

# FERGUSON

COLOUR TV

## ICC5

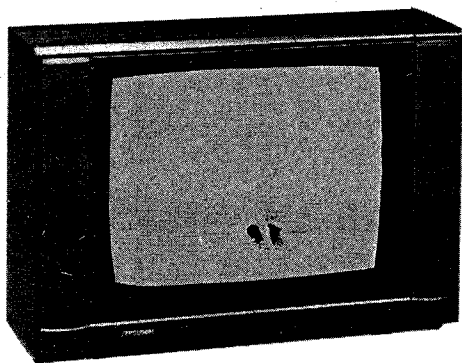
For Service Manuals Contact  
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## Service Manual

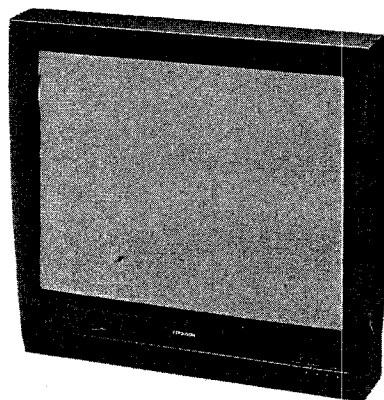
Part One – Volume One

MODELS 51K4-51K5-51K7-51L3-51L7-59K4-59K5-59K7-59L7-66M3-68K4

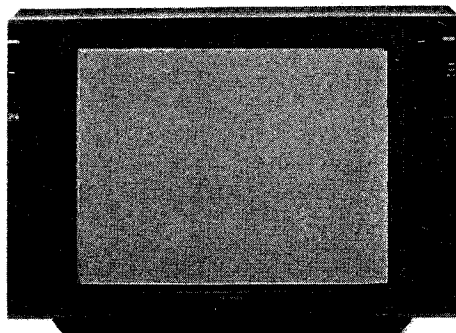
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Typical Interiors FST  
Style Receiver Model 51L3



Typical Monitor Style  
Receiver Model 59K7



Typical Planar Range  
Receiver Model 68K4

# GENERAL INFORMATION AND CIRCUIT DESCRIPTION

# INTRODUCTION

## *The International Colour Chassis – ICC5 Features:*

Core chassis with plug-in modules to cater for a wide range of models with various facilities, such as NICAM stereo, Fastext, On-Screen Graphics and Child Lock facilities

Suitable for a range of picture tubes, 51cm to 68cm, including FST, AX and Medium/Super Planar types

Integral remote control processor. Remote control also operates most Ferguson video recorders

Integral frequency synthesis tuner

Isolated switched mode power supply with separate standby supply

Integral Peritelevision socket

Plug-in Fastext and On-Screen Graphics PCB

Auto black-and-white level control – picture tube continuously monitored for good colour balance

Auto switch-off to standby in the absence of a signal or remote control command

## CHASSIS IDENTIFICATION NUMBERS

### For the models included in this manual

A chassis identification number is printed on a white label attached to the chassis assembly frame moulding.	51K4 – 02M5 001 004 51K5 – 02M5 001 002 51K7 – 02M5 001 003 51L3 – 02M5 001 020 51L7 – 02M5 001 024
The model numbers with their chassis identification numbers are as listed:	59K4 – 02M5 001 006 59K5 – 02M5 001 005 59K7 – 02M5 001 007 59L7 – 02M5 001 007  66M3 – 02M5 001 021  68K4 – 02M5 001 005

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*This manual contains general chassis information only – see separate folder of circuit diagram sheets for detailed model information. Part numbers are listed in a separate parts lists book.*

# GENERAL INFORMATION

## SPECIFICATION

The figures quoted are typical and may vary due to component tolerances etc.

### POWER SUPPLY

240V a.c. 50-60Hz (nominal). The chassis is mains isolated apart from the power supply section, and is stabilized across mains voltage range 185 – 264V. No mains input adjustment is required.

### POWER CONSUMPTION

240V a.c. input.

Maximum figures are for maximum beam current and sound. Minimum are for zero beam current and no sound. The power consumption on standby is 5W (all models).

51K4 -140W (maximum)  
60W (minimum)

51K5 -160W (maximum)  
70W (minimum)

51K7 -100W (maximum)  
70W (minimum)

51L3 -90W (maximum)  
60W (minimum)

51L7 -100W (maximum)  
70W (minimum)

59K4 - 140W (maximum)  
60W (minimum)

59K5 -160W (maximum)  
70W (minimum)

59K7 -100W (maximum)  
70W (minimum)

59L7 -100W (maximum)  
70W (minimum)

66M3 -100W (maximum)  
70W (minimum)

68K4 -170W (maximum)  
70W (minimum)

### FREQUENCY COVERAGE

UHF Channels 21 – 70  
471.25MHz - 863.25MHz.

### TUNER

Frequency synthesis with prescaler output, 40 pre-programmable positions. AV on 8, 9 and 10, AUX (peritel) on 0.

### SENSITIVITY

Better than 20 $\mu$ V (p.d.) into 75 ohms for a locked picture.

For NICAM stereo reception the sensitivity is 50 $\mu$ V.

### MAXIMUM SIGNAL INPUT

Aerial input (for 1% cross-modulation):  
100dB $\mu$ V (100mV).

### INTERMEDIATE FREQUENCIES

31.5MHz (8.0MHz)  
Adjacent channel (N +1 vision)

32.948MHz (6.552MHz)  
Nicom sound carrier

33.5MHz (6.0MHz) – Sound carrier

35.07MHz (4.43MHz)  
Chroma sub-carrier

39.5MHz – Vision carrier

41.5MHz (-2.MHz)  
Adjacent channel (N -1 sound)

### PICTURE TUBES

90° Medium Planar:  
51K4 – 51L3 – 51L7

110° Super Planar:  
59K5 – 59K7 – 59L7 – 68K4

110° FST:  
51K5 – 51K7 – 59K4 – 66M3

### EHT

51cm tubes – zero beam current:25kV  
Maximum beam current: 24kV

59cm tubes – zero beam current:27kV  
Maximum beam current: 26kV

66cm tubes – zero beam current:27kV  
Maximum beam current: 26kV

68cm tubes – zero beam current:27kV  
Maximum beam current:25.5kV

### BEAM CURRENT LIMITING

1mA  $\pm$ 15%.

### AUDIO OUTPUT

#### Mono sound models:

Power output: 5W rms into 8 ohms at less than 10% THD ).

### NICAM STEREO MODELS

Power output: 10W +10W rms into 8 ohms at less than 10% THD.

Signal-to-noise ratio:  
70dB (NICAM sound)  
50dB (FM sound)

Audio frequency response:  
NICAM, 35 – 12,500Hz (-3dB)  
FM, 25 – 10,000Hz (-3dB)

Aerial input sensitivity:  
NICAM, 50 $\mu$ V. FM, 10 $\mu$ V

Phono socket output:  
40mV (200 ohms)

Bass control range:  
-11dB, +9dB at 40Hz

Treble control range:  
-10dB, +11.5dB at 12.5kHz

Balance control range: -20dB

### REMOTE CONTROL

Full infra-red remote control with range of facilities varying with individual models. Remote control decoding is carried out in the main chassis Control Microprocessor.

Ferguson Limited reserves the right to vary specifications or use alternative materials as may be deemed necessary or desirable at any time.

# INSTALLATION NOTES

For full installation instructions refer to the user Operating Instructions and Circuit Diagram Sheets.

## POWER SUPPLY

Mains input 240V a.c. 50 – 60Hz. The receiver will operate from a supply of 185 – 264V, no adjustments being required.

## DEGAUSSING

A dual PTC thermistor unit running from the mains supply operates whenever the receiver is switched on from cold.

## CHILD PROOF LOCK

When this is activated, the receiver will be on standby and when any attempt is made to take the receiver out of standby the words 'CHILD LOCK' will appear on screen and full operation will normally only be obtained after keying-in a previously entered PIN.

If the PIN is not known, it is possible to bypass the lock as follows:

Press the remote control coloured buttons in the sequence – red – green – blue and then hold down the yellow button for at least 4-seconds.

## PERITELEVISION SOCKET

The Peritelevision socket is selected by programme number 0 (AUX) button; 'AUX' is displayed on the screen and 'AU' on the front panel LED display.

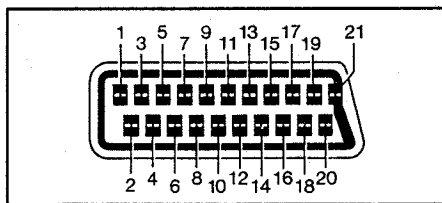
If the equipment connected to the socket provides a switching voltage on contact 8 (+9.5V to +12V), this will automatically select the AV mode from TV or standby. With the AV mode thus selected, the receiver will not automatically switch to standby after five minutes in the absence of a video signal or a remote control command.

This allows audio equipment such as a CD player to be connected. The switching voltage operation is ignored when selection is made by pressing the 0 (AUX) button.

Composite video is the normal input signal mode but if a switching voltage of +1V to 3V appears on contact 16, the receiver will accept RGB input signals.

Alternatively, if the external equipment does not provide for a switching voltage on contact 16, pressing the TEXT button will switch to RGB input\*. The front panel LED display will show 'A---'. RGB output is not available. To return to composite video input – in the absence of a switching voltage on contact 16 – the TV button can be pressed on the remote control.

## Connection Details



1. Audio out B: mono or stereo RH channel.
2. Audio in B: mono or stereo RH channel.
3. Audio out A: mono or stereo RH channel.
4. Audio common return.
5. Blue return.
6. Audio in A: mono or stereo LH channel.

7. Blue in (RGB)
8. Function switching: +9.5V to +12V (external input mode).
9. Green return.
10. No connection permitted.
11. Green in (RGB).
12. No connection permitted.
13. Red return.
14. No connection permitted.
15. Red in (RGB)\*.
16. Fast blanking input: +1V to +3V for fast blanking switching (75 ohm).
17. Video return.
18. Blanking return.
19. Composite video out.
20. Composite video in\*.
21. Common return.

## Input/Output Signal Levels

Composite video in and out: 1Vp-p  $\pm 3$ dB positive going (75ohm)

Composite sync: 0.3V p-p -3dB +10dB negative going (75 ohm).

RGB in: 0.7V p-p  $\pm 3$ dB positive going (75 ohm).

Audio in and out: 0.5V rms  
Input impedance >10k ohm.  
Output impedance <1k ohm.

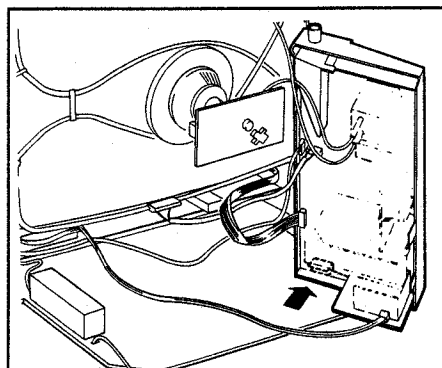
\* In later production, provision is made for accepting the separate luminance and chrominance signals from Super VHS video recorders such as the Ferguson FV39S. The chroma signal is on contact 15 and luma on 20. This mode is selected by pressing the TEXT button as described above for RGB selection on earlier models. RGB selection is then by contact 16 switching only.

# ACCESS FOR SERVICE

Disconnect the receiver from the mains supply by removing the mains plug from the supply socket. It is advisable to check both poles of the mains switch for correct operation

Different methods are employed for cabinet back fixings in the various models – see the appropriate model Circuit Diagram sheet for details.

The lead lengths are sufficient to allow the main chassis to be turned and fitted into the vertical servicing position, on either the LH or RH side of the receiver, but care is necessary to avoid fouling the video/chroma board against the CRT base board.



The chassis clipped into its vertical servicing position (on left-hand side for some models).

## IMPORTANT

Although the chassis is isolated, an area of the main PCB carries live mains. A mains filter cage is provided.

## FUSE

A mains input fuse is located inside the mains input filter cage. Cartridge type 20mm T1.6A, circuit reference FP05.

## NOTE

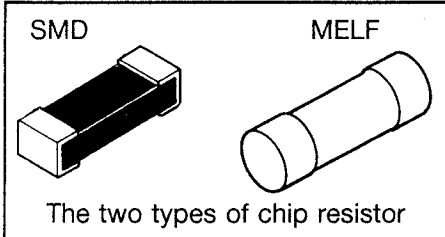
Do not disturb the tube neck adjustments as these have been set for optimum performance during tube manufacture.

# SERVICE NOTES

## SURFACE MOUNTED DEVICES

Surface mounted devices (SMDs) are used in the ICC5 chassis, particularly Metal Ended Leadless Frame resistors and capacitors (MELFs).

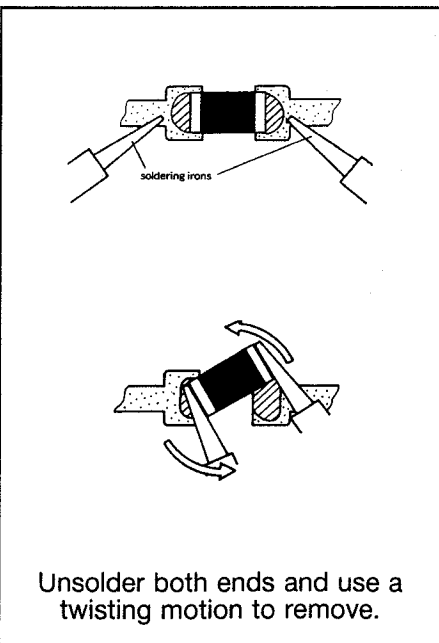
Particular care is needed when replacing one of these 'chip' components, both in the unsoldering as well as when soldering in a replacement.



Specialised equipment is available for removal and replacement of faulty components but, when not available, replacement can be carried out with tweezers and a soldering iron.

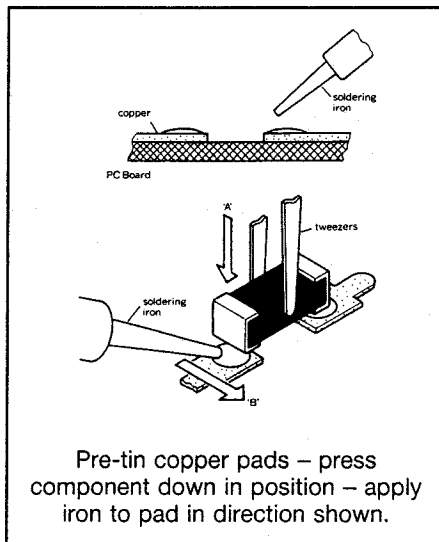
### Points to note

1. Avoid lifting the copper print – the heat applied must be kept to a minimum.
2. Use temperature controlled irons with the smallest possible bit size (commensurate with the size of the component). The bit temperature should be within 2500C to 3300C. Weller types EC300 or TCP3 are suitable.
3. Use either soldering tweezers or two irons to melt the solder at both ends of a component and use a twisting motion to remove. Break the glue bond to the laminate if necessary. There is no need to reglue the replacement.



4. Allow the board to cool and clean the area with alcohol to remove surplus flux.
5. Re-tin pad areas using a minimum of solder – 26 SWG is recommended.
6. Pick up the new component by the body with tweezers, carefully place in position, press down and apply the soldering iron tip to the pad – not to the component. Capacitors and resistors should be pre-heated before soldering to prevent them being left under permanent stress.

The solder should flow freely, wetting the termination surface. Avoid using too much solder as it could conceal a dry joint.



## IC WARNING

All ICs are vulnerable to static damage unless properly mounted in printed circuit boards or in approved packing. They must be handled with care and not loosened, removed or inserted from a live circuit.

Touch an earthed object before handling any IC or PCB and use an earthed soldering iron. Replacements supplied by FERGUSON Limited are especially packed in conductive material which may be plastic. Keep ICs in transit packing until used and when returning suspect devices under guarantee, always protect them in the original packing. **Do not use non-conductive plastic such as polystyrene, even for temporary storage of integrated circuits.**

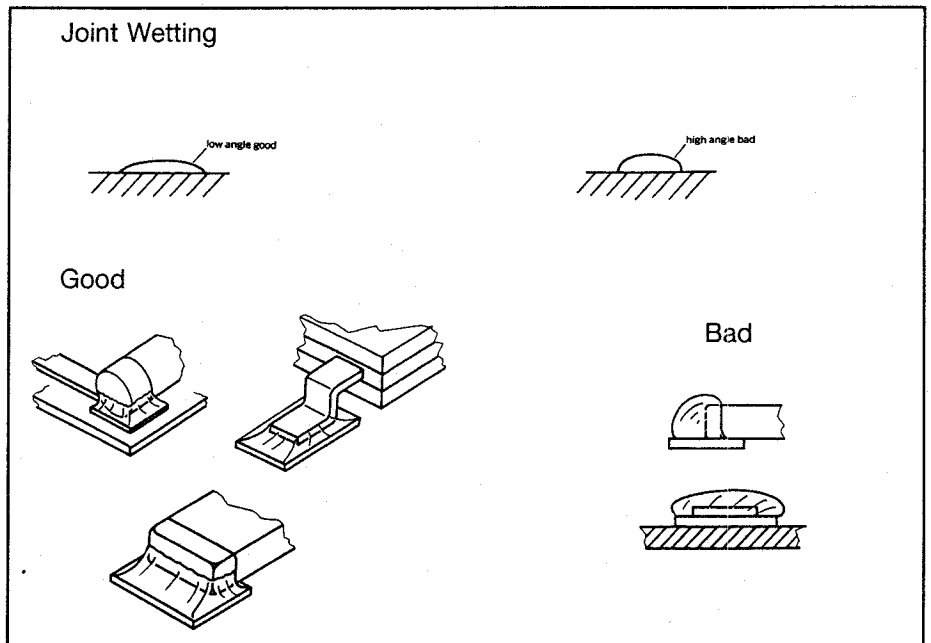
## EHT SHOCK HAZARD

The EHT must be safely discharged before attempting to disconnect the EHT lead from the tube anode.

Clip one end of a convenient lead, such as a meter lead, to the tube earthing strap on the tube body, fold back the suction cap and discharge the EHT through the lead. Press in one side of the spring clip which projects into the tube cavity to ease removal of the EHT connector.

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## Good soldering is important



# SERVICING ADJUSTMENTS

The following preset adjustments are not usually required during installation and should be made only if necessary after servicing.

## SET V2 HT (PL15)

Located on main chassis

### Conditions

Programme 1 selected with locked picture but blank screen, i.e. contrast and brightness turned to minimum.

Sound volume turned to minimum.

### Test Point

Measure V2 voltage at DP41 cathode.

### Adjustment

Adjust PL15 for correct V2 volts:

51K4 and 51L3.....	115V
51K5, 51K7, 59K4 and 66M3 .....	158V
51L7, 59K5, 59K7, 59L7 and 68K4.....	145V

## SET A1 VOLTS (PV90A)

Located on tube base PCB.

### Conditions

Normal reception conditions but with contrast and brightness set to minimum to give a black screen.

### Test Point

CRT pin 6, green cathode.

### Adjustment

Adjust PV90A for correct A1 volts:

51K4, 51L3, 51L7, 59K5, 59K7, 59L7, and 68K4 Medium /Super Planar tubes.....	150V
51K5, 51K7, 59K4 and 66M3 AX series 110° FST .....	130V

## FOCUS (PV90B)

Located on tube base PCB.

Adjust for overall picture sharpness.

## PICTURE WHITE (PV50 and PV70)

Located on tube base PCB.

### Conditions

Display greyscale wedge or test card.

### Adjustment

Adjust PV50 (red) and PV70 (blue) for clean peak white, free from colouration.

NOTE: The A1 and Picture White adjustments are repeated in the full alignment sequence.

## PICTURE GEOMETRY

The picture geometry adjustments (with the exception of the North-South Pincushion) are located in a line at the rear of the chassis and can be accessed through holes in the cabinet back.

### Height (PF14) and Width (PG12)

Adjust for full vertical and horizontal scan consistent with correct proportions.

### Picture Shift

#### Horizontal (PL01)

#### Vertical (PF02)

Adjust as required to centre picture. It may be necessary to readjust the vertical after making the horizontal adjustment.

### East-West Pincushion (PG08)

Adjust to remove bowing at left- and right-hand edges of the picture.

### East-West Trapezium (PG02)

Adjust to give equal width at top and bottom of picture.

### North-South Pincushion (PG53, PG58 and LG42)

59K5, 59K7, 59L7, 68K4 only.

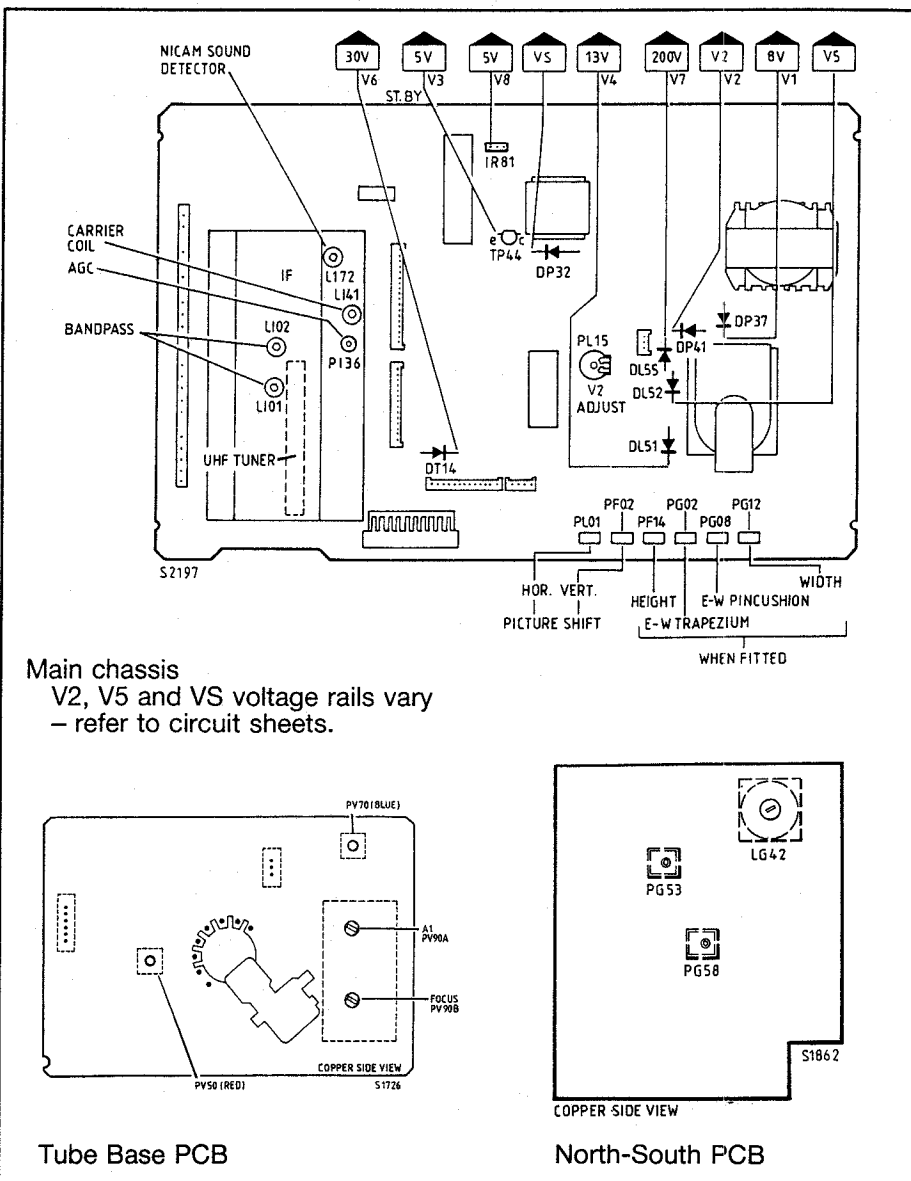
The following adjustments are located on the North-South module.

With a cross-hatch pattern displayed, turn PG53 fully clockwise (as viewed from the copper side of the board).

Adjust LG42 to centralise the curvature of the top and bottom horizontal lines.

Adjust PG58 so that the centre horizontal line is straight.

Adjust PG53 so that the top and bottom horizontal lines are straight.

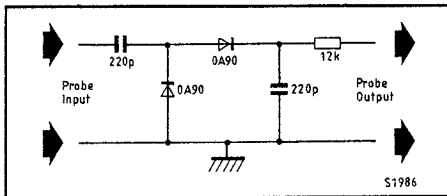


# ALIGNMENT

Full alignment sequence excluding picture and geometry adjustments. See the end of this section for alignment of NICAM and On-Screen Graphics modules.

## EQUIPMENT REQUIRED

1. IF wobbulator with markers at 33.7MHz and 37.6MHz.
2. Oscilloscope capable of displaying 100mV at 6MHz and also of functioning in the XY mode, i.e. dual input.
3. Non-metallic trimming tools including an 8BA (4mm) non-metallic box spanner.
4. Multirange meter (20k ohm/V) such as the Avometer model 8.
5. Signal generator covering 5MHz to 40MHz and capable of FM to 100kHz deviation with a modulating frequency of 1kHz.
6. One 8 ohm 2W resistor (not needed for models with NICAM sound).
7. UHF pattern generator providing the usual colour bar sequence and an all-black and all-white raster plus sound.
8. Separate power supply providing 12V at 300mA, 4.25V at 10mA and 2V at 10mA.
9. Detector probe such as the one shown.



NOTE: Additional equipment is needed to align the NICAM and OSG modules. See page 9.

## BANDPASS LI01-LI02

1. Connect the wobbulator output lead via a series 3.9k ohm resistor and 1nF capacitor between the junction of CI01/CI02 and earth.
2. Connect the input of the detector probe across RI32 and its output to the oscilloscope (should the wobbulator not be provided with its own detector probe).

3. Set the wobbulator centre frequency to 36.5MHz with markers at 37.6MHz and 33.7MHz. Connect the 12V supply between BS15/15 and earth.
4. Switch on the 12V supply and adjust the Y gain of the display for full scale deflection.
5. Adjust LI01 for minimum at 37.6MHz and LI02 for maximum at 33.7MHz – this order must be followed.
6. Switch off the 12V supply and disconnect the detector probe and wobbulator input.

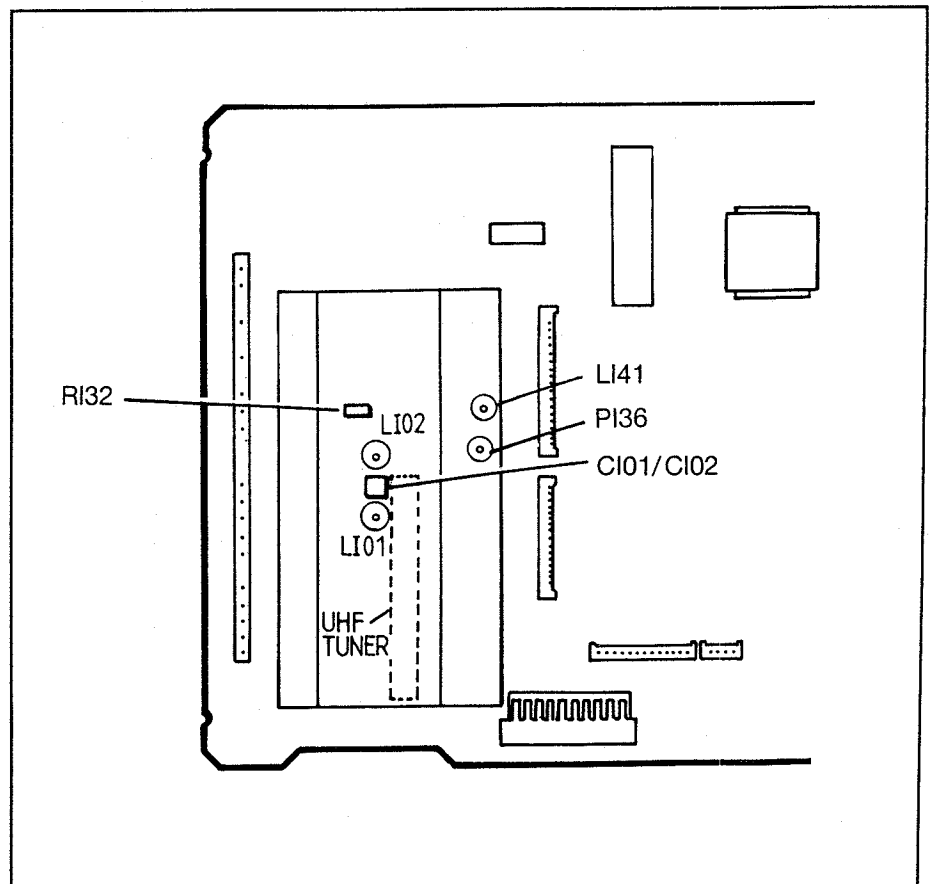
## CARRIER COIL LI41

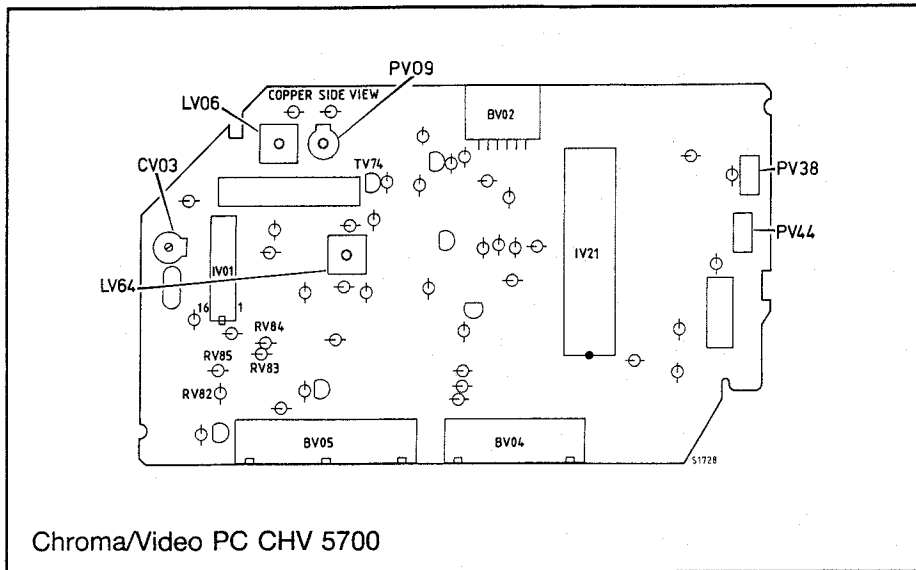
7. Connect the generator, set to 39.5MHz, in place of the wobbulator and connect the meter between I136/11 and earth.  
NOTE: The generator output not to be less than 100mV p.d. across 75 ohms. Connect the 2V supply between I136/4 and earth. Set meter to 0-10V range.
8. Switch on the 12V and 2V supplies.

9. Adjust LI41 for minimum meter reading.
10. Switch off the supplies and disconnect generator and the meter.

## AGC

11. Connect the pattern generator to the aerial input socket and adjust the generator output for 1.5mV p.d. across 75 ohms. Set the generator to channel 27 (vision carrier 519.25MHz) with the colour bar sequence.
12. Turn PI36 fully clockwise.
13. Switch receiver on and set the tuner to channel 27
14. Mute volume and adjust brightness, contrast and colour for normal viewing (normalise condition).
15. Adjust PI36 until noise appears and then finally adjust for the condition where noise just disappears.
16. Switch the receiver off.





## CHROMINANCE

### Chroma/Video PC CHV 5700

17. Short circuit pins 5 and 6 of IV01.
  18. Apply 4.25V to pin 2 of IV01.
  19. Switch the receiver on and adjust CV03 for the slowest scrolling of the colour signal.
  20. Switch off, remove the short and the applied voltage.
  21. Connect one input of the oscilloscope between the junction of RV82/83 and earth. Connect the other input between the junction of RV84/85 and earth. Switch the oscilloscope to the XY mode.
  22. Switch the receiver on and adjust the respective Y gains of the oscilloscope to obtain a full scale vector style display.
  23. Adjust PV09 for minimum amplitude of the centre dot, and LV06 to obtain single dots for the 6 colours of the colour bar.
  24. Repeat sequence 23 once more.
- If suitable test equipment is not to hand, PV09 and LV06 can be adjusted for minimum 'Venetian Blind' effect while observing an off air test card (normalised colour condition). Check for satisfactory results by advancing the colour control.*
25. Switch the receiver off and disconnect the oscilloscope.

## LUMINANCE

### Chroma/Video PC CHV 5700

26. Connect one input of the oscilloscope between the emitter of TV74 and earth.
27. Switch the receiver on and set the pattern generator for an all-black raster and with the sound signal on.
28. Adjust LV64 for a minimum of the 6MHz signal.
29. Switch the receiver off and disconnect the oscilloscope.

## A1, BEAM LIMITING AND GREY-SCALE

### Tube Base PCB

30. Connect the meter, 600V range, between pin 6 of the CRT and earth.
31. Switch the receiver on and make sure that the pattern generator is still providing an all-black raster on channel 27 and with the sound signal off.
32. Turn PV38 and PV44 fully anti-clockwise.
33. Adjust the A1 control (PV90A) for a reading of 130V if a Mullard 110° FST tube is fitted, or 150V if the tube is a Videocolour 90° Medium Planar or 110° Super Planar type.
34. Disconnect the meter and connect it between BS02/1 and earth (0V-3V range). Set the pattern generator to provide the colour bar sequence and normalise the TV receiver analogues.
35. Note the reading on the meter and adjust PV38 for a 0.5V increase on this reading.

36. Set the pattern generator to provide an all-white raster and adjust contrast to maximum.
37. Note the reading on the meter and adjust PV44 for a 0.7V decrease on this reading.
38. Disconnect the meter and adjust PV50 and PV70 on the tube base PCB for the desired white. Alternatively, reset the pattern generator for the colour bar sequence, adjust contrast and brightness for a normal picture and set colour to minimum. Adjust PV50 and PV70 for optimum grey-scale.

NOTE: To adjust the A1 control if the pattern generator will not give an all-black or all-white signal, set the contrast, brightness and colour to minimum for step 33. For step 37 (PV44 adjustment), contrast, brightness and colour must be set to maximum.

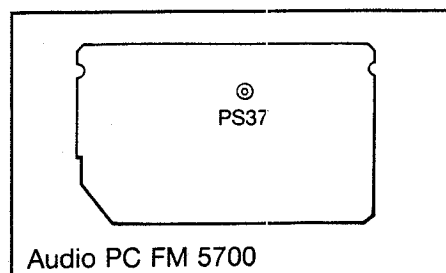
39. Switch off and disconnect the pattern generator.

## AUDIO VOLUME RANGE PRESET

### Audio PC FM 5700

*Models with monophonic sound only.*

40. Connect the generator, set to 6MHz, 15kHz deviation at 1kHz modulation, across BS15/14 and earth.
41. Connect the 8 ohm 2W resistor in place of the loudspeakers and the oscilloscope across the resistor.
42. Switch on and transmit the Normalise command.
43. Adjust PS37 for:
  - a) 1V p-p across the 8 ohms at 15kHz deviation.
  - or
  - b) 3V p-p across the 8 ohms at 50kHz deviation.
44. Switch off and disconnect the 8 ohm resistor and the oscilloscope.





# NICAM AND ON-SCREEN GRAPHICS ALIGNMENT

The following factory preset adjustments are carried out during manufacture and should not be readjusted in the field unless components affecting the settings are changed. It is recommended that only qualified engineers having the correct servicing equipment should attempt any of the NICAM adjustments as the performance of the decoder may be impaired.

## EQUIPMENT REQUIRED

1. A 7-digit, or more, frequency counter capable of resolving greater than 20MHz. The counter must be fitted with a 10:1 probe.
2. TV pattern generator providing, at least, a 1kHz tone at  $\pm 20$ kHz deviation.
3. General purpose oscilloscope.
4. Non-metallic trimming tools.

## MAIN CHASSIS

### Sound Detector (LI72)

1. Connect the oscilloscope to PL/ SK BS15 pin 14.
2. Connect the pattern generator, set to any convenient channel.
3. Adjust LI72 for minimum video signal on oscilloscope display.

## NICAM BOARD PC1253

### 5.824MHz Clock (CY16)

1. Connect the frequency counter to IS01 pin 26.
2. Without any aerial signal, adjust CY16 for 5.824MHz (range: 5.82390MHz – 5.82440MHz).

### 6.552MHz Clock (CY17)

3. Connect the frequency counter to IS01 pin 7.
4. Without any aerial signal, adjust CY17 for 6.5518MHz (range: 6.551799MHz – 6.55190MHz).

*Connect the pattern generator set to any convenient channel for the following operations.*

### 17.73MHz Clock (CW09)

5. Connect the frequency counter to IS04 pin 13.
6. Adjust CW09 for 17.73MHz (range: 17.729MHz – 17.731MHz).

### 6MHz Detector (LS05)

7. Connect oscilloscope to IS07 pin 8.
8. Adjust LS05 for maximum recovered sound.

## FASTTEXT AND ON-SCREEN GRAPHICS BOARD PC1251

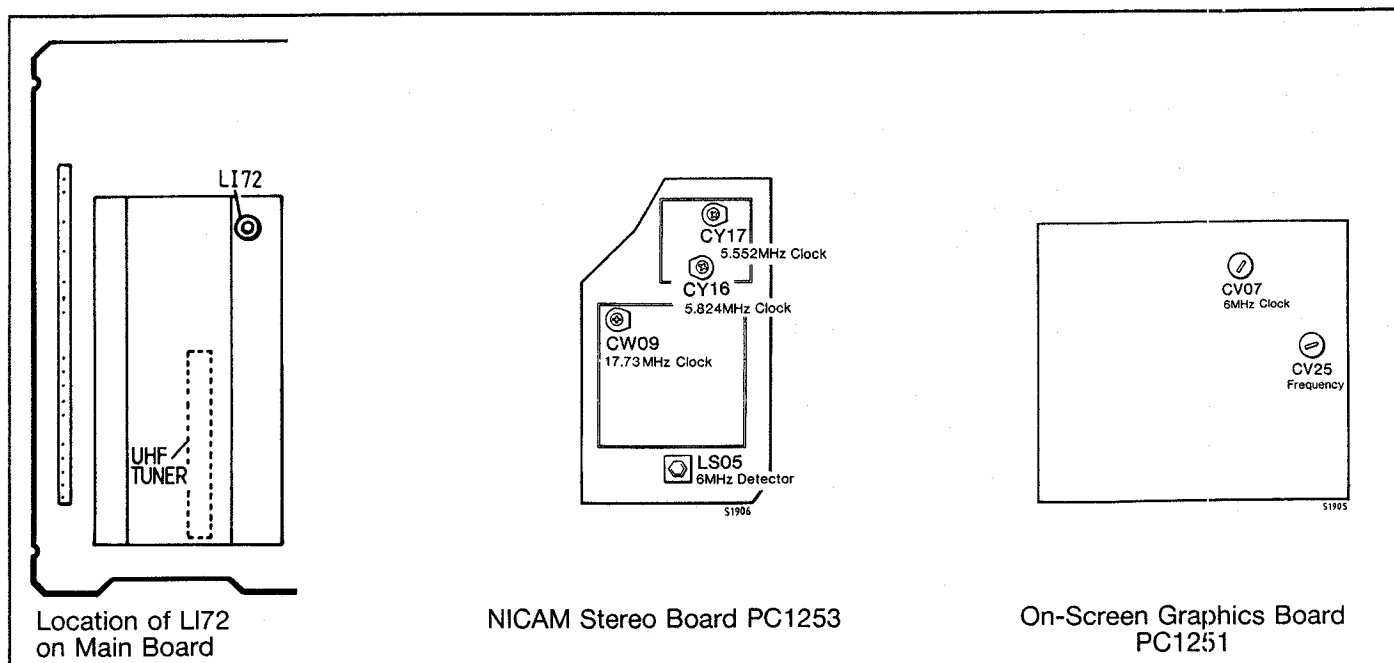
### 6MHz Clock (CV07)

1. Connect the frequency counter to IV03 pin 17.
2. Adjust CV07 for 6.0002MHz  $\pm 200$ Hz.

### On-Screen Display Oscillator Frequency (CV25)

3. Connect the frequency counter to IV05 pin 5.
4. Obtain an on-screen display as per the instruction book.
5. Adjust CV25 for 5.7MHz  $\pm 100$ kHz in order to centre the On-Screen Graphics display.

For Service Manuals Contact  
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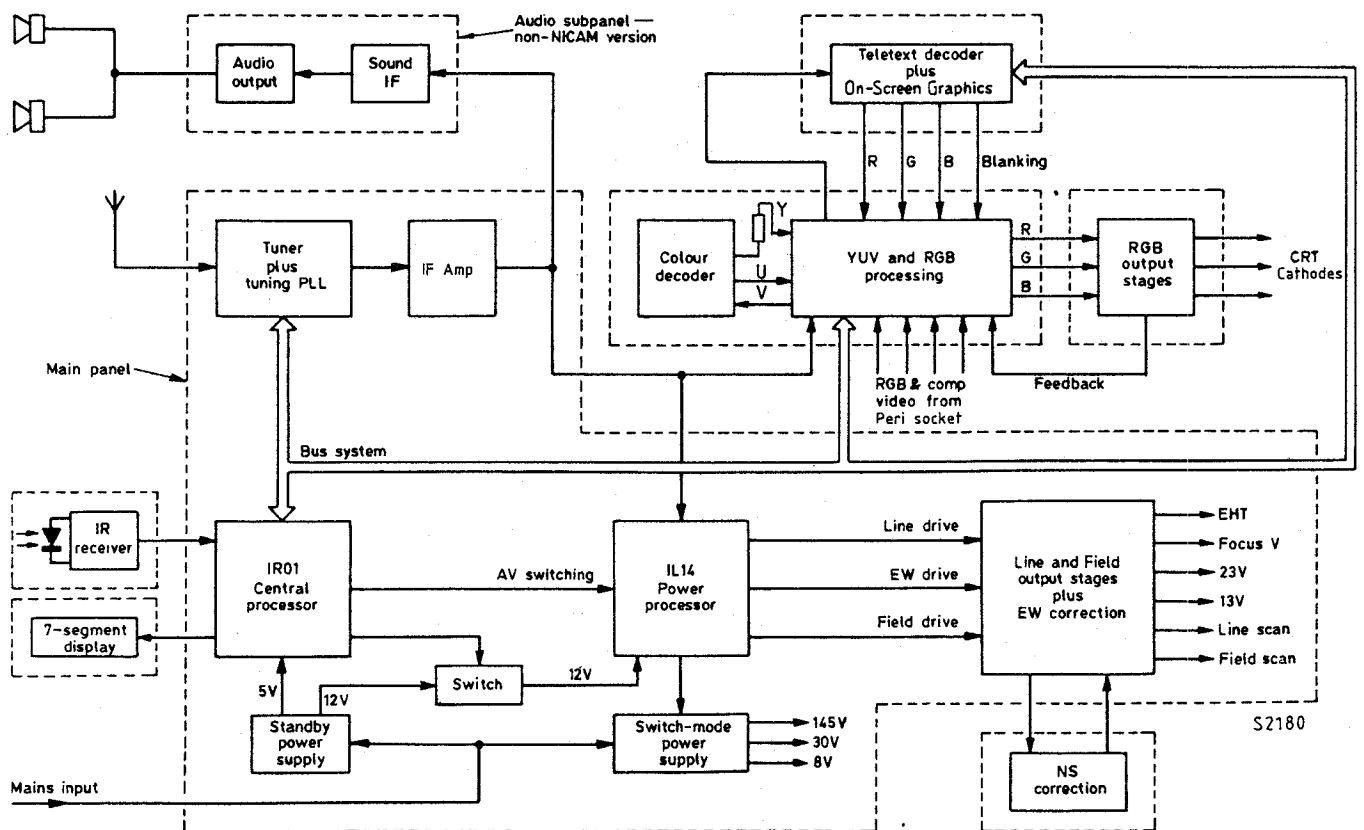
Location of LI72 on Main Board

NICAM Stereo Board PC1253

On-Screen Graphics Board PC1251

# CIRCUIT DESCRIPTION

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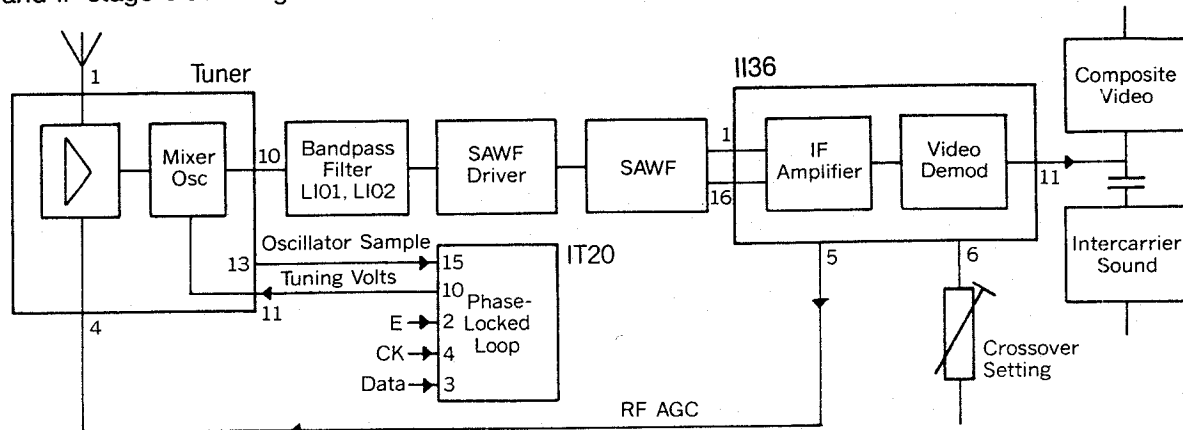


**Simplified block diagram of the ICC5 chassis – mono sound version**

NOTE: References in the circuit description to the '158V supply' refer to the nominal voltage of the V2 supply which varies between different models – refer to individual Circuit Diagrams sheets.

# TUNER, IF AND MONO AUDIO AMPLIFIER

Tuner and IF stage block diagram – for information on NICAM stereo versions, see page 23.



The complete tuner and IF amplifier are contained within a multi-section screening can on the main chassis. This ensures a high standard of immunity to external signals. There is space for both VHF and UHF tuner modules but in most UK models only the UHF module will be fitted. For service work the cans must be removed and replaced after servicing.

## UHF TUNER

All the UHF tuning and gain circuits are carried on a small PC module soldered into the main PCB. Most of the decoupling components are carried on the main PCB using MELF types to obtain a compact design with low inductance.

The circuit of the tuner is conventional, using a MOSFET RF stage and a bipolar mixer oscillator with tuned aerial, bandpass and oscillator, using 4 varicap diodes.

AGC is applied to Gate 2 of the RF stage and the IF is taken from the mixer to IF coupling coils on the main chassis.

The tuning volts are supplied from a Phase-Locked Loop control IC (IT20) which requires an oscillator sample signal from the tuner.

As the tuning is PLL controlled an AFC circuit is not required.

In the event of a fault in the tuner unit the module should be replaced as service requires special equipment. The module is pre-aligned and can be replaced with no realignment required.

## VISION IF AMPLIFIER

The IF signal from the tuner via the bandpass IF coils LI01, LI02 feeds an emitter follower TI27 and an amplifier transistor TI33 which is the Surface Acoustic Wave Filter Driver. The SAW Filter FI29 provides the IF selectivity without the need for alignment.

The IF is of the intercarrier sound type and the filter shape is correct for this. The balanced output from the filter is fed into a TDA2451 IC (I136) which performs the functions of an AGC controlled amplifier, synchronous detector and AGC amplifier.

The amplifier has some 60dB of gain control and the detector is tuned to 39.5MHz by coil LI41 on pins 8 and 9 of the IC.

Tuner AGC is supplied from pin 5, the take over point being adjusted by the variable resistor PI36 on pin 6 to give the best noise and cross-modulation performance.

The vision and intercarrier sound signals from pin 11 are filtered and feed the Video and Sound circuits, via plugs and sockets BV05/22 and BS15/14 respectively.

## FREQUENCY SYNTHESISER PLL

This circuit uses a single-chip PLL with integrated pre-divider and four bandswitching outputs.

A microcomputer provides the divider and band data information for the tuning process via a three-line BUS; data, clock and enable. Data, an 18-bit word, is entered whenever the enable line is high and occurs whenever there is a channel selection.

The four MSBs contain the band information and the remaining 14-bits signal the programmable dividers which further divide the fixed pre-divided tuner oscillator frequency at pin 15. The output is always 7812.5Hz, channel ON-TUNE, and is similar to that of a 4MHz oscillator divided by 512. These two signals are fed to a phase/frequency comparator and its output controls TT12 which functions as a variable load resistor for the 30V tuning voltage produced by DT14. A tuning voltage of 0.5V to 30V is available for the tuner.

A change in oscillator frequency due to drift, fine tuning or channel change, is signalled to the programmable divider, resulting in automatic adjustment of the tuning voltage until the 7812.5Hz output signal frequency is again present.

The smallest tuning step is 62.5kHz, thus providing 128 fine tuning steps for the 8MHz channel width in the UHF band.

## SOUND IF AMPLIFIER

The sound circuit is conventional, using a TBA120T IC (IS02) which includes a four-stage limiter amplifier, FM demodulator, d.c. volume control, AF switching for the Peritel input and an AF preamplifier.

The input is shaped by a 6MHz ceramic filter whilst the demodulator uses a fixed-tuned 6MHz ceramic resonator.

## AUDIO OUTPUT

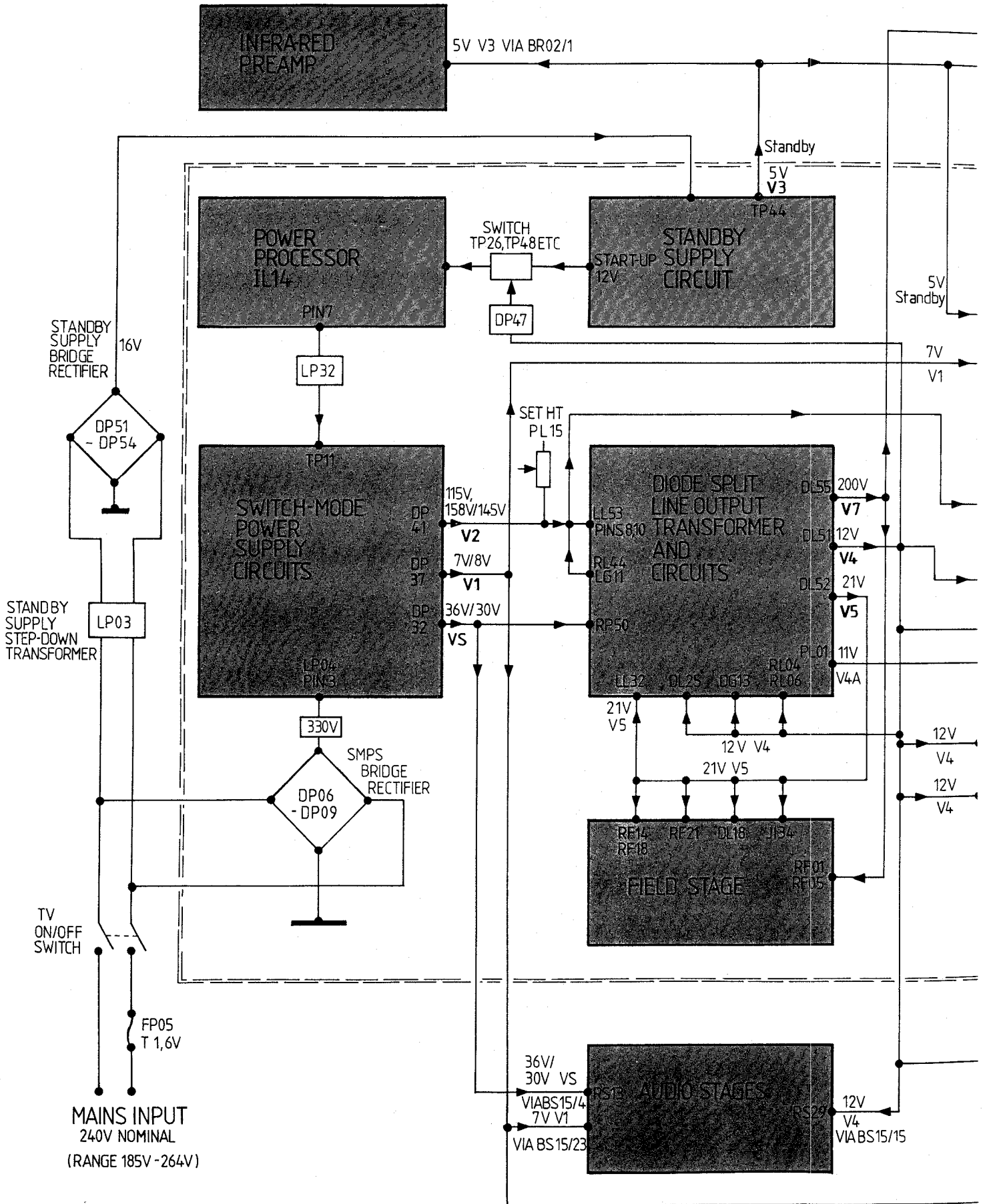
The volume control has a range of greater than 65dB and is controlled from the main receiver microcomputer. The preset PS37 is adjusted for minimum volume, while mute is obtained by reducing the control voltage to zero. There is an extra mute circuit which operates when the line oscillator is not locked to an incoming signal. This operates on both the IF and output circuits and is performed by switching off transistor TS21, causing the collector voltage to rise and thereby switching off both the IF and audio output ICs.

The output stage is a TDA2030A IC (IS11) on a heat sink and, using an 8 ohm loudspeaker combination, 6W of music power is available. The IC has full short-circuit protection.

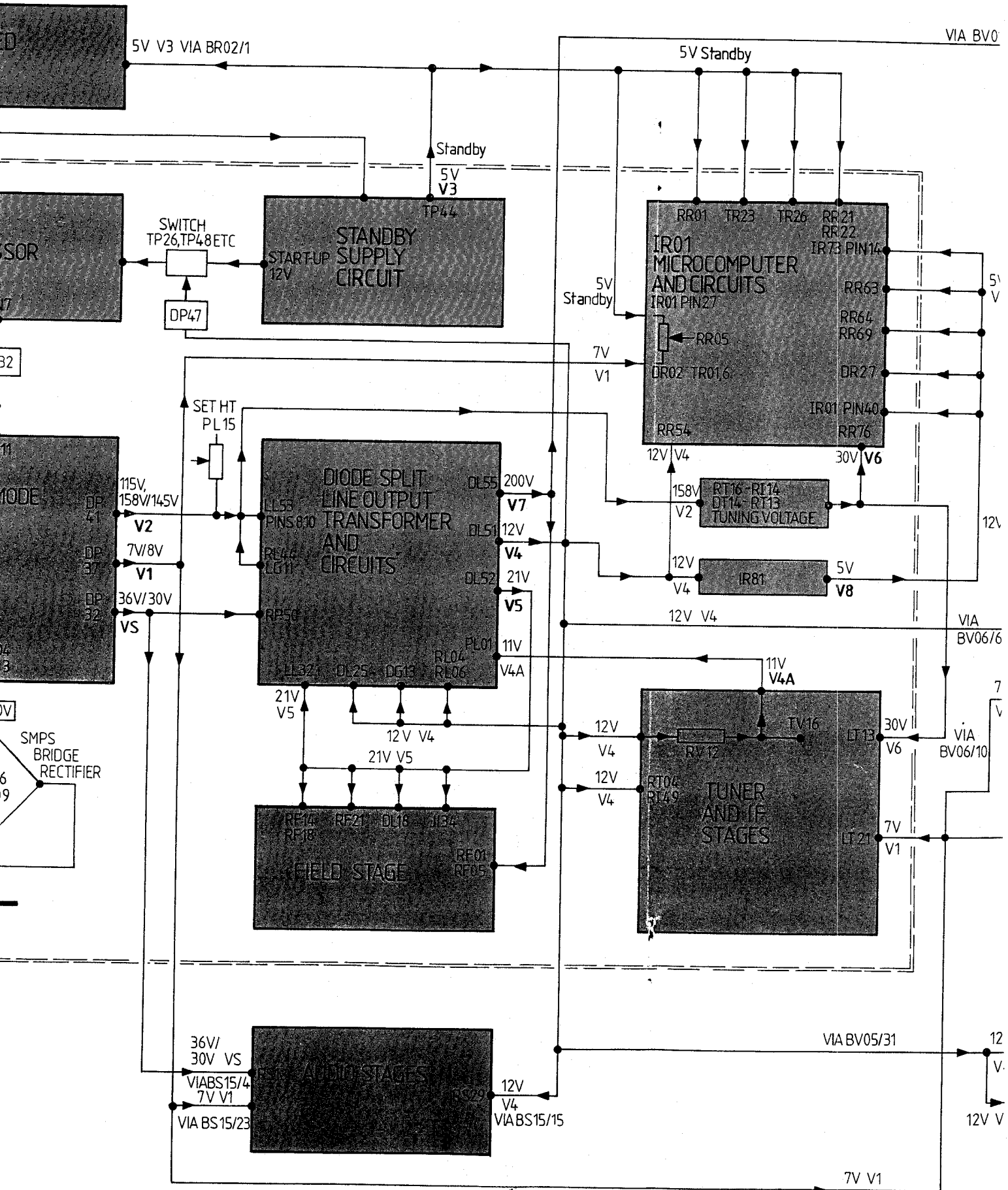
—Continued on Page 14

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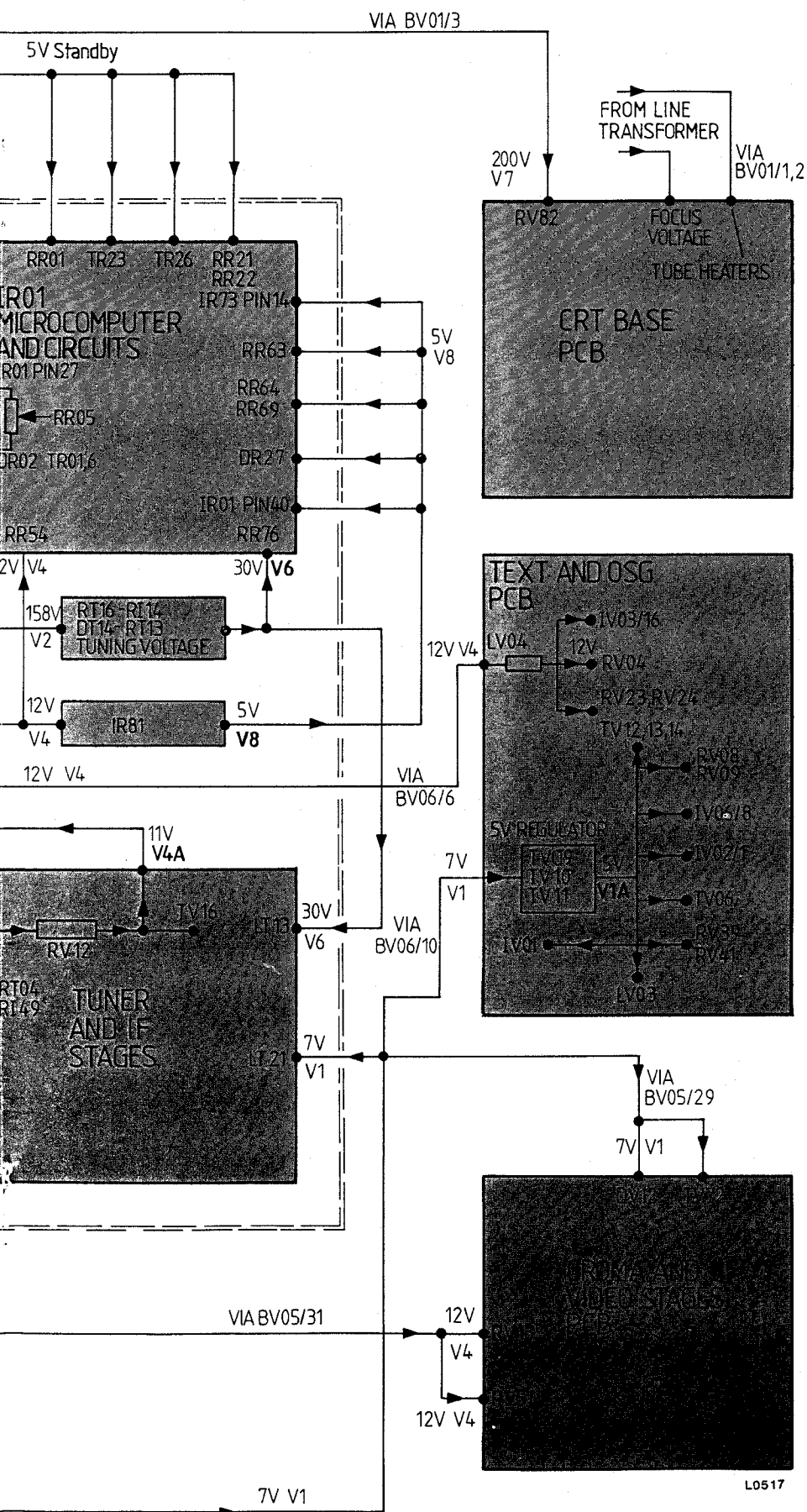
# BLOCK DIAGRAM SHOWING



# BLOCK DIAGRAM SHOWING MAIN VOLTAGE RAIL



# MAIN VOLTAGE RAILS



## SUPPLY VOLTAGE TABLE

SUPPLY	VOLTAGE	SOURCE
V3	5V	STAND BY
VS	36V [30V]	SWITCH MODE
V1	7V [8V]	SWITCH MODE
V1A	5V	V1
V2	158V	SWITCH MODE
V4	12V	LINE OUTPUT
V4A	11V	V4
V5	21V	LINE OUTPUT
V6	30V	V2
V7	200V	LINE OUTPUT
V8	5V	V4

NOTES: The voltage rails for V2, V5 and VS vary between models; refer to circuit diagram sheets.  
All voltages may vary by  $\pm 5\%$

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L0517

## VIDEO SIGNAL PROCESSING

The luminance and chrominance signal processing circuits are mounted on a plug-in module.

### CHROMA

Chroma signal processing is carried out by IC IV01 (AN5620X) which takes the composite chrominance signal and produces colour difference signals U, V as outputs.

The signal is supplied by an emitter follower, TV49, via a chroma filter to shape the response into pin 1 of the IC, the input to the ACC gain controlled amplifier, which has a 26dB range. The output of this amplifier feeds the chroma delay-line of 63 $\mu$ s delay. Delayed and undelayed signals at pins 9 and 8 feed two demodulators which include killer control stages.

PAL decoding is then carried out in a conventional way. The U,V signals are output on pins 11 and 10, from internal emitter followers. These signals are fed to pins 11 and 12 of IV21.

The undelayed signal is also used to phase lock a 4.43MHz crystal oscillator. 7.8kHz components are derived to provide the PAL switching frequency.

### VIDEO

Video signal processing is carried out by IC, type HA11498, (IV21) which is BUS controlled by a microcomputer. This IC has the following features:

BUS control of colour, brightness and gain (contrast)

Internal switching between two RGB inputs; Peritel and teletext, with contrast and brightness control on both inputs.

Auto black and white level adjustment, removing the need for gain adjustments in the video drive stage.

Beam current limiting.

Flyback blanking.

The internal video input is fed through a 6MHz sound trap to the input (pin 38). It is amplified to 3V peak-to-peak and appears at the output pins, 39 and 41. Pin 39 is used by the teletext decoder and the Peritel socket, pin 19. Pin 41, via an emitter follower, feeds:

The luminance delay-line VV53, into which is integrated a 4.43MHz rejector.

The chrominance filter circuit.

The power processor IL14.

Signals from three input sources can be selected by the video switches 1 and 2:

Internal video input pin 38

External video input pin 36

External sync. input pin 40

The output from VV53 pin 41 also goes, via a 4.43MHz chroma trap integrated in VV53, into IV21 pin 13, the Y signal input pin. The Y signal reaches matrix 2 through video switch 3 and the contrast and brightness controls.

The colour-difference signals at pins 11 and 12 are clamped and reach matrix 2 via the video switch and the saturation control. RGB signals are present at the output of matrix 2.

Two independent RGB signals can be coupled into the signal path from pins 3 to 8, either from the teletext unit or the Peritel input which has the priority.

To enable the contrast and brightness to be adjusted on the RGB inputs, these are converted to YUV signals by matrix 1. The RGB must provide a switching voltage at pin 9 for external RGB and pin 10 for teletext, to close switches 3 to 5.

When using an external RGB source a synchronising source is necessary at pin 40. RGB operation can be forced via TV72.

As the d.c. level must be defined for RGB signals, clamping is necessary on each channel. Three external capacitors on pins 18,19 and 20 maintain this d.c. level between scanning pulses.

Automatic adjustment of the black and white levels (auto-grey-scale) occurs during field flyback with IV21 operating in a feedback loop with the video output stages, each channel RGB, sequentially scanned and fed to pin 33 of IV21.

IV21 generates a measuring pulse against which the beam currents of each channel (at black and white, typically 30 $\mu$ A and 500 $\mu$ A respectively) are translated into voltages and compared. The sign of the comparison decides whether the memory capacitors are to be charged or discharged. The resulting voltage alters the white level gain, or the black level d.c. offset, of the relevant channel.

The memory capacitors are CV34/36/38 for the white level and CV35/37/39 for the black level (the black level current is equivalent to the c.r.t. leakage current). The advantages of this control method are; the colour temperature is the same at high and low brightness levels and a drive-gain change cannot occur without a corresponding d.c. offset change. It is then not necessary to measure very low cut-off currents viz, 4 $\mu$ A.

Thus, as very low cut-off currents are not a requirement, the impedance at pin 33 can be made quite low so that any voltage appearing at this pin does not exceed 12V. This voltage represents the total instantaneous beam current and, when integrated by CV44 at pin 35, gives the value of the average beam current which is then compared with the programmable reference voltage at pin 37, set by PV44. Beam limiting commences at 70% of the programmed value at pin 37 when the drive-gain (contrast) is reduced.

The maximum reduction is limited to 6dB and is set by adjustment of PV38. When this reduction is inadequate to prevent the programmed value from being exceeded, then the brightness is reduced and the d.c. offset values of the output stages are reduced. These reductions are obtained by increasing the amplitude of the measuring pulse generated within IV21.

Transistor TV50 suppresses flashing of the picture tube at receiver switch off, following the rapid decay of IV21 output voltages and the slower decay of the c.r.t. voltages. TV50 remains conductive and the resulting collector voltage switches off TV81 on the c.r.t. base board for a few microseconds, during which time the c.r.t. voltages have decayed sufficiently so that they are unable to support any brightening of the c.r.t.

## VIDEO OUTPUT AND TUBE BASE MODULE

The three RGB stages are identical, each using a class AB stage which gives a typical drive voltage of 60 volts peak-to-peak with a good high frequency response.

Adjustment for picture white is by PV50 in the red channel and PV70 in the blue channel, see Alignment Adjustments, page 8.

Three transistors TV51/61/71, feed the drive and cut-off currents of each channel to a common load, RV95. The potential developed across this resistor is applied to pin 33 of IC IV21, through which is effected the auto-grey-scale and beam-current limiting functions.

