



SERVICE AND OPERATION MANUAL

MTG-2902SN **OPEN FRAME S/VGA COLOR MONITORS**

29" : 49 - 6157 - VP2

VISION PRO
HAPP CONTROLS

This monitor has been designed and manufactured to deliver high performance video. For continued peak performance use and safe operation, it is recommended to use only high quality Happ Controls replacement parts or their exact specified equivalent when servicing.

SAFETY PRECAUTIONS AND WARNINGS

X-Radiation Warning

COMPONENTS WHICH MAY AFFECT POTENTIAL EXCESS EMISSION OF X-RADIATION IN THE HORIZONTAL DEFLECTION AND HIGH VOLTAGE CIRCUITS (INCLUDING THE PICTURE TUBE) AND ETC ARE INDICATED BY A (★) ON THE SCHEMATIC DIAGRAM. USE ONLY COMPONENT TYPE SHOWN IN THE PARTS LIST.

The only potential source of X-radiation emission is the picture tube. When the high voltage and horizontal deflection circuits are operating correctly there is no possibility of excess X-radiation emission. NEVER attempt to modify these circuits.

High Voltage

The display contains HIGH VOLTAGE capable of delivering LETHAL quantities of energy. Service should only be attempted by trained personnel familiar with the potential dangers inherent with high voltage equipment.

Safety Related Component Warning

Certain components used in these color monitors are critical for safe operation of the display.

These part numbers are marked by (△) on schematic diagram. It is essential that these safety critical components be replaced only with exact manufacturer specified components to prevent the possibility of excessive X-radiation emission, electrical shock, fire or premature component failure. Modifying the original design without written approval from us is expressly forbidden, will void the original parts and labor warranty, and may result in creating hazardous situation.

CRT Warning

All picture tubes used in Happ Controls monitors are equipped with an integral implosion protection system. The picture tube is, however, a highly evacuated component which outside surfaces are subject to strong external forces. Care must be exercised so as not to bump or scratch the tube during installation or servicing as this may cause the tube to implode, resulting in possible personal injury and property damage. Shatter-proof goggles must be worn by individuals while handling the CRT or installing the display in the cabinet. Do not handle the CRT by neck.

1. Always ensure the high voltage at the anode cap is fully discharged prior to handling or service.
2. Replace picture tube only with same type and number.

Product Safety and Service Guidelines

1. Service should be performed only after reading all of the warnings and precautions in the manual and as labeled on the CRT and chassis.
2. Where a short circuit has occurred, replace all components that indicate evidence of overheating. Also check for evidence of overheating or poor connection on all plastic connectors.
3. Inspect wiring for frayed leads and damaged insulation. When service is required, observe original lead dress, assume lead dress is followed as from the factory, especially in the high voltage circuitry area.
4. Do not expose this display to rain or place in areas where the potential for exposure to moisture is high. Additionally, do not mount the removed OSD-CONTROL-BOARD outside the cabinet or in areas where there is a possibility of exposure to moisture.
5. All protective devices must be reinstalled per original design.

PERFORMANCE AND OPERATING DATA

1. Power Supply

Input Voltage : Auto-Doubler.
 90VAC-132VAC 50/60Hz.
 182VAC-260VAC 50/60Hz .
 Consumption : 130Watt ±20Watt.

2. Input Signal

- Video Input: Analog, Positive Signal (0.7V p-p)
- Horizontal Sync: TTL Level, Positive
or Negative Pulse
- Scanning: 30KHz ~ 38KHz
- Vertical Input: TTL Level, Positive or Negative
Pulse
- Scanning: 49Hz ~ 120Hz

Hf	Vf	Resolution	H Range	V Range
31KHz	70Hz	720x400	+/-1KHz	49~120Hz
31KHz	60Hz	640x480		
38KHz	60Hz	800x600		

3.C.R.T

1. Size : 29inch
2. Dot : 0.85mm
3. Phosphor : P22

4.Leakage Current

To chassis ground, at 125VAC, 60Hz (Line/Neut in common) - 0.195mA Maximum

5.High Pot

Line/Neut in common to secondary/chassis,
 1500VAC 60Hz for 1 second
 2.0mA Maximum, No Breakdown

6.Raster Non-linearity

Using a vertical and horizontal symmetrical cross hatch pattern to equation for non-linearity will be:
 Non-linearity (%) = ((largest grid minus the smallestgrid)
 Divided by (largest grid plus the
 Smallest grid)) times 100.
 10% Maximum

7. Temperature

Operating: 0° ~ 50°C
 Storage: -10°C ~ 70°C
 Humidity: 0% ~ 90%(Non-condensing)

8. Degaussing

Automatic at power-up and software via control
 Switch "SEL"

9. Regulation (Static)

The horizontal and vertical size will change less than **3mm** for a 25% white level abrupt luminance change.

10. Display Stability for Temperature

The temperature is cycled from 25 degrees C to 0 degrees C, and from 25 degrees C to 55 degrees C the video size and centering drift will not exceed 5mm horizontally or 4mm vertically.
 (Measured after a 20 min. warm-up period at 25 degrees)

11. Monitor Test Specifications

Parameter	Nominal	Specification
H/V (0 μA Beam Current)	29.5KV	+/-500V
G2	600V DC	+/-10V
Brightness	0.5ft/L	+/-0.15ft/L
Contrast (15% Window Box)	60.0ft/L	+/-5ft/L
White Balance	X: 0.281 Y: 0.311	+/-0.015 +/-0.015

Test Mode: VESA 640x 480(Fh: 31KHz, Fv: 60Hz)
 Signal: BSG-170 (BARO)

12. WARRANTY

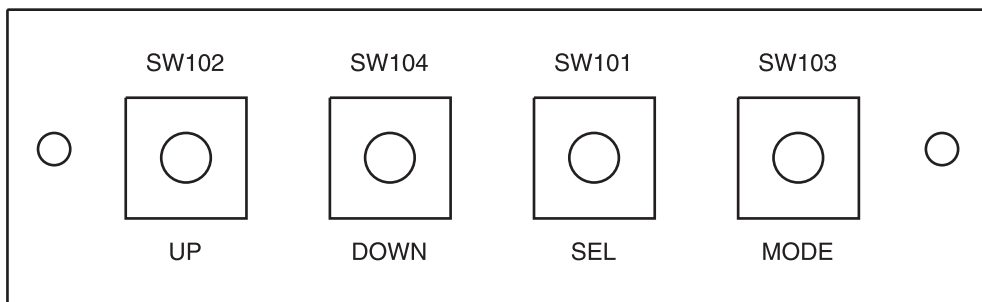
Manufacturer warranty 2 years parts and labor.
 (Except on C.R.T)

O.S.D. CONTROL METHOD

User Adjustment

Location	Adjustment	Function
Control PCB	OSD Control	Brightness Contrast Horizontal Position Horizontal-Size Vertical Position Vertical-Size Pincushion Trapezoid Degaussing Rotation Color Recall
Control PCB	VR401 VR901 FBT VR402	Sub-Bright H.V Adjustment Focus and Screen Sub H-Size Adjustment

O.S.D Control Sub-P.C.B



O.S.D (On Screen Display)

1. Digital Control Panel

The digital control panel is located at the rear side of the monitor. If you are not satisfied with the factory settings, use these OSD controls for proper adjustment. Then, these adjusted settings are kept in memory even if you turn off power switch.

2. Key Description

1) MODE

Call or Remove Main-Menu

Save adjusted value and Return to Main-Menu.

2) SEL

Select Icon on Main-Menu.

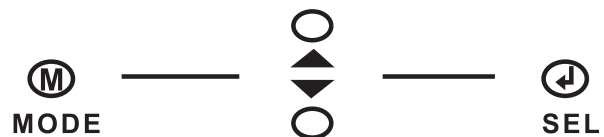
3) UP/DOWN

Search Icon on Main-Menu.

Adjust the value of each Icon.

