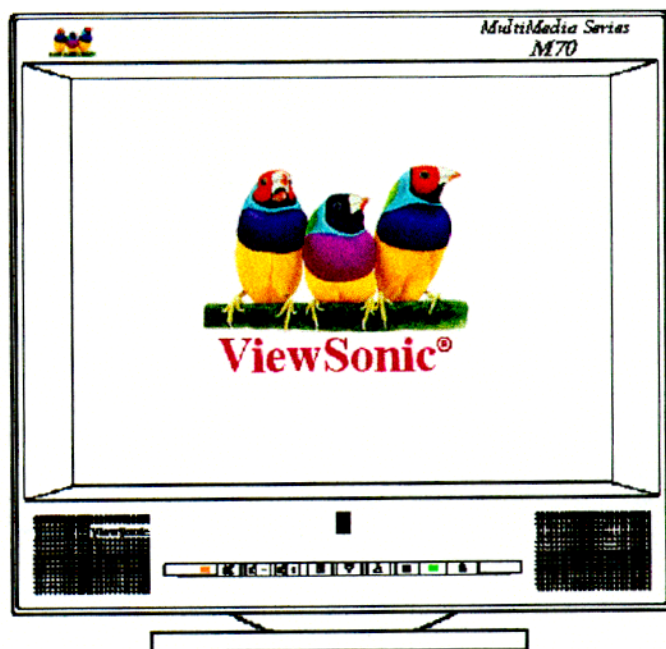


Service Manual

ViewSonic M70 Model No. VCDTS21503-1

***17" Digital Controlled Color Monitor
(16" viewable) MultiMedia Series***



(Rev. 1 - August 1999)

ViewSonic® 381 Brea Canyon Road, Walnut, California 91789 USA - (800) 888-8583

■ Preface

■ Before You Start

General Safety Precautions

1. Use an isolation transformer in the power line and AC supply to troubleshoot.
2. When servicing, observe the original lead dress, especially in the high voltage circuits. If a short circuit is found, replace all parts which have been overheated or damaged.
3. Potentials, as high as 26kV are present when this display is in operation. Operation of the display without the rear cover involves the danger of a shock hazard from the display power supply. Servicing should not be attempted by anyone who is not thoroughly familiar with the precautions necessary when working on high voltage equipment. Always discharge the anode of the picture tube to the display chassis before handling the tube.
4. After servicing, be sure to check the items listed in the Safety Checkout, below before returning the serviced unit to the customer.

Safety Checkout

The following checks must be made after correcting the original service problem and before the unit is returned to the customer.

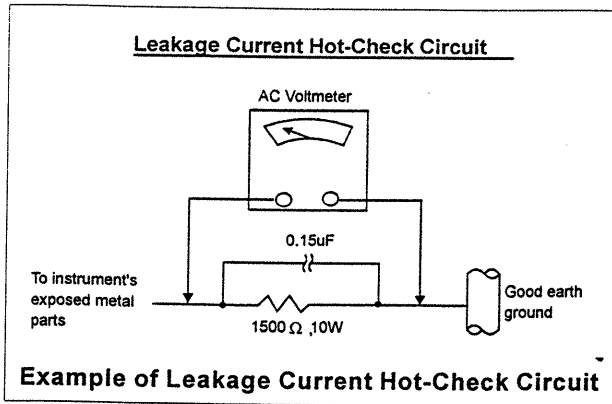
1. Check the area of your repair for unsoldered or poorly soldered connections. Check the entire board surface for solder splashes and bridges.
2. Check the inter board wiring to ensure that no wires are pinched or coated with high-wattage resistors.
3. Check that all control knobs, shields, covers, ground straps and mounting hardware have been replaced. Make absolutely sure you have replaced all the insulators.
4. Look for any unauthorized replacement parts, particularly transistors, that may have been installed during a previous repair. Point them out to the customer and recommend their replacement.
5. Look for parts which, though functioning, show obvious signs of deterioration. Point them out to the customer and recommend their replacement.
6. Check the line cord for cracks and abrasion. Recommend the replacement of any such line cord to the customer.
7. After making any repair, check the B+ and HV to see whether they are at the values specified. Make sure your instruments are accurate; if your HV meter always shows a low HV, check the meter to ensure it is not malfunctioning.
8. Carry out the leakage current checks as detailed below overleaf.

Leakage Current Cold Check

1. Unplug the AC cord and connect a jumper between the two prongs on the plug.
2. Turn on the display power switch.
3. Use an ohmmeter to measure the resistance value between the jumpered AC plug and each exposed metallic cabinet part on the display, such as screwheads, terminals control shafts, etc. When an exposed metallic part has a return path to the chassis, the reading should be between 240k and 5.2M. When exposed metal does not have a return path to the chassis, the reading must be.

Leakage Current Hot Check

1. Plug the AC cord into the AC outlet. Do not use an isolation transformer for this check.
2. Connect a 1.5k, 10 watt resistor in parallel with a 0.15F capacitor between each exposed metallic part on the set and a good earth ground (see How to Find a Good Earth, below) as



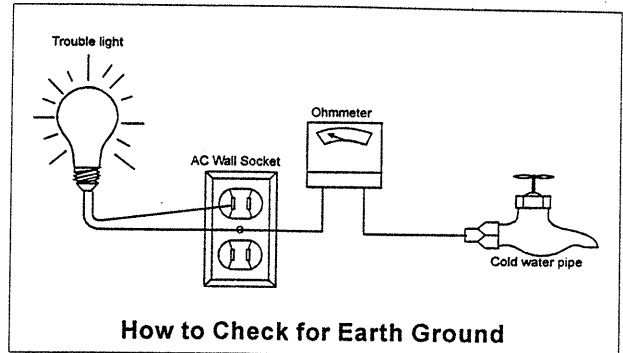
shown in the diagram below.

3. Use an AC voltmeter with 1000 ohms/volt or more sensitivity to measure the potential across the resistor.
4. Check each exposed metallic part, and measure the voltage at each point.
5. Reverse the polarity of the AC plug in the AC outlet and repeat the above measurements.
6. The potential at any point should not exceed 0.75 volt RMS. A leakage current tester (Simpson Model 229, RCA WT-540A or equivalent) may be used to make the hot checks.

Leakage current must not exceed 0.5 milliamp. If a measurement is outside of the specified limit, there is a possibility of a shock hazard and the monitor should be repaired and rechecked before it is returned to the customer.

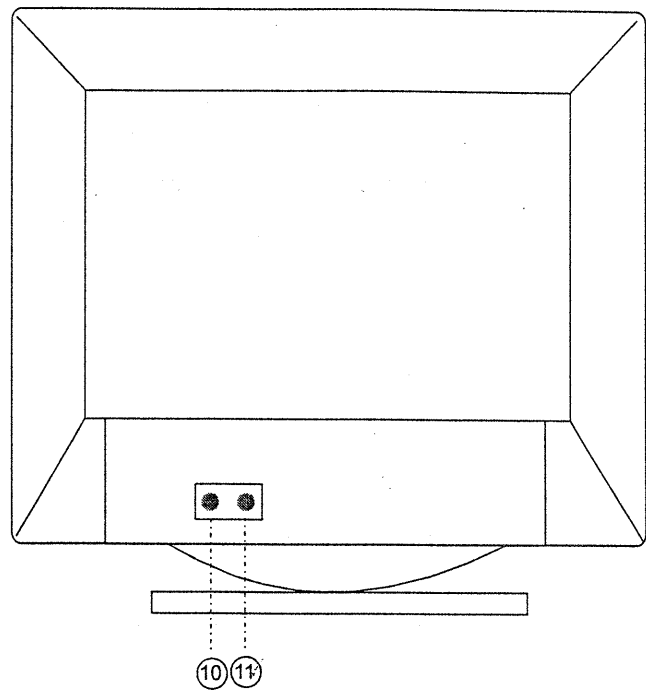
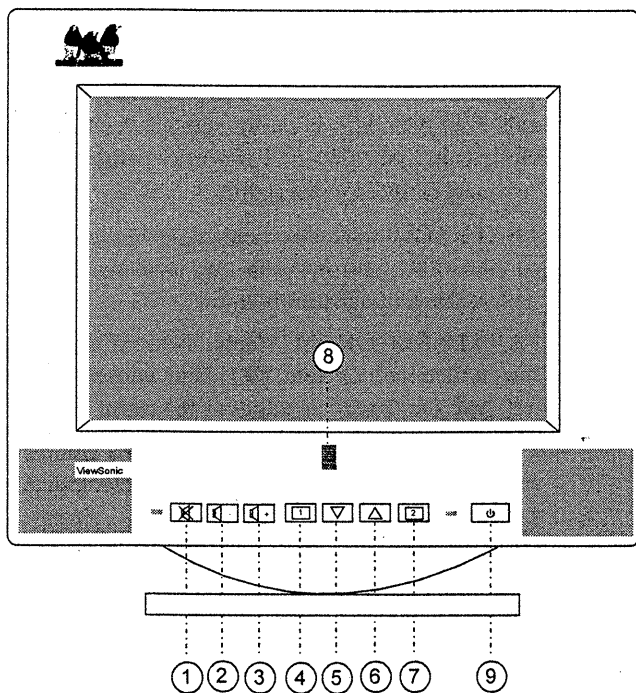
How to Find A Good Earth

A cold water pipe is a guaranteed earth ground; the cover plate retaining screw on most AC outlet boxes is also at earth ground. If the retaining screw is to be used as your earth ground, verify that it is at ground by measuring the resistance between it and a cold water pipe with an ohmmeter. The reading should be zero (0) ohms. If a cold water pipe is not accessible, connect a 60-100 watt trouble light (not a neon lamp) between the hot side of an AC power receptacle and the retaining screw. Try both slots, if necessary, to locate the hot side of the line. The lamp should light at normal brilliance if the screw is at ground potential.
















1.0. Product Specification

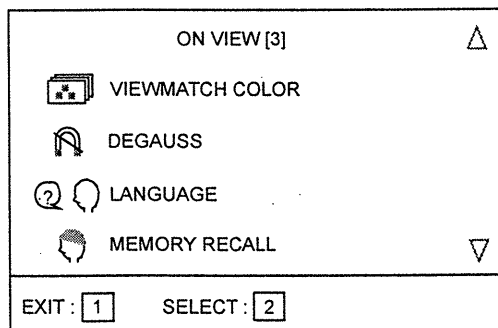
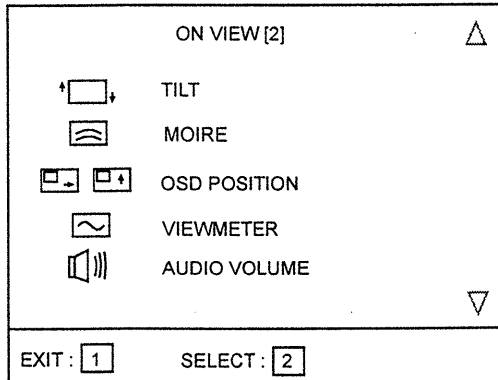
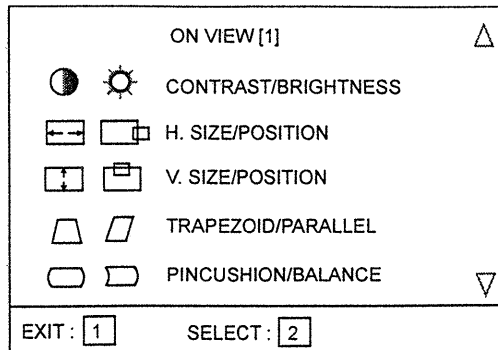
1.1. Monitor Control Locations & Functions



KEY TO BUILT-IN MONITOR CONTROL FUNCTIONS

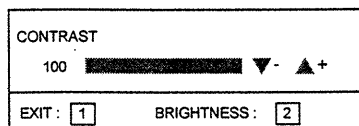
①	"  " Mute key	Use mute button, when active shall mute the internal speakers and external earphone.
②	"  - " Volume key	Press to decrease speaker volume.
③	"  + " Volume key	Press to increase speaker volume.
④	"  " for OSD ON/OFF and selection confirm	Press to call up OSD function onto screen and confirm the right/left arrow keys selection for OSD icon.
⑤ ⑥	"  ", "  " adjusting setting and OSD function selection	Adjust setting of currently selected OSD icon or measurement "  " key to increase, "  " key to decrease.
⑦	"  " key	For confirm OSD function "icon change" or measurement "  " key to increase, "  " key to decrease.
⑧	Microphone "  "	This microphone is used to speak on monitor inside.
⑨	"  " Power ON/OFF	Hard power ON/OFF button. Adjacent LED is lit when on. The LED color is green for normal condition and change to orange for DPMS condition
⑩	AUDIO IN (at rear side)	This jack is used for audio input.
⑪	MIC OUT (at rear side)	For microphone output.

1.2. OnView® Main Menus



CONTRAST adjusts foreground white level of screen image.

Shortcut: Before displaying the OnView menu, press [▼] or [▲] button. A small control screen appears as shown below. Press [▼] or [▲] to adjust.



Press button [2] to toggle between the Contrast and Brightness control screen



BRIGHTNESS adjusts background black level of screen image. Press [▲] or [▼] to adjust.



H-SIZE (Horizontal Size) adjusts the width of the screen image. [▼] decreases width, [▲] increases width.



H-POSITION (Horizontal Position) moves the screen image left or right. [▼] moves screen to left, [▲] moves screen to right.



V-SIZE (Vertical Size) adjusts the height of the screen. [▼] decreases screen height, [▲] increases screen height.



V-POSITION (Vertical Position) moves the screen up and down. [▼] moves screen down, [▲] moves screen up.

PINCUSHION straightens vertical sides of the screen. [▼] curves vertical edges inward, [▲] curves vertical edges outward.



PIN-BALANCE curves the screen's vertical edges to the left or right. [▼] curves vertical edges to left, [▲] curves vertical edges to right.



TRAPEZOID makes vertical edges of the screen image parallel. [▼] narrows top and widens bottom, [▲] widens top and narrows bottom.



PARALLELOGRAM slants vertical edges of the screen to the left or right. [▼] slants vertical edges to the left, [▲] slants vertical edges to the right.



TILT rotates entire screen image. [▼] rotates screen counter-clockwise, [▲] rotates screen clockwise.



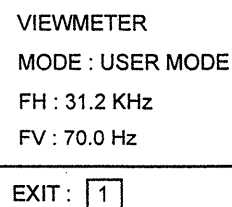
MOIRE balances between sharp focus and reduced interference patterns. Moire is an advanced control that should be left at the factory preset.



OSD(On Screen Display) POSITION allows you to move the menus and control screens where you want. Press [▼] or [▲] to move the OSD.



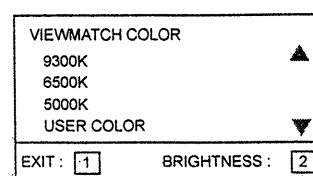
VIEWMETER® displays information about the frequency signal input (horizontal scan and refresh rate) coming from the graphics card in your computer. See your graphics card's user guide.



AUDIO VOLUME adjusts audio volume. [▼] Decrease audio volume, [▲] increase audio volume.



VIEWMATCH® COLOR has four color controls; three color temperatures, 9300°K, 6500°K and 5000°K, where the reds, greens and blues cannot be adjusted. The fourth, USER COLOR, allows you to adjust the reds, greens and blues.



Button [1] exits this control menu

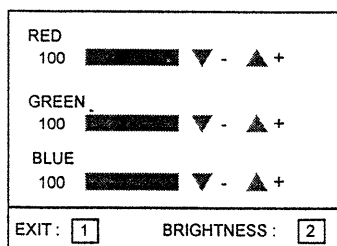
Button [2] displays the control screen for the highlighted option

VIEWMATCH COLOR, continued**For color temperatures**


- Highlight the desired color temperature control by pressing [▼] or [▲].
 9300°k : Adds blue to the screen image for a cooler white.
 6500°k : Adds red to the screen image for a warmer white and a richer, more vibrant red.
 5000°k : Adds additional red to the screen image for the warmest white.
- Select the highlighted temperature by pressing button [2].

For USER colors


- Highlight USER COLOR by pressing [▼] or [▲]. Display the control screen by pressing button [2]. The control screen below appears.




- Highlight red, green or blue by pressing [▼] or [▲].
- Select the highlighted red, green or blue by pressing button [2].
- Adjust the selected color by pressing [▼] or [▲]. The status bar adjusts accordingly.
- De-select the control by pressing button [2]. Adjust another color by repeating steps 2-4. Or, exit the control screen by pressing button [1].

 **DEGAUSS** corrects irregular colors appearing around the edges of screen images. Degaussing removes build-up of magnetic fields that can affect color purity and convergence. There are two ways to degauss the ViewSonic M50; by pressing the power button to turn the monitor on, or by selecting the DEGAUSS control from the menu.

Important: Do not degauss repeatedly. Doing so can be harmful to the monitor. Wait at least 20 minutes before selecting this control again.

 **LANGUAGE** allows you to choose from among five languages for the menu and control screens: English, French, German, Italian and Spanish. Highlight the language you want by pressing the [▼] or [▲] button. To exit this control screen, press button [1].

 **MEMORY RECALL** returns adjustments back to factory settings.

Exception : This control will not affect changes made with the USER COLOR control.

1.3. Product Overview

The monitor installed in the ViewSonic M70-M/E/A/P phom described in this service manual has the following features:

- 17 inches 0.27mm dot pitch conventional C.R.T
- 30k~70kHz horizontal scanning
- 50~160Hz vertical refresh rate scanning
- 16 total memory modes in standard configuration
- Universal segmented auto range Power Supply
- VESA/NUTEK/EPA compliant power management

1.4. CRT Characteristics

- Screen Size : 17 inches
- Diagonal : 16"
- Phosphor Dot Pitch : 0.27mm
- Mask Type : Shadow Mask
- Faceplate Treatment : Anti-glare, anti-static
- Standard Light Transmission : 46% type

1.5. Power Specifications**1.5.1 Power Supply**

- A/C Receptacle : IEC320
- Power Supply Type : Universal
- A/C Line Voltage Ranges : 88VAC~264VAC
- A/C Line Frequency Ranges : 50Hz/60Hz±3Hz
- Degauss : Automatic and Manual
(20 minutes for a full recovery)

1.5.2 Power Management

Summary of operating states:

APM State	LED Color	Power Consumption	Automatic Recovery Time
On	Green	< 130W	Not applicable
Stand by	Orange	<15W	< 3 seconds
Suspend	Orange	< 15W	< 3 seconds
Off	Orange	< 5W	<10 seconds

1.6. Regulatory**1.6.1 Standard**

The product has been tested to the following standards and are approved to use the relevant marks or statements:

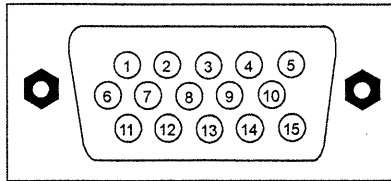
- NE60950 and GS MARK
- TCO92
- PTB X-RAY
- CE
- CB REPORT
- NEMKO, DEMKO, SEMKO, SET1
- C-TICK
- CB CERTIFICATE
- BCIQ
- VCCI

1.6.2 ESD Immunity

The disply will be tested to and meet the requirements of CISPR24 (4kV contact, 8kV air discharge).

1.7. Video Input Signal Characteristics

- Video Type : Analog
- Amplitude: 700mV maximum
- Video Input Impedance : 75 Ohms \pm 1%
- Optional DDC 1/2B video Connector Pin Assignments:



pin	Signal	pin	Signal	pin	Signal
1	Red video	6	Red return	11	Monitor GND
2	Green video	7	Green return	12	SDA
3	Blue video	8	Blue return	13	H. sync
4	Monitor GND	9	No pin	14	V.sync (VCLK)
5	No pin	10	Sync return	15	SCL

1.8. Sync Input Signal Characteristics

1.8.1 Separate Sync

- Sync Type : TTL
- Amplitude : 2.4V minimum (Logic High),
0.8V max.(Logic Low)
- Polarity : Positive or Negative
- Equalization pulses : Not allowed

1.8.2 Composite Sync

- Sync Type : TTL
- Amplitude : 2.4V minimum (Logic High),
0.8V max.(Logic Low)
- Polarity : Positive or Negative
- Serration Pulses : Allowed at horizontal rate
- Equalization pulses : Not allowed

1.9. Environmental

1.9.1 Temperature/Humidity/Altitude

Operating :

- Temperature : 0°C to 40°C
- Relative Humidity : 5 to 95%,non-condensation
- Altitude : -400 to +3000 meters

Non-Operating :

- Temperature : -40°C to +60°C
- Relative Humidity : 5 to 95%,non-condensation
- Altitude : -400 to +12000 meters

1.9.2 Vibration Test

Vibration Freq	5-250 Hz
Acceleration	1.0 G
Sweep Time	1 oct/min
Test Time	60 min per axis

1.9.3 Drop Test

- Drop Height : 76.2cm
- Test Direction : 1 Corner, 3 Edges, 6 Faces
- Shock pulse \leq 30G

1.10.Preset Timing Modes

This display has 6 preset display modes configured during manufacture, given in the following table:

Mode No.	Hf KHz	Vf Hz	Dot x Line
01	31.469	70.087	640x400
02	37.500	75.000	640x480
03	46.875	75.000	800x600
04	60.023	75.029	1024x768
05	63.981	60.020	1280x1024
06	49.725	74.550	832x624

2.0. Disassembly Instruction

2.1. Remove the Rear Cover

1. Remove the six screws at the rear cover. Refer to the figure 2-1 (A).
2. Remove the rear cover.

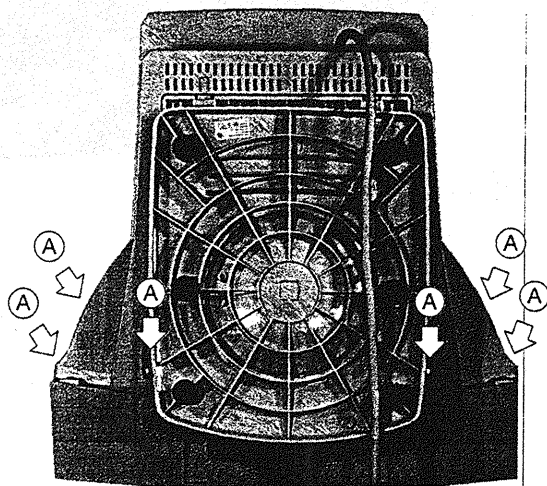


Figure 2-1

2.2. Internal Disassembly (Right Side)

The neck board is plugged on to the CRT neck and is enclosed in a metal shielding.

1. Disconnect the four ground wires from the neck shield. Refer to the figure 2-2 (A).
2. Disconnect the ground wire. Refer to the figure 2-2 (B).
3. Disconnect the two connected pins from the main board. Refer to the figure 2-2 (C).
4. Release the cable wire from the heat-sink. Refer to the figure 2-2 (D).
5. Cut the cable tie. Refer to the figure 2-2 (E).

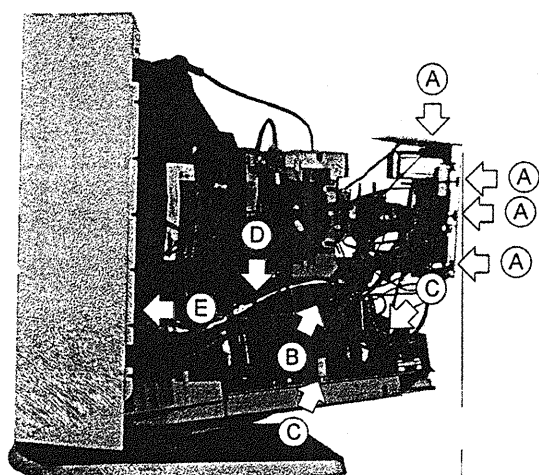


Figure 2-2

2.3. Internal Disassembly (Left Side)

1. Disconnect the ground wire from the neck shield. Refer to the figure 2-3 (A).
2. Disconnect the ground wire from the main board. Refer to the figure 2-3 (B).

3. Release the screw from the FBT cover. Refer to the figure 2-3 (C).

IMPORTANT NOTE

To avoid risk of electric shock, before removing the anode cap, made sure the anode has been completely discharged as high voltage may remain on the anode for extended time after power off.

