2SC1871 2SC1875</td>	SK538 350p SK538 1100p	360p	2SD1880	125p	2SD1417	850p	2SD1024	18p	2SD545	250p	2\$C3907	200p 280p	2SC3352	80p	2SC2873	50p 280p	2SC2362 2SC2365	425p 220p	2SC1871 2SC1875
SC1080 125 25C385 1200 25C385 2500 250062 1200 25C385 2500 250081 2009 250184 2009 250184 2009 250184 2009 250184 2009 250184 2009 250184 2009 250184 2009 250184 2009 250184 250184 250184 250184 250184 250184 250184 250184 250184 250184 250184 250184 250184 250184 <td>SK544 30p SK552 250p</td> <td>450p</td> <td>2SD1886</td> <td>160p</td> <td>2SD1427</td> <td>70p</td> <td>2\$D1031</td> <td>225p</td> <td>2SD554</td> <td>75p</td> <td>2SC3943</td> <td>120p</td> <td>2SC3356</td> <td>3200p</td> <td>2SC2879</td> <td>25p</td> <td>2SC2371</td> <td>15p</td> <td>25C1890</td>	SK544 30p SK552 250p	450p	2SD1886	160p	2SD1427	70p	2\$D1031	225p	2SD554	75p	2SC3943	120p	2SC3356	3200p	2SC2879	25p	2SC2371	15p	25C1890
25019 2502 25239 100 25239 1200 25039 1200	SK553 225p SK555 320p	300p	2SD1894	280p	2SD1430	200p	2SD1046	225p	2SD556	1200	2SC3950	300p	2SC3376	80p	2SC2883	50p	2SC2383	125p	2SC1904
25:1913 900 25:1914 300 25:1914 300 25:1914 300 25:1914 300 25:1914 300 25:1914 300 25:1914 300 25:1914 300 25:1914 300 25:1914 300 25:1914 300 25:1914 300 25:1914 200 25:1914 200 25:1914 200 25:1914 200 25:1914 200 25:1914 200 25:1914 200 25:1914 200 25:1914 300 25:1914 300 25:1914 300 25:1914 300 25:1144 300 25:1144 300 25:1144 300 25:1144 300 25:1144 300 25:1144 300 25:1144 300 25:1144 300 25:1144 300 25:1145 300 25:1145 300 25:1145 300 25:1145 300 25:1145 300 25:1145 300 25:1145 300 25:1145 300 25:1145 300 25:1145 300 25:1145 300 25:1145 300 25:1145 300 25:1145 300 <td< td=""><td>SK556 500p SK557 400p SK959 600p</td><td>280p</td><td>2SD1910</td><td>400p</td><td>2SD1432</td><td>130p</td><td>2SD1051</td><td>50p</td><td>2SD560</td><td>70p</td><td>2SC3955</td><td>120p</td><td>2SC3378</td><td>50p</td><td>2SC2899</td><td>110p 120p</td><td>2SC2407</td><td>20p</td><td>2SC1907</td></td<>	SK556 500p SK557 400p SK959 600p	280p	2SD1910	400p	2SD1432	130p	2SD1051	50p	2SD560	70p	2SC3955	120p	2SC3378	50p	2SC2899	110p 120p	2SC2407	20p	2SC1907
15:0122 1756 25:2248 500 25:212 4800 25:2388 600 25:006 400 25:007 35:00 25:006 400 25:007 35:00 25:007 35:00 25:007 35:00 25:007 35:00 25:007 35:00 25:007 35:00 25:007 35:00 25:007 35:00 25:007 35:00 25:007 35:00 25:007 35:00 25:007 35:00 25:007 35:00 25:007 35:00 25:007 35:00 25:007	SK560 580p SK566 475p	50p 50p	2SD1929	100p 165p	2SD1439	150p	2SD1062	25p	2SD592	210p	2SC3973	80p	2SC3383	80p	2SC2911	200p	2SC2440	30p	2SC1914
1800 25C:2488 2750 25C:349 1400 25C:349 1500 25D:144 300p 25D:144 300p 25C:1941 170 25C:482 1600 25C:342 1600 25C:342 1600 25C:342 200 25C:342 700 25C:343 1400 25C:343 1500 25D:113 25D:113 25D:113 25D:113 25D:113 25D:114 25D:113 25D:114	SK606 70p SK612 80p	75p	2SD1933	80p	2SD1442	250p	2SD1064	30p	2SD600	220p	2SC3987	20p	2SC3397	650p	2SC2921	50p	2SC2459	175p	2SC1922
250144 37p 2502470 65p 250249 28040 300p 250240 300p 250143 300p 250144 300p 250145 300p 250145 300p 250145 300p 250145 300p 250145 100p 250146 40p 250148 40p 250146 300p 250146 300p 250146 300p 250146 300p 250146 300p 250146 40p 250206 75p 250146 40p	SK684 950p SK685 1150p	500p	2SD1941	300p	2SD1446	150p	2SD1069	60p	2SD602	1400p	2SC3997	35p	2SC3400	75p	2SC2923	275p	2SC2488	180p	2SC1929
125:145 350p 25:2143 100p 25:2434 300p 25:2143 100p	SK699 100p SK719 300p	80p	2SD1958 2SD1959	200p 275p	2SD1451 2SD1452	150p 375p	2SD1088 2SD1094	70p 300p	2SD613 2SD617	100p 280p	2SC4005 2SC4020	40p 130p	2\$C3405	280p 75p	2SC2929 2SC2934	120p	2SC2470 2SC2481	350p	2SC1942
1251147 450p 25C1283 400p 25C1283 400p 25C1283 200p 25C1493 300p 25C1493 40p 25D1493 300p 25D1494 200p 25D1493 300p 25C1493 300p 25C1493 200p 25D1493 300p 25C1493 200p 25D1493 300p 25C1493 300p	SK724 500p SK725 550p SK726 425p	450p	2SD1984	250p	2SD1455	20p	2SD1111	10p	2SD636	350p	2SC4029	30p	2SC3416	400p	2SC2939	120p	2SC2483	350p	2SC1945
25C1997 70p 25C499 50p 25C499 50p 25D138 40p 25D1486 40p 25D138 40p 25D1484 40p 25D138 40p 25D138 40p 25D138 40p 25D138 40p 25D134 40p 25D137 40p 25D136 50p 25D166 26p 25D167 20p 25D136 60p 25D136 25D136 25D136 25D136 <	SK727 475p SK739 400p	300p	2SD1994	50p	2SD1458	200p	2SD1128	15p	2SD638	40p	2SC4048	120p	2SC3419	50p	2SC2958	400p	2SC2485	450p	2SC1947
1251197 1300p 252232 252325 650p 2524124 250p 250567 25p 2501142 350p 250218 650p 2551197 100p 252237 120p 252301 1400p 252417 130p 25067 20p 2501143 130p 251067 30p 2510173 30p 251069 350p 2511143 30p 251069 350p 2510143 100p 2520261 100p 251173 100p 251173 30p 251069 50p 2502081 100p 251173 30p 251056 50p 2502081 100p 250178 100p <	SK758 300p SK769 500p	75p	2SD2006	40p 225p	2SD1468	75p 40p	2SD1135 2SD1138	350p	2SD640 2SD655	550p 140p	2SC4059 2SC4064	45p 75p	2SC3421 2SC3422	160p 250p	2SC2979 2SC2987	50p 25p	2SC2499 2SC2500	70p 10p	2SC1957 2SC1959
25C1970 1000p 25C2197 1200p 25C3197 1000p 25C3197 200p 25C3197 400p 25C197 600p 25C197 600p 25C3197 25009 25C3197 200p 25C3197 200p 25C3197 200p 25C3197 200p 25C3197 100p 25C197 100p 25C197 100p 25C197 100p 25C197 100p 25C197 100p 25D176 25D177 25D176 25D176 25D176 25D176 25D176 25D176 25D1767 25D176 25D176	SK786 200p SK787 800p	50p	2SD2012	300p	2SD1496	350p	2SD1142	25p	2SD666	175p	2SC4107	65p	2SC3425	60p	2SC2995	600p	2SC2503	1300p	2SC1967
25C1972 600p 25C527 300p 25C1001 1450p 25C1493 125p 25C1493 180p 25D1169 150p 25D160 25D160 25D160 25D160 25D160 25D160 25D160 25D1161 150p 25D160 25D160 25D160 25D1161 25D160 25D1250 70p 25D1250 70p 25D1250 70p 25D240 25D160 25D1161 25D126 60p 25D1260 10p 25D240 25D126 70p 25D240 25D160 25D126 50p 25D240 25D126 70p 25D240 25D126 25D1161 35Dp 25D126 60p 25D240 25D240 25D240 25D240 25D160 25D1260 25D1260 25D126	SK791 225p SK792 300p SK793 300p	80p	2SD2033	2 350p	2SD1497-0	176p	2SD1148	35p	2SD669	400p	2SC4125	130p	25C3447	1400p	2SC3001	120p	2SC2517	100p	2SC1970
25C1980 300 25C2328 1000 25C3368 1000 25C3461 275p 25C4161 125p 25C725 200 25D1164 75p 25D1151 1000 25D2111 175p 25C1984 1000 25C2542 3000 25C3486 70p 25C4196 600 25D1161 2500 25D1151 175p 25C1986 1000 25C2464 25p 25C3387 125p 25C3481 300p 25C421 400p 25D1164 25D123 100p 25D1233 200p 25C302 15p 25C4546 5p 25C3042 300p 25C342 27p 25C423 550p 25D146 400p 25D1541 130p 25D144 42p 25D144 43p 25D154 40op 25D154 40op 25D154	SK794 315p SK796 600p	2500	2SD2066 2SD2125	50p 60p	2SD1506 2SD1508	65p 150p	2SD1159 2SD1160	250p 180p	2SD676 2SD717	200p 400p	2SC4138 2\$C4157	125p 180p	2SC3457 2SC3459	1450p 1850p	2SC3022	300p 150p	2SC2527 2SC2534	600p 150p	2SC1972 2SC1973
25C1984 160p 25C2542 300p 25C3037 125p 25C4189 700p 25D725 27p 25D1163 280p 25D152 70p 25D225 17p 2SC1985 100p 2SC2546 55p 2SC033 80p 2SC442 75p 2SC0731 250p 2SD1185 350p 2SD1525 600p 2SD233 200p 2SC0301 15p 2SC2546 25p 2SC3040 280p 2SC342 350p 2SD734 15p 2SD1431 350p 2SD144 350p 2SD2340 225p 2SC2002 15p 2SC2551 50p 2SC3424 30p 2SC3502 50p 2SC4424 20p 2SD171 120p 2SD144 30p 2SD146 30p 2SD146 30p 2SD144 30p 2SD144 30p	SK809 850p SK812 150p	35p	2SD2144	100p	2SD1511	75p	2SD1164	240p	2SD722	125p	2SC4161	275p	2SC3461	550p	2SC3026	100p	2SC2538	30p	2SC 1980
125C1986 100p 25C2464 25p 25C2031 25p 25C2031 25p 25C2031 15p 25C2347 65p 25C2340 25p 25C2340 25p 25C2350 55p 25D1185 280p 25D1185 280p 25D141 35op 25D134 35op 25D134 25D134 35op 25D134 25D134 35op 25D134 25D135 25D133 <td>SK817 325p SK851 550p</td> <td>175p</td> <td>2\$D2255</td> <td>70p</td> <td>2SD1521</td> <td>280p</td> <td>2SD1169</td> <td>275p</td> <td>2SD726</td> <td>700p</td> <td>2SC4199</td> <td>70p</td> <td>2SC3468</td> <td>125p</td> <td>2SC3037</td> <td>300p</td> <td>2SC2542</td> <td>150p</td> <td>2SC1984</td>	SK817 325p SK851 550p	175p	2\$D2255	70p	2SD1521	280p	2SD1169	275p	2SD726	700p	2SC4199	70p	2SC3468	125p	2SC3037	300p	2SC2542	150p	2SC1984
25C2003 200 25C2351 700 25C303 500 25C4237 6600 25D743 1300 25D1191 1200 25D1446 3600 25D747 6000 25C2004 200 25C2555 2000 25C3066 600 25C305 2400 25C4278 175p 25D760 700 25D155 170p 25J75 220p 25C2023 180p 25C2555 120p 25C3071 25p 25C306 250p 25D763 140p 25D1755 170p 25J77 25Dp 25C2027 200p 25C2568 120p 25C3071 25p 25C307 30p 25C317 30p 25C171 30p 25D177 20p 25D177 20p 25D177 20p 25D177 20p <td< td=""><td>SK872 650p SK875 475p SK903 500p</td><td>200p 225p</td><td>2SD2333 2SD2340</td><td>100p 350p</td><td>2SD1526 2SD1541</td><td>280p 400p</td><td>2SD1185 2SD1186</td><td>260p 15p</td><td>2SD732 2SD734</td><td>250p 550p</td><td>2SC4231 2SC4235</td><td>275p 275p</td><td>2SC3486</td><td>260p</td><td>2\$C3040</td><td>65p</td><td>2SC2547</td><td>15p</td><td>2SC2001</td></td<>	SK872 650p SK875 475p SK903 500p	200p 225p	2SD2333 2SD2340	100p 350p	2SD1526 2SD1541	280p 400p	2SD1185 2SD1186	260p 15p	2SD732 2SD734	250p 550p	2SC4231 2SC4235	275p 275p	2SC3486	260p	2\$C3040	65p	2SC2547	15p	2SC2001
125C2022 110p 25C2353 200p 25C3068 60p 25C305 240p 25C3278 175p 25D762 100p 25D1955 170p 25D77 350p 25C2028 30p 25C2555 120p 25C307 35p 25C306 250p 25C4300 200p 25D192 100p 25D195 170p 25J77 350p 25C2027 200p 25C2562 90p 25C307 200p 25C317 100p 25C340 350p 25D783 140p 25D1196 60p 25D175 100p 25J173 20p 25D172 100p 25D173 100p 25D172 100p 25D177 100p 25D176 200p 25D177 20p 25D177 20p 25D177 20p 25D177 20p 25D177 20p 25D177 20p 25D177 <td>SK904 500p SK951 275p</td> <td>700p</td> <td>2SJ56</td> <td>350p</td> <td>2SD1546</td> <td>120p</td> <td>2SD1191</td> <td>130p</td> <td>2SD743</td> <td>650p</td> <td>2SC4237</td> <td>50p</td> <td>2SC3503</td> <td>30p</td> <td>2SC3052</td> <td>70p</td> <td>2SC2551</td> <td>20p</td> <td>2SC2003</td>	SK904 500p SK951 275p	700p	2SJ56	350p	2SD1546	120p	2SD1191	130p	2SD743	650p	2SC4237	50p	2SC3503	30p	2SC3052	70p	2SC2551	20p	2SC2003
25C2026 300 25C2562 900 25C3071 250 25C3071 6500 25C3071 6500 25C3071 6500 25C3071 250 25C3071 2000 25C3073 1000 25C3073 1000 25C3073 1000 25C3073 1000 25C3073 1000 25C3073 1000 25C3074 2000 25C3071 1000 25C3071 1000 25C3071 1000 25C3071 200 25D1171 1700 25U109 2000 25D1111 1200 25D1771 1000 25D1771 1000 25D1771 1000 25D1771 1000 25D1771 1000 25D1771 1000 25D1771 2000 25D1111 11000 25D1771 2000 25D1171 2000 25D1111 11000 25D1771 2000 25D1771 2000 25D1771 2000 25D1771 2000 25D1771 2000 25D1761 2000 25D1761 2000 25D1761 2000 25D1761 2000 25D1761 2000 25D176	SK952 275p SK955 750p	220p	2SJ76	170p	2SD1554	150p	2SD1196	70p	2SD760	175p	2SC4278	240p	2SC3505	60p	2\$C3068	200p	2SC2553	110p	2SC2022
25C2037 50p 25C2570 30p 25C375 100p 25C318 120p 25C4313 120p 25D774 20p 25D172 100p 25L113 1050p 25C2055 120p 25C2571 350p 25C317 100p 25C319 25D74 30p 25D172 20p 25D175 20p 25D177 20p 25D177 20p 25D177 20p 25D175 20p 25D175 20p 25D175 20p 25D175 20p	SK956 600p SK962 700p	225p	2SJ79	300p 75p	2SD1556 2SD1565	60p 40p	2SD1198 2SD1207	140p 180p	2SD763 2SD768	200p 550p	2SC4300 2SC4301	660p 750p	2SC3507 2SC3509	25p 100p	2SC3073	90p 200p	2SC2562 2SC2563	30p 200p	2SC2026 2SC2027
25C2055 150p 25C2577 110p 25C3086 150p 25C328 45p 25C328 200p 25D178 25D178 25D177 200p 25D178 200p 25D173 300p	SK1023 550p SK1036 450p SK1057 600p	1050p	2SJ113	100p	2SD1572	120p	2SD1211	20p	2SD773	1000p	2SC4313	120p	2SC3518	160p	2SC3075	30p	2SC2570	50p	2SC2037
25C2080 40p 25C257 110p 25C310 70p 25C331 226p 25C387 426p 25D786 100p 25D125 70p 25D1579 120p 25L1119 700p 25C2081 75p 25C2581 25p 25C3437 226p 25D787 20p 25D127 40p 25D1589 60p 25L162 60p 25D127 40p 25D1591 100p 25L162 60p 25D129 25D19 25D1591 100p 25L162 60p 25D123 30p 25D1591 100p 25L162 20p 25D788 20p 25D123 300p 25D1591 100p 25L182 160p 25C2075 40p 25C2511 70p 25C373 775p 25C448 250p 25D784 30p 25D1950 100p 25L307 125p 25L006 25D795 25D7954 33p 25D1246 20p 25D169 100p 25L307 175p 25D7854 140p 25D1264 25D1260 310	SK1058 800p SK1081 700p	1200p	2SJ116	200p	2SD1576	75p	2SD1218	400p	2SD777	300p	2SC4382	45p	2SC3526	150p	2SC3086	110p	2SC2577	150p	2SC2055
25C2071 140p 25C2588 600p 25C3116 75p 25C358 200p 25D782 200p 25D1737 300p 25D1591 310p 25.1182 150p 25C2073 40p 25C2580 40p 25C3177 75p 25C377 75p 25C431 90p 25D1783 300p 25D1593 125p 25L070 25C2075 60p 25C2592 20op 25C312 160p 25C3581 200p 25C448 250p 25D1794 33p 25D1593 100p 25L300 825J97 25C2075 60p 25C3581 200p 25C448 250p 25D1794 33p 25D1244 20p 25D1695 100p 25L300 100p 25C3307 175p 25D784 30op 25D1244 20p 25D1694 34p 25D1695 100p 25C3149 45p 25C358 20op 25C4517 30op 25D1794 45p 25D1694 45p 25D1691 45p 25D1691 45p	SK1082 450p SK1102 375p	700p	2SJ119	120p	2SD1579 2SD1589	70p	2SD1225 2SD1227	100p 20p	2SD786 2SD787	425p 50p	2SC4387 2SC4408	225p 200p	2\$C3531 2\$C3549	750p 35p	2SC3101 2SC3112	110p 175p	2SC2579 2SC2580	75p	2SC2060 2SC2061
25C2075 60p 25C2591 80p 25C312 50p 25C384 200p 25C448 250p 25D75A 43p 25D124 25p 25D1951 100p 25L307 175p 25C2075 95p 25C2592 200p 25C314 145p 25C391 200p 25C317 250p 25D75A 140p 25D1246 20p 25D169 210p 25L109 45p 25C2085 100p 25C3149 180p 25C3595 20p 25C4517 30op 25D78A 178p 25D1267 40p 25D1609 45p 25K34 40p 25C2085 00p 25C314 180p 25C3595 20p 25C451 30op 25D1247 40p 25D1609 45p 25K43 40p 25C2085 100p 25C3595 20p 25C451 40p 25D160 45p 25D160 45p 25D1632 40p 25C343 40p 25C4531 40p 25C1635 10p 25C369 <	SK1117 250p SK1118 226p	150p	2SJ182	310p	2SD1591	300p	2SD1237	ZOp	2SD789	90p	2SC4431	200p	2SC3568	75p	2SC3116	600p	2SC2588	140p	2SC2071
25C2085 100p 25C2631 10p 25C349 180p 25C3595 220p 25C4517A 300p 25D789 175p 25D1247 40p 25D1698 45p 25K433 40p 25C2065 60p 25C23150 100p 25C3597 75p 25C4517A 300p 25D199 150p 25D1251 180p 25D1632 400p 25C3597 75p 25C457A 1400p 25D1251 180p 25D1632 400p 25C1637 100p 25C3597 140p 25C4574 1400p 25D1254 85p 25D1633 400p 25C1637 100p 25C3597 140p 25C4574 1400p 25D1254 85p 25D1637 150p 25D1637 150p 25D1637 150p 25C1637 150p 25C1637 100p 25C4541 100p 25C1474 40p 25C454 100p 25D1637 150p 25D1647 40p 25C4654 100p 25C454 100p 25C454 25D1647 40p 25C464	SK1120 550p SK1190 350p SK1191 800p	175p	2SJ307	100p	2SD1595	25p	2SD1244	33p	2SD794	250p	2SC4468	200p	2SC3584	50p	2SC3122	50p	2SC2591	60p	2SC2075
25C2092 100p 25C2611 30p 25C3151 175p 25C4599 140p 25D829 45p 25D1254 65p 25D1637 50p 25K55 100p 25C2094 1200p 25C26201 70p 25C3152 130p 25C3600 175p 25C4542 650p 25D811 450p 25D1264 90p 25D1647 40p 25K85 100p 25C2037 2300p 25C26261 70p 25C2607 2300p 25D1264 50p 25D164 250p 25D1264 50p 25D1264 50p 25D1264 50p 25D1264 50p 25D1264 50p 25D1264 50p	SK1217 700p SK1221 200p	40p	2SK33	45p	2SD1609 2SD1632	40p 180p	2SD1247 2SD1251	175p 150p	2SD798 2SD799	300p 450p	2SC4517A 2SC4531	220p 75p	2SC3595 2SC3597	180p 100p	2SC3149 2SC3150	10p 60p	2SC2603 2SC2610	60p	2SC2085 2SC2086
100012304000 2304000 1300 2303000 100012304/42 273012306/9 300812301/64 34817501/64 348175012	SK1275 275p SK1296 350p	100p 100p	2\$K68	40p	2SD1647	90p	2SD1263	450p	2SD811	650p	2SC4542	175p	2SC3600	130p	2SC3152	70p	2SC2621	1200p	2SC2094
25C2099 2500p 25C2626 600p 25C3156 350p 25C3607 160p 25C3607 150p 25D820 250p 25D1265 75p 25D1650 160p 25K97 200p	SK1299 450p SK1317 900p	200p	2SK97	150p	2SD1650	75p	2SD1265	250p	2SD820	350p	2\$C4744	150p	2SC3807	350p	2SC3156	600p	2SC2626	2500p	2SC2099
25C2120 10p 25C2631 20p 25C3158 260p 25C3616 45p 25C4747 375p 25D822 290p 25D1267 55p 25D1656 250p 25K107 40p 25C2122A 300p 25C2632 35p 25C3159 200p 25C3636 280p 25C4752 350p 25D826 30p 25D1271 55p 25D1663 350p 25K109 150p	SK1338 250p SK1341 500p SK1342 500p	40p	2SK107	250p	2SD1656	55p	2SD1267	290p	2SD822	375p 350p	2SC4747 2SC4752	46p 280p	2SC3616 2SC3636	260p 200p	2SC3158 2SC3159	20p 35p	25C2631 25C2632	10p 300p	2SC2120 2SC2122
25C2131 550p 2SC2634 10p 2SC3164 270p 2SC3642 225p 2SC4769 300p 2SD829 375p 2SD1271A 225p 2SD1866 60p 2SK117 50p 2SC2141 60p 2SC2636 40p 2SC3657 400p 2SC4770 250p 2SD836 50p 2SD1866 60p 2SK118 50p 2SC2141 60p 2SC4636 40p 2SC3657 400p 2SC4770 250p 2SD836 50p 2SD1667 120p 2SK118 50p	SK1342 500p SK1350 200p SK1356 225p	50p 50p	25K117 25K118	60p 120p	2SD1866 2SD1667	226p 200p	2SD1271/ 2SD1272	375p 50p	2SD829 2SD836	300p 250p	2SC4769 2SC4770	225p 400p	2SC3642 2SC3657	150p	2SC3169	40p	2SC2636	60p	2SC2141
25C2168 80p 25C2640 1800p 25C3175 150p 25C3688 120p 25C4825 70p 250837 55p 25D124 80p 25D125 85p 25D168 120p 25K125 100p 25K12	SK1357 350p SK1358 400p	650p	2SK133	85p	2SD1669	80p	2SD1274	65p	2SD837	70p	2SC4825	120p	2SC3668	180p	2SC3173	1800p	2SC2640	80p	2SC2166
2SC2188 70p 2SC2654 180p 2SC3778 125p 2SC3779 10p 2SC3679 140p 2SC5002 450p 2SD841 110p 2SD1276 60p 2SD1276 10p 2SD1276 225p 2SD1680 225p 2SK152 40p 2SC2200 250p 2SC2655 75p 2SC3779 70p 2SC3679 140p 2SC5002 450p 2SD844 200p 2SD1277 190p 2SD1680 45p 2SK161 30p	SK1377 150p SK1400 250p	40p	2SK152	225p	2SD1680	60p	2SD1276	110p 200p	2SD841 2SD844	500p 450p	2SC4927 2SC5002	280p 140p	2SC3678 2SC3679	125p 70p	2SC3178 2SC3179	180p 75p	2SC2654 2SC2655	70p 250p	2SC2188 2SC2200
2SC2209 50p 2SC2656 550p 2SC3180 175p 2SC680 380p 2SC5003 350p 2SD850 170p 2SD1684 70p 2SL183 40p 2SC2216 50p 2SC2560 100p 2SC3181 200p 2SC3685 450p 2SC5044 250p 2SD856 48p 2SD1288 175p 2SD1706 325p 2SK168 40p	SK1404 290p SK1461 220p SK1462 425p	40p 40p	2SK163 2SK168	70p 325p	2SD1684 2SD1706	600p 175p	2SD1279 2SD1288	170p 48p	2SD850 2SD856	350p 250p	2SC5003 2SC5044	380p 450p	2SC3680 2SC3685	175p 200p	2SC3180 2SC3181	550p 100p	2SC2656 2SC2550	50p	2SC2209 2SC2216
25C2228A 60p 25C2668 10p 25C3198 30p 25C3588 550p 25C5149 400p 25D863 23p 25D1291 280p 25D1708 376p 25K184 35p	SK1462 425p SK1487 250p SK1507 475p	35p	2SK184	376p	2SD1708	280p	2SD1291	23p	2SD863	400p	2SC5149	550p	2SC3688	30p	2SC3198	10p	2SC2668	60p	2SC2228
25C2230 30p 2SC2881 170p 2SC3202 25p 2SC3715 480p 2SD198 140p 2SD1866 120p 2SD1718 275p 2SK193 40p 2SC2233 100p 2SC2682 70p 2SC3209 120p 2SC3717 120p 2SD199 195p 2SD866A 140p 2SD1297 300p 2SD1729 230p 2SK195 150p	SK1529 700p SK1537 400p	40p	2SK193	275p	2SD1718	70p	2SD1293	120p 140p	2SD866	140p	2SD198	480p	2SC3715	25p	2SC3202 2SC3209	170p	2SC2681 2SC2682	80p 100p	25C2230 25C2233
2SC2235 60p 2SC2688 27p 2SC3210 550p 2SC729 450p 2SD200 180p 2SD867 350p 2SD1730 27p 2SX197 140p 2SC2236 20p 2SC680 60p 2SC3211 220p 2SC3746 100p 2SD201 280p 2SD868 260p 2SD1730 27p 2SX197 140p 2SC2236 20p 2SC3211 220p 2SC3746 100p 2SD201 280p 2SD868 260p 2SD1730 27p 2SX112 35p	SK1544 900p SK1767 275p	140p 35p	2SK197 2SK212	275p 325p	2SD1730 2SD1732	20p 45p	2SD1302 2SD1306	350p 260p	2SD867 2SD868	180p 260p	2SD200 2SD201	450p 100p	2SC3729 2SC3746	550p 220p	2SC3210 2SC3211	27p 60p	2SC2688 2SC2690	60p 20p	2SC2235 2SC2236
25C2238 45p 25C2205 50p 25C3225 50p 25C3225 50p 25C324 90p 25D870 140p 25D1309 140p 25D1740 125p 25K216 200p	SK2038 295p SK2039 750p SK2134 300p	200p	2SK216	126p	2SD1740	140p	2SD1309	140p	2SD870	90p	2SD234	100p	2SC3748	50p	2SC3225	50p	2SC2705	45p	2SC2238

REPLACEMENT VIDEO HEADS

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Model Pric AKAI V\$105, 112, 115, 116, 120, 125, 126, 201, 202, 205, 200, 240, 244, 245, 247, 248, 250, 301, 303, 304, V\$P8, V\$P100, V\$9300, V\$9500 V\$P1700, V\$9700, V\$9800 V\$1200 V\$1
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 3500p

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 VCR6000, VCR4000, VCR5000,
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 VCR8503, VCR8804, VCR9340
 2100p

 VCR8503, VCR8604, VCR9340
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 VCR8514
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 VCR924
 3650p

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 < GRANADA CSI, DS2 VHSAH1 VHSAH3 1800p 1100p 2400p

	R	Er	LA	
e	Mode		P	rice
	VHSAN3 VHSAY3 VHSBH1, VH			800p
	VHS8P1	SCH1		1200p 2100p 850p
P	VHSBY3			2600p 1600p 1600p
ppp	VHSD52 VHSEH2, VH VHSEY1, VH VHSFS1, VH VHSFG2, VH VHSFB3	SEY2		1400p
p	VHSFG2, VH VHSFB3	SFG4, VH STJ2. VHS	SF63,	1300p
P	VHSTJ1, VH: VHSYJ2	STJ2. VHS	STJ3, VH	SWJ3, 700p
	VHSFB3 VHSTJ1, VHS VHSYJ2 VHSVH4, VH VHSVH2 VHSWJI VHS VHSWJI VHS	5WH1, VI 5X./3	15XH1,	1600p 700p
р	GRUNDIG VS410, 415,	435. 450. 4	456, 460,	
P	505, 510, 520 BARCELONA), 521, 530 MV\$540	, 546	1600p 00,
p	GRUNDIG V\$410, 415, 4 505, 510, 520 BARCELONA 600, SE5100, TVR4500, 45 441, 500, 505 V\$5180, V\$6 9091, GV200 SE2100, 511 MADRID, SE V\$5480	6100, 611 10, 5510, 1 510, 518	0,9100 /\$400,44 .600.61	40.
P	VS5180, VS6 9091, GV200	190, 700, 201, 209	900, 901,	902.
p	SE2100, 5110 MADRID, SE	0 5140, VS5	40.	1400p
p	MV/\$550 620	, VS550, 6	520, 630,	3000p 640, 2400p
P				2300p
	VS680, GV28 VS160, VS74 VS170 MVS660, SE0	O STRO VER		4400p 4600p
	VS6690			3500p
	MVS710, 720 VS710, 716, 7 VS922, 9291, MV2105, 211	, 910, SE7	120, 912	0. 920,
р Р	VS922, 9291, MV2105, 211	GV210, 2 5, SE2120	11, 220, 3	1700p
P P P	VXL2, 3, 4, 20			1000p
٢	VXL6 VXL7			1300p
P,	VXI8 9 10 1	11, 19, 90,		
р	HITACHI	16 30 33	34 330	1100p
p	503, 640, 503 VT7, VT17, V	0, VTP10, T18, VT19	30	1000p
P	VT35, VT350, VT100, 110, 1	VT38, VT	39 13, 115,	2300p 118,
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p	100, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,	, 725, 210, 821, 825	211, 215	5, 726.
p	921 VT3000		NO VITEE	650p
P	VT3000 VT4000, VT42 VT5600 VT77, 680, 65 8000, 8030, 8 VT870C, 9000 9900 VT8 9, 56, 57	00. 6700,	6800, 700	1100p
P.	8000, 8030, 8 VT8700, 9000	040, 8100, 9300, 95	8300, 85 00, 9700	500
p	9900 VT8, 9, 56, 57 588 VT65	, 570, 575	. 576, 58	0, 585, 3200p
P P P	VT65 VT130, 135. 1	38. 145, 2	50, 255, 2	2400p 258,
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P	VT52, VT60, V VT64, VT640	/T61E, VT	62E, VT6	3, 1100p
I,	(4 HEAD)), VT260, V	71450, V	2200p 2050p
	VT530 VT522, VTM2 822, 922, 925 VT660E	12, 620, 6	22, 720,	722, 1650p
P	V15/0, V15/5	o, VI 580, V	/1585, V	1588,
p p	VT540, 545, 5 VTM598, 640, VTM730, 731, 748, 753, 754, VTM841, 845, VTF770, 774,	45, 548, V 645, 646,	TD660, 6	65,
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5	VTF770, 774, 865	775, 860,	861,	1100p
p	VT85, VT86, V VTF780, VTF7	/T88 /85	4	2600p 1800p
	VT85, VT86, V VTF780, VTF7 VTF180, VTF1 VTF180, VTF1 VTF350, VTF3 VTM220, VTM VTS390F	185, V 11-20 151 1220E, VTP	4220UK	150p
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•	HRD110, 111, HRS100, 8904	120, 121, 8923, 89	220, 225, 24, 8925,	8929,
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2	HRD154, 170, 320, 321, 350,	171, 210, 521, 522,	211, 217, 526, 526	310,
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	FV26 HRD565, HRD	566, 3V48	1	2000
	3V64, 3V65, F FV26 HRD565, HRD HRD725, HRD 8930, 8931, 85 3V30 8945	755, 3V43 33, 8940,	, 3V53 2 3V29,	850p
,	3V00, 8902, 89	903,8909,	8912,	700p 400p
,	8922 FV31, FV41R	UDDA	1	000p 500p
2	8922 FV31, FV41R FV37, FV43R, BR70005, BR7 BR7030/40H, I HR7200, 7300 BR6200	0005, BR	7030, 3	100p
;	HR7200, 7300 BR6200	, 7350, 26	50,	7000
2	HR0455		2	000p 400p
	HRD300, 400, 640, 650 HR4100		2	000p
	HRD750, HRD	830, HRD	360 3	300p