3. OSD Controls

1) BRIGHTNESS



- ① Press the "MODE" key then Main-Menu OSD comes out as below Figure.
- ② Search "BRIGHTNESS" sub-menu by using "UP/DOWN" key on the Main-Menu OSD.
- ③ Select the "BRIGHTNESS" by pressing "SEL" key. Then The "BRIGHTNESS" OSD color changes from violet to red.
- ④ Adjust Brightness as much as you want by using "UP/DOWN" key.
- ⑤ After finishing the Brightness adjust, Press the "MODE" key then The "BRIGHTNESS" OSD Color changes from red to violet and changed brightness value saved automatically.
- ⑥ If you want to adjust other function (sub-menu), Search your wanting Sub-menu like "CONTRAST" by using "UP/DOWN" keys and then adjust as same way as item 3),4) and 5).
- ⑦ Press the "MODE" key again to finish the adjustment then the OSD is disappeared.

2) CONTRAST

as same way as BRIGHTNESS

3) H. POSITION

as same way as BRIGHTNESS

4) H. SIZE

as same way as BRIGHTNESS

5) V. POSITION

as same way as BRIGHTNESS

6) V. SIZE

as same way as BRIGHTNESS

7) PINCUSHION

as same way as BRIGHTNESS

8) TRAPEZOID

as same way as BRIGHTNESS

9) ROTATION

as same way as BRIGHTNESS

10) COLOR



COLOR1	COLOR2	USER
RED		50
GRE		50
BLU		50

- ① Press the "MODE" key then Main-Menu OSD comes out as left below figure.
- ② Search "COLOR" sub-menu by using "UP/DOWN" key on the Main-Menu OSD.
- ③ Select the "COLOR" by pressing "SEL" key. Then The color Sub-Menu OSD comes out as right below figure.
- ④ Search "USER" using "UP/DOWN" key ("COLOR1" and "COLOR2" is adjusted in factory by auto-alignment machine.)
- ⑤ Press "SELECT" key to adjust "RED", "GREEN" and "BLUE"
The each "RED", "GREEN" and "BLUE" is selected by pressing the "SELECT" key and selected item changes OSD color from white to its own color as character (ex: "RED" goes to red color)
- ⑥ Adjust "RED", "GREEN" or "BLUE" using "UP/DOWN" key.
- ⑦ Press "MODE" key to finish the color adjustment then the OSD goes back to Main-Menu.
- ⑧ Press the "MODE" key again to finish the adjustment then the OSD is disappeared.

11) RECALL

When press the "RECALL" key, all user's adjustment value is erased and covered by factory adjustment value.

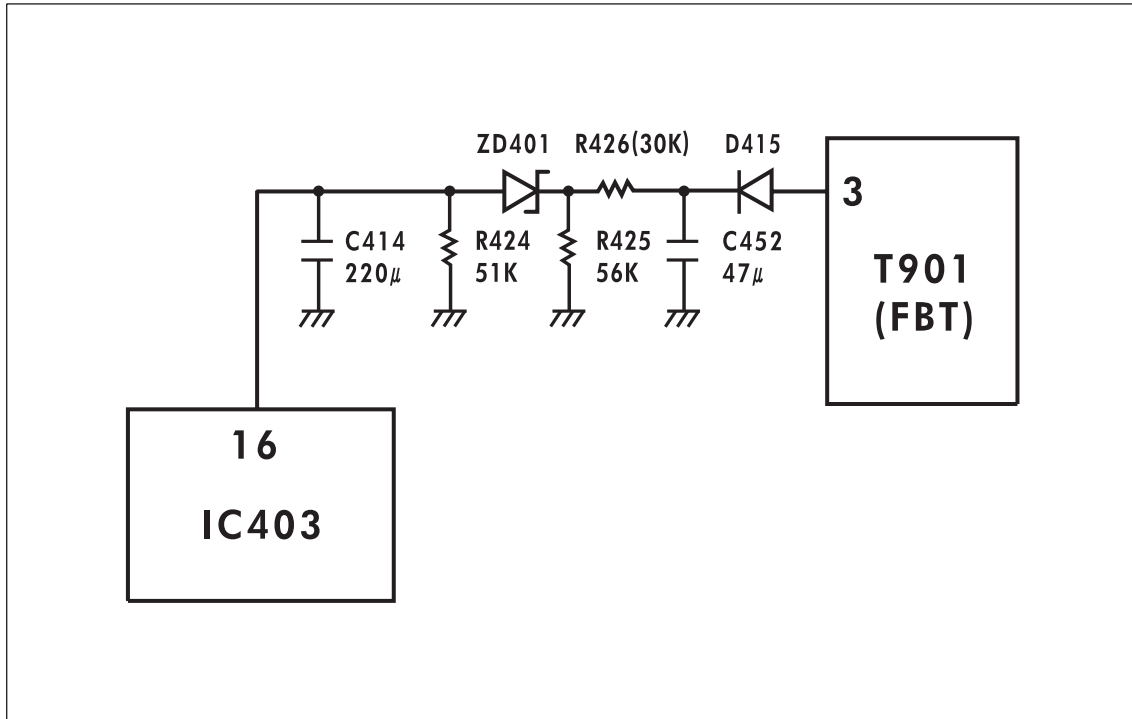
At first stage without any user's adjustment, the monitor is set-up by factory adjustment value.

HIGH VOLTAGE SHUT-DOWN CIRCUIT

Attachment I. Hold-down or Safety Circuit Information

The X-Ray Protection Circuit senses CRT's high voltage or beam current and stops the horizontal oscillator if excessive voltage or current exist.

The circuit operates if the high voltage exceeds about 10% specifications.



The pin 3 of the flyback transformer supplies feedback voltage to the X-ray protection circuit..