The transistor TV81, driven by transistor TV50, provides spot suppression by biasing off all three video output stages until the c.r.t. voltages have decayed sufficiently so that they are unable to support any brightening of the c.r.t.

Focus and A1 controls are mounted on this module (PV90A and PV90B).

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## POWER SUPPLY

A switched mode power supply, synchronised at the horizontal scanning frequency, is employed. Special features of the design are as follows:

All output voltages are stabilized.

Shielding of the switching power supply transformer is not necessary.

Excellent stability of the operating voltage for the horizontal deflection stage is achieved by secondary regulation.

The operating safety and reliability are enhanced by a separate standby power supply.

The power consumption during standby operation is very low (about 5W).

The control range extends from 185V to 264V.

### STANDBY SUPPLY

*In order to switch the receiver on from the standby mode it is necessary to maintain power to the infra-red detector and the control panel microcomputer during standby.*

This power is supplied by a transformer, LP03. The a.c. output is rectified and smoothed to 12V and then to 5V. When an 'on' command is received by the micro computer, transistors TR26 and TP48 apply power to pin 8 of the power processor, IL14. This feed is only used during start-up.

During normal operation, the power is supplied from the diode split transformer via DP47.

### SWITCHED MODE SUPPLY

When an 'on' command is received, the power processor IL14 delivers very narrow but gradually widening pulses, at line frequency to transformer LP32. This transformer provides mains isolation and transforms down the drive pulses feeding the pulse amplifier TP11.

TP11 delivers this signal in inverted form to the driving stage, a push-pull emitter follower consisting of TP19 and TP16, which supplies the base current for the switching transistor, TP24. The bootstrap circuit, DP21 and CP19, increases the efficiency of the driving stage. It ensures a sufficiently high base current in TP16 during the conducting phase of the switching transistor, TP24. When TP16 blocks, TP24 blocks too, while TP11 and TP19 conduct. This operation is typical of switched mode power supplies.

### REGULATION

The 158V (V2) supply present at CP41 supplies the horizontal deflection stage. It is decreased to about 1.3V by the voltage divider and supplied to pin 9 of IL14.

The pulse-width modulator present in IL14 derives the pulse width at the output pin 7, from the voltage difference between the internally preset voltage of 1.3V and that prevailing at pin 9. When the system voltage deviates from its set value, IL14 delivers pulses of differing width at pin 7.

An excessive voltage rise is counteracted by IL14 temporarily delivering narrower control pulses to TP24 via TP11 etc, thus shortening the conducting period. Since less energy is accepted during a shorter conducting period, the energy dissipation in the secondary circuit is consequently lower. Thus the system stabilizes to its set value.



If the system voltage drops as a result of increasing load, the pulse-width modulator in IL14 yields progressively broader pulses at the scanning frequency and TP24 remains conductive for a longer period. The energy storage coil, LP04, now absorbs more energy.

During the blocking phase of TP24, the energy transfer proceeds to the secondary circuit of LP04. Thus, the voltage remains stable even for increasing load on the 158V V2 rail.

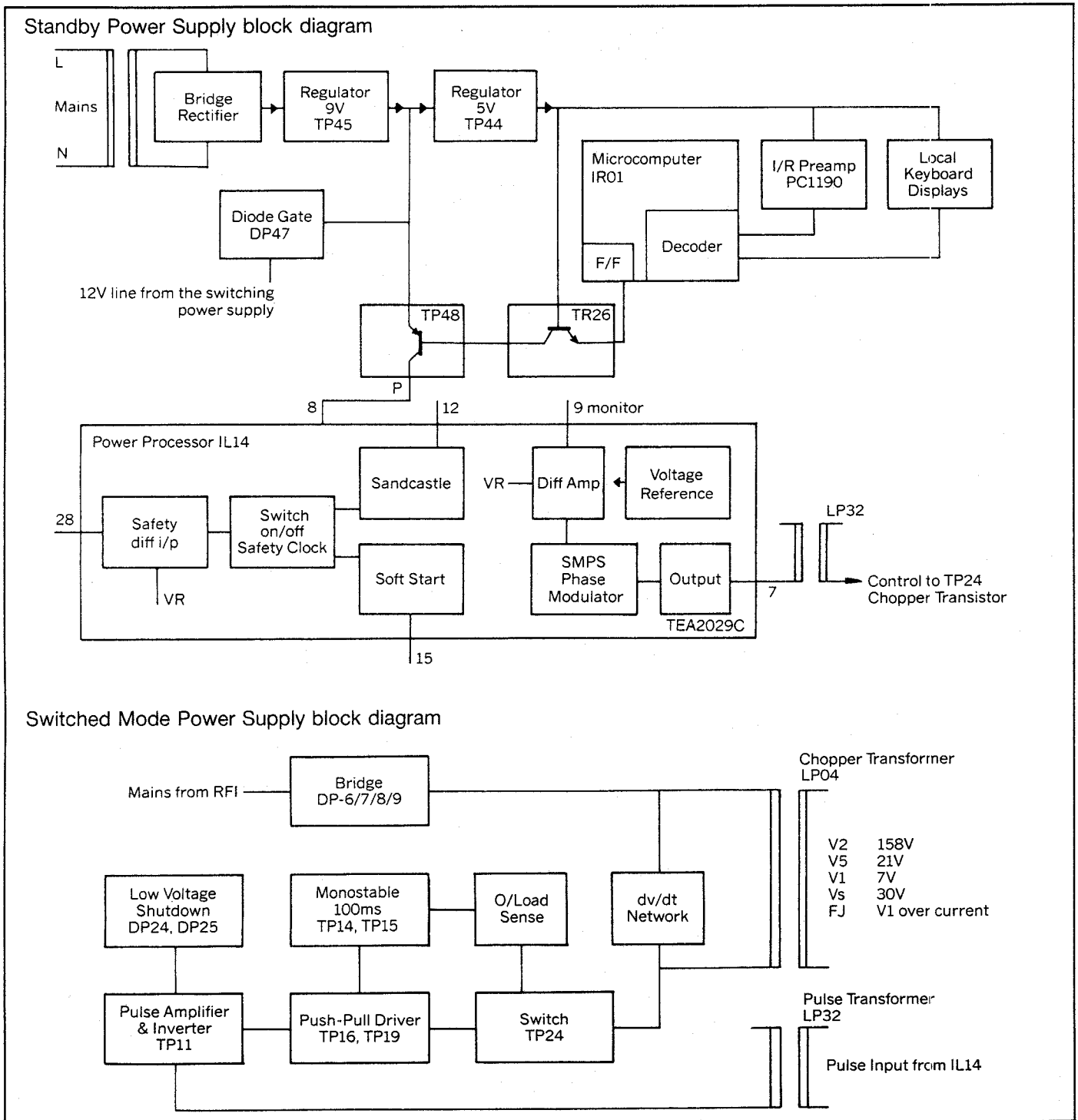
## PROTECTIVE CIRCUITRY

The safety circuits operate only when a fault results in an extreme overload. If this happens, the supply switches off. This is indicated by a level of 7V at pin 15 of IL14.

Special circuitry has been incorporated to monitor the mains input voltage – should this fall below 180V the microcomputer will close down the power supply.

Excessive current in TP24 (the chopper transistor), prolonged overloading of the power supply outputs or an excessive rise in output voltages will result in pin 28 of IL14 being activated. This causes an immediate shutdown for two to three seconds, after which the switched mode power supply attempts to go through its normal start-up procedure. If, however, the fault persists, after two attempts at restart the supply will remain off and the receiver will be in the 'protected' mode.

This mode can only be cancelled by turning the mains power switch off and then on again.



# LINE TIMEBASE

All of the line drive waveforms are generated in the power processor IC, IL14, a TEA2029C.

The core of this IC is a PLL circuit and comprises a VCO which oscillates at 500kHz the output being divided by 32 to give 15625Hz (line scan frequency). This output is fed to a phase comparator together with the line sync pulses from an amplitude filter. A control voltage from the phase comparator readjusts the VCO until they are in phase.

The ceramic oscillator is on pins 17 and 19 with the PLL phase shift circuit on pin 18 – using this circuit removes the need for a hold control.

The RC network on pin 22 smoothes the oscillator frequency whilst the control time constant is adjusted by the charge and discharge current controlled by the IC.

The IC switches to AV time constant in the following conditions:

Low level on pin 23

No video signal

Noisy signal (to obtain a wider capture range)

With a good signal-to-noise ratio, the IC switches to a long time constant.

Within the IC, the synchronised line scan frequency is used in four switching stages:

1. To process the line component in the sandcastle pulse.
2. To derive the control voltage in the phase comparator for the phase shifter Ø2, whereby a scanning pulse from the line output transformer is fed to pin 12 of the IC as a reference for phase comparison. This defines the start of scan and, thereby, the horizontal position.
3. For the line sawtooth drive waveform.
4. For driving the pulse-shaper phase shifter Ø3, which, with the line sawtooth, controls the time and pulse width of the output line drive signal at pin 10.

During the switch-on phase, the charging of capacitor CL16 results in a slowly increasing pulse width of the line scan drive pulse on pin 10. This prevents the overloading of the line transistor TL31 during start-up. In normal operation the drive pulse width is 26µs, regardless of operating voltages and transistor switching delays.

The line driver transistor, TL29, amplifies the drive pulse from pin 10 and, via the driver transformer LL32, provides the current to saturate the line output transistor TL31

Switching peaks are damped by the RC network RL29 and CL29 when TL29 switches off.

Start-up power for TL29 is derived from the switch mode power supply transformer LP04 pin 20 whilst, during normal operation, the supply comes from the line output transformer (LL53) 21V rail. The line output transistor TL31 operates as a switch, with diodes DL46 and DL41 in parallel to prevent inverse operation. These diodes form part of the E/W diode modulator.

Power for the scanning circuits is taken from the 158V supply of the switch mode power supply into pins 8 and 10 of the line transformer. The major components of the scan circuit are:

- BL46 Horizontal Scan coils
- TL31 Line Output transistor
- CL44 S-Correction capacitor
- CL48 Flyback tuning capacitor
- DL46 Switching diode

The flyback is controlled when the line transistor TL31 is switched off by the tuning capacitor CL48 and the S-corrector CL44 operating in series.

To ensure low-loss switching in the line transistor, the line driver circuit must provide a clean switch-off at the end of forward scan. The driver transformer provides a sharp negative pulse to remove the charge from the base of TL31.

The operation of the stage is conventional with the line output transformer giving the following power supply rails:

12V from pin 2

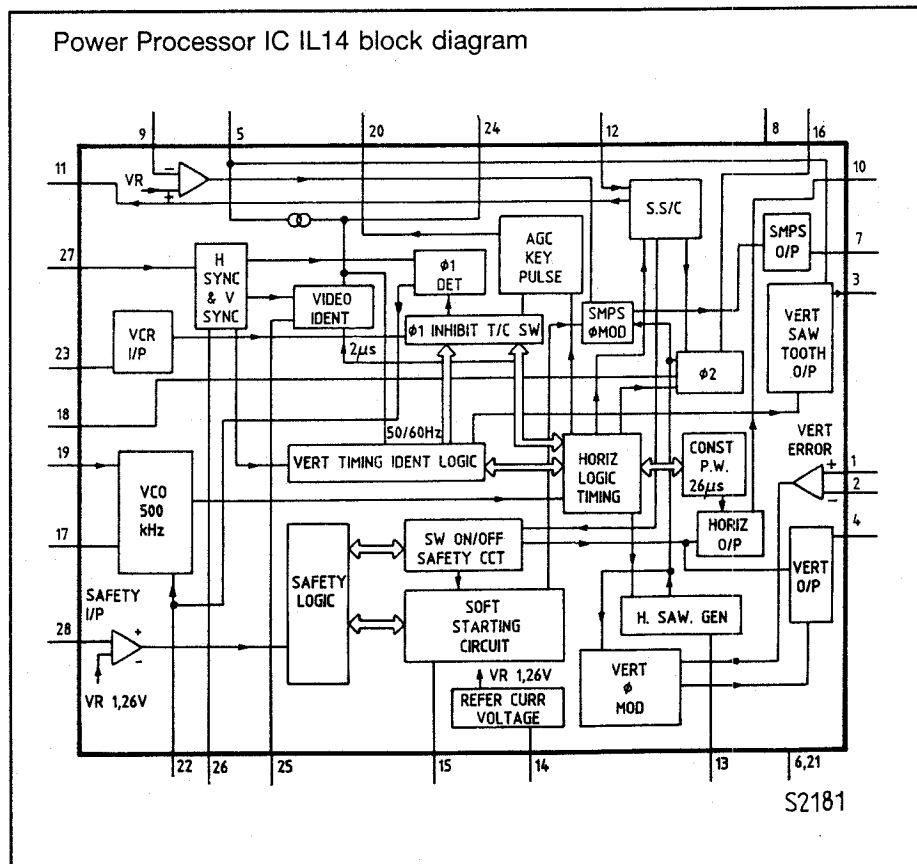
21V from pin 3

200V from pin 6

Tube heaters from pin 7

The EHT, Focus and A1 supplies come from the diode split part of the transformer.

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# EAST-WEST CORRECTION CIRCUIT

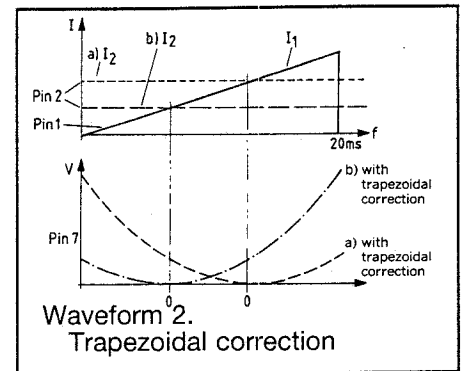
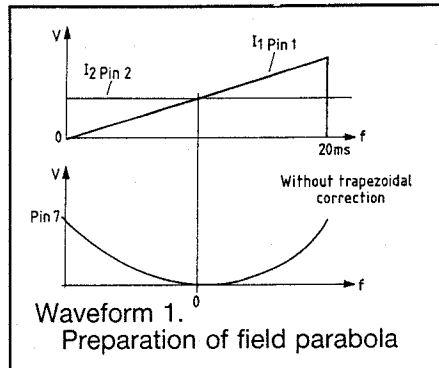
The 110° picture tube requires an east-west correction circuit which modulates the line deflection current parabolically by about 7% at the field frequency.

## EAST-WEST DRIVING CIRCUIT

The preparation of the east-west driving signal is effected in the IC, IG01. From the difference between the input currents at pin 1 (field sawtooth) and pin 2 (adjustable direct voltage), a parabola is formed at the output of the multiplier. If the arithmetical average of the sawtooth current at pin 1 is equal to the current at pin 2, a symmetrical parabola results at the output of the multiplier (Waveform 1). Hence, an east-west trapezoidal correction can be adjusted with PG02 (Waveform 2).

The output current from the multiplier results in a voltage, in proportion to the current, at the externally connected impedance. It is compared with a linear sawtooth voltage at the line frequency in the comparator – connected downstream. The positioning of the sawtooth voltage can be varied by adjusting PG12 (width control).

The pulse-width modulated signal from the comparator controls the final stage, which operates in the D-mode. An IC internal diode returns the excess energy drawn from the final line scanning stage to the 21V rail. The integration of the output signal at pin 5, which is switched at the line scanning frequency, is performed by the coupling coil, LG11.



## FIELD TIMEBASE

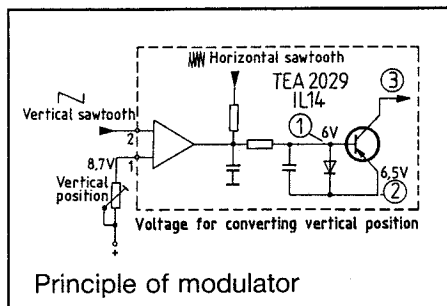
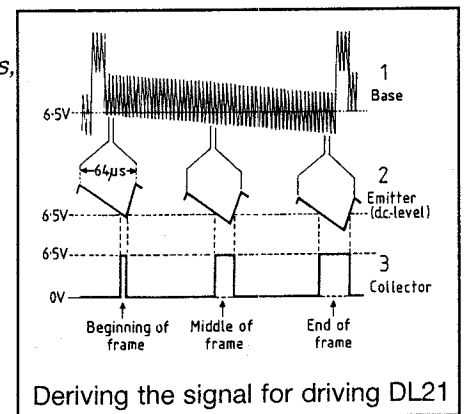
The power processor IC, IL14, contains all the small signal parts of the field stages, with an external power output stage using a silicon controlled rectifier DL21.

### SAWTOOTH GENERATION

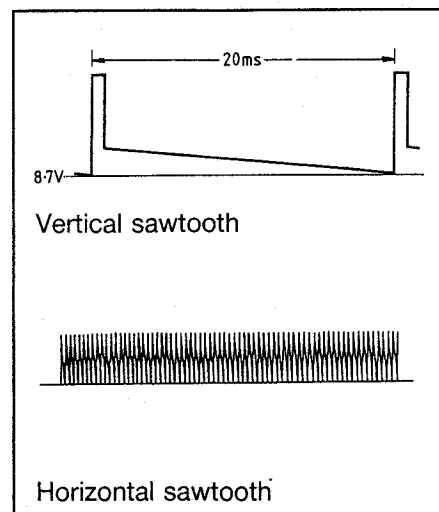
The capacitor CF01 on pin 5 of IL14 is charged through RF01 with an almost constant current from the 200V rail to give a sawtooth on pin 5. CF01 is discharged by the IC at each vertical sync pulse.

The field sawtooth at pin 5 is fed to pin 3 at low impedance and also to pin 2 by RF11. The differential amplifier connected to pins 1 and 2 has two inputs, a vertical sawtooth on pin 2 and a field shift correcting voltage on pin 1.

The modulator operates as a comparator with a switching threshold situated at 6V. From the beginning to the end of a frame, the scanning frequency sawteeth shift progressively deeper into the switching threshold of the transistor, from line to line. A pulse-width modulated signal, at the scanning frequency, is established at its collector. This switching pulse is available, with 12V peak-to-peak, at pin 4 of IL14 and thus as the driving signal for the gate of DL21, the final field stage.



The field sawtooth output from the differential amplifier is applied, together with a horizontal sawtooth waveform, to the modulator transistor which controls the switching transistor.



### FINAL FIELD STAGE

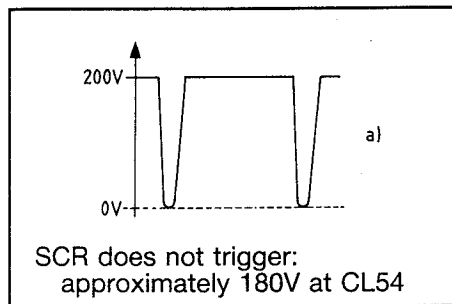
The final field stage has only one active device, a silicon controlled rectifier, DL21. The deflection coil BL55 is connected as a bridge between the operating voltage (21V) and the line transformer winding 4/11. It is therefore, directly coupled. The line transformer supplies all of the deflection power.

The winding 4/11 which supplies line scan pulses at about 240V peak-to-peak, is alternately connected to chassis earth by diode DL22 during line flyback and by the silicon controlled rectifier DL21 during forward scan.

Two extremes show how a bipolar current flows in the deflection coils.

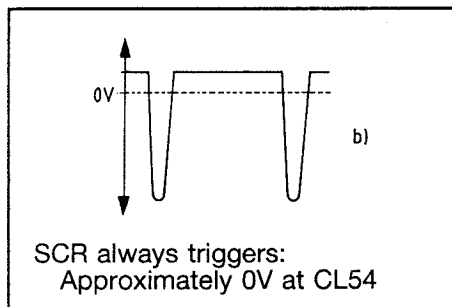
1. The SCR does not trigger
2. The SCR always triggers

In the first case a normal clamping circuit would be involved – terminal 4 of the line transformer would be clamped to chassis during the flyback phase and the voltage curve shown, would appear at terminal 11.



The low-pass filter LL32-CL54 would allow a high positive voltage on CL54, so a high current would flow from CL54 through the deflection coil and RF17 to the 21V rail – this occurs during the field flyback to deflect the beam to the next frame starting position as quickly as possible.

In the second case the winding is always connected to chassis earth via terminal 4. The d.c. voltage of 0V which appears at terminal 11 causes a current to flow in the opposite direction from the 21V rail through RF17 and the deflection coil to CL54.



The two limit cases show how current can flow through the deflection coil in both directions.

For reasons of linearity, the driving range has been utilised only minimally. Hence, maximum voltages of  $23 \pm 20V$  are established at CL54. 23V to 43V corresponds to the upper half of the picture and 23V to 3V corresponds to the lower half. Residual components at the line frequency are negligible, since the reactive component of the field deflection coil is very large at this frequency and allows practically no current to flow.

A vertical sawtooth is generated from the line scan pulses in the following way:

At the beginning of the picture, at the upper edge of the frame, the modulator supplies narrow pulses at the scanning frequency to the gate of the silicon control rectifier. These make it possible for the diode, DL22, to clamp the voltage in the

integrating network, LL32 and CL54, at about 43.5V. With every further line that is scanned, the gate-triggering signal is broadened and the clamping time for DL22 therefore becomes shorter.

The clamping voltage arising in the integrating network similarly decreases in proportion. Field sawtooth components are thus generated for driving the current through the deflection system.

Extinction of the triggered SCR is effected with each scanning pulse from the winding 4/11.

## STABILISATION

A negative feedback signal results from the voltage drop over the reference resistor, RF17, and is supplied through RF15, PF14 and RF16 to pin 2 of the IC, IL14. Amongst other purposes, it serves to stabilise the picture amplitude. PF14, in the negative feedback path, determines the field amplitude.

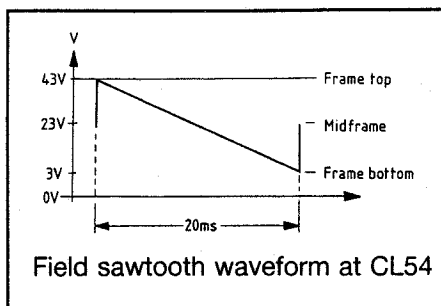
## TANGENTIAL CORRECTION

The tangential correction is performed by DF17, DF18, RF13 and RF18.

In the vertical mid-frame zone, the voltage drop across the reference resistor, RF17, is so small that no current flows through the diodes. In the upper and lower fourths of the picture, the threshold values are exceeded. The diodes now conduct and increase the negative feedback and the deflection current decreases. RF18 increases the corrective current during the conductive phase of DF17 and DF18 – the temperature drift is thereby reduced.

A slight non-linearity of the sawtooth is compensated by RF13, which allows a non-symmetrical current to flow between the upper and lower edges of the picture.

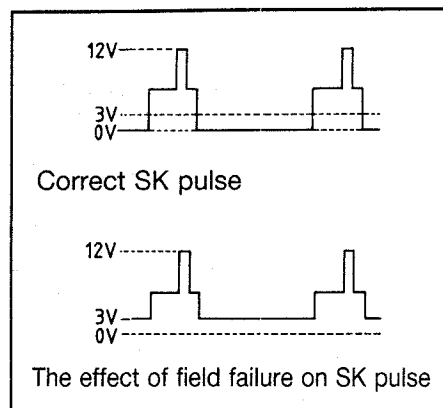
A d.c. level, adjustable with the use of PF02, provides the vertical position correction through pin 1 of the IC.



## FIELD BLANKING PROTECTION CIRCUIT

The field sawtooth voltage at the output of the differential amplifier is fed to a switching transistor, in addition to the modulator transistor.

The switching transistor is conductive for each field flyback period. If no field flyback is recognised, or if the flyback period is longer than the blanking time, the protection circuit responds. If this happens, the lower level of the supersandcastle pulse at pin 11 then stands at about 3V.



The change to the sandcastle pulse causes the video processor to reduce beam current and so protect the picture tube from damage caused by field failure.

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# NORTH-SOUTH MODULE NS 5000 M

*The Videocolor 'Super Planar' (SP) picture tube requires more geometry correction than standard 110° tubes. It requires more 'S' correction, North-South correction and 'gull-wing' correction.*

## 'S' CORRECTION

In addition to the horizontal linearity circuit on the main PCB there is a further 'S' shaping circuit comprising LG23 and CG23, tuned to twice line scan frequency (31kHz) and connected in series with the horizontal deflection coils to provide the extra correction required.

The modulated line pulses are shaped to sawteeth by a Miller integrator (Miller capacitor CG53). This is followed by a driver transistor TG45 and a direct coupled power amplifier TG42. There is negative feedback to the emitter of TG45, and temperature compensation is provided by a silicon diode DG49 in the base supply of TG45.

The power stage TG42 drives a tuneable line frequency resonance circuit LG42, CG42. This provides North-South phase adjustment for left/right symmetry by tuning, with drive adjustment by PG53.

## NORTH-SOUTH PINCUSHION

The SP tube has about 8% N-S pincushion distortion and to compensate for this the vertical deflection current is modified by a cosine correction current from a modulator.

The correction current, which is fed into the centre of the scan coils via plug BG36, is obtained as follows:

The modulator TG62, DG62, DG63, DG64 is supplied with vertical sawtooth via BL05 and horizontal flyback pulses from BL07. These signals are coupled together as follows:

During the first half of the vertical scan, diode DG63 conducts and DG62 is off. The signals are coupled together by CG66, RG66, RG65, DG63, CG59 and RG59 to capacitor CG57. During the second half of scan, diode DG62 conducts and DG63 is off, so transistor TG62 with the vertical sawtooth, functions as a clamping amplifier. The line pulses are inverted by the transistor so that the stage delivers both amplitude and phase modulated pulses.

A d.c voltage, adjusted by PG58, is added to permit differences in the amount of correction applied, as necessary, at the top and bottom of the picture.

## 'GULL-WING'

The 'Gull-wing' distortion on the SP tube is in the region of 2% at approximately one third and two thirds of the way down the tube, with top, centre and bottom having almost no error. A suitable correction signal would be a twice-line frequency cosine waveform, amplitude modulated by a sine wave at field rate.

So that the correction is independent of field frequency, an oscillator or tuned filter is not used, instead the signal is produced by the addition of two sawtooths (one being inverted) with a suppressed centre – this with the correct amplitude of signal results in a triangular waveform – a first approximation of a sine wave.

The operation of the circuit is as follows:

Transistor TG04 acts as a phase splitter amplifier with a vertical sawtooth applied to its base. The collector signal is fed to a bridge rectifier (DG07 to DG11) and as a bias voltage is stored in CG09, only the peaks of the signal pass through the rectifier.

These peaks are added to the emitter signal, via RG07 and RG06, to give a triangular waveform which is passed to TG14, a Miller integrator transistor. TG14 converts it into a near sine wave signal which is fed to the modulator stage TG19, DG18, DG19 and DG21.

The twice-line scan frequency switching pulses are derived from the S shaping circuit LG23 and CG23 and fed via CG22 and RG22 to TG19, the carrier input of the modulator stage. The modulated output of this stage appears across the capacitor CG26.

This is a twice-line scan frequency square wave, amplitude modulated by the field frequency sine wave. This is fed to the Miller integrator transistor TG28 and shaped into a sawtooth waveform. TG34 is an output amplifier driving a tuneable double line frequency circuit LG36, CG36.

Gull-wing phase adjustment for left/right correction is obtained by tuning this coil. The amplitude is adjusted by PG29.

As the module is mounted near the line transformer with its stray magnetic field which may couple into LG36, a capacitor CG33, is fitted to provide compensation for this stray coupling.

# INFRA-RED REMOTE CONTROL

All models employing the ICC5 chassis are equipped with remote control, although the control facilities vary between the different models.

Apart from the infra-red detector and pre-amplifier, the decoding and control functions are all incorporated on the main chassis. The digital output signals from the transmitter are decoded in the I/R decoder section of the Central Control Unit (CCU) microprocessor IC IR01.

Three bus systems developed in the CCU provide the required controls:

1. A 3-line BUS, data/clock/enable.  
 IM - BUS: Provides the control information for the non-volatile memory IC, IR73 and the NICAM 1 unit.
2. A 2-line BUS, data/clock.  
 I<sup>2</sup>C - BUS: Provides the control for teletext, on-screen display and the NICAM 11 unit
3. A 3-line BUS, data/clock/enable.  
 Thomson-BUS: Provides the divider and band-data information to IT20 for the tuning process and adjustment of the analogues; contrast, brightness and colour.

## Channel Selection

The THOMSON-BUS signals set the division ratio of the programmable dividers for the phase-lock loop IC (IT20). The final tuning data is fed back to the CPU via the DATA BUS and is memorised. The system ensures accurate tuning without the need for conventional AFC. Any tuning drift as the tuner ages is compensated by the memory being continually refreshed.

## The Infra-Red Pre-amplifier

The I/R detector diode D921 is reverse biased and the d.c. component is balanced by two feedback loops. The first loop controls the d.c. component below 200 $\mu$ A and is decoupled by C942, while the second loop controls the d.c. component above 200 $\mu$ A and is decoupled by C943.

An increase in the reverse current leakage in D921 is amplified by the 4-stage amplifier in IC904. The first three stages are controlled by the AGC loop. The first, second and fourth stages are decoupled by C948, C944 and C955. HT decoupling to pin 4 is achieved by C941, R998 and R999. Pin 9 of IC904 sits low and pulses high, driving pin 10 via the capacitor C949 which sets the pulse length.

C951 ensures that all self-generated noise in the amplifier is restricted from reaching the pulse stretch input. Pin 11 is the stretched output which feeds IR01 pin 6.

## Typical Transmitter (RH71M using PC1681-001)

The transmission system employs pulse position coding, generated by IC1791 (SAA3018). The keypad is arranged as a scanned matrix of 7 driver outputs, drive 0 to drive 6 on pins 13 to 19, and 7 sense inputs, sense 0 to sense 6, on pin 8 to pin 2 respectively.

Pressing a command button to start a code transmission pulls a sense input from a high to a low state as it is connected to an output.

A two-position switch (VHS-TV) allows the selection of an alternative sub-system code so that the transmitter can also control a video recorder.

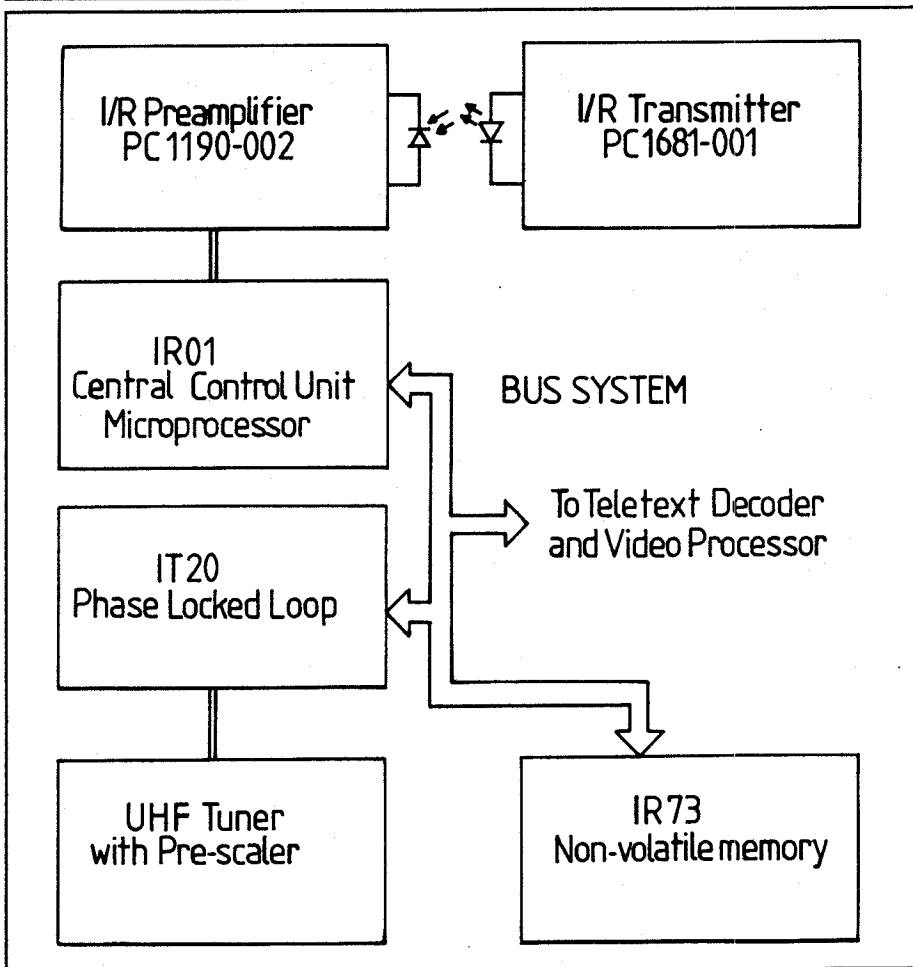
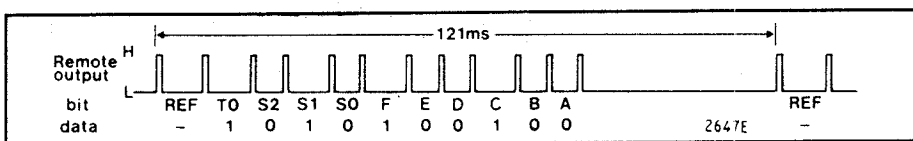
Drive 6 (pin19) is connected to pin 9 (Address Mode) to ensure modulation

of the transmission output (REMO) pin 1. The format of the output data is shown in the diagram.

The data word starts with a constant reference time bit (REF) used as a reference time for the decoding sequence. Next comes a toggle bit (TO) which informs the decoder that the next instruction is to be considered as a new command. Then follow three bits, S2 - S1 - S0 which define the sub-system address and finally, six command bits, F - E - D - C - B - A, which are defined by the selected switch on the keypad.

The burst of 38kHz carrier from pin 1 is passed to TR1791 which drives pulses of current through the I/R emitting diode D1791.

Each time a command button is pressed, D1792 flashes to indicate that the pulse train is being transmitted. As well as acting as the transmitter 'ON' LED, D1792 also acts as a voltage clamp which fixes the base voltage of TR1791. The value of R1992 determines the current through D1791.



# FASTTEXT AND ON-SCREEN GRAPHICS (OSG)

*These functions are contained on a separate plug-in printed circuit board, PC1251.*

## TELETEXT

The text functions are carried out by three ICs:

IV02, SAA5243, Computer Controlled Teletext (CCT)

IV03, SAA5231, Video Input Processor (VIP)

IV01  $\mu$ PD4364C/15L, static RAM

The text decoder requires control and the software for this is contained within the main microcomputer IR01 on the TV receiver main board. This software provides full 'FASTTEXT' control with 4 pages of memory.

The circuit function is as follows: The video signal is taken from the emitter follower TV16 into pin 27 of IV03, passed through an adaptive sync separator, an HF compensator and on to an adaptive data slicer.

The video composite sync signal on pin 25 is used by the CCT, IV02, in its timing chain. The sync signal for use by the TV appears on Pin 1 of IV03 and will either be the incoming video signal or, in the absence of incoming video, a text composite sync signal generated by IV02 on pin 12.

Teletext clock regeneration is by a crystal at twice data frequency, phase locked to the data signal. This crystal is the only adjustment required for the teletext decoder and is adjusted to 6.0002MHz (with no video input) using the trimmer CV07. Teletext data output is from pin 15 of IV03 and this data is fed directly to IV02, pin 6.

IV02 (CCT) contains all the digital parts of the text decoder and is controlled by the microcomputer (CCU) via the I<sup>2</sup>C BUS.

Incoming teletext data are offered to each of the four data acquisition circuits in a priority order decided by the software. If the data is for a page that has been requested, then it is stored in the static RAM IC, IV01, ready for the character generator to display or the CCU to act upon. An additional acquisition circuit captures the Broadcast Service Data Packet, 8/30.

A timing chain controls all the time functions of the IC. It accepts the 6MHz clock and video sync signals from IV03 and provides sandcastle and text composite sync outputs for IV03. A full memory interface for up to 8K of RAM is provided.

The character generator provides RGB data outputs and a blanking output for mixed and subtitled modes. The CCT is controlled via the I<sup>2</sup>C BUS by the main microcomputer, IR01.

The RGB data outputs are buffered and level reduced by the transistors TV02, TV03 and TV04 before they are mixed with the RGB outputs from the On-screen Graphics IC, IV05. The blanking is fed to TV05 in a similar way.

## On-Screen Graphics

IC IV05 (hPD6144C) is a custom masked device. This IC is controlled by a 3-wire BUS (NECBUS) which uses the two I<sup>2</sup>C lines and an extra strobe line directly from the CCU.

The output of the device is synchronised by line and field sync at pins 14 and 15. These sync signals are obtained from the sandcastle pulse by transistors TV07 and TV08.

The only adjustment is to set the frequency of the on-chip oscillator to 5.7MHz  $\pm$ 100kHz by means of trimmer CV25.

RGB output is from pins 9, 10 and 11 while pin 12 supplies a fast blanking signal. These signals are buffered and level reduced by transistors TV12, TV13 and TV14. The blanking signal is combined with the text blanking signal at the base of TV05.

IV06 contains character codes for station ident. and Point of Sale (POS) message.

The POS is programmed during factory set-up and can be accessed by the dealer by holding down the Prog.(+) and Prog.(-) buttons whilst switching the receiver on with the mains On/Off switch. Note: The message is overwritten if names are entered for programmes 21 to 40 inclusive.

# NICAM STEREO SOUND – AUDIO MODULE

This module, comprising two PCBs – PC1252 and PC1253, contains IF amplification and filters, detection, demodulation, digital demultiplexing, clock generation, audio switching, audio digital-to-analogue convertors (DACs), analogue FM audio detector and two audio output amplifiers.

The Central Control Unit (CCU) NICAM processing routines are initialized by detection of the base-emitter junction of TS41 on PC1252 on power-up. If this is not detected, the CCU assumes that a mono audio module is installed and therefore operates a different set of instructions. This results in no audio output from PC1253.

The main ICC5 chassis has a special IF amplifier section with quasi-parallel sound (QPS) and a special SAW IF filter to accommodate both the 6MHz FM sound and the 6.552MHz NICAM sound carriers.

The vision amplifier is conventional with the SAW filter driving the vision IF amplifier IC, I136 a TDA4443. The sound signals are taken from another output of the SAW filter and amplified in a separate IC, I171, a TDA4445B which produces sound IF output from pin 12 and feeds the audio module via pin 14 of socket BS15.

The 6MHz FM sound IF and the 6.552MHz NICAM signals are fed from BS15 to a 6MHz ceramic filter QS506 and to amplifiers TS01, TS02 and TS03 and bandpass filter LS01 which separates the two signals and feeds them to IS07 and IS01 respectively.

Taking the NICAM signal first, this enters the Quadrature Phase Shift Keying (QPSK) decoder IS01 at Pin 4. The decoder has two crystal oscillators. The first, running at 6.552MHz, regenerates the carrier frequency by means of a PLL, producing the signal to detect the reference and quadrature components and yielding the data stream.

The second oscillator runs at eight times the data clock rate of 728kHz – 5.824MHz, again controlled by a PLL. This clock is used to produce a square wave which is used as timing for the quadrature detector to decode the data stream. The data stream is then sliced to become the data output on pin 29. Other outputs are 728kHz clock on pin 27 and 5.824MHz clock on pin 26.

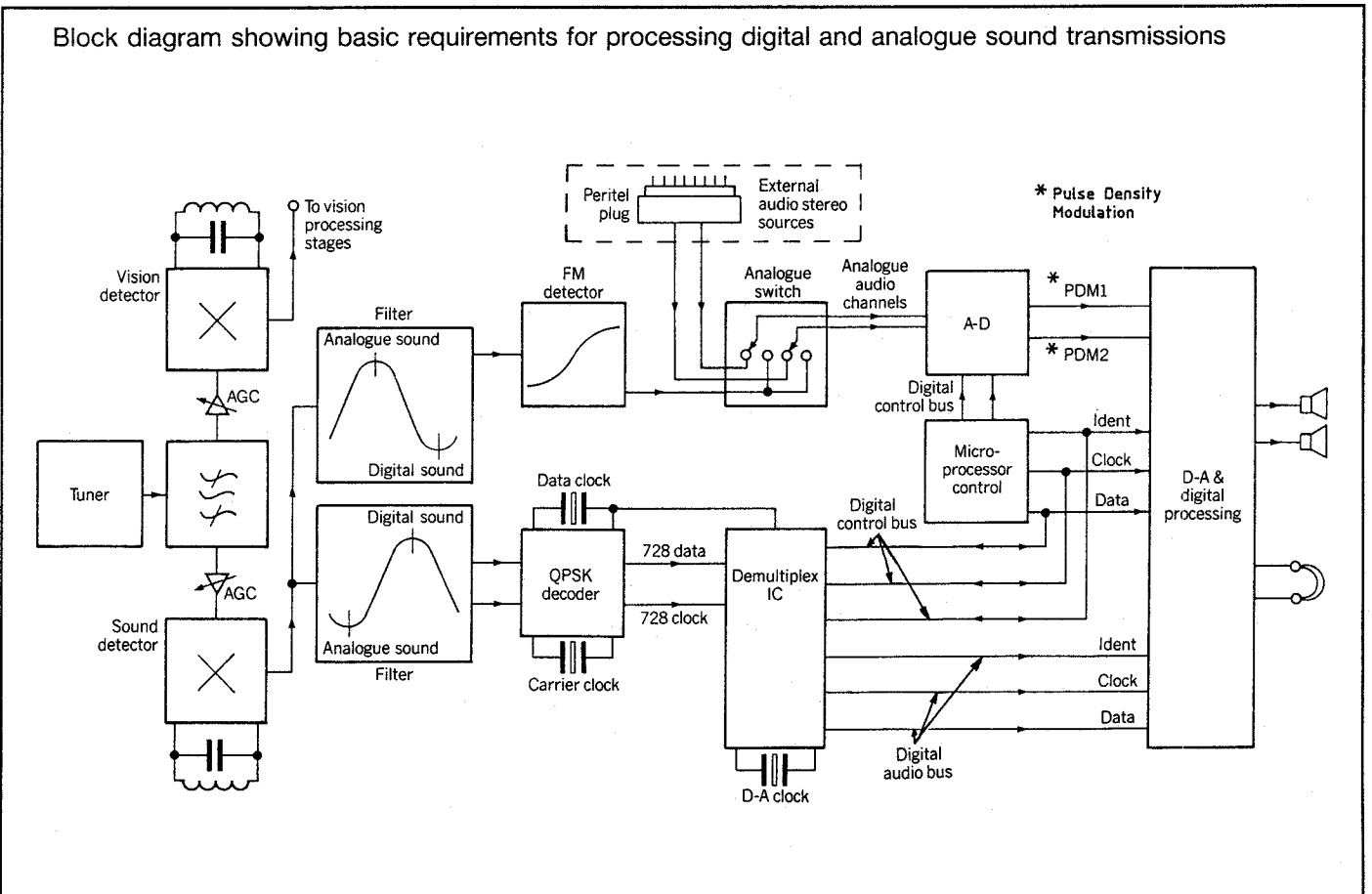
The three outputs from IS01 feed the NICAM demultiplexer IC, IS02, which must first descramble the data stream. There is an unscrambled part of the data known as the Frame Alignment Word. This word is used to lock the data detector so that the data stream can be descrambled with the aid of a pseudo-random bit sequence generator.

This first stage yields the interleaved sound data in a block of 64 samples of 11-bit words with 11 data bits and 5 control bits, CO to C4.

These control bits are used to indicate the nature of the data (stereo, mono or dual-language) and are sent by the IC along the INTERMETALL (IM) BUS to be read by the receiver's main Central Control Unit (CCU) IC. The IM-BUS is a three-line bus of data, clock and ident signals and this is used by the CCU to control both the demux IC, IS02, and the Audio Processor (APU) IC, IS09 and the A-D Converter (ADC) IC IS08.

The data now requires to be de-interleaved into two separate channels- the descrambled data is controlled by a memory manager and read into a 64 x 11-bit memory. For stereo sound, only two memory blocks are needed, one to read the data into, while the other outputs its data to the DAC controller.

When a dual language is being transmitted, the two languages are contained within alternate blocks so that an additional memory is required to provide simultaneous data to the DAC controller – these three memories are in the demux IC.





The DAC controller converts the 10-bit data from its companded form back to a 14-bit sample by using the 11th parity bit to obtain a range bit. The data is now ready for the external DACs to process.

The DAC controller is timed by a 16.384MHz clock which is also used as the system clock, with output at pin 40 for IS09, in the NICAM mode.

The output from the demux IC is in the form of a 3-Wire Sound bus (S-BUS) consisting of data, clock and ident signals – this S-BUS feeds the next IC, IS09.

IS09 requires the data to be transmitted serially in 4 x 16-bit samples per cycle, so that the 14 bit NICAM data is extended to 16-bit by repeating the LSB twice.

With stereo, the data is alternate L and R so that the pair of DACs each receive a L and R sample. In dual-language mode, the data is in Language A or Language B so that A or B is routed to the pair of DACs.

IS02, has four other outputs of interest:

Pin 8 outputs an error flag by a 'high' when bad data is on the S-bus.

Pin 34 is a mute flag output to indicate that the demux has muted and is not providing any output so that the FM sound can be selected.

Pin 20 is used for test and when forced high de-mutes the demux.

Pin 19, when forced high, makes the demux output unrelated programme material which has been indicated by a C4 bit on pin 35.

IS09 uses the 16.384MHz clock divided by 4 and 128 to produce the 32kHz sample frequency in NICAM mode – this IC performs the audio functions of Volume, Balance, Stereo-wide and Tone controls under command of the IM bus.

The IC can also switch between two different inputs, S-BUS and PDM (Pulse Density Modulated). In this way the selection of NICAM or FM audio is achieved.

## FM SIGNAL PATH

The analogue FM signal path differs from a standard receiver by the use of digital signal processing.

The FM detector, IS07, is a TBA120 and this part of the circuit is conventional. The output of the TBA120 is taken to IS08 which is an A-D converter which produces two serial PDM digital output signals at pins 10 and 11 from either the FM input or an input to pins 21 and 24 from the Peritelevision socket. The PDM signals are fed to IS09 pins 16 and 17.

IS08 can also switch an analogue output from either FM or Peritelevision to pins 22 and 23 and this can be routed via the audio switch IS12 to the low pass filters LS10, LS11 and amplifiers TS11 and TS14 to the phono sockets and the Peritelevision socket outputs.

IS08 produces the PDM outputs from the FM audio signal by sampling. The sample rate is driven from the system clock which, for NICAM is 16.384MHz. However, this clock frequency cannot be used as there are only two divide ratios available: 3 or 4 and 128, producing either 32kHz or 42.67kHz. 32kHz would result in beats with the pilot tones (Zwei Ton only) and 42.67kHz would produce a beat at 11.73kHz with twice the line frequency.

To overcome this problem a different clock frequency of 17.73MHz is used with a sample frequency of 46.17kHz. Any beats produced are outside the audio range. This new clock is generated by the two ICs, IS03 and IS04 which also switch the required clock by control from the IM BUS and TS16.

The sample rate of 46.17kHz cannot be used for the stereo input from the Peritelevision socket, as IS09 cannot perform stereo processing at this speed. Therefore, a sample rate of 34.62kHz is used in Peritelevision mode and, as there is less line signal present, the beat with twice line frequency is not a problem.

## AUDIO OUTPUT AMPLIFIER

This circuit is in two parts:

The audio drive to the loudspeakers.

The outputs to the phono and Peritelevision sockets.

The loudspeaker output signals come from the output of DAC 1 on pins 19 and 20 of IS09 and can be either NICAM or FM. As NICAM does not have the same pre-emphasis as the FM signal, they are at different audio levels so that NICAM is routed via amplifiers TS06 and TS08 and the two de-emphasis networks RS74, CS82 on the Right channel and RS83, CS87 on the Left channel.

The FM signal is routed straight through, with de-emphasis by RY74, CS85 on the Right channel and RY75 and CS90 on the Left.

The power amplifiers are TDA2030 ICs, IS40 and IS41 which feed the loudspeakers and the headphone socket.

Mute, which operates during channel change, FM/NICAM selection and at switch-on, as well as when required by the viewer, is accomplished by turning the volume to zero in IS09 and by a 'high' on the inhibit input pin 6 of IS10.

Peritelevision and phono socket outputs are taken from IS12 and amplifiers LS10 and LS11.

For Service Manuals Contact  
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# FERGUSON

## ICC5 COLOUR TV

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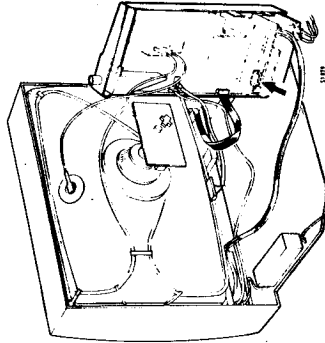
### Covering: Model 59K5

### Sheet ONE of Two ACCESS FOR SERVICE

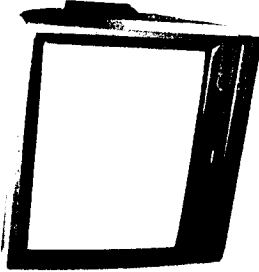
Disconnect the receiver from the mains supply by removing the mains plug from the wall socket. It is advisable to check both poles of the mains on-off switch for correct operation.

Remove the cabinet back by unscrewing the six retaining screws. The chassis frame hooks into the cabinet base and is held in position by the cabinet back.

The lead lengths are sufficient to allow the main chassis to be turned and clipped into the vertical servicing position as shown in the diagram, but care is necessary in order to avoid forcing the video-chroma board against the CRT base board.



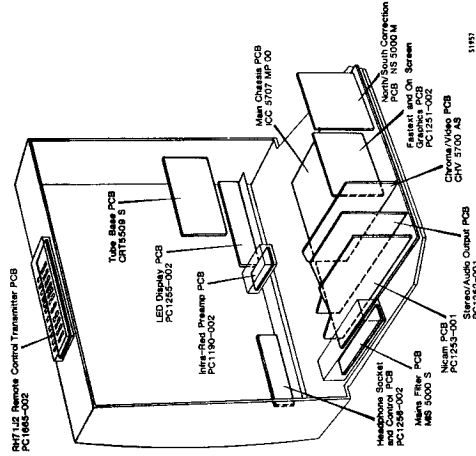
Main Chassis Servicing Position  
 Push the chassis into the plastic clip as shown



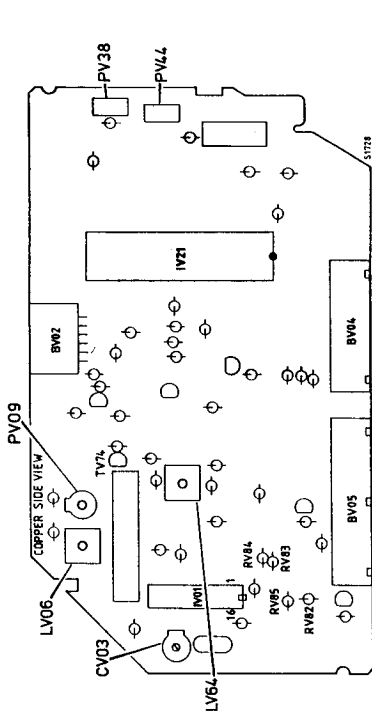
Model 59K5 with Remote Control, FASTEXT, On-Screen Graphics, Peritelevision Facilities and NICAM Stereo Sound



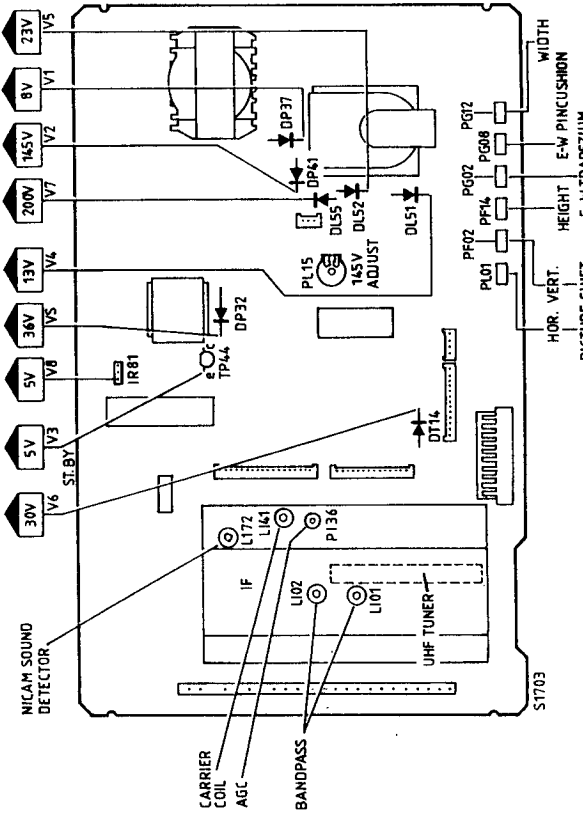
009373



Printed Circuit Board Location Diagram



Chroma/Video Board CHV 5700 AS Adjustment Diagram



Main Board ICC 5707 MP 00 Adjustment Diagram

## INSTALLATION

### Power Supplies

Mains input 240V a.c. 50Hz. The receiver will operate from a mains input between 180V and 264V no adjustments being required. The chassis is isolated - however an area of the main PCB carries live mains and the usual precautions must be taken when servicing in this area.

### Fuse

Mains input circuit reference FPO5 20mA cartridge type T1.6A. Unclip the mains input filler cage for access.

### Aerial Socket

Standard coaxial 75 ohms impedance.

### Degaussing

Dual PTC thermistor unit running on the a.c. mains operates whenever the receiver is switched on from cold.

### Customer Controls

See Operating Instructions for details.

### WARNING

**EHT Shock Hazard**  
The EHT must be safely discharged before attempting to disconnect the EHT lead from the tube anode.

Clip one end of a convenient lead, such as a meter lead, to the tube earthing strap on a meter body, fold back the suction cap and discharge the EHT through the lead. Press in one side of the spring clip which projects into the tube cavity to ease removal of the EHT connector.

### IMPORTANT

Do not disturb the tube neck adjustments as these have been set for optimum performance during tube manufacture.

### SERVICING

#### ADJUSTMENTS

The following preset adjustments are not usually required during installation and should be made only if necessary after servicing.

#### SET V2 HT 145V (PL15)

Conditions are Programme 1 selected with locked picture but black screen, i.e. contrast, brightness and sound volume controls at minimum. Measure the V2 voltage at DIP10mm. (See test point diagram) and if necessary adjust to 145V. Readjust controls for normal reception.

The following picture geometry adjustments are grouped in a row at the bottom of the chassis and can be accessed through holes in the cabinet back.

#### PICTURE HEIGHT AND WIDTH (PF4 AND PG12)

Adjust for full vertical and horizontal scan consistent with correct proportions.

#### PICTURE SHIFT (PL01 horizontal and PF02 vertical)

If necessary, adjust to centre the picture. It may be necessary to readjust the vertical after making the horizontal adjustment.

#### EAST-WEST PINCUSHION (PG08)

Adjust to remove bowing at the left and right-hand edges of the picture.

#### EAST-WEST TRAPEZIUM (PG02)

Adjust to give equal width at top and bottom of picture.

## NORTH-SOUTH PINCUSHION (PG53, PG56 and LG42)

The following adjustments are located on the north-south PCB.

With a crosshatch pattern displayed turn PG53 fully clockwise (as viewed from copper side of board). Adjust LG42 to centralise the curvature of the top and bottom horizontal lines. Adjust PG56 so that the centre horizontal line is straight.

Adjust PG53 so that the top and bottom horizontal lines are straight.

The following adjustments are located on the tube base PCB.

Note: The A1 and Picture White Adjustment are repeated in the full alignment sequence.

### A1 VOLTAGE (PV90A)

Adjust under normal reception conditions but with contrast and brightness at minimum to give a black screen. Check the voltage at the green cathode (pin 6) and, if necessary adjust for 150V. Restore normal picture.

### FOCUS VOLTAGE (PV90B)

Adjust for overall picture sharpness.

### PICTURE WHITE ALIGNMENT (PV50 AND PV70)

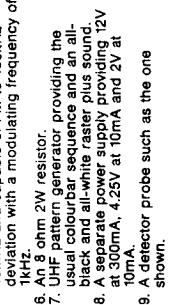
Use a Greyscale wedge or test card to observe results. Adjust PV50 (red) and PV70 (blue) for clean peak white, free from colouration.

### ALIGNMENT

Full alignment sequence excluding picture geometry adjustments

#### Equipment Required

1. An IF wobulator with markers at 33.7MHz and 37.6MHz.
2. An oscilloscope capable of displaying 100mV at 6MHz and also of functioning in the XY mode, i.e. dual input.
3. Non-metallic trimming tools, including an 8 BA(4mm) non-metallic box spanner.
4. A multirange meter (20kΩ/V) such as the Avometer Model 8.
5. A signal generator covering 5MHz to 40MHz and capable of FM to 100kHz deviation with a modulating frequency of 4kHz.
6. 1kΩ, 2W resistor.
7. UHF pattern generator providing the usual colour bars and an all-black and all-white raster signal.
8. A separate power supply providing 12V at 300mA, 4.25V at 10mA and 2V at 10mA.
9. A detector probe such as the one shown.



### Bandpass L101 and L102

1. Connect the wobulator output lead, via a series 3.9kΩ resistor and 1nF capacitor, between the junction of C101/C102 and earth.

2. Connect the input of the detector probe across R132 and its output to the oscilloscope (should the wobulator not be provided with its own detector probe).

3. Set the wobulator centre-frequency to 36.5MHz and the output to maximum, with markers at 37.6MHz and 33.7MHz. Connect the 12V supply between BS15/15 and earth.
4. Switch on the 12V supply and adjust the Y gain of the display for a full scale deflection.
5. Adjust L101 for a minimum at 37.6MHz and L102 for a maximum at 33.7MHz - this will be the colour bar.
6. Switch off the 12V supply and disconnect the detector probe and the wobulator input.

### Carrier Coil L141

7. Connect the generator, set to 39.5MHz, in place of the wobulator and the meter between I36/11 and earth (generator output not to be less than 100mV p.d. across 75 ohms). Connect the 2V supply between I36/4 and earth. Meter on 0V-10V range.
8. Switch on the 12V and 2V supplies.
9. Adjust L141 for a minimum meter reading.
10. Switch off the supplies and disconnect the generator, the supplies and the meter.

### AGC

11. Connect the pattern generator to the aerial input socket and adjust the generator output for 1.5mV p.d. across 75 ohms. The generator should be set to 59.25MHz, with the colourbar sequence.
12. Adjust potentiometer P166 maximum clockwise.
13. Switch the receiver on and adjust the tuner to channel 27.
14. Mute volume and adjust brightness, contrast, and colour for normal viewing, i.e. normalise condition.
15. Adjust P166 until noise appears and then finally adjust for the condition where noise just disappears.
16. Switch the receiver off.

### Luminance/Chroma Video Module (PC CHV 5700) Chrominance Channel

17. Short-circuit pins 5 and 6 of IV01.
18. Apply 4.25V to pin 2 of IV01.
19. Switch the receiver on and adjust CV03 for the slowest scrolling of the colour signal.
20. Switch off, remove the short and the applied voltage.
21. Connect one input of the oscilloscope between the junction of RY82/83 and the input of RY84/85. Switch on the oscilloscope to the XY mode.
22. Switch the receiver on and adjust the respective Y gains of the oscilloscope to obtain a full scale vector style display.
23. Adjust PV09 for minimum amplitude of the centre dot and LV06 to obtain single dots for the 6 colours of the colourbar.
24. Repeat sequence 23 once more. If suitable test equipment is not to hand then PV09 and LV06 can be adjusted for minimum vertical blind effect whilst observing an air-air test card (normalised colour condition).

Check for satisfactory results by advancing the colour control.

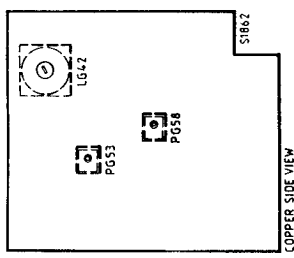
25. Switch the receiver off and disconnect the oscilloscope.

### Luminance channel

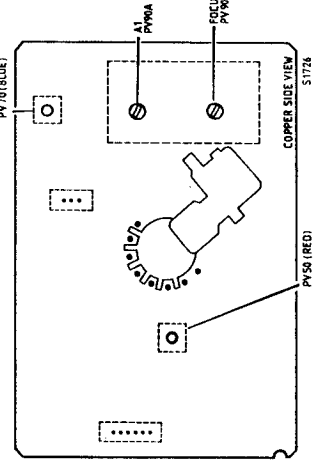
26. Connect one input of the oscilloscope between the emitter of TV74 and earth.
27. Switch the receiver on and set the pattern generator for an all-black raster.
28. Adjust LV64 for a minimum of the 6MHz signal.
29. Switch the receiver off and disconnect the oscilloscope.

### A1, Beam-limiting and Grey-Scale

30. Connect the meter, 600V range, between pin 6 of the CRT and earth.
31. Switch the receiver on and make sure that the pattern generator is still providing an all-black raster on channel 27.
32. Set PV38 and PV44 to maximum anti-clockwise.
33. Adjust the A1 control (PV90A) on the tube base board, for a reading of 150V.
34. Disconnect the meter and connect it between BS02/1 and earth (0V-3V range). Set the pattern generator to provide the colourbar sequence.
35. Note the reading on the meter and adjust PV38 for a 0.5V increase on this reading.
36. Set the pattern generator to provide an all-white raster and adjust contrast to maximum.
37. Note the reading on the meter and adjust PV44 for a 0.7V decrease on this reading.
38. Disconnect the meter and adjust PV50 and PV70, on the tube base board, for the pattern generator for the colourbar sequence, normalise contrast and brightness and adjust colour to minimum. Adjust PV50 and PV70 for optimum greyscale performance. N.B. Should the pattern generator be incapable of providing an all-black and all-white signal, then adjustment of the A1 control requires that the contrast, brightness and colour be set to minimum. Adjustment of PV44 requires be set to maximum.
39. Switch-off and disconnect the pattern generator.

