

NEC

MODELS MultiSync V520
MultiSync V521
MultiSync MV521
Diamond Scan 51
(Model No. N0501 Series)

COLOR MONITOR

SERVICE MANUAL

Better Service
Better Reputation
Better Profit

NEC/MITSUBISHI

NEC-MITSUBISHI ELECTRIC VISUAL SYSTEMS



WARNING

The SERVICE PERSONNEL should have the appropriate technical training knowledge and experience necessary to :

- Be familiar with specialized test equipment, and
- Be careful to follow all safety procedures associated with high voltage CRT circuit designs to minimize danger to themselves and their coworkers.

To avoid electrical chocks, this equipment should be used with an appropriate power cord and be connected only to a properly grounded AC outlet

This equipment utilized a micro-gap power switch. Turn off the monitor by first pushing the front panel power switch. Next, remove the power cord from the AC outlet.

To prevent fire or shock hazards, do not expose this unit to rain or moisture



This symbol warns the personnel that un-insulated voltage within the unit may have sufficient magnitude to cause electric shock.



This symbol alerts the personnel that important literature concerning the operation and maintenance of this unit has been included. Therefore, it should be read carefully in order to avoid any problems.



PRODUCT SAFETY CAUTION

1. When parts replacement is required for servicing, always use the manufacturer's specified replacement.
2. Comply with all caution and safety-related notes on the product display chassis and picture tube.
3. When replacing the component, always be certain that all the components are put back in the place.
4. When servicing display monitor unit, it is required that the provided lead dress is used in the high voltage circuit area.
5. It is also recommended that shatter proof goggles are worn, when removing, installing and handling the picture tube. People not equipped with the proper precautionary measures mentioned should keep the picture tube away from body while handling.
6. As for a connector, pick and extract housing with fingers properly since a disconnection and improper contacts may occur, when wires of the connector are led.
7. Use a proper screwdriver. If you use screwdriver that does not fit, you may damage the screws.

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1 Precautions

Follow these safety and servicing precautions to prevent damage and to protect against potential hazards such as electrical shock and X-rays.

1.1 Safety Precautions

1-1-1 Warnings

1. For safety purpose, do not attempt to modify the circuit board, and always disconnect the AC power before performing servicing on the monitor.
2. Operation of the monitor outside its cabinet or with the cover removed involves the risk of shock hazard. Repair work on the monitor should only be attempted by service personnel who are thoroughly familiar with all necessary safety precautions and procedures for working on high voltage equipment.
3. Do not lift the CRT by the neck. After completely discharging the high voltage anode, handle the CRT only when wearing shatterproof goggles. Try to keep the CRT away from the body during handling.
4. High voltage should always be kept at the rated value, no higher. Only when high voltage is excessive are X-rays capable of penetrating the shell of the CRT. Operation at high voltages may also cause failure of the CRT or high voltage circuitry.
5. The CRT is especially constructed to limit X-ray emission to 0.5mR/HR at 300 microamperes anode current. To ensure continued X-ray protection, replace the CRT with only the same or equivalent type as the original, and adjust the anode's voltage to the designated maximum rating, never to exceed.

1-1-2 Safety Checks

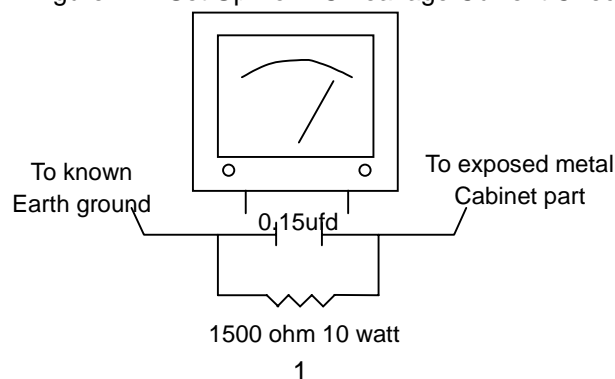
Before returning the monitor to the user, perform the following safety checks:

1. Inspect to make certain that each lead dress is not pinched or that hardware is not lodged between the chassis and other metal parts in the monitor.
2. Inspect all protective devices such as nonmetallic control knobs, insulating materials, cabinet backs, adjustment and compartment covers or shields, isolation resistor-capacitor networks, mechanical insulators, etc.
3. AC Leakage Current Check

Always perform the AC Leakage Current Check on the exposed metal parts, including metal cabinets, screwheads and control shafts, as follows:

- a) Plug the AC line cord directly into a rated AC outlet. Do not use an isolation transformer during the check.
- b) Use an AC voltmeter with at least 5000 ohms per volt sensitivity as follows:
Connect a 1500 ohms, 10 watt resistor paralleled by a 0.15uF AC capacitor in series with all exposed metal cabinet parts and a known earth ground, such as electrical conduct or electrical ground connected to earth ground, as shown in the Figure 1-1. Measure the AC voltage across the combination of resistor and capacitor.

Figure 1-1. Set Up For AC Leakage Current Check



- c) Reverse the AC plug at the AC outlet and repeat the steps for AC voltage measurements for each exposed metal part.
- d) Voltage reading must not exceed 0.3 volts RMS, equivalent to 0.2 milliampere AC. Any value exceeding this limits will constitute a potential shock hazard and must be corrected immediately

1-1-3 Product Safety Notices

Many electrical and mechanical parts in this chassis have special safety-related characteristics which are often not evident from visual inspection. The protection afforded by them may not be obtained by replacing them with components rated for higher voltage, wattage, etc. Before replacing any of these components, consult the Recommended Spare Parts List given at the end of this manual. Any of the replacements that do not provide the same safety characteristics may result in shock, fire, X-ray emission or other hazards.

1.2 Servicing Precautions

Warning: An electrolytic capacitor installed with the wrong polarity might explode.

Caution: Before performing servicing covered by this service manual, read and follow the Safety Precautions section of this manual.

Note: If unforeseen conflict between the following servicing precautions and of the safety precautions, always follow the safety precautions

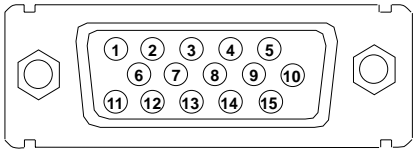
1. Follow closely the servicing precautions printed on the monitor cabinet and chassis.
2. Always unplug the AC power cord from the AC power source before removing or installing any component or assembly, disconnection PCB plugs or connectors and connecting a test component in parallel with a capacitor.
3. When replacing parts or circuit boards, clamp the lead wires around the unit before soldering.
4. When replacing a high wattage resistor (>0.5W metal oxide film resistor) in the circuit board, keep the resistor about 1 cm (1/2 inch) away from the circuit board.
5. Keep wires away from the high voltage or high temperature components.
6. Keep wires in their original positions so as to minimize interference.
7. Always connect a test instrument's ground lead to the instrument chassis ground before connecting the positive lead; always remove the instrument's ground lead last.

SPECIFICATION

| Monitor Specifications | N0501 Monitor | Notes |
|--|---|---|
| Picture Tube | Diagonal: 38cm(15inch) Viewable Image Size: 35cm(13.8inch) Radius: 1080mm | 90° deflection, 0.28mm trio dot pitch, medium short persistence phosphor, multi-layered, anti-static screen coating, semi-tint screen, Invar Shadow Mask. |
| Input Signal | Video: ANALOG 0.7Vp-p/75 Ohms Sync: Separate sync. TTL Level Horizontal sync. Positive/ Negative Vertical sync. Positive/Negative | |
| Display Colors | Analog input: Unlimited number of Colors | Depends on display card used. |
| Synchronization Range | Horizontal: 31 kHz to 70 kHz Vertical: 55 Hz to 120 Hz | Automatically Automatically |
| Resolutions Supported | 640 × 480 @ 60 to 120 Hz | Some systems may not support all modes listed. NEC cites recommended resolution at 85 Hz for optimal display performance. |
| Resolution based on horizontal and vertical frequencies only | 800 × 600 @ 55 to 110 Hz | |
| | 832 × 624 @ 55 to 106 Hz | |
| | 1024 × 768 @ 55 to 87 Hz | |
| | 1152 × 870 @ 55 to 77 Hz 1280 × 1024 @ 55 to 66 Hz | |
| Active Display Area (Factory Setting) | Horizontal: 270mm Vertical: 203mm | Dependent upon signal timing used, and does not include border area. |
| Active Display Area (Full Scan) | 280mm 210mm | Dependent upon signal timing used, and does not include border area. |
| Power Supply | AC 100 - 240V, 50 - 60Hz | |
| Current Rating | 1.3A @ 100 - 240V | |
| Dimensions | 360(W) × 380(H) × 381(D) mm | |
| Weight (Net) | 12.5 kg | |
| Environmental Considerations | | |
| | Operating Temperature: 0° C to + 35° C | |
| | Humidity: 30% to 80% | |
| | Altitude: 0 to 3000 m | |
| | Storage Temperature: -20° C to + 60° C | |
| | Humidity: 10% to 90% | |
| | Altitude: 0 to 13700 m | |

NOTE: Technical specifications are subject to change without notice.

PIN ASSIGNMENT

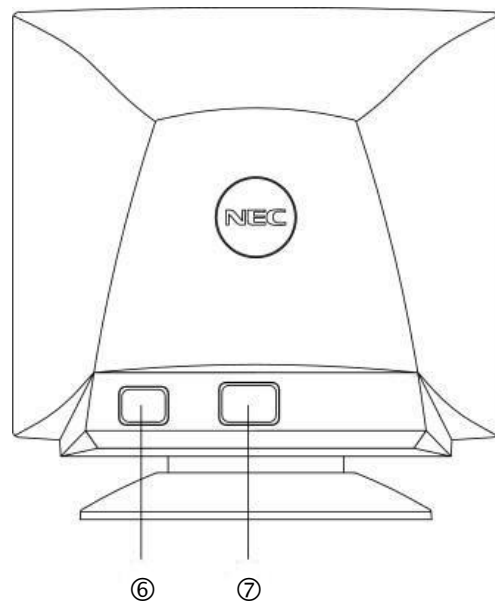
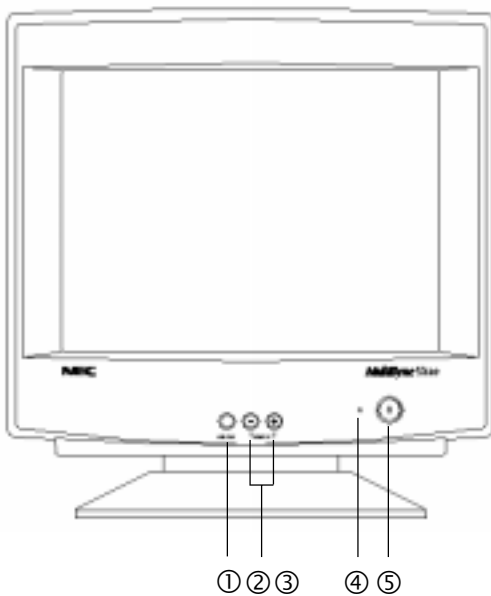


| PIN NO. | Mini D-SUB-15P |
|---------|----------------|
| 1 | RED |
| 2 | GREEN |
| 3 | BLUE |
| 4 | GROUND |
| 5 | GROUND |
| 6 | GROUND |
| 7 | GROUND |
| 8 | GROUND |
| 9 | NO PIN |
| 10 | GROUND |
| 11 | GROUND |
| 12 | SDA |
| 13 | H.SYNC. |
| 14 | V.SYNC. |
| 15 | SCL |

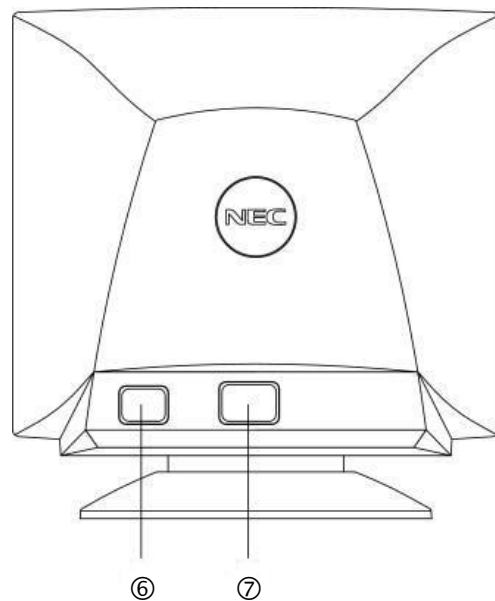
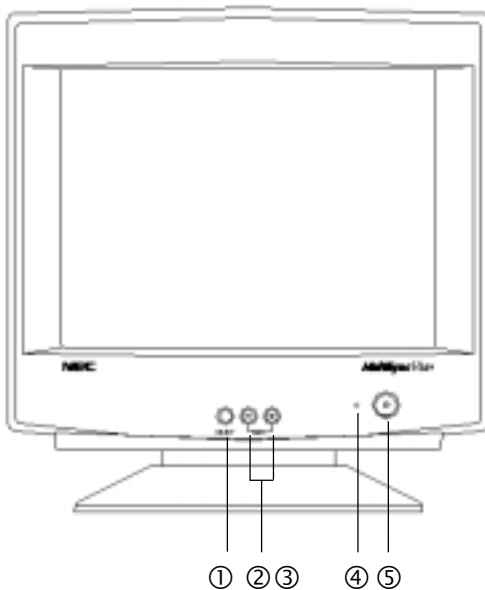
CONTROLS

- ① "SELECT": To display OSM windows, mode changes, or activate the degaussing or OSM window color selection.
- ② CONTROL BUTTON (-,+): Without OSM — Adjust the contrast.
With OSM — Select icon and adjust.
- ③ "RESET": Return the adjustment item to the factory setting.
- ④ Power indicator LED: The LED indicate Power management state.
- ⑤ POWER SWITCH: Push/push to turn the monitor on and off.
- ⑥ Power input: To connect with the power cord.
- ⑦ Signal input with the captive cable: To connect with personal computers' analogue RGB output.

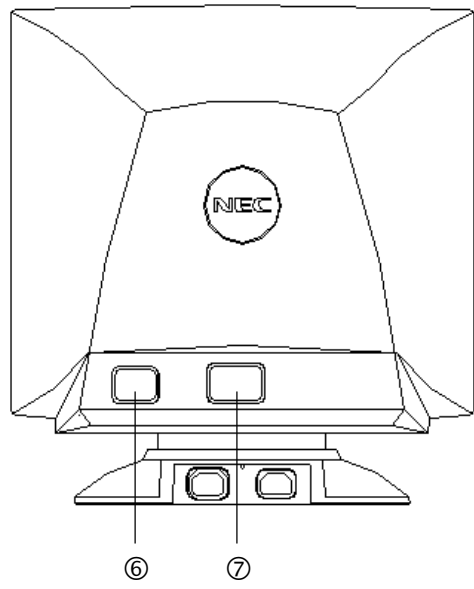
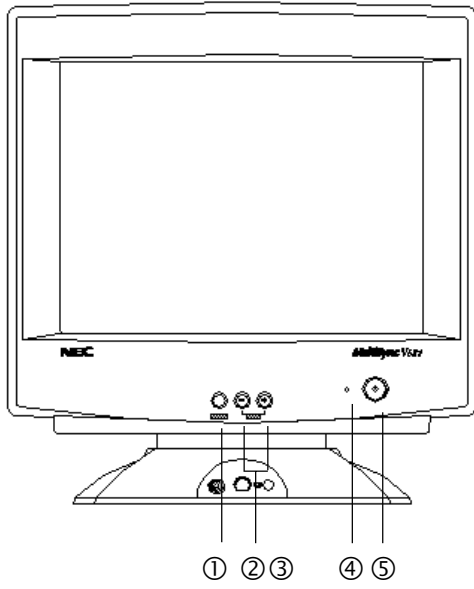
MultiSync V520



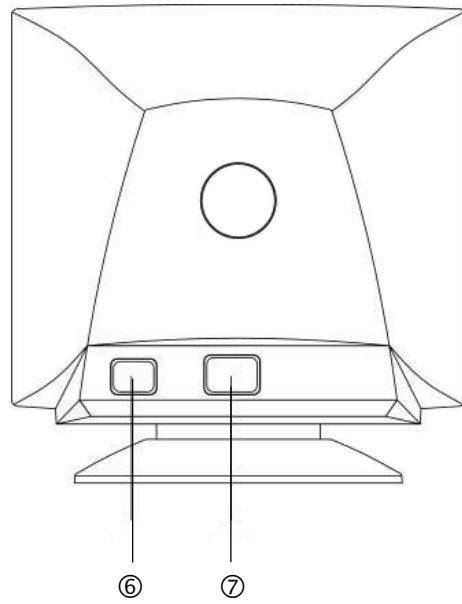
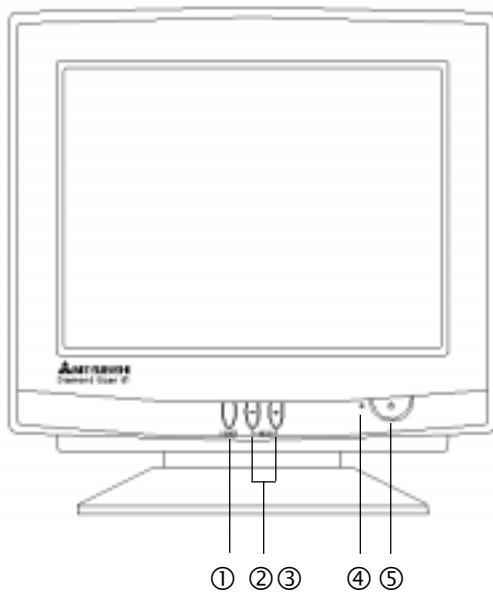
MultiSync V521



MultiSync MV521



Diamond Scan 51



OSD OPERATION

FUNCTION VALUE ADJUSTMENT

If OSD off, press UP key to increase Contrast value,
press DOWN key to decrease Contrast value.
press SELECT key to display OSD and Brightness icon is active (Fig. 1)



Fig. 1

Press UP key or DOWN key to select icon right or left and the selected icon display red color
If selected icon is DAC out, press SELECT key will display DAC value bar (fig 2)



Fig. 2

User can press UP key or DOWN key to adjust DAC value.
Press SELECT key to close DAV value bar and UP key or DOWN key to select the other icon.

SPECIAL FUNCTION OPERATION

1. Degauss Active

If selected icon is degauss icon, press SELECT key to activate degauss (Fig. 3).



Fig. 3

2. Color Temperature Select

If selected icon is 9300/7500/6500/user color icon, press SELECT key to select Color Temperature for 9300, 7500, 6500 or user defined (Fig 4 – 7).



Fig. 4



Fig. 5



Fig. 6



Fig. 7

3. OSD Color Select

If OSD icon is selected, press SELECT key to change OSD color, there are three kinds of OSD color can be selected (Fig. 8 – 10).



Fig. 8



Fig.9



Fig. 10

Background white
 Action icon red
 Normal icon black
 Value bar blue

blue
 red
 white
 yellow

black
 red
 white
 green

4. SYNC OSD Display

If EXIT icon is selected, press SELECT key to close OSD menu and then display sync information for 2 sec. This sync information will not be close until release SELECT key (Fig. 11).

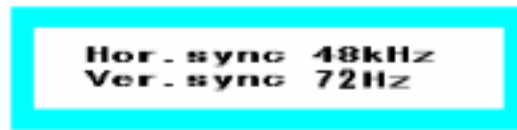


Fig. 11

5. Factory mode

Press SELECT key + UP key and power on, system enter factory mode.

OSD will display "FA" to indicate in factory mode (Fig. 12 – 13).

Operation of factory mode is same as normal mode except below 2 condition:

- a. adjustment value is saved to user and factory area.
- b. R, G, B value are saved to current color temperature.



Fig. 12



Fig. 13

6. OSD Move Mode

Press DOWN key and power on, system enter OSD move mode, user can move OSD display position in this mode.

Press SELECT key then OSD display following figure (Fig. 14) and only 3 icons OSD H-position / OSD V-position / ESC can be selected.



Fig. 14

Function explanation



Brightness: Adjusts the overall image and background screen brightness.



Contrast: Adjusts the image brightness in relation to the background.

(Contrast control is also effective with “-, +” button even through OSM window is not existing.)



Red Color Control: Adjust the red contrast of the display.



Green Color Control: Adjust the green contrast of the display.



Blue Color Control: Adjust the blue contrast of the display.



Horizontal position: Moves the image horizontally left or right.



Vertical position: Moves the image vertically up or down.



Horizontal size: Increases or decreases the horizontal size of the image.



Vertical size: Increases or decreases the vertical size of the image.



Pincushion/Barrel: Increases or decreases the curvature of the sides either inward or outward.



Trapezoid: Increases or decreases the bottom of the screen to be the same as the top.



Parallelogram: Increases or decreases the tilt of the sides either to the left or right.



Bow (Pincushion Balance): Increases or decreases the curvature of the sides either left or right.



Rotation: Rotate the image.



Degauss: Select the degauss icon on “Icon select window” and push “SELECT”

button. It will eliminate the stray magnetic field and correct the scan the electron beam, and will affect the purity, focus, convergence.

Caution: Allow a minimum interval of 20 minutes to elapse between uses of the degauss function.

9300K Color Temperature: Select the Color Temperature icon on “Icon Select Window” and push “SELECT” button.

It can be switched the different color Temperature.



OSD: There are 3 background colors (Blue, Black, and white).

These can be selected by “SELECT” button after the selection of “OSD” on “Icon select window”.

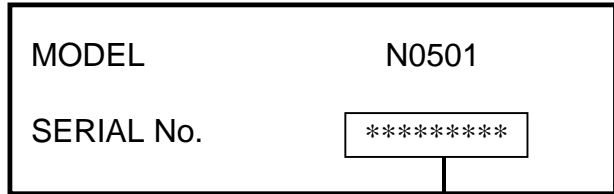
exit EXIT: To exit the OSM window. Select EXIT on “Icon select window”. Then push “SELECT” button to exit OSM window.

Note: If you do not push buttons over 10 seconds in OSM condition, the window will automatically disappear.

SERIAL NUMBER INFORMATION

Refer to the serial number information shown below.

Ex.) SERIAL NUMBER LABEL



0 Y 0 0 0 0 1 Y □

Manufactured Year : _____
(Last digit)

Manufactured Month : _____

January to September 1 to 9

October X

November Y

December Z

00001 ~ on ward
(Start from 00001 ~ when
month is changed.)

Factory mark : _____

NPG CHINA "Y"

Control Code ... E

Control Code ... A (Diamand
Scan 51)

DISASSEMBLY

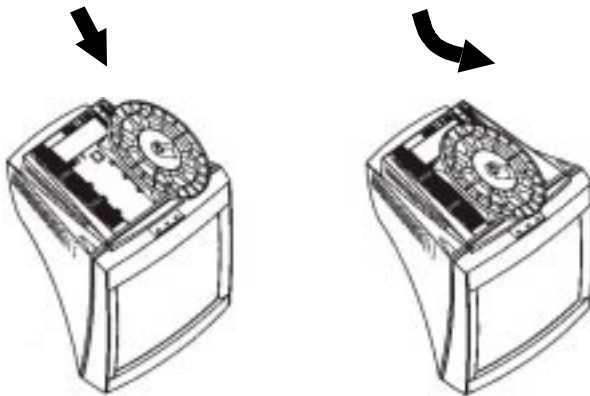
Tilt / swivel base fixing, removing

Fixing

This product consists of the MultiSync monitor and the tilt / swivel base.

When fixing the tilt / swivel base to the MultiSync monitor, please follow the steps below.

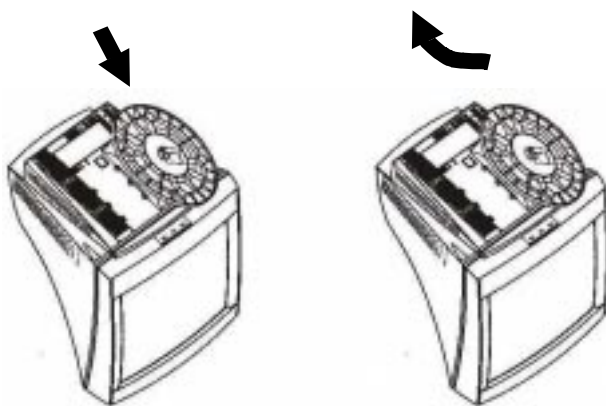
- Push the six hooks of the tilt / swivel base into the six holes at the bottom of the MultiSync monitor.
- Then slide the tilt / swivel base forward.
- Then the latch above the tilt / swivel base engages it is secure.



Removing

Please removing the tilt / swivel base when transporting for repair.

- Push down the latch of the MultiSync monitor and pull out the tilt / swivel base.
- Slide backward the tilt / swivel base from the front of the MultiSync monitor.
- Pull out the tilt / swivel base from the holes of the MultiSync monitor.



Cabinet Back



- 1. Turn the monitor CRT face down on a clean static free surface to prevent scratching CRT face.
- 2. Remove the screw "b".
- 3. Raise the signal cable vicinity of a cabinet back and lightly hit part (figure 1 reference) of a top of the cabinet back and remove the cabinet back.

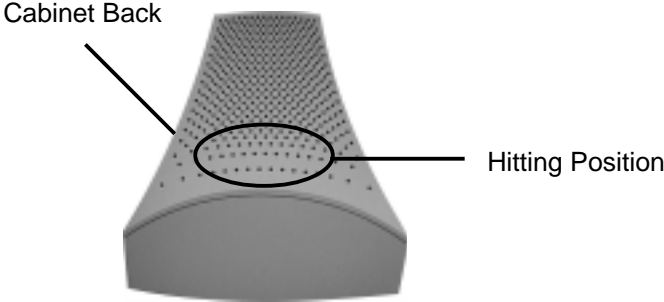
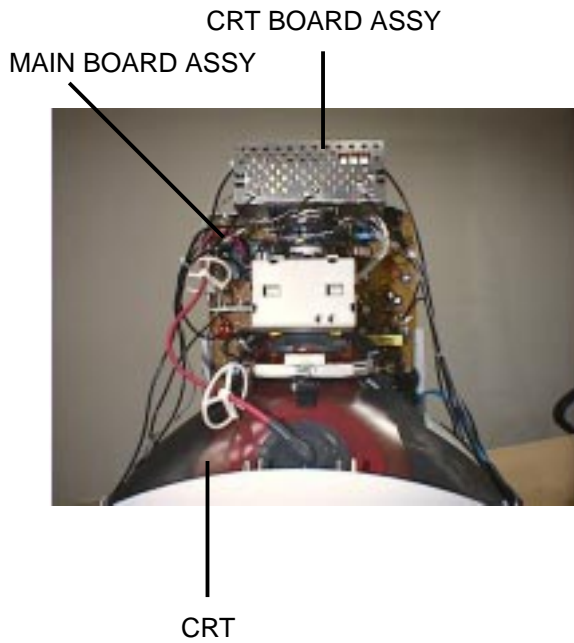


Fig. 1

MAIN BOARD and CRT BOARD



1. Unsolder the GND wire from MAIN BOARD ASSY
2. Disconnect the connector "P201", "P202", "S204" and "S205" from the CRT BOARD ASSY.
3. Disconnect the CRT BOARD ASSY from the CRT
4. Disconnect the connector "S301" and "P102" from the MAIN BOARD ASSY.
5. Remove the Anode Cap from the CRT.

NOTE:

Carefully discharge the CRT anode by shorting it to ground before removing Anode Cap.

6. Lift up the MAIN BOARD ASSY from the Cabinet Front ASSY.

ADJUSTMENT SPECIFICATIONS

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N0501 Adjustment Specifications

Ver. 1.1
2000,11,16

(1) Adjustment & Inspection Tools:

- | | |
|-----------------------------------|-----------------------------------|
| (A) Color Analyzer | (B) Signal Generator CHAROMA 2135 |
| (C) Multi Meter | (D) Hi-Voltage Probe |
| (E) Convergence Meter | (F) Demagnetizer |
| (G) Power Meter | (H) Automatic Alignment System |
| (I) DDC write & inspection system | |

(2) TIMING TABLE(Factory Mode –20 MODES)

| MODE | RESOLUTION | H-SYNC EREQ. | V-SYNC FREQ | H . POLARITY | V . POLARITY |
|------|---------------|--------------|-------------|--------------|--------------|
| 1 | VGA350 | 31.5KHz | 70Hz | + | - |
| 2 | VGA400 | 31.5kHz | 70Hz | - | + |
| 3 | VGA480 | 31.5KHz | 60Hz | - | - |
| 4 | MAC 35K | 35.0KHz | 66Hz | - | - |
| 5 | 800*600(56) | 35.2KHz | 56Hz | + | + |
| 6 | 8514A | 35.5KHz | 87Hz | + | + |
| 7 | 640*480(75) | 37.5KHz | 75Hz | - | - |
| 8 | EVGA400 | 37.8KHz | 84Hz | - | + |
| 9 | 800*600(60) | 37.8KHz | 60Hz | + | + |
| 10 | 640*480 | 43.3KHz | 85Hz | - | - |
| 11 | 800*600(75) | 46.8KHz | 75Hz | + | + |
| 12 | 1024*768(60) | 48.3KHz | 60Hz | - | - |
| 13 | MAC 49K | 49.7KHz | 74Hz | - | - |
| 14 | 800*600(85) | 53.6KHz | 85Hz | + | + |
| 15 | 1024*768(70) | 56.4KHz | 70Hz | - | - |
| 16 | 1024*768(75) | 60.0KHz | 75Hz | + | + |
| 17 | 640*480(120) | 63.7KHz | 120Hz | - | - |
| 18 | 1280*1024(60) | 64.0KHz | 60Hz | + | + |
| 19 | 800*600(100) | 64.0KHz | 100Hz | + | + |
| 20 | 1024*768(85) | 68.6KHz | 85Hz | + | + |

(3) Definition for Normal Condition

- (A) Input AC Voltage 110V/60HZ.
- (B) Warm up time minimum 30 minutes.
- (C) Crosshatch Reverse Pattern.
- (D) ALL VR's Adjust Center Position.
- (E) Color temp 9300K
- (F) OSD I-CON [R], [G], [B] gain control bar center position in Factory Mode

(4) Hot Key Operation

- (A) Factory Mode: SELECT Key + UP (+) Key if pressed when the power SW on.
- (B) OSD Position Control Mode: DOWN (-) Key if pressed when the power SW on.

(5) B+ Adjustment

- (A) MODE: No. 12.
- (B) Pattern: Full white. (Brightness just cut off)
- (C) Adjust VR101 to make the cathode of D112 has 13.6V.
- (D) Check other power source should be 78 \pm 0.2V, 6.2V \pm 0.3V, 53.5V \pm 1.5V, -11.5 \pm 0.5V.

(6) X-RAY Test

- (A) Mode: No.12
- (B) Pattern: Normal Crosshatch (Brightness just cut off)
- (C) Test
 1. Use Hi-Voltage probe
 2. Adjust VR102 until X-RAY protector is operated, then check the protection voltage should be 29.5kV or less.
 3. After X-RAY protection test, turn back the VR102 position to center.

(7) H. V. Adjustment

- (A) Mode: No. 12
- (B) Pattern: Full White(Brightness just cut off)
- (C) Adjust VR102 to make the cathode of D114 has 116.0V (Toshiba, Samsung CRT), 115V (LG CRT)
- (D) Check the high voltage is 24.5kV \pm 1kV.

(8) H-Raster Center Adjustment

- (A) Mode: No. 18
- (B) Pattern: Crosshatch Reverse
- (C) Adjust the Brightness Control that the background can be visible.
- (D) Change SW301 position to make the mostly near center background position.

(9) Mode 11 Pre-Adjustment

- (A) Mode: No. 12
- (B) Pattern: Crosshatch
- (C) Enter to Factory mode. Adjust H-phase, V-center, H-size, V-size, Pincushion, Trapezoid, Bow, Parallelogram, and rotation to make Picture Position Center and Picture Size 270*203mm.

(10) White Balance Adjustment

- (A) Setting
 - Enter Factory Mode,
 - Mode: No. 12, Pattern: Full White.
 - Warm up 30 min.
 - Make External Degauss.

(B) Cut Off Adjustment

1. Select the color Mode 9300K
2. Cut Off Adjustment: Video Signal Off (0.vp-p), Bright Control set to Mex., Adjust the Screen VR(G2), at the Brightness 1~1.5FL. (3.4~5.1 cd/m²)
3. Adjust VR210, VR230 and VR250 to make X=283, Y=297, with readjusting G2 to keep the brightness between 1~1.5FL (3.4~5.1 cd/m²).

(C) White Balance Adjustment (Factory Auto Adjustment)

1.9300K (Select the color Mode 9300K)

- 1) 50*50mm Green block Pattern, Brightness Control set to Max, Contrast Control set to Max, Adjust [G] gain control to Y=50FL. (171 cd/m²)
- 2) Change Pattern to Full White, Brightness control set to Min.
- 3) Adjust [R] gain control, [B] gain control to X=283, Y=297 at the contrast control is adjusted 15FL (52cd/m²).
- 4) Check the color tracking shall be X=283 \pm 15, Y=297 \pm 15 between Y=5~25FT-L (17~86cd/m²) condition.

2.7500K (Select the color Mode 7500K)

- 1) 50*50mm Green block Pattern, Brightness Control set to Max, Contrast Control set to Max, Adjust [G] gain control to Y=46FL. (158 cd/m²)
- 2) Change Pattern to Full White, Brightness control set to Min.
- 3) Adjust [R] gain control, [B] gain control to X=300, Y=315 at the contrast control is adjusted 15FL (52cd/m²).

3. 6500K (Select the color Mode 6500K)

- 1) 50*50mm Green block Pattern, Brightness Control set to Max, Contrast Control set to Max, Adjust [G] gain control to Y=44FL. (151 cd/m²)
- 2) Change Pattern to Full White, Brightness control set to Min.
- 3) Adjust [R] gain control, [B] gain control to X=315, Y=325 at the contrast control is adjusted 15FL (52cd/m²).

(D) Maximum brightness Adjustment

1. Brightness control set to Max., contrast control set to Max
2. Adjust VR306 to Y=31FL(105cd/m²)

(11) Focus Adjustment

(A) Mode: No.16

(B) Pattern: Full 'o' (4dots hole) Pattern, Brightness just cut off, Contrast maximum.

(C) Adjust Focus VR that 'o' mark shall be clearly at 1/4 poit of the diagonal line.

(12) Convergence Adjust

(A) Mode: No. 12

(B) Pattern: Crosshatch.

(C) Use the convergence meter to check whether the convergence is within spec.
Adjust the CPC Magnet to make the convergence within spec.

(13) Power Saving Function Inspection

(A) Mode: No. 12

(B) Pattern: Any Pattern

(C) Inspection

1. It should be into power off Mode when the both horizontal sync and vertical sync are disable after 4 seconds. Check the LED color "Orange" and the power consumption must be less then 5W.
2. The picture should be recovered readable within 3 seconds when the both horizontal sync and vertical sync are enable. Check the LED color "Green".

(14) Geometry Adjustment (Factory Auto Alignment)

(A) Enter to the Factory Mode.

(B) Adjust H-size, V-size, H-phase, V-phase, Pincushion, and Trapezoid for all preset signals.

(C) Adjustment data are automatically stored into the factory-preset memory after 1 sec.

Note: for the factory auto alignment, Mode No. 2,3,7,9,10,11,12,14,15,16,17,18,19,20 shall be adjusted. Other modes can be used the calculated average value.

(15) DDC 1/2B Writing and Inspection

(A) Mode: Any Mode, Pattern: Any Pattern.

(B) Connect the MICON Tech. DDC Read/Write System.

(C) Run NPG03A1.EXE then Press "F3" Key to write the EDID Data.

(16) Setting Before Shipment

Color Temp 9300K

OSD Back Ground: Blue

OSD Position: Center of the screen

Contrast: Maximum

Brightness: Preset (Background should be disappeared)

Self test pattern: Crosshatch (Select the "P2" in the Factory Mode)

(17) Adjustment Magnetic Field

(A) For Northern Hemisphere Model

Vertical: +40uT, Horizontal: +/-0uT (Neutral)

(B) For Southern Hemisphere Model

Vertical: -40uT, Horizontal: +/-0uT (Neutral)

(18) TIMING SHEET for N0501/N0701

Rev1.0

| Preset Mode No. | 1 | 2 | 3 | 4 | 5 | 6 |
|------------------|---------|---------|---------|----------------|-----------------|---------------|
| Signal Name | VGA350 | VGA400 | VGA480 | MACII (35K) | 800*600 (56) | 8514/A XGA |
| Resolution | 640*350 | 640*400 | 640*480 | 640*480 | 800*600 | 1024*768 |
| Dot Clock (MHz) | 25.175 | 28.322 | 25.175 | 30.240 | 36.000 | 44.900 |
| fh (kHz) | 31.47 | 31.47 | 31.47 | 35.00 | 35.16 | 35.52 |
| fv (Hz) | 70.09 | 70.09 | 59.94 | 66.67 | 56.25 | 86.96 |
| Total (dot) | 800 | 800 | 800 | 864 | 1024 | 1264 |
| (uS) | 31.78 | 31.78 | 31.78 | 28.57 | 28.44 | 28.15 |
| Disp (dot) | 640 | 640 | 640 | 640 | 800 | 1024 |
| (uS) | 25.42 | 25.42 | 25.42 | 21.16 | 22.22 | 22.81 |
| Front (dot) | 16 | 16 | 16 | 64 | 24 | 8 |
| (uS) | 0.64 | 0.64 | 0.64 | 2.12 | 0.67 | 0.18 |
| Sync Pulse (dot) | 96 | 96 | 96 | 64 | 72 | 176 |
| (uS) | 3.18 | 3.81 | 3.81 | 2.12 | 2.00 | 3.92 |
| Back (dot) | 48 | 48 | 48 | 96 | 128 | 56 |
| (uS) | 1.91 | 1.91 | 1.91 | 3.17 | 3.56 | 1.25 |
| Total (H) | 449 | 449 | 525 | 525 | 625 | 408.5 |
| (mS) | 14.268 | 14.268 | 16.683 | 15.000 | 17.778 | 11.500 |
| Disp (H) | 350 | 400 | 480 | 480 | 600 | 384 |
| (mS) | 11.122 | 12.711 | 15.253 | 13.714 | 17.067 | 10.810 |
| Front (H) | 37 | 12 | 10 | 3 | 1 | 0 |
| (mS) | 1.176 | 0.381 | 0.318 | 0.086 | 0.028 | 0.000 |
| Sync Pulse (H) | 2 | 2 | 2 | 3 | 2 | 4 |
| (mS) | 0.064 | 0.064 | 0.064 | 0.086 | 0.057 | 0.113 |
| Back (H) | 60 | 35 | 33 | 39 | 22 | 20 |
| (mS) | 1.907 | 1.112 | 1.049 | 1.114 | 0.626 | 0.563 |
| Interlace | NON | NON | NON | NON | NON | YES |
| Polarity (H/V) | POS/NEG | NEG/POS | NEG/NEG | NEG/NEG | POS/POS | POS/POS |
| Composite Sync | | | | NEG | | |
| Composite Video | | | | | | |
| Character Font | 7*9 | 7*9 | 7*9 | 7*9 | 7*9 | 7*9 |
| Serration | OFF | OFF | OFF | ON | OFF | OFF |
| EQP | OFF | OFF | OFF | OFF | OFF | OFF |

| Preset Mode No. | 7 | 8 | 9 | 10 | 11 | 12 |
|------------------|-----------------|-------------------|-----------------|-----------------|-----------------|--------------------|
| Signal Name | 640*480 (75) | EVGA400 (VESA) | 800*600 (60) | 640*480 (85) | 800*600 (75) | 10*7(60) (VESA) |
| Resolution | 640*480 | 640*400 | 800*600 | 640*480 | 800*600 | 1024*768 |
| Dot Clock (MHz) | 31.500 | 31.5000 | 40.000 | 36.000 | 49.500 | 65.000 |
| fh (kHz) | 37.50 | 37.86 | 37.88 | 43.27 | 46.88 | 48.36 |
| fv (Hz) | 75.00 | 84.13 | 60.32 | 85.01 | 75.00 | 60.00 |
| Total (dot) | 840 | 832 | 1056 | 832 | 1056 | 1344 |
| (uS) | 26.67 | 26.41 | 26.40 | 23.11 | 21.33 | 20.68 |
| Disp (dot) | 640 | 640 | 800 | 640 | 800 | 1024 |
| (uS) | 20.32 | 20.32 | 20.00 | 17.78 | 16.16 | 15.75 |
| Front (dot) | 16 | 24 | 40 | 56 | 16 | 24 |
| (uS) | 0.51 | 0.76 | 1.00 | 1.56 | 0.32 | 0.37 |
| Sync Pulse (dot) | 64 | 40 | 128 | 56 | 80 | 136 |
| (uS) | 2.03 | 1.27 | 3.20 | 1.56 | 1.62 | 2.09 |
| Back (dot) | 120 | 128 | 88 | 80 | 160 | 160 |
| (uS) | 3.81 | 4.06 | 2.20 | 2.22 | 3.23 | 2.46 |
| Total (H) | 500 | 450 | 628 | 509 | 625 | 806 |
| (mS) | 13.333 | 11.886 | 16.579 | 11.76 | 13.333 | 16.666 |
| Disp (H) | 480 | 400 | 600 | 480 | 600 | 768 |
| (mS) | 12.800 | 10.565 | 15.840 | 11.093 | 12.800 | 15.880 |
| Front (H) | 1 | 9 | 1 | 1 | 1 | 3 |
| (mS) | 0.027 | 0.238 | 0.026 | 0.023 | 0.021 | 0.062 |
| Sync Pulse (H) | 3 | 3 | 4 | 3 | 3 | 6 |
| (mS) | 0.080 | 0.079 | 0.106 | 0.069 | 0.064 | 0.124 |
| Back (H) | 16 | 38 | 23 | 25 | 21 | 29 |
| (mS) | 0.427 | 1.004 | 0.607 | 0.578 | 0.448 | 0.600 |
| Interlace | NON | NON | NON | NON | NON | NON |
| Polarity (H/V) | NEG/NEG | NEG/POS | POS/POS | NEG/NEG | POS/POS | NEG/NEG |
| Composite Sync | | | | | | |
| Composite Video | | | | | | |
| Character Font | 7*9 | 7*9 | 7*9 | 7*9 | 7*9 | 7*9 |
| Serration | OFF | OFF | OFF | OFF | OFF | OFF |
| EQP | OFF | OFF | OFF | OFF | OFF | OFF |

| Preset Mode No. | 13 | 14 | 15 | 16 | 17 | 18 |
|------------------|------------------|-----------------|--------------------|--------------------|------------------|---------------------|
| Signal Name | MACII (49.7K) | 800*600 (85) | 10*7(70) (VESA) | 10*7(75) (VESA) | 640*480 (120) | 12*10(60) (VESA) |
| Resolution | 832*624 | 800*600 | 1024*768 | 1024*768 | 640*480 | 1280*1024 |
| Dot Clock (MHz) | 57.286 | 56.250 | 75.000 | 78.750 | 55.00 | 108.000 |
| fh (kHz) | 49.73 | 53.67 | 56.48 | 60.02 | 63.66 | 63.98 |
| fv (Hz) | 74.55 | 85.06 | 70.07 | 75.03 | 120.11 | 60.02 |
| Total (dot) | 1152 | 1048 | 1328 | 1312 | 864 | 1688 |
| (uS) | 20.11 | 18.63 | 17.71 | 16.66 | 15.71 | 15.63 |
| Disp (dot) | 832 | 800 | 1024 | 1024 | 640 | 1280 |
| (uS) | 14.52 | 14.22 | 13.65 | 13.00 | 11.645 | 11.85 |
| Front (dot) | 32 | 32 | 24 | 16 | 32 | 48 |
| (uS) | 0.56 | 0.57 | 0.32 | 0.20 | 0.582 | 0.44 |
| Sync Pulse (dot) | 64 | 64 | 136 | 96 | 96 | 112 |
| (uS) | 1.12 | 1.14 | 1.81 | 1.22 | 1.745 | 1.04 |
| Back (dot) | 224 | 152 | 144 | 176 | 96 | 248 |
| (uS) | 3.91 | 2.70 | 1.92 | 2.23 | 1.745 | 2.30 |
| Total (H) | 667 | 631 | 806 | 800 | 530 | 1066 |
| (mS) | 13.413 | 11.756 | 14.272 | 13.328 | 8.325 | 16.661 |
| Disp (H) | 624 | 600 | 768 | 768 | 480 | 1024 |
| (mS) | 12.548 | 11.179 | 13.599 | 12.795 | 7.540 | 16.005 |
| Front (H) | 1 | 1 | 3 | 1 | 8 | 1 |
| (mS) | 0.020 | 0.019 | 0.053 | 0.017 | 0.126 | 0.016 |
| Sync Pulse (H) | 3 | 3 | 6 | 3 | 6 | 3 |
| (mS) | 0.060 | 0.056 | 0.106 | 0.050 | 0.094 | 0.047 |
| Back (H) | 39 | 27 | 29 | 28 | 36 | 38 |
| (mS) | 0.784 | 0.503 | 0.513 | 0.466 | 0.566 | 0.594 |
| Interlace | NON | NON | NON | NON | NON | NON |
| Polarity (H/V) | NEG/NEG | POS/POS | NEG/NEG | POS/POS | NEG/NEG | POS/POS |
| Composite Sync | NEG | | | | | |
| Composite Video | | | | | | |
| Character Font | 7*9 | 7*9 | 7*9 | 7*9 | 7*9 | 7*9 |
| Serration | ON | OFF | OFF | OFF | OFF | OFF |
| EQP | OFF | OFF | OFF | OFF | OFF | OFF |

| | | | | | | |
|------------------|------------------|------------------|--|--|--|--|
| Preset Mode No. | 19 | 20 | | | | |
| Signal Name | 800*600 (100) | 1024*768 (85) | | | | |
| Resolution | 800*600 | 1024*768 | | | | |
| Dot Clock (MHz) | 67.50 | 94.5 | | | | |
| fh (kHz) | 63.92 | 68.677 | | | | |
| fv (Hz) | 100.03 | 85 | | | | |
| Total (dot) | 1056 | 1376 | | | | |
| (uS) | 15.64 | 14.561 | | | | |
| Disp (dot) | 800 | 1024 | | | | |
| (uS) | 11.852 | 10.836 | | | | |
| Front (dot) | 40 | 48 | | | | |
| (uS) | 0.593 | 0.508 | | | | |
| Sync Pulse (dot) | 80 | 96 | | | | |
| (uS) | 1.185 | 1.016 | | | | |
| Back (dot) | 136 | 208 | | | | |
| (uS) | 2.015 | 2.201 | | | | |
| Total (H) | 639 | 808 | | | | |
| (mS) | 9.997 | 11.765 | | | | |
| Disp (H) | 600 | 768 | | | | |
| (mS) | 9.386 | 11.183 | | | | |
| Front (H) | 3 | 1 | | | | |
| (mS) | 0.047 | 0.015 | | | | |
| Sync Pulse (H) | 4 | 3 | | | | |
| (mS) | 0.063 | 0.044 | | | | |
| Back (H) | 32 | 36 | | | | |
| (mS) | 0.501 | 0.524 | | | | |
| Interlace | NON | NON | | | | |
| Polarity (H/V) | POS/POS | POS/POS | | | | |
| Composite Sync | | | | | | |
| Composite Video | | | | | | |
| Character Font | 7*9 | 7*9 | | | | |
| Serration | OFF | OFF | | | | |
| EQP | OFF | OFF | | | | |

Distortion Adjustment

Factory Mode Setting


*After completion of adjustment exit the factory mode and data will be saved.