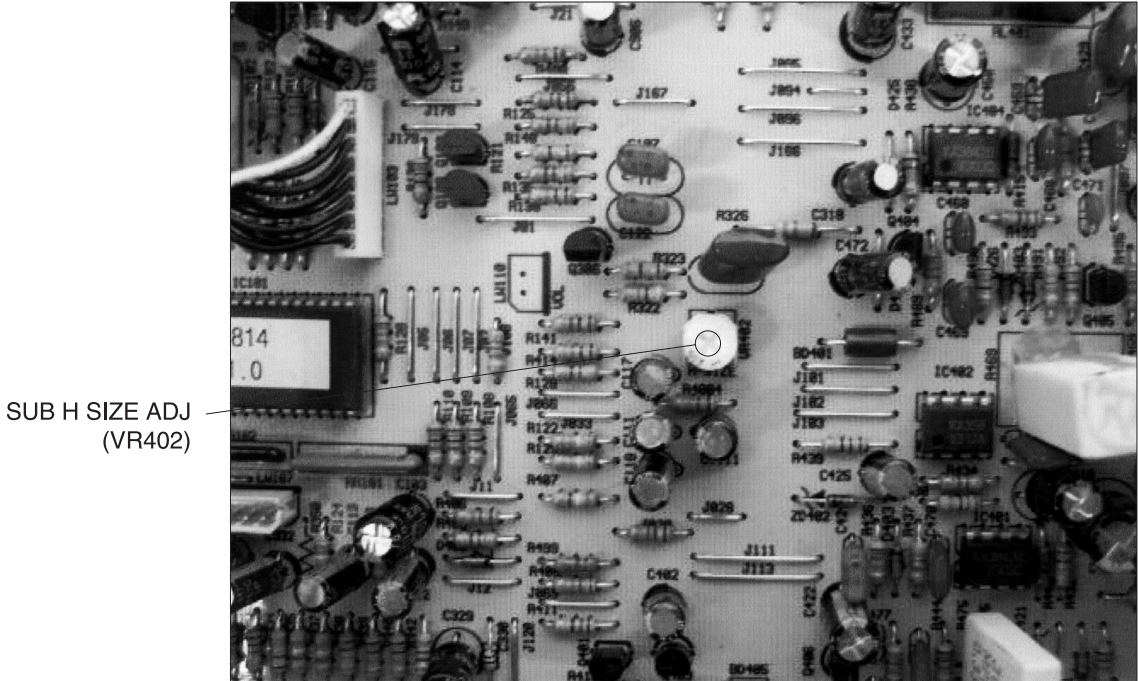
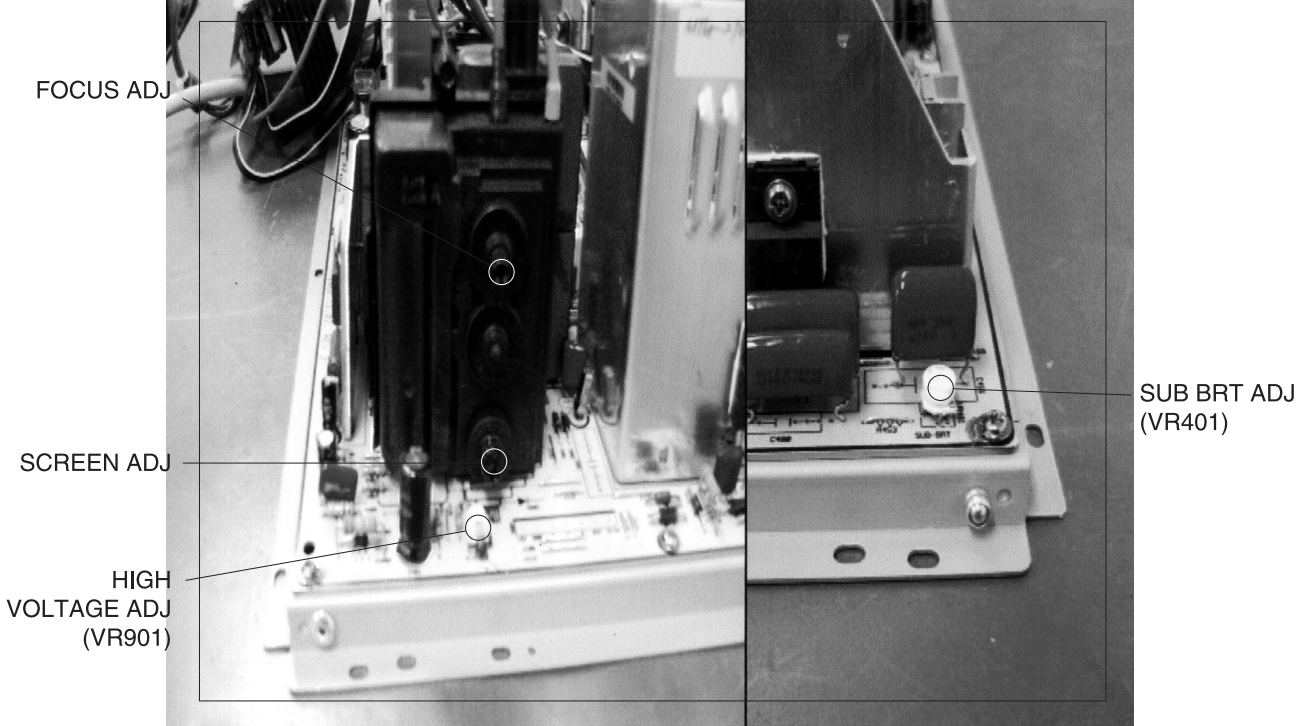
Flyback pulse(FBT #3) rectified by D415 and C452. The D.C. voltage divided by R426, R425(point A)

In case of normal operation, the voltage is lower than breakdown voltage.

When the voltage is higher than breakdown voltage, The X-ray protection circuit is operated immediately.

IC 403(pin 16) stops the operation of the monitor.

CONTROLS(VARIABLE RESISTORS)



PARTS LIST

LOC.	PARTS NAME	SPECIFICATIONS	LOC.	PARTS NAME	SPECIFICATIONS
CAPACITORS					
C470	C CERAMIC	B 50V 100pF K	C241	C CERAMIC AXIAL	F 50V 0.1uF Z
C420	C CERAMIC	B 50V 1000pF K	C243	C CERAMIC AXIAL	F 50V 0.1uF Z
C471	C CERAMIC	B 50V 330pF K	C255	C CERAMIC AXIAL	F 50V 0.1uF Z
C305	C CERAMIC	B 50V 470pF K	C803	C CERAMIC-AC	DA AC400V E 1000pF M
C465	C CERAMIC	B 50V 470pF K	C804	C CERAMIC-AC	DA AC400V E 1000pF M
C829	C CERAMIC	B 1KV 100pF K	C835	C CERAMIC-AC	DA AC400V E 2200pF M
C437	C CERAMIC	B 1KV 100pF K	C836	C CERAMIC-AC	DA AC400V E 2200pF M
C812	C CERAMIC	B 1KV 220pF K	C401	C ELECTRO	50V 10uF RND(8x11.5)
C448	C CERAMIC	B 1KV 330pF K	C834	C ELECTRO	16V 100uF RSS(6.3x11)
C439	C CERAMIC	B 2KV 100pF K	C101	C ELECTRO	16V 100uF RSS(6.3x11)
C225	C CERAMIC	B 50V 1000pF K	C102	C ELECTRO	16V 100uF RSS(6.3x11)
C242	C CERAMIC	B 50V 220pF K	C103	C ELECTRO	16V 100uF RSS(6.3x11)
C208	C CERAMIC	B 500V 220pF K	C114	C ELECTRO	16V 100uF RSS(6.3x11)
C212	C CERAMIC	B 500V 220pF K	C329	C ELECTRO	16V 100uF RSS(6.3x11)
C216	C CERAMIC	B 500V 220pF K	C407	C ELECTRO	16V 100uF RSS(6.3x11)
C219	C CERAMIC	B 500V 4700pF K	C433	C ELECTRO	16V 100uF RSS(6.3x11)
C220	C CERAMIC	B 2KV 1000pF K	C838	C ELECTRO	16V 220uF RSS(8x11.5)
C201	C CERAMIC	F 50V 0.1uF Z	C414	C ELECTRO	16V 220uF RSS(8x11.5)
C202	C CERAMIC	F 50V 0.1uF Z	C104	C ELECTRO	16V 47uF RSS(5x11)
C203	C CERAMIC	F 50V 0.1uF Z	C810	C ELECTRO	25V 100uF RSS(6.3x11)
C105	C CERAMIC AXIAL	F 50V 0.1uF Z	C907	C ELECTRO	25V 100uF RSS(6.3x11)
C322	C CERAMIC AXIAL	F 50V 0.1uF Z	C422	C ELECTRO	25V 100uF RSS(6.3x11)
C323	C CERAMIC AXIAL	F 50V 0.1uF Z	C425	C ELECTRO	25V 47uF RSS(5x11)
C325	C CERAMIC AXIAL	F 50V 0.1uF Z	C472	C ELECTRO	50V 10uF RSS(5x11)
C326	C CERAMIC AXIAL	F 50V 0.1uF Z	C813	C ELECTRO	50V 10uF RSS(5x11)
C327	C CERAMIC AXIAL	F 50V 0.1uF Z	C814	C ELECTRO	50V 10uF RSS(5x11)
C330	C CERAMIC AXIAL	F 50V 0.1uF Z	C820	C ELECTRO	50V 10uF RSS(5x11)
C404	C CERAMIC AXIAL	F 50V 0.1uF Z	C901	C ELECTRO	50V 10uF RSS(5x11)
C406	C CERAMIC AXIAL	F 50V 0.1uF Z	C905	C ELECTRO	50V 10uF RSS(5x11)
C413	C CERAMIC AXIAL	F 50V 0.1uF Z	C121	C ELECTRO	50V 10uF RSS(5x11)
C461	C CERAMIC AXIAL	F 50V 0.1uF Z	C806	C ELECTRO	50V 1uF RSS(5x11)
C462	C CERAMIC AXIAL	F 50V 0.1uF Z	C111	C ELECTRO	50V 1uF RSS(5x11)
C463	C CERAMIC AXIAL	F 50V 0.1uF Z	C1111	C ELECTRO	50V 1uF RSS(5x11)
C906	C CERAMIC AXIAL	F 50V 0.1uF Z	C112	C ELECTRO	50V 1uF RSS(5x11)
C205	C CERAMIC AXIAL	F 50V 0.1uF Z	C113	C ELECTRO	50V 1uF RSS(5x11)
C209	C CERAMIC AXIAL	F 50V 0.1uF Z	C115	C ELECTRO	50V 1uF RSS(5x11)
C213	C CERAMIC AXIAL	F 50V 0.1uF Z	C117	C ELECTRO	50V 1uF RSS(5x11)
C214	C CERAMIC AXIAL	F 50V 0.1uF Z	C118	C ELECTRO	50V 1uF RSS(5x11)
C226	C CERAMIC AXIAL	F 50V 0.1uF Z	C317	C ELECTRO	50V 1uF RSS(5x11)
C227	C CERAMIC AXIAL	F 50V 0.1uF Z	C324	C ELECTRO	50V 1uF RSS(5x11)
C228	C CERAMIC AXIAL	F 50V 0.1uF Z	C332	C ELECTRO	50V 1uF RSS(5x11)
C233	C CERAMIC AXIAL	F 50V 0.1uF Z	C409	C ELECTRO	50V 1uF RSS(5x11)
C236	C CERAMIC AXIAL	F 50V 0.1uF Z	C318	C ELECTRO	50V 2.2uF RSS(5x11)