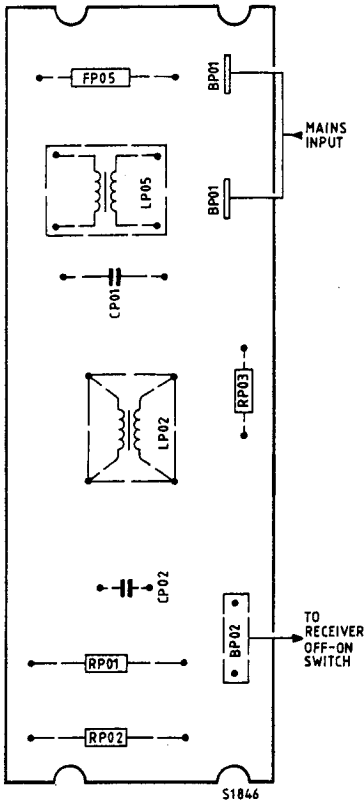


North-South Board NS 5000 M Adjustment Diagram

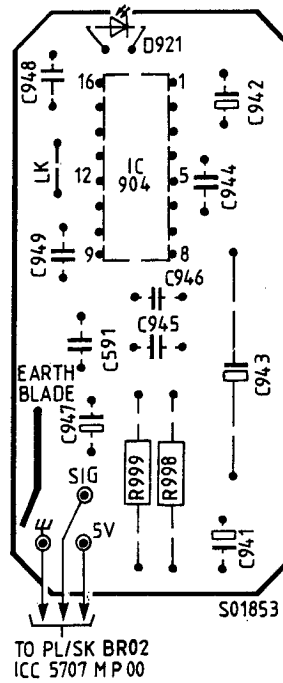


Tube Base Board CRT 5509 S Adjustment Diagram

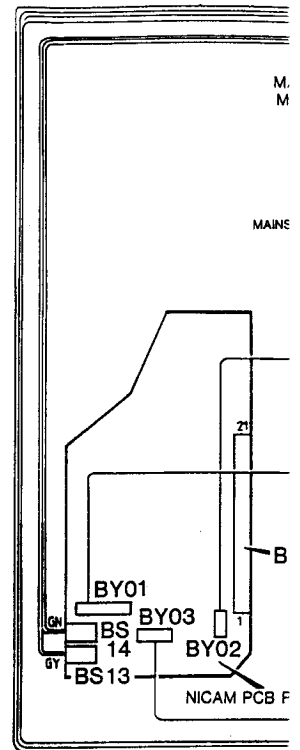
Refer to sheet TWO for NICAM and On-Screen Graphics Adjustments



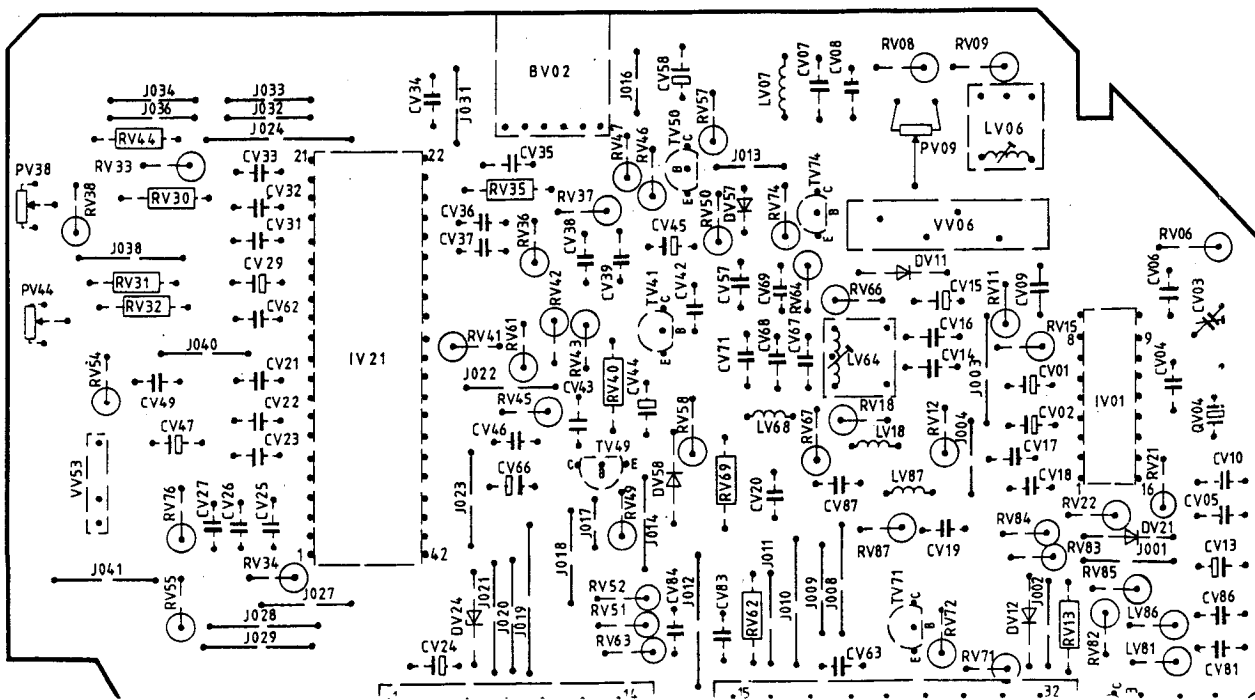
Mains Filter MIS 5000 S  
Component Location Diagram  
-viewed through Copper Side

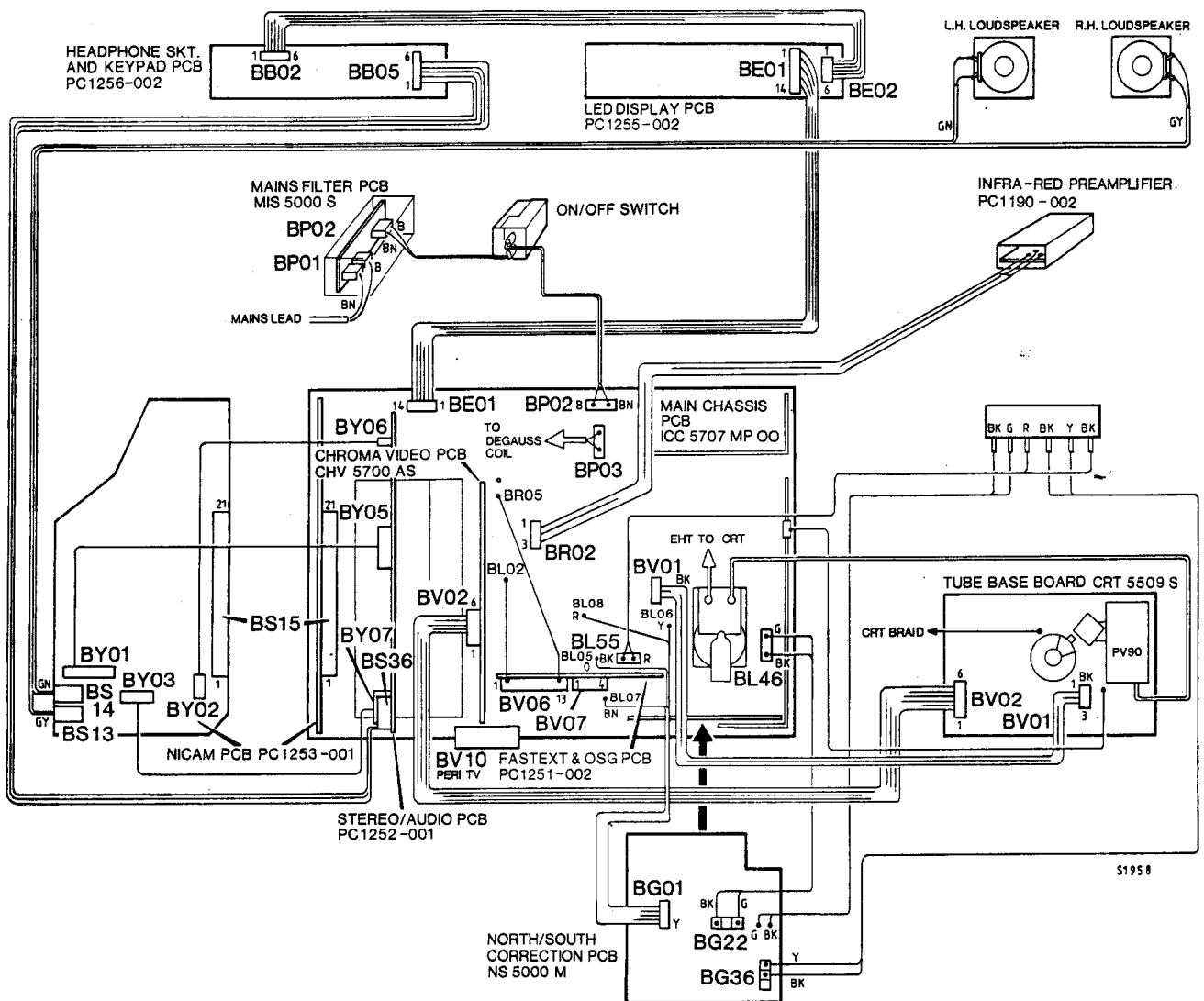


Infra-red Preamp PC1190-002  
Component Location Diagram  
-viewed through Copper Side

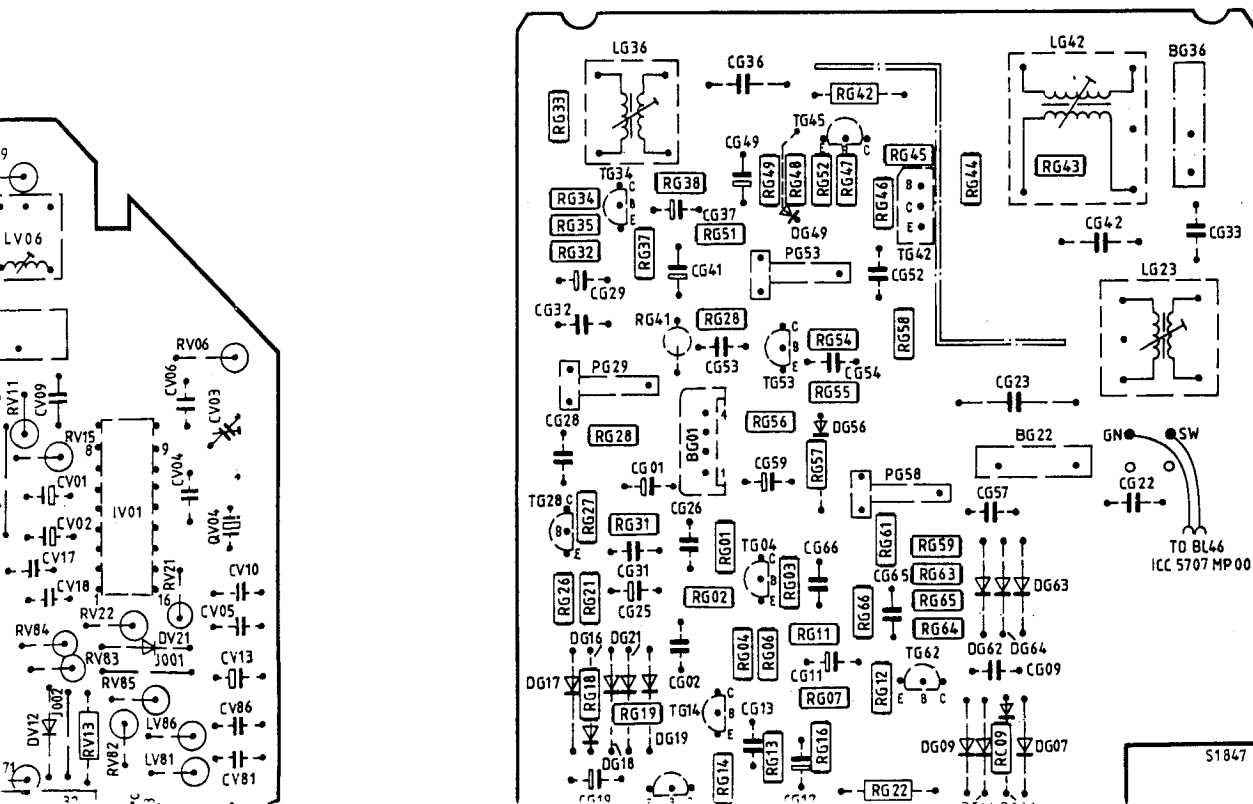


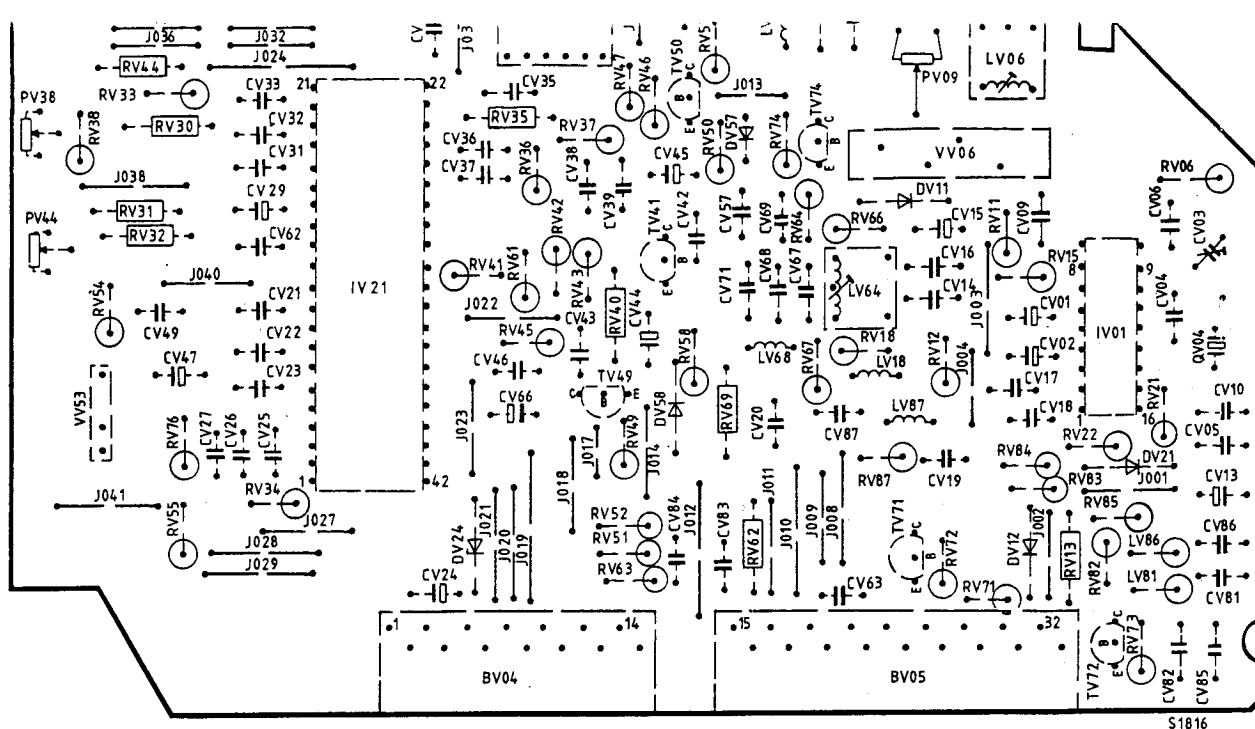
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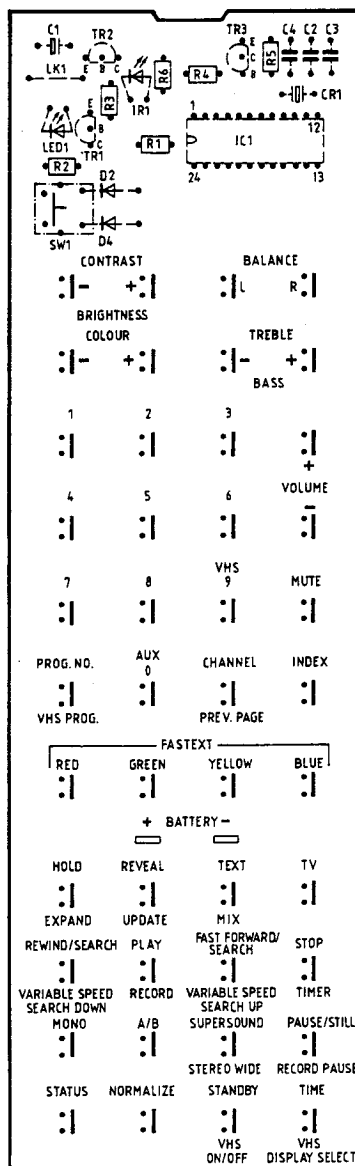


Model 59K5 Wiring Interconnections Diagram



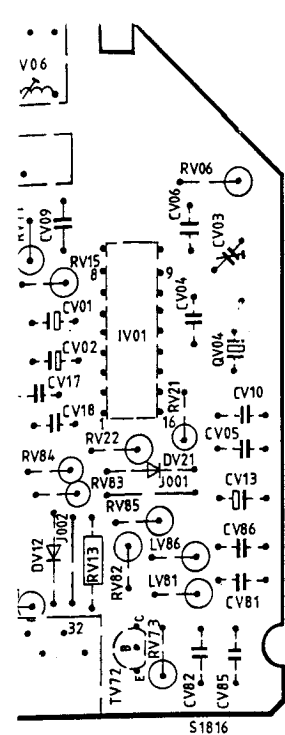


Chroma/Video Board CHV 5700 AS Component Location Diagram-viewed through Copper Side

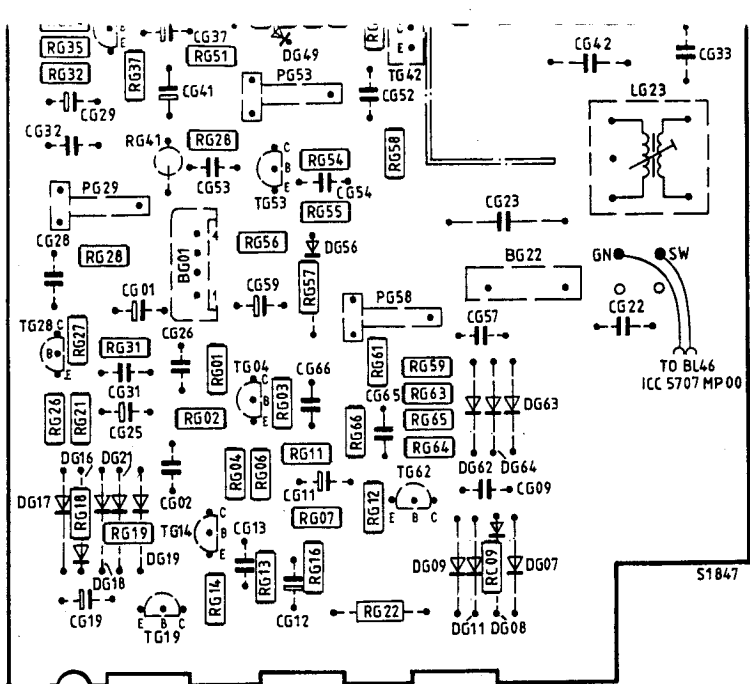


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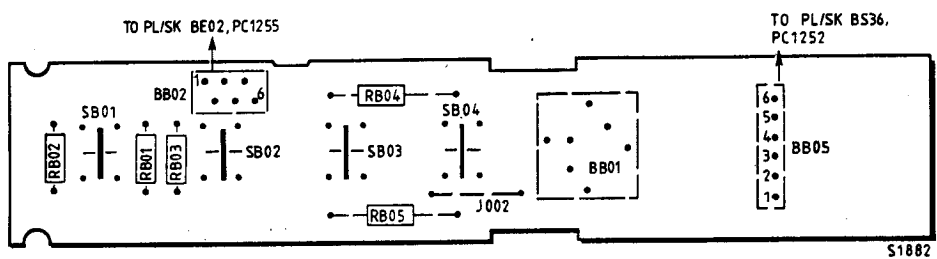
RH71J2 Transmitter Board PC1665-002 Component Location Diagram-viewed through Copper Side



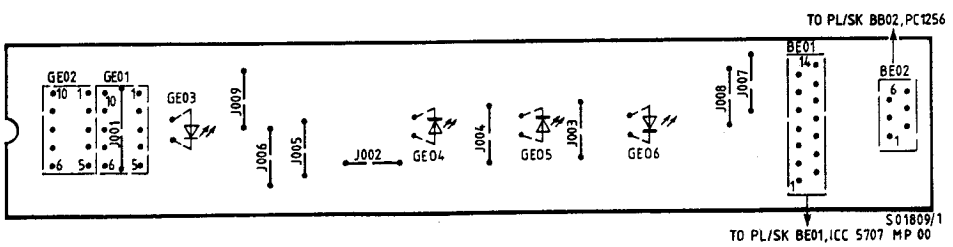
rough Copper Side



North-South Correction Board NS 5000 M  
Component Location Diagram  
-viewed through Copper Side

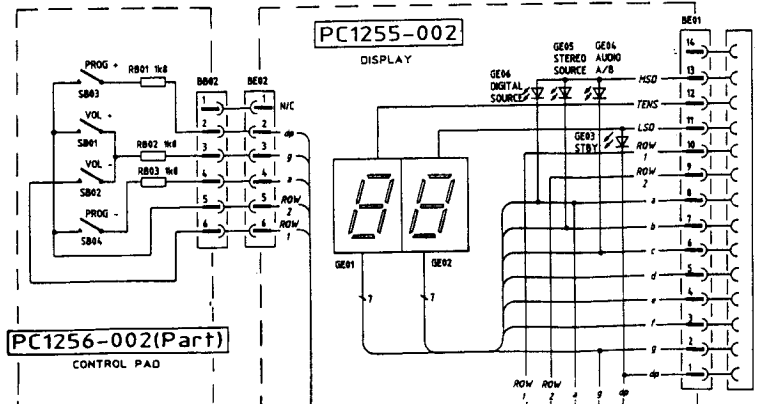
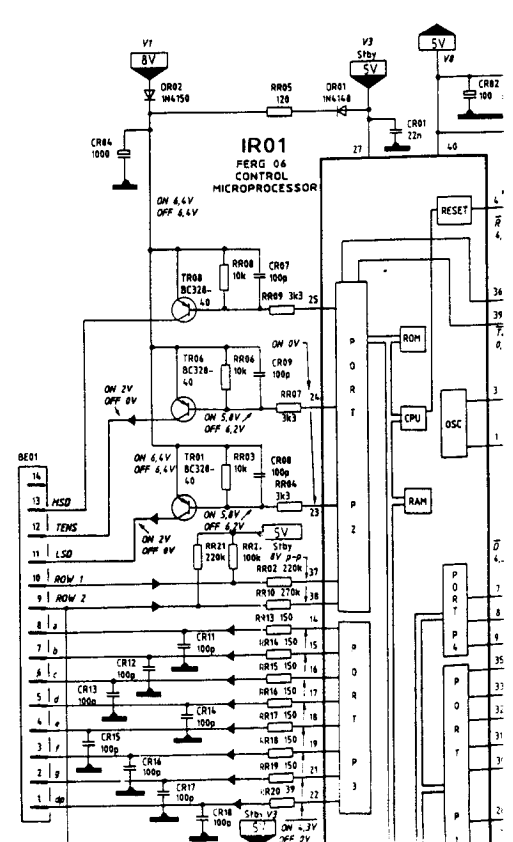
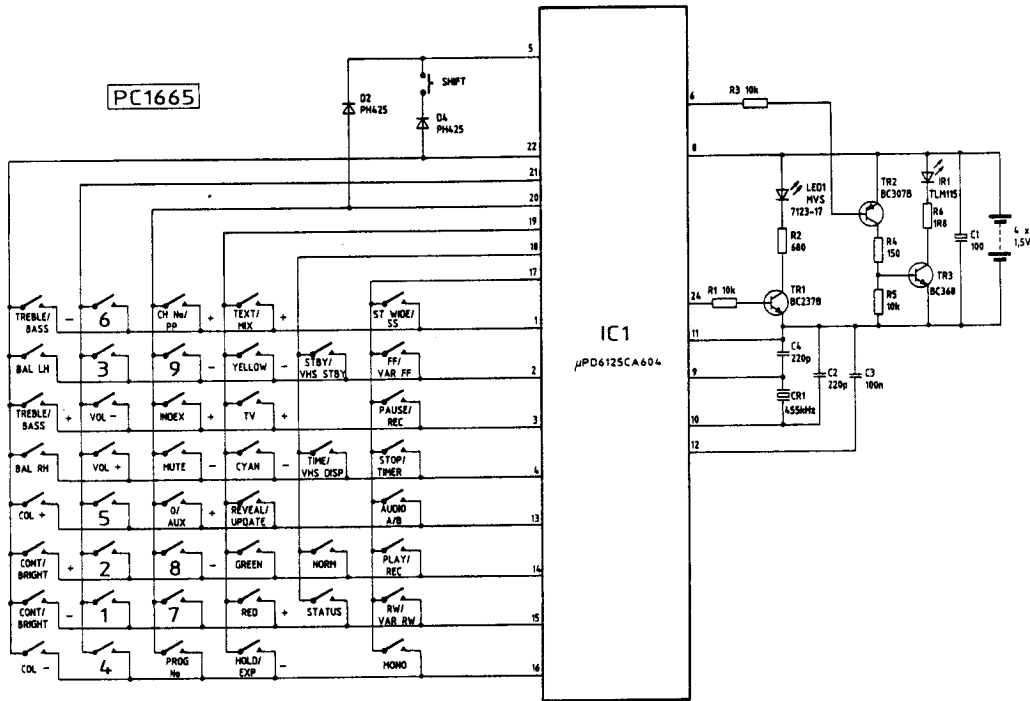
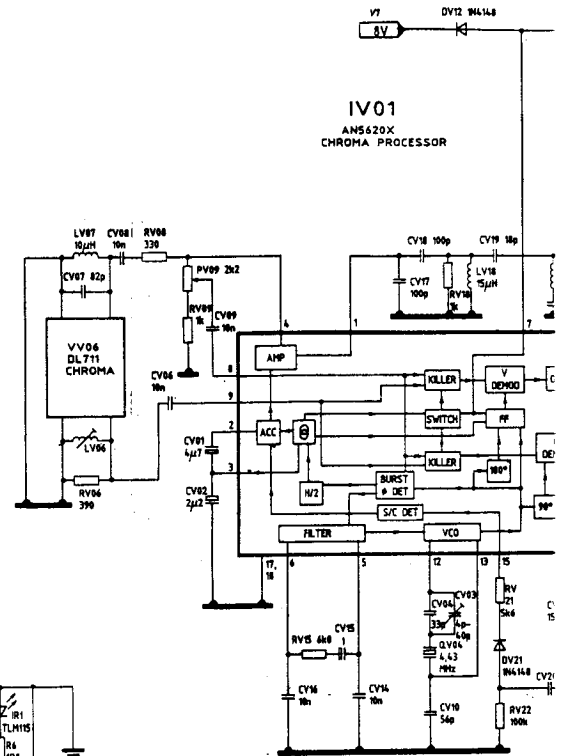


Headphone Socket and Control Board  
PC1256-002 Component Location Diagram  
-viewed through Copper Side

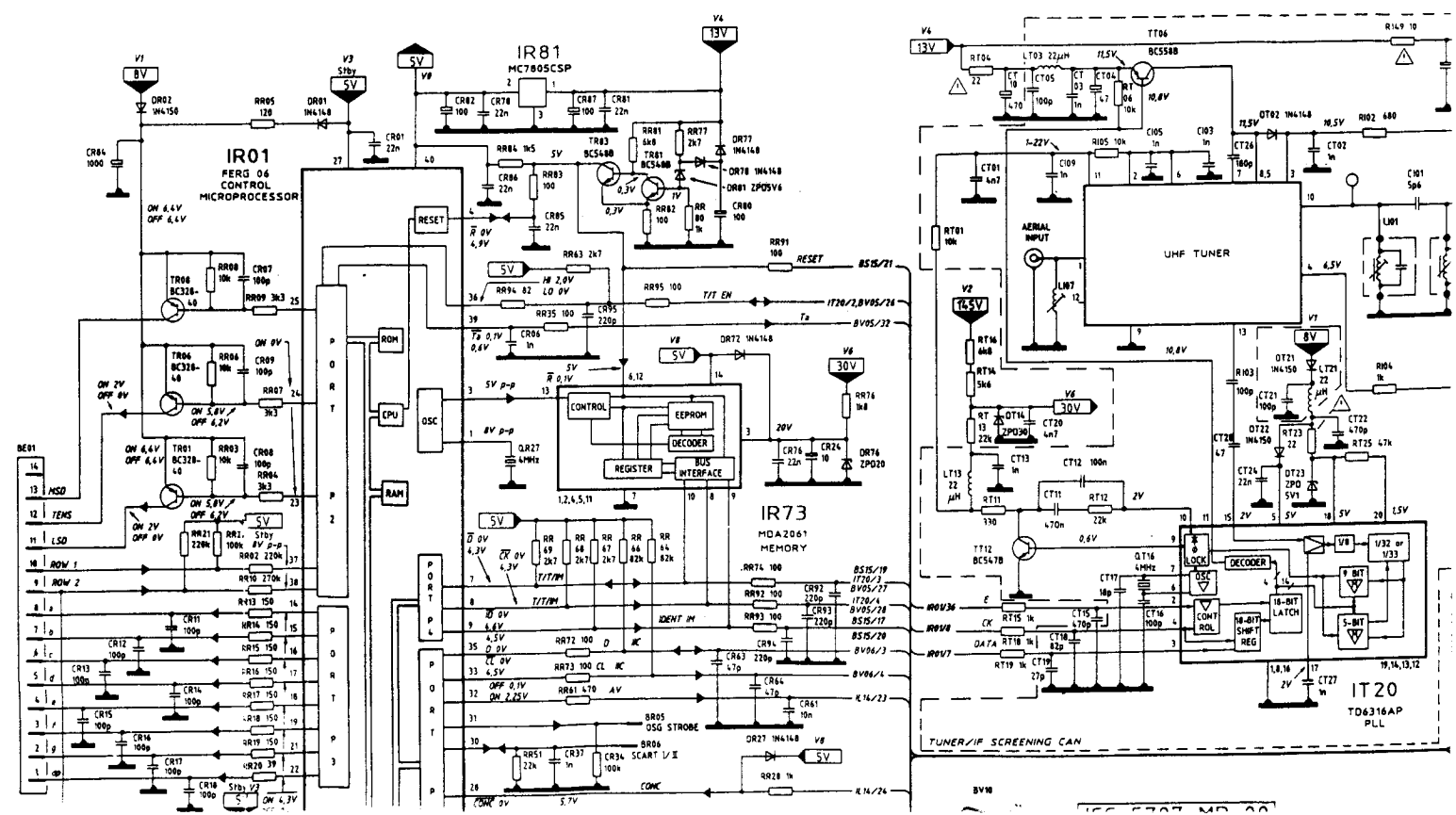
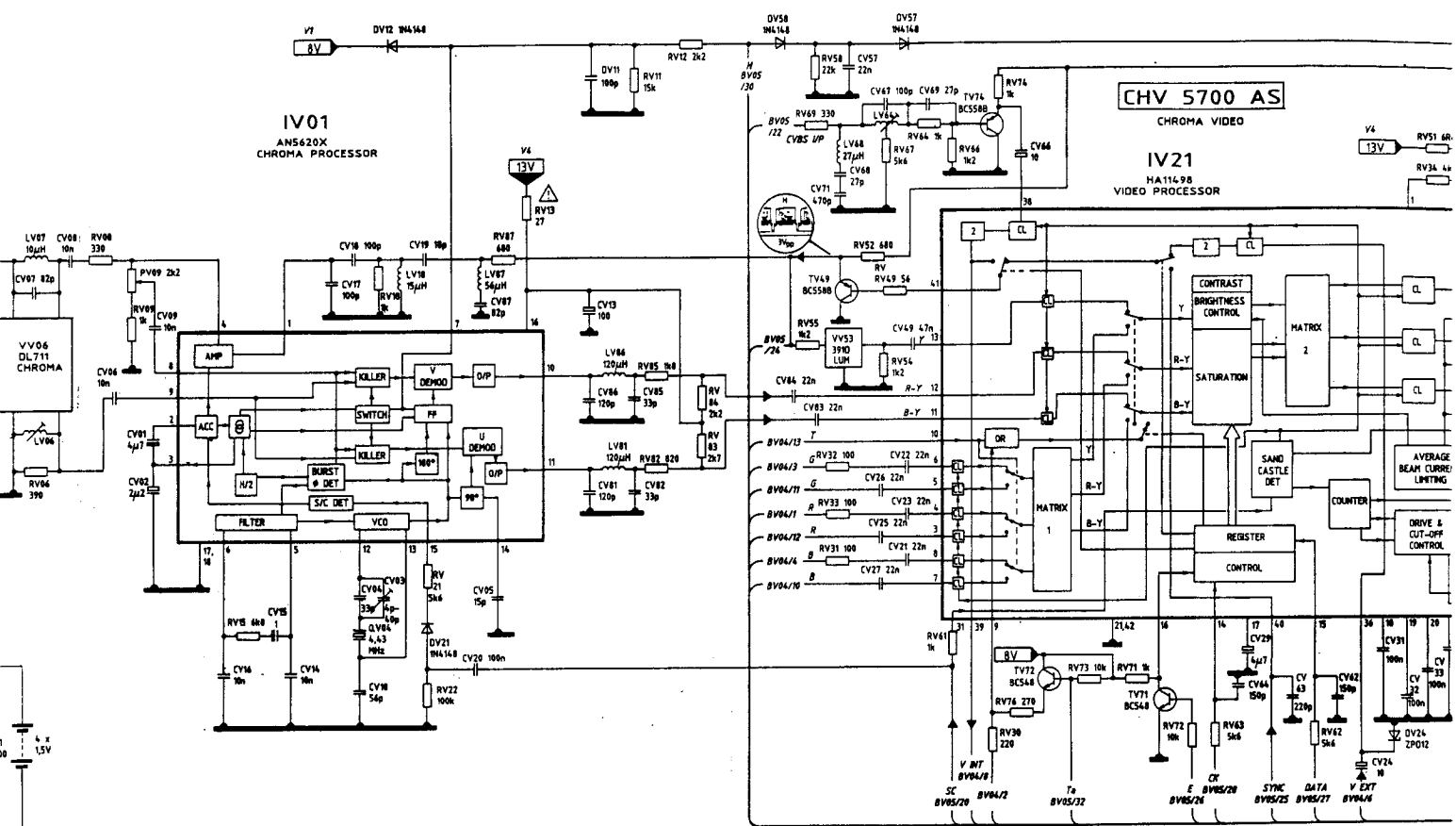


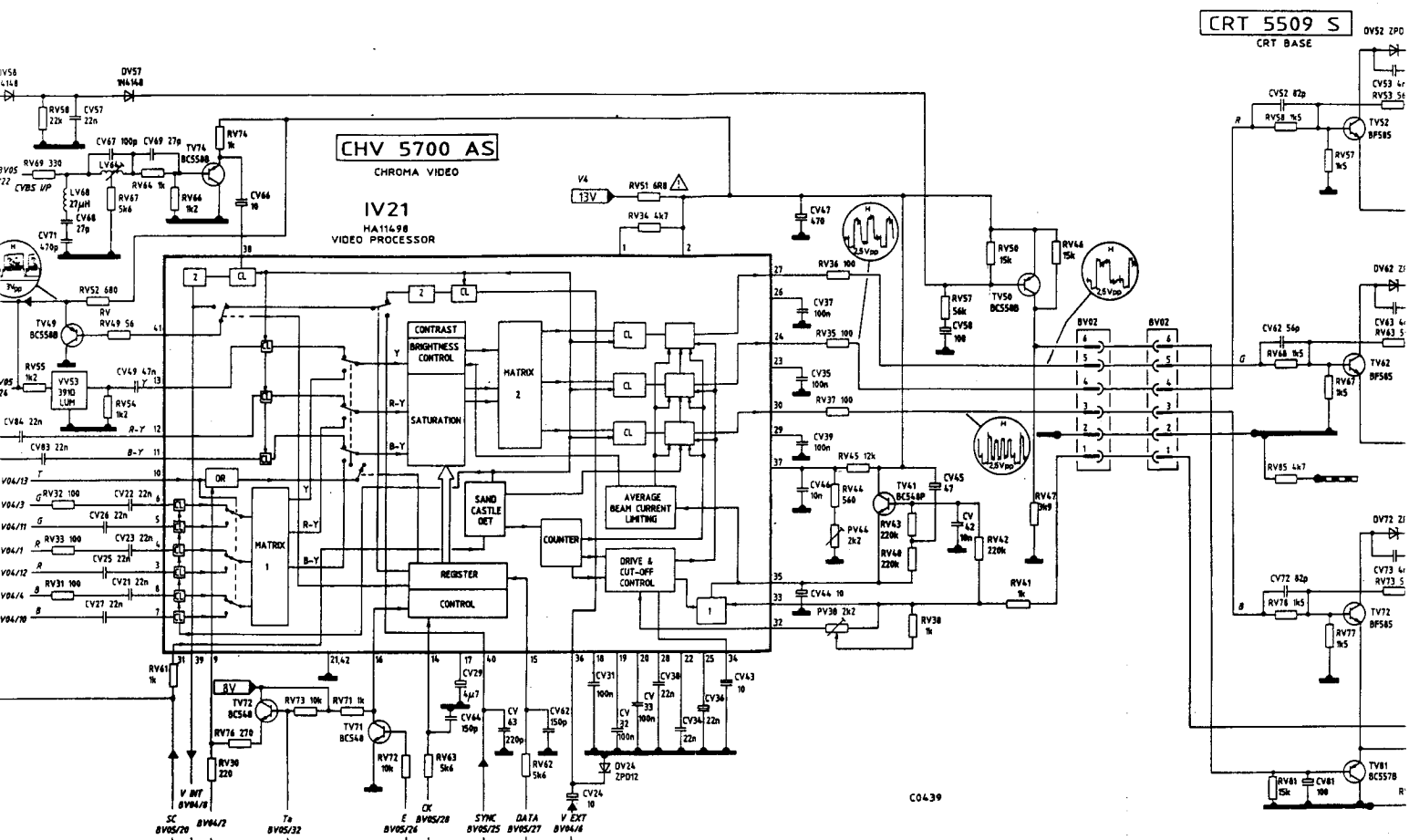
LED Display Board PC1255-002 Component Location Diagram  
-viewed through Copper Side

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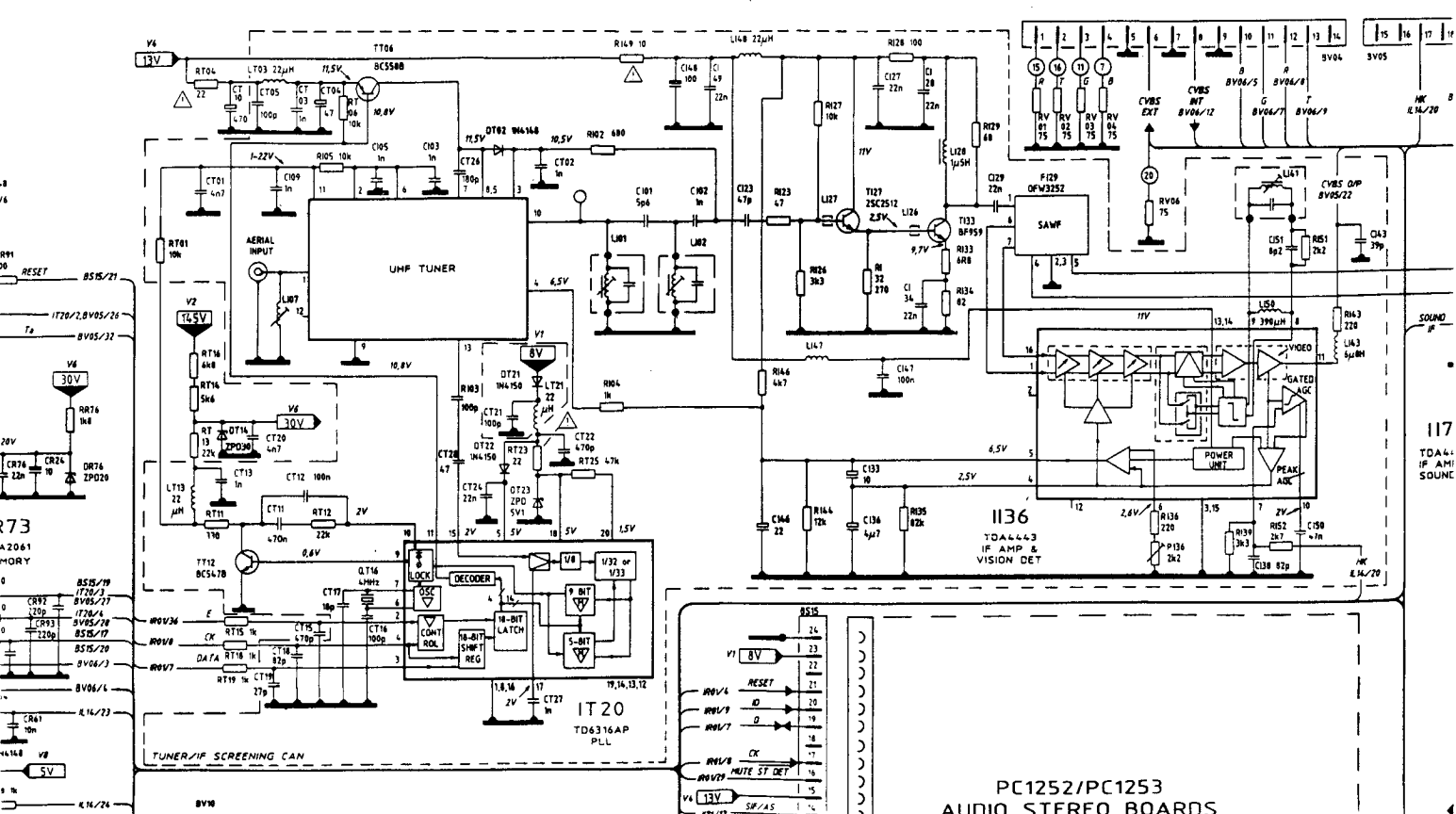
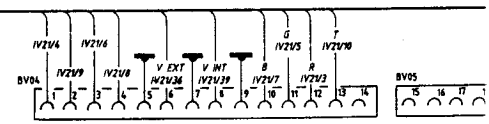


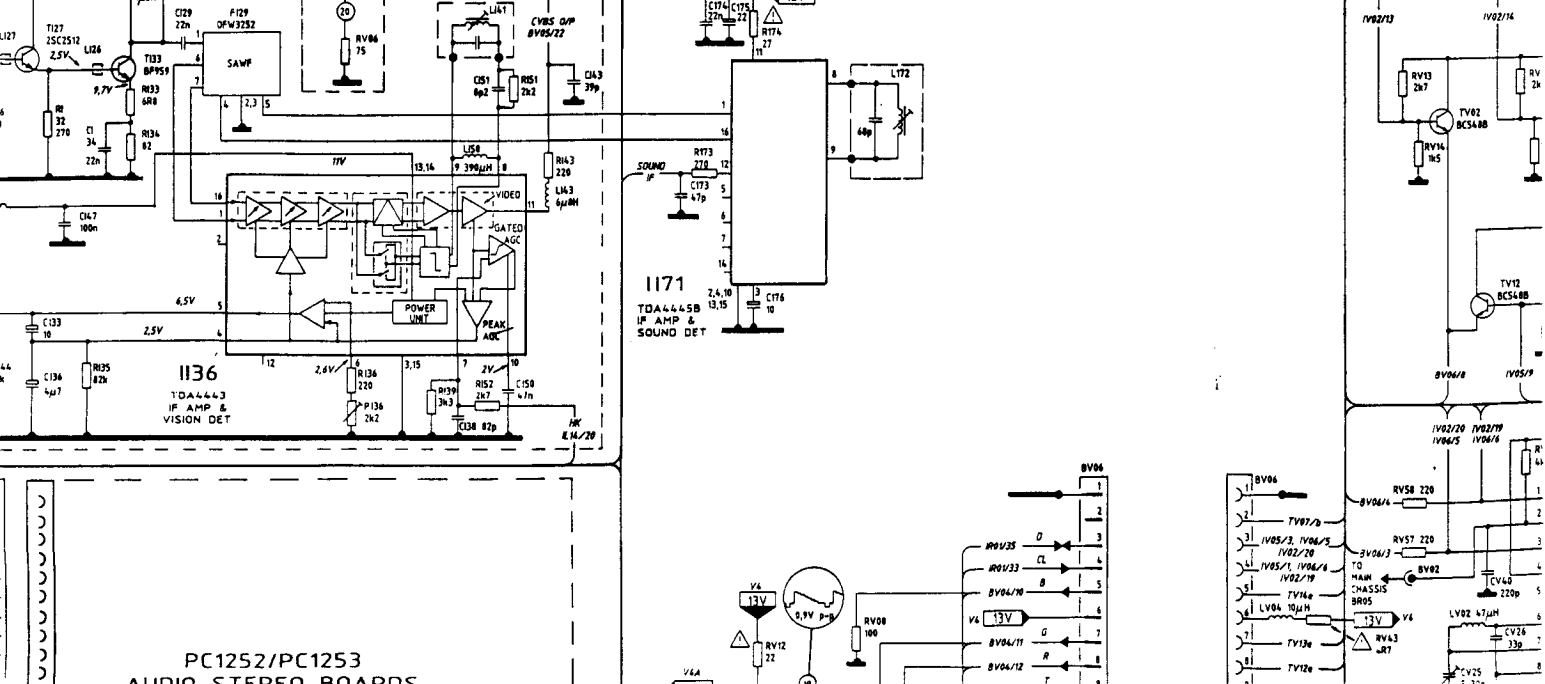
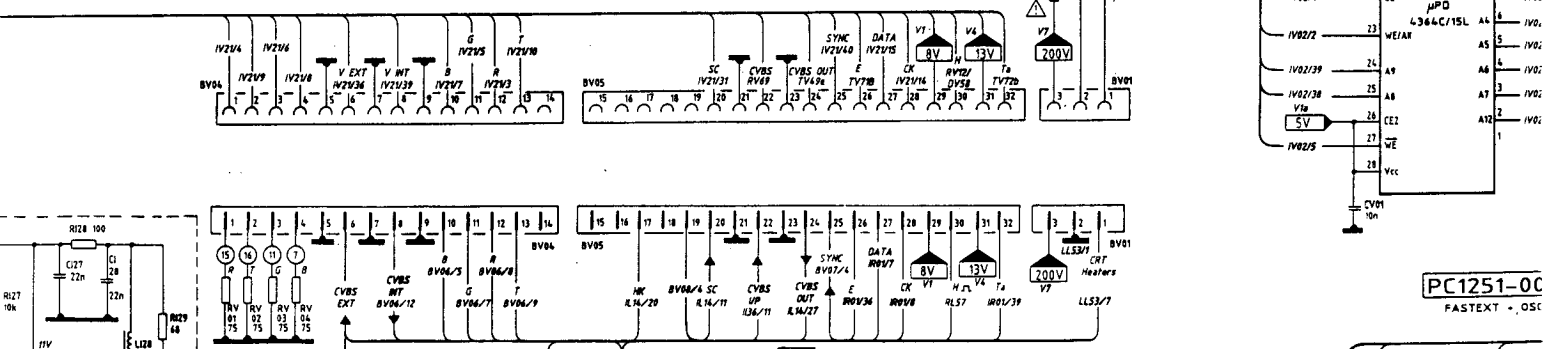
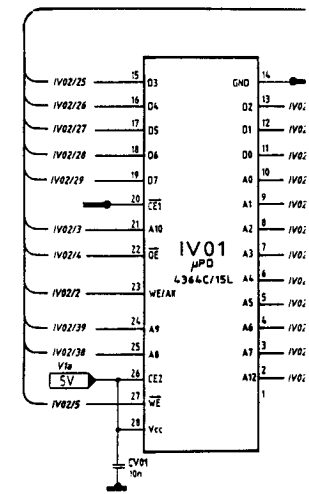
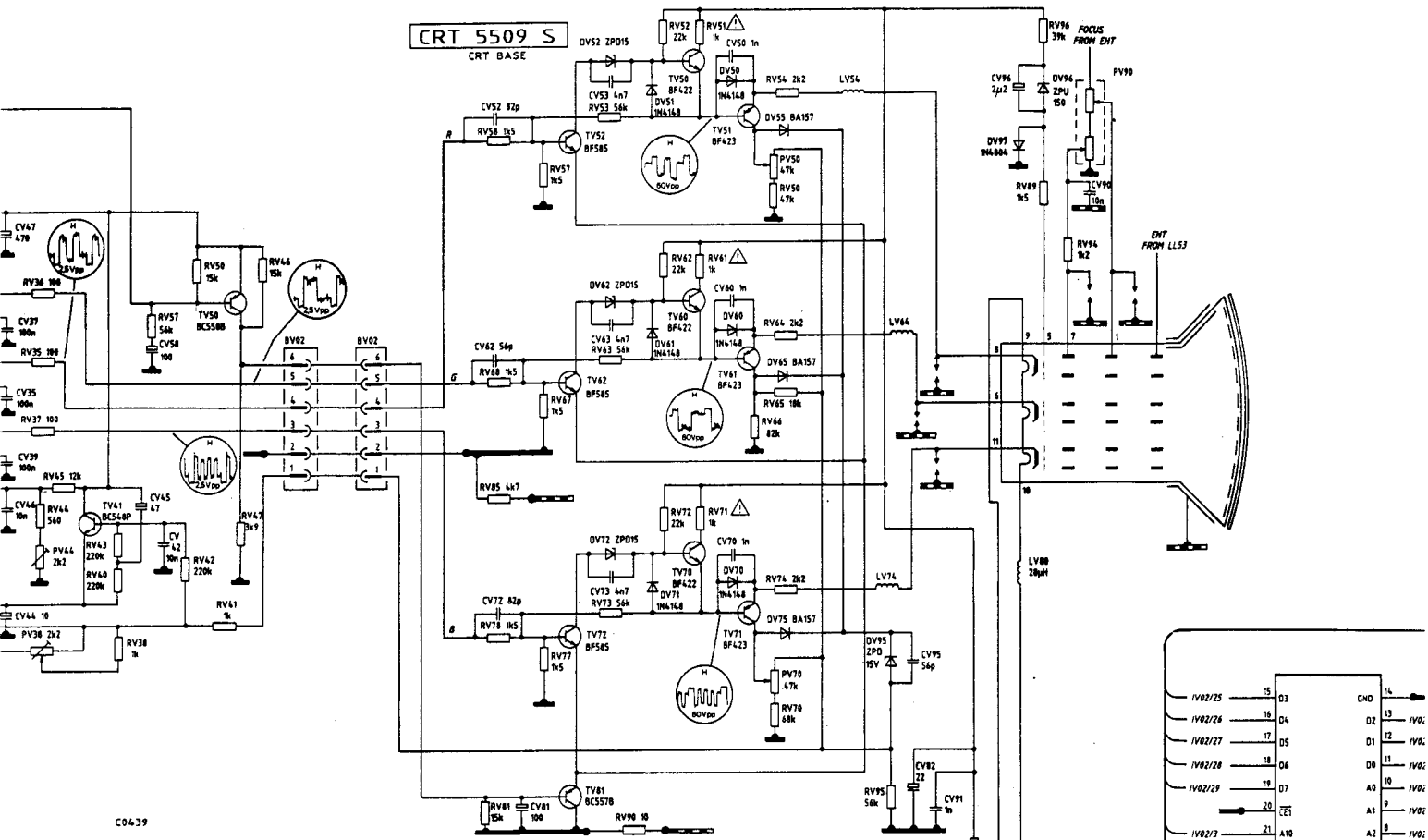






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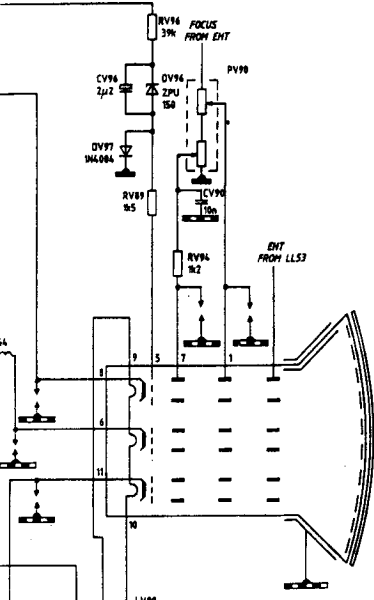




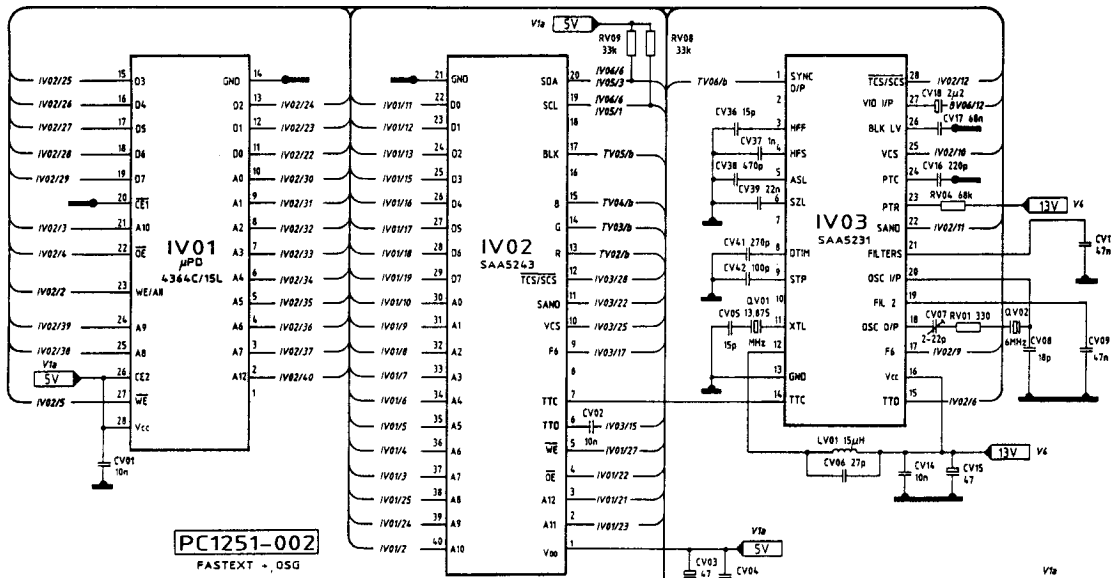
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PARTS**

**⚠ indicates critical safety  
components, and  
identical components should  
be used for replacement.**

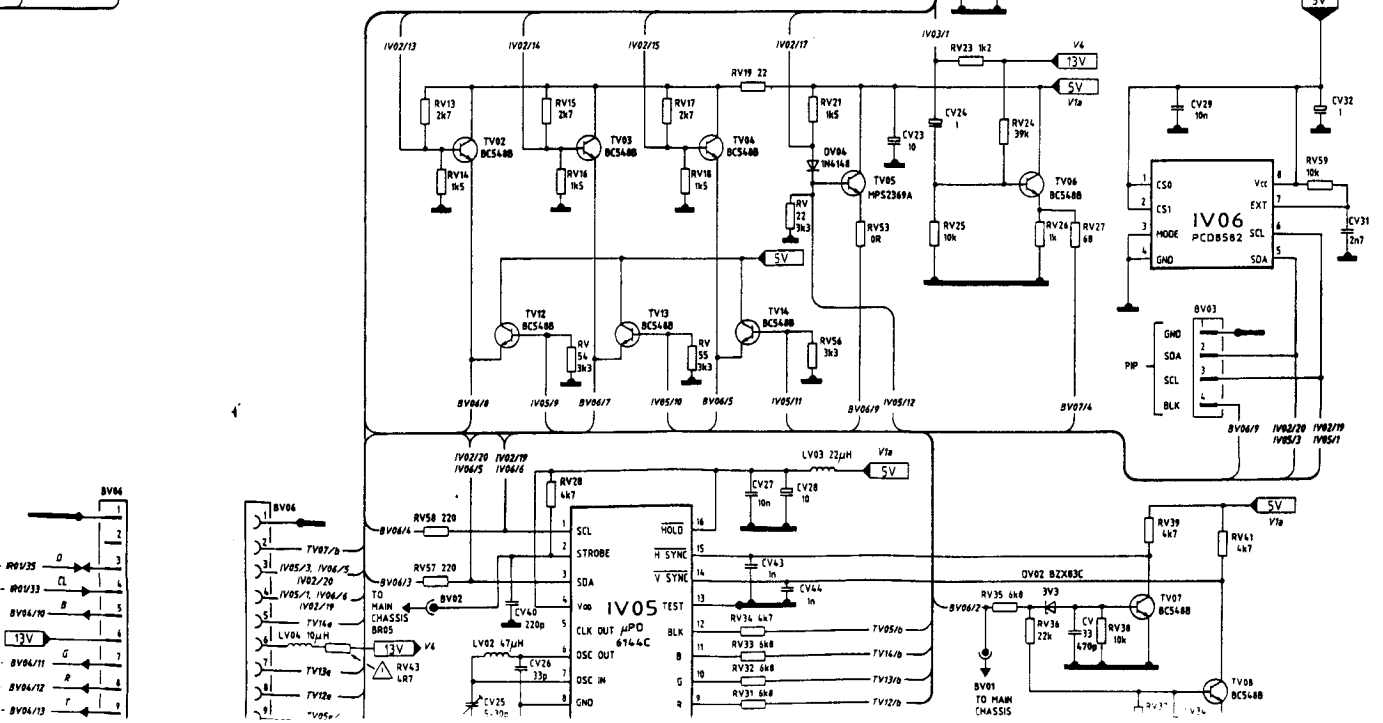
Component Description (e.g. Capacitor)	Circuit area used	Component number (e.g. 03)
<b>CP03</b>		
<ul style="list-style-type: none"> <li>B - HEADPHONE/KEYPAD</li> <li>C - CHROMINANCE</li> <li>D - DECODER</li> <li>E - DISPLAY (INTERFACE)</li> <li>F - VERTICAL</li> <li>G - GEOMETRY</li> <li>I - INTERMEDIATE FREQUENCY</li> <li>L - DEFLECTION</li> <li>O - OSCILLATOR</li> <li>P - POWER SUPPLY</li> <li>R - REMOTE CONTROL</li> <li>S - SOUND</li> <li>T - TUNING CONTROL</li> <li>V - VIDEO</li> </ul>		

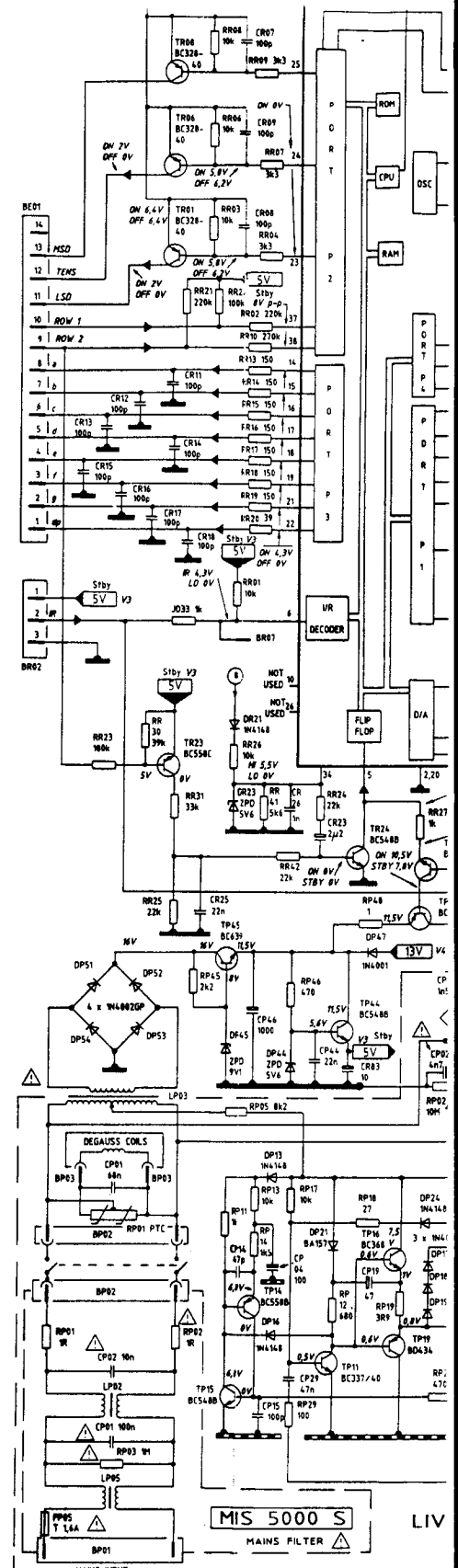
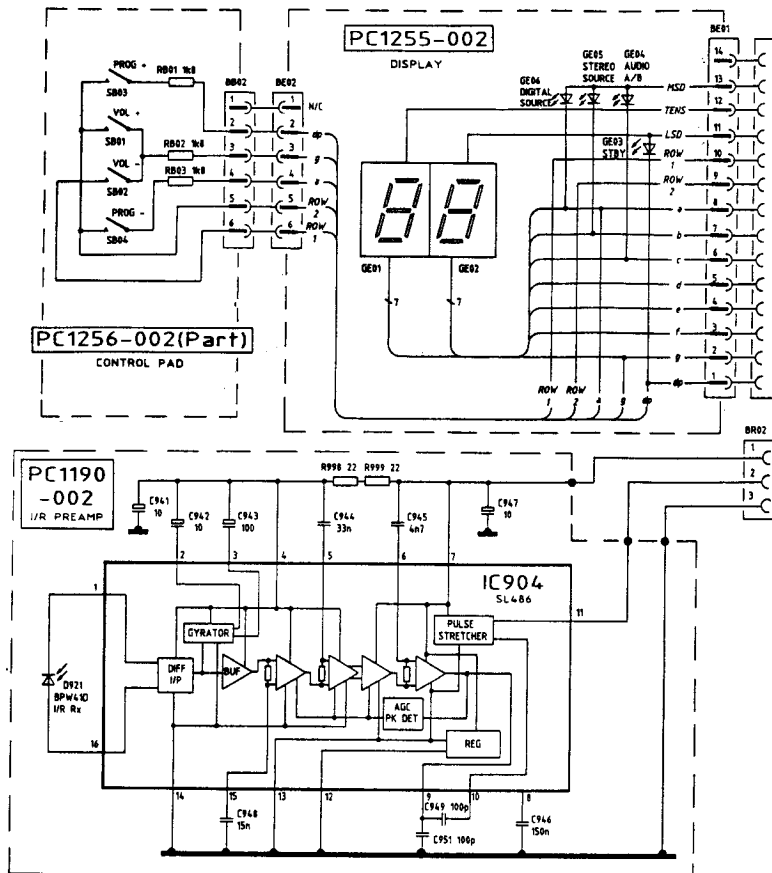


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**PC1251-002**  
FASTEXT + .OSG



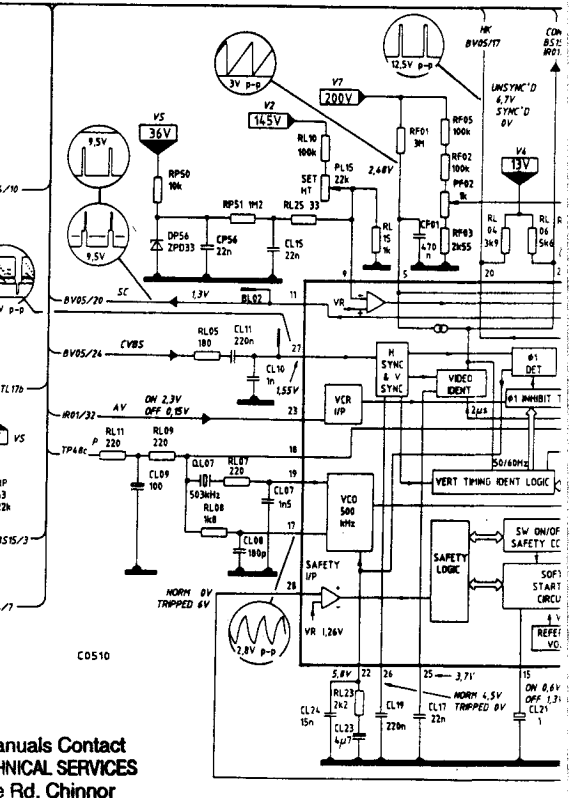
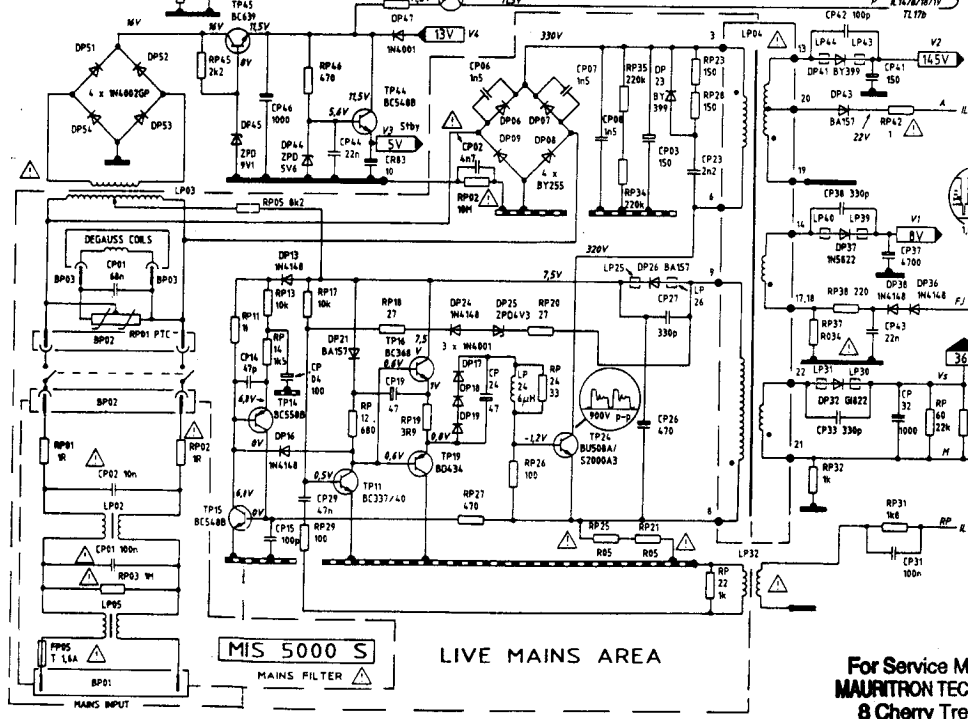
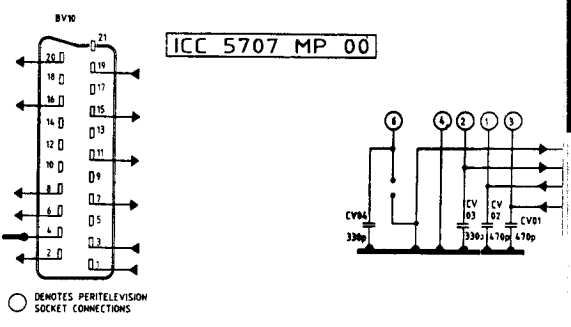
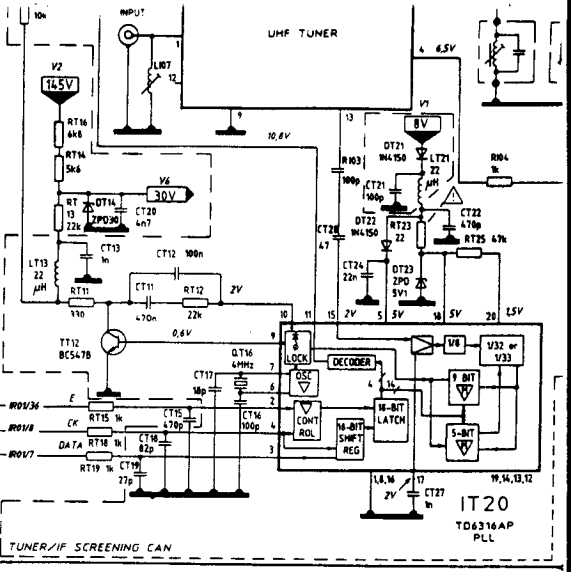
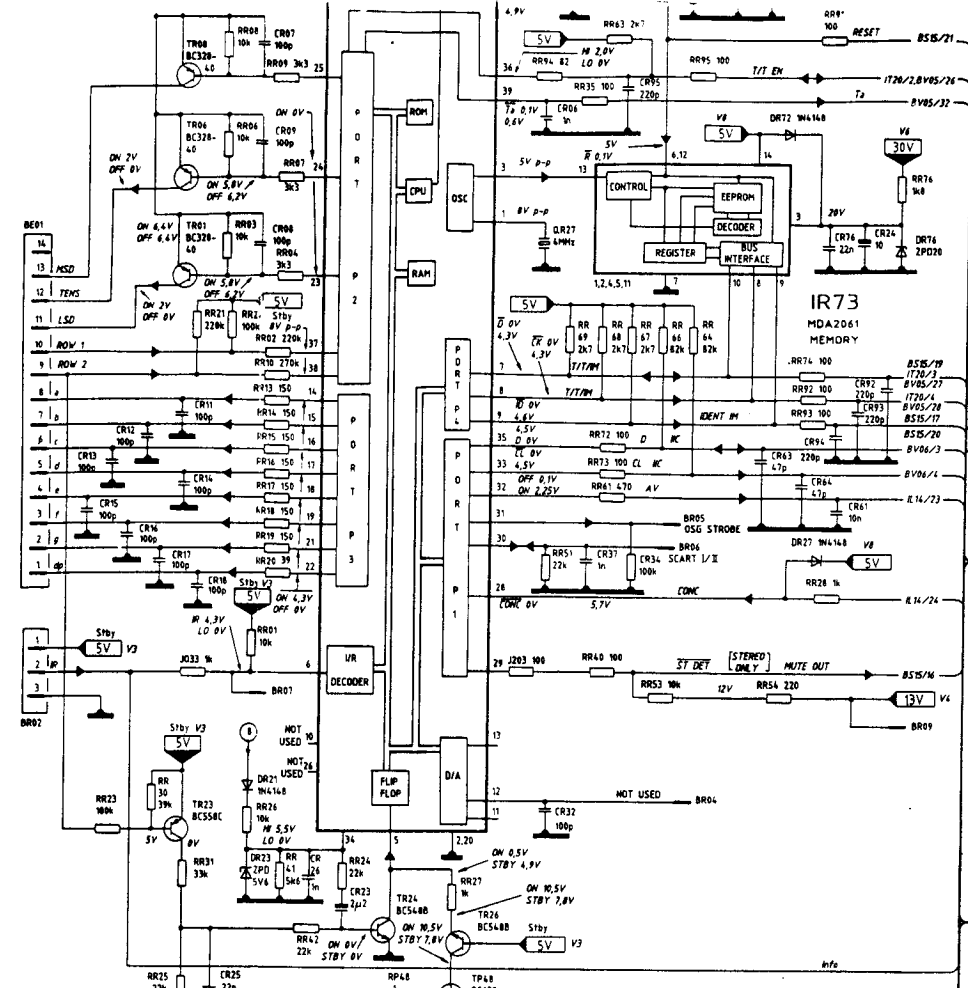