Signal : All signals Cross hatch

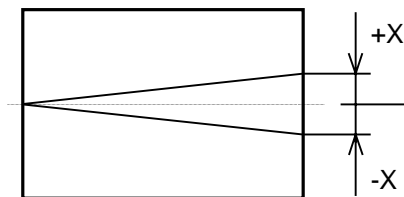
Perform the adjust for signal No. 14 in step 6-1~3.

Perform the adjust for above all signal in step 6-4,5.


1. Picture Tilt Adjustment

- (1) Receive signal 14 (Cross hatch).
- (2) When OSM MENU is displayed, Select the "  " icon.
- (3) Make sure that the picture tilt meets the following standards.

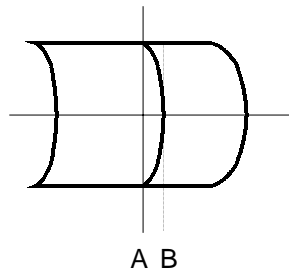
$$X \leq \pm 1.0 \text{ mm}$$




2. Pincushion Balance Adjustment

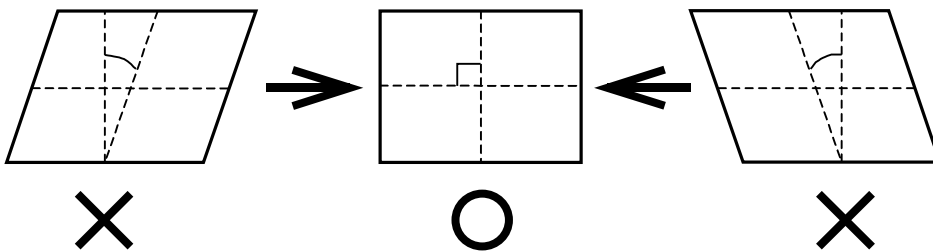
- (1) When OSM MENU is displayed, Select the "  " icon.
- (2) Make sure that the Pincushion Balance meets the following standards.

$$A - B \leq 0.5 \text{ mm}$$




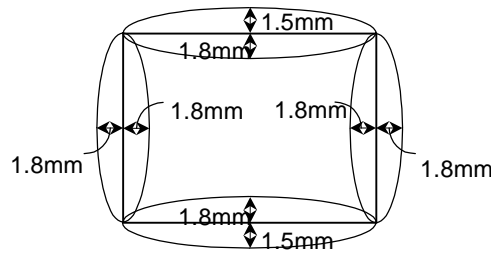
3. Parallelogram distortion Adjustment

- (1) When OSM MENU is displayed, Select the "  " icon.
- (2) Adjust "+", "-" SW so that the vertical line and horizontal line at the screen's center fall at right angles. (less than 90 ± 0.5 degree)




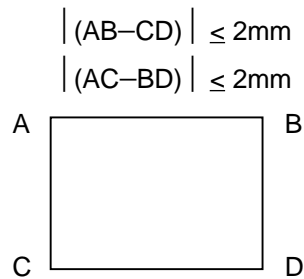
4. Side Pincushion Adjustment

- (1) When OSM MENU is displayed, Select the “” icon.
- (2) Make sure that the side pincushion distortion meets the following standards.



5. Trapezoid Distortion Adjustment

- (1) When OSM MENU is displayed, Select the “” icon.
- (2) Make sure that the trapezoid distortion meets the following standards.







6. Preset Picture Size and Position Adjustment

Factory Mode Setting

Signal: All Signals Cross hatch

*Perform the Preset Picture Size and Position Adjustment for above all signal.

- (1) When OSM MENU is displayed, Select the “”, “”, “”, “” icon.
- (2) Adjust the picture size and position as listed below by “-”, “+” SW.

Picture size

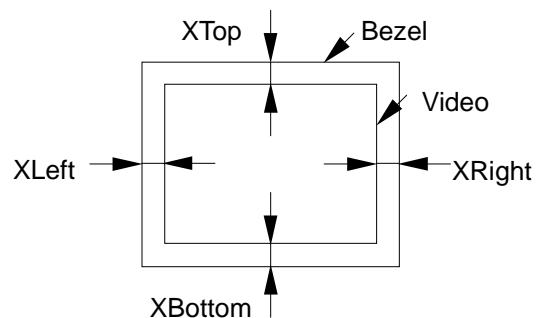
H : $270 \pm 2\text{mm}$

V : $203 \pm 2\text{mm}$

Picture position

H : $| (X_{\text{TOP}} - X_{\text{BOTTOM}}) | \leq 3\text{mm}$

V : $| (X_{\text{LEFT}} - X_{\text{RIGHT}}) | \leq 3\text{mm}$



7. Purity

- (1) Receive signal 14(Cross hatch pattern).
- (2) The CRT face should be facing east and degauss the entire unit by external degaussing coil.
- (3) Make sure the single color purity.
If not, readjust CPC magnet and touch up using correction magnets.

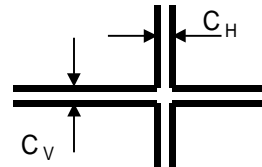
8. Convergence

C_H : Convergence error of horizontal direction

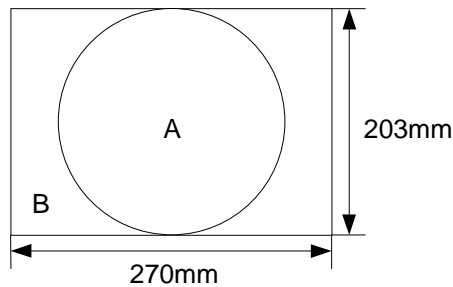
C_V : Convergence error of vertical direction

C_S : Total direction of Convergence error

(Calculate by " $\sqrt{C_H^2 + C_V^2}$ ")



- (1) Receive signal 14(Cross hatch pattern).
- (2) Measure convergence error., If it is out of spec, adjust static convergence by 4-pole magnets and 6-pole magnets.



A Zone (A circle 203 mm in the center of the CRT face center)

C_H, C_V : Within 0.35 mm

C_S : No rule

B Zone (Areas outside of zone A within the rectangle of 270 mm×203 mm)

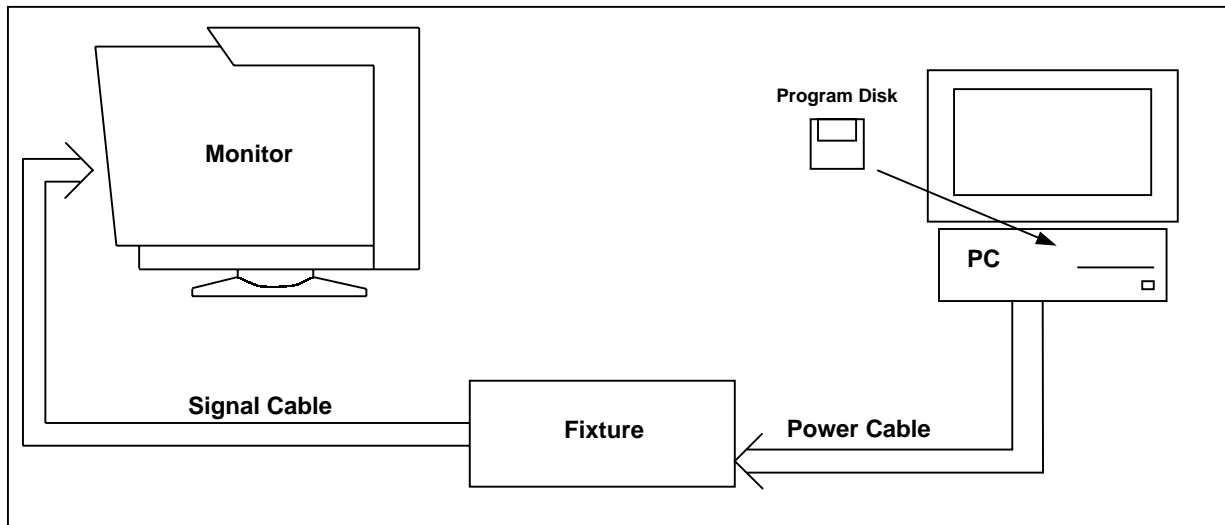
Safety with the list below.

| | | |
|---|--|--|
| | $C_H \leq 0.35 \text{ mm}$ | $0.35 \text{ mm} < C_H < 0.40 \text{ mm}$ |
| $C_V \leq 0.35 \text{ mm}$ | OK | Calculate C_S and judge Within 0.50 mm → OK |
| $0.35 \text{ mm} < C_V < 0.40 \text{ mm}$ | Calculate C_S and judge Within 0.50 mm → OK | Need to touch up |

Write and Inspection for Plug and Play Communication

1. Construction of System

This system should be connected as shown below.



Note: PC clock speed should be below 266MHz. OS is PC-DOS.

Fixture Board can be connected directly to PC without Printer Cable.

2. EDID Write and Inspection Method

- 1) Run specified EDID write and Inspection program on PC-DOS mode.
The monitor turns into the self test mode.
- 2) Run the specified EDID write and inspection program under PC-DOS mode.
- 3) Key in the serial No. or Scan serial No. bar code.
- 4) Press "Return" key to write the EDID data.
- 5) Press "F1" key to inspect DDC1 communication.
- 6) Press "F2" key to inspect DDC2 communication
EDID DATA Format: Please refer the 3. EDID data File.

3. EDID DATA FILE

MultiSync V520 EDID Serial No. Format

Week of Manufacture (Month*4)
Year of Manufacture

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 00 | 00 | FF | FF | FF | FF | FF | FF | 00 | 38 | A3 | 1D | 25 | 01 | 01 | 01 | 01 |
| 10 | 18 | 09 | 01 | 02 | 0C | 1C | 15 | 78 | EA | B4 | 18 | A1 | 55 | 48 | 99 | 25 |
| 20 | 10 | 48 | 4C | FF | EE | 00 | 31 | 59 | 45 | 59 | 61 | 59 | 71 | 4A | 81 | 40 |
| 30 | 01 | 01 | 01 | 01 | 01 | 01 | 30 | 2A | 00 | 98 | 51 | 00 | 2A | 40 | 30 | 70 |
| 40 | 13 | 00 | 0E | CB | 10 | 00 | 00 | 1E | 00 | 00 | 00 | FD | 00 | 37 | 78 | 1F |
| 50 | 46 | 0B | 00 | 0A | 20 | 20 | 20 | 20 | 20 | 20 | 00 | 00 | 00 | FC | 00 | 4E |
| 60 | 45 | 43 | 20 | 56 | 35 | 32 | 30 | 0A | 20 | 20 | 20 | 20 | 20 | 00 | 00 | FF |
| 70 | 00 | 39 | 36 | 30 | 30 | 30 | 30 | 31 | 59 | 41 | 0A | 20 | 20 | 20 | 00 | 4C |

Serial No Area 9bytes Check Sum

MultiSync V521 / MV521 EDID Serial No. Format

Week of Manufacture (Month*4)
Year of Manufacture

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 00 | 00 | FF | FF | FF | FF | FF | FF | 00 | 38 | A3 | C0 | 5D | 01 | 01 | 01 | 01 |
| 10 | 24 | 09 | 01 | 02 | 0C | 1C | 15 | 78 | EA | B4 | 18 | A1 | 55 | 48 | 99 | 25 |
| 20 | 10 | 48 | 4C | FF | EE | 00 | 31 | 59 | 45 | 59 | 61 | 59 | 71 | 4A | 81 | 40 |
| 30 | 01 | 01 | 01 | 01 | 01 | 01 | EA | 24 | 00 | 60 | 41 | 00 | 28 | 30 | 30 | 60 |
| 40 | 13 | 00 | 0E | CB | 10 | 00 | 00 | 1E | 00 | 00 | 00 | FD | 00 | 37 | 78 | 1F |
| 50 | 46 | 0B | 00 | 0A | 20 | 20 | 20 | 20 | 20 | 20 | 00 | 00 | 00 | FC | 00 | 4E |
| 60 | 45 | 43 | 20 | 56 | 35 | 32 | 31 | 0A | 20 | 20 | 20 | 20 | 00 | 00 | 00 | FF |
| 70 | 00 | 39 | 39 | 30 | 30 | 30 | 30 | 31 | 59 | 41 | 0A | 20 | 20 | 20 | 00 | 17 |

Serial No Area 9bytes Check Sum

DiamondScan 51 EDID Serial No. Format

Week of Manufacture (Month*4)
Year of Manufacture

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 00 | 00 | FF | FF | FF | FF | FF | FF | 00 | 34 | AC | 30 | 45 | 01 | 01 | 01 | 01 |
| 10 | 2D | 0A | 01 | 02 | 0C | 1C | 15 | 78 | EA | B4 | 18 | A1 | 55 | 48 | 99 | 25 |
| 20 | 10 | 48 | 4C | FF | EE | 00 | 31 | 59 | 45 | 59 | 61 | 59 | 71 | 4A | 81 | 40 |
| 30 | 01 | 01 | 01 | 01 | 01 | 01 | EA | 24 | 00 | 60 | 41 | 00 | 28 | 30 | 30 | 60 |
| 40 | 13 | 00 | 0E | CB | 10 | 00 | 00 | 1E | 00 | 00 | 00 | FD | 00 | 37 | 78 | 1F |
| 50 | 46 | 0B | 00 | 0A | 20 | 20 | 20 | 20 | 20 | 20 | 00 | 00 | 00 | FC | 00 | 44 |
| 60 | 69 | 61 | 6D | 6F | 6E | 64 | 53 | 63 | 61 | 6E | 35 | 31 | 00 | 00 | 00 | FF |
| 70 | 00 | 30 | 59 | 30 | 30 | 30 | 30 | 31 | 59 | 41 | 0A | 20 | 20 | 20 | 00 | 60 |

Serial No Area 9bytes Check Sum

Bar Code Format(code39)

| | | | | | | | | | | | | | | | | | | | | |
|---------|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|---|
| Digit | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | |
| Format | * | N | N | N | N | N | N | N | N | _ | Y | M | S | S | S | S | S | F | R | * |
| Example | * | N | B | 5 | 0 | 0 | 9 | 0 | T | _ | 0 | Y | 0 | 0 | 0 | 0 | 1 | Y | E | * |

*+Set Assembly Code + 1 space + Serial No. + *

SET Assembly code depends on the CRT and Destination.

Serial No. Descriptions:

Y: Manufactured Year (Last digit) ex. 0 → 2000

M: Manufactured Month 1 ~ 9, X(October),
Y(November), Z(December)

S: Serial No. (5digits) 00001 ~ onward
(restart when month is changed)

F: Factory Code: Y is NPG China Factory

R: Product Revision code: start from E

EDID Code Input Procedure

ex.

- 1) Scan Bar code (20 digits) NB50090T_0Y00001YE
- 2) Skip 11 digits then find the Serial No. 0Y00001YE
- 3) Make Year hex Code from Year digit 0 → 0Ah
- 4) Make Week hex Code from Month digit $11 * 4 = 44 \rightarrow 2Dh$
- 5) Change Serial No. to ASCII code 30h 59h 30h 30h 30h 30h 31h 59h 45h
- 6) Apply Serial No. Information to the default EDID code.
- 7) Download EDID from PC to Monitor.
- 8) DDC1 Inspection
- 9) DDC2B Inspection

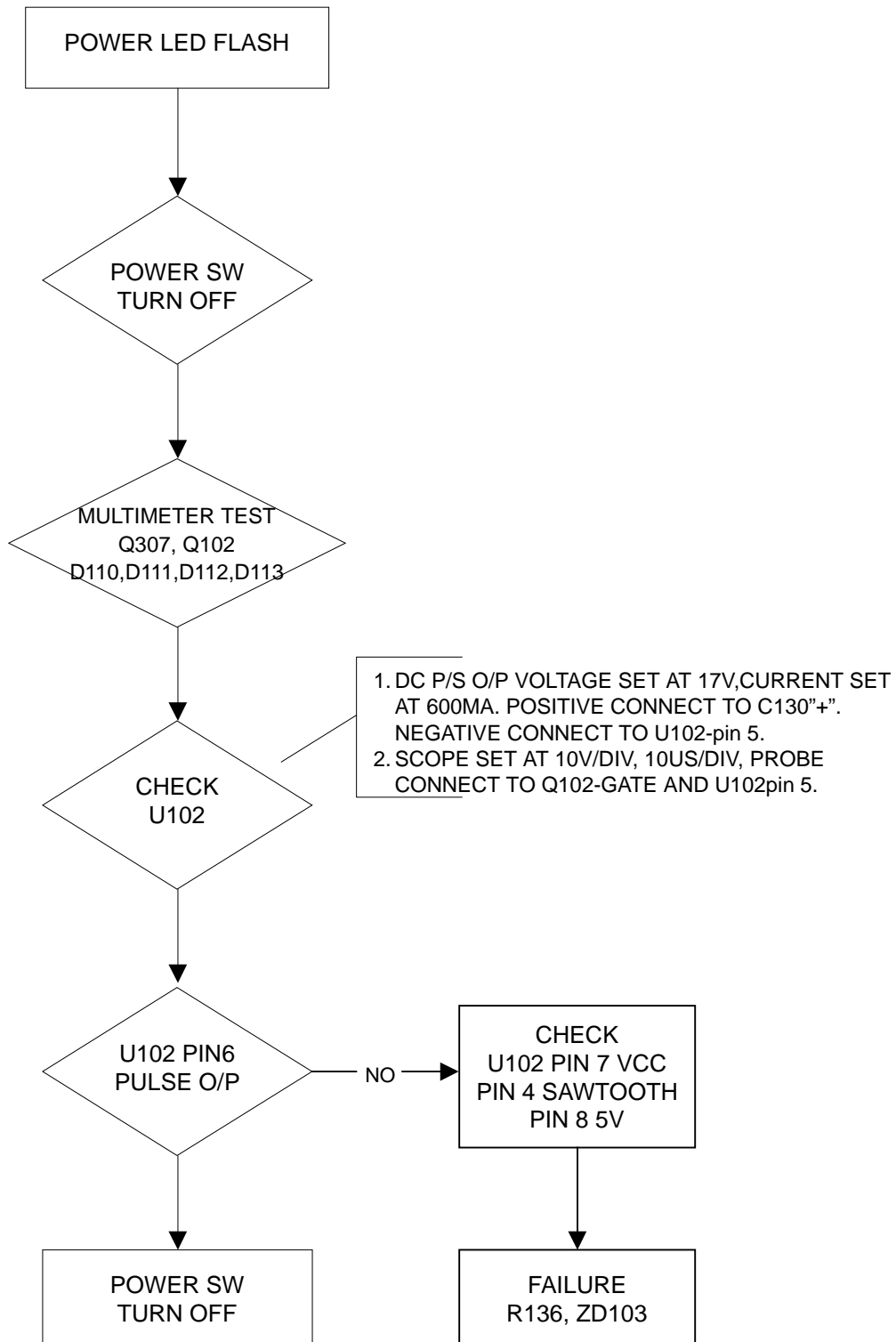
TROUBLE SHOOTING

Refer to User's Manual trouble shooting section before using this chart.

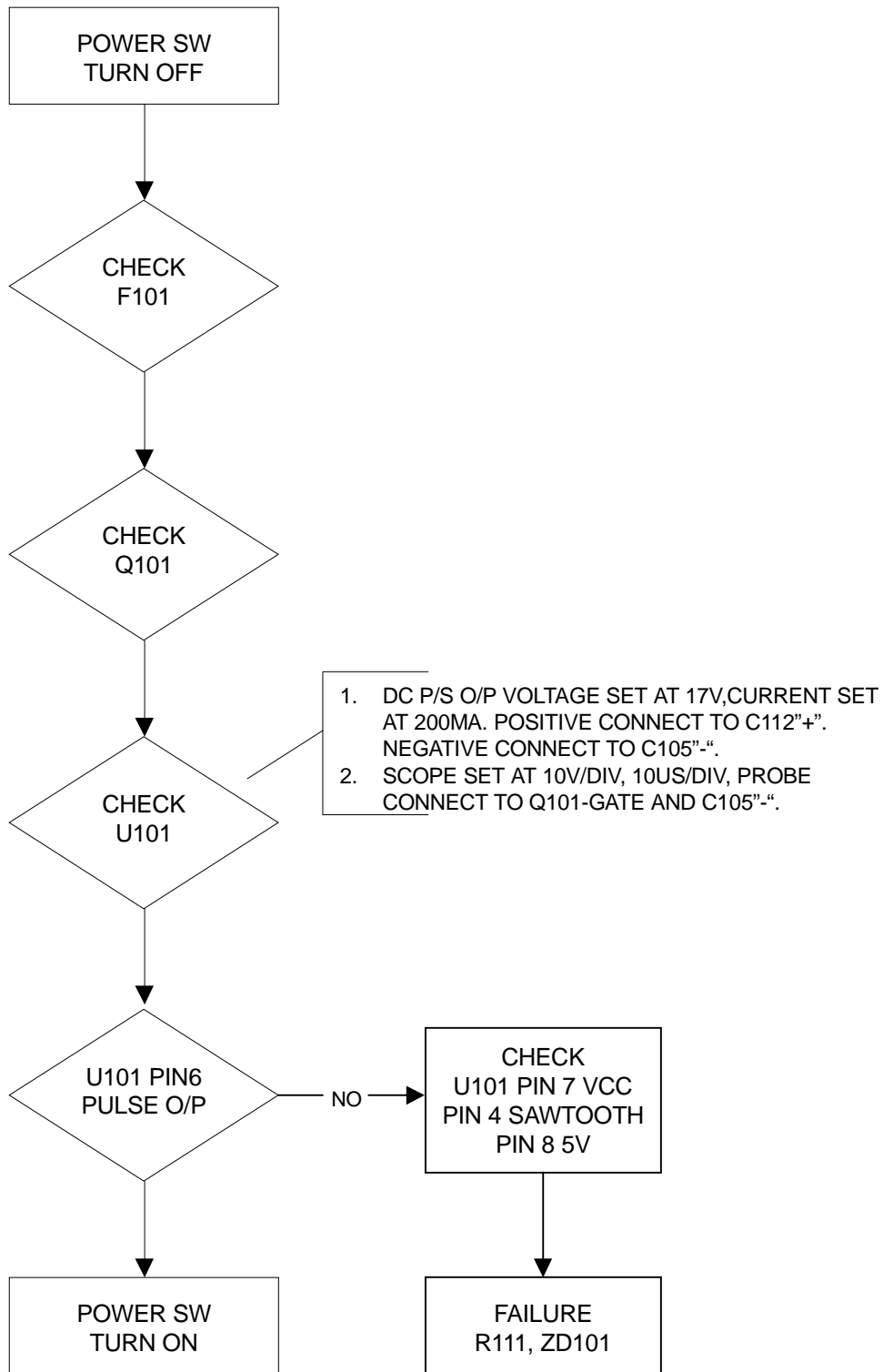
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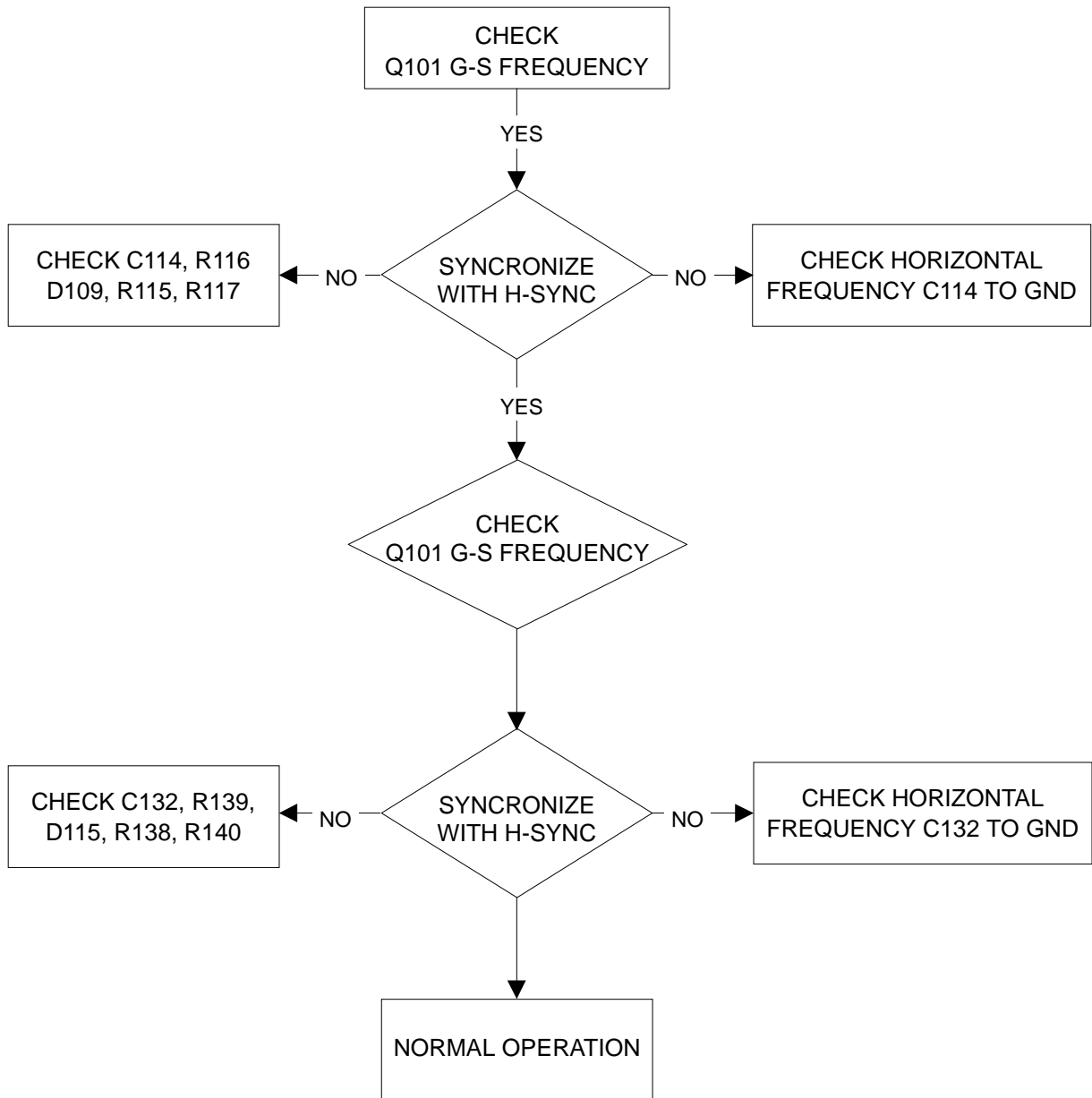
1. NO OPERATION, POWER LED FLASH



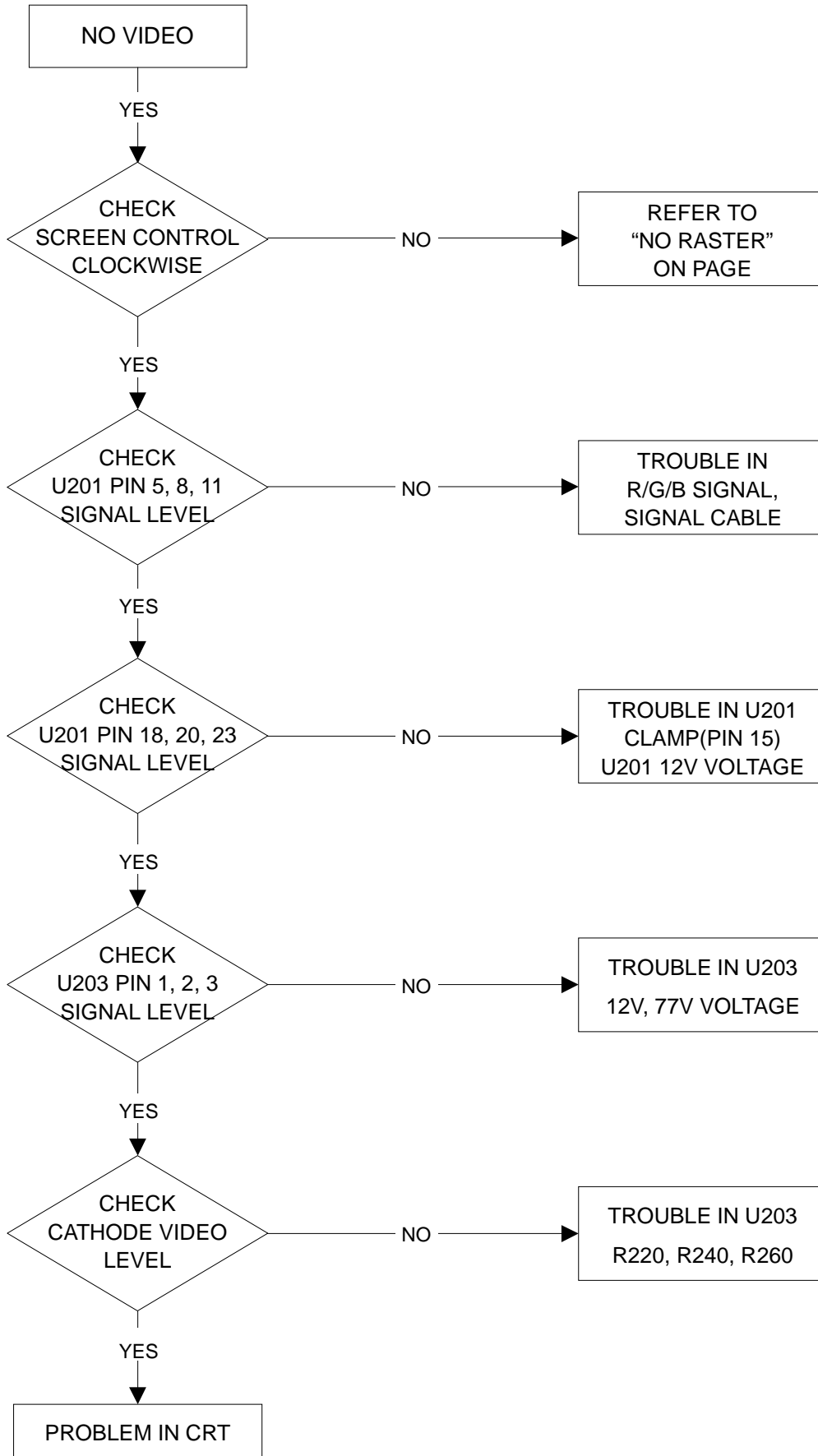
2. NO OPERATION, POWER LED OFF



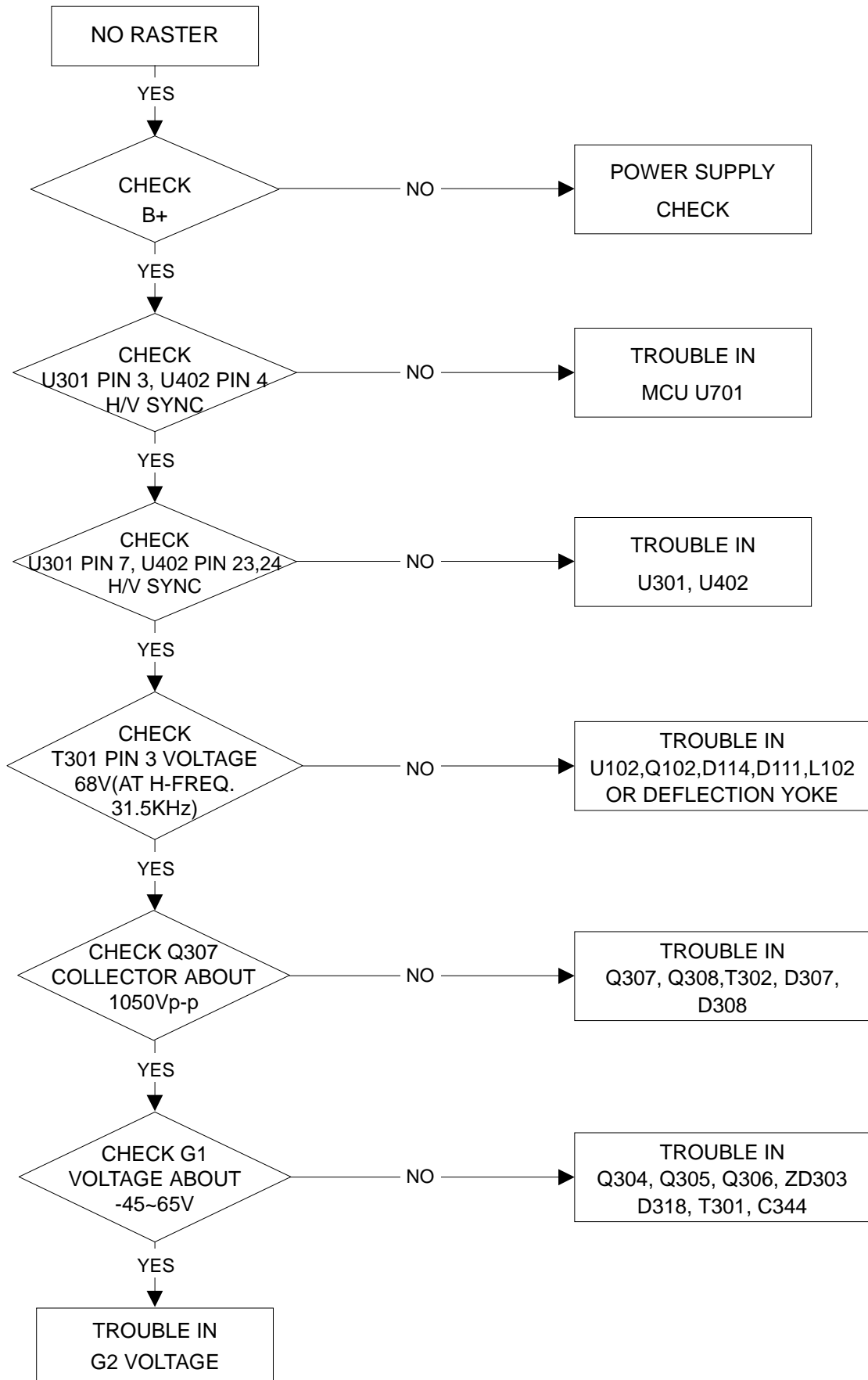
3. VIDEO NOISE, UNSYNCHRONOUS



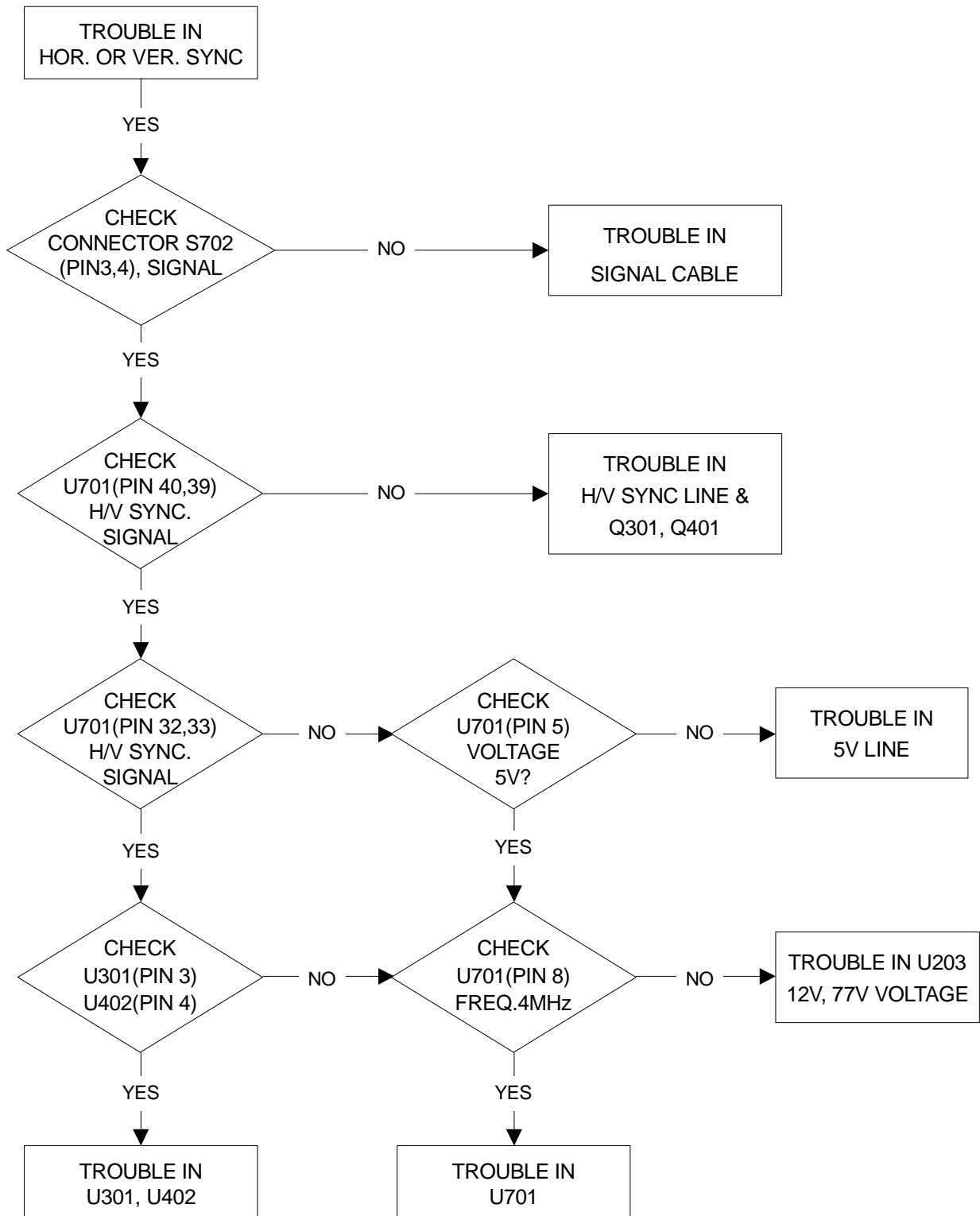
4. NO VIDEO



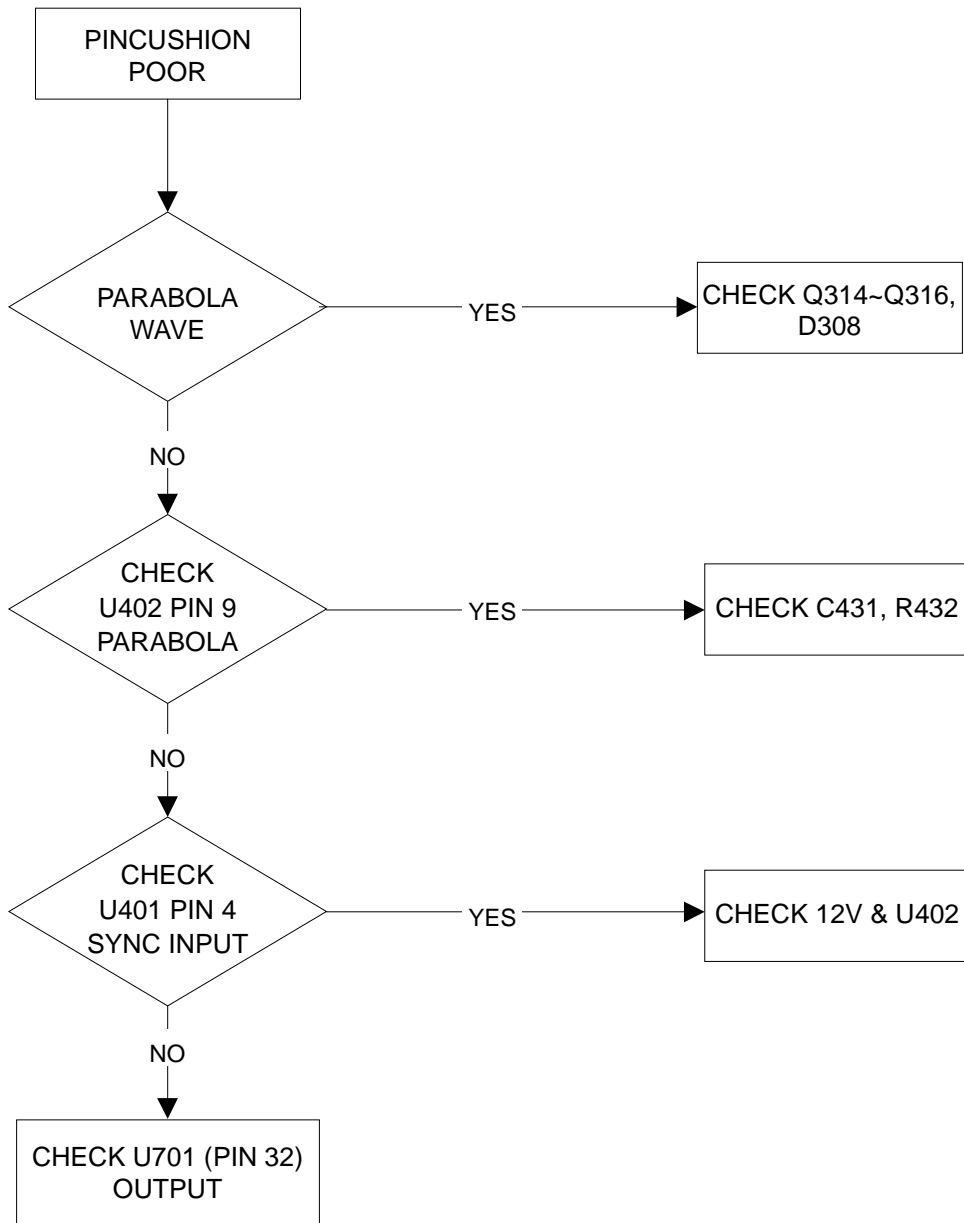
5. NO RASTER



6. TROUBLE IN H. V SYNC



7. PINCUSHION POOR



CIRCUIT DESCRIPTION

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1. Power supply circuit

① Outline

This power supply unit adopts the switching mode technology, and is an off-line mode type unit that provided several different DC outputs. The scanning frequency is available in different values ranging from 31 kHz to 69 kHz. Moreover, it is capable to operate at an AC input voltage of 100V ~ 240V and an AC frequency of 50-60 Hz \pm 3Hz.