PARTS LIST

LOC.	PARTS NAME	SPECIFICATIONS	LOC.	PARTS NAME	SPECIFICATIONS
C904	C ELECTRO	50V 47uF RSS(6.3x11)	C842	C LINE ACROSS(All Model)	AC 275V 0.68uF
C411	C ELECTRO	50V 47uF RSS(6.3x11)	C474	C MYLAR	MPE 63V 0.1uF J (P=5.0mm)(K)
C418	C ELECTRO	50V 47uF RSS(6.3x11)	C843	C MYLAR	MPE 63V 0.1uF J (P=5.0mm)(K)
C445	C ELECTRO	50V 47uF RSS(6.3x11)	C107	C MYLAR	MPE 63V 0.1uF J (P=5.0mm)(K)
C452	C ELECTRO	50V 47uF RSS(6.3x11)	C122	C MYLAR	MPE 63V 0.1uF J (P=5.0mm)(K)
C458	C ELECTRO	50V 47uF RSS(6.3x11)	C307	C MYLAR	MPE 63V 0.1uF J (P=5.0mm)(K)
C402	C ELECTRO	50V 4.7uF RSS(5x11)	C310	C MYLAR	MPE 63V 0.1uF J (P=5.0mm)(K)
C457	C ELECTRO	350V 1uF RSS(8x11.5)	C313	C MYLAR	MPE 63V 0.1uF J (P=5.0mm)(K)
C825	C ELECTRO	350V 220uF FHS(22x45)	C424	C MYLAR	MPE 63V 0.1uF J (P=5.0mm)(K)
C807	C ELECTRO	250V 470uF LHS	C819	C MYLAR	MPE 63V 0.22uF J (P=5.0mm)(K)
C808	C ELECTRO	250V 470uF LHS	C312	C MYLAR	MPE 63V 0.22uF J (P=5.0mm)(K)
C415	C ELECTRO	16V 1000uF RSS(10x20)	C331	C MYLAR	MPE 63V 0.22uF J (P=5.0mm)(K)
C828	C ELECTRO	16V 1000uF RSS(10x20)	C412	C MYLAR	MPE 63V 0.22uF J (P=5.0mm)(K)
C832	C ELECTRO	16V 1000uF RSS(10x20)	C328	C MYLAR	MPE 63V 0.33uF J (P=5.0mm)(K)
C301	C ELECTRO	25V 1000uF RSS(13x20)	C321	C MYLAR	100V 1000pF J (P=5.0mm)
C314	C ELECTRO	25V 2200uF RSS(16x25)	C443	C MYLAR	100V 1000pF J (P=5.0mm)
C466	C ELECTRO	25V 470uF RSS(10x16)	C444	C MYLAR	100V 1000pF J (P=5.0mm)
C847	C ELECTRO	25V 470uF RSS(10x16)	C460	C MYLAR	100V 1000pF J (P=5.0mm)
C308	C ELECTRO	50V 220uF RSS(10x16)	C469	C MYLAR	100V 0.01uF J (P=5.0mm)
C306	C ELECTRO	50V 470uF RSS(13x20)	C478	C MYLAR	100V 0.01uF J (P=5.0mm)
C827	C ELECTRO	50V 470uF RSS(13x20)	C817	C MYLAR	100V 0.01uF J (P=5.0mm)
C823	C ELECTRO	250V 10uF RSS(10x20)	C410	C MYLAR	100V 0.01uF J (P=5.0mm)
C839	C ELECTRO	250V 10uF RSS(10x20)	C426	C MYLAR	100V 0.01uF J (P=5.0mm)
C844	C ELECTRO	400V 4.7uF RSS(10x16)	C432	C MYLAR	100V 0.01uF J (P=5.0mm)
C451	C ELECTRO	350V 10uF RSS(10x20)	C435	C MYLAR	100V 0.01uF J (P=5.0mm)
C826	C ELECTRO	350V 100uF RSS(18x40)	C459	C MYLAR	100V 0.01uF J (P=5.0mm)
C417	C ELECTRO	350V 22uF RSS(13x25)	C120	C MYLAR	100V 0.1uF J (P=5.0mm)
C423	C ELECTRO	450V 10uF RSS(13x20)	C818	C MYLAR	100V 1500pF J (P=5.0mm)
C486	C ELECTRO	450V 10uF RSS(13x20)	C419	C MYLAR	100V 1500pF J (P=5.0mm)
C215	C ELECTRO	16V 100uF RSS(6.3x11)	C421	C MYLAR	100V 1500pF J (P=5.0mm)
C222	C ELECTRO	16V 100uF RSS(6.3x11)	C467	C MYLAR	100V 1500pF J (P=5.0mm)
C224	C ELECTRO	16V 100uF RSS(6.3x11)	C815	C MYLAR	100V 0.015uF J (P=5.0mm)
C229	C ELECTRO	16V 100uF RSS(6.3x11)	C801	C MYLAR	100V 0.15uF J (P=5.0mm)
C230	C ELECTRO	16V 100uF RSS(6.3x11)	C809	C MYLAR	100V 0.15uF J (P=5.0mm)
C235	C ELECTRO	16V 100uF RSS(6.3x11)	C902	C MYLAR	100V 0.15uF J (P=5.0mm)
C240	C ELECTRO	16V 100uF RSS(6.3x11)	C311	C MYLAR	100V 0.15uF J (P=5.0mm)
C250	C ELECTRO	50V 10uF RSS(5x11)	C316	C MYLAR	100V 0.15uF J (P=5.0mm)
C258	C ELECTRO	50V 1uF RSS(5x11)	C429	C MYLAR	100V 0.15uF J (P=5.0mm)
C223	C ELECTRO	50V 22uF RSS(5x11)	C434	C MYLAR	100V 0.15uF J (P=5.0mm)
C231	C ELECTRO	250V 10uF RSS(10x20)	C450	C MYLAR	100V 0.15uF J (P=5.0mm)
C246	C ELECTRO	250V 10uF RSS(10x20)	C468	C MYLAR	100V 2200pF J (P=5.0mm)
C232	C ELECTRO	250V 33uF RSS(13x25)	C816	C MYLAR	100V 2200pF J (P=5.0mm)
C802	C LINE ACROSS(1902,29")	AC 275V 0.22uF	C440	C MYLAR	100V 2200pF J (P=5.0mm)