4. Remove the anode cap from the CRT. Refer to the figure 2-3 (D).

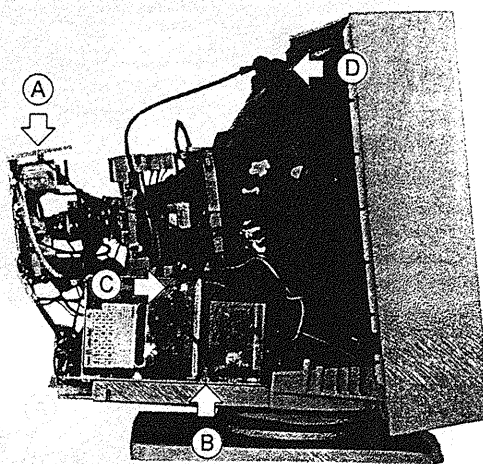


Figure 2-3

2.4. Internal Disassembly (Back Side)

1. Disconnect the ground wire from the main board. Refer to the figure 2-4 (A).
2. Remove the nine solder sides from the neck board. Refer to the figure 2-4 (B).
3. Remove the neck shield.
4. Remove the neck board.
5. Disconnect the two ground wires from the neck board. Refer to the figure 2-5 (A).

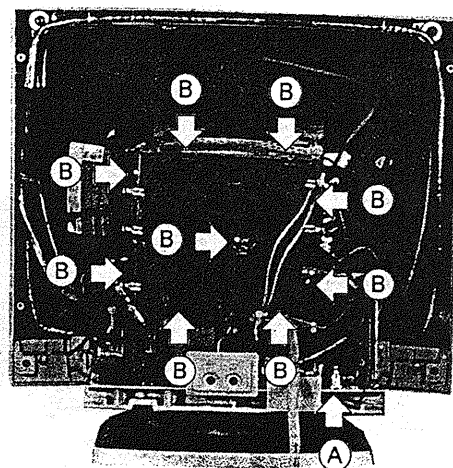


Figure 2-4

2.5. Remove the Main Board

1. Place the CRT face downward.
2. Remove the two screws from the bottom cover. Refer to the figure 2-5 (B).

3. Disconnect the five connected pins from the main board. Refer to the figure 2-6 (A).
4. Remove the bottom cover and main board.
5. Remove the seven screws from the main board. Refer to the figure 2-7 (A).
6. Remove the main board.

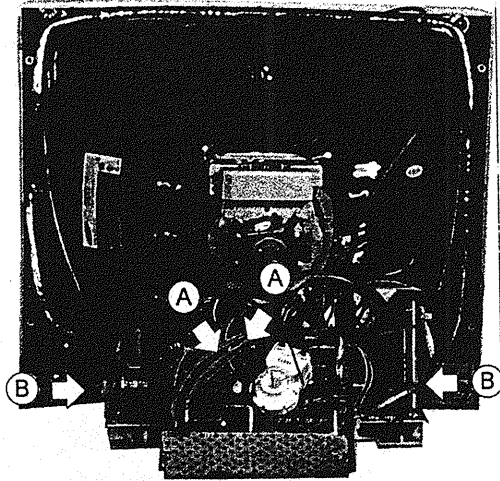


Figure 2-5

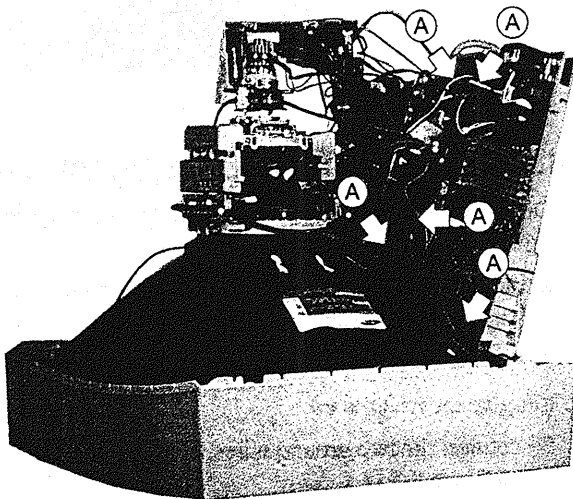


Figure 2-6

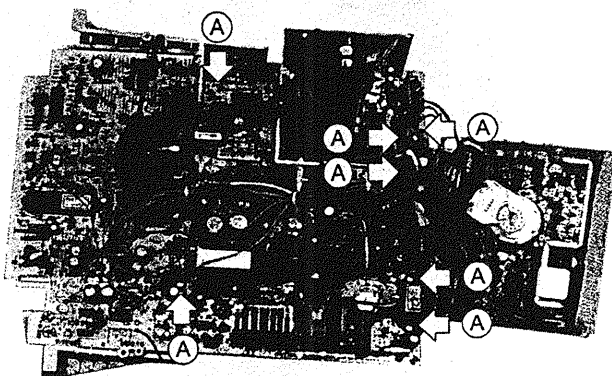


Figure 2-7

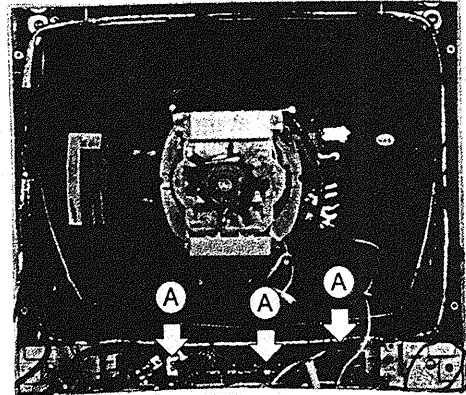


Figure 2-8

2.6. Remove the Control Board

1. Remove the three screws from the control board. Refer to the figure 2-8 (A).
2. Remove the control board.

3.0. Product Theory of Operation

3.1. Introduction

The model platform design meet plug and play, display power saving rule and full range sync capability and with a universal power supply which can be offer world wide requirement. The working rang as:

- AC input: 88~265Vac 47~63Hz.
- Horizontal frequency range: 30~70kHz.
Vertical frequency range: 50~160Hz.
- The circuit block diagram show on figure3-1.

3.2. Power Supply

The monitor used a universal range and flyback mode switching power which converter AC power to DC and supply 7Vdc voltage output. The output voltage detail are:

+6.3V	@500mA	Heater
12V	@230mA	uP/PLL IC/ Vertical output /Control IC/Video Pre-amp
5V	@140mA	uP Power
16V	@1000mA	Vertical O/P Tilt
80V	@480mA	Video out/Driver
167V	@380mA	Hout. B+/Video
-12V	@520mA	Driving for Vertical O/P/Tilt

The 5V and 12V supply is driven from 16V supply railly by means of separate voltage regulator. As this switching power is running on un-synchronous. See figure3-2 for detail block diagram.

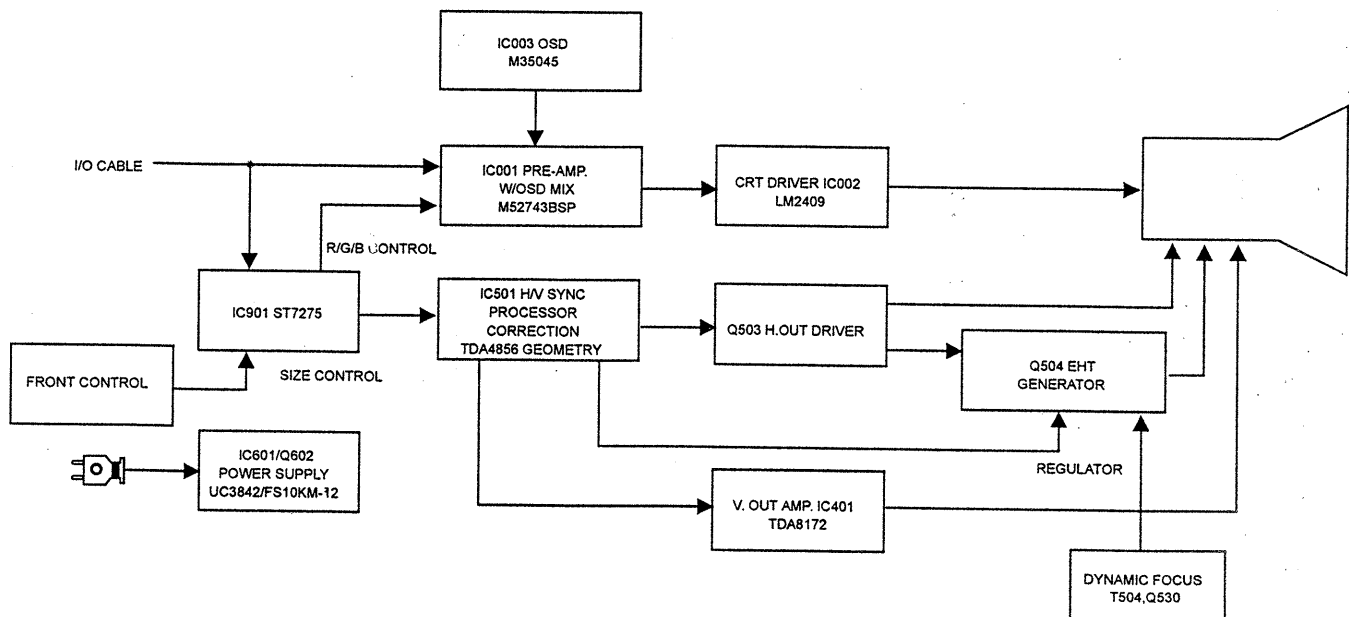


Figure 3-1 Block Diagram of Platform

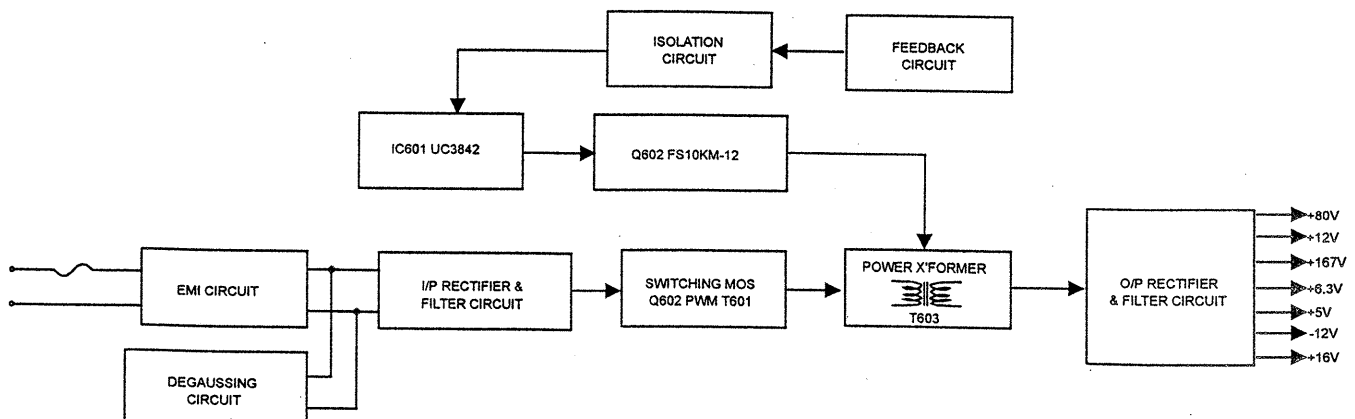


Figure 3-2 Switching Power Supply Block Diagram

3.2.1. Degaussing

The monitor is equipped a manual degaussing circuit making use of one duo PTC (PTC1) and relay control circuit. The degaussing is working on power on and OSD control.

3.2.2. Input Stage

- EMI filter: LF601, C601, C602, C603, C604, C648, C649, FB612~FB619. This portion for rejection conductive noise from switching power supply for meet agency rule requirement.
- D601 is rectify from AC to DC voltage.
- C606 is filter for average AC voltage into DC.
- TH601 is inrush current limits parts. The parts is negative temperature coefficient of resistance when power on units the input current limits by TH601.

3.2.3. Flyback Converter

This power supply used current mode control and flyback mode converter for converter unregulated voltage into a stable voltage for secondary circuit used.

Current mode PWM control circuit:

- IC601 (UC3842): Current mode PWM control IC.
- Q602 (FS10KM-12): Power MOSFET.
- Start up power: R603.
- Normal power supply: D604, C647, D626, C607.
- Power supply on power saving mode: 6.3V Switch and +15V Switch.
- Voltage feedback: IC602, IC603.
- Regulator Circuit: IC603, R643, R644, R641, C640, C622.

3.2.4. Flyback Converter Circuit

- T603: Flyback choke for storage energy and converter to output DC voltage power.
- Snubbers: C608, R605 and D605. The snubbers is for clamp peak voltage on switching time.
- For start up power saving: Q611, Q612, C607. When power start up will be active, R603 floating.

3.2.5. Secondary Output

- **167V output:** For horizontal deflection used, the voltage offer for DC converter to a follow frequency voltage which control by horizontal size. D613, D626 and L604.
- **80V output:** For video output amplifier and H-Driver used. D615, C625 and L603.
- **12 V output:** For IC501 PLL, vertical output amplifier and tilt circuit. D616, C628 and L602.
- **6.3 V output:** For heater of CRT and tilt used. D618 and C632.
- **5 V output:** Supply uP control. This output must be keep stable voltage on any mode so the normal voltage supply from 15 volt via the IC605.
- **-12 V output:** For vertical IC's Vee. IC401 TDA8172 and tilt.

3.3. The Deflection Circuit

The deflection circuit including horizontal, vertical deflection and EHT circuit which working range is horizontal from 30 to 70kHz and vertical 50 to 120Hz. The circuits are control by IC901 microprocessor. See figure 3-3 Block diagram for more detail construction information.

3.3.1. Control IC501 (TDA4856)

The TDA4856 is a auto-sync deflection controller with fully DC voltage control. See figure 3-4 block diagram for more information. The TDA4856 provides sync processor, H+V synchronization with fully autosync capability. The sync range set up on horizontal 30 to 70kHz and vertical form 50 to 120Hz. Other function is geometry correction function vertical position, high and linearity control. Figure 3-4 Block diagram of IC501.

3.3.2. Vertical output amplifier with TDA8172

The TDA8172 is a power amplifier for use in vertical deflection system for frame frequency 50 to 120Hz.

The TDA8172 consists of a differential input stage, two output stage, a flyback generator, a protection circuit for output stage and guard circuit. Figure 3-5 Block diagram.

The differential input stage has a high CMRR differential current mode input (Pin 1 and 7), the signal input form IC501 (TDA4856) pin 12 and 13.

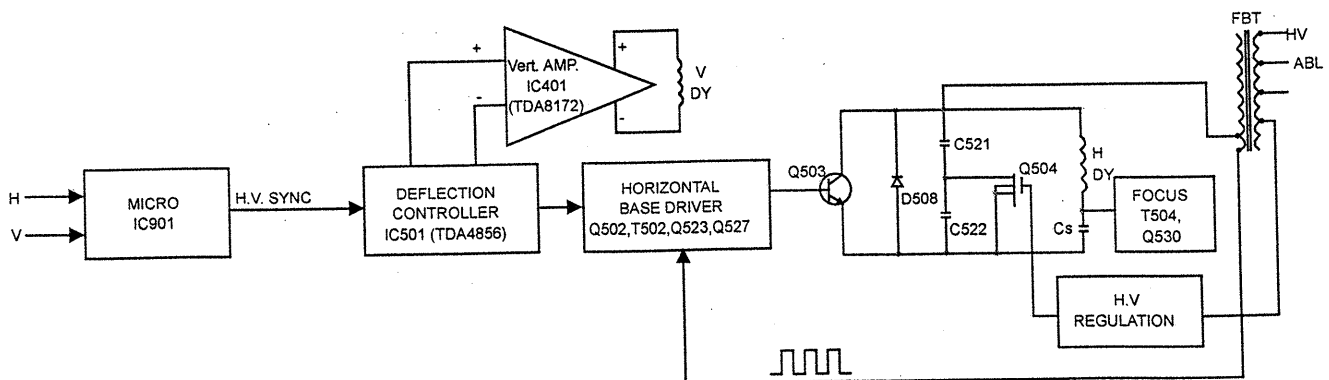


Figure 3-3 Deflection Circuit Block Diagram

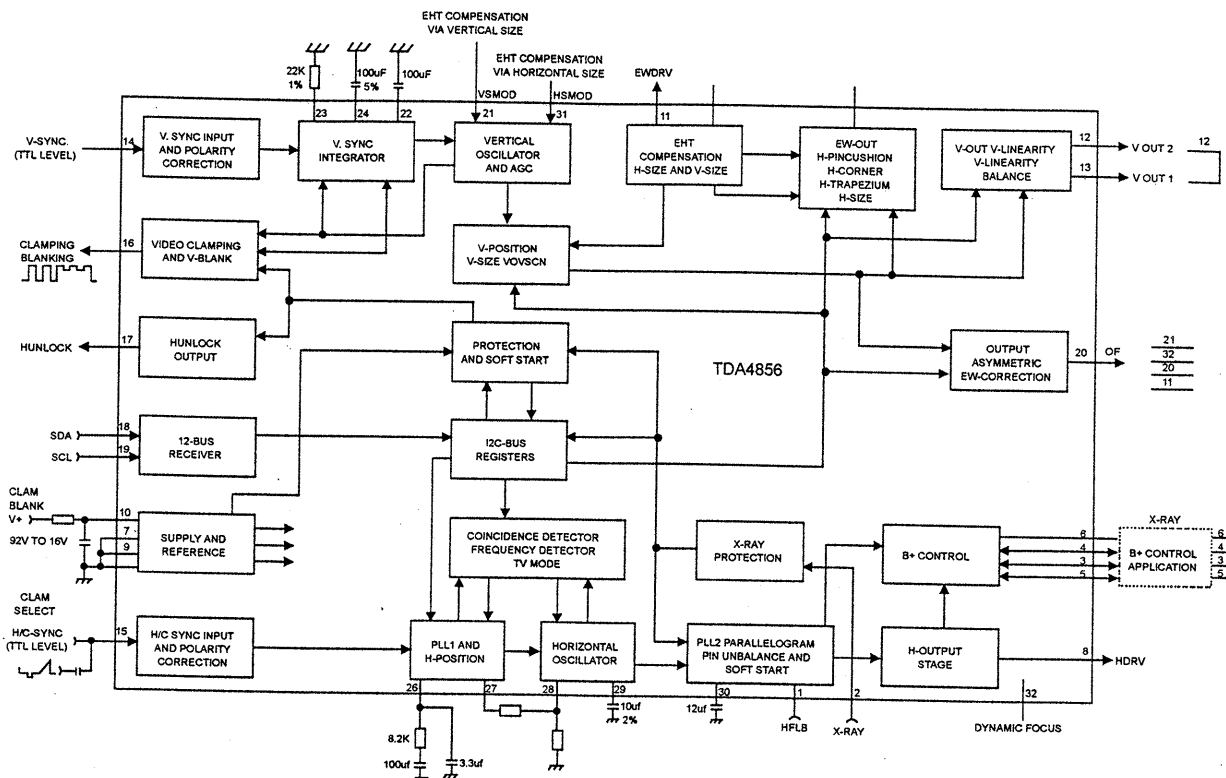


Figure 3-4 Block Diagram and Application of the TDA4856

Two output stage are current drive in opposite phase and operate in combination with the deflection coil in a full bridge configuration.

During flyback the flyback generator supplier the output stage a with flyback voltage.

The circuit makes it possible to optimize power consumption and flyback time.

The internal guard circuit provide a blanking signal for the CRT. The guard signal active HIGH:

- At thermal overheat.
- When feedback loop is out of range.
- During flyback.
- The snubber and dumper resistor for correction deflection waveform. R407, R406 and C405.

3.3.3. Horizontal B+ Converter

This DC converter provide a suitable voltage for horizontal deflection requirement which voltage is varying by frequency and size. So the deflection current sense by T503 which is converter current to voltage.

TDA4856 provide current mode PWM converter (pin 3, 4, 5, 6), the pulse width is proportional to horizontal size and pincushion and keystone geometry correction, the current feedback will be stable size depend on temperature and 151V B+ change.

Deflection current sense: T503.

H-size control and geometry correction circuit: The correction wave form come from Pin11 of IC501, the wave form through R571 to Pin5 of IC501 for control pulse width of B+ converter.

Switching parts: Q501 is switching parts of B+ converter. The duty cycle is follow the H-size and E/W correction wave form.

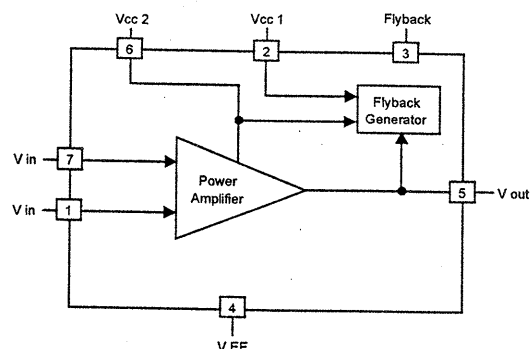


Figure 3-5 Block Diagram of TDA8172

Driving of switching parts: Q515, Q516 are buffer transistor which is driving pulse from pin6 of IC501 to gate of Q501.

Flywheel diode: D503 is flywheel diode which is working on recovery cycle of converter.

Converter choke: T501 is converter choke with voltage anode voltage generate (FBT).

3.3.4. Horizontal Output Stage

Horizontal output transistor: Q503 is output transistor.

Horizontal output driving: T502, Q502, Q523 and Q527 combination for take optimum driving condition of Ib1/Ib2 for Q503.

Damper diode: D508.

Current sensor: T503 is yoke current sensor and converter current to voltage and feedback to B+ converter pin 3 of IC501.

Horizontal linearity coil: L505 is horizontal linearity coil for correct right and left side as some as size.

S correction capacitor: C524, C525, C527 and C526, those 4 capacitor cover full range linearity requirement and control by Q506 for C526 and Q524 for C524, Q507 for C527. The separate range as:

	CS0	CS1	CS2	CS3
70K>HS>61.5K	HI	HI	HI	LO
61.5K>HS>51.5K	HI	HI	LO	LO
51.5K>HS>45K	HI	LO	HI	HI
45K>HS>36.3K	HI	LO	LO	HI
36.3K>HS>29K	LO	LO	LO	HI

Raster center shift circuit: D511, D512, C350 for filter a DC voltage close B+ voltage of horizontal output. Q519, Q517, Q518 are control raster shift direction (right or left) by up IC901. The raster center correction will be set up primary mode and measured raster position then auto change raster position on center by CAS.

3.3.5. EHT Regulator

This portion is regulating a stable anode voltage. The concept is modulate effect tuning capacitance to stable anode voltage. So the circuit used HRET signal to make a active pulse and pulse width modulated by anode voltage feedback voltage.

Anode voltage feedback by R596, VR501 and C501. The VR501 adjust anode voltage to specify volatge of CRT. H.V=25kV.

Error amp: IC503B (LM358H) with reference voltage 5.1V and amp for compare reference and sampling voltage from anode voltage.

IC502A is pulse generate and modulation parts.

Q510 and Q511 is totem pole buffer of Q504 driving.

Q504 is switching parts which is modulate effect tuning capacitance for keep stable anode voltage.

3.3.6. Dynamic Focus

- The Horizontal Dynamic is pick up from Cs wave through C588 into T504's and modify by R5A3, C586 to get properly wave from. 300V±50Vp-p.
- T504's pin2 is connected Q506's drain that is switched in 51.5kHz. To getting the dynamic voltage of low frequency close to high frequency.
- The vertical dynamic is provide by pin32 of IC501, Via C592, R572, R573, R575, C593, Q530, R576, R577, R578, C594 amplifying then into T504's pin11.
- The vertical dynamic B+ is get from pin 5 of FBT Via D513, L508, C595.
- See figure 3-6 Dynamic Focus Circuit.

3.4. Video Amplifier

The RGB video and sync signals are supplied through a video cable directly to the Video Board at connector CN301. The RGB signals are terminated in 75 ohms by R101, R201 and R301.