# Model 59K5 Circuit Diagram

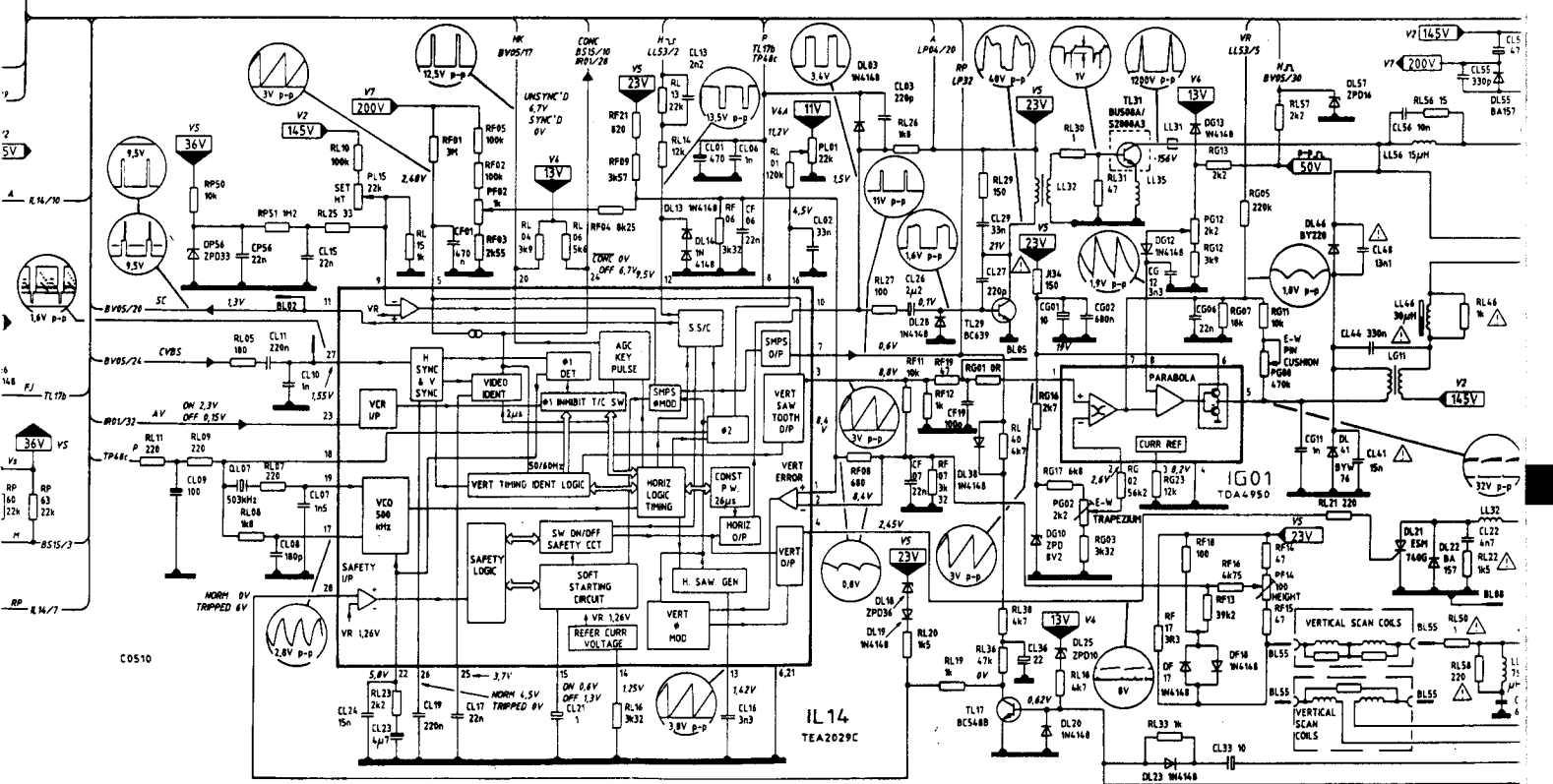
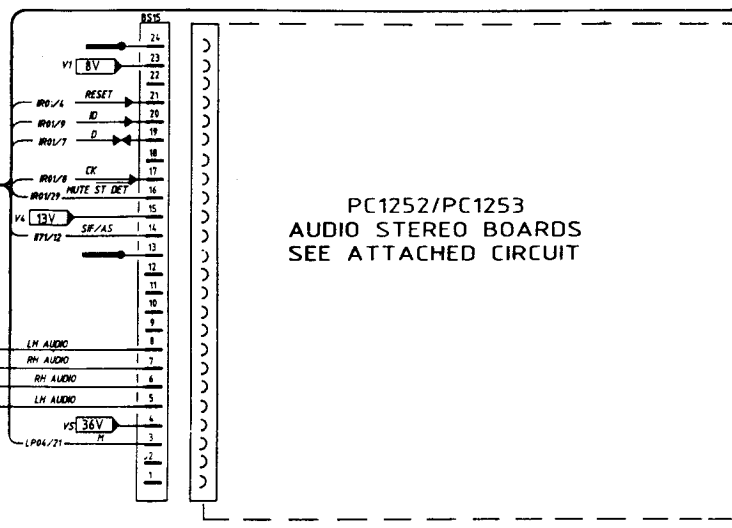
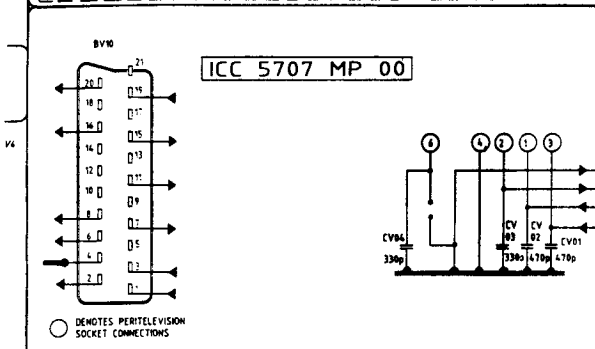
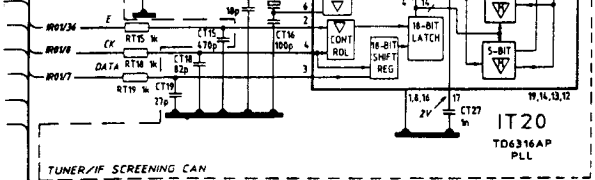
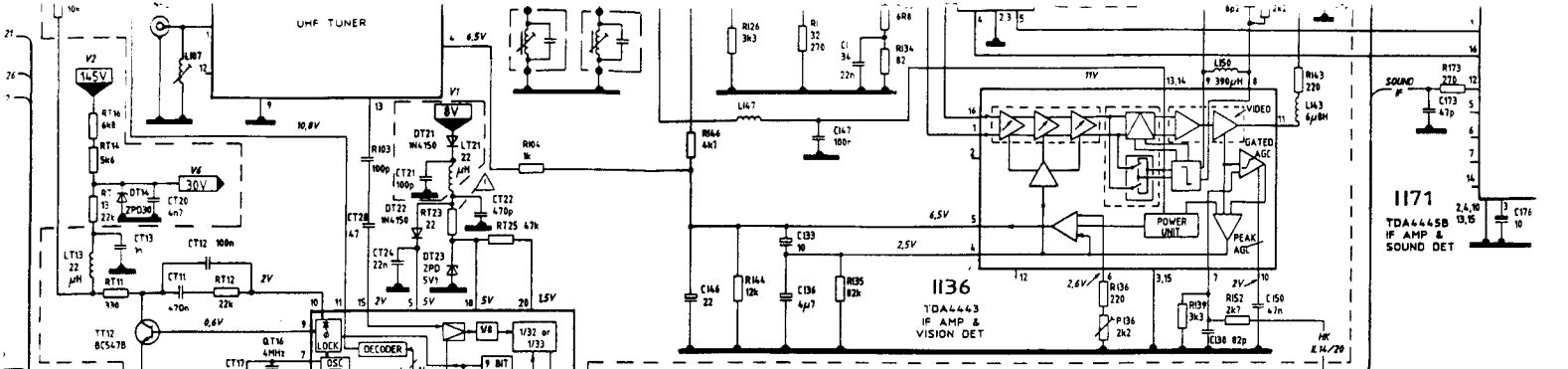
Refer to Sheet TWO  
for NICAM Circuits

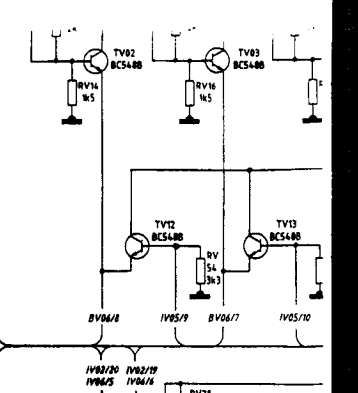
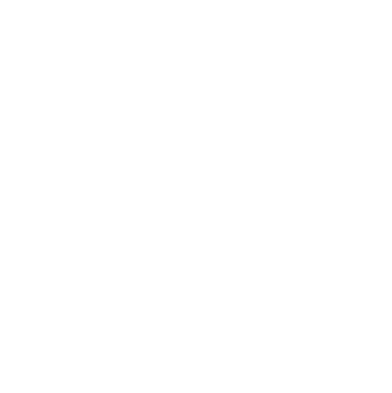
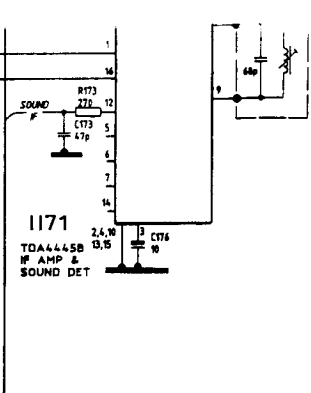
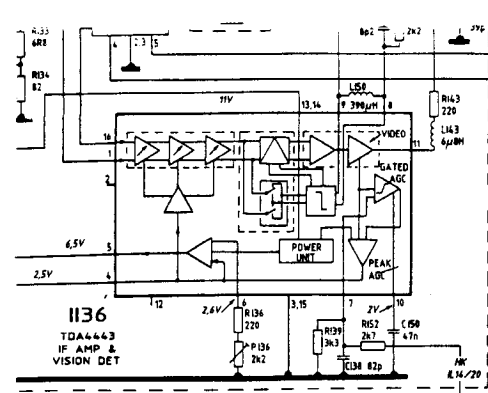
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PCB Number	Quote Part Number below when ordering spares
ICC 5707 MP 00	30503900
CRT 5509 S	30563800
PC1665-002	01V6665002
CHV 5700 AS	30458900
PC1251-002	01V6251002
PC1256-002	01V6256002
PC1255-002	01V6255002
PC1190-002	10M4102001
MIS 5000 S	30091400
PC1252-001	01V6252001
PC1253-001	01V6253001
NS 5000 M	30346300

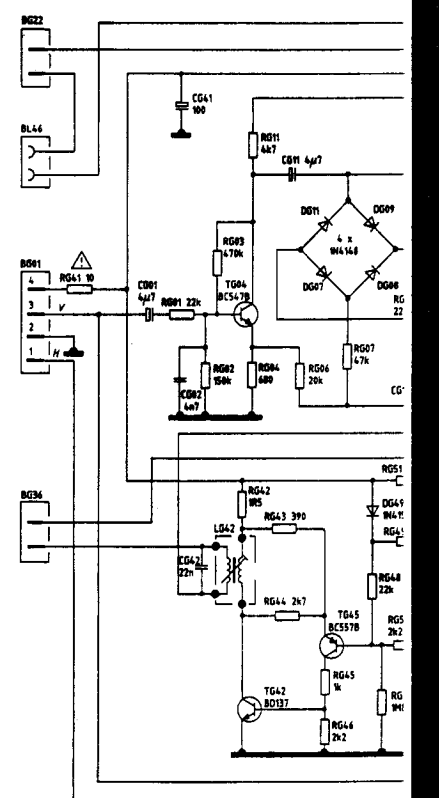
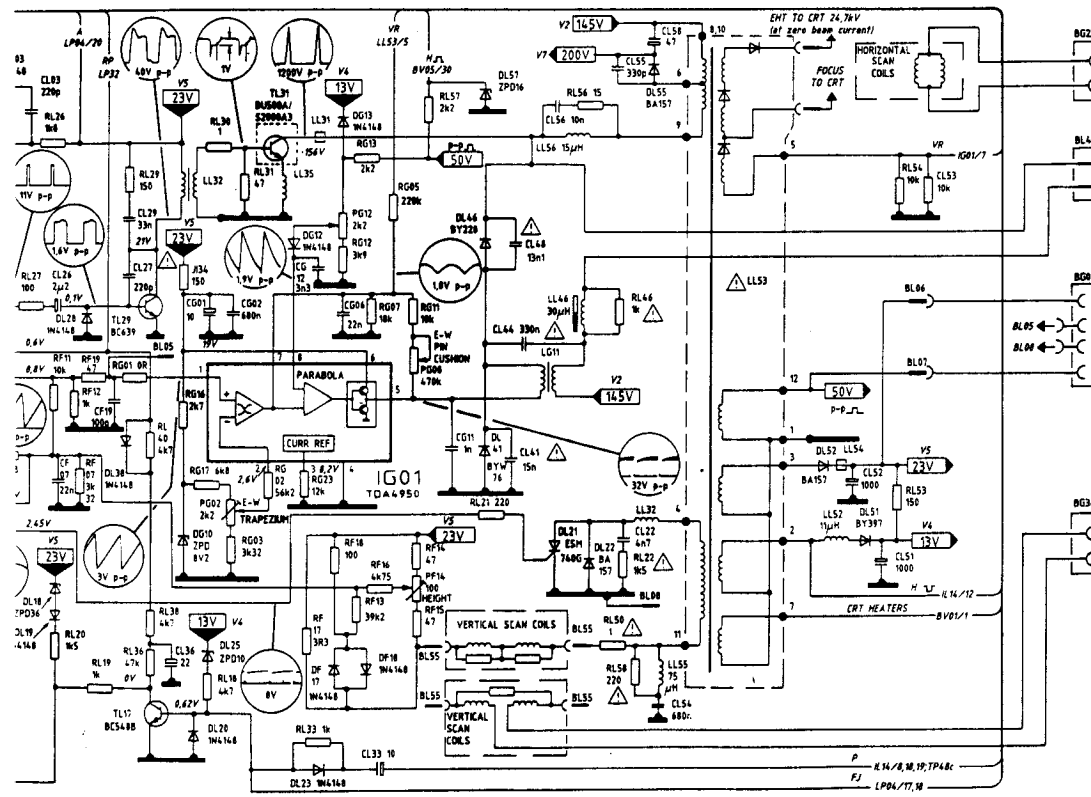
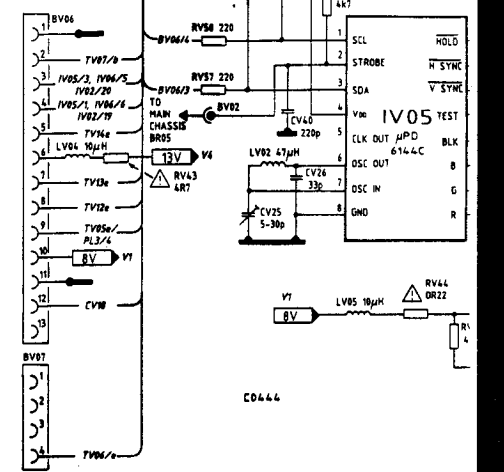
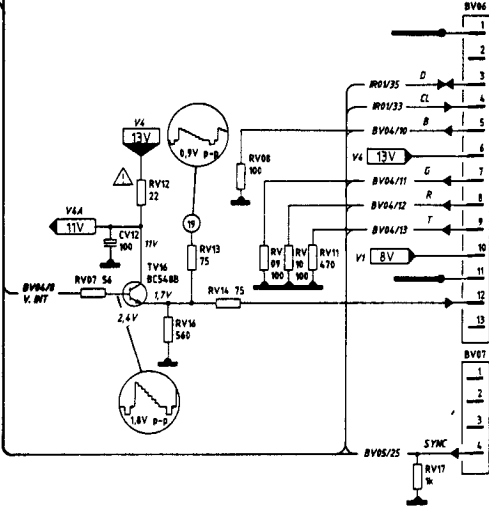


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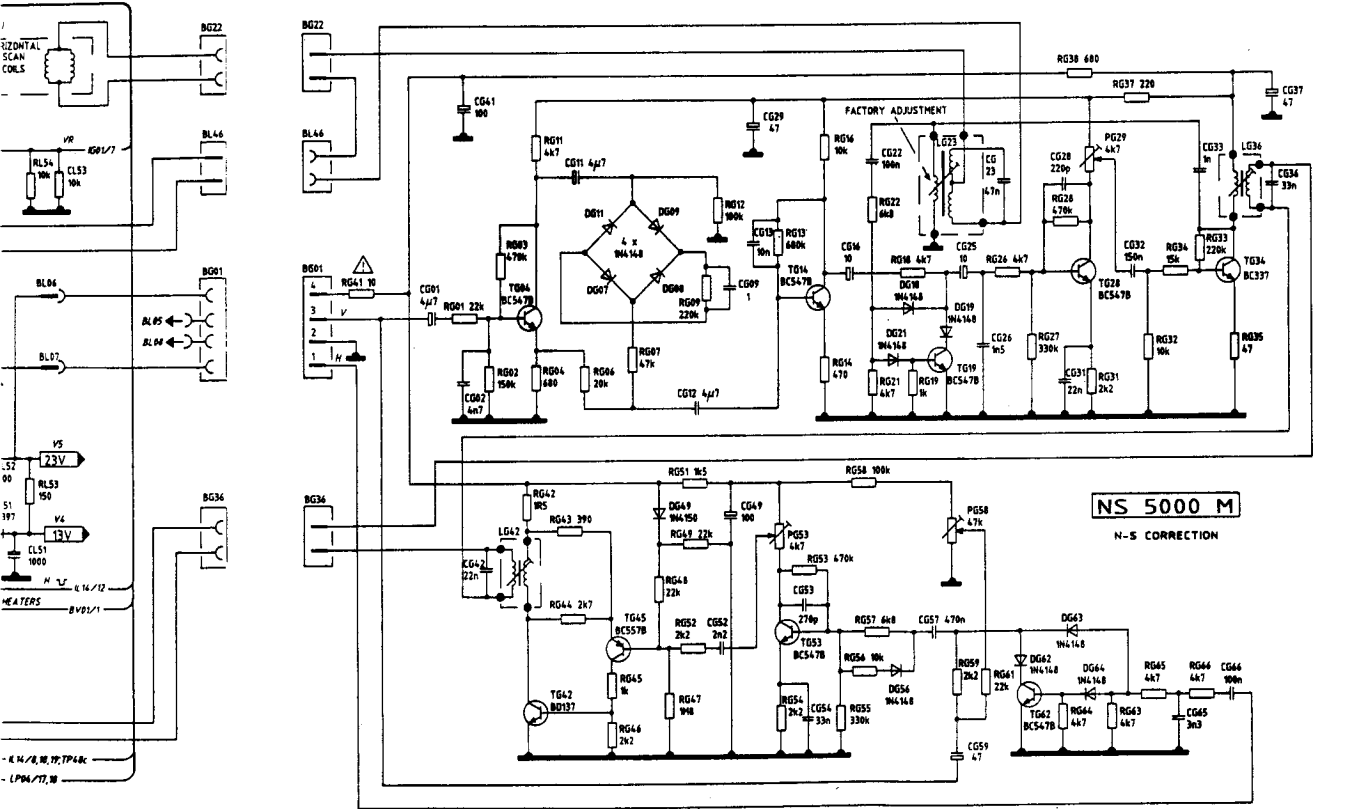
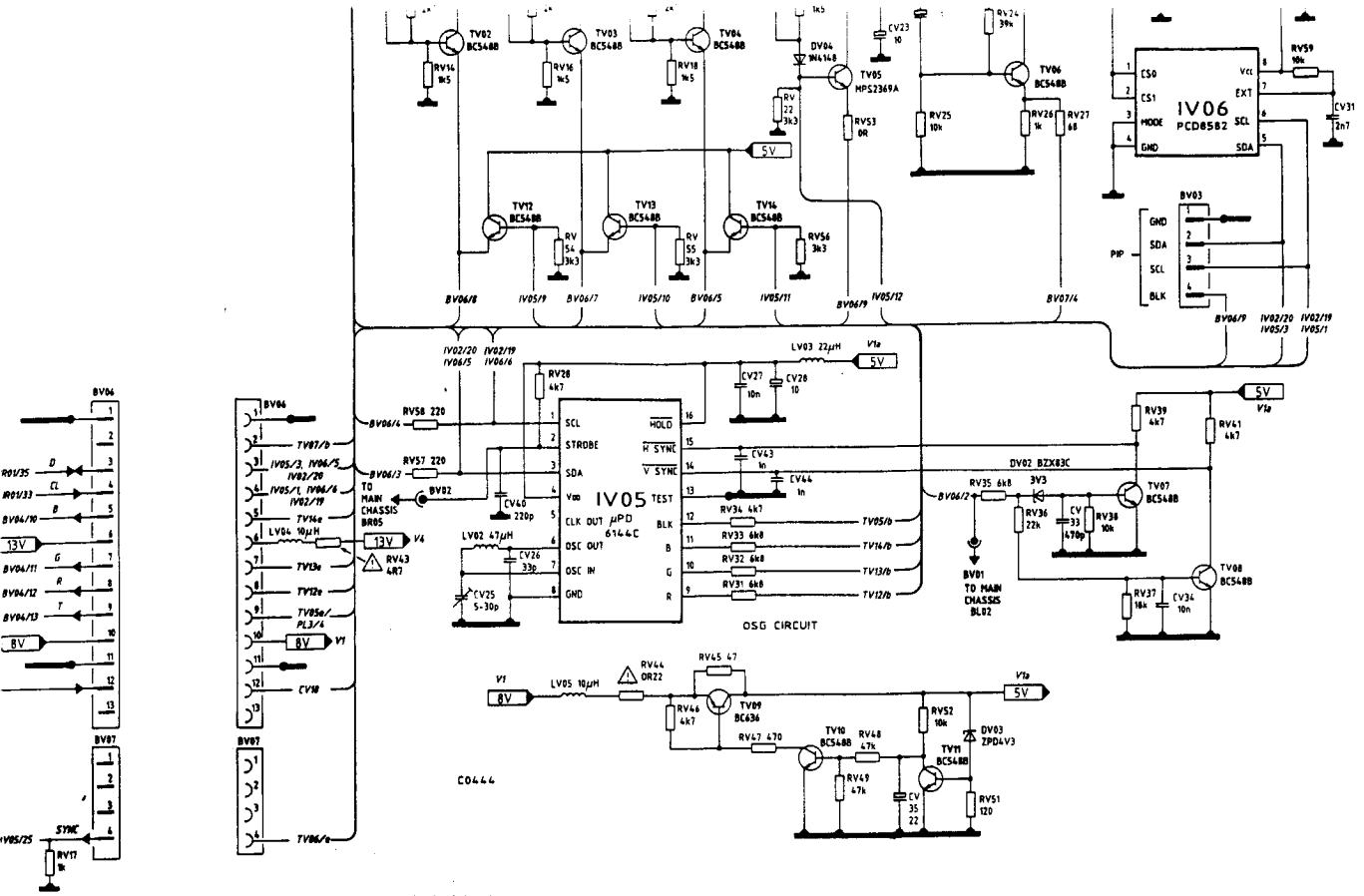


PC1252/PC1253  
AUDIO STEREO BOARDS  
SEE ATTACHED CIRCUIT



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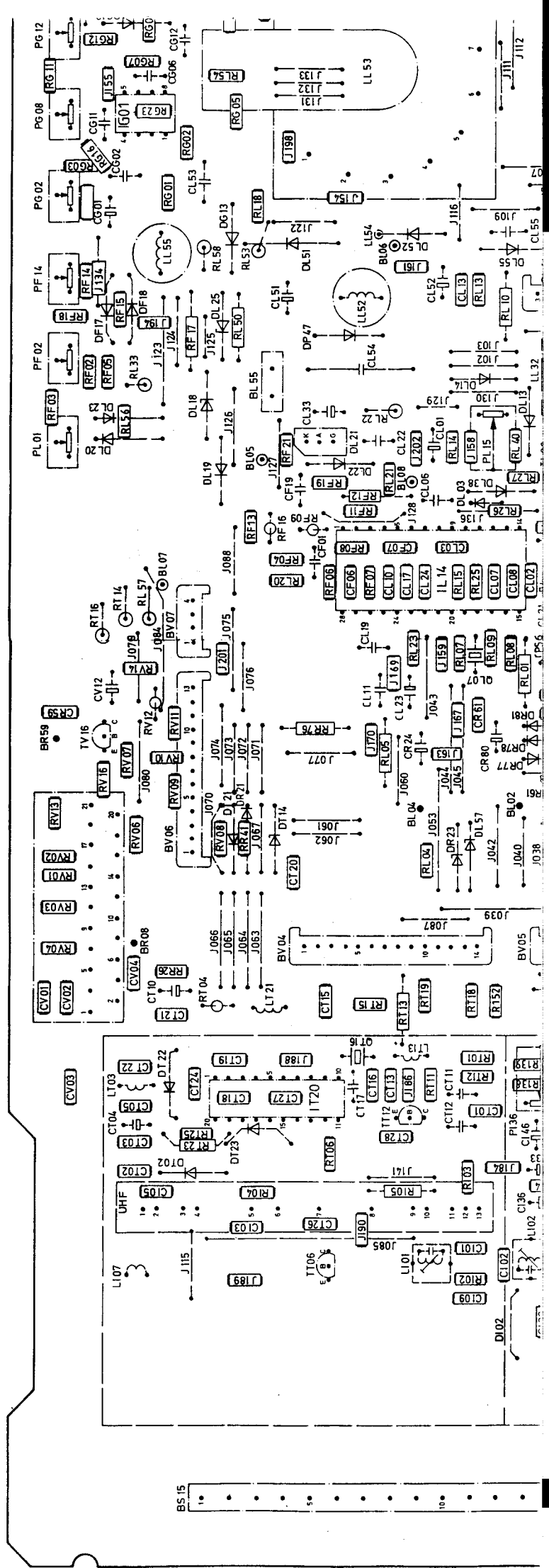
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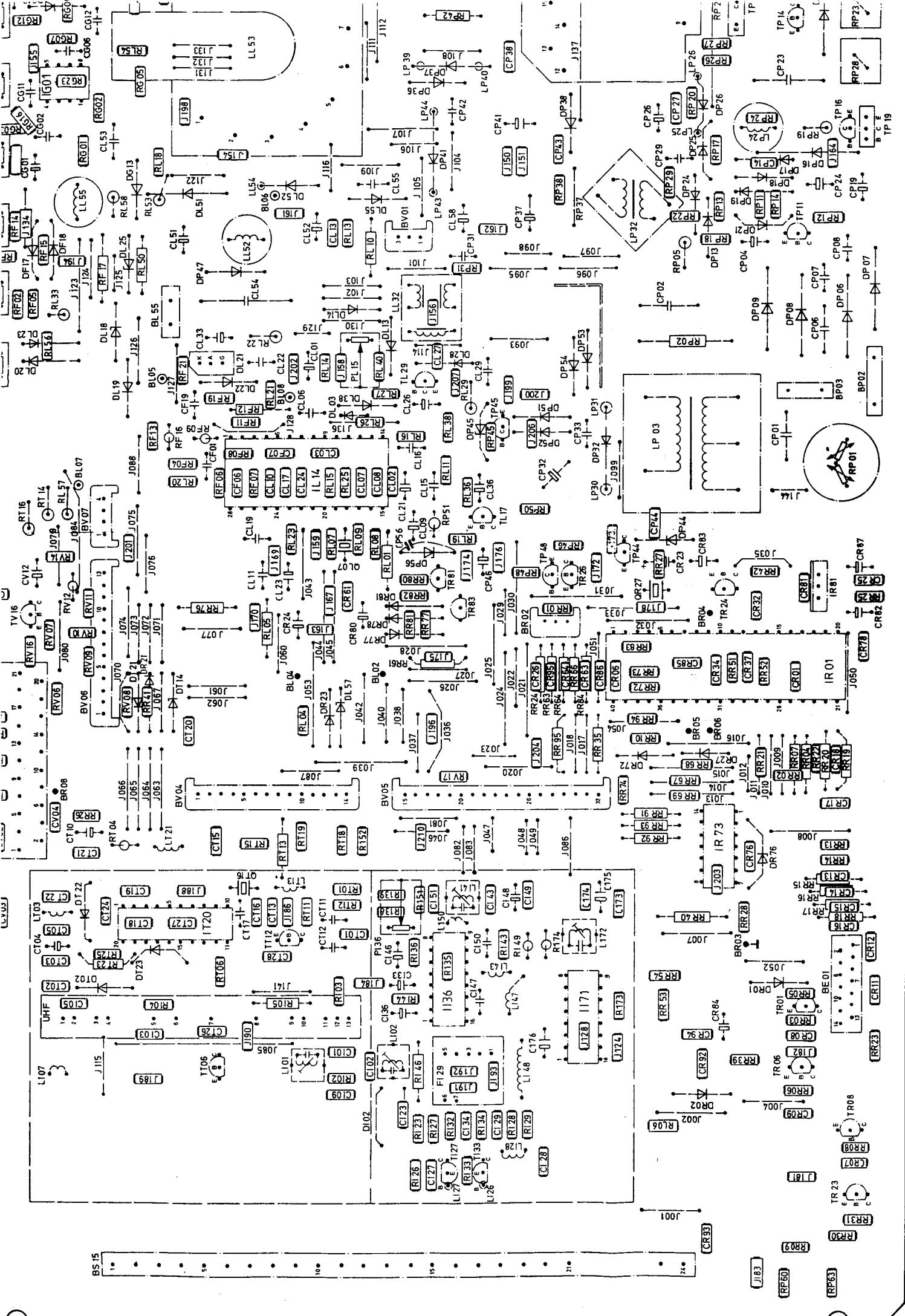
Covering:  
**Model 59K5**  
Sheet TWO of Two

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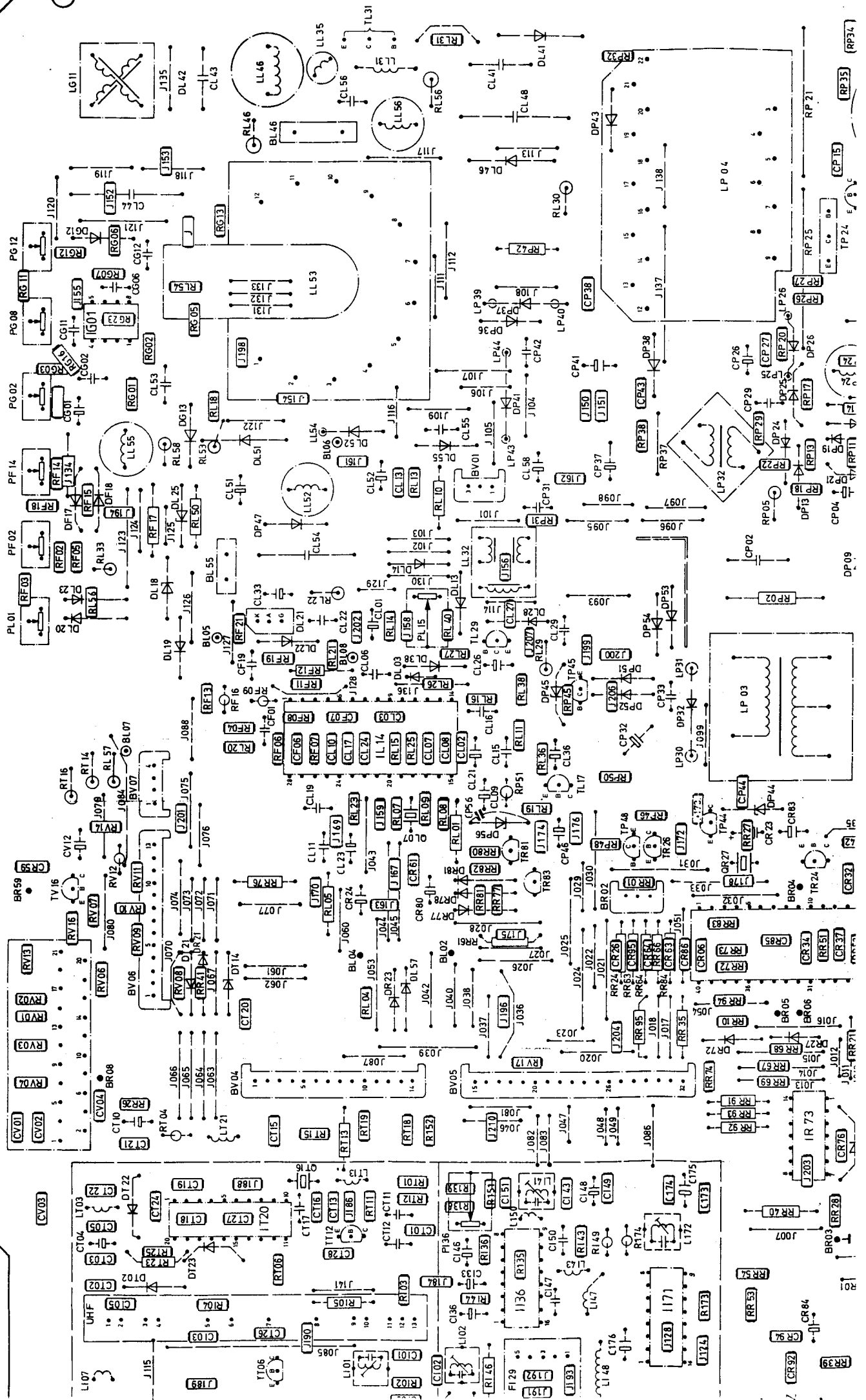
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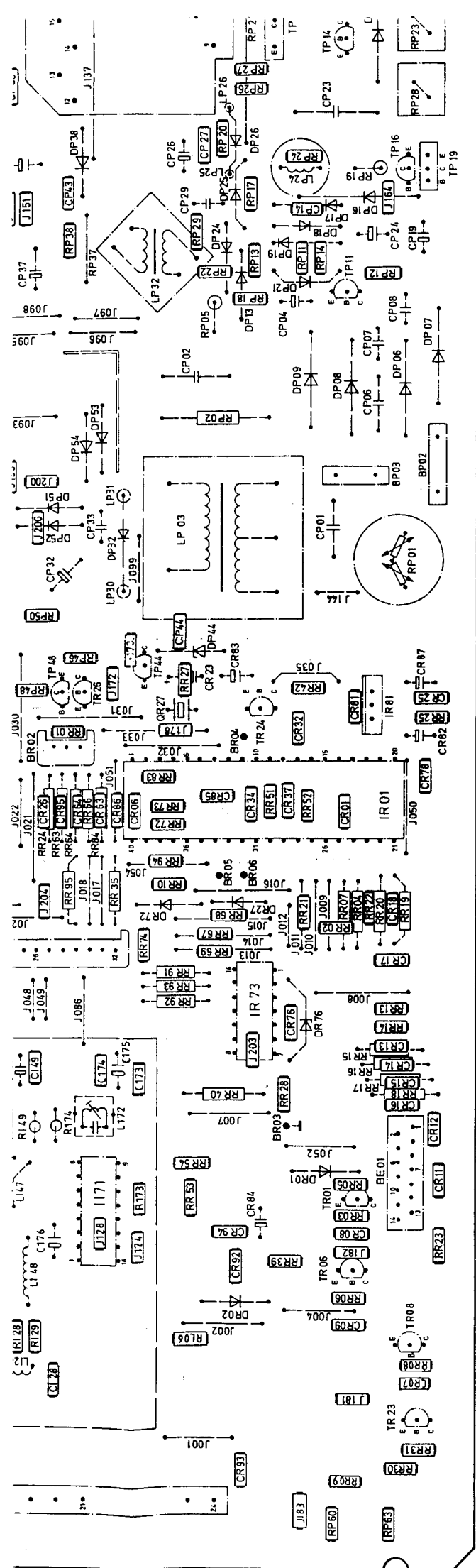




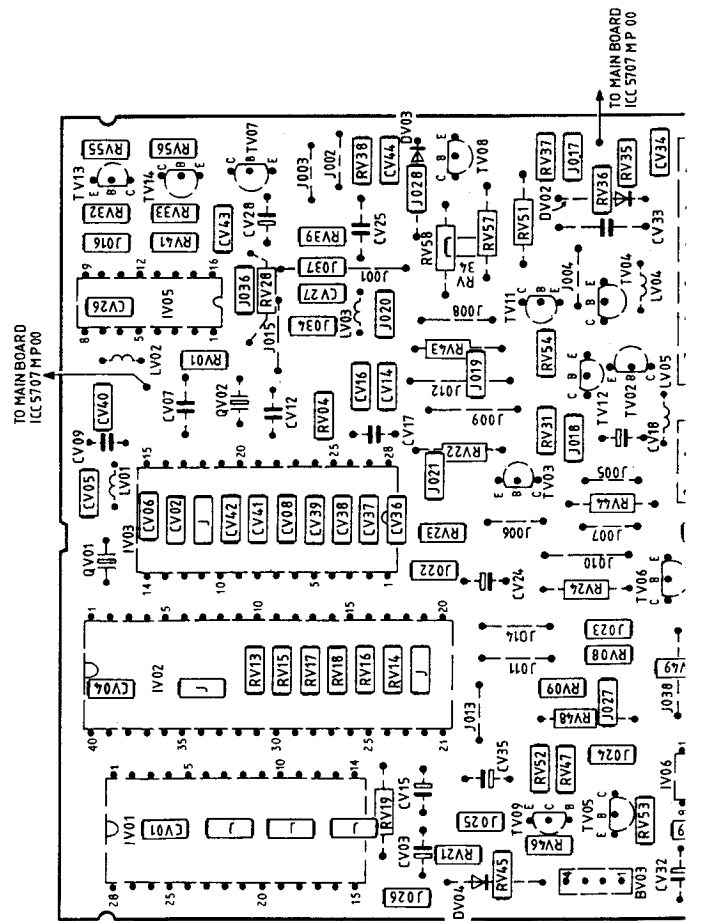
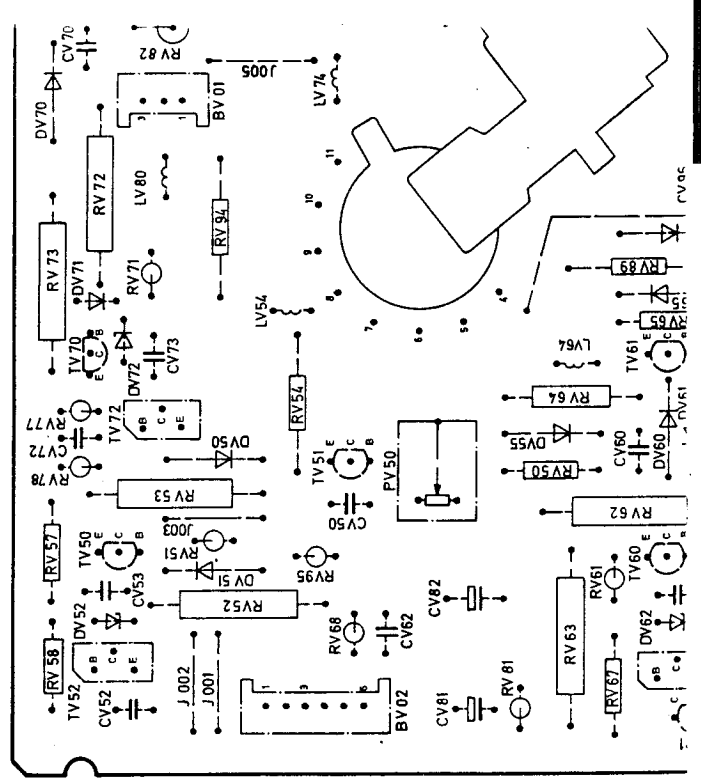


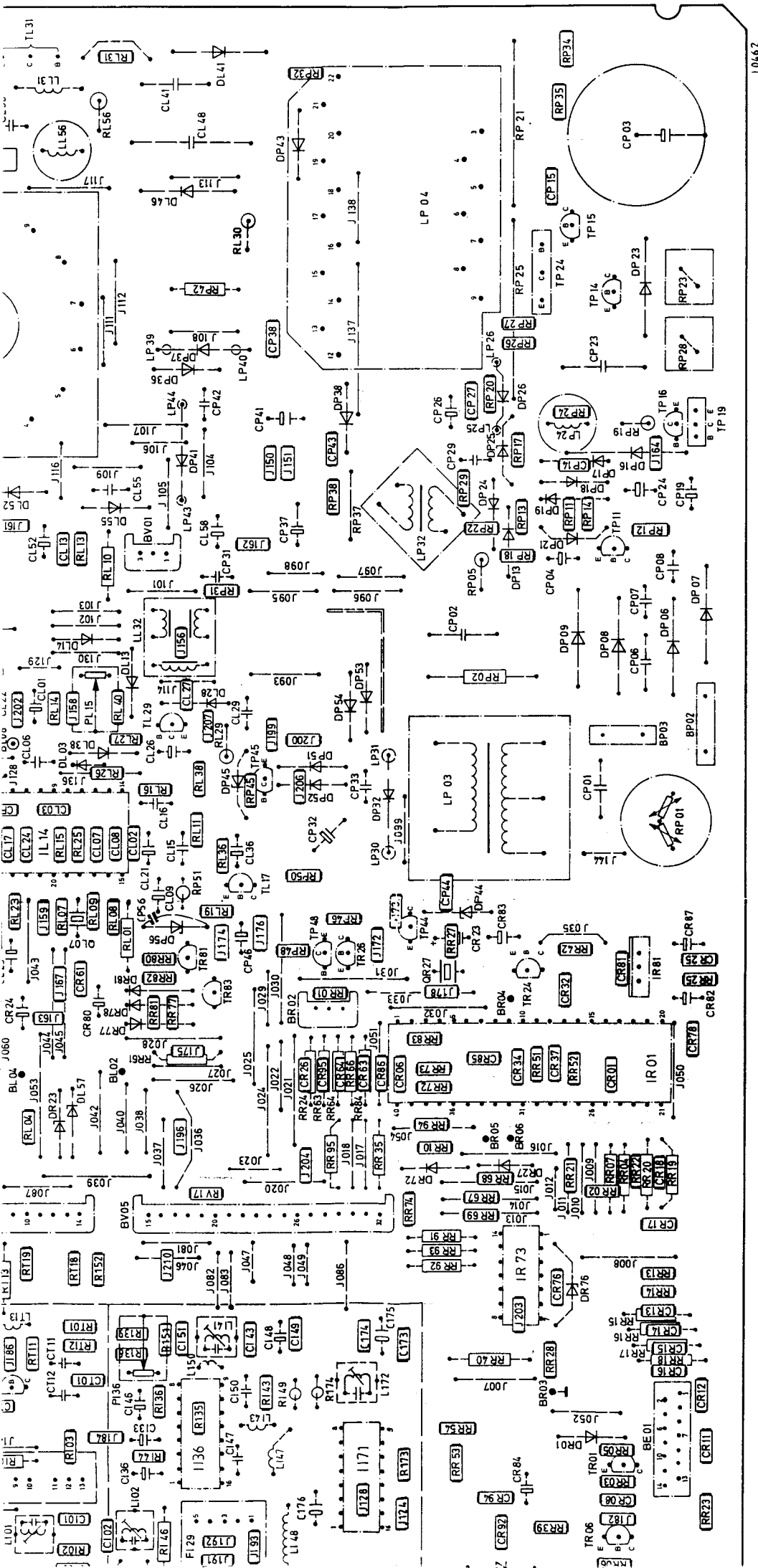
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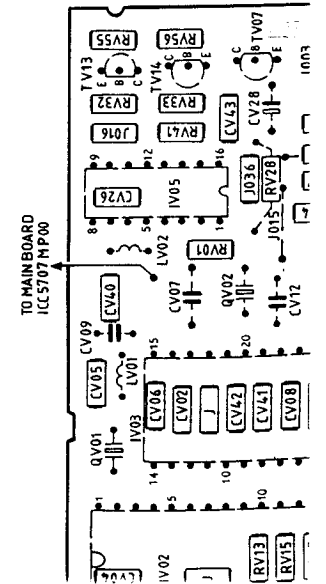
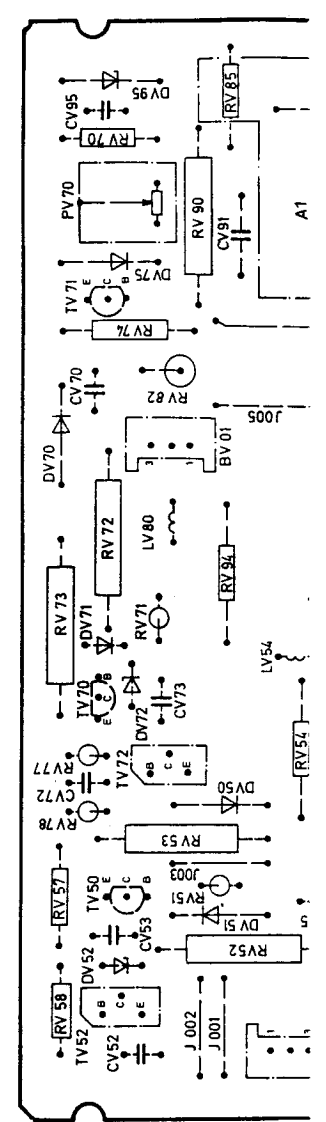
Main Board ICC 5707 MP 00 Component Location Diagram-viewed through Copper Side

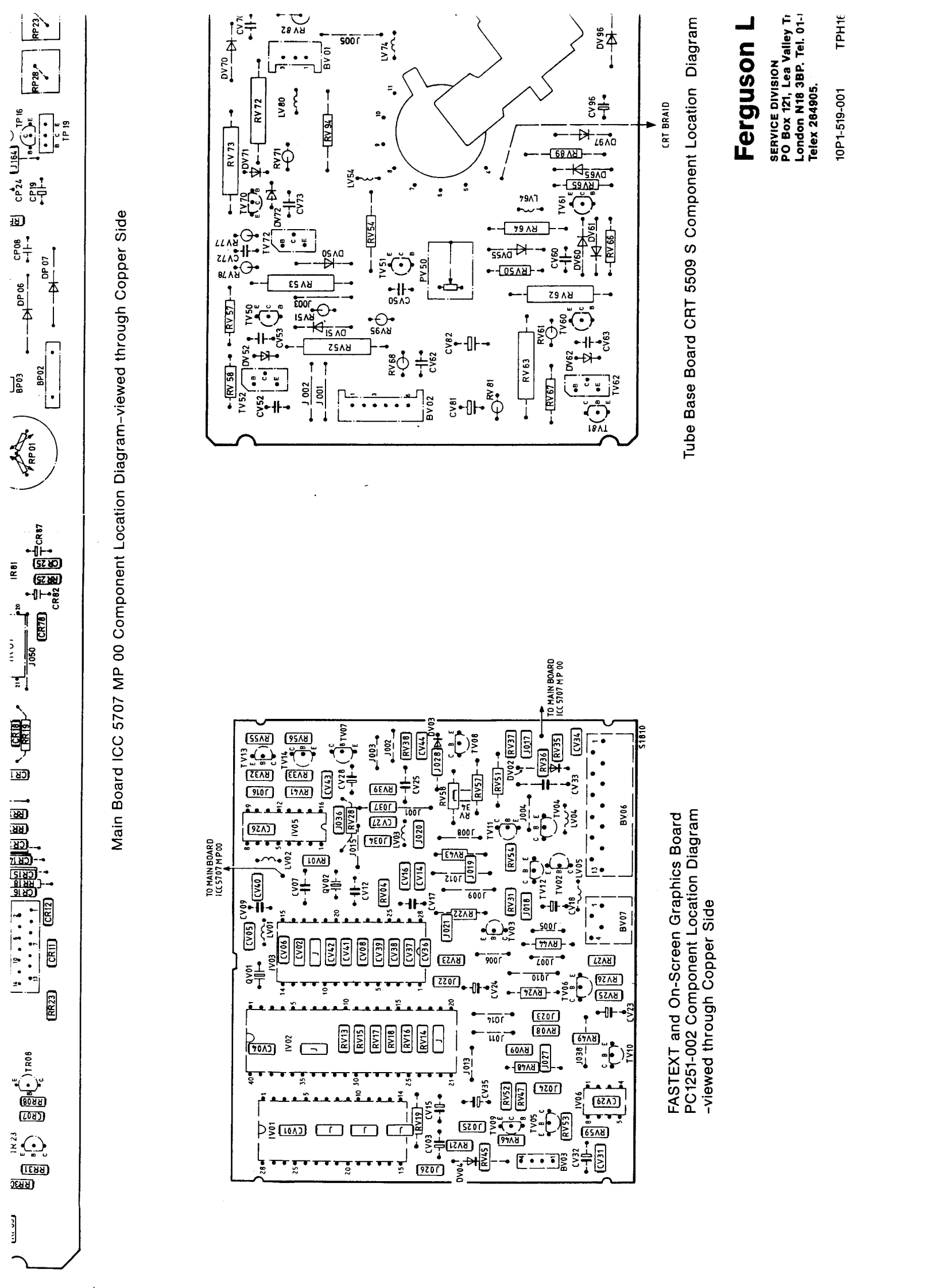




Main Board ICC 5707 MP 00 Component Location Diagram-viewed through Copper Side

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Main Board ICC 5707 MP 00 Component Location Diagram-viewed through Copper Side

FASTEXT and On-Screen Graphics Board  
PC1251-002 Component Location Diagram  
-viewed through Copper Side

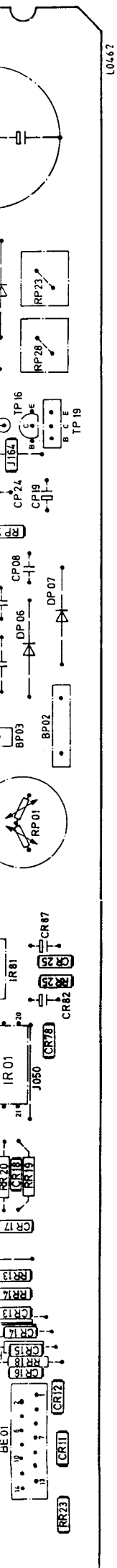
Tube Base Board CRT 5509 S Component Location Diagram

# Ferguson L

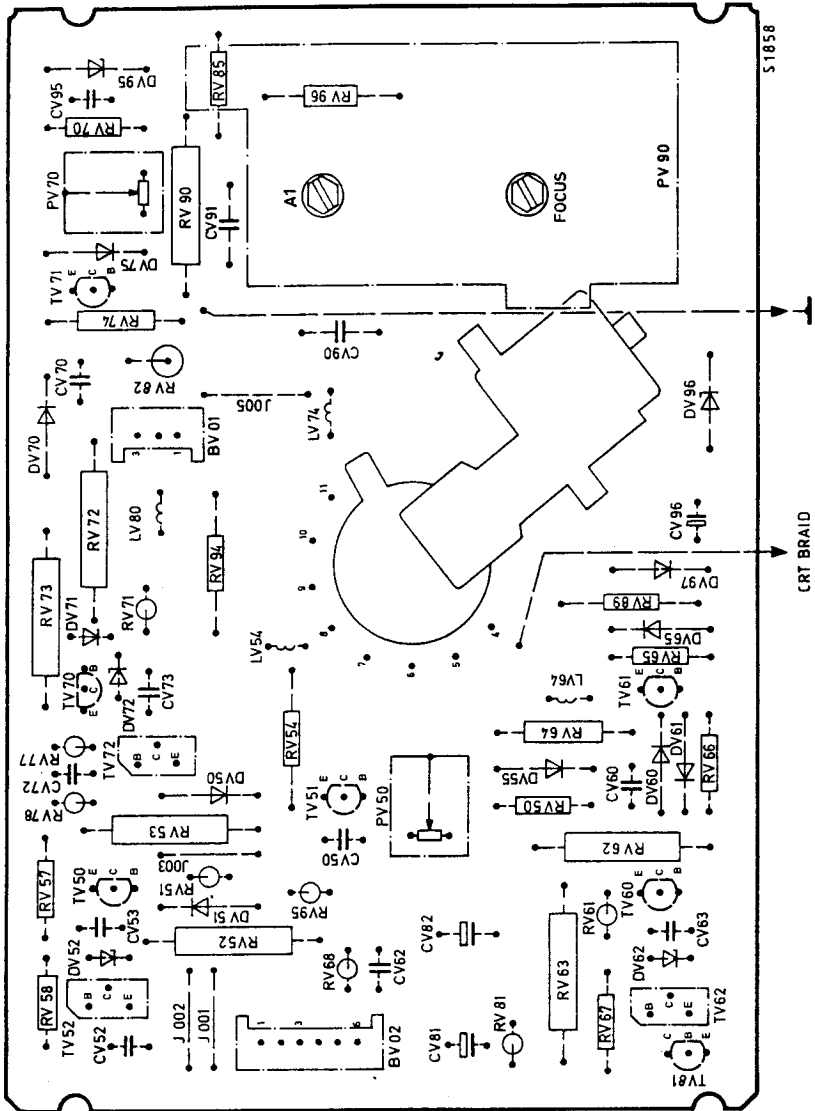
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Main Board ICC 5707 MP 00 Component Location Diagram-viewed through Copper Side



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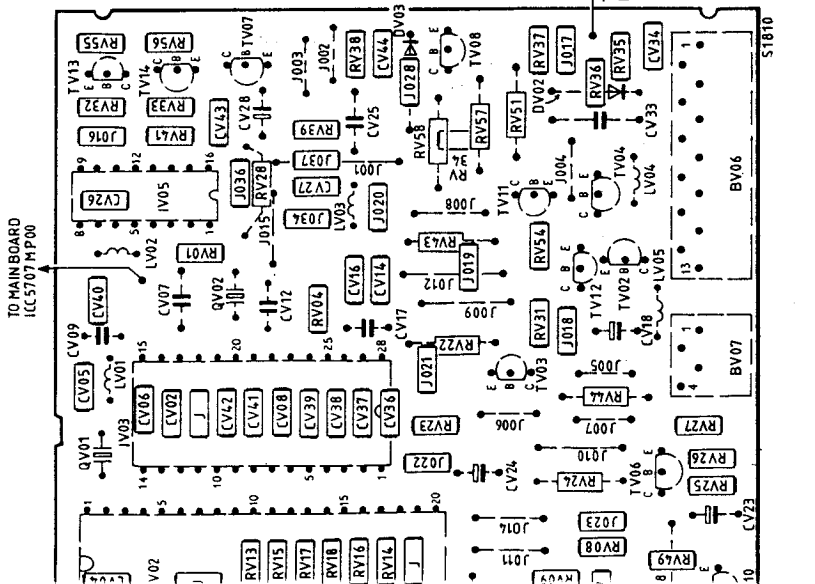
Tube Base Board CRT 5509 S Component Location Diagram - viewed through Copper Side

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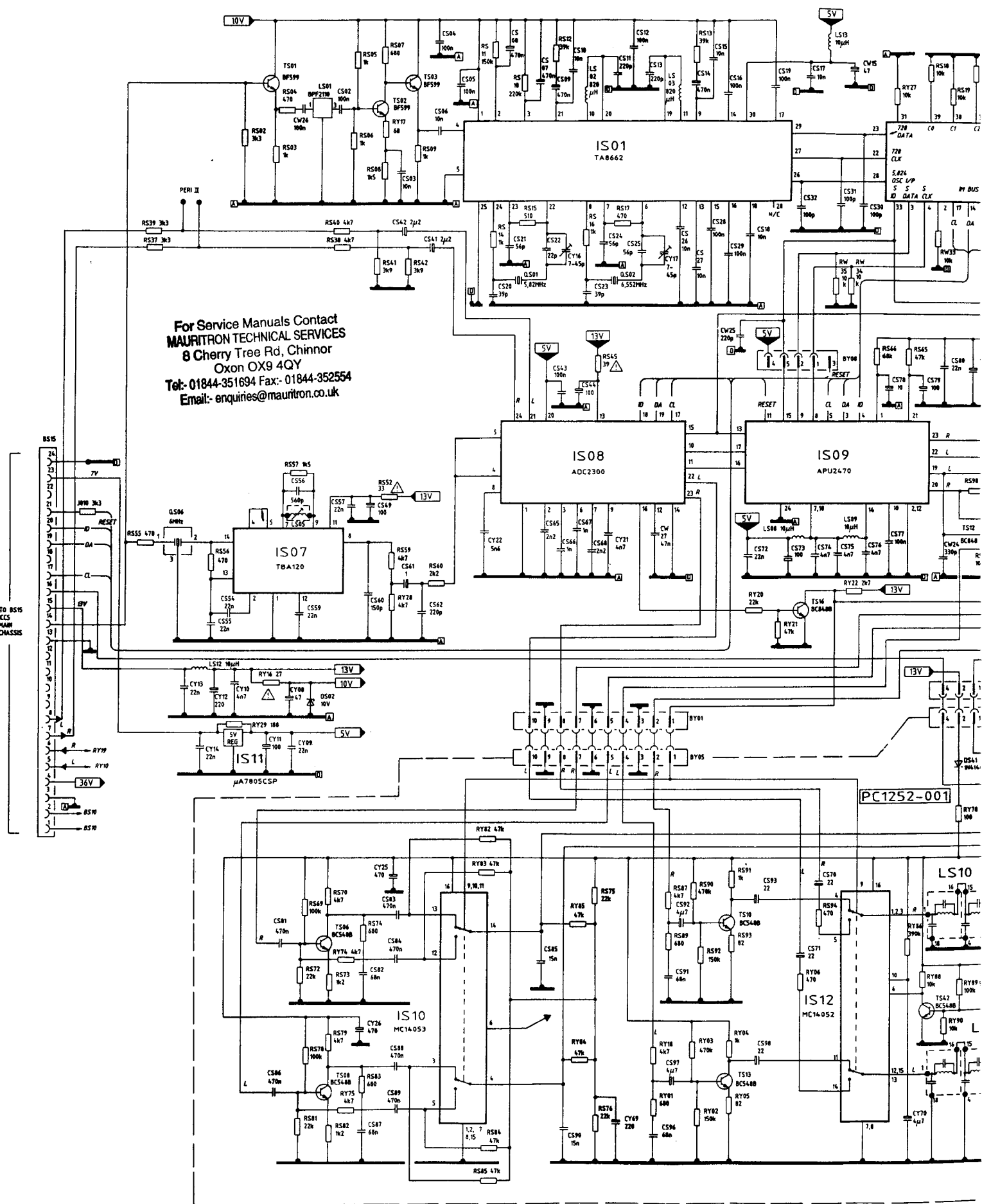
10P1-519-001      TPH1601      F289ES

Gamma and On-Screen Graphics Board  
 002 Component Location Diagram  
 through Copper Side



# STEREO/AUDIO BOARD PC1252-001 and NICAM STEREO BOAR

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**NICAM and O.S.G. SERVICING ADJUSTMENTS**

## MAIN CHASSIS

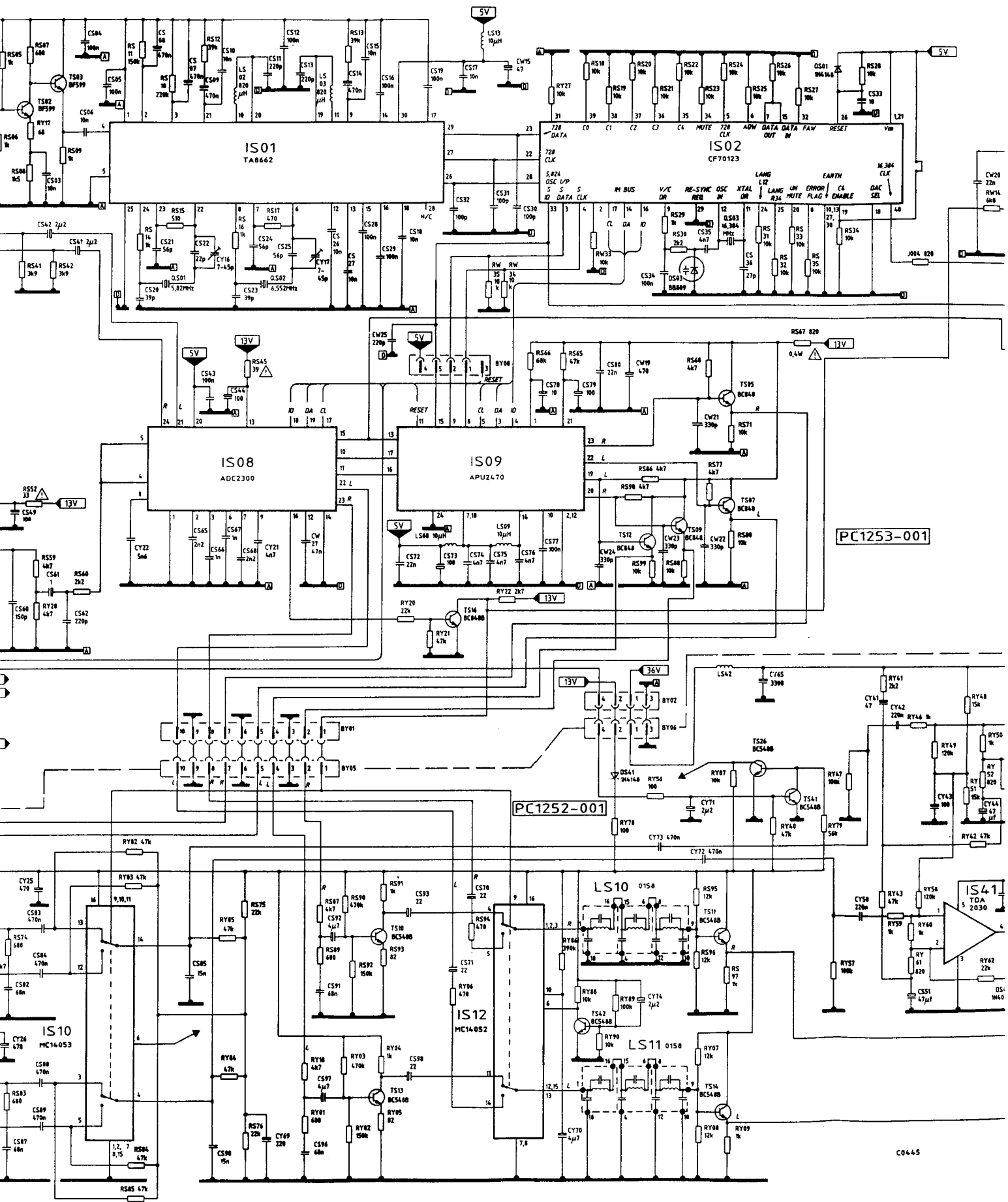
### NICAM Sound Detector (L172)

Connect the oscilloscope to PL/SK BS15 pin 14. With a NICAM signal present,

### 17.73MHz Clock (CW09)

Connect the frequency counter to IS04 pin 13 via a 10:1 probe. With a locked mono signal present, adjust CW09 for 17.73MHz. (Range: 17.729MHz - 17.731MHz).

# RD PC1252-001 and NICAM STEREO BOARD PC1253-001



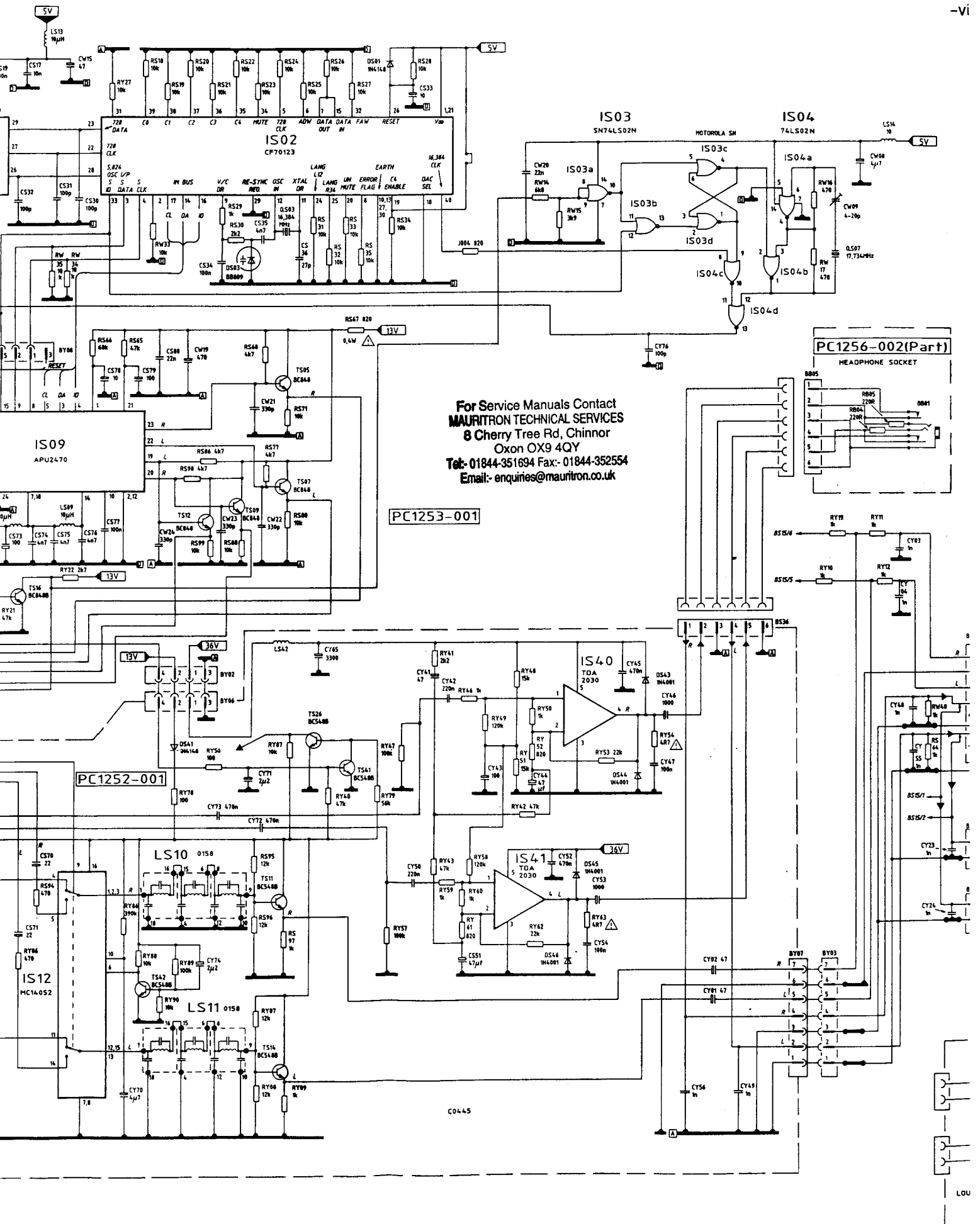
**MAIN CHASSIS**  
**NICAM Sound Detector (L172)**  
 Connect the oscilloscope to PL/SK BS15 pin 14. With a NICAM signal present.

**17.73MHz Clock (CW09)**  
 Connect the frequency counter to IS04 pin 13 via a 10:1 probe. With a locked mono signal present, adjust CW09 for 17.73MHz. (Range: 17.729MHz - 17.731MHz).

