

AL-5064 PD

ML1564PD

Service Manual

SERVICEMAN WARNING X-RAY PRECAUTION

This product includes critical mechanical and electrical parts which are essential for X-radiation safety. For continued safety replace critical components indicated in the service manual only with the exact replacement parts given in the parts list. High operating voltage for this product is 26KV at minimum brightness. Refer to the service manual for measurement procedures and proper service adjustments.

Use high impedance meter to measure 2ND anode voltage. Connect HV probe (lead) to 2ND anode: connect (-) to picture tube dag grounding device. Arcing 2ND lead anode to chassis or tuner may damage transistors. When discharging picture tube or 2ND lead anode, arc to picture tube mounting wire or picture tube dag only. HV supply failures can increase X-radiation. Service HV supply with set inoperative or limit operating time to minimum.

WARNING

Picture tube in this receiver employs integral implosion protection. Replace with tube of the same type number for continued safety. High-vacuum picture tube is dangerous to handle