The RGB signals then enter an IC1 M52743BSP video pre-amplifier, providing synchronous black level clamping variable picture contrast (gain) and RGB gain balance for alignment. Separate gain control voltages for the three pre-amplifier channels are provided by the microcontroller via the I²C bus. These inputs enable the individual gains of each channel to be varied to allow channel gain balance. In addition, a common signal is applied on pin15 of IC1 to adjust all three channels by the same amount, to allow for overall gain or contrast control (ABL).

A synchronous clamping signal is driven from the horizontal sync pulse by Q001 and Q002. This takes the trailing edge of the horizontal sync pulse, differentiates it through C022 and R008, which is applied pin 19 of IC001. This timing is shown in Figure 3-7.

The outputs of the video pre-amplifier are fed to IC002's pin8, pin9, pin11, a power amplifier IC, through resistors FB104, FB204 and FB304. In addition, on screen display video information generated by IC003 can be injected via pin13, pin15, pin17 of IC003 through pin4, pin9, pin13 of IC001.

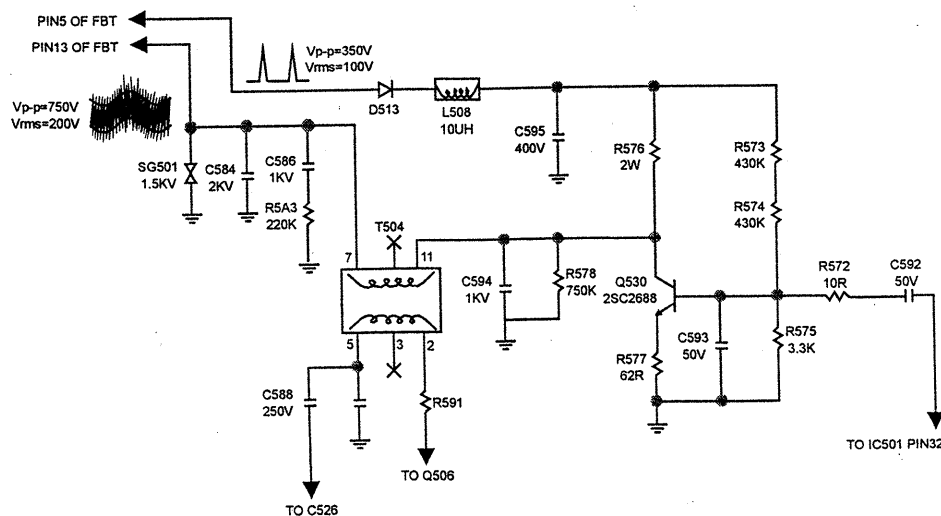
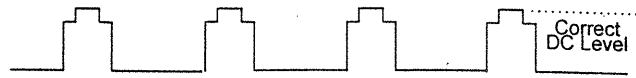


Figure 3-6 Dynamic Focus Circuit

Amplifies the video signals to around 30Vp-p. The outputs are AC coupled to the CRT cathodes via C106, C206 and C306. In order to bias the DC level of the cathodes correctly, the AC coupled signal is DC restored by clamping to a DC voltage which can be varied under microprocessor control. Considering Red channel output on IC001 as an example, the signal is clamped by D105 to the voltage set by the transistor amplifiers formed by Q101, which amplify the adjustable voltage at the output of the DAC of IC001. A similar stage can be seen for the green and blue channel outputs.

When the video signal amplification circuit is added, this waveform will change as shown in figure 3-8 (a). Without the DC component, as shown in figure 3-8 (b), the DC level of darker and brighter displays will be different, so when this kind of signal without a DC component is sent to the CRT, it will cause the contrast of the image to change as the signal changes. Therefore Q101, Q201, Q301, D105, D205 and D305 serve as a DC clamp and the CRT's cathodes DC voltage can be adjusted by the pin23, pin24, pin25 of IC001 DAC.

(a) Correct Waveform with DC component



(b) Waveform without DC component

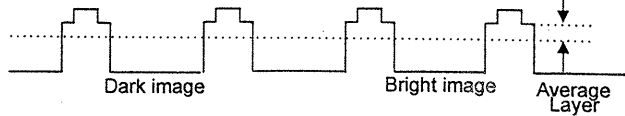


Figure 3-8 The Post Output Amplifier Circuit

IC003 is an On Screen Display processor. This is a simple video generation that has its own oscillator circuit. The oscillator circuit by using an internal Phase Locked Loop (PLL) the IC003 can sync to the incoming vertical and horizontal oscillator frequencies and produce the OSD video signals once initialized and loaded by the commands and data received on the I²C bus. When the OSD display is activated, the blanking output of the IC003 also sends a signal to the blanking input of IC001 (pin 1) to provide an optional black background for the OSD display.

The RGB signals are amplified to drive the CRT by IC002 LM2409 amplifier and capacitively coupled to the cathodes.

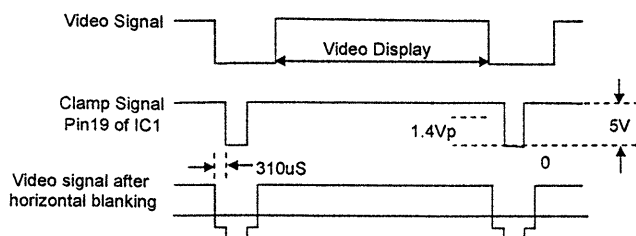
Brightness control is achieved by Q006 via controlling Ice of Q101, Q201, Q301 to change the R, G, B DC level. The bias is an output of the pin26 of IC1. Vertical blanking signals is coupled into pin 27 of IC1 to prevent visible retrace lines.

IC004 24C21 is DDC data Read/Write IC.

- ABL control (IC001's pin15):

R016 via D002, L502 to Q533. By sensing the beam current of CRT to determine the Q533 Ice.

Connected pin26 of IC001 via D014, D016, Q007, R052, R048. when brightness is adjusted too light (pin26 over around 4.0 Vdc), the Q007 will be active and pull down the agin of R.G.B ouptut.



NOTE:

- Clamp signal is generated from horizontal sync pulse time.
- When the clamp signal is less than 1.4Vp-p, the IC's internal clamp loop will operate; when greater than 1.4Vp-p, it will not operate.

Figure 3-7 Timing of Pin 19 Clamp Signal

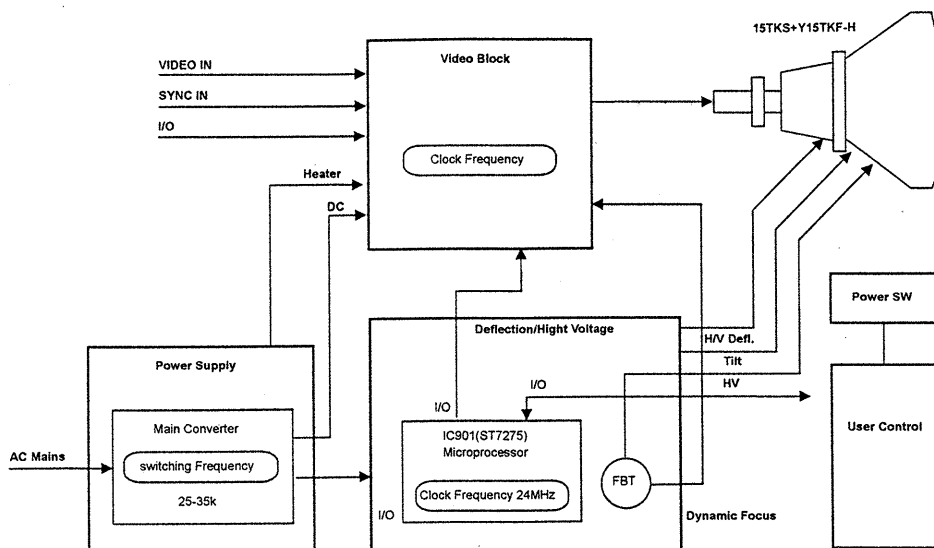


Figure 3-9 Monitor Block Diagram

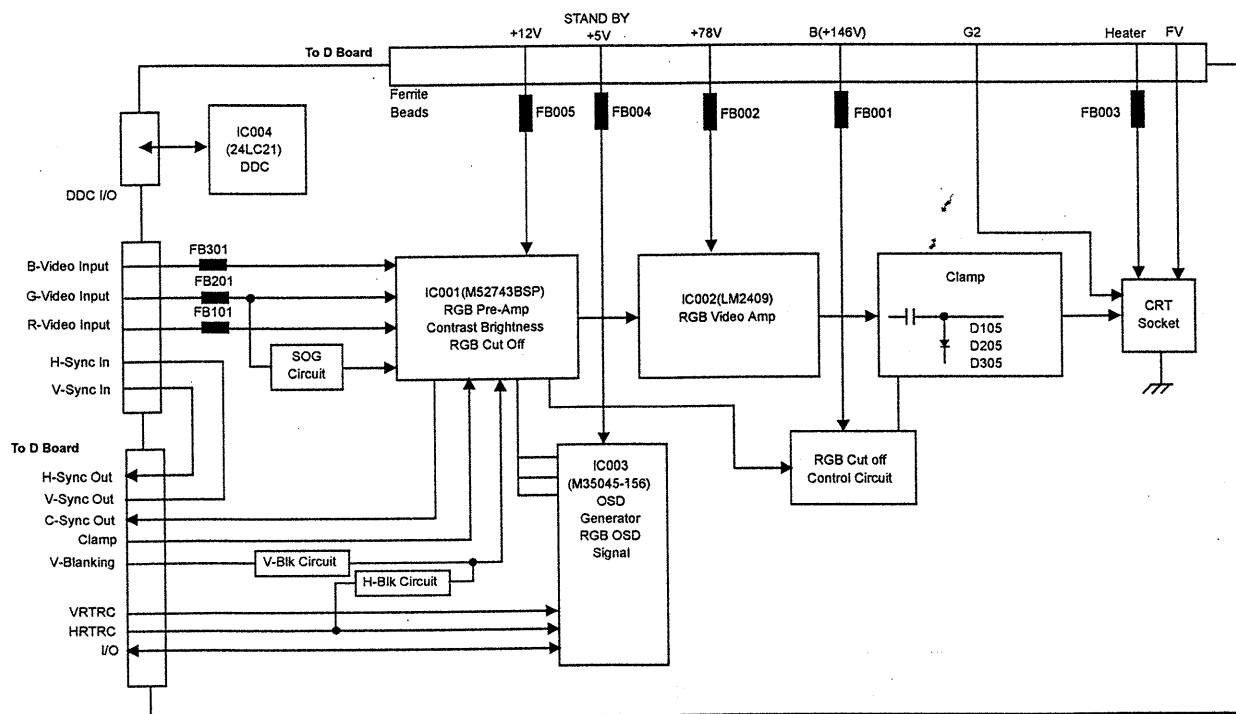


Figure 3-10 Video Board Block Diagram

4.0. Alignment Procedure

4.1. Setup Adjustments

1. Before alignment, the units need to be warm up 30 minutes, the screen face on east and make sure the input-signal was 700mVp-p.

Preset the initial value before going into CAS auto-alignment.

2. Adjust high-voltage and confirm the H.V protected function : Input 60k primary mode and cross hatch pattern, the adjusting VR501 to shut down the units, and make sure the point of shut-down being $29 \pm 1.5\text{kV}$. Turn back RV501 to minimum then switch off/on the units to adjust H.V= $26 \pm 0.2\text{kV}$.

3. White-balance auto-alignment :

- 1) Input "FF(H)" into the E2P address 6E0~6E8.
- 2) Before alignment, the initial data should be :
ABL=000H, Rvpp/Gvpp/Bvpp=AOH/AOH/AOH,
Rvdc/Gvdc/Bvdc=70H/70H/70H.
- 3) Input primary 1 mode and djust H-size and V-size to 300mm/225mm.
- 4) Set the brightness = 00H.
- 5) Use the raster's pattern to adjust G2 (FBT SCREEN VR), let the raster = 2.0FL. Pre-adjusting raster's X,Y value to meet the 9300°k specification. The G gun's Vdc should be fixed, only adjust R,B gun's Vdc.
- 6) Use the raster's pattern to adjust brightness, let the raster luminance = 0.03FL.
- 7) Using the full-white pattern.
- 8) Adjusting the dark white-balance, at first :
Adjust contrast's luminance to 3FL. The G gun keep the fixing value, just only adjusting the R,B gun's Vdc until the X,Y value meet the 9300°k specification and check raster's luminance = 0.03FL. if not, should be adjusted the brightness = 0.03FL, and re-check white-balance.
- 9) Then adjusting the light white-balance :
Adjust contrast's luminance to 34FL. The G gun keep the fixing value, just only adjusting the R,B gun's Vp-p until the X,Y value meet the 9300°k specification and check raster's luminance = 0.03FL. If not, should be adjusted the brightness = 0.03FL, and re-check white-balance.
- 10) To alignment item 8), 9) make sure the color-temperature can meet the 9300°k specification at the raster = 0.03FL.

4. Set the raster luminance :

- 1) Input the raster pattern.
- 2) Set up the E2P's value of brightness to "00H" then adjust G2 (Focus VR) to raster = $1.1 \pm 0.2\text{FL}$.
- 3) Set this value as the G2's value.

5. Set the brightness recall value and calculate the minimum of brightness.

- 1) Input the raster pattern.
- 2) Adjust brightness to raster = 0.03FL, then increase 15 steps (MAX-FFH). Set the result as the recall's value of brightness.

- 3) Set the recall value x2, then get a value, and set the value to be brightness minimum.

Formula : $\text{min} = \text{recall} \times 2$

6. Set the Contrast max.

- 1) Make sure the brightness was set to recall's value.
- 2) Input the full-white pattern, then adjusting contrast to luminance = $33.5 \pm 0.5\text{FL}$. Set the value as contrast max.

7. Set up ABL.

- 1) Contrast = max. , and brightness = recall.
- 2) Input the full-white pattern, make sure the contrast = max. Adjusting ABL to $31 \pm 0.4\text{FL}$, then decrease 20 steps. And set the value as ABL's value.

- 8.

- 1) Copy all of the 9300°k's value to 6500°k, and fix the G gun's value. Directly align the light-white-balance, then checking the dark-white-balance. To interactive alignment same as item 3. 8), 9), 10). To align item 8), 9), make sure the color-temperature can meet the 6500°k specification at the raster = 0.03FL.

- 2) Copy all of the 6500°k's value to 5000°k, and re-adjust item 3. 8), 9) to meet 5000°k specification.

Color temperature specification :

5000°k : X = 0.346 ± 0.01 , Y = 0.359 ± 0.01

6500°k : X = 0.313 ± 0.01 , Y = 0.329 ± 0.01

9300°k : X = 0.281 ± 0.01 , Y = 0.311 ± 0.01

- 3) Reset the pix to 9300°k.

9. Confirm ACL function.

- 1) After achieving the ABL alignment procedule, set the contrast and brightness = max.
- 2) The luminance should be within 32FL~40FL, otherwise regards as the CAL abnormal.

10. Terrestrial magnetic field set-up.

Northern hemisphere(UC/AEP) : H=0 gauss, V=0.45 gauss.

Southern hemisphere : H=0.01 gauss, V= -0.52 gauss.

11. Tilt confirmation.

Input the primary mode, cross hatch pattern, and adjusting tilt rotation key to the best for pix. Tilt can be auto-alignment so that should be less than 1mm. The adjustable range should be $\pm 2\text{mm}$.

12. Focus alignment.

- 1) Input the Primary Mode, Full-White Pattern, and set the Ext Bri. to recall, adjusting the Ext Contrast to 30FL, then set up the "ME" 7x9 Pattern.
- 2) Adjust FBT focus VR1/VR2, let the "ME" text was the clearest.
- 3) Double check 68kHz and VGA mode, if not, should be re-adjusted the focus.

13. Misconvergence Alignment.

Input the primary mode, cross hatch pattern, adjusting the misconvergence that should be(A zone) $\leq 0.25\text{mm}$, (B zone) $\leq 0.35\text{mm}$, refer to the figure 4-1.

Go into the CAS auto-alignment : SPEC. : A<0.3, B<0.4

14. Pre-adjustment.

H/DC-center :

- 1) Input mode 8 (68kHz/85Hz) to adjust H-raster center (PWM 3) to lay on the center of bezel ± 1 mm.
- 2) 1) alignment's value minus with the F/V table (65kHz~72kHz)'s value (98) of H-raster center that will be get a differential. The differential minus or pluse the default value of F/V table then save back into the F/V table.

Example 1. Adjustment value=B8(H)
Differential : B8(H)-98(H) = 20(H)

Example 2. Adjustment value=68(H)
Differential : 68(H)-98(H) = -30(H)

Default data		After revising		After revising	
Value	kHz	Value	kHz	Value	kHz
2F	32.5	4F	32.5	0F(H)	32.5
47	45	67	45	17(H)	45
5D	47	7D	47	2D(H)	47
6B	51.5	8B	51.5	3B(H)	51.5
7C	58	9C	58	4C(H)	58
84	61.5	A4	61.5	54(H)	61.5
8B	65	AB	65	5B(H)	65
98	72	B8	72	68(H)	72

H/V Size range set up :

- 1) Input test mode 2, adjusting H-size to 290mm. Set this value as the H-size's minimum.
- 2) Input test mode 2, adjusting V-size to 190mm. Set this value as the V-size's minimum.
- 3) Input test mode 1, adjusting H-size to 300mm. Set this value as the H-size's maximum.
- 4) Input test mode 1, adjusting V-size to 225mm. Set this value as the V-size's maximum.

Rotation :

Adjust the pix parallel with bezel.

15. Preset mode alignment.

- 1) H position : Hor. pix put on the center of bezel, $|L-R| \leq 1.5$ mm.
- 2) H size : Adjust H-size = 300 ± 1.5 mm.
- 3) V position : Vert. pix put on the center of bezel, $|T-B| \leq 1.5$ mm.
- 4) V size : Adjust V-size = 225 ± 1.5 mm.
- 5) Rotation : Adjust pix to parallel in bezel.
- 6) Pinbalance : Adjust pix to balance on both of side.
- 7) Paralelogram : Adjust pix to balance on both of side.
- 8) Pincushion : Adjust the vertical line of both of side ≤ 1.5 m.

- 9) Trapezium : Adjust the trap ≤ 1.5 mm on the top and bottom.
- 10) Notice : All the different A/C need to be adjusted test mode 3, the mode should be regard as the preset mode which need to be saved the factory preset.

End the auto-alignment procedure.

16 Image performance confirmation.

Input all preset mode timing to confirm the value of alignment:

- 1) Hor. phase : $|L-R| \leq 3$ mm,
primary mode : $|L-R| \leq 2$ mm.
- 2) Hor. size : 300 ± 3 mm,
primary mode : 300 ± 2 mm.
- 3) Vert. center : $|T-B| \leq 3$ mm,
primary mode : $|T-B| \leq 2$ mm.
- 4) Vert. size : 225 ± 3 mm,
primary mode : 225 ± 2 mm.
- 5) Hor. linearity :
primary mode : $\frac{|Max-Min|}{|Max+Min|} \times 100 < 3.5\%$
Other mode : $< 5\%$, except VGA mode $< 7\%$
- 6) Vert. Linearity :
primary mode : $\frac{|Max-Min|}{|Max+Min|} \times 100 < 5\%$
- 7) Geometric edge distortion :
The sum of edge distortions (pin/barrel/trap/parallelogram/S-curve, etc.) shall not exceed spec : 2mm.

17. Recall button function confirmation.

Input the preset mode and adjusting the any key, then press the recall key. Checking image performance if go back the original preset's value or not.

18 Uniformity confirmation.

Input the primary mode, full-white pattern with 5 circle and turn contrast to max. The luminance can not less than 75% at any place of CRT.

19. Brightness confirmation.

- 1) Input the primary mode, press the recall function key and with full-white pattern. The luminance should be 31~36FL on the center, spec : 30~36FL, 2" Square Pattern ≥ 31 FL.
- 2) Input the primary mode, set the ext. brightness and contrast to max., the luminance should be 32~38FL on the center.

20. Regulation confirmation.

Input the preset mode with full-white pattern, then adjusting the contrast at 5FL and max. that the differential should be ≤ 1 mm, spec. : 1.5mm.

21. Purity confirmation.

Input the primary mode with full-white pattern, then setting the ext. bri. to recall and adjusting contrast to 25FL. To confirm the purity of R, G, B. The criteria as the following:

- 1) Only input R signal, can not see the color of G, B.
- 2) Only input G signal, can not see the color of R, B.
- 3) Only input B signal, can not see the color of R, G.
- 4) Input the full-white pattern and check the entire display that no impurity should be noticeable. The X,Y's deviation should be ≤ 0.01 .

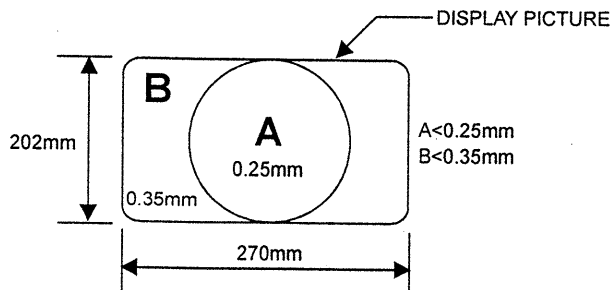


Figure 4-1 The Misconvergence Alignment

4.2. DDC 1/2 Data Writing

Writing the DDC 1/2 data in EEROM.