**On-Screen Display Oscillator Frequency (CV25)**  
 Connect the frequency counter to IV05 pin 5 via a 10:1 probe. Adjust CV25 for 5.7MHz ± 100kHz in order to centre the

# STEREO BOARD PC1253-001

St  
Cc  
-vi



For Service Manuals Contact  
**MAURITRON TECHNICAL SERVICES**  
 8 Cherry Tree Rd, Chinnor  
 Oxon OX9 4QY  
 Tel: 01844-351694 Fax: 01844-352554  
 Email: enquiries@mauritron.co.uk

PC1253-001

PC1256-002(Part)

HEADPHONE SOCKET

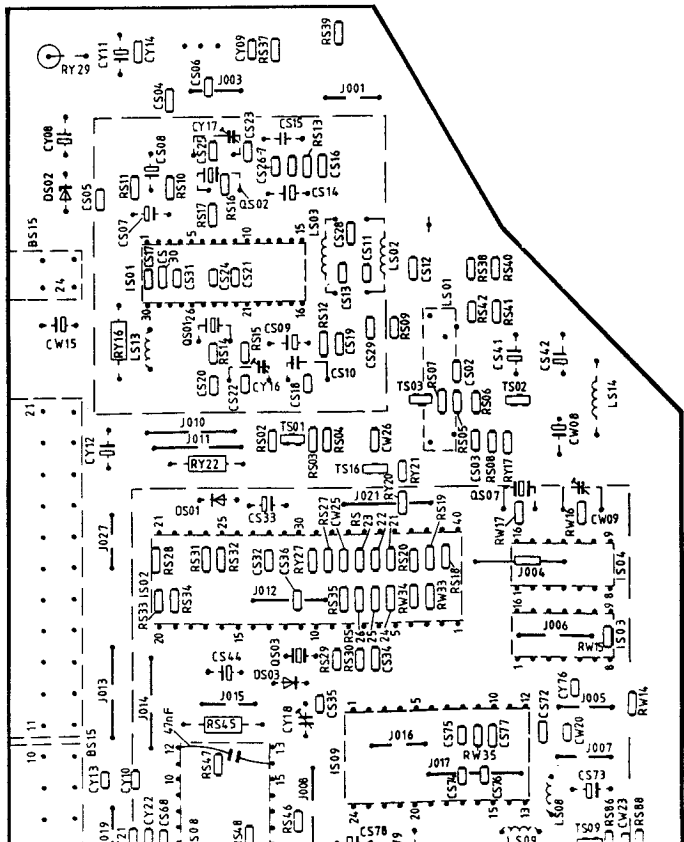
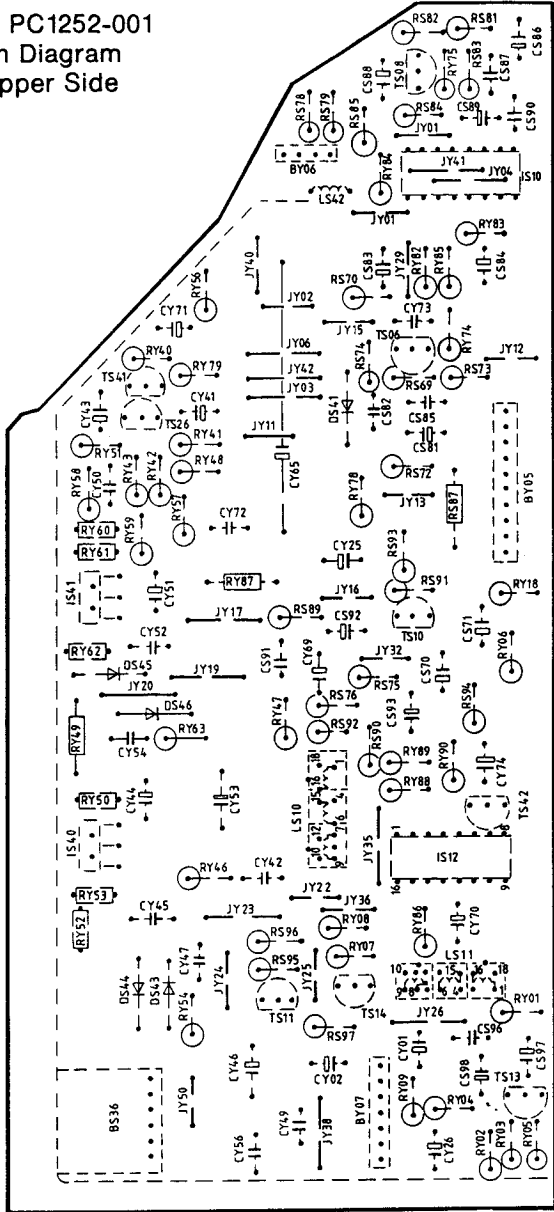
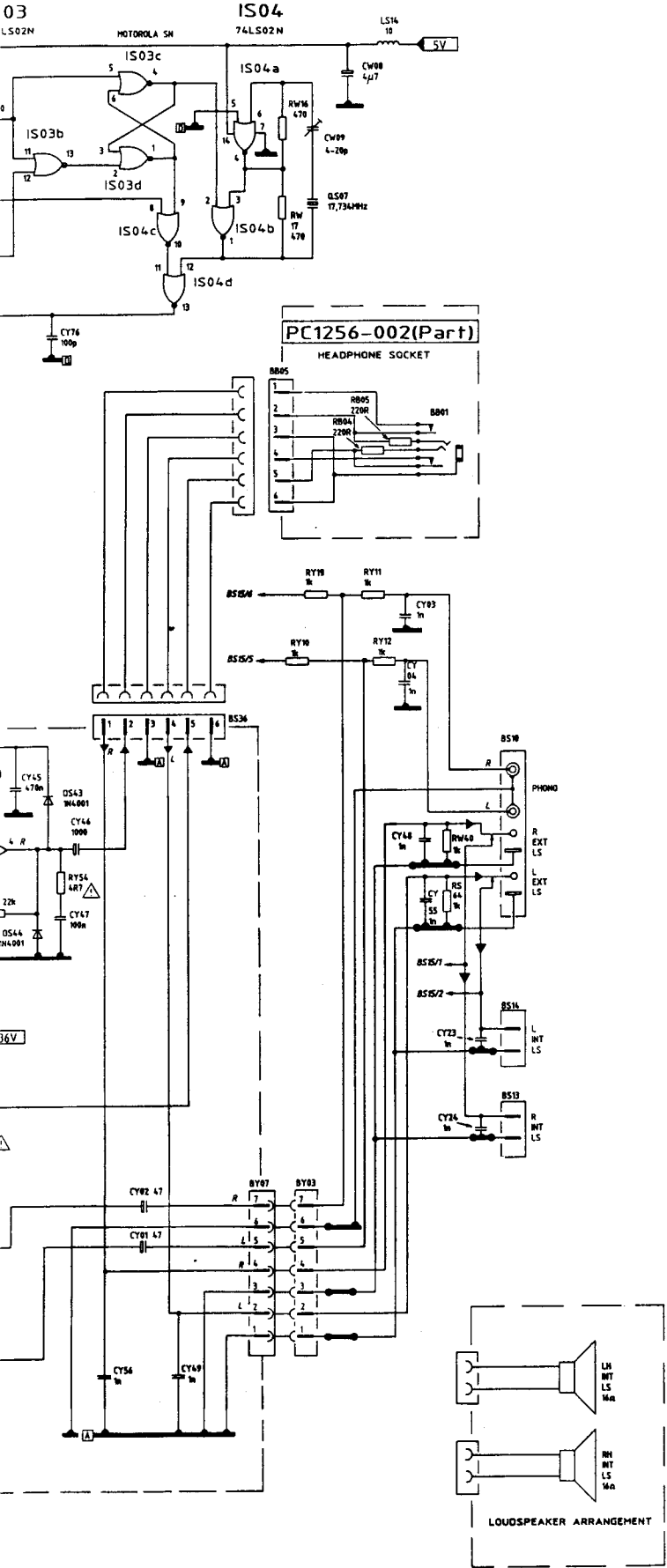
### On-Screen Display Oscillator Frequency (CV25)

Connect the frequency counter to IV05 pin 5 via a 10:1 probe. Adjust CV25 for 5.7MHz + 100kHz in order to centre the



On-Screen Graphics Board

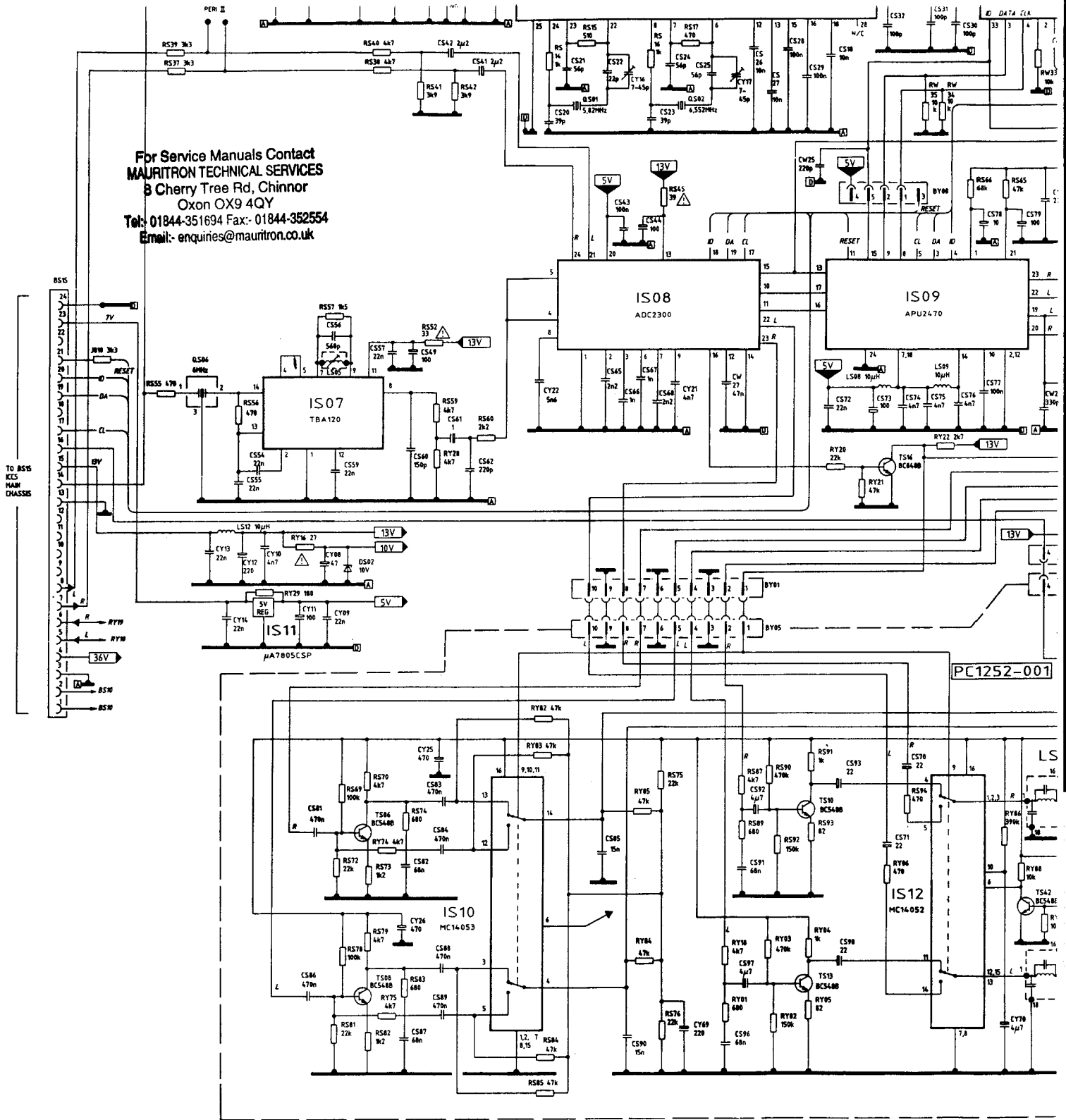
Stereo/Audio Board PC1252-001  
 Component Location Diagram  
 -viewed through Copper Side



CV07  
 8MHz Clock

On-Screen Graphics Board

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 Email: enquiries@mauritron.co.uk



## NICAM and O.S.G. SERVICING ADJUSTMENTS

The following factory preset adjustments are carried out during manufacture and should not be readjusted in the field unless components affecting the settings are changed.

It is recommended that only competent engineers having the correct servicing equipment should attempt any of the NICAM adjustments as the performance of the decoder may be impaired.

### Equipment Required

1. Frequency counter capable of resolving 100MHz and fitted with a 10:1 probe.
2. TV pattern generator capable of providing a 1kHz audio tone.
3. General purpose oscilloscope (CRO).
4. Non-metallic trimming tools.

## MAIN CHASSIS

### NICAM Sound Detector (L172)

Connect the oscilloscope to PL/SK BS15 pin 14. With a NICAM signal present, adjust L172 for minimum video signal on CRO display.

### NICAM BOARD PC1253

#### 5.824MHz Clock (CY16)

Connect the frequency counter to IS01 pin 26 via a 10:1 probe. With no NICAM signal present, i.e. noise, adjust CY16 for 5.824MHz (Range: 5.82390MHz - 5.82440MHz).

#### 5.552MHz Clock (CY17)

Connect the frequency counter to IS01 pin 7 via a 10:1 probe. With no NICAM signal present, i.e. noise, adjust CY17 for 6.5518MHz (Range: 6.551799MHz - 6.55190MHz).

#### 17.73MHz Clock (CW09)

Connect the frequency counter to IS04 pin 13 via a 10:1 probe. With a locked mono signal present, adjust CW09 for 17.73MHz. (Range: 17.729MHz - 17.731MHz).

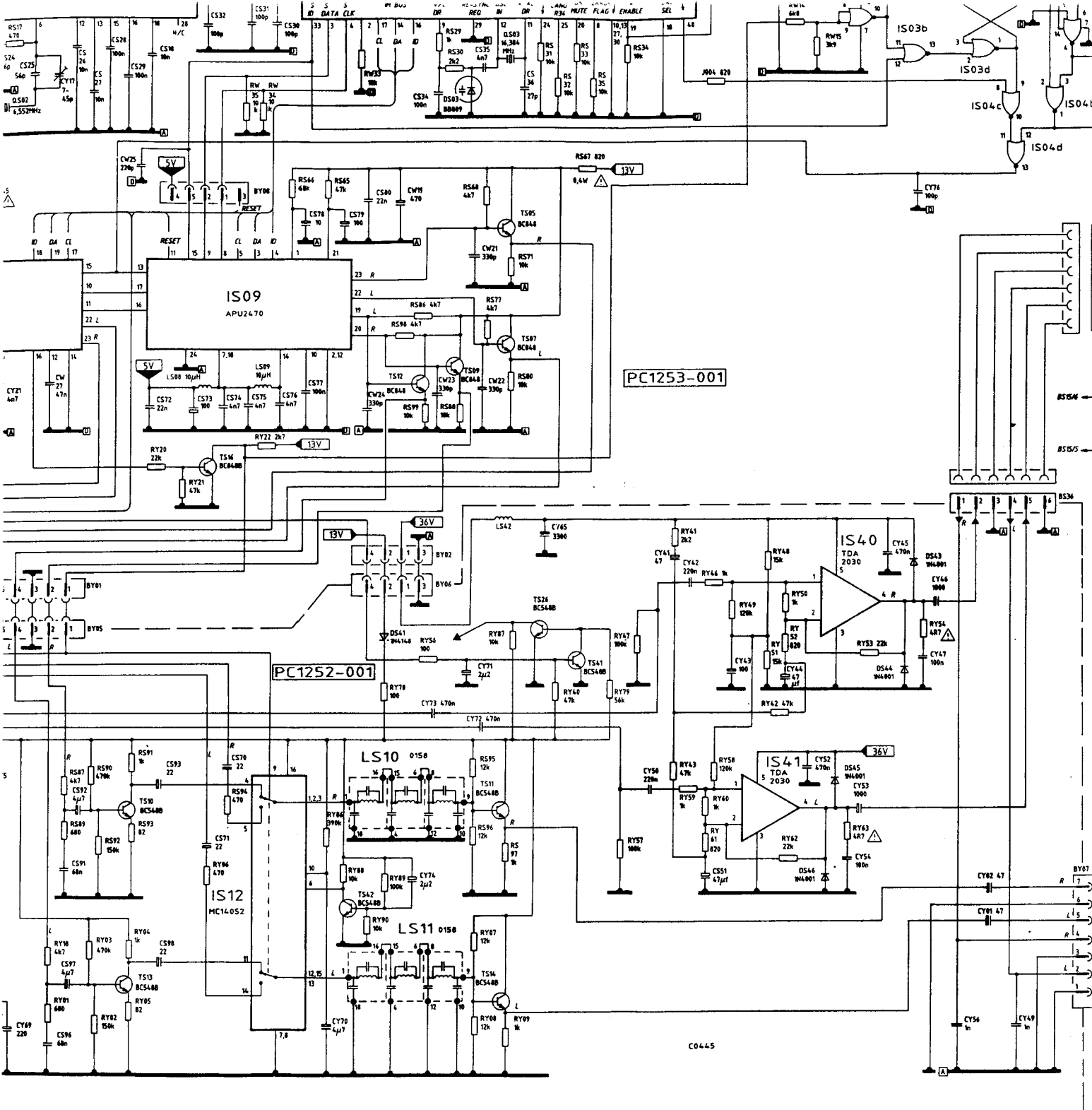
#### 6MHz Detector (LS05)

Connect the TV pattern generator to the aerial socket and apply a 1kHz audio tone. With the oscilloscope connected to IS07 pin 8, adjust LS05 for maximum recovered sound.

## FASTTEXT AND O.S.G. BOARD PC1251

#### 6MHz Clock (CV07)

Connect the frequency counter to IV03 pin 17 via a 10:1 probe. With no signal present, adjust CV07 for 6.0002MHz ± 200Hz.



**17.73MHz Clock (CW09)**

Connect the frequency counter to IS04 pin 13 via a 10:1 probe. With a locked mono signal present, adjust CW09 for 17.73MHz. (Range: 17.729MHz - 17.731MHz).

**6MHz Detector (LS05)**

Connect the TV pattern generator to the aerial socket and apply a 1kHz audio tone. With the oscilloscope connected to IS07 pin 8, adjust LS05 for maximum recovered sound.

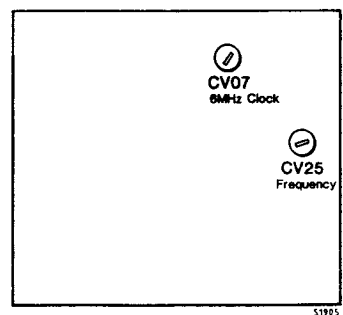
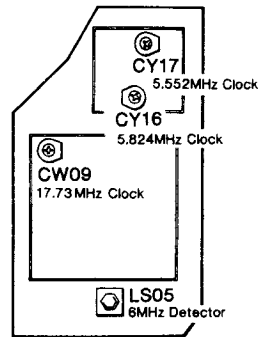
**FASTEXT AND O.S.G. BOARD PC1251**

**6MHz Clock (CV07)**

Connect the frequency counter to IV03 pin 17 via a 10:1 probe. With no signal present, adjust CV07 for 6.0002MHz ± 200Hz.

**On-Screen Display Oscillator Frequency (CV25)**

Connect the frequency counter to IV05 pin 5 via a 10:1 probe. Adjust CV25 for 5.7MHz ± 100kHz in order to centre the On Screen Graphics display.



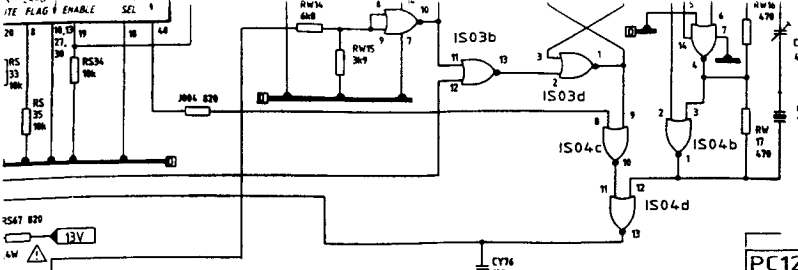
On-Screen  
PC1251-0  
Adjustme

NICAM Stereo Board PC1253-001 Adjustment Diagram

5  
7

pin  
1a1

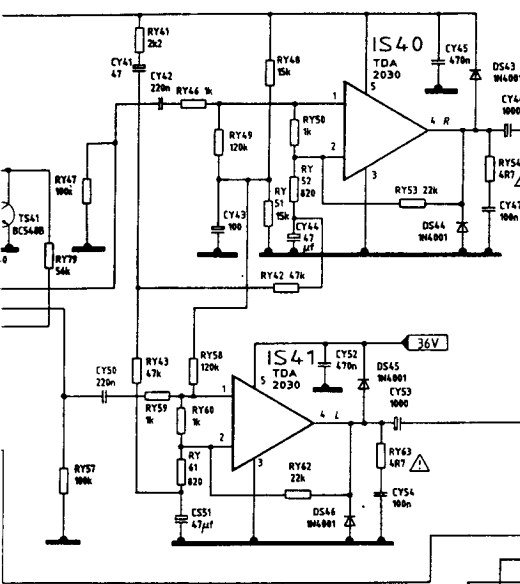
pin  
3l



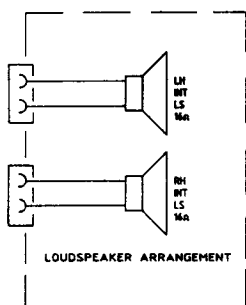
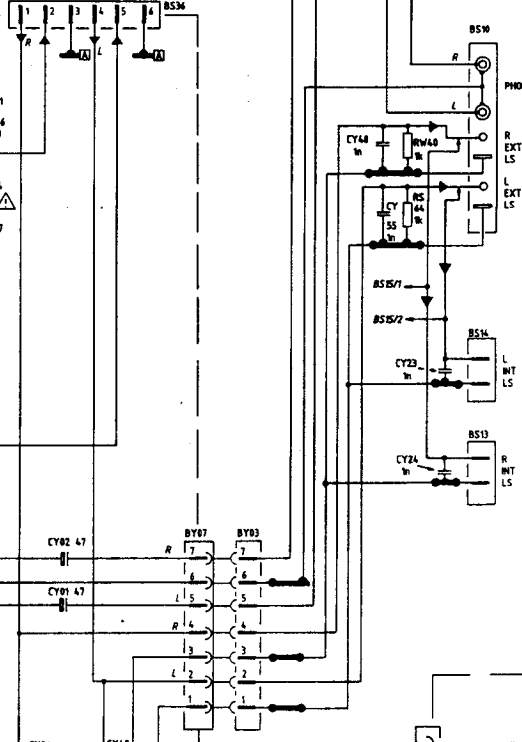
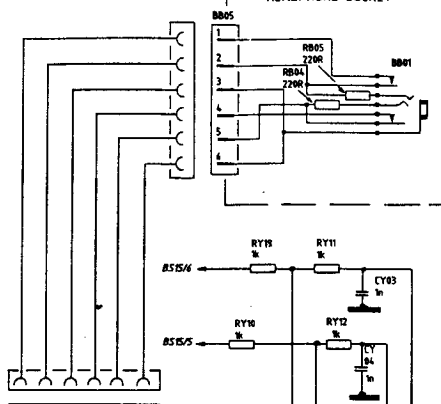
For Service Manuals Contact  
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 8 Cherry Tree Rd, Chinnor  
 Oxon OX9 4QY  
 Tel:- 01844-351694 Fax:- 01844-352554  
 Email:- enquiries@mauritron.co.uk

**PC1256-002(Part)**  
 HEADPHONE SOCKET

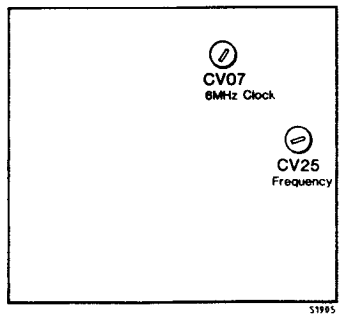
**PC1253-001**



C0445



**Oscillator**  
 Counter to IV05 pin  
 CV25 for  
 or to centre the  
 display.

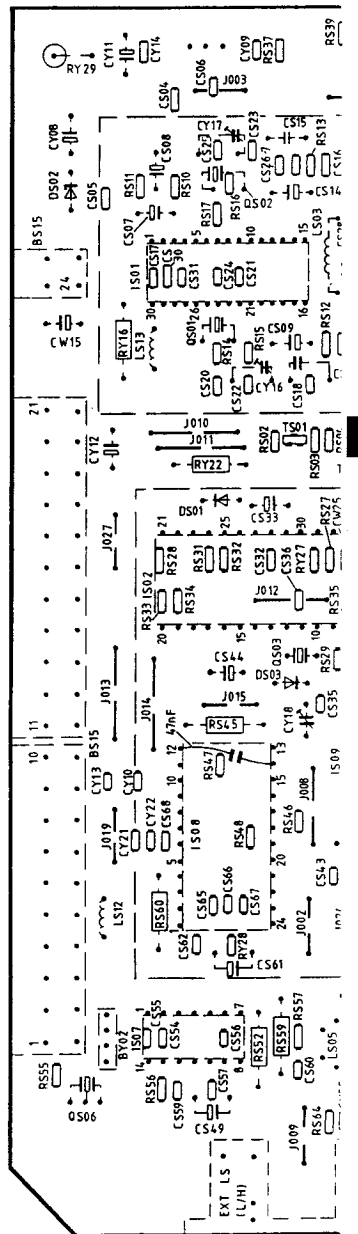
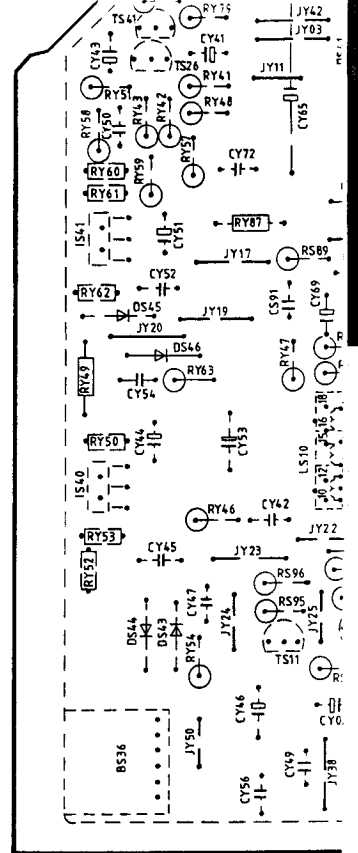


On-Screen Graphics Board  
**PC1251-002**  
 Adjustment Diagram

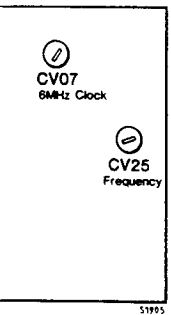
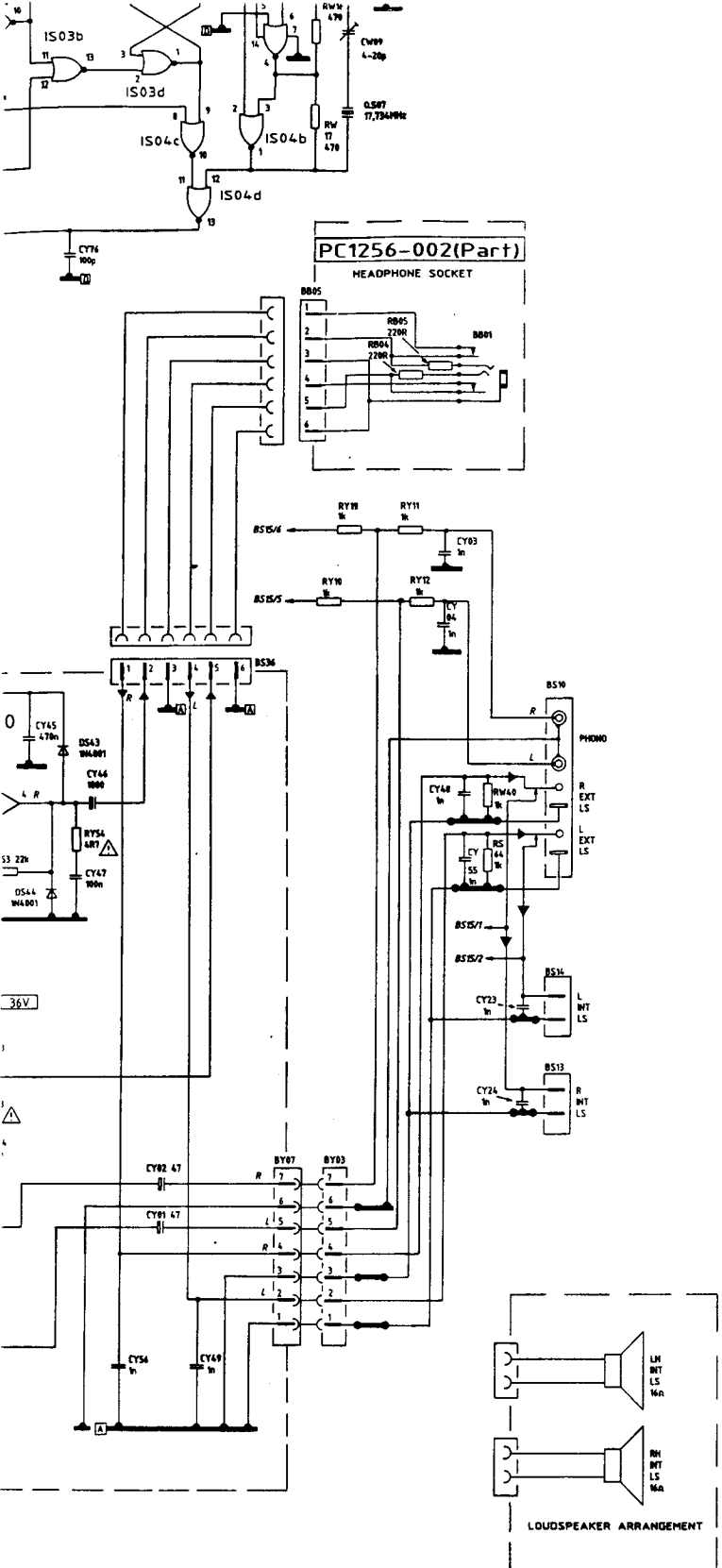
Clock

**NICAM Stereo Board PC1253-001**  
 Adjustment Diagram

**NICAM Stereo Board PC1253-001**  
 Component Location Diagram  
 -viewed through Copper Side

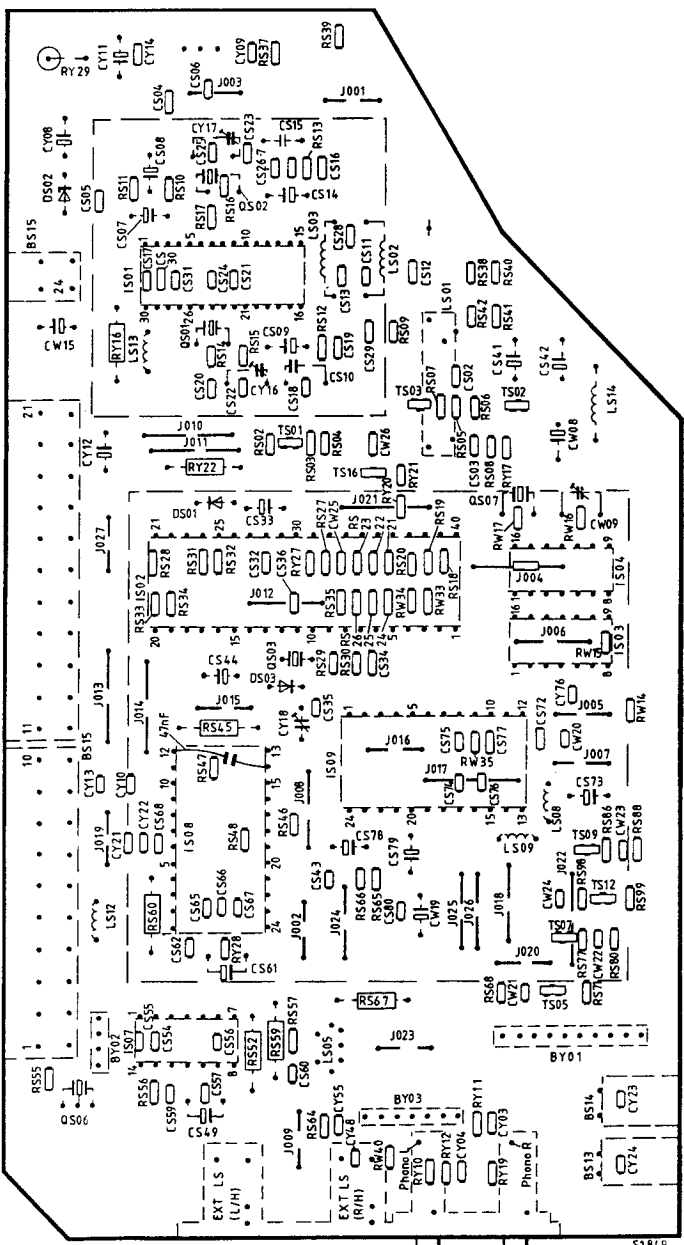
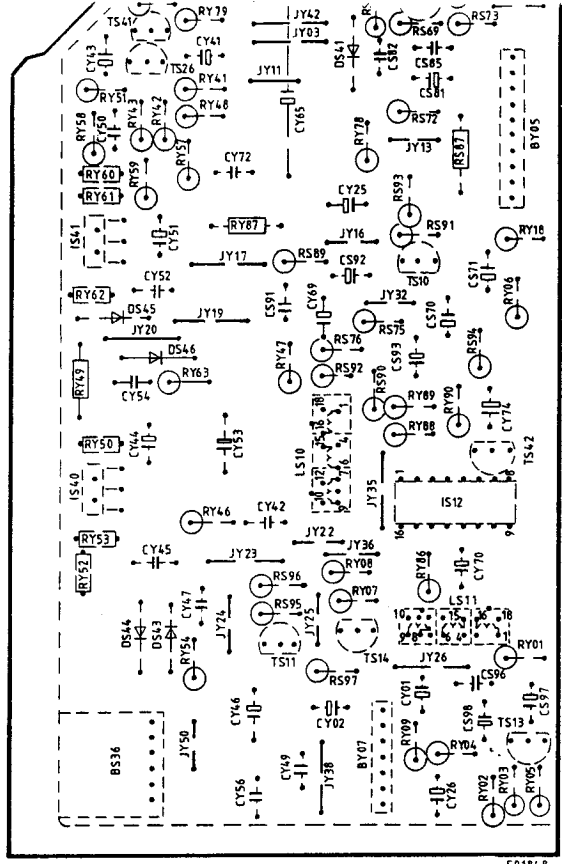






On-Screen Graphics Board  
PC1251-002  
Adjustment Diagram

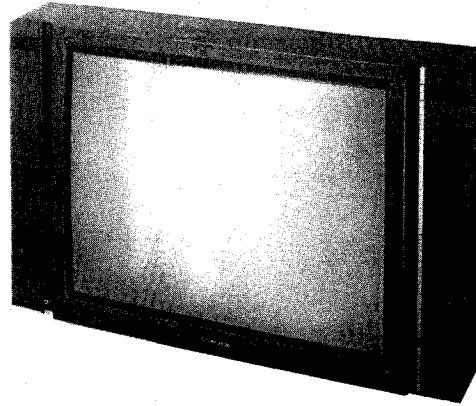
NICAM Stereo Board PC1253-001  
Component Location Diagram  
-viewed through Copper Side



## ICC5 (IMC)

COLOUR TV

## PROVISIONAL SERVICE INFORMATION



MODEL 68M5 WITH REMOTE CONTROL, FASTEXT, ON-SCREEN GRAPHICS USING INTERACTIVE MENU CONTROL (IMC), NICAM STEREO SOUND AND TWO PERITELEVISION SOCKETS WITH S-VHS FACILITIES.

FERGUSON is a registered trade-mark.

## COVERING MODELS 59M5 AND 68M5 SHEET ONE OF TWO

### SERVICING SAFETY NOTES

Do not disconnect any modules whilst the TV receiver is switched on.

It is advisable to power the TV receiver via an isolating transformer when servicing.

Do not exceed the U2 HT voltage of 147V as this also sets the EHT.

The CRT and deflection system is a complete fixed unit which is optimally adjusted at the factory. Do not alter the position of the neck components, slacken any sealed screws or lift the unit by its neck.

Any safety covers, cages etc. must be replaced after servicing.

### OSCILLOGRAMS

The oscillograms shown in the circuit diagram are with a colourbar signal (white=100%, colour 75%), input voltage 2mV approx. Set brightness, contrast and colour controls for normal picture.

### VOLTAGES

DC voltages measured with 240V approx. input voltage, unless stated otherwise, and the measurements made with a 20kΩ/volt multimeter.

For Service Manuals Contact  
MAURITRON TECHNICAL SERVICES  
8 Cherry Tree Rd, Chinnor  
Oxon OX9 4QY  
Tel:- 01844-351694 Fax:- 01844-352554  
Email:- enquiries@mauritron.co.uk

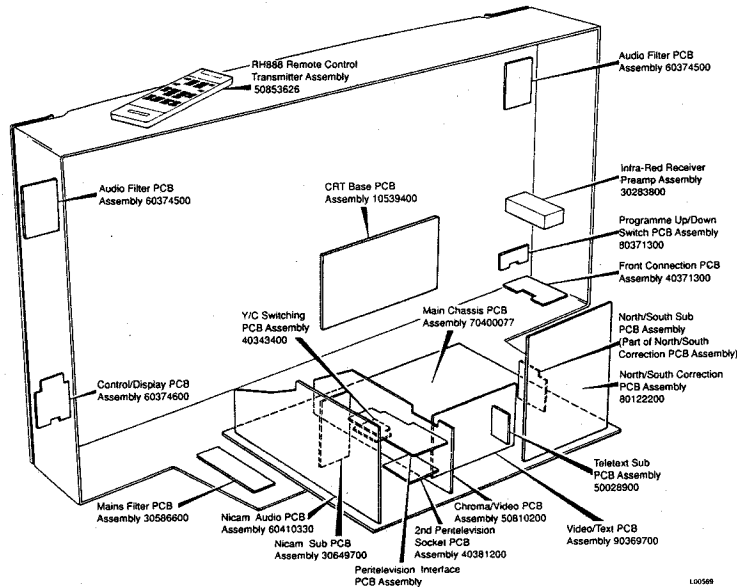
#### NOTE:

The remote control transmitter assembly and preamplifier assembly, also the UHF tuner assembly are supplied as complete items only. Circuit diagrams for these assemblies are shown for reference only.

The component location diagrams include components which may not be fitted for these models.



RH888 REMOTE CONTROL TRANSMITTER



Printed Circuit Board Location Diagram

#### Socket AV1 (BV)

- 1 Audio output B: m right; nominal 0.5V (20 Hz-20kHz).
- 2 Audio input B: m right; nominal 0.5V (20Hz-20kHz)
- 3 Audio output A: m left; nominal 0.5 V (20Hz-20kHz)
- 4 Audio commom r
- 5 Blue return
- 6 Audio input A: mo left; nominal 0.5Vr (20Hz-20kHz)
- 7 Blue input: 0.7Vp-
- 8 Function switching external input mo
- 9 Green return
- 10 No connection per
- 11 Green input: 0.7Vr
- 12 No connection per
- 13 Red return
- 14 No connection per

### ACCESS FOR SERVICE

Disconnect the receiver from the mains supply by removing the mains plug from the wall socket. It is advisable to check both poles of the mains on-off switch for correct operation.

Remove the cabinet back by unscrewing the five retaining screws and pulling the back rearwards away from the cabinet base.

#### SET U2 HT 147V (PL15)

Conditions are Programme 1 selected with locked picture but black screen, i.e. contrast, brightness and sound volume turned to minimum. Measure the U2 voltage at DP41 cathode (see chassis diagram) and if necessary adjust to 147V. Readjust controls for normal reception.

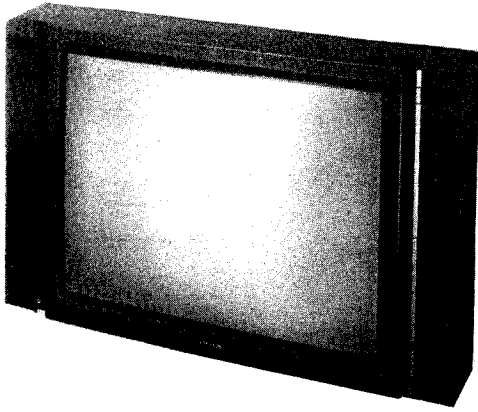
The following picture geometry adjustments are grouped in a row at the rear of the chassis and can be accessed

Set PG 29 to maximum clockwise position. Centre the hump of the 4th crosshatch-line at the top and bottom with LG 36. Straighten both lines with PG 29. With PF 14 adjust vertical height to correct amplitude.

#### Correction of the horizontal lines at the left and right side of the screen.

Turn PG 92 and PG 95 fully clockwise.

8. A  
a  
11  
9. A  
S



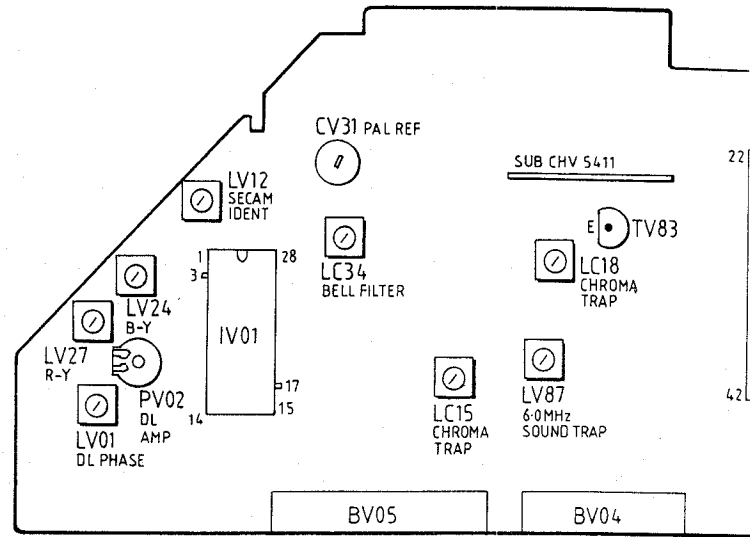
**MODEL 68M5 WITH REMOTE CONTROL, FASTEXT, ON-SCREEN GRAPHICS USING INTERACTIVE MENU CONTROL (IMC), NICAM STEREO SOUND AND TWO PERITELEVISION SOCKETS WITH S-VHS FACILITIES.**



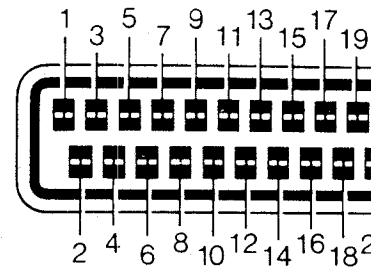
**RH888 REMOTE CONTROL TRANSMITTER**

control transmitter assembly  
lifier assembly, also the UHF  
bly are supplied as complete  
Circuit diagrams for these  
are shown for reference only.

ent location diagrams include  
which may not be fitted for  
s.

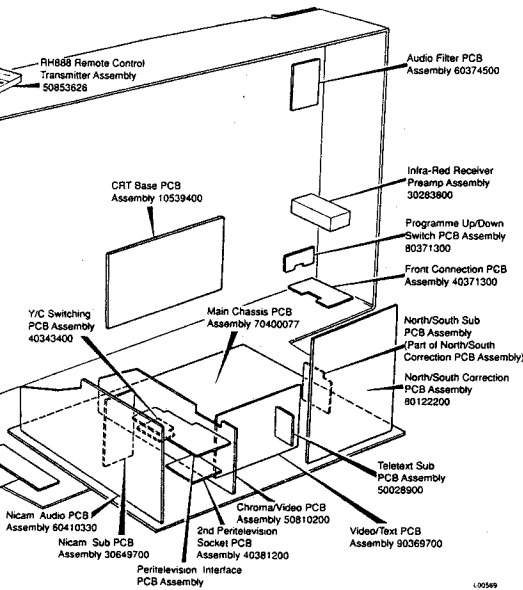


**Chroma/Video Board 50810200 Adjustment Diagram**



**Peritelevision Socket**

**AV1 (BV10) As viewed from rear of the Receiver**



**Internal Circuit Board Location Diagram**

**Socket AV1 (BV10) Contact Functions**

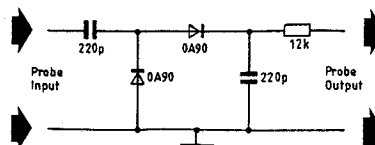
- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1 Audio output B: mono or stereo channel right; nominal 0.5Vr.m.s.; &lt;1kΩ (20 Hz-20kHz).</li> <li>2 Audio input B: mono or stereo channel right; nominal 0.5Vr.m.s.; &lt;10kΩ (20Hz-20kHz)</li> <li>3 Audio output A: mono or stereo channel left; nominal 0.5 Vr.m.s.; &lt;1kΩ (20Hz-20kHz)</li> <li>4 Audio common return</li> <li>5 Blue return</li> <li>6 Audio input A: mono or stereo channel left; nominal 0.5Vr.m.s.; &gt;10kΩ (20Hz-20kHz)</li> <li>7 Blue input: 0.7Vp-p ±3dB positive going, 75Ω</li> <li>8 Function switching: +9.5V to +12V external input mode or 6V for 16:9 switching</li> <li>9 Green return</li> <li>10 No connection permitted</li> <li>11 Green input: 0.7Vp-p ±3dB positive going, 75Ω</li> <li>12 No connection permitted</li> <li>13 Red return</li> <li>14 No connection permitted</li> </ol> | <ol style="list-style-type: none"> <li>15 Red input: 0.7Vp-p ±3dB positive going 75Ω<br/>Chrominance input: 0.3Vp-p ±3dB for Y/C mode</li> <li>16 Fast blanking input: +1V to +3V for fast blanking switching, 75Ω</li> <li>17 Video return</li> <li>18 Blanking return</li> <li>19 Composite video output: 1Vp-p ±3dB positive going, 75Ω</li> <li>20 Composite video input: 1Vp-p ±3dB positive going, 75Ω<br/>Composite sync input: 0.3Vp-p -3dB +10dB negative going, 75Ω<br/>Luminance input: 1Vp-p ±3dB positive going 75Ω</li> <li>21 Common return</li> </ol> |
|--|---|

**(PL15)**  
programme 1 selected with  
black screen, i.e.  
and sound volume  
Measure the U2  
mode (see chassis  
essary adjust to 147V.  
or normal reception.

Set PG 29 to maximum clockwise position.  
Centre the hump of the 4th crosshatch-line  
at the top and bottom with LG 36.  
Straighten both lines with PG 29.  
With PF 14 adjust vertical height to correct  
amplitude.

**Correction of the horizontal lines at  
the left and right side of the screen.**  
Turn PG 92 and PG 95 fully clockwise.

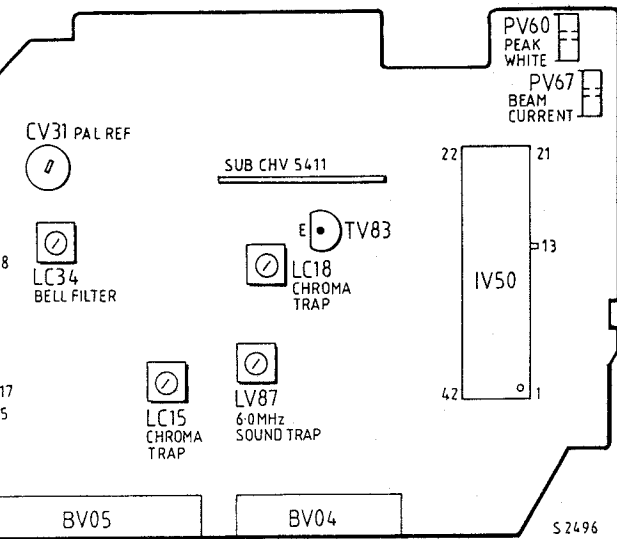
8. A separate power supply providing 12V at 300mA, 16V at 50mA, and 2V at 10mA.
9. A detector probe such as the one shown.



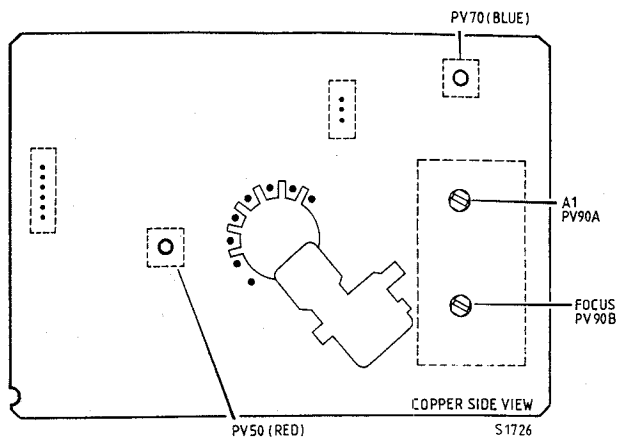
**Luminance/Chroma Video  
CHV 5308 (50810200)**  
Alignment of the SECAM section  
for reference only in case a fault  
develop which affects the PAL :

Although the receiver is intended  
system I use in the UK, the SECAM  
can be enabled using baseband

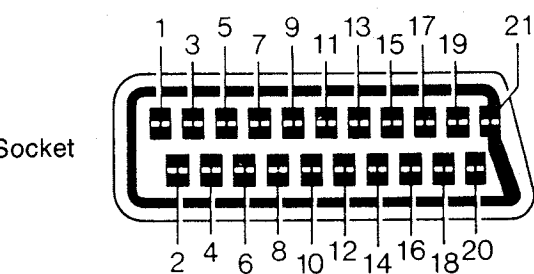
**CHROMINANCE CHANNEL**



Board 50810200 Adjustment Diagram



Tube Base Board 10539400 Adjustment Diagram



AV1 (BV10) As viewed from the rear of the Receiver

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 Tel:- 01844-351694 Fax:- 01844-352554  
 Email:- enquiries@mauritron.co.uk

**Socket AV2 (BZ05) Contact Functions**

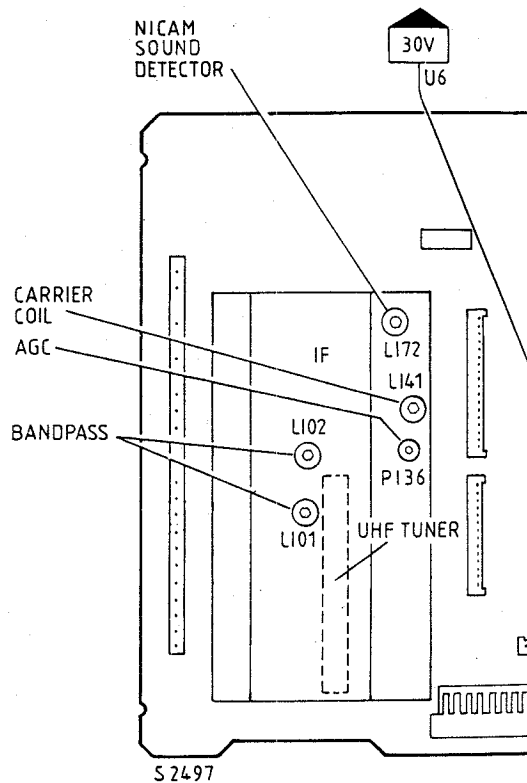
As AV1 except:

- 1 Not connected
- 3 Not connected
- 8 Not connected
- 19 Not connected

**PHONO SOCKETS**

A pair of audio sockets, provided at the rear of the receiver, allow connections to be made to a cassette recorder or Hi-fi equipment so that the TV sound can be recorded or reproduced.

Left or right audio output: nominal 0.5Vr.m.s; >1kΩ (20Hz-20kHz).



Main Board 70400

Providing 12V  
 12V at

one



**Luminance/Chroma Video Module CHV 5308 (50810200)**

Alignment of the SECAM section is given for reference only in case a PAL should develop which requires the PAL section.

Although the receiver is intended for PAL system I use in the UK, the SECAM circuit can be enabled using baseband inputs.

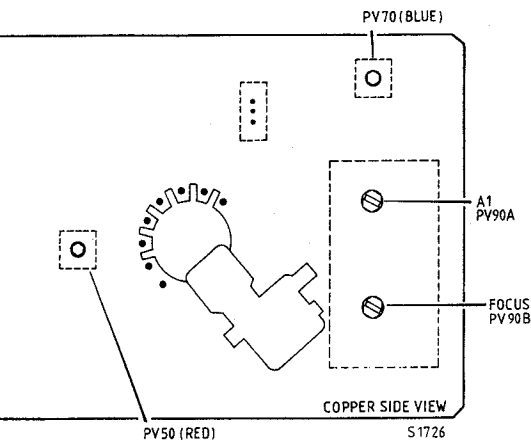
pull-in immediately. Reset the signal generator for normal signal output level.

**B-Y Demodulator (LV24)**

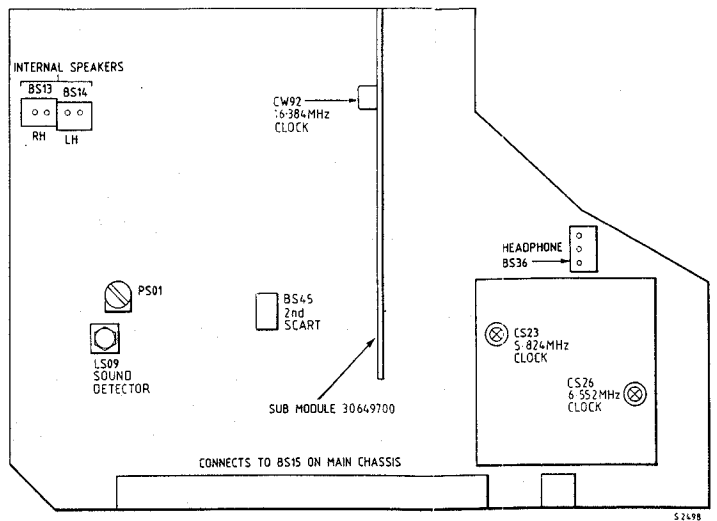
- 29. Connect the oscilloscope between pin 3 of LV01 and earth.
- 30. Colour LV24 for the black-bar of the colour signal and the blanking level to be of the same amplitude.

**R-Y Demodulator (LV27)**

- 51. Note the reading on the meter and adjust PV60 for a 0.5V increase on the reading.
- 52. Set the pattern generator to provide a all-white raster and adjust contrast to maximum.
- 53. Note the reading on the meter and adjust PV67 for a 0.7V increase on the reading.
- 54. Disconnect the meter and base PV5 and PV70, on the tube base board, for the desired white. Alternatively, reset

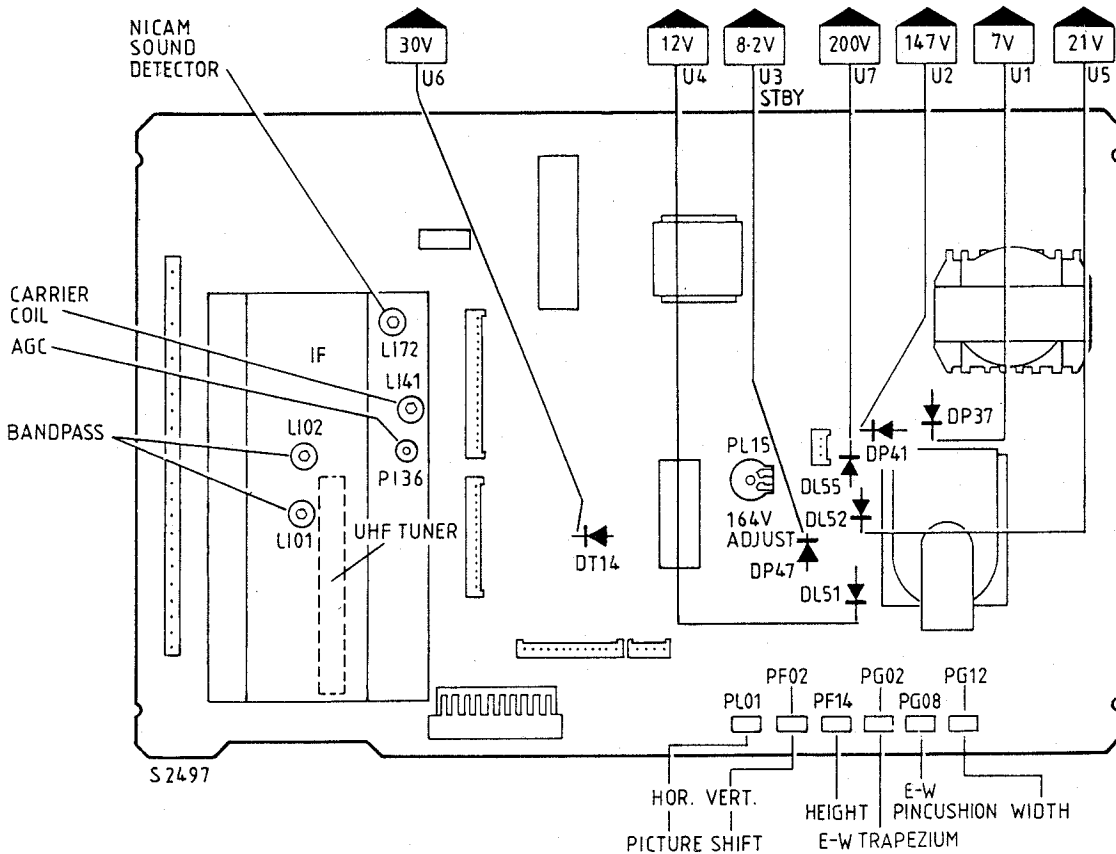


Base Board 10539400 Adjustment Diagram

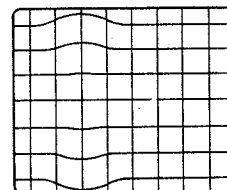


NICAM Audio Board 60410330 Adjustment Diagram

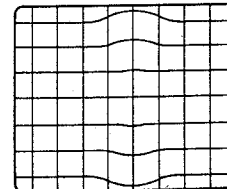
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Oxon OX9 4QY  
Tel:- 01844-351694 Fax:- 01844-352554  
Email:- enquiries@mauritron.co.uk



Main Board 70400077 Adjustment Diagram



Incorrect



Correct

Figure 1

51. Note the reading on the meter and adjust PV60 for a 0.5V increase on this reading.
52. Set the pattern generator to provide an all-white raster and adjust contrast to maximum.
53. Note the reading on the meter and adjust PV67 for a 0.7V increase on this reading.
54. Disconnect the meter and adjust PV50 and PV70, on the tube base board, for the desired white. Alternatively, reset

**NICAM 5.824 MHz Clock (CS23)**

Connect the frequency counter to pin 26 of IS01. Without any aerial input signal, adjust CS23 for 5.824 MHz (Range: 5.82390 MHz-5.82440MHz).

**6.552 MHz clock (CS26)**

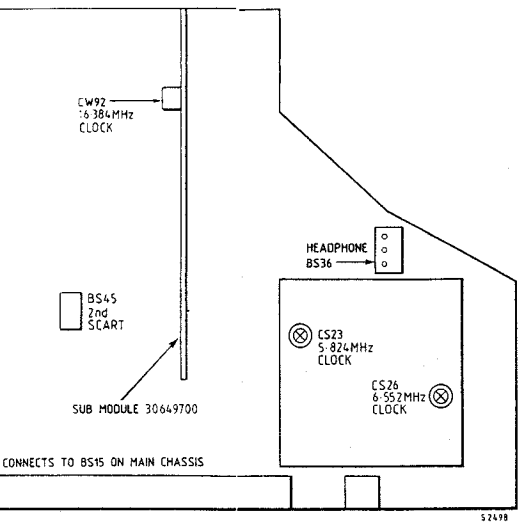
Connect the frequency counter to pin 8 of IS01. Without any aerial signal, adjust CS26 for 6.5518 MHz (Range: 6.551699 MHz-6.55209 MHz).

**Service Mode FJO**

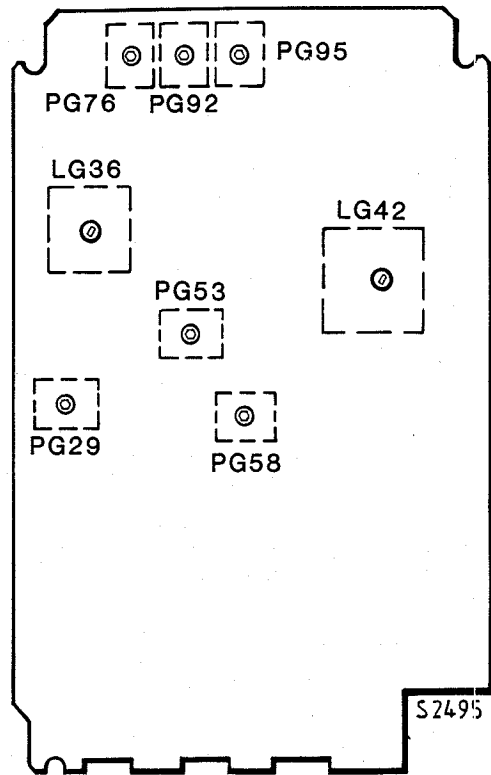
\* The following functions may be change by using the remote control transmitter. The letters below the words Service Mod indicate the programmed condition of the microprocessor.

**SERVICE MODE CHARACTE**

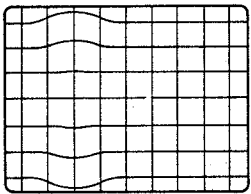
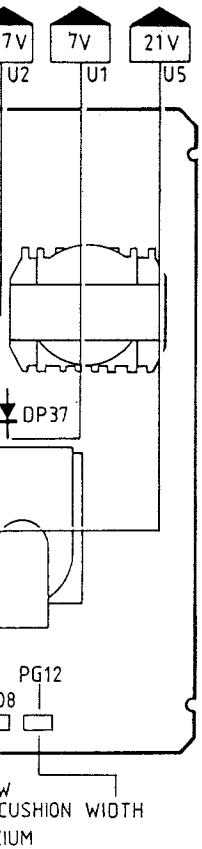
CHARACTER	MEANING
-----------	---------



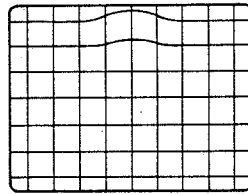
Radio Board 60410330 Adjustment Diagram



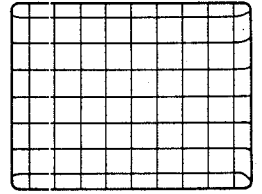
North-South Raster Correction Board 80122200 Adjustment Diagram



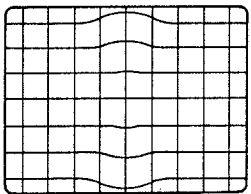
Incorrect



Incorrect

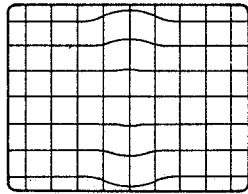


Incorrect



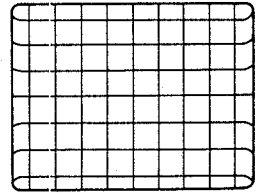
Correct

Figure 1



Correct

Figure 2



Correct

Figure 3

North-South Raster Correction Adjustments - Refer to Text

S23)  
to pin 26 of  
gnal,  
ge:  
to pin 8 of  
adjust  
551699

**Service Mode**  
FJO

\* The following functions may be changed by using the remote control transmitter. The letters below the words Service Mode indicate the programmed condition of the microprocessor.

**SERVICE MODE CHARACTERS**

**2nd LEVEL (GREEN BACKGROUND)**

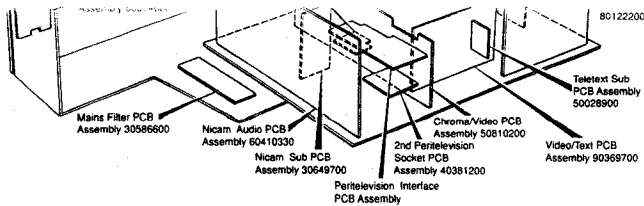
**KEY**

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

(white=100%, colour 75%), input voltage 2mV approx. Set brightness, contrast and colour controls for normal picture.

## VOLTAGES

DC voltages measured with 240V approx. input voltage, unless stated otherwise, and the measurements made with a 20k $\Omega$ /volt multimeter.



Printed Circuit Board Location Diagram

## ACCESS FOR SERVICE

**Disconnect the receiver from the mains supply by removing the mains plug from the wall socket.** It is advisable to check both poles of the mains on-off switch for correct operation.

Remove the cabinet back by unscrewing the five retaining screws and pulling the back rearwards away from the cabinet base.

## CHASSIS REMOVAL

The complete chassis can be removed from the cabinet base by first lifting and pulling rearwards the left hand side of the chassis, as viewed from the rear of the receiver. Slide the chassis to the left and lift it free of the cabinet base.

## INSTALLATION

### Power Supplies

Mains input 240V (nominal) a.c. 50Hz. The receiver will operate from a mains input between 180V and 264V no adjustments being required. The chassis is isolated - however **an area of the main PCB carries live mains** and the usual precautions must be taken when servicing in this area.

### Fuse

Mains input circuit reference FP05 20mm cartridge type T1.6A. Unclip the mains input filter cage for access.

### Aerial Socket

Standard coaxial 75 ohms impedance.

### Degaussing

Dual PTC thermistor unit running from the a.c. mains operates whenever the receiver is switched on from cold.

### Customer Controls

See Operating Instructions for details.

## WARNING

### EHT Shock Hazard

The EHT must be safely discharged before attempting to disconnect the EHT lead from the tube anode.

Clip one end of a convenient lead, such as a meter lead, to the tube earthing strap on the tube body, fold back the suction cap and discharge the EHT through the lead. Press in one side of the spring clip which projects into the tube cavity to ease removal of the EHT connector.

## IMPORTANT

Do not disturb the tube neck adjustments as these have been set for optimum performance during tube manufacture.

## SERVICING ADJUSTMENTS

*The following preset adjustments are not usually required during installation and should be made only if necessary after servicing.*

*Allow TV receiver to warm-up for at least 5 minutes before making any adjustments.*

### SET U2 HT 147V (PL15)

Conditions are Programme 1 selected with locked picture but black screen, i.e. contrast, brightness and sound volume turned to minimum. Measure the U2 voltage at DP41 cathode (see chassis diagram) and if necessary adjust to 147V. Readjust controls for normal reception.

*The following picture geometry adjustments are grouped in a row at the rear of the chassis and can be accessed through holes in the cabinet back.*

### PICTURE HEIGHT AND WIDTH (PF14 AND PG12)

Adjust for full vertical and horizontal scan consistent with correct proportions.

### PICTURE SHIFT (PL01 horizontal and PF02 vertical)

If necessary, adjust to centre the picture. It may be necessary to readjust the vertical after making the horizontal adjustment.

### EAST-WEST PINCUSHION (PG08)

Adjust to remove bowing at the left and right-hand edges of the picture.

### EAST-WEST TRAPEZIUM (PG02)

Adjust to give equal width at top and bottom of picture.

### NORTH-SOUTH PINCUSHION

Also refer to adjustment diagrams

*The following adjustments are located on the North/South module.*

### Preparation

Apply a crosshatch test pattern. If the test pattern generator is fitted with a line frequency control, set the control to the exact line frequency, otherwise misalignment takes place.

The horizontal linearity coil LG 23 has been aligned in the factory for best possible operation and must not be touched (beware of overheating).

The turning direction of the corresponding controls are seen from the copper side of the north-south module.

An optimum adjustment can only be achieved if a second person - observing the screen from a distance of 3 yards and with the eye level at screen centre - guides the adjusting person.

### North-South Correction

Turn controls PG 92 and PG 95 fully counter clockwise and PG 53 fully clockwise. Adjust vertical height control PF 14 (on main chassis) to an amplitude where the upper and lower edges of the picture are just visible.

With LG 42 centre the hump of the top and bottom cross-hatch line (Fig. 1).

With PG 58 adjust the bending degree to symmetry on top and bottom (Fig. 2).

With PG 53 straighten the second horizontal crosshatch-line on top and bottom.