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/39	5.BR:	5600,	SRS	5800, 90 368E	<i>o</i> oc	5550 1400 2600 1950)p)p
/67	HV. F	V68T RIES	X, FV	77		3800	9 P
/421 916	L OL, V 00, H	R172	L)5	1	210	1950 3300)p)p
RJ6 RJ3 RJ3	05UK 00, H 16EG	CHR RJ30	J610E 5, HR	K U315,	000	7100 3750)p
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(50 38 CRL	0E, 8 3, VX	00A.	810A	. 820, 80		7708 1200 1450	in I
			VX75 VX99 5, VX8			1500 1750 1100 2650	p
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30 31 33 33 33	7 9 0			0, HS70 0 2, HSB2 5, 37G		2300 1900 2300 2800	p
34 32 41	9. HS	E27, M33,	31, 3 34, 3	2, HSB2 5, 37G	7,	2150	p
33 5E1 5E4	в 0. нS 1,	E11,	HSE2	O, HSE2	1,	1900	p p
81 30 27 20	0, HS 0, HS 3, HS	B20 301, 550C	H530	2. HS31	0,	2100 1350 650	P
33 81 , 25	7, HS 2, HS , 30,	347 E12, MX1	HSE2	2, HSM	160	1400 3, 18, 2100	p
81 85.	1, HS 2, HS 58.	B21 E50, 60	1G2 52G,	10, HSE2 2, HS31 12, HSM HSM36,	50	2600 2000 1, 54, 3300	P P
E5	1 2, HS	421G	52G, 4, HS	5600		3000 3250 1000 3050	
M2 M4	0, H9 0 9, H9	SM55	E			2250	p p p
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(80) ATI	7, NV 50, N DNA	330 V805	1 NAS	, 340, 39 0.7500, 0, 8600, 0, 8600, 0, 8600,		1502800	P
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G3 SD	0, 31 30, 1 5, NV	, 40, 0EE, G46	130, M 11, 2,	VJ37, 4 30, 35	0.	42, 1450 1700	P
210 430	, NV 00, A 0, NV 22, N	M3, F G220 431, IVSD.	0 NV43 25, N	10, 20, 1 17, 30, 35 3, NVSE VSD3 70	2,	700 700	p
730 EA 366), NV D HO. 1	730F,	, NV7:	70	1	450 850 2000	b
850	NV.	950				500 400 750	P
601 J47 70	4, N	VG33 NVSI	D20E	0 NVL23, : E, , 120, N	25,	28,	
G1 G1 G1 G1 G1	4, 45 0, 11, 65	12, 1	14, 16	, 120. N	1	500	
G1 G2 D4	B 0,21, B 1, NU	22, 2 G300	25, 28	, 200.	1	800 700	P P
64	2				- 94	450 600 400	
600 680 610 G7,	0, AI	H681 3620 39, N	0, AG 0, AG V230	6820 6300	221	050 600 600	
780 G 1 M7	5, NV	/G40 //G40	0		NNN	400 600 800 200	
J45 SD-	NV.	J47			NNA	250	P
F55 FS2 /80	00, M	VFS VHD	88, N	6820 6300 VSF90, NV HD 1	4	000) 800)	p p
HF SD 733	100 0, A0	3735	0, AG	7355,	31	400	P
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N9052, N9 VCP1	530, DX200	10 3 1	150p 400p 700p
764 DS6000	2400, 740, 7	1	400p 500p 500p
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VH1, VH2A D1000, D1	100	5) T	100p 700p 600p
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VR6420 VR67114 H VR6440	HEAD	1 2	725p 800p 500p
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SV7400, SV	8400	1	500p 500p 200p
SV900, SV9 SV601, SV6 SV800, SV8	900 511, SV691 310	0 1	450p 500p
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923N	20	20	550p 500p 550p
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VC900, VCH851, VCH852, VCH882 VCH80, VCH81, VFH815 VCA33, VCA36, VCA43, VCA VCA45,	2700p 2800p
VCA49	1500p
VCA35, VCA33 VC570 SONY	2200p 2800p
DSR-19H FOR SL-T 9ME DSR-21 R FOR SLC 8-C9 DSR-35R FOR SLC 8-C9 DSR-35R FOR SLC 400, C40,	2600p SLF1UB,
SLF12, 30PF, 35, 60PS, SLK8 SLT20ME, 30ME, SL100	1500p
VCA85, VCA83 VCS70 SONY DSR-19R FOR SL-T 9ME DSR-21 R FOR SL-C 8-C9 DSR-35R FOR SL-T 9ME DSR-35R FOR SL-T 9ME DSR-35R FOR SL-T 8ME SLT20ME, 30ME, SL100 DSR-33R FOR SL-T RANGE, SL5100, SL3000, SL3000, SL300, SL0 SL452, SL130 SL452, SL452, SL450, SL410, SL452, SL452, SL450, SL410, SL452, SL452, SL450, SL410, SL472, SL427, SL427, SL474 DSR43R, SLHF100P, SL475, SL473, SL474, SL475, SL474, SL475, SL474, SL475, SL474, SL475, SL474, SL475, SL474, SL475, SL474, SL474, SL474, SL474, SL474, SL474, SL474, SL474, SL474, SL474, SL474, SL474, SL474, SL474, SL474,	515000, E. 1300p
SLT7ME SLV201, SLV202 SLV201, SLV202	1600p 2000p
SLV275, SLV373VB, SLV410, SLV412, SLV427, SLV474 DSR49R, SLHF100P	2200p
SLHF100UB SLV656, SLV715, 725, 727, 75 SLV777, SLV815, SLV825	3850p 7, 4600p
SLV353UB CCDF340E, CCDF500E, CCDV CCDV95E, CCDSP5E	2600p 90E, 4800p
SLV801, SLV802 SLV310, SLV315, SLV325, SLV335	3550p 1600p
SLV210, SLV212, SLV270, SL SLV265, SLV300 SLV125, 213, 225, 252, 255, 2 SLVX1, 20, 3	273, 1150p 62, 280,
SIVYES	1750p 2750p 3000p
SLVX75, SLVX90, SLVX95 SLV282, SLVX30, SLVX35 SLHF100P, SLHF100UB	2025p 3850p 5150p
SLVE7, SLVE8, SLVE9 SLVE90 SLV615, SLV625, SLVE600, S SLVE800	5150p
TOSHIBA V63 V9680	1500p 3400p
V8600, V8650, V8700 V21, V31, V32, V33, V50, V51, V53,	3000p V52.
Veson	1450p 700p V81,
V55, V57 V71, V73, V74, V75, V77, V80, V82, V83, V841V85, V86, V87, V88 DV90, 96, 97, NM3, V108, 105	1200p
V88 DV90, 96, 97, NM3, V108, 109 199, 200, 202, 205, 207, 209, 8 93, 94 V5470, V5480 V600	1450p 1300p 2360p
V880MS V700G	2360p 2600p 3700p 2500p
V500G, V509G V9680 V300G, V301, V305, V306, V309G	2900p
V3092 V110, V120, V130, V140, V210 V120, V120, V130, V140, V210 V220, V221, V222 V271, V280 VCP51E, VCP2C2 V55, V66, V6 V312, V322, V412 V312, V322, V412 V312, V322, V412	2550p 1700p), V211,
V220, V221, V222 V711, V380 VCPB1E, VCP2C2	1500p 3850p 1200p
V65, V66, V6 V312, V322, V412 V91G	1250p 2600p 4600p
V609, V610V610B, V610UK, V V659F, V660, V660F V312, V403T, V413G V703W, V813G	611, 3200m
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Model	Price	
AKAI VS10, VS9300, VS9500, VS	9700, V59800,	FVHP
VS10, VS9300, VS9500, VS VP7100, VP77 VS1, VS2, VS3, VS4, VS5, V VS12, VS15	185p /S8. VS8, VS9, 165p	
VS12, VS15 VS105, 112, 115, 116, 120, 126, 155, 165, 205, 220, 240 VS247, 248, 250, 512, VS51	125,	GHV
VS247, 248, 250, 512, VS51 VSX9	5, 516, 165p	GHV
VSX9 VS201, 301, 303, 304, 803, - VS282, VP58, VP82 VS125, VS155, VS185, VS2 VS12	506, 607, VSP8, 165p	GHV 4410
V\$125, V\$155, V\$185, V\$2 V\$512	20, VS240, VS250, 165p	8430 1291
VS22, 23, 25, 35, 37, 38, 53 426, 427, 462, 465, 467,	, 66, 75, 422, 425,	4200 4315 GSE
VS485, 765, 766, 767, 768, VSA77, VSA650,	865, 867, 965, 967,	GSE 1910
V3512 VS22, 23, 25, 35, 37, 38, 53 426, 427, 462, 465, 467, VS485, 755, 766, 767, 768, VS477, VSA650, VSF10, 11, 12, 16, 180, 190 221, 222, 230, 240, 30, 33 VSF330, 4, 500, 550, VSF8 VS5420, 450, 470	, 200, 210, 220,	VT7,
VEE260 261 262 265 270	274 275 280	0000
290, 340, 350, 410, 420, 43 VSF441, 440, 450, 455, 480	C , 490, 497, 510,	VM6 VT8
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55, 60, 64, 65, 70, 73, 74, 7 V\$P110, V\$X580, V\$X580	5, 165p	168. VT25
VS17, 20, 22, 23, 24, 25, 26 55, VSA77	1, 27, 36, 37, 38, 53, 775p	418, V74
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PINCH ROLLER ASSEMBL VS422, 425, 426, 427, 462, 765, 766, 767, 768, 865, 867, 965, 967, VSA650, VS 180, 190, 200, 210, 220, 221, 222, 230, 240, 30, 300 330, 4, 500, 510, 600, 460	F10, 11, 12, 14, 15,	575, VT8- 780
221, 222, 230, 240, 30, 300 330, 4, 500, 510, 600,	, 301, 310, 320, 33,	780, VTL: 622,
PINCH ROLLER ASSEMSL	Y UUUU	727.
VSS99 ALBA	165p	821
VCR3000X, VCR4000 VCR6000, VCR6000 VCR161, VCR222	165p 166p	925
VCR7000, VCR7800, VCH8	180p	3280
VCR8800 VTV10	165p 165p	
AMSTRAD VCR1000, 2000, 4500, 460 5100, 6200, 8600,	0, 4700, 5200, 6000	
VCR8602, 8603, 8604, 870 8804, 9000, 9005.	0, 8704, 8714, 8804	VTF 280, VTF
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9340 PINCH ROLLER ASSEMB	7000	VXI
153148 TX3650, UF20, VCR3000, VCR9500	VCR3002, VCR400	0. VXI
PINCH ROLLER ASSEMB	LY PART NO:	V20
DD9900, 8904, TX3650, U VCR3000, 3002, 9500	F20, 22, 24, 185;	HB
V\$1004 V\$1104	165	2 HR:
3V00, 3V01, 3V16, 3V22, 3 8900, 6901, 6902, 6903, 8 8912, 8922, 8923, 8924, 8 3V29, 3V30, 3V31, 3V32, 3 8933, 6940, 6941, 6942	3V23, 3V24, 3292, 904, 8906, 8909,	HR 150
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3V57, 3V58, 3V59, 3V65, 3V59, 5V59, 5V59, 5V59, 5V59, 5V59, 5V108, 118, 22L, 26D, 318, 32L, FV33H, 5V44L, FV46T, FV508, 518, 52L, VC141L, FV37H, FV44L, FV46T, FV508, 518, 52L, SV649, 5V69, 5V6, 5V6, 5V6, 5V6, 5V6, 5V6, 5V6, 5V6	165 13H, 14T, 20B, 21R	P HR 215
22L, 26D, 31R, 32L, FV33H 50B, 51R, 52L, VC141L	1. 395, 41R, 42L. 165	p 600
		P SR HR
3V35, 3V36, 3V38, 3V39, 8944 PINCH ROLLER ASSEME	1100	
3V42, 3V43, 3V44, 3V45, 3V55, 3V50, 3V57, 8945, PINCH ROLLER ASSEME	3V48, 3V53, 3V54, 8947, 8948 1350	704
PINCH ROLLER ASSEME FV37, FV57, FV58 PINCH ROLLER ASSEME	3LY 350	909 BR
FV31R	185	
FV41L, FV42L PINCH ROLLER ASSEME	925 SLY	PI
3V58, 3V59, 3V64, 3V65, 20, 21, 22, 26, 30, 32, 33 FV39, VC141L	875	16
PINCH ROLLER ASSEME FV43H, FV44L, FV45X, F	BLY	PI HP
PINCH ROLLER ASSEME FV61, FV62, FV67, FV68,	BLY FV70, FV71, FV72,	60 HF
FV74, FV77 PINCH ROLLER ASSEMI	BLY 775	P11 BP
FISHER FVHP420, 520, 530	165	in 19
FVHP615, 618, 620, 622, 720, 721, 722, 725, 730, FVHP810, 630, 840	710, 711, 716, 716, 716, 165	35 Ip HF
FVHP905, 906, 907, 908, 918, 970, 975, 980, 990,	FVHP 5000, 5005.	PI
5050, 5075, 5100 VBR330, V8S3500, 7000	, 7100, 7500, 7600,	H
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FVHD140, FVHD40, FVH	D55, FVHP1, FVHP	10. V
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PI	NCH ROLI	LER ASSEMBLY	1350p	HSE11, 12, 1 52, 5300, 54 31, 32, 41, 5
G	OLDSTAI	R 1, 1232, 1233, 124 1245, 1246,165p 248, 1250, 1266,	40, 1241, 1242,	150. RSM16
11	PG5 1296	1392 1393		27, 30, 33, 3 40, 45, 450, 9 HSMS2, 9, H 15, 17, 19, 2
G	HV1891, 1	900, 2145, 3000, 3 00, 9200, GM/92	8010, 4400, 10, 8215,	
84	30GHVP1 291, GHVP	240, 1241, 1247, 1295, 1296, VCP4	1248, 1290, 000, 4100, 4130,	303, 85, 5V8 HS200, HS3 HS304, HS3 HS700
444	200, 4300, 315, 4316, 551200, 1	1240, 1241, 1247, 1295, 1296, VCP4 4301, 4305, VCP4 4320, 4321, 4325, 291, 1295, 1296, 1	4326, 4350, 4326, 4350, 1297 1891	HS306, HS3 HS338, HS3
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8	300, 8500,	30, 5500, 6500, 68 8700, 930, VT950	0,9700,9900,	NV100, 180, 600, 668, 77 AG6010, 60
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7	1840, 830 80, 785, 80 71 30, 100	VTF680, 665, 70 60, 861, 865, 0, 2000, VTLC50, 26, 630, 635	VTM598 620.	NVH70 NVG9, NVG
8	22, 625, 6 TM636, 6	26, 630, 635	722, 725, 726.	AG6840, 67 7355, 7650, 28, NVG300
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8	21, 622. 8 /TM835, 8	25, 830, 831, 38, 840, 841, 845,	920, 921, 922,	NVV8000 NVD48, NV NVJ700PX
2 1 2	TS80, 85,	28, 830, 831, 38, 840, 841, 845, 31, 935, 890, 895VM200, VMS7200	2300, 2380, 3200 1650	NVHD100, INVSD40
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1	/TF360, 285, 3 /TF360, 36	55, 180, 185, 250, 50, 351, 355, 35, VTM140, 141, 15, 220, 221, 31, 235, 284, VTS	145, 145, 210,	42, 45, 47, NVL20, 23. PINCH ROL
				N.E.C.
	/20H, VXL H13V, VTV	5, VXL6, VXL7, 8,	9, 10, 11, 19, 90 165p	N830, 831, PVC2300, 2 766
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	VXL90	LLER ASSEMBLY	7006	9110, 9120 N9530, 961 DS6000G,
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				VH800, 82 974, 1012, VH1060, 1
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1	SR3200, 3	30, 368	105	VH3060, 4
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1	VR	5943	4458K	3	542, V			1666	•
	234	464, 6 0, 235	50, 24	14, VH	2480,	2485,	2486	, 2334 , 2489, 560,	
	VRI N-1	B660, 700,	6860. /R287	6861. D	6862.	6863		165	
	VH: 495	2025, 586, V	VH65	50, VM	6862. 0581 9, 6448	1, 544	9, 654	105	
1	PR	HB ESSU			ASSE			103	P
•	402 DV 291	186, 1	90, VI	R211, 312, 3	2115, 3	212. 2	13, 2	23, 286	5.
,	VR 47	3210.	3219, 582,	322. 3	8229, 3 61,	23, 53	SBD.	23, 286 , 486, 80,	
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	VB	231.2	232. 3	35812 32, 42	2 3581	3 9, 512,	522	300 3,722, 185	100
	VR	29,72	_			-	PR3		
	VH	R110	0, 111	0, 115	0, 120	0, 130	0, 15	00.	

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2	Model Price	
	VHR2700, 3330, MVR220 165p VTC5000, 5150, 5300, 5350, 5400, 5500, 6000,	5 9
	6010, 6500, 9100, VTC9300, VTCM10, 20, 11, 21, 30, 31, 40, 50,	Ş
	VPR5800 165p VHR3100.3300, 3310, 3400, 3500, 3700, 3800,	P
	VTC3000 165p	AV
14,	VHR120, 130, 14, 141, 143, 14, 150, 151, 153, 154, 15, 16, 171, 194, 22	A>1>>>125>>>>4>1>>>125>>>>
Sp	154, 15, 16, 171, 194, 22 0VHR23, 252, 240, 244, 250, 251, 274, 27, 297, 310, 330, 335, 356, 330, VHR4100, 4105, 4150, 4200, 430, 4300, 4350, 4400, 474, 4770, 500, 6850, 7100, 7200, 5300, 5350, 5600, 5700, 6850, 7100, 7200, 7250, VHR7269, 7300, 740, 7440, 7500, 7520, 7530, 7540, 7700, 773, 780, 0VHR7810, 8000, 8070, 8100, 8200, 2500, 8500, VHR04000, 4410, 4500, 4500, 4410, 4710, 4890, 6700, VHR57001 85p VCR100 1650	V
5p	4150, 4200, 430, 4300, 4350, 4400, 474, 4770, 5080, VHRS100, 5200, 5300, 5350, 5600,	1 2
	5700, 6850, 7100, 7200, 7250, VHR7260, 7300, 7400, 7440, 7500, 7520, 7530, 7540, 7700,	5
B	774, 780, 0VHR7810, 8000, 8070, 8100, 8200, 8250, 8500, 8800, VHRD4400, 4410, 4500,	V
50	4600, 4610, 4710, 4890, 6700, VHRS700165p VCR100 165p	VV
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433,	PINCH ROLLER ASSEMBLY VHR3100, 3200, 3300, 3310, 3400, 3700,	1
870.	VHR3100, 3200, 3300, 3310, 3400, 3700, 3800, VHRDS00, 7000 1350p PINCH ROLLER ASSEMBLY	1
00,	CUADD	1
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5p	VC699, 700, 772, 750, 779, 780, 781, 7810, 782, 782MK2, 7822, 783,	
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65p 250,	VHL3, VR1000, 2000, 2500, 3200, 3300, 3500, 3600, 3650, 3800, VR54400, VR55000 165p	
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66 p	SAMSONCE SV716, 717, VB510, 520, 610, 616, 617, 519, 620, 626, 627, 629, 900, 910, V1510, 520, 611, 616, 521, 626, 900, 910, VX510, 520, 613, 616, 521, 626, 900, VX617, 619, 628, 627, 629 SVX301, 303, 305, 307, 319, 322, VB710, 713, 750, 770, 910, 8220, 8225, 970, VX710, 713, 770, 750, 8220, 8225, 970, VX710, 712, VY720, 730, 757, 737, 790, 825, 8275, 870,	
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65p	356 165p PX990, 991, 992, S11230, 1240, SVX4000,	
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).	 PINCH ROLLER ASSEMBLY SV6700.8750, 9700, VHR3100, 3200, 3300, 3310, 3400, 3700, 3800, VHRD500, 7001350 PINCH ROLLER ASSEMBLY 	P
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1 2	5X9, V\$105, 112, 115, 116, 120, 125, 1 55, 165, 205, 220, V\$24, 240, 244, 245, 48, 250, 512, 515, 16	
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1 1	CR40000	130p
V	CR5000, VCR6000 CR161, VCR222	105p 100p
V	CR7000, VCR7800, VCR8000, VCR8800	75p
12	TV10	105p
1	VR123, VCR4600, VCR4700, /CR5200	110p 80p
1	/CR7000 /CR1000, 2000, 6000, 6100, 6200, 8600	8602.
1	i603, 8604, /CR5700, 8704, 8714, 8800, 8804, 9000 (244, 9340,	, 9005,
1 c	D8900, DD8904, TVR4 TX3650, UF20, 22 24, VCR3000, 3002,	110p
1 9	/S00 /S1004	7Бр 105р
17		200p
11	TV200, ATV222, ATV224 ATV202, ATX200	90p 150p
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11	RTV317 RTV301, RTV333, RTV338, RTV404,	50p
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	FV74, FV77 FV43H, FV44L, FV46T, FV57H	50p 100p
	FV37H 3V52	80p 55p 100p
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	6100 VCR100	180p
	VTR1000, VTR1001 TX3650, VCR3000, VCR3002.	100p
	VCR9500	76p
	VB\$7000 V8\$9000	245p 120p
	FVHP520, FVHP530, FVHP420 FVHP615, 618, 620, 622, 710, 711, 735 721, 722, 725, 730.	600
	FVHP830, 840	75p
	FVHP905, 906, 907, 908, 910, 911, 911 918	5.916. 75p
	VBR330, V857500, VB57600, V859900	100p 75p
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	GRANADA VHSH1, VHSAH3	100p
p	VHSVH4, VHSWH1, VHSXH1 VHSYH2	60p 50p
	VHSBH1, VHSCH 1 VHSBP1 VHSAN3	150p 135p 110p
P	VHSAN3 VHSDS2 VHSAY3	126p 125p
p	VHSRV3	100p 70p
	VHSEY1, VHSEY2 VHSCC1	100p

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TELEVISION TV/VCR SPARES GUIDE SPRING 1997

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

Aiwa UK Ltd., P.O. Box 443, West Drayton, Middx UB7 ONZ. 0181-899 5520 Fax 0181-899 0055/0181 564 9067 See also CPC and Willow Vale.

Akai UK Ltd., Haslemere Heathrow Estate, 12 Silver Jubilee Way, Parkway, Hounslow, Middx TW4 6NQ. 0181-897 6388 Fax 0181-759 6118 (Service

only). See also CPC, Wizard and Chas Hyde.

Akura Spares available from Akura Components Ltd., 44 Deerdykes View, Westfield, Cumbernauld, Glasgow G68 9HW. plus spares for Minoka and Royal Lux. 01236-457 022 Fax 01236-457 053. Alba Radio Ltd., 12 Thames Road, Barking, Essex IG11 OHZ. Spares for Alba, Bush, some Goodmans and Hinari models and some Brother microwave and Dirt Devil. 0181-787 3000 Fax 0181-787 3110 See also Willow Vale, CPC,

Ambassador Brand name used by Sentra Electronics.

Wizard.

Amstrad Spares handled by CPC Ltd. See also Chos Hyde & Son Ltd., Willow Vale and Wizard.

Autovox See Comet Group plc:

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

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

Beovision/Beocord Bang and Olufsen UK Ltd., Unit 630, Wharfdale Road, Winnersh, Wokingham, Berks RG41

5TP. 01734-692 288 Fax 01734-694 477, See also CPC.

Binatone Electronics plc., Binatone House, 1 Beresford Avenue, Wembley, Middx HAO 1YX. 0181-903 5211 Fax 0181-903 5521.Trade only. Blair's Electrical Services, 13 Belgrave Road, Dresden, Stokeon-Trent ST3 4PR. Spares for Saba, Thomson, Telefunken and Nord Mende. 01782-599 377 Fax 01782-599 378.

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

BPL Spares for these TV sets available from Falmouth Hi Fi, 14 Market Strand, Falmouth, Cornwall TR11 3DE. Spares also available for some Crown, Dansai, Datsura, Kuro and Zenor models. **01326-313 412** Fax 01326-211 210.

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

Cambridge Spares available from SEME.

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

Cathay Spares available from Diamond Television.

Commodore Spares available from CPC.

Comet Group plc., After Sales Service H.Q., Unit 5, City Park Ind. Estate, Gelderd Road, Leeds LS12 6DR. 01132-310 523. Spáres önly – accessories direct. Fax 01132-311 463.

Contec CTVs sold by Dixons: Spares available from Partmaster.

CPC Ltd., Component House, Faraday Drive, Fulwood, Preston, Lancs PR2 4PP. 01772-654 455

Fax 01772-654 466. Authorised spares distributor for Aiwo, Alba, Amstrad, Bush, Citizen, Commodore, Ferguson, Fidelity, Finlux, GEC, GoldStar, Goodmans, Hinori, Ingersoll, IIT, Logic, Luxor, Matsui, Nokia, Orion, Osume, Pace, Philips, Pye Saisho, Salora, Samsung, Sinclair, Skantic, Sony, Toshiba and Triumph.

Compatible spares available (video certain models only) for Akai, Bang and Olufsen, Canon, Crown, Daewoo, Decca, Duol, Funai, Grundig, Hantarex, Hitachi, JVC, Kenwood, Marañtz, Mitsubishi, NEC, Nikkai, Panasonic, Pioneer, Questar, Sansui, Schneider, Sentra, Sharp, Solavox, Tashiko, Tatung and Telefunken.

Crown Corporation Spares available from Key Electronics. See also CPC, HRS. Made in India models see BPL.

Daewoo Electronic Sales UK Ltd., Daewoo Building, Wharfedale Road, Winnersh Triangle, Wokingham, Berks RG41 5TP. 01734-272 272

Fax 01734-699 000. **Note:** Daewoo brand products only, not OEM products. For the latter, refer to the original distributor. See also CPC and Willow Vale.

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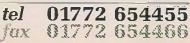
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Dansai TV and Video spares available from NEI. Made in India models see BPL.

Datsura See BPL.

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

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

Diamond Television 15/1.5a Rodbourne Road, Rodbourne, Swindon, SN2 2AG. Spares for Cathay and Venturer products. Murphy TVs with model numbers starting CTV, the Murphy VCR7101, Sansui SV77 VCR and Osaki VCR31/2/3 plus mechanical parts for the VCR35, also spares for the Venturer audio full range. 01793-497 591

Fax 01793-431 687.

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

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

Etron Brand nome used by Nikkai Imports Ltd.

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

Ferguson Thomson Multimedia Sales UK Ltd., Spares Dept, Crown Rd, Enfield, Middx EN1 1DZ.

0181-344 4411/2 Fax 0181-344 4452. See also CPC, HRS, Chas Hyde, SEME, Willow Vale and Wizard.

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

Finlandia Spares available from Granada Rental Services.

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

Fujitsu General 154 Grea[®] North Road, Birchwood Industria Estate, Hatfield, Herts AL9 5JN. 01707-272 841 Fax 01707-273 111.

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

General See Fujitsu General

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

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VT8500, 8700 80 VT680, VT6500, VT6800, VT9300, VT9500, VT9700, 9900 75	790, 8220, 8225, 5E9060, 9001 90p	VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI		PART NO:	(POWER SWITCH +	REMOTE
VT9700, 9900 75; VT52, VT57, VT61, VT62, VT83, 84, 65, 85, 86 640 90;	8. W1710, 730, 750, 970, VX710, 712, 720, 730.	(HS200), TELEFUNKEN (VR510,			SWITCH	
VT3000 120 VT100, 110, 111, 113, 115, 118, 120, 125, 121	P 10/0000 110-	519, 610), THOMSON (VK300,		USED ON: PRICE:	KV2022, KV2024 200p	
130, 135, 138, VT145, 150, 168, 170, 175, 220, 225, 250, 255 258, 260, VTL30 90	SANYO	305, 306, 3301), FERGUSON		PART NO:	(POWER SWITCH 2	
VM500 VM600 90	P 21, 30, 31, 50 75p VTC5300, VTC5350, VTC5400,	(3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912,		USED ON:	KV1400, KV1440, K KV2060	V2040,
HR3300, HR3330, HR3360, HR3660, HR4100 130 HR7200, HR7300 70		8922, 8925)		PRICE:	125p	
HR7350, HR7600, HR7610, HR7650, HR7655 75	VTC1100, 1300, 1500, VHR1100, 1110, 1150.	BLAUPUNKT, ORION (VH1, 2A),	VL02 30p	PART NO:	(POWER SWITCH 2 REMOTE SWITCH)	
HR7700 751 HRD110, 111, 120, 121, 220, 225,	VHH1500, 2370, MVH220 90p	NATIONAL (NV200,2010, 3000,	*L02 00p	USED ON:	KV2020	
BP5000 90 HRD 140, 141, 143, 150, 152, 157, 158, 160, 190, 250, 257, 310, HRD455, 565, 566, 725,	VHR2700 100p VHR3100, 3110, 3150, 3300, 3310, 3400,	7000, 8150, 8200, 8400, 8600,		PRICE £2.00 PART NO:	2 PIN (FUNCTION S	SWITCH
755, HRP50 566 HRD170, 171, 180, 210, 21 1, 217, 230, 300, 320, 321, 330, 337, HRD350, 370, 400, 430,	TL\$1001 80p	8610, 8620), SHARP (VC2300,		USED ON:	KV1612, MKK, V16	
440, 44 1, 500, 530, 700, 750.950, HRS5000, 5500, 8000, 9000, 8R9060,	VHR120, 130, 14, 141, 143, 14, 150, 151, 153, 154, 15, 16, 171, VHR194, 220, 23, 235, 240,	6000, 6200, 6300, 7300, 7700, 8300)			KV2052, KV2056, K KV2215, KV2216, K	
BRS600, 605, 920, 925 - 50 HRD227, 520, 52 1, 522, 527, 600, 610, 620,	P 244, 250, 251, 274, 297, 310, 330, VHR335, 390, 4100, 4105, 4150, 4200, 430, 4300, 4350, 474, VHR4770, 5080, 5100, 5200, 5300, 5350,				KV2256, KV2704, K	
637, 641, 650, 830, HRD840, HRDX20, 22, HRJ200, 205, 300, 30 SR330, HRS10 80	5, 5700, 6850, 7100, VHR7200 7250, 7260, 7300,	AKAI IVS10),GRANADA VL (VHSXJ3), TT (VR3993,3994),	_06 40p		KV2706, KV275PE3	
HRD840, 550, 560, 580, 590, 640, 660, 870, 720, 730, 740, 770, HRD820, 860, 870, 880,	7700, 774, 7800, 7810, 8000, 8100, 8200, 8250, 8500, VHR8800, 8801, VHRD4400, 4410,	JVC (HR2650, 7600, 7610, 7650,		PEOLA	KV2756PE3	
910, 960, 980, HRDX20, 25, HRJ2 10, HRJ215, 315, 316, 318, 400, 405, 407, 410, 411, 415, 416, 507, HRJ6 10, 615, 715, 97,	4500, 4600, VHRD4610, 4710, 4890, 670075p VMD66, VMD68P 80p			AKAI M132773		IT01
HRS4700, 5800, SR3200, SRS368E 60, HRJ600 40;	p VIC6010 /3p	535, 539, 550, 630, 650),		GOLDSTAR	MZ366960J2 VXP0521	IT02 IT17
LOGIK VR955 180;	SHARP VC200, 381, 384, 385, 386, 388, 390, 393, 838 9100, 9300, 9500, VC9700 100p	THOMSON (V309, 316, 357, VK309, 411,TX8000),		HITACHI	6861471	1103
MATSUI VX600, 730, 735, 750, 755, 765, 850, 6000, VS888 751	VC7300. VC7700, VC7750, VC7800,	FERGUSON (3V31, 8941, 8942)			6861482	IT04
VX1000, VX2000, VX2500, VX3000, VX6000 1001	VC8300 115p		07 400	JVC/	6886971 PU 489678	IT05 IT06
VX800 70j MITSUBISHI	P 496, 8481 80p VC402, 500, 571, 573, 581, 582, 583, 584, 585.	AUTHENTIC (N850), DECCA VI (VR8300), GRANADA (VHSTJ3,	.07 40p	FERGUSON	PU 51380	IT07
HS200 2001 HS300, 301, 302, 307, 310, 337, 338, 347, 34 411, 412, 421, 480, HSB10, 20, 30, HSE10, 20	9. VC108, 405, 408, 550, 600, 651, 674, 681, 682,	WJ1, WJ3), ITT (VR3913, 3914,			PU 51402A PU 55373	IT08 IT09
30, 70 110 HS303, HS304, HS308, HS307, HS330,	P VC700, 750, 763, VC6F3, VC6V3 70p	3963) JVC (HT7200, 7300, 7350,			PU 55374	IT10
HS400, HS700 110 HS318, HS319, HS410 110; HSM1000, 18, HSM23, 25, 33, 34, 35, 37, 54,	757, 793, 800,VC7810, 7822, VCA100, 102, 103, 104, 131, 140, 170, 202, 03, VCA234,	7700) TELEFUNKEN (VR450,		PANASONIC	VXP 0329 VXP 0343	IT11 IT12
55, 57, 58, 59, 68 65 N.E.C.	501, 502, 802, 5011, VCB311, 361, VCD801, 802, VCH851, 852, 882, VCM73, VCT72 75p	520, 529, 540, 549, 620, 640, 920 1920), THOMSON (V4100,			VXP 0344	IT13
N630, N631, N832, N833 100 N895 801	p 244, 254, 30, 33, 35, VCA38, 37, 40, 43, 454,	VK308, 309, 312, 410),			VXP 0401 VXP 0433	IT 14 IT 15
PVC2300, PVC2400 180 DX1000, 1600, 1500, 2000, 3000, N9012, 9013, 9014, 9016, N9033, 9034, 9053, 9054,	P 48, 50, 505, 51, 52, 53, 54, 55, 56, 57, 58, VCA60, 605, 615, 67, 68, 1031, VCB320, VCB597, VCD805, VCD806, 810, 815, VCH80,	FERGUSON (3V23, 29, 30, 8923,			VXP 0463	IT16
9055, 9058, 9068, 9096, 9110, 9120, N9510, 9520, 9530, 9610 85	81 85 865 910 VC51000	8924, 8929, 8930, 8931, 8940)			VXP 0521 VXP 0581	IT17 IT18
NATIONAL PANASONIC NV300, NV330PX, NV332, NV333 NV340, NV366 100	313, VC790ET 80p	GRANADA (VHSAY3), SHARP VL	.08 45p	SANYO	1430662T15620	IT19
NV777, NV788 1001 NV2000, NV2010, NV3000 2001	SONY SLC8, SL10, SLT8ME 140p	(VC200, 381, 384, 385, 386, 388,		SHARP	NIDL005GEZZ	1720
NV7000, NV7200, NV7800 95 NV8600, NV8610, NV882 145 NV230, 250, 280, 430, 431, 433, 450, 460, 46	P SLC5, SLC7, SLJ7, SLJ9, SLT7ME 140p P SLC9, SL8000, SL8080, SLT50 165p	390, 393, 9300, 9500, 9700)			NIDL0006GEZZ NPLY0107GEZZ	IT21 IT22
470, 650, 730, NV770, 810, 870, 890, 970, A0 1000, 1050 110	SIV255 125 213 225 262 SIVX1	PANASONI	C	PRICE		
NV370, NV380, NV480, NV630, NV780, NV830, NV850 70 NV600, NV688, AG6010, AG6015 100	TOSHIBA	MODE SWITCH		20p EACH 16p EACH FOR	A PACK OF 5 FOR EAC	H MODEL
NVG7, 9, 10, 11, 12, 14, 15, 16, 18, 30, 130, 400, NVH70 60	V33, V31, V32, V51, V52, V53, V9600,	NV2000, 2010, 7000, 7200, 7800			A PACK OF 10 FOR EA	
NVFV1, NVM10, 3000, 3300, 40, 7, 9000, 9900, NVMS1, 4 70 NVM 1, NVM3, NVM5 70	V61, V63, V65, V66, V67 150p DV80B, DV80D, V71, 73, 74, 75, 77, 81, 83,	NV230, 260, 430, 810, 870, 2300 (VSS0110)), 4300 £3.50 £2.25		Designation of the	
PHILIPS VR6460, VR6920 170	80p V108. 109, 110, 120, 130, 140, 199, 209, 210,	NV830 (VSS0091)	£2.10	G	RANDATA LTD	
VR6540 100 VR6442, VR6542 70	660, 711, 880 120p	NV300, 333, 340, 366, 688, 777,		Те	l: 0181-900 232	9
VR2025, VR2580 100 DV186, 190, 286, 291, 292, 468, 471, 562, 57 761, VR201, 202, 203, 211, 2115, 212, 213,		(VSS0060	£3.75	Fa	x: 0181-903 612	26
223, 311, 312, 313, 3210, 3219, 322, 32, 29,	VCPB1E 110p	NVG21, 25, NVH65, NVD80 (VS	50175A) £2.00	A State of the second s		
	HERITE STRATES TO A STREET					1.5.1.1.1.1.1

VIDEO SERVICE KITS

VIDE	O SE	RVICE KITS	
AMSTRAD VCR700			
Contents BELT SET. PINCH ROLLER Drder Code: SK41	REEL 10	DLER. VIDED LAMP	
FERGUSON & JVC 3V42/43 HRD455/HRD725			£5.5
Contents BELT SET, PINCH ROLLER CLUTCH MECHANISM, TI BAND		Economy Kit Contents BELT SET, PINCH ROLLER SUPPLY CLUTCH, TAKE UP CLUTCH	
Order Code: SK37	£16.0		£9.0
3V58/59/64/65 HRD 170/180/210/230/300/3 HR S5000 Contents	120/370/4	00/430/530/700/750	
BELT SET, PINCH ROLLER Order Code: SK44	IDLER A	RM, TENSION BAND	£7.00
3V29/3V30 HR7200/7300/7350			
Contents BELT SET, PINCH ROLLER, Order Code: SK05	TENSIO	N BANO, IOLER TYRES	£5.00
3V35/36, 38/39/49 HRD110/111/120/225 Contents RELT SET BINGU 2011 FD	TRACIN		
BELT SET, PINCH ROLLER, Order Code: SKB4 3V31/3V42	TENSIU	N BAND, IULER TYRES	£5.00
HR7600/7610/7650/7655 Contents		Economy Kit Contents	
BELT SET, T/U REEL TABLE TYRE. PINCH ROLLER. REE IBLER. T/U CLUTCH. T/U ID TENSION BAND. VIDEO LA Drder Code: SK33	L ILER.	BELT SET, T/U REEL TABLE TYRE, PINCH ROLLER, REEL IDLER TYRE, T/U IDLER TYRI T/U CLUTCH	E. £5.00
3V35/36/38/39/49 HRD110/111/120/121/225 Contents		Economy Kit Contents	
BELT SET. T/U REEL TABLE TYRE. SUPPLY REEL TABLE TYRE. PINCH ROLLER. T/U CLUTCH. T/U IDLER. REEL		BELT SET. T/U REEL TABLE TYRE. SUPPLY REEL TABLE TYRE. PINCH ROLLER. T/U CLUTCH. T/U IOLER TYRE. RI	EEL
IDLER. TENSION BAND Order Code: SK35	£10.00	IDLER TYRE	£5.50
3V29/3V30 HRD7200/7300/7350			
Contents 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 IDI TENSION BAND. VIDEO LA Order Code: SK31	ER. MP £10.00	IDLE TYRE. T/U IDLER TYRE. T/U CLUTCH ORDER CODE: SK32	£5.00
3V44/45/48/53/54/55/57 HRP50/HRD140/150/158/160 HRD250/257/565/566/755			
BELT SET. PINCH ROLLER. CLUTCH MECHANISM. TEN BANO	SION	Economy Kit Contents BELT SET. PINCH ROLLER	
Order Code: SK39 FISHER		OROER CODE: SK40	£9.50
FVHP905/906/907/908/910/91 Contents	1/916/91	Economy Kit Contents	
BELT SET. PINCH ROLLER. IDLER. GEAR IDLER UNIT. TENSION BAND Order Code: SK57	£13.00	BELT SET. PINCH ROLLER, IDLER TYRE ORDER CODE: SK58	
FVHP615/618/620/622/710/71			£5.00
730/830/840 Contents	471471	Economy Kit Contents	
BELT SET. PINCH ROLLER. IOLER. GEAR IDLER UNIT. TENSION BAND Order Code: SK68		BELT SET. PINCH ROLLER. IDLER TYRE	
HITACHI	£11.00	ORDER CODE: SK69	£300
VT11/VT33 Contents BELT SET, PINCH ROLLER, TI	ENSION		
Univer Code: SK08	RSA	L TRIPLER	£5.00
	-	.00 each	
		MODE KIT .75 each	

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VIDEO SERVICE KITS (Cont.)