PARTS LIST

LOC.	PARTS NAME	SPECIFICATIONS	LOC.	PARTS NAME	SPECIFICATIONS
C403	C MYLAR	100V 0.022uF J (P=5.0mm)	BD403	COIL-BEAD	BFS3565
C821	C MYLAR	100V 0.22uF J (P=5.0mm)	BD404	COIL-BEAD	BFS3565
C427	C MYLAR	100V 3300pF J (P=5.0mm)	BD405	COIL-BEAD	BFS3565
C436	C MYLAR	100V 3300pF J (P=5.0mm)	L801	COIL-BEAD	BFS3565
C482	C MYLAR	100V 4700pF J (P=5.0mm)	L802	COIL-BEAD	BFS3565
C805	C MYLAR	100V 0.047uF J (P=5.0mm)	L803	COIL-BEAD	BFS3565
C442	C MYLAR	100V 0.047uF J (P=5.0mm)	L805	COIL-BEAD	BFS3565
C903	C MYLAR	MPE 250V 0.1uF K(P=10mm)	BC201	COIL-BEAD	BFS3565
C846	C MYLAR	MPE 250V 0.047uF K (P=10mm)	L202	COIL-BEAD	BFS3565
C481	C MYLAR	NPPS 1.6KV 3300pF J(P=20mm)	L204	COIL-BEAD	BFS3565
C449	C MYLAR	NPPS 1.6KV 5300pF J(P=22mm)	L206	COIL-BEAD	BFS3565
C441	C MYLAR	NPPS 1.6KV 6800pF J (P=20mm)	L209	COIL-BEAD	BFS3565
C480	C MYLAR	NPPS 1.6KV 820pF J(P=20mm)	L210	COIL-BEAD	BFS3565
C428	C MYLAR	MPP 400V 0.1uF J (P=12.5mm)	L211	COIL-BEAD	BFS3565
C473	C MYLAR	MPP 400V 0.1uF J (P=12.5mm)	L403	COIL-CHOKE	C85R
C455	C MYLAR	MPP 400V 0.15uF J(P=15mm)	L201	COIL-INDUCTOR	4.7uH K
C430	C MYLAR	MPP 400V 0.047uF J(P=10mm)	L203	COIL-INDUCTOR	4.7uH K
C453	C MYLAR	MPP 400V 0.47uF J(P=22mm)	L402	COIL-LINEARITY	MS-3709D
C476	C MYLAR	MPP 400V 0.068uF J(P=10mm)	T901	FBT	6174Z-6035U
C464	C MYLAR	MPP 400V 0.082uF J(P=10mm)	LF801	FILTER-LINE	MS-3711
C811	C MYLAR	NPP 630V 4700pF J (P=10mm)	LF802	FILTER-LINE	MS-3711
C438	C MYLAR	PFU 400V 0.2uF J(P=20mm)	T401	TRANS-BUFFER	MS-3705
C456	C MYLAR	PFU 400V 0.2uF J(P=20mm)	T404	TRANS-DRIVE	MS-3701A
C221	C MYLAR	100V 0.1uF J (P=5.0mm)	T405	TRANS-DRIVE	MS-3702A
C234	C MYLAR	100V 0.1uF J (P=5.0mm)	T402	TRANS-FEED BACK	MS-3706a
C237	C MYLAR	100V 0.1uF J (P=5.0mm)	T406	TRANS-REG	MS-3704
C238	C MYLAR	100V 0.1uF J (P=5.0mm)	T403	TRANS-SMPS	TM-2903F
C239	C MYLAR	100V 0.1uF J (P=5.0mm)	T801	TRANS-SMPS	TM-2900M
C207	C MYLAR	200V 0.1uF K	T802	TRANS-SYNC	MS-3713
C211	C MYLAR	200V 0.1uF K			
C218	C MYLAR	200V 0.1uF K			
C206	C MYLAR	MPE 250V 0.22uF K (P=12.5mm)			
C210	C MYLAR	MPE 250V 0.22uF K (P=10mm)			
C217	C MYLAR	MPE 250V 0.22uF K (P=10mm)			
C408	C STYROL	100V 680pF(COG) G			
TRANSFORMERS, COIL					
L207	COIL-AXIAL	56uH (AL02)			
L208	COIL-AXIAL	56uH (AL02)			
L212	COIL-AXIAL	22uH (AL03)			
L205	COIL-AXIAL	4.7uH (AL03)			
L213	COIL-AXIAL	100uH (AL04)			
BD401	COIL-BEAD	BFS3565			
SEMICONDUCTORS					
BD801	DIODE BRIDGE	D3SBA60-4100			
D301	DIODE RECT	1N4002			
D901	DIODE RECT	1N4002			
D902	DIODE RECT	1N4002			
D404	DIODE RECT	1N4004			
D433	DIODE RECT	1N4004			
D801	DIODE RECT	1N4007			
D416	DIODE RECT	GUF10A			
D418	DIODE RECT	GUF10J			
D806	DIODE RECT	GUF10J			
D809	DIODE RECT	GUF10M			
D412	DIODE RECT	FMP-G2FS			

PARTS LIST

LOC.	PARTS NAME	SPECIFICATIONS	LOC.	PARTS NAME	SPECIFICATIONS
D435	DIODE RECT-FAST	FMP-G2FS	D440	DIODE SW	1N4148
D417	DIODE RECT-FAST	FMQ-G5FS	D441	DIODE SW	1N4148
D408	DIODE RECT-FAST	11DQ04-TA2B2	D206	DIODE SW	1N4148
D422	DIODE RECT-FAST	11DQ04-TA2B2	D208	DIODE SW	1N4148
D423	DIODE RECT-FAST	11DQ04-TA2B2	D205	DIODE SW	1SS244
D414	DIODE RECT-FAST	1N4936	D207	DIODE SW	1SS244
D415	DIODE RECT-FAST	1N4936	D209	DIODE SW	1SS244
D807	DIODE RECT-FAST	1N4936	D211	DIODE SW	1SS244
D424	DIODE RECT-FAST	1N4937	D212	DIODE SW	1SS244
D432	DIODE RECT-FAST	D1NL20U-4060	D213	DIODE SW	1SS244
D810	DIODE RECT-FAST	D2L20U-4000	D436	DIODE TVS	P6KE440A
D410	DIODE RECT-FAST	RGP02-16E	D437	DIODE TVS	P6KE440A
D409	DIODE RECT-FAST	D5L60-4000	D438	DIODE TVS	P6KE440A
D411	DIODE RECT-FAST	D5L60-4000	D439	DIODE TVS	P6KE440A
D431	DIODE RECT-FAST	RU4AM	ZD401	DIODE ZENER	UZ-12B
D405	DIODE RECT-FAST	S2L60-4000	ZD425	DIODE ZENER	UZ-22BM
D811	DIODE RECT-FAST	S3L20U-4000	ZD404	DIODE ZENER	UZ-30BSB
D812	DIODE RECT-FAST	S3L20U-4000	ZD101	DIODE ZENER	UZ-5.1B
D813	DIODE RECT-FAST	S3L60-4000	ZD102	DIODE ZENER	UZ-5.1B
D814	DIODE RECT-FAST	S3L60-4000	ZD901	DIODE ZENER	UZ-6.2B
D210	DIODE RECT-FAST	1N4936	ZD402	DIODE ZENER	UZ-9.1B
D302	DIODE SW	1N4148	ZD403	DIODE ZENER	UZ-9.1B
D401	DIODE SW	1N4148	ZD201	DIODE ZENER	UZ-9.1BH
D402	DIODE SW	1N4148	Q414	FET	2N7000
D403	DIODE SW	1N4148	Q431	FET	2SK2198
D406	DIODE SW	1N4148	Q802	FET	2SK2676-4100
D407	DIODE SW	1N4148	Q426	FET	IRF630A(B)
D421	DIODE SW	1N4148	Q427	FET	IRF630A(B)
D425	DIODE SW	1N4148	Q416	FET	IRF644A
D426	DIODE SW	1N4148	Q441	FET	IRF644A
D427	DIODE SW	1N4148	Q407	FET	IRF740A
D428	DIODE SW	1N4148	Q413	FET	IRF740A
D429	DIODE SW	1N4148	IC301	IC	STV9379A
D430	DIODE SW	1N4148	IC403	IC DEFLECTION	KB2147(S1D2147A01-A0B0)
D802	DIODE SW	1N4148	IC103	IC EEPROM	KS24C040
D803	DIODE SW	1N4148	IC402	IC OP-AMP	KA358
D804	DIODE SW	1N4148	IC202	IC OSD	KS2501F(S5D2501F01-D0B0)
D805	DIODE SW	1N4148	IC805	IC PHOTO	CNY17-3
D816	DIODE SW	1N4148	IC401	IC POWER	KA3842B
D201	DIODE SW	1N4148	IC404	IC POWER	KA3842B
D202	DIODE SW	1N4148	IC802	IC POWER	KA3842B
D203	DIODE SW	1N4148	IC801	IC POWER	STR83145
D204	DIODE SW	1N4148	IC806	C REGULATOR	KA431AZ