Set PG 29 to maximum clockwise position.

Centre the hump of the 4th crosshatch-line at the top and bottom with LG 36.

Straighten both lines with PG 29.

With PF 14 adjust vertical height to correct amplitude.

### Correction of the horizontal lines at the left and right side of the screen.

Turn PG 92 and PG 95 fully clockwise.

Balance the deviations of the left and right side with PG 76 (Fig. 3).

Straighten the horizontal lines - left and right side of the screen - with PG 92 for the lower half of the picture and with PG 95 for the upper half of the picture.

*The following adjustments are located on the tube base PCB.*

**Note:** The A1 and Picture White Adjustment are repeated in the full alignment sequence.

### A1 VOLTAGE (PV90A)

Adjust under normal reception conditions but with contrast and brightness at minimum to give a black screen.

Check the voltage at the green cathode (pin 6) and if necessary adjust PV90A for 200V.

Restore normal picture.

### FOCUS VOLTAGE (PV90B)

Adjust for overall picture sharpness.

### PICTURE WHITE ALIGNMENT (PV50 AND PV70)

Use a Greyscale wedge or test card to observe results. Adjust PV50 (red) and PV70 (blue) for clean peak white, free from colouration.

## ALIGNMENT

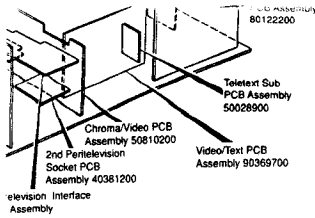
*Full alignment sequence excluding picture geometry adjustments*

### Equipment Required

1. An IF wobulator with markers at 33.7MHz and 37.6MHz.
2. An oscilloscope capable of displaying 100mV at 6MHz and, also, of functioning in the XY mode, i.e. dual input.
3. Non-metallic trimming tools, including an 8BA(4mm) non-metallic box spanner.
4. A multirange meter (20k $\Omega$ /V) such as the Avometer Model 8.
5. A signal generator covering 4MHz to 40MHz and capable of FM to 100kHz deviation with a modulating frequency of 1kHz.
6. An 8 ohm 2W resistor.
7. UHF pattern generator providing the usual colourbar sequence and an all-black and all-white raster plus sound. The pattern generator should be capable of providing standard system I PAL plus SECAM signals.

7. Function switching external input mode
8. Green return
9. No connection per
10. Green input: 0.7V
11. No connection per
12. Red return
13. No connection per
14. No connection per

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14. M
- c
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- th
- w
15. A
- th
- w
16. S



- 7 Blue input: 0.7Vp-p ±3dB positive going, 75Ω
- 8 Function switching: +9.5V to +12V external input mode or 6V for 16:9 switching
- 9 Green return
- 10 No connection permitted
- 11 Green input: 0.7Vp-p ±3dB positive going, 75Ω
- 12 No connection permitted
- 13 Red return
- 14 No connection permitted
- 21 Common return

Left or right a  
0.5Vr.m.s; >1

For Service Manuals Contact  
**MAURITRON TECHNICAL SERVICES**  
 8 Cherry Tree Rd, Chinnor  
 Oxon OX9 4QY  
 Tel:- 01844-351694 Fax:- 01844-352554  
 Email:- enquiries@mauritron.co.uk

## ard Location Diagram

Set PG 29 to maximum clockwise position.  
 Centre the hump of the 4th crosshatch-line at the top and bottom with LG 36.  
 Straighten both lines with PG 29.  
 With PF 14 adjust vertical height to correct amplitude.

### Correction of the horizontal lines at the left and right side of the screen.

Turn PG 92 and PG 95 fully clockwise.  
 Balance the deviations of the left and right side with PG 76 (Fig. 3).  
 Straighten the horizontal lines - left and right side of the screen - with PG 92 for the lower half of the picture and with PG 95 for the upper half of the picture.

*The following adjustments are located on the tube base PCB.*

**Note:** The A1 and Picture White Adjustment are repeated in the full alignment sequence.

### A1 VOLTAGE (PV90A)

Adjust under normal reception conditions but with contrast and brightness at minimum to give a black screen.  
 Check the voltage at the green cathode (pin 6) and if necessary adjust PV90A for 200V.  
 Restore normal picture.

### FOCUS VOLTAGE (PV90B)

Adjust for overall picture sharpness.

### PICTURE WHITE ALIGNMENT (PV50 AND PV70)

Use a Greyscale wedge or test card to observe results. Adjust PV50 (red) and PV70 (blue) for clean peak white, free from colouration.

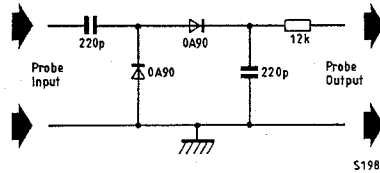
## ALIGNMENT

*Full alignment sequence excluding picture geometry adjustments*

### Equipment Required

1. An IF wobulator with markers at 33.7MHz and 37.6MHz.
2. An oscilloscope capable of displaying 100mV at 6MHz and, also, of functioning in the XY mode, i.e. dual input.
3. Non-metallic trimming tools, including an 8BA(4mm) non-metallic box spanner.
4. A multirange meter (20kΩ/V) such as the Avometer Model 8.
5. A signal generator covering 4MHz to 40MHz and capable of FM to 100kHz deviation with a modulating frequency of 1kHz.
6. An 8 ohm 2W resistor.
7. UHF pattern generator providing the usual colourbar sequence and an all-black and all-white raster plus sound. The pattern generator should be capable of providing standard system I PAL plus SECAM signals.

8. A separate power supply providing 12V at 300mA, 16V at 50mA, and 2V at 10mA.
9. A detector probe such as the one shown.



### Bandpass LI01 and LI02

1. Connect the wobulator output lead, via a series 3.9kΩ resistor and 1nF capacitor, between the junction of CI01/CI02 and earth.
2. Connect the input of the detector probe across RI32 and its output to the oscilloscope (should the wobulator not be provided with its own detector probe).
3. Set the wobulator centre-frequency to 36.5MHz and the output to maximum, with markers at 37.6MHz and 33.7MHz. Connect the 12V supply between BS15/15 and earth and connect the 16V supply to the collector of TP45.
4. Switch on the 12V and 16V supplies and adjust the Y gain of the display for a full scale deflection. Select a UHF channel with the remote control.
5. Adjust LI01 for a minimum at 37.6MHz and LI02 for a maximum at 33.7MHz - this order must be followed.
6. Switch off the 12V and 16V supplies and disconnect the detector probe and the wobulator input.

### Carrier Coil LI41

7. Connect the generator, set to 39.5MHz, in place of the wobulator and the meter between I136/11 and earth (generator output not to be less than 100mV p.d. across 75 ohms). Connect the 2V supply between I136/4 and earth. Meter on 0V-10V range.
8. Switch on the 12V and 2V supplies.
9. Adjust LI41 for a minimum meter reading.
10. Switch off the supplies and disconnect the generator, the supplies and the meter.

### AGC

11. Connect the pattern generator to the aerial input socket and adjust the generator output for 1.5mV p.d across 75 ohms. The generator should be set to channel 27, vision carrier, 519.25MHz, with the colourbar sequence.
12. Adjust potentiometer PI36 maximum clockwise.
13. Switch the receiver on and adjust the tuner to channel 27.
14. Mute volume and adjust brightness, contrast, and colour for normal viewing, i.e. normalise condition.
15. Adjust PI36 until noise appears and then finally adjust for the condition where noise just disappears.
16. Switch the receiver off.

### Luminance/Chroma Video Module CHV 5308 (50810200)

*Alignment of the SECAM section is given for reference only in case a fault should develop which affects the PAL section.*

*Although the receiver is intended for PAL system I use in the UK, the SECAM circuit can be enabled using baseband inputs.*

### CHROMINANCE CHANNEL

**Note:** It is necessary to remove the NICAM audio board in order to carry out the following adjustments.

### PAL

#### Reference Oscillator (CV31)

17. Short-circuit pin 17 of IV01 to chassis.
18. Switch the receiver on and adjust CV31 for the slowest scrolling of the chroma signal.
19. Switch the receiver off and remove the short from pin 17.

#### Delay Line Amplitude (PV02) and Phase (LV01)

20. Connect one input of the oscilloscope between pin 1 of IV01 and earth and the other input between pin 3 of IV01 and earth.
21. Switch the oscilloscope to the XY mode.
22. Switch the receiver on and adjust the respective Y gains of the oscilloscope to obtain a full scale vector style display.
23. Adjust PV02 for minimum amplitude of the centre dot and LV01 to obtain single dots for the six colours of the colourbar.
24. Repeat sequence 23. once more.

*If suitable test equipment is not to hand then PV02 and LV01 can be adjusted for minimum venetian blind effect whilst observing an off-air test card (normalized colour condition). Check for satisfactory results by advancing the colour control.*

25. Switch the receiver off and disconnect the oscilloscope.

### SECAM

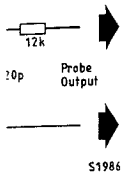
#### Secam Ident (LV12)

26. Adjust the pattern generator, which should still be connected to the aerial socket of the receiver, to provide a SECAM signal on channel 27. The pattern generator should provide a colourbar sequence.  
**Note:** It may be necessary to attenuate the signal from the generator in order to carry out the following adjustment.
27. Switch the receiver on and adjust LV12 for correct identification of the chroma picture.
28. Check the adjustment of LV12 by disconnecting the signal from the pattern generator and then reconnecting it. The colours should



providing 12V  
and 2V at

the one



output lead, via  
a 1nF  
connection of

detector probe to  
the  
oscillator not  
detector

frequency to  
maximum,  
and 33.7MHz.  
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connect the 16V  
P45.

supplies and  
play for a full  
HF channel

at 37.6MHz  
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### Luminance/Chroma Video Module CHV 5308 (50810200)

Alignment of the SECAM section is given for reference only in case a fault should develop which affects the PAL section.

Although the receiver is intended for PAL system I use in the UK, the SECAM circuit can be enabled using baseband inputs.

### CHROMINANCE CHANNEL

**Note:** It is necessary to remove the NICAM audio board in order to carry out the following adjustments.

#### PAL

##### Reference Oscillator (CV31)

- Short-circuit pin 17 of IV01 to chassis.
- Switch the receiver on and adjust CV31 for the slowest scrolling of the chroma signal.
- Switch the receiver off and remove the short from pin 17.

##### Delay Line Amplitude (PV02) and Phase (LV01)

- Connect one input of the oscilloscope between pin 1 of IV01 and earth and the other input between pin 3 of IV01 and earth.
- Switch the oscilloscope to the XY mode.
- Switch the receiver on and adjust the respective Y gains of the oscilloscope to obtain a full scale vector style display.
- Adjust PV02 for minimum amplitude of the centre dot and LV01 to obtain single dots for the six colours of the colourbar.
- Repeat sequence 23. once more.  
*If suitable test equipment is not to hand then PV02 and LV01 can be adjusted for minimum venetian blind effect whilst observing an off-air test card (normalized colour condition). Check for satisfactory results by advancing the colour control.*
- Switch the receiver off and disconnect the oscilloscope.

### SECAM

##### Secam Ident (LV12)

- Adjust the pattern generator, which should still be connected to the aerial socket of the receiver, to provide a SECAM signal on channel 27. The pattern generator should provide a colourbar sequence.

**Note:** It may be necessary to attenuate the signal from the generator in order to carry out the following adjustment.

- Switch the receiver on and adjust LV12 for correct identification of the chroma picture.
- Check the adjustment of LV12 by disconnecting the signal from the pattern generator and then reconnecting it. The colours should

pull-in immediately. Reset the signal generator for normal signal output level.

### B-Y Demodulator (LV24)

- Connect the oscilloscope between pin 3 of IV01 and earth.
- Adjust LV24 for the black-bar of the colourbar signal and the blanking level to be of the same amplitude.

### R-Y Demodulator (LV27)

- Connect the oscilloscope between pin 1 of IV01 and earth.
- Adjust LV27 for the black-bar of the colourbar signal and the blanking level to be of the same amplitude.

### Bell Filter (LC34)

- Connect the oscilloscope between pin 15 of IV01 and earth.
- Adjust LC34 for equal amplitude of the colourbar signal.
- Switch the receiver off and disconnect the oscilloscope

### LUMINANCE CHANNEL

#### Sound Carrier Trap (LV87)

- Connect the input of the oscilloscope between the emitter of TV83 and earth.
- Switch the receiver on and set the pattern generator for an all-black raster.
- Adjust LV87 for a minimum of the sound carrier signal.

#### Chroma Carrier Traps (LC15 and LC18)

- Connect the oscilloscope between pin 13 of IV50 and earth.
- Adjust the pattern generator to provide the SECAM colourbar sequence.
- Switch the receiver on and adjust LC15 for minimum chroma signal.
- Adjust the pattern generator to provide the PAL colourbar sequence.
- Adjust LC18 for minimum chroma signal.
- Switch the receiver off and disconnect the oscilloscope.
- Disconnect the pattern generator from the aerial socket of the receiver.

### A1, Beam-Limiting and Grey-Scale

Connect the pattern generator to the aerial socket of the receiver and adjust the generator to provide a PAL all-black raster on channel 27.

- Connect the meter, 600V range, between pin 6 of the CRT and earth.
- Switch the receiver on.
- Set PV60 and PV67 to maximum anti-clockwise.
- Adjust the A1 control (PV90A) on the tube base board, for a reading of 200V on the meter.
- Disconnect the meter and connect it between BS02/1 and earth (0V-3V range). Set the pattern generator to provide the colourbar sequence.

- Note the reading on the meter and adjust PV60 for a 0.5V increase on reading.
- Set the pattern generator to provide all-white raster and adjust contrast maximum.
- Note the reading on the meter and adjust PV67 for a 0.7V increase on reading.
- Disconnect the meter and adjust PV and PV70, on the tube base board, the desired white. Alternatively, reset the pattern generator for the colour sequence; normalise contrast and brightness and adjust colour to minimum. Adjust PV50 and PV70 for optimum greyscale performance.  
N.B Should the pattern generator be incapable of providing an all-black or all-white signal, then adjustment of A1 control requires that the contrast brightness and colour be set to minimum. Adjustment of PV67 requires that contrast, brightness and saturation be set to maximum.
- Switch-off and disconnect the pattern generator.

## NICAM AUDIO SERVICING ADJUSTMENTS

The following factory preset adjustments are carried out during manufacture and should not be readjusted in the field unless components affecting the settings are changed.

It is recommended that only qualified engineers having the correct servicing equipment should attempt any of the NICAM adjustments or the performance of the decoder may be impaired.

### Equipment Required

- A 7-digit, or more, frequency counter capable of resolving greater than 20MHz. The counter must be fitted with a 10:1 probe.
- A TV pattern generator providing, at least, a 1kHz tone at  $\pm 20$ kHz deviation.
- General purpose oscilloscope (CRO).
- Non-metallic trimming tools.

## MAIN CHASSIS

### Sound Detector (LI72)

Connect the oscilloscope to PL/SK BS1 pin 14. Connect the pattern generator at any convenient channel and adjust LI72 minimum video signal on CRO display.

### NICAM AUDIO BOARD Sound Detector (LS09)

Connect the oscilloscope to pin 8 of ISC. Connect the pattern generator at any convenient channel and adjust LS09 for maximum recovered audio.

### (PS01)

Connect the oscilloscope to pin 20 of IS. Adjust PS01 to give the same FM output as the NICAM output.

## Main Board 7040077 Adjustment Diagram

For Service Manuals Contact  
**MAURITRON TECHNICAL SERVICES**  
8 Cherry Tree Rd, Chinnor  
Oxon OX9 4QY  
Tel:- 01844-351694 Fax:- 01844-352554  
Email:- enquiries@mauritron.co.uk

### Service Mode FJO

\* The following functions may be changed by using the remote control transmitter. The letters below the words Service Mode indicate the programmed condition of the microprocessor.

#### SERVICE MODE CHARACTERS

CHARACTER	MEANING
A	Test mode active
*B	Satellite reception enabled
*C	FLOF functions via sub-menu
*E	UK + Eire channels
*F	UK channels only
H	I <sup>2</sup> C bus test active
*J	Auto S-VHS detection on
N	Ferguson remote operation
O	Point of sale message installed

To activate/deactivate the different settings, as shown in the following two tables the remote control buttons are defined as follows:  
Since there are not enough buttons to select all the functions, a sublevel can be called.

#### SERVICE MODE REMOTE KEY FUNCTI

KEY	
0	UK only
1	UK and Eire
2	Satellite reception enabled
3	Satellite reception disabled
4	FLOF functions on separate keys
5	FLOF functions via sub-menu
6	
7	
8	
9	
DISP	
+	
-	
SOUND	
PICTURE	
NORM	LED dimmer adjust
TEXT	2nd level of service mode
OFF	Exit service mode and into standby

- Note the reading on the meter and adjust PV60 for a 0.5V increase on this reading.
- Set the pattern generator to provide an all-white raster and adjust contrast to maximum.
- Note the reading on the meter and adjust PV67 for a 0.7V increase on this reading.
- Disconnect the meter and adjust PV50 and PV70, on the tube base board, for the desired white. Alternatively, reset the pattern generator for the colourbar sequence; normalise contrast and brightness and adjust colour to minimum. Adjust PV50 and PV70 for optimum greyscale performance.  
N.B Should the pattern generator be incapable of providing an all-black and all-white signal, then adjustment of the A1 control requires that the contrast, brightness and colour be set to minimum. Adjustment of PV67 requires that contrast, brightness and saturation be set to maximum.
- Switch-off and disconnect the pattern generator.

## NICAM AUDIO SERVICING ADJUSTMENTS

The following factory preset adjustments are carried out during manufacture and should not be readjusted in the field unless components affecting the settings are changed.

It is recommended that only qualified engineers having the correct servicing equipment should attempt any of the NICAM adjustments or the performance of the decoder may be impaired.

### Equipment Required

- A 7-digit, or more, frequency counter capable of resolving greater than 20MHz. The counter must be fitted with a 10:1 probe.
- A TV pattern generator providing, at least, a 1kHz tone at  $\pm 20$ kHz deviation.
- General purpose oscilloscope (CRO).
- Non-metallic trimming tools.

## MAIN CHASSIS

### Sound Detector (LI72)

Connect the oscilloscope to PL/SK BS15 pin 14. Connect the pattern generator at any convenient channel and adjust LI72 for minimum video signal on CRO display.

### NICAM AUDIO BOARD Sound Detector (LS09)

Connect the oscilloscope to pin 8 of IS09. Connect the pattern generator at any convenient channel and adjust LS09 for maximum recovered audio.

### (PS01)

Connect the oscilloscope to pin 20 of IS04. Adjust PS01 to give the same FM output as the NICAM output.

### NICAM 5.824 MHz Clock (CS23)

Connect the frequency counter to pin 26 of IS01. Without any aerial input signal, adjust CS23 for 5.824 MHz (Range: 5.82390 MHz-5.82440MHz).

### 6.552 MHz clock (CS26)

Connect the frequency counter to pin 8 of IS01. Without any aerial signal, adjust CS26 for 6.5518 MHz (Range: 6.551699 MHz -6.55209 MHz).

## NICAM SUB MODULE

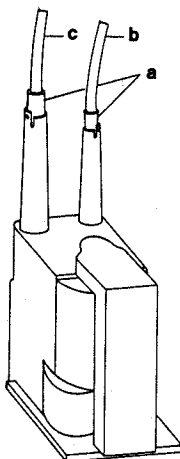
### NICAM 16.384 MHz Demultiplexing Clock, if fitted (CW92)

With a NICAM signal present, connect the oscilloscope to pin 9 of IW98 and adjust CW92 for for 25% mark/space ratio.

## LINE OUTPUT TRANSFORMER REPLACEMENT

The replacement LOPT supplied does not have the cable clips and cables fitted.

It is therefore necessary to remove the cable clips (a), the focus cable (b) and the EHT cable (c) from the original transformer.



## SERVICE MODE

If the microprocessor in circuit position IR01 is replaced or the back-up battery in position XR85 becomes discharged, it will be necessary to reprogram the microprocessor. This is done by entering the Service Mode of the TV receiver.

To enter the Service Mode of the TV receiver, first ensure that the TV receiver is switched off by the on/off switch on the receiver.

Press both volume - and programme - buttons on the TV receiver simultaneously and at the same time switch the TV on again using the on/off switch. Keep the buttons depressed until the following is being displayed on the TV screen.

**CS23)**  
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signal,  
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1.

**Service Mode**  
**FJO**

\* The following functions may be changed by using the remote control transmitter. The letters below the words Service Mode indicate the programmed condition of the microprocessor.

**SERVICE MODE CHARACTERS**

CHARACTER	MEANING	DEFAULT CONDITION
A	Test mode active	Off
*B	Satellite reception enabled	Off
*C	FLOF functions via sub-menu	Off
*E	UK + Eire channels	Off
*F	UK channels only	On
H	I <sup>2</sup> C bus test active	Off
*J	Auto S-VHS detection on	On
N	Ferguson remote operation	Off
O	Point of sale message installed	Off

To activate/deactivate the different settings, as shown in the following two tables the remote control buttons are defined as follows:  
Since there are not enough buttons to select all the functions, a sublevel can be called.

**SERVICE MODE REMOTE KEY FUNCTIONS**

KEY	FUNCTION
0	UK only
1	UK and Eire
2	Satellite reception enabled
3	Satellite reception disabled
4	FLOF functions on separate keys
5	FLOF functions via sub-menu
6	
7	
8	
9	
DISP	
+	
-	
SOUND	
PICTURE	
NORM	LED dimmer adjust
TEXT	2nd level of service mode
OFF	Exit service mode and into standby

**2nd LEVEL (GREEN BACKGROUND)**

KEY	FUNCTION
1	
2	
3	
4	
5	
6	
7	
8	
9	
NORM	Auto S-VHS detection on
DISP	Auto S-VHS detection off
+	
-	
PROG	1st level
OFF	Exit service mode

When programming is completed, switch the TV receiver to standby using the remote control transmitter. This stores the desired functions and also abandons the Service Mode.

**SERVICE ADVICES**

**Preset Adjustments**

If the TV picture levels such as brightness, contrast, colour balance or colour intensity are incorrect, check the following preset adjustments before looking for any fault.

In order to enter the service preset adjustments mode, switch the TV receiver into standby by using the remote control transmitter. Press the P button on the remote control until the TV switches on again.

The following menu will appear on the TV screen.

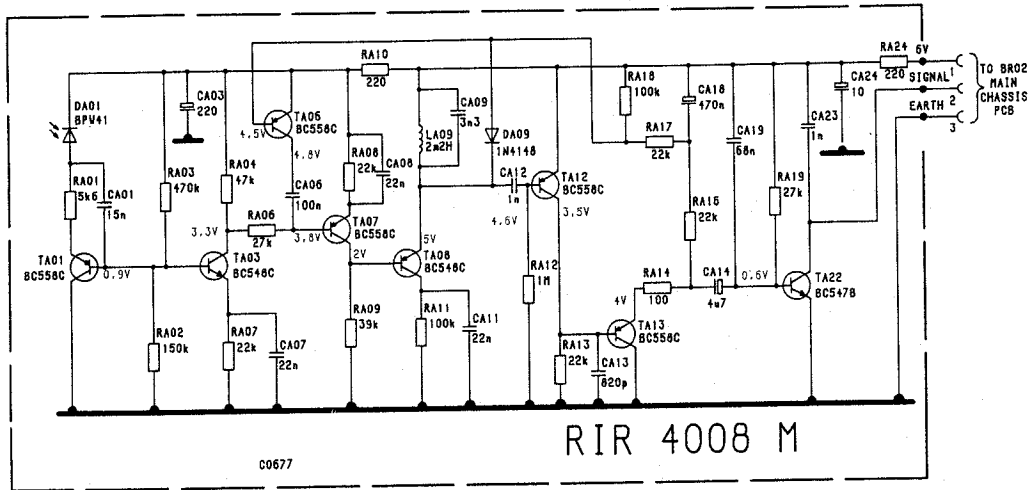
> EF CORRECT	___ ___
COL BALANCE	___ ___
COLOUR	___ ___
BRIGHTNESS	___ ___
CONTRAST	___ ___
MENU SIZE	HALF (-) FULL (+)

All the TV picture settings should be at the centre. To adjust, press the P button in order to select the appropriate line and place the level at the centre by using the <- and +> buttons on the remote control handset. The EF CORRECT line is active on 78 cm CRT receivers only.

When the settings have been adjusted, leave the menu screen by pressing the TV button on the remote control transmitter.

# MODELS 59M5 AND 68M5

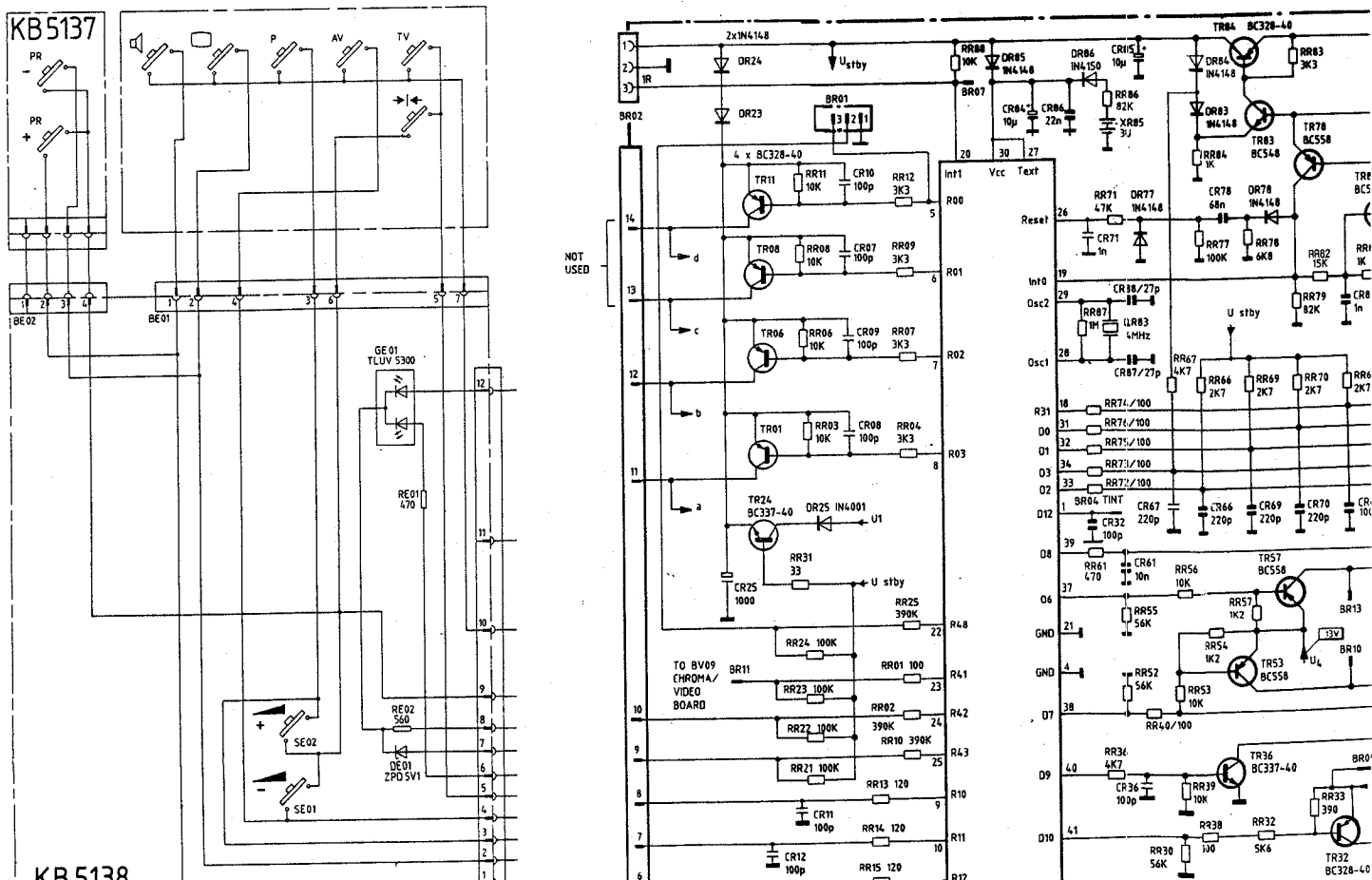
## CIRCUIT DIAGRAMS



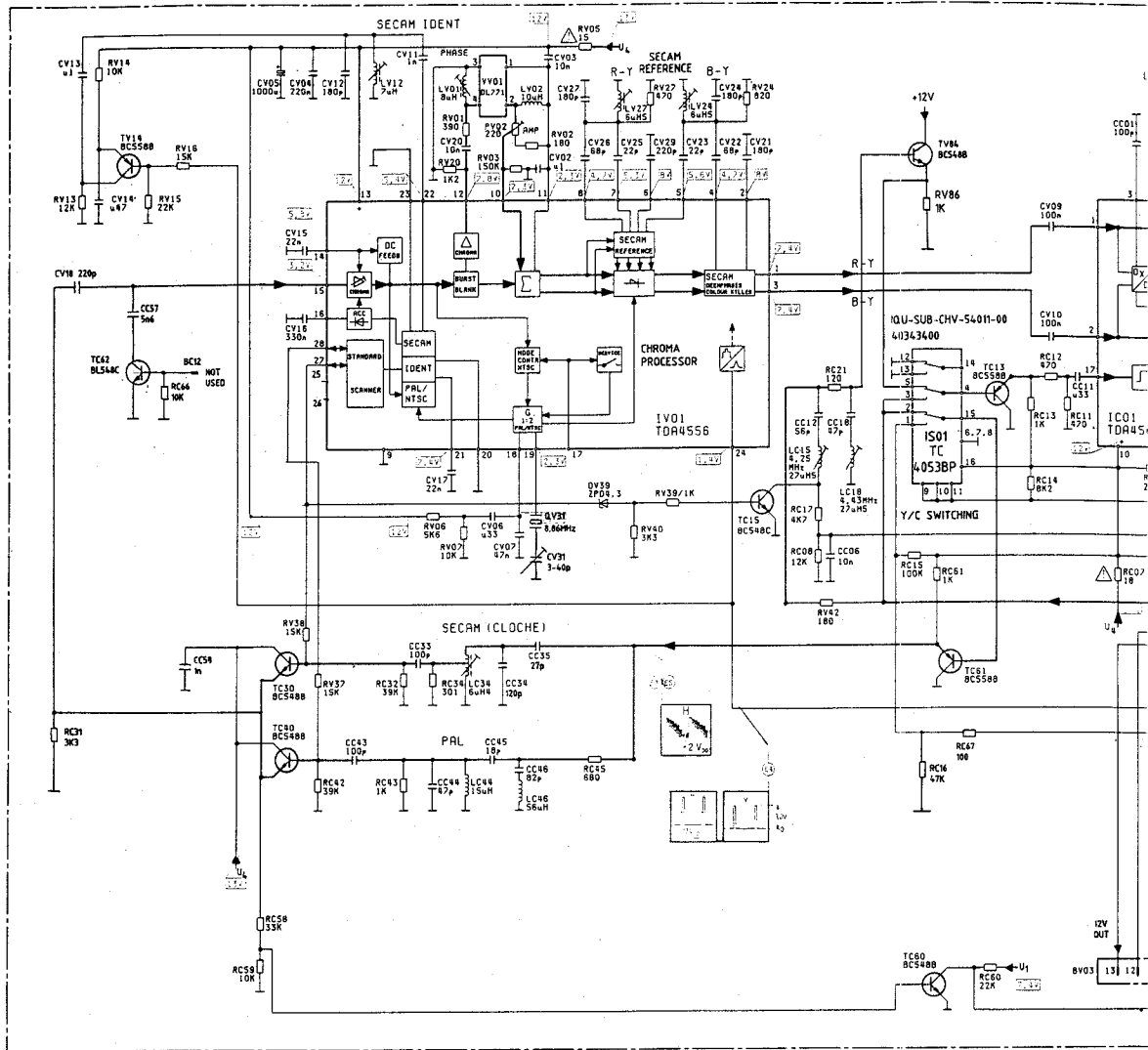
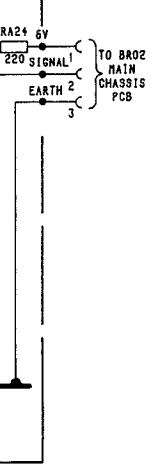
Infra-Red Receiver  
Preamp 30283800

For Service Manuals Contact  
MAURITRON TECHNICAL SERVICES  
8 Cherry Tree Rd, Chinnor  
Oxon OX9 4QY  
Tel: 01844-351694 Fax: 01844-352554  
Email: enquiries@mauritron.co.uk

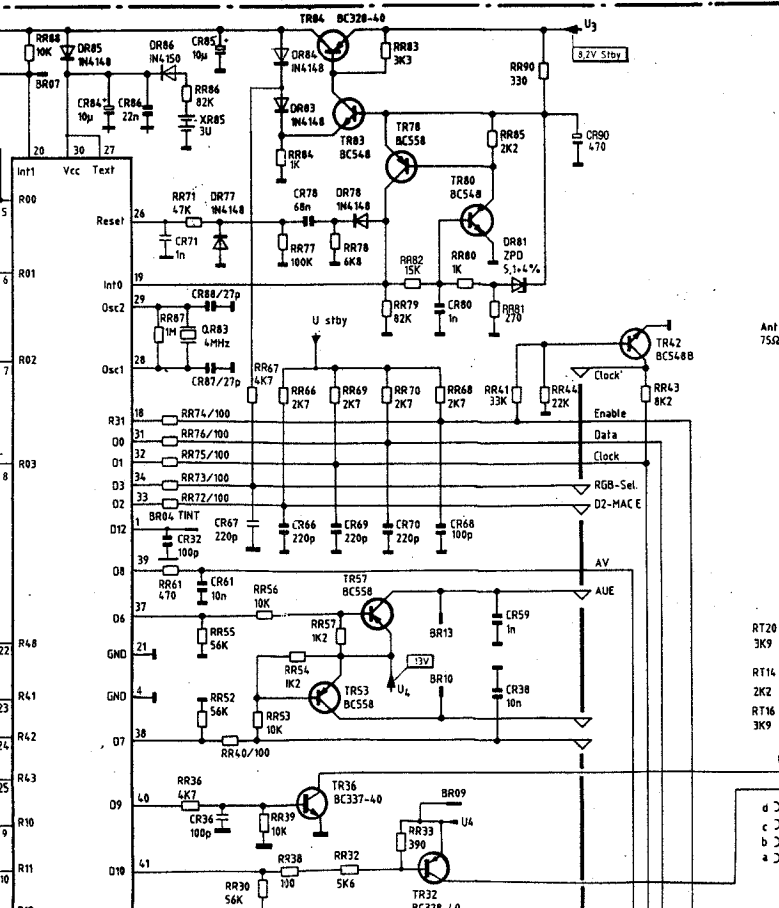
Programme Switch  
80372600



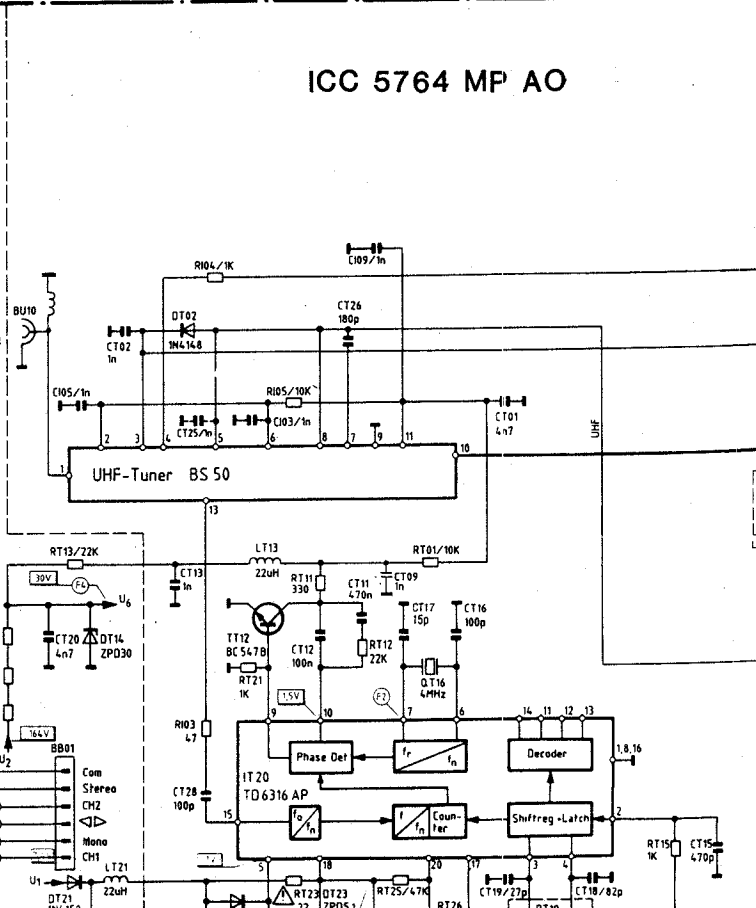
5

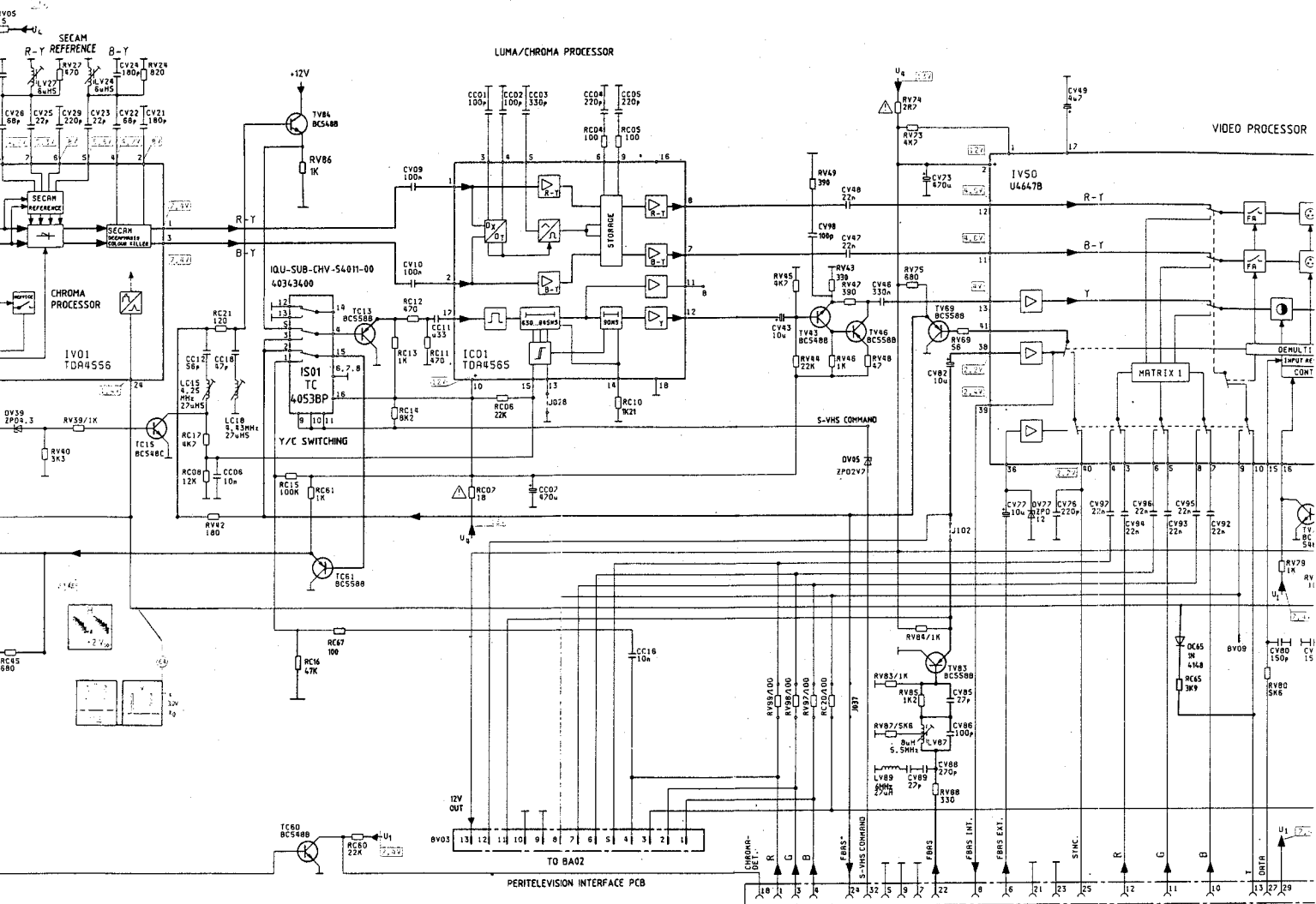


Video/Chroma 50810200



ICC 5764 MP AO

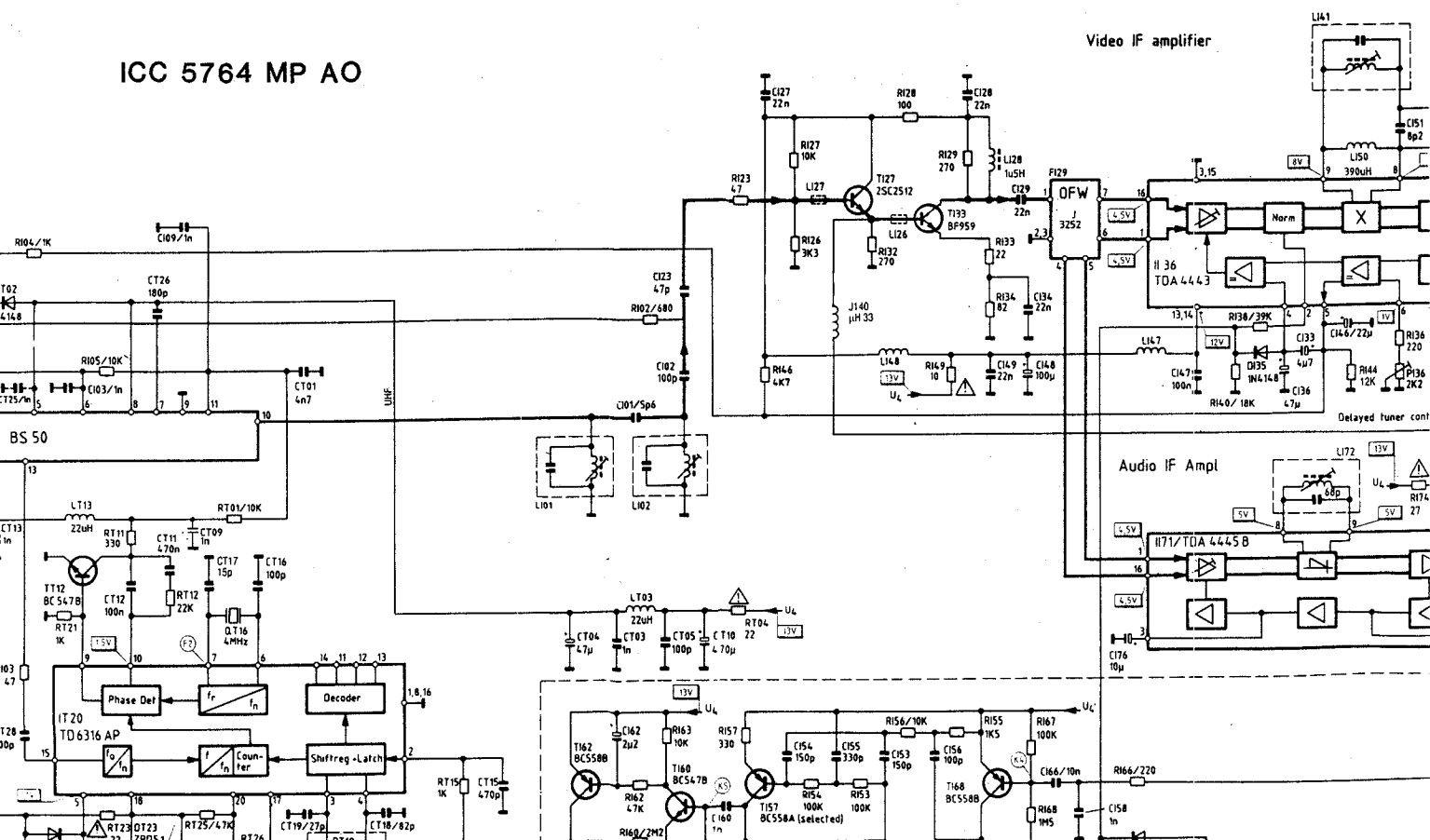




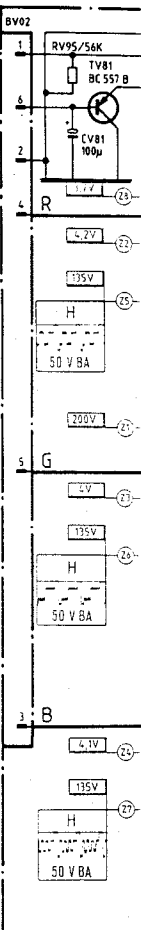
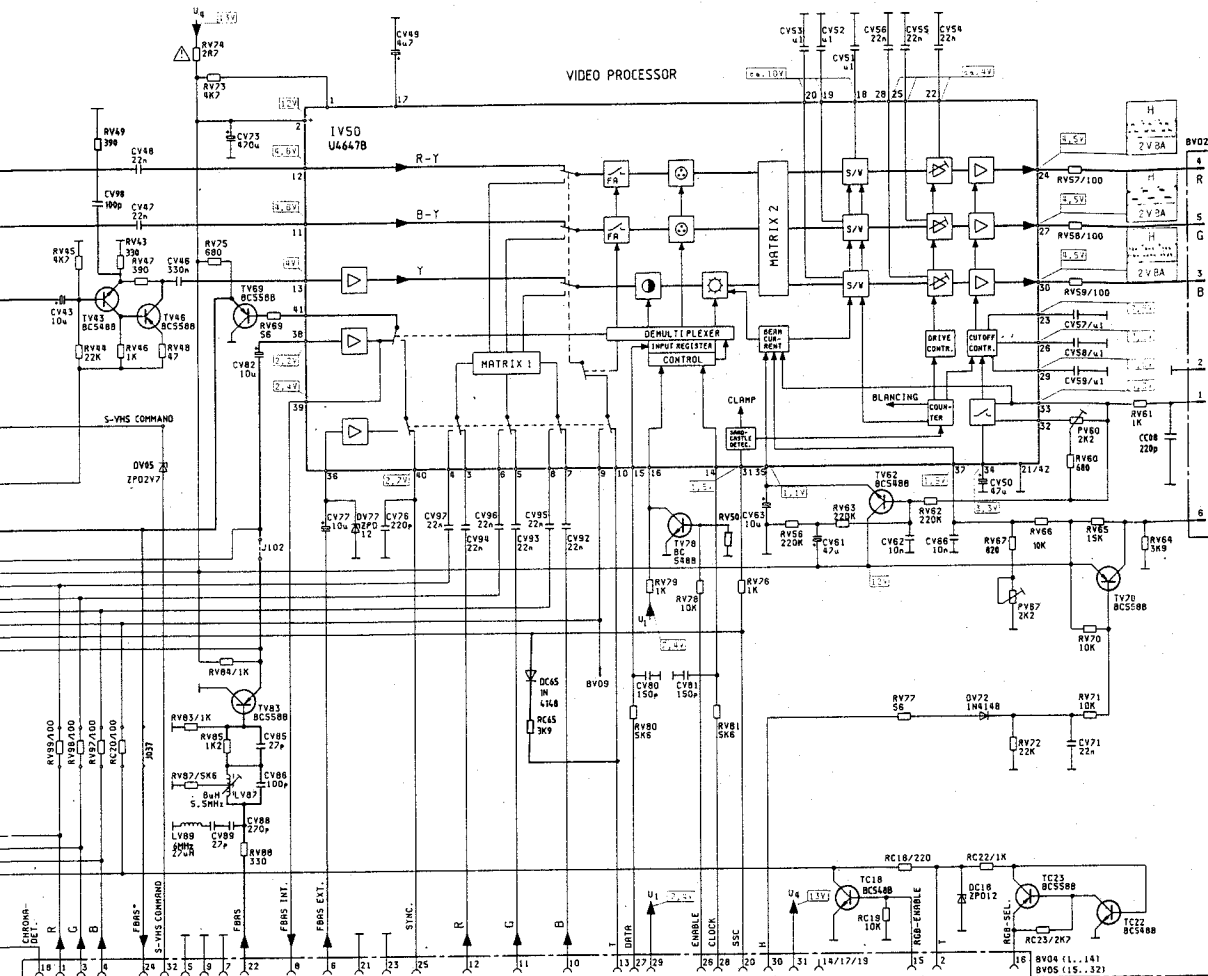
chroma 50810200

For Service Manuals Contact  
**MAURITRON TECHNICAL SERVICES**  
 8 Cherry Tree Rd, Chinnor  
 Oxon OX9 4QY  
 Tel: 01844-351694 Fax: 01844-352554  
 Email: enquiries@mauritron.co.uk

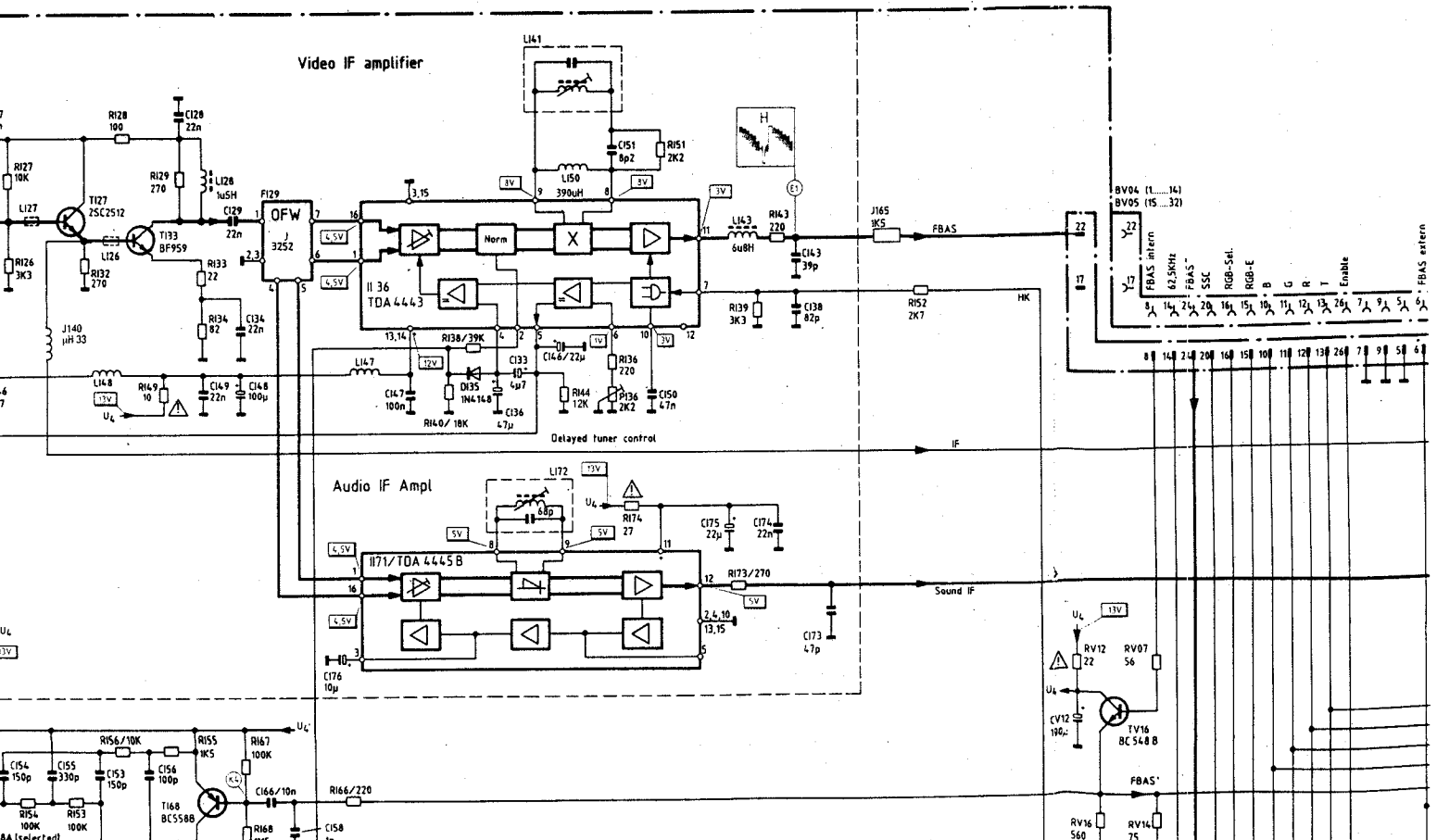
### ICC 5764 MP AO



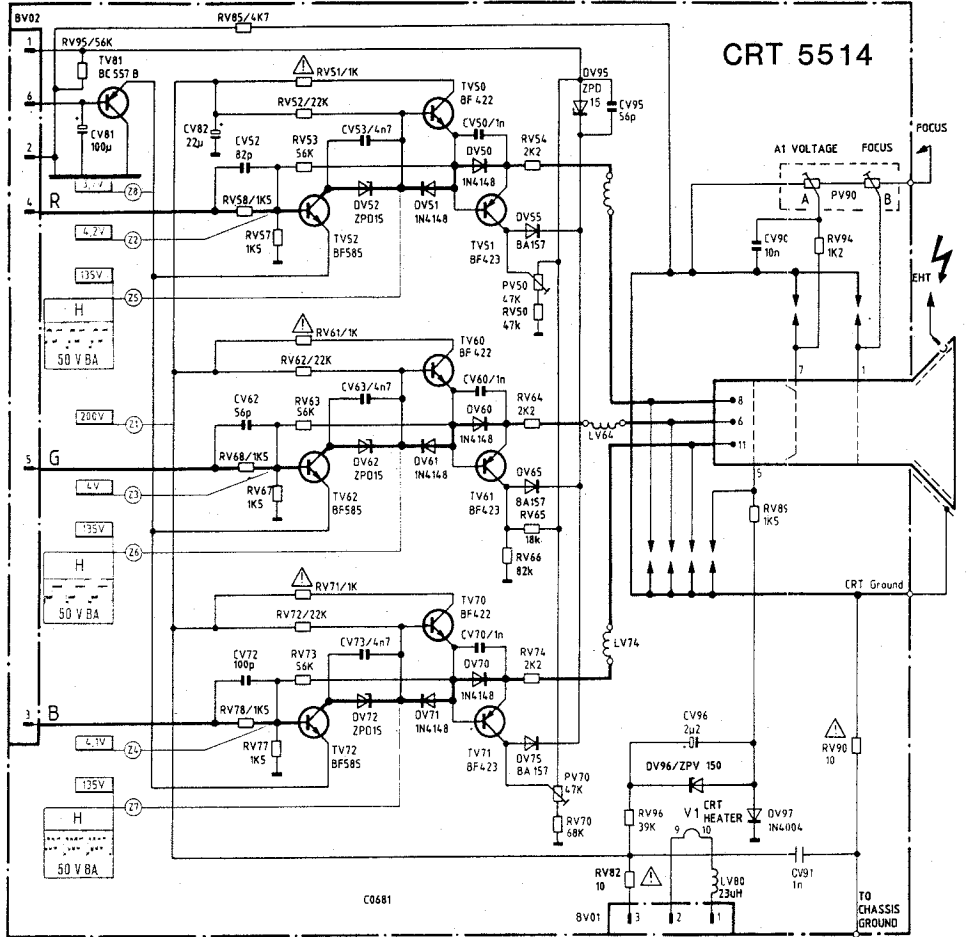
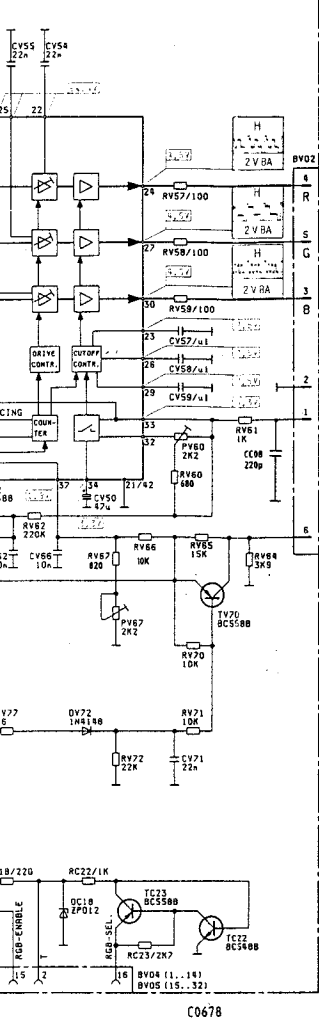
# PE CHV 5308



C0678

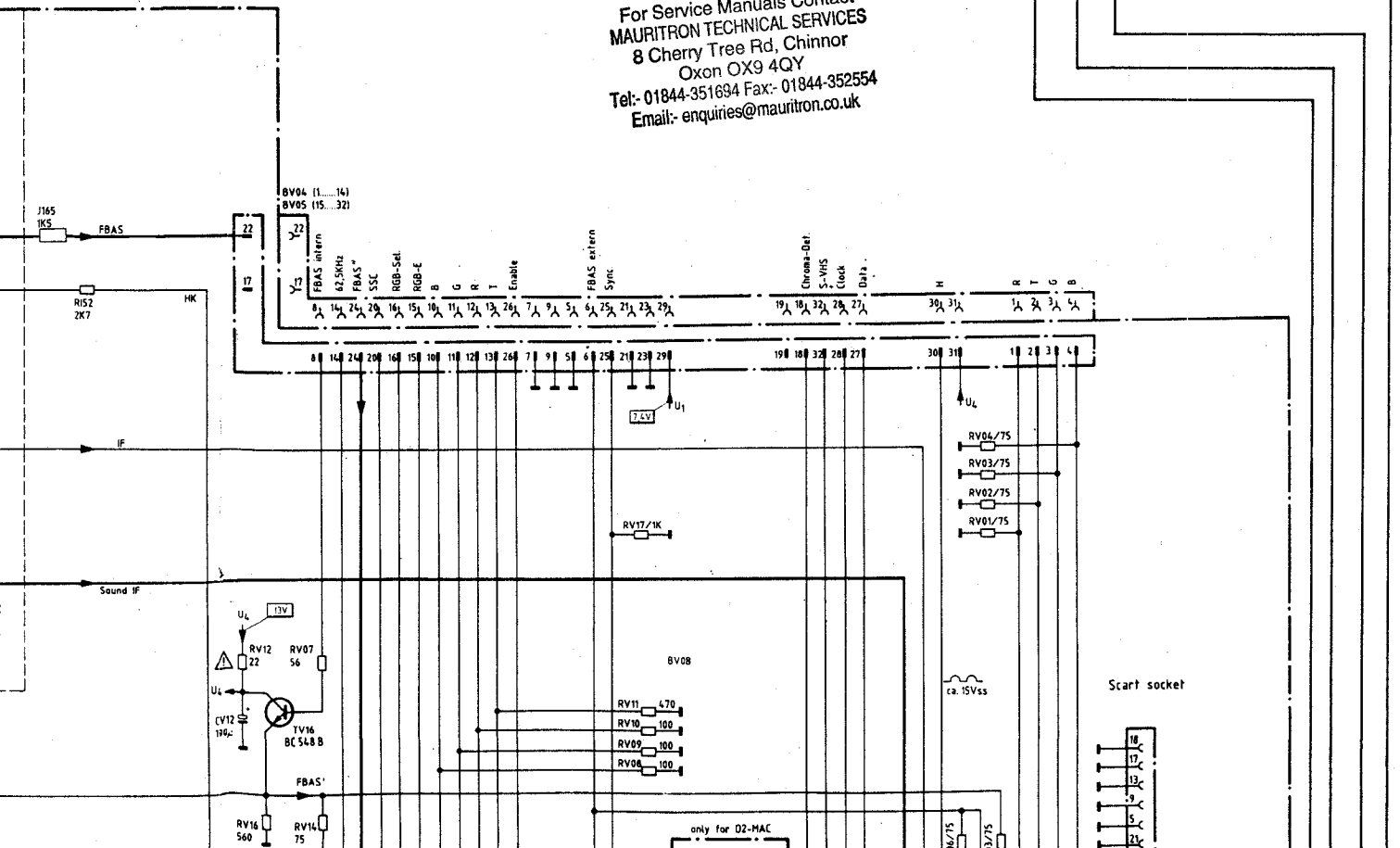


PE CHV 5303

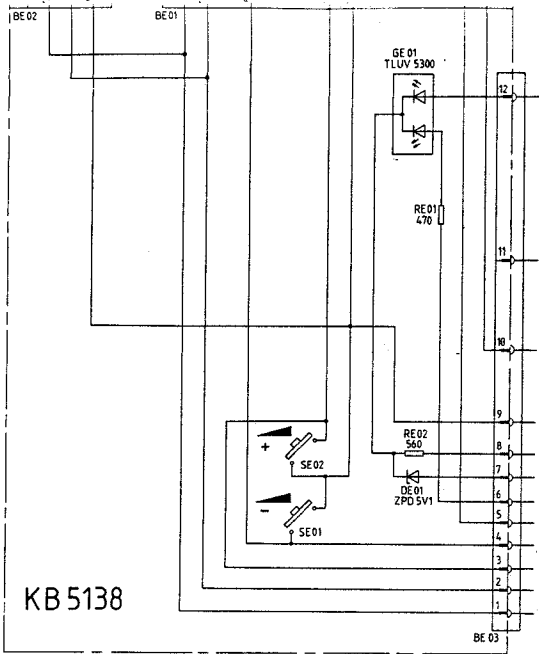


CRT Base 10539400

For Service Manuals Contact  
 MAURITRON TECHNICAL SERVICES  
 8 Cherry Tree Rd, Shinners  
 Oxon OX9 4QY  
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 Email: enquiries@mauritron.co.uk

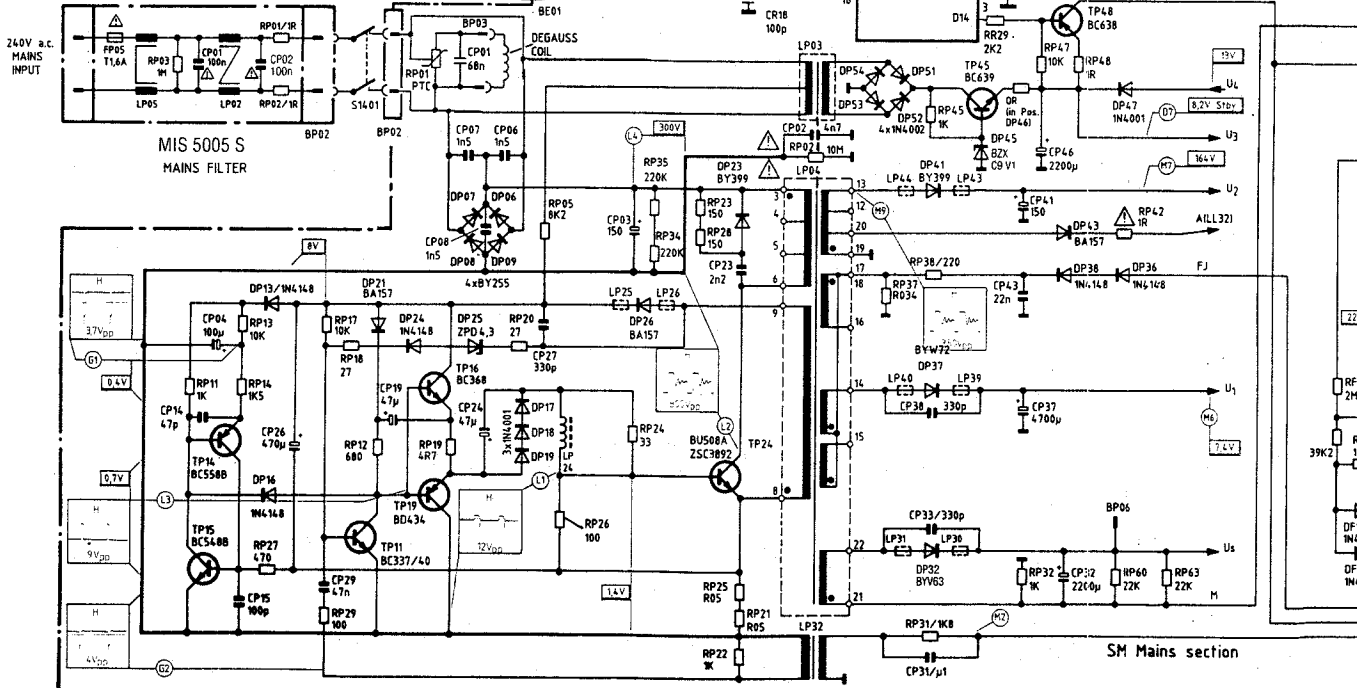
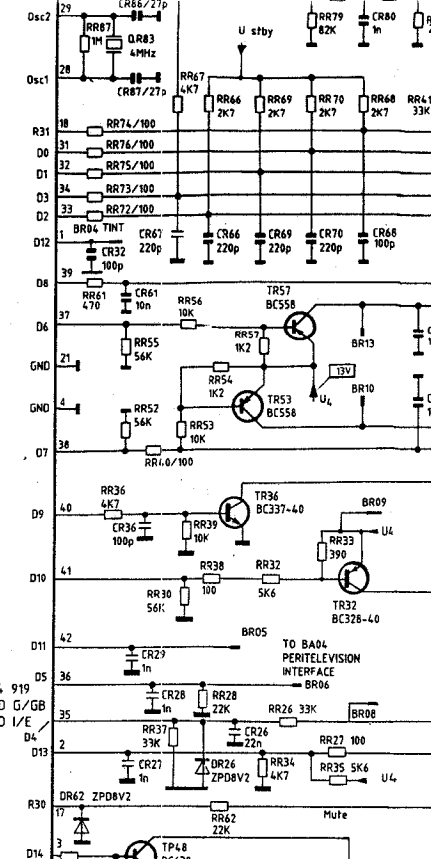
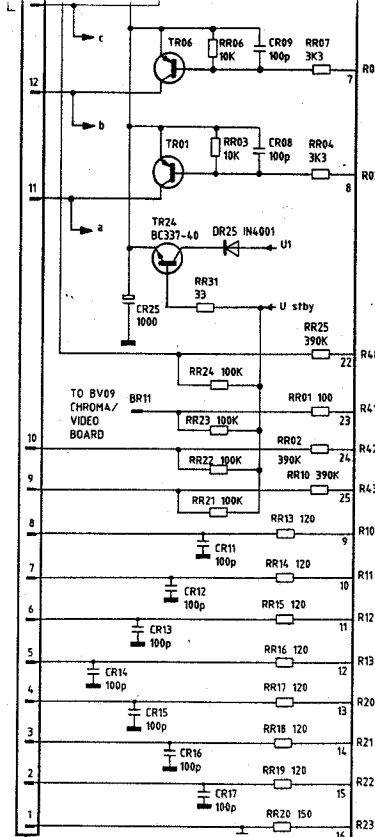






KB 5138

Control/Display  
60374600



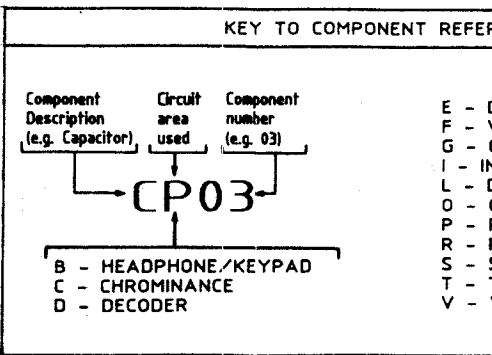
Important! On the primary side of the line section, measure all voltages and oscillograms against primary line section ground

For Service Manuals Contact  
MAURITRON TECHNICAL SERVICES  
8 Cherry Tree Rd, Chinnor  
Oxon OX9 4QY  
Tel: 01844-351694 Fax: 01844-352554  
Email: enquiries@mauritron.co.uk

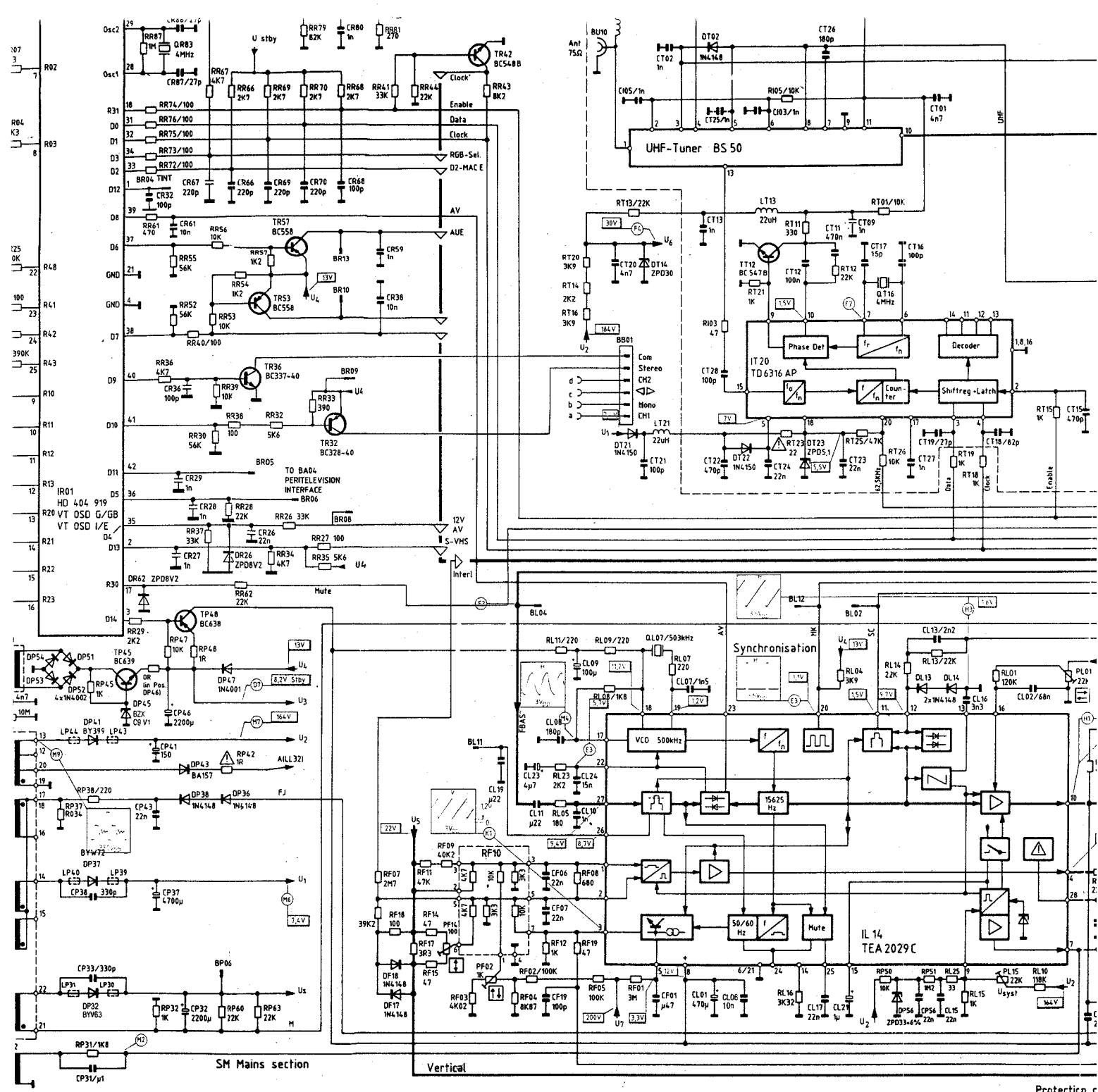
# FERGUSON LIMITED

SERVICE DIVISION  
PO Box 1594, CROWN ROAD, ENFIELD, MIDDLESEX EN1 1DY.  
TEL: 081-804 7979 (24-HOURS SPARES ORDERING).  
FAX: 081-443 1899. TELEX 264905 FERGSVC G.