	VIDEO SEI	RV	ICE KITS (Con	t.)
	VT11/VT33			
0	Contents BELT SET. T/UP REEL TABLE TYRE. SUPPLY REEL TABLE TYRE. PINCH ROLLER, FF/RE IDLER. CLUTCH PLATE. TENSION BAND	w	Economy Kit Contents BELT SEL PINCH ROLLER FF/REW IDLER TYRE. T/UP TABLE TYRE. SUPPLY REE TABLE TYRE	REEL
	Order Code: SK45	£13.(00 ORDER CODE: SK46	£3.75
0	VT52/61/62/63/64/65/85/86/64 Contents BELT SET, PINCH ROLLER, FF/REVY ARM, CLUTCH PLAT TENSION BAND Order Code: SK49		Economy Kit Contents BELT SET, PINCH ROLLER FF/REW IDLER 0 DRDER CODE: SK50	
	VT400/405/410/13/14/15/18/42			£3.00
	510/520/25/26/530/35/36/540/ Contents TIMING BELT. PINCH ROLLE	545/46	/48/570/75/576/580/85/88	
0	TENSION BAND Order Code: SK52			£9.75
	VT100/110/111/113/115/118/12 175/220/225/250/255/258/260/ Contents BELT SET. PINCH ROLLER, FF	VTL30		
)	TENSION BAND Order Code: SK51	/11.211	Ann. CLUICH FLAIE	£14.00
	PANASONIC NV2000/NV2010		NI 7000 SI 7000 (III 7000	
1	Contents BELT SET. PINCH HOLLER.		NV7000/NV7200/NV7800 Contents BELT SET. PINCH ROLLER.	
	TENSION BAND. IDLEH TYRE Order Code: SK03 NV300/NV330/NV333/NV340/I	£5.0		RES £5.00
	Contents BELT SET. PINCH ROLLER. TE			
	Order Code: SK01	NSIU	N BAND, IULEN TYRE	£5.00
1	NV2000/NV2010 Contents			
	BELT SET. PINCH ROLLER, FF IDLER, PLAY IDLER, TENSION BAND, VIDEO LAMP		Economy Kit Contents BELT SET. PINCH ROLLER. IDLER TYRE, PULLEY TYRE	
	Order Code: SK13 NV7000/NV7200/NV7800	£6.00	ORDER CODE: SK14	£3.50
	Contents		Economy Kit Contents	
	BELT SET, PINCH ROLLER, IDLER UNIT. PLAY IDLER, TENŠION BAND Order Code: SK11	£8.50	BELT SET, PINCH ROLLER IDLER TYRE. CLUTCH TYRE ORDER CODE: SK12	63.25
	NV300/NV330/NV333/NV340/N			
	Contents BELT SET, PINCH ROLLER,		Economy Kit Contents BELT SET, PINCH ROLLER	
	IDLER UNIT. PLAY IDLER. TENSION BAND		IDLER TYRE. PLAY IDLER	
			ORDER CODE: SK16	£3.25
	NVG7/NVG9/NVG10/NVG11/NV NVG18/NVG30/NVG120/NVG13 AG1810 (P/K) Contents	VG12/ 80/NV	G400/NVH65 (PX/AC)/	
	LOADING BELT. CAPSTAN BELT. PINCH ROLLER. IDLER		Economy Kit Contents LOADING BELT, CAPSTAN BELT, PINCH ROLLER, IDLER	
	TENSION BAND Order Code: SK27	26.00	TYRE ORDER CODE: SK28	£3.00
	NV332 Contents		Economy Kit Contents	
	BELT SET, PINCH ROLLER, PLAY IDLER, FF/REW IDLER, TENSION BAND, FF/REW TYRE Deter Code: CMTP		BELT SET, PINCH ROLLER PLAY IDLER TYRE. FF/REW IDLER TYRE	
	Drder Code: SK29 E1 NV230/250/260/280/430/450/460	12.00		£5.10
	AG1200PK/AG1500PK Contents	4/0/6	Economy Kit Contents	
	BELT_SET, PINCH ROLLER, IDLER. TENSION BAND Order Code: SK23	5.00	BELT SET, PINCH ROLLER IDLER TYRE DRDER CODE: SK24	£3.25
	NV600/NV688 Contents			
	BELT SET, PINCH ROLLER, PLAY IDLER, FF/REW IDLER. TENSION BAND		Economy Kit Contents BELT SET, PINCH ROLLER PLAY IDLER TYRE, FF/REW IDLER TYRE	
	Order Code: SK25 £1	2.00	OROER CODE: SK26	£6.00
	NV730/NV770 Contents SLOT IN BELT, LOADING BELT PINCH ROLLER, IDLER UNIT.		Economy Kit Contents SLOT IN BELT. LOADING BELT PINCH ROLLER. IOLER TYRE	r.
	TENSION BAND		ORDER CODE: SK20	£3.00
	NV370/NV380/480/630/780/830/8	50/AG		l
	Contents BELT SET, PINCH ROLLER, IOLER. TENSION BAND Order Code: SKZ1	5.00	Economy Kit Contents BELT SET. PINCH ROLLER IDLER TYRE ORDER CODE: SK22	EZ.75
	NV777/NV788			LL /S
	Contents BELT SET, PINCH ROLLER,		Economy Kit Contents BELT SET, PINCH ROLLER	H C
	IDLER UNIT, TENSION BAND		IDLER TYRE	
	(I		SHOEN CODE SKIS	E4.00

VIDEO SERVICE KITS (Cont.)

TIDEO SEI		L VIIS	GUIIL./
SHARP VC381			
Contents BELT SET. PINCH ROLLER.		Economy Kit Col	
REEL IDLER. TENSION BAN	D.	BELT SET. PINCH REEL IDLER TYRE	
VIDEO LAMP Order Code: SK67	£8.00	ORDER CODE: SI	(48 €3.25
VC500/VC571/VC581/VC582/			
Contents BELT SET. PINCH ROLLER.		Economy Kit Con BELT SET. PINCH	
REEL IDLER. TENSION BANI Order Code: SK60		REEL IDLER	
VC781/VC7810/VC7822/VC78	£9.50		(61 £5.00
VCA100/VCA102/VCA104/VC	A202		
Contents BELT SET. PINCH ROLLER.		Economy Kit Con BELT SET. PINCH	
REEL DRIVE UNIT. TENSION BAND		REEL DRIVE UNIT	TYRE
Order Code: SK64	£13.50	ORDER CODE: SN	65 £3.75
VC681/VC682/VC684/VC685/V Contents	(C693/VC	699/VC6F3/VC700 Economy Kit Con	
BELT SET. PINCH ROLLER.		BELT SET. PINCH	ROLLER
REEL DRIVE UNIT. TENSION BAND		REEL DRIVE UNIT	
Order Code: SK62		ORDER CODE SK	
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REPLACEMENT PHILI			
Replaces Ferguson Part I	No:		
00E6-067-001, used on T Replaces Philips Part No	s:		90p
138-10138, 138-10313. 1. Replaces Philips Part No	2V - 90 s:	mAh	75p
138-1229, 2.4V - 90mAh REPLACEMENT FERGU		CAD RACKI	£1.35
Replaces Ferguson Part I Used on: 3V35, 3V56, 3V	Vos:00E	6-066-001, 2.4	/
	10		150p
		EMENT	
		JTPUT DRMERS	
Description	SFC		ice Order
HITACHI 2433752		150	Code
ORION 3714002		150	Op LOT02
FIDELITY ZX300 FE TX100 90 DEG		150 150	Op LOT04
SABA 490007182 FE TX90 WHITE		150	
HT 0307/37 EQ BLAUPUNKT 230		160 160	
GRUNDIG 2922010		160 150	Op LOTO9
NORMENDE 5255		160 160	Op LOT11
SABA 81000 200 SALORA T236 EQ		160	Op LOT13
SABA 811-50-24 SABA 770223500		165 160	Op LOT15
TELEFUNKEN AT1		160 145	Op LOT17
TELEFUNKEN EQ SALORA FM0218B		140 160	
NORMENDE 5255		160	
FE TX100 GREEN		150 140	p LOT22
HINARI CT4/5 5113 SELECO 6320410		150	Dp LOT24
BLAUPUNKT 8667		160	p LOT26
ITT CT3326 MUL		1450 1500	Dp LOT28
11T D066/37 EQ 11T 3546 EQ		1600 1500	p LOT30
LUXOR 5810110 SABA 849380920		1600 1600	
HITACHI 2434141 CP FE TX100 110 D		1200 1500	
HANTAREX 28021 SHARP C3700 EQ		1600 1600	p LOT35
HITACHI 2432981 CP FERGUSON 00D3-508-002		1300	p LOT37
Fits Chassis TX99 41cm + Used On: 51K2, 51J8, 51J7	51cm	1650	p LOT38
41H3, 41H2, 51K3			
PANASONIC TLF 14567F Used On: TC2043, TC2243,	TX300	1850	
Used On: TX2231, TX2244		£15.0	
Used On: TC2210, TC2160,		2000	p LOT41
TX1752, TX2112 TX2112, TX2162, TXC22			
PANASONIC TLF14586F		£18.0	0 LOT42
FC1651, TC2051, TC2061, FC2253, TC2263, TX5500 HINARI		1600	0 107/0
Jsed On: CT15 HTACHI 2434274		1600	
CPT2174, CPT2176, CPT217	8, 2434	1250	
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AMSTRAD SRD510, SRD520 SATPSU3	
AMSTRAD SRD500 SATPSU:	650p
AMSTRAD SRX340, SRX345, SRX350 SATSPU5 PACE D100/150 SATPSUB	
PACE D100/150 SATPSUB CHURCHILL D2MAC SATPSU7	650p
PACE MSS100 SATPSU8	
PACE MSS200/300 APPOLL SATPSU9 PACE MSS500/1000 SATPSU10	900p
PACE MISS500/1000 SATPSUID REGUSON SRD4 SATPSUID	
ECHOSTAR SR5500 SATPSU12	
ECHOSTAR 6500/7700/8700 SATPSU13	3125p
AMSTRAD SRD600 SATPSU14 MIMTEC (Surensen) SATPSU15	
MIMTEC (Surensen) SATPSU15 MISTRAD SRD700/SR950/SRX100/301	775p
PACE 9000 SWITCH MODE TRANS Order Code: PACE 9000 Price: PACE PRD800/PRD900 SWITCH MOD FORMER Order Code: PRD800 Price: 5	800p DE TRANS-
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ALBA CTV10 TRAVEL NIKKAI BABY 10 ORDER CODE: BABY 10 PRICE: 1200p + VAT udio Control Head MSTRAD ORIGINAL NO: 150751	LER
ALBA CTV10 TRAVEL NIKKAI BABY 10 ORDER CODE: BABY 10	4700, 0, 5000
ALBA CTV10 TRAVEL NIKKAI BABY 10 ORDER CODE: BABY 10 PRICE: 1200p + VAT UDIO CONTROL Head WSTRAD ORIGINAL NO: 150751 sed on: AMSTRAD TVR1, 2, 3, VCR4500, 4500MKII, INAL VS2, VCR4500, 4800, 5200, 5600, 4600MKII, INAL VS2, VCR4500, 4800, 5000, 5600, 4600MKII, INAL VS2, VCR450, 4800, 5000, 5600, 5600, 4600MKII, INAL VS2, VCR450, 5000, 5600, 5600, 5600, 5000, 5600, 5	4700, %, 5000 1008, PRICE: 1350p 100, 8600, 244 ELITY, GOLD- WOFEX,
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ALBA CTV10 TRAVELL NIKKAI BABY 10 ORDER CODE: BABY 10 PRICE: 1200p + VAT Udio Control Head ASTRAD ORIGINAL NO: 150751 ed on: AMSTRAD TVR1, 2, 3, VCR4600, 4500MKII, NAI VS2, VCR4600, 4800, 5200, 5600, 5600, VIP200 to fits: FIDELITY, FUNAL HINARI, PROLINE. SCHNE WADA, UNIVERSUM DRDER CODE: AH01 ASTRAD ORIGINAL NO: 153134 ed on: AMSTRAD DD8500, 3904, VCR2000, 6600, 6 32, 8603, VCR8604, 8700, 8704, 8714, 8800, 9005, 8 100 fits: ANTECH, BONDSTEC, CASIO, CROWN, FID ND, GRANADA, HINARI, MARQUANT, OMEGE, PR HNEIDER, SEG, SENTRA, SHINTOM, TASHIKO, TA WADA, UNIVERSUM ORDER CODE: AH02 PROCEED AND CONTROL VIDEO SC ead for National Panasonic INT NUMBER MODELS 10081 NVG7 stc	4700, 60, 5000 HDER, PRICE: 1350p 100, 8600, 244 ELITY, GOLD- KOFEX, TUNG, PRICE: 1450p PRICE: 1450p PRICE 875p
ALBA CTV10 TRAVELL NIKKAI BABY 10 ORDER CODE: BABY 10 PRICE: 1200p + VAT UDIO CONTROL HEAD MITTAD ORIGINAL NO: 150751 ed on: AMSTRAD TVR1, 2, 3, VCR4600, 4600MKII, NAI V52, VCR4600, 4800, 5200, 5600, 5600, VIP200 to fits: FIDELITY, FUNAL HINARI, PROLINE. SCHNE WADA, UNIVERSUM DRDER CODE: AH01 NISTRAD ORIGINAL NO: 153134 ed on: AMSTRAD DD8900, 8904, VCR2000, 6600, 8 20, 6fbs: ANTECH, BONDSTEC, CASIO, CROWN, FID ND, GRANADA, HINARI, MARQUANT, OMEGE, PF HNEIDER, SEG, SENTRA, SHINTOM, TASHIKO, TA WADA UNIVERSUM ORDER CODE: AH02 ND, GRANADA, HINARI, MARQUANT, OMEGE, PF HNEIDER, SEG, SENTRA, SHINTOM, TASHIKO, TA WADA UNIVERSUM ORDER CODE: AM02 REPLACEMENT AND CONTROL VIDEOS SE CONTROL MUNICERSUM ORDER CODE: AM02 RINUMBER MDELS R0081 NVG7 etc	4700, 6, 5000 IDER, PRICE: 1350p 100, 8600, 244 ELITY, GOLD- IOFEX, TUNG, PRICE: 1450p Dund PRICE

Controls 1000s of models • Teletext functions with Fastext
 Clear (large key) layout • 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	PRICE
SVMOTOR	170p
SV MOTOR	170p
12V CW MOTOR	1700
12V CCW MOTOR	1700
13.2 CCW MOTOR	2900

NAMG	M00ELS VS35, VS35, VS55, VS56, VS75 VHS021 VHSV12 GHV120011231P, 1295P, 9400, 73401, 65E1298P, 6551891P, 200011, 2000510, VCP4208, 4311, 4315, 4316, 4320, 4321, 4325 GHV51, 1221, 1232, 1240, 1241, 1242, 1244, 1248, 1251, 1355, 3075, 3	CH25 CH26 CH01 CH02 CH02 CH02 CH03 CH03 CH04 CH03 CH04 CH05 CH02 CH02 CH02 CH02 CH02 CH02 CH02 CH02	PRIC 3200; 1100, 2800; 2900; 2900; 200; 200; 200; 200; 200;
GOLDSTAR	VHS0P1 VHS0P1 VHS0P1 VHS1J2 GHV1200F123P, F35P, 9400, 73401, GSE1239P, GS51851P, 200010, 200510, VCP4306, 4300, 4301, 4355, VCP4306, 4311, 4315, 4316, 4320, 4221, 4325 GHV51, 1221, 1282, 1240, 1241, 1242, 1244, 1248, 1248, 1248, GHV8000, 8200 8200 8203, 3739, 8943, 8944, 8951, 3735, 3745, 3749, HRD 110, 111, 120, 121, 225 8947, 8948, HRD 140, 141, 150, 157, 158, 180, 250, HRD237, 455, 556, 566, 725, 5755 6946, 8950, FV10B, 122, 134, 147, 205, 218, 221, 24, 355, 566, 725, 5755 6946, 8950, FV10B, 122, 134, 147, 205, 218, 222, 254, 3545, 5545, 5755 6946, 8950, FV10B, 122, 134, 147, 205, 218, 222, 254, 556, 566, 757, HRD120, 470, 550, 550, 557, 550, 557, 556, 550, 120, 500, 500, 610, 620, 660, 670, HRD20, 600, 610, 620, 660, 670, HRD20, 840, 850, 850, 4050, 660, 710, HRD20, 470, 550, 550, 557, 540, 550, 550, 577, 586, 3935, 3937, 6944 NV730 NR30EG, N831EG, N831EG, N832EG	CH05 CH01 CH25 CH25 CH26 CH02 CH02 CH02 CH03 CH03 CH04 CH27 CH07 CH20 CH20 CH02 CH02 CH02 CH02 CH02 CH02	11006 28007 28007 28007 28007 28007 28007 28007 28007 28007 28007 28007
GOLDSTAR	VHSY.42 GHV1320F, 1231P, 1255P, 9400, GHV1320F, 1231P, 1255P, 9400, 27401, 651E320P, 6551E81P, 200010, 200510, VCP4200, 4300, 4301, 4305, VCP4200, 4311, 4315, 4318, 4320, 4321, 4225 GHV51, 1221, 1232, 1240, 1241, 1242, 1244, 1248, 1248, GHV3000, 2000 3V38, 3V39, 5943, 8944, 8511, 3V42, 3V43, 8V44, 8948, GHV3000, 2000 3V38, 3V39, 5943, 8944, 8551, 3V42, 3V43, 3V44, 3V45, 3V57, 6945, 8947, 8948, HRD 140, 141, 150, 157, 158, 150, 250, 5947, 8948, HRD 140, 141, 150, 157, 158, 150, 250, 5947, 8948, HRD 140, 140, 520, 2154, 3V55, 3V57, 6945, 8947, 8948, HRD 140, 140, 530, 3054, 3V55, 7V11R, 2956, 216, 220, 560, 570, HRD 230, 430, 530 3V58, 3V56, 3V54, 3V65, FV11R, 2956, 216, 520, 560, 570, HRD 230, 430, 530 3V58, 3V55, 3075, 527, 540, 550, 561, 600, 510, 520, 560, 570, HRD 230, 430, 530 500, 510, 520, 560, 570, HRD 230, 430, 530 500, 510, 520, 545, 3545, 3545, 3547, 5305, 5305, 5377, 5448 WR3056, N831EG, N831EG, N832FG, N832F	CH01 CH25 CH25 CH02 CH02 CH03 CH04 CH03 CH04 CH19 CH20 CH27 CH07 CH20 CH02 CH02 CH02	2800; 280; 28
FERGUSON & J.V.C.	GHV1230P, 1231P, 1255, 9400, 73401, 651289P, 6551891P, 200010, 200510, VCP4200, 4301, 4305, 4301, 4305, VCP4300, 4311, 4315, 4316, 4320, 4221, 4325 6HV51, 1221, 1232, 1240, 1241, 1242, 1244, 1246, 1248, 1248, 1244, 1242, 1244, 1246, 1248, 1244, 1244, 1242, 1244, 1246, 1248, 1244, 1345, 4316, 4321, 444, 1246, 1244, 1244, 124, 121, 225 3V42, 3V43, 3V43, 1446, 3V44, 3V44, 3V53, 3V43, 3V44, 3V44, 3V44, 3V53, 3V43, 3V44, 3V44, 3V44, 3V53, 3V44, 3V45, 3V45, 1275, 6945, 8948, 8950, FV108, 121, 134, 161, 208, 218, 221, 26, 395, HRD 230, 430, 530 3V58, 3V59, 3V54, 3V55, FV11R, 9950, 8951, HRD 170, HRD 180, HRD370 6V31R HRD570, 450, 560, 6370, HRD 230, 430, 550 500, 510, 620, 630, 360, 910, 560, FRG0250 HRD 230, 840, 850, 803, 955, 397, 5948 9V73916, 3325, 3946, 3976, 3985, 3976, 3985, 3937, 5948, 3976, 3985, 3937, 5948, 3976, 3985, 3937, 5948, 3976, 3985, 2995, 3937, 5948, 3976, 3976, 5948, 3976, 3976, 5948, 3976, 3976, 5948, 3976, 3976, 5948, 3976, 3977, 5948, 3976, 39778, 3977, 5948, 3976, 3977, 5948, 39767, 39778, 39	CH25 CH25 CH26 CH01 CH02 CH02 CH03 CH04 CH19 CH29 CH29 CH29 CH20 CH27 CH01 CH02 CH02 CH02 CH02	2009 <u>2</u> 2800g 2800g 2800g 2800g 2800g 2800g 2800g 2800g 2800g 2800g
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ITT	6947, 6848, HRD 140, 141, 150, 157, 158, 180, 250, HRD257, 455, 565, 566, 725, 756 6948, 8950, FV108, 122, 1341, 147, 208, 218, 218, 224, 26, 395, HRD 230, 430, 530 3V38, 3V59, 3V54, 3V65, FV118, 9950, 8951, HRD 170, HRD 180, HRD370 FV318 HRD515, 520, 527, 540, 550, 580, 600, 610, 620, 650, 670, HRD 830, 840, 850, 4250, 8600, FV37H HRD540, 580, 830, 860, 910, 960, HRD540, 580, 530, 582, 5346, 3348, 3376, 3985, 3955, 3397, 6948 NV730 N833EG, N831EG, N831EG, N832EG, N832E, N832E,	CH03 CH04 CH19 CH20 CH27 CH01 CH02 CH02 CH02 CH08	2800p 2800p 4300p 2200p 2400p 2800p 2800p
17.7	8948, 8950, FV108, 124, 134, 147, 208, 218, 221, 26, 395, HRD 230, 423, 530 31788, 8950, FV108, 124, 26, 395, HRD 230, 423, 530 31788, 8958, HRD 170, HRD 180, HRD 370, HRD 370, HRD 370, HRD 370, FV118, FV118, 550, 550, 557, 540, 550, 550, 550, 550, 550, 550, 550	CH03 CH04 CH19 CH20 CH27 CH01 CH02 CH02 CH02 CH08	2800p 2800p 4300p 2200p 2400p 2800p 2800p
ITT	3V58, 3V59, 3V54, 3V65, FV11R, 850, 8951, HR0170, HR0180, HH0370 FV31R HR0575, 520, 527, 540, 550, 560, 600, 610, 620, 660, 670, HR0530, 840, 850, 850, 4050, 6600, FV37H HR0540, 580, 830, 860, 910, 960, HR0570, HR0520, FERGUSON FV57H VR396, 3226, 3346, 3346, 3976, 3386, 3395, 3397, 6948 NV730 NR3916, 372, 3546, 3546, 3978, 3886, 3935, 3937, 6948	CH04 CH19 CH20 CH27 CH07 CH01 CH02 CH02 CH08	2800p 4300p 2200p 2400p 2800p 2800p
LT.T.	FV31R HRD515, 520, 527, 540, 550, 560, 560, 570, HRD830, 840, 850, 860, 870, HRD830, 840, 850, 860, 870, 860, 870, 870, 870, 870, 870, 870, 870, 87	CH19 CH20 CH27 CH07 CH01 CH02 CH02 CH02 CH06	4303p 2200p 2400p 2800p 2800p
LTT.	HRD515, 520, 527, 540, 550, 580, 600, 510, 620, 660, 671, HRD530, 840, 850, 850, 4500, 6600, FV37H HRD540, 580, 830, 880, 4150, 660, HRD570, HRDX20, FRGUSON FV57H VR3605, VR396, 3948, 3976, 3986, 3995, 3937, 5948 VR3916, 3226, 3545, 3548, 3976, 3886, 3935, 3937, 6948 NV730 NR30EG, N831EG, N831EG, N832, N833EG	CH20 CH27 CH01 CH02 CH02 CH02 CH06	2200p 2400p 2800p 2800p
LTT.	600, 610, 620, 660, 670, HRD830, 840, 850, 850, 4050, 6600, FV37H HRD540, 580, 880, 880, 310, 960, HRD970, HRDX20, VR3050, V7305 VR3051, 5325, 3348, 3376, 3986, 3995, 3997, 5948 VR316, 3225, 3348, 3376, 3886, 3995, 3997, 6948 NV730 NR30EG, N831EG, N831EG, N832, N830EG, N831EG, N831EG, N832	CH27 CH01 CH02 CH02 CH02 CH06	2400p 2800p 2800p
LTT.	FERGUSON FV57/4 VR3605, VR3905 VR3916, 3262, 5346, 3976, 3985, 3995, 3997, 6348 VR3916, 3026, 3346, 3948, 3975, 3886, 3935, 5387, 6548 NV730 NR30EG, NR31EG, NR31EG, NR32, NR32EG	CH01 CH02 CH02 CH06	2800p 2800p
LTT.	VP3605, VP3905 VR3916, 3926, 3946, 3946, 3976, 3986, 3995, 3997, 5946 VR3916, 3926, 3948, 3975, 3886, 3995, 3937, 6948 NV730 NR30EG, NB31EG, NB31EG, NB32, NB33EG	CH01 CH02 CH02 CH06	2800p 2800p
	VR3916, 3926, 3946, 3948, 3976, 3986, 3995, 3997, 6948 VR3916, 3926, 7346, 3948, 3975, 3986, 3995, 3937, 6948 NV730 N830EG, N831EG, N831EG, N832, N833EG	CH02 CH08	-
	3986, 3995, 3997, 6948 NV730 N830EG, N831EG, N831EG, N832, N833EG	CH06	2000-
NATIONAL DAMA COM	N830EG, N831EG, N831EG, N832, N833EG		2800p
NATIONAL PANASONIC	N833EG		4300p
	A1007	CHOT	2800p
PHILIPS	N895 CASSETTE UFT ASSEMBLY (6912	CH02	2800p
	DV186, 190, 286, 471, 562, 761, VR6180, 6182, 6185, 6285, VR6290, 6291, 6293, 6362, 5367, 5393, 6467, 6468, 6470, VR6561, 6670, 6760,		
	6761, 6870, 6970 VR5443	CH05 CH22	1100p 2900p
	VR6448	CH23	2500p
	49SB6	CH24	2500p
	VCA100, VCH851, VCH852 VCA103, 103GV, 106, 106GVM, 254GVM	CH22 CH23	2900p
	VCS211, 244, 5055, 605, VCB230, VCD806G, 810G, VCT212, 310, 410G, 610	CH24	2500p
	VR2970	CH02	2800p
	V320, 321, 323, 326, 4200, 4300 V342, 343, 352, 353, 360, 364, 368, 4210, 4230, 4260, 4400, V5500,	CHOI	2800p
	6000, 8540	CH02	2800p
	V\$5, V57 V65, V86	CH01 CH02	2800p
ervice Aids			
DESCRIPTION	VOLUME	CODE	PRICE
VIDEO HEAD CLEANER SWITCH CLEANER		SP01 SP02	160p 170p
SILICONE GREASE	200 Mt.	SP03	2100
FREEZE IT FREEZE IT	170ML 400ML	SP04 SP16	310p 500p
FOAM CLEANER	400ML	SP05	180p
ANTI-STATIC AEROKLEANE	135ML 135ML	SP05 SP07	190p 220p
AERO DUSTER	150ML	SP08	310p
AERO DUSTER	400ML	SP17	550p
SLASSIC SEAL	200ML 250ML	SP09 SP10	250p
COLDKLENE	2501HL	SP13	23 0p
ADHESIVE 120	250ML 400ML	SP18 SP19	150p 190p
ABEL REMOVER 130	200ML	SP20	240p
TUBE SILICON GREASE	400ML	SP21	240p
UBE SILICON SEALANT WI		SP11 SP22	210p 280p
UBE SILICON SEALANT CL	EAR 75ML	SP23	280p
TUBE HEAT SINK COMPOUN DRIVE CLEANER	25 GRAMMES 200ML	SP12 SP24	150p 150p
SCREEN CLEANER	200ML	SP25	150p
COMPUTER CARE KIT	-	SP25	2100p
f you purchase more th	ms are manufactured by 5 an one Servisol Product, po- ill be charged as follows: 450p for more than 5 (stage & ;	

SONY OPTICAL PICK UP PART NO: KSS210A SONY CDPC 301M, CDPC 305M

PART NO: KSS2108 USED ON MODELS: CFD100, 1054, 120, 300, 440, 454, 455, 50, 600, 55, 58, 60 CFD68, 750, 755, 760, 765, 770, 775, 4405, W100, 100S

Fits most Sony, Akai & J.V.C. Portable Hi-Fi and Midi Syst

2000p

erns

2000

A comprehensive guide to receiver reviewing, featuring stock faults and installation tips. Price 1400p Only No VAT Postage 100p Order Code: BOOK03 SEMICONDUCTOR COMPARISONS 1996 Listing more than 29,000 Semiconductors with suitable alternative complete with descriptions and base information. Price: £14.50 - No VAT. Order Code: BOOK04 **VIDEO CLEANING STICKS** Order Code: SP14 Price 17p each 15p each pack of 10pcs 13p each pack of 25pcs **VIDEO MAINTENANCE TOOLS** Set of 8 Allen keys packed in a plastic wallet Order Code: TOOL9 Price 125p Specifically designed for video maintenance **UNIVERSAL HEAD EXTRACTOR TOOL** Hand tool designed for extracting hard to remove heads without damage to either the head or the mounting assembly. Adjustable so as to suit various brand heads. PRICE - 600p **GRANDATA LTD** Tel: 0181-900 2329

Cassette Tape Heads

Soldering Accessories DESCRIPTION ANTEX SOLDERING IRONS

25 WATT 240 VAC (XS25W 240V) 15 WATT 240 VAC (XS15W 240V) 25 WATT SPARE ELEMENT

SOLDERING STAND & SPONGES SOLDERING STAND (MADE BY ANTEX) SPARE SPONGE

SOLDER MOP STANDARD GAUGE 1.2MM X 1.5M SOLDER MOP 1.2MM X 10M

FAULT FINDING GUIDE BOOKS Satellite Fault Finding Guide Issue 1. Listing about 1,000 faults for over a range of 24 different brands. Order Code: BOOK05. Price £8.50 – No VAT.