- For Chunghwa CRT :

	0	1	2	3	4	5	6	7	8	9
00	00	FF	FF	FF	FF	FF	FF	00	5A	63
10	44	54	01	00	00	00	01	09	01	02
20	1F	20	18	BE	E8	5F	A9	A0	54	47
30	99	25	0D	48	4C	FF	FE	80	31	59
40	45	59	61	59	71	4F	81	40	81	80
50	01	01	01	01	EA	24	00	60	41	00
60	28	30	30	60	13	00	2C	E1	10	00
70	00	1E	00	00	00	FF	00	44	54	39
80	30	31	30	30	30	30	31	0A	20	20
90	00	00	00	FD	00	32	A0	1E	46	0A
100	00	0A	20	20	20	20	20	20	00	00
110	00	FC	00	56	69	65	77	53	6F	6E
120	69	63	20	4D	37	30	00	60		

- For Samsung CRT :

	0	1	2	3	4	5	6	7	8	9
00	00	FF	FF	FF	FF	FF	FF	00	5A	63
10	44	54	01	00	00	00	01	09	01	02
20	1F	20	18	7B	E8	FB	89	A1	55	4B
30	97	24	11	48	4C	FF	FE	80	31	59
40	45	59	61	59	71	4F	81	40	81	80
50	01	01	01	01	EA	24	00	60	41	00
60	28	30	30	60	13	00	2C	E1	10	00
70	00	1E	00	00	00	FF	00	44	54	39
80	30	31	30	30	30	30	31	0A	20	20
90	00	00	00	FD	00	32	A0	1E	46	0A
100	00	0A	20	20	20	20	20	20	00	00
110	00	FC	00	56	69	65	77	53	6F	6E
120	69	63	20	4D	37	30	00	20		

(08-09)

ID Manufacturer Name = VSC

(10-11)

Product ID Code = 4454 (DT)

(12-15)

Serial Number = 1

(16)

Week Of Manufacturer = 1

(17)

Year Of Manufacturer = 1999

(10-17)

Complete Serial Number (bar code label)=DT90700001

(18)

EDID Structure Version Number = 1

(19)

EDID Structure Revision Number = 2

(20)

Video input definition :

Separate Sync, Composite Sync, Sync on Green, blank-to-black, Serration of the V-sync, Analog Signal, 0.700Vpp/0.300Vpp

(21)

Maximum Horizontal Image Size = 32 cm

(22)

Maximum Vertical Image Size = 24 cm

(23)

Display Gamma = 2.90(for Chunghwa CRT)

Display Gamma = 2.23(for Samsung CRT)

(24)

DPMS Supported Feature:= Stand By, suspend, Active off

GTF Supported= OFF

Display Type = RGB color display,

Chroma info : Chunghwa CRT/Samsung CRT

(25-34)

For Chunghwa CRT :

Red_x=0.626,Green_x=0.280,Blue_x=0.146,White_x=0.283

Red_y=0.329,Green_y=0.601,Blue_y=0.053,White_y=0.298

For Samsung CRT :

Red_x=0.632,Green_x=0.295,Blue_x=0.143,White_x=0.283

Red_y=0.335,Green_y=0.593,Blue_y=0.066,White_y=0.298

(35)

Established timing I:

720 x 400 @ 70Hz (VGA, IBM)..... YES

720 x 400 @ 88Hz (XGA2, IBM)..... YES

640 x 480 @ 60Hz (VGA, IBM)..... YES

640 x 480 @ 67Hz (MAC II, APPLE) YES

640 x 480 @ 72Hz (VESA) YES

640 x 480 @ 75Hz (VESA) YES

800 x 600 @ 56Hz (VESA) YES

800 x 600 @ 60Hz (VESA) YES

(36)

Established timing II:

800 x 600 @ 72Hz (VESA) YES

800 x 600 @ 75Hz (VESA) YES

832 x 624 @ 75Hz (MAC II, APPLE) YES

1024 x 768 @ 87Hz (interlace) (8514A, IBM).... YES

1024 x 768 @ 60Hz (VESA) YES

1024 x 768 @ 70Hz (VESA) YES

1024 x 768 @ 75Hz (VESA) YES

1280 x 1024 @ 75Hz (VESA) NO

(37)

Manufacturer reserved timing :

1152 x 870 @ 75Hz (MAC II, APPLE) YES

Manufacturer timing :

(Support for VESA DDC V1.0p rev:1.6p)

640 x 480 @ 85Hz (VESA) NO

800 x 600 @ 85Hz (VESA) NO

1024 x 768 @ 85Hz (VESA) NO

1280 x 1024 @ 85Hz (VESA) NO

1600 x 1280 @ 75Hz (VESA) NO

1600 x 1200 @ 85Hz (VESA) NO

EDID Ver 1,REV 0 FLAG NO

(38-53)

Standard Timing Identification:

#1: 640 x 480 @ 85Hz, Image_Asp_Ratio= 4:3

#2: 800 x 600 @ 85Hz, Image_Asp_Ratio= 4:3

#3: 1024 x 768 @ 85Hz, Image_Asp_Ratio= 4:3

#4: 1152 x 864 @ 75Hz, Image_Asp_Ratio= 4:3

#5: 1280 x 960 @ 60Hz, Image_Asp_Ratio= 4:3

#6: 1280 x 1024 @ 60Hz, Image_Asp_Ratio= 5:4

#7: (0x01h) Not Specified

#8: (0x01h) Not Specified

(54-71)

Detailed Timing Description #1:1024x768

Pixel Clock = 94.50MHz

Horizontal Image Size = 300mm

Vertical Image Size = 225mm

Refresh Mode : Non-interlace

Horizontal:

Active Time = 1024 pixels

Blanking Time = 352 pixels

Sync offset = 48 pixels

Sync Pulse Width = 96 pixels

Border = 0 pixels

H-sync Frequency = 68.68 KHz

Vertical:

Active Time = 768 lines

Blanking Time = 40 lines

Sync offset = 1 lines

Sync Pulse Width = 3 lines

Border = 0 lines

V-sync Frequency = 85.00 Hz

Sync configuration :

Digital Separate, V-SYNC(+), H-SYNC(+)

(72-89)

Detailed Timing Description / Monitor Descriptor #2

Monitor serial Number : DT90100001

(90-107)

Detailed Timing Description / Monitor Descriptor #3

Max. Supported Pixel_clock : 100 MHz

Min. V-Sync Rate : 50 Hz

Max. V-Sync Rate : 160 Hz

Min. H-Sync Rate : 30 KHz

Max. H-Sync Rate : 70 KHz

(108-125)

Detailed Timing Description / Monitor Descriptor #4

Monitor Name : ViewSonic M70

For Chunghwa CRT :

EDID Checksum byte = (0x60) OK

For Samsung CRT :

EDID Checksum byte = (0x20) OK

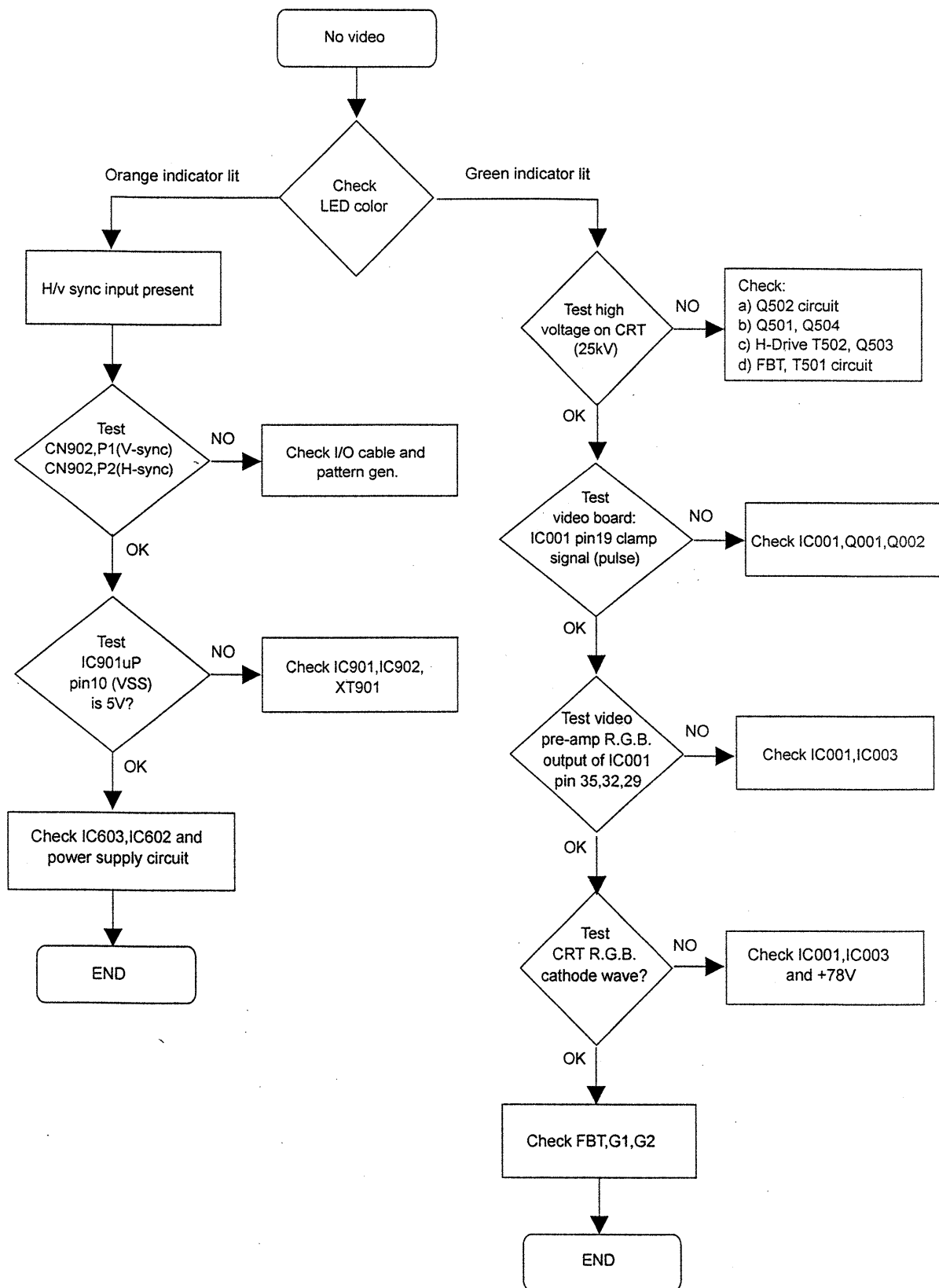
4.3. The Preset Timing Parameters

See next page Table 4-1 .

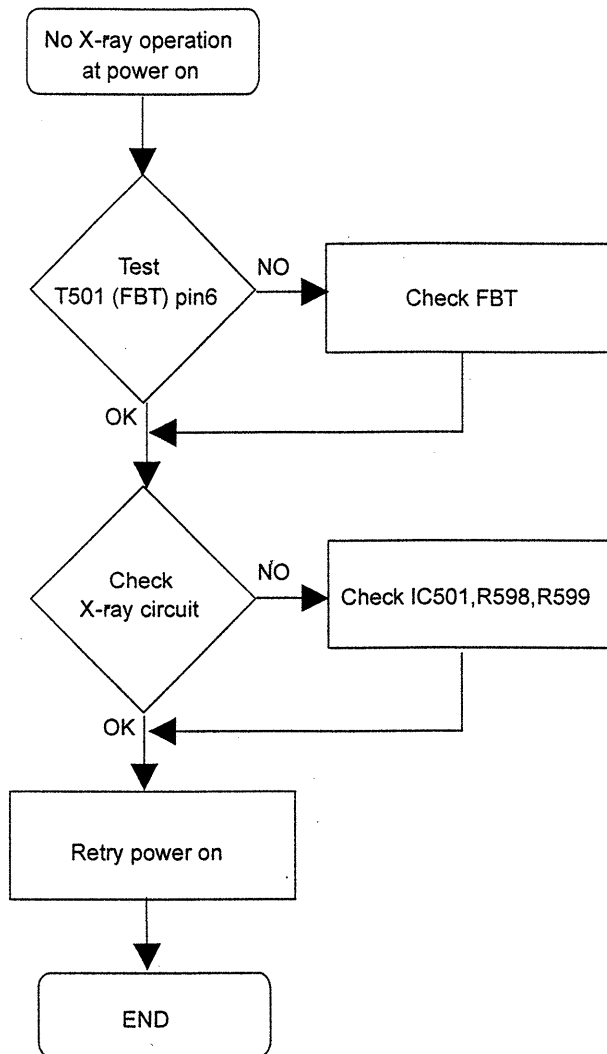
Mode Number	Model	Model2	Model3	Model4	Model5	Model6
Data Pixel	640	640	800	1024	1280	832
Data Line	400	480	600	768	1024	624
H. Freq.(kHz)	31.469	37.500	46.875	60.023	63.981	49.725
V. Freq.(Hz)	70.087	75.000	75.000	75.029	60.020	74.550
Pixel Rate(MHz)	25.175	31.500	49.500	78.750	108.00	57.280
Hor. FP μ s	0.636	0.508	0.323	0.203	0.444	0.559
Hor. Sync μ s	3.813	2.032	1.616	1.219	1.037	1.117
Hor. BP μ s	1.907	3.810	3.232	2.235	2.296	3.910
Hor. Active μ s	25.422	20.317	16.162	13.003	11.852	14.524
Hor. Total μ s	31.778	26.667	21.333	16.660	15.630	20.111
Ver. FP μ s	0.381	0.026	0.021	0.017	0.016	0.020
Ver. Sync μ s	0.064	0.080	0.064	0.050	0.047	0.060
Ver. BP μ s	1.112	0.427	0.448	0.466	0.594	0.784
Ver. Active μ s	12.711	12.800	12.800	12.795	16.005	12.549
Ver. Total μ s	14.269	13.333	13.333	13.328	16.661	13.413
Polarity(H.V)	-,+	-, -	+,+	+,+	+,+	-, -
Primary mode is 60.023kHz / 75.029Hz(1024x768)						