The block diagram is the functional construction schematics, that shows the major functions of this power supply unit.

② EMI

The EMI circuit has a 2-stage construction, with the first stage consisting of the common mode choke unit and one X-capacitor, and the second stage consisting of the common mode choke unit and four Y-capacitors.

R101 is the bleed resistor of the X-capacitor. When the power supply switch is turned OFF, this resistor carries out the emergency charging of the capacitor C101.

The EMI is the circuit that prevents the monitor switching noise from being generated, there by minimizing the negative influence on the other electronic equipment.

③ AC rectifier and smoothing capacitor

The AC input is rectified by means of the full-bridge rectifier, that consists of the diodes D101 to D104. The AC voltage is converted into the DC voltage by passing through the next stage, that consists of the smoothing capacitor C105.

TH101 is a NTC thermistor for the power supply at the in-rush current limit.

④ Degaussing circuit

The degaussing circuit consists of the PTC thermistor TH102, the degaussing coil and the relay RL101. The relay is controlled by means of the +12V control signal coming from the CPU.

⑤ Transformer and energy

1) When the PWM controls IC KA3842A chip, a driving pulse is generated at the gate of the transistor Q101, and Q101 turns ON. The current returns from the "plus" (+) side of the energy-supplying capacitor C105 to the "minus" (-) side of the same capacitor C105, passing through the transformer Q101 D-S. During the ON cycle, the energy is stored in the transformer T101. The transistor Q101 turns OFF when the driving pulse disappears from Q101. As a result, all voltages of the dot ends of the winding flow to the positive direction and reach the fly-back rectifier. At that point of time, the diodes of the rectifier of the secondary side turn ON, a temporary energy is induced at the secondary side, and the ON cycle of the driving pulse is repeated.

- 2) The power supply MOS FET Q101 carries out the ON/OFF operation of the control unit, by means of U101 KA3842A. KA3842A is a PWM (pulse width modulation) IC chip, with 16 V starting voltage and 10 V cut-off voltage.

The following list shows the pin layout of KA3842A pulse width modulation IC chip.

| | | | |
|--------|----------------|--------|--------------|
| Pin 1: | Feedback | Pin 2: | Compensation |
| Pin 3: | Current sensor | Pin 4: | Oscillator |
| Pin 5: | Ground (GND) | Pin 6: | Pulse output |
| Pin 7: | VCC | Pin 8: | VREF (5.1 V) |

- 3) Overcurrent protection

R111 is a sensor resistor, and it has the function of increasing the current of this loop when the output of the secondary side is either in the overloaded state or is insufficient.

Since the current passing through the R111 sensor resistor has voltage dropping effect, the operation of the output pulse is stopped when a voltage lower than 1 Volt is detected at the pin number 3 of the KA3842A chip, and the switch of the power supply MOS FET is kept in the “break” state until the VCC voltage is charged up to 16 Volts, and the operation of U101 KA3842A is resumed.

When it is not clearly known whether there is voltage shortage or not, however, this circuit repeats the ON/OFF switching, and the power supply LED lights up.

- 4) Starting circuit

The resistor R164 and R168 and the transistor Q112 and diode D107 and resistor R165, R149 and zener diode ZD105 are for the starting operation. When the circuit starts its operation, the power supply transformer T101 supplies the auxiliary 12 Volt power to the control IC chip U101 via pins 6 and 7 of the winding transformer T101.

- 5) Synchronization circuit

The synchronization signal is induced from the fly-back transformer (FBT), and carries out the synchronization with the power supply frequency. The frequency range is from 31 kHz to 61 kHz, and the component elements of the synchronization circuit are C114, R116, D109, R115 and R117.

- 6) Feedback circuit

The feedback circuit loop induces the 12 V voltage through the pin 6 and the pin 7 of the power supply transformer. That voltage is connected with the pin 3 of the IC chip U101 by passing through D108, C113 and passing next through R122, VR101, R120 and R190. This is a regular loop.

- 7) Snubber circuit

The snubber circuit has the function of clamping the ON/OFF spikes of the power supply MOS-FET, and its component elements D105, C106, R106 make up a snubber that turns OFF the power supply MOS-FET.

- 8) Secondary rectifier and smoothing rectifier

The secondary rectifier is a harmonic rectifier consisting of D111, C124 and R128, and it works as a snubber circuit as well. The capacitors C120 and C138 are the smoothing rectifier working on the 45 Volt DC output. There are also other DC outputs, such as 80 Volt (D110), 13.5 Volt (D112) and 6.3 Volt (D113).

⑥ DC/DC

The DC/DC voltage is DC 45 volts, and since the set-up voltage is variable from 60 volts to 160 volts, it is variable depending on the horizontal synchronism. The frequency band is variable from 31 kHz to 65 kHz. The voltage is fed back from the fly-back transformer (FBT). The DC/DC output voltage is used as high-voltage input of FBT T301.

- 1) DC/DC is a step-up circuit, and consists mainly of the choke L106, the transistor Q102, the diode D114 and U102.
- 2) When the PWM controls U102 IC KA3843, a driving pulse is generated at the gate of the transistor Q102, and the transistor Q102 turns ON. During the ON cycle, the energy is stored in the choke L106. The transistor Q102 turns OFF when the driving pulse disappears from the gate of the transistor Q102. As a result, the voltage at the dot terminal of the winding flows in the positive direction and goes to the fly-back rectifier. The energy stored in the choke L106 is entered in the FBT, passing through the choke L106, the diode D114 and the capacitor C129.
- 3) The feedback is detected by the FBT via diode D130, the capacitor C145, the resistor R145 the variable resistor VR102 and the fixed resistor R146, and is connected to the U102-2 pin.
This is loop is the regular type one.
- 4) The frequency of the synchronization signal coming from video H-SYNC is variable from 31 kHz to 69 kHz. The circuit consists of the capacitor C132, the resistor R139, the diode D115, the resistor R138 and the resistor R140.
- 5) The soft start circuit consists of the resistor R178, the capacitor C164, the diode D133 and the diode D117.

2. MCU

Monitor MCU Specification

Frequency Specification

H-freq. : 29.5K – 70KHz

V-freq. : 43 – 160Hz

Judge polarity only when frequency is 31.5 KHz and 37.8 KHz

Support composite sync detection

System Architecture

1. MCU – Weltrend WT6016, 16K bytes ROM size
2. EEPROM – 24C04 series, 4K bit, with ID code for identify initialization.
3. OSD – Myson MTV016N-12

Input

1. Sync input – 2 pins for H-sync & V-sync frequency inverted input.
2. Key input – 2 pins for A/D key input (SELECT, UP, DOWN and RECALL).
3. Burn-in ID input – 1 pins for Burn-in ID input.
4. Reset input – low pulse for reset MCU
5. Crystal input – 2 pins using 8MHz crystal.

Output – MCU digital pin

1. Degauss – Active high pulse for 2.5 sec when in degauss. MCU will activate degauss while power on.
2. CS output – 3 pins (CS2, CS1, CS0) for CS control

| H-sync | CS2 | CS1 | CS0 |
|------------------------------|------------|------------|------------|
| H-sync < 33.25KHz | 0 | 0 | 0 |
| 33.25KHz < H-sync < 36.50KHz | 0 | 1 | 0 |
| 36.50KHz < H-sync < 40.50KHz | 0 | 1 | 1 |
| 40.50KHz < H-sync < 45.10KHz | 1 | 0 | 0 |
| 45.10KHz < H-sync < 51.60KHz | 1 | 0 | 1 |
| 51.60KHz < H-sync < 55.10KHz | 1 | 1 | 0 |
| 55.10KHz < H-sync < 62.15KHz | 1 | 1 | 0 |
| 62.15KHz < H-sync | 1 | 1 | 1 |
| Mode change | 0 | 0 | 0 |

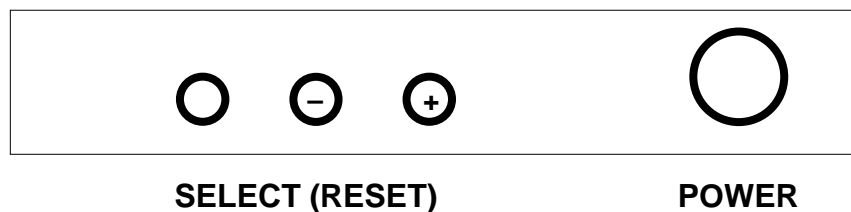
3. Power saving – 2 pins (PMUS, PMUO) for power saving control
- if Hf > 70KHz or Hf < 23KHz, enter power saving mode (suspend).
 - enter power saving mode after 3 sec when condition met.
 - enter suspend mode first for 3 sec before enter off mode if off mode condition met.

| Mode | H-sync freq. | V-sync freq. | Burn-in ID | PMUS | PMUO |
|----------|--------------|--------------|------------|------|------|
| Normal | Yes | Yes | --- | 1 | 1 |
| Stand By | No | Yes | --- | 0 | 1 |
| Suspend | Yes | No | --- | 0 | 1 |
| Off | No | No | Low | 0 | 0 |
| Burn-in | No | No | High | 1 | 1 |

PS. Output H-sync 48KHz, V-sync 75Hz for Burn-in mode.

4. Mute – 2 pins for screen mute
- Mute1 – active low pulse for about 0.6 sec when mode change.
 - Mute2 – active low pulse for about 1.0 sec when mode change, active with mute 1 simultaneously.
5. D/A – 14 pins (PWM output) are Brightness, Contrast, H-phase, H-size, V-center, V-size, Pincushion, Trapezoid, Rotation, Parallel, Pin-balance, R-gain, G-gain and B-gain.
- DAC value 255 means the maximum output volts except Parallel PWM.
 - All D/A except Rotation, Brightness, Contrast, R-gain G-gain B-gain are mode dependent functions.
 - Parallel is voltage inverter function.
6. Sync output – 2 pins for H-sync and V-sync negative output, normal high.
7. DDC – 2 pins (DDC SDA/DDC SCL) for DDC1/DDC2B or auto alignment control.
- In auto alignment mode, all keys and OSD are disabled.
8. SDA/SCL – 2 pins for EEPROM and OSD control.
9. WP – 1 pin, high for EEPROM write protect.

Control Panel Operation



1. Key arrangement – 3 keys for OSD control.
2. Hot key operation
 - A. Factory Mode: SELECT Key + UP (+) Key if pressed when the power SW on.
 - B. OSD Position Control Mode: DOWN (-) Key if pressed when the power SW on.
 - C. Aging mode: Select key if pressed when the power SW on.

IIC interface

1. DDC1/DDC2B – VESA DDC1/DDC2B is supported.
2. Auto alignment – I²C auto alignment protocol is supported.

Timing Table

Total 24 modes.

1. Factory mode – 20 modes

| Mode | Resolution | H-sync. | V-sync. | H polarity | V polarity |
|------|---------------|---------|---------|------------|------------|
| 1 | VGA 350 | 31.5KHz | 70Hz | + | - |
| 2 | VGA 400 | 31.5KHz | 70Hz | - | + |
| 3 | VGA 480 | 31.5KHz | 60Hz | - | - |
| 4 | MACII 35k | 35.0KHz | 66Hz | * | * |
| 5 | 800*600(56) | 35.2KHz | 56Hz | * | * |
| 6 | 8514A | 35.5KHz | 87Hz | * | * |
| 7 | 640*480(75) | 37.5KHz | 75Hz | * | * |
| 8 | EVGA 400 | 37.8KHz | 84Hz | - | + |
| 9 | 800*600(60) | 37.8KHz | 60Hz | * | * |
| 10 | 640*480(85) | 43.3KHz | 85Hz | * | * |
| 11 | 800*600(75) | 46.8KHz | 75Hz | * | * |
| 12 | 1024*768(60) | 48.3KHz | 60Hz | * | * |
| 13 | MACII 49k | 49.7KHz | 74Hz | * | * |
| 14 | 800*600(85) | 53.6KHz | 85Hz | * | * |
| 15 | 1024*768(70) | 56.4KHz | 70Hz | * | * |
| 16 | 1024*768(75) | 60.0KHz | 75Hz | * | * |
| 17 | 640*480(120) | 63.7KHz | 120Hz | * | * |
| 18 | 1280*1024(60) | 64.0KHz | 60Hz | * | * |
| 19 | 800*600(100) | 64.0KHz | 100Hz | * | * |
| 20 | 1024*768(85) | 68.6KHz | 85Hz | * | * |

** indicate do not care.

2. User mode – 4 modes
– FIFO replacement is applied.

Pin Definition

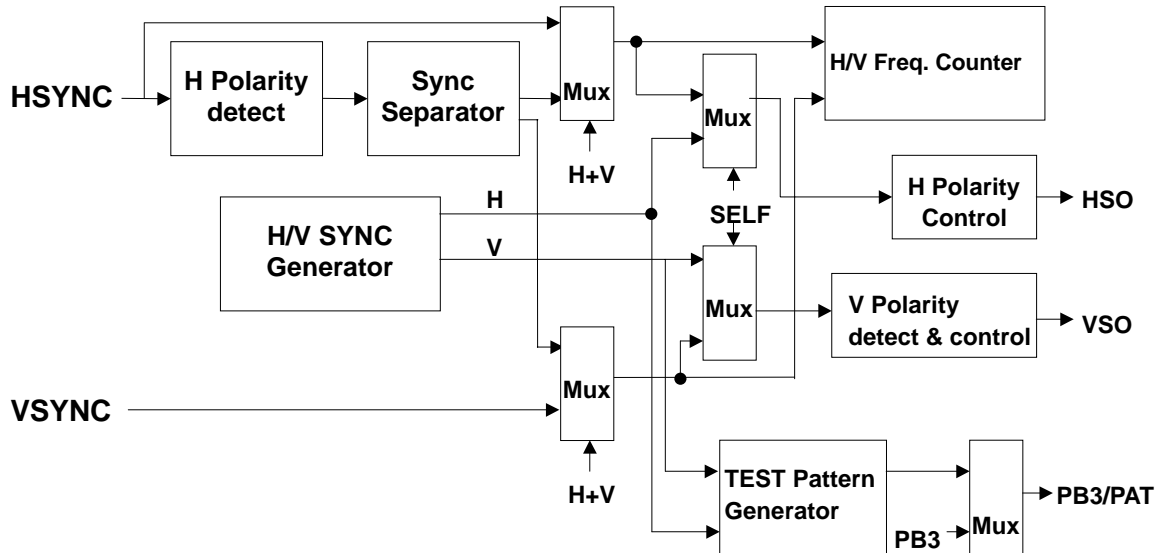
| Pin | Name | Description | I/O |
|-----|----------|----------------------|-----|
| 1 | DA2 | Pin-balance PWM | O |
| 2 | DA1 | H Position PWM | O |
| 3 | DA0 | H size PWM | O |
| 4 | Reset | Low reset | I |
| 5 | Vdd | +5V | I |
| 6 | Vss | Ground | I |
| 7 | Osc O | 8MHz Crystal out | O |
| 8 | Osc I | Crystal in | I |
| 9 | PB5 | EEPROM/OSD SDA | I/O |
| 10 | PB4 | EEPROM/OSD SCL | O |
| 11 | PB3 | Test Pattern | O |
| 12 | PB2 | CS1 | O |
| 13 | PB1 | CS0 | O |
| 14 | PB0 | PMU OFF | O |
| 15 | IRQ | CS2 | O |
| 16 | PC7 | MUTE2 | O |
| 17 | PC6 | Degauss out | O |
| 18 | PC5 | MUTE1 | O |
| 19 | PC4 | PMU suspend | O |
| 20 | PC3 | Burn-in ID | I |
| 21 | PC2 | EEPROM write protect | O |
| 22 | PC1 | UP/RESET key | I |
| 23 | PC0 | DOWN/SELECT key | I |
| 24 | SDA | DDC SDA | I/O |
| 25 | SCL | DDC SCL | I |
| 26 | PA0 | Rotation PWM | O |
| 27 | PA1 | Contrast PWM | O |
| 28 | PA2 | Brightness PWM | O |
| 29 | PA3 | R-gain PWM | O |
| 30 | PA4 | G-gain PWM | O |
| 31 | PA5 | B gain PWM | O |
| 32 | PA6 | V-sync out | O |
| 33 | PA7 | H-sync out | O |
| 34 | DA7 | V-center PWM | O |
| 35 | DA6 | Parallel PWM | O |
| 36 | DA5 | Trapezoid PWM | O |
| 37 | DA4 | Pincushion PWM | O |
| 38 | DA3 | V-Size PWM | O |
| 39 | Hsync in | H-sync input | I |
| 40 | Vsync in | V-sync input | I |

PIN DESCRIPTION

| Pin No. | | Pin Name | I/O | Descriptions |
|---------|----|----------|-----|---|
| 40 | 42 | | | |
| 1 | 1 | DA2 | O | D/A converter 2. Open-drain output. External applied voltage can up to 10V. |
| 2 | 2 | DA1 | O | D/A converter 1. Open-drain output. External applied voltage can up to 10V. |
| 3 | 3 | DA0 | O | D/A converter 0. Open-drain output. External applied voltage can up to 10V. |
| 4 | 4 | /RESET | I | Reset. Active low. Schmitt trigger input. Internal pull high. |
| 5 | 5 | VDD | | Power supply (+5V). |
| 6 | 7 | GND | | Ground (0V). |
| 7 | 8 | OSCO | O | Oscillator Output. Connects a 8MHz crystal. |
| 8 | 9 | OSCI | I | Oscillator Input. Connects a 8MHz crystal. |
| 9 | 10 | PB5/SDA2 | I/O | I/O Port B5 or I²C data pin. This pin can be an I/O port or I ² C serial data pin. |
| 10 | 11 | PB4/SCL2 | I/O | I/O Port B4 or I²C data pin. This pin can be I/O port or I ² C clock pin. |
| 11 | 12 | PB3/PAT | I/O | I/O Port B3 or self-test pattern output. When as an I/O port, it is same as PB5. When it is configured to test pattern output, a video signal is output. |
| 12 | 13 | PB2 | I/O | I/O Port B2. Same as PB0. |
| 13 | 14 | PB1 | I/O | I/O Port B1. Same as PB0. |
| 14 | 15 | PB0 | I/O | I/O Port B0. When it is an input pin, it has an internal pull-up resistor. When it is an output pin, the source/sink current is 5mA. |
| 15 | 16 | PB6/IRQ | I/O | I/O Port B6 or Interrupt Request. When as interrupt request input, it has an internal pull high resistor. When as an I/O port, it is same as PB3. |
| 16 | 17 | PC7 | I/O | I/O Port C7. When it is an input pin, it has an internal pull-up resistor. When it is an output pin, the sink current is 10mA and the source current is 5mA. |
| 17 | 18 | PC6 | I/O | I/O Port C6. Same as PC7. |
| 18 | 19 | PC5 | I/O | I/O Port C5. Same as PC7. |
| 19 | 20 | PC4 | I/O | I/O Port C4. Same as PC7. |
| 20 | 21 | PC3 | I/O | I/O Port C3. Same as PC7. |
| 21 | 22 | PC2 | I/O | I/O Port C2. Same as PC7. |
| 22 | 23 | PC1/AD1 | I/O | I/O Port C1 or A/D converter input 0. |
| 23 | 24 | PC0/AD0 | I/O | I/O Port C0 or A/D converter input 1. |
| 24 | 25 | SDA1/PD1 | I/O | DDC serial clock or I/O Port D1. When it is a DDC interface pin, It is an open-drain output. When as an I/O port, it is same as Port B. |
| 25 | 26 | SCL1/PD0 | I/O | DDC serial clock or I/O Port D0. When it is a DDC interface pin, It is an open-drain output. When as an I/O port, it is same as Port B. |
| 26 | 27 | PA0/DA8 | I/O | I/O Port A0 or D/A converter 8. This pin can be the output of D/A converter 8 (source /sink = 5mA) or an I/O pin (source = -100uA, sink = 5mA). |
| 27 | 28 | PA1/DA9 | I/O | I/O Port A1 or D/A converter 9. Same as PA0/DA8. |
| 28 | 29 | PA2/DA10 | I/O | I/O Port A2 or D/A converter 10. Same as PA0/DA8. |
| 29 | 30 | PA3/DA11 | I/O | I/O Port A3 or D/A converter 11. Same as PA0/DA8. |
| 30 | 31 | PA4/DA12 | I/O | I/O Port A4 or D/A converter 12. Same as PA0/DA8. |
| 31 | 32 | PA5/DA13 | I/O | I/O Port A5 or D/A converter 13. Same as PA0/DA8. |
| 32 | 33 | PA6/VSO | I/O | I/O Port A6 / VSYNC OUT. This pin can be the output of VSYNC or an I/O pin. When as an I/O pin, it is same as PA0. |
| 33 | 34 | PA7/HSO | I/O | I/O Port A7 / HSYNC OUT. This pin can be the output of HSYNC or an I/O pin. When as an I/O pin, it is same as PA0. |
| 34 | 35 | DA7 | O | D/A converter 7. Open-drain output. External applied voltage can up to 10V. |
| 35 | 36 | DA6 | O | D/A converter 6. Open-drain output. External applied voltage can up to 10V. |
| 36 | 38 | DA5 | O | D/A converter 5. Open-drain output. External applied voltage can up to 10V. |
| 37 | 39 | DA4 | O | D/A converter 4. Open-drain output. External applied voltage can up to 10V. |
| 38 | 40 | DA3 | O | D/A converter 3. Open-drain output. External applied voltage can up to 10V. |
| 39 | 41 | HSYNC | I | HSYNC input. Schmitt trigger input. |
| 40 | 42 | VSYNC | I | VSYNC input. Schmitt trigger input. |

SYNC Processor

The SYNC processor can : (1) separate the composite sync signal; (2) calculate HSYNC and VSYNC frequencies; (3) detect polarities of HSYNC and VSYNC input; (4) control the output polarities of HSO and VSO pin; (5) generate free-running horizontal and vertical sync signals for burn-in test; (6) generate self-test pattern signal.

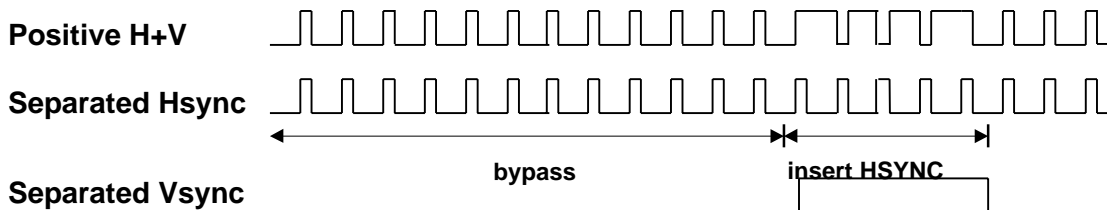


Composite Sync Signal Separation

The composite sync signal comes from HSYNC pin and is separated by the sync separator.

The operations of sync separator are:

- detect the polarity and convert composite sync signal to positive polarity.
- extract Vsync
 - Pulse width less than 8us will be filtered, but the Vsync will be widened about 8us.
- count the pulses during the separated Vsync is low and save the counter value (N_H).
- bypass the composite sync pulses before the counter equals to N_H .
- start inserting Hsync pulses after the counter equals to N_H until the separated Vsync is low.
- the period of inserted Hsync is decided by the last two bypassed Hsync.
- the pulse width of the inserted Hsync is 2us.



To decide whether the HSYNC input is a composite sync signal or not, program should check the frequency of VSYNC first (reset H+V bit to "0"). If the VSYNC frequency is lower than 15.25Hz (OVF2=1), set H+V bit to "1" and check VSYNC frequency again. If VSYNC still has no frequency, that is power saving condition, program should reset H+V bit. If it has a valid frequency, the HSYNC input is composite signal.

Frequency Calculation

Horizontal frequency and vertical frequencies calculation are done by using one 10-bit up counter. After power is on, the SYNC processor calculates the vertical frequency first (H/V bit = "0"). A 31.25KHz clock counts the time interval between two VSYNC pulses, then sets the FRDY bit and generates an INT1 interrupt (if IEN_S bit is "1"). The software can either use interrupt or polling the FRDY bit to read the correct vertical frequency. After reading the REG#16H, the FRDY bit is cleared to "0", counter is reset and H/V bit is set. The SYNC processor starts to count horizontal frequency. The horizontal frequency calculation is done by counting the HSYNC pulses in 8.192 ms. Like the vertical frequency, the horizontal frequency can be read when the FRDY bit is set or INT1 occurs. After reading the REG#16H, the FRDY, INT_S and H/V bits are cleared. The SYNC processor starts to calculate the vertical frequency again, and so on.

The relationships between counter value and frequency are:

$$\text{Hfreq} = (\text{counter value} \times 122.07) \text{ Hz}$$

$$\text{Vfreq} = (31250 / \text{counter value}) \text{ Hz}$$

The frequency range:

$$\text{Hfreq range: } 122.07 \text{ Hz to } 124.8 \text{ kHz; Resolution: } 122.07\text{Hz}$$

$$\text{Vfreq range: } 30.5 \text{ Hz to } 31.25 \text{ kHz}$$

If counter overflowed, the OVF1 bit will be set to "1". The counter keeps on counting until it overflowed again. The OVF2 bit and FRDY bit will be set when counter overflowed twice. This is designed for finding the vertical frequency bellows 15.25Hz. The program should check REG#17H before reading REG#16H.

Polarity Detect/Control

The polarities of HSYNC and VSYNC are automatically detected and are shown in the H_POL and V_POL bits. The polarities of HSO and VSO are controlled by the HOP and VOP bits. For example, set HOP bit to "1", the HSO pin always outputs positive horizontal sync signal, whatever the HSYNC input's polarity is.

Free-running Sync Signal

The self-generated sync signals are output from HSO and VSO pins if SELF bit is "1". Three kinds of frequencies are provided:

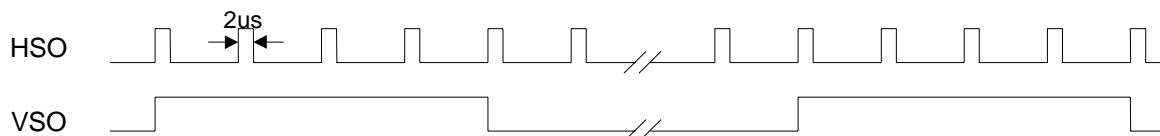
$$(1) \text{ Hfreq} = 8\text{MHz}/125 = 64.0\text{kHz}, \text{ Vfreq} = \text{Hfreq}/1024 = 62.5\text{Hz}.$$

$$(2) \text{ Hfreq} = 8\text{MHz}/167 = 47.9\text{kHz}, \text{ Vfreq} = \text{Hfreq}/640 = 74.9\text{Hz}.$$

$$(3) \text{ Hfreq} = 8\text{MHz}/257 = 31.1\text{kHz}, \text{ Vfreq} = \text{Hfreq}/512 = 60.8\text{Hz}.$$

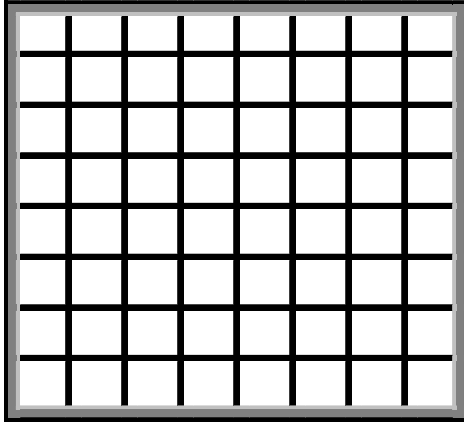
The output polarities are controlled by the HOP and VOP bits.

The pulse width of HSO is 2us and VSO is four HSO cycles. The timing relationship is shown in the following:

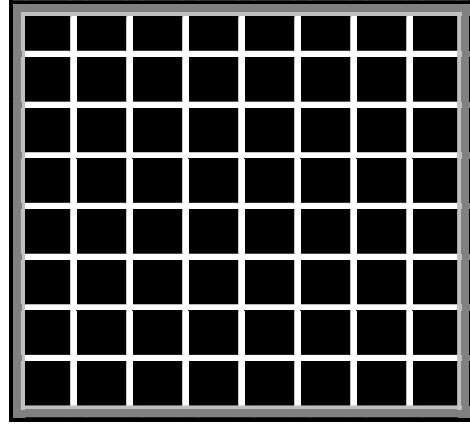


Test Pattern Generation

A self-test pattern signal comes out from pin PB3/PAT. It can generate a cross hatch picture, a inverted cross hatch picture, a whit epicture or a black picture.



8 × 8 cross hatch



Inverted 8 × 8 cross hatch

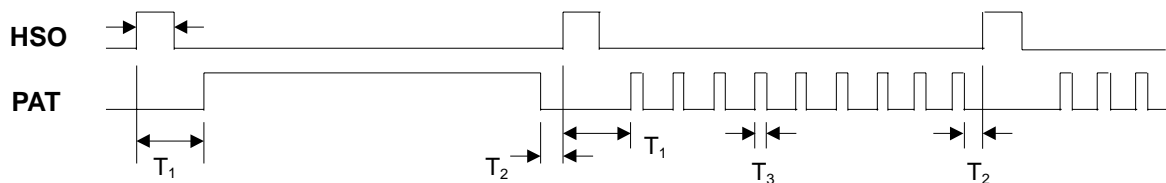


White Picture



Black Picture

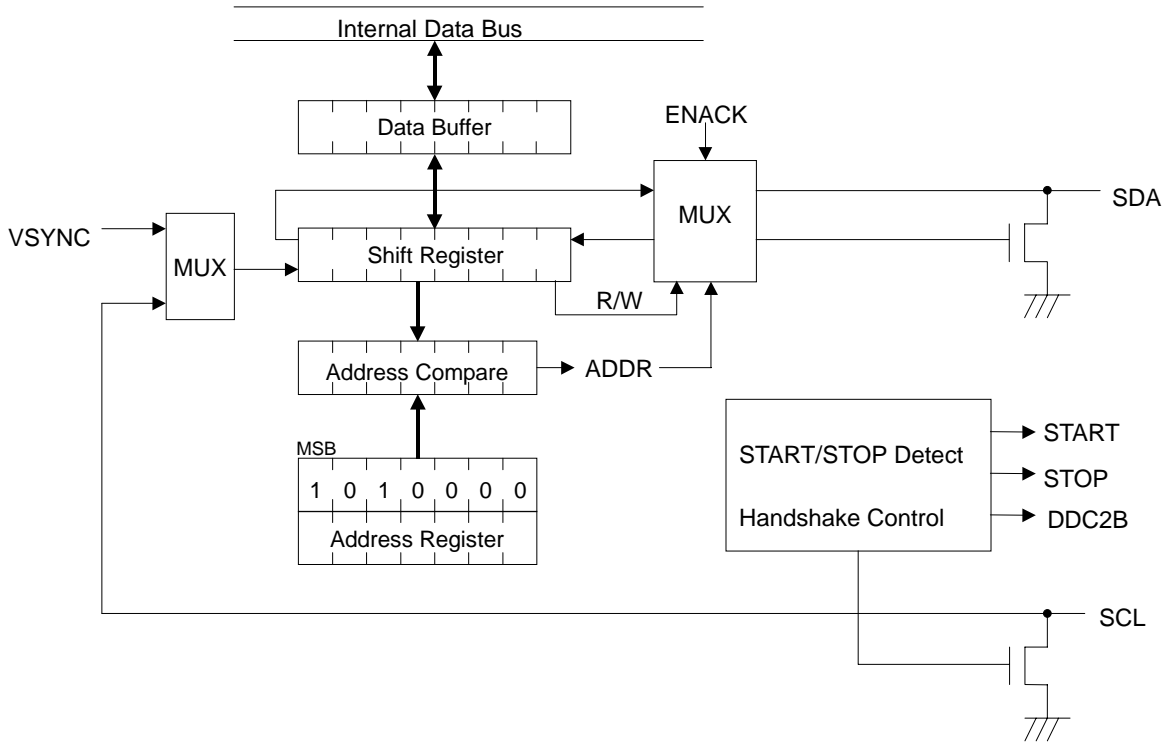
The test pattern signal is generated when SELF and ENPAT are both set to “1”. This video signal will synchronize to the free-running Hsync and Vsync, no matter which frequency is chosen. The following diagram shows the timing relationship of cross hatch picture.



| HSO | VSO | T ₁ | T ₂ | T ₃ |
|---------|--------|----------------|----------------|----------------|
| 31.1kHz | 60.8Hz | 6us | 1us | 62.5ns |
| 47.9kHz | 74.9Hz | 5.125us | 0.625us | 62.5ns |
| 64kHz | 62.5Hz | 3.625us | 0.875us | 62.5ns |

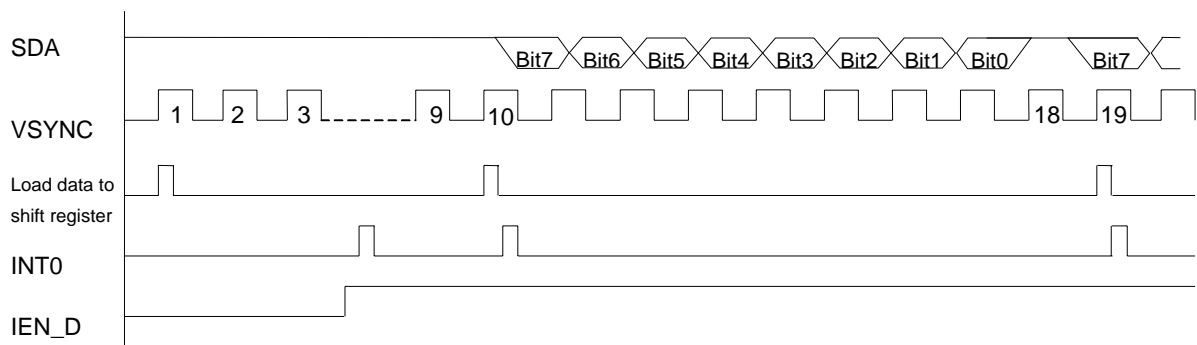
DDC Interface

The DDC interface is a slave mode I²C interface with DDC1 function. It is fully compatible with VESA DDC1/2B standard. The functional block diagram is shown in the below.



After power on or reset the DDC interface, it is in DDC1 state. The shift register shifts out data to SDA pin on the rising edge of VSYNC clock. Data format is an 8-bit byte followed by a null bit. Most significant bit (MSB) is transmitted first. Every time when the ninth bit has been transmitted, the shift register will load a data byte from data buffer (REG#18H). After loading data to the shift register, the data buffer becomes empty and generates an INT0 interrupt. So the program must write one data byte into REG#18 every nine VSYNC clocks.

Since the default values of data buffer (REG#22) and shift register are FFH, the SDA pin outputs high level if no data had been written into data buffer after power on reset. When program finished initialization and set the IEN_D bit to "1", the INT0 will occur because the data buffer is empty. The INT0 service routine should check the DDC2B bit is "0" and then writes the first EDID data byte into data buffer. When the second INT0 occurs, the INT0 service routine writes the second EDID data byte into data buffer and so on.



If a low level occurs on the SCL pin in DDC state, the DDC interface will switch to DDC2B state immediately and set the DDC2B bit to "1". No interrupt will be generated. But, if there is no valid device address and it receives 128 VSYNC pulses while the SCL is high level, it will lock into DDC2B state and disregard VSYNC.

In some case, program wants to go back DDC1 state, set RDDC bit in REG#1AH and reset it again. This operation resets the DDC interface to the initial condition.

When it is in DDC2B state, the VSYNC clock is disregarded and the communication protocol follows the DDC standard. The data format on SDA pin is:

| | | | | | | | | | |
|---|---------|-----|---|-----------------|---|-------|-----------------|---|---|
| S | Address | R/W | A | D7, D6, ..., D0 | A | ----- | D7, D6, ..., D0 | A | P |
|---|---------|-----|---|-----------------|---|-------|-----------------|---|---|

S: Start condition. A falling edge occurs when SCL is high level.

P: Stop condition. A rising edge occurs when SCL is high level.

A: Acknowledge bit. "0" means acknowledge and "1" means non-acknowledge.

Address: 7-bit device address.

R/W: Read/Write control bit, "1" is read and "0" is write.

D7, D6, ..., D0: data byte.

The hardware operations in DDC2B state are:

(1) START/STOP detection

When the START condition is detected, the DDC interface is enabled and set START bit to "1".

When the STOP condition is detected, the DDC interface is disabled, set STOP bit to "1" and generate INT0 interrupt.

The START bit is cleared when the following data byte received.

The STOP bit is cleared after writing REG#19H.

(2) Address Recognition

It contains two device addresses in WT6018. On fixed address ('1010000') is for EDID reading and one programmable address (REG#19H) is for external control, such as auto alignment.

If the address is equal to "1010000", set ADDR bit to "0".

If the address is equal to the bit A6 to bit A0 (REG#19H), set ADDR bit to "1".

If the address is not equal to anyone above, the DDC interface will not response acknowledge.

The ADDR bit is updated when a new device address is received.

(3) Store R/W bit and decide the direction of SDA pin

The R/W bit on the SDA pin will be stored in the RW bit.

(4) Acknowledge bit control/detection

Acknowledge bit control in receive direction:

If ENACK=1 and address compare is true, response acknowledge (Acknowledge bit ="0").

If ENACK=0 or address compare is false, response non-acknowledge (Acknowledge bit ="1").

Acknowledge bit detect in transmit direction:

If the acknowledge bit is "1", the DDC interface will be disabled and release the SDA pin.

If the acknowledge bit is "0", the DDC interface keeps on communicating.

(5) Data bytes transmit/receive

If the RW bit is “1”, the shift register will load data from the data buffer (REG#18H) before the data byte is transmitted and shift out data to the SDA pin before the rising edge of the SCL clock.

If the RW bit is “0”, the shift register will shift in data on the rising edge of the SCL clock and the whole data byte is latched to the data buffer (REG#18H).

(6) Handshaking procedure

The handshaking is done on the byte level. The DDC interface will hold the SCL pin low after the acknowledge bit automatically. The bus master will be forced to wait until the WT6018 is ready for the next byte transfer. To release the SCL pin, write REG#19H will release clear the wait state.

(7) Interrupt INTO

The DDC interface interrupt is enabled by setting the IEN_D bit in the REG#1AH.

Interrupt INTO occurs when:

- Transmit buffer empty in DDC1 state.

The INTO occurs when the shift register load data from data buffer.

Write REG#18H will clear the transmit buffer empty condition.

- Acknowledge is detected in DDC2B state.