00XM001001 TPH1675 F1090N

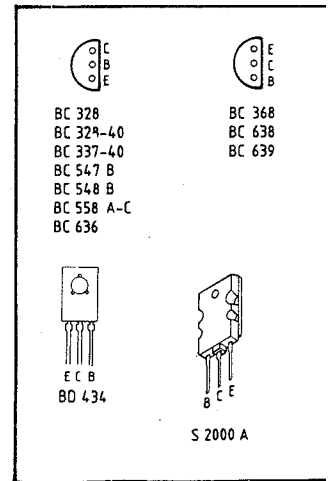
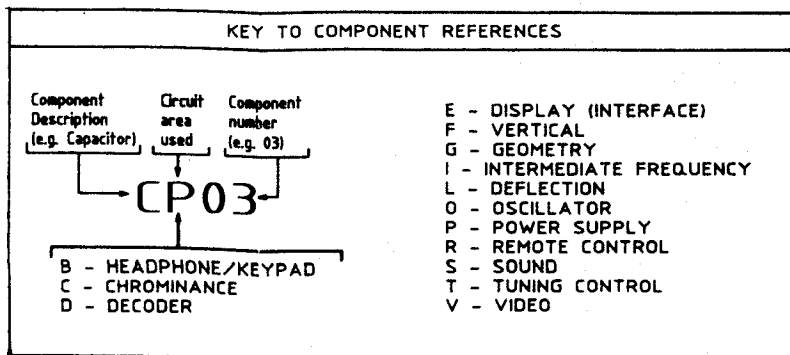


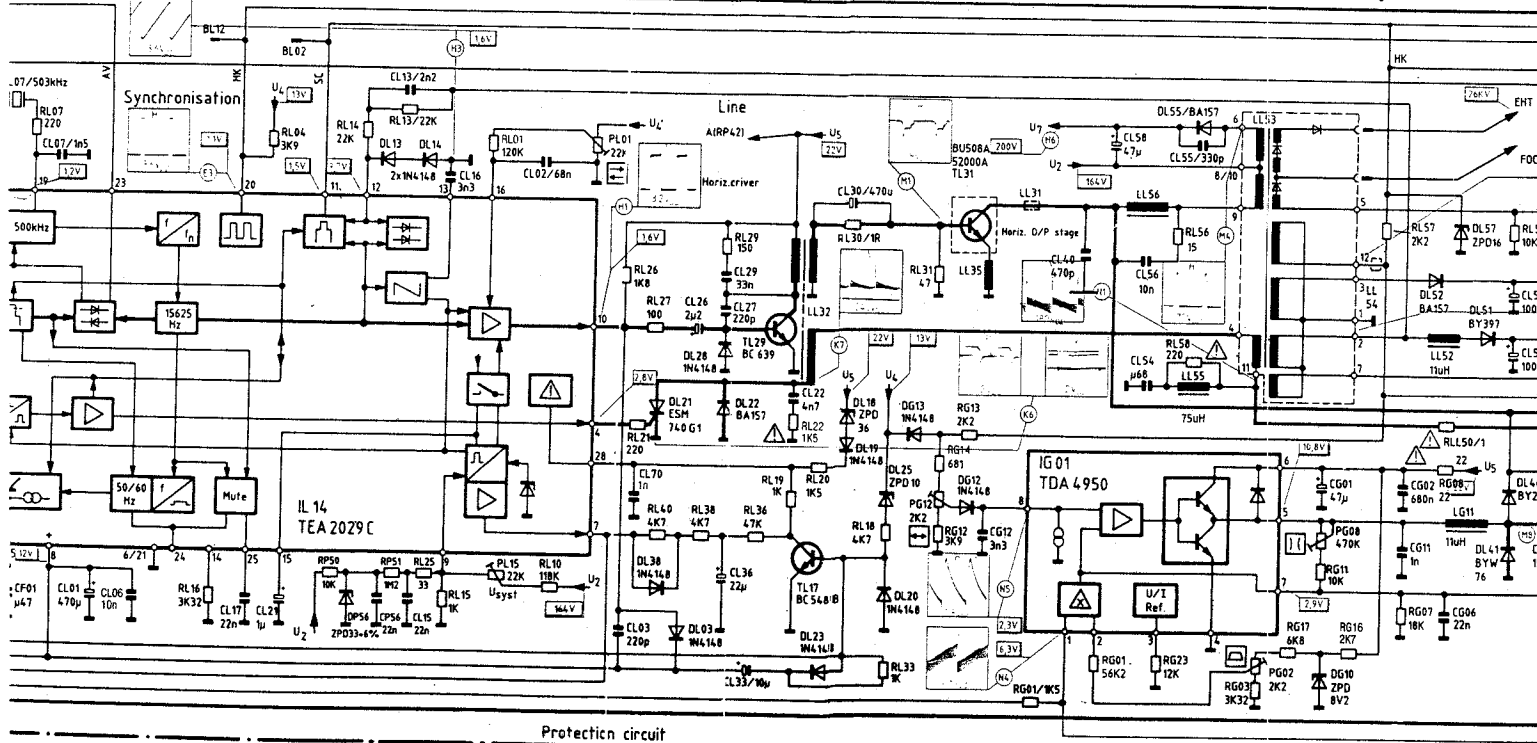
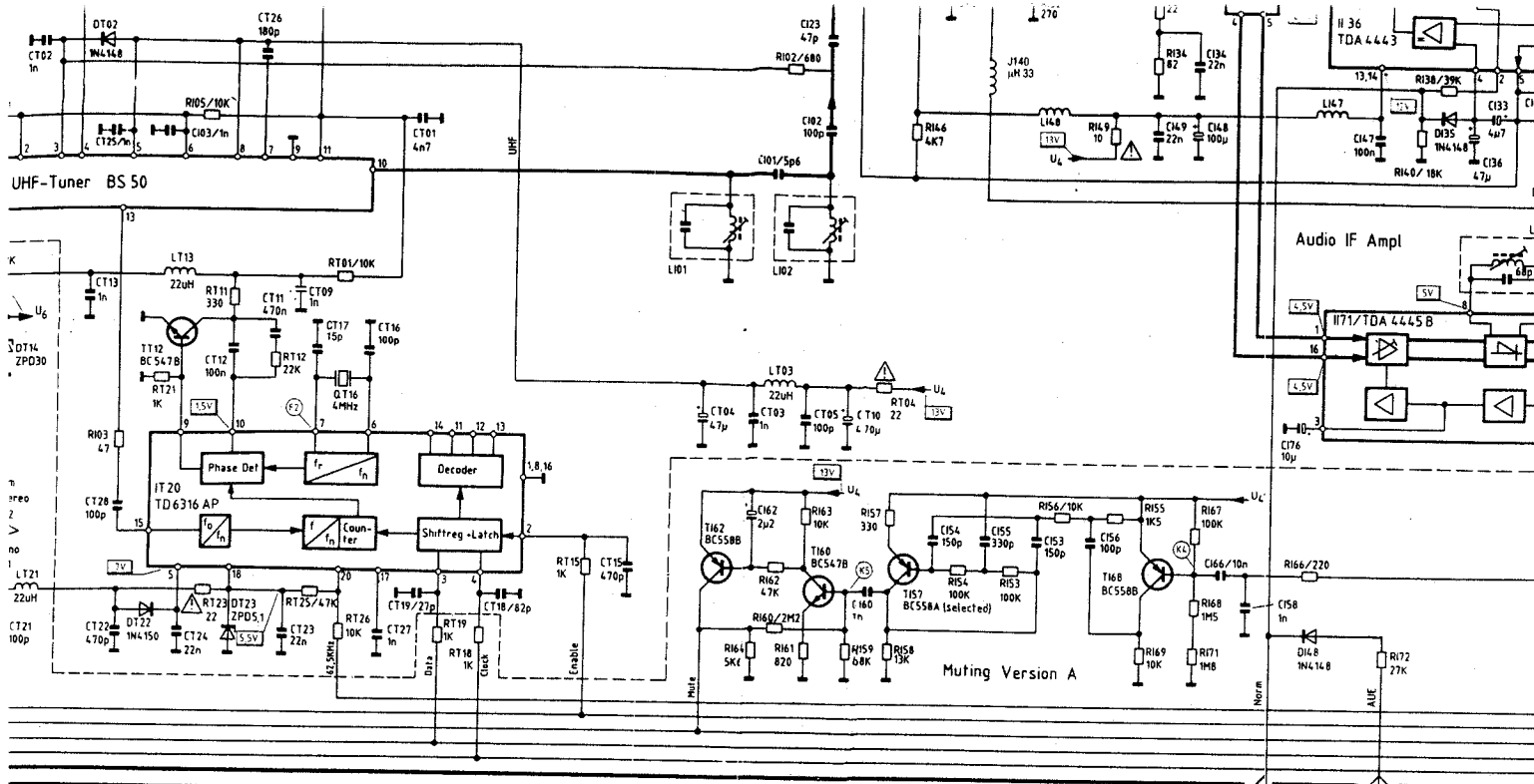
E - D  
F - V  
G - C  
I - D  
L - IN  
O - C  
P - R  
R - P  
S - S  
T - T  
V - V



Main Chassis 7040077

Semiconduc





0077

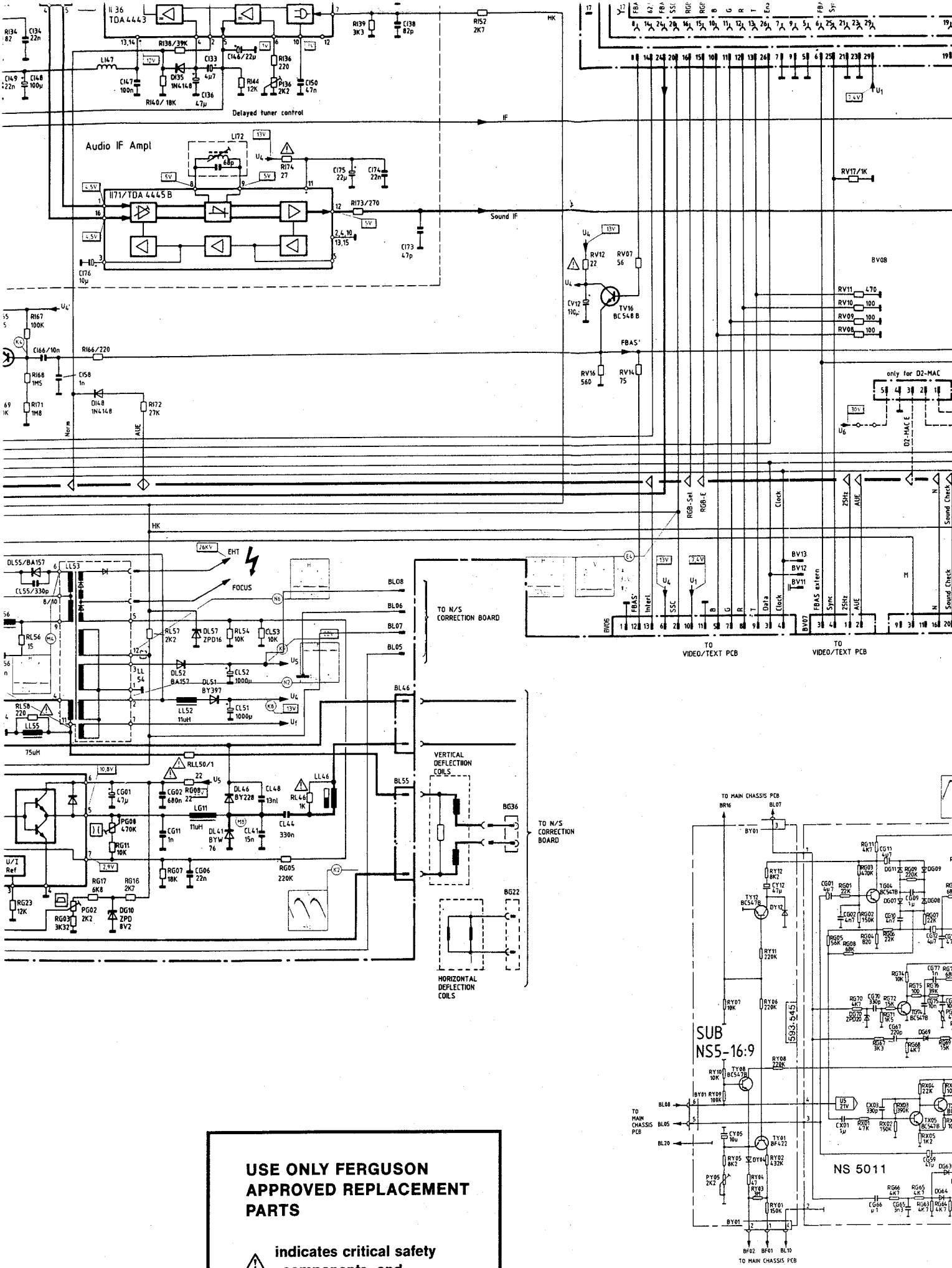
Semiconductor Bases

BC 328	BC 368	2 S: 2512	BF 959
BC 329-40	BC 638	BF 763	
BC 337-40	BC 639		
BC 547 B			
BC 548 B			
BC 558 A-C			
BC 636			


  

BD 434	S 2000 A	BU 508 A	L 4805
			MC 7805
			MC 7807

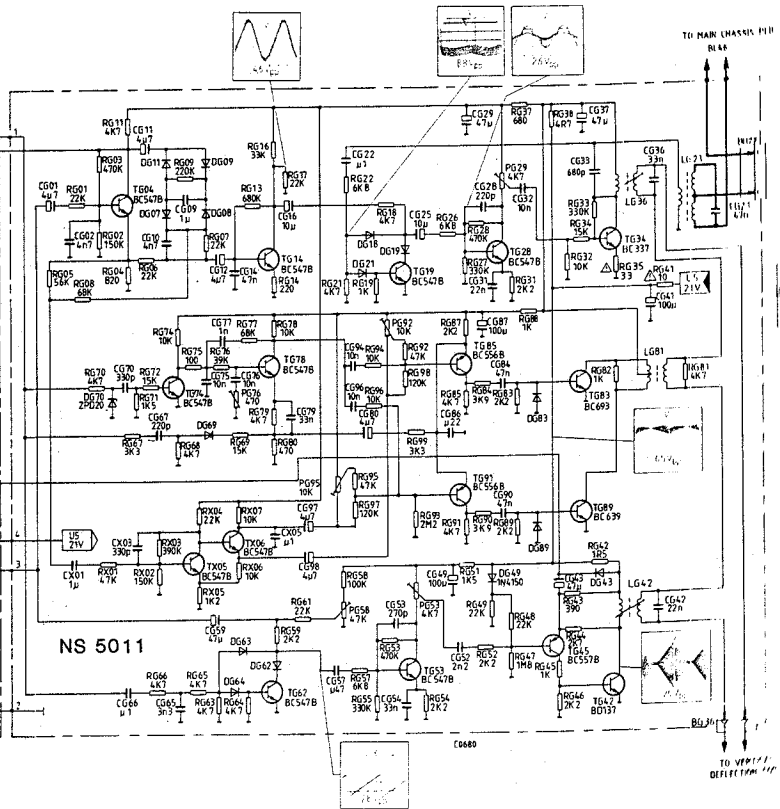
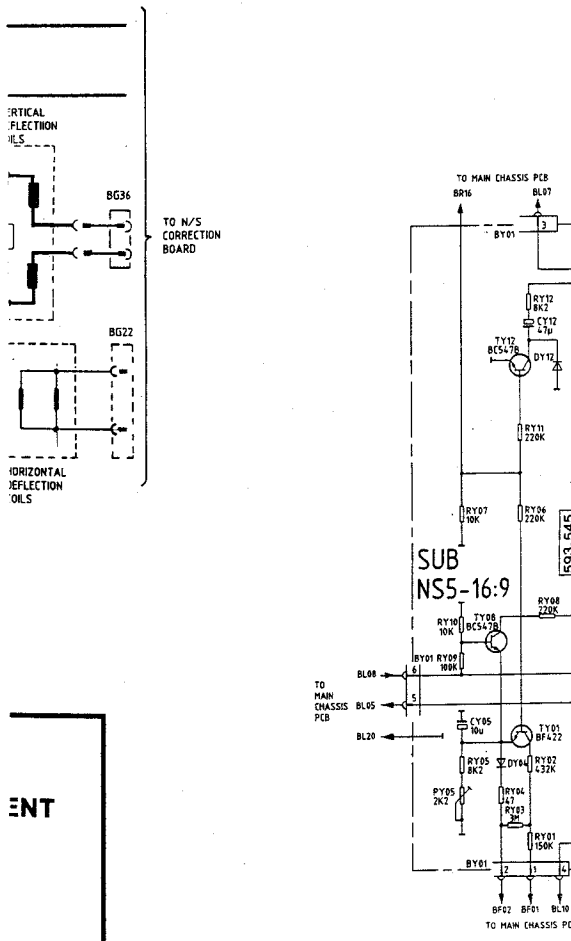
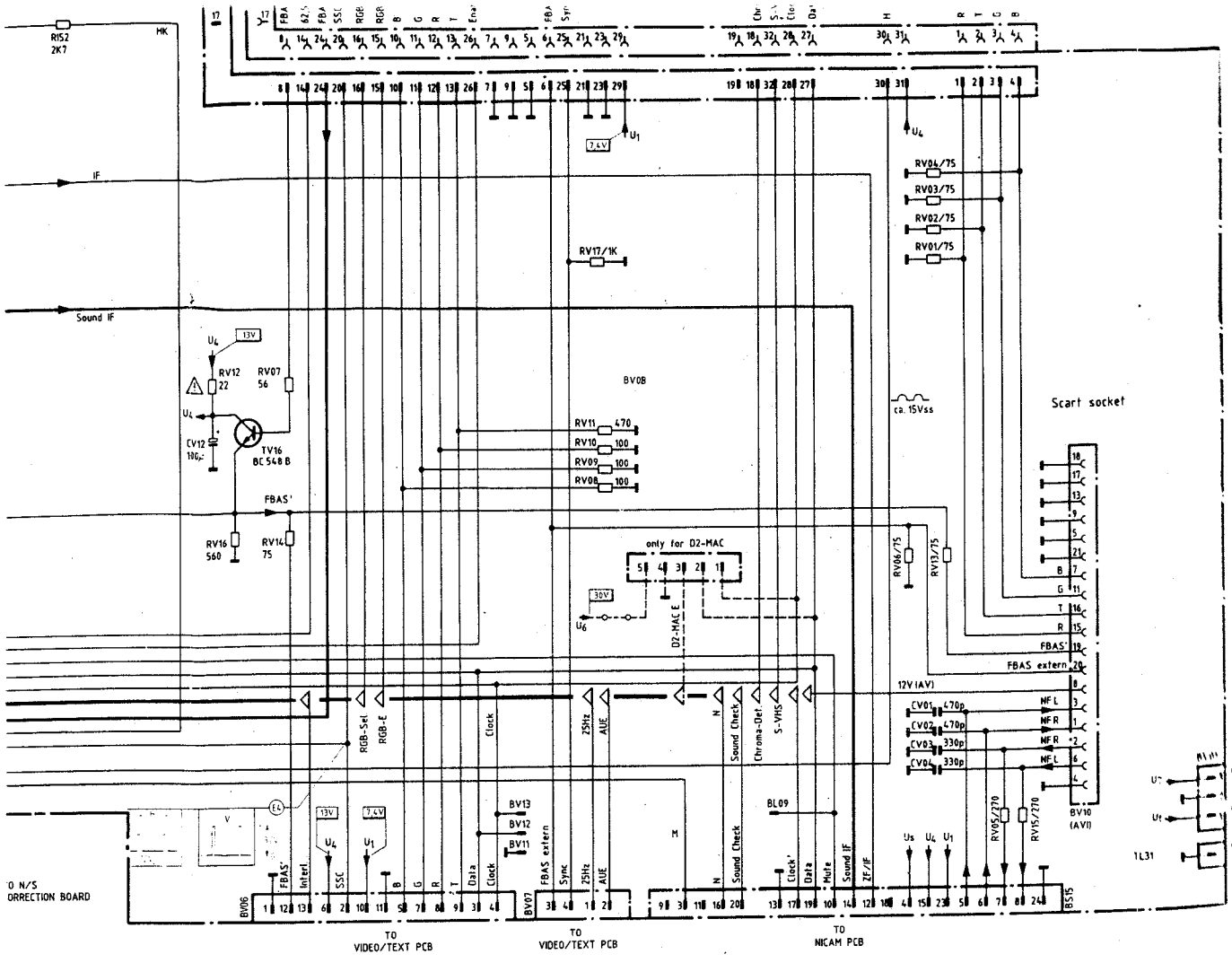
U  
A  
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id  
be



**USE ONLY FERGUSON APPROVED REPLACEMENT PARTS**

 indicates critical safety components, and identical components should be used for replacement.

North-South Rast  
(used on early re



North-South Raster Correction 80122200 (used on early receivers)

# FERGUSON

## ICC5 (IMC)

COLOUR TV

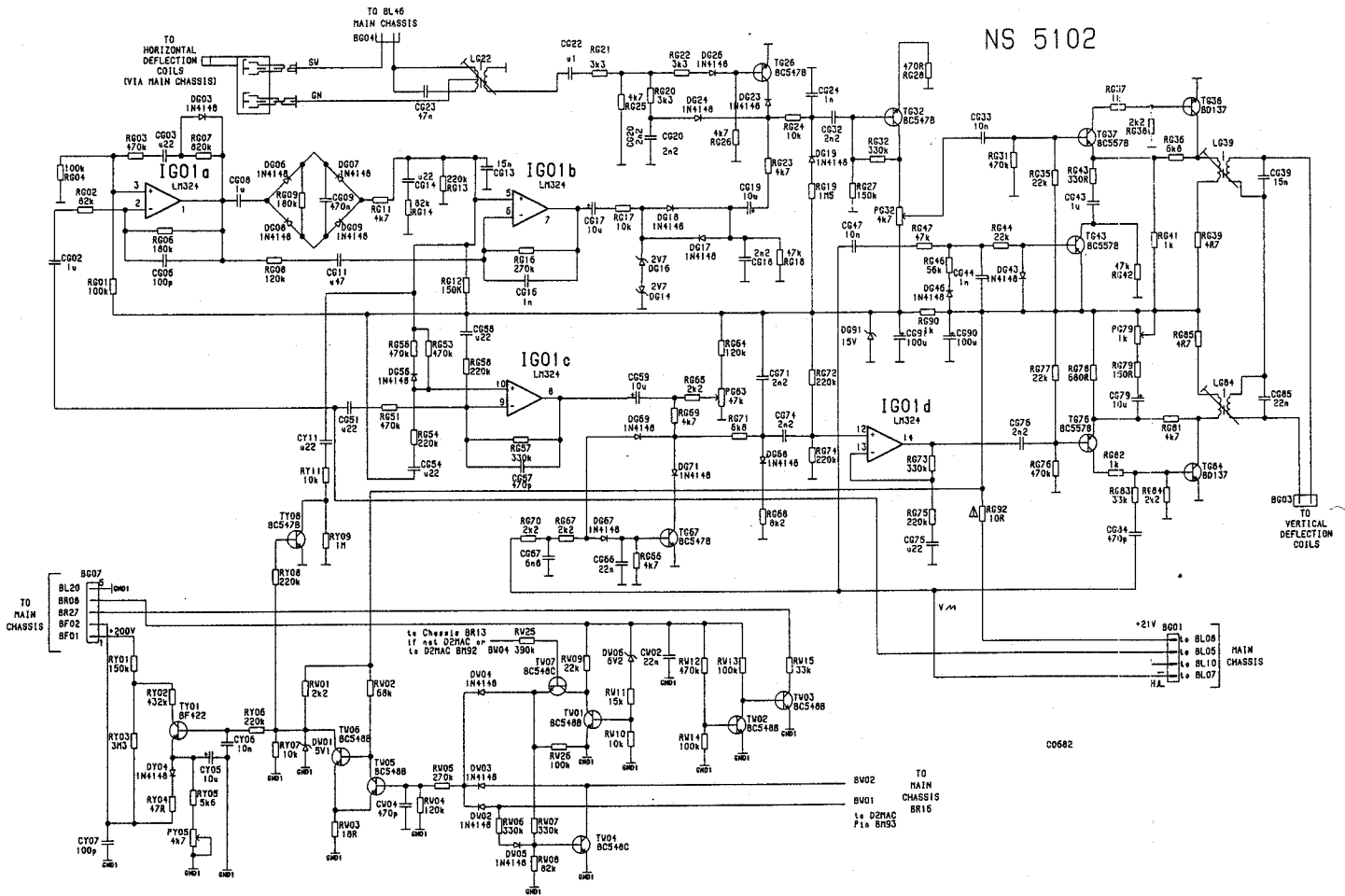
# PROVISIONAL SERVICE INFORMATION

# COVERING MODELS 59M5 AND 68M5 SHEET TWO OF TWO

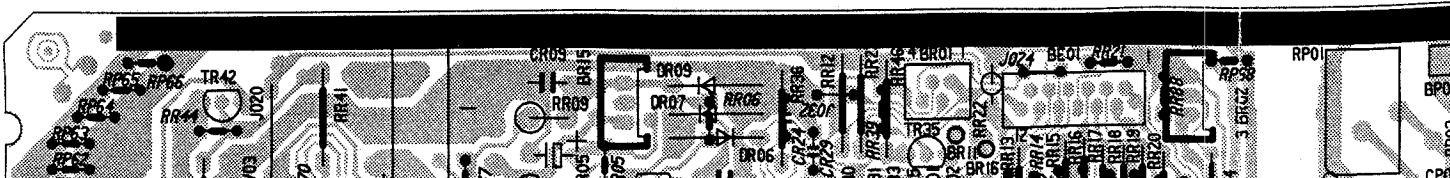
For Service Manuals Contact  
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8 Cherry Tree Rd, Chinnor  
Oxon OX9 4QY  
Tel: 01844-351634 Fax: 01844-352554  
Email: enquiries@mauritron.co.uk

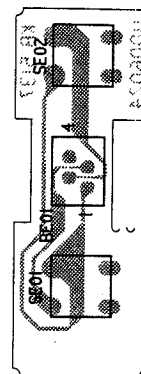
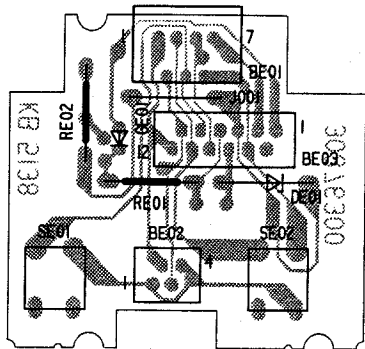
Control/Disp  
- viewed thro

FERGUSON is a registered trade-mark.



North-South Raster Correction 60392100  
(used on later receivers)

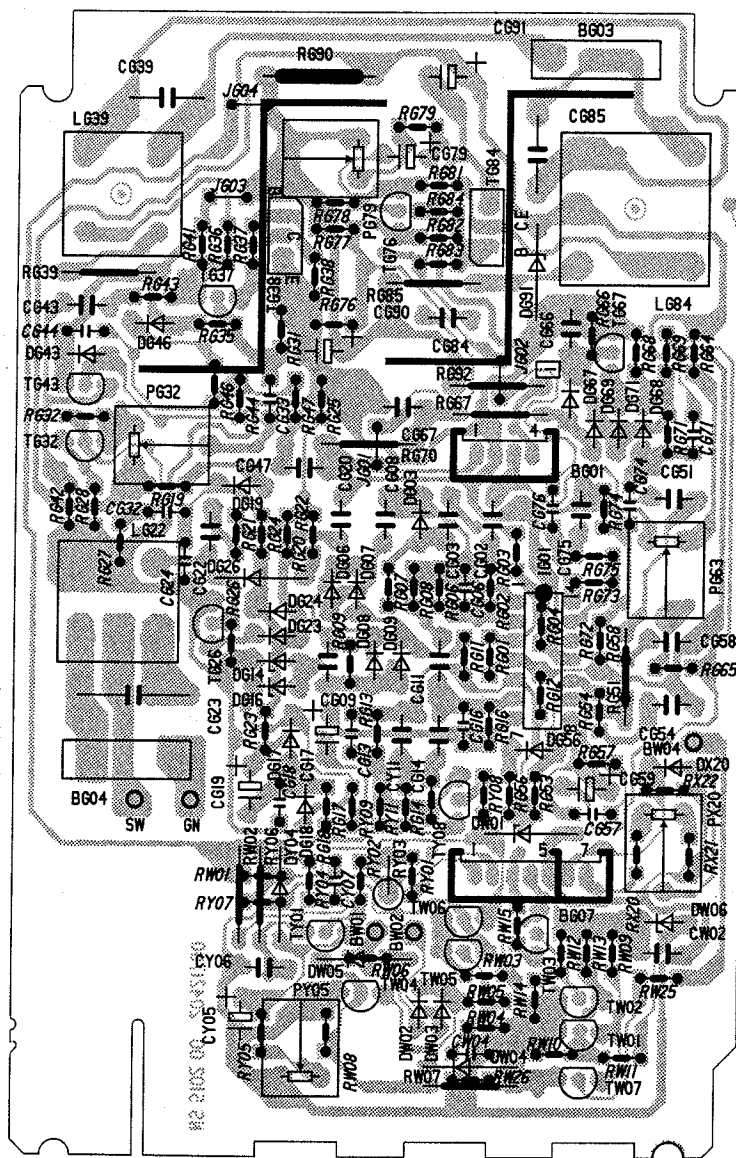
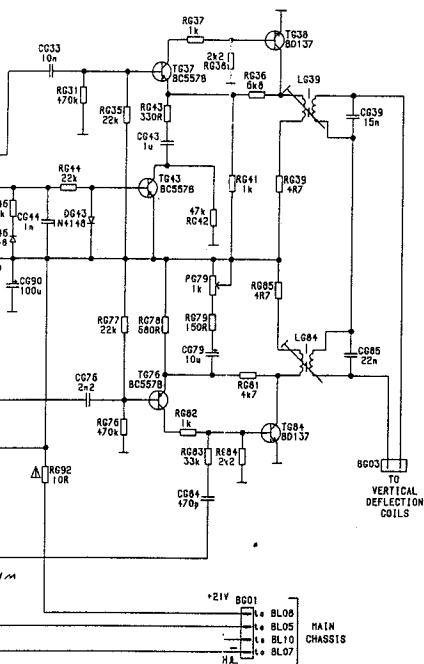




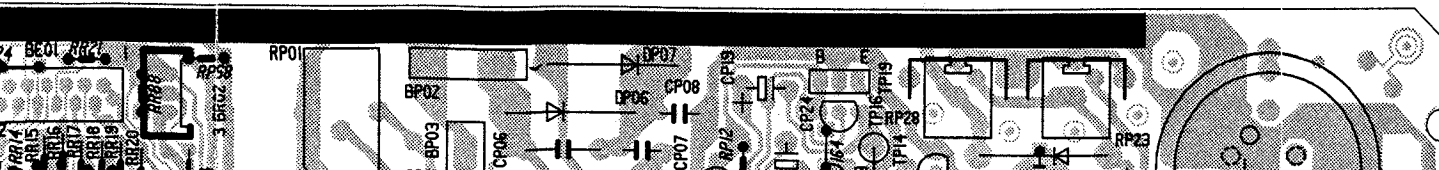
Programme Switch  
 Component Location  
 - viewed through

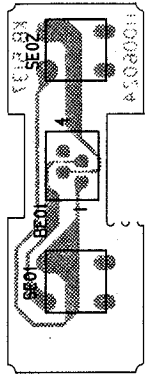
Control/Display PCB 60374600 Component Location Diagram  
 - viewed through Component Side

NS 5102



North-South Raster Correction PCB 60392100  
 Component Location Diagram  
 - viewed through Component Side  
 (used on later receivers)

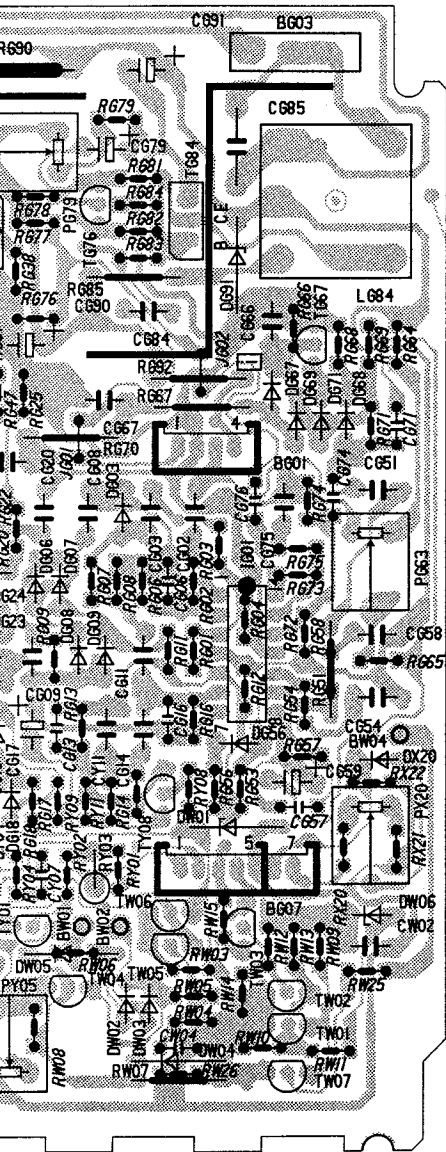




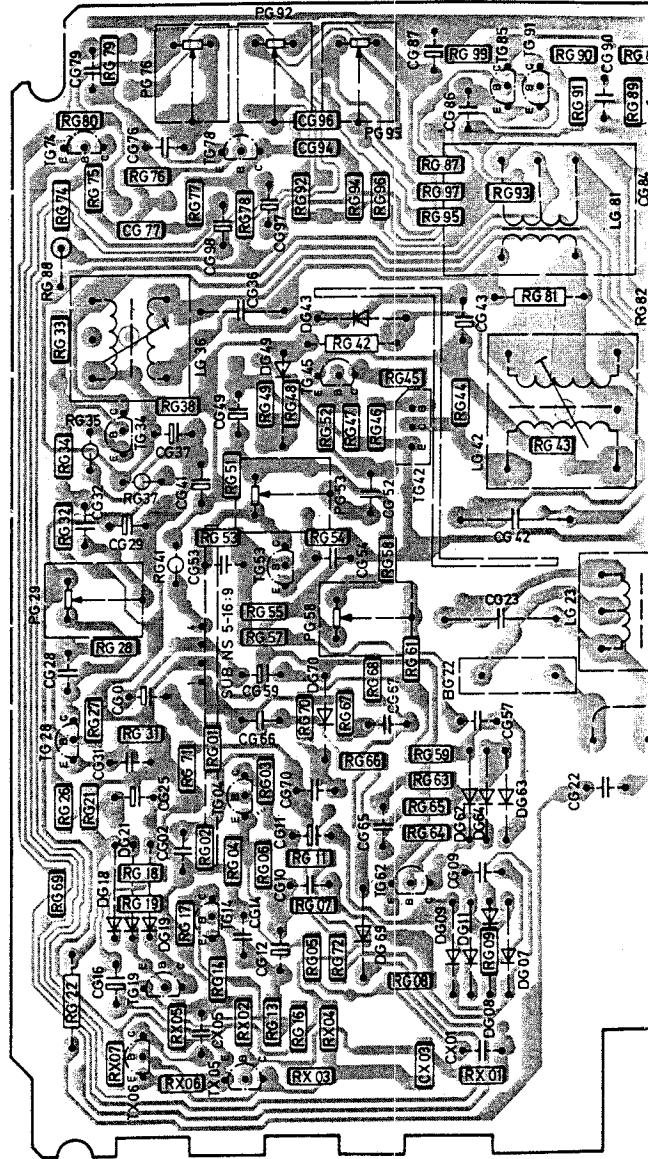
Programme Switch PCB 80372600  
 Component Location Diagram  
 - viewed through Component Side

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**MAURITRON TECHNICAL SERVICES**  
 8 Cherry Tree Rd, Chinnor  
 Oxon OX9 4QY  
**Tel:- 01844-351694 Fax:- 01844-352554**  
**Email:- enquiries@mauritron.co.uk**

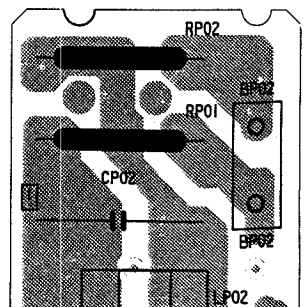
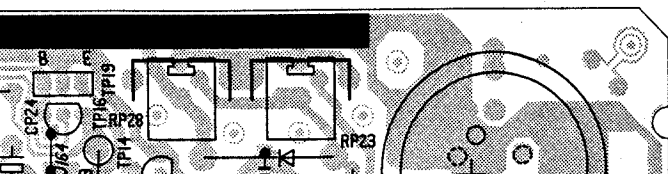
Component Location Diagram



North-South Raster Correction PCB 60392100  
 Component Location Diagram  
 (used on early receivers)

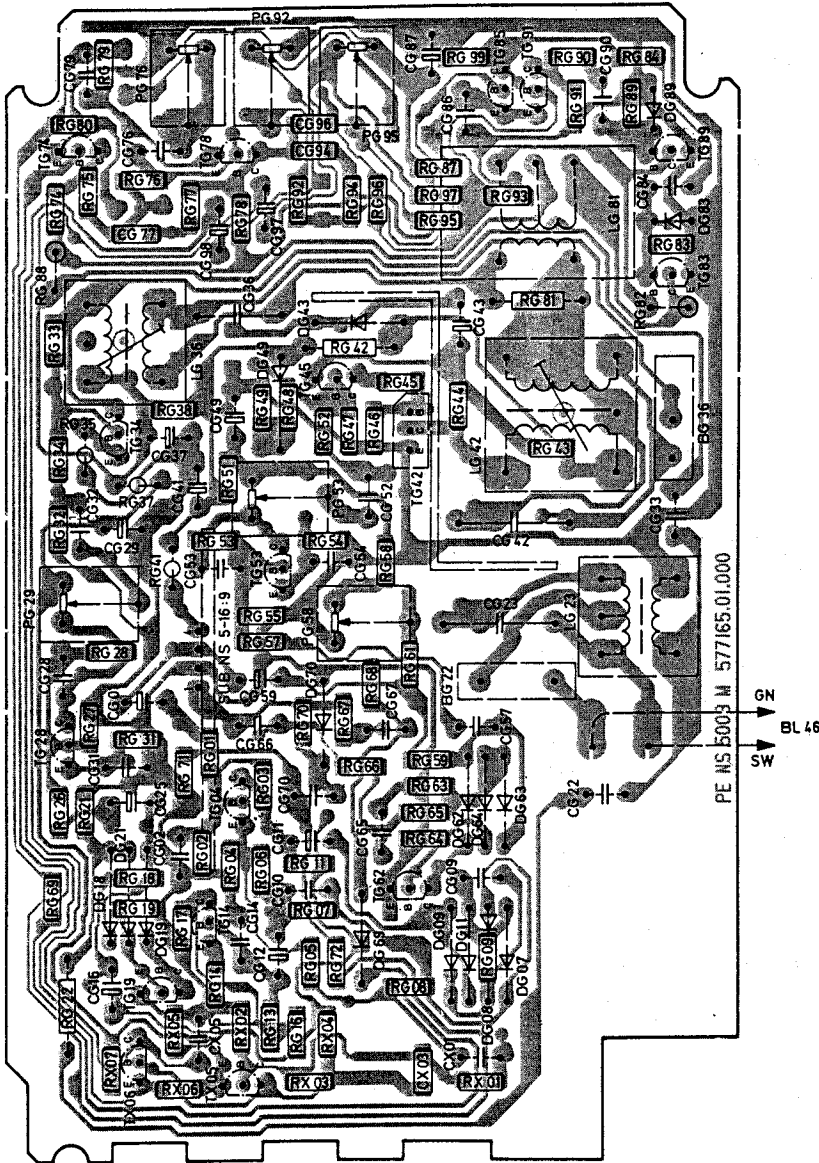


North-South Raster Correction PCB 80122200  
 Component Location Diagram  
 - viewed through Copper Side  
 (used on early receivers)

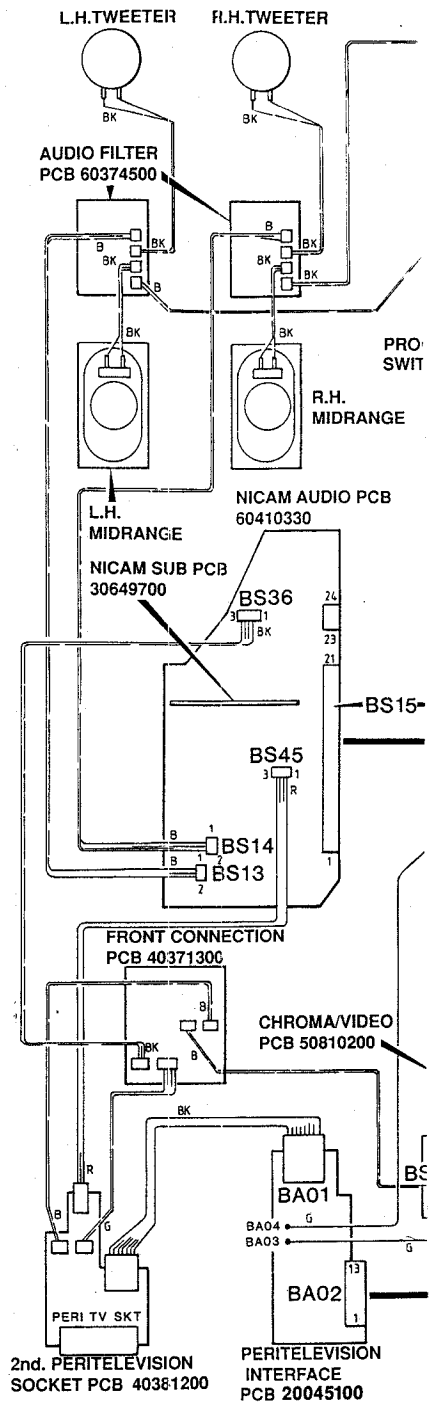
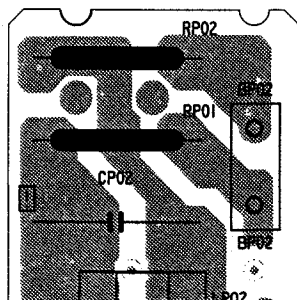




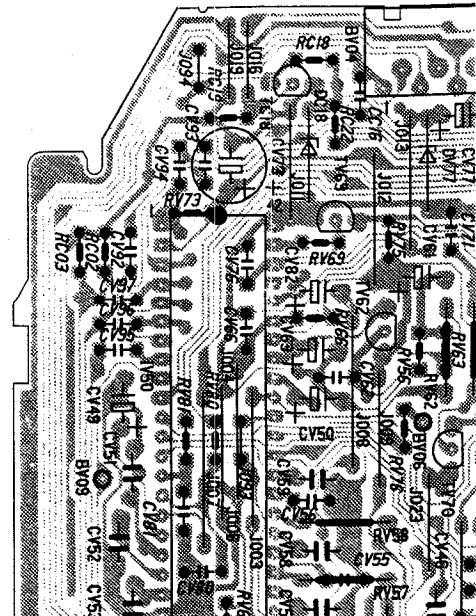
atch PCB 80372600  
 ation Diagram  
 h Component Side

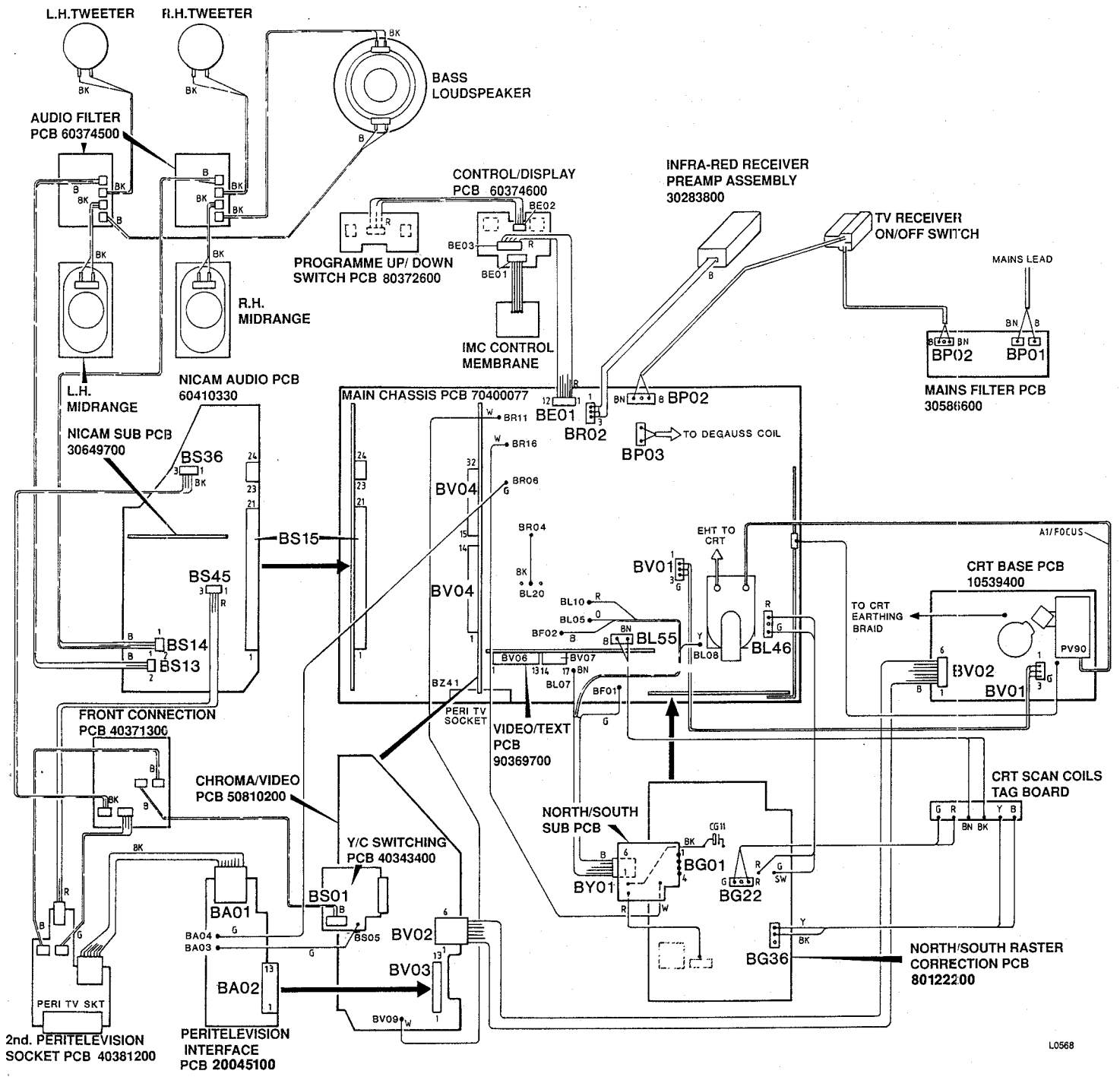


North-South Raster Correction PCB 80122200  
 Component Location Diagram  
 - viewed through Copper Side  
 (used on early receivers)

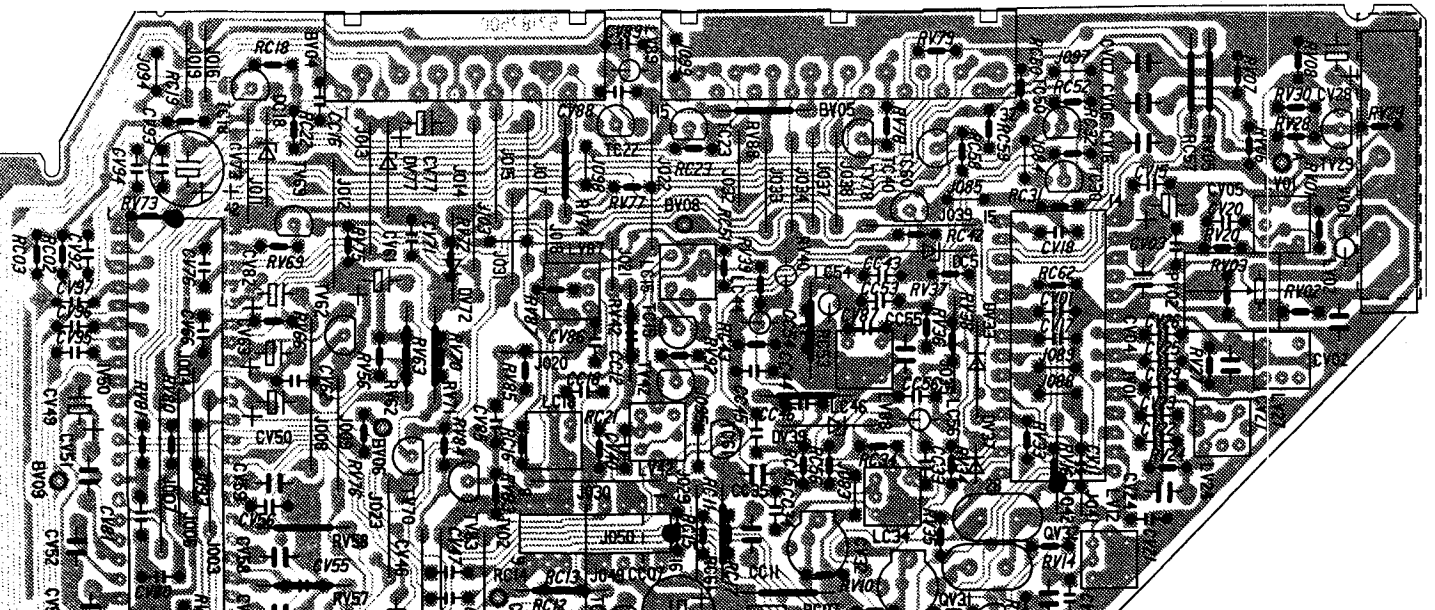


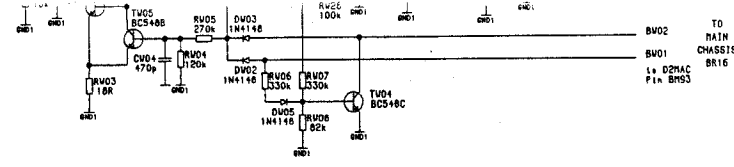
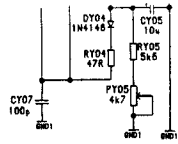
Mode



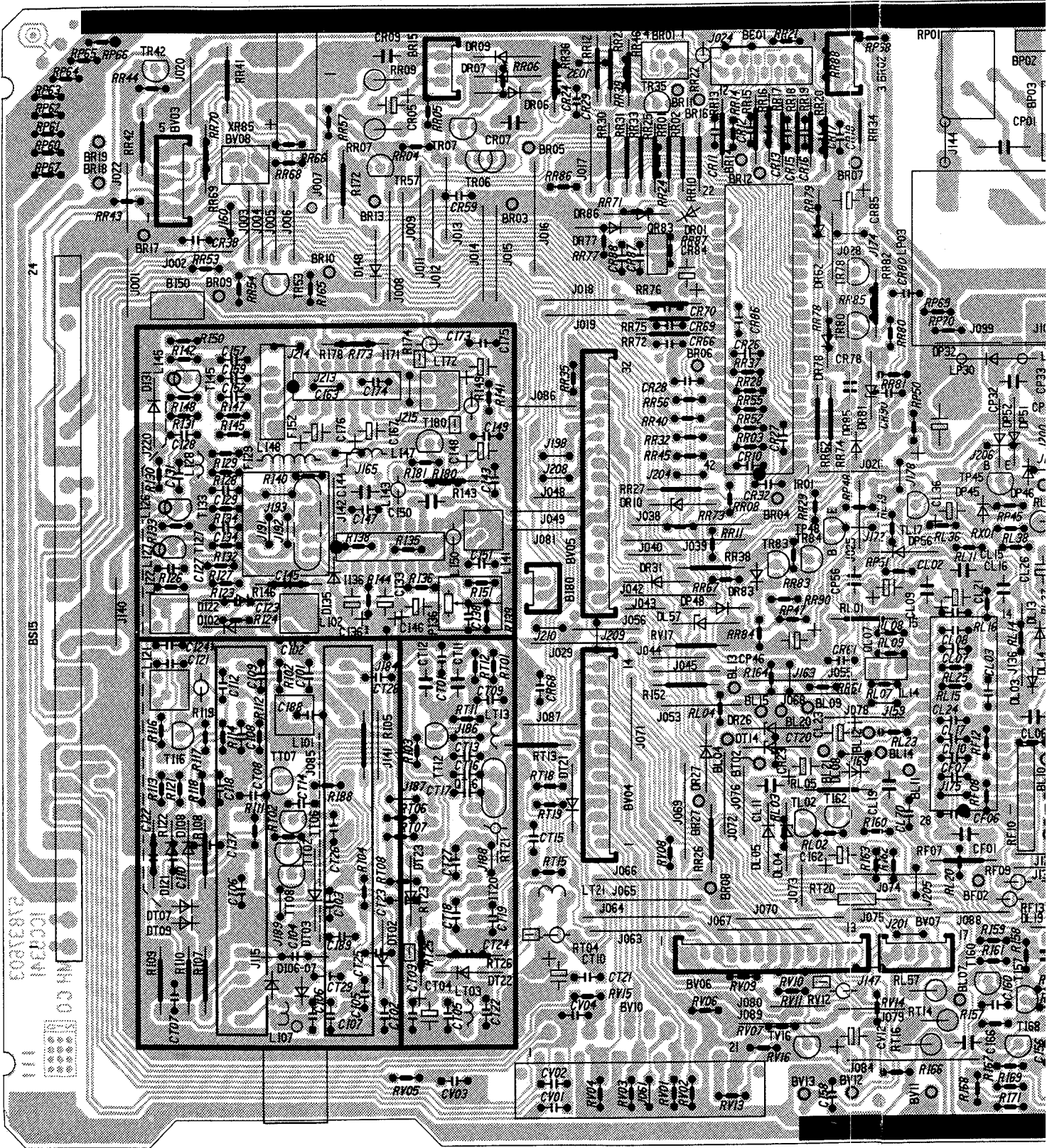


Models 59M5 and 68M5 Wiring Interconnections Diagram



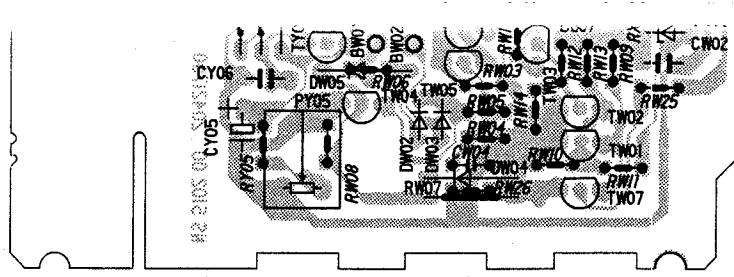


North-South Raster Correction 60392100  
(used on later receivers)

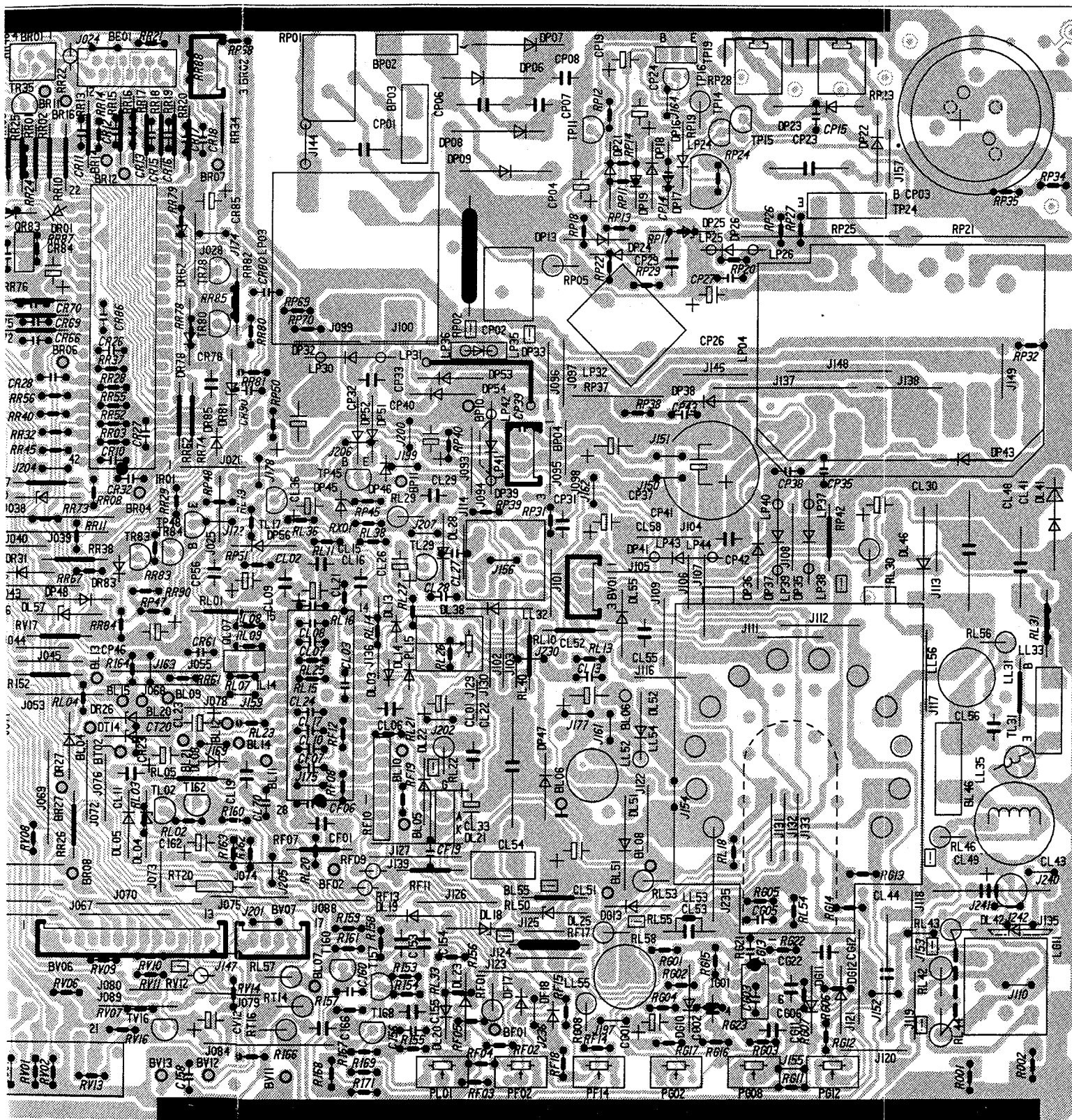


Main Chassis PCB 70400077 Component I  
- viewed through Component Side

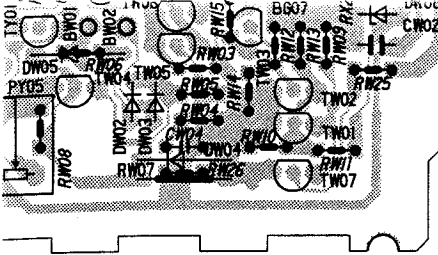
TO MAIN CHASSIS BR10  
BW02  
BW01  
D2MAC  
P1A BR93



North-South Raster Correction PCB 60392100  
Component Location Diagram  
- viewed through Component Side  
(used on later receivers)

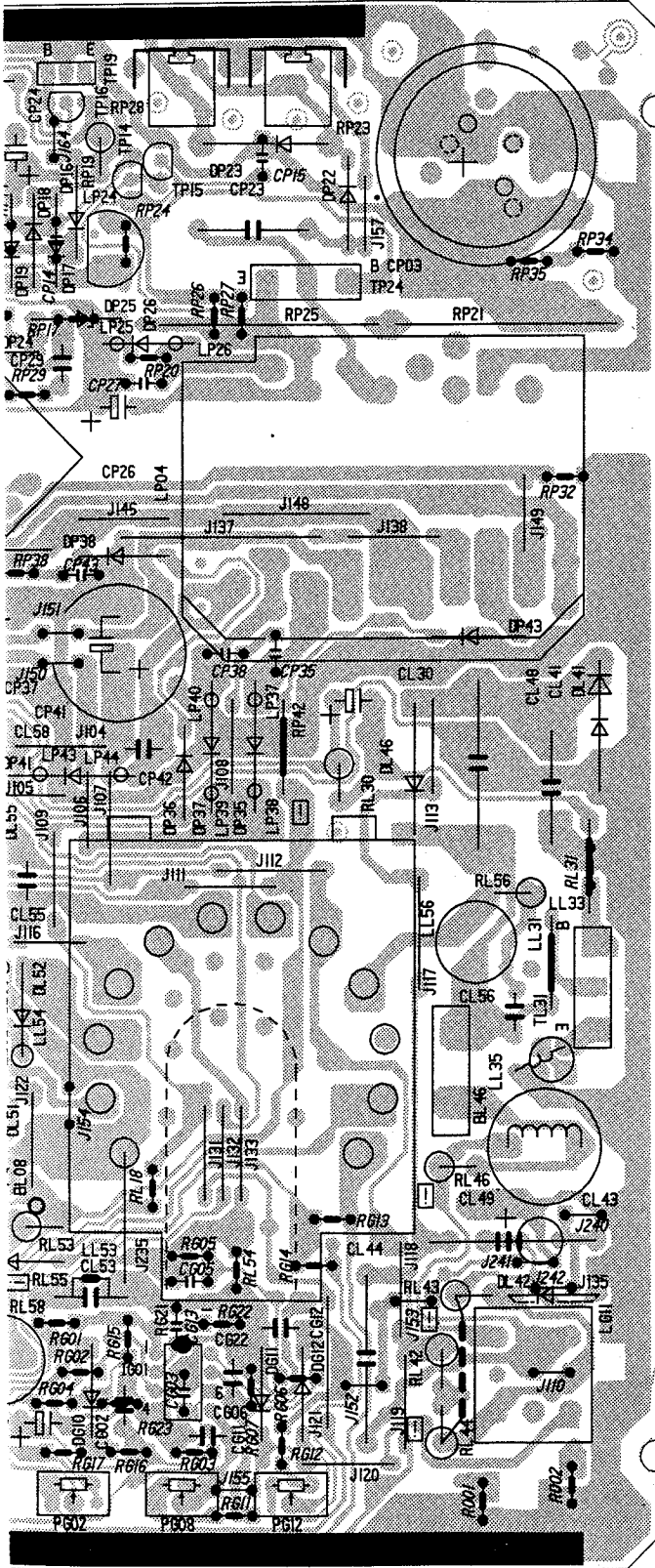


Main Chassis PCB 70400077 Component Location Diagram  
- viewed through Component Side