PARTS LIST

LOC.	PARTS NAME	SPECIFICATIONS	LOC.	PARTS NAME	SPECIFICATIONS
R821	R CARBON FILM	1/4W 1K J	R110	R CARBON FILM	1/4W 2K J
R130	R CARBON FILM	1/4W 10K J	R141	R CARBON FILM	1/4W 2K J
R332	R CARBON FILM	1/4W 10K J	R414	R CARBON FILM	1/4W 20K J
R339	R CARBON FILM	1/4W 10K J	R830	R CARBON FILM	1/4W 220 J
R340	R CARBON FILM	1/4W 10K J	R836	R CARBON FILM	1/4W 220 J
R4004	R CARBON FILM	1/4W 10K J	R464	R CARBON FILM	1/4W 2.2K J
R405	R CARBON FILM	1/4W 10K J	R492	R CARBON FILM	1/4W 2.2K J
R465	R CARBON FILM	1/4W 10K J	R493	R CARBON FILM	1/4W 2.2K J
R494	R CARBON FILM	1/4W 10K J	R406	R CARBON FILM	1/4W 22K J
R802	R CARBON FILM	1/4W 10K J	R408	R CARBON FILM	1/4W 22K J
R835	R CARBON FILM	1/4W 10K J	R488	R CARBON FILM	1/4W 22K J
R331	R CARBON FILM	1/4W 100K J	R121	R CARBON FILM	1/4W 2.4K J
R349	R CARBON FILM	1/4W 100K J	R323	R CARBON FILM	1/4W 2.4K J
R419	R CARBON FILM	1/4W 100K J	R326	R CARBON FILM	1/4W 24K J
R461	R CARBON FILM	1/4W 100K J	R123	R CARBON FILM	1/4W 27K J
R817	R CARBON FILM	1/4W 100K J	R418	R CARBON FILM	1/4W 27K J
R822	R CARBON FILM	1/4W 100K J	R837	R CARBON FILM	1/4W 27K J
R467	R CARBON FILM	1/4W 10 J	R850	R CARBON FILM	1/4W 27K J
R484	R CARBON FILM	1/4W 10 J	R477	R CARBON FILM	1/4W 2.2 J
R496	R CARBON FILM	1/4W 10 J	R903	R CARBON FILM	1/4W 3K J
R819	R CARBON FILM	1/4W 10 J	R106	R CARBON FILM	1/4W 30K J
R826	R CARBON FILM	1/4W 10 J	R325	R CARBON FILM	1/4W 30K J
R101	R CARBON FILM	1/4W 1.2K J	R426	R CARBON FILM	1/4W 30K J
R102	R CARBON FILM	1/4W 1.2K J	R1112	R CARBON FILM	1/4W 330 J
R137	R CARBON FILM	1/4W 12K J	R864	R CARBON FILM	1/4W 330 J
R315	R CARBON FILM	1/4W 12K J	R447	R CARBON FILM	1/4W 3.3K J
R336	R CARBON FILM	1/4W 12K J	R468	R CARBON FILM	1/4W 3.3K J
R341	R CARBON FILM	1/4W 12K J	R473	R CARBON FILM	1/4W 3.3K J
R411	R CARBON FILM	1/4W 150 J	R413	R CARBON FILM	1/4W 33K J
R417	R CARBON FILM	1/4W 15K J	R335	R CARBON FILM	1/4W 3.9K J
R454	R CARBON FILM	1/4W 15K J	R337	R CARBON FILM	1/4W 3.9K J
R334	R CARBON FILM	1/4W 150K J	R407	R CARBON FILM	1/4W 3.9K J
R438	R CARBON FILM	1/4W 150K J	R450	R CARBON FILM	1/4W 3.9K J
R455	R CARBON FILM	1/4W 150K J	R451	R CARBON FILM	1/4W 3.9K J
R485	R CARBON FILM	1/4W 150K J	R499	R CARBON FILM	1/4W 3.9K J
R486	R CARBON FILM	1/4W 150K J	R902	R CARBON FILM	1/4W 3.9K J
R457	R CARBON FILM	1/4W 18K J	R122	R CARBON FILM	1/4W 39K J
R445	R CARBON FILM	1/4W 180K J	R124	R CARBON FILM	1/4W 39K J
R318	R CARBON FILM	1/4W 1.5 J	R129	R CARBON FILM	1/4W 39K J
R439	R CARBON FILM	1/4W 200 J	R403	R CARBON FILM	1/4W 39K J
R472	R CARBON FILM	1/4W 200 J	R404	R CARBON FILM	1/4W 39K J
R108	R CARBON FILM	1/4W 2K J	R412	R CARBON FILM	1/4W 39K J
R109	R CARBON FILM	1/4W 2K J	R421	R CARBON FILM	1/4W 39K J

PARTS LIST

LOC.	PARTS NAME	SPECIFICATIONS	LOC.	PARTS NAME	SPECIFICATIONS
R449	R CARBON FILM	1/4W 39K J	R400	R CARBON FILM	1/4W 68K J
R429	R CARBON FILM	1/4W 470 J	R448	R CARBON FILM	1/4W 68K J
R128	R CARBON FILM	1/4W 4.7K J	R342	R CARBON FILM	1/4W 7.5K J
R144	R CARBON FILM	1/4W 4.7K J	R8000	R CARBON FILM	1/4W 7.5K J
R145	R CARBON FILM	1/4W 4.7K J	R135	R CARBON FILM	1/4W 8.2K J
R146	R CARBON FILM	1/4W 4.7K J	R140	R CARBON FILM	1/4W 8.2K J
R147	R CARBON FILM	1/4W 4.7K J	R489	R CARBON FILM	1/4W 8.2K J
R333	R CARBON FILM	1/4W 4.7K J	R495	R CARBON FILM	1/4W 8.2K J
R347	R CARBON FILM	1/4W 4.7K J	R906	R CARBON FILM	1/4W 8.2K J
R348	R CARBON FILM	1/4W 4.7K J	R433	R CARBON FILM	1/4W 82K J
R409	R CARBON FILM	1/4W 4.7K J	R818	R CARBON FILM	1/4W 82K J
R434	R CARBON FILM	1/4W 4.7K J	R322	R CARBON FILM	1/4W 91K J
R437	R CARBON FILM	1/4W 4.7K J	R483	R CARBON FILM	1/6W 10K J
R452	R CARBON FILM	1/4W 4.7K J	R497	R CARBON FILM	1/6W 10K J
R823	R CARBON FILM	1/4W 4.7K J	R487	R CARBON FILM	1/6W 2K J
R825	R CARBON FILM	1/4W 4.7K J	R498	R CARBON FILM	1/6W 2K J
J188	R CARBON FILM	1/4W 47K J	R4003	R CARBON FILM	1/6W 200K J
R441	R CARBON FILM	1/4W 47K J	R481	R CARBON FILM	1/6W 200K J
R491	R CARBON FILM	1/4W 47K J	R250	R CARBON FILM	1/2W 1K J
R816	R CARBON FILM	1/4W 47K J	R251	R CARBON FILM	1/2W 100K J
R833	R CARBON FILM	1/4W 47K J	R231	R CARBON FILM	1/2W 56 J
R901	R CARBON FILM	1/4W 47K J	R239	R CARBON FILM	1/2W 56 J
R446	R CARBON FILM	1/4W 470K J	R258	R CARBON FILM	1/2W 56 J
R459	R CARBON FILM	1/4W 47 J	R207	R CARBON FILM	1/4W 100 J
R460	R CARBON FILM	1/4W 47 J	R208	R CARBON FILM	1/4W 100 J
R813	R CARBON FILM	1/4W 47 J	R209	R CARBON FILM	1/4W 100 J
R820	R CARBON FILM	1/4W 4.7 J	R214	R CARBON FILM	1/4W 100 J
R338	R CARBON FILM	1/4W 51K J	R216	R CARBON FILM	1/4W 100 J
R458	R CARBON FILM	1/4W 51K J	R247	R CARBON FILM	1/4W 100 J
R136	R CARBON FILM	1/4W 560 J	R252	R CARBON FILM	1/4W 100 J
R410	R CARBON FILM	1/4W 560 J	R261	R CARBON FILM	1/4W 100 J
R442	R CARBON FILM	1/4W 560 J	R263	R CARBON FILM	1/4W 100 J
R311	R CARBON FILM	1/4W 5.6K J	R265	R CARBON FILM	1/4W 100 J
R316	R CARBON FILM	1/4W 5.6K J	R211	R CARBON FILM	1/4W 10 J
R425	R CARBON FILM	1/4W 56K J	R213	R CARBON FILM	1/4W 10 J
R432	R CARBON FILM	1/4W 56K J	R256	R CARBON FILM	1/4W 10 J
R436	R CARBON FILM	1/4W 62K J	R212	R CARBON FILM	1/4W 1.8K J
R466	R CARBON FILM	1/4W 680 J	R271	R CARBON FILM	1/4W 220K J
R471	R CARBON FILM	1/4W 680 J	R232	R CARBON FILM	1/4W 3.3K J
R490	R CARBON FILM	1/4W 680 J	R240	R CARBON FILM	1/4W 3.3K J
R863	R CARBON FILM	1/4W 680 J	R248	R CARBON FILM	1/4W 3.3K J
R126	R CARBON FILM	1/4W 68K J	R217	R CARBON FILM	1/4W 33 J
R328	R CARBON FILM	1/4W 68K J	R218	R CARBON FILM	1/4W 33 J