Video Recorders Edition 4 Lists more than 4,500 faults for 43 different brands Price £12.75 – No VAT. Order Code: BOOK01

TELEVISION Edition 6 Lists more than 8,450 faults with 460 pages covering 58 different brands Price: 1600p only - no VAT. Order Code: BOOK02 Satellite Repair Manual Edition 4

15 WATT SPARE ELEMENT

SOLDER 18 SWG 500 GRAMMES 20 SWG 500 GRAMMES 22 SWG 500 GRAMMES

DESOLDERING AIDS

DESOLDERING PUMP

SPARE NOZZLE

PRICE 90p 110p 150p 200p

PRICE

900p 900p 450p

450p

350p

55p

500p 650p 700p

80p 400p 320p

60p

CODE

S101 S102 S103

S104

\$108

\$109

S110 S111 S112

S107 S113

S105 S106

HEAD TYPE MONO HEAD STEREO HEAD MINI HEAD AUTO REVERSE HEAD

Fax: 0181-903 6126

REPLACEMENT LINE OUTPUT TRANSFORMERS/CD PICK UPS

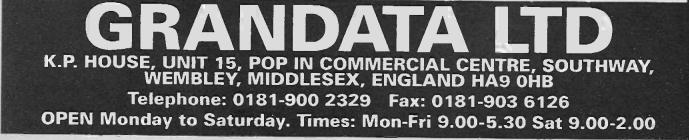
R	EPLAC	ENEN	I LINE	: OUTP	UT TF
	T LINE OUTPUT	4515 01 24	LOT137 1600p	094-01021/0.5	LOT59 1750p
Part No.	ORMERS Code Price	4515 01 46 4515 03 01	LOT138 1600p LOT169 1500p	094-01027/0.0 094-01038/0.7	LOT186 1825p LOT245 1900p
AKAI 45150344	LOT56 1650p	4515 03 02 4515 03 04	LOT180 1550p LOT169 1500p	094-01052/0.8 094-01057/1.1	LOT186 1825p LOT285 1450p
101-214017-03 101-220005-03A	LOT278 1600p LOT72 1600p	4515 03 05 4515 03 06	LOT180 1550p LOT168 1550p	610.018.6620	LOT189 1650p
D 050/37 D 053/37	LOT27 1450p LOT207 1650p	4515 03 08	LOT22 1500p	610.018.6637 SHARP	LOT215 1800p
D 056/37	LOT56 1650p	4515 03 09 4515 03 10	LOT178 1500p LOT168 1550p	RTRNF 1220 CEZZ RTRNF 1783 BMZZ	LOT39 1850p LOT202 1800p
D 059/37 D 069/37	LOT200 1600p LOT56 1660p	4515 03 13 4515 03 14	LOT30 1500p LOT174 1700p	RTRNF 1783 CEZZ RTRNF 1786 BMZZ	LOT202 1800p
FCM 2015 AL	LOT78 1500p	4515 03 15 4515 03 18	LOT22 1500p LOT192 1550p	RTRNF 1786 CEZZ	LOT211 1850p
00 D-3-508-001 00 D-3-508-002	LOT38 1650p	4515 03 19	LOT30 1500p	RTRNF 2000 BMZZ RTRNF 2002 BMZZ	
00 D-3-508-003	LOT276 1650p	4515 03 20 4515 03 22	LOT190 1850p LOT196 1550p	ATRNF 2002 CEZZ ATRNF 2003 BMZZ	LOT307 1450p LOT308 1425p
00 D-3-515-001 PL1 00 D-4-208-001	LOT276 1650p LOT79 1800p	4515 03 24 4515 03 25	LOT194 1550p LOT22 1500p	RTRNF 2004 BMZZ RTRNF 2005 BMZZ	LOT307 1450p LOT308 1425p
00 D-4-208-002 00 D-4-235-002	LOT79 1800p LOT240 1250p	4515 03 26 4515 03 28	LOT198 1550p LOT27 1450p	ATRNF 2006 8MZZ	LOT308 1425p
00 D-4-235-002 HTI 00 D-4-235-00201G	LOT81 1600p	4515 03 29 4516 03 30	LOT193 1550p LOT179 1550p	RTRNF 2007 BMZZ RTRNF 2023 BMZZ	LOT307 1450p LOT310 1500p
00 D-4-260-004 HTI	LOT38 1650p	4515 03 31	LOT207 1550p	SONY 3753100	LOT275 1700p
00 H-0-701-2400 06 D-3-083-001	LOT182 1550p LOT82 1400p	4515 03 34 4515 03 35	LOT56 1650p LOT193 1550p	1-439-243-00	LOT91 1700p
06 D-3-083-002 06 D-3-084-001	LOT82 1400p LOT23 1400p	4515 03 38 4515 03 40	LOT27 1450p LOT200 1600p	1-439-243-12	L0191 1700p
06 D-3-087-001 06 D-3-088-001	LOT23 1400p LOT84 1450p	4515 03 41 4515 03 43	LOT56 1650p LOT196 1550p	1-439-243-31 1-439-243-32	LOT229 1700p LOT229 1700p
06 D-3-093-001	LOT204 1600p	4515 03 44	LOT56 1650p	1-439-243-41 1-439-244-00	LOT229 1700p LOT48 1800p
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
06 D-333-512-001 FETX 100 90 DEG	LOT204 1600p LOT04 1500p	4516 03 51 4515 03 75	LOT27 1450p LOT56 1650p	1-439-244-21 1-439-244-31	LOT48 1800p LOT48 1800p
FETX 90 WHITE	LOT06 1650p	4516 18 01	LOT22 1500p	1-439-256-00	LOT45 1800p LOT45 1800p
FETX 100 100 DEG GRUNDIG		MITSUBISHI 731003	LOT51 1650p	1-439-256-21	LOT45 1800p
29201.008.01 29201.014.01	LOT153 1750p LOT140 1850p	276-16399 334 B 07803	LOT49 1800p LOT50 1700p	1-439-256-22 1-439-276-21	LOT45 1800p LOT230 1700p
29201.015.01 29201.017.01	LOT149 1400p LOT50 1250p	334 8 078030 334 8 08104	LOT50 1700p	1-439-280-00	LOT92 1700p LOT92 1700p
29201.018.01	LOT163 1300p	334 B 08108	LOT74 1600p LOT295 1600p	1-439-286-00	LOT46 1800p
29201.018.02 29201.019.01	LOT61 1700p LOT62 1250p	334 P 18506 334 P 18507	LOT51 1650p LOT75 1600p	1-439-288-11 1-439-288-12	LOT45 1800p LOT46 1800p
29201.019.02 29201.022.01	LOT62 1250p LOT63 1700p	5908-05008A-AA D 108/37	LOT70 1500p LOT49 1800p	1-439-286-13 1-439-286-21	LOT46 1800p LOT46 1800p
29201.022.02	LOT166 1800p	DCF1577	LOT273 1700p	1-439-288-00	LOT228 1750p
29201.022.03 29201.022.04	LOT165 1760p LOT165 1750p	DCF2077A KFS 602268	LOT272 1550p LOT279 1550p	1-439-288-12 1-439-289-00	LOT228 1750p LOT47 1800p
29201.022.04A 29201.024.01	LOT165 1750p LOT65 1700p	MSH-1FBW08	LOT78 1500p	1-439-289-21 1-439-289-22	LOT47 1800p LOT47 1800p
29201.024.04 HINARI	LOT164 1800p	BABY10 ORION	LOT67 1450p	1-439-289-31	LOT47 1800p LOT93 1550p
154 138 K	LOT24 1500p	3714002	LOT02 1500p	1-439-294-11	LOT93 1550p
51 13914 1 51 14184 1	LOT24 1500p LOT24 1500p	TLF 14512 F	LOT39 1850p	1-439-294-21 1-439-303-00	LOT269 1650p LOT94 1700p
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
HITACHI 2424593		TLF 14567 F	LOT39 1850p	1-439-303-32	LOT94 1700p
2432101	LOT79 1800p	TLF 14568 F TLF 14584 F	LOT40 1500p LOT41 2000p	1-439-311-00 1-439-311-11	LOT95 1660p LOT95 1660p
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 1650p
2432651 2432761	LOT80 1800p LOT169 1500p	TLF 70012 TLF 70012 F	LOT78 1500p LOT78 1500p	1-439-311-32	LOT95 1550p
2432981	LOT37 1300p	TLF 70012A	LOT78 1500p	1-439-331-22 1-439-331-41	LOT96 1550p LOT98 1550p
2432981 2432982	LOT37 1300p LOT37 1300p	TLF 70018 TLF 70018 F	LOT274 1550p LOT274 1550p	1-439-332-00 1-439-332-11	LOT99 1700p LOT9 1700p
2433011 2433012	LOT171 1650p	TLF 70161 TLF 70162	LOT278 1550p LOT72 1800p	1-439-332-21 1-439-332-41	LOT99 1700p
2433014 2433212	LOT171 1650p LOT168 1500p	TLF 70162A TLF 701628	LOT72 1600p LOT72 1800p	1-439-332-42	LOT100 1700p LOT101 1700p
2433291	LOT172 1700p	TLF 70162G	LOT72 1800p	1-439-332-52 1-439-333-00	LOT100 1700p LOT270 1550p
2433301 2433441	LOT246 1600p LOT188 1900p	TLF 77001 B PHILIPS	LOT274 1550p	1-439-333-11 1-439-333-12	LOT270 1550p LOT270 1550p
2433442 2433451	LOT191 1600p LOT81 1600p	4822 140 10142 4822 140 101145	LOT142 1800p LOT134 1450p	1-439-363-11	LOT268 1650p
2433452 2433453	LOT82 1400p LOT82 1400p	4822 140 10146 4822 140 10151	LOT112 1700p LOT102 2150p	1-439-383-21 1-439-387-11	LOT268 1550p
2433455 2433521	LOT234 1600p	4822 140 10151	LOT103 1250p	1-439-387-21 1-439-416-11	LOT311 1600p LOT255 1750p
2433581	LOT25 1600p LOT22 1500p	4822 140 10171 4822 140 10176	LOT104 2150p	1-439-416-12	LOT255 1750p LOT255 1750p
2433721 2433751	LOT83 1600p LOT01 1500p	4822 140 10194 4822 140 10198	LOT105 1750p LOT118 1750p	1-439-416-23	LOT255 1750p
2433752 2433752	LOT01 1500p LOT250 1600p	4822 140 10201 4822 140 10236	LOT104 2150p LOT118 1750p	1-439-416-41 1-439-416-51	LOT255 1780p
2433891	LOT23 1400p	4822 140 10246	LOT111 1750p	1-439-430-21 154125A	LOT271 1550p LOT275 1700p
2433892 2433893	LOT84 1450p LOT23 1400p	4822 140 10247 4822 140 10254	LOT105 1750p LOT107 1600p	TOSHIBA	The second second
2433952 2434002	LOT33 1200p LOT200 1600p	4822 140 10263 4822 140 10269	LOT117 1750p LOT210 1650p	37010 37011	LOT131 1450p LOT131 1450p
2434141 2434274	LOT33 1200p LOT44 1250p	4822 140 10271	LOT208 1850p	37012 37013	LOT131 1450p LOT131 1450p
2434453	LOT86 1600p	4822 140 10274 4822 140 10282	LOT123 1600p LOT122 1600p	37014	LOT131 1450p
2434455 2434593	LOT234 1600p LOT44 1250p	4822 140 10283 4822 140 10294	LOT104 1450p LOT125 2150p	37015 37016	LOT131 1450p LOT131 1450p
2435062 2435121	LOT296 1600p LOT87 1450p	4822 140 10306 4822 140 10325	LOT110 1600p LOT132 1300p	37017 37018	LOT131 1450p LOT131 1450p
2435131 2435141	LOT251 1600p LOT282 1450p	4822 140 10326	LOT122 1850p	37019	LOT131 1450p LOT55 1700p
2435301	LOT88 1450p	4822 140 10328 4822 140 10349	LOT124 1450p LOT106 1450p	2433751	LOT01 1500p
2435671 2436201	LOT89 1600p LOT109 1450p	4822 140 10353 4822 140 10358	LOT284 1450p LOT284 1400p		LOT250 1600p LOT281 1550p
2436202 2432101-2	LOT109 1450p LOT79 1800p	4822 140 10367 4822 140 10369	LOT286 1400p	23236052	LOT131 1450p
2433451H	LOT81 1600p	4822 140 10381	LOT109 1450p LOT128 1450p	23236198	LOT288 1400p
2433453H 2433891H	LOT82 1400p LOT23 1400p	4822 140 10384 4822 140 10395	LOT127 2150p LOT116 1750p		LOT289 1500p LOT129 1500p
2433892G I.T.T.	LOT84 1450p	4822 140 10408 4822 140 10421	LOT73 1500p LOT109 1450p	23236425	LOT288 1400p
4515 01 08 4515 01 15	LOT113 1400p LOT136 1800p	4822 140 17078 SANYO	LOT103 1250p	3122113837011	LOT131 1450p
4615 01 16	LOT139 1675p	094-00020/0.9	LOT113 1400p	TFB 4039 AD	LOT131 1460p LOT293 1550p
4515 01 17 4515 01 19	LOT139 1675p LOT169 1500p	094-00035/0.2 094-01020/0.7	LOT162 1350p LOT59 1750p		LOT281 1550p
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Models & Description CD PICK UPS	Ordes Cod	Price
AINA XC007	K555151A	1900p
DX-9904, DX-DVA CXL60, CXL66, CXL80, CXN3100, CXN320, CXN3300, CXN4300, CXN430, CXN430, CXN540, CXN550, CXN959, CXN959, CXN9720, CXSL70, DX23100M, FDN535, FDN535, FDN535, LCX69, LCX665, LCX70M, LCX80, M7400, M75, NSX320, NSX450, NSX430, NSX433,	KSS152A	1600p
NX5990, NX992, NX5993, NXX036, NXX093, NXX20, SXFH553, SXFH520, XC300, XC559, XC790, XC500, XC590, XC590, XC590, XC590, XC590, ZC300, Z	KSS152A	_2000p
LCX&G, LCXAP1, XC002, XC004, XC005, XC777 XP31, XP33, XP55, XP80G XP6,XP7	KSS2108 KS220A KSS331A	2000p 2500p 3400p
AKAI CD73, DC33 CD25, CD29, CD27, CD32, CD36, CD37, CD52, CD55, CD57, CD650, CD690, CD750, CD79, CD25, CD26, CD27, CD32, CD36, CD37, CD52, CD55, CD57, CD650, CD670, CD79, CD7	KSS151A	1900p
CD1488, CDM800, CDM570, CDEM770, CDM959, MX550, MX570, MX650, MX670, MX750, MX950 DENON CC015001, DCD1580, DCDE 3520	KSS210A	2000p
DCD1420, DCD500, DCD500 DCD1420, DCD520, DCD510, DCD520, DCD560, DCD510, DCD520, DCD52	KSS151A KS152A KSS210A	1900p 1600p 2000P
DCD195, DCD1290, UCD296, DCD266G, DCD315, DCD480, DCD580, DCD615, DCD75, DCD825, 0CD890, DCD895, DN2000F GOLDSTAR	KSS240A	2600p
CD952A, CD952AJ, CD952LJ, CD952SJ, FFH101KL, FFH101WL, FFH222A/L, FFH272L, FFH33L, FFH273K, FJ30B, FH30B, CD320A/L, CD533C4, FFH212A/L, FFH212E GRUNDIG	KSS210A KSS2108	2000p 2000p
CD360, CD435 CCD300, CD101MCD904, MC10, NEW ORLEANS CD	HOPM3 KSS210A	2160p 2000p
KRCD100, RR1900CD, RR3100CD, RR4000CD, RR610CD, RR700CD CDP60, CDP90	KSS210B KSS220A	2000p
C0965 C0505 HTTACHI	KSS331A OPTIMA5	3400p 3600p
DAW560 FX-10	HOPM3 KSS210A	2150p 2000p
AXC10	KSS2108	2000p
1930-1992, LATE 1987-1988 - XLE3008K, XLE318K, XLE518K, XLE9008K, XLM9318K, XLV1018K XLV2118K, XLV225K, XLV118K, XLV328K, XL20101N, XL24118K, XL2448K, XL2555K, XL25118K COPADIC CASESTTE, MIN SYSTEMS - MOCEST 1930-1932 CA C33, CA-MX308K, CA-MX338K, UX-A5, UX-A6, XL-M309, XL-M4038K, XL-M408, XL-M409,	OPTIMA3 OPTIMAAS	4000p 6000p
XL-M504BK, XL-M505TN, XL-M506, XL-M509, XL-M705TN, XL-V737BK, XL-M75TN, XL-V221BK, XL-V737TN, XL-V221BK, XL-V75TN, XL-V221BK, XL-V75TN, XL-V252TK, XL-V55TN, XL-V252TK, XL-V55TN, XL-X5TN, XL-X5TN, XL-X5TN, XL-X55TN, XL-X55TN, XL-X5TN, XL-X5TN	OPTIMAS	3600p
XLV274BK, XLZ463TN, XLZ464BK, XLZ574, XLZ674, XTMXG7, XTMXG9, XTS60 KENWOOD	OPTIMAES	3300p
DP47, DP5605G, DP3020, DP87, L1000D DP1303, DP1510, DP2103, DP3010, DP3030, DP3050, DP4030, DP491, DP5010, DP5030, DP540, DP520, DP7030, DP7050, DP730, DP320, DP320, DP350, DPM550, DPM550, DPM550, DPM7730, DPM850, DPM991, DX5620, M225, M25, M350, P03030, PDM991, RDX25,	K55152A	1600p
RXDC3, RXDC31, UD22, UD302 DPC42, DPC72, DPC75, DPC80, DPC92 DP1050, DP2562, DP3060, DP501, DP5060, DP722, DP76, DP86, DP89, M77A, P03060,	KSS210A KSS220A	2000p 2500p
UD502, UD70, UD701, UD90, XE5 DPC321, DPC521, DPC531, DPC631K, DPC721, DPC731	KSS240A KSS331A	2600p 3400p
DP1060, DP2060, PART No: RCTRH8136AFZZ PANASONIC SUP177A, SUP202A, SUP212A, SUP222A, SUP277A, SUP377A, SUP477AK, SUP477A,	RH8136A	46 <u>00p</u>
SLPG100A, SLPG200A, SLPG200A, SLPG200AK, SLPG200AK, SLPJ22A, SLPJ22A, SLPJ22A, SLPJ23A, SLPJ2AA, SLPJ2AA, SLPJ2AA, SLPJ2AA, SLPJ2AA, SLPJ2AA, SLPJ2AA, SLPJ2	691-30209	5500+
SLPJ26, SLPJ27, SLPJ37, SLPJ45, SLPK25, SLPK25, SLPS50, SLPS70, SLPS700, SLPS840, SLPS900 PHILIPS	SOAAD70A	23500
A28334, CD070, CD080, 690, 910, 820, PART NO, 4822-691-30768 C0100, CD130, CD138, CD1482, CD240, CD244, CD210, CD300, CD303, CD304, CD386, CD480, CD482, CD560, CD560, CD582, CD583, CD584, CD610, CD620, CD530, CD780, CD781, CD782, CD842, CD882, CD586, CDF104, CD4479, FCD185	4822-691	3100p
AS449, AS445, AS540, AS640, A28648, A28640, CD070, CD080, CD091, CD183, CD185, CD650, CD710, CD72, CD742, CD744, CD740, CD970, CD920, CD935, FW17, FW21, FW25, FV330, FV36, FV7360, FV4301, FV40, FV41, FV45, FV65, FV765,	691-30209 CDM12.1	6500p
A28006	CDM12.4 K\$\$2108	2200p 2000p
PIONEER	OPTIMA6S	3300p
PDM400, PDM410, PDM500, PDM510, PDM500, PDM610, PDM700, PDM710, PDM730, PDT303, PDT403, PDT503, PDX540M, PDX560M, PDZ560T, PDZ72T, PDZ73T, PDZ81M, PDZ82M, PDZ58M, PDZ560M, XOZ53T, XDZ54T	KSS151A	1900p
N32. N9301, FP010, FP021, FP032, FP014, FP04500, FP04500, FP05700, FP0561, FP05600, FP05700, FP07700, FP8700, FP074, FPC7428, FPCF5281, FP24067, FP04501, FP07201, FP07201, FP07201, FP04304, FP0450, FP04508, FP04503, FP04504, FP05201, FP04501, FP07201, FP07201, FP07201, FP02204, FP0551, FP0561, FP05711, FP07311, FP07310, FP07201, FP07201, FP07201, FP02304, FP0551, FP0561, FP05711, FP07311, FP07310, FP07201, FP07201, FP07201, FP07204, FP05310, FP0511, FP07311, FP07310, FP07201, FP07201, FP07201, FP07204, FP05310, FP0541, FP07311, FP07311, FP07311, FP07311, FP07311, FP07311, FP07304, FP03710, FP0741, FP07311, F	PEA1030	5300p
POM400, PDM410, PDM500, PDM510, PDM510, PDM510, PDM710, PDM710, PDM730, PDT303, PDT403, PDT503, PDX540M, PDX550M, PDZ580T, PDZ73T, PDZ73T, PDZ31M, PDZ52M, PDZ53M, PDZ560M, XDZ53T, XDZ54T, XDZ55T, XDZ62, XDZ62M, XDZ520, XRZ32 SAMSUNG	PWY1009	48000
CD20 CD1200, CD1310, SCM-6000, SCM6900	HOPM3 KSS210A	2150p
RCD1200, RCD1300, RCD1350, RCD1600, RCD2600, RCD990, RCD995, SCM6500 SANYD DCF33, DCT55, DCX502, DCX701, DCX702, DCX602, DCX691, DCX691N, MCD210,	SCH90T4N	3600p
PART No. 5142186855 DCFS5, MCD450K, 560K, MCD230L, 50F, PART No. 5142205006	614218 614220	2300p 5600p
DCX1000MD_DCX1003_DCX800MD_DCX803_DCX915 DCD10, DCD11U, DCD20, DCD30, DCD304T_DCD6, DCD8U, DCMS1, DCX110, DCX120, DCX10, DCX20, DCX93, DCX94, MCDMS4CL, MCDMS50L_MCDMS504, MCD21L_	KSSZICA	20000
MCDZ2L, MCDZ3L, PART No. 6142391303 DCD12, PART No. 6450055966	614239 645005	3300p 3700p
MC0231L, MC0261L, MC0261L, MC0271L SNARP CD 111, CD-301, CD-302, CD-304, CD-310, CD-C3, CD-1700, CD-4800, CD-41, CD-410, CD-410, CD-412, CD-415, CD-416, CD-417, CD-420, CD-43, CK4550, CM4556CD, D4-150, D4-160, D4-450,	KSS2108	2000p
DX-460, DX-461, DX-860, DX-860, DX-860, DX-860, DX-854, DX-875, DX-875, DX-875, DX-875, DX-8750, DX-870, DX-8770, DX-870, DX-8750, DX-870, DX-870, DX-870, DX-870, DX-870, DX-870, DX-870, DX-870, DX-850, DX-), RH8122A	\$750p
01-50CD, 01-60CD, 0780CD, PART No. RCTRH8124AFZZ DXR-8408, PART No. RCTRH8130AFZ2 CD5366F, 360H, 370, 450HE, CMS150CDH, CMSR400CDH, CP150, CPH400, CP5360, 370.	RH8124AF RH8130AF	2900p 2900p
PART No. RCTRH8136AFZZ	RH8136AF	4500p
KS\$121A	KSS240A KSS121A	2600p 3500p
KSS210A	KSS151A KSS210A KSS210B	1900p 2000p 2000p
K\$\$220A K\$\$331A	KSS331A	2500p 2500p 3400p
KSS36GA	KSS360A	2600p
SLP200, SLP230, SLP250, SLP333, SLP555, SLP777, SLP999,SLPA10, SLPC20, SLP126, SLP145, SLP5700, SLP5900	SOAD70A	2350p

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VIDEO RECORDER POWER SUPPLY REPAIR KITS PHILIPS	· Maximum Rea		CM3900A DIGITAL MULTIME	TER	
For ES7047 Chassis: CP110		d Resistance Overload Protected for Function and Range Operation	Features:		
Order Code: VCRPSU1 Price: 675p	· Supplied in Wa	allet with Test Probes	Large LCD Display Height 18mm		
PANASONIC For ES 7054 Chassis: HSM	DC Voltage 2V/	20V/200V/500V	· Maximum Reading 1999 + Unit		
Order Code: VCRPSU2 Price: 1125p	AC Voltage 200 DC Current 200		- Single Manual Rotary Switch fr	or Function and Range Operation	
For ES 7053 Chassis: JSM		2/20kΩ/200kΩ/2MΩ	 Auto Power off (approx 15 min)	
Order Code: VCRPSU3 Price: 900p	Order Code: C		Diode Test Function		
For ES 7050 Chassis: KSM		ANGING DIGITAL MULTIMETER	All Ranges Overload Protected Supplied with Test Probes		
Order Code: VCRPSU4 Price: 1500p For ES 7051 Chassis: LSM	Features:	ay with Decimal Point	DC Voltage: 200mV/2V/20V/200	V/700V Accuracy +0.5%	
Order Code: VCRPSU5 Price: 1500p	• 33 Segment Ba		 AC Voltage: 200mV/2V/20V/200 	V/700V	
For ES 7055 Chassis: MSM	Override Indica	ition	DC Current A: 200µA/20mA/200	mA/2A/20A	
Order Code: VCRPSU6 Price: 1650p For ES 7052 Chassis: NSM		for Function Selection	 AC Current A: 200μA/20mA/200 Resistance Ω: 200Ω/2kΩ/200kΩ/ 	mA/2A/20A	
Order Code: VCRPSU7 Price: 1750p	Auto Power off Auto Polarity w	(approx 15 mins)	Order Code: CM3900A	Price: 2900p	
NEW NATIONAL PANASONIC VCR SERVICE KITS		Continuity Test with Buzzer	CM3920 DIGITALMETER WITH T	EMP MEASUREMENT	
This Service Kit consists of the parts for the upperside of the G	All ranges over		Features:		
deck, G rev. deck and G2 deck. Suitable for the following models:	Low Battery Inc.		Temperature Measurement		
AG5150, AG5250, AG5700, AG6024, NVF55, NVF55F, NVF65,	Supplied with 1 DC Voltage: 320	lest Probes DmV/3.2V/32V/320V/600V	Diode and Transistor HFE Test Large LCD Display		
NVF75, NVF77, NVJ30, NVJ33, NVJ35, NVJ36, NVJ37, NVJ40,		0mV/3.2V/32V/320V/600V	Height 18mm		
NVJ42, NVJ45, NVJ46, NVJ47, NVJ48, NVL20, NVL21, NVL23,	· DC Current A: 3	20µA/3200µA/32mA/320mA/10A	Maximum Reading 1999 + Unit		
NVL25, NVL28, NVW1, NVFS100, NVFS200, NVFS88, NVFS90 This kit consists of the following:		20µA/3200µA/32mA/320mA/10A	Single Manual Rotary Switch for		
Pinch Roller Unit, Mode Switch, PS Pull Out Gear, Sub Loading	Order Code: Cl	12/3.2kΩ/32kΩ/320kΩ/3.2MΩ/32MΩ 12700 Price 4050p	 Auto Power off (approx 15 min) Diode Test Function 		
Arm Unit, Pinch Cam, Pinch Cam Cap, PS Unit, Cut Washer,		CAPACITANCE METER	All Ranges Overload Protected		
Connection Gear, Cut Washer Order Code: SK134 Price: 1100a	Features:		Supplied with Test Probes		
Order Code: SK134 Price: 1100p This Service Kit consists of the parts for the lowerside of the G	3.5 LCD Display Height 18mm		DC Voltage: 200mV/2V/20V/200	//1000V Accuracy ±0.5%	
deck, and the G rev. deck.	Maximum Read	ling 1999	 AC Voltage: 200mV//2V/20V/200 	V/700V	
Suitable for the following models:	Capacitance 9 F	langes from 200pF-20000µF	DC Current A: 2mA/20mA/200m AC Current A: 200mA/20A	A/20A	
AG6024, NVF55, NVF55F, NVJ30, NVJ33, NVJ35, NVJ36, NVJ37, NVJ40, NVJ42, NVJ45, NVJ46, NVJ47, NVJ48, NVL20, NVL21,	Measuring from		 AL Current A: 200mA/20A Resistance Ω: 200Ω/2kΩ/200kΩ/. 	2MQ/20MQ/200MQ	
NVJ40, NVJ42, NVJ45, NVJ46, NVJ47, NVJ48, NVL20, NVL21, NVL23, NVL25, NVL28, NVW1	Single Manual I Zero Adjust Kno	Rotary Switch for Function and Range Operation	Capacitance: 2nF/20nF/200nF/2p		
This kit consists of the following:	Order Code: Ch		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 Pulley Unit, Loading Gear (supply), Loading Cam Gear, Cut		T IDLERS & PULLEYS fodels			
Washer, Retainer Gear Unit, C Ring, Detent Arm		711, 14, 17, 19, 33, 34, 35, 38, 39, 52, 57 , 61, 62, 63, 1	A 65 86 86 990	Description	
Order Code: SK135 Price 1000n	3	50, 640, 16S, 5030	A, 03, 63, 66, 330,	FF Rew Idler 6886792	
TRANSPARENT REPAIR ADJUSTMENT CASSETTE	Order Code: ID			Price 100p	
This transparent videocassette replaces a normal videotape dur- ing measurements, adjustments and inspection. The mechanical		fodels T680, 6500, 6800, 9300, 9500VT9700, 9900		Description	
parts come into sight and become accessible.	Order Code: ID	L02		Play Idler 6861482 6861481 Price: 180p	
Order Code: Tool23 Price: 500p	Make N	lodels		Description	
VOLTAGE TESTER	Blaupunkt R Goldstar G	TV301, 306, 307, 309, 311, 312, 315, 316, 317, 319, 3	20, 404, 414, 424, 434, 444, 478, 707	ldler	
A terminal screwdriver incorporating continuity and voltage detection supplied complete with batteries on blister card.	Goldstar G	HV1221, 1232, 1240, 1241, 1242, 1243, 1244, 1245, 1 000, 8200, 8210, 8215, GVHP51, VCP4100, 4130	246, 1247, GHV1248,	Idler	
With Eusoslot and instructions for use.	Grundig M	IVS400, 440, VS400, 410, 440VS450, 460		Idier	
Order Code: Tool11 Price: 220p	National N	V230, 250, 260, 280, 370, 380, NV430, 431, 433, 450,	460, 465, 470, 480, 630,	Idler Arm VXP 0521	
SPRING HOOK Spring Hook, to unlock springs in audio tape recorders and VCR's	6	50, 730, 780, NV810, 830, 850, 870, 890, NVG7, 9, 10,	11, 12, 14, 15, 16, 18,		
Order Code: Tool20 Price: 265p	Philips V	0, 130, 400, AG1000, AG1050, 1200, 1500, 1810, AG2 R6460, VR6520, VR6920	100, 2200, NVH65, 70	Idler Arm 40340162	
SATMETER	Order Code: ID	L08		Price 100p	
The Satmeter is a professional portable satellite strength mater designed for the installation and maintenance of satellite TV sys-		lode/s CR7000		Description	
tems. The Satmeter can be used as stand alone meter with pow-		C200, 381, 383, 384, 385, 386, VC388, 390, 393, 3300,	8281 9100 9300 9500 9700	Idler 150280 Idler NIDL0005GEZZ	
ering the LNB as well as in loop. Through operation with	Order Code: ID	L10	0001, 0100, 0000, 0000, 0100	Price: 100p	
satellite RX powering the LNB. Acoustical signal : On signal strength		lodels		Description	
Acoustical signal : On signal strength LED indicator : Vertical/horizontal		R6540 2300, 387, 402, 471, 473, 477, VC481, 482, 483, 486, 4	199 406 500 571 579	Idler	
Frequency range : 900 to 2050 MHz		11, 582. 583, 584, 585, 8481, 5F3, 5W20E	100, 400, 300, 571, 373,	Idler NIDL0006GEZZ	
Input impedence : 70 OHM	Order Code: IDI	.11		Price: 100p	
Power amplifier : 18 DB Detection range : -60 to -10 DBM		odels 510		Description	
Max_Input Single : -10 DBM		/23, 3V29, 3V30, 3V31, 3V323V35, 8923, 8924, 8929,	8930 8931 8940 8941 8942	Reel Idler Reel Idler PU48967	
Order Code: Tool22 Price: 8500p	J.V.C. HE	7200, 7300, 7350, 7600, 7610, 7650, 7655, 7700	5000,0001,0040,0041,0042	Reel Idler PU48967	
DIGITAL MULTIMETERS CM2300 DIGITAL MULTIMETER	Order Code: iDi	20		Price: 175p	
Features:		odels '39, 3V30, 3V31, 3V32, 3V353V36, 3V38, 3V39, 3V49,	8930 8931 8932 0040	Description	
* 3.5 LCD Display	89	41, 8942, 8943, 8944		Take Up Idler PU 51402	
• Height 12mm	J.V.C. HF	7200, 7600, 7650, 7655, 7300, 7350, 7610, HRD110,	111, 120, 121, 225	Take Up Idler PU 51402A	
Max Reading 1999 HV Indication for High Voltage	Order Code: IDL	22 odels		Price 100p	
Single Manual Rotary Switch for Function and Range Operation		39, 3V30, 3V31, 3V32, 3V353V36, 3V38, 3V39, 3V49,	8930, 8931, 8933, 8940	Description	
All Ranges Overload Protected	89	41, 8942, 8943, 8944		Take Up Clutch PU 51380	
10A DC Current Test DC Voltage 2V/20V/200V/500V	J.V.C. HF	7200, 7600, 7650, 7655, 7300, 7350, 7610		Take Up Clutch	
C Voltage 2V/20V/200V/500V AC Voltage 200/500V	Order Code: IDL	23		PU 53462A PU 51380	
DC Current 200mA	Make M	odels		Price: 200p Description	
Resistance 2kΩ/20kΩ/200kΩ/2MΩ		532, VR6520, 6843, 644		Reel Idler	
Supplied with test probes Order Code: CM2300 Rrice: 975p	Sharp VC	2600, 651, 681, 682, 684, 685, 693, 699, 700, 783, 6FR	, 6V3, 6F3	Idler Assembly	
Order Code: CM2300 Price: 975p CM2400T DIGITAL MULTIMETER WITH TEMP MEASUREMENT	Order Code: IDL	88		NPLYV0107GEZZ Price: 615p	
Features:	Make Mi	odels		Description	
• 3.5 LCD Display	Philips VR	6843, 6943, 44SB9, VR44SB920, 44SB922, 6943		Reel Drive Unit	
• Height 12mm • Maximum Reading 1999	Sharp VC	772, 780, 781, 782, 785, 786, VC787, 800, 793, 799, 7 4, VCA131, 140, 170, 202, 203, 234, 501, VCA602, 50	810, 7822, VCA100, 102,	Lat.	
10A DC Current Test	85	2, VCH882, VCM73, VCT72, VC782MK11	, + CDOUT, 802, VCR851,	Idler NPLTV0111GEZZ	
DC Voltage 200mV/2V/20V/200V/1000V	Order Code: IDL	90		Price: 700p	
AC Voltage 200/750V DC Current 0.2mA/200mA/20mA/200mA/20A		odels 11 915 916 917 9012 90128:9014 9016 9022 902	4 0022 NO054 0055 0050	Description	
Resistance 200Ω/2kΩ/20kΩ/200kΩ/2mΩ		11, 915, 916, 917, 9012, 9013N9014, 9016, 9033, 903 96, N9110, 9120, 9510, 9520, 9530, N9610, DX1000, 1	+, 5053, (90054, 9055, 9056, 9066, 600, 2006, DX3060, PX1200	Idler Arm Assembly	
Supplied with Test Probes	Order Code: IDL	245		Price: 270p	
Continuity Test		odels & Description			
Continuity Test Diode Test and Continuity Check	Philips Pr DV	essure Roller Assembly PS403-40205 186, 190, VR211, 2115, 212, 213, 223, 286, 291, 292,	211 212 212 2210 2240 202 200	202 52500 100400	
All Ranges Overload Protected	47	1, 562, 582, 571, 761, 201, 202, VR203, 302, 303, 305	6180 6182 6185 6285 6290 6291	6293 V86362 6367	
Order Code: CM2400T Price: 1450p	639	30, 6391, 6393, 6467, 6468, 6470, 6561, 6570, 6581VF	6670, 6676, 6710, 6760, 6761, 6762	6870 6970 6975	
CM2900 PACKET DIGITAL MULTIMETER Features:	86	31, 53SB7, 68SB4, 71SB4, 71SB5, 72SB8, 72SB8, 925	SB31, 20DV1, 20DV2, 20RW7, 21DV1	. 21DV2. 2SB01.	
• 3.5 LCD Display	Toshiba V9	B02, 2SB11, 2SB12, 30DV2, 31DV1, 31DV2, 31DV, 33 1, V95 Pressure Roller Assembly - PS403-40205	5802, 35803, 35805, 35811, 35812	35813	
Compact and Lightweight Pocket Size	Order Code: PR2			Price: 300p	
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		the second se	and the second se		