Table 4-1 Table of Preset Timing Parameters

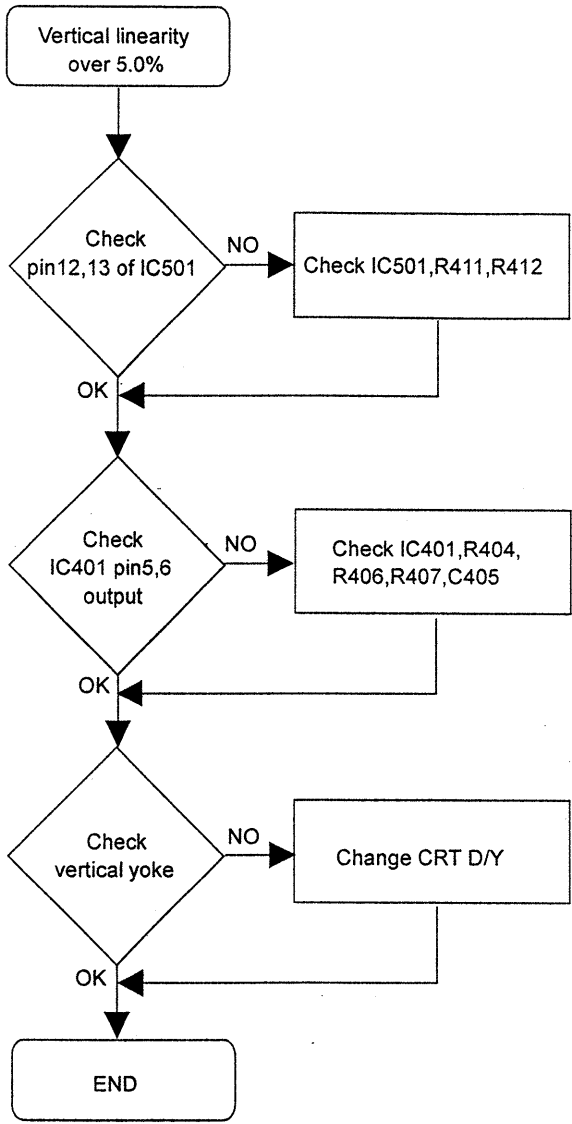
No Display at Power-on



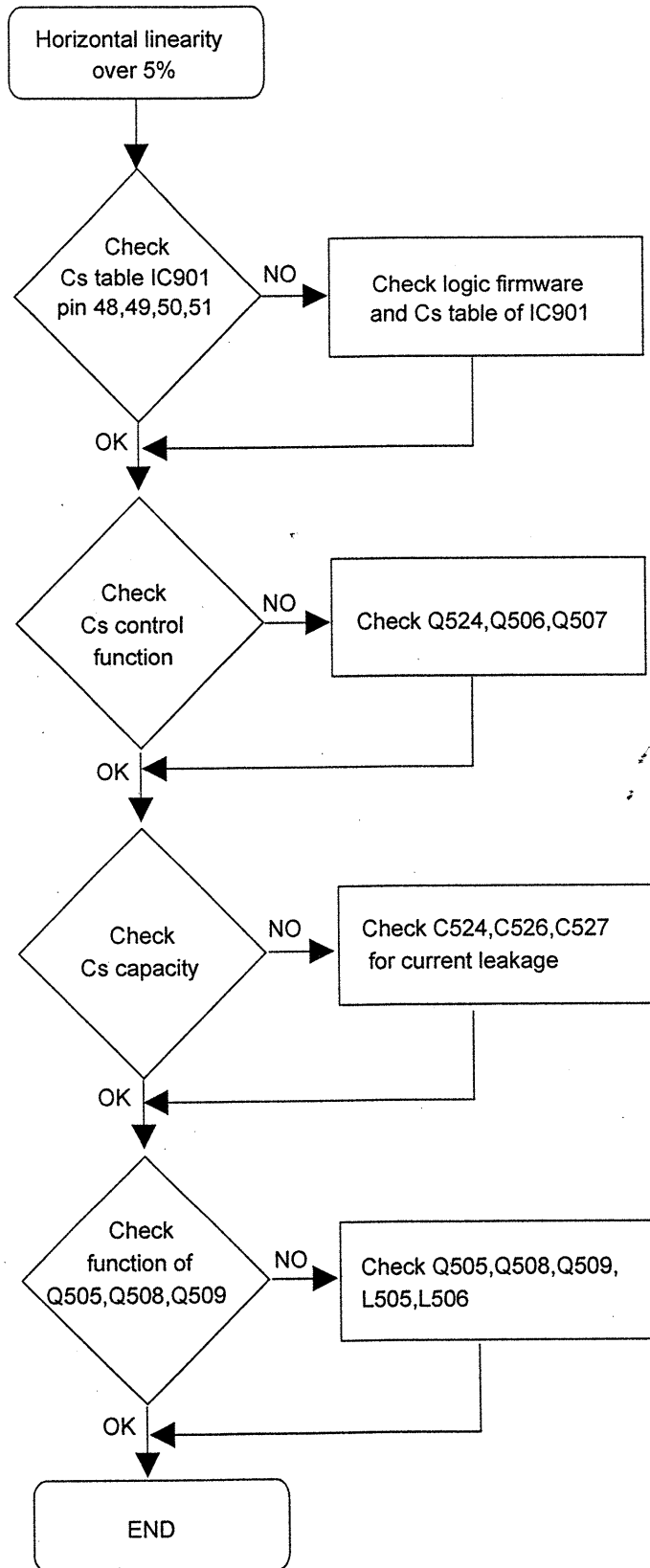
5.2. No X-ray Operation



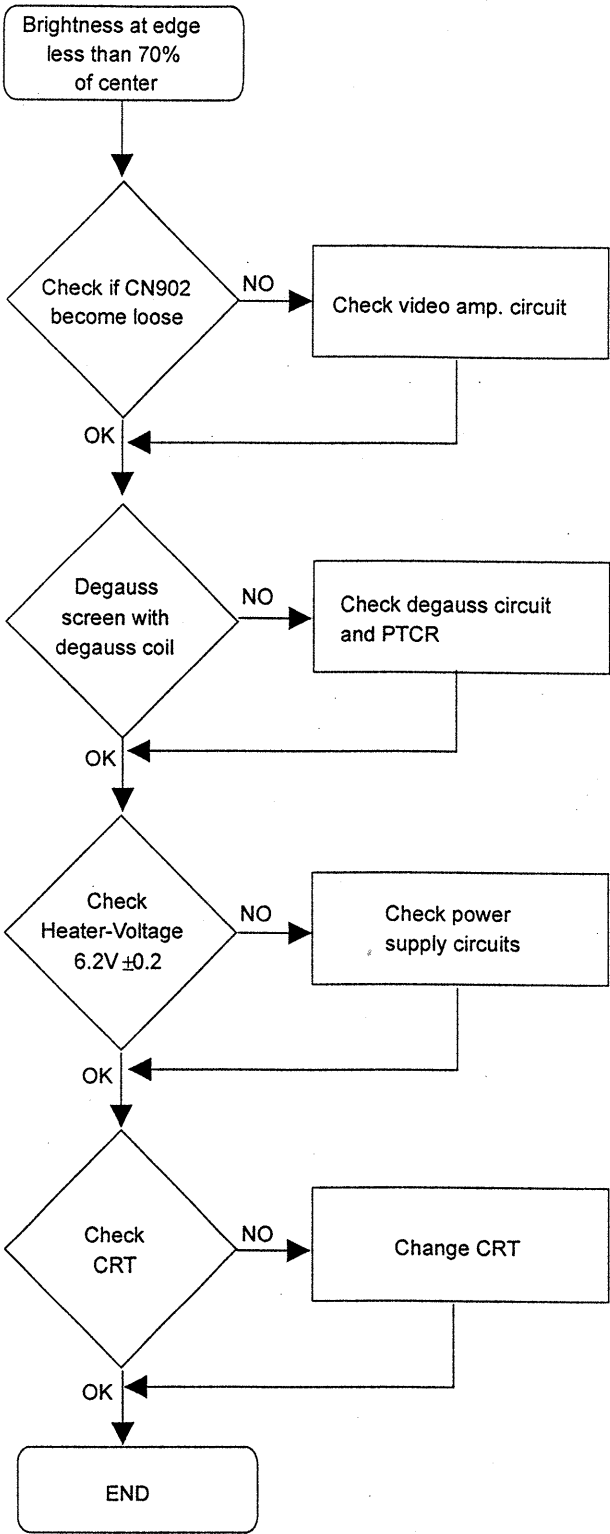
Poor Vertical Linearity



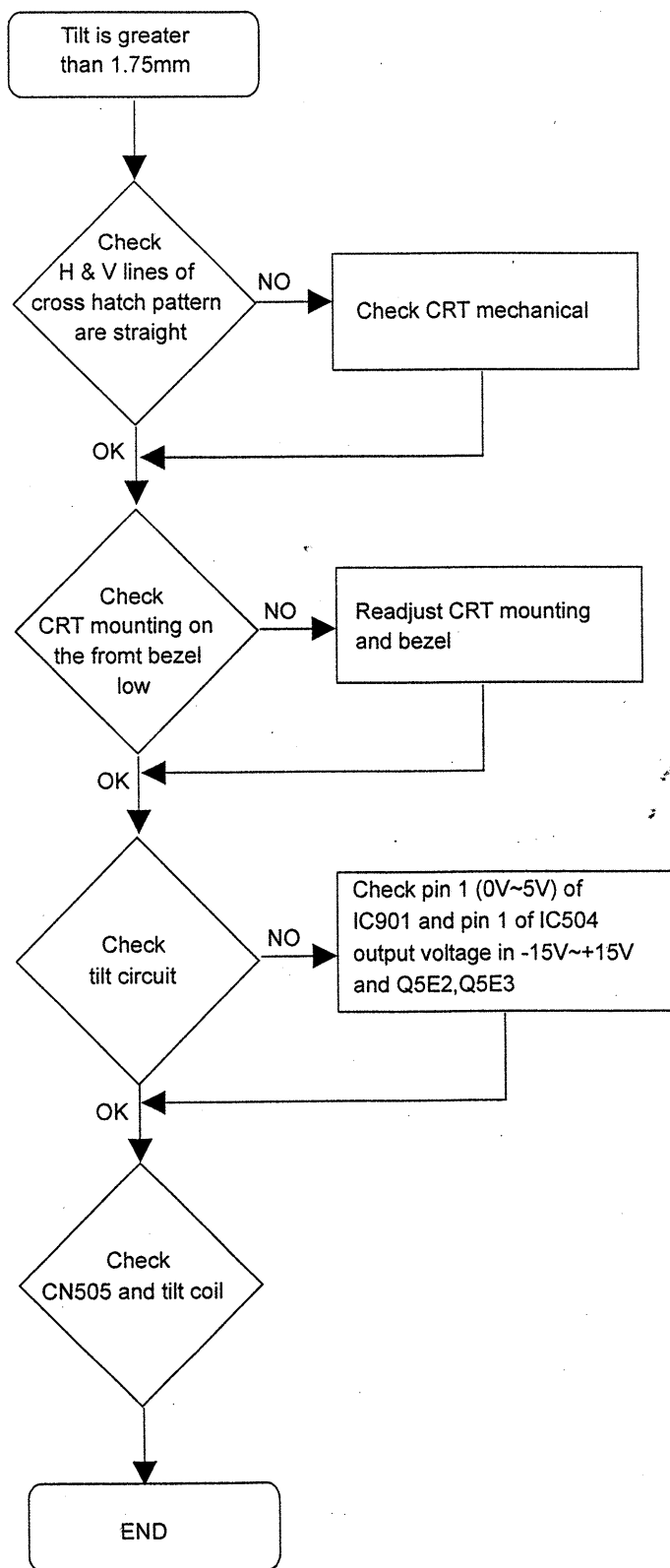
Poor Horizontal Linearity



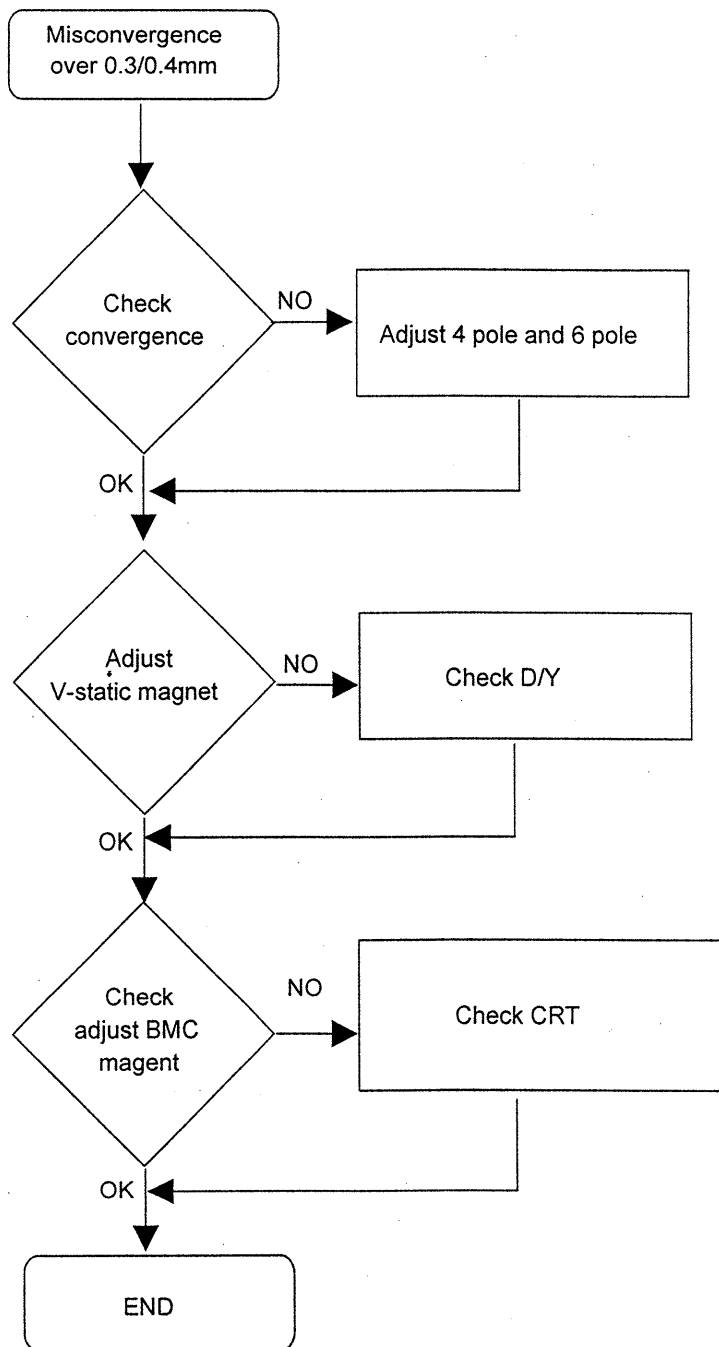
Poor Uniformity



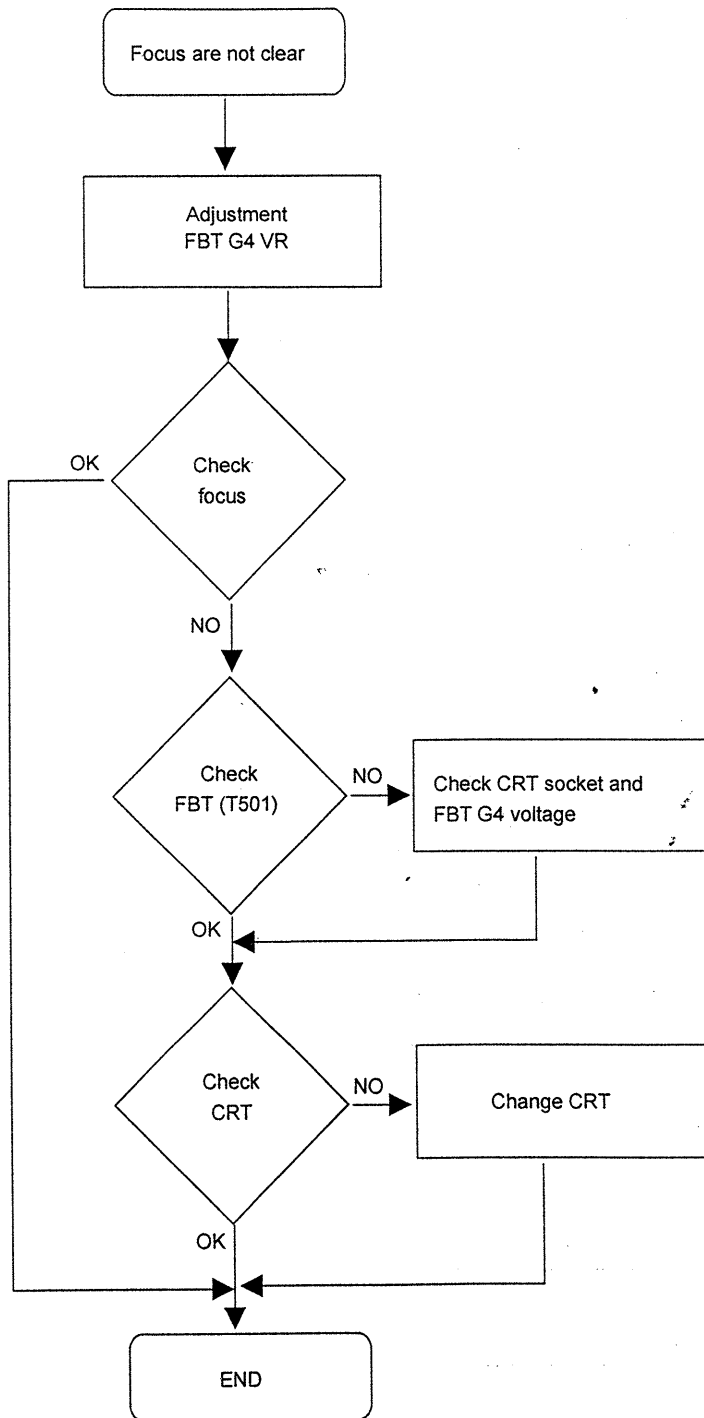
Tilted Display Area



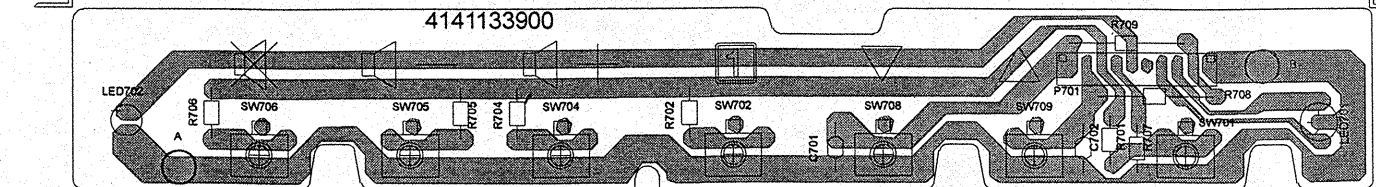
Misconvergence



Poor Focus



6.2. Control Board

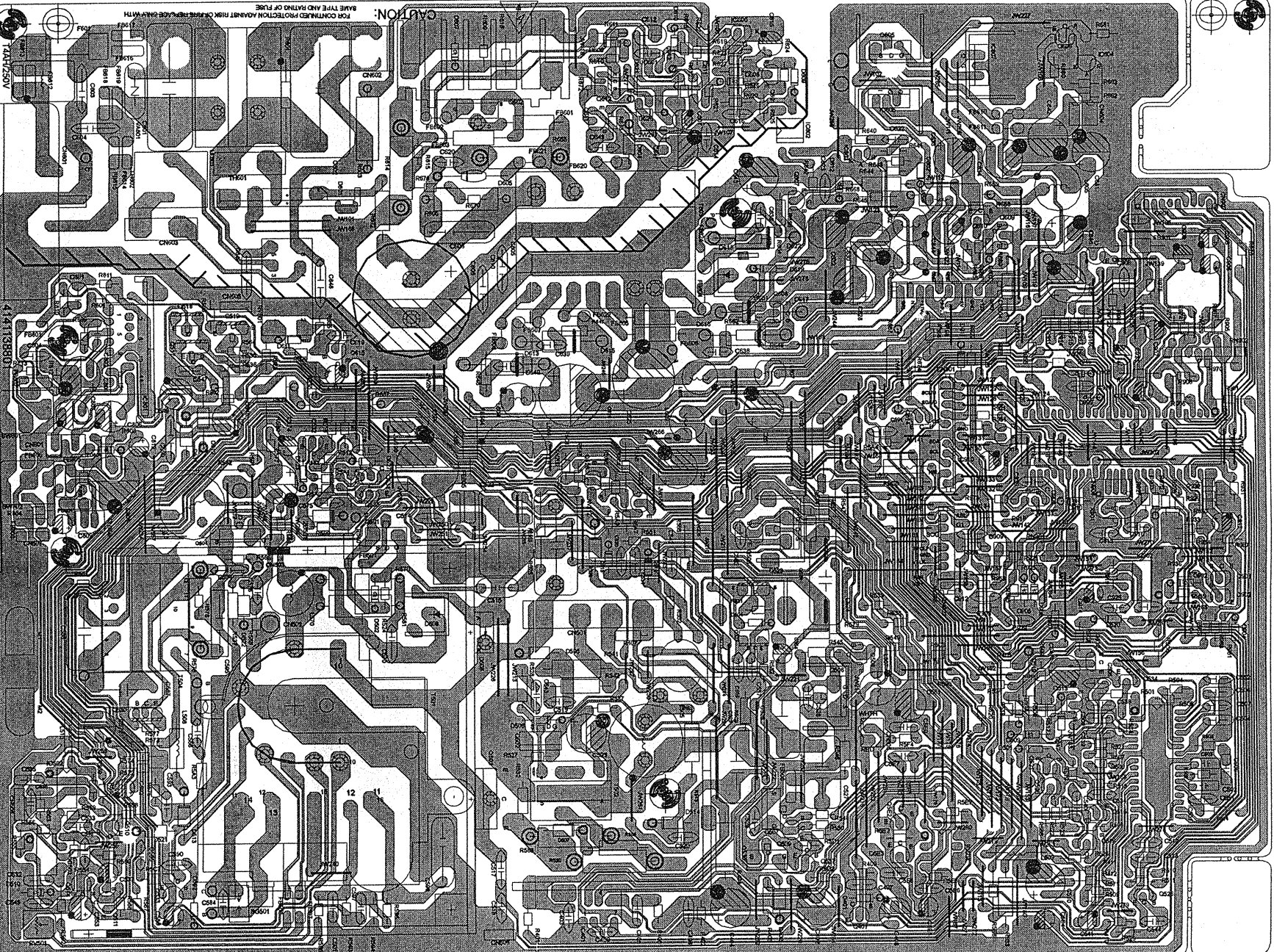


6.2. Control Board



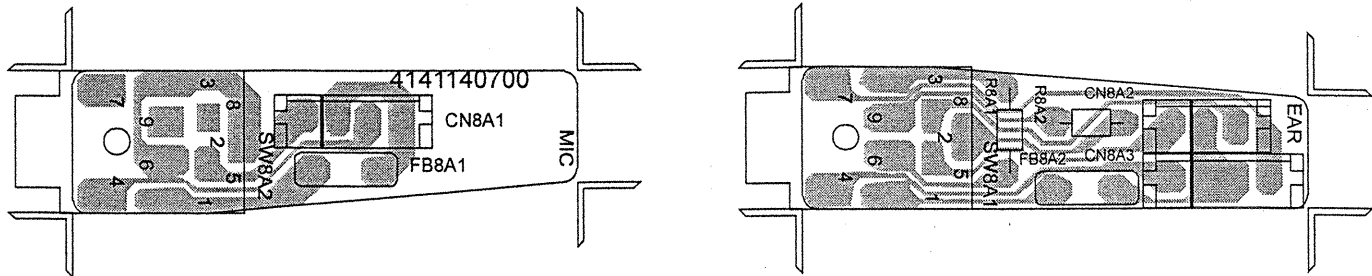
74A7250V

CAUTION:
DO NOT EXPOSE TO HIGH TEMPERATURES
DURING SOLDERING AND REWORKING OF PLACES
FOR CONTINUED PROTECTION AGAINST RISK OF FIRE

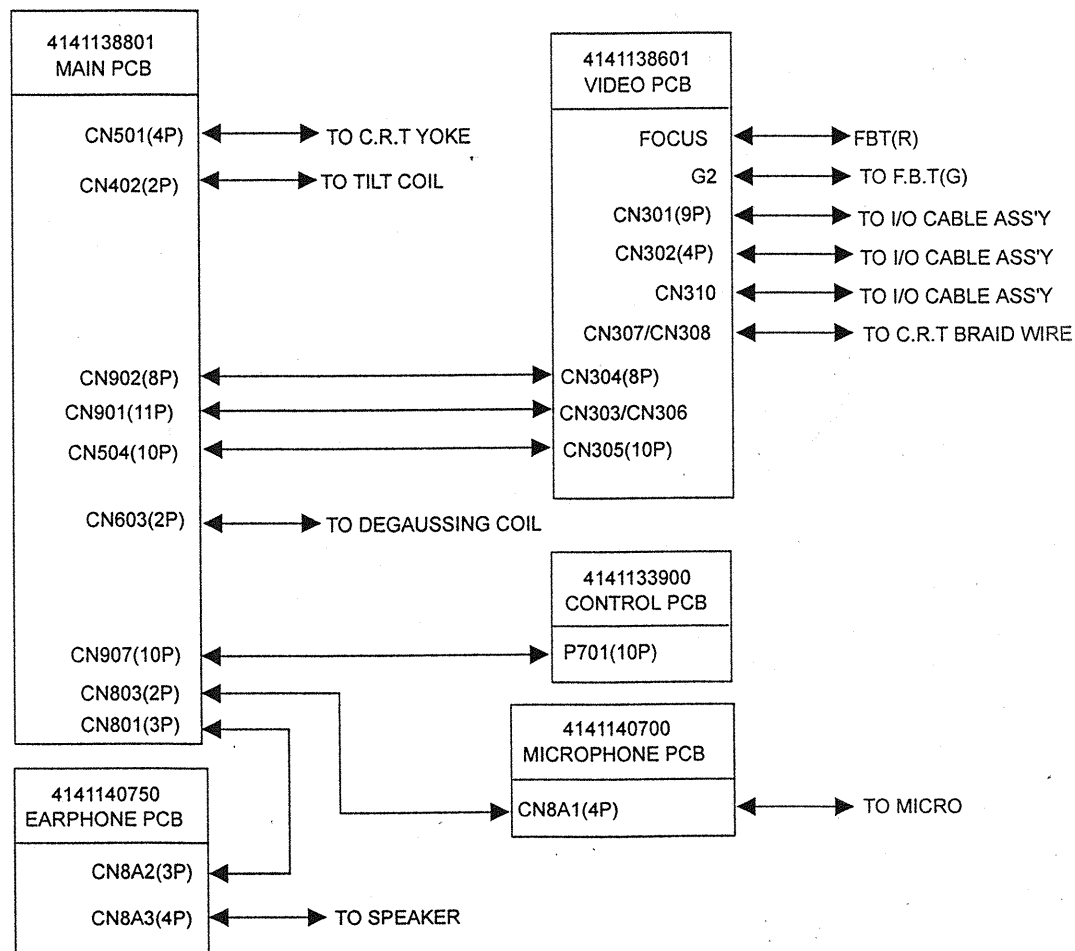


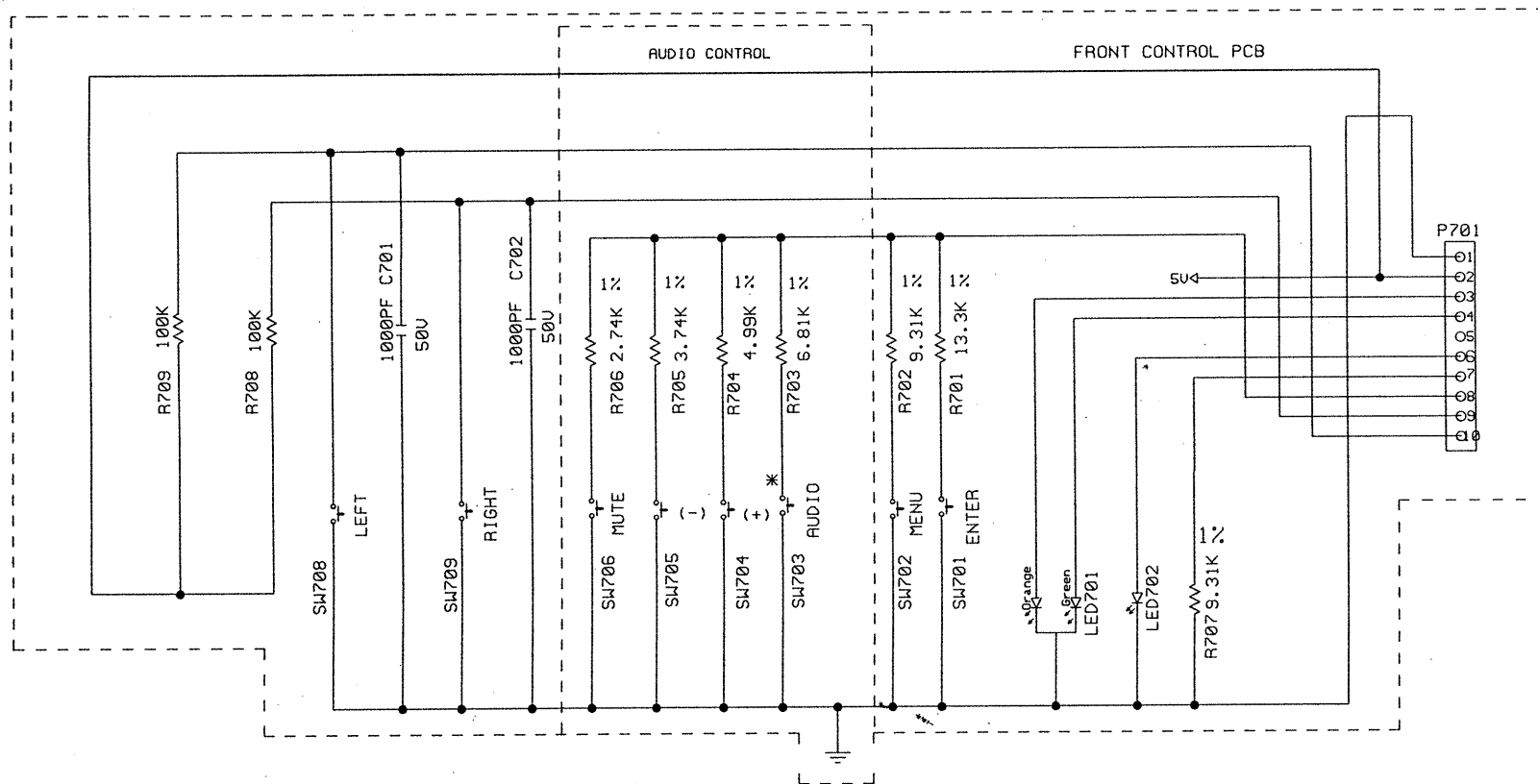
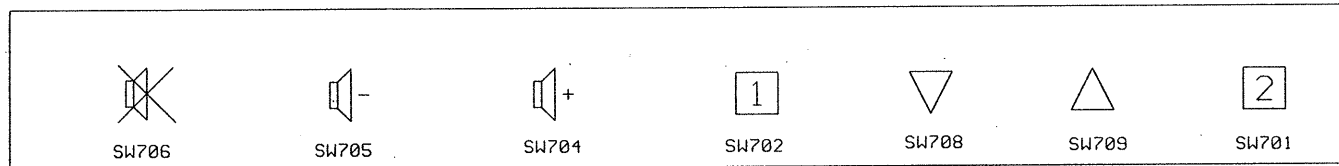
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6.4. Microphone and Earphone Board



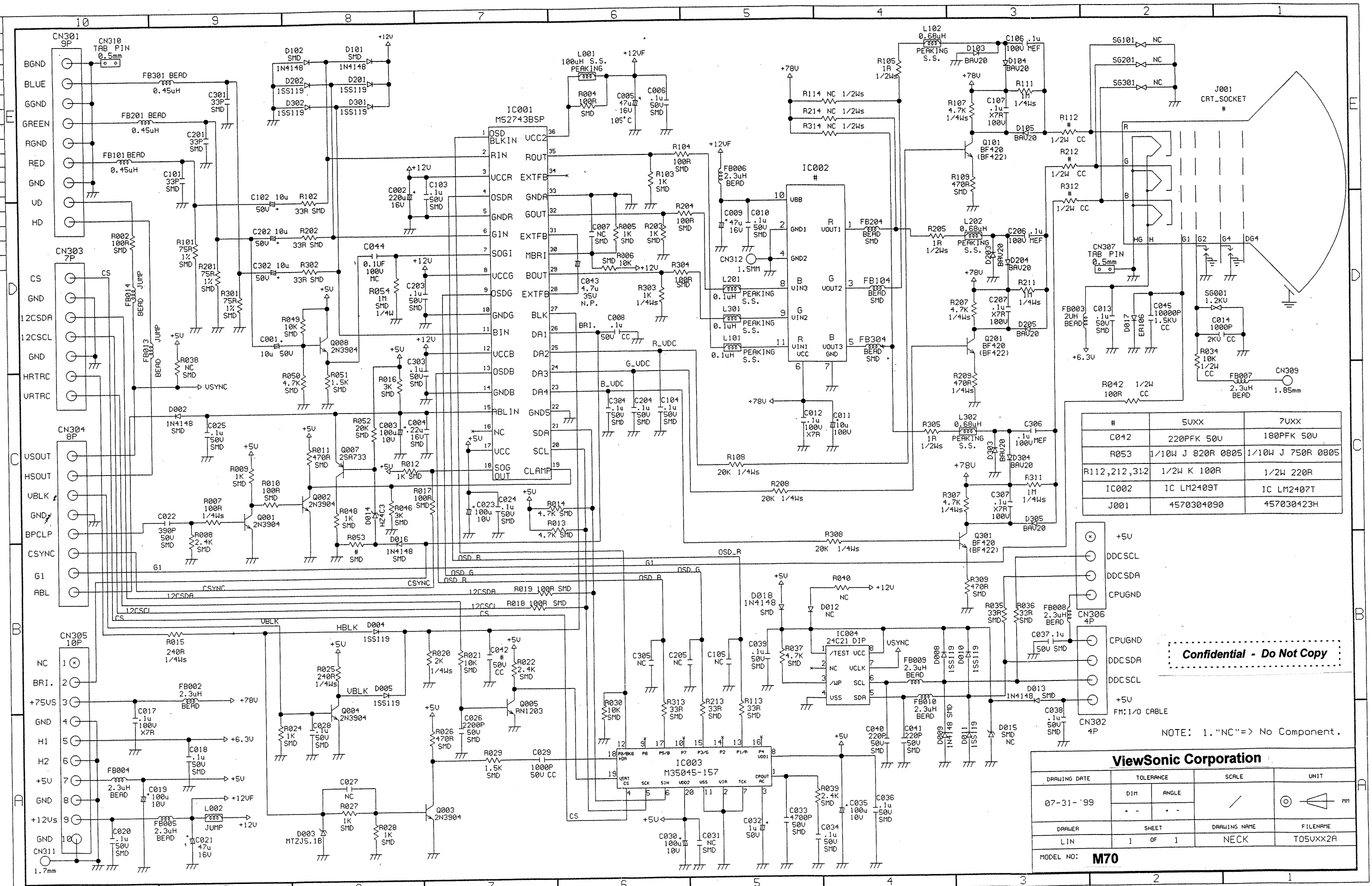
6.5. PCB Wiring Connection





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ViewSonic Corporation			
DRAWING DATE	TOLERANCE		SCALE
03-24-'99	DIM	ANGLE	/
	+	-	
DRAWER	SHEET	DRAWING NAME	FILE NAME
TAI	1 OF 1	CONTROL	US5U4X4A
MODULE NO.		M70	