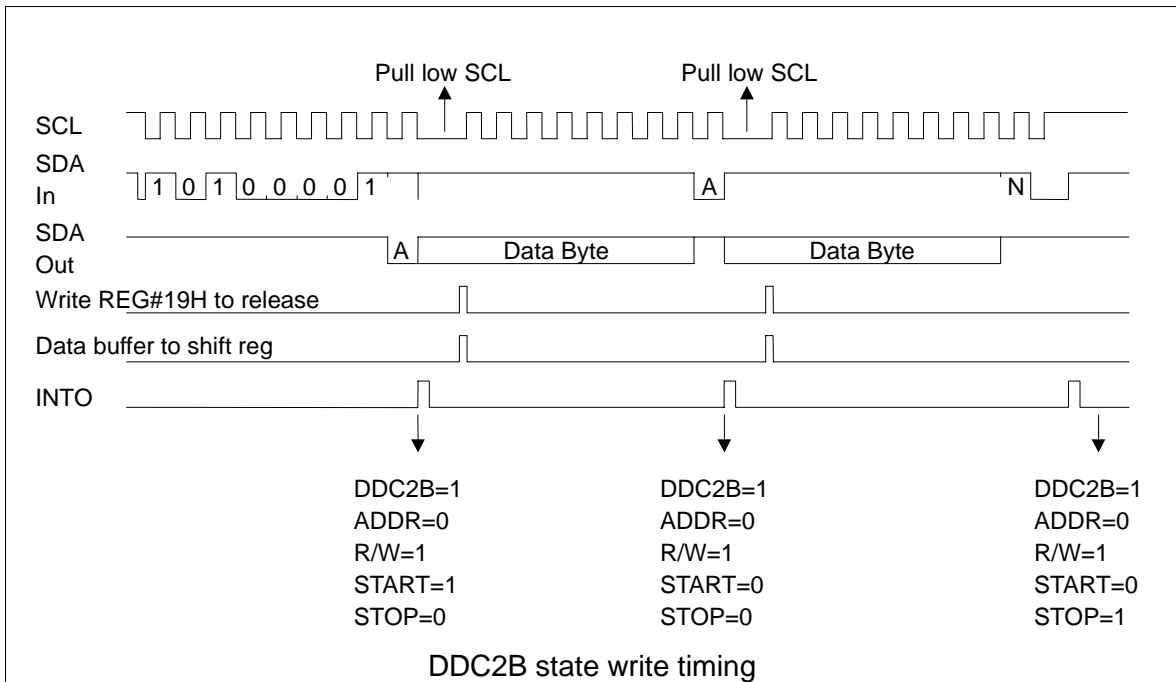
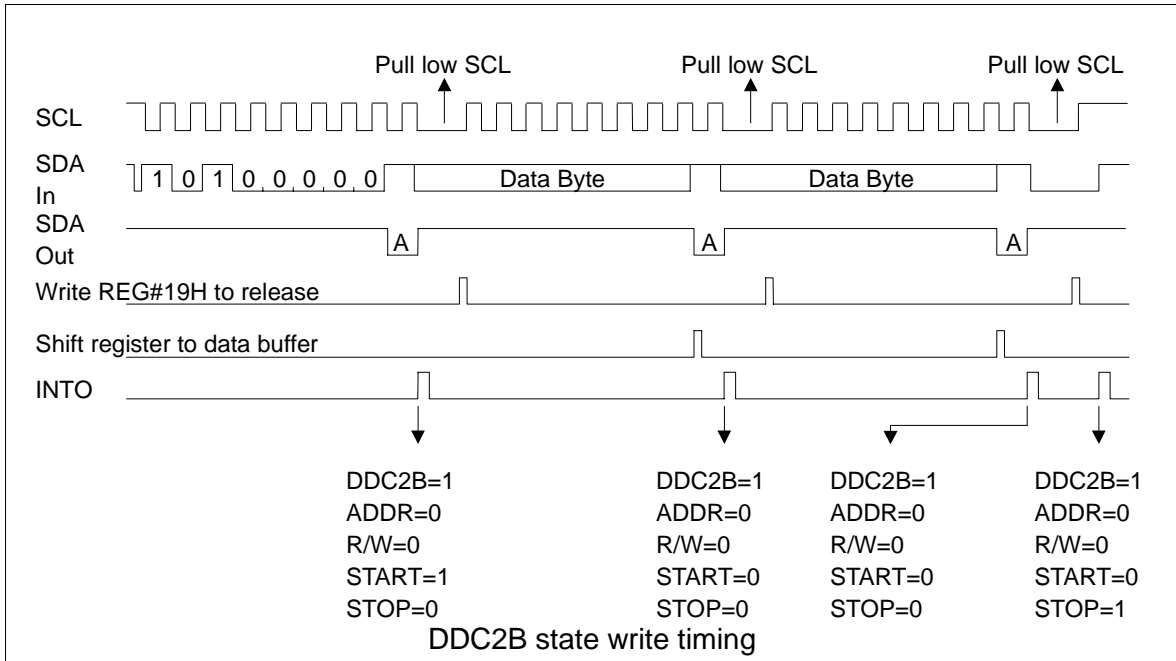
The INTO occurs on the falling edge of the SCL clock after the acknowledge had been detected.

The SCL pin will be pulled low to force the bus master to wait until the service routine write REG#19H.

- STOP condition occurs in DDC2B mode

| Address | R/W | Initial | Bit7 | Bit6 | Bit5 | Bit4 | Bit3 | Bit2 | Bit1 | Bit0 |
|---------|-----|---------|-------|------|------|-------|------|------|------|-------|
| 0018H | R/W | FFH | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
| 0019H | R | 40H | DDC2B | ADDR | R/W | START | STOP | -- | -- | -- |
| 0019H | W | A0H | A6 | A5 | A4 | A3 | A2 | A1 | A0 | ENACK |

| Bit Name | Bit value = “1” | Bit value = “0” |
|------------------|---|--------------------------------------|
| DDC2B | DDC2B state. | DDC1 state. |
| ADDR | Received address equals to the address in REG#19H(W). | Received address equals to ‘1010000’ |
| RW | Received R/W bit is ‘1’ | Received R/W bit is ‘0’ |
| START | START condition is detected. | No START condition is detected. |
| STOP | STOP condition is detected. | No STOP condition is detected. |
| ENACK | Enable acknowledge. | Disable acknowledge. |
| A6, A5, ... , A0 | 7-bit slave address | |
| D7, D6, ... , D0 | Data to be transmitted or received data. | |



3. 2-wire serial CMOS E²R0PM

Outstanding Features

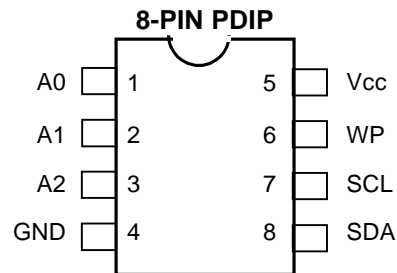
- Internally Organized 512 × 8 (4K)
- Two-wire Serial Interface
- Bidirectional Data Transfer Protocol
- Write Protect Pin for Hardware Data Protection
- 16-byte Page Write Modes
- Partial Page Writes Are Allowed
- Self-timed Write Cycle (10 ms max)

Description

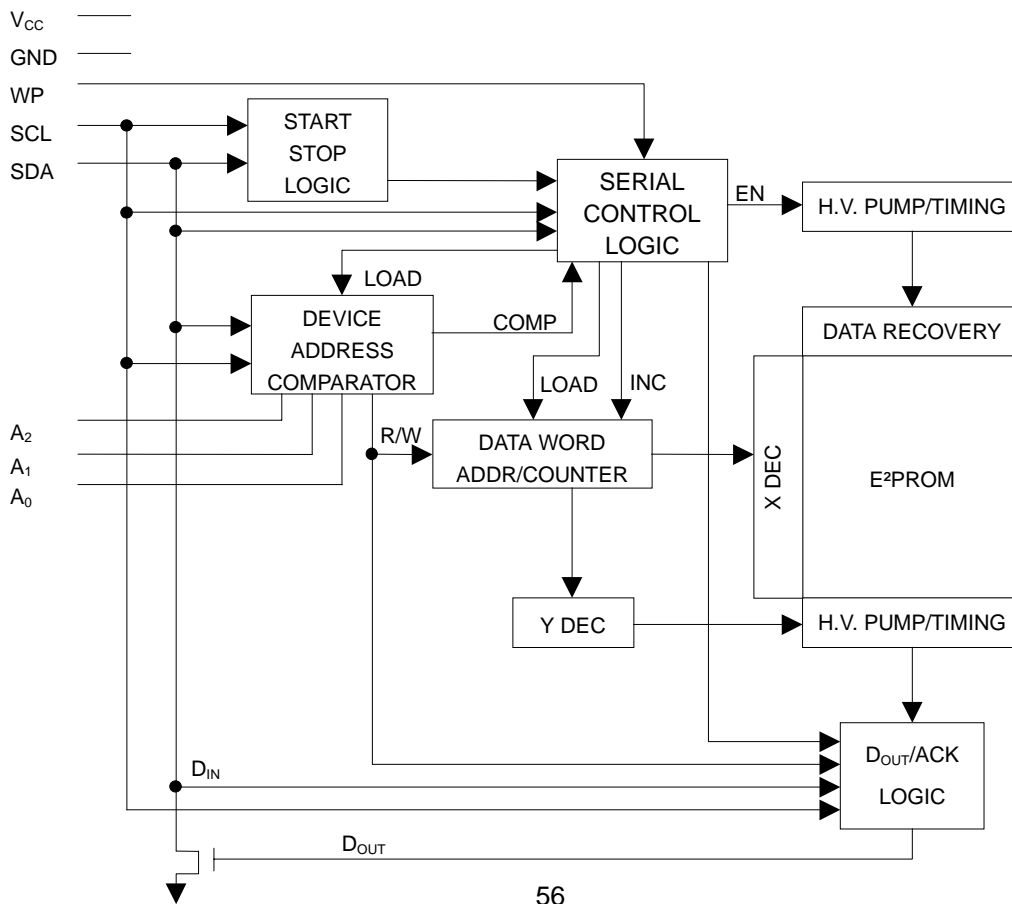
The AT24C04 provides 4096 bits of serial electrically erasable and programmable read only memory (EEPROM) organized as words of 8 bits each. The device is available in space saving eight-pin PDIP and is accessed via a two-wire serial interface. The AT24C04 is guaranteed for 100,000 erase/write cycles and 100 year data retention.

Pin Configurations

| Pin Name | Function |
|----------|--------------------|
| A0 to A2 | Address Inputs |
| SDA | Serial Data |
| SCL | Serial Clock Input |
| WP | Write Protect |
| NC | No Connect |



Block Diagram

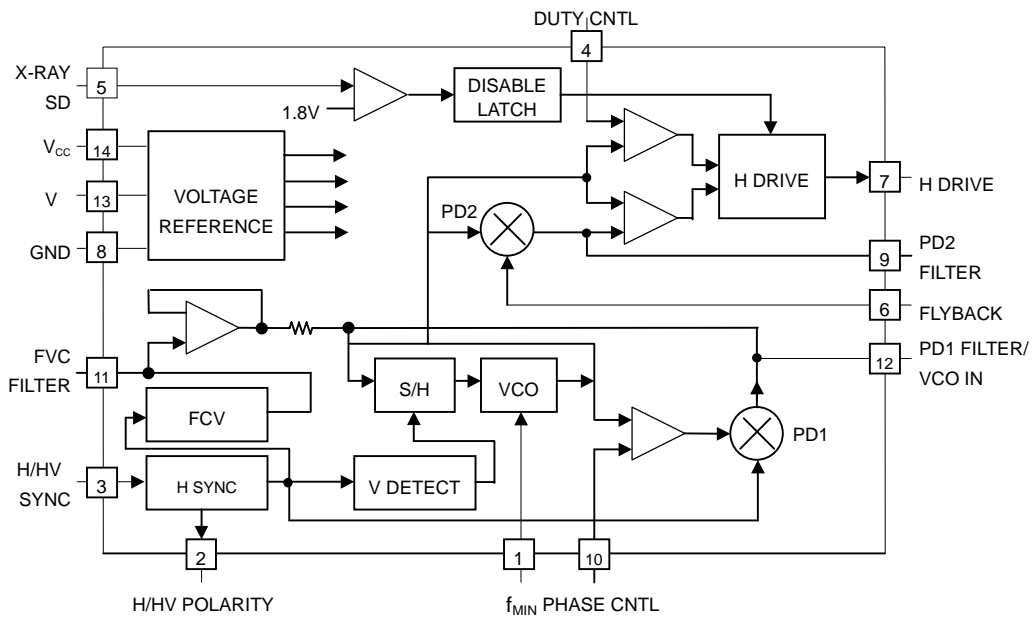


4. Horizontal deflection signal processing

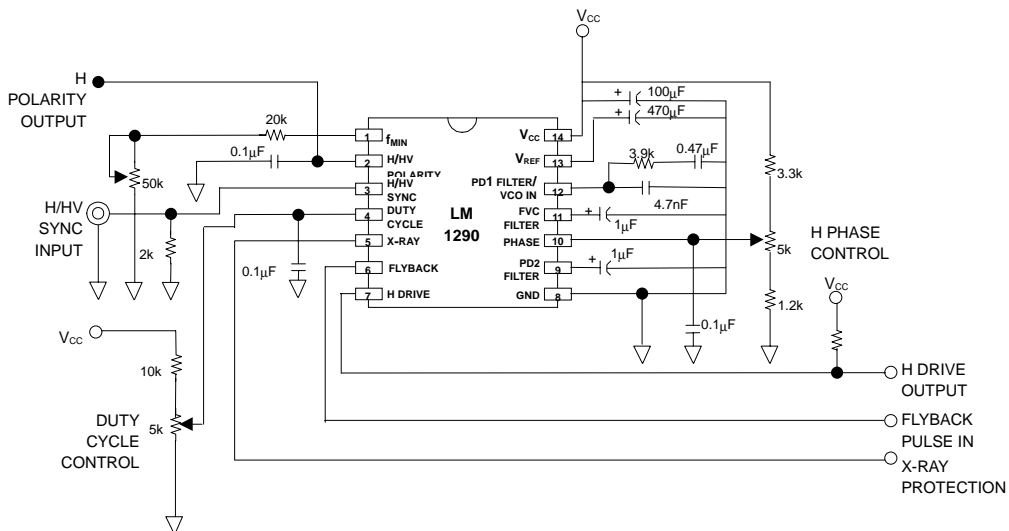
LM1290:

1. Full-automatic synchronization from 22 kHz to 90 kHz. No component changeover nor external adjustment is required.
2. DC control H phase and duty cycle.
3. The resistance corresponds to the frequency programmable down to VCO.
4. X-ray input invalid.
5. H-drive invalid due to low VCC (when $V_{CC} < 9.5V$). The H OUT transistor is protected as a result.
6. The capacitor protects the H output transistor during the change of the scanning mode, by means of the programmable frequency ramming $H VO/dt$.

System Block Diagram



Typical Application LM1290



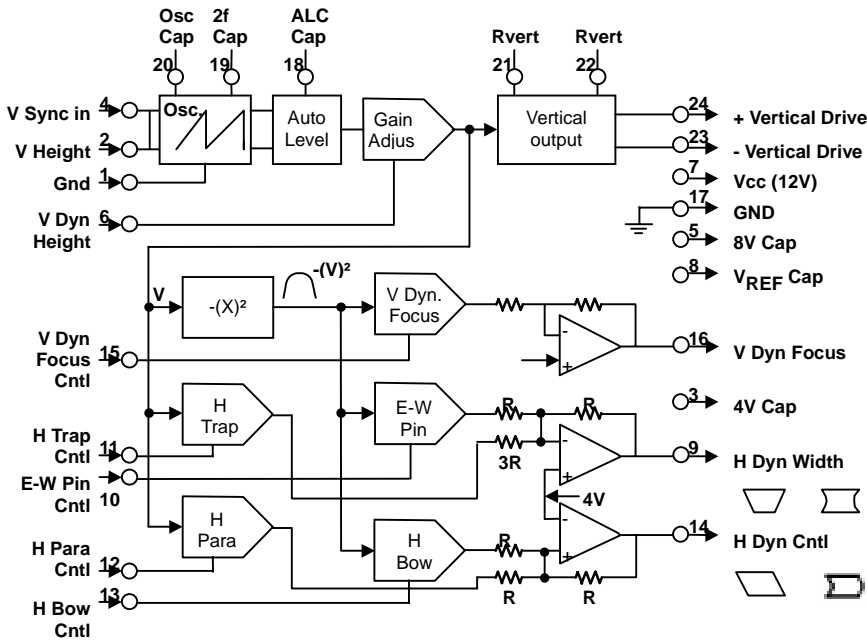
1. PIN 1. f_{min} : lower limit frequency of this setting. $f_{min} = 5.6 \times 10^8 / (R_{min} * 500)$
 $f_{min} = 29.1 \text{ kHz}$, $R_{min} = 18.7 \text{ K}\Omega$ (When the frequency is 30kHz or more)
 $f_{min} = 22.8 \text{ kHz}$, $R_{min} = 24 \text{ K}\Omega$ (When the frequency is 24kHz or more)
2. PIN 2. Polarity of H/HV:
 $C_{POL} = 0.1 \mu\text{f}$, $I_o = \pm 1 \mu\text{A}$, $V_o = 1 - e^{-t/RC}$
3. H/HV synchronous input:
 When there is compatibility between TTL and CMOS, the H/HV synchronous input is within the 0.35 to 1.85 V range, and the polarity is negative.
4. Power factor control:
 $V_4 = 0 \sim 4\text{V} = 70 \text{ to } 30\%$, $10\%/V$
 $V_4 = (V_{ref} * R_1) / R_2 = 2.17\text{V}$
 $\text{Duty} = (2.17 * 10\%/V) + 30\% = 51.7 \text{ to } 56.7\%$
5. X-ray shutdown:
 Specification: 1.65 to 1.8V shutdown
 When $B+ \text{ HV} = 25 \text{ kV}$, we have $V_{out} = 25 V_{DC}$, therefore, when shutdown $\text{HV} = 27.5 \text{ kV}$, we have $V_{out} = 30.8 V_{DC}$.
 When $R_1 = 10.7 \text{ K}\Omega$ and $R_2 = 10 \text{ K}\Omega$, we have shutdown $V_{OL} = 26.8 \text{ to } 28.2 \text{ KV}$.
6. Fly-back input threshold voltage:
 $10 V_{p-p} < V_{in}$, $V_{cc} (12\text{V}) R_{484} = 24 \text{ K}\Omega$, $V_{in} = 11 V_{p-p}$.
7. Horizontal drive:
 Low level current: Minimum 100mA
 Low level voltage: Maximum 0.4V
 48.36 KHz : $T_{on} = 11.01 \mu\text{s}$, $T_{off} = 9.66 \mu\text{s}$: 53.28%
8. Pin 10 H-PHASE control:
 Control gain = 8.89% TH/V
 Minimum control ROMGE = $\pm 22\% T_N$
 $V_{10} = 3.8 \sim 6.8\text{V}$ $f = 31.5 \text{ kHz}$, Range = $\pm 7.9 \mu\text{s}$
 $f = 64 \text{ kHz}$, Range = $\pm 3.9 \mu\text{s}$
9. V_{ref} : V_{ref} specification = 8.2 V_{DC}
10. FVC filter:
 $FVC = 0.052 \text{ V/kHz}$ $V_{11} \text{ } 31.5 \text{ KHz to } 64 \text{ KHz} = 1.734 \text{ to } 3.53\text{V}$

5. Vertical compensation and geometrical compensation of the raster

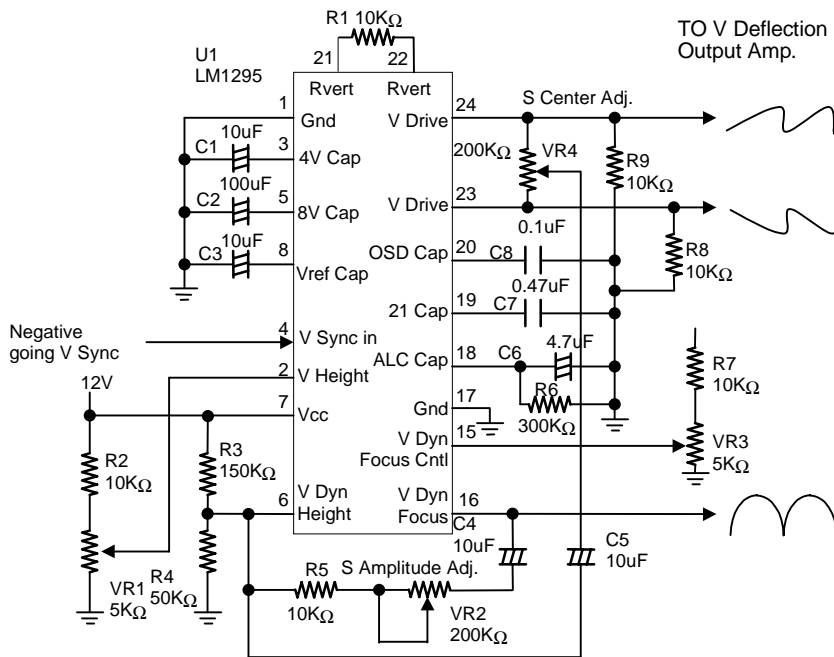
LM1295:

1. Vertical scanning frequency : 50 to 100Hz.
2. DC control compensation amplitude
3. Temperature stability of the vertical amplitude : 1%.
4. Dynamic vertical deflection compensation corresponding to the secondary anode voltage drop.
5. Positive and negative compensation signals.

Block Diagram



LM1295 Application



1. V-Height (Pin-2):
The amplitudes of the +V and –V drive currents are controlled by means of the 0V to 4V voltage of this pin. The current can be raised by raising the voltage. The control range is approximately 1.8 to 1.
2. 4V CAP (Pin 3):
4 V CAP (capacitor), 10 uF capacitor.
3. V-Sync in:
The vertical synchronization input is a negative TTL level pulse, and it has the function of locking the vertical oscillator. The pulse has a minimum width of approximately 200 nS.
4. 8V CAP (Pin 5):
8V CAP (capacitor), 100uF capacitor.
5. V-Dyn Height (Pin 6):
The amplitude of the driving currents of the voltages +V and –V are controlled by means of the 3V to 4V voltage of this pin.
6. H-Dyn Height (Pin 9):
This output is expressed by the sum of the vertical ramp and the parabola resulting from that ramp. The amplitude and the polarity of the ramp signal is controlled by H TRAP CNTRL (Pin 11), and the amplitude and polarity of the parabola is controlled by E-W PIN CNTRL (PIN 10), both in the DC-control mode.
7. E-W PIN CNTRL (Pin 10):
This is the E-W direction pincushion deformation control function, and the voltage range is within the 0V-4V range. When the voltage falls within the 2V-4V range, the amplitude increases, and the parabola becomes positive. On the other hand, when the voltage falls within the 2V-0V range, the parabola becomes negative.
8. TRAP CNTRL (Pin 11):
This is the trapezoid control function, and the voltage is within the 0V-4V range. When the voltage falls within the 2V-4V range, the amplitude increases, and the ramp becomes positive. On the other hand, when the voltage falls within the 0V-2V range, the ramp becomes negative.
9. Parallelogram control (Pin 12):
The voltage is within the 0V to 4V range. When the voltage falls within the 2V-4V range, the ramp, the ramp becomes positive.
One the other hand, when the voltage falls within the 0V-2V range, the ramp becomes negative.
10. Bow shape control (Pin 13):
The voltage is within the 0V-4V range. When the voltage falls within the 2V-4V range, the parabola becomes positive. On the other hand, when the voltage falls within the 0V-2V range, the parabola becomes negative.

11. Output of the parabola and bow-shaped parabola (Pin 14):

The amplitude and the polarity of the ramp signal are controlled by means of the PARA CNTRL (Pin 12), and the amplitude and polarity of the parabola are controlled by the BOW CNTRL (PIN 13).

In both cases, the control is carried out in the DC mode.

12. V Dyn Focus control (Pin 15):

The voltage is within the 0V to 4V range. When the voltage falls within the 2V-4V range, the parabola becomes positive. On the other hand when the voltage falls within the 0V-2V range, the parabola becomes negative.

13. V Dyn Focus (Pin 16)

14. ALC Cap (Pin 18):

This is the Automatic level Controller (ALC) capacitor, and the recommended value is 4.7 uF.

15. Frequency doubling capacitor:

This is the vertical oscillator that locks at a frequency twice as high as the vertical synchronization frequency. Its capacitance is 0.47 uF.

16. OSC Cap (Pin 20):

The value of the capacitance is 0.1 uF.

17. Rvert (Pin 21/22):

The vertical resistor has the function of determining the gain of the vertical ramp current generator.

18. -V drive (Pin 23) and +V drive (PIN 24):

-V is the negative portion of the vertical ramp output current of the object of the operation.

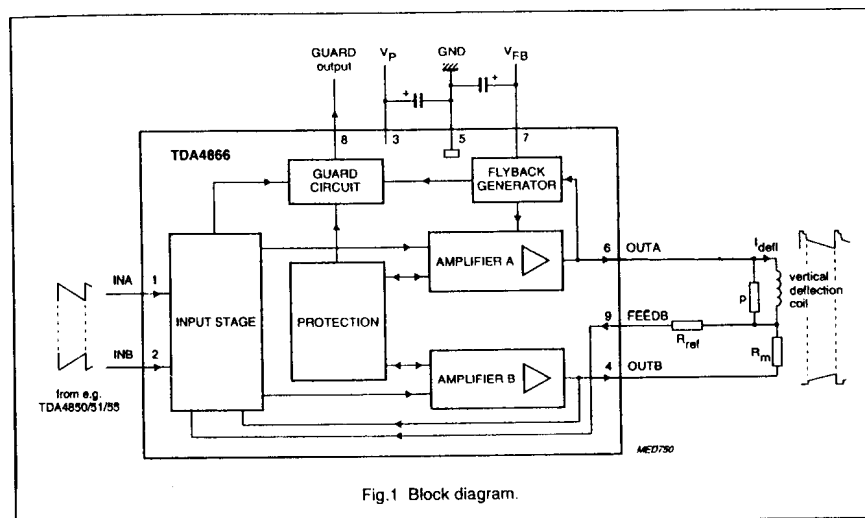
The ramp current waveform is superimposed on the DC current of the approximately 315 uA.

The voltage corresponding to the output (typically 10 k Ω) is typically 6V.

6. Full bridge current driver vertical deflection booster

TDA4866

1. Fully built-in type construction, with practically no external component.
2. High-grade amplification of the linear sawtooth wave signal.
3. High-efficiency DC coupling vertical bridge circuit.
4. Powerless vertical shift
5. Deflection frequencies up to 140 Hz
6. The power consumption and fly-back time can be optimized, because the power supply voltage and the fly-back voltage can be individually adjusted.
7. Superior transition movement during the fly-back.
8. Guard circuit provided for screen protection.



Function Description

1) Differential input stage

Since the differential input stage is provided with high-grade CMRR differential current input (Pins 1/2) system, the magnetic resistance is high, and is optimum for driver units with differential signals and single-ended current signals.

2) Output stage

The two output stages are current-driven type ones with opposite phases, and are operated in combination with the deflection coil that has full-bridge construction.

3) Fly-back generator

During fly-back, the fly-back generator supplies the fly-back voltage to the output stage A.

4) Protection unit

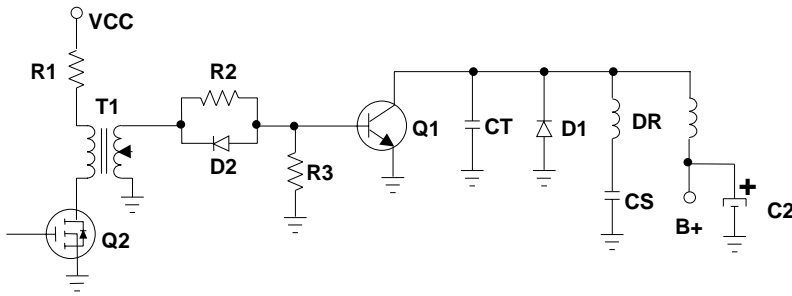
The output stage is provided with protection units against overheating and short-circuit of the coil (Pins 4/6).

5) Guard circuit

The built-in guard circuit supplies the fly-back line erasing signal to the CRT, and the guard signal is active.

7. Horizontal drive and power supply output

Circuit Diagram



Description of the circuit:

1) R1, T1 and Q2 compose the horizontal driving circuit, and the transistor Q1 generates a horizontal output through the driving signal.

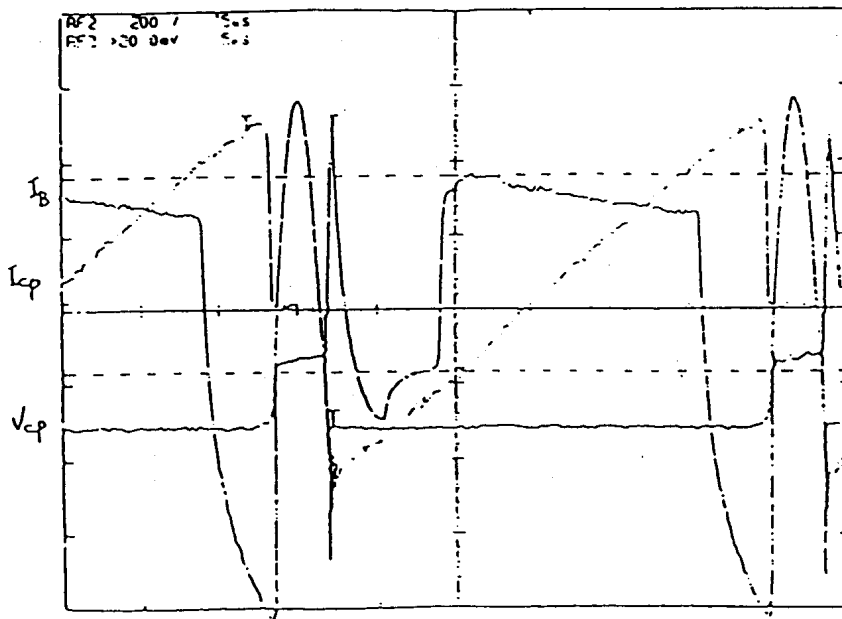
$$I_{B1} = I_{CPMAX} / Q1h_{feMIN}$$

$$I_{B2} \approx 3I_{B1}$$

$$di/dt \approx 3.3 \text{ A/us}$$

2) The resistor R2 corrects the current IB1, the resistor R3 works as a damping resistor and leak resistor, and the diode D2 works as a discharging device and polar body. As long as the transistor Q1 is OFF, the discharge is accelerated and the storage time (Tstg) is shortened.

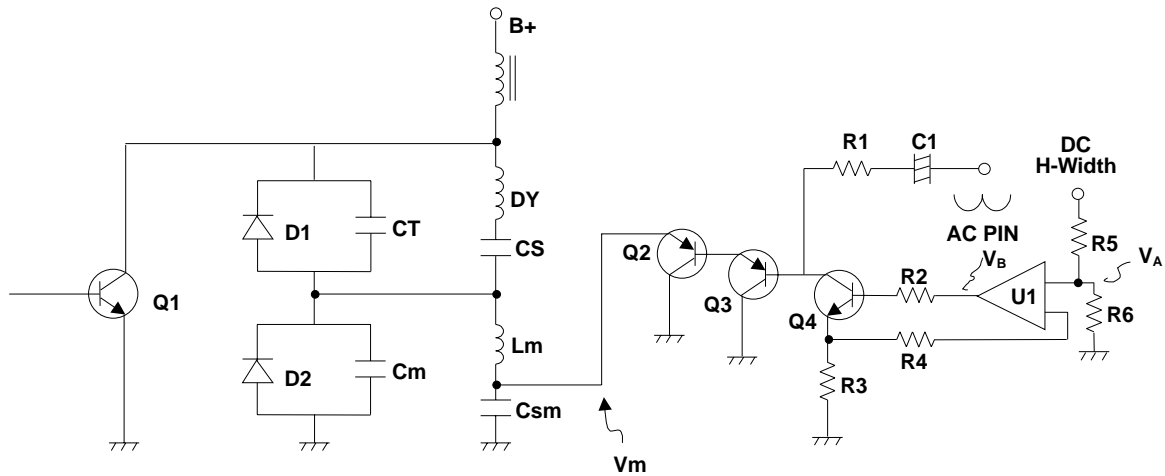
3) H-OUT circuit waveform



Time 5uS/div

8. Horizontal amplitude control

Circuit Diagram



Description of the circuit:

- 1) The diodes D1 and D2 compose the bipolar modulation circuit, and have the function of controlling the currents of the coils DY (I_{pp}) and Lm (I_m) through voltage modulation carried out by utilizing VM.

$$B+ = V_m + V_{cs} \quad \text{Therefore, } V_{cs} = (I_y \cdot L_y) / t_s \rightarrow I_y = (V_{cs} \cdot t_s) / L_y, \text{ with } B+ \text{ fixed.}$$

Such being the case, the horizontal width decreases when $V_m \uparrow \rightarrow V_{cs} \downarrow \rightarrow I_y \downarrow$

Inversely, the horizontal width decreases when $V_m \downarrow \rightarrow V_{cs} \uparrow \rightarrow I_y \uparrow$

$$(B+ = (V_p \cdot 2Tr) / (\pi \cdot Ts), Tr = \int \hat{L}_y C_t, T_m = \int \hat{L}_m C_m)$$

- 2) Q2, Q3, Q4 and U1 compose the control circuit of H-WIDTH. Of those devices, the transistor Q1 and Q2 compose the Darlington current amplifier, and on the other hand the transistor Q4 and the operational amplifier U1 compose the emitter-coupled circuit, that stabilize the voltage and control the current.
- 3) The horizontal width broadens when $V_a \uparrow \rightarrow V_{bl} \uparrow \rightarrow I_1 \uparrow \rightarrow I_2 \uparrow \rightarrow V_m \downarrow \rightarrow$. An inference in the opposite sense is also possible.

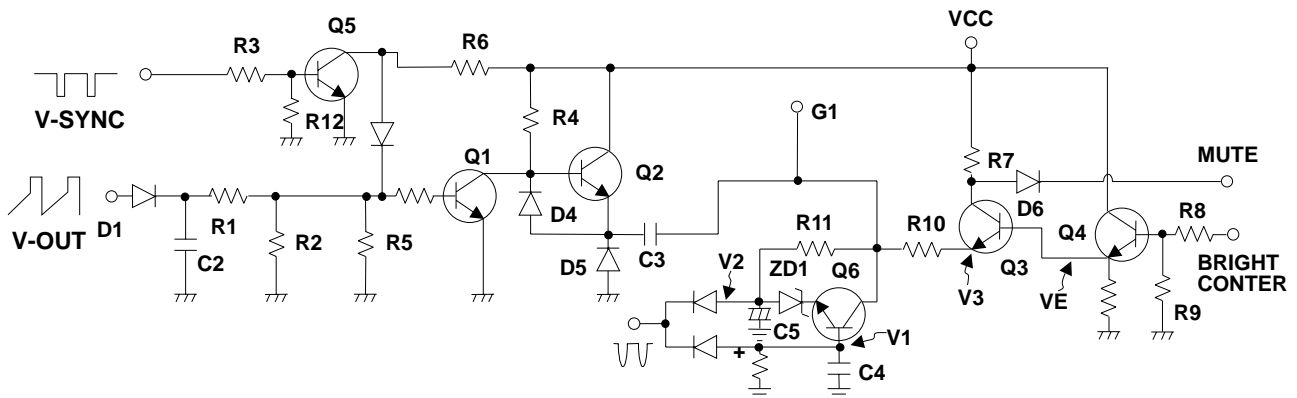
Test points for maintenance:

- 1) $C_T = 31 \text{ to } 37 \text{ kHz} = 3.2 \text{ us}$
 $48 \text{ to } 64 \text{ kHz} = 3.0 \text{ us}$
 $C_m \div 2.8 \text{ us}$

- 2) $V_{A \text{ CENTER}}: 31 \text{ to } 64 \text{ kHz } \int \hat{U} 1.91 \text{ to } 4.06V$
 $V_{M \text{ CENTER}}: 31 \text{ to } 64 \text{ kHz } \int \hat{U} 11.6 \text{ to } 27.4V$

9. Fly-back line erasing unit & spot erasing unit

Circuit Diagram



Description of the circuit:

- 1) The vertical blanking circuit completes by Q1, Q2, Q3 and peripheral circuit.
The vertical sync pulse applied to R3, R12 connected to Q5 base. Q5 is invert amplifier, then mixer with Q1 base together for compensate vertical retrace time of the blanking pulse.
- 2) The vertical amplifier output waveform through D1, C2, R1, R2 make waveform forming and clamp. Then applied to Q1 base, the vertical blanking amplifier of the Q1, the output connected to buffer Q2, through C3 coupling to G1 control circuit. D4, D5 for over voltage protect.
- 3) The Q6 is spot killer protect circuit, in normal power on stage.
 $V1 = V2$ and ZD1, so Q6 off. The CRT G1 voltage is fixed at $-45 \sim -67V_{dc}$ with vertical blanking pulse $12V_{pp}$ $V_{G1} = - (V \times R11) / (R10 + R11)$, ($V = V1 - V3$).
When power off the voltage $V1 > V2$, then Q6 turn on pulling V_{G1} to $-180V$ to protect CRT.
- 4) When Mute set to lower the Q3 off $G1 = -180V$ screen cut off no picture display, this mute circuit makes active, at power ON/OFF and when mode change stage.
- 5) Q4 bias set up by MCU to control the V_{ce} bias of Q3, then control G1 voltage output.

Test points for maintenance:

- 1) Check D1, R3 and Q1 collector
- 2) G1 voltage control range= $-45 \sim -67V_{DC}$
G1 off momentary voltage $\approx -180V_{AC}$

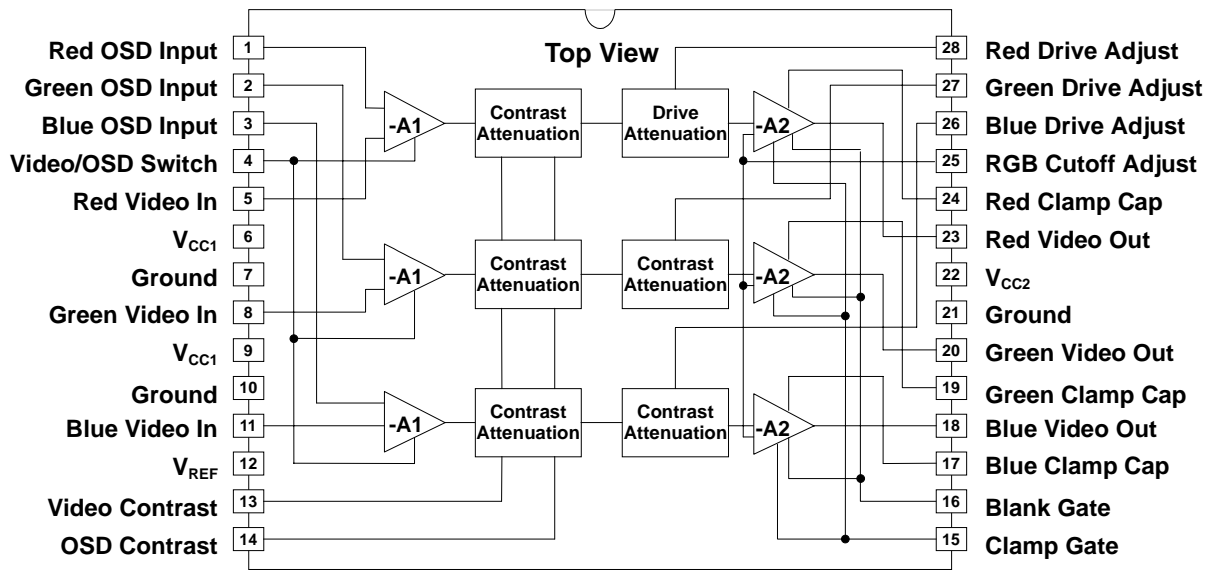
10. Video amplifier system with on-screen display

LM1281 (U201)

Outstanding features:

- * Three-channel video amplifier bandwidth 85 MHz @ -3 dB (4 V_{p-p} output)
- * OSD TTL input, bandwidth 50 MHz
- * High-speed video/OSD changeover
- * High impedance DC contrast control above the 0-4V, 40dB range
- * High impedance DC OSD contrast control above the 0-4V, 40dB range

BLOCK AND CONNECTION DIAGRAM



Description of the functions

Figure 1 shows the block diagram of LM1281, in conformity with the pin layout of the IC.

Every channel accepts both the video signal and the OSD signal at the input amplifier (A1).

Also the video/OSD changeover signal passes either the video signal or the OSD signal through LM1281, or is connected with the input amplifier for control purposes. The next contrast adjustment block is a drive adjustment type one.

The reference level for the DC return circuit is set by means of the RGB cutoff adjustment pin (PIN 25). Attention must be paid to the fact that the blank clamp gate is active when it is stuck at the LOW state. Under ordinary circumstances, these pins are controlled by means of the standard TTL signal.

Test Circuits

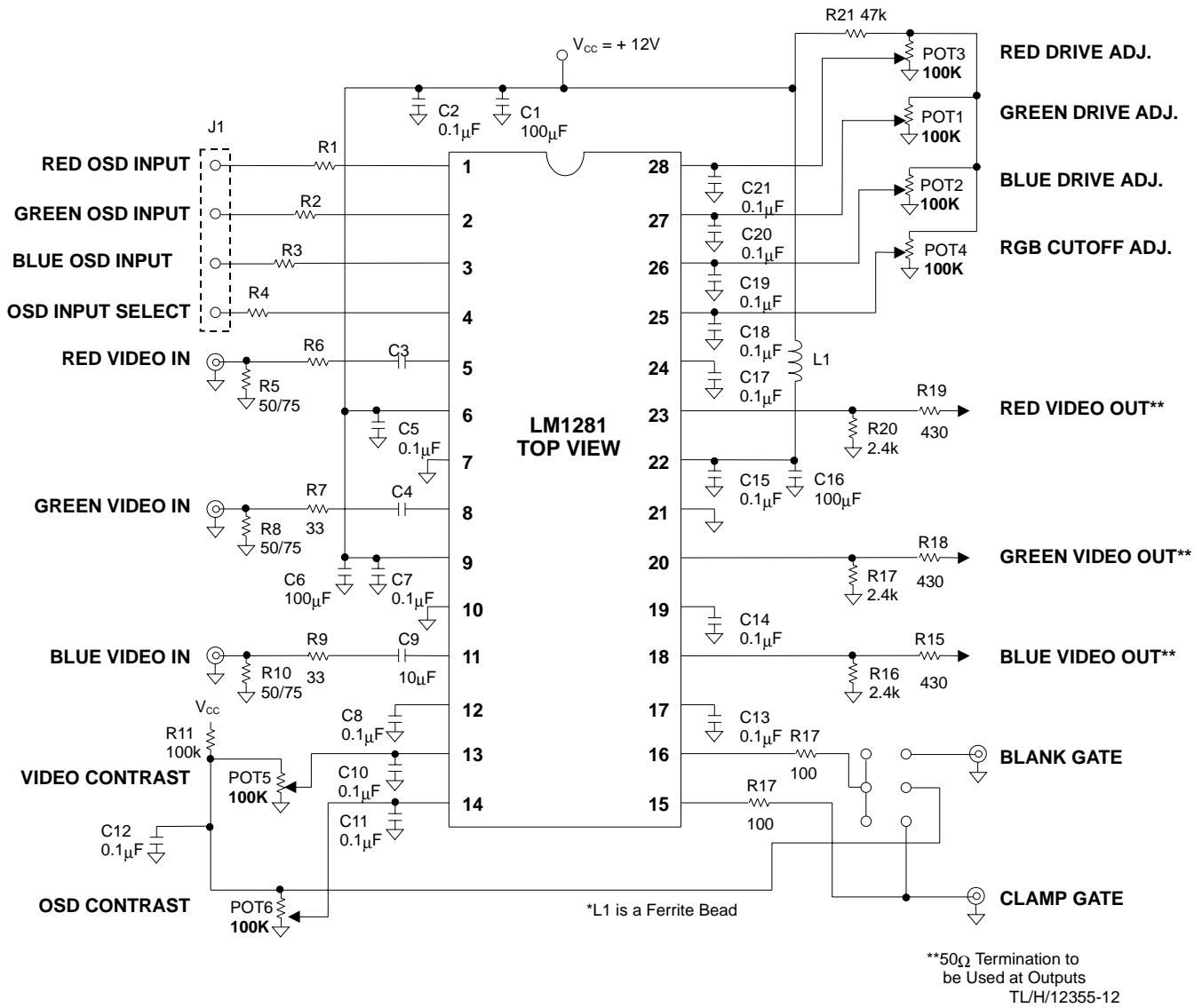
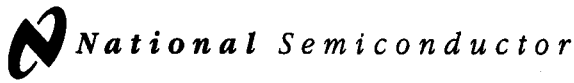


FIGURE 2 LM1281 OSD Video Preamp Demonstration Board Schematic



August 1999

LM2438 Monolithic Triple 13.5 ns CRT Driver

General Description

The LM2438 is an integrated high voltage CRT driver circuit designed for use in color monitor applications. The IC contains three high input impedance, wide band amplifiers which directly drive the RGB cathodes of a CRT. Each channel has its gain internally set to -14 and can drive CRT capacitive loads as well as resistive loads present in other applications, limited only by the package's power dissipation.