REMOTE CONTROLS

			CATHOLO							
Description	Order Code	Price	Description	Order	Price	V	CR ALI	GNM	ENT K	1Ť
GRUNDIG	0000		PHILIPS (continued)	Code		CONTAINS				
TP160E	RC 107	900p	RC38	RC 301	750p		OF 7 HEAD & TAP		VERS A	SET OF 8
TP200, TP300	RC 380	750p	KT3 TEXT	RC 5301	750p	- RCA TYP TOOL	E AUDIO & CONTR	OL HEAD PO	SITIONING	• 0.77mm
TP400	RC 401	675p	RC5352	RC 5352	750p		USTMENT TOOL P	OR TAPE GU		· 1.27mm
TP590-600	RC 600	750p	RC5375	RC 5375	750p		E BACK TENSION			1.50mm
TP390, TP610	RC 610	750p	RC5 STANDARD	RC 5534	850p		ADJUSTMENT TO	OL FOR VAR		2.40mm
TP621	RC 621	800p	RC5901	RC 5901	850p		USTMENT TOOL			3.00mm
TP630, TP650	RC 650	750p	RC5903	RC 5903	700p	3 P	eversible Screwdr Spring Hook	ivers	Circlip Pliens Micro Screwdriv	
TP660	RC 660	750p	SABA			H		Heed Extract		
TP661	RC 661	750p	16772 ~	RC149	000-	Orde	er Code: To	00110	Price: 29	005
HITACHI			TC319-320	RC 328	900p 800p					
CLE800-CLE830	RC 140M	700p	TC356	RC 356	800p		F	USES		
A617402/655602	RC 192	800p	TC358	RC358	800p		TIME	LAG	QUICK	BLOW
A512120/230	RC 900	750p	TC360	RC 360	750p		(20m		(20m	
A514790	RC 901	750p	TC365	RC 365	750p	Value	Order Code	Price	Order Code	Price
A5088470	RC 902	800p			, oop	160mA	FUSE 01	75p	FUSE 17	60p
A518612	RC 903	750p	SALORA			250mA	FUSE 02	75p	FUSE 18	60p
SCL002	RC 904	750p	SERIES L	RC 190	750p	315mA	FUSE 03	75p	FUSE 19	60p
C2096	RC 905	800p	86173	RC 882	750p	400mA	FUSE 04	75p	FUSE 20	60p
A511940	RC 906	750p	SANYO			500mA	FUSE 05	75p	FUSE 21	60p
655602H	RC 907	800p	RC218, RC222, RC228, RC238	RC 140M	700p	630mA	FUSE 06	75p	FUSE 22	60p
ITT			JXGE	RC 878	800p	800mA	FUSE 07	60p	FUSE 23	60p
IFB13, 14, 15	RC 143	800p	JXDE	RC 884	750p	1A	FUSE 08	60p	FUSE 24	60p
FS4	RC 148	750p	VHR2300	RC 890	750p	1.25A	FUSE 09	60p	FUSE 25	60p
RG305	RC 305	675p	RC628	RC 865	900p	1.6A	FUSE 10	60p	FUSE 26	60p
RG306	RC 306	750p		110 005	300p	2A	FUSE 11	50p	FUSE 27	60p
FS9/1-10/1	RC 307	750p	SHARP			2.5A	FUSE 12	50p	FUSE 28	60p
VS5 RUK	RC 308	750p	G0121CESA, 123CESA, 204, 251	RC 140M	850p	3.15A	FUSE 13	55p	FUSE 29	50p
VS4-1	RC 310	750p	SIEMENS			4A	FUSE 14	55p	FUSE 30	50p
MULTICONTROL (17C20)	RC 311	750p	FC616	RC 130	050-	5A	FUSE 15	60p	FUSE 31	50p
KORTING			FC631		850p	6.3A	FUSE 16	60p	FUSE 32	50p
18279, 18396, 18460, 18521 SE	RC 108	750p	FC742	RC 132	750p					
40540 VTS	RC 108	750p	10/42	RC 164	750p		F	USES		
LOEWE			SONY			CURREN	RATING	ORDE	RCODE	PRICE
DC11	RC 146	800p	RM604, RM605, RM606	RC 140	700p		CERAM	IC PLUG	TOP	
	110 140	ooop	32 CHANNEL	RC 140M	700p	3A		FU	SE 33	100p
MATSUI			RM613	RC 141	750p	5A		FU	SE 34	100p
010270601	RC 889	750 p	RM632, RM636	RC 160	675p	13A			SE 35	.100p
VX770	RC 892	750p	TATUNG				20mm CEF			
METZ			TATUNG	00.077		3.15A			SE 41	100p
JAVA COLOR (6890)	RC 166	800p	FXA RC70	RC 877	750p	4A 5A			SE 42	100p
COLOR (7156)	RC 183	800p	FX70 FASTTEXT	RC 883	750p	6.3A			SE 43	100p
AVA (7180)	RC 184	800 p	FATUFASTIEAT	RC 894	750p	8A			SE 38 SE 39	100p
MITSUBISHI			TELEFUNKEN			10A			SE 35 SE 40	100p
939P/03607, 939P/03609	RC 140M	850p	FB632	RC 632 ST	750p		32mm CERA			loop
NOKIA		-	FB 639	RC 639 ST		8A			SE 44	210p
SATELLITE	RC 550	750p	THORNETPOLICON			10A			SE 45	210p
NORDMENDE		, oop	THORN/FERGUSON		1.00	15A			SE 46	210p
TC2336	RC 351N	750-	3V35-42	RC 342	650p	20A			SE 47	210p
CMC1, TC3519		750p	3V31-32	RC 344	750p		38mm CERA	MIC SLO	WBLOW	
	RC 356	800p	3V57-58	RC 628	750p	10A		FU	SE 48	875p
OCEANIC			TX10 TEXT	RC 732	575p	-				
390C9500	RC 339	750p	TX10 STEREO TEXT TX9-90-100	RC 738	575p	ALL THE	ABOVE PRICES	ARE FOR	PACKS OF 10	FUSES
ORION			3V55, FV11	RC 740	675p				-	
RC53	RC 892	750p		RC 783	750p					
PANASONIC			TX100 FASTTEXT	RC 785	650p		. PRC	TE	CTO	R
EUR51200	RC 200	800p	TX100 STEREO FASTTEXT PROFESSIONAL	RC 789	650p	1.0			010	
TC2200	RC 201	850p	PROFESSIONAL	RC 790	650p					NO. 1. 1
VSQ0357/NV730	RC 202	750p	TOSHIBA			ICPF1	0 ICPF38	ICPN	10 ICP	N38
TNQ1621	RC 203	750p	CT937	RC 950	750p			101.11		100
PHILCO		1.000	CT9117	RC 951	750p	10000				-
CARVEL, CONCORDE,	PC 100	750-	201R4B	RC 952	750p	ICPF1	5 ICPF50	ICPN	15 ICPI	N50
	RC 108	750p			-					-
TELESTAR			We stock Remote C	ontrole f	or	ICPF2	0 ICPF75	ICPN	20 ICP	N75
TC10	RC 152	900p					- 10/175	IOT A		375
		-	T000 1'//		1.1.1	1 1 1 1 1 1 1 1				
PHILIPS			OVER SUUU different	I models		10000	- 10	10-00		
PHILIPS RC5002,5154	RC 134	750p	over 5000 different	models.		ICPF2	5 ICPN5	ICPN	25	
	RC 134 RC 135	750p 750p				ICPF2	5 ICPN5	ICPN	25	
RC5002,5154 KT3 NON TEXT 59117032			Ring for further de	etails on		ICPF2				
RC5002,5154 KT3 NON TEXT	RC 135	750p		etails on		ICPF2	5 ICPN5 Price: Or			



TELEVISION April 1997

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KV2602256 KV26002266 KV21XMTV KV21XMTV KV21215/17 KV22125/56 PX KV2752/56 PX KV2752/56 PX KV2752/56 PX TOSHTBA 150R68 155798 155798 ITT 108 11/20 ITTA 1 11/20 TVA 1 11/20 TVA 1 11/20 TVA 1 11/20 TVA 1 11/20 S1 - 13/21 11/20 S1 - 13/21 11/20 S1 - 13/21 11/20 PTT 455, 1456, 1476 11/6.00 CPT1451, 1456, 1476 11/6.00 CPT1451, 1456, 1476 11/6.00 CPT12174, 2176, 2178 11/9.50 CPT2174, 2176, 2178 11/9.50 CPT2372, 2174, 2176, 2178 11/9.50 CPT2373, 2174, 2176, 2178 11/9.50 CPT2374, 2475, 2475 £1/6.50 2432732 £1/6.50 2434002 £1/6.50 2434141 £1/6.40 2434274 £1/6.50 KT3 KT4, Konig KT4, II.R K40, 140-10246 K40, 140-10269 24 85-983-5 FERCUSONTHORN TX85, 86, 89, 99 2435121 TX89, 2435701 TX90, 14°, T9031, Red Spot TX90, 10°, T9034, Red Spot TX90, 20°, T9034, White Spot TX109/10°, FST, T00451, TX109/0°, FST, T00451, TX100-90°, T6031, Blue Spot TX100-90°, T6031, Blue Spot TX100-90°, T6031, Blue Spot TX100-90°, T6031, Blue Spot £19.50 CRN £10.50 £16.50 £13.50 Red Spot £13.80 White Spot £15.80 White Spot £14.50 31. 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Blue Spot £14.50 £15.80 £15.50 £15.50 £15.50 £15.50 £15.50 SAID110.01 MATSUI 1440A, 1480A 1420B, 1440B 1420B, 1440B 1422, 1450, 1455 3214009 3714002 5908-9509A-AA MITSUBISHI £16.60 £18.00 £18.00 £16.50 £16.60 £16.60 £16.90 £15.00 £16.50 £15.00 £15.00 £15.00 £15.00 2B..... 3A PIONEER SV2801 SV2803 SD28 AV1 £16.50 £15.50 £16.50 £17.80 .£16.00 .£15.00 .£16.50 .£16.50 .£15.50 .£15.50 .£15.50 3714002 5908-05009A-AA MITSUBISHI CT2131 CT2145 CT2528 CT2529 314P18506 314P18506 314P18506 TX10090°, T6031, Blue Spot. £14.50 ASIF £17.80 SIK, SJK7, S9P7 £19.50 SIR7 £119.50 SIR7 £115.50 S9M5 68M5 £17.50 47325700 £115.50 S702, 68K4 £15.50 S9M5 68M5 £17.50 47325700 £115.50 FIDELITY £10.50 AVS1600, 2000 £14.50 CTV140 £14.50 ZX2000 £15.50 \$39.80 SD28 AV1 SAISHO CT14R, CT141 CT141B, CT141 CT141B, CT142B 3714002 3214009 SALORA Chassis L. £15.00 .£16.50 .£15.00 .£16.50 £14.50 £25.80 £25.80 £23.50 2434141 2434274 2434274 2434274 2434404 3334593 1TT/NONIA Compact B/110° Compact B/110° Compact B/R/10° Compact S/R/10° Compact S/R/10° Compact S/R/10° Compact S/R/10° Compact S/R/10° 155T9B 175R9B 215R8B 215T8B 1400RB AT2079/09 AT2079/15 AT2079/17 £23.50 £23.50 £15.00 £14.50 £25.80 £23.50 £16.80 .£15.90 .£17.80 .£19.80 .£14.00 .£15.80 .£17.90 \$55.00 Chassis L Chassis M Chassis N Chassis S 334P18506 NIKKAI Baby 10 NTI4, 20 NORDMENDE F11B F17. £55.00 £36.00 £22.00 £55.00 £19.80 FM504 FM513 4\$15-05-07. £15.80 £55.00 £22.00 AT2079/23 . 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What a Life!

Is the world full of oddballs, Don Bullock wants to know. Or is it just that they all home in on him?

left the shop to stack up some old sets. When I returned, Steven was grinning.

"Had a right oddball crone in" he said. "Name of Swampe. Wanted us to traipse through a mile of riverside weeds and scrubland to refit a coaxial plug. I've had dealings with the couple before. Call you back forty times and keep you waiting ages for payment. Then you get the equivalent of seven and six pence. So I referred her to Snoddy's."

Greeneyes' Microwave

Just then Greeneycs came in, breathing fire. "What's Snoddy's number?" she demanded. "The microwave's playing up again. You took a week to fix it last time and it's never been right since. What's the matter with it – and you?"

"Hang on" I replied. "I'm clever, yes, even brilliant, but not clairvoyant. Last time it was the magnetron, and we had to get one. What arc the symptoms?"

"When I switch it on it goes 'tuh, tuh, tuh'. It doesn't produce its usual droning noise, and refuses to stop when I try to switch it off.

"Yes, you'd better ring Snoddy's. And you could tell them to send the bill to Crubb's Foodstore. They're into electronics."

Anyway, we naturally took a look at it. It's a Sharp R8880, which has a grill as well. After opening it up we noticed the small motor under the magnetron. It opens and closes a little flap at the back, depending on whether the grill or oven is being used. It was trying to do this but failed: the flap was offering physical resistance because it was sticking on some gunge. A thorough clcan restored normal working.

"Snoddy's indeed" I commented.

Aerial Leads

Then Steven came back. "I've to pop along to Mrs Senile" he said, "to unplug her teamaker and plug in her TV set instead. I have to do it about once a week. When she finishes watching TV at night she plugs the teamaker in ready for the morning. Then she doesn't understand why she can't watch TV while she drinks her tea."

I understood the situation all too well. About half a century ago I had a similar customer. She had a Decca monochrome set with separate aerial sockets for TV and VHF radio. In those days TV closed early. Each weekend she'd plug her TV aerial into the VHF socket to listen to late-night radio. Next morning she'd find herself without TV and give us a call.

A Goodmans C1401R

As Steven left, Mrs Bustler came in. Her husband followed, carrying a Goodmans C1401R colour portable.

"Watch that step" she said over her shoulder, "we don't want anything to happen to our TV." Then she looked at me. "Where's the usual nice young man?" she asked.

"He's gone for a crate of matches" I said. "He's a firebug, you see. What seems to be the trouble?"

"This thing" she replied, nodding towards the set and her husband. "He does nothing, just blinks at me. 'Ere, didn't you used to be old Mr Bullock?"

I agreed to take on the set, and they trouped off. We've had this trouble before with these Goodmans. The cause is usually the STR5412 chopper chip. I sensed a quick buck, but it took a bit longer. The first thing to do is to check

for about 100V at pin 2 of the chip.

It was there all right, but not at the other side of the 1N4937 diode D806 which was leaky. As we didn't have a 1N4937 I fitted a BYD33D. This brought the set to life, and I boxed it up. A soak test proved that all was well.

"Old Mr Bullock" I muttered as I put the set to one side, "used to be old Mr Bullock..." I went back outside to finish stacking my sets.

Down by the Riverside

Greeneyes came in to say that there'd been a call. "If you feel up to it. Actually she said she wanted the old man, not Steven. At the back of Deadend Lane, down by the riverside. Ever such a nice old girl. Name of Swampe, place called Bodkin's Shack. Something to do with an aerial."

I made to reply, but her eyes darkened. So I got together some coaxial cable, connectors and clips, and set off.

As I neared the river it started to rain. The road became a track, then a footpath. I gathered my bits and pieces, got out of the van and continued on foot. I could see Bodkin's Shack in the distant, misty scrubland. Before long I'd got to the door and knocked.

An emaciated old girl opened it. "You'll be old Mr Bullock, hasn't it?" she said, "Pop and I have been expecting you."

I went into the barest room I've ever seen, with an old iron woodstove whose chimney flu rose through the roof. An ancient, thin man with glinting eyes sat in a rocking chair close by.

"Connie, get Mr Bullock a chair" he said. Connie did as bidden.

"Now fetch that plug for Mr Bullock." A used coaxial plug was brought at once. They looked an odd couple, as she stood beside him. "It came off the acrial lead by our bed, look you" said the old man. "And I want you to put it back on. Show Mr Bullock where the cable is, Connie."

Connie pulled open a curtain, and we walked through a cloud of dust into their dingy bcdroom. An ancient Ferguson monochrome set of the 1400 chassis type sat on a stool beside the huge bed. The plugless cable hung bcside it.

I refitted the plug and tried the set. To my surprise there was a reasonable picture – with the usual vision modulation buzz on the sound.

We went back to the old man to report that the job had been done.

"I'll send you seven and six next pension day" he said. "Now Connie, show Mr Bullock out."

As we went out into the rain, Connie pulled the door behind her. She touched my arm.

"Please understand" she said, "he's not my husband. I'm his daughter."

The old man's voice came through the gap in the doorway. "Connie. Come here, now" he piped. Connie turned and fled inside.

It took me a while to reach the van. Once inside it I sat and thought. Is the world full of these oddballs, or do they just home in on me?

The Porkpie Hat

When I got back I found this chap in sunglasses with a cravat and a porkpie hat. He had a cigarette in a long holder, and his fingers were encrusted with rings. He also had a gold watch as large as a mantlepiece clock, and a loud, ringing voice.

"Slimey" he said. "Nigel Slimey, and plcased to meet you." He pumped my arm as though I was the village pump and idiot. "It's about this old Fergie portable. Got it here. No picture, though the sound's all right."

He removed his sunglasses and screwed a monocle into his eye socket. Then he stood back to look at me. "Now, can you mend it? Eh?!"

I took the set and waived him out. It was a 16in. model, fitted with the TX9 chassis (series 1044). When I switched it on there was EHT but the screen remained blank. I soon discovered that the tube's first anode voltage was missing. R233 ($300k\Omega$) in the feed to the first anode supply potentiometer was open-circuit. A replacement restored the picture.

While the set was on soak test I noticed that it emitted a discordant, high-pitched whine when the beam current was high – on bright scenes. So I made a simple stethoscope with the outer of a length of coax, made sure that it was dry (I'm not stupid), jammed one end into my ear and moved the other end around the chopper and line output circuits.

It didn't take long to pinpoint the source of the whinc. The graphite core of the chopper transformer was cracked. I glued to with epoxy resin and the set stopped its whining.

A Dead Hitachi

Old Miss Brittle stepped into the workshop gingerly. She was accompanied by a small, watery-eyed man who was carrying an Hitachi TV set. He put it on the counter and Miss Brittle waved him away.

"This set's no use to me as it is, Mr Snoddy" she said. "What's the use of a televisor that doesn't televise?"

So now, on top of everything else, I'm Mr Snoddy I thought as I took the back off the set. It was fitted with the G8Q chassis and, apart from the LED display lighting, was quite dead.

I checked the voltage at the HT reservoir capacitor C931. The HT was present, but didn't get much farther. One end of the HT smoothing coil L931 had never been soldered, so there was no voltage at the smoothing capacitor C936.

When I'd cleaned off the connection and resoldered it the set worked well enough.

John Berryman

Our next caller was the happy and ruddy undertaker John Berryman. He looks more like a gamekeeper.

"Hi Don" he called as he breezed in. "How are you, eh? How are you keeping?"

"Never mind the trade enquiries, John" I replied. "Busy?"

"Champion" he said. "They're poppin' off a treat, so I can't complain. Anyhow, come and look in the van. I've a corpse that might interest you."

He beckoned me out to his big closed van, flung open the doors and pointed to a GEC C2200 colour set. "That's him" said John.

We carried the set to the bench and I plugged it in. When I switched it on it just squealed.



The road became a track. . . .

"That's all the rotten thing does" he said.

I checked the BU508A line output transistor, which read barely leaky. When a replacement had been fitted the set sprang to life.

"Bet you can't do that with your jobs" I said. "By the way, why are you so much happier in your work than I am in mine?"

"Well, my customers all come with the same fault, Don. No intermittents, and none of them give me any old buck."

"What you you get for each job?" I asked him.

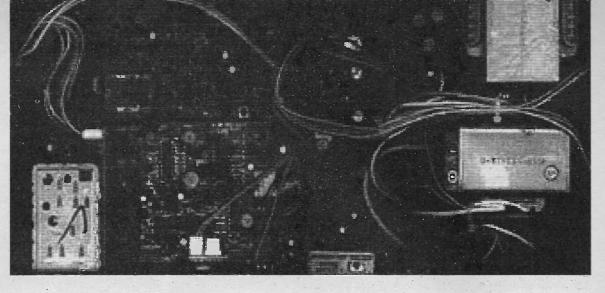
"A thousand" he replied. "Yup, life is good! Wanna job as my assistant?"

"Don't tempt me" I said.

Well Done!

The other day we had to order a service manual for the Grundig E1 satellite receiver-decoder. When it arrived we were struck by the exceptionally high quality of its production. It covers the Omni and E2 chassis as well as the E1, and also covers receivers in the Philips, JVC and Matsui ranges. Several of the fifty or so A4 pages - the ones with circuit and layout diagrams fold out to A3 size. The quality of the text and drawings has to be seen to be believed. It was obtained from Grove Farm Publications, Long Lane, Barnby in the Willows, Newark, Notts NG24 2SG (01636 626 327)

Highly recommended!



Satellite Notebook

Hotbird 2 Reception

Eutelsat's Hotbird 2 is now in operation at 13°E. The transmissions are mainly digital, though there are analogue signals from Poland, Portugal and Dubai in the range 11.7-11.8GHz, which is within the tuning range of most receivers. The Arabic channel ART (Arabic Radio and TV) also transmits in analogue form, but at the top of Hotbird 2's frequency range – apparoximately 12.01GHz, with horizontal polarity. Apparently ART transmits a lot of high-quality Arabic football, which might appeal to some customers.

If an old 10GHz local oscillator LNB is used, with a 2MHz tuner, ART will be found right at the top of the band – despite being some 300MHz above the highest (specified) output frequency. Even with distribution via a magnetic switch, I've not so far come across a 10GHz LNB that doesn't produce good pictures. No doubt when these LNBs were made little thought was given to the upper cut-off frequency in either the low-noise amplifier or the IF amplifier sections.

If a new 9.75GHz, enhanced LNB is used, ART's IF will be at around 2.25GHz, which is possibly outside the range of all tuners currently on the market! This seems to go against the idea that the latest is always the best. If you are installing a Eutelsat system, the older type of Astra LNB could be used for the purpose, with a new one for Astra.

I use a 10GHz LNB (actually an enhanced 9-75GHz LNB detuned to 10GHz) with a Pace MAC receiver and motorised dish. The Pace receiver covers 700-2,150MHz which, with a motorised dish, gives reception from Arte via Astra 1D at 10-714GHz to the Spanish Teledeporte sports channel via Hispasat at 12·14GHz. **H.C.**

Twisted Dishes

The son of a local builder for whom we do a lot of work recently bought a secondhand offset solid 1m dish he'd been offered at a reasonable price. But after installing it all he could get were very sparkly pictures. Could we call round and adjust it?

The pictures were indeed very poor, way below what should have been obtained with a dish of that size. There wasn't much doubt what was the cause of the trouble though – the dish was badly twisted out of shape. To check a dish, close one eye and look across the rims. This is an easy check for twisting. The rims should be parallel with each other. A certain amount of twisting is tolerable, but if the distortion is excessive the signals that arrive at the focal point start to cancel out and a dramatic loss of gain occurs.

Fortunately this dish was made of light aluminium. Judicious bending and 'cycballing' across the rims produced a dramatic change, with the signals back where they should have been.

A signal level meter will also show up distortion, where the signals increase when say the west side of the dish is pushed east, indicating that the dish wants to go a little east. If pushing the east side west also increases the signals, you've got distortion. In this case pull both the east and west rims back (pull from the rear), then eyeball the rims and try again with the meter. Note that you can't really do this with a 1-8m solid primefocus monster!

If pushing the LNB support arm up or down (usually up) gives more signal with an offset dish but adjusting the dish doesn't, the dish support frame is probably forcing the dish to distort a little out of shape. The support arm is normally fixed to the frame: bending it flexes the frame. **H.C.**

A Thomson VideoCrypt Decoder

This stand-alone VideoCrypt decoder had clocked up quite a few years' service with an elderly Drake ESR4240E receiver. It's in circuit all the time. The screen symptom was a series of white dots after a sudden white-to-black video transition, mainly with non-coded channels. This was mentioned in passing when I called to tune in some new channels – the owner blamed the satellite.

I wasn't so sure that Astra was the culprit, and in fact the cure turned out to be surprisingly simple -a small anticlockwise tweak to the left-hand preset PP02 in the power supply removed the offending dots completely. **H.C.**

The Drake ESR3240E

These black, manually-tuned receivers date from the early Eighties. They are of very sturdy construction in comparison with their more modern counterparts. We still have one or two private customers who use them, and sold a lot to pubs/bars at the time - these are almost all still working. Various decoders have been linked to them over the years, and Marconi H/V polarisation switching has been added, changeover being carried out by operating a switch added to the front panel (located between the fine tune and audio controls). The main drawback is that only 24 internally preset channels are available

Reports from Hugh Cocks and Pete Haylor together with a fine-tune facility at the front. Crunch time came when Eurosport dropped its 6.5MHz wideband sound feed. The Drake receiver has tunable sound, but only with a wide bandwidth. Tuning in the narrow-band carriers produces very poor, hissy sound.

Modification to narrow-band sound is not too difficult however. The circuitry used is conventional: the incoming signal is mixed with the output from a variable-frequency oscillator, the result being passed through a wideband 10-7MHz ceramic filter to an LM3089 demodulator chip that's situated at approximately the centre of the PCB.

Replace the existing ceramic filter with a couple of 10.7MHz filters in series – you can get these from a scrapped receiver somewhat younger in age than the Drake one. Avoid using the 10.52MHz 'leftchannel' filters from scrapped stereo receivers, as the demodulator in the Drake receiver uses a non-adjustable 10.7MHz ceramic resonator (a 10.52MHz filter might work if nothing else was to hand).

The wideband filter in the Drake receiver is situated in the middle of the PCB, adjacent to pin 1 of the LM3089 chip, has an orange dot on it and is labelled "J 10.7A". It looks like two filters in one pack. The "proper looking" blue-dot filter (labelled D10.7A) between pins 8 and 9 is the ceramic resonator.

As PCB removal is difficult, cut the wideband filter off the board carefully. The replacement filters must be connected in series and the input/ground and output/ground connections soldered to the original positions. The original filter was connected via solid plated-through holes, so soldering is easy using a small bit.

You should now be rewarded with good Eurosport audio. The receiver has a 6.65MHz fixed or variable audio system. An internal preset between the audio pushbuttons, conveniently labelled on the PCB, sets the fixed audio frequency. It can be tuned to 7.02MHz, leaving the external variable control for tuning other frequencies as required. One of our customers likes the 'feel' of the audio tuning knob going across the BBC subcarriers on UK Gold, saying that it reminds him of a good old-fashioned radio! The audio isn't expanded of course, but sounds quite good - even when passed through a hi-fi system.

The tuner in the ESR3240E has a wide range for a receiver of this age.

It goes down to the Granada channels with a 10GHz LNB and to well above 1,750MHz. The local oscillator of an Astra 1D LNB could possibly be tweaked to give Sky Sports 3 at the top of the band and CNBC/ARTE at the bottom. The ESR3240E has the potential to be a good DXing receiver, but I've never had the time to pursue this. The IF is 70MHz, which dates it! Reducing the 'IF gain' by means of a preset at the rear of the receiver produces a dramatic increase in sensitivity with very weak signals.

The power supply is conventional, i.e. not switch-mode. The main problem you get is a jammed manual selector knob. It's mounted on a PCB sub-assembly and has to be removed and greased. With care, the Drake receiver may see analogue transmissions out! H.C.

A Pace MSS1000

One of these receivers had suffered from a severe supply voltage overload. Various other items in the house had died as well, and I wasn't very optimistic when its owner mentioned that "a smell of burning" had come from the receiver.

As the receiver lives on a high shelf, the owner had not been able to see the top cover. The plastic top had melted immediately above the HT electrolytic, leaving the bare case metal exposed. An incredible amount of heat in a very short time would have been needed to do this.

I reconnected an Amstrad receiver that had previously been used and took the MSS1000 back to the workshop. By this time the local power supply problem had been rectified – it was something to do with a cable that had broken in a nearby village.

After a nasty encounter with an MSS500 a few months back following a lightning strike, I wasn't very optimistic about the MSS1000. When I opened it up I found that the electrolytic hadn't exploded, as the mains fuse had fortunately blown in time. I removed it, cleaned the PCB in the area and replaced both the electrolytic and the fuse - after checking the four bridge rectifier diodes (they were all OK). To my surprise the receiver worked first time! I had to clean up the top, but because of the receiver's location the damage couldn't be seen.

Strangely, a Hitachi VCR that had been on standby at the time of the overload continued to work, though the Grundig TV set connected to the VCR and satellite receiver had died. Insurance companies here in the

Quick Tips

Ferguson 99-channel receiver: All was lost when store was pressed following adjustments. A replacement SDA2586 chip cured the problem.

Amstrad SRD545: The red and green LEDs were pulsing. The cure was to replace C302 (100μ F), which is inside the small can on the power supply pancl. Pace Models: We've had a number of cases where the main reservoir capacitor has been faulty. Some have been short-circuit, others leaky. Symptoms have been a dead set, hum on sound and distorted graphics. P.H.

Algarve now offer an "electrical risk" option with their household policies. For around £16 a year you get cover on up to £4,000 worth of electrical equipment for damage caused by power fluctuations and lightning – well worth having. **H.C.**

Connexions 8520

A few of these receivers are still in use here. The earliest must be about ten years old. The 8520 was one of the first receiver-positioners and was way ahead of anything else in its range at the time. The receivers were manufactured for Connexions by a Canadian company called Tee-Com – in fact some Tee-Com branded receivers did appear at the end of the production run, in about 1989/90.

One owner rang to say that only some of the VideoCrypt channels could be decoded, the others refusing to appear. This sounded odd, but was in fact the case. The higher-frequency channels could be decoded but those near the bottom of the band could be seen encoded but not decoded. Non-coded channels nearby, such as TNT and ZDF, produced good pictures.

The decoder in use was an old Thomson SVA1 stand-alone type. Curing the problem was actually quite simple. When the baseband video gain preset in the receiver (near the phono video/audio output sockets) was turned up a fraction decoding was obtained on all channels. Very odd!

I have since tried an experiment with another of these receivers. When I reduced the video output to the decoder the same effect was seen at a critical setting. I've not scoped the video output, but it must be lower. The demodulator is an oldfashioned 70MHz IF type mounted on the main PCB. The only explanation that occurs to me is that the AGC is not even across the band, and that altering the IF level from the bottom to the top of the band produces a fractionally different video output level. Strange that this has taken so many years to show up! H.C.



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The Joule A-400 radio decoding system has now proven itself as the most cost effective solution to all your decoding requirements. This CE approved, easy to use computer based system is now being sold overseas to Service Departments and Police Forces. It can now be supplied with the software to decode most of the latest RDS radios that contain their security codes within the main processor chip, as well as the more familiar eeprom based models.

Purchase the Starter Kit which includes bundled software to decode over 100 models for £375.00 + vat (additional software is available separately). Or, the Index Reader version which includes ALL available software for £275.00 + vat and covering literally hundreds of models (codes are supplied by phone or fax and cost £5.00 each or £10.00 for the Blaupunkt RDS models). You may also opt for a combination of the two systems tailored to suit exactly your requirements which can lead to even more profitability.

Contact us now for a free brochure and demonstration disk (please state 3.5" or 5.25"), or visit us at our factory for a full demonstration.

Electronic Sound Systems

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Store Closures

Store closures, 'rationalisation' and job losses have been announced by both Granada and Radio Rentals. In both cases the plan is to close smaller outlets and reduce head office staffing.

Radio Rentals is to close 90 of its 616 stores, with a loss of some 200 jobs. The 90 accounted for just seven per cent of new business last year. In addition, 150 head office staff are to be made redundant. The company blames store location as the cause of the problem, and is to concentrate on "new-generation" super stores – three have recently been opened in prime high street positions. A 33 per cent fall in profits (to $\pounds76.$ lm) for the nine months to the end of December was recently announced, though turnover rose five per cent to $\pounds1.2$ bn.

Granada is to close 100 of its 562 outlets, with a loss of some 250 jobs. The shops to be closed contributed just two per cent to overall profits last year. In addition, 90 out of almost 1,000 jobs are being made redundant at the company's Bedford head office and its Ashby-de-la-Zouch (Leicester) warchouse is to be closed with a further loss of about 100 jobs. The company is moving to "just in time" store deliveries, to improve efficiency and speed up its response to market conditions. At its peak in 1988 Granada had 750 high street outlets.

Granada is also to change the role of some of those it employs in field jobs. Technicians are to become "more involved with customers rather than fixing equipment" as the emphasis moves to replacements rather than repairs.

Electronic programme guide via teletext

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A new electronic programme guide for analogue satellite, cable and terrestrial TV services has been jointly developed by EACAM (the European Association of Consumer Electronics Manufacturers) and the EBU. Known as NextView, it uses the teletext channel to transmit programme data in the form of enhanced text and graphics.

Features offered by NextView include the ability to display programme details up to a week in advance, provision of information on the current and next programme, an on-screen message system which tells viewers when a programme is about to start, and VCR timer programming by simply clicking on an onscreen menu. A new communication protocol, known as NextView link, enables control signals to be sent between suitably equipped TV sets and VCRs. Timer data is sent from the TV set to the VCR via pin 10 of a scart connector.

NextView is an open, royalty-free standard that's gained support from many companies including Bang and Olufsen, Grundig, Hitachi, JVC, LG Electronics, Loewe Opta, Metz, Mitsubishi, Panasonic, Philips, Samsung, Sanyo, Seleco, Semi-Tech, Sharp, Siemens, Sony, Thomson Multimedia and Toshiba. Several chip manufacturers support the system.

Philips, Sony and Thomson plan to launch equipment incorporating NextView in Europe later this year. No price information has been announced so far, but a premium of three-five per cent is expected when NextView is featured. Broadcasters in Switzerland and The Netherlands have already announced plans to transmit NextView data. EACAM forecasts that around thirty-forty million TV sets and VCRs in Europe will be equipped with NextView by the year 2000.

The ITC has released a draft code of conduct on Electronic Programme Guides. Its main concerns are with the assembly and presentation of TV schedule and programme details by EPG providers, and with the way in which the EPG data is transmitted. A recently released BBC document on EPGs stresses the importance of developing electronic guides that don't discriminate between an operator's programmes and those of its competitors.

.................

Channel 5

The lower transmission powers and different channel groups used by Channel 5 could mean a bonanza for aerial installers when the service starts on March 30th. It could also mean a lot of complaints from potential viewers as the coverage is limited and there are to be no relay stations.

An interesting situation could arise in parts of south London near Crystal Palace. The London transmissions will actually be from Beulah Hill, some kilometres to the north of the Crystal Palace mast, which could lead to aerial alignment problems. Your editor has found the signal to be perfectly all right at his west London home, using his little set-top log-periodic aerial (what an admission!).