8.0. Mechanical Parts

8.1. Key to Exploded View

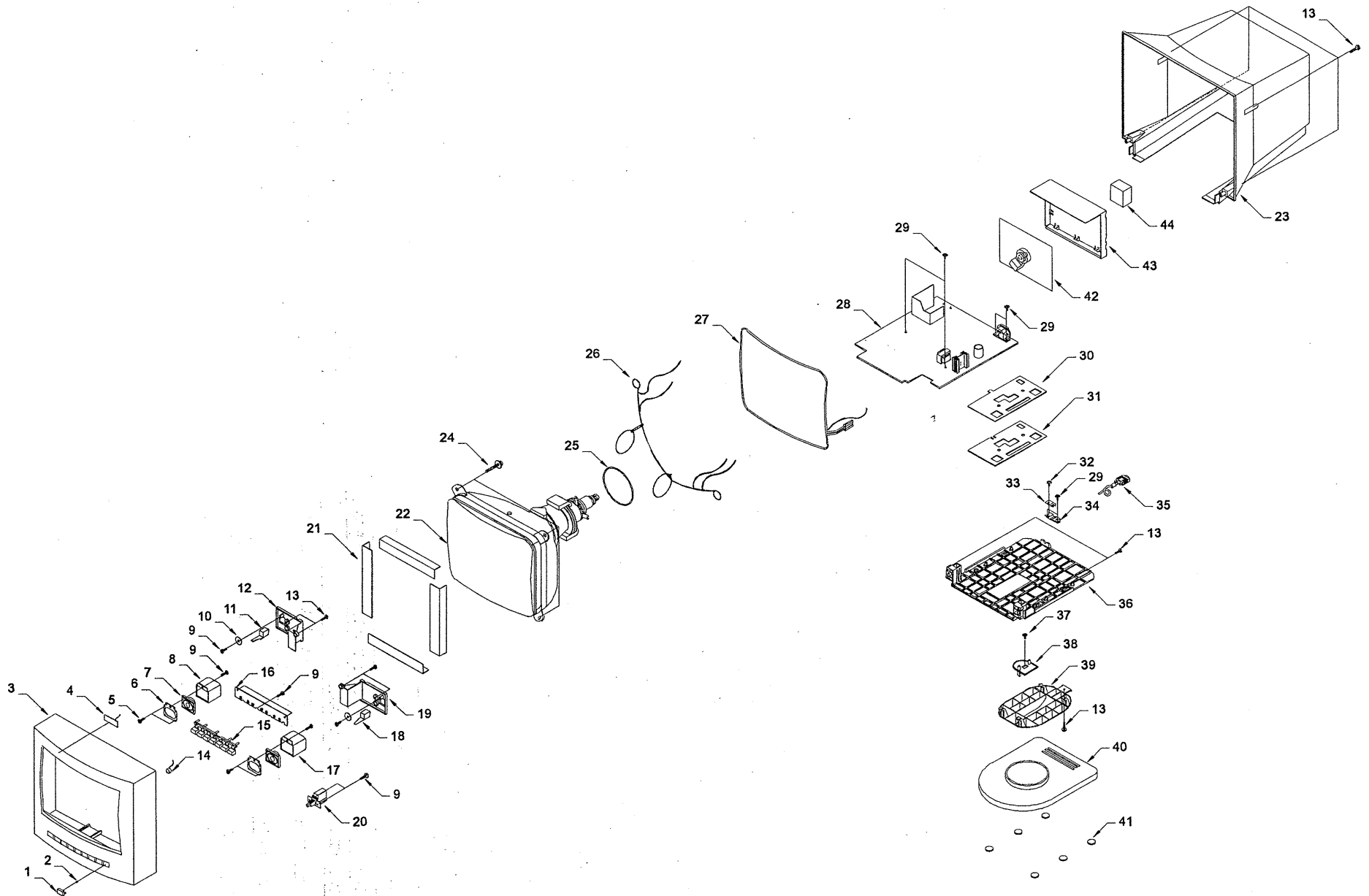
No.	Number Part	Description
1	1PA70K5B82	POWER KNOB
2	2011097B82	POWER SPRING
3	1P011K7B82	BEZEL
4	2015096320	AEF PLATE A FOR BEZEL
	C4607F4110	WIRE ASS'Y 300MM FOR AEF PALTE
5	8128112608	SCREW B/H WCAP M2.6X8 TIT FOR SPEAKER BOX & FIXING PLATE ASS X4
6	2001097B80	FIXING PLATE
7	4004122508	SPEAKER 2.5W 8R 1.5" 40X28
8	1P430K7B80	SPEAKER BOX (L)
9	8418113010	SCREW BIND(+) TAPPING M3X10 ZI FOR CONTROL PCB & BEZEL X3, PW SW & BEZEL X2, PCB & HOLDER X2, MIC/EAR PCB & COVER R/L X2, SPEAKER BOX R/L & BEZEL X2
10	3111301208	WASHER FOR MIC/EAR PCB & COVER R/L X2
11	SS5V420320-404	EXT. MICROPHONE PCB ASS'Y
12	1P641K7B82	BEZEL COVER "L"
13	8418114016	SCREW BID(+) TRI M4X16 FOR BUCKET & BEZEL X2, BUCKET & BOTTOM X2, BOTTOM & BEZEL X2, COVER L & BEZEL X2
14	40A6415120	INT. MICROPHONE ECM-60
	9023095D30	MIC. GROM
15	1PAK0K7B82	PIANO KEY
16	SS7V420220-404	CONTROL PCB ASS'Y
17	1P420K7B80	SPEAKER BOX (R)
18	SS5V420420-404	EARPHONE PCB ASS'Y
19	1P631K7B82	BEZEL COVER "R"
20	4410202006	POWER SWITCH SS-160-7D SPST FOR S601
21	5550421194	COPPER TAPE W=42mm #1194
22	7010039917	CRT M41QAR361X224 (TCO/S-2) FOR SAMSUNG CRT FOR 7V423/F
	7010039717	CRT M41AGE93X76C FOR 7V4A
23	1P021K7V42	BUCKET
24	C367F10030	RUBBER WASHER & SCREW ASS'Y FOR CRT & BEZEL X4
25	C460670110	TILT RING WIRE ASS'Y 270mm FOR CRT
26	C001137V11	CRT BRAID WIRE ASS'Y
27	7020177B80	DEGAUSSING COIL WAL MYLAR FOR SAMSUNG CRT
28	US7V420144-V	MAIN PCB ASS'Y
29	8418113012	SCREW BIND(+) M3X12 P ZINC FOR PCB & BOTTOM X6
30	9009197B80	INSULATOR (A)
31	2008097B80	BOTTOM SHIELD
32	8121114008	SCREW CAP BID(+) M4X8 TAPPING FOR I/O CABLE & STOPPER X1
33	2016095Y11	CABLE BRACKET
34	2017095Y11	CABLE STOPPER
35	C7105V2110	I/O CABLE ASS'Y
36	1P032K7B80	BOTTOM COVER
37	8037115020	SCREW BIND(+) HD M5X20 HI-LOW FOR RETAINER & BASE X1

No.	Number Part	Description
38	1AI00C9H10	RETAINER
39	1H040K7B80	BALL
40	1H050K9H10	BASE
41	9021097M10	FOOT
42	US7V420244-V	NECK PCB ASS'Y
43	2003097B80	NECK SHIELD
44	9010097M10	SPONGE 90X60X40T

8.2. Other parts

No.	Number Part	Description
	1023094330	SPACER RING
	1M14007B82	LENS
	1P500K5V42	HOLDER
	2000000011	CLIP WIRE FOR FBT COVER & HEAT SINK WIRE FIX
	2018095Y11	METAL HOLDER
	463310000N	AC POWER CORD WALL 6FT GRY UL/ FOR 7V42
	4639H2500N	AC POWER CORD 185MM VDE BLK FOR 7V43
	463110000N	AC POWER CORD PC VDE GRY 9FT FOR 7V4A/F
	5290005000	TUBE-SHRINK ID=5* FOR S601
	5541025095	CABLE TIE 2.5X90 FOR CANCELY WIRE FIXED
	555040S002	CLOTH FILM TAPE #40mm FOR CRT-M41AGE93X76C
	8127113006	SCREW PAN(+)/HD CAP M3X6 TAPPI FOR WIRE CLIP X2
	8513145025	SCREW W/LOCK WSR HEXAGON(+)/HD FOR CRT X4
	9001197V42	CARTON
	9002097G1B	LOGO
	9010097B80	INSULATOR (B)
	9012097V42	MANUAL FOR 7V42/A
	9012097V43	MANUAL FOR 7V43
	9012097V4F	MANUAL FOR 7V4F
	9013899A82	CD-ROM
	C4595Y1170	GND WIRE ASS'Y 150MM
	C4597B1031	GND WIRE ASS'Y 1450MM FOR BEAD PIN CN502
	C4597F1013	GND WIRE ASS'Y 140MM
	C4597Y1130	GND WIRE ASS'Y
	C4605V2101	POWER LINE W/SHIELD & CORE
	C4605V2110	GND WIRE ASS'Y W/CORE FOR BTM SHIELD TO MAIN PCB
	C488010050	AUDIO & MICROPHONE CABLE ASS'Y

8.3. Exploded View



9.0. PCB Component List

9.1. Explanation of Parts Listing

This section contains a complete listing of the components used on the printed circuit boards contained in the system. For a listing of the mechanical parts, please refer to Section 8., Mechanical Parts. The list of parts in this section is separated by PCB, and the order of the listing is based on the location reference (REF.) printed on the circuit board and shown in the schematics. Components without a reference location are listed at the beginning of each table in order of the part number, and the location reference of the part with which they are connected is given in the description.

For example:

	2003097301	HEAT SINK FOR Q1
--	------------	------------------

shows Part No. 2003097301, which is connected or related to the components with a location reference of Q1. Italic items indicate components that are critical for safety or are of proprietary design and must be replaced with parts of the exact same specification or ordered directly from the manufacturer.

For example:

<i>Q1</i>	<i>4101515070</i>	<i>TRS. MOSFET 2SK1507 TO-220</i>
-----------	-------------------	-----------------------------------

Indicates that the TRS. MOSFET, Part No. 4101515070 located at reference Q1, should only be replaced with the exact same part ordered from the manufacturer.

9.2. Microphone Board

No.	Number Part	Description
	<i>SS5V420320-404</i>	<i>EXT. MICROPHONE PCB ASS'Y</i>
	4141140700	P.C.B. EXT. MICROPHONE
FB8A1	7099159250	FERRITE BEAD
SW8A2	4490103551	EARPHONE JACK

9.3. Earphone Board

No.	Number Part	Description
	<i>SS5V420420-404</i>	<i>EARPHONE PCB ASS'Y</i>
	4141140750	P.C.B. EARPHONE
	C4885V4240	EXT. MIC & EARPHONE WIRE ASS'Y FOR EARPHONE TO MAIN
FB8A2	7099159250	FERRITE BEAD
R8A1	4050524155	RES-CF 1/4W J 240R SMALL -AT-
R8A2	4050524155	RES-CF 1/4W J 240R SMALL -AT-
SW8A1	4490103551	EARPHONE JACK

9.4. Control Board

No.	Number Part	Description
	<i>SS7V420220-404</i>	<i>CONTROL PCB ASS'Y</i>
	362230043A	LED HOLDER 3PIN LED-4X3A FOR LED701
	36223LE300	LED HOLDER LED-3A FOR LED702
	4141133900	P.C.B. CONTROL
	C488101026	CONN. 10P & WIRE ASS'Y W/CORE FOR P806 & P701
C701	7181102552	CAP-COG 1000PFJ 50V -AT-

No.	Number Part	Description
C702	7181102552	CAP-COG 1000PFJ 50V -AT-
LED701	4120623690	LED 2369-1 VYVGL 5* 3PIN Y/G
LED702	4120657310	LED LT5731-41 3* YELLOW ROUND
R701	4257041332	RES-PR MF 1/4W F 13.3K AT SMAL
R702	4257049311	RES-PR MF 1/4W F 9.31K SMALL -
R704	4257044991	RES-PR MF 1/4W F 4.99K AT SMAL
R705	4257043741	RES-PR MF 1/4W F 3.74K SMALL -
R706	4257042551	RES-PR MF 1/4W F 2.55K SMALL -
R707	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R708	4050510455	RES-CF 1/4W J 100K -AT- SMALL
R709	4050510455	RES-CF 1/4W J 100K -AT- SMALL
SW701	4410604040	KEYSWTCH TACT SKHHAM2520 1KEY
SW702	4410604040	KEYSWTCH TACT SKHHAM2520 1KEY
SW704	4410604040	KEYSWTCH TACT SKHHAM2520 1KEY
SW705	4410604040	KEYSWTCH TACT SKHHAM2520 1KEY
SW706	4410604040	KEYSWTCH TACT SKHHAM2520 1KEY
SW708	4410604040	KEYSWTCH TACT SKHHAM2520 1KEY
SW709	4410604040	KEYSWTCH TACT SKHHAM2520 1KEY

9.5. Main Board

No.	Number Part	Description
	<i>US7V420144-V</i>	<i>MAIN PCB ASS'Y</i>
	2001095W2A	HEAT SINK FOR IC607
	2002095V21	HEAT SINK FOR IC401
	2007095Y11	HEAT SINK (F1) FOR IC605
	2007095Y11	HEAT SINK (F1) FOR Q523
	2007095Y11	HEAT SINK (F1) FOR Q506
	2007095Y11	HEAT SINK (F1) FOR Q524
	2008095Y11	HEAT SINK (V-OUT) FOR Q602
	2008283080	HEAT SINK FOR D503
	2009197B80	FBT COVER FOR Q503,504,508
	2013095V42	HEAT SINK FOR IC801
	3011100030	NUT ISO HEX M3 Z1NC FOR Q503
	3340101525	BEAD PIN 1.5* L=25 FOR R530 X2,R576 X2,R583 X2
	3340230165	BEAD PIN 16.5X2.3* FOR CN502
	3340236016	BEAD PIN 16.5X2.36mm FOR R614 X2,R653 X2
	3340303400	TERMINAL TAB T=0.3mm FOR M1,M2
	4141138801	P.C.B. MAIN
	46905Y1101	FUSE HOLDER FOR F601 X2
	5318203001	WIRE 1007 #18 BLK 300-5-5 FOR C-C'
	5322201501	WIRE 1007 #22 BLK 140-5-5 FOR A-A'
	5322221021	WIRE 1032 #22 RED 1200V 100-5 FOR B-B'
	5324233301	WIRE UL1007 #24 ORG 320-5-5 FOR I-I'
	5530200101	CORD CRAMP TH-C FOR FBT COVER & WIRE ASS'Y

No.	Number Part	Description
	5530200102	CORD CRAMPER TH-A FOR FBT COVER & I/O CABLE
	5560020006	CORE 7.5(OD)X2.4(ID)X7.5(L) FOR D503(+)
	8026113010	SCREW BIND(+) TAPPING M3X10 TR FOR PCB & FBT COVER
	8121114008	SCREW CAP BID(+) M4X8 TAPPING FOR CN601-GND TO FBT COVER
	8504113006	SCREW BID(+) M3X6 MACH W/DISK FOR IC401
	8504113006	SCREW BID(+) M3X6 MACH W/DISK FOR IC605
	8504113006	SCREW BID(+) M3X6 MACH W/DISK FOR IC607
	8504113006	SCREW BID(+) M3X6 MACH W/DISK FOR IC801
	8504113006	SCREW BID(+) M3X6 MACH W/DISK FOR Q506
	8504113006	SCREW BID(+) M3X6 MACH W/DISK FOR Q524
	8504113008	SCREW BID(+) M3X8 MACH W/DISK FOR Q523
	8504113010	SCREW BIND(+) M3X10 MACH W/DISK FOR Q501,504,D508
	8504113010	SCREW BIND(+) M3X10 MACH W/DISK FOR Q602
	8504113012	SCREW BIND(+) M3X12 MACH W/DISK FOR Q503
	C4595W2000	WIRE UL1007 #18 BLK 400mm FOR TO NECK SHIELD
	C4597W1060	GND WIRE ASS'Y FOR CN312 TO CN507
	C4597W1081	GND WIRE ASS'Y YEL/GRN W/CORE FOR CN601-GND
	C4607F4120	WIRE ASS'Y 300MM FOR MAIN PCB CN503
	C488110023	CONN. 11P & WIRE ASS'Y W/CORE FOR CN504,901,902 TO CN303,304,305
C402	5156471S25	CAP-EC6 470UFM 25V -SF-
C403	5116223111	CAP-MC 0.022UFK 100V -RT-
C404	5153102S25	CAP-EC3 1000UFM 25V 10X20 -SF-
C405	5110224550	CAP-PETP FILM 0.22UFJ 50V P:5
C406	5116332111	CAP-MC 0.0033UFK 100V -RT-
C407	5116223111	CAP-MC 0.022UFK 100V -RT-
C408	5156471S35	CAP-EC6 470UFM 35V -SF-
C409	5116102111	CAP-MC 0.001UFK 100V -RT-
C501	5116223111	CAP-MC 0.022UFK 100V -RT-
C502	5110104550	CAP-PETP FILM 0.1UFJ 50V P:5MM
C503	5110104550	CAP-PETP FILM 0.1UFJ 50V P:5MM
C504	5116103511	CAP-MC 0.01UFJ 100V -RT-
C505	5110104550	CAP-PETP FILM 0.1UFJ 50V P:5MM
C506	5116103511	CAP-MC 0.01UFJ 100V -RT-
C507	5116472511	CAP-MC 0.004UFJ 100V -RT-
C508	5128101552	CAP-CCSL 100PFJ 50V -RT-
C509	5116332111	CAP-MC 0.0033UFK 100V -RT-
C510	5153102S25	CAP-EC3 1000UFM 25V 10X20 -SF-
C512	5128101552	CAP-CCSL 100PFJ 50V -RT-
C513	5128101552	CAP-CCSL 100PFJ 50V -RT-
C514	5134104452	CAP-SCF 0.1UFZ 50V -RT-

No.	Number Part	Description
C515	5074223102	CAP-MEF 0.022UFK 250V P:10MM -
C516	5156471S25	CAP-EC6 470UFM 25V -SF-
C517	510H221193	CAP-CCR 220PFK 3KV P:7.5mm -SF
C518	5101152132	CAP-CCB 1500PFK 1KV P=5.0MM
C521	51906223A3	CAP-MPP 6200PHJ 2KV -SF-
C522	51903323A3	CAP-MPP 0.0033UFH 2KV P:15MM -
C523	515X100S02	CAP-ECX 10UFM 160V -SF-
C524	5198754583	CAP-PMS 0.75UFJ 250V P:22.5MM
C525	5198184583	CAP-PMS 0.18UFJ 250V P:15mm -
C526	5198394583	CAP-PMS 0.39UFJ 250V P:15MM -S
C527	5198154583	CAP-PMS 0.15UFJ 250V P:15mm -
C528	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C529	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C530	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C531	5116223111	CAP-MC 0.022UFK 100V -RT-
C532	5116153111	CAP-MC 0.015UFK 100V -RT-
C533	5077474505	CAP-MEF 0.47UFJ 50V P:5.0MM
C534	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C535	5116102111	CAP-MC 0.001UFK 100V -RT-
C536	5128331552	CAP-CCSL 330PFJ 50V -RT-
C537	5156470T16	CAP-EC 47UFM 16V -RT-
C538	5116123111	CAP-MC +-10% 0.012UF/100V -RT-
C539	5116153111	CAP-MC 0.015UFK 100V -RT-
C540	5116563111	CAP-MC 0.056UFK 100V -RT-
C541	5156221T16	CAP-EC6 220UFM 16V -RT-
C542	5116223111	CAP-MC 0.022UFK 100V -RT-
C543	5101221143	CAP-CCB 220PFK 500V -SF-
C545	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C546	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C547	5110104550	CAP-PETP FILM 0.1UFJ 50V P:5MM
C548	5156221T25	CAP-EC6 220UFM 25V -RT-
C549	5156221T25	CAP-EC6 220UFM 25V -RT-
C550	5074103102	CAP-MEF 0.01UFK 250V -SF-
C553	5156101T16	CAP-EC6 100UFM 16V -RT-
C554	5156229T02	CAP-EC6 2.2UFM 160V -RT-
C555	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C556	515X101S07	CAP-ECX 100UFM 200V -SF-
C557	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C560	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C561	5156331T16	CAP-EC6 330UFM 16V -RT-
C570	510H2221C3	CAP-CCR 2200PFK 2KV P:7.5mm -S
C572	5156221T16	CAP-EC6 220UFM 16V -RT-
C573	5199913583	CAP-PMV 0.091UFJ 250V P:15MM
C574	5156100T50	CAP-EC6 10UFM 50V 5X11 -RT-
C575	5116103511	CAP-MC 0.01UFJ 100V -RT-
C576	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C577	5156479S03	CAP-EC6 4.7UFM 250V -SF-
C584	51288098C2	CAP-CCSL 8PF+-5PF 2KV -RT-
C585	5101102132	CAP-CCB 1000PFK 1KV -RT-
C586	51282205C2	CAP-CCSL 22PFJ 2KV -RT-
C587	5199224583	CAP-PMV 0.22UFJ 250V P:15mm -S
C588	5199683583	CAP-PMV 0.068UFJ 250V P:15MM
C589	5156109T50	CAP-EC6 1UFM 50V 6.3X11 -RT-
C590	5134104452	CAP-SCF 0.1UFZ 50V -RT-

No.	Number Part	Description
C591	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C592	5156100T50	CAP-EC6 10UFM 50V 5X11 -RT-
C593	5110224550	CAP-PETP FILM 0.22UFJ 50V P:5
C594	510H2221C3	CAP-CCR 2200PFK 2KV P:7.5mm -S
C595	5074104104	CAP-MEF 0.1UFK 400V P:15MM -SF
C597	5110332550	CAP-PETP FILM 3300PFJ 50V P:5M
C598	5190224503	CAP-MPP 0.22UFJ 100V -SF-
C599	5156221T50	CAP-EC6 220UFM 50V -RT-
C5E4	5156100T50	CAP-EC6 10UFM 50V 5X11 -RT-
C5E5	5156470T16	CAP-EC 47UFM 16V -RT-
C5E6	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C5E7	5116332111	CAP-MC 0.0033UFK 100V -RT-
C5E8	5110224550	CAP-PETP FILM 0.22UFJ 50V P:5
C5E9	5110224550	CAP-PETP FILM 0.22UFJ 50V P:5
C601	5065474425	CAP-MPR 0.47UFM 250V P:27.5MM
C602	5065105425	CAP-MPR 1UFM 250V -SF-
C603	5063471325	CAP-CCS 470PFM AC 250V P:10mm
C604	5063471325	CAP-CCS 470PFM AC 250V P:10mm
C605	5063472425	CAP-CCS 4700PFM 250V P:10mm -S
C606	515P221S04	CAP-ECP 220UFM 400V 25* -SF-
C607	5156470T35	CAP-EC6 47UFM 35V -RT-
C608	5074104104	CAP-MEF 0.1UFK 400V P:15MM -SF
C610	5063472425	CAP-CCS 4700PFM 250V P:10mm -S
C611	5128681552	CAP-CCSL 680PFJ 50V -RT-
C612	5092103615	CAP-PP .01UFG 100V P:10mm -SF-
C613	5128271552	CAP-CCSL 270PFJ 50V -RT-
C614	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C615	5156101T16	CAP-EC6 100UFM 16V -RT-
C616	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C618	5156100T50	CAP-EC6 10UFM 50V 5X11 -RT-
C619	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C620	510H101132	CAP-CCR 100PFK 1KV P:5.0mm -RT
C622	5101222152	CAP-CCB 2200PFK 50V -RT-
C625	5156221S01	CAP-EC6 220UFM 100V 16X25MM -S
C626	5156101S07	CAP-EC6 100UFM 200V -SF-
C628	5153102S25	CAP-EC3 1000UFM 25V 10X20 -SF-
C630	5156471S25	CAP-EC6 470UFM 25V -SF-
C633	5153102S25	CAP-EC3 1000UFM 25V 10X20 -SF-
C634	5156102S16	CAP-EC6 1000UFM 16V -SF-
C635	5156102S10	CAP-EC6 1000UFM 10V -SF-
C636	5101102132	CAP-CCB 1000PFK 1KV -RT-
C643	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C645	5156471T16	CAP-EC6 470UFM 16V -RT-
C646	5153102S25	CAP-EC3 1000UFM 25V 10X20 -SF-
C647	5156221T35	CAP-EC6 220UFM 35V -RT-
C648	5061472440	CAP-CCS 4700PFM 400V -SF-
C649	5061472440	CAP-CCS 4700PFM 400V -SF-
C651	5153102S25	CAP-EC3 1000UFM 25V 10X20 -SF-
C801	5077224505	CAP-MEF 0.22UFJ 50V P:5mm -SF-
C802	5077224505	CAP-MEF 0.22UFJ 50V P:5mm -SF-
C803	5156471T16	CAP-EC6 470UFM 16V -RT-
C804	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C805	5156332S25	CAP-EC6 3300UFM 25V -SF-
C806	5156331T16	CAP-EC6 330UFM 16V -RT-