The IC is packaged in an industry standard 9-lead TO-220 molded plastic power package. See Thermal Considerations section.

Features

- Well matched with LM1279 video preamp
- 0V to 5V input range
- Stable with 0–20 pF capacitive loads and inductive peaking networks
- Convenient TO-220 staggered lead package style
- Standard LM243X Family Pinout which is designed for easy PCB layout

Applications

- 1024 x 768 displays up to 60 Hz refresh
- Pixel clock frequencies up to 60 MHz
- Monitors using video blanking

Schematic and Connection Diagrams

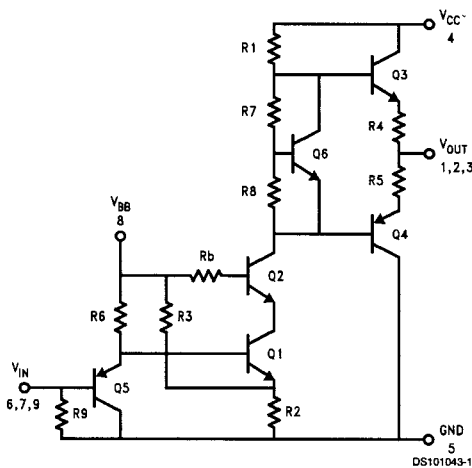
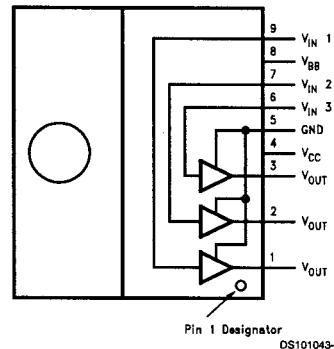


FIGURE 1. Simplified Schematic Diagram
(One Channel)



Note: Tab is at GND

Top View
Order Number LM2438T

LM2438 Monolithic Triple 13.5 ns CRT Driver

Theory of Operation

The LM2438 is a high voltage monolithic three channel CRT driver suitable for high resolution display applications. The LM2438 operates with 80V and 12V power supplies. The part is housed in the industry standard 9-lead TO-220 molded plastic power package.

The circuit diagram of the LM2438 is shown in *Figure 1*. The PNP emitter follower, Q5, provides input buffering. Q1 and Q2 form a fixed gain cascode amplifier with resistors R1 and R2 setting the gain at -14. Emitter followers Q3 and Q4 isolate the high output impedance of the cascode stage from the capacitance of the CRT cathode which decreases the sensitivity of the device to load capacitance. Q6 provides biasing to the output emitter follower stage to reduce cross-over distortion at low signal levels.

Figure 2 shows a typical test circuit for evaluation of the LM2438. This circuit is designed to allow testing of the LM2438 in a 50Ω environment without the use of an expensive FET probe. In this test circuit, the two 2.49 kΩ resistors form a 200:1 wideband, low capacitance probe when connected to a 50Ω coaxial cable and a 50Ω load (such as a 50Ω oscilloscope input). The input signal from the generator is ac coupled to the base of Q5.

Application Hints

INTRODUCTION

National Semiconductor (NSC) is committed to provide application information that assists our customers in obtaining the best performance possible from our products. The following information is provided in order to support this commitment. The reader should be aware that the optimization of performance was done using a specific printed circuit board designed at NSC. Variations in performance can be realized due to physical changes in the printed circuit board and the application. Therefore, the designer should know that component value changes may be required in order to optimize performance in a given application. The values shown in this document can be used as a starting point for evaluation purposes. When working with high bandwidth circuits, good layout practices are also critical to achieving maximum performance.

IMPORTANT INFORMATION

The LM2438 performance is targeted for the XGA (1024 x 768, 60 Hz refresh) resolution market. The application circuits shown in this document to optimize performance and to protect against damage from CRT arcover are designed specifically for the LM2438. If another member of the LM243X family is used, please refer to its datasheet.

POWER SUPPLY BYPASS

Since the LM2438 is a wide bandwidth amplifier, proper power supply bypassing is critical for optimum performance. Improper power supply bypassing can result in large overshoot, ringing or oscillation. 0.1 μF capacitors should be connected from the supply pins, V_{CC} and V_{BB}, to ground, as close to the LM2438 as is practical. Additionally, a 47 μF or larger electrolytic capacitor should be connected from both supply pins to ground reasonably close to the LM2438.

ARC PROTECTION

During normal CRT operation, internal arcing may occasionally occur. Spark gaps, in the range of 200V, connected from the CRT cathodes to CRT ground will limit the maximum volt-

age, but to a value that is much higher than allowable on the LM2438. This fast, high voltage, high energy pulse can damage the LM2438 output stage. The application circuit shown in *Figure 9* is designed to help clamp the voltage at the output of the LM2438 to a safe level. The clamp diodes, D1 and D2, should have a fast transient response, high peak current rating, low series impedance and low shunt capacitance. FDH400 or equivalent diodes are recommended. Do not use 1N4148 diodes for the clamp diodes. D1 and D2 should have short, low impedance connections to V_{CC} and ground respectively. The cathode of D1 should be located very close to a separately decoupled bypass capacitor (C3 in *Figure 9*). The ground connection of D2 and the decoupling capacitor should be very close to the LM2438 ground. This will significantly reduce the high frequency voltage transients that the LM2438 would be subjected to during an arcover condition. Resistor R2 limits the arcover current that is seen by the diodes while R1 limits the current into the LM2438 as well as the voltage stress at the outputs of the device. R2 should be a ½W solid carbon type resistor. R1 can be a ¼W metal or carbon film type resistor. Having large value resistors for R1 and R2 would be desirable, but this has the effect of increasing rise and fall times. Inductor L1 is critical to reduce the initial high frequency voltage levels that the LM2438 would be subjected to. The inductor will not only help protect the device but it will also help minimize rise and fall times as well as minimize EMI. For proper arc protection, it is important to not omit any of the components shown in *Figure 9*.

Application Hints (Continued)

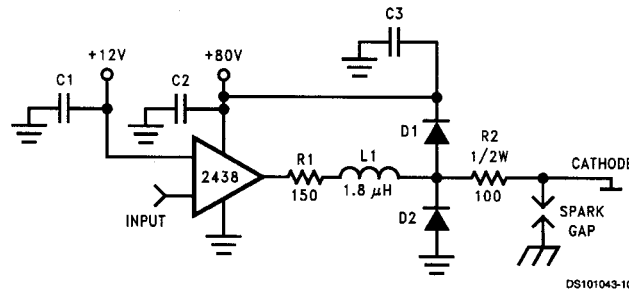


FIGURE 9. One Channel of the LM2438 with the Recommended Application Circuit

OPTIMIZING TRANSIENT RESPONSE

Referring to *Figure 9*, there are three components (R_1 , R_2 and L_1) that can be adjusted to optimize the transient response of the application circuit. Increasing the values of R_1 and R_2 will slow the circuit down while decreasing overshoot. Increasing the value of L_1 will speed up the circuit as well as increase overshoot. It is very important to use inductors with very high self-resonant frequencies, preferably above 300 MHz. Ferrite core inductors from J.W. Miller Magnetics (part #78F1R8K) were used for optimizing the performance of the device in the NSC application board. The values shown in *Figure 9* can be used as a good starting point for the evaluation of the LM2438. Using a variable resistor for R_1 will simplify finding the value needed for optimum performance in a given application. Once the optimum value is determined the variable resistor can be replaced with a fixed value.

EFFECT OF LOAD CAPACITANCE

Figure 8 shows the effect of increased load capacitance on the speed of the device. This demonstrates the importance of knowing the load capacitance in the application. *Figure 8* also shows the effect inductance has on the rise and fall times.

EFFECT OF OFFSET

Figure 7 shows the variation in rise and fall times when the output offset of the device is varied from 40 to 50 V_{DC} . The rise time shows a maximum variation relative to the center data point (45 V_{DC}) of about 2%. The fall time shows a variation of about 2% relative to the center data point.

THERMAL CONSIDERATIONS

Figure 4 shows the performance of the LM2438 in the test circuit shown in *Figure 2* as a function of case temperature. The figure shows that the rise time of the LM2438 increases by approximately 5% as the case temperature increases from 50°C to 100°C. This corresponds to a speed degradation of 1% for every 10°C rise in case temperature. The fall time increases by approximately 7.5% as the case temperature increases from 50°C to 100°C. This corresponds to a speed degradation of 1.5% for every 10°C rise in case temperature.

Figure 6 shows the maximum power dissipation of the LM2438 vs. Frequency when all three channels of the device are driving an 8 pF load with a 40 V_{p-p} alternating one pixel on, one pixel off signal. The graph assumes a 72% active time (device operating at the specified frequency) which is typical in a monitor application. The other 28% of the time

the device is assumed to be sitting at the black level (65V in this case). This graph gives the designer the information needed to determine the heat sink requirement for his application. The designer should note that if the load capacitance is increased the AC component of the total power dissipation will also increase.

The LM2438 case temperature must be maintained below 100°C. If the maximum expected ambient temperature is 70°C and the maximum power dissipation is 2.6W (from *Figure 6*, 30 MHz bandwidth) then a maximum heat sink thermal resistance can be calculated:

$$R_{TH} = \frac{100^{\circ}\text{C} - 70^{\circ}\text{C}}{2.6\text{W}} = 11.5^{\circ}\text{C/W}$$

This example assumes a capacitive load of 8 pF and no resistive load.

TYPICAL APPLICATION

A typical application of the LM2438 is shown in *Figure 11*. Used in conjunction with an LM1279, a complete video channel from monitor input to CRT cathode can be achieved. Performance is ideal for 1024 x 768 resolution displays with pixel clock frequencies up to 60 MHz. *Figure 11* is the schematic for the NSC demonstration board that can be used to evaluate the LM1279/2438 combination in a monitor.

PC BOARD LAYOUT CONSIDERATIONS

For optimum performance, an adequate ground plane, isolation between channels, good supply bypassing and minimizing unwanted feedback are necessary. Also, the length of the signal traces from the preamplifier to the LM2438 and from the LM2438 to the CRT cathode should be as short as possible. The following references are recommended:

Ott, Henry W., "Noise Reduction Techniques in Electronic Systems", John Wiley & Sons, New York, 1976.

"Video Amplifier Design for Computer Monitors", National Semiconductor Application Note 1013.

Pease, Robert A., "Troubleshooting Analog Circuits", Butterworth-Heinemann, 1991.

Because of its high small signal bandwidth, the part may oscillate in a monitor if feedback occurs around the video channel through the chassis wiring. To prevent this, leads to the video amplifier input circuit should be shielded, and input circuit wiring should be spaced as far as possible from output circuit wiring.

Application Hints (Continued)

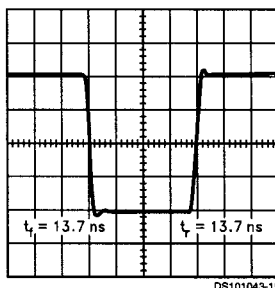
NSC DEMONSTRATION BOARD

Figure 12 shows the routing and component placement on the NSC LM1279/2438 demonstration board. The schematic of the board is shown in Figure 11. This board provides a good example of a layout that can be used as a guide for future layouts. Note the location of the following components:

- C54, C56 — V_{CC} bypass capacitor, located very close to pin 4 and ground pins
- C43, C44 — V_{BB} bypass capacitors, located close to pin 8 and ground
- C53, C55 — Additional V_{CC} bypass capacitors, near LM2438 and V_{CC} clamp diodes. Very important for arc protection.

The routing of the LM2438 outputs to the CRT is very critical to achieving optimum performance. Figure 13 shows the routing and component placement from pin 1 of the LM2438

to the red cathode. Note that the components are placed so that they almost line up from the output pin of the LM2438 to the red cathode pin of the CRT connector. This is done to minimize the length of the video path between these two components. Note also that D16, D17, R21 and D9 are placed to minimize the size of the video nodes that they are attached to. This minimizes parasitic capacitance in the video path and also enhances the effectiveness of the protection diodes. The anode of protection diode D17 is connected directly to a section of the the ground plane that has a short and direct path to the LM2438 ground pins. The cathode of D16 is connected to V_{CC} very close to decoupling capacitor C53 (see Figure 13) which is connected to the same section of the ground plane as D17. The diode placement and routing is very important for minimizing the voltage stress on the LM2438 during an arc-over event. Lastly, notice that S1 is placed very close to the red cathode and is tied directly to CRT ground.



DS101043-15

FIGURE 10. Waveform at Cathode with LM1279/243X Demo Board

12. On Screen Display

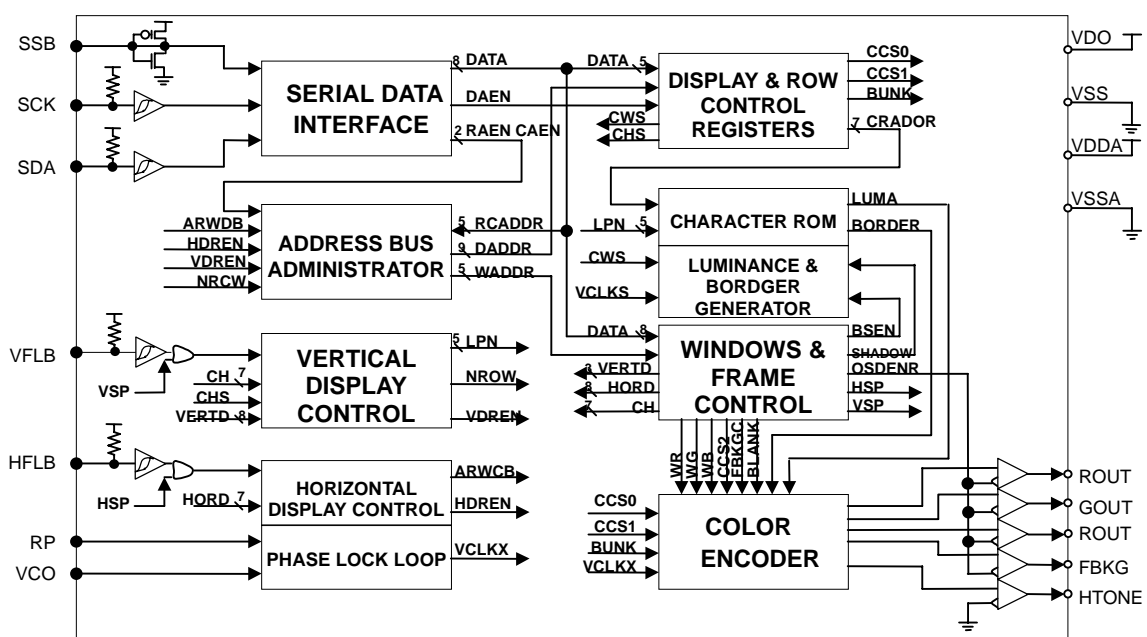
FEATURES

- Horizontal sync input may be up to 100 kHz.
- On-chip PLL circuitry up to 90MHz pixel rate for multi-sync operation.
- Programmable horizontal resolutions up to 1524 dots per display row.
- 538 bytes display registers to control full screen display.
- Full screen display consists of 10 (rows) by 24 (columns) characters.
- 12 × 18 dot matrix per character.
- 128 built-in characters and graphic symbols and character by character color selection.
- Maximum 8 color selectable per display row.
- Double character height and/or width control.
- Programmable positioning for display screen center.
- Bordering and shadowing effect for display.
- Programmable vertical character height (18 to 71 lines) for multi-sync operation.
- 4 programmable background windows with multi-level windowing effect.
- Software clear function for display frame buffer.
- Hsync and Vsync input polarity selectable.
- Auto detection for input edge distortion between Hsync and Vsync inputs.
- Half tone and fast blanking output.
- Software force blank function for display frame.
- Compatible with both SPI bus and I²C interface through pin selection.
- 16 pins PDIP package.

GENERAL DESCRIPTION

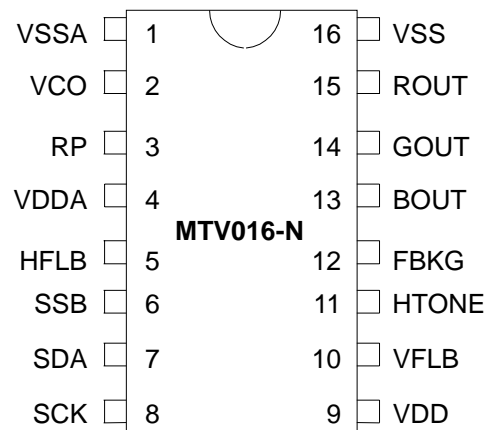
MTV016 is designed for use in monitor applications to display the built-in characters or symbols onto monitor screen. The display operation is by transferring data and control information in micro controller to RAM through a serial data interface. It can execute full screen display automatically and specific functions such as character bordering, shadowing, double height and width, font by font color control, frame positioning, frame size control by character height and horizontal display resolution, and windowing effect.

BLOCK DIAGRAM



1.0 CONNECTION DIAGRAM

(16 PINS PDIP 300 MIL PACKAGE)



2.0 PIN DESCRIPTIONS

| Name | I/O | Pin# | Function |
|-------|-----|------|--|
| VSSA | - | 1 | Analog ground. This ground pin is used to internal analog circuitry. |
| VCO | I/O | 2 | Voltage Control Oscillator. This pin is used to control the internal oscillator frequency by DC voltage input from external low pass filter. |
| RP | I/O | 3 | Bias Resistor. The bias resistor is used to regulate the appropriate bias current for internal oscillator to resonate at specific dot frequency. |
| VDDA | - | 4 | Analog power supply. Positive 5 V DC supply for internal analog circuitry. And a 0.1uF decoupling capacitor should be connected across to VDDA and VSSA. |
| HFLB | I | 5 | Horizontal input. This pin is used to input the horizontal synchronizing signal. It has an internal 100 kΩ pull-up resistor. |
| SSB | I | 6 | Serial interface enable. It is used to enable the serial data interface and is also used to select I ² C or SPI bus operation. If this pin is left floating, I ² C bus is enable. Otherwise the SPI bus is enabled. |
| SDA | I | 7 | Serial data input. The external data transfer through this pin to internal display registers and control registers. It has an internal 100 kΩ pull-up resistor. |
| SCK | I | 8 | Serial clock input. The clock input pin is used to synchronize the data transfer. It has an internal 100 kΩ pull-up resistor. |
| VDD | - | 9 | Digital power supply. Positive 5 V DC supply for internal digital circuitry and a 0.1uF decoupling capacitor should be connected across to VDD and VSS. |
| VFLB | I | 10 | Vertical input. This pin is used to input the vertical synchronizing signal. It has an internal pull-up resistor. |
| HTONE | O | 11 | Half tone output. This pin is used to attenuate the external R, G, B amplifiers gain for the transparent windowing effect. |
| FBKG | O | 12 | Fast Blanking output. It is used to cut off the external R, G, B signals while this chip is displaying characters or windows. |
| BOUT | O | 13 | Blue color output. It is a blue color video signal output. |
| GOUT | O | 14 | Green color output. It is a green color video signal output. |
| ROUT | O | 15 | Red color output. It is a red color video signal output. |
| VSS | - | 16 | Digital ground. This ground pin of internal digital circuitry. |

Replacement Parts List

1) MultiSync V520 Parts List

B: Asia, C: China, R: Australia, T: Toshiba, L: LG, O: Orion

| | ASSY CODE | PART NO | DESCRIPTION | LOCATION | Q'TY | ALT | REMARK |
|----|--------------------|----------|-------------------------------|-----------|------|-----|--------|
| 1 | CABINET FRONT ASSY | 10100552 | CABINET FRONT | | 1 | | |
| 2 | CABINET FRONT ASSY | 11300351 | PUSH BUTTOM(A)-FUCTION KEY | | 1 | | |
| 3 | CABINET FRONT ASSY | 11300781 | PUSH BUTTOM(A)-POWER KNOB | | 1 | | |
| 4 | CABINET FRONT ASSY | 11600121 | LENS | | 1 | | |
| 5 | CABINET FRONT ASSY | 13000061 | COIL SPRING | | 1 | | |
| 6 | CRT BOARD A/I | 80000561 | BEAD 3.5x6x0.8/T | B201 | 1 | | |
| 7 | CRT BOARD A/I | 80000561 | BEAD 3.5x6x0.8/T | B208 | 1 | | |
| 8 | CRT BOARD A/I | GB910358 | CERAMIC Z5V(F)/T 0.01u/50V Z | C201 | 1 | | |
| 9 | CRT BOARD A/I | GB910358 | CERAMIC Z5V(F)/T 0.01u/50V Z | C202 | 1 | | |
| 10 | CRT BOARD A/I | GB910358 | CERAMIC Z5V(F)/T 0.01u/50V Z | C203 | 1 | | |
| 11 | CRT BOARD A/I | GB210458 | CERAMIC Y5V/T 0.1u/50V Z | C204 | 1 | | |
| 12 | CRT BOARD A/I | GB210458 | CERAMIC Y5V/T 0.1u/50V Z | C205 | 1 | | |
| 13 | CRT BOARD A/I | GA310655 | ELECT 85oC/T 10u/50V M | C206 | 1 | | |
| 14 | CRT BOARD A/I | GB910358 | CERAMIC Z5V(F)/T 0.01u/50V Z | C207 | 1 | | |
| 15 | CRT BOARD A/I | GA322725 | ELECT 85oC/T 220u/16V M | C209 | 1 | | |
| 16 | CRT BOARD A/I | GA310655 | ELECT 85oC/T 10u/50V M | C210 | 1 | | |
| 17 | CRT BOARD A/I | GA410575 | ELECT NP/T 1u/100V M | C213 | 1 | | |
| 18 | CRT BOARD A/I | GA210575 | ELECT 105oC/T 1u/100V M | C214 | 1 | | |
| 19 | CRT BOARD A/I | GA310655 | ELECT 85oC/T 10u/50V M | C230 | 1 | | |
| 20 | CRT BOARD A/I | GB910358 | CERAMIC Z5V(F)/T 0.01u/50V Z | C231 | 1 | | |
| 21 | CRT BOARD A/I | GA410575 | ELECT NP/T 1u/100V M | C233 | 1 | | |
| 22 | CRT BOARD A/I | GA210575 | ELECT 105oC/T 1u/100V M | C234 | 1 | | |
| 23 | CRT BOARD A/I | GA310655 | ELECT 85oC/T 10u/50V M | C250 | 1 | | |
| 24 | CRT BOARD A/I | GA410575 | ELECT NP/T 1u/100V M | C253 | 1 | | |
| 25 | CRT BOARD A/I | GA210575 | ELECT 105oC/T 1u/100V M | C254 | 1 | | |
| 26 | CRT BOARD A/I | GB210458 | CERAMIC Y5V/T 0.1u/50V Z | C267 | 1 | | |
| 27 | CRT BOARD A/I | GB910358 | CERAMIC Z5V(F)/T 0.01u/50V Z | C270 | 1 | | |
| 28 | CRT BOARD A/I | GE210252 | PLASTIC PEI/T 0.001u/50V J | C271 | 1 | | |
| 29 | CRT BOARD A/I | GB7471F3 | CERAMIC Y5P(B)/T 470P/500V K | C272 | 1 | | |
| 30 | CRT BOARD A/I | GB7102F3 | CERAMIC Y5P(B)/T 1000P/500V K | C275 | 1 | | |
| 31 | CRT BOARD A/I | GB7102H3 | CERAMIC Y5P(B)/T 1000P/1KV K | C276 | 1 | | |
| 32 | CRT BOARD A/I | GB7102F3 | CERAMIC Y5P(B)/T 1000P/500V K | C278 | 1 | | |
| 33 | CRT BOARD A/I | GB910358 | CERAMIC Z5V(F)/T 0.01u/50V Z | C280 | 1 | | |
| 34 | CRT BOARD A/I | GB910358 | CERAMIC Z5V(F)/T 0.01u/50V Z | C281 | 1 | | |
| 35 | CRT BOARD A/I | GB210458 | CERAMIC Y5V/T 0.1u/50V Z | C282 | 1 | | |
| 36 | CRT BOARD A/I | GB210458 | CERAMIC Y5V/T 0.1u/50V Z | C283 | 1 | | |
| 37 | CRT BOARD A/I | GB210458 | CERAMIC Y5V/T 0.1u/50V Z | C284 | 1 | | |
| 38 | CRT BOARD A/I | GA347625 | ELECT 85oC/T 47u/16V M | C285 | 1 | | |
| 39 | CRT BOARD A/I | GB7102F3 | CERAMIC Y5P(B)/T 1000P/500V K | C287 | 1 | | |
| 40 | CRT BOARD A/I | GA347625 | ELECT 85oC/T 47u/16V M | C289 | 1 | | |
| 41 | CRT BOARD A/I | GB910358 | CERAMIC Z5V(F)/T 0.01u/50V Z | C291 | 1 | | |
| 42 | CRT BOARD A/I | GA310655 | ELECT 85oC/T 10u/50V M | C292 | 1 | | |
| 43 | CRT BOARD A/I | GA310655 | ELECT 85oC/T 10u/50V M | C293 | 1 | | |
| 44 | CRT BOARD A/I | GB910358 | CERAMIC Z5V(F)/T 0.01u/50V Z | C294 | 1 | | |
| 45 | CRT BOARD A/I | GE210352 | PLASTIC PEI/T 0.01u/50V J | C295 | 1 | | |
| 46 | CRT BOARD A/I | GE210352 | PLASTIC PEI/T 0.01u/50V J | C296 | 1 | | |
| 47 | CRT BOARD A/I | GB7102F3 | CERAMIC Y5P(B)/T 1000P/500V K | C297 | 1 | | |
| 48 | CRT BOARD A/I | GB910358 | CERAMIC Z5V(F)/T 0.01u/50V Z | C299 | 1 | | |
| 49 | CRT BOARD A/I | 72000291 | PN9501 CRT BOARD(22.5D NECK) | CRT BOARD | 1 | | |
| 50 | CRT BOARD A/I | EJAC0018 | DIODE/T 1A 1N4937 | D201 | 1 | | |
| 51 | CRT BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D202 | 1 | | |
| 52 | CRT BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D203 | 1 | | |

| | | | | | | | |
|-----|---------------|----------|------------------------------|------|----|--|--|
| 53 | CRT BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D204 | 1 | | |
| 54 | CRT BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D205 | 1 | | |
| 55 | CRT BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D210 | 1 | | |
| 56 | CRT BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D211 | 1 | | |
| 57 | CRT BOARD A/I | 80000451 | DIODE/T 1/2W 1SS83 | D212 | 1 | | |
| 58 | CRT BOARD A/I | 80000051 | DIODE/T 1/2W 1SS82 | D212 | OR | | |
| 59 | CRT BOARD A/I | 80001211 | DIODE/T 1/2W BAV21 (PHILIPS) | D212 | OR | | |
| 60 | CRT BOARD A/I | 80004711 | ROHM DIODE 1SS244 | D212 | OR | | |
| 61 | CRT BOARD A/I | 80000451 | DIODE/T 1/2W 1SS83 | D213 | 1 | | |
| 62 | CRT BOARD A/I | 80000051 | DIODE/T 1/2W 1SS82 | D213 | OR | | |
| 63 | CRT BOARD A/I | 80001211 | DIODE/T 1/2W BAV21 (PHILIPS) | D213 | OR | | |
| 64 | CRT BOARD A/I | 80004711 | ROHM DIODE 1SS244 | D213 | OR | | |
| 65 | CRT BOARD A/I | 80000451 | DIODE/T 1/2W 1SS83 | D214 | 1 | | |
| 66 | CRT BOARD A/I | 80000051 | DIODE/T 1/2W 1SS82 | D214 | OR | | |
| 67 | CRT BOARD A/I | 80001211 | DIODE/T 1/2W BAV21 (PHILIPS) | D214 | OR | | |
| 68 | CRT BOARD A/I | 80004711 | ROHM DIODE 1SS244 | D214 | OR | | |
| 69 | CRT BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D230 | 1 | | |
| 70 | CRT BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D231 | 1 | | |
| 71 | CRT BOARD A/I | 80000451 | DIODE/T 1/2W 1SS83 | D232 | 1 | | |
| 72 | CRT BOARD A/I | 80000051 | DIODE/T 1/2W 1SS82 | D232 | OR | | |
| 73 | CRT BOARD A/I | 80001211 | DIODE/T 1/2W BAV21 (PHILIPS) | D232 | OR | | |
| 74 | CRT BOARD A/I | 80004711 | ROHM DIODE 1SS244 | D232 | OR | | |
| 75 | CRT BOARD A/I | 80000451 | DIODE/T 1/2W 1SS83 | D233 | 1 | | |
| 76 | CRT BOARD A/I | 80000051 | DIODE/T 1/2W 1SS82 | D233 | OR | | |
| 77 | CRT BOARD A/I | 80001211 | DIODE/T 1/2W BAV21 (PHILIPS) | D233 | OR | | |
| 78 | CRT BOARD A/I | 80004711 | ROHM DIODE 1SS244 | D233 | OR | | |
| 79 | CRT BOARD A/I | 80000451 | DIODE/T 1/2W 1SS83 | D234 | 1 | | |
| 80 | CRT BOARD A/I | 80000051 | DIODE/T 1/2W 1SS82 | D234 | OR | | |
| 81 | CRT BOARD A/I | 80001211 | DIODE/T 1/2W BAV21 (PHILIPS) | D234 | OR | | |
| 82 | CRT BOARD A/I | 80004711 | ROHM DIODE 1SS244 | D234 | OR | | |
| 83 | CRT BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D250 | 1 | | |
| 84 | CRT BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D251 | 1 | | |
| 85 | CRT BOARD A/I | 80000451 | DIODE/T 1/2W 1SS83 | D252 | 1 | | |
| 86 | CRT BOARD A/I | 80000051 | DIODE/T 1/2W 1SS82 | D252 | OR | | |
| 87 | CRT BOARD A/I | 80001211 | DIODE/T 1/2W BAV21 (PHILIPS) | D252 | OR | | |
| 88 | CRT BOARD A/I | 80004711 | ROHM DIODE 1SS244 | D252 | OR | | |
| 89 | CRT BOARD A/I | 80000451 | DIODE/T 1/2W 1SS83 | D253 | 1 | | |
| 90 | CRT BOARD A/I | 80000051 | DIODE/T 1/2W 1SS82 | D253 | OR | | |
| 91 | CRT BOARD A/I | 80001211 | DIODE/T 1/2W BAV21 (PHILIPS) | D253 | OR | | |
| 92 | CRT BOARD A/I | 80004711 | ROHM DIODE 1SS244 | D253 | OR | | |
| 93 | CRT BOARD A/I | 80000451 | DIODE/T 1/2W 1SS83 | D254 | 1 | | |
| 94 | CRT BOARD A/I | 80000051 | DIODE/T 1/2W 1SS82 | D254 | OR | | |
| 95 | CRT BOARD A/I | 80001211 | DIODE/T 1/2W BAV21 (PHILIPS) | D254 | OR | | |
| 96 | CRT BOARD A/I | 80004711 | ROHM DIODE 1SS244 | D254 | OR | | |
| 97 | CRT BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J1 | 1 | | |
| 98 | CRT BOARD A/I | R0319110 | JUMPER WIRE AI/T 15mm | J10 | 1 | | |
| 99 | CRT BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J19 | 1 | | |
| 100 | CRT BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J2 | 1 | | |
| 101 | CRT BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J20 | 1 | | |
| 102 | CRT BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J22 | 1 | | |
| 103 | CRT BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J24 | 1 | | |
| 104 | CRT BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J25 | 1 | | |
| 105 | CRT BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J26 | 1 | | |

| | | | | | | | |
|-----|---------------|----------|--------------------------------|------|---|--|--|
| 106 | CRT BOARD A/I | R0319110 | JUMPER WIRE AI/T 15mm | J27 | 1 | | |
| 107 | CRT BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J28 | 1 | | |
| 108 | CRT BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J29 | 1 | | |
| 109 | CRT BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J3 | 1 | | |
| 110 | CRT BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J30 | 1 | | |
| 111 | CRT BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J31 | 1 | | |
| 112 | CRT BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J32 | 1 | | |
| 113 | CRT BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J35 | 1 | | |
| 114 | CRT BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J37 | 1 | | |
| 115 | CRT BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J4 | 1 | | |
| 116 | CRT BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | J5 | 1 | | |
| 117 | CRT BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J6 | 1 | | |
| 118 | CRT BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J7 | 1 | | |
| 119 | CRT BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J8 | 1 | | |
| 120 | CRT BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J9 | 1 | | |
| 121 | CRT BOARD A/I | FA040473 | CARBON 1/8W(T) 5% 47Kohm | JP1 | 1 | | |
| 122 | CRT BOARD A/I | HB013828 | PACKING COIL /T 0.82uH K(EC24) | L203 | 1 | | |
| 123 | CRT BOARD A/I | HB013828 | PACKING COIL /T 0.82uH K(EC24) | L204 | 1 | | |
| 124 | CRT BOARD A/I | HB013828 | PACKING COIL /T 0.82uH K(EC24) | L205 | 1 | | |
| 125 | CRT BOARD A/I | HC006002 | BEAD 3.5X4.7/T | L206 | 1 | | |
| 126 | CRT BOARD A/I | EAA12133 | TR NPN 2SC1213AC TO-92(T) | Q201 | 1 | | |
| 127 | CRT BOARD A/I | FA040221 | CARBON 1/8W(T) 5% 220ohm | R201 | 1 | | |
| 128 | CRT BOARD A/I | FA040101 | CARBON 1/8W(T) 5% 100ohm | R202 | 1 | | |
| 129 | CRT BOARD A/I | FA040101 | CARBON 1/8W(T) 5% 100ohm | R203 | 1 | | |
| 130 | CRT BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R204 | 1 | | |
| 131 | CRT BOARD A/I | FA040152 | CARBON 1/8W(T) 5% 1.5Kohm | R205 | 1 | | |
| 132 | CRT BOARD A/I | FA240103 | CARBON 1/4W(T) 5% 10Kohm | R206 | 1 | | |
| 133 | CRT BOARD A/I | FA040101 | CARBON 1/8W(T) 5% 100ohm | R208 | 1 | | |
| 134 | CRT BOARD A/I | FA040101 | CARBON 1/8W(T) 5% 100ohm | R209 | 1 | | |
| 135 | CRT BOARD A/I | FB247509 | METAL 1/4W(T) 1% 75ohm | R210 | 1 | | |
| 136 | CRT BOARD A/I | FA040330 | CARBON 1/8W(T) 5% 33ohm | R211 | 1 | | |
| 137 | CRT BOARD A/I | FA040101 | CARBON 1/8W(T) 5% 100ohm | R212 | 1 | | |
| 138 | CRT BOARD A/I | FA040391 | CARBON 1/8W(T) 5% 390ohm | R213 | 1 | | |
| 139 | CRT BOARD A/I | FA040333 | CARBON 1/8W(T) 5% 33Kohm | R219 | 1 | | |
| 140 | CRT BOARD A/I | FA240151 | CARBON 1/4W(T) 5% 150ohm | R220 | 1 | | |
| 141 | CRT BOARD A/I | FA040111 | CARBON 1/8W(T) 5% 110ohm | R221 | 1 | | |
| 142 | CRT BOARD A/I | FA040224 | CARBON 1/8W(T) 5% 220Kohm | R223 | 1 | | |
| 143 | CRT BOARD A/I | FB247509 | METAL 1/4W(T) 1% 75ohm | R230 | 1 | | |
| 144 | CRT BOARD A/I | FA040330 | CARBON 1/8W(T) 5% 33ohm | R231 | 1 | | |
| 145 | CRT BOARD A/I | FA040101 | CARBON 1/8W(T) 5% 100ohm | R232 | 1 | | |
| 146 | CRT BOARD A/I | FA040391 | CARBON 1/8W(T) 5% 390ohm | R233 | 1 | | |
| 147 | CRT BOARD A/I | FA040333 | CARBON 1/8W(T) 5% 33Kohm | R239 | 1 | | |
| 148 | CRT BOARD A/I | FA240151 | CARBON 1/4W(T) 5% 150ohm | R240 | 1 | | |
| 149 | CRT BOARD A/I | FA040111 | CARBON 1/8W(T) 5% 110ohm | R241 | 1 | | |
| 150 | CRT BOARD A/I | FA040224 | CARBON 1/8W(T) 5% 220Kohm | R243 | 1 | | |
| 151 | CRT BOARD A/I | FB247509 | METAL 1/4W(T) 1% 75ohm | R250 | 1 | | |
| 152 | CRT BOARD A/I | FA040330 | CARBON 1/8W(T) 5% 33ohm | R251 | 1 | | |
| 153 | CRT BOARD A/I | FA040101 | CARBON 1/8W(T) 5% 100ohm | R252 | 1 | | |
| 154 | CRT BOARD A/I | FA040391 | CARBON 1/8W(T) 5% 390ohm | R253 | 1 | | |
| 155 | CRT BOARD A/I | FA040333 | CARBON 1/8W(T) 5% 33Kohm | R259 | 1 | | |
| 156 | CRT BOARD A/I | FA240151 | CARBON 1/4W(T) 5% 150ohm | R260 | 1 | | |
| 157 | CRT BOARD A/I | FA040111 | CARBON 1/8W(T) 5% 110ohm | R261 | 1 | | |
| 158 | CRT BOARD A/I | FA040224 | CARBON 1/8W(T) 5% 220Kohm | R263 | 1 | | |

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|-----|------------------|----------|-------------------------------|------------|---|-----|--|
| 159 | CRT BOARD A/I | FA040221 | CARBON 1/8W(T) 5% 220ohm | R270 | 1 | | |
| 160 | CRT BOARD A/I | FA240223 | CARBON 1/4W(T) 5% 22Kohm | R278 | 1 | | |
| 161 | CRT BOARD A/I | FA240223 | CARBON 1/4W(T) 5% 22Kohm | R280 | 1 | | |
| 162 | CRT BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R282 | 1 | | |
| 163 | CRT BOARD A/I | FA040112 | CARBON 1/8W(T) 5% 1.1Kohm | R284 | 1 | | |
| 164 | CRT BOARD A/I | FA240334 | CARBON 1/4W(T) 5% 330Kohm | R286 | 1 | | |
| 165 | CRT BOARD A/I | FA330101 | CARBON 1/2W(T) 5% 100ohm | R287 | 1 | | |
| 166 | CRT BOARD A/I | FA040103 | CARBON 1/8W(T) 5% 10Kohm | R288 | 1 | | |
| 167 | CRT BOARD A/I | FA040102 | CARBON 1/8W(T) 5% 1Kohm | R289 | 1 | | |
| 168 | CRT BOARD A/I | FA240223 | CARBON 1/4W(T) 5% 22Kohm | R290 | 1 | | |
| 169 | CRT BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R291 | 1 | | |
| 170 | CRT BOARD A/I | FA240101 | CARBON 1/4W(T) 5% 100ohm | R292 | 1 | | |
| 171 | CRT BOARD A/I | FA040103 | CARBON 1/8W(T) 5% 10Kohm | R293 | 1 | | |
| 172 | CRT BOARD A/I | FA040562 | CARBON 1/8W(T) 5% 5.6Kohm | R294 | 1 | | |
| 173 | CRT BOARD A/I | FA040562 | CARBON 1/8W(T) 5% 5.6Kohm | R295 | 1 | | |
| 174 | CRT BOARD A/I | FA040105 | CARBON 1/8W(T) 5% 1Mohm | R296 | 1 | | |
| 175 | CRT BOARD A/I | FA040473 | CARBON 1/8W(T) 5% 47Kohm | VR201 | 1 | | |
| 176 | CRT BOARD A/I | FA040473 | CARBON 1/8W(T) 5% 47Kohm | VR202 | 1 | | |
| 177 | CRT BOARD INSERT | GB9332H3 | CERAMIC Z5V(F)/T 3300P/1KV Z | C277 | 1 | | |
| 178 | CRT BOARD INSERT | GAB22675 | ELECT 105oC/T 22u/100V M | C288 | 1 | | |
| 179 | CRT BOARD INSERT | R0224070 | SINGLE PIN 1P L=14mm 2.36mm | CRT GND | 1 | | |
| 180 | CRT BOARD INSERT | 80000071 | CRT SOCKET 22.5mm | CRT SOCKET | 1 | T,O | |
| 181 | CRT BOARD INSERT | 14000041 | SCREW (P-#2CBRITS*3*8*15BF) | FOR U203 | 1 | | |
| 182 | CRT BOARD INSERT | HB013100 | PACKING COIL /T 10uH K(EC24) | J23 | 1 | | |
| 183 | CRT BOARD INSERT | HB000008 | CHOKO COIL 100uH 8X10 | L201 | 1 | | |
| 184 | CRT BOARD INSERT | HB000008 | CHOKO COIL 100uH 8X10 | L202 | 1 | | |
| 185 | CRT BOARD INSERT | FB910229 | FUSIBLE MF RES 1/4W 2.2ohm J | R297 | 1 | | |
| 186 | CRT BOARD INSERT | R0224129 | BASE PIN 6P+HOUSING P=2.5mm | S201 | 1 | | |
| 187 | CRT BOARD INSERT | R0224127 | XH-BASE PIN 4P | S202 | 1 | | |
| 188 | CRT BOARD INSERT | R0224129 | BASE PIN 6P+HOUSING P=2.5mm | S204 | 1 | | |
| 189 | CRT BOARD INSERT | R0224130 | BASE PIN 7P+HOUSING P=2.5mm | S205 | 1 | | |
| 190 | CRT BOARD INSERT | 80000631 | IC LM1281 | U201 | 1 | | |
| 191 | CRT BOARD INSERT | 12600112 | HEAT SINK (CRT ,PWB) | U203 | 1 | | |
| 192 | CRT BOARD INSERT | 80003661 | N.S VIDEO DRIVE IC LM2438 | U203 | 1 | | |
| 193 | CRT BOARD INSERT | 80001941 | OSD IC MTV016N | U204 | 1 | | |
| 194 | CRT BOARD INSERT | FF300203 | VR CARBON 6mm 20K/B | VR210 | 1 | | |
| 195 | CRT BOARD INSERT | FF300203 | VR CARBON 6mm 20K/B | VR230 | 1 | | |
| 196 | CRT BOARD INSERT | FF300203 | VR CARBON 6mm 20K/B | VR250 | 1 | | |
| 197 | MAIN BOARD A/I | HC006002 | BEAD 3.5X4.7/T | B101 | 1 | | |
| 198 | MAIN BOARD A/I | 80000561 | BEAD 3.5x6x0.8/T | B103 | 1 | | |
| 199 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | B104 | 1 | | |
| 200 | MAIN BOARD A/I | HC006002 | BEAD 3.5X4.7/T | B105 | 1 | | |
| 201 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | B106 | 1 | | |
| 202 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | B107 | 1 | | |
| 203 | MAIN BOARD A/I | 80000561 | BEAD 3.5x6x0.8/T | B108 | 1 | | |
| 204 | MAIN BOARD A/I | 80000561 | BEAD 3.5x6x0.8/T | B109 | 1 | | |
| 205 | MAIN BOARD A/I | HC006002 | BEAD 3.5X4.7/T | B301 | 1 | | |
| 206 | MAIN BOARD A/I | HC006002 | BEAD 3.5X4.7/T | B302 | 1 | | |
| 207 | MAIN BOARD A/I | HC006002 | BEAD 3.5X4.7/T | B303 | 1 | | |
| 208 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 5mm | B31A | 1 | | |
| 209 | MAIN BOARD A/I | HC006002 | BEAD 3.5X4.7/T | B701 | 1 | | |
| 210 | MAIN BOARD A/I | GB8103F5 | CERAMIC Z5U(E)/T 0.01u/500V M | C106 | 1 | | |
| 211 | MAIN BOARD A/I | GA347625 | ELECT 85oC/T 47u/16V M | C108 | 1 | | |