Multiview's TIM (Tune-In Module) has just been released and should be helpful with some of the problems Channel 5 will bring. It's a small, simple to connect modulator that has been designed for use with all types of satellite receiver. TIM increases the RF range from typically 30-39 to 50 channels without affecting the signal. It uses the LNB 13/18V supply for power. Suggested retail price of the unit. which comes with simple installation instructions, is £25. For trade enquiries call EuroTechnic Distribution on 0171 381 0022 (fax 0171 386 8131).



CPC has been appointed exclusive UK distributor for the US Tenma range of quality test equipment ltems available from CPC initially include audio analysers, bench power supplies, capacitance meters, frequency counters and multimeters:- over-40 product lines in fact. For further information check with CPC on 01772 654 455



Merlin Equipment's new NOTEpower 75i inverter enables notebook computers, camcorders, mobile telephones and video games to be used and recharged in cars by converting the 12V supply to 230V AC, giving enough power to run all day without the need for expensive spare battery packs. For further information apply to Merlin Equipment. Telephone 01491 824333.

DVD News

JVC has launched its first DVD player, Model XV1000, in Japan. It includes linear PCM audio at 20and 24-bit resolution with 96kHz sampling and is compatible with DVDs, music CDs and Video CDs. Price is the equivalent of about £465. No UK launch details have been announced. JVC is also marketing DVD software titles in Japan, at around £20 each.

Thomson has announced its plans for the launch of DVD in Europe. Initially, DVD players will be shown and demonstrated at key retail outlets. Actual hardware launches will depend on the availability of movie discs. The players will be made by Panasonic, which expects to launch its own players in Europe late this year or early next year at around £600.

C-Cube Microsystems has announced a range of chips, designated the ZiVA family, designed to lower the cost of DVD players. The ZiVA-DS chip incorporates an MPEG-2 video decoder, Dolby/AC3, MPEG and linear PCM audio decoders, sub-picture decoding and an on-screen display controller. An alternative device, the ZiVA-D6, adds six-channel AC3 audio decoding. Further development work on the range is in progress. This could include a chip that in addition to decoding incorporates a microcontroller and an NTSC/PAL encoder.

Matsushita has announced what is claimed to be the first integrated pickup for DVDs and CDs. It has a dual-focus system that can read CD-ROM, DVD-ROM and other phasechange discs. The pickup is suitable for several types of disc drive, including DVD players that offer compatibility with music, computer and Photo CDs. With the addition of several items it can also be used for CD-recordable discs.

Digital Developments

Pace and Hitachi are co-operating in the development of a PC satellite data broadcasting card which will enable audio, video and data services to be broadcast directly to PCs. Suggested uses include prepackaged or bundled Internet services, business and/or financial services, video and film clips, home shopping and banking, news data services and advertising.

Harris Semiconductor has introduced the first multimedia decoder/encoder chip set for enhanced PC video capture, domestic PC video editing cards and other applications. The chips are designed to enhance the performance and simplify the implementation of multimedia applications including MPEG1/2 set-top box systems. Applications could include home VCR-to-PC editing systems, PC video capture, teleconferencing, digital video disc and VCR systems.

The two chips are the HMP8112 decoder and the HMP8156 encoder. The HM8112 accepts PAL or NTSC video, also S video, and converts it to either 8- or 16-bit 4:2:2 YC digital video. It incorporates provision for brightness, contrast, colour saturation, hue and sharpness adjustment. The HM8156 accepts digital video in this form or 16/24bit RGB or ITV-R Bt-656 data and converts it to standard PAL, NTSC, RGB or S video.

The chip set's main innovations are in the decoder IC. They include a patented, cost-effective comb filter for improved luminance/chrominance separation without loss of vertical detail, a patented sample rate converter (SRC) that enables the decoder to use any available clock instead of a specific separate video clock frequency, and digital PLLs for steadier images with PC-based home video editing.

Further details of these chips can be obtained from the Harris Information Centre, Osprey House, Berkeley Business Park, Finchamstead, Berkshire RG11 4YJ (01734 328 585, fax 01734 328 148).

The ITC has published its code of subtitling, sign language and audio description for DTT services. This states that no category of programme will be excluded from the minimum statutory requirement, and that by the tenth anniversary of the start of the digital service fifty per cent of programmes must be subtitled, ten per cent must have audio description and five per cent must have sign language.

WebTV, which is based in California, has claimed a breakthrough with its new VideoFlash technology. This enables full-screen, TV quality video to be sent via the Internet using standard modems. The technology, which is based on software algorithms. is being incorporated in the company's settop TV boxes to add Internet browsing to normal TV viewing. The data compression ratio used is understood to be ten times higher than MPEG-1. VideoFlash can be automatically downloaded as a software update for those who have a monthly subscription to WebTV's Internet service. Because of patent applications, few other technical details are available. WebTV's set-top boxes are manufactured and sold in the USA by Philips and Sony. The technology was demonstrated at the recent Las Vegas CES.

TV/Video Equipment

Products to be released by JVC in the UK this year will introduce some interesting new technology. There will be TV sets that include 4:3 Panoramic Zoom, which expands a 14:9 or 16:9 picture to fill a 4:3 display. This is the opposite effect to the Panoramic feature incorporated in some widescreen JVC sets. Panoramic Zoom 4:3 minimises distortion by leaving the centre portion of the picture untouched while the top and bottom are stretched. The sides of the picture are also compressed.

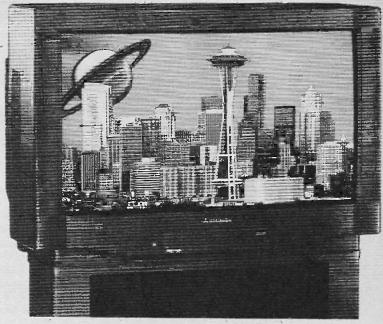
Some widescreen sets will offer Auto Panoramic Zoom, which senses the picture signal format automatically then adjusts its dimensions to fill the screen.

JVC has come up with a 3D Phonic chip that improves the audio performance. A number of TV sets and VCRs will include a Spatialiser chip to widen the stereo sound effect. The 32in. widescreen JVC Model AV32WP2EKR incorporates 3D Phonic, with a built-in centre speaker for dialogue, 100Hz Digiscan and a splitscreen facility to enable viewers to watch two different video sources on a single screen. It will cost around £2,000.

Most of JVC's new VCRs will offer three picture enhancement systems in addition to VHS-HQ. These are the tape tuning system BEST, the VHS Pro Digi chip set for S video operation, and 3R which is said to give sharper pictures.

The GR-DVJ70EK is a special edition of the DV1 mini digital camcorder launched to mark the company's seventieth anniversary. Price is around £1,600. Model GR-DVM1EK, at around £2,000, is a digital camcorder with a fold-out LCD screen. Model GR-SZ3000EK is an S-VHS-C camcorder with mono sound priced at around £800.

Mitsubishi has released two 28in. widescreen sets, Model CT28BW2B with Nicam sound at £850, and Model CT28BW2BD with Dolby Pro Logic Surround sound at £1,000. The sets incorporate claborate speaker arrangements and a choice of 4:3, 14:9, 16:9, Cinema and Panoramic viewing modes. Dark-tinted Superflat



CRTs with Invar shadowmasks provide improved contrast, especially in the darker areas of the picture, and higher brightness without colour shift. Dynamic white control enhances detail in the brighter areas of the picture, while colour temperature control enables the viewer to select a warmer or cooler looking picture. Scan velocity modulation improves picture sharpness. The on-screen menu selection system is colour coordinated with the remote control unit's buttons. There's Fastext with a seven-page memory, and automatic subtiling in three modes. In addition the sets can provide NTSC and SECAM playback from a VCR, LaserDisc player or a camcorder.

NEC's Flat Panel TV

NEC has started to sell a 42in. screen flat panel TV sct, called the PlasmaX, in Japan. It's priced at the equivalent of nearly £6,000 and has the screen, receiver circuitry and speakers in a panel only 99mm thick. To achieve good brightness and contrast, the screen uses clear. thin capsulated filters which cut out external light. NEC hopes to be able to reduce the price to about a third by the year 2000. Mass production of the plasma display panels is to start in June.

New Editor for CQ-TV

A warm welcome to Ian Pawson who has taken over as editor of CQ-

TV, the magazine of the British Amateur Television Club. This excellent journal is issued free to members of the club. It publishes much technical information, also projects, for those interested in generating, transmitting and receiving TV signals.

For information on membership of the club, apply to Dave Lawton, GOANO, Grenehurst, Pinewood Road, High Wycombe, Bucks HP12 4DD (01494 528 899. Dave's email address is: 100046.1056@compuserve.com

Trade News

Willow Vale Electronics is now distributing in the UK the full range of wall brackets from AVF. The stylish range includes brackets to support TV sets, VCRs, speakers and microwaves.

INDEX AND FAULTS DISCS

Version 5 of the consolidated index and directory disc, covering volumes 38-46 (1988-96) of *Television*, is now available from SoftCopy Ltd. Also fault report discs for volumes 38-46. For further details refer to the box at the top of page 446.

Correction

Our apologies to Manzan Electronics for printing the company's old address on page 357 last month. Manzan has moved to 60 Church Road, Higher Tranmere, Birkenhead, Merseyside L42 0LH (01516 511 121). Independent reports confirm that the Kontakt Chemie products the company is now distributing in the UK are first rate while being competitively priced. The Mitsubishi CT28BW2

Servicing the Accountants' Way

hen I was a service engineer working for a company that serves a large retail organisation it became clear to me that in order to achieve a reasonable income I would have to engage in practices that would otherwise be considered unacceptable. When accountants bring in methods that they hope will cut costs. and engineers' salaries are tied to the number of jobs completed compared to the number issued, some pretty horrendous things can happen.

To back my view, here are some examples. In my

Bob Chisholm argues that standards fall when accountants control servicing operations in large organisations opinion they represent only the tip of the iceberg. The problem should be of great concern to the public, manufacturers and insurance companies alike, as equipment could be left in an unsatisfactory state when the correct procedures and practices are ignored.

A Sony TV set should have had its mains switch replaced with a modified

type. But the switch obtained from Sony was defective. Instead of re-ordering the switch, an original type from stores was fitted. The job sheet and rear cover indicated that the modified switch had been fitted.

A JVC VCR needed a new RF converter. As the type used in an own-brand model could also be used, one was obtained from a scrap unit. After fitting it the RF output was realigned to that of the original modulator. As the JVC machine was under manufacturer's warranty, the part no. was taken off the JVC converter and attached to the job sheet to enable an under warranty claim to be made. Note that JVC lists the RF converter as a safety item.

It's well known that the electrolytic capacitors in the power supply in many Panasonic VCRs dry up. Replacements $(1.000\mu$ F instead of 680μ F) obtained from own-brand TV sets were sometimes used. They are not high-temperature types. Customers were charged as if new capacitors had been fitted.

Another common fault with one Panasonic VCR power supply is failure to start because a 1μ F, 400V electrolytic has dried up. We didn't have one. So the voltage across it was measured and found to be about 70V. A replacement rated at 100V was then fitted.

A Sony KV2572U TV set had a crack around its line

output transformer. The board was removed, the green resist was scraped off with a fibre pen, then desoldering braid was soldered across the cracks to bridge the broken tracks. The set then worked correctly. To enable a labour claimback to go through, the engineer's report said that the trouble had been dry-joints.

-

The cause of field collapse in an Hitachi C2564TN TV set was an open-circuit fusible resistor. As the correct type was not stocked, a CP was fitted. The job card indicated that a new Hitachi resistor had been fitted, the Hitachi part number being used to make a labour claimback.

A Sony TV set's plastic cabinet mounting into which the CRT is bolted had broken. The CRT was removed and Araldite was used to glue the mounting to the cabinet. When it had set, the CRT and chassis were refitted.

The gears in the Panasonic G deck can cause the mechanism to jam. In this event they should all be replaced. In fact Panasonic suppplies service kits with all the parts considered necessary to service these decks. But only a couple of the gears were held in store. These, not the complete train, would be replaced. Provided the machine worked, it would be sent out. One bounced back like a yo-yo. Each time the deck was realigned and returned.

A Sony multidisc CD player had chewed teeth on one of the gears. A screwdriver and pliers were used to straighten the teeth, after which the machine worked – just!

There was an EW fault with a Philips set fitted with the CP110 chassis. The cause was the bridge coil and its associated 390nF capacitor. The correct coil came but not the capacitor. So a 470nF, 200V capacitor obtained from a scrap Sony board was fitted.

A Ferguson FV62L VCR was sent in with a new carriage. But the problem was caused by the loading motor, not the carriage. So a motor obtained from a scrap Akai deck was fitted. To enable a warranty claim to be paid, the Ferguson part no. was put down on the job sheet. The same thing could happen with Toshiba models.

The fault with a JVC HRD910 was no video through the scart socket on aux input. It was caused by a faulty video processor chip. This was ordered from JVC but was out of stock. While we were waiting, the customer complained about the length of time the job was taking. Coincidentally another HRD910 came in, with mechanical problems. I was told to contact the customer about the problems he was having and to ask casually whether he used his machine to copy via the scart socket. Having ascertained that he didn't, I was told to swap over the video processor boards so that the first machine could be returned. I protested, but was told to "get on with it". I had to guess at a suitably high video processor board price to insert on the job sheet so that a claim against the insurers could be made. The second customer was left with a faulty machine

A Sony TV set under manufacturer's warranty came in because it was said to require a new CRT. The fault had been diagnosed by a field engineer. In such a case the practice was to check the set to confirm the diagnosis. I couldn't find any fault with the CRT, nor could the senior engineer. So I suggested that the "CRT" was cancelled from the job sheet, and "no fault found" written in the engineer's report. I was told by the manager to write "fitted CRT" on the job sheet and invent a suitable report so that a labour and parts claim could be submitted to Sony.

The spares buyers sometimes substituted pattern parts instead of original spares. Examples are the BU508A transistor, which can't cope with switching speeds; an alternative for the TA7698AP chip; and the use of a substitute 2SD1497 transistor in Sony sets. The original Sony transistor is a plastic-encapsulated device. The substitute has a metal tab that shorts to the heatsink (the type no. is the same). Cheap, unmarked idlers would be used in ownband VCRs.

With many of these repairs, claims are made to manufacturers or insurance underwriters who, unwittingly, pay up

In all the above cases the correct parts were readily

available from the manufacturer. So you might wonder why I and, to the best of my knowledge, others went to so much trouble to bodge. The basic reason was that engineers' grading and remuneration depended on the conversion rate they achieved. This is a term now widely used in assessing performance. In our industry it's the ratio of the number of jobs completed compared to those issued. This meant that you could be penalised for ordering parts that were not held or were temporarily not in stock. One could also be penalised when the wrong parts were ordered or those received were faulty.

The bodges and dodges used to improve conversion rates were suggested and seemed to be used by other engineers. With the exception of the JVC VCRs and the Sony TV set with no fault found, I didn't actually have to carry out repair in the manner described. Indeed many products were repaired properly. But to do my work correctly could be costly in terms of income.

To make a successful labour claimback from a manufacturer the product type, the model and serial number, the fault report and part numbers must all be correct. We might be asked to rewrite a report where it was felt that a particular claim might not go through. The report has to tie in with the symptom reported by the customer: this could lead to a certain amount of inventiveness to make the claim plausible.

In my opinion the local management team knew exactly what was going on at local level but didn't condone it.

Apart from short-changing customers and manufacturers, the sorts of things mentioned above have a ripple effect on the trade, since they affect the prices at which all dealers must buy and sell products.

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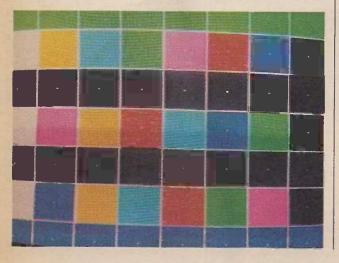
DX and satellite reception. News from abroad. Receiving digital signals. A Band I phaser circuit. Roger Bunney reports

Breeause of my current move to a new house the column differs a bit this month from the usual one. After twenty six years, I'm moving from central Romsey to a house towards the north of the town. Sorting out receiving equipment, aerials and miscellaneous bits and pieces acquired over a quarter of a century is a continuing activity as I write these lines. There is also the little job of dismantling my 50ft lattice mast. So bear with me!

January is, anyway, a traditionally quiet month for DX reception. So I probably won't miss much.

Back in 1971, when we came here, Cherville Street was a quiet location. Now it's a very busy main road. In 1971 we had just the local BBC-1 service in Band I. Now we have a mass of interference instead.

As I chuck out the accumulated rubbish of 26 years, I find lengths of alloy tube that were parts of various experimental aerials. There were many failures, but a number of successes as well. Activities



extended from VHF to UHF, then the ATS-6 satellite in 1976. Twenty years on and we are up to 12.8GHz.

A number of friends have been lost during this time. Charlie Rafarel, Reg Roper, Simon Hamer and Andrew Sykes to name just a few. It's a time to reflect and also look forward. What, I wonder, will the next quarter century bring?

Terrestrial News

UK: A new challenge for Northen UK DXers is about to hit the airwaves. During mid-March the Edinburgh-based 'Channel 6' will start transmitting in ch. E34, initially as a text-based service with 300 pages of local information. The University, the council and other groups and organisations are being invited to participate. The operation is to be financed by advertisements - two sales staff will try to fill the other 500 text pages available.

There's now a Band I operation in the Birmingham area, near ch. E2 at 48-45MHz. The 1W wideband FM radio link from the Dudley Road Hospital transmits the BHBN hospital radio programme to other establishments in the vicinity. If it causes DX interference, a sharply tuned notch filter should reduce the signal, allowing some sort of ch. E2 (48-25MHz) reception Norway: An Oslo ch. E12 caption in early January announced the closure of the transmitter and five slave relays - on January 22nd. It advised retuning to ch. E30 from the Tryvann Tower. The NRK-1 ch. E6 Oslo outlet will probably also close shortly, as the plan is to move all Norwegian TV transmissions to UHF

Norkring, jointly run by

NRK/Telenor, now owns all the terrestrial NRK/TV2 transmitters, microwave links, SNG trucks and the technical facilities for both internal and overseas links. Kazakstan: To overcome illegal TV transmissions in Almaty and Akmola, the state is to auction commercial broadcasting licences. These will provide competition for the state broadcaster Kazak TV and the only approved commercial broadcaster NTK.

Czech Republic: Nova TV started teletext transmissions on January 1st. Stereo and dual-language broadcasting are unlikely in the near future.

Slovak Republic: The ch. R4 and R5 transmitters have all now been closed down to allow expansion of CCIR Band II FM radio. The TV services have been moved to UHF.

Satellite News and Views

A contract worth \$100m has been awarded to Matra Marconi to contruct the Intelsat K-TV satellite, which will take up orbital position at 95°E with thirty Ku band transponders. Planned launch date is Autumn 1998. Coverage will extend across India and China, with switchable beams for areas in the Far East. Satellite TV services to the Indian subcontinent are on the increase. They include Rupert Murdoch's 40-channel Star TV package, which is due to start in April.

Ted Turner plans to increase his European programming, probably via his London HQ. A general entertainment channel based on the TBS Superstation is a possibility. Input from the Warner Brothers satellite channel might be included.

A mystery signal,

coloured squares

with dots. Any

ideas?

Increased use of the transponders aboard the Amos satellite at 4°W is planned. The Telenovela Channel would provide programmes, mainly Venezuelan soaps, derived from South America. The target is Eastern Europe, with dubbing into five languages. The adult channel Babylon Blue is intended for Romanian cable TV operators. Amos carries four Polish ATV channels, using two analogue transponders.

RTL Plus, which is to start operations this spring, will provide time-shifted offerings from the other RTL services (RTL, RTL2 and Super RTL).

Rupert Murdoch's Japan Sky Broadcasting service JSkyB is to start in April, initially with twelve channels. If successful, the number of channels could be increased to some 150 over the next twelve months. The signal technology will be similar to the rival PerfecTV service, which started in Autumn 1995 with the aim of increasing to 100 channels. A third broadcaster, DirecTV, intends to target Japan with 100 channels from late 1997.

The Spanish government is to provide some $\pounds 120m$ to back TVE's proposed commercial digital satellite TV service TVE Tematica, which will provide competition for the current Canal Plus Espagne service.

Late last year we warned against buying B-MAC decoders to view the American Forces' TV service (AFRTS). It has now been confirmed that from July MPEG-2 digital coding will be adopted by the service, based on the Scientific Atlanta PowerVu package.

After some days of testing with the Polish ATV channel (11.643GHz horizontal) Telecom 2D at 5°W fired up on January 23rd, with nine high-powered transponders.

Hot Bird 2 was extremely busy over Christmas and into the New Year, with new channels arriving and existing ones changing frequencies. There have been corresponding changes in the transmissions from Eutelsat II F2 (10°E) and II F3 (16°E).

Digital Satellite TV

Experiences reported by the few 'pioneers' who have so far attempted MPEG digital reception suggest that it's fraught with difficulties. Far from being DVB compliant, the receivers seem to be inflexible. As a result, careful and detailed programming of bit and error rates are, where possible, required. This is far from the fastmoving needs of the active satellite zapper! The receivers are also expensive.

Tom Cardwell recently acquired a surplus ex-Reuters/NTL MPEG receiver that needed very careful programming, also a relatively high signal input. It transpires that these are MPEG-1/1.5 receivers which are rather touchy when used for MPEG-2 reception. A Nokia manufactured Kirch D-box from Germany proved to be more successful - the photo on the right shows a Reuters Belgrade MPEG news feed as received. In addition several TV programme packages from Eutelsat at 13°E locked up with ease. The bit rates differed considerably. This gives hope, but receiver programming was both prolonged and difficult. It's a start, anyway.

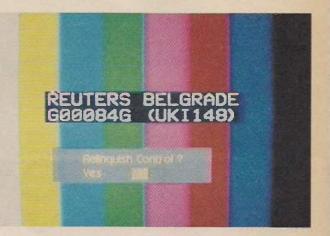
The first happier MPEG news arrived in late January, in the form of a product review of the German Mascom 9500 receiver in Tele-Satellite magazine. A prototype had been supplied for test, and the results were encouraging. Provided the correct frequency is tuned in, the receiver automatically adjusts itself to the incoming signal parameters - low for a news feed, high for a programme. The testers tapped in false parameters to try to fool the receiver, which proved able to correct itself. The receiver is simple to use and locks up quickly. With experience of the new technology, operation should become still easier. Volume production is due to start in early spring. I'm trying to obtain one to test but, being manufactured in Germany, it's likely to be expensive.

The Taiwanese manufacturer Sun Moon Star has started mass production of a digital MPEG receiver which is being marketed under various names, e.g. the Skandia SK888. It has several MPEG transmission prameters preprogrammed within its software, so it should be possible to skate between different MPEG services and achieve almost instantaneous lock up.

In view of the direction in which the technology is moving, I feel it's likely that a user-friendly MPEG receiver will be available within the coming year.

Band I Aerial Phaser Unit

Back in the days of 405-line VHF transmissions in the late Seventies I



suffered from computer VDU interference here. It came from a nearby office complex, and extended across the band. After trying various stacked/variablyspaced element aerials, I came across an HF aerial phasing system then being marketed by Radmic Systems in Crawley. I scaled it down for low VHF operation, and obtained remarkable interference rejection – in excess of -40dB with co-channel interference. A detailed article on this appeared in the

A Reuters Belgrade MPEG digital news feed received by Tom Cardwell.



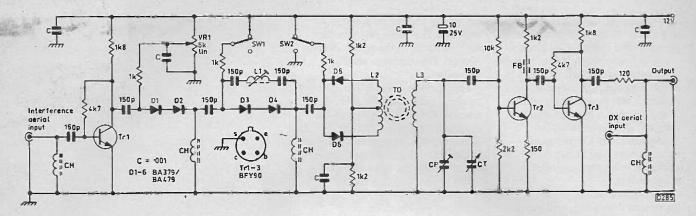


Fig. 1: Circuit diagram of the Band I aerial phaser unit. Tr1-3 BYF90. CH VHF choke or 12 turns of 22g enamelled wire close spaced at 4mm diameter. CP 3-22pF subminiature preset. CT 3-30pF Jackson air-spaced aerial trimmer. TO T37-12 toroid from Cirkit. L1 7 turns on 1mm coil former or wound round toroid. L2 5 turns centre-tapped, wound between central turns of L3. L3 9 turns wound over two-thirds of toroid, 26/28g enamelled wire. Use nail varnish or equivalent to hold turns in position.

January 1981 issue of *Television*. Other enthusiasts adopted the design, generally with great success. 405-line transmissions have long since gone, and in more recent years the Band I/III spectrum has been gradually filled with PMR, beacons, walkie-talkies, baby alarms – you

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name it and I'm sure it's there somewhere! Band I in particular has been filled with interference, to the extent that TV-DXing has become threatened. In my own area for example the 48-52MHz band is always jammed with noise. But Band I continues to be used in various European/African countries for TV services. The TV-DX hobby is still alive, though greater technical knowledge is required for success.

Various amateur/SWL phasing systems that offer similar rejection levels at HF and up to VHF have appeared in recent years, costing up to £200. My original design was quite complex. A simplified, cheaper version is shown in Fig. 1. The most expensive item is the Jackson air-spaced/ceramic phasing capacitor CT. If you already have one of these, the unit can be made for around £5.

The principle is simple. High-level interference from an interference pickup aerial is amplified, attenuated to match the interference picked up by the DX aerial, phase shifted by 180°, then added to the DX signal to provide interference cancellation. In practice complete interference cancellation is unlikely, but at about 45dB down the interference is pretty hard to see!

My original problem was with interference that came from about fifty yards to the south. I had a fiveelement wideband Band I array at 53ft, and the interference was rising from beneath. A two-element wideband Band I interference pickup aerial was installed at 30ft on the same lattice mast, directed at the interference source. I found that the interference could be cancelled out and, if the main DX aerial was pointing south, some additional wanted signal gain was often provided. When the main aerial was rotated, the phase cancellation conditions changed and adjustment was required. With practice, this could be done in seconds.

With the circuit shown in Fig. 1, the input from the interference aerial is fed via the BYF90 preamplifier transistor Tr1 to a variable attenuator network that consists of a $5k\Omega$ linear bias potentiometer (VR1) and two series-connected pin diodes, D1 and D2. A following pair of pin diodes, D3 and D4, is shortor open-circuited by switch SW1. When SW1 is open-circuit, the interference signal passes via the phase-shift coil L1. When SW1 applies bias to the diodes, L1 is bypassed. The next two pin diodes, D5 and D6, are connected to the ends of the primary winding L2 on the toroid TO. They determine the signal direction/phase, with selection by SW2. TO's secondary winding L3 is tuned to resonance by CT. CP is set to the LF end of the required coverage with CT at maximum mesh (it tunes higher when unmeshed). This is followed by a buffer stage (Tr2) then an amplifier (Tr3). The phase-shifted interference is finally mixed with the input from the DX aerial.

By adjusting VR1 to control the amplitude of the interference signal, and CT to vary its phase, possibly with L1, the amount of interference can be considerably reduced.

Some improvements could be tried, for example a FET in position Tr2 and varicap tuning instead of the mechanical trimmer CT, which is an expensive item. But the phasing system shown should make it possible to operate on channels that were previously jammed.

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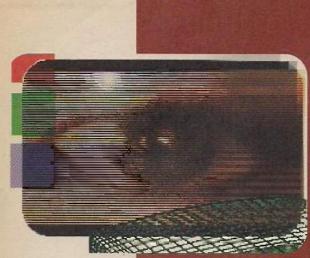
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Reports from Philip Blundell, AMIEEIE Justin Smith David A. Chaplin J.K. Potts Adrian Farnborough Michael Maurice Michael Dranfield Chris Watton John Edwards and Terry Lamoon

Grundig G1000 Chassis

There was no blue in the picture. A scope check at the blue output (pin 19) of the MC44007 chip showed that the signal was of lower amplitude and at a lower DC level than the signals at the red and green outputs (pins 17 and 18). Comparisons with the voltage table in the manual also showed that the B - Y input (pin 26) was low at 1-2V instead of 3V. C825, which is an 0-1µF surface-mounted capacitor, was leaky. **P.B.**

Sanyo CBP2152 (E4-A21 Chassis)

This set was dead. It would come out of standby for a few seconds, then go back to standby again. The HT supply to the line output stage was present, but the drive was missing at the line output and driver transistors. Checks around the TDA4505 chip showed that there was no line drive output at pin 26, though there was oscillation at pin 23. In addition the 12V supply at pin 7 was low. Tracing the source of this back to the power supply, I found that the output from the L78M12 regulator chip IC362 was also low. A new L78M12 restored the set to life. **P.B.**

Grundig XS63/8 (CUC5360 Chassis)

This set had no Nicam sound, and a whistle accompanied the mono sound. Fortunately we had a set in

TV Fault Finding

stock with the same IF module. This enabled us to prove that the fault was in the IF module. (I was led up the garden path recently by a Ferguson VCR with no Nicam sound: the cause was the tuner unit!) Checks showed that the supplies to the IF module and the clock signals were all OK. As the MSP2400 chip is in a socket, a replacement was tried. It cured the trouble. When we looked into the price of the chip we were in for a bit of a surprise however: an exchange module is only slightly more expensive. P.B.

Ferguson TX100 Chassis

Line tearing from cold was the symptom with this set. Many possible causes are listed, and I checked out every one – with no success. Matters were made worse by the fact that the fault would reappear only when the set had been off for quite some time. Finally, more out of desperation than anything else, I decided to replace the line driver transformer. I then waited for two hours before switching on again. This time everything was OK. J.S.

Ferguson TX98 Chassis

I nearly gave up with this bouncer (Model 51P7) and refunded the customer his money! The original complaint had been "intermittently cuts out". I resoldered a number of joints, then soak tested the set for five days. No problem. But after returning it the customer was on the phone within four hours! The set was intermittently resetting itself to programme 1.

Unfortunately no amount of flexing, tapping, cooling or heating would instigate the fault. But I discovered that running the set for a few hours covered with a blanket would produce a reset action. During the following week I replaced the IR receiver diode, the IR amplifier chip, undertook the capacitor modification in the remote control input line and resoldered every single joint that looked even halfway suspicious. Still no joy.

As a last attempt, I replaced the TDA8138 5V/12V regulator chip IC11. I then covered the set with a blanket and put it on test, taking a tentative look each hour. It stayed resolutely of progamme 3.

Hindsight is wonderful. When I reexamined the circuit diagram it became obvious that IC11 also has a reset function. J.S.

Matsui 2074/Bush 2152

I was told that this set was dead. But it worked all right when I switched it on. I tried it again later and it came on, but with a few seconds' delay. When I tried it next day it was dead. It tanspired that relay RLY901 had intermittent contacts. D.A.C.

Saisho CM250R

Low volume that couldn't be adjusted using the up/down buttons was the complaint with this set. When I checked it I discovered that none of the picture controls worked either, though channel changing was OK. I noticed that the set would switch on directly when the mains switch was used, though there's a standby button. The plastic standby button was found to be damaged, and was holding the standby touch switch in its closed position. When a new button was fitted the controls all worked correctly. D.A.C.

NEI 2031TX/Bush 2520

This set would switch on OK from cold, but if it was switched back on when warm there were no results. The set would come on if the posistor in the start-up circuit, R802, was frozen or tapped. A replacement posistor cured the fault. These sets are fitted with the Indiana 100 chassis. D.A.C.

Decca/Tatung 190 Chassis

Sometimes these sets switch on with no sound or raster and 0 showing in the channel display. The cause is usually a faulty control switch membrane – one of the touch pads is making permanent contact. A check can be made by disconnecting the membrane from its PCB socket: the set should then switch on with normal sound and vision.

Two types of switch membrane are used in the 190 series chassis. One is straight and plugs into a horizontally mounted socket. The other has a bend so that it can be plugged into a vertical socket. **D.A.C**.

Ferguson TX86 Chassis

The TIPL791A chopper transistor TR6 and the TEA2018A chopper control chip IC4 were both shortcircuit, while the 1.8Ω surge limiter reistor R88 was open-circuit. The cause of the trouble was a dry-joint at pin 4 of the line deflection coils socket 13. **D.A.C.**

Amstrad TVR3

Very poor off-air reception and recording quality were the complaints with this TV/VCR unit. With prerecorded tapes the picture quality was OK. The aerial input is on the TV section. It consists of a coaxial socket/phono socket adaptor. The phono plug on the lead that feeds the aerial signal to the tuner is plugged into the back of this adaptor, then soldered in place. The solder had cracked and no longer held the phono plug. When the aerial had been plugged in, the phono plug had been pushed back, taking with it the centre contact tube of the coaxial socket. Reception was back to normal when a new aerial socket assembly had been fitted and securely soldered in position. D.A.C.

Akura CX18

This colour portable's standby transformer had an open-circuit primary winding. Because of this there were no results. **D.A.C.**

Quickies

Ferguson 20E2: There was no memory on chs. 1-4. The M293 chip was faulty.

Philips 2A chassis: This set was tripping. TR7598 was short-circuit collector-to-emitter and R3601 (5.6Ω) was open-circuit.

Matsui 2080: Set went off after ten minutes. The STR50103A chip was faulty.

Fidelity ZX3000 chassis. Picture

tearing was the complaint with one of these sets. The cause was the 33μ F, 250V capacitor on the right-hand side of the chopper transformer.

Philips CF1 chassis: There was no raster though the EHT was OK. R3585 (1 Ω) was open-circuit. Sony KV1340UB: An overbright picture flashing green were the complaints with one of these sets. R709 (330k Ω) on the tube base panel was open-circuit. Philips CTX-E chassis: Tripping was cured by replacing D6564 (BY448) and D6482 (BYV95B). J.K.P.

Mitsubishi CT2554TX

Line output transistor failure at switch on can be a disconcerting fault when all the usual causes (power supply and incorrect line drive waveform) have been excluded. This particular set had short-circuit line scan coils. A.F.

Mitsubishi CT2531BM (Euro 4 Chassis)

The HT voltage should be 156V in these sets. In this one it had risen to 190V. As a result, it was destroying line output transistors. The STR59041 chopper chip IC901 can be troublesome, but in this case C908 (10μ F, 100V) was responsible. It's the reservoir capacitor for IC901's -41V supply. A.F.

Bush 2114

This set had come to us ten months previously because of power supply problems. We'd replaced a number of capacitors and resistors in the chopper circuit. This time it was dead but the power supply was working. The cause of the problem was no line drive output at pin 11 of the TDA2579 timebase generator chip IC401. At switch on this chip receives a start-up supply at pin 16. The voltage here was found to be low at 4.9V because C808 $(1,000\mu F, 25V)$, the reservoir capacitor for the chopper derived 24V supply, was leaky. A replacement restored normal operation. M.M.

Philips CP90 Chassis

Field bounce was the complaint with this set. Checks showed that this originated in the IF/sync panel. A new TDA2579 timebase generator chip cured the problem. M.M.

Mitsubishi CT21M5BT

This set was dead, with the chopper transistor Q901 short-circuit and R991 open-circuit. We replaced these items along with IC901, D909 (3V) and C914 (47μ F, 25V). At switch on the set tried to start then died. A check on the line output transistor Q552 showed that it was leaky both ways. After fitting a replacement the set went into the standby mode and attempts to switch it on were rewarded with tripping. The line output transformer was the cause of this. The set worked once the LOPT had been replaced: all we had to do was to reprogram the EPROM. M.M.