PARTS LIST

LOC.	PARTS NAME	SPECIFICATIONS	LOC.	PARTS NAME	SPECIFICATIONS
R219	R CARBON FILM	1/4W 33 J	R476	R CEMENT	5W 2.2 J (R TYPE)
R253	R CARBON FILM	1/4W 390 J	R474	R CEMENT	5W 3 J (R TYPE)
R254	R CARBON FILM	1/4W 390 J	R469	R CEMENT	5W 56 J (R TYPE)
R255	R CARBON FILM	1/4W 390 J	R811	R CEMENT	5W 68K J (R TYPE)
R210	R CARBON FILM	1/4W 39K J	R215	R CEMENT	5W 5.2 J (R TYPE)
R262	R CARBON FILM	1/4W 47K J	R226	R CEMENT	10W 750 J (R TYPE)
R264	R CARBON FILM	1/4W 47K J	R260	R CEMENT	10W 750 J (R TYPE)
R266	R CARBON FILM	1/4W 47K J	R272	R CEMENT	10W 750 J (R TYPE)
R230	R CARBON FILM	1/4W 68K J	R273	R CEMENT	10W 750 J (R TYPE)
R238	R CARBON FILM	1/4W 68K J	R274	R CEMENT	10W 750 J (R TYPE)
R246	R CARBON FILM	1/4W 68K J	R275	R CEMENT	10W 750 J (R TYPE)
R229	R CARBON FILM	1/4W 820K J	R415	R Fusible	1/4W 22 J
R237	R CARBON FILM	1/4W 820K J	R443	R Fusible	1/4W 22 J
R245	R CARBON FILM	1/4W 820K J	R430	R Fusible	1/4W 27 J
R276	R CARBON FILM	1/6W 2K J	R857	R Fusible	2W 0.1 J(SMALL)
R204	R CARBON FILM	1/6W 33 J	R858	R Fusible	2W 0.1 J(SMALL)
R205	R CARBON FILM	1/6W 33 J	R859	R Fusible	2W 0.1 J(SMALL)
R206	R CARBON FILM	1/6W 33 J	R854	R Fusible	3W 0.22 J(SMALL)
R227	R CARBON FILM	1/6W 33 J	R228	R Fusible	1W 100 J
R235	R CARBON FILM	1/6W 33 J	R236	R Fusible	1W 100 J
R243	R CARBON FILM	1/6W 33 J	R244	R Fusible	1W 100 J
R257	R CARBON FILM	1/6W 33 J	R828	R METAL FILM	1/4W 1.12K F
R277	R CARBON FILM	1/6W 39K J	R424	R METAL FILM	1/4W 51K F
R220	R CARBON FILM	1/6W 68 J	R422	R METAL FILM	1/4W 7.5K F
R221	R CARBON FILM	1/6W 68 J	R463	R METAL FILM	1/4W 75 F
R222	R CARBON FILM	1/6W 68 J	R831	R METAL FILM	1/4W 910K F
R223	R CARBON FILM	1/6W 68 J	R812	R METAL OXIDE	1W 100K J
R224	R CARBON FILM	1/6W 68 J	R810	R METAL OXIDE	1W 150K J
R225	R CARBON FILM	1/6W 68 J	R804	R METAL OXIDE	1W 15 J
R501	R CARBON FILM	1/6W 100 J	R480	R METAL OXIDE	1W 1 J
R502	R CARBON FILM	1/6W 100 J	R478	R METAL OXIDE	1W 1.5 J
R503	R CARBON FILM	1/6W 1 J	R479	R METAL OXIDE	1W 1.5 J
R504	R CARBON FILM	1/6W 1 J	R829	R METAL OXIDE	1W 58.4K F (R TYPE)
R505	R CARBON FILM	1/6W 1 J	R845	R METAL OXIDE	1W 58.4K F (R TYPE)
R509	R CARBON FILM	1/6W 75 J	R4001	R METAL OXIDE	1W 0.22 J
R510	R CARBON FILM	1/6W 75 J	R4002	R METAL OXIDE	1W 0.22 J
R511	R CARBON FILM	1/6W 75 J	R855	R METAL OXIDE	1W 0.22 J
R846	R CEMENT	10W 0.22 J(TRIPOPE TYPE)	R314	R METAL OXIDE	1W 1.2 J
R824	R CEMENT	2W 0.22 J (MPR TYPE)	R312	R METAL OXIDE	2W 270 J
R475	R CEMENT	2W 0.33 J (MPR TYPE)	R196	R METAL OXIDE	2W 2.7K J
R470	R CEMENT	3W 100 J (R TYPE)	R324	R METAL OXIDE	2W 4.7K J
R482	R CEMENT	3W 100K J(R TYPE)	R849	R METAL OXIDE	2W 47 J(SMALL)
R805	R CEMENT	3W 4.7 J (R TYPE)	R456	R METAL OXIDE	2W 750 J