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| 212 | MAIN BOARD A/I | GA322645 | ELECT 85oC/T 22u/35V M | C109 | 1 | | |
| 213 | MAIN BOARD A/I | GB747153 | CERAMIC Y5P(B)/T 470P/50V K | C110 | 1 | | |
| 214 | MAIN BOARD A/I | GE210352 | PLASTIC PEI/T 0.01u/50V J | C111 | 1 | | |
| 215 | MAIN BOARD A/I | GB910358 | CERAMIC Z5V(F)/T 0.01u/50V Z | C112 | 1 | | |
| 216 | MAIN BOARD A/I | GA310655 | ELECT 85oC/T 10u/50V M | C113 | 1 | | |
| 217 | MAIN BOARD A/I | GF210462 | MEF CAP BOX 0.1u/63V J | C114 | 1 | | |
| 218 | MAIN BOARD A/I | GF210452 | MEF CAP BOX 0.1u/50V J | C114 | OR | | |
| 219 | MAIN BOARD A/I | GF233262 | MEF CAP BOX 0.0033u/63V J | C115 | 1 | | |
| 220 | MAIN BOARD A/I | GF233252 | MEF CAP BOX 0.0033u/50V J | C115 | OR | | |
| 221 | MAIN BOARD A/I | GA310655 | ELECT 85oC/T 10u/50V M | C116 | 1 | | |
| 222 | MAIN BOARD A/I | GAH22675 | ELECT CAP 105oC/T 22u/100V M TK() | C119 | 1 | | |
| 223 | MAIN BOARD A/I | GAJ22675 | ELECT CAP 105oC/T 22u/100V M PF() s | C119 | OR | | |
| 224 | MAIN BOARD A/I | GE222352 | PLASTIC PEI/T 0.022u/50V J | C123 | 1 | | |
| 225 | MAIN BOARD A/I | GB7331H3 | CERAMIC Y5P(B)/T 330P/1KV K | C124 | 1 | | |
| 226 | MAIN BOARD A/I | GB7101H3 | CERAMIC Y5P(B)/T 100P/1KV K | C127 | 1 | | |
| 227 | MAIN BOARD A/I | GA347625 | ELECT 85oC/T 47u/16V M | C130 | 1 | | |
| 228 | MAIN BOARD A/I | GF210462 | MEF CAP BOX 0.1u/63V J | C131 | 1 | | |
| 229 | MAIN BOARD A/I | GF210452 | MEF CAP BOX 0.1u/50V J | C131 | OR | | |
| 230 | MAIN BOARD A/I | GE233352 | PLASTIC PEI/T 0.033u/50V J | C132 | 1 | | |
| 231 | MAIN BOARD A/I | GF233262 | MEF CAP BOX 0.0033u/63V J | C133 | 1 | | |
| 232 | MAIN BOARD A/I | GF233252 | MEF CAP BOX 0.0033u/50V J | C133 | OR | | |
| 233 | MAIN BOARD A/I | GB747153 | CERAMIC Y5P(B)/T 470P/50V K | C134 | 1 | | |
| 234 | MAIN BOARD A/I | GB747153 | CERAMIC Y5P(B)/T 470P/50V K | C135 | 1 | | |
| 235 | MAIN BOARD A/I | GA347725 | ELECT 85oC/T 470u/16V M | C136 | 1 | | |
| 236 | MAIN BOARD A/I | GA347625 | ELECT 85oC/T 47u/16V M | C137 | 1 | | |
| 237 | MAIN BOARD A/I | GAH47725 | ELECT CAP 105oC/T 470u/16V M TK() | C139 | 1 | | |
| 238 | MAIN BOARD A/I | GAJ47725 | ELECT CAP 105oC/T 470u/16V M PF() s | C139 | OR | | |
| 239 | MAIN BOARD A/I | GE210352 | PLASTIC PEI/T 0.01u/50V J | C140 | 1 | | |
| 240 | MAIN BOARD A/I | GA310725 | ELECT 85oC/T 100u/16V M | C141 | 1 | | |
| 241 | MAIN BOARD A/I | GE210352 | PLASTIC PEI/T 0.01u/50V J | C142 | 1 | | |
| 242 | MAIN BOARD A/I | GB8103F5 | CERAMIC Z5U(E)/T 0.01u/500V M | C144 | 1 | | |
| 243 | MAIN BOARD A/I | GA310555 | ELECT 85oC/T 1u/50V M | C145 | 1 | | |
| 244 | MAIN BOARD A/I | GB910358 | CERAMIC Z5V(F)/T 0.01u/50V Z | C149 | 1 | | |
| 245 | MAIN BOARD A/I | GA310655 | ELECT 85oC/T 10u/50V M | C150 | 1 | | |
| 246 | MAIN BOARD A/I | GA347625 | ELECT 85oC/T 47u/16V M | C151 | 1 | | |
| 247 | MAIN BOARD A/I | GB7471F3 | CERAMIC Y5P(B)/T 470P/500V K | C152 | 1 | | |
| 248 | MAIN BOARD A/I | GA347555 | ELECT 85oC/T 4.7u/50V M | C156 | 1 | | |
| 249 | MAIN BOARD A/I | GE210352 | PLASTIC PEI/T 0.01u/50V J | C162 | 1 | | |
| 250 | MAIN BOARD A/I | GA347555 | ELECT 85oC/T 4.7u/50V M | C164 | 1 | | |
| 251 | MAIN BOARD A/I | GB910358 | CERAMIC Z5V(F)/T 0.01u/50V Z | C301 | 1 | | |
| 252 | MAIN BOARD A/I | GF210462 | MEF CAP BOX 0.1u/63V J | C302 | 1 | | |
| 253 | MAIN BOARD A/I | GF210452 | MEF CAP BOX 0.1u/50V J | C302 | OR | | |
| 254 | MAIN BOARD A/I | GB910358 | CERAMIC Z5V(F)/T 0.01u/50V Z | C304 | 1 | | |
| 255 | MAIN BOARD A/I | GA347625 | ELECT 85oC/T 47u/16V M | C305 | 1 | | |
| 256 | MAIN BOARD A/I | GA310655 | ELECT 85oC/T 10u/50V M | C306 | 1 | | |
| 257 | MAIN BOARD A/I | GE210352 | PLASTIC PEI/T 0.01u/50V J | C307 | 1 | | |
| 258 | MAIN BOARD A/I | GA310655 | ELECT 85oC/T 10u/50V M | C308 | 1 | | |
| 259 | MAIN BOARD A/I | GA347555 | ELECT 85oC/T 4.7u/50V M | C309 | 1 | | |
| 260 | MAIN BOARD A/I | GA347555 | ELECT 85oC/T 4.7u/50V M | C312 | 1 | | |
| 261 | MAIN BOARD A/I | GA347655 | ELECT 85oC/T 47u/50V M | C313 | 1 | | |
| 262 | MAIN BOARD A/I | GF210452 | MEF CAP BOX 0.1u/50V J | C314 | 1 | | |
| 263 | MAIN BOARD A/I | GF210462 | MEF CAP BOX 0.1u/63V J | C314 | OR | | |
| 264 | MAIN BOARD A/I | GF210252 | MEF CAP BOX 0.001u/50V J | C315 | 1 | | |

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| 265 | MAIN BOARD A/I | GF210262 | MEF CAP BOX 0.001u/63V J | C315 | OR | | |
| 266 | MAIN BOARD A/I | GF247262 | MEF CAP BOX 0.0047u/63V J | C316 | 1 | | |
| 267 | MAIN BOARD A/I | GF247252 | MEF CAP BOX 0.0047u/50V J | C316 | OR | | |
| 268 | MAIN BOARD A/I | GA347455 | ELECT 85oC/T 0.47u/50V M | C317 | 1 | | |
| 269 | MAIN BOARD A/I | GA322725 | ELECT 85oC/T 220u/16V M | C320 | 1 | | |
| 270 | MAIN BOARD A/I | GF222462 | MEF CAP BOX 0.22u/63V J | C326 | 1 | | |
| 271 | MAIN BOARD A/I | GF222452 | MEF CAP BOX 0.22u/50V J | C326 | OR | | |
| 272 | MAIN BOARD A/I | GA310555 | ELECT 85oC/T 1u/50V M | C328 | 1 | | |
| 273 | MAIN BOARD A/I | GA347725 | ELECT 85oC/T 470u/16V M | C330 | 1 | | |
| 274 | MAIN BOARD A/I | GB7102H3 | CERAMIC Y5P(B)/T 1000P/1KV K | C334 | 1 | | |
| 275 | MAIN BOARD A/I | GA347625 | ELECT 85oC/T 47u/16V M | C335 | 1 | | |
| 276 | MAIN BOARD A/I | GA310555 | ELECT 85oC/T 1u/50V M | C336 | 1 | | |
| 277 | MAIN BOARD A/I | GA410585 | ELECT NP/T 1u/250V M | C339 | 1 | | |
| 278 | MAIN BOARD A/I | GA310555 | ELECT 85oC/T 1u/50V M | C340 | 1 | | |
| 279 | MAIN BOARD A/I | R0319110 | JUMPER WIRE A/I/T 5mm | C341 | 1 | | |
| 280 | MAIN BOARD A/I | GF210462 | MEF CAP BOX 0.1u/63V J | C343 | 1 | | |
| 281 | MAIN BOARD A/I | GF210452 | MEF CAP BOX 0.1u/50V J | C343 | OR | | |
| 282 | MAIN BOARD A/I | GA347585 | ELECT 85oC/T 4.7u/250V M | C344 | 1 | | |
| 283 | MAIN BOARD A/I | GE222352 | PLASTIC PEI/T 0.022u/50V J | C348 | 1 | | |
| 284 | MAIN BOARD A/I | GE233352 | PLASTIC PEI/T 0.033u/50V J | C350 | 1 | | |
| 285 | MAIN BOARD A/I | GA310555 | ELECT 85oC/T 1u/50V M | C352 | 1 | | |
| 286 | MAIN BOARD A/I | GB633152 | CERAMIC SL/T 330P/50V J | C353 | 1 | | |
| 287 | MAIN BOARD A/I | GE222352 | PLASTIC PEI/T 0.022u/50V J | C354 | 1 | | |
| 288 | MAIN BOARD A/I | GE210252 | PLASTIC PEI/T 0.001u/50V J | C401 | 1 | | |
| 289 | MAIN BOARD A/I | GA310655 | ELECT 85oC/T 10u/50V M | C402 | 1 | | |
| 290 | MAIN BOARD A/I | GF222452 | MEF CAP BOX 0.22u/50V J | C403 | 1 | | |
| 291 | MAIN BOARD A/I | GF222462 | MEF CAP BOX 0.22u/63V J | C403 | OR | | |
| 292 | MAIN BOARD A/I | GAH47725 | ELECT CAP 105oC/T 470u/16V M TK() | C404 | 1 | | |
| 293 | MAIN BOARD A/I | GAJ47725 | ELECT CAP 105oC/T 470u/16V M PF() s | C404 | OR | | |
| 294 | MAIN BOARD A/I | GE222252 | PLASTIC PEI/T 0.0022u/50V J | C405 | 1 | | |
| 295 | MAIN BOARD A/I | GA310655 | ELECT 85oC/T 10u/50V M | C406 | 1 | | |
| 296 | MAIN BOARD A/I | GB210458 | CERAMIC Y5V/T 0.1u/50V Z | C407 | 1 | | |
| 297 | MAIN BOARD A/I | GAH10825 | ELECT CAP 105oC/T 1000u/16V M TK() | C408 | 1 | | |
| 298 | MAIN BOARD A/I | GAJ10825 | ELECT CAP 105oC/T 1000u/16V M PF() s | C408 | OR | | |
| 299 | MAIN BOARD A/I | GB910358 | CERAMIC Z5V(F)/T 0.01u/50V Z | C409 | 1 | | |
| 300 | MAIN BOARD A/I | GA310745 | ELECT 85oC/T 100u/35V M | C410 | 1 | | |
| 301 | MAIN BOARD A/I | GA310655 | ELECT 85oC/T 10u/50V M | C416 | 1 | | |
| 302 | MAIN BOARD A/I | GE233252 | PLASTIC PEI/T 0.0033u/50V J | C417 | 1 | | |
| 303 | MAIN BOARD A/I | GA310725 | ELECT 85oC/T 100u/16V M | C418 | 1 | | |
| 304 | MAIN BOARD A/I | GA310655 | ELECT 85oC/T 10u/50V M | C419 | 1 | | |
| 305 | MAIN BOARD A/I | GB910358 | CERAMIC Z5V(F)/T 0.01u/50V Z | C420 | 1 | | |
| 306 | MAIN BOARD A/I | GA310655 | ELECT 85oC/T 10u/50V M | C423 | 1 | | |
| 307 | MAIN BOARD A/I | GA322725 | ELECT 85oC/T 220u/16V M | C424 | 1 | | |
| 308 | MAIN BOARD A/I | GA347485 | ELECT 85oC/T 0.47u/250V M | C428 | 1 | | |
| 309 | MAIN BOARD A/I | GA422625 | ELECT NP/T 22u/16V M | C431 | 1 | | |
| 310 | MAIN BOARD A/I | GA310655 | ELECT 85oC/T 10u/50V M | C433 | 1 | | |
| 311 | MAIN BOARD A/I | GA310655 | ELECT 85oC/T 10u/50V M | C435 | 1 | | |
| 312 | MAIN BOARD A/I | GA310655 | ELECT 85oC/T 10u/50V M | C437 | 1 | | |
| 313 | MAIN BOARD A/I | GA310655 | ELECT 85oC/T 10u/50V M | C438 | 1 | | |
| 314 | MAIN BOARD A/I | GA310555 | ELECT 85oC/T 1u/50V M | C440 | 1 | | |
| 315 | MAIN BOARD A/I | GE247252 | PLASTIC PEI/T 0.0047u/50V J | C442 | 1 | | |
| 316 | MAIN BOARD A/I | GA347555 | ELECT 85oC/T 4.7u/50V M | C446 | 1 | | |
| 317 | MAIN BOARD A/I | GA347455 | ELECT 85oC/T 0.47u/50V M | C447 | 1 | | |

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|-----|----------------|----------|------------------------------|------|----|--|--|
| 318 | MAIN BOARD A/I | GF210462 | MEF CAP BOX 0.1u/63V J | C448 | 1 | | |
| 319 | MAIN BOARD A/I | GF210452 | MEF CAP BOX 0.1u/50V J | C448 | OR | | |
| 320 | MAIN BOARD A/I | GA347555 | ELECT 85oC/T 4.7u/50V M | C450 | 1 | | |
| 321 | MAIN BOARD A/I | GE268252 | PLASTIC PEI/T 0.0068u/50V J | C601 | 1 | | |
| 322 | MAIN BOARD A/I | GE210352 | PLASTIC PEI/T 0.01u/50V J | C603 | 1 | | |
| 323 | MAIN BOARD A/I | GA310655 | ELECT 85oC/T 10u/50V M | C604 | 1 | | |
| 324 | MAIN BOARD A/I | GB710253 | CERAMIC Y5P(B)/T 1000P/50V K | C605 | 1 | | |
| 325 | MAIN BOARD A/I | GA310555 | ELECT 85oC/T 1u/50V M | C701 | 1 | | |
| 326 | MAIN BOARD A/I | GB210458 | CERAMIC Y5V/T 0.1u/50V Z | C702 | 1 | | |
| 327 | MAIN BOARD A/I | GA310725 | ELECT 85oC/T 100u/16V M | C703 | 1 | | |
| 328 | MAIN BOARD A/I | GA322555 | ELECT 85oC/T 2.2u/50V M | C704 | 1 | | |
| 329 | MAIN BOARD A/I | GB633052 | CERAMIC SL/T 33P/50V J | C705 | 1 | | |
| 330 | MAIN BOARD A/I | GB633052 | CERAMIC SL/T 33P/50V J | C706 | 1 | | |
| 331 | MAIN BOARD A/I | GB610152 | CERAMIC SL/T 100P/50V J | C707 | 1 | | |
| 332 | MAIN BOARD A/I | GB610152 | CERAMIC SL/T 100P/50V J | C708 | 1 | | |
| 333 | MAIN BOARD A/I | GB910358 | CERAMIC Z5V(F)/T 0.01u/50V Z | C724 | 1 | | |
| 334 | MAIN BOARD A/I | GA347625 | ELECT 85oC/T 47u/16V M | C725 | 1 | | |
| 335 | MAIN BOARD A/I | GA310655 | ELECT 85oC/T 10u/50V M | C726 | 1 | | |
| 336 | MAIN BOARD A/I | GA310655 | ELECT 85oC/T 10u/50V M | C727 | 1 | | |
| 337 | MAIN BOARD A/I | GA310655 | ELECT 85oC/T 10u/50V M | C728 | 1 | | |
| 338 | MAIN BOARD A/I | EJA20003 | DIODE/T 1A BA159 | D105 | 1 | | |
| 339 | MAIN BOARD A/I | EJAC0017 | DIODE/T 1A 1N4936 | D106 | 1 | | |
| 340 | MAIN BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D107 | 1 | | |
| 341 | MAIN BOARD A/I | EJAC0017 | DIODE/T 1A 1N4936 | D108 | 1 | | |
| 342 | MAIN BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D109 | 1 | | |
| 343 | MAIN BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D115 | 1 | | |
| 344 | MAIN BOARD A/I | EJA20003 | DIODE/T 1A BA159 | D116 | 1 | | |
| 345 | MAIN BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D117 | 1 | | |
| 346 | MAIN BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D119 | 1 | | |
| 347 | MAIN BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D120 | 1 | | |
| 348 | MAIN BOARD A/I | EJAC0018 | DIODE/T 1A 1N4937 | D124 | 1 | | |
| 349 | MAIN BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D125 | 1 | | |
| 350 | MAIN BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D126 | 1 | | |
| 351 | MAIN BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D127 | 1 | | |
| 352 | MAIN BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D128 | 1 | | |
| 353 | MAIN BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D129 | 1 | | |
| 354 | MAIN BOARD A/I | EJAC0017 | DIODE/T 1A 1N4936 | D130 | 1 | | |
| 355 | MAIN BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D133 | 1 | | |
| 356 | MAIN BOARD A/I | EJA05819 | DIODE STKY/T 1A/40V 1N5819 | D134 | 1 | | |
| 357 | MAIN BOARD A/I | EJAC0018 | DIODE/T 1A 1N4937 | D301 | 1 | | |
| 358 | MAIN BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D302 | 1 | | |
| 359 | MAIN BOARD A/I | EJAC0018 | DIODE/T 1A 1N4937 | D303 | 1 | | |
| 360 | MAIN BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D304 | 1 | | |
| 361 | MAIN BOARD A/I | EJA05819 | DIODE STKY/T 1A/40V 1N5819 | D305 | 1 | | |
| 362 | MAIN BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D306 | 1 | | |
| 363 | MAIN BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D310 | 1 | | |
| 364 | MAIN BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D311 | 1 | | |
| 365 | MAIN BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D313 | 1 | | |
| 366 | MAIN BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D314 | 1 | | |
| 367 | MAIN BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D315 | 1 | | |
| 368 | MAIN BOARD A/I | EJAC0018 | DIODE/T 1A 1N4937 | D318 | 1 | | |
| 369 | MAIN BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D320 | 1 | | |
| 370 | MAIN BOARD A/I | EJAC0018 | DIODE/T 1A 1N4937 | D321 | 1 | | |

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|-----|----------------|----------|----------------------------|------|---|--|--|
| 371 | MAIN BOARD A/I | EJAC0018 | DIODE/T 1A 1N4937 | D322 | 1 | | |
| 372 | MAIN BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D323 | 1 | | |
| 373 | MAIN BOARD A/I | EJAC0018 | DIODE/T 1A 1N4937 | D324 | 1 | | |
| 374 | MAIN BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D325 | 1 | | |
| 375 | MAIN BOARD A/I | EJAC0018 | DIODE/T 1A 1N4937 | D328 | 1 | | |
| 376 | MAIN BOARD A/I | EJAC0018 | DIODE/T 1A 1N4937 | D329 | 1 | | |
| 377 | MAIN BOARD A/I | EJAC0018 | DIODE/T 1A 1N4937 | D330 | 1 | | |
| 378 | MAIN BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D331 | 1 | | |
| 379 | MAIN BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D401 | 1 | | |
| 380 | MAIN BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D402 | 1 | | |
| 381 | MAIN BOARD A/I | EJAC0018 | DIODE/T 1A 1N4937 | D403 | 1 | | |
| 382 | MAIN BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D601 | 1 | | |
| 383 | MAIN BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D602 | 1 | | |
| 384 | MAIN BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D604 | 1 | | |
| 385 | MAIN BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D605 | 1 | | |
| 386 | MAIN BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D60A | 1 | | |
| 387 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | D701 | 1 | | |
| 388 | MAIN BOARD A/I | EJA05819 | DIODE STKY/T 1A/40V 1N5819 | D702 | 1 | | |
| 389 | MAIN BOARD A/I | EJ044148 | DIODE "T" 1N4148 | D704 | 1 | | |
| 390 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 17.5mm | J1 | 1 | | |
| 391 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J10 | 1 | | |
| 392 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J100 | 1 | | |
| 393 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 20mm | J101 | 1 | | |
| 394 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J102 | 1 | | |
| 395 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 20mm | J103 | 1 | | |
| 396 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J105 | 1 | | |
| 397 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 15mm | J106 | 1 | | |
| 398 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 15mm | J107 | 1 | | |
| 399 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | J108 | 1 | | |
| 400 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 17.5mm | J109 | 1 | | |
| 401 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 17.5mm | J110 | 1 | | |
| 402 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 15mm | J111 | 1 | | |
| 403 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J112 | 1 | | |
| 404 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 15mm | J113 | 1 | | |
| 405 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | J114 | 1 | | |
| 406 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J115 | 1 | | |
| 407 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J116 | 1 | | |
| 408 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 15mm | J117 | 1 | | |
| 409 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J118 | 1 | | |
| 410 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J119 | 1 | | |
| 411 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 15mm | J12 | 1 | | |
| 412 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | J120 | 1 | | |
| 413 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | J121 | 1 | | |
| 414 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 17.5mm | J123 | 1 | | |
| 415 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J124 | 1 | | |
| 416 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J125 | 1 | | |
| 417 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | J127 | 1 | | |
| 418 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | J128 | 1 | | |
| 419 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | J129 | 1 | | |
| 420 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J13 | 1 | | |
| 421 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | J130 | 1 | | |
| 422 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 20mm | J131 | 1 | | |
| 423 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 15mm | J132 | 1 | | |

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|-----|----------------|----------|-------------------------|------|---|--|--|
| 424 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 15mm | J133 | 1 | | |
| 425 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 15mm | J134 | 1 | | |
| 426 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 17.5mm | J135 | 1 | | |
| 427 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 17.5mm | J136 | 1 | | |
| 428 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 17.5mm | J137 | 1 | | |
| 429 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 17.5mm | J138 | 1 | | |
| 430 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J139 | 1 | | |
| 431 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | J14 | 1 | | |
| 432 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | J15 | 1 | | |
| 433 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J16 | 1 | | |
| 434 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J17 | 1 | | |
| 435 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J19 | 1 | | |
| 436 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | J2 | 1 | | |
| 437 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J20 | 1 | | |
| 438 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J21 | 1 | | |
| 439 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 17.5mm | J22 | 1 | | |
| 440 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J23 | 1 | | |
| 441 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J24 | 1 | | |
| 442 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J27 | 1 | | |
| 443 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J28 | 1 | | |
| 444 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J29 | 1 | | |
| 445 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | J3 | 1 | | |
| 446 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 17.5mm | J30 | 1 | | |
| 447 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J31 | 1 | | |
| 448 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 20mm | J33 | 1 | | |
| 449 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J34 | 1 | | |
| 450 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J35 | 1 | | |
| 451 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 15mm | J36 | 1 | | |
| 452 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J37 | 1 | | |
| 453 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J38 | 1 | | |
| 454 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J39 | 1 | | |
| 455 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J4 | 1 | | |
| 456 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J40 | 1 | | |
| 457 | MAIN BOARD A/I | HB003101 | PACKING COIL /T 100uH | J41 | 1 | | |
| 458 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J42 | 1 | | |
| 459 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | J43 | 1 | | |
| 460 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 20mm | J44 | 1 | | |
| 461 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J45 | 1 | | |
| 462 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J46 | 1 | | |
| 463 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J47 | 1 | | |
| 464 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J48 | 1 | | |
| 465 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | J49 | 1 | | |
| 466 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J5 | 1 | | |
| 467 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J51 | 1 | | |
| 468 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | J52 | 1 | | |
| 469 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | J53 | 1 | | |
| 470 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | J54 | 1 | | |
| 471 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | J55 | 1 | | |
| 472 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 17.5mm | J56 | 1 | | |
| 473 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 17.5mm | J57 | 1 | | |
| 474 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J58 | 1 | | |
| 475 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | J59 | 1 | | |
| 476 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J6 | 1 | | |

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|-----|----------------|----------|-------------------------------------|----------|----|--|--|
| 477 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | J61 | 1 | | |
| 478 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J62 | 1 | | |
| 479 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 20mm | J64 | 1 | | |
| 480 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J66 | 1 | | |
| 481 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J67 | 1 | | |
| 482 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 17.5mm | J68 | 1 | | |
| 483 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J69 | 1 | | |
| 484 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J7 | 1 | | |
| 485 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 17.5mm | J70 | 1 | | |
| 486 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J71 | 1 | | |
| 487 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J72 | 1 | | |
| 488 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J73 | 1 | | |
| 489 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | J74 | 1 | | |
| 490 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 17.5mm | J75 | 1 | | |
| 491 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J76 | 1 | | |
| 492 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | J77 | 1 | | |
| 493 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | J78 | 1 | | |
| 494 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 17.5mm | J79 | 1 | | |
| 495 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | J8 | 1 | | |
| 496 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 20mm | J80 | 1 | | |
| 497 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | J81 | 1 | | |
| 498 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J82 | 1 | | |
| 499 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | J84 | 1 | | |
| 500 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | J86 | 1 | | |
| 501 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J87 | 1 | | |
| 502 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | J88 | 1 | | |
| 503 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 15mm | J89 | 1 | | |
| 504 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 17.5mm | J9 | 1 | | |
| 505 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 15mm | J91 | 1 | | |
| 506 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | J92 | 1 | | |
| 507 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J93 | 1 | | |
| 508 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J94 | 1 | | |
| 509 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J95 | 1 | | |
| 510 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 10mm | J96 | 1 | | |
| 511 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | J97 | 1 | | |
| 512 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | J98 | 1 | | |
| 513 | MAIN BOARD A/I | 80000561 | BEAD 3.5x6x0.8/T | J99 | 1 | | |
| 514 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | JP1 | 1 | | |
| 515 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | JP2 | 1 | | |
| 516 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 12.5mm | JP3 | 1 | | |
| 517 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | JP4 | 1 | | |
| 518 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | JP5 | 1 | | |
| 519 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 20mm | JP6 | 1 | | |
| 520 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 5mm | JP701 | 1 | | |
| 521 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | JP8 | 1 | | |
| 522 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | L308 | 1 | | |
| 523 | MAIN BOARD A/I | 72000583 | N0501,N0701 MAIN BOARD(V3) | MAIN PCB | 1 | | |
| 524 | MAIN BOARD A/I | 80003831 | IC REGULATOR TL431 817B 4P | Q103 | 1 | | |
| 525 | MAIN BOARD A/I | EAA18157 | TR NPN 2SC1815GR TO-92(T) (T.P.S.) | Q105 | 1 | | |
| 526 | MAIN BOARD A/I | EAA09456 | TR NPN 2SC945P TO-92(T) (N.P.S.) | Q105 | OR | | |
| 527 | MAIN BOARD A/I | EAA23281 | TR NPN KSC 2328A TO-92(T) (SAMSUNG) | Q106 | 1 | | |
| 528 | MAIN BOARD A/I | EAA22355 | TR NPN 2SC2235Y TO-92(T) (TOSHIBA) | Q106 | OR | | |
| 529 | MAIN BOARD A/I | EAA18157 | TR NPN 2SC1815GR TO-92(T) (T.P.S.) | Q107 | 1 | | |

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|-----|----------------|----------|------------------------------------|------|----|--|--|
| 530 | MAIN BOARD A/I | EAA09456 | TR NPN 2SC945P TO-92(T) (N.P.S.) | Q107 | OR | | |
| 531 | MAIN BOARD A/I | EBA09281 | TR PNP KSA 928A TO-92(T) (SAMSUNG) | Q108 | 1 | | |
| 532 | MAIN BOARD A/I | EBA10205 | TR PNP 2SA1020Y TO-92(T) | Q108 | OR | | |
| 533 | MAIN BOARD A/I | EAA18157 | TR NPN 2SC1815GR TO-92(T) (T.P.S.) | Q110 | 1 | | |
| 534 | MAIN BOARD A/I | EAA09456 | TR NPN 2SC945P TO-92(T) (N.P.S.) | Q110 | OR | | |
| 535 | MAIN BOARD A/I | EBA04230 | TR PNP BF423 TO-92(T)(T.P.) | Q112 | 1 | | |
| 536 | MAIN BOARD A/I | EAA18157 | TR NPN 2SC1815GR TO-92(T) (T.P.S.) | Q113 | 1 | | |
| 537 | MAIN BOARD A/I | EAA09456 | TR NPN 2SC945P TO-92(T) (N.P.S.) | Q113 | OR | | |
| 538 | MAIN BOARD A/I | EBA10157 | TR PNP 2SA1015GR TO-92(T) (T.P.S.) | Q117 | 1 | | |
| 539 | MAIN BOARD A/I | EBA07336 | TR PNP 2SA733P TO-92(T) (N.P.S.) | Q117 | OR | | |
| 540 | MAIN BOARD A/I | EAA23690 | TR NPN PH2369 TO-92(T) (PHILIPS) | Q301 | 1 | | |
| 541 | MAIN BOARD A/I | EAA18157 | TR NPN 2SC1815GR TO-92(T) (T.P.S.) | Q302 | 1 | | |
| 542 | MAIN BOARD A/I | EAA09456 | TR NPN 2SC945P TO-92(T) (N.P.S.) | Q302 | OR | | |
| 543 | MAIN BOARD A/I | EAA04220 | TR NPN BF422 TO-92(T) (T,P) | Q304 | 1 | | |
| 544 | MAIN BOARD A/I | EBA04230 | TR PNP BF423 TO-92(T)(T.P.) | Q305 | 1 | | |
| 545 | MAIN BOARD A/I | EAA18157 | TR NPN 2SC1815GR TO-92(T) (T.P.S.) | Q306 | 1 | | |
| 546 | MAIN BOARD A/I | EAA09456 | TR NPN 2SC945P TO-92(T) (N.P.S.) | Q306 | OR | | |
| 547 | MAIN BOARD A/I | EFA29610 | TR 2SK2961 FET TOSHIBA | Q308 | 1 | | |
| 548 | MAIN BOARD A/I | EBA10157 | TR PNP 2SA1015GR TO-92(T) (T.P.S.) | Q310 | 1 | | |
| 549 | MAIN BOARD A/I | EBA07336 | TR PNP 2SA733P TO-92(T) (N.P.S.) | Q310 | OR | | |
| 550 | MAIN BOARD A/I | EBA04230 | TR PNP BF423 TO-92(T)(T.P.) | Q315 | 1 | | |
| 551 | MAIN BOARD A/I | EAA06673 | TR NPN 2SD667AC TO-92(T) (HITACHI) | Q316 | 1 | | |
| 552 | MAIN BOARD A/I | EAA18157 | TR NPN 2SC1815GR TO-92(T) (T.P.S.) | Q320 | 1 | | |
| 553 | MAIN BOARD A/I | EAA09456 | TR NPN 2SC945P TO-92(T) (N.P.S.) | Q320 | OR | | |
| 554 | MAIN BOARD A/I | EAA18157 | TR NPN 2SC1815GR TO-92(T) (T.P.S.) | Q323 | 1 | | |
| 555 | MAIN BOARD A/I | EAA09456 | TR NPN 2SC945P TO-92(T) (N.P.S.) | Q323 | OR | | |
| 556 | MAIN BOARD A/I | EAA18157 | TR NPN 2SC1815GR TO-92(T) (T.P.S.) | Q324 | 1 | | |
| 557 | MAIN BOARD A/I | EAA09456 | TR NPN 2SC945P TO-92(T) (N.P.S.) | Q324 | OR | | |
| 558 | MAIN BOARD A/I | EAA18157 | TR NPN 2SC1815GR TO-92(T) (T.P.S.) | Q401 | 1 | | |
| 559 | MAIN BOARD A/I | EAA09456 | TR NPN 2SC945P TO-92(T) (N.P.S.) | Q401 | OR | | |
| 560 | MAIN BOARD A/I | EAA18157 | TR NPN 2SC1815GR TO-92(T) (T.P.S.) | Q402 | 1 | | |
| 561 | MAIN BOARD A/I | EAA09456 | TR NPN 2SC945P TO-92(T) (N.P.S.) | Q402 | OR | | |
| 562 | MAIN BOARD A/I | EAA18157 | TR NPN 2SC1815GR TO-92(T) (T.P.S.) | Q601 | 1 | | |
| 563 | MAIN BOARD A/I | EAA09456 | TR NPN 2SC945P TO-92(T) (N.P.S.) | Q601 | OR | | |
| 564 | MAIN BOARD A/I | EAA18157 | TR NPN 2SC1815GR TO-92(T) (T.P.S.) | Q603 | 1 | | |
| 565 | MAIN BOARD A/I | EAA09456 | TR NPN 2SC945P TO-92(T) (N.P.S.) | Q603 | OR | | |
| 566 | MAIN BOARD A/I | EBA10157 | TR PNP 2SA1015GR TO-92(T) (T.P.S.) | Q604 | 1 | | |
| 567 | MAIN BOARD A/I | EBA07336 | TR PNP 2SA733P TO-92(T) (N.P.S.) | Q604 | OR | | |
| 568 | MAIN BOARD A/I | EAA18157 | TR NPN 2SC1815GR TO-92(T) (T.P.S.) | Q605 | 1 | | |
| 569 | MAIN BOARD A/I | EAA09456 | TR NPN 2SC945P TO-92(T) (N.P.S.) | Q605 | OR | | |
| 570 | MAIN BOARD A/I | EAA18157 | TR NPN 2SC1815GR TO-92(T) (T.P.S.) | Q606 | 1 | | |
| 571 | MAIN BOARD A/I | EAA09456 | TR NPN 2SC945P TO-92(T) (N.P.S.) | Q606 | OR | | |
| 572 | MAIN BOARD A/I | EAA18157 | TR NPN 2SC1815GR TO-92(T) (T.P.S.) | Q702 | 1 | | |
| 573 | MAIN BOARD A/I | EAA09456 | TR NPN 2SC945P TO-92(T) (N.P.S.) | Q702 | OR | | |
| 574 | MAIN BOARD A/I | FA330684 | CARBON 1/2W(T) 5% 680Kohm | R101 | 1 | | |
| 575 | MAIN BOARD A/I | FA040331 | CARBON 1/8W(T) 5% 330ohm | R102 | 1 | | |
| 576 | MAIN BOARD A/I | FA240330 | CARBON 1/4W(T) 5% 33 ohm | R104 | 1 | | |
| 577 | MAIN BOARD A/I | FA240564 | CARBON 1/4W(T) 5% 560Kohm | R107 | 1 | | |
| 578 | MAIN BOARD A/I | FA240334 | CARBON 1/4W(T) 5% 330Kohm | R108 | 1 | | |
| 579 | MAIN BOARD A/I | FA040470 | CARBON 1/8W(T) 5% 47ohm | R109 | 1 | | |
| 580 | MAIN BOARD A/I | FA240113 | CARBON 1/4W(T) 5% 11Kohm | R10A | 1 | | |
| 581 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R110 | 1 | | |
| 582 | MAIN BOARD A/I | FA040102 | CARBON 1/8W(T) 5% 1Kohm | R112 | 1 | | |

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|-----|----------------|----------|---------------------------|------|---|--|--|
| 583 | MAIN BOARD A/I | FA040752 | CARBON 1/8W(T) 5% 7.5Kohm | R113 | 1 | | |
| 584 | MAIN BOARD A/I | FA330104 | CARBON 1/2W(T) 5% 100Kohm | R114 | 1 | | |
| 585 | MAIN BOARD A/I | FA040390 | CARBON 1/8W(T) 5% 39ohm | R115 | 1 | | |
| 586 | MAIN BOARD A/I | FA240271 | CARBON 1/4W(T) 5% 270ohm | R116 | 1 | | |
| 587 | MAIN BOARD A/I | FA240390 | CARBON 1/4W(T) 1% 39ohm | R117 | 1 | | |
| 588 | MAIN BOARD A/I | FA240203 | CARBON 1/4W(T) 5% 20Kohm | R118 | 1 | | |
| 589 | MAIN BOARD A/I | FA040104 | CARBON 1/8W(T) 5% 100Kohm | R119 | 1 | | |
| 590 | MAIN BOARD A/I | FA330104 | CARBON 1/2W(T) 5% 100Kohm | R120 | 1 | | |
| 591 | MAIN BOARD A/I | FA040103 | CARBON 1/8W(T) 5% 10Kohm | R122 | 1 | | |
| 592 | MAIN BOARD A/I | FA040102 | CARBON 1/8W(T) 5% 1Kohm | R123 | 1 | | |
| 593 | MAIN BOARD A/I | FA240681 | CARBON 1/4W(T) 5% 680ohm | R126 | 1 | | |
| 594 | MAIN BOARD A/I | FA040223 | CARBON 1/8W(T) 5% 22Kohm | R127 | 1 | | |
| 595 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R129 | 1 | | |
| 596 | MAIN BOARD A/I | FA040223 | CARBON 1/8W(T) 5% 22Kohm | R130 | 1 | | |
| 597 | MAIN BOARD A/I | R0319110 | JUMPER WIRE A/I/T 15mm | R131 | 1 | | |
| 598 | MAIN BOARD A/I | FA040102 | CARBON 1/8W(T) 5% 1Kohm | R132 | 1 | | |
| 599 | MAIN BOARD A/I | FA040330 | CARBON 1/8W(T) 5% 33ohm | R135 | 1 | | |
| 600 | MAIN BOARD A/I | FA040102 | CARBON 1/8W(T) 5% 1Kohm | R137 | 1 | | |
| 601 | MAIN BOARD A/I | FA240750 | CARBON 1/4W(T) 5% 75ohm | R138 | 1 | | |
| 602 | MAIN BOARD A/I | FA330561 | CARBON 1/2W(T) 5% 560ohm | R139 | 1 | | |
| 603 | MAIN BOARD A/I | FA040470 | CARBON 1/8W(T) 5% 47ohm | R140 | 1 | | |
| 604 | MAIN BOARD A/I | FA040203 | CARBON 1/8W(T) 5% 20Kohm | R141 | 1 | | |
| 605 | MAIN BOARD A/I | FA040224 | CARBON 1/8W(T) 5% 220Kohm | R142 | 1 | | |
| 606 | MAIN BOARD A/I | FA040102 | CARBON 1/8W(T) 5% 1Kohm | R144 | 1 | | |
| 607 | MAIN BOARD A/I | FA040273 | CARBON 1/8W(T) 5% 27Kohm | R145 | 1 | | |
| 608 | MAIN BOARD A/I | FA040222 | CARBON 1/8W(T) 5% 2.2Kohm | R146 | 1 | | |
| 609 | MAIN BOARD A/I | FA040202 | CARBON 1/8W(T) 5% 2Kohm | R147 | 1 | | |
| 610 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R148 | 1 | | |
| 611 | MAIN BOARD A/I | FB241051 | METAL 1/4W(T) 1% 1.05Kohm | R149 | 1 | | |
| 612 | MAIN BOARD A/I | FB246242 | METAL 1/4W(T) 1% 62.4Kohm | R151 | 1 | | |
| 613 | MAIN BOARD A/I | FA040332 | CARBON 1/8W(T) 5% 3.3Kohm | R152 | 1 | | |
| 614 | MAIN BOARD A/I | FA040562 | CARBON 1/8W(T) 5% 5.6Kohm | R154 | 1 | | |
| 615 | MAIN BOARD A/I | FA040104 | CARBON 1/8W(T) 5% 100Kohm | R155 | 1 | | |
| 616 | MAIN BOARD A/I | FA330159 | CARBON 1/2W(T) 5% 1.5ohm | R156 | 1 | | |
| 617 | MAIN BOARD A/I | R0319110 | JUMPER WIRE A/I/T 10mm | R157 | 1 | | |
| 618 | MAIN BOARD A/I | FB240470 | METAL 1/4W(T) 1% 47ohm | R158 | 1 | | |
| 619 | MAIN BOARD A/I | FA040105 | CARBON 1/8W(T) 5% 1Mohm | R159 | 1 | | |
| 620 | MAIN BOARD A/I | FA040202 | CARBON 1/8W(T) 5% 2Kohm | R160 | 1 | | |
| 621 | MAIN BOARD A/I | FA040103 | CARBON 1/8W(T) 5% 10Kohm | R161 | 1 | | |
| 622 | MAIN BOARD A/I | 80000561 | BEAD 3.5x6x0.8/T | R162 | 1 | | |
| 623 | MAIN BOARD A/I | FA240122 | CARBON 1/4W(T) 5% 1.2Kohm | R163 | 1 | | |
| 624 | MAIN BOARD A/I | FA040103 | CARBON 1/8W(T) 5% 10Kohm | R167 | 1 | | |
| 625 | MAIN BOARD A/I | FA040104 | CARBON 1/8W(T) 5% 100Kohm | R168 | 1 | | |
| 626 | MAIN BOARD A/I | FB910010 | METAL 1/4W(T) 5% 1ohm | R169 | 1 | | |
| 627 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R173 | 1 | | |
| 628 | MAIN BOARD A/I | FA040103 | CARBON 1/8W(T) 5% 10Kohm | R177 | 1 | | |
| 629 | MAIN BOARD A/I | FA040473 | CARBON 1/8W(T) 5% 47Kohm | R178 | 1 | | |
| 630 | MAIN BOARD A/I | FA330102 | CARBON 1/2W(T) 5% 1Kohm | R182 | 1 | | |
| 631 | MAIN BOARD A/I | FA040102 | CARBON 1/8W(T) 5% 1Kohm | R301 | 1 | | |
| 632 | MAIN BOARD A/I | FA040561 | CARBON 1/8W(T) 5% 560ohm | R303 | 1 | | |
| 633 | MAIN BOARD A/I | FA040225 | CARBON 1/8W(T) 5% 2.2Mohm | R305 | 1 | | |
| 634 | MAIN BOARD A/I | FA040101 | CARBON 1/8W(T) 5% 100ohm | R306 | 1 | | |
| 635 | MAIN BOARD A/I | FA040103 | CARBON 1/8W(T) 5% 10Kohm | R307 | 1 | | |