Hitachi C2114T

This set lost its sound after a few hours and wouldn't respond to either front panel or remote control commands. We found that the TNP47C1237N microcontroller chip responded to heating and cooling. A replacement cleared the fault. M.M.

Sharp DV5103H

This set appeared to be dead. A check showed that the HT voltage was low at about 45V instead of 113V. As there appeared to be no short-circuits I checked around the feedback loop in the power supply and found that the 6-2V zener diode D754 had a 62Ω leak both ways. Replacing D754 and the CNX82A optocoupler cured the fault. M.M.

Sony KV2212 (YE2 Chassis)

This set had a narrow band of picture across the screen, similar to field collapse. As the field output stage's 40V supply was present and correct, I started to check the electrolytic capacitors in the area. When I came to the field scan coupling capacitor C522 (470 μ F, 63V) one leg came out as I lifted it off the board. It was in a very sorry state. A replacement cured the fault. M.M.

Sony KVX25TU (AE1 Chassis)

The complaint with this set, which came from another dealer, was intermittent loss of the sound. This is normally caused by dry-joints around the audio chip, but the dealer had resoldered these. He hadn't resoldered the connection to the chopper transformer's 40V pin however. Doing this cured the fault. M.M.

Mitsubishi CT2153STX (Euro 4Z Chassis)

Very intermittent luminance, with parts of the picture breaking up, was the complaint with this set. Teletext was not affected. I traced the video signal through the circuitry on the decoder panel. It was present at pin 17 of the TDA4565 delay line chip IC602, but there was virtually no output at pin 11 – and what there was jumped all over the place. A new TDA4565 chip put an end to the mischief. M.M.

GoldStar CIT2168F (PC04A Chassis)

There was no sound, and lack of a manual didn't help. I found that there was no volume control pulsewidth modulated output from the microcontroller chip, so I assumed that this chip was faulty and replaced it. Wrong! In fact the sound was being muted because the microcontroller chip thought there wasn't a locked signal. The culprit turned out to be the TDA1940 sync separator/line generator chip IC401, which wasn't producing an output when coincidence was detected. M.M.

Matsui 1436

This set would come out of standby but otherwise remained lifeless. The power supply was working, and there was HT at the collector of the line output transistor. There was also line drive at the output from the driver transformer. But it didn't reach the base of the output transistor, because of a dry-joint on the link between these two items. The dry-joint was visible only when examined with a magnifying glass. Resoldering it cured the trouble. M.M.

Samsung CI591

There was sound but no picture. When the setting of the first anode preset was turned up a dim picture appeared. It was also too wide. A check on the HT voltage showed that it was correct, but a scope check on the HT feed to the line output transformer showed that about 50V p-p of noise was present. C41 $(4.7\mu F, 400V)$ had a bulging case: a replacement restored the picture. M.M.

Saisho CM260T/T (Fidélity ZX5000 Chassis)

If you find that the BUT11A chopper transistor is short-circuit, replace the following items as well: C5 (4.7μ F, 63V); C7 (220μ F, 25V); IC1 (UC3844N); and the CNY75B optocoupler IC13. The set will then switch on first time. **M.Dr.**

Hitachi G8Q Chassis

If the set is tripping, try loading the 145V HT line with a 100W bulb. We've found that these sets trip when the line output stage isn't working. The most common reason for this is failure of the TDA2579A timebase generator chip IC701.

If the set still won't come on, lift R713 which is connected to pin 16 (trip input) of IC701. You will probably find that the set springs to life, but with a snowy screen and no activity around the microcontroller chip IC1501. In this situation the first suspect is the 4MHz crystal X1501. The cause of the fault could however be IC1501 or the MDA2062 EEPROM chip IC1502 – we've had all these items fail at one time or another.

If the set is fitted with the PCF84C type of microcontroller chip, the replacement comes with a modification sheet – it requires a different supply voltage. M.Dr.

Amstrad CTV1410

This set had us fooled for a bit. It was dead with no HT, i.e. no voltage could be measured at the cathode of the 112V supply rectifier D904. The HT supply is switched on/off by relay RL Y901, but the supply's 100μ F, 160V reservoir capacitor is on the output side of the relay. Hence the no-voltage situation at the cathode of D904 – things would have been clearer if we had made a scope check at the cathode of D904 first. The cause of the problem was RL Y901's contacts, which were open-circuit. **M.Dr.**

Matsui 2086

The power supply was running but the set wouldn't come out of standby. Checks in the line output stage showed that D406 (BYT52J) was short-circuit, R421 (0.5 Ω) open-circuit and the 12V zener diode ZD401 short-circuit. The basic cause of the trouble was a common one: the HT voltage had risen because the 47 μ F capacitor in the power supply had dried up. M.Dr.

Philips CP90 Chassis

If the top of the picture flickers and wavers to one side, rcplace the following capacitors in the IF can: C2044 1 μ F, 63V; C2045 22 μ F, 35V; C2073 33 μ F, 16V; C2087 1 μ F, 63V; C2093 22 μ F, 35V; and C2098 1 μ F, 63V. M.Dr.

Sharp DV5150

This set was dead when it was brought to us. On removing the back we noticed that both speakers and the degaussing coils were disconnected, then that lots of parts were missing from the PCB. All was revealed when we turned the PCB over: someone had been replacing components surface-mount style! To top it all, the replacement resistors and diodes on the underside hadn't even had their leads cropped. All in all a cowboy job to the highest extent.

After fitting the correct components in the right places, and resoldering pins 1, 2 and 3 of the line output transformer, we were back with the original problem: the set would power up then return to standby. It's a stock fault with these sets. The cause is no supply to the field output chip because the 3.3Ω safety resistor R612 is open-circuit.

It transpired that the owner had been quoted a very high price to replace the LOPT – the previous 'repairer' had presumably discovered that disconnecting pins 1, 2 and 3 stopped the set returning to standby. There should be a law against people who do things like this. **M.Dr.**

Ferguson ICC5 Chassis

This set was as good as dead: there was just a flick from the standby LED when it was switched off. This indicated that there was a heavy load on the power supply. Some cold checks in the line output stage brought us to CL44 (300nF, 250V) which was split from end to end. It read OK when checked with a capacitance meter, but presumably couldn't take it when the voltage was up. C.W.

Salora J Chassis

Two of these sets, actually the Granada Model C16BZ4, came in with colour faults. The first one had a yellow picture, i.e. no blue. Checks in the RGB output stages showed that the tube's blue gun was cut off - there was 194V at the blue cathode, with the correct 120V at the red and green cathodes. The blue control RTB270 had the effect of an on/off switch: it would produce either no blue or a flooded blue raster which became so bright that beam limiter action tripped the set. The cause of the fault was RB271 (56kΩ) which was open-circuit.

The problem with the second set was a little more difficult to sort out. It had a perfect mono picture but there was no R - Y. A new TDA3562A colour decoder chip made no difference, and its supply voltage and the sandcastle pulses were as specified. Some time was then spent carrying out checks in the chroma delay-line circuit, all to no avail. To cut a long story short, the cause of the problem turned out to be the TDA2653A field output chip ICB400! It was presumably affecting the sandcastle pulse, though this was not apparent from scope checks. Anyway, a new TDA2653A restored correct colours. **C.W**.

Philips 2A Chassis

Very intermittently the standby and mute LEDs would flash and the channel display would go off. After a lot of work I found that the 7V supply to the search tune/control PCB, at pin 7 of M3, was fluctuating. The symptom was so infrequent that the cause couldn't be traced to a particular component. Replacing C2716 (1,500µF), D6726 (1N4148) and D6642 (BYD33G) seems to have stopped the flashing lights however. C.W.

Finlux 5000 Chassis

The customer said that the set produced a screenful of snow then went dead. The dead set bit was no problem: there's auto switch off when the set isn't receiving a signal. The cause of the tuning fault was rather more difficult to trace.

The tuner is controlled, at pins 5 and 6, by an I2C bus. Its tuning supply, at pin 3, should be variable from 0V to 24V but was stuck at 30V. The on-screen programming worked and showed the correct numbers, and scope checks at the tuner's I2C pins showed plenty of activity which altered when the channel was changed. A new tuner was tried, but there was still no tuning. The cause of the problem turned out to be the SDA2586 memory chip ICa2, which is an eight-pin pre-programmed EPROM, part no. 4400267056. It's available from Nokia or CPC. C.W.

Goodmans 2575

This set was dead with only a few volts at the collector of the line output transistor. When the HT supply was disconnected from the line output transformer the power supply worked normally. Checks in the line output stage showed that a BY448 diode in the EW correction circuit had shorted and burnt the surrounding print. A print repair job and a new diode got the set working again but the raster had bowed sides, indicating loss of EW correction. A new TDA4950 chip (IC18) put that right. You'll find the BY448 diode alongside the large EW coil. J.E.

Sony AE1 Chassis

The job card read "dead after water spillage". Fortunately the damage

was restricted to the 2.7Ω , 7W surge limiting resistor, the TEA2164 power supply control chip and the 2SD1548 chopper transistor. I replaced these items then wound the set up using a variac. All was well. I.E.

Saisho CM2880IX/Matsui 2890

Dead with no standby LED indication. I found that the mains input wasn't reaching the bridge rectifier because the relay wasn't being energised. Further checks showed that the primary winding of the standby transformer T101 was open-circuit. It's available from CPC under part no. MA040535009C. I've had to order three in as many months. J.E.

Samsung CI3482

The cause of no red picture content was traced to the 2SC2330 red driver transistor Q503 on the CRT base panel. It was short-circuit baseto-emitter. J.E.

Hinari CT16

This portable was dead. When I tried to power it there was a short, timid sssh noise then the set shut down. Checks in the line output stage showed that the boost diode D552 was short-circuit. A replacement brought the set back to life, but the diode was very warm. I decided to use a BY229 fitted to a mica kit, bolted to a very convenient hole in the chassis above the line output transistor, with fly leads for connection to the PCB. The set then worked normally, with the diode nice and cool. J.E.

Fisher FTS7111TX

This set was dead with "PA" in the display. The power supply was working, but there was no line drive because the 12V supply at pin 10 of the TDA2578 timebase generator chip ICh1 was missing. I connected a scope to pin 11 to watch the line drive at switch on, and found that there was a very brief squarewave before the set shut down to standby.

The line output stage was being heavily loaded, and cold checks showed that the PY55-600 26V supply rectifier Dz1 was shortcircuit. Amongst other things it supplies the TDA3652 field output chip. After fitting a replacement I switched on and was rewarded with a raster that was blank apart from the figure "1". Then smoke appeared and I hurriedly switched off. Ck10 (1,000 μ F, 25V) in the field scan circuit had shorted. In went a replacement, rated at 63V. This time the set produced a normal picture and all was well. I thought the original capacitor had been a bit near its limit. So, out of curiosity, I measured the voltage across the replacement. The reading was just under 25V. J.E.

Beon 1401

Sound distortion was the complaint with this set. Checks in the audio output stage eventually brought us to R153 which had risen in value from $82k\Omega$ to over $2M\Omega$. J.E.

Sony KV2IVX-IMT

Picture rolling was the complaint with this set. When freezer was applied to the UPC1377C timebase generator chip the picture temporarily locked. A replaced cured the rolling.

Intermittent or permanent field collapse is usually caused by dryjoints at Q551, Q553, Q554 and Q555. After resoldering these transistors it pays to replace C556 $(4.7\mu F, 160V)$ and C560 $(470\mu F)$. J.E.

Panasonic U3W Chassis

The cause of field collapse turned out to be the 2SD837 Darlington transistor Q403, which was opencircuit base-to-collector. J.E.

Matsui 1436

This portable had a really strange fault. When it came on the colour would be in vertical bands that moved across the screen from left to right. Fortunately the fault was intermittent – it responded to gentle tapping with a screwdriver. The cause of the trouble was a badly soldered joint at the chassis side of C140. **T.L.**

Sony KVX2982 (BE3B Chassis)

The sound would suddenly become very loud for an instant then return to the set level. It would do this only once a day and fortunately a friend of mine knew the answer. You resolder all the joints at RA2 and RA3 on the microcontroller subpanel. It works! **T.L.**

Matsui 14T

If the display produced by one of these portables has a green, red or blue background, go straight for C821, C824 and C825. Remove them, clean then solder them back in. This normally cures the fault. They are surface-mounted devices on the print side of the main PCB. **T.L.**



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Answer to Test Case 412 - see page 397 -

Faults in power supply circuits can be destructive. When the fault is spasmodic as well, a lot of frustration is likely to be generated! If jobs like this one were priced at their true cost, taking into account the time involved and the number of replacement components fitted, they would seldom be viable – especially in an old set like this one. In this case however the scope display and lamp dimming when the fault occurred provided useful clues, narrowing down the field of search. Full marks to TechnoCrat!

It was plain that the control circuit was trying to restore correct conditions when the output voltage fell, but whatever was causing the upset must have been very painful for the chopper transistor. The cause could have been a fizz up inside the chopper transformer, or an occasional shorting of some of its turns, but not this time. In fact the guilty party was the chopper transistor's 4.7μ F base drive coupling capacitor C2351. It could have dried up with age, or have been electrically leaky. Either way the problem would have occurred. Chopper and line output transistors are particularly fussy about their drive conditions. If the pulse waveform is incorrect, they die – either because of punch through or over dissipation.

The replacement capacitor we fitted was a 105°C type. We use them in all our power supply repairs now, for greater reliability. It will certainly outlast the rest of the set. The customer has since phoned back to say that there's something wrong with the sound!

NEXT MONTH IN TELEVISION

Channel 5 Reception Guide

Because of the different powers and locations used for the Ch. 5 transmissions, and their relations with other signals, many reception problems are likely to be enountered. To help with this, we have prepared a picture guide which shows the effects that can occur. It will enable you to analyse what's happening and why, and see what can be done to alleviate or eliminate the problems.

Servicing the Mitsubishi HSMX1B

John Coombes on how to tackle the various mechanical and electronic faults you could encounter with these machines.

Digital TV French Style

Hugh Cocks describes his experiences when setting up a satellite receiver for reception of French digital TV channels.

LCR Range Extensions

How extra ranges can be added to an inexpensive *LCR* bridge to meet service department needs. For a few pounds you can achieve a reasonably accurate and versatile bridge.

Pace SS9000/9200 Channel Expansion

A further modification from Martin Pickering, this time to obtain automatic ADX control with with early Pace satellite receivers.