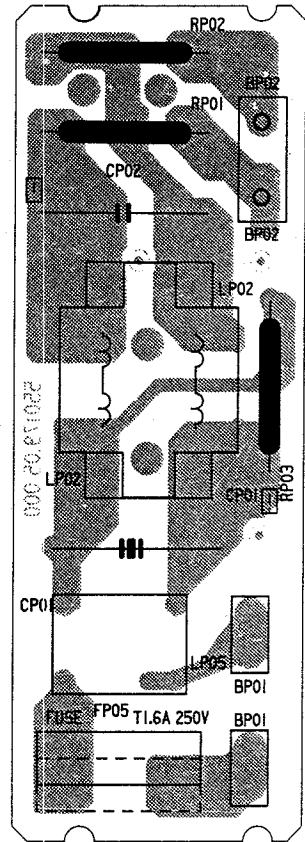


North-South Raster Correction PCB 80122200  
Component Location Diagram  
- viewed through Copper Side  
(used on early receivers)

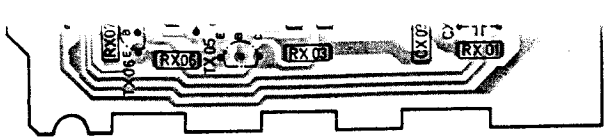
ster Correction PCB 60392100  
ation Diagram  
h Component Side  
eivers)



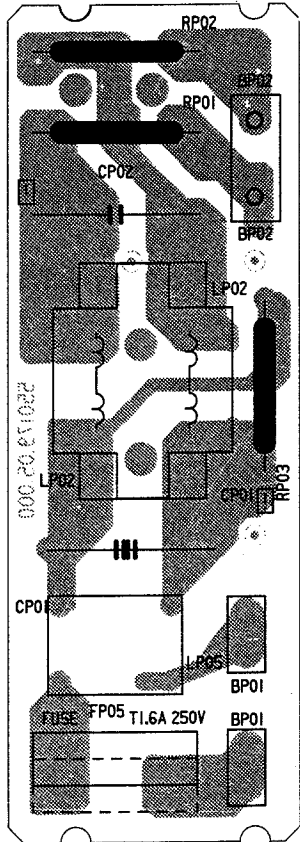
Mains Filter PCB 30586600  
Component Location Diagram - viewed through



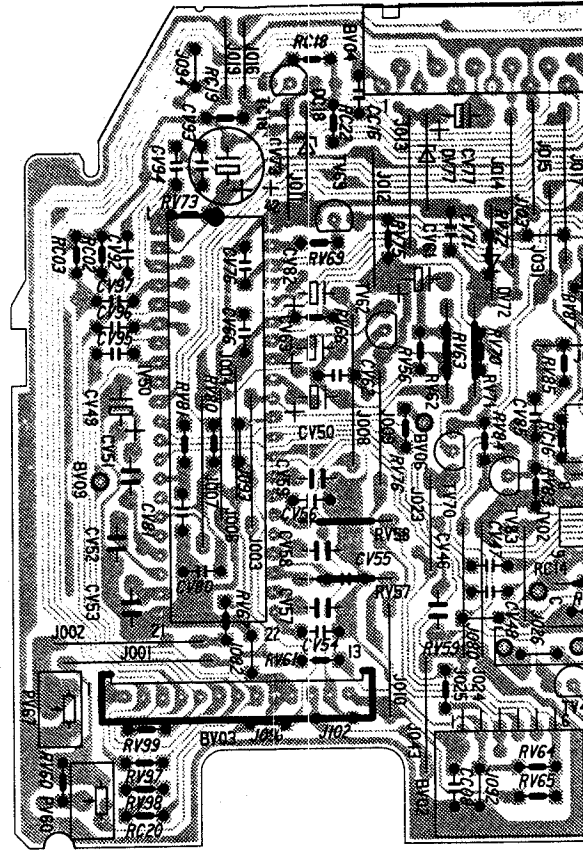
CRT Base PCB 10539400 Component  
- viewed through Component Side



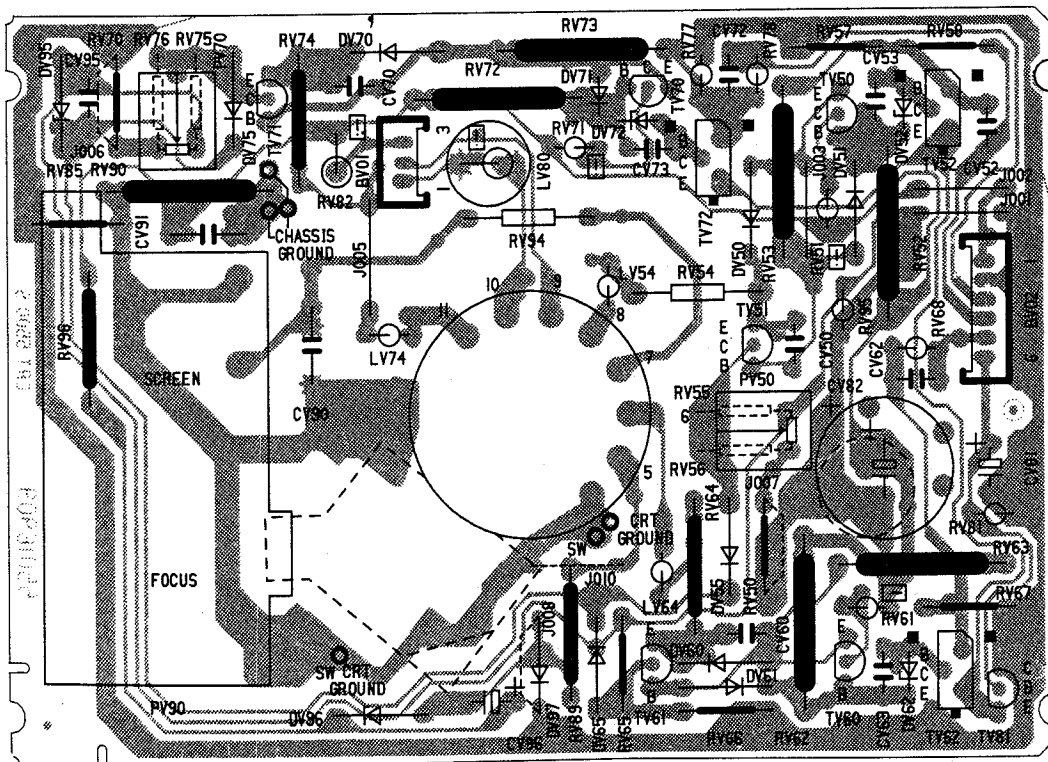
North-South Raster Correction PCB 80122200  
 Component Location Diagram  
 - viewed through Copper Side  
 (used on early receivers)



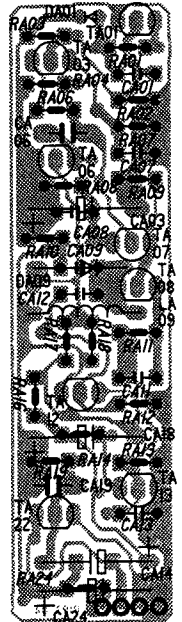
Mains Filter PCB 30586600  
 Component Location Diagram - viewed through Component Side



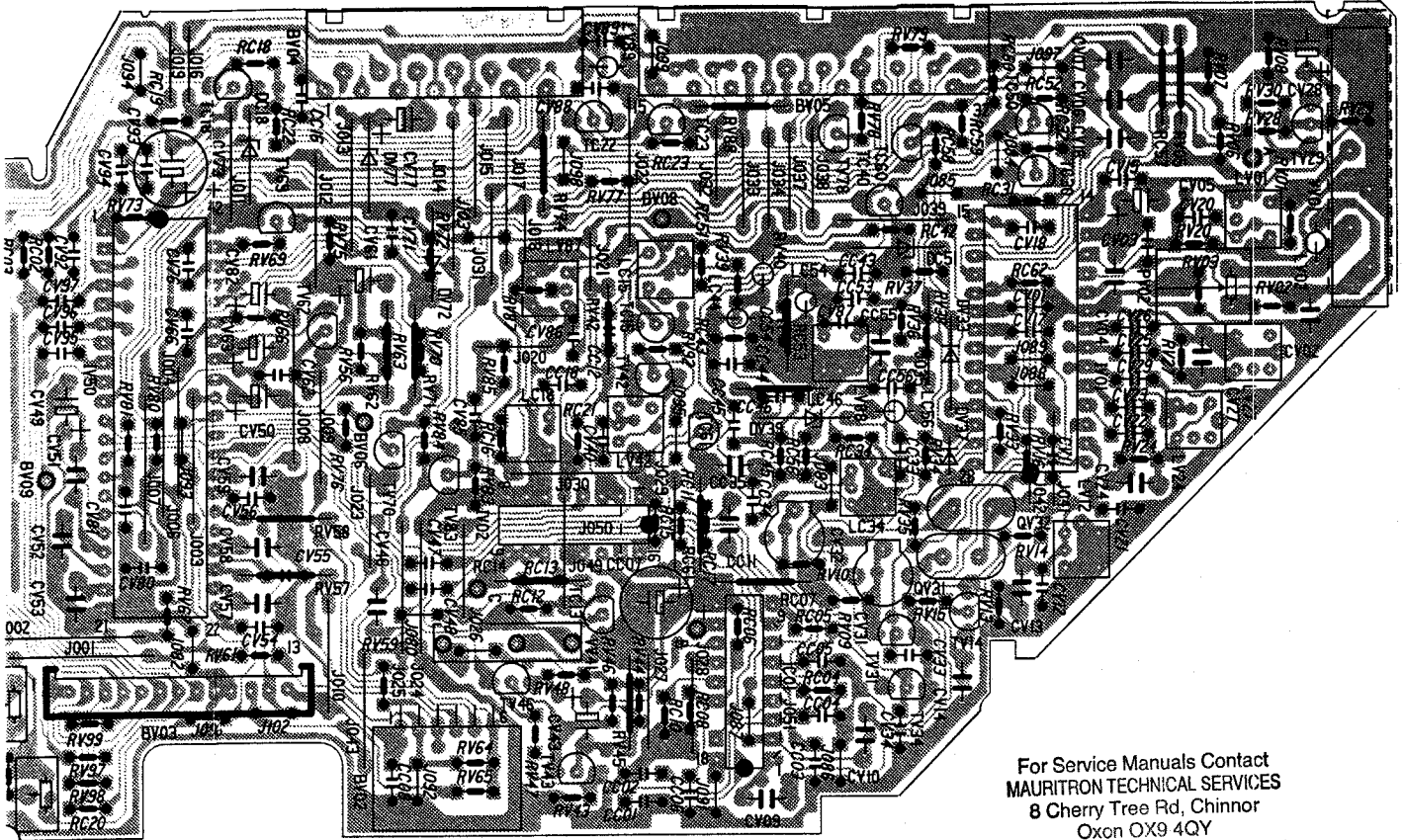
Chroma/Video PCB 50810200 Component Location Diagram  
 - viewed through Component Side



CRT Base PCB 10539400 Component Location Diagram  
 - viewed through Component Side



Infra-Red Receiver Preamp  
 Component Location Diagram  
 - viewed through Component Side

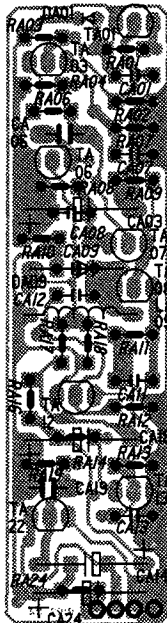


Chroma/Video PCB 50810200 Component Location Diagram  
- viewed through Component Side

For Service Manuals Contact  
MAURITRON TECHNICAL SERVICES  
8 Cherry Tree Rd, Chinnor  
Oxon OX9 4QY  
Tel:- 01844-351694 Fax:- 01844-352554  
Email:- enquiries@mauritron.co.uk

### SPARES ORDERING

When ordering replacements always quote the model number, component reference (if known), description and part number



Infra-Red Receiver Preamp PCB 30283800  
Component Location Diagram  
- viewed through Component Side

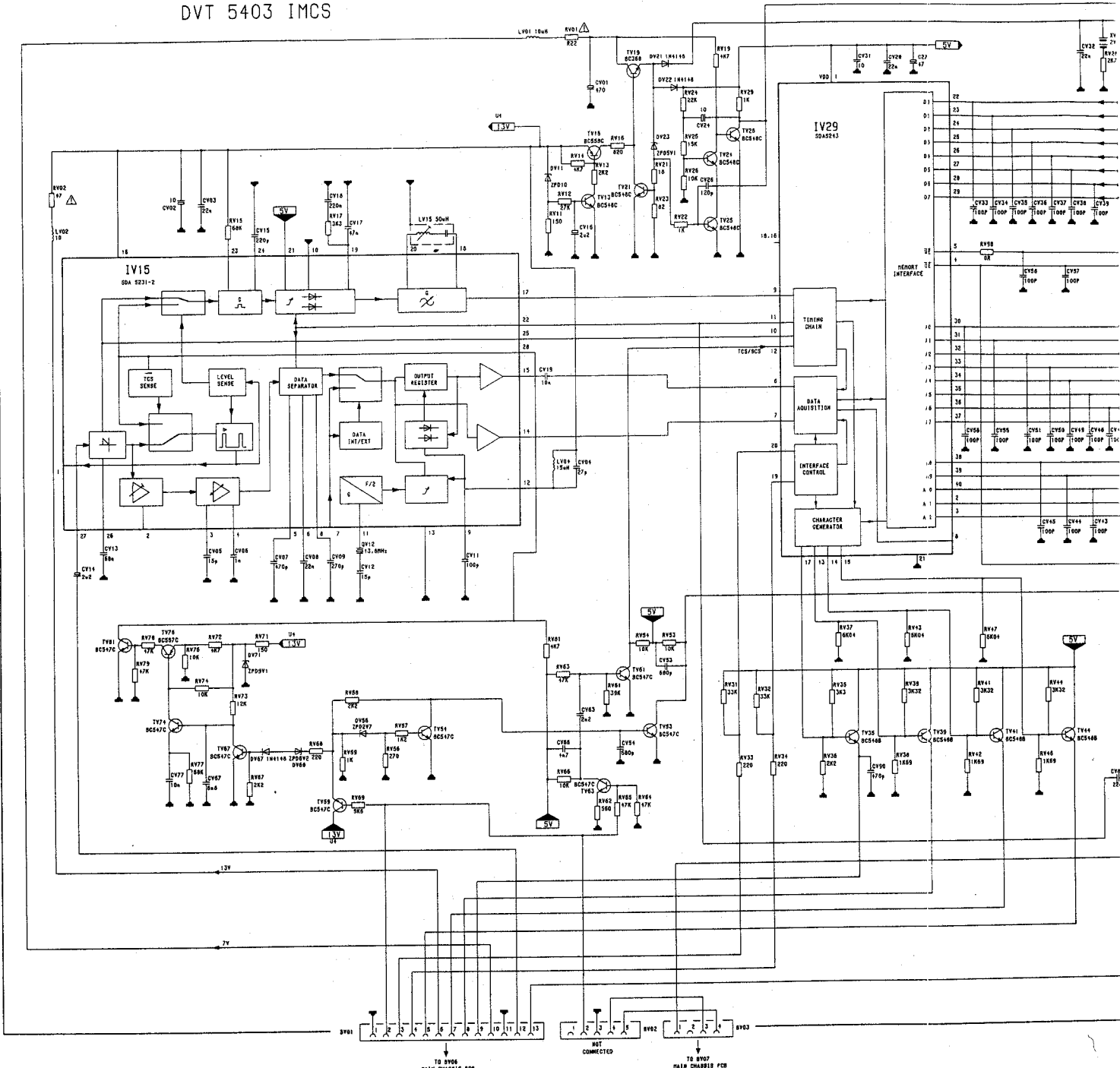
PCB Name/Assembly Type Number	Quote Part Number below when ordering spares
Model 59M5 or Model 68M5 Main Chassis Assembly, ICC5 5764 MP AO	70400077
UHF Tuner Assembly, UHF 4100 C (Assembled item only)	30078100
Peritelevision Interface PCB Assembly, PE SC1 5008	20045100
2nd Peritelevision (SCART) Socket PCB Assembly, PE SUB SKC 5007	40381200
NICAM Audio PCB Assembly including Sub Module, FM NI SRS 5701	60410330
NICAM Sub Module (Separate) PC1268	30649700
Audio Filter (Crossover) PCB Assembly, SUB SF 5000	60374500
Chroma/Video PCB Assembly, PE CHV 5308	50810200
CRT Base PCB Assembly, CRT 5514	10539400
North-South Correction PCB Assembly, PE NS 5011 (Early version)	80122200
North-South Correction PCB Assembly, PE NS 5102 (Later version)	60392100
Mains Filter PCB Assembly, MIS 5005 S	30586600
Control/Display PCB Assembly, PE KB 5138	60374600
Programme Number Up/Down Switch PCB Assembly, PE KB 5137	80372600
Front Connection PCB Assembly (Including Headphone Socket), FCB 5004	40371300
Infra-Red Preamp Assembly, AS RIR 4008 M (Assembled item only)	30283800
Remote Control Transmitter Assembly, Type RH888 (Assembled item only)	50853626
Video/Text PCB Assembly, DVT 5403 IMCS	90369700
Y/C Switching PCB Assembly, EQU SUB CHV 5411 00	40343400
Model 59M5 CRT Assembly Type A59-EAU25X02	10532800
Model 68M5 CRT Assembly Type A68-EAU25X02	10540300

## FERGUSON LIMITED

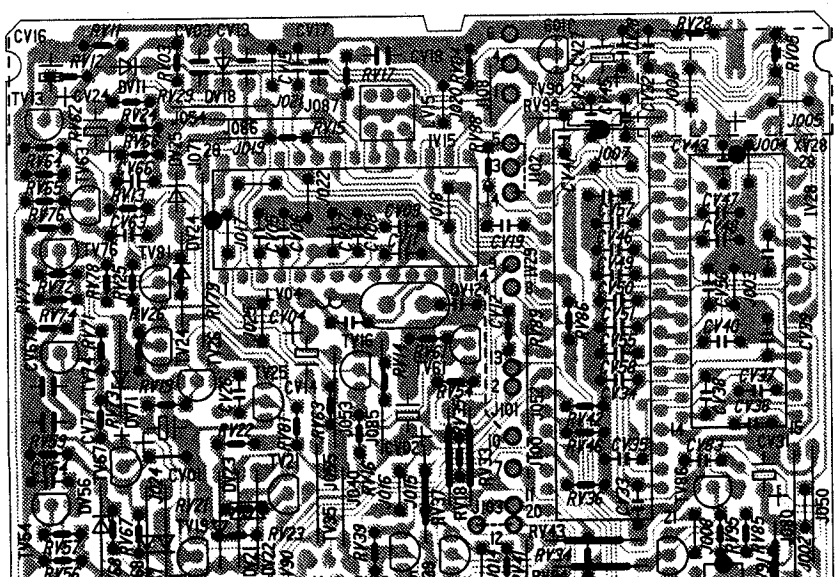
### SERVICE DIVISION

PO Box 1594, CROWN ROAD, ENFIELD, MIDDLESEX EN1 1DY.  
TEL: 081-804 7979 (24-HOURS SPARES ORDERING).  
FAX: 081-443 1899. TELEX 264905 FERGSVC G.

DVT 5403 IMCS

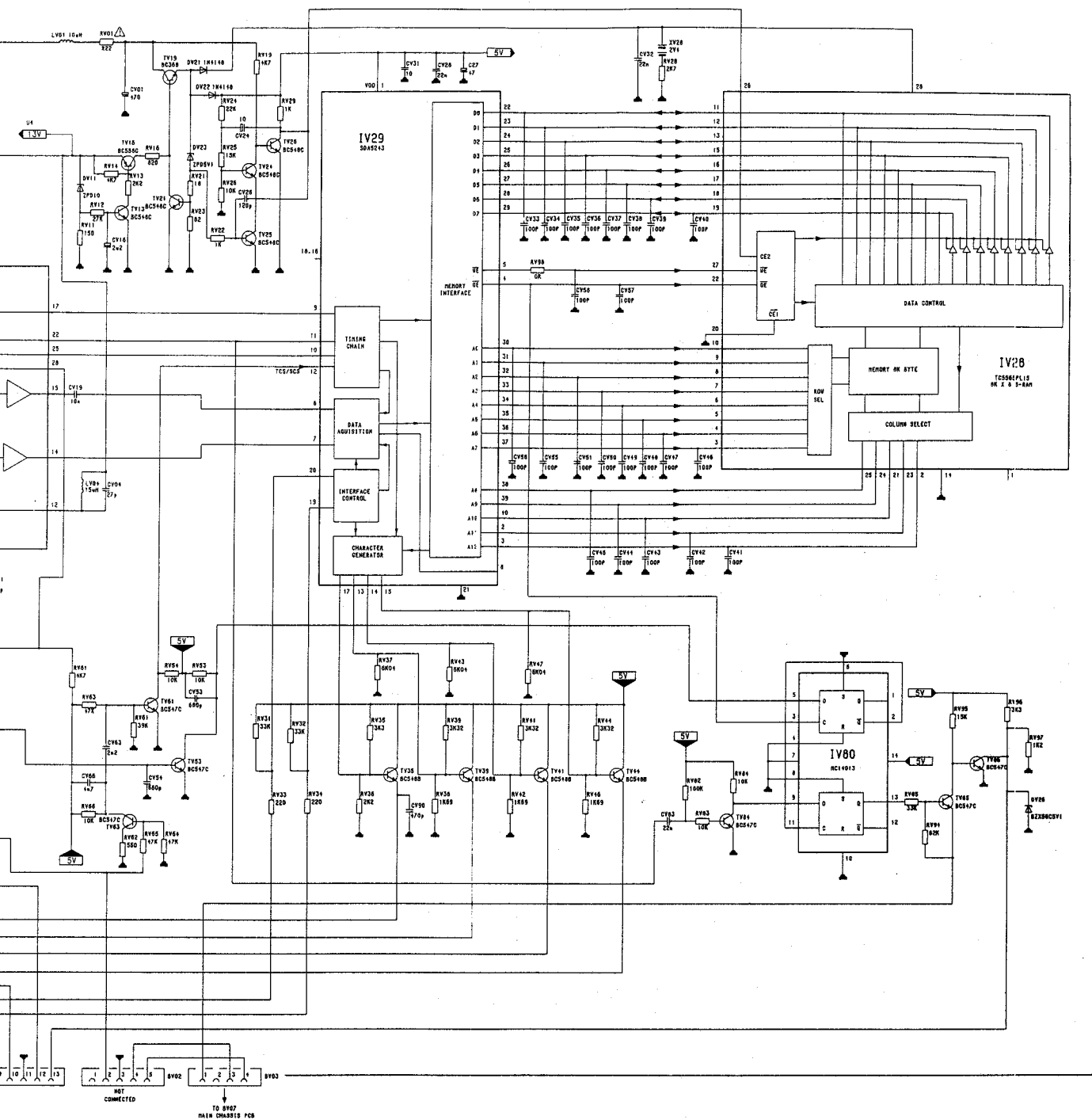


Videotext 90369700

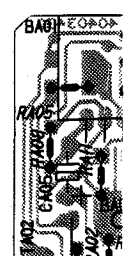
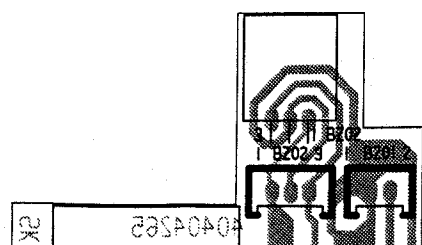
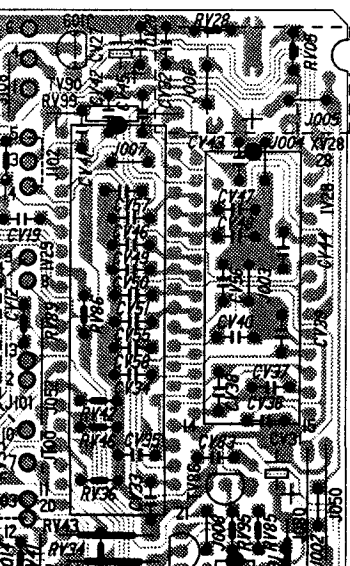


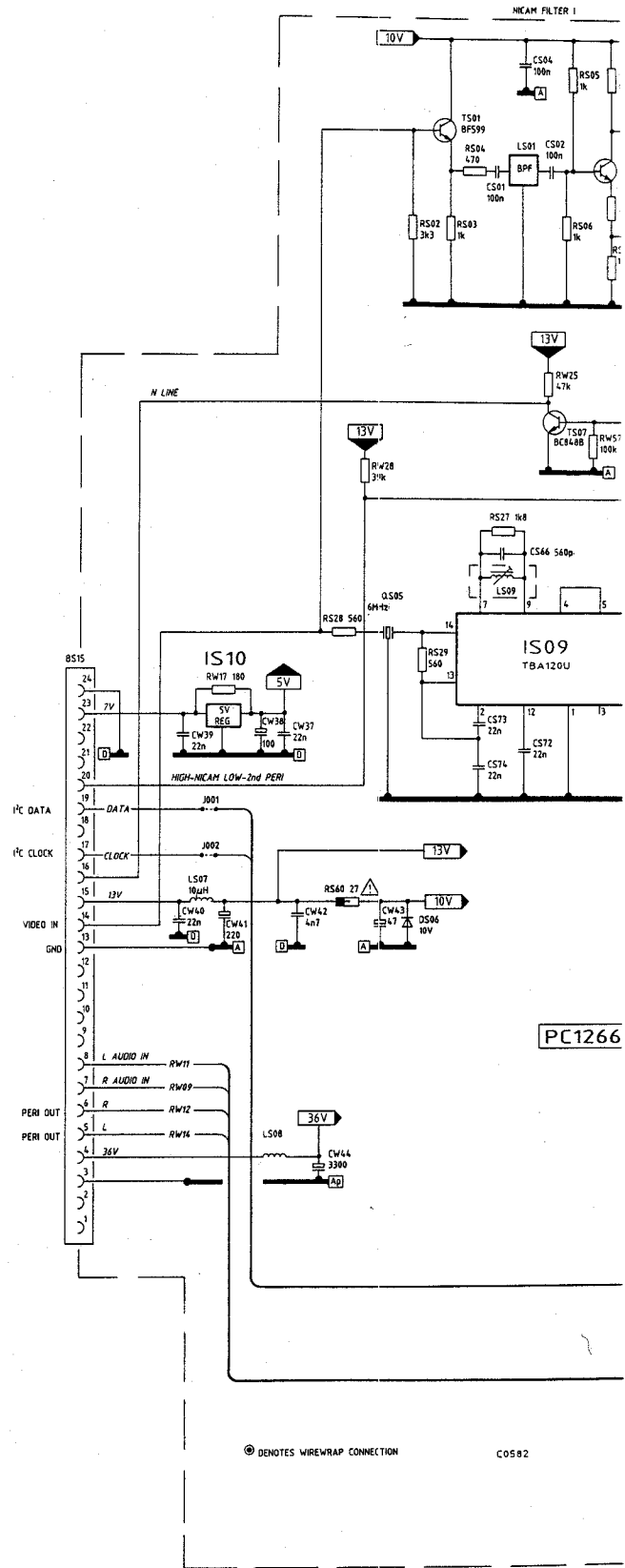
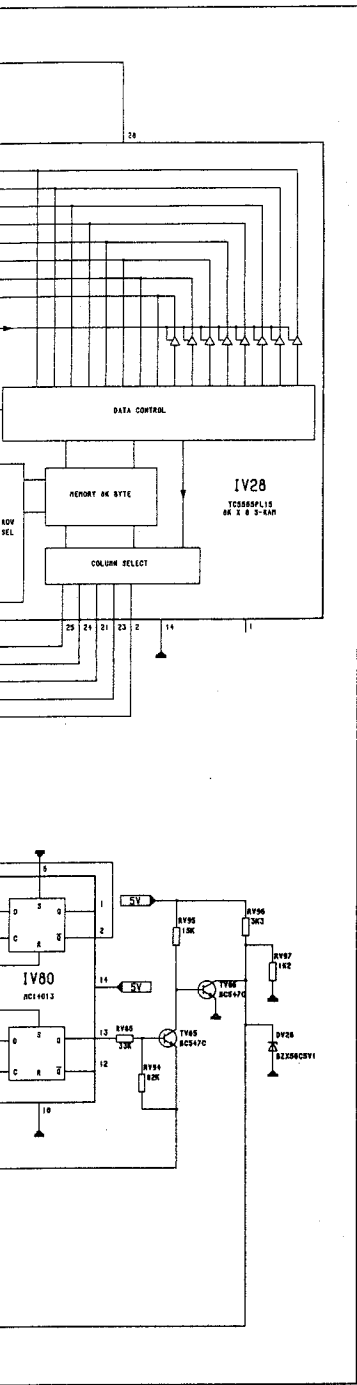
2XC



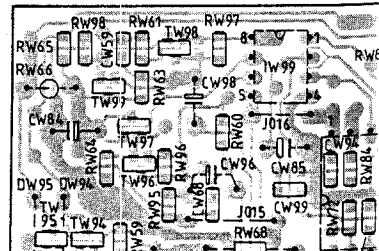
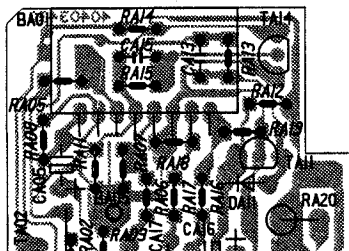
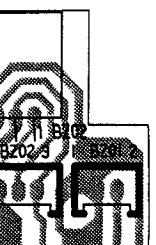


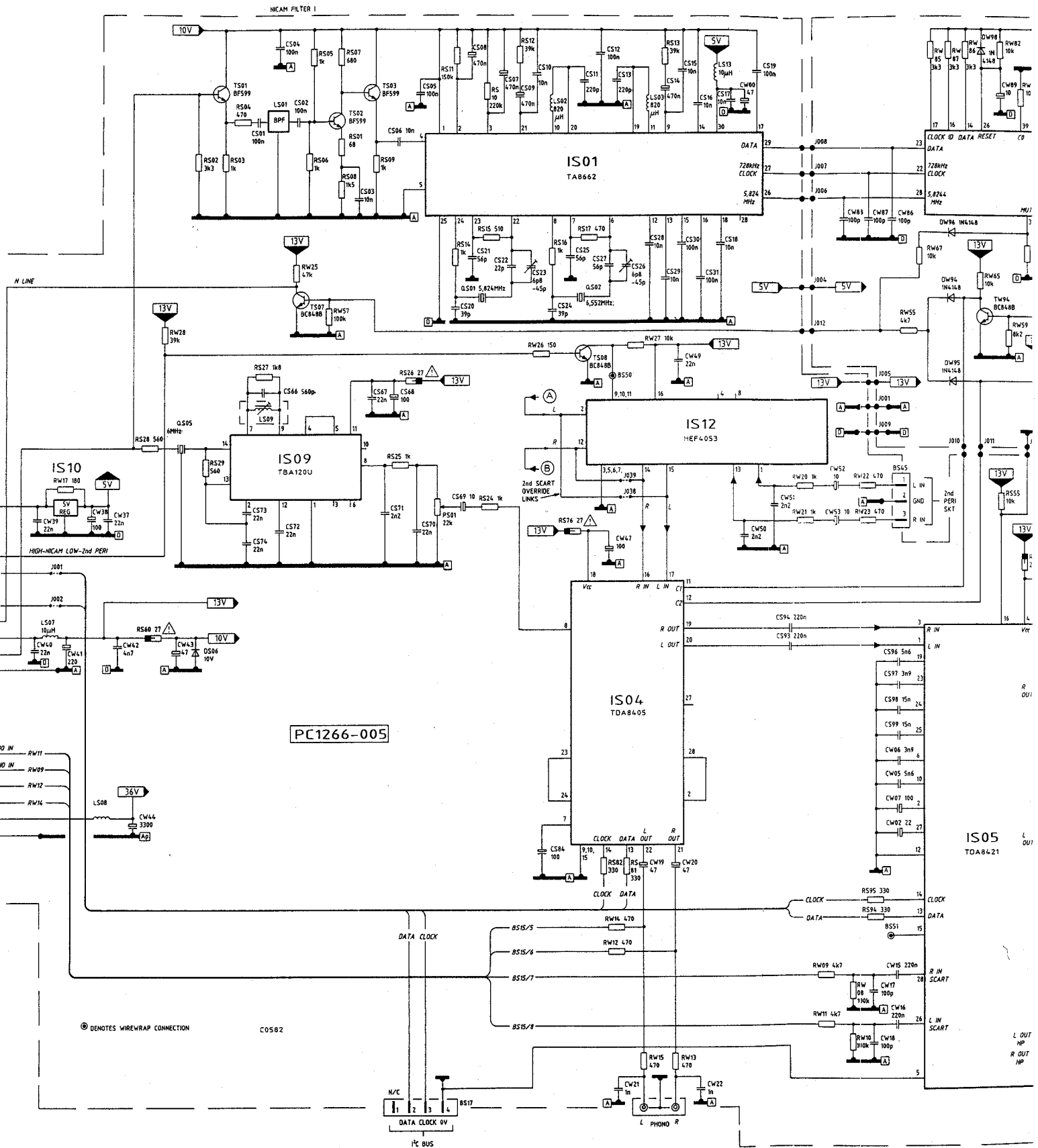
Videotext 90369700



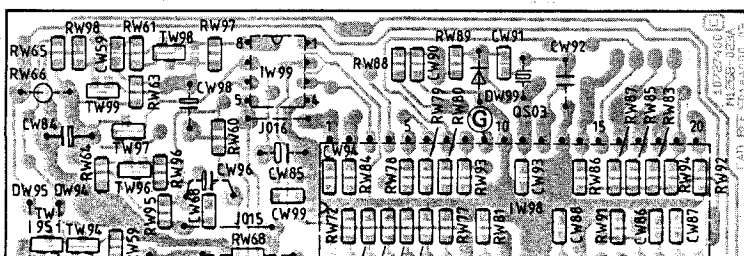


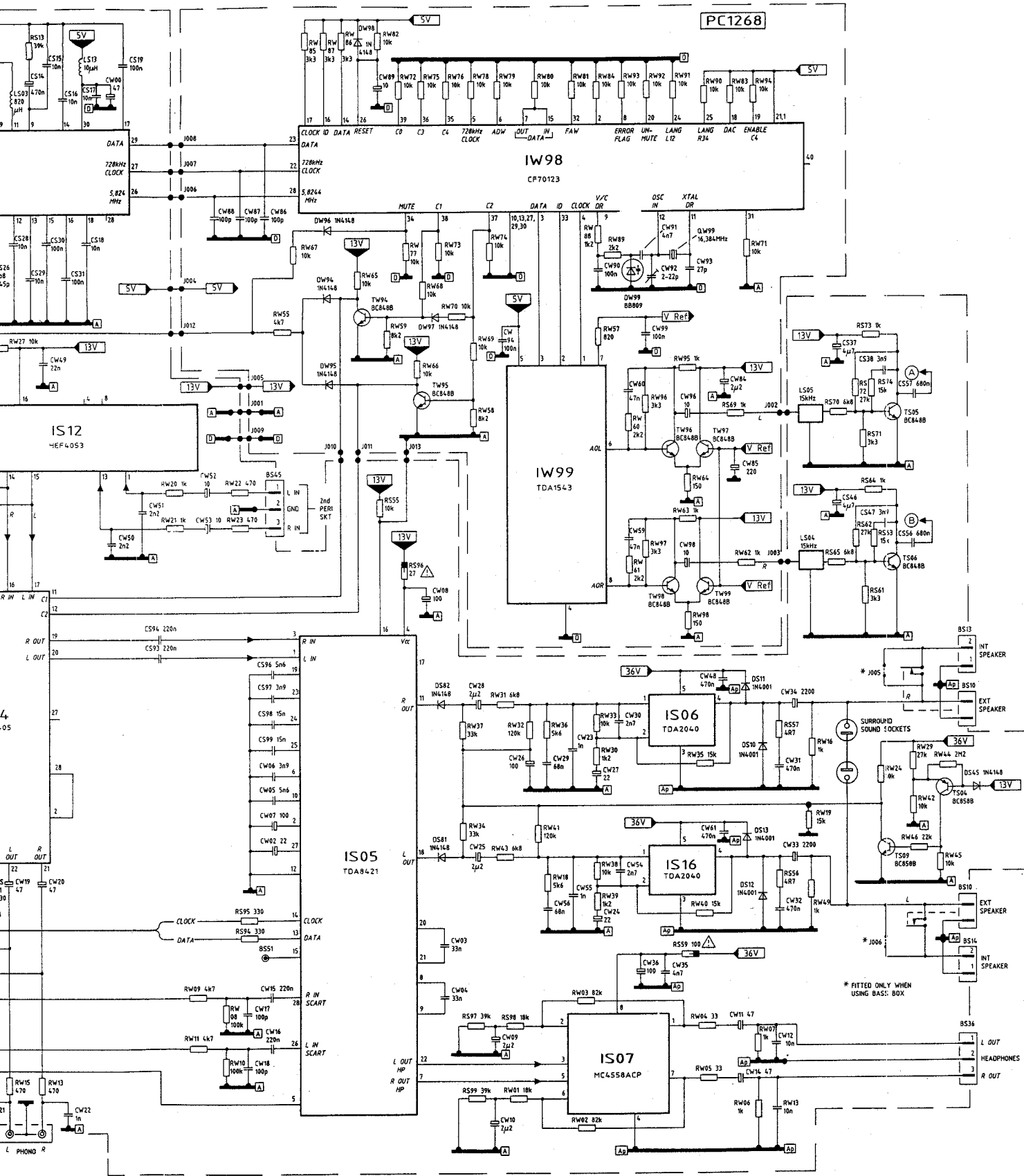
For Service Manuals Contact  
**MAURITRON TECHNICAL SERVICES**  
 8 Cherry Tree Rd, Chinnor  
 Oxon OX9 4QY  
 Tel: 01844-351694 Fax: 01844-352554  
 Email: enquiries@mauritron.co.uk



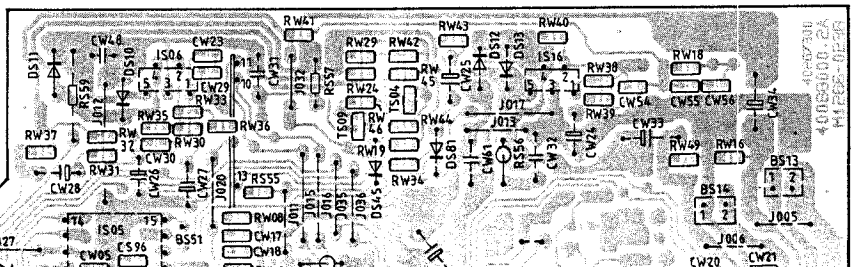


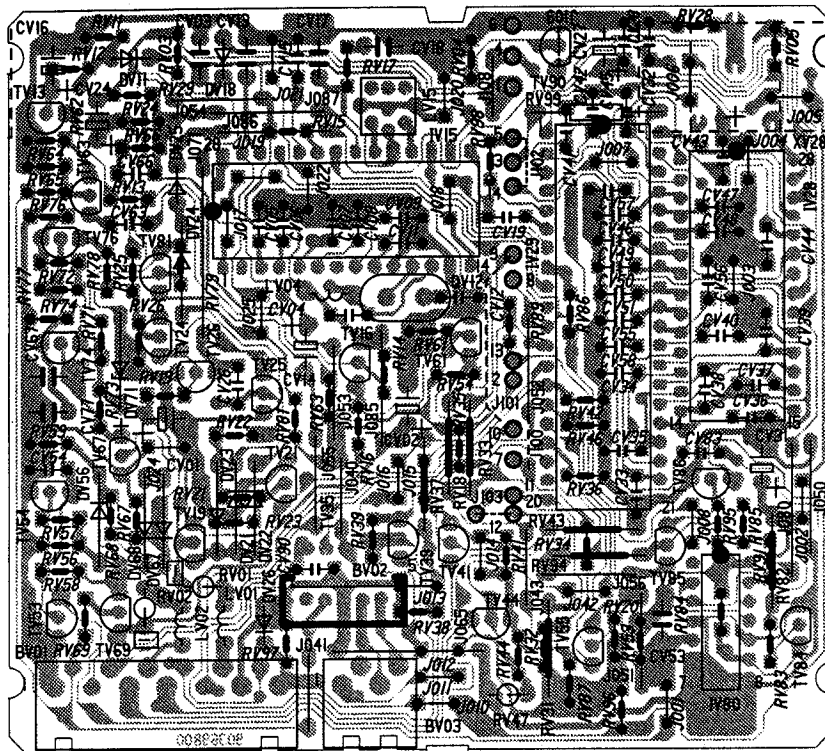
NICAM Audio PCB 60410330 and NICAM Sub PCB 30649700





PCB 60410330 and NICAM Sub PCB 30649700





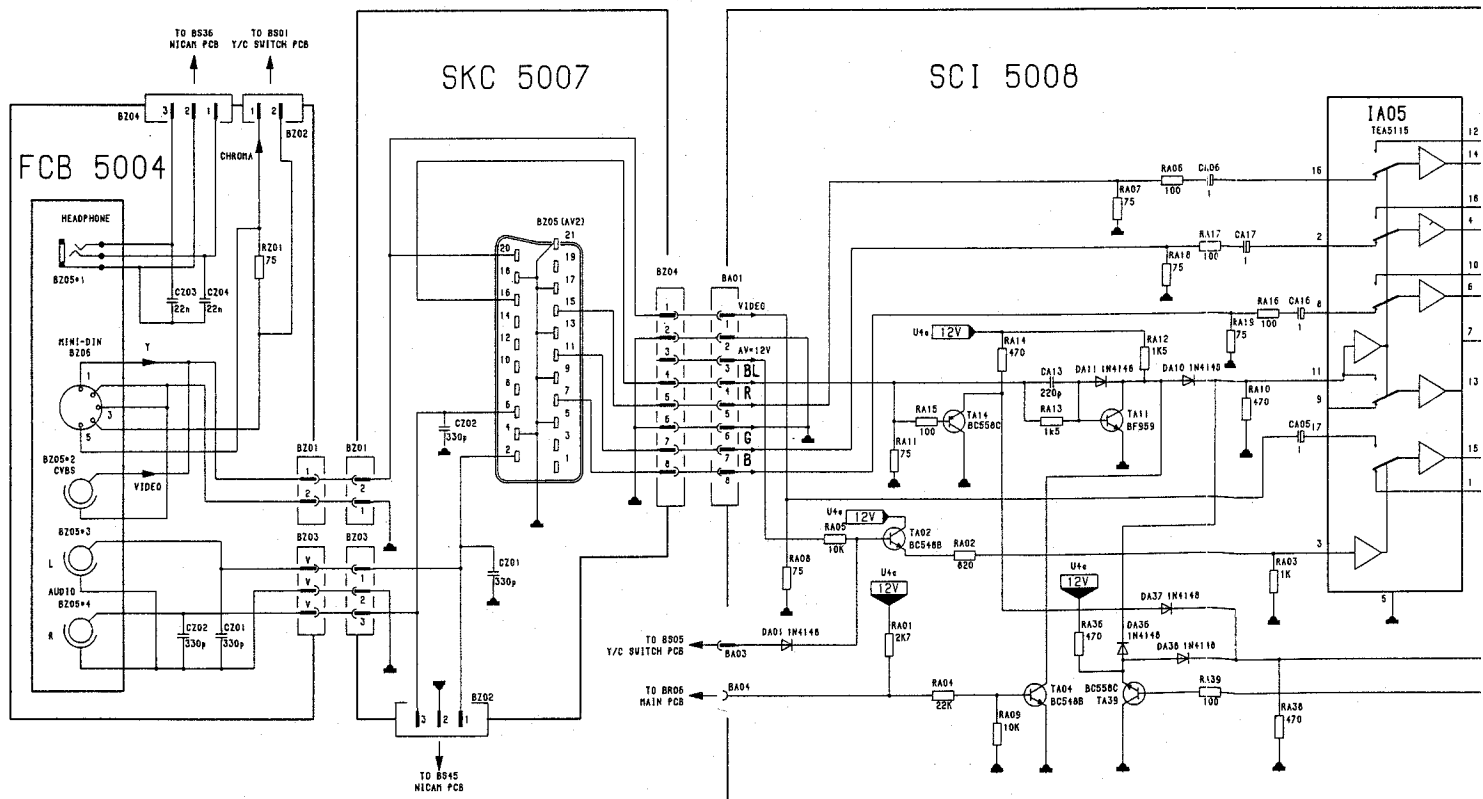
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**MAURITRON TECHNICAL SERVICES**  
 8 Cherry Tree Rd, Chinnor  
 Oxon OX9 4QY  
 Tel:- 01844-351634 Fax:- 01844-352554  
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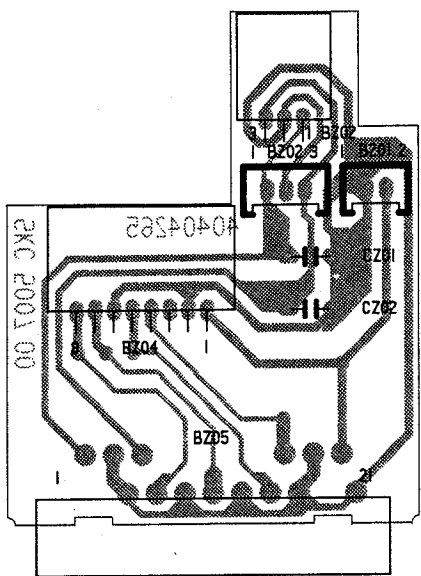
Videotext PCB 90369700 Component Location Diagram  
 - viewed through Component Side



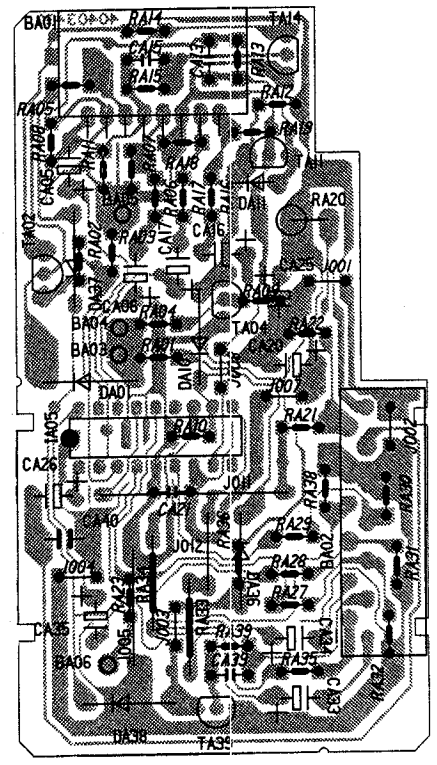
2nd Perite  
 Compon  
 - viewed

Front Connections PCB 40371300

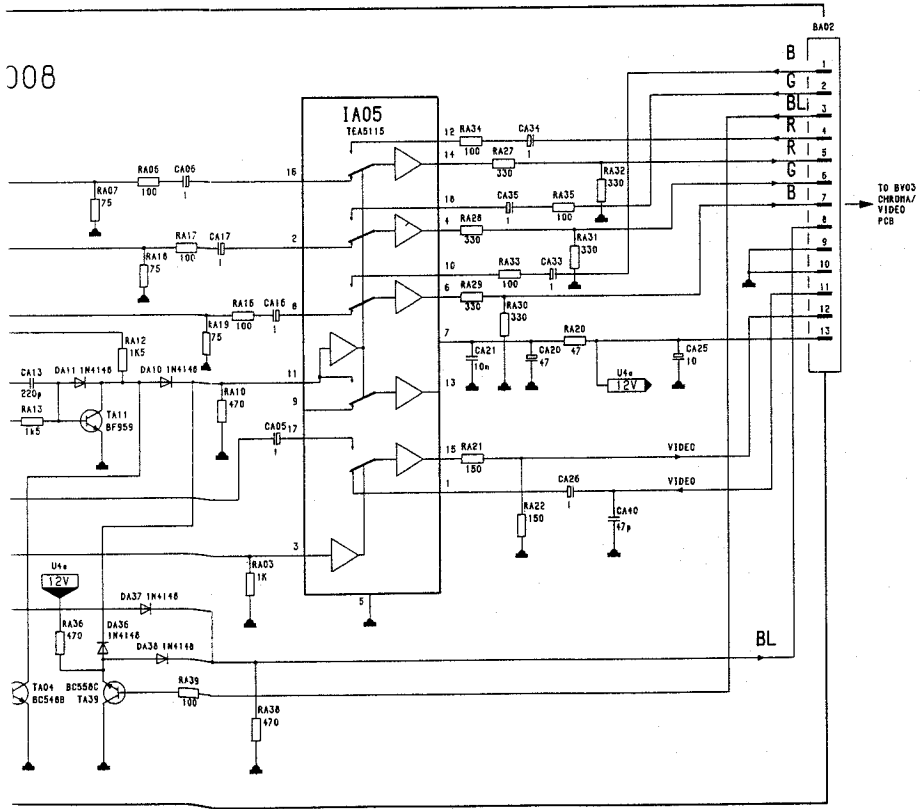




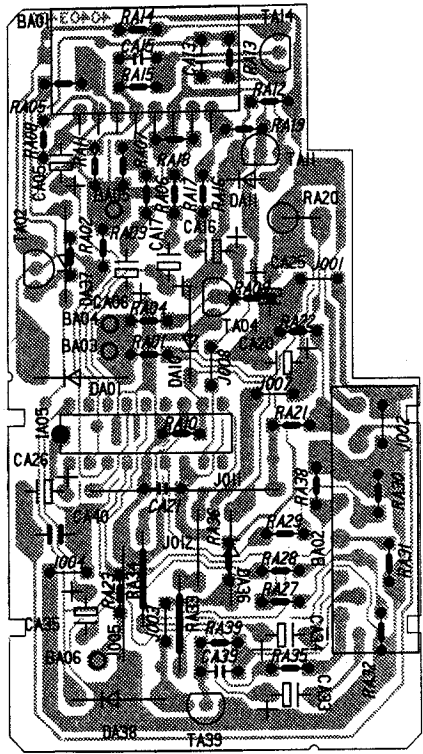
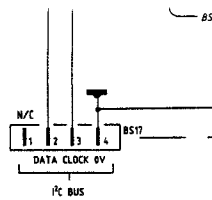
2nd Peritelevision Socket PCB 40381200  
Component Location Diagram  
- viewed through Component Side



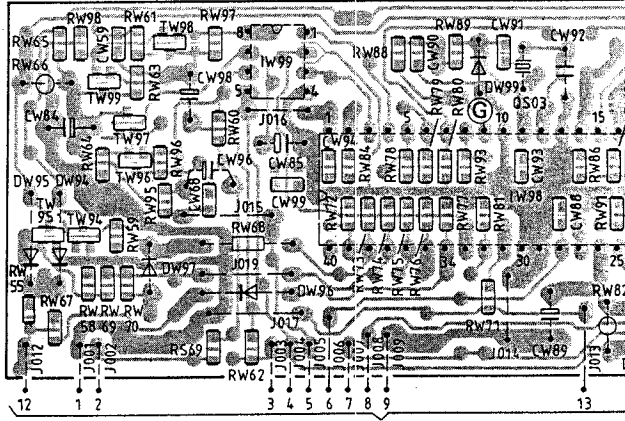
Peritelevision Interface PCB 20045100  
Component Location Diagram  
- viewed through Component Side



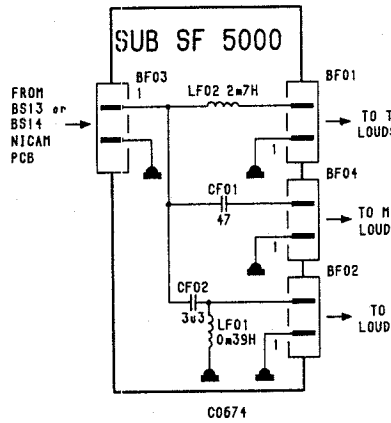
Peritelevision Interface 20045100



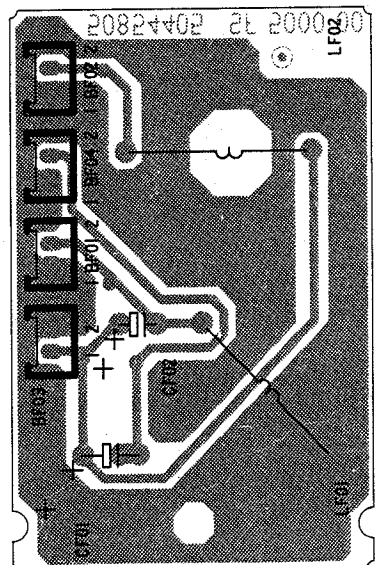
Peritelevision Interface PCB 20045100  
Component Location Diagram  
- viewed through Component Side



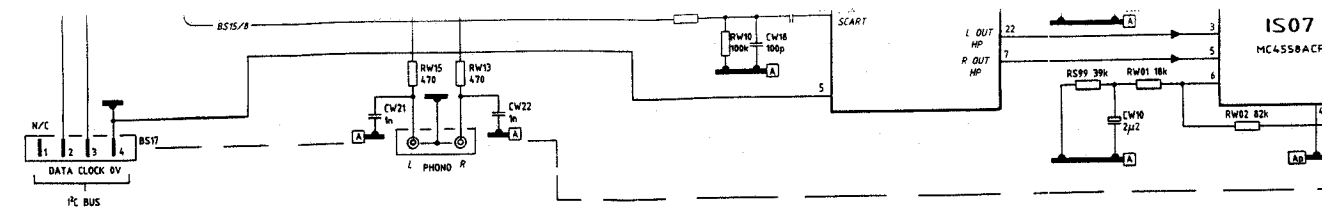
NICAM Sub PCB 30649700 Component Location  
- viewed through Copper Side



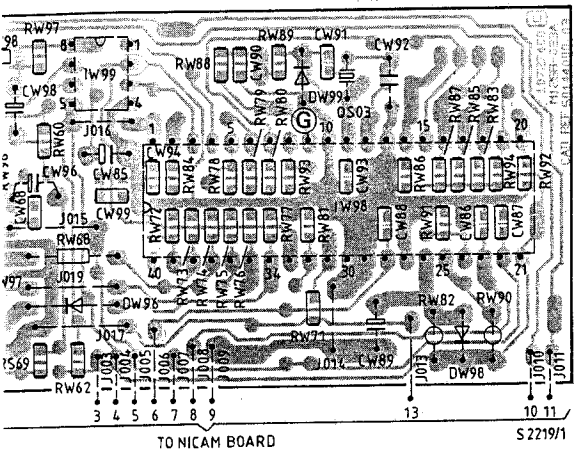
Audio Filter (Crossover) 60374500



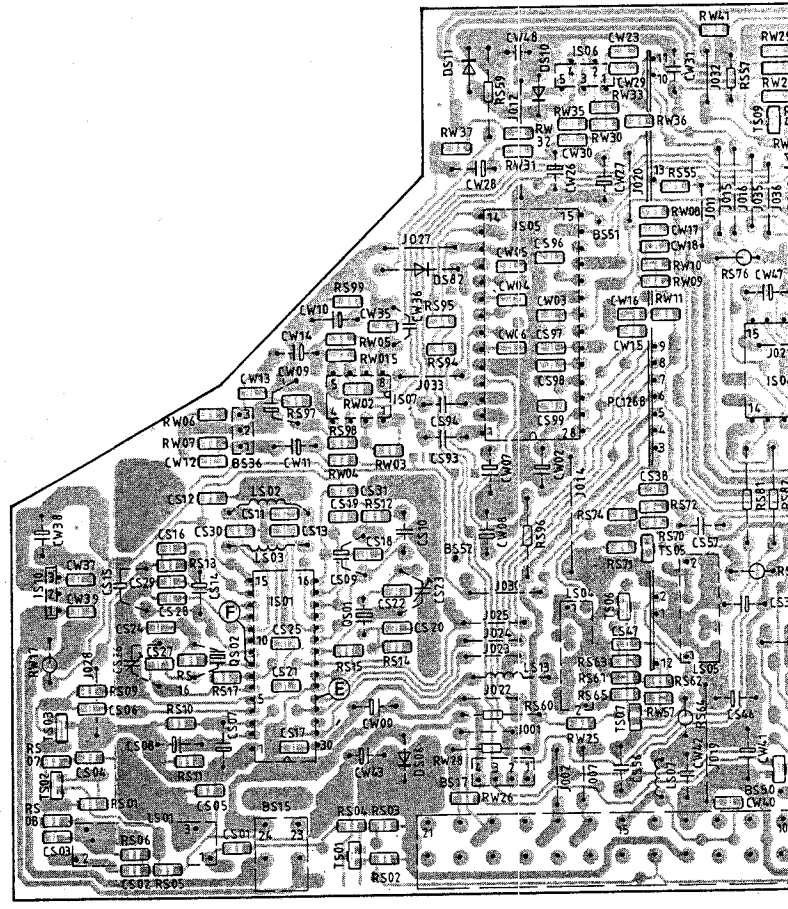
Audio Filter (Crossover) PCB 60374500  
Component Location Diagram  
- viewed through Component Side



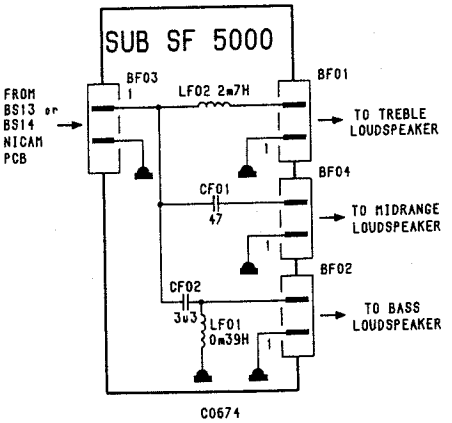
NICAM Audio PCB 60410330 and NICAM Sub PCB 30649700



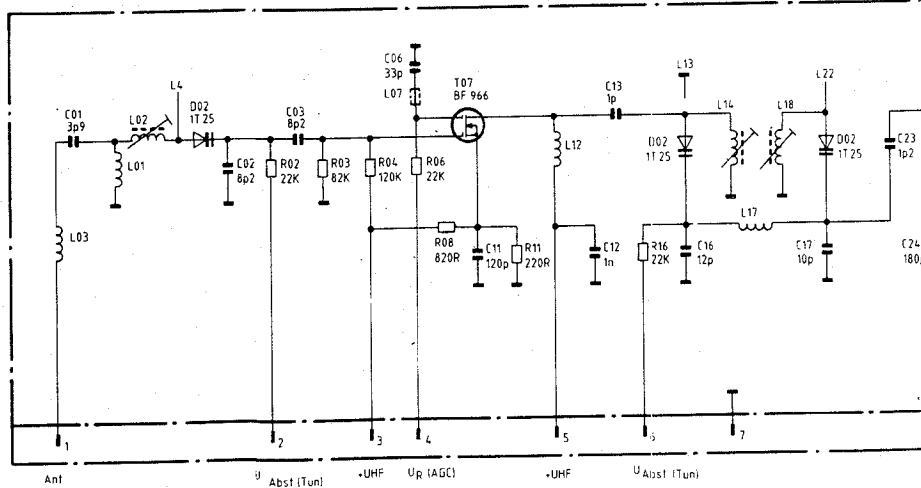
b PCB 30649700 Component Location Diagram through Copper Side



NICAM Audio PCB 60410330 Component Location Diagram - viewed through Copper Side

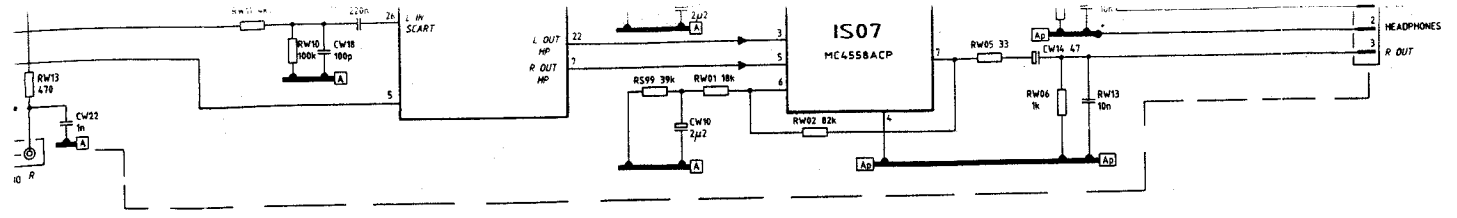


Audio Filter (Crossover) 60374500



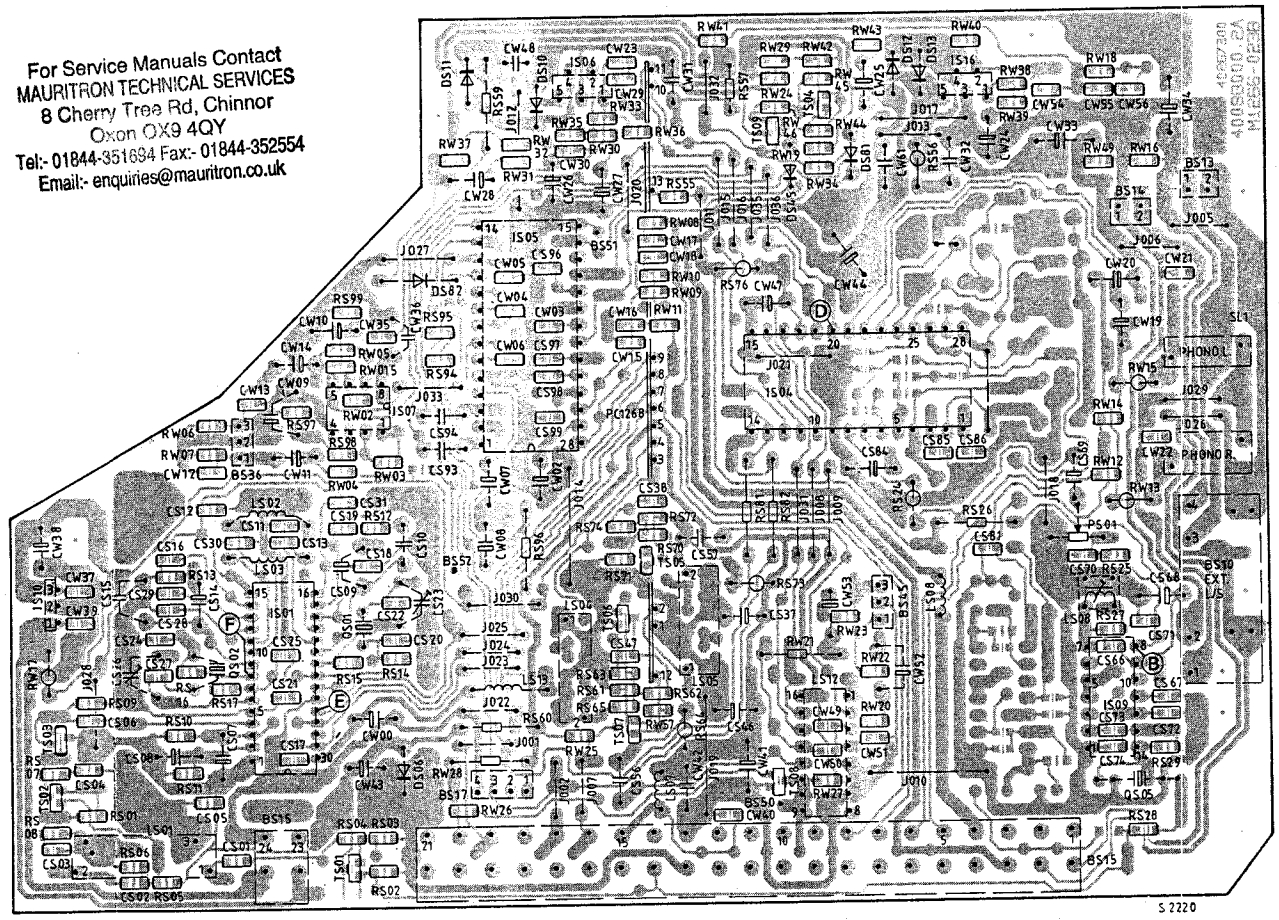
UHF Tuner Assembly 30078100 (Assembled Item only - no Component Location Diagram)



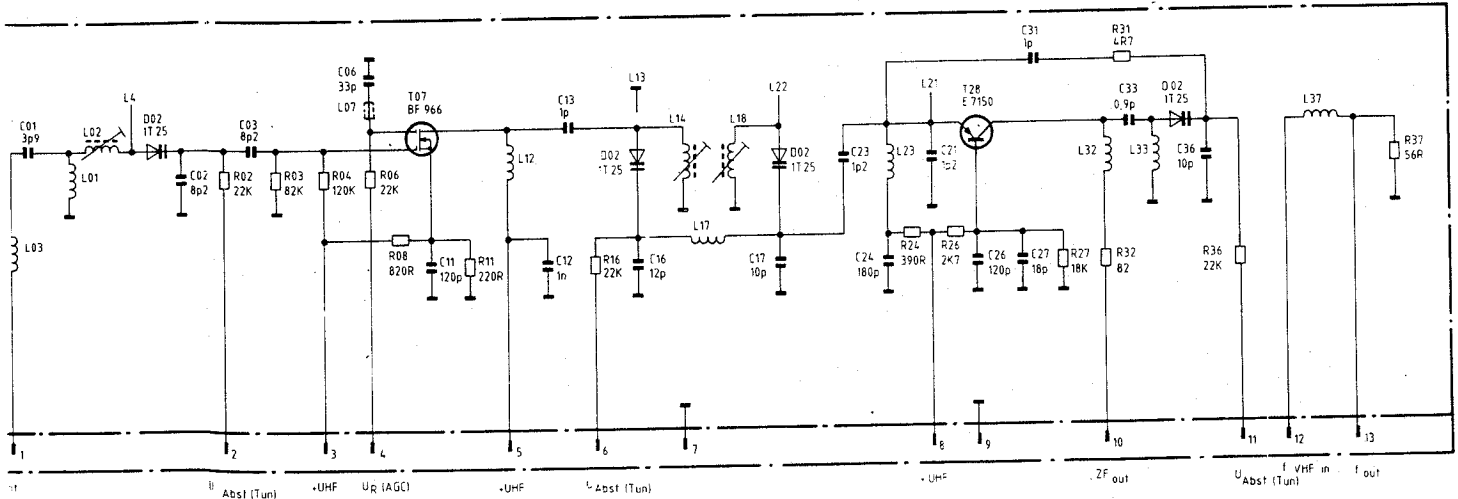


B 60410330 and NICAM Sub PCB 30649700

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NICAM Audio PCB 60410330 Component Location Diagram  
 - viewed through Copper Side



UHF Tuner Assembly 30078100  
 (Assembled Item only - no Component Location Diagram shown)