PARTS LIST

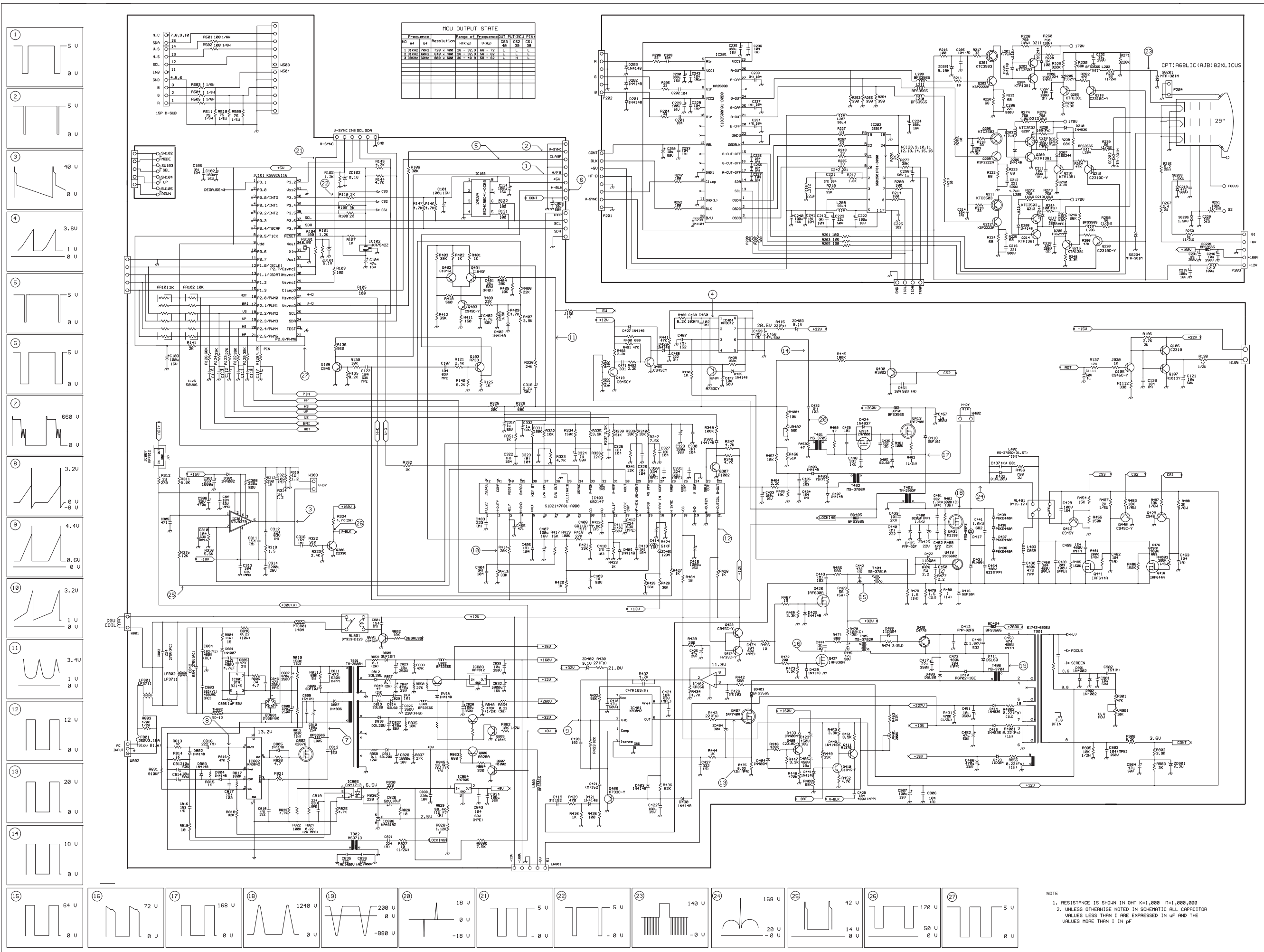
LOC.	PARTS NAME	SPECIFICATIONS	LOC.	PARTS NAME	SPECIFICATIONS
R267	R METAL OXIDE	3W 2.4 J(SMALL)	AR101	R NETWORK	1/8W 2Kx6F
R313	R METAL OXIDE	1W 390 J	VR901	VR-SEMI	NVZ 6TLT 10K
R319	R METAL OXIDE	1W 1.2 J	VR401	VR-SEMI	NVZ 6TLT 200K
AR102	R NETWORK	1/8W 10Kx6F	VR402	VR-SEMI	NVZ 6TLT 50K

MISCELLANEOUS

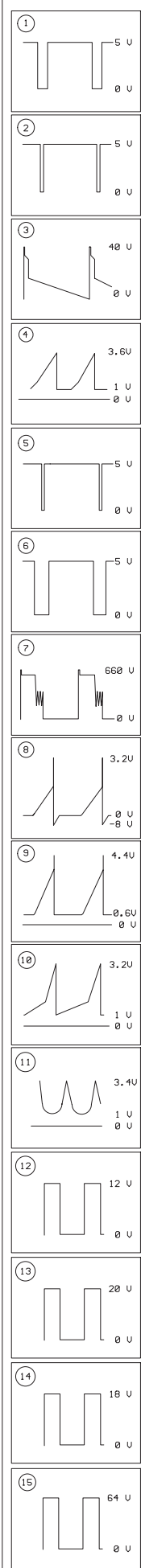
W801	WAFER	YFW800-02	P202	WAFER	YMW250-06
W402	WAFER	YFW800-04	P201	WAFER	YMW250-12
W105	WAFER	YMW250-02	P205	WAFER	YMAW250-05
LW107	WAFER	YMW250-05	W503	WAFER	YMAW250-06
LW109	WAFER	YMW250-06	W504	WAFER	YMAW250-06
W802	WAFER	LW1143-05	W502	WAFER	YMW250-02
G2	WAFER	YFW800-01	M002	COIL-DEGAUSSING	CD-2904A
P204	WAFER	YFW800-02	M004	COIL-ROTATION	CD-0380R
P203	WAFER	YMW250-05	DSP501	CONNECTOR	15P D-SUB
CONTROL PCB WIRE	CONNECTOR ASSY(29)	5P 1600 5264-05/5264-05			
W503↔LW109	CONNECTOR ASSY(29)	6P 500 5264-06/5264-06			
W504↔P202	CONNECTOR ASSY(33)	RGB 6P 350 5264-06/OP 14C CORE			
LW801	CONNECTOR ASSY(38)	5P 450 YMH251-05/250-05			
LW103+LW106	CONNECTOR ASSY(38)	12P 450 YMH251-12/SHIELD			
W802	CORD-POWER	KJP-120/CH1143-05			
M001	CPT(LICUS)	A68LIC82X			
M001	CPT(PHILIPS)	A68AJB82X			
M003	CRT GROUND ASSY	0.16/4/16-1200(H)			
F801(Slow Blue Type)	FUSE	53S 250V 3.15A UL/CSA/TUV			
F801A	FUSE CLIP	FC-21D			
A001	PCB MAIN	330x247x1.6T(MTG-2902)			
A002	PCB UNION	265x147.5x1.6T(MTG-2902)			
PTC801	POSISTOR	ECPAC140M290			
RL401	RELAY	DY1S-12H			
RL801	RELAY	DY313-D12S			
RS101	RESONATOR-CERA	CST8.00M			
PACKING	SIGNAL CABLE ASSY	SM-027			
SK401	SOCKET CRT	ISH-02S			
SG203	SPARK GAP	1.5KV+-500V			
SG205	SPARK GAP	1.5KV+-500V			
SG201	SPARK GAP	MTA-301M			
SG202	SPARK GAP	MTA-301M			
SG204	SPARK GAP	MTA-301M			
SW102	SW-TACT	IT-1102AH-T			
SW103	SW-TACT	IT-1102AH-T			
SW104	SW-TACT	IT-1102AH-T			
SW105	SW-TACT	IT-1102AH-T			
TH802	THERMISTOR	5D-13			

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MCU OUTPUT STATE									
MCU Pin	Frequency	Resolution	Range of Presence	OUT	MCU	Pin	Frequency	Resolution	Range of Presence
1	310KHz	720	28 - 53.9	68 - 72	L	1	310KHz	720	28 - 53.9
2	310KHz	640	28 - 53.9	68 - 72	L	2	310KHz	640	28 - 53.9
3	310KHz	480	28 - 53.9	68 - 72	L	3	310KHz	480	28 - 53.9
4	310KHz	320	28 - 53.9	68 - 72	L	4	310KHz	320	28 - 53.9



NOTE
 1. RESISTANCE IS SHOWN IN OHM K=1,000 M=1,000,000
 2. UNLESS OTHERWISE NOTED IN SCHEMATIC ALL CAPACITOR VALUES LESS THAN 1 ARE EXPRESSED IN uF AND THE VALUES MORE THAN 1 IN pF