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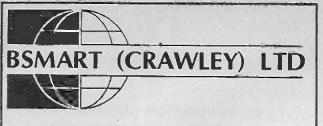
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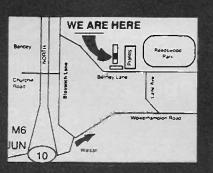
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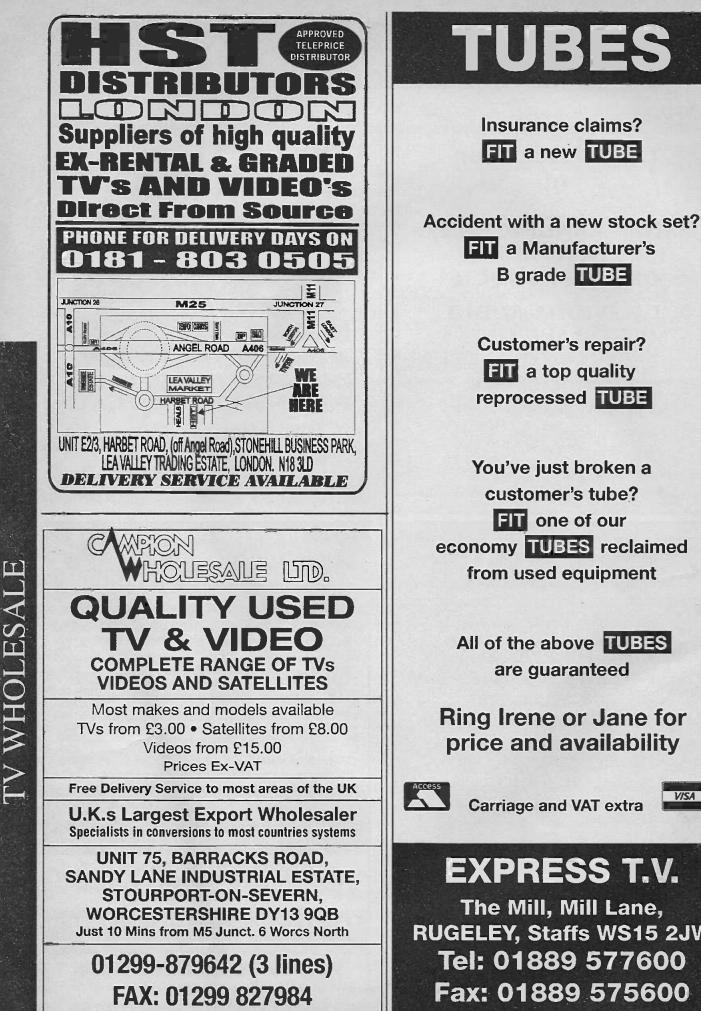
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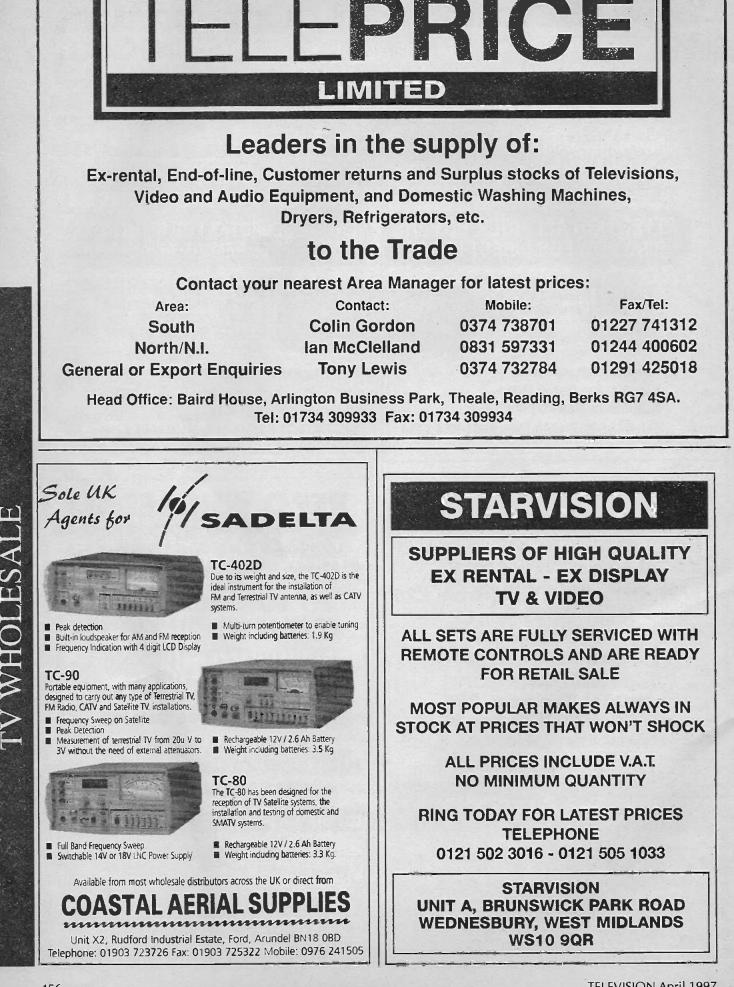
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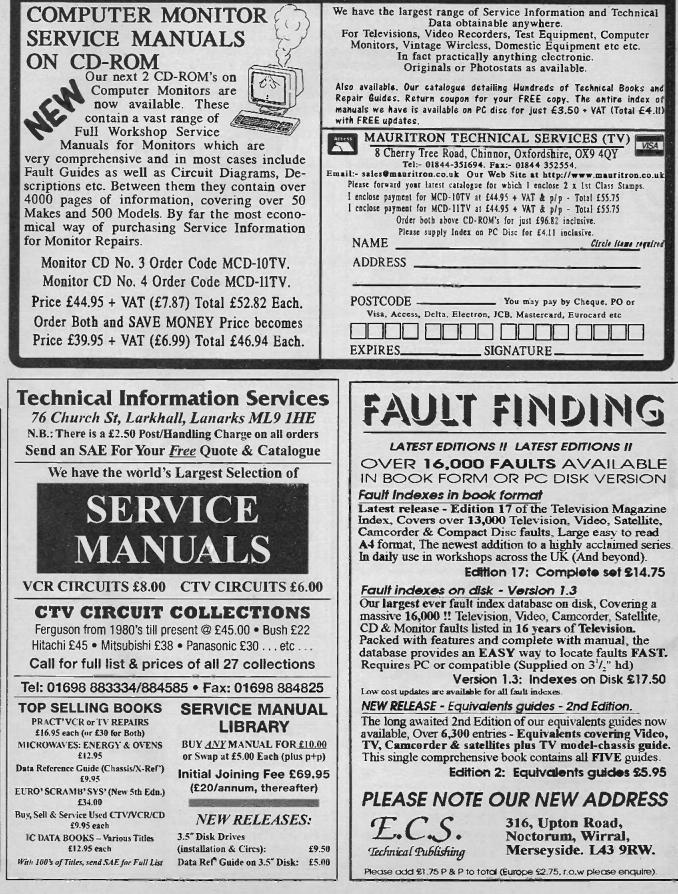
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lib for £1 lib for £1 P/P	£1.00 per lb £1.25 per lb	YELLOW SPOT AND SECAM P/P 55.00ea CHOKE-MAINS INPUT-TX9-TX10	£20.0 £4.0
CRYSTAL-4MHZ OR 6MHZ EAC	н .30р	CHROME BOARD-ICC5	
CRYSTAL-TV-4.4MHZ OR 8.8MHZ EACI DESOLDER PUMP	H 30p £2.00	UCs U4647TKFOR HAL1498	£6.0
DIGITAL CAPACITANCE METER - CMC		CONVERTOR-RGB-S-VHS - VA341 DECK AND CAPSTAN MOTOR:-	£20.0
200PF-20MF	£28.00	FV61LV, FV62LV, FV67LV, FV68LV EACH	£30.0
DIODES-TV-100 MIXED	£3.00	FV70B, FV71LV, FV72LV, FV74LVX EACH	£30.0
FILTERS – 455 & 480 EACI FOCUS POTS-K40	H 20p £2.00	FV77HV	£30.0
FRONT PANELS (PLASTIC) FOR AMSTR		DECK AND HEAD-FV31R DECK MECHANISM	
PERDIO. FIDELITY, DECCA, TATUNG		VIDEOSTAR-R2000 P/P £5.00ea	£30.0
ALL 1992 MODELS EACI FUSES-100 MIXED	1 £4.00 £3.00	DRUM-LOWER PDM2024A-1	£20.0
GAS SOLDER IRON-PORTASOL HOBBY		DRUM-LOWER-PU\$362931-2 DRUM-UPPER-20439318	£30.0 £20.0
HANDSETS-SEE SEPARATE LISTING		DRUM-UPPER-YDM2018B	£10.0
INFRA RED DETECTOR	68.00	DRUM-UPPER-YDM2037A	£20.0
WIDE/SHORT ANGLE WITH RELAY INFRA RED RECEIVER-MATSUMI MINI	ALL UNIT	HEAD-FV3IR	E12.0
INVERTER 12Y DC TO 230V AC -		HEAD AND DRUM-FVZIA MODULATOR-SP212315	115.0
100 WATT, SUITABLE FOR 14" TV	£15.00	MODULATOR-SRB1	25
LOPTS - SEE SEPARATE LISTING	£3.50	MODULATOR-SATELLITE-T1040-SRD3/4	£2.0
MAGNIFIER – 2X AND 4X MILLI VOLTMETER-ELECTRONIC-LEA		PANEL-TX89 PANEL-10 MIXED FROM TX9 TO ICCS	£10.0
LMV-181A 40V A/C IN-1MV F/S		PANEL-DECODER-ICCS	£5.0
IMV-300V CALIBRATED - COST £225	.00 £35.00	PANEL-FRONT-TX98	
MIXED COMPONENTS BY WEIGHT	£1.00 per lb	T1353E W/INFRA-RED RECEIVER PANEL-FRONT-TX100	£5.0 £4.0
4/4	£1.25 per lb	PANEL-FRONT-TX100 PANEL-IF-TX9, TX10	24.0
MODULATOR-TUNABLE SATELLITE-T		PANEL-REMOTE AND POWER SUPPLY	
MODULATOR KIT, 5V TO 12V - FOR ALL CAMERAS	\$5.00	FV3IR DISPLAY P/P £2,00ca	£5.0 £5.0
MOTORS SEE SEPARATE LISTING	23.00	PANEL-REMOTE-TX9, TX10 EACH PANEL-REMOTE-TX10-540/01	£5.0 £5.0
PANEL-CM201	£10.00	PANEL-REMOTE-TX10, WITH BATTERY	
PANEL-IK2-FM2211 STEREO	£5.00	AND 4 1/Cs - 1544-033C	£7.0
PANEL-CVC80-POWER POSITOR-2322 662 98009	£5.00 50p	PANEL-REMOTE TX90 - 139.001 I/Cs M293B1 AND M\$1000	£10.0
POSITOR-2322 662 98009	50-p	PANEL-REMOTE TX100	110.0
POSITOR-3 PIN POS. PTH451 BLACK TY	PE 50p	L/C M293B1-SAA5012	£10.0
POWER SUPPLY - 12V DC & 24V DC-REGULATED	£2.00	PANEL-REMOTE TX100	£10.0
POWER SUPPLY-REGULATED 3-12V 500		WITH STAND-BY BATTERY AND I/Cs PANEL-T1228B TEXT	10.0
PSUAC 12V 500MA	£1.00	FOR TX89, TX98, TX99, TX100	£15.0
PSUAC 9V 1A	\$1.50	PANEL-TX90 THORN FRONT -	
QUARTZ HALOGEN - 500W 200V FOR OUTDOOR LAMPS	£1.00	- 8 BUTTONS 01M4-515-002 PANEL-TUBE BASE-ICC5	£10.0
R.S. SAFE BLOC	£5.00	PANEL-TUBE BASE-ICCS PANEL-TUBE-BASE-TX89, TX98, TX99	15.0
RELAYS SUB MINIATURE	25p	PANEL TUNING 1509G-TX9.TX10	£5.0
SATELLITE TUNER UNIT - 2427611 BASE BAND/VIDEO OUT	£6.00	POWER SUPPLY 12V-3A	\$4.0
SCART TO 4 PHONO LEADS 1.5M	£5.00 £4,00	FOR VIDEOSTAR CAMERA PP3 PUSH BUTTON UNIT-TX85, TX86 - 8 BUTTON	
SCART TO 6 PHONO LEADS	£6.00	RECEIVER - INFRA-RED - IC\$L486-TX100	50
SCART TO "D" PLUG	00.13	TRANSFORMERS-SWITCH MODE:-	
SCART TO SCART LEADS - ALL PINS CONNECTED - 1.5 METRES	£2.00	TX85, TX86, TX89 EACH TX100	£4.f
SOUND 5.5MHZ MPM 1000T	£1.00	473190-00, 40153000 EACH	\$5.0
	£1.00	ICC5 3112-338-326842	£5.0 £5.0
SOUND 6.0MHZ MPM 1040	4.4.16.10		£5.0 £4.0
TRANSFORMER-RS ENCAPSULATED N		TUBE BASE ON PANEL - ICC5	£5.0
	ALNS £1.00 £7,00	GRUNDIG	£5.0 £4.0
TRANSFORMER-RS ENCAPSULATED N 0-120V-0-120V PRI 0-9V-0-9V SEC TRIPLER BG 2032-642-3002 TRIPLER BG 2037-642-1005	£1.00 £7,00 £7,00	GRUNDIG TRIPLERS BG2032-642-3002	£5.0 £4.0 £5.0
TRANSFORMER-RS ENCAPSULATED N 0-120V-0-120V PRI 0-9V-0-9V SEC TRIPLER BG 2032-642-3002 TRIPLER BG 2087-642-1005 TRIPLER KT3/K30	£1.00 £7,00 £7,00 £4.00	GRUNDIG TRIPLERS BG2032-642-3002 TRIPLERS BG2087-642-1005	£5.0 £4.0 £5.0 £9.0
TRANSFORMER-RS ENCAPSULATED N G-120V-0-120V PR10-9V-0-9V SEC TRIPLER BG 2032-642-3002 TRIPLER BG 2032-642-1005 TRIPLER MT3/K30 TRIPLER-UNIVERSAL	£1.00 £7,00 £7,00	GRUNDIG TRIPLERS BG2032-642-3002 TRIPLERS BG2087-642-1005 TRIPLERS BG2087-642-1005 TRIPLER WITH FOCUS POT	£5.0 £4.0 £5.0 £9.0
TRANSFORMER-RS ENCAPSULATED N 0-120V-0-120V PRI 0-9V-0-9V SEC TRIPLER BG 2032-642-3002 TRIPLER BG 2087-642-1005 TRIPLER KT3/K30	£1.00 £7,00 £7,00 £4.00	GRUNDIG TRIPLERS BG2032-642-3002 TRIPLERS BG2087-642-1005	£5.0 £4.0
TRANSFORMER-RS ENCAPSULATED N 0-1204-0-1204 PRI 0-944-0-94 SEC TRIPLER BG 2023-642-0005 TRIPLER BG 2037-642-1005 TRIPLER WINVERSAL TUNERS - SEE SEPARATE LISTING TUNING POTS - 8 WAY	£1,00 £7,00 £7,00 £4,00 £5,00	GRUNDIG TRIPLERS BG2032-642-3002 TRIPLERS BG2037-642-1005 TRIPLERS BG2087-642-1005 UNIVERSAL TRIPLER – UPRIGHT PRINTED CIRCUIT TYPE	£5.0 £4.0 £5.0 £9.0 £9.1 £9.1 £7.0
TRANSFORMER-RS ENCAPSULATED N 0-120V-0-120V PRI0-9V-0-9V-5EC TRIPLER BG 2032-642-3002 TRIPLER BG 2087-642-1005 TRIPLER KTAX30 TRIPLER XTAX30 TRIPLER - UNIVERSAL TUNERS - SEE SEPARATE LISTING TUNERS - SEE SEPARATE LISTING TUNING POTS - 8 WAY	£1.00 £7.00 £7.00 £4.00 £5.00 50p	GRUNDIG TRPLERS 862032-642-002 TRIPLERS 862032-642-005 TRIPLER WITH FOCUS FOT UNIVERSAL TRIPLER – UPRIGHT PRINTED CIRCUITTYPE HITACHI	£5.0 £4.0 £5.0 £9.0 £9.0 £7.0 £9.0
TRANSFORMER-RS ENCAPSULATED N 0-120V-0-120V PRI-09-V-09V SEC TRIPLER BG 2032-642-3002 TRIPLER BG 2032-642-3005 TRIPLER KTXX30 TRIPLER XTXX30 TRIPLER SEPERATE LISTING TUNERS – SEE SEPARATE LISTING TUNERS – SEE	£1.00 £7.00 £7.00 £4.00 £5.00 50p 22/93 £4.00 £4.00	GRUNDIG TRIPLERS BG2032-642-3002 TRIPLERS BG2037-642-1005 TRIPLERS BG2087-642-1005 UNIVERSAL TRIPLER – UPRIGHT PRINTED CIRCUIT TYPE HTTACHI DECODER-TELETEXT PC232A5 – ISSUE 4 HEAD AND DRUM – 620E	E5.0 £4.0 £5.0 £9.1 £9.1 £7.0 £9.1 £7.0 £9.1 £15.0 £12.0
TRANSFORMER-RS ENCAPSULATED N 0-120V-0-120V PRI 0-9V-0-9V SEC TRIPLER BG 2032-642-3002 TRIPLER BG 2032-642-3002 TRIPLER KTAX30 TRIPLER ATAX30 TRIPLER - UNIVERSAL TUNING POTS - & WAY AMSTRAD DISPLAY PANEL - LONG CHASSIS - 19 TRONT PANEL FOR ALL 1992 MODELS TRONT PANEL FOR ALL 1992 MODELS	£1.00 £7,00 £7,00 £4.00 £5.00 50p 22/93 £4.00 £12.00	GRUNDIG TRIPLERS BG2032-642-3002 TRIPLERS BG2032-642-3002 TRIPLERS BG2037-642-1005 TRIPLER WITH FOCUS POT UNIVERSAL TRIPLER – UPRIGHT PRINTED CIRCUITTYPE HTTACHI DECODER-TELETEXT PC232A5 – ISSUE 4 HEAD AND DRUM – 620E MAINS SWITCH WITH 5 AND-BY	E5.0 £4.0 £5.0 £9.1 £9.1 £7.0 £9.4 £15.0 £12.0 50
TRANSFORMER-RS ENCAPSULATED N 0-120V-0-120V PELO9-V-20V SEC TRIPLER BG 2032-642-3002 TRIPLER KTAX30 TRIPLER KTAX30 TRIPLER SES SEPARATE LISTING TUNING POTS – 8 WAY AMSTRAD DISPLAY PANEL FOR ALL 1992 MODELS HEAD AND DRUM – 0600 HEAD AND DRUM – 0600	£1.00 £7.00 £7.00 £4.00 £5.00 50p 62/93 £4.00 £12.00 £12.00	GRUNDIG TRIPLERS BG2032-642-3002 TRIPLERS BG2032-642-3002 TRIPLERS BG2037-642-1005 TRIPLERS WITH FOCUS POT UNIVERSAL TRIPLER – UPRIGHT PRINTED CIRCUITTYPE HITACHI DECODER-TELETEXT PC232A5 – ISSUE 4 HEAD AND DR UM – 620E MAINS SWITCH WITH STAND-BY MODULATOR No 558781	E5.0 £4.0 £5.0 £9.1 £9.1 £7.0 £9.4 £15.0 £12.0 50
TRANSFORMER-RS ENCAPSULATED N 0-120V-0-120V PRI 0-9V-0-9V SEC TRIPLER BG 2032-642-3002 TRIPLER BG 2032-642-3002 TRIPLER KTAX30 TRIPLER ATAX30 TRIPLER - UNIVERSAL TUNING POTS - & WAY AMSTRAD DISPLAY PANEL - LONG CHASSIS - 19 TRONT PANEL FOR ALL 1992 MODELS TRONT PANEL FOR ALL 1992 MODELS	£1.00 £7,00 £7,00 £4.00 £5.00 50p 22/93 £4.00 £12.00	GRUNDIG TRIPLERS BG2032-423-002 TRIPLERS BG2087-642-1005 TRIPLERS WITH FOCUS POT UNIVERSAL TRIPLER – UPRIGHT PRINTED CIRCUITTYPE HITACHI DECODER-TELETEXT PC232A5 – ISSUE 4 HEAD AND DRUM – 620E MAINS SWITCH WITH STAND-BY MODULATOR No 5587881 OSCILLOSCOPE 20MHZ DOUBLE BEAM –	£5.0 £4.0 £5.0 £9.1 £7.0 £9.1 £7.0 £9.1 £15.0 £15.0 £15.0
TRANSFORMER-RS ENCAPSULATED N 0-120V-0-120V PRI0-9V-0-9V-0-9V SEC TRIPLER BG 2082-642-3002 TRIPLER BG 2082-642-3002 TRIPLER KTAX30 TRIPLER XTAX30 TRIPLER SEE SEPARATE LISTING TUNING POTS - 8 WAY AMSTRAD DISPLAY PANEL - LONG CHASSIS - 19 FRONT PANEL FOR ALL 1992 MODELS HEAD AND DRUM - 6000 HEAD AND DRUM - 6000 HEAD AND DRUM - 6000 HEAD AND DRUM - 6000 HEAD AND DRUM - 8,900 PLASTIC FRONT WITH FLAP -8,900 PLASTIC FRONT WITH FLAP -8,900 POWERS SUPPLY/SVS1000-VS1100	21,00 17,00 17,00 17,00 17,00 17,00 15,00 12,00 112,00 112,00 112,00 112,00 12,000 12,0	GRUNDIG TRIPLERS BG2032-642-3002 TRIPLERS BG2087-642-3002 TRIPLERS BG2087-642-3005 TRIPLER WITH FOCUS FOT UNIVERSAL TRIPLER – UPRIGHT PRINTED CIRCUETTYPE HITACHI DECODER-TELETEXT PC232A5 – ISSUE 4 HEAD AND DRUM. 620E MAINS SWITCH WITH STAND-BY MODULATOR No 5587881 OSCILLOSCOPE 20MH2 DOUBLE BEAM – V212 PANEL-TELETEXT G8P-ISSUE 6	£5.0 £4.0 £5.0 £9.4 £9.1 £7.0 £9.1 £15.0 £15.0 £188.0 £10.0
TRANSFORMER-RS ENCAPSULATED N 0-120-0-120 PRI-0-9-V5C TRIPLER BG 2032-642-3002 TRIPLER BG 2032-642-3002 TRIPLER BG 2032-642-3002 TRIPLER STAK30 TRIPLER	£1,00 £7,00 £7,00 £7,00 £5,00 £5,00 £1,00 £1,200 £1,200 £1,200 £1,200 £1,200 £1,200 £5,00 £5,00 £5,00	GRUNDIG TRIPLERS BG2032-642-3002 TRIPLERS BG2037-642-1005 TRIPLERS BG2037-642-1005 TRIPLERS WITH FOCUS POT UNIVERSAL TRIPLER – UPRIGHT PRINTED CHRCUITTYPE HITACHI DECODER-TELETEXT PC232A5 – ISSUE 4 HEAD AND DRUM – 620E MAINS SWITCH WITH STAND-BY MODULATOR No 5587881 OSCILLOSCOPE 20MHZ DOUBLE BEAM – V212 PANEL-TELETEXT G8P – ISSUE 6 PANEL-TELETEXT G8P – ISSUE 6 PANEL-TELETEXT G8P – ISSUE 7	E5.0 E9.4
TRANSFORMER-RS ENCAPSULATED N 0-120V-0-120V PRL0-9V-20V SEC TRIPLER BG 2032-642-3002 TRIPLER BG 2032-642-3002 TRIPLER KTXX30 TRIPLER XTXX30 TRIPLER SEE SEPARATE LISTING TUNERS - SEE SEPARATE LISTING TUNING POTS - 8 WAY AMSTRAD DISPLAY PANEL - LONG CHASSIS - 19 FRONT PANEL FOR ALL 1992 MODELS HEAD AND DRUM - MICAM ENDEL-CLOCK DISPLAY - 8,900 PLASTIC FRONT WITH FLAP - 8,900 POWER SUPPLY-LONG OR SHORT CHA 1991/1992 KIDPLY - 100G OR SHORT CHA 1991/1992 MODELS	21,00 17,00 17,00 17,00 17,00 17,00 15,00 12,00 112,00 112,00 112,00 112,00 12,000 12,0	GRUNDIG TRIPLERS BG2032-642-3002 TRIPLERS BG2032-642-3002 TRIPLERS BG2087-642-1005 TRIPLER WITH FOCUS POT UNIVERSAL TRIPLER – UPRIGHT PRINTED CIRCUITTYPE HITACHI DECODER-TELETEXT PC332A5-ISSUE 4 HEAD AND BRUM - 620E MADULATOR NO 557851 OSCTLLOSCOPE 20MH2 DOUBLE BEAM – V212 PANEL-TELETEXT (G8P-ISSUE 6 PANEL-TELETEXT PC315-11 - ISSUE 7 PANEL-TELETEXT PC315-11 - ISSUE 7 PANEL-TELETEXT PC315-11 - ISSUE 7	E5.0 54.0 55.0 59.4 59.4 59.4 59.4 59.4 59.4 59.4 59.4 51.5 50.5 51.5 5
TRANSFORMER-RS ENCAPSULATED N 0-120-0-120 PRI-0-9-V5C TRIPLER BG 2032-642-3002 TRIPLER BG 2032-642-3002 TRIPLER BG 2032-642-3002 TRIPLER STAK30 TRIPLER	£1,00 £7,00 £7,00 £7,00 £5,00 £5,00 £1,00 £1,200 £1,200 £1,200 £1,200 £1,200 £1,200 £5,00 £5,00 £5,00	GRUNDIG TRPLERS BG2032-642-3002 TRPLERS BG2032-642-3002 TRPLERS BG2037-642-3005 TRPLER WITH FOCUS POT UNIVERSAL TRIFLER – UPRIGHT PRINTED CIRCUITYPE HITACHI DECODER-TELETEXT PC328A5 – ISSUE 4 HEAD AND DRUM – 620E MADUS SWITCH WITH STAND-BY MODULATOR NO 5578781 OSCITLOSCOPE 20MHZ DOUBLE BEAM – V212 PANEL-TELETEXT PC315-11 – ISSUE 7 PANEL-TELETEXT PC3	E5.0 54.0 55.0 57.0 69.4
TRANSFORMER-RS ENCAPSULATED N 0-120V-0-120V PRI0-9V-0-9V-0-9V SEC TRIPLER BG 2032-642-3002 TRIPLER BG 2032-642-3002 TRIPLER KTAX30 TRIPLER KTAX30 TRIPLER SEE SEPARATE LISTING TUNING POTS - 8 WAY AMSTRAD DISPLAY PANEL - LONG CHASSIS - 19 FRONT PANEL FOR ALL 1992 MODELS HEAD AND DRUM - 0000 HEAD AND DRUM	£1.00 £7.00 £7.00 £4.00 £5.00 50p 50p £12.00 £12.00 £12.00 £12.00 £13.00 £5.00 £5.00 £3.00	GRUNDIG TRIPLERS BG2037-442-3002 TRIPLERS BG2087-642-3005 TRIPLERS BG2087-642-3005 TRIPLER WITH FOCUS POT UNIVERSAL TRIPLER – UPRIGHT PRINTED CIRCUITTYPE HITACHI DECODER-TELETEXT PC232A5 – ISSUE 4 HEAD AND DRUM – 620E MAINS SWITCH WITH STAND-BY MODULATOR No 5587881 OSCILLOSCOPE 20MH2 DOUBLE BEAM – V212 PANEL-TELETEXT G8P–ISSUE 6 PANEL-TELETEXT PC3 IS-11 – ISSUE 7 PANEL-TELETEXT PC8 F-S.T. – ISSUE 6 PANEL-TELETEXT PC8 F-S.T. – ISSUE 6 FANEL-TELETEXT FC8 F-S.T. – ISSUE 6	£5.0 £4.0 £5.0 £9.0 £9.1 £9.1 £7.0
TRANSFORMER-RS ENCAPSULATED N 0-120V-0-120V PELO9-VA-09V SEC TRIPLER BG 2032-642-3002 TRIPLER BG 2032-642-3002 TRIPLER KTAX30 TRIPLER KTAX30 TRIPLER SEE SEPARATE LISTING TUNING POTS - 8 WAY AMSTRAD DISPLAY PANEL FOR ALL 1992 MODELS HEAD AND DRUM - NGCAM PANEL-CLOCK DISPLAY - 8.900 POWER SUPPLY_VS1000-VS1100 POWER SUPPLY_SU00-VS1100 POWER SUPPLY_SWITCH MODE - DOUBLE DECKER	\$1,00 \$7,00 \$4,00 \$5,00 \$5,00 \$2,93 \$4,00 \$12,00 \$12,00 \$12,00 \$12,00 \$12,00 \$5,00 \$5,00 \$5,00 \$5,00 \$5,00 \$5,00 \$2,5,000\$\$2,5,	GRUNDIG TRIPLERS BG2032-642-3002 TRIPLERS BG2037-642-1005 TRIPLERS BG2037-642-1005 TRIPLERS WITH FOCUS POT UNIVERSAL TRIPLER – UPRIGHT PRINTED CIRCUITTYPE HITACHI DECODER-TELETEXT PC232A5 – ISSUE 4 HEAD AND DRUM – 620E MAINS SWITCH WITH STAND-BY MODULATOR No 5587881 OSCTL OSCOPE 20MHZ DOUBLE BEAM – V212 PANEL-TELETEXT PC315-11 – ISSUE 7 PANEL-TELETEXT PC315-11 – ISSUE 7 POWER SUPPLY VIDE 0 SWITCH MODE STR 4211 ISSUE 10 POWER SUPPLY VIDE 0 SWITCH MODE	E5.0 54.0 55.0 59.4 59.0 57.0 59.0 57.0 59.0 57.0 59.0 57.0 59.0 57.0 59.0 57.0 59.0 57.0 59.0 57.0 59.0 57.0 59.0
TRANSFORMER-RS ENCAPSULATED N 0-120V-0-120V PRI0-9V-0-9V-0-9V SEC TRIPLER BG 2032-642-3002 TRIPLER BG 2032-642-3002 TRIPLER KTAX30 TRIPLER KTAX30 TRIPLER SEE SEPARATE LISTING TUNING POTS - 8 WAY AMSTRAD DISPLAY PANEL - LONG CHASSIS - 19 FRONT PANEL FOR ALL 1992 MODELS HEAD AND DRUM - 0000 HEAD AND DRUM	£1.00 £7.00 £7.00 £4.00 £5.00 50p 50p £12.00 £12.00 £12.00 £12.00 £13.00 £5.00 £5.00 £3.00	GRUNDIG TRIPLERS BG2037-442-3002 TRIPLERS BG2087-642-3005 TRIPLERS BG2087-642-3005 TRIPLER WITH FOCUS POT UNIVERSAL TRIPLER – UPRIGHT PRINTED CIRCUITTYPE HITACHI DECODER-TELETEXT PC232A5 – ISSUE 4 HEAD AND DRUM – 620E MAINS SWITCH WITH STAND-BY MODULATOR No 5587881 OSCILLOSCOPE 20MH2 DOUBLE BEAM – V212 PANEL-TELETEXT G8P–ISSUE 6 PANEL-TELETEXT PC3 IS-11 – ISSUE 7 PANEL-TELETEXT PC8 F-S.T. – ISSUE 6 PANEL-TELETEXT PC8 F-S.T. – ISSUE 6 FANEL-TELETEXT FC8 F-S.T. – ISSUE 6	E5.0 54.0 55.0 59.0
TRANSFORMER-RS ENCAPSULATED N 0-120V-0-120V PRIC-9V-20V SEC TRIPLER BG 2032-642-3002 TRIPLER BG 2032-642-3002 TRIPLER MSXX30 TRIPLER MSXX30 TRIPLER SESSAL TUNERS - SEE SEPARATE LISTING TUNING POTS - 8 WAY AMSTRAD DISPLAY PANEL - LONG CHASSIS - 19 FRONT PANEL FOR ALL 1992 MODELS HEAD AND DRUM - MCGM PANEL-CLOCK DISPLAY - 8,900 POWER SUPPLY-LONG OR SHORT CHA PANEL-CLOCK DISPLAY - 8,900 POWER SUPPLY-NS 1000-VS 1100 POWER SUPPLY-NS 1000-VS 1100 POWER SUPPLY-SU00-VS 1100 POWER SUPPLY-S MODELS POWER SUPPLY-S MODELS POWER SUPPLY - SWITCH MODE - DOUBLE DECKER ETRI FAN - 6in 240V 2005 200 25D1422 EE	22,93 E4.00 57.00 57.00 57.00 54.00 55.00 50p 51.00 51.200 51.200 55.00 55.00 55.00 65.00 65.00 65.00 65.00	GRUNDIG TRIPLERS BG2037-642-3002 TRIPLERS BG2037-642-3002 TRIPLERS BG2087-642-3005 TRIPLERS BG2087-642-3005 TRIPLERS WITH POCUS POT UNIVERSAL TRIPLER – UPRIGHT PRINTED CIRCUTTYPE HTTACHI DECODER-TELETEXT PC332A5-ISSUE 4 HEAD AND DRUM. 620E MAINS SWITCH WITH STAND-BY MODULATOR No 5587881 OSCITLOSCOPE 20MHZ DOUBLE BEAM – V212 PANEL-TELETEXT (GBP-ISSUE 6 PANEL-TELETEXT (GBP-ISSUE 6 PANEL-TELETEXT PC315-11 - ISSUE 7 PANEL-TELETEXT PC315-12 - ISSUE 6 PANEL-TELETEXT PC35E POWER SUPPLY TV SWITCH MODE STR 4211 ISSUE 10 POWER SUPPLY TV DEO SWITCH MODE VTM312ELM	E5.0 E9.4
TRANSFORMER-RS ENCAPSULATED N 0-120V-0-120V PELO9-V-09V SEC TRIPLER BG 2032-642-3002 TRIPLER BG 2032-642-3002 TRIPLER KTAX30 TRIPLER KTAX30 TRIPLER SEE SEPARATE LISTING TUNING POTS - 8 WAY AMSTRAD DISPLAY PANEL - LONG CHASSIS - 19 FRONT PANEL FOR ALL 1992 MODELS IEAD AND DRUM - NICAM PANEL-CLOCK DISPLAY - 8,900 PULASTIC FROM WITH FLAP - 8,900 POWER SUPPLY-SUBOL-VSI 100 POWER SUPPLY SUBOL-VSI 100 POWER SUPPLY SWITCH MODE - DOUBLE DECKER ETRI FAN - 6in 240V 200 200	11.00 17.00 17.00 17.00 15.00 15.00 12.00 15.00 10	GRUNDIG TRIPLERS BG2037-642-3002 TRIPLERS BG2037-642-3002 TRIPLERS BG2087-642-3005 TRIPLERS BG2087-642-3005 TRIPLERS WITH POCUS POT UNIVERSAL TRIPLER – UPRIGHT PRINTED CIRCUTTYPE HTTACHI DECODER-TELETEXT PC332A5-ISSUE 4 HEAD AND DRUM. 620E MAINS SWITCH WITH STAND-BY MODULATOR No 5587881 OSCITLOSCOPE 20MHZ DOUBLE BEAM – V212 PANEL-TELETEXT (GBP-ISSUE 6 PANEL-TELETEXT (GBP-ISSUE 6 PANEL-TELETEXT PC315-11 - ISSUE 7 PANEL-TELETEXT PC315-12 - ISSUE 6 PANEL-TELETEXT PC35E POWER SUPPLY TV SWITCH MODE STR 4211 ISSUE 10 POWER SUPPLY TV DEO SWITCH MODE VTM312ELM	E5.0 59.4 59.4 59.4 59.4 59.4 59.4 59.4 59.4 59.4 51.5 50.6 E13.0 E138.0 E138.0 E13.0
TRANSFORMER-RS ENCAPSULATED N 0-120V-0-100V PELO-9V-20V SEC 0-120V-0-100V PELO-9V-20V SEC TRIPLER BG 2032-642-3002 TRIPLER BG 2032-642-3002 TRIPLER MTAX30 TRIPLER MTAX300 TRIPLER MTAX300 TRIPLER MTAX300 TRIPLER MTAX300 TRANT MTAX3000000000000000000000000000000000000	21,00 57,00 54,00 55,00 50p 92/93 54,00 51,200 52,00 52,00 53,00 53,00 55,00 55,00 55,00 55,00 55,00 55,00 55,00 55,00 55,00 55,00 50,000 50,000 50,000 50,000	GRUNDIG TRIPLERS BG2037-642-3002 TRIPLERS BG2037-642-3002 TRIPLERS BG2087-642-3005 TRIPLERS BG2087-642-3005 TRIPLERS WITH POCUS POT UNIVERSAL TRIPLER – UPRIGHT PRINTED CIRCUTTYPE HTTACHI DECODER-TELETEXT PC332A5-ISSUE 4 HEAD AND DRUM. 620E MAINS SWITCH WITH STAND-BY MODULATOR No 5587881 OSCITLOSCOPE 20MHZ DOUBLE BEAM – V212 PANEL-TELETEXT (GBP-ISSUE 6 PANEL-TELETEXT (GBP-ISSUE 6 PANEL-TELETEXT PC315-11 - ISSUE 7 PANEL-TELETEXT PC315-12 - ISSUE 6 PANEL-TELETEXT PC35E POWER SUPPLY TV SWITCH MODE STR 4211 ISSUE 10 POWER SUPPLY TV DEO SWITCH MODE VTM312ELM	E5.0 59.4 59.4 59.4 59.4 59.4 59.4 57.4 57.4 51.5 5
TRANSFORMER-RS ENCAPSULATED N 0-120V-0-100V PEL0-9V-20V SEC 0-120V-0-100V PEL0-9V-20V SEC TRIPLER BG 2032-642-3002 TRIPLER BG 2032-642-3002 TRIPLER MSAL TUNING POTS - 8 WAY AMSTRAD DISPLAY PANEL FOR ALT LISTING TUNING POTS - 8 WAY AMSTRAD DISPLAY PANEL FOR ALT 1992 MODELS HEAD AND DRUM - 0600 HEAD AND DRUM - 0600 POWER SUPPLY-VS 1000-VS 1000 POWER SUPPLY SU000-VS 1000 POWER	11.00 17.00 17.00 17.00 17.00 17.00 17.00 17.00 17.00 12.00 15.00 10	GRUNDIG TRPLERS BG2032-642-3002 TRPLERS BG2032-642-3005 TRPLERS BG2032-642-3005 TRPLERS BG2032-642-3005 TRPLERS BG2032-642-3005 TRPLERS BG2032-642-3005 UNIVERSAL TRIPLER – UPRIGHT PRINTED CIRCUITTYPE HITACHI DECODER-TELETEXT PC332A5-ISSUE 4 IEAD AND BRUM - 620E MADULATOR NO 578781 OOSCITLOSCOPE 20MHZ DOUBLE BEAM - V212 PANEL-TELETEXT C3P-ISSUE 6 PANEL-TELETEXT PC315-11 - ISSUE 7 PANEL-TELETEXT PC315-11 - ISSUE 6 POWER SUPPLY VIDEO SWITCH MODE STR 4211 ISSUE 10 POWER SUPPLY VIDEO SWITCH MODE VTM312ELM ILS9 BUN84 60P BUN24 50P BUX2000 BUX49 20P SPEXED POWER SUPPLY VIDEO SWITCH MODE VTM312ELM BUX407000	E5.0 54.0 55.0 59.0 57.0 57.0 57.0 51.0
TRANSFORMER-RS ENCAPSULATED N 0-120V-0-100V PEL0-9V-20V SEC TRIPLER BG 2032-642-3002 TRIPLER BG 2032-642-3002 TRIPLER BG 2032-642-3002 TRIPLER STATA TRIPLER STAXS-00 TOWERS STATE LISTING TUNING POTS - 8 WAY AMSTRAD DISPLAY PANEL - LONG CHASSIS - 19 FRONT FANELFOR ALL 1992 MODELS HEAD AND DRUM - 0600 HEAD AND DRUM - 0600 POWER SUPPLY-S1000-VS 1100 POWER SUPPLY-SU00-VS 1100 POWER SUPPLY SU00-VS 1000 POWER SUPPLY SUNG OR SHORT CHA 1991/1992 MODELS POWER SUPPLY SUNG OR SHORT CHA 1991/1992 MODELS FAN - 6in 240V 7805 20p 7805 20p 7805 20p 7806 20p 7807 20p <t< td=""><td>11.00 17.00 17.00 17.00 17.00 17.00 17.00 17.00 17.00 12.00 10</td><td>GRUNDIG TRPLERS BG2032-642-3002 TRPLERS BG2032-642-3005 TRIPLERS BG2032-642-3005 TRIPLERS BG2032-642-3005 UNIVERSAL TKHLER – UPRIGHT PRINTED CIRCUITTYPE HITACHI DECODER-TELETEXT PC332A5-ISSUE 4 HEAD AND BRUM - 620E MANS SWITCH WITH STAND-BY MODULATOR NO 55781 OSCTLLOSCOPE 20MH2 DOUBLE BEAM - V212 PANEL-TELETEXT G8P-ISSUE 6 PANEL-TELETEXT PC315-11 - ISSUE 7 PANEL-TELETEXT PC315-11 - ISSUE 6 POWER SUPPLY VIDEO SWITCH MODE STR 4211 ISSUE 10 POWER SUPPLY VIDEO SWITCH MODE YTM312ELM L1.40 BUX84 509 BUX84 509 BYX255600 BYX28300 50 UX042500 BY2014 50 BYX25400 BY2015 150 100 BY202 150 CA3122Q</td><td>E5.0 54.0 55.0 59.4</td></t<>	11.00 17.00 17.00 17.00 17.00 17.00 17.00 17.00 17.00 12.00 10	GRUNDIG TRPLERS BG2032-642-3002 TRPLERS BG2032-642-3005 TRIPLERS BG2032-642-3005 TRIPLERS BG2032-642-3005 UNIVERSAL TKHLER – UPRIGHT PRINTED CIRCUITTYPE HITACHI DECODER-TELETEXT PC332A5-ISSUE 4 HEAD AND BRUM - 620E MANS SWITCH WITH STAND-BY MODULATOR NO 55781 OSCTLLOSCOPE 20MH2 DOUBLE BEAM - V212 PANEL-TELETEXT G8P-ISSUE 6 PANEL-TELETEXT PC315-11 - ISSUE 7 PANEL-TELETEXT PC315-11 - ISSUE 6 POWER SUPPLY VIDEO SWITCH MODE STR 4211 ISSUE 10 POWER SUPPLY VIDEO SWITCH MODE YTM312ELM L1.40 BUX84 509 BUX84 509 BYX255600 BYX28300 50 UX042500 BY2014 50 BYX25400 BY2015 150 100 BY202 150 CA3122Q	E5.0 54.0 55.0 59.4
TRANSFORMER-RS ENCAPSULATED NO 0-120V-0-120V PELO-9V-0-9V SEC 0-120V-0-120V PELO-9V-0-9V SEC TRIPLER BG 2032-642-3002 TRIPLER BG 2032-642-3002 TRIPLER BG 2032-642-3002 TRIPLER KT0X-042-1005 TRIPLER KT0X-042-1005 TRIPLER ST0X-042-1005 TRIPLER ST0X-042-100 PROFESTEPD-1000-050 FRAD AND DRUM - NICAM PANEL-CLOCK DISPLAY - 8.900 PULASTIC FRANCH WITH FLAY - 8.900 PULASTIC FRANCH WITH FLAY - 8.900 PULASTIC FRANCH WITH FLAY - 8.900 POWER SUPPLY SUBOLVS 1100 TROMER SUPPLY SUBOLVS 1100 TROME	11.00 17.00 17.00 17.00 17.00 15.00 15.00 15.00 12.00 11.2.00 11.2.00 11.2.00 11.2.00 15.00 10.00 1	GRUNDIG TRIPLERS BG2032-642-3002 TRIPLERS BG2032-642-3005 TRIPLERS BG2037-642-1005 TRIPLERS WITH FOCUS POT UNIVERSAL TRIPLER - UPRIGHT PRIVED CIRCUTTYPE HTTACHI DECODER-TELETEXT PC232A5 - ISSUE 4 HEAD AND DRUM - 620E MAINS SWITCH WITH STAND-BY MODULATOR No 5587881 OSCILLOSCOPE 20MHZ DOUBLE BEAM - V212 PANEL-TELETEXT GP- ISSUE 6 PANEL-TELETEXT PCB F.S.T USSUE 6 PANEL-TELETEXT SPCB F.S.T USSUE 6 POWER SUPPLY VIDEO SWITCH MODE STR 4211 ISSUE 10 PUX84 S0p BUX39 6100 POWER SUPPLY VIDEO SWITCH MODE STR 4211 ISSUE 10 DUX34AF POWER SUPPLY VIDEO SWITCH MODE SUM9 20p BUX392 BUX393 100 BUX371100	E5.0 54.0 55.0 59.4 59.1
TRANSFORMER-RS ENCAPSULATED N 0-120V-0-120V PELO-9V-20V SEC 0-120V-0-120V PELO-9V-20V SEC TRIPLER BG 2032-642-3002 TRIPLER BG 2032-642-3002 TRIPLER STAXS-0 TRIPLER STAXS-0 TRIPLER SEE SEPARATE LISTING TUNING POTS - 8 WAY AMSTRAD DISPLAY PANEL FOR ALL 1992 MODELS FRONT PANEL FOR ALL 1992 MODELS IEAD AND DRUM - 6000 HEAD AND DRUM - MCAM PANEEL-CLOCK DISPLAY - 8.900 POWER SUPPLY_VIODO-VSII00 POWER SUPPLY_SUNDO-VSII00 POWER SUPPLY_SUNTCH MODE - DOUBLE DECKER ETRI FAN - 6in 240V 7805 20p 25D1875 110 25C973 1.00 25C975 1.00 25C975 1.00 25C975 1.00 25C973 1.00 25C973 1.00 25C973 1.00 25C973 1.00 25C973 1.00 25C975 1.00 25C9775 <td>11.00 17.00 17.00 17.00 17.00 17.00 17.00 17.00 17.00 17.00 17.00 17.00 17.00 17.00 17.00 17.00 12.00 15.00 10</td> <td>GRUNDIG TRIPLERS BC2032-642-3002 TRIPLERS BC2032-642-3005 TRIPLERS BC2037-642-1005 TRIPLERS WITH FOCUS POT UNIVERSAL TRIPLER - UPRIGHT PRINTED CIRCUITTYPE HTTACHI DECODER-TELETEXT PC232A5 - ISSUE 4 IBLA AND DRUM - 620E MAINS SWITCH WITH STAND-BY MODULATOR No 5587881 OSCITLLOSCOPE 20MHZ DOUBLE BEAM - V212 PANEL-TELETEXT GCP - ISSUE 6 PANEL-TELETEXT PC315-11 - ISSUE 6 PANEL-TELETEXT PC3 FS.T - ISSUE 6 PANEL-TELETEXT PC3 FS.T - ISSUE 6 PANEL-TELETEXT PC3 FS.T - ISSUE 6 PANEL-TELETEXT SCH PC3 FS.T - ISSUE 6 PANEL-TELETEXT SCH PC3 FS.T - ISSUE 6 PANEL-TELETEXT SCH PC3 FS.T - USSUE 6 PANEL-TELETEXT SCH PC3 FS.T - USSUE 6 PANEL-TELETEXT SCH PC3 FS.T - USSUE 6 POWER SUPPLY VIDEO SWITCH MODE STR 4211 ISSUE 10 POWER SUPPLY VIDEO SWITCH MODE STR 4211 ISSUE 10 POWER SUPPLY VIDEO SWITCH MODE STR 4210 ISSUE 10 PUX384 S0p BUX39 S0p BUX39 S0p</td> <td>E5.0 54.0 55.0 59.4</td>	11.00 17.00 17.00 17.00 17.00 17.00 17.00 17.00 17.00 17.00 17.00 17.00 17.00 17.00 17.00 17.00 12.00 15.00 10	GRUNDIG TRIPLERS BC2032-642-3002 TRIPLERS BC2032-642-3005 TRIPLERS BC2037-642-1005 TRIPLERS WITH FOCUS POT UNIVERSAL TRIPLER - UPRIGHT PRINTED CIRCUITTYPE HTTACHI DECODER-TELETEXT PC232A5 - ISSUE 4 IBLA AND DRUM - 620E MAINS SWITCH WITH STAND-BY MODULATOR No 5587881 OSCITLLOSCOPE 20MHZ DOUBLE BEAM - V212 PANEL-TELETEXT GCP - ISSUE 6 PANEL-TELETEXT PC315-11 - ISSUE 6 PANEL-TELETEXT PC3 FS.T - ISSUE 6 PANEL-TELETEXT PC3 FS.T - ISSUE 6 PANEL-TELETEXT PC3 FS.T - ISSUE 6 PANEL-TELETEXT SCH PC3 FS.T - ISSUE 6 PANEL-TELETEXT SCH PC3 FS.T - ISSUE 6 PANEL-TELETEXT SCH PC3 FS.T - USSUE 6 PANEL-TELETEXT SCH PC3 FS.T - USSUE 6 PANEL-TELETEXT SCH PC3 FS.T - USSUE 6 POWER SUPPLY VIDEO SWITCH MODE STR 4211 ISSUE 10 POWER SUPPLY VIDEO SWITCH MODE STR 4211 ISSUE 10 POWER SUPPLY VIDEO SWITCH MODE STR 4210 ISSUE 10 PUX384 S0p BUX39 S0p BUX39 S0p	E5.0 54.0 55.0 59.4
TRANSFORMER-RS ENCAPSULATED N 0-120V-0-120V PELO-9V-20V SEC 0-120V-0-120V PELO-9V-20V SEC TRIPLER BG 2032-642-3002 TRIPLER BG 2032-642-3002 TRIPLER MSAL TUNING POTS - 8 WAY AMSTRAD DISPLAY PANEL FOR ALT 1992 MODELS TRONT PANEL FOR ALT 1992 MODELS TRANC CCK DISPLAY - 8,900 PULASTIC FROMT WITH FLAP - 8,900 PULASTIC FROMT WITH FLAP - 8,900 POWER SUPPLY-VS 1000-VS 1100 POWER SUPPLY SUBJELST 197 FOWER SUPPLY SUBJELST 197 POWER SUPPLY SUBJELST 197 POWER SUPPLY SUBJELST 197 FAN - 6in 240V TROS 20p ZOUBLE DECKER ETRI FAN - 6in 240V TROS 20p ZOUBLE DECKER ETRI SEC39738 1.00 ANS511 E1 SEC3979 1.00 SEC39738 1.00 SEC39738 1.00 SEC39738 1.00 SEC39738 1.00 SEC39738 1.00<	£1.00 \$7.00 \$7.00 \$7.00 \$27.00 \$2.00 \$20 \$2.00 <td>GRUNDIG GRUNDIG TRPLERS BG2032-642-3002 TRPLERS BG2032-642-3005 TRPLERS BG2032-642-3005 TRPLERS BG2032-642-3005 TRPLERS BG2032-642-3005 UNIVERSAL TKHLER – UFRIGHT PRINTED CIRCUITTYPE HTTACHI DECODER-TELETEXT PC332A5-ISSUE 4 IEAD AND BRUM - 620E MADUL ANDR NO 53781 OGCTLLOSCOPE 20MHZ DOUBLE BEAM - V212 PANEL-TELETEXT G8P-ISSUE 6 PANEL-TELETEXT PC315-11 - ISSUE 7 PANEL-TELETEXT PC315-11 - ISSUE 6 PANEL-TELETEXT PC315-11 - ISSUE 6 PANEL-TELETEXT VC315-11 - ISSUE 6 PANEL-TELETEXT VC315-11 - ISSUE 6 POWER SUPPLY VIDEO SWITCH MODE STR 4211 ISSUE 10 POWER SUPPLY VIDEO SWITCH MODE VTM312ELM L1.00 BUX84 60p BYX255000 POWER SUPPLY VIDEO SWITCH MODE VTM312ELM BY225800 BY UX3500 BUX84 500 BY225500 BY UX1050 MMP BY235 BY25500 BY UX1050 MMP BY235 BY25800 BY UX1050 SUE ED</td> <td>E5.0 54.0 55.0 59.4 59.5</td>	GRUNDIG GRUNDIG TRPLERS BG2032-642-3002 TRPLERS BG2032-642-3005 TRPLERS BG2032-642-3005 TRPLERS BG2032-642-3005 TRPLERS BG2032-642-3005 UNIVERSAL TKHLER – UFRIGHT PRINTED CIRCUITTYPE HTTACHI DECODER-TELETEXT PC332A5-ISSUE 4 IEAD AND BRUM - 620E MADUL ANDR NO 53781 OGCTLLOSCOPE 20MHZ DOUBLE BEAM - V212 PANEL-TELETEXT G8P-ISSUE 6 PANEL-TELETEXT PC315-11 - ISSUE 7 PANEL-TELETEXT PC315-11 - ISSUE 6 PANEL-TELETEXT PC315-11 - ISSUE 6 PANEL-TELETEXT VC315-11 - ISSUE 6 PANEL-TELETEXT VC315-11 - ISSUE 6 POWER SUPPLY VIDEO SWITCH MODE STR 4211 ISSUE 10 POWER SUPPLY VIDEO SWITCH MODE VTM312ELM L1.00 BUX84 60p BYX255000 POWER SUPPLY VIDEO SWITCH MODE VTM312ELM BY225800 BY UX3500 BUX84 500 BY225500 BY UX1050 MMP BY235 BY25500 BY UX1050 MMP BY235 BY25800 BY UX1050 SUE ED	E5.0 54.0 55.0 59.4 59.5
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	M708 LB1 E1.50 STR6602D £4.00 M37204ECSP £1.00 STR58041 £4.00 M58658P £1.00 TA8691N £3.00 MN850 £1.00 TA8691N £3.00	TDA3564 TDA3565	£2.00	TDA8138 £1.80 -		ES.00
	NTOB LBI FL30 STR6602D £4.00 M37204ECSP £1.00 TA8691N £3.00 MN850 £1.00 TA8691N £3.00 NN850 £1.00 TA8691N £3.00 SA3705 £1.00 TA8691N £3.01 SA3105 £3.00 TDA1050 £1.40 SAA3018 £1.00 TDA1550 £2.00	TDA3564 TDA3565 TDA3566 TDA3581	£2.00 £3.50 £3.00	TDA8138 £1.80 - TDA8190 £3.00 TDA8349 £3.09	WE HA	WE GE
	MT08 LBI CL30 STR660LZD F4400 M3220HCS2 F4.00 STR5641 64.00 MS320HCS2 F4.00 TAS69L1 63.00 MS3620F F1.00 TAS69L1 63.00 S1327C3 F1.00 TAS69L1 63.00 S1327C41 F1.00 TDA1054 64.00 SAA3018 F1.00 TDA1510 F1.70 SAA3510 F1.00 TDA1513 F1.00	TDA3564 TDA3565 TDA3566 TDA3581 TDA3590 TDA3591 TDA3591 TDA3592A	£2.00 £3.50 £3.00 £3.00 £3.00 £3.00	TDA8138 £1.89 - TDA8190 £3.00 TDA8349 £3.09 TDA8417-3 £3.00 TDA8703 £3.00 TDA9403 £1.50	WE HAALAR STOCK VIDE	WE GE COF
	MT03 BEI1 STR 65041 64.00 MT320HES2 BL00 STR 55041 64.00 MS320HES2 BL00 TDA 1505 61.40 SAA3018 E1.00 TDA 1510 61.70 SAA5310 E2.00 TDA 1543 E1.00 CH2FT E2.00 TDA 1543 61.00 CH2FT E2.00 TDA 1543 61.00	TDA3564 TDA3565 TDA3566 TDA3581 TDA3590 TDA3590 TDA3591 TDA3592A TDA3592A TDA3650 TDA3651	£2.00 £3.50 £3.00 £3.00 £3.00 £3.00 £7.00 £3.00	TDA8138 £1.80 TDA8190 £3.00 TDA8349 £3.00 TDA8349 £3.00 TDA8417-3 £3.00 TDA9003 £1.30 TDA9003 £1.00 TDB2033 £1.00 TDD16105 50p	WE HALAR A LAR STOCK VIDE PANE	GE GE COF LS
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