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| 636 | MAIN BOARD A/I | FA330561 | CARBON 1/2W(T) 5% 560ohm | R308 | 1 | | |
| 637 | MAIN BOARD A/I | FA040224 | CARBON 1/8W(T) 5% 220Kohm | R30C | 1 | | |
| 638 | MAIN BOARD A/I | FA040224 | CARBON 1/8W(T) 5% 220Kohm | R30E | 1 | | |
| 639 | MAIN BOARD A/I | FA040103 | CARBON 1/8W(T) 5% 10Kohm | R310 | 1 | | |
| 640 | MAIN BOARD A/I | FB910010 | METAL 1/4W(T) 5% 1ohm | R313 | 1 | | |
| 641 | MAIN BOARD A/I | FA040565 | CARBON 1/8W(T) 5% 5.6Mohm | R317 | 1 | | |
| 642 | MAIN BOARD A/I | FA040103 | CARBON 1/8W(T) 5% 10Kohm | R318 | 1 | | |
| 643 | MAIN BOARD A/I | FA040823 | CARBON 1/8W(T) 5% 82Kohm | R319 | 1 | | |
| 644 | MAIN BOARD A/I | FA040122 | CARBON 1/8W(T) 5% 1.2Kohm | R322 | 1 | | |
| 645 | MAIN BOARD A/I | FA040393 | CARBON 1/8W(T) 5% 39Kohm | R325 | 1 | | |
| 646 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R326 | 1 | | |
| 647 | MAIN BOARD A/I | FA040104 | CARBON 1/8W(T) 5% 100Kohm | R327 | 1 | | |
| 648 | MAIN BOARD A/I | FA040473 | CARBON 1/8W(T) 5% 47Kohm | R328 | 1 | | |
| 649 | MAIN BOARD A/I | FA040822 | CARBON 1/8W(T) 5% 8.2Kohm | R329 | 1 | | |
| 650 | MAIN BOARD A/I | FA040103 | CARBON 1/8W(T) 5% 10Kohm | R330 | 1 | | |
| 651 | MAIN BOARD A/I | FA040153 | CARBON 1/8W(T) 5% 15Kohm | R331 | 1 | | |
| 652 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R332 | 1 | | |
| 653 | MAIN BOARD A/I | FA040392 | CARBON 1/8W(T) 5% 3.9Kohm | R336 | 1 | | |
| 654 | MAIN BOARD A/I | FA040333 | CARBON 1/8W(T) 5% 33Kohm | R337 | 1 | | |
| 655 | MAIN BOARD A/I | FA240243 | CARBON 1/4W(T) 5% 24Kohm | R338 | 1 | | |
| 656 | MAIN BOARD A/I | FA040224 | CARBON 1/8W(T) 5% 220Kohm | R339 | 1 | | |
| 657 | MAIN BOARD A/I | FA040104 | CARBON 1/8W(T) 5% 100Kohm | R340 | 1 | | |
| 658 | MAIN BOARD A/I | FA040103 | CARBON 1/8W(T) 5% 10Kohm | R343 | 1 | | |
| 659 | MAIN BOARD A/I | FA330102 | CARBON 1/2W(T) 5% 1Kohm | R344 | 1 | | |
| 660 | MAIN BOARD A/I | FA040103 | CARBON 1/8W(T) 5% 10Kohm | R345 | 1 | | |
| 661 | MAIN BOARD A/I | FB241301 | METAL 1/4W(T) 1% 1.3Kohm | R346 | 1 | | |
| 662 | MAIN BOARD A/I | FB242801 | METAL 1/4W(T) 1% 2.8Kohm | R347 | 1 | | |
| 663 | MAIN BOARD A/I | FA330913 | CARBON 1/2W(T) 5% 91Kohm | R348 | 1 | | |
| 664 | MAIN BOARD A/I | FA240243 | CARBON 1/4W(T) 5% 24Kohm | R350 | 1 | | |
| 665 | MAIN BOARD A/I | FB910010 | METAL 1/4W(T) 5% 1ohm | R351 | 1 | | |
| 666 | MAIN BOARD A/I | FB241022 | METAL 1/4W(T) 1% 10.2Kohm | R352 | 1 | | |
| 667 | MAIN BOARD A/I | FA040104 | CARBON 1/8W(T) 5% 100Kohm | R353 | 1 | | |
| 668 | MAIN BOARD A/I | FA040224 | CARBON 1/8W(T) 5% 220Kohm | R354 | 1 | | |
| 669 | MAIN BOARD A/I | FA040102 | CARBON 1/8W(T) 5% 1Kohm | R355 | 1 | | |
| 670 | MAIN BOARD A/I | FA040153 | CARBON 1/8W(T) 5% 15Kohm | R357 | 1 | | |
| 671 | MAIN BOARD A/I | FA040474 | CARBON 1/8W(T) 5% 470Kohm | R358 | 1 | | |
| 672 | MAIN BOARD A/I | FA040473 | CARBON 1/8W(T) 5% 47Kohm | R359 | 1 | | |
| 673 | MAIN BOARD A/I | FA040103 | CARBON 1/8W(T) 5% 10Kohm | R360 | 1 | | |
| 674 | MAIN BOARD A/I | FA040103 | CARBON 1/8W(T) 5% 10Kohm | R361 | 1 | | |
| 675 | MAIN BOARD A/I | FA040154 | CARBON 1/8W(T) 5% 150Kohm | R362 | 1 | | |
| 676 | MAIN BOARD A/I | FA040104 | CARBON 1/8W(T) 5% 100Kohm | R363 | 1 | | |
| 677 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R364 | 1 | | |
| 678 | MAIN BOARD A/I | FB242153 | METAL 1/4W(T) 1% 215Kohm | R366 | 1 | L | |
| 679 | MAIN BOARD A/I | FB241913 | METAL 1/4W(T) 1% 191Kohm | R366 | 1 | T.O | |
| 680 | MAIN BOARD A/I | FB241872 | METAL 1/4W(T) 1% 18.7Kohm | R368 | 1 | | |
| 681 | MAIN BOARD A/I | FA040103 | CARBON 1/8W(T) 5% 10Kohm | R369 | 1 | | |
| 682 | MAIN BOARD A/I | FA040822 | CARBON 1/8W(T) 5% 8.2Kohm | R371 | 1 | | |
| 683 | MAIN BOARD A/I | FA040222 | CARBON 1/8W(T) 5% 2.2Kohm | R372 | 1 | | |
| 684 | MAIN BOARD A/I | FB243481 | METAL 1/4W(T) 1% 3.48Kohm | R373 | 1 | | |
| 685 | MAIN BOARD A/I | FB241002 | METAL 1/4W(T) 1% 10Kohm | R374 | 1 | | |
| 686 | MAIN BOARD A/I | FA040104 | CARBON 1/8W(T) 5% 100Kohm | R375 | 1 | | |
| 687 | MAIN BOARD A/I | FA040103 | CARBON 1/8W(T) 5% 10Kohm | R377 | 1 | | |
| 688 | MAIN BOARD A/I | FA040103 | CARBON 1/8W(T) 5% 10Kohm | R379 | 1 | | |

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| 689 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R383 | 1 | | |
| 690 | MAIN BOARD A/I | FA330150 | CARBON 1/2W(T) 5% 15ohm | R385 | 1 | | |
| 691 | MAIN BOARD A/I | FB241002 | METAL 1/4W(T) 1% 10Kohm | R386 | 1 | | |
| 692 | MAIN BOARD A/I | FA040132 | CARBON 1/8W(T) 5% 1.3Kohm | R387 | 1 | | |
| 693 | MAIN BOARD A/I | FA040153 | CARBON 1/8W(T) 5% 15Kohm | R390 | 1 | | |
| 694 | MAIN BOARD A/I | FA240224 | CARBON 1/4W(T) 5% 220Kohm | R393 | 1 | | |
| 695 | MAIN BOARD A/I | FA040474 | CARBON 1/8W(T) 5% 470Kohm | R394 | 1 | | |
| 696 | MAIN BOARD A/I | FA040105 | CARBON 1/8W(T) 5% 1Mohm | R395 | 1 | | |
| 697 | MAIN BOARD A/I | FA040102 | CARBON 1/8W(T) 5% 1Kohm | R401 | 1 | | |
| 698 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R402 | 1 | | |
| 699 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R403 | 1 | | |
| 700 | MAIN BOARD A/I | FA040224 | CARBON 1/8W(T) 5% 220Kohm | R404 | 1 | | |
| 701 | MAIN BOARD A/I | FA040103 | CARBON 1/8W(T) 5% 10Kohm | R405 | 1 | | |
| 702 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R406 | 1 | | |
| 703 | MAIN BOARD A/I | FA040473 | CARBON 1/8W(T) 5% 47Kohm | R407 | 1 | | |
| 704 | MAIN BOARD A/I | FA040471 | CARBON 1/8W(T) 5% 470ohm | R408 | 1 | | |
| 705 | MAIN BOARD A/I | FA040473 | CARBON 1/8W(T) 5% 47Kohm | R409 | 1 | | |
| 706 | MAIN BOARD A/I | FB246801 | METAL 1/4W(T) 1% 6.8Kohm | R410 | 1 | | |
| 707 | MAIN BOARD A/I | FB241002 | METAL 1/4W(T) 1% 10Kohm | R411 | 1 | | |
| 708 | MAIN BOARD A/I | FB246801 | METAL 1/4W(T) 1% 6.8Kohm | R412 | 1 | | |
| 709 | MAIN BOARD A/I | FB247682 | METAL 1/4W(T) 1% 76.8Kohm | R413 | 1 | | |
| 710 | MAIN BOARD A/I | FA330331 | CARBON 1/2W(T) 5% 330ohm | R414 | 1 | | |
| 711 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R416 | 1 | | |
| 712 | MAIN BOARD A/I | FA330159 | CARBON 1/2W(T) 5% 1.5ohm | R417 | 1 | | |
| 713 | MAIN BOARD A/I | FA040103 | CARBON 1/8W(T) 5% 10Kohm | R418 | 1 | | |
| 714 | MAIN BOARD A/I | FA040394 | CARBON 1/8W(T) 5% 390Kohm | R419 | 1 | | |
| 715 | MAIN BOARD A/I | FA040134 | CARBON 1/8W(T) 5% 130K | R420 | 1 | | |
| 716 | MAIN BOARD A/I | FA040153 | CARBON 1/8W(T) 5% 15Kohm | R423 | 1 | | |
| 717 | MAIN BOARD A/I | FA040473 | CARBON 1/8W(T) 5% 47Kohm | R430 | 1 | | |
| 718 | MAIN BOARD A/I | FA040102 | CARBON 1/8W(T) 5% 1Kohm | R432 | 1 | | |
| 719 | MAIN BOARD A/I | FA040473 | CARBON 1/8W(T) 5% 47Kohm | R433 | 1 | | |
| 720 | MAIN BOARD A/I | FA040223 | CARBON 1/8W(T) 5% 22Kohm | R440 | 1 | | |
| 721 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R442 | 1 | | |
| 722 | MAIN BOARD A/I | FA040103 | CARBON 1/8W(T) 5% 10Kohm | R443 | 1 | | |
| 723 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R444 | 1 | | |
| 724 | MAIN BOARD A/I | FA040103 | CARBON 1/8W(T) 5% 10Kohm | R447 | 1 | | |
| 725 | MAIN BOARD A/I | FA040103 | CARBON 1/8W(T) 5% 10Kohm | R449 | 1 | | |
| 726 | MAIN BOARD A/I | FA040913 | CARBON 1/8W(T) 5% 91Kohm | R450 | 1 | | |
| 727 | MAIN BOARD A/I | FA240103 | CARBON 1/4W(T) 5% 10Kohm | R451 | 1 | | |
| 728 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R452 | 1 | | |
| 729 | MAIN BOARD A/I | FA040473 | CARBON 1/8W(T) 5% 47Kohm | R454 | 1 | | |
| 730 | MAIN BOARD A/I | FA040304 | CARBON 1/8W(T) 5% 300Kohm | R455 | 1 | | |
| 731 | MAIN BOARD A/I | FA040822 | CARBON 1/8W(T) 5% 8.2Kohm | R456 | 1 | | |
| 732 | MAIN BOARD A/I | FA040103 | CARBON 1/8W(T) 5% 10Kohm | R457 | 1 | | |
| 733 | MAIN BOARD A/I | FA040224 | CARBON 1/8W(T) 5% 220Kohm | R458 | 1 | | |
| 734 | MAIN BOARD A/I | FA040104 | CARBON 1/8W(T) 5% 100Kohm | R459 | 1 | | |
| 735 | MAIN BOARD A/I | FA040103 | CARBON 1/8W(T) 5% 10Kohm | R460 | 1 | | |
| 736 | MAIN BOARD A/I | FA040103 | CARBON 1/8W(T) 5% 10Kohm | R601 | 1 | | |
| 737 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R602 | 1 | | |
| 738 | MAIN BOARD A/I | FA040102 | CARBON 1/8W(T) 5% 1Kohm | R603 | 1 | | |
| 739 | MAIN BOARD A/I | FA040103 | CARBON 1/8W(T) 5% 10Kohm | R604 | 1 | | |
| 740 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R605 | 1 | | |
| 741 | MAIN BOARD A/I | FA040222 | CARBON 1/8W(T) 5% 2.2Kohm | R608 | 1 | | |

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|-----|----------------|----------|---------------------------------------|-------|----|--|--|
| 742 | MAIN BOARD A/I | FA240222 | CARBON 1/4W(T) 5% 2.2Kohm | R609 | 1 | | |
| 743 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R610 | 1 | | |
| 744 | MAIN BOARD A/I | FA040223 | CARBON 1/8W(T) 5% 22Kohm | R611 | 1 | | |
| 745 | MAIN BOARD A/I | FA040103 | CARBON 1/8W(T) 5% 10Kohm | R612 | 1 | | |
| 746 | MAIN BOARD A/I | FA040103 | CARBON 1/8W(T) 5% 10Kohm | R613 | 1 | | |
| 747 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R701 | 1 | | |
| 748 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R704 | 1 | | |
| 749 | MAIN BOARD A/I | FA040103 | CARBON 1/8W(T) 5% 10Kohm | R705 | 1 | | |
| 750 | MAIN BOARD A/I | FA040101 | CARBON 1/8W(T) 5% 100ohm | R706 | 1 | | |
| 751 | MAIN BOARD A/I | FA040101 | CARBON 1/8W(T) 5% 100ohm | R707 | 1 | | |
| 752 | MAIN BOARD A/I | FA040331 | CARBON 1/8W(T) 5% 330ohm | R708 | 1 | | |
| 753 | MAIN BOARD A/I | FA040103 | CARBON 1/8W(T) 5% 10Kohm | R709 | 1 | | |
| 754 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R710 | 1 | | |
| 755 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R713 | 1 | | |
| 756 | MAIN BOARD A/I | FA040102 | CARBON 1/8W(T) 5% 1Kohm | R714 | 1 | | |
| 757 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R715 | 1 | | |
| 758 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R716 | 1 | | |
| 759 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R717 | 1 | | |
| 760 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R718 | 1 | | |
| 761 | MAIN BOARD A/I | FA040102 | CARBON 1/8W(T) 5% 1Kohm | R719 | 1 | | |
| 762 | MAIN BOARD A/I | FA040103 | CARBON 1/8W(T) 5% 10Kohm | R720 | 1 | | |
| 763 | MAIN BOARD A/I | FA040152 | CARBON 1/8W(T) 5% 1.5Kohm | R721 | 1 | | |
| 764 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R722 | 1 | | |
| 765 | MAIN BOARD A/I | FA240103 | CARBON 1/4W(T) 5% 10Kohm | R725 | 1 | | |
| 766 | MAIN BOARD A/I | FA040242 | CARBON 1/8W(T) 5% 2.4Kohm | R726 | 1 | | |
| 767 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R728 | 1 | | |
| 768 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R729 | 1 | | |
| 769 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R733 | 1 | | |
| 770 | MAIN BOARD A/I | FA040222 | CARBON 1/8W(T) 5% 2.2Kohm | R735 | 1 | | |
| 771 | MAIN BOARD A/I | FA040103 | CARBON 1/8W(T) 5% 10Kohm | R736 | 1 | | |
| 772 | MAIN BOARD A/I | FA040104 | CARBON 1/8W(T) 5% 100Kohm | R737 | 1 | | |
| 773 | MAIN BOARD A/I | FA040471 | CARBON 1/8W(T) 5% 470ohm | R739 | 1 | | |
| 774 | MAIN BOARD A/I | FA040471 | CARBON 1/8W(T) 5% 470ohm | R740 | 1 | | |
| 775 | MAIN BOARD A/I | FA040101 | CARBON 1/8W(T) 5% 100ohm | R742 | 1 | | |
| 776 | MAIN BOARD A/I | FA040101 | CARBON 1/8W(T) 5% 100ohm | R743 | 1 | | |
| 777 | MAIN BOARD A/I | FA040101 | CARBON 1/8W(T) 5% 100ohm | R761 | 1 | | |
| 778 | MAIN BOARD A/I | FA040101 | CARBON 1/8W(T) 5% 100ohm | R762 | 1 | | |
| 779 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R768 | 1 | | |
| 780 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R769 | 1 | | |
| 781 | MAIN BOARD A/I | FA040472 | CARBON 1/8W(T) 5% 4.7Kohm | R770 | 1 | | |
| 782 | MAIN BOARD A/I | FA040471 | CARBON 1/8W(T) 5% 470ohm | R771 | 1 | | |
| 783 | MAIN BOARD A/I | R0319110 | JUMPER WIRE AI/T 7.5mm | VR307 | 1 | | |
| 784 | MAIN BOARD A/I | EKA0180B | ZEN DIODE 1/2W(T) HZS 18-2 (HITACHI) | ZD101 | 1 | | |
| 785 | MAIN BOARD A/I | EKC0180B | ZEN DIODE 1/2W(T) BZX79F18 (PHILIPS) | ZD101 | OR | | |
| 786 | MAIN BOARD A/I | EKA01201 | ZEN DIODE 1/2W(T) HZS12A2 (HITACHI) | ZD102 | 1 | | |
| 787 | MAIN BOARD A/I | EKC01201 | ZEN DIODE 1/2W(T) BZX79F12 (PHILIPS) | ZD102 | OR | | |
| 788 | MAIN BOARD A/I | EKA00507 | ZEN DIODE 1/2W(T) HZS5C2 (HITACHI) | ZD104 | 1 | | |
| 789 | MAIN BOARD A/I | EKC00507 | ZEN DIODE 1/2W(T) BZX79F5V1 (PHILIPS) | ZD104 | OR | | |
| 790 | MAIN BOARD A/I | EKA01201 | ZEN DIODE 1/2W(T) HZS12A2 (HITACHI) | ZD301 | 1 | | |
| 791 | MAIN BOARD A/I | EKC01201 | ZEN DIODE 1/2W(T) BZX79F12 (PHILIPS) | ZD301 | OR | | |
| 792 | MAIN BOARD A/I | EKA00507 | ZEN DIODE 1/2W(T) HZS5C2 (HITACHI) | ZD303 | 1 | | |
| 793 | MAIN BOARD A/I | EKC00507 | ZEN DIODE 1/2W(T) BZX79F5V1 (PHILIPS) | ZD303 | OR | | |
| 794 | MAIN BOARD A/I | EKA00507 | ZEN DIODE 1/2W(T) HZS5C2 (HITACHI) | ZD701 | 1 | | |

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|-----|-------------------|----------|---|-----------|----|--|--|
| 795 | MAIN BOARD A/I | EKC00507 | ZEN DIODE 1/2W(T) BZX79F5V1 (PHILIPS) | ZD701 | OR | | |
| 796 | MAIN BOARD A/I | EKA00507 | ZEN DIODE 1/2W(T) HZS5C2 (HITACHI) | ZD702 | 1 | | |
| 797 | MAIN BOARD A/I | EKC00507 | ZEN DIODE 1/2W(T) BZX79F5V1 (PHILIPS) | ZD702 | OR | | |
| 798 | MAIN BOARD A/I | EKA00507 | ZEN DIODE 1/2W(T) HZS5C2 (HITACHI) | ZD703 | 1 | | |
| 799 | MAIN BOARD A/I | EKC00507 | ZEN DIODE 1/2W(T) BZX79F5V1 (PHILIPS) | ZD703 | OR | | |
| 800 | MAIN BOARD A/I | EKA00507 | ZEN DIODE 1/2W(T) HZS5C2 (HITACHI) | ZD704 | 1 | | |
| 801 | MAIN BOARD A/I | EKC00507 | ZEN DIODE 1/2W(T) BZX79F5V1 (PHILIPS) | ZD704 | OR | | |
| 802 | MAIN BOARD INSERT | 14000051 | SCREW (#2CBRITS*4*8*15BF) | AC SOCKET | 2 | | |
| 803 | MAIN BOARD INSERT | 80000991 | BEAD WBR6H-3T-R7K-B5 | B102 | 1 | | |
| 804 | MAIN BOARD INSERT | GJ047400 | SAFETY X-CAP 0.47u/275V M | C101 | 1 | | |
| 805 | MAIN BOARD INSERT | 80010661 | EPCOS B81130 X-CAP | C101 | OR | | |
| 806 | MAIN BOARD INSERT | GJ047404 | SAFETY X-CAP 0.47u/275V M(ISKRA) | C101 | OR | | |
| 807 | MAIN BOARD INSERT | GJ047405 | SAFETY X-CAP 0.47u/275V M(PHILIPS) | C101 | OR | | |
| 808 | MAIN BOARD INSERT | GJ047407 | SAFETY X-CAP 0.47u/275V M(OKAYA) | C101 | OR | | |
| 809 | MAIN BOARD INSERT | GJ047409 | SAFETY X-CAP 0.47u/250V M(PILKOR) | C101 | OR | | |
| 810 | MAIN BOARD INSERT | GJ04740A | SAFETY X-CAP 0.47u/275V M(EPCOS B81130) | C101 | OR | | |
| 811 | MAIN BOARD INSERT | GJH102E5 | SAFETY Y-CAP/S 1000P/400V M | C103 | 1 | | |
| 812 | MAIN BOARD INSERT | GJH102E5 | SAFETY Y-CAP/S 1000P/400V M | C104 | 1 | | |
| 813 | MAIN BOARD INSERT | GKA227E5 | POWER ELECT 85oC 220u/400V M | C105 | 1 | | |
| 814 | MAIN BOARD INSERT | GAI10775 | ELECT CAP 105oC/A 100u/100V M TK() | C120 | 1 | | |
| 815 | MAIN BOARD INSERT | 80011091 | ELECT LOW ESR 100u/100V M 10X30(105oC) | C120 | OR | | |
| 816 | MAIN BOARD INSERT | GAK10825 | ELECT CAP 105oC/A 1000u/16V M PF() s | C121 | 1 | | |
| 817 | MAIN BOARD INSERT | GAI10825 | ELECT CAP 105oC/A 1000u/16V M TK() | C121 | OR | | |
| 818 | MAIN BOARD INSERT | GAA10815 | ELECT 85oC/A 1000u/10V M | C122 | 1 | | |
| 819 | MAIN BOARD INSERT | GAA22685 | ELECT 85oC/A 22u/250V M | C129 | 1 | | |
| 820 | MAIN BOARD INSERT | GAI10775 | ELECT CAP 105oC/A 100u/100V M TK() | C138 | 1 | | |
| 821 | MAIN BOARD INSERT | 80011091 | ELECT LOW ESR 100u/100V M 10X30(105oC) | C138 | OR | | |
| 822 | MAIN BOARD INSERT | GFA33382 | PLASTIC MPE/A 0.033u/250V J | C143 | 1 | | |
| 823 | MAIN BOARD INSERT | GJH102E5 | SAFETY Y-CAP/S 1000P/400V M | C146 | 1 | | |
| 824 | MAIN BOARD INSERT | GJC222E5 | SAFETY Y-CAP/D 2200P/400V M | C147 | 1 | | |
| 825 | MAIN BOARD INSERT | GJH102E5 | SAFETY Y-CAP/S 1000P/400V M | C154 | 1 | | |
| 826 | MAIN BOARD INSERT | GB8103F5 | CERAMIC Z5U(E)/T 0.01u/500V M | C310 | 1 | | |
| 827 | MAIN BOARD INSERT | GFC392J2 | PLASTIC PPS/A 3900P/2KV J | C318 | 1 | | |
| 828 | MAIN BOARD INSERT | GED512M2 | PLASTIC PPN/A 5100P/800V J | C319 | 1 | | |
| 829 | MAIN BOARD INSERT | GAA22685 | ELECT 85oC/A 22u/250V M | C325 | 1 | | |
| 830 | MAIN BOARD INSERT | GFA15482 | PLASTIC MPE/A 0.15u/250V J | C329 | 1 | | |
| 831 | MAIN BOARD INSERT | GFD20482 | PLASTIC PMM/A 0.2u/250V J (MYLAR) | C332 | 1 | | |
| 832 | MAIN BOARD INSERT | GFB204E2 | PLASTIC 378/A 0.2u/400V J(PILKOR) | C332 | OR | | |
| 833 | MAIN BOARD INSERT | GFA10582 | PLASTIC MPE/A 1u/250V J | C333 | 1 | | |
| 834 | MAIN BOARD INSERT | GFA10382 | PLASTIC MPE/A 0.01u/250V J | C345 | 1 | | |
| 835 | MAIN BOARD INSERT | GFB15482 | PLASTIC MPP/A 0.15u/250V J | C351 | 1 | | |
| 836 | MAIN BOARD INSERT | GFB43482 | PLASTIC MPP/A 0.43u/250V J | C355 | 1 | | |
| 837 | MAIN BOARD INSERT | GFB22482 | PLASTIC MPP/A 0.22u/250V J | C356 | 1 | | |
| 838 | MAIN BOARD INSERT | EJB20001 | DIODE/A 3A 1N5406 | D101 | 1 | | |
| 839 | MAIN BOARD INSERT | EJB20001 | DIODE/A 3A 1N5406 | D102 | 1 | | |
| 840 | MAIN BOARD INSERT | EJB20001 | DIODE/A 3A 1N5406 | D103 | 1 | | |
| 841 | MAIN BOARD INSERT | EJB20001 | DIODE/A 3A 1N5406 | D104 | 1 | | |
| 842 | MAIN BOARD INSERT | 80003561 | DIODE 600V/1.6A RG2A SANKEN s | D110 | 1 | | |
| 843 | MAIN BOARD INSERT | 80011241 | DIODE SANKEN 3A/400V RG4 s (A+K) | D111 | 1 | | |
| 844 | MAIN BOARD INSERT | 80011251 | DIODE TOSHIBA 3A/400V 3GU41 s (A+K) | D111 | OR | | |
| 845 | MAIN BOARD INSERT | 80003551 | DIODE 200V/1.6A RG2Z SANKEN s | D112 | 1 | | |
| 846 | MAIN BOARD INSERT | 80003551 | DIODE 200V/1.6A RG2Z SANKEN s | D113 | 1 | | |
| 847 | MAIN BOARD INSERT | 80003561 | DIODE 600V/1.6A RG2A SANKEN s | D114 | 1 | | |

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|-----|-------------------|----------|--------------------------------|------------|----|--|--|
| 848 | MAIN BOARD INSERT | 80003551 | DIODE 200V/1.6A RG2Z SANKEN s | D118 | | | |
| 849 | MAIN BOARD INSERT | 14000041 | SCREW (P-#2CBRITS*3*8*15BF) | D307 | 1 | | |
| 850 | MAIN BOARD INSERT | 80001171 | DIODE/A 5TUZ47C (TOSHIBA) | D307 | 1 | | |
| 851 | MAIN BOARD INSERT | 80009541 | DIODE FAGOR FUF5406 s (A+K) | D308 | 1 | | |
| 852 | MAIN BOARD INSERT | 80001131 | DIODE/A 2A/600V RG4A (s) | D308 | OR | | |
| 853 | MAIN BOARD INSERT | 80009261 | DIODE SANKEN RP3F s (A+K) | D316 | 1 | | |
| 854 | MAIN BOARD INSERT | 80011471 | DIODE FUJI ERD07-15L s (A+K) | D316 | OR | | |
| 855 | MAIN BOARD INSERT | 80010981 | DIODE TOSHIBA 3TH41 s (A+K) | D316 | OR | | |
| 856 | MAIN BOARD INSERT | JA000070 | FUSE 2.5A/250V 51S SB | F101 | 1 | | |
| 857 | MAIN BOARD INSERT | 14000071 | SCREW (PL-CPTS*3*8*15BF) | FOR FBT | 3 | | |
| 858 | MAIN BOARD INSERT | R0180028 | FUSE HOLDER 5X20mm | FOR FUSE | 2 | | |
| 859 | MAIN BOARD INSERT | 80010631 | JUMPER 2.54mm | FOR SW301 | 1 | | |
| 860 | MAIN BOARD INSERT | 80000781 | SINGLE PIN L=12.0 D=1.5 | FOR TH101 | 2 | | |
| 861 | MAIN BOARD INSERT | JD010040 | IC SOCKET 40P | FOR U701 | 1 | | |
| 862 | MAIN BOARD INSERT | HA030010 | EMI FILTER COIL 20.45X10.2X10 | G2,G4 WIRE | 1 | | |
| 863 | MAIN BOARD INSERT | 80003511 | WIRE GND 70mm Y/G 1015 18A | L100 | 1 | | |
| 864 | MAIN BOARD INSERT | 80000111 | LINE FILTER ET24 10mH MIN | L101 | 1 | | |
| 865 | MAIN BOARD INSERT | HB000015 | LINE FILTER UU10.5 1mH | L102 | 1 | | |
| 866 | MAIN BOARD INSERT | 80003681 | CHOKE T50-26B 200uH | L103 | 1 | | |
| 867 | MAIN BOARD INSERT | 80010671 | N0501 DC-DC 180uH COIL | L106 | 1 | | |
| 868 | MAIN BOARD INSERT | 80009291 | H-CENTER CHOKE | L301 | 1 | | |
| 869 | MAIN BOARD INSERT | 80005141 | N9501 WIDTH COIL 185uH | L303 | 1 | | |
| 870 | MAIN BOARD INSERT | 80010391 | N0501 LINEARITY CHOKE | L306 | 1 | | |
| 871 | MAIN BOARD INSERT | 80010381 | N0501 LINEARITY COIL | L307 | 1 | | |
| 872 | MAIN BOARD INSERT | 80000131 | LED L-59GH/1GYC | LED701 | 1 | | |
| 873 | MAIN BOARD INSERT | 18000331 | WIRE CLIP (WC-13T) | LW101 | 1 | | |
| 874 | MAIN BOARD INSERT | JD512001 | AC SOCKET 3P | P101 | 1 | | |
| 875 | MAIN BOARD INSERT | R0224301 | BASE PIN 1.55 P=5/7.5 2P | P102 | 1 | | |
| 876 | MAIN BOARD INSERT | 12800032 | HEAT SINK 40*12*50 B | Q101 | 1 | | |
| 877 | MAIN BOARD INSERT | 14000041 | SCREW (P-#2CBRITS*3*8*15BF) | Q101 | 1 | | |
| 878 | MAIN BOARD INSERT | EF202500 | FET N 2SK2545 TO-220F TOSHIBA | Q101 | 1 | | |
| 879 | MAIN BOARD INSERT | 80000901 | FET N FS7KM-12 600V/7A TO-220F | Q101 | OR | | |
| 880 | MAIN BOARD INSERT | 80000981 | FET N 2SK2645-01/MR TO-220F | Q101 | OR | | |
| 881 | MAIN BOARD INSERT | EF211180 | FET N 2SK1118 TO-220F | Q101 | OR | | |
| 882 | MAIN BOARD INSERT | 12800041 | HEAT SINK 23*17*25 | Q102 | 1 | | |
| 883 | MAIN BOARD INSERT | 14000041 | SCREW (P-#2CBRITS*3*8*15BF) | Q102 | 1 | | |
| 884 | MAIN BOARD INSERT | EF206301 | FET N YTAF630 TO-220F | Q102 | 1 | | |
| 885 | MAIN BOARD INSERT | EB307720 | TRPNP KSB772 TO-126 | Q104 | 1 | | |
| 886 | MAIN BOARD INSERT | 80000201 | TR PNP 2SB1273 S/R | Q104 | OR | | |
| 887 | MAIN BOARD INSERT | 80002451 | TR PNP 2SB1274 S/R (SANYO) | Q104 | OR | | |
| 888 | MAIN BOARD INSERT | 12600231 | HEAT SINK (FBT) | Q307 | 1 | | |
| 889 | MAIN BOARD INSERT | EA853390 | TR NPN 2SC5339(hfE) TO-3P | Q307 | 1 | | |
| 890 | MAIN BOARD INSERT | R0311D04 | SCREW CTTWC M3.0X10 | Q307 | 1 | | |
| 891 | MAIN BOARD INSERT | EF206301 | FET N YTAF630 TO-220F | Q313 | 1 | | |
| 892 | MAIN BOARD INSERT | EB20861A | TR PNP 2SB861C TO-220F | Q314 | 1 | | |
| 893 | MAIN BOARD INSERT | R0311D04 | SCREW CTTWC M3.0X10 | Q314 | 1 | | |
| 894 | MAIN BOARD INSERT | EF206301 | FET N YTAF630 TO-220F | Q322 | 1 | | |
| 895 | MAIN BOARD INSERT | FB470680 | MOF 1W/M(A) 5% 68ohm | R103 | 1 | | |
| 896 | MAIN BOARD INSERT | FB560338 | MOF 2W/M(A) 5% 0.33ohm | R105 | 1 | | |
| 897 | MAIN BOARD INSERT | FB570563 | MOF 2W/M(B) 5% 56Kohm | R106 | 1 | | |
| 898 | MAIN BOARD INSERT | FC110158 | WOUND RES 2W(A) 5% 0.15ohm | R111 | 1 | | |
| 899 | MAIN BOARD INSERT | FB560103 | MOF 2W/M(A) 5% 10Kohm | R125 | 1 | | |
| 900 | MAIN BOARD INSERT | FB470100 | MOF 1W/M(A) 5% 10ohm | R128 | 1 | | |

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|-----|-------------------|----------|--------------------------------------|-------|----|--|--------|
| 901 | MAIN BOARD INSERT | FB560152 | MOF 2W/M(A) 5% 1.5Kohm | R134 | 1 | | |
| 902 | MAIN BOARD INSERT | FC030338 | WOUND RES 1W/M(A) 5% 0.33ohm | R136 | 1 | | |
| 903 | MAIN BOARD INSERT | FB470623 | MOF 1W/M(A) 5% 62Kohm | R143 | 1 | | |
| 904 | MAIN BOARD INSERT | 80002031 | FUSEABLE RES 1/2W(A)M 0.22 ohm | R150 | 1 | | |
| 905 | MAIN BOARD INSERT | 80002031 | FUSEABLE RES 1/2W(A)M 0.22 ohm | R175 | 1 | | |
| 906 | MAIN BOARD INSERT | 80009841 | FUSEBLE RES. 1/2W(A)M 68ohm J | R304 | 1 | | |
| 907 | MAIN BOARD INSERT | FB710150 | MOF 3W/M(A) 5% 15ohm | R309 | 1 | | |
| 908 | MAIN BOARD INSERT | FB560139 | MOF 2W/M(A) 5% 1.3ohm | R311 | 1 | | |
| 909 | MAIN BOARD INSERT | FB470270 | MOF 1W/M(A) 5% 27ohm | R312 | 1 | | |
| 910 | MAIN BOARD INSERT | FB560102 | MOF 2W/M(A) 5% 1Kohm | R316 | 1 | | |
| 911 | MAIN BOARD INSERT | FB560201 | MOF 2W/M(A) 5% 200ohm | R335 | 1 | | |
| 912 | MAIN BOARD INSERT | FB470393 | MOF 1W/M(A) 5% 39Kohm | R349 | 1 | | |
| 913 | MAIN BOARD INSERT | FB560681 | MOF 2W/M(A) 5% 680ohm | R376 | 1 | | |
| 914 | MAIN BOARD INSERT | FB470139 | MOF 1W/M(A) 5% 1.3ohm | R415 | 1 | | |
| 915 | MAIN BOARD INSERT | FB470109 | MOF 1W/M(A) 5% 1ohm | R421 | 1 | | |
| 916 | MAIN BOARD INSERT | FB470109 | MOF 1W/M(A) 5% 1ohm | R422 | 1 | | |
| 917 | MAIN BOARD INSERT | FB470100 | MOF 1W/M(A) 5% 10ohm | R606 | 1 | | |
| 918 | MAIN BOARD INSERT | 80003751 | RELAY 12V 6P GSA-SS-212DM(GOOD-SKY) | RL101 | 1 | | |
| 919 | MAIN BOARD INSERT | 80003761 | RELAY 12V 6P OSA-SS-212DM5(OEG) | RL101 | OR | | |
| 920 | MAIN BOARD INSERT | 80010001 | RELAY RUDH-SH-112D 400ohm (GOOD SKY) | RL301 | 1 | | |
| 921 | MAIN BOARD INSERT | R0224308 | BASE PIN 2.36mm P=8/10 4P | S301 | 1 | | |
| 922 | MAIN BOARD INSERT | R0224125 | BASE PIN 2P+HOUSING P=2.5mm | S701 | 1 | | |
| 923 | MAIN BOARD INSERT | R0224129 | BASE PIN 6P+HOUSING P=2.5mm | S702 | 1 | | |
| 924 | MAIN BOARD INSERT | 80009971 | SW POWER 30V/0.3A JPS1258(Favortron) | SW101 | 1 | | |
| 925 | MAIN BOARD INSERT | 80010621 | WAFER 2Lx3P 2.54mm | SW301 | 1 | | |
| 926 | MAIN BOARD INSERT | 80000251 | TACT SW 1P 100G+-50 | SW701 | 1 | | |
| 927 | MAIN BOARD INSERT | 80000251 | TACT SW 1P 100G+-50 | SW702 | 1 | | |
| 928 | MAIN BOARD INSERT | 80000251 | TACT SW 1P 100G+-50 | SW703 | 1 | | |
| 929 | MAIN BOARD INSERT | 80009981 | POWER X'FM ERL35 500uH N0501 | T101 | 1 | | B Ver. |
| 930 | MAIN BOARD INSERT | 80010421 | 15" 70K N0501 FBT | T301 | 1 | | |
| 931 | MAIN BOARD INSERT | 80000281 | H.DRIVE X'FM 4.5mH EI-19 | T302 | 1 | | |
| 932 | MAIN BOARD INSERT | 80009691 | N0501 D.F X'FM EI-19(1:7.5) | T303 | 1 | | |
| 933 | MAIN BOARD INSERT | 80000801 | THERMISTOR NTCR SCK054 13.3mm | TH101 | 1 | | |
| 934 | MAIN BOARD INSERT | 80005821 | THERMISTOR PTCR 4.5ohm | TH102 | 1 | | |
| 935 | MAIN BOARD INSERT | R0224074 | SINGLE PIN L=11.5 D=1.0 | TP1 | 1 | | |
| 936 | MAIN BOARD INSERT | R0224074 | SINGLE PIN L=11.5 D=1.0 | TP2 | 1 | | |
| 937 | MAIN BOARD INSERT | R0224077 | BASE PIN 1P 1.55mm | TPC | 1 | | |
| 938 | MAIN BOARD INSERT | DD002600 | IC LINEAR KA3842A 8P | U101 | 1 | | |
| 939 | MAIN BOARD INSERT | DD002900 | IC LINEAR KA3843B 8P | U102 | 1 | | |
| 940 | MAIN BOARD INSERT | 80000321 | IC PHOTO COUPLE PS2501 4P | U103 | 1 | | |
| 941 | MAIN BOARD INSERT | 80000321 | IC PHOTO COUPLE PS2501 4P | U103 | OR | | |
| 942 | MAIN BOARD INSERT | DD004600 | IC LM1290 | U301 | 1 | | |
| 943 | MAIN BOARD INSERT | 12800282 | HEAT SINK 44*27*50 | U401 | 1 | | |
| 944 | MAIN BOARD INSERT | 14000041 | SCREW (P-#2CBRITS*3*8*15BF) | U401 | 1 | | |
| 945 | MAIN BOARD INSERT | 80001041 | IC TDA8172 (N.S,SGS) | U401 | 1 | | |
| 946 | MAIN BOARD INSERT | 80000351 | IC LM1295 | U402 | 1 | | |
| 947 | MAIN BOARD INSERT | 80011501 | N0701 VE MASK MCU | U701 | 1 | | |
| 948 | MAIN BOARD INSERT | 80011491 | N0701 VE MTP WT6016 V3 | U701 | OR | | |
| 949 | MAIN BOARD INSERT | BE028000 | IC AT24C04 (ATMEL,ST) | U702 | 1 | | |
| 950 | MAIN BOARD INSERT | 80008701 | IC KS24C041C(SAMSUNG) | U702 | OR | | |
| 951 | MAIN BOARD INSERT | FF300201 | VR CARBON 6mm 200 ohm/B | VR101 | 1 | | |
| 952 | MAIN BOARD INSERT | FF310102 | VR CARBON 6mm 1K | VR102 | 1 | | |
| 953 | MAIN BOARD INSERT | FF300103 | VR CARBON 6mm 10K VZ067TH1 | VR306 | 1 | | |

| | | | | | | | |
|------|----------------------|----------|---|-----------------|----|-----|-----|
| 954 | MAIN BOARD INSERT | 80010021 | N9701 VE WIRE ASSY | WIRE ASSY | 1 | | |
| 955 | MAIN BOARD INSERT | EM08003 | X'TAL 49U 8MHz | X701 | 1 | | |
| 956 | MAIN BOARD INSERT | 18000321 | EDGE SADDLE(SB-31) | | 1 | | |
| 957 | MAIN BOARD INSERT | 80010741 | GND WIRE BLACK 180mm 18AWG 1015 4.3D | | 1 | | |
| 958 | PACKING ASSY | 11000381 | REVOLVING ASSY | 2 nd Tooling | OR | | |
| 959 | PACKING ASSY | 80002931 | POWER CORD 3P 1.8M AUSTRALIA NON-SHIELD | CORD POWER | 1 | | R |
| 960 | PACKING ASSY | 80001661 | POWER CORD 3P 1.8M CHINA NON- SHIELD COLOR SG 8508(CT0A6) | CORD POWER | 1 | | C |
| 961 | PACKING ASSY | 13700091 | BAG POLYETHYLENE (360*360) | FOR Ball&Base | 1 | | |
| 962 | PACKING ASSY | 80001651 | POWER CORD 3P 1.8M EUROPE | POWER CORD | 1 | | B |
| 963 | PACKING ASSY | 11000331 | REVOLVING STAND ASSY(94HB) | | 1 | | |
| 964 | PACKING ASSY | 13200901 | CARTON BOX 520-1(B) | | 1 | | B,R |
| 965 | PACKING ASSY | 13201021 | CARTON BOX 520-1(C) | | 1 | | C |
| 966 | PACKING ASSY | 13400531 | POLYLON(R)CARTON | | 1 | | |
| 967 | PACKING ASSY | 13400541 | POLYLON(R)CARTON | | 1 | | |
| 968 | PACKING ASSY | 13700021 | BAG POLYETHYLENE (270*370) | | 1 | | |
| 969 | PACKING ASSY | 13700031 | BAG POLYETHYLENE (150*370) | | 1 | | |
| 970 | PACKING ASSY | 13700071 | PE BAG (500*480*850 + WARNING) | | 1 | | |
| 971 | PACKING ASSY | 15200241 | LABEL (D8,CYAN) | | 1 | | R |
| 972 | PACKING ASSY | 15200251 | LABEL (D8,MAGENTA) | | 1 | | C |
| 973 | PACKING ASSY | 15200331 | LABLE,SERIAL BARCODE | | 1 | | |
| 974 | PACKING ASSY | 15500621 | OWNERS MANUAL V520/V720-1(B Ver.) | | 1 | | B,R |
| 975 | PACKING ASSY | 15500751 | OWNERS MANUAL V520/V720(C Ver.)-1 | | 1 | | C |
| 976 | PACKING ASSY | 15700043 | WARRANTY CARD (AUST) | | 1 | | R |
| 977 | PACKING ASSY | 15900051 | SALES OFFICE LIST | | 1 | | B,C |
| 978 | REVOLVING STAND ASSY | 11000361 | REVOLVING STAND(B)(ABS 94HB) | 2 nd Tooling | OR | | |
| 979 | REVOLVING STAND ASSY | 17000451 | CUSHION SHEET(14.8*14.8*T4) | FOR 2nd Base | OR | | |
| 980 | REVOLVING STAND ASSY | 17000291 | CUSHION SHEET | FOR BASE | 4 | | |
| 981 | REVOLVING STAND ASSY | 11000251 | REVOLVING STAND(B) | | 1 | | |
| 982 | REVOLVING STAND ASSY | 11000261 | REVOLVING STAND(T) | | 1 | | |
| 983 | SET ASSY | 80009271 | SIGNAL CABLE 20276 1.5M FOR N9701 VE | CABLE | 1 | | |
| 984 | SET ASSY | 80010851 | 15" LG CRT M36QBX801X04(A) | CRT | 1 | L | B,C |
| 985 | SET ASSY | 80011531 | 15" LG CRT M36QBX801X04(A)(S) | CRT | 1 | L | R |
| 986 | SET ASSY | 80005211 | TOSHIBA M36LGE23X205(F1M1) | CRT | 1 | T | B,C |
| 987 | SET ASSY | 80011191 | 15" ORION M36QCZ100XX41 | CRT | 1 | O | B,C |
| 988 | SET ASSY | 80010481 | 15" N0501 MPRII DEGAUSSING | DEGUESSING COIL | 1 | T | |
| 989 | SET ASSY | 80011221 | 15" MPRII DEGAUSSING FOR ORION/LG | DEGUESSING COIL | 1 | O,L | |
| 990 | SET ASSY | 14000011 | SCREW (#2CBRITS*4*16*15BF) | FOR BACK | 2 | | |
| 991 | SET ASSY | 14300031 | SCREW (PL-CPIMS*4*10*15BF) | FOR BKT-CAB | 2 | | |
| 992 | SET ASSY | 18000261 | ANODE CLAMPER | FOR CRT | 2 | | |
| 993 | SET ASSY | 14600011 | SCREW SPECIAL (5*25) | FOR CRT | 4 | | |
| 994 | SET ASSY | 17000111 | CRT PAD t=3.5 | FOR CRT | 4 | | |
| 995 | SET ASSY | 18000281 | FIXED CABLE CLIP(GL-70A) | FOR DEGUES | 2 | | |
| 996 | SET ASSY | 18000351 | FIXED CABLE CLIP(GL-140A) | FOR DEGUES | 2 | | |
| 997 | SET ASSY | 14000071 | SCREW (PL-CPTS*3*8*15BF) | FOR FBT H.S. | 1 | | |
| 998 | SET ASSY | 11700211 | SUPPORT | FOR FRONT | 2 | | |
| 999 | SET ASSY | 12000551 | BRACKET CABLE | FOR SIGNAL | 1 | | |
| 1000 | SET ASSY | 14000071 | SCREW (PL-CPTS*3*8*15BF) | FOR SINGLE BRK | 2 | | |
| 1001 | SET ASSY | 14000021 | SCREW (#2CBRITS*4*12*15BF) | FOR SUPPORT | 4 | | |
| 1002 | SET ASSY | 80010731 | GND WIRE BLECK 160mm 18AWG 1015 | GND 5,GND7 | 2 | | |
| 1003 | SET ASSY | 80010721 | GND WIRE BLECK 320mm 18AWG 1015 | GND 8 | 1 | | |
| 1004 | SET ASSY | 80010751 | V521 CRT GND WIRE | GND WIRE | 1 | | |
| 1005 | SET ASSY | HB000018 | ROTATION COIL 200TN | ROTATION | 1 | | |
| 1006 | SET ASSY | 17000351 | CUSHION PIECE (BACK)80*60*30 | SPONGE | 1 | | |

| | | | | | | | |
|------|----------|----------|---|------|-------|--|-----|
| 1007 | SET ASSY | R0191207 | TAPE BLACK L=75mmX3 | TAPE | 0.015 | | |
| 1008 | SET ASSY | 17000321 | CABLE TIES(GT-100M) | TIE | 9 | | |
| 1009 | SET ASSY | 10100542 | CABINET FRONT ASSY | | 1 | | |
| 1010 | SET ASSY | 10100563 | CABINET BACK | | 1 | | |
| 1011 | SET ASSY | 12300202 | PLATE SHIELDING (VIDEO) | | 1 | | |
| 1012 | SET ASSY | 15000881 | NAME PLATE INSERTUCTION V520-1(B Ver.) | | 1 | | B,R |
| 1013 | SET ASSY | 15000931 | NAME PLATE INSERTUCTION V520-1(C Ver.) | | 1 | | C |
| 1014 | SET ASSY | 15200201 | LABEL (EMC)(V500R) | | 1 | | R |
| 1015 | SET ASSY | 15200031 | LABEL (REV.) | | 1 | | |
| 1016 | SET ASSY | 15200471 | LABLE WARNING (27.5KV/600uA) | | 1 | | |
| 1017 | SET ASSY | 18000331 | WIRE CLIP (WC-13T) | | 1 | | |
| 1018 | SET ASSY | 18000421 | SWITCH EXPANDING COVER | | 1 | | |
| 1019 | SET ASSY | 15200261 | LABEL (EMC)(2)(V500R) | | 2 | | R |
| 1020 | SET ASSY | 18000271 | SPACER SUPPORT(PS-26GD) | | 4 | | |