No.	Number Part	Description
C807	5156331T16	CAP-EC6 330UFM 16V -RT-
C809	5156109T50	CAP-EC6 1UFM 50V 6.3X11 -RT-
C812	5156220T25	CAP-EC6 22UFM 25V 5X11 -RT-
C901	5128471552	CAP-CCSL 470PFJ 50V -RT-
C903	5156229T50	CAP-EC6 2.2UFM 50V -RT-
C904	5156229T50	CAP-EC6 2.2UFM 50V -RT-
C905	5156229T50	CAP-EC6 2.2UFM 50V -RT-
C906	5156229T50	CAP-EC6 2.2UFM 50V -RT-
C907	5156100T50	CAP-EC6 10UFM 50V 5X11 -RT-
C908	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C910	5156100T50	CAP-EC6 10UFM 50V 5X11 -RT-
C912	5128101552	CAP-CCSL 100PFJ 50V -RT-
C913	5128101552	CAP-CCSL 100PFJ 50V -RT-
C914	5156100T50	CAP-EC6 10UFM 50V 5X11 -RT-
C915	5121220552	CAP-CCCH 22PFJ 50V -RT-
C916	5121220552	CAP-CCCH 22PFJ 50V -RT-
C917	5156229T50	CAP-EC6 2.2UFM 50V -RT-
C923	5156229T50	CAP-EC6 2.2UFM 50V -RT-
C927	5121470552	CAP-CCCH 47PFJ 50V -RT-
C928	5121470552	CAP-CCCH 47PFJ 50V -RT-
C930	5134104452	CAP-SCF 0.1UFZ 50V -RT-
CN306	4490200207	CONN. 2P WAFER ROUND PIN 10MM
CN501	4490400207	CONN. 4P WAFER ROUND PIN
CN504	4491000330	CONN. 10P 2.5mm W232V10T00
CN505	4490200130	CONN. 2P WAFER 2.5MM
CN506	4490100209	CONTACT T=0.5 187
CN507	4490100209	CONTACT T=0.5 187
CN508	4490100209	CONTACT T=0.5 187
CN601	4570704350	AC SOCKET
CN602	4490300190	CONN. 3.96 3P W/O PIN 2 -SF-
CN605	4490100209	CONTACT T=0.5 187
CN801	4490300130	CONN. 3P WAFER 2.5MM (B3B-XH-A
CN803	4490200130	CONN. 2P WAFER 2.5MM
CN901	4491100330	CONN. 11P 2.5mm W232V11T00
CN902	4490800330	CONN. 8P 2.5mm W232V08T00
CN907	4491000260	CONN. 10P WAFER TYPE:1-173981-
D401	4120511900	DIODE ISS119TD -AT-
D402	4120104001	DIODE 1N4001 -AT-
D501	4120511900	DIODE ISS119TD -AT-
D502	41205015AU	DIODE ZENER MTZJ15A
D503	4130303040	DIODE ER304 DO-201AD 400V/3A
D504	4120511900	DIODE ISS119TD -AT-
D506	4120511900	DIODE ISS119TD -AT-
D507	4130104140	DIODE SB140 1A/40V -AT-
D508	41305001F0	DIODE FMQ-CIFS TO-220 2PIN
D509	41205091CU	DIODE ZENER MTZJ9.1C -AT-
D510	41205051AU	DIODE ZENER MTZJ5.1A -AT-
D511	4130101040	DIODE PS104R 400V/1A DO-41 -A
D512	4130101040	DIODE PS104R 400V/1A DO-41 -A
D513	4130101060	DIODE ER106 DO-41 1A/600V
D514	4130101041	DIODE PG104R 1A/400V -AT-
D515	4120511900	DIODE ISS119TD -AT-
D516	4120511900	DIODE ISS119TD -AT-
D517	4120511900	DIODE ISS119TD -AT-

No.	Number Part	Description
D518	4120511900	DIODE ISS119TD -AT-
D519	4130101040	DIODE PS104R 400V/1A DO-41 -A
D520	5406100000	JUMP WIRE 0.6*
D521	4130101040	DIODE PS104R 400V/1A DO-41 -A
D522	4130101041	DIODE PG104R 1A/400V -AT-
D523	4120511900	DIODE ISS119TD -AT-
D526	4130101040	DIODE PS104R 400V/1A DO-41 -A
D527	4120501202	DIODE ZENER 1/2W 12V HZ12A1 -A
D592	4120511900	DIODE ISS119TD -AT-
D601	4130400082	DIODE BRIDGE 4A/600V P:5mm(GB
D603	4120511900	DIODE ISS119TD -AT-
D604	4130101040	DIODE PS104R 400V/1A DO-41 -A
D605	4130101060	DIODE ER106 DO-41 1A/600V
D606	4120511900	DIODE ISS119TD -AT-
D607	4120502705	DIODE ZENER 27V RD 27EB4 -AT-
D608	4120502705	DIODE ZENER 27V RD 27EB4 -AT-
D609	4120511900	DIODE ISS119TD -AT-
D610	4120511900	DIODE ISS119TD -AT-
D611	4120511900	DIODE ISS119TD -AT-
D613	4130305406	DIODE UF5406(UF3J-5302) 3
D615	41303031F6	DIODE 31DF6
D616	4130305402	DIODE UF5402G -AT-
D617	4130305402	DIODE UF5402G -AT-
D619	4120511900	DIODE ISS119TD -AT-
D621	4120511900	DIODE ISS119TD -AT-
D622	4130305402	DIODE UF5402G -AT-
D626	4120511900	DIODE ISS119TD -AT-
D902	41205003C2	DIODE ZENER HZ3C2 -AT-
D903	4120511900	DIODE ISS119TD -AT-
D905	41205051AU	DIODE ZENER MTZJ5.1A -AT-
D906	41205051AU	DIODE ZENER MTZJ5.1A -AT-
D907	41205051AU	DIODE ZENER MTZJ5.1A -AT-
D908	41205051AU	DIODE ZENER MTZJ5.1A -AT-
D909	41205051AU	DIODE ZENER MTZJ5.1A -AT-
D910	4120511900	DIODE ISS119TD -AT-
F601	5268400052	FUSE 4A/250VAC 5X20 SLO-BLO
FB501	4322309006	FERRITE BEAD 3UH -AT-
FB503	4322309504	FERRITE BEAD 3uH
FB504	4322309006	FERRITE BEAD 3UH -AT-
FB507	7099159250	FERRITE BEAD
FB508	7099159250	FERRITE BEAD
FB601	4322309006	FERRITE BEAD 3UH -AT-
FB602	4322309504	FERRITE BEAD 3uH
FB603	4322309006	FERRITE BEAD 3UH -AT-
FB605	4322309006	FERRITE BEAD 3UH -AT-
FB606	4322309006	FERRITE BEAD 3UH -AT-
FB607	4322309504	FERRITE BEAD 3uH
FB608	4322309504	FERRITE BEAD 3uH
FB612	7067A10131	TOROID CHOKE COIL W/TUBE 130UH
FB614	7099159250	FERRITE BEAD
FB617	7099159250	FERRITE BEAD
FB618	7099159250	FERRITE BEAD
FB620	4322309504	FERRITE BEAD 3uH
FB621	4322309504	FERRITE BEAD 3uH

No.	Number Part	Description
FB622	4322309504	FERRITE BEAD 3uH
FB624	4322309504	FERRITE BEAD 3uH
FB801	7099159250	FERRITE BEAD
FB802	7099159250	FERRITE BEAD
FB803	7099159250	FERRITE BEAD
FB804	7099159250	FERRITE BEAD
FB805	7099159250	FERRITE BEAD
FB806	7099159250	FERRITE BEAD
FB901	4322209046	FERRITE BEAD 2UH -AT-
IC401	4159780400	IC LA78040
IC501	4159485600	IC TDA4856/V2 32PIN SOT232-1
IC502	4159393000	IC LM 393 8PIN
IC503	4159358000	IC LM358 8PIN
IC504	4159358000	IC LM358 8PIN
IC601	4159384200	IC KA3842A 8PIN
IC602	4159072100	POTO COUPLER 4P TLP721F (GR)
IC603	415943100A	IC TL431 REGULATOR TO-92 -RT-
IC605	4159780501	IC 7805 REGULATOR 3PIN
IC606	4114501006	TRS. MCR100-6 TO-92 -RT-
IC607	4159781201	IC MCT7812CT TO-220AB
IC801	4159749600	IC TDA7496
IC901	4159727500	IC ST72T75 OTP 56PIN
IC902	415924C160	IC M24C16BN 8PIN DIP
JW101	5406100000	JUMP WIRE 0.6*
JW104	5406100000	JUMP WIRE 0.6*
JW105	5406100000	JUMP WIRE 0.6*
JW107	5406100000	JUMP WIRE 0.6*
JW108	5406100000	JUMP WIRE 0.6*
JW109	5406100000	JUMP WIRE 0.6*
JW110	5406100000	JUMP WIRE 0.6*
JW111	5406100000	JUMP WIRE 0.6*
JW112	5406100000	JUMP WIRE 0.6*
JW113	5406100000	JUMP WIRE 0.6*
JW114	5406100000	JUMP WIRE 0.6*
JW116	5406100000	JUMP WIRE 0.6*
JW117	5406100000	JUMP WIRE 0.6*
JW118	5406100000	JUMP WIRE 0.6*
JW119	5406100000	JUMP WIRE 0.6*
JW120	5406100000	JUMP WIRE 0.6*
JW121	5406100000	JUMP WIRE 0.6*
JW122	5406100000	JUMP WIRE 0.6*
JW123	5406100000	JUMP WIRE 0.6*
JW124	5406100000	JUMP WIRE 0.6*
JW125	5406100000	JUMP WIRE 0.6*
JW126	5406100000	JUMP WIRE 0.6*
JW127	5406100000	JUMP WIRE 0.6*
JW128	5406100000	JUMP WIRE 0.6*
JW129	5406100000	JUMP WIRE 0.6*
JW130	5406100000	JUMP WIRE 0.6*
JW131	5406100000	JUMP WIRE 0.6*
JW132	5406100000	JUMP WIRE 0.6*
JW133	5406100000	JUMP WIRE 0.6*
JW134	5406100000	JUMP WIRE 0.6*
JW135	5406100000	JUMP WIRE 0.6*

No.	Number Part	Description
JW251	5406100000	JUMP WIRE 0.6*
JW252	5406100000	JUMP WIRE 0.6*
JW254	5406100000	JUMP WIRE 0.6*
JW255	5406100000	JUMP WIRE 0.6*
JW256	5406100000	JUMP WIRE 0.6*
JW257	5406100000	JUMP WIRE 0.6*
JW258	5406100000	JUMP WIRE 0.6*
JW259	5406100000	JUMP WIRE 0.6*
JW261	5406100000	JUMP WIRE 0.6*
JW262	5406100000	JUMP WIRE 0.6*
JW263	5406100000	JUMP WIRE 0.6*
JW264	5406100000	JUMP WIRE 0.6*
JW265	5406100000	JUMP WIRE 0.6*
JW266	5406100000	JUMP WIRE 0.6*
JW267	5406100000	JUMP WIRE 0.6*
JW268	5406100000	JUMP WIRE 0.6*
JW269	5406100000	JUMP WIRE 0.6*
JW270	5406100000	JUMP WIRE 0.6*
JW271	5406100000	JUMP WIRE 0.6*
JW272	5406100000	JUMP WIRE 0.6*
JW273	5406100000	JUMP WIRE 0.6*
JW274	5406100000	JUMP WIRE 0.6*
JW275	5406100000	JUMP WIRE 0.6*
JW276	5406100000	JUMP WIRE 0.6*
JW277	5406100000	JUMP WIRE 0.6*
JW278	5406100000	JUMP WIRE 0.6*
JW279	5406100000	JUMP WIRE 0.6*
JW280	5406100000	JUMP WIRE 0.6*
JW281	5406100000	JUMP WIRE 0.6*
JW282	5406100000	JUMP WIRE 0.6*
JW283	5406100000	JUMP WIRE 0.6*
JW284	5406100000	JUMP WIRE 0.6*
JW285	5406100000	JUMP WIRE 0.6*
JW287	5406100000	JUMP WIRE 0.6*
JW288	5406100000	JUMP WIRE 0.6*
JW384	5406100000	JUMP WIRE 0.6*
L502	4321101006	COIL PEAKING 100UH -AT-
L503	4323103003	COIL CHOKE 10mH W/BASE (DR 12X
L505	708S205Y11	COIL LINEARITY -SF-
L506	4323103003	COIL CHOKE 10mH W/BASE (DR 12X
L507	4323122003	INDUCTOR MICRO 1.2MMH
L508	4321100006	COIL PEAKING 10UH -AT-
L509	4321151006	COIL PEAKING 150UH -AT-
L510	4321151006	COIL PEAKING 150UH -AT-
L570	4323709003	CHOKE COIL 7uH
L601	4323101303	COIL CHOKE 100uH
L602	4323101303	COIL CHOKE 100uH
L603	4323101303	COIL CHOKE 100uH
L604	4323101303	COIL CHOKE 100uH
L607	4326101005	MICRO INDUCTOR 100UH +5%
L608	5406100000	JUMP WIRE 0.6*
L609	4323101303	COIL CHOKE 100uH
LF601	7065Y11133	COMMON MODE CHOKE
Q401	411020945P	TRS. KSC945CG TO-92 -RT-

No.	Number Part	Description
Q501	4104096340	TRS. MOSFET SFS9634 TO-220FM
Q502	4105906340	TRS. IRF634R TO-220F
Q503	4100253870	TRS. 2SC5387 TO-3P NPN 1500V/I
Q504	41035007K0	TRS. FS7KM-16A TO-220FN
Q505	411020945P	TRS. KSC945CG TO-92 -RT-
Q506	4105906340	TRS. IRF634R TO-220F
Q507	4105906340	TRS. IRF634R TO-220F
Q508	411020945P	TRS. KSC945CG TO-92 -RT-
Q509	411020945P	TRS. KSC945CG TO-92 -RT-
Q510	411020945P	TRS. KSC945CG TO-92 -RT-
Q511	4110007330	TRS. KSA733C-GTA TO-92 -RT-
Q512	4110234000	TRS. 2SC3400 TO-92
Q513	4110007330	TRS. KSA733C-GTA TO-92 -RT-
Q514	4110007330	TRS. KSA733C-GTA TO-92 -RT-
Q515	411020945P	TRS. KSC945CG TO-92 -RT-
Q516	4110007330	TRS. KSA733C-GTA TO-92 -RT-
Q517	410030669A	TRS. 2SD669A TO-126
Q518	410010649A	TRS. 2SB649A(C) TO-126
Q519	4100226880	TRS. 2SC2688 TO-126
Q520	411020945P	TRS. KSC945CG TO-92 -RT-
Q521	4110007330	TRS. KSA733C-GTA TO-92 -RT-
Q523	4100316400	TRS. 2SD1640Q TO-126
Q524	4105906440	TRS. IRF644R TO-220 250V/14A
Q526	4110234000	TRS. 2SC3400 TO-92
Q527	410023209L	TRS. 2SC3209LK SP-8
Q528	411020945P	TRS. KSC945CG TO-92 -RT-
Q529	411020945P	TRS. KSC945CG TO-92 -RT-
Q530	4100226880	TRS. 2SC2688 TO-126
Q531	4112409200	TRS. KSP92 TO-92
Q532	4110007330	TRS. KSA733C-GTA TO-92 -RT-
Q533	4110007330	TRS. KSA733C-GTA TO-92 -RT-
Q534	4110234000	TRS. 2SC3400 TO-92
Q535	4110234000	TRS. 2SC3400 TO-92
Q5E2	411030667A	TRS. 2SD667A TO-92M -RT-
Q5E3	411010647A	TRS. 2SB647A(C) -RT-
Q601	4110007330	TRS. KSA733C-GTA TO-92 -RT-
Q602	41035010K0	TRS. FS10KM-12 TO-220F
Q607	4110009660	TRS. 2SA966 TPE6 TO-92M -RT-
Q608	4110234000	TRS. 2SC3400 TO-92
Q609	4110009660	TRS. 2SA966 TPE6 TO-92M -RT-
Q610	4110234000	TRS. 2SC3400 TO-92
Q611	411030667A	TRS. 2SD667A TO-92M -RT-
Q612	410023209L	TRS. 2SC3209LK SP-8
Q613	4110007330	TRS. KSA733C-GTA TO-92 -RT-
Q614	411030667A	TRS. 2SD667A TO-92M -RT-
Q615	411020945P	TRS. KSC945CG TO-92 -RT-
Q901	411020945P	TRS. KSC945CG TO-92 -RT-
Q902	411020945P	TRS. KSC945CG TO-92 -RT-
Q907	4111139040	TRS. 2N3904 TO-92 -RT-
Q908	4111139040	TRS. 2N3904 TO-92 -RT-
R401	4257041821	RES-PR MF 1/4W F 1.82K AT SMAL
R402	4257041821	RES-PR MF 1/4W F 1.82K AT SMAL
R403	4050133955	RES-CF 1/2W J 3.3R -AT- SMALL
R404	4171075856	RES-MOF 1W J 0.75R -AT-

No.	Number Part	Description
R405	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R406	4050515955	RES-CF 1/4W J 1.5R SMALL -AT-
R407	4050133155	RES-CF 1/2W J 330R -AT- SMALL
R409	4257041002	RES-PR MF 1/4WF 10K AT SMALL
R410	4257043011	RES-PR MF 1/4WF 3.01K SMALL -
R411	4257046811	RES-PR MF 1/4WF 6.81K SMALL -
R412	4257046811	RES-PR MF 1/4WF 6.81K SMALL -
R500	4050543055	RES-CF 1/4W J 43R -AT- SMALL
R501	4050527355	RES-CF 1/4W J 27K -AT- SMALL
R502	4257042212	RES-PR MF 1/4WF 22.1K SMALL -
R503	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R504	4257041181	RES-PR MF 1/4WF 1.18K SMALL -
R505	4257042801	RES-PR MF 1/4WF 2.8K AT SMALL
R506	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R508	4257044122	RES-PR MF 1/4WF 41.2K SMALL -
R510	4050510155	RES-CF 1/4W J 100R -AT- SMALL
R511	4050510155	RES-CF 1/4W J 100R -AT- SMALL
R512	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R513	4050510155	RES-CF 1/4W J 100R -AT- SMALL
R515	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R516	4050543255	RES-CF 1/4W J 4.3K SMALL -AT-
R517	4050551155	RES-CF 1/4W J 510R SMALL -AT-
R518	4050551455	RES-CF 1/4W J 510K SMALL -AT-
R519	4050591155	RES-CF 1/4W J 910R -AT- SMALL
R520	4257049091	RES-PR MF 1/4WF 9.09K SMALL -
R521	4257041002	RES-PR MF 1/4WF 10K AT SMALL
R522	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R523	5406100000	JUMP WIRE 0.6*
R524	4050582255	RES-CF 1/4W J 8.2K -AT- SMALL
R525	4050556055	RES-CF 1/4W J 56R SMALL -AT-
R526	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R527	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R528	4050122155	RES-CF 1/2W J 220R -AT- SMALL
R529	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R530	4177315955	RES-MOF 3W J 1.5R SMALL -SF-
R531	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R532	4050147055	RES-CF 1/2W J 47R -AT- SMALL
R533	4177113253	RES-MOF 1W J 1.3K -SF- SMALL
R534	4172020053	RES-MOF 2W J 20R -SF-
R535	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R536	4050568255	RES-CF 1/4W J 6.8K SMALL -AT-
R537	4050115355	RES-CF 1/2W J 15K SMALL -AT-
R538	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R539	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R540	4050110555	RES-CF 1/2W J 1M SMALL -AT-
R543	4177127153	RES-MOF 1W J 270R SMALL -SF-
R544	4050110455	RES-CF 1/2W J 100K SMALL -AT-
R545	4050110455	RES-CF 1/2W J 100K SMALL -AT-
R546	4050110455	RES-CF 1/2W J 100K SMALL -AT-
R547	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R548	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R549	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R550	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R551	4050547355	RES-CF 1/4W J 47K -AT- SMALL

No.	Number Part	Description
R552	4257041000	RES-PR MF 1/4WF 100R AT SMALL
R553	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R554	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R555	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R556	4050510455	RES-CF 1/4W J 100K -AT- SMALL
R557	4172020053	RES-MOF 2W J 20R -SF-
R558	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R559	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R560	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R561	4050543055	RES-CF 1/4W J 43R -AT- SMALL
R562	4050522055	RES-CF 1/4W J 22R SMALL -AT-
R563	4050510455	RES-CF 1/4W J 100K -AT- SMALL
R565	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R566	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R567	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R568	4050522255	RES-CF 1/4W J 2.2K -AT- SMALL
R569	5406100000	JUMP WIRE 0.6*
R570	4177368053	RES-MOF 3W J 68R -SF- SMALL
R571	4050515355	RES-CF 1/4W J 15K -AT- SMALL
R572	4050510055	RES-CF 1/4W J 10R -AT- SMALL
R573	4050543455	RES-CF 1/4W J 430K SMALL -AT-
R574	4050543455	RES-CF 1/4W J 430K SMALL -AT-
R575	4050533255	RES-CF 1/4W J 3.3K -AT- SMALL
R576	4177330355	RES-MOF 3W J 30K SMALL -IB- L
R577	4050562055	RES-CF 1/4W J 62R SMALL -AT-
R578	4050575455	RES-CF 1/4W J 750K SMALL -AT-
R579	4050122055	RES-CF 1/2W J 22R SMALL -AT-
R580	4050510155	RES-CF 1/4W J 100R -AT- SMALL
R581	4177368053	RES-MOF 3W J 68R -SF- SMALL
R582	4050512255	RES-CF 1/4W J 1.2K -AT- SMALL
R583	4177315955	RES-MOF 3W J 1.5R SMALL -SF-
R585	5406100000	JUMP WIRE 0.6*
R586	5406100000	JUMP WIRE 0.6*
R587	4050547955	RES-CF 1/4W J 4.7R SMALL -AT-
R589	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R590	4050510555	RES-CF 1/4W J 1M -AT- SMALL
R591	5406100000	JUMP WIRE 0.6*
R592	4050556355	RES-CF 1/4W J 56K SMALL -AT-
R593	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R594	4050510555	RES-CF 1/4W J 1M -AT- SMALL
R595	4050510455	RES-CF 1/4W J 100K -AT- SMALL
R596	4257041433	RES-PR MF 1/4WF 143K SMALL -A
R598	4257042432	RES-PR MF 1/4WF 24.3K SMALL -
R599	4257045491	RES-PR MF 1/4WF 5.49K SMALL -
R5A0	4257041103	RES-PR MF 1/4WF 110K AT SMALL
R5A1	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R5A2	4050513355	RES-CF 1/4W J 13K SMALL -AT-
R5A3	4050110555	RES-CF 1/2W J 1M SMALL -AT-
R5A5	4050547155	RES-CF 1/4W J 470R SMALL -AT-
R5A6	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R5A7	4050518355	RES-CF 1/4W J 18K SMALL -AT-
R5A8	4050510555	RES-CF 1/4W J 1M -AT- SMALL
R5A9	4050547155	RES-CF 1/4W J 470R SMALL -AT-
R5B0	4050510355	RES-CF 1/4W J 10K -AT- SMALL

No.	Number Part	Description
R5B1	4050536255	RES-CF 1/4W J 3.6K SMALL -AT-
R5B2	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R5C0	4050512455	RES-CF 1/4W J 120K -AT- SMALL
R5C1	4050520355	RES-CF 1/4W J 20K -AT- SMALL
R5C2	4050568255	RES-CF 1/4W J 6.8K SMALL -AT-
R5C3	4050551355	RES-CF 1/4W J 51K -AT- SMALL
R5C4	4050510455	RES-CF 1/4W J 100K -AT- SMALL
R5C5	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R5C6	4050510155	RES-CF 1/4W J 100R -AT- SMALL
R5C7	4050115155	RES-CF 1/2W J 150R SMALL -AT-
R5C8	5406100000	JUMP WIRE 0.6*
R5C9	5406100000	JUMP WIRE 0.6*
R5E6	4257041002	RES-PR MF 1/4W F 10K AT SMALL
R5E7	4257045112	RES-PR MF 1/4W F 51.1K SMALL -
R5E8	4257041132	RES-PR MF 1/4W F 11.3K SMALL -
R5E9	4050510155	RES-CF 1/4W J 100R -AT- SMALL
R5F1	4257045622	RES-PR MF 1/4W F 56.2K SMALL -
R5F4	4050543155	RES-CF 1/4W J 430R -AT- SMALL
R601	4050156455	RES-CF 1/2W J 560K SMALL -AT-
R602	4322309006	FERRITE BEAD 3UH -AT-
R603	4172030353	RES-MOF 2W J 30K -SF-
R605	4172030353	RES-MOF 2W J 30K -SF-
R609	4050527255	RES-CF 1/4W J 2.7K -AT- SMALL
R610	4050510055	RES-CF 1/4W J 10R -AT- SMALL
R611	4050518055	RES-CF 1/4W J 18R -AT- SMALL
R612	4257044991	RES-PR MF 1/4W F 4.99K AT SMAL
R614	4172022855	RES-MOF 2W J 0.22R -IB-
R615	4257041821	RES-PR MF 1/4W F 1.82K AT SMAL
R616	4257046341	RES-PR MF 1/4W F 6.34K SMALL -
R618	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R619	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R620	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R621	4050522155	RES-CF 1/4W J 220R SMALL -AT-
R622	4050522155	RES-CF 1/4W J 220R SMALL -AT-
R623	4050510155	RES-CF 1/4W J 100R -AT- SMALL
R624	4050591255	RES-CF 1/4W J 9.1K SMALL -AT-
R625	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R626	4050515355	RES-CF 1/4W J 15K -AT- SMALL
R627	4257047321	RES-PR MF 1/4W F 7.32K SMALL -
R628	4050562055	RES-CF 1/4W J 62R SMALL -AT-
R629	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R630	4050539255	RES-CF 1/4W J 3.9K -AT- SMALL
R640	4050510455	RES-CF 1/4W J 100K -AT- SMALL
R641	4050547155	RES-CF 1/4W J 470R SMALL -AT-
R642	4050522155	RES-CF 1/4W J 220R SMALL -AT-
R643	4257048872	RES-PR MF 1/4W F 88.7K SMALL -
R644	4257042801	RES-PR MF 1/4W F 2.8K AT SMALL
R645	5406100000	JUMP WIRE 0.6*
R650	4050115155	RES-CF 1/2W J 150R SMALL -AT-
R651	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R652	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R653	4172022155	RES-MOF 2W J 220R -IB- L=83
R655	4050516255	RES-CF 1/4W J 1.6K -AT- SMALL
R656	4050510355	RES-CF 1/4W J 10K -AT- SMALL

No.	Number Part	Description
R657	4050127955	#RES-CF 1/2W J 2.7R -AT- SMALL
R658	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R664	5406100000	JUMP WIRE 0.6*
R665	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R666	4050515255	RES-CF 1/4W J 1.5K SMALL -AT-
R667	4172068253	RES-MOF 2W J 6.8K -SF-
R668	4171013956	RES-MOF 1W J 1.3R -AT-
R669	4050110955	RES-CF 1/2W J 1R SMALL -AT-
R670	4050510555	RES-CF 1/4W J 1M -AT- SMALL
R672	4050582455	RES-CF 1/4W J 820K SMALL -AT-
R673	4050511455	RES-CF 1/4W J 110K SMALL -AT-
R674	4050536355	RES-CF 1/4W J 36K -AT- SMALL
R678	4050510555	RES-CF 1/4W J 1M -AT- SMALL
R801	5406100000	JUMP WIRE 0.6*
R802	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R803	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R804	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R805	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R808	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R809	4257041743	RES-PR MF 1/4W F 174K SMALL -A
R810	4257041743	RES-PR MF 1/4W F 174K SMALL -A
R811	4050513355	RES-CF 1/4W J 13K SMALL -AT-
R812	4050513355	RES-CF 1/4W J 13K SMALL -AT-
R813	4050547155	RES-CF 1/4W J 470R SMALL -AT-
R901	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R905	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R906	4050510155	RES-CF 1/4W J 100R -AT- SMALL
R907	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R908	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R910	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R911	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R914	4257041002	RES-PR MF 1/4W F 10K AT SMALL
R915	4257045111	RES-PR MF 1/4W F 5.11K AT SMAL
R916	4257041001	RES-PR MF 1/4W F 1K AT SMALL
R917	4257041001	RES-PR MF 1/4W F 1K AT SMALL
R918	4050520355	RES-CF 1/4W J 20K -AT- SMALL
R919	4050510155	RES-CF 1/4W J 100R -AT- SMALL
R923	4050522055	RES-CF 1/4W J 22R SMALL -AT-
R925	4050522055	RES-CF 1/4W J 22R SMALL -AT-
R927	4050510555	RES-CF 1/4W J 1M -AT- SMALL
R928	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R929	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R930	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R931	4050547155	RES-CF 1/4W J 470R SMALL -AT-
R932	4050547155	RES-CF 1/4W J 470R SMALL -AT-
R933	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R934	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R935	4050518155	RES-CF 1/4W J 180R SMALL -AT-
R936	4050518155	RES-CF 1/4W J 180R SMALL -AT-
R949	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R950	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R951	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R953	5406100000	JUMP WIRE 0.6*
R955	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL

No.	Number Part	Description
R956	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R961	4257041001	RES-PR MF 1/4WF 1K AT SMALL
R963	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R965	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R967	4050582255	RES-CF 1/4W J 8.2K -AT- SMALL
R968	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R969	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R970	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R971	4257042001	RES-PR MF 1/4WF 2K AT SMALL
R972	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R973	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R974	4257043329	RES-PR MF 1/4WF 33.2R SMALL -
R975	4257043012	RES-PR MF 1/4WF 30.1K AT SMAL
R976	4257044750	RES-PR MF 1/4WF 475R -AT-
RN901	4082083325	RES-NET 8P J 3.3K COMMON
RN902	4082084725	RES-NET 8P J 4.7K COMMON
RV501	52241104E4	POT(CERMET) 0.3W 100K 6*
RY601	4420612014	RELAY OSA-SS-212DM5
SG501	5106122204	SPARK GAP 1.2KV AG-15 P:5mm-R
SW801	4490100502	EAR PHONE JACK
SW802	4490100502	EAR PHONE JACK
T501	7050307V10	F.B.T.
T502	7050205Y11	DRIVER TRANSFORMER
T503	7177H10000	TRANSDUCER CURRENT SENSOR
T504	7050505Y11	FOCUS TRANSFORMER
T603	7050105V10	POWER TRANSFORMER
TH601	4490200207	CONN. 2P WAFER ROUND PIN 10MM
TH601	710501003B	THMER. +-15% 10R 5A 15* WKINK
TH602	7021174230	PTCR 14R
X901	7152400010	CRYSTAL 24MHz AT-49 +-30ppm
ZD501	4120510160	Z-D Z10-160B 1W 160V +-5% DO-4
ZD801	41205051AU	DIODE ZENER MTZJ5.1A -AT-

9.6. Neck Board

No.	Number Part	Description
	US7V420244-V	NECK PCB ASSY
	2003195Y11	HEAT SINK FOR IC002
	4141138601	P.C.B. NECK
	8504113008	SCREW BID(+) M3X8 MACH W/DISK FOR IC002
	C459178212	GND WIRE ASS'Y 60MM FOR IC002 TO CN312
C001	5156100T50	CAP-EC6 10UFM 50V 5X11 -RT-
C002	5156221S16	CAP-EC6 220UFM 16V -SF-
C003	5156101T10	CAP-EC6 100UFM 10V -RT-
C004	7144224106	CAP-X7R 0.22UFK 16V CHIP 0805
C005	515X470T16	CAP-ECX 47UFM 16V -RT-
C006	7146104456	CAP-Y5V 0.1UFZ 50V CHIP 0805
C008	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C009	5156470T16	CAP-EC6 47UFM 16V -RT-
C010	7146104456	CAP-Y5V 0.1UFZ 50V CHIP 0805
C011	5156100T01	CAP-EC6 10UFM 100V -RT-
C012	7140104214	CAP-X7R 0.1UFM 100V -RT-
C013	7146104456	CAP-Y5V 0.1UFZ 50V CHIP 0805

No.	Number Part	Description
C014	51011021C3	CAP-CCB 1000PFK 2KV P:10MM -SF
C017	7140104214	CAP-X7R 0.1UFM 100V -RT-
C018	7146104456	CAP-Y5V 0.1UFZ 50V CHIP 0805
C019	5156101T10	CAP-EC6 100UFM 10V -RT-
C020	7146104456	CAP-Y5V 0.1UFZ 50V CHIP 0805
C021	5156470T16	CAP-EC6 47UFM 16V -RT-
C022	7183391556	CAP-COG 390PFJ 50V CHIP 0805
C023	5156101T10	CAP-EC6 100UFM 10V -RT-
C024	7146104456	CAP-Y5V 0.1UFZ 50V CHIP 0805
C025	7146104456	CAP-Y5V 0.1UFZ 50V CHIP 0805
C026	7144222156	CAP-X7R 2200PFK 50V CHIP 0805
C028	7146104456	CAP-Y5V 0.1UFZ 50V CHIP 0805
C029	5101102152	CAP-CCB 1000PFK 50V -RT-
C030	5156101T10	CAP-EC6 100UFM 10V -RT-
C032	5156109T50	CAP-EC6 1UFM 50V 6.3X11 -RT-
C033	7144472156	CAP-X7R 4700PFK 50V CHIP 0805
C034	7146104456	CAP-Y5V 0.1UFZ 50V CHIP 0805
C035	5156101T10	CAP-EC6 100UFM 10V -RT-
C036	7146104456	CAP-Y5V 0.1UFZ 50V CHIP 0805
C037	7146104456	CAP-Y5V 0.1UFZ 50V CHIP 0805
C038	7146104456	CAP-Y5V 0.1UFZ 50V CHIP 0805
C039	7146104456	CAP-Y5V 0.1UFZ 50V CHIP 0805
C040	7183221556	CAP-COG 220PFJ 50V CHIP 0805
C041	7183221556	CAP-COG 220PFJ 50V CHIP 0805
C042	5101181152	CAP-CCB 180PFK 50V -RT-
C043	5162479T35	CAP-NP 4.7UFM 35V -RT-
C044	5116104111	CAP-MC 0.1UFK 100V -RT-
C045	5104103463	CAP-CCF 0.01UFZ 1.5KV -SF-
C102	5156100T50	CAP-EC6 10UFM 50V 5X11 -RT-
C103	7146104456	CAP-Y5V 0.1UFZ 50V CHIP 0805
C104	7146104456	CAP-Y5V 0.1UFZ 50V CHIP 0805
C106	5110104501	CAP-PETP FILM 0.1MFJ 100V -RT
C107	7140104214	CAP-X7R 0.1UFM 100V -RT-
C202	5156100T50	CAP-EC6 10UFM 50V 5X11 -RT-
C203	7146104456	CAP-Y5V 0.1UFZ 50V CHIP 0805
C204	7146104456	CAP-Y5V 0.1UFZ 50V CHIP 0805
C206	5110104501	CAP-PETP FILM 0.1MFJ 100V -RT
C207	7140104214	CAP-X7R 0.1UFM 100V -RT-
C302	5156100T50	CAP-EC6 10UFM 50V 5X11 -RT-
C303	7146104456	CAP-Y5V 0.1UFZ 50V CHIP 0805
C304	7146104456	CAP-Y5V 0.1UFZ 50V CHIP 0805
C306	5110104501	CAP-PETP FILM 0.1MFJ 100V -RT
C307	7140104214	CAP-X7R 0.1UFM 100V -RT-
CN301	4490900330	CONN. 9P 2.5mm W232V09T00
CN302	4490400330	CONN. 4P 2.5mm W232V04T00
CN303	4490700330	CONN. 7P 2.5mm W232V07T00
CN304	4490800330	CONN. 8P 2.5mm W232V08T00
CN305	4491000330	CONN. 10P 2.5mm W232V10T00
CN306	4490400330	CONN. 4P 2.5mm W232V04T00
CN307	4490100209	CONTACT T=0.5 187
CN308	4490100209	CONTACT T=0.5 187
CN310	4490100209	CONTACT T=0.5 187
CN313	4490100209	CONTACT T=0.5 187
D002	412014148T	DIODE 1N4148 (BAS32L) MLF SMD

No.	Number Part	Description
D003	41205051BU	DIODE ZENER MTZJ5.1B -AT-
D004	4120511900	DIODE 1SS119TD -AT-
D005	4120511900	DIODE 1SS119TD -AT-
D008	4120511900	DIODE 1SS119TD -AT-
D009	412014148T	DIODE 1N4148 (BAS32L) MLF SMD
D010	4120511900	DIODE 1SS119TD -AT-
D011	4120511900	DIODE 1SS119TD -AT-
D013	412014148T	DIODE 1N4148 (BAS32L) MLF SMD
D014	41205004C3	DIODE ZENER HZ4C3 -AT-
D015	41205051BT	Z-D RLZ-5.1B
D016	412014148T	DIODE 1N4148 (BAS32L) MLF SMD
D017	4130101060	DIODE ER106 DO-41 1A/600V
D018	412014148T	DIODE 1N4148 (BAS32L) MLF SMD
D101	412014148T	DIODE 1N4148 (BAS32L) MLF SMD
D102	412014148T	DIODE 1N4148 (BAS32L) MLF SMD
D103	413258020U	DIODE BAV20 DO-35 -AT-
D104	413258020U	DIODE BAV20 DO-35 -AT-
D105	413258020U	DIODE BAV20 DO-35 -AT-
D201	4120511900	DIODE 1SS119TD -AT-
D202	4120511900	DIODE 1SS119TD -AT-
D203	413258020U	DIODE BAV20 DO-35 -AT-
D204	413258020U	DIODE BAV20 DO-35 -AT-
D205	413258020U	DIODE BAV20 DO-35 -AT-
D301	4120511900	DIODE 1SS119TD -AT-
D302	4120511900	DIODE 1SS119TD -AT-
D303	413258020U	DIODE BAV20 DO-35 -AT-
D304	413258020U	DIODE BAV20 DO-35 -AT-
D305	413258020U	DIODE BAV20 DO-35 -AT-
FB002	7099159250	FERRITE BEAD
FB003	4322209046	FERRITE BEAD 2UH -AT-
FB004	7099159250	FERRITE BEAD
FB005	7099159250	FERRITE BEAD
FB006	7099159250	FERRITE BEAD
FB007	7099159250	FERRITE BEAD
FB008	7099159250	FERRITE BEAD
FB009	7099159250	FERRITE BEAD
FB010	7099159250	FERRITE BEAD
FB013	5406100000	JUMP WIRE 0.6*
FB014	5406100000	JUMP WIRE 0.6*
FB101	7099458250	FERRITE BEAD 0.45uH
FB104	4328350006	FERRITE BEAD (SMD)
FB201	7099458250	FERRITE BEAD 0.45uH
FB204	4328350006	FERRITE BEAD (SMD)
FB301	7099458250	FERRITE BEAD 0.45uH
FB304	4328350006	FERRITE BEAD (SMD)
IC001	4159527432	IC M52743BSP
IC002	4159240900	IC LM2409T
IC003	4159350453	IC M35045-157
IC004	4159242100	IC 24LC21 8PIN
J001	457030423H	SOCKET CRT
JW001	5406100000	JUMP WIRE 0.6*
JW002	5406100000	JUMP WIRE 0.6*
JW003	5406100000	JUMP WIRE 0.6*
JW004	5406100000	JUMP WIRE 0.6*

No.	Number Part	Description
JW005	5406100000	JUMP WIRE 0.6*
JW007	5406100000	JUMP WIRE 0.6*
JW008	5406100000	JUMP WIRE 0.6*
JW009	5406100000	JUMP WIRE 0.6*
JW013	5406100000	JUMP WIRE 0.6*
JW014	5406100000	JUMP WIRE 0.6*
JW015	5406100000	JUMP WIRE 0.6*
JW016	5406100000	JUMP WIRE 0.6*
JW017	5406100000	JUMP WIRE 0.6*
JW018	5406100000	JUMP WIRE 0.6*
JW019	5406100000	JUMP WIRE 0.6*
JW020	5406100000	JUMP WIRE 0.6*
JW021	5406100000	JUMP WIRE 0.6*
JW022	5406100000	JUMP WIRE 0.6*
JW023	5406100000	JUMP WIRE 0.6*
JW024	5406100000	JUMP WIRE 0.6*
JW025	5406100000	JUMP WIRE 0.6*
JW026	5406100000	JUMP WIRE 0.6*
JW027	5406100000	JUMP WIRE 0.6*
JW028	5406100000	JUMP WIRE 0.6*
JW029	5406100000	JUMP WIRE 0.6*
JW030	5406100000	JUMP WIRE 0.6*
JW031	5406100000	JUMP WIRE 0.6*
JW032	5406100000	JUMP WIRE 0.6*
JW033	5406100000	JUMP WIRE 0.6*
JW034	5406100000	JUMP WIRE 0.6*
JW035	5406100000	JUMP WIRE 0.6*
JW036	5406100000	JUMP WIRE 0.6*
JW037	5406100000	JUMP WIRE 0.6*
JW038	5406100000	JUMP WIRE 0.6*
JW041	5406100000	JUMP WIRE 0.6*
JW043	5406100000	JUMP WIRE 0.6*
JW044	5406100000	JUMP WIRE 0.6*
JW046	5406100000	JUMP WIRE 0.6*
JW047	5406100000	JUMP WIRE 0.6*
L001	432B101006	COIL PEAKING 100uH SS-TYPE -AT
L002	432B101006	COIL PEAKING 100uH SS-TYPE -AT
L101	432B108006	PEAKING COIL 0.1uH
L102	432B688006	COIL PEAKING 0.68uH SS-TYPE -
L201	432B108006	PEAKING COIL 0.1uH
L202	432B688006	COIL PEAKING 0.68uH SS-TYPE -
L301	432B108006	PEAKING COIL 0.1uH
L302	432B688006	COIL PEAKING 0.68uH SS-TYPE -
Q001	4111139040	TRS. 2N3904 TO-92 -RT-
Q002	4111139040	TRS. 2N3904 TO-92 -RT-
Q003	4111139040	TRS. 2N3904 TO-92 -RT-
Q004	4111139040	TRS. 2N3904 TO-92 -RT-
Q005	4110234000	TRS. 2SC3400 TO-92
Q007	4110007330	TRS. KSA733C-GTA TO-92 -RT-
Q008	4111139040	TRS. 2N3904 TO-92 -RT-
Q101	4114804200	TRS. BF420
Q201	4114804200	TRS. BF420
Q301	4114804200	TRS. BF420
R002	4010110152	RES-CHIP 1/10W J 100R 0805

No.	Number Part	Description
R004	4010110152	RES-CHIP 1/10W J 100R 0805
R005	4010110252	RES-CHIP 1/10W J 1K 0805
R006	4010110352	RES-CHIP 1/10W J 10K 0805
R007	4050510155	RES-CF 1/4W J 100R -AT- SMALL
R008	4010124252	RES-CHIP 1/10W J 2.4K 0805
R009	4010110252	RES-CHIP 1/10W J 1K 0805
R010	4010110152	RES-CHIP 1/10W J 100R 0805
R011	4010147152	RES-CHIP 1/10W J 470R 0805
R012	4010110252	RES-CHIP 1/10W J 1K 0805
R013	4010147252	RES-CHIP 1/10W J 4.7K 0805
R014	4010147252	RES-CHIP 1/10W J 4.7K 0805
R015	4050524155	RES-CF 1/4W J 240R SMALL -AT-
R016	4010130252	RES-CHIP 1/10W J 3K 0805
R017	4010110152	RES-CHIP 1/10W J 100R 0805
R018	4010110152	RES-CHIP 1/10W J 100R 0805
R019	4010110152	RES-CHIP 1/10W J 100R 0805
R020	4050520255	RES-CF 1/4W J 2K -AT- SMALL
R021	4010110352	RES-CHIP 1/10W J 10K 0805
R022	4010124252	RES-CHIP 1/10W J 2.4K 0805
R024	4010110252	RES-CHIP 1/10W J 1K 0805
R025	4050524155	RES-CF 1/4W J 240R SMALL -AT-
R026	4010147152	RES-CHIP 1/10W J 470R 0805
R027	4010110252	RES-CHIP 1/10W J 1K 0805
R028	4010110252	RES-CHIP 1/10W J 1K 0805
R029	4010115252	RES-CHIP 1/10W J 1.5K 0805
R030	4010110352	RES-CHIP 1/10W J 10K 0805
R034	4060210315	RES-CC 1/2W K 10K -AT-
R035	4010133052	RES-CHIP 1/10W J 33R 0805
R036	4010133052	RES-CHIP 1/10W J 33R 0805
R037	4010147252	RES-CHIP 1/10W J 4.7K 0805
R039	4010124252	RES-CHIP 1/10W J 2.4K 0805
R042	4060210115	RES-CC 1/2W K 100R -AT-
R046	4010120252	RES-CHIP 1/10W J 2K 0805
R048	4010110252	RES-CHIP 1/10W J 1K 0805
R049	4010110352	RES-CHIP 1/10W J 10K 0805
R050	4010147252	RES-CHIP 1/10W J 4.7K 0805
R051	4010115252	RES-CHIP 1/10W J 1.5K 0805
R052	4010120352	RES-CHIP 1/10W J 20K 0805
R053	4010175152	RES-CHIP 1/10W J 750R 0805
R054	4010110552	RES-CHIP 1/10W J 1M 0805
R101	4010175002	RES-CHIP 1/10W F 75R 0805
R102	4010100052	RES-CHIP 1/10W J 0R 0805
R103	4010110252	RES-CHIP 1/10W J 1K 0805
R104	4010110152	RES-CHIP 1/10W J 100R 0805
R105	4050110955	RES-CF 1/2W J 1R SMALL -AT-
R107	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R108	4050520355	RES-CF 1/4W J 20K -AT- SMALL
R109	4010147152	RES-CHIP 1/10W J 470R 0805
R111	4050510555	RES-CF 1/4W J 1M -AT- SMALL
R112	4060247015	RES-CC 1/2W K 47R -AT-
R113	4010133052	RES-CHIP 1/10W J 33R 0805
R201	4010175002	RES-CHIP 1/10W F 75R 0805
R202	4010100052	RES-CHIP 1/10W J 0R 0805
R203	4010110252	RES-CHIP 1/10W J 1K 0805

No.	Number Part	Description
R204	4010110152	RES-CHIP 1/10W J 100R 0805
R205	4050133055	RES-CF 1/2W J 33R SMALL -AT-
R207	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R208	4050520355	RES-CF 1/4W J 20K -AT- SMALL
R209	4050547155	RES-CF 1/4W J 470R SMALL -AT-
R211	4050510555	RES-CF 1/4W J 1M -AT- SMALL
R212	4060247015	RES-CC 1/2W K 47R -AT-
R213	4010133052	RES-CHIP 1/10W J 33R 0805
R301	4010175002	RES-CHIP 1/10W F 75R 0805
R302	4010100052	RES-CHIP 1/10W J 0R 0805
R303	4010110252	RES-CHIP 1/10W J 1K 0805
R304	4010110152	RES-CHIP 1/10W J 100R 0805
R305	4050151055	RES-CF 1/2W J 51R -AT- SMALL
R307	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R308	4050520355	RES-CF 1/4W J 20K -AT- SMALL
R309	4010147152	RES-CHIP 1/10W J 470R 0805
R311	4050510555	RES-CF 1/4W J 1M -AT- SMALL
R312	4060247015	RES-CC 1/2W K 47R -AT-
R313	4010133052	RES-CHIP 1/10W J 33R 0805
SG001	5106122304	SPARK GAP 1.2KV AG-15 P:5.0MM