REVISED BY ECN: NN1010005

SORT BY A SSY CODE

2) MultiSync V521 Different List

B: ASIA, R: Australia, L: LG, T:Toshiba, S:Samsung

| | ASSY CODE | PART NO | DESCRIPTION | LOCATION | Q'TY | ALT | REMARK |
|----|----------------------|----------|---|-----------------|------|-----|--------|
| 1 | CABINET FRONT ASSY | 10101111 | CABINET FRONT(PC+ABS) | | 1 | | |
| 2 | CABINET FRONT ASSY | 11300351 | PUSH BUTTON (CONTROL A) | | 1 | | |
| 3 | CABINET FRONT ASSY | 11300781 | PUSH BUTTON (SW) | | 1 | | |
| 4 | CABINET FRONT ASSY | 11600181 | LENS | | 1 | | |
| 5 | CABINET FRONT ASSY | 13000061 | COIL SPRING | | 1 | | |
| 6 | PACKING ASSY | 80002931 | POWER CORD 3P 1.8M AUSTRALIA NON-SHIELD COLOR SG 8508 | CORD POWER | 1 | | R |
| 7 | PACKING ASSY | 80001651 | POWER CORD 3P 1.8M EUROPE N-SHIELD COLOR SG8508 | CORD POWER | 1 | | B |
| 8 | PACKING ASSY | 11000331 | REVOLVING STAND ASSY | | 1 | | |
| 9 | PACKING ASSY | 13400491 | POLYON(R) CARTON | | 1 | | |
| 10 | PACKING ASSY | 13400501 | POLYON(L) CARTON | | 1 | | |
| 11 | PACKING ASSY | 13700021 | BAG POLYETHYLENE (270*370) | | 1 | | |
| 12 | PACKING ASSY | 13700031 | BAG POLYETHYLENE (150*370) | | 1 | | |
| 13 | PACKING ASSY | 13700071 | PE BAG (500*480*850 + WARNING) | | 1 | | |
| 14 | PACKING ASSY | 13700091 | BAG POLYETHYLENE (360*360) | | 1 | | |
| 15 | PACKING ASSY | 13201121 | CARTON BOX V721(R)-1 | | 1 | | R |
| 16 | PACKING ASSY | 15500701 | OWNERS MANUAL V721/V921(R) | | 1 | | R |
| 17 | PACKING ASSY | 13201221 | CARTON BOX V721(B)-1 | | 1 | | B |
| 18 | PACKING ASSY | 15500771 | OWNERS MANUAL V521/V721/V921 | | 1 | | B |
| 19 | PACKING ASSY | 19700041 | INSTRUCTION CD-ROM V521/V721/V921 | | 1 | | B |
| 20 | PACKING ASSY | 15900051 | SALES OFFICE LIST | | 1 | | B |
| 21 | PACKING ASSY | 15700043 | WARRANTY CARD(AUST) | | 1 | | R |
| 22 | PACKING ASSY | 15200261 | LABEL (EMC) (2) (V500R) | | 2 | | R |
| 23 | PACKING ASSY | 11000381 | REVOLVING STAND ASSY | | OR | | |
| 24 | PACKING ASSY | 11000382 | REVOLVING STAND ASSY | | OR | | |
| 25 | REVOLVING STAND ASSY | 17000291 | CUSHION SHEET | FOR BASE | 4 | | |
| 26 | REVOLVING STAND ASSY | 17000451 | CUSHION SHEET | FOR BASE | 4 | | |
| 27 | REVOLVING STAND ASSY | 11000251 | REVOLVING STAND(B)(94HB) | | 1 | | |
| 28 | REVOLVING STAND ASSY | 11000261 | REVOLVING STAND(T)(94HB) | | 1 | | |
| 29 | REVOLVING STAND ASSY | 11000262 | REVOLVING STAND(T)(94HB) | | 1 | | |
| 30 | REVOLVING STAND ASSY | 11000361 | REVOLVING STAND(B)(94HB) | | 1 | | |
| 31 | REVOLVING STAND ASSY | 11000362 | REVOLVING STAND(B)(94HB) | | 1 | | |
| 32 | SET ASSY | 80009271 | SIGNAL CABLE 20276 1.5M FOR N9701 VE | CABLE | 1 | | |
| 33 | SET ASSY | 80005581 | 17"LG M41LFQ803X13(LA) | CRT | 1 | L | R |
| 34 | SET ASSY | 80004531 | LG M41LFQ803X13(LA) | CRT | 1 | L | B |
| 35 | SET ASSY | 80004551 | SAMSUNG M41QAR361X101(A) | CRT | 1 | S | |
| 36 | SET ASSY | 80009321 | TOSHIBA M41LRT128X401(FA) | CRT | 1 | T | |
| 37 | SET ASSY | 80010521 | 17" N0701 TCO DEGAUSSING SAMSUNG CRT | DEGAUSSING COIL | 1 | S | |
| 38 | SET ASSY | 80010531 | 17" N0701 TCO DEGAUSSING LG CRT | DEGAUSSING COIL | 1 | L | |
| 39 | SET ASSY | 80010501 | 17" N0701 TCO DEGAUSSING TOSHIBA CRT | DEGAUSSING COIL | 1 | T | |
| 40 | SET ASSY | 14000011 | SCREW (#2CBRITS*4*16*15BF) | FOR BACK | 2 | | |
| 41 | SET ASSY | 14000071 | SCREW (PL-CPTS3*8*15BF) | FOR BKT-CAB | 2 | | |
| 42 | SET ASSY | 14300031 | SCREW (PL-CPIMS*4*10*15BF) | FOR BKT-CAB | 2 | | |
| 43 | SET ASSY | 14000031 | SCREW (#2CBRTS*3*12*15BF) | FOR BKT-PCB | 2 | | |
| 44 | SET ASSY | 17000252 | COPPER SHIELDING | FOR CRT | 1 | | |
| 45 | SET ASSY | 14600011 | SCREW SPECIAL (5*25) | FOR CRT | 4 | | |
| 46 | SET ASSY | 17000111 | CRT PAD t=3.5 | FOR CRT | 4 | | |
| 47 | SET ASSY | 17000261 | AL TAPE 40*130mm | FOR CRT | 4 | | |
| 48 | SET ASSY | 18000281 | FIXED CABLE CLIP(GL-70A) | FOR DEGUES | 2 | | |
| 49 | SET ASSY | 18000371 | FIXED CABLE CLIP(GL-115A) | FOR DEGUES | 2 | | |
| 50 | SET ASSY | 11700221 | SUPPORT(PC+ABS) | FOR FRONT | 2 | | |
| 51 | SET ASSY | 14000021 | SCREW (#2CBRITS*4*12*15BF) | FOR FRONT | 4 | | |
| 52 | SET ASSY | 18000271 | SPACER SUPPROT(PS-26GD) | FOR M/B | 4 | | |
| 53 | SET ASSY | 80000031 | GND WIRE 18AWG L=130mm | GND WIRE | 1 | | |

| | | | | | | | |
|----|----------|----------|-------------------------------------|-------------|-------|---|---|
| 54 | SET ASSY | 80000891 | WIRE L=360mm BLACK AWG18 | GND WIRE | 1 | | |
| 55 | SET ASSY | 80001931 | 17" ROTATION COIL | GND WIRE | 1 | | |
| 56 | SET ASSY | 80010951 | MS75 CRT GND WIRE | GND WIRE | 1 | | |
| 57 | SET ASSY | 72000641 | TCO PCB | PCB TCO | 1 | | |
| 58 | SET ASSY | 80005101 | WIRE 1618 24AWG 40mm BK | SHIELD WIRE | 1 | | |
| 59 | SET ASSY | R0191207 | TAPE BLACK L=75mmX3 | TAPE | 0.015 | | |
| 60 | SET ASSY | 80011271 | WIRE 1618 24AWG 970mm GRAY(LG) | TCO WIRE | 1 | L | |
| 61 | SET ASSY | 80011601 | WIRE 1618 24AWG 790mm GRAY (T) | TCO WIRE | 1 | T | |
| 62 | SET ASSY | 80011261 | WIRE 1618 24AWG 890mm GRAY(SAMSUNG) | TCO WIRE | 1 | S | |
| 63 | SET ASSY | 17000321 | CABLE TIES(GT-100M) | TIE | 10 | | |
| 64 | SET ASSY | 15200031 | LABEL (REV.) | | 1 | | |
| 65 | SET ASSY | 15000981 | NAME PLATE INSTRUCTION V721(R) | | 1 | | |
| 66 | SET ASSY | 15200471 | LABEL WARNING (27.5KV/600uA) | | 1 | | |
| 67 | SET ASSY | 15200331 | LABEL,SERIAL BARCODE | | 1 | | |
| 68 | SET ASSY | 15200681 | LABEL TCO99 (FOR CABINET) | | 1 | | |
| 69 | SET ASSY | 15200201 | LABEL (EMC) (V500R) | | 1 | | R |
| 70 | SET ASSY | 10100924 | CABINET BACK | | 1 | | |
| 71 | SET ASSY | 10101101 | CABINET FRONT ASSY(PC+ABS) | | 1 | | |
| 72 | SET ASSY | 12000281 | BRACKET(PCB) | | 1 | | |
| 73 | SET ASSY | 12000551 | BRACKET(CABLE) | | 1 | | |
| 74 | SET ASSY | 12300202 | PLATE SHIELDING (VIDEO) | | 1 | | |
| 75 | SET ASSY | 17000301 | CUSHION PIECE (BACK) | | 1 | | |
| 76 | SET ASSY | 18000311 | PCB SUPPORT (SS-8) | | 1 | | |
| 77 | SET ASSY | 18000421 | SWITCH EXPANDING COVER | | 1 | | |
| 78 | SET ASSY | 18000261 | ANODE CLAMPER(SPA-11G) | | 2 | | |
| 79 | SET ASSY | 18000361 | HOLDER PCB FOR TCO(CBS-5C) | | 3 | | |

REVISED BY ECN: NN960011

SORT BY ASSY CODE

3) MultiSync MV521 Different List

B: ASIA, R: Australia, L: LG, T: Toshiba, O: Orion

| | ASSY CODE | PART NO | DESCRIPTION | LOCATION | Q'TY | ALT | REMARK |
|----|----------------------|----------|--------------------------------------|----------------------|------|-----|--------|
| 1 | CABINET FRONT ASSY | 10101032 | CABINET FRONT(PC+ABS) | | 1 | | |
| 2 | CABINET FRONT ASSY | 11300351 | PUSH BUTTOM(V)-FUCTION KEY | | 1 | | |
| 3 | CABINET FRONT ASSY | 11300781 | PUSH BUTTOM(SW)-POWER KNOB | | 1 | | |
| 4 | CABINET FRONT ASSY | 11600121 | LENS(V) | | 1 | | |
| 5 | CABINET FRONT ASSY | 13000061 | COIL SPRING | | 1 | | |
| 6 | PACKING ASSY | 13700091 | BAG POLYETHYLENE (360*360) | FOR Ball&Base | 1 | | |
| 7 | PACKING ASSY | 80001651 | POWER CORD 3P 1.8M EUROPE | POWER CORD | 1 | | |
| 8 | PACKING ASSY | 11000341 | AUDIO BASE ASSY | | 1 | | |
| 9 | PACKING ASSY | 13200881 | CARTON BOX V521-1 (B) | | 1 | | |
| 10 | PACKING ASSY | 13400571 | POLYLON(L)CARTON | | 1 | | |
| 11 | PACKING ASSY | 13400581 | POLYLON(R)CARTON | | 1 | | |
| 12 | PACKING ASSY | 13700021 | BAG POLYETHYLENE (270*370) | | 1 | | |
| 13 | PACKING ASSY | 13700031 | BAG POLYETHYLENE (150*370) | | 1 | | |
| 14 | PACKING ASSY | 13700071 | PE BAG (500*480*850 + WARNING) | | 1 | | |
| 15 | PACKING ASSY | 15500661 | OWNERS MANUAL V521/V921-1 (B) | | 1 | | |
| 16 | PACKING ASSY | 15500671 | MANUAL (AUDIO BASE) | | 1 | | |
| 17 | PACKING ASSY | 15900051 | SALES OFFICE LIST | | 1 | | |
| 18 | REVOLVING STAND ASSY | 17000441 | CUSHION PIECE (BACK)80*60*30 | FOR BASE | 4 | | |
| 19 | REVOLVING STAND ASSY | 11000261 | REVOLVING STAND(T) | | 1 | | |
| 20 | REVOLVING STAND ASSY | 11000311 | REVOLVING STAND (B) PC+ABS | | 1 | | |
| 21 | REVOLVING STAND ASSY | 11000321 | COVER STAND(MA) PC+ABS | | 1 | | |
| 22 | SET ASSY | 80005101 | WIRE 40mm 1618 BK | A | 1 | | |
| 23 | SET ASSY | 80009271 | SIGNAL CABLE 20276 1.5M FOR N9701 VE | CABLE | 1 | | |
| 24 | SET ASSY | 80005181 | 15" TOSHIBA M36LGE128X205(F1M1) | CRT | 1 | T | |
| 25 | SET ASSY | 80010851 | 15" LG CRT M36QBX801X04(A) | CRT | 1 | L | |
| 26 | SET ASSY | 80011191 | 15" ORION M36QCZ100XX41 | CRT | 1 | O | |
| 27 | SET ASSY | 80010491 | 15" N0501 TCO DEGAUSSING | DEGAUSSING COIL | 1 | T,O | |
| 28 | SET ASSY | 80011231 | 15" MPRII DEGAUSSING FOR ORION/LG | DEGAUSSING COIL | 1 | L | |
| 29 | SET ASSY | 14000011 | SCREW (#2CBRITS*4*16*15BF) | FOR BACK | 2 | | |
| 30 | SET ASSY | 18000261 | ANODE CLAMPER | FOR CRT | 2 | | |
| 31 | SET ASSY | 14600011 | SCREW SPECIAL (5*25) | FOR CRT | 4 | | |
| 32 | SET ASSY | 17000111 | CRT PAD t=3.5 | FOR CRT | 4 | | |
| 33 | SET ASSY | 12300202 | PLATE SHIELDING (VIDEO) | FOR CRT PCB | 1 | | |
| 34 | SET ASSY | 18000281 | FIXED CABLE CLIP(GL-70A) | FOR DEGUES | 2 | | |
| 35 | SET ASSY | 18000351 | FIXED CABLE CLIP(GL-140A) | FOR DEGUES | 2 | | |
| 36 | SET ASSY | 17000571 | MAYLAR SHEET (CU) | FOR FBT BOTTOM | 1 | | |
| 37 | SET ASSY | 14000071 | SCREW (PL-CPTS*3*8*15BF) | FOR FBT HEAT SINK | 1 | | |
| 38 | SET ASSY | 11700221 | SUPPORT | FOR FRONT | 2 | | |
| 39 | SET ASSY | 14300031 | SCREW (PL-CPIMS*4*10*15BF) | FOR GND | 2 | | |
| 40 | SET ASSY | 80005101 | WIRE 40mm 1618 BK | FOR MAYLAR SHEET | 1 | | |
| 41 | SET ASSY | 12000551 | BRACKET CABLE | FOR SIGNAL | 1 | | |
| 42 | SET ASSY | 14000021 | SCREW (#2CBRITS*4*12*15BF) | FOR SUPPORT | 4 | | |
| 43 | SET ASSY | 80010731 | GND WIRE BLECK 160mm 18AWG 1015 | GND 5,GND7 | 2 | | |
| 44 | SET ASSY | 80010721 | GND WIRE BLECK 320mm 18AWG 1015 | GND 8 | 1 | | |
| 45 | SET ASSY | 80010751 | V521 CRT GND WIRE | GND WIRE | 1 | | |
| 46 | SET ASSY | 18000361 | HOLDER PCB FOR TCO (CBS-50) | HOLDER | 4 | | |
| 47 | SET ASSY | HB000018 | ROTATION COIL 200TN | ROTATION | 1 | | |
| 48 | SET ASSY | 17000351 | CUSHION PIECE (BACK)80*60*30 | SPONGE | 1 | | |
| 49 | SET ASSY | 72000671 | TCO BOARD 250X52.5mm | TCO PCB | 1 | | |
| 50 | SET ASSY | 10100913 | CABINET BACK | | 1 | | |
| 51 | SET ASSY | 10101022 | CABINET FRONT ASSY | | 1 | | |
| 52 | SET ASSY | 15000861 | NAME PLATE INSTRUCTION V521-1(B) | | 1 | | |
| 53 | SET ASSY | 15200031 | LABEL (REV.) | | 1 | | |

| | | | | | | | |
|----|----------|----------|---|--|---|--|---|
| 54 | SET ASSY | 15200331 | LABLE SERIAL BARCODE(B Ver.) | | 1 | | |
| 55 | SET ASSY | 15200471 | LABLE WARNING (27.5KV/600uA) | | 1 | | |
| 56 | SET ASSY | 15200681 | LABEL TCO99 | | 1 | | B |
| 57 | SET ASSY | 15201061 | LABEL SAFETY(Russia+Poland for cabinet) | | 1 | | |
| 58 | SET ASSY | 17000252 | COPPER SHEILDING(V500PNR) | | 1 | | |
| 59 | SET ASSY | 18000331 | WIRE CLIP (WC-13T) | | 1 | | |
| 60 | SET ASSY | 18000421 | SWITCH EXPANDING COVER | | 1 | | |
| 61 | SET ASSY | 18000461 | SNAP CLIP (MB-01G) | | 3 | | |
| 62 | SET ASSY | 17000261 | AL TYPE 40*130mm | | 4 | | |
| 63 | SET ASSY | 18000271 | SPACER SUPPORT(PS-26GD) | | 4 | | |

REVISED BY ECN: NN 1030001

SORT BY ASSY CODE

4) Diamond Scan 51 Different List

T: Toshiba, O: Orion

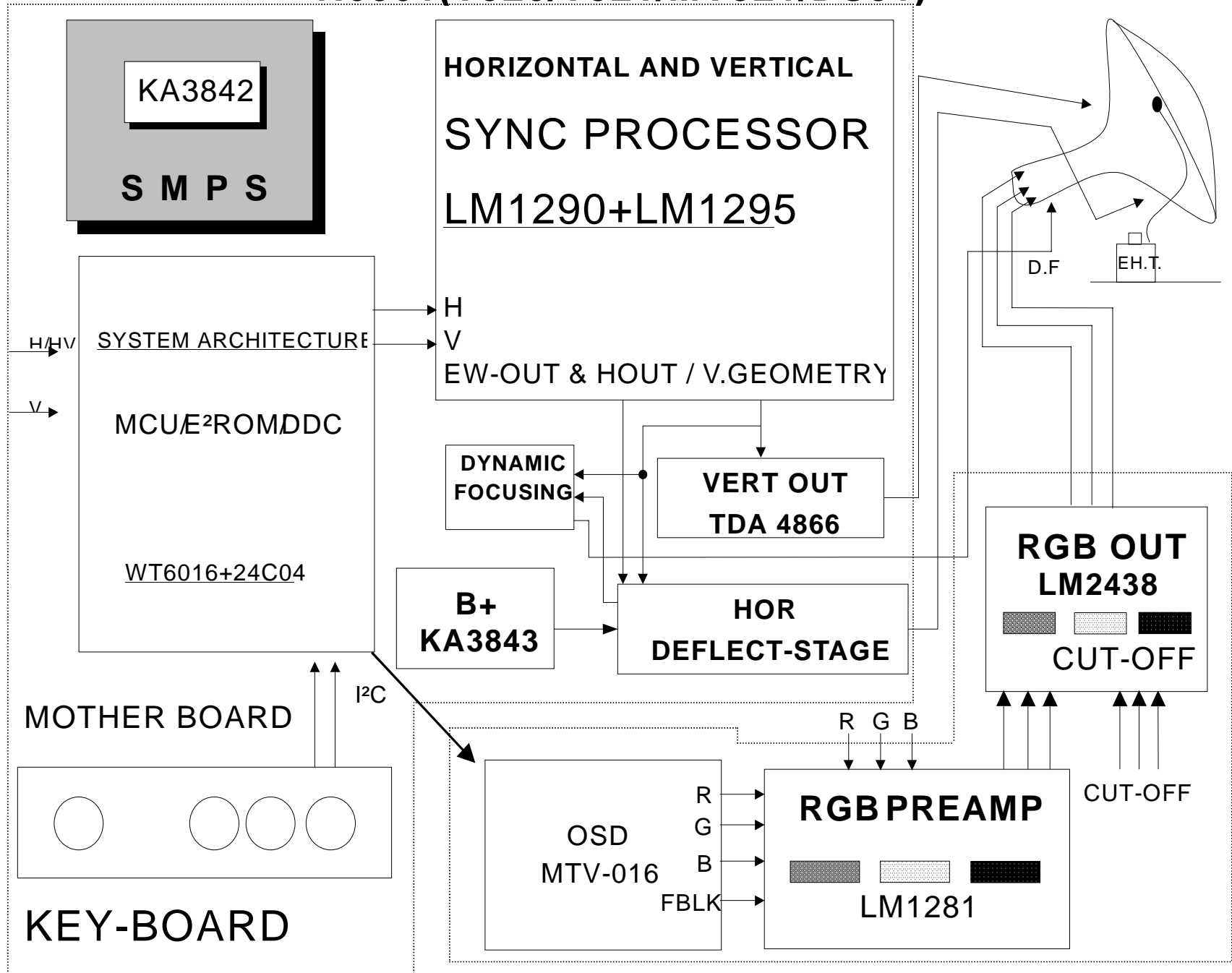
| | ASSY CODE | PART NO | DESCRIPTION | LOCATION | Q'TY | ALT | REMARK |
|----|----------------------|----------|--------------------------------------|----------------|------|-----|--------|
| 1 | CABINET FRONT ASSY | 10100721 | CABINET FRONT | | 1 | | |
| 2 | CABINET FRONT ASSY | 11300481 | PUSH BUTTON(FUNCTION) | | 1 | | |
| 3 | CABINET FRONT ASSY | 11300491 | PUSH BUTTON(SW) | | 1 | | |
| 4 | CABINET FRONT ASSY | 11600181 | LENS | | 1 | | |
| 5 | CABINET FRONT ASSY | 13000061 | COIL SPRING | | 1 | | |
| 6 | PACKING ASSY | 80001651 | POWER CORD 3P 1.8M EUROPE | POWER CORD | 1 | | |
| 7 | PACKING ASSY | 11000331 | REVOLVING STAND ASSY | | 1 | | |
| 8 | PACKING ASSY | 13200911 | CARTON BOX DS51(B) | | 1 | | |
| 9 | PACKING ASSY | 13400251 | POLYLON(L)CARTON | | 1 | | |
| 10 | PACKING ASSY | 13400261 | POLYLON(R)CARTON | | 1 | | |
| 11 | PACKING ASSY | 13700021 | BAG POLYETHYLENE (270*370) | | 1 | | |
| 12 | PACKING ASSY | 13700031 | BAG POLYETHYLENE (150*370) | | 1 | | |
| 13 | PACKING ASSY | 13700071 | PE POLYETHYLENE (500*480*850+W) | | 1 | | |
| 14 | PACKING ASSY | 13700091 | BAG POLYETHYLENE (360*360) | | 1 | | |
| 15 | PACKING ASSY | 15500681 | OWNERS MANUAL DS51(B) | | 1 | | |
| 16 | PACKING ASSY | 15200281 | LABLE,SERIAL BARCODE(A) | | 1 | | |
| 17 | PACKING ASSY | 11000381 | REVOLVING STAND ASSY | | OR | | |
| 18 | REVOLVING STAND ASSY | 17000291 | CUSHION SHEET | FOR BASE | 4 | | |
| 19 | REVOLVING STAND ASSY | 17000451 | CUSHION SHEET | FOR BASE | 4 | | |
| 20 | REVOLVING STAND ASSY | 11000251 | REVOLVING STAND(B)(94HB) | | 1 | | |
| 21 | REVOLVING STAND ASSY | 11000261 | REVOLVING STAND(T)(94HB) | | 1 | | |
| 22 | REVOLVING STAND ASSY | 11000361 | REVOLVING STAND(B)(94HB) | | 1 | | |
| 23 | SET ASSY | 80009271 | SIGNAL CABLE 20276 1.5M FOR N9701 VE | CABLE | 1 | | |
| 24 | SET ASSY | 80005211 | TOSHIBA M36LGE23X205(F1M1) | CRT | 1 | T | |
| 25 | SET ASSY | 80011191 | 15" ORION M36QCZ100XX41 | CRT | 1 | O | |
| 26 | SET ASSY | 80010481 | 15" N0501 MPRII DEGAUSSING | DEGUSSING COIL | 1 | T | |
| 27 | SET ASSY | 80011221 | 15" MPRII DEGAUSSING FOR ORION/LG | DEGUSSING COIL | 1 | O | |
| 28 | SET ASSY | 14000011 | SCREW (#2CBRITS*4*16*15BF) | FOR BACK | 2 | | |
| 29 | SET ASSY | 14000071 | SCREW (PL-CPTS3*8*15BF) | FOR BKT-CAB | 2 | | |
| 30 | SET ASSY | 14300031 | SCREW (PL-CPIIMS*4*10*15BF) | FOR BKT-CAB | 2 | | |
| 31 | SET ASSY | 14600011 | SCREW SPECIAL (5*25) | FOR CRT | 4 | | |
| 32 | SET ASSY | 17000111 | CRT PAD t=3.5 | FOR CRT | 4 | | |
| 33 | SET ASSY | 18000281 | FIXED CABLE CLIP(GL-70A) | FOR DEGUES | 2 | | |
| 34 | SET ASSY | 18000351 | FIXED CABLE CLIP(GL-140A) | FOR DEGUES | 2 | | |
| 35 | SET ASSY | 11700211 | SUPPORT | FOR FRONT | 2 | | |
| 36 | SET ASSY | 14000021 | SCREW (#2CBRITS*4*12*15BF) | FOR FRONT | 4 | | |
| 37 | SET ASSY | 18000271 | SPACER SUPPORT(PS-26GD) | FOR M/B | 4 | | |
| 38 | SET ASSY | 80010731 | GND WIRE BLECK 160mm 18AWG 1015 | GND 5,GND7 | 2 | | |
| 39 | SET ASSY | 80010721 | GND WIRE BLECK 320mm 18AWG 1015 | GND 8 | 1 | | |
| 40 | SET ASSY | 80010751 | V521 CRT GND WIRE | GND WIRE | 1 | | |
| 41 | SET ASSY | HB000018 | ROTATION COIL 200TN | ROTATION | 1 | | |
| 42 | SET ASSY | 17000351 | CUSHION PIECE(BACK) | SPONGE | 1 | | |
| 43 | SET ASSY | 17000321 | CABLE TIES(GT-100M) | TIE | 9 | | |
| 44 | SET ASSY | 15000891 | NAME PLATE INSTRUCTION DS51(B) | | 1 | | |
| 45 | SET ASSY | 15200471 | LABLE WARNING (27.5KV/600uA) | | 1 | | |
| 46 | SET ASSY | 15200031 | LABEL (REV.) | | 1 | | |
| 47 | SET ASSY | 10100701 | CABINET FRONT ASSY | | 1 | | |
| 48 | SET ASSY | 10101581 | CABINET BACK | | 1 | | |
| 49 | SET ASSY | 12000551 | BRACKET (CABLE) | | 1 | | |
| 50 | SET ASSY | 12300202 | PLATE SHIELDING (VIDEO) | | 1 | | |
| 51 | SET ASSY | 18000261 | ANODE CLAMPER(SPA-11G) | | 1 | | |
| 52 | SET ASSY | 18000421 | SWITCH EXPANDING COVER | | 1 | | |

REVISED BY ECN: NN1040009

SORT BY ASSY CODE

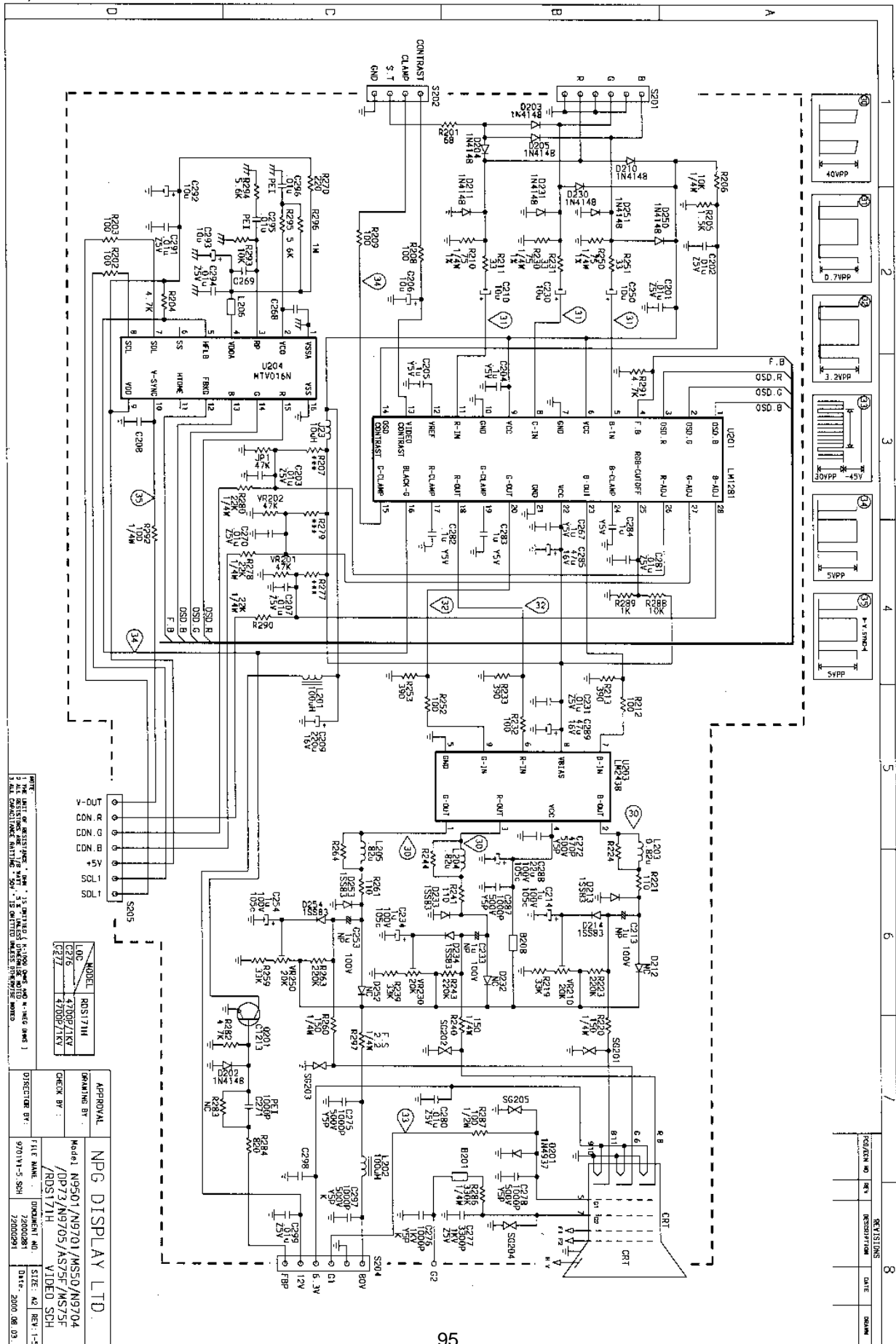
N0501(V520/V521/MV521/DS51)

BLOCK DIAGRAM



SCHEMATIC DIAGRAMS

1) Video Board



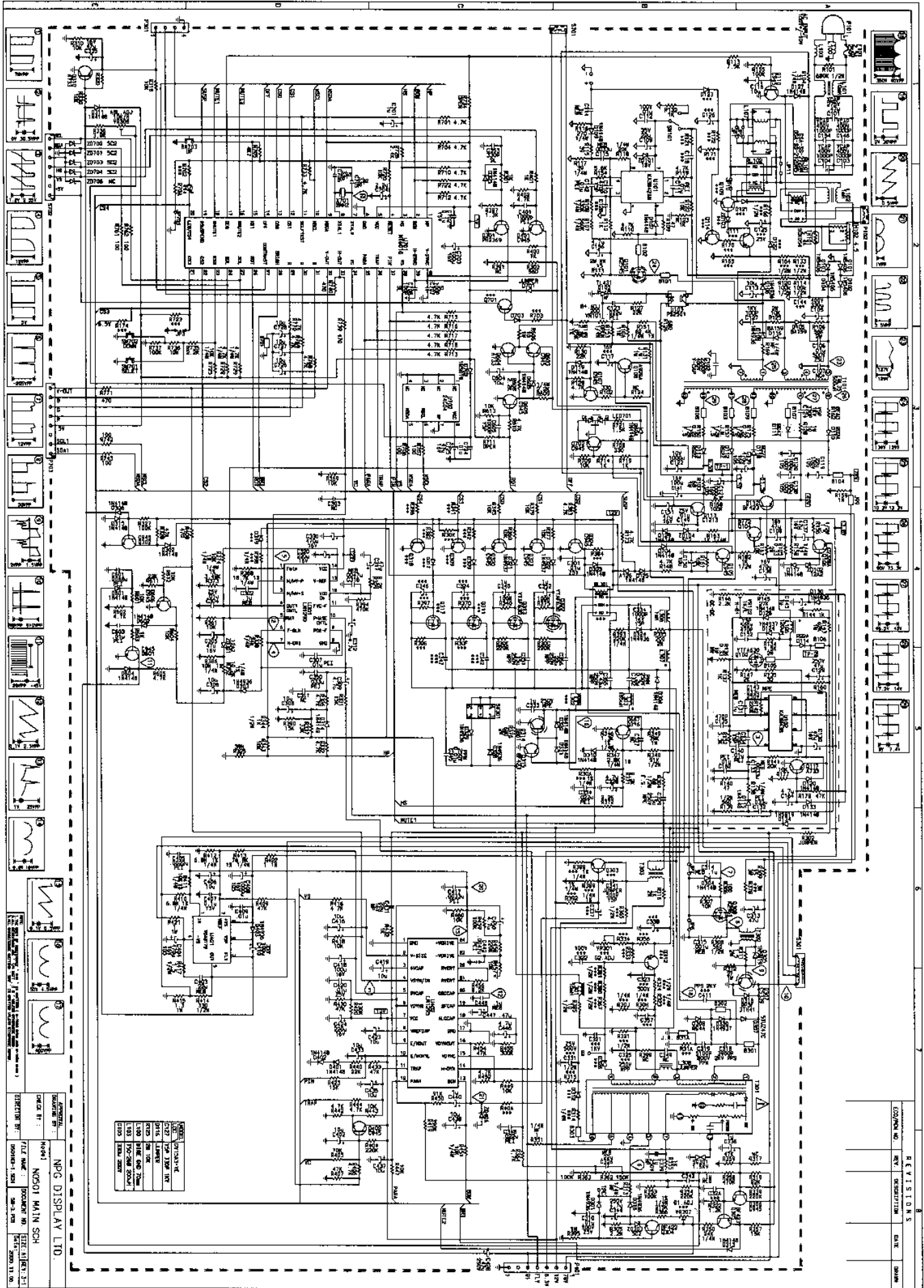
NOTE: 1. THE DATE OF REVISIONS IS SHOWN IN THE RIGHT HAND COLUMN.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.

| | |
|-------|------------|
| MODEL | RDS171H |
| LOC | 47009/71K1 |
| C276 | 47009/71K1 |
| C277 | 47009/71K1 |

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|-------------|------------------|
| APPROVAL | NPG DISPLAY LTD. |
| DESIGNED BY | 970115-SH |
| CHECK BY | 72000281 |
| DATE | 2000.08.03 |
| FILE NAME | DISCUSS/NO. 1 |
| SIZE | A4 |
| REV | 1-5 |

| NO. | REVISIONS | DATE | SCALE |
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2) Main Board



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| REVISIONS | DATE | BY | CHKD BY | APP'D BY |
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| COMPONENT | VALUE |
| RESISTOR | 10K |
| CAPACITOR | 100N |
| INDUCTOR | 100UH |
| DIODE | 1N4148 |
| TRANSISTOR | 2N3904 |
| IC | 74LS00 |
| IC | 74LS125 |
| IC | 74LS138 |
| IC | 74LS244 |
| IC | 74LS273 |
| IC | 74LS373 |
| IC | 74LS595 |
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| IC | 74LS300 |

NGC DISPLAY LTD.

NGC01 MAIN SCH

REV: 1.0

DATE: 2000.11.03

DESIGNER: NGC

CHKD BY: NGC

APP'D BY: NGC

FILE NAME: NGC01 MAIN SCH

PROJECT NO: NGC01

DATE: 2000.11.03

REV: 1.0

DESIGNER: NGC

CHKD BY: NGC

APP'D BY: NGC

FILE NAME: NGC01 MAIN SCH

PROJECT NO: NGC01

DATE: 2000.11.03

REV: 1.0

DESIGNER: NGC

CHKD BY: NGC

APP'D BY: NGC

FILE NAME: NGC01 MAIN SCH

PROJECT NO: NGC01

DATE: 2000.11.03

REV: 1.0

DESIGNER: NGC

CHKD BY: NGC

APP'D BY: NGC

FILE NAME: NGC01 MAIN SCH

PROJECT NO: NGC01

DATE: 2000.11.03

REV: 1.0

DESIGNER: NGC

CHKD BY: NGC

APP'D BY: NGC

FILE NAME: NGC01 MAIN SCH

PROJECT NO: NGC01

DATE: 2000.11.03

REV: 1.0

DESIGNER: NGC

CHKD BY: NGC

APP'D BY: NGC

FILE NAME: NGC01 MAIN SCH

PROJECT NO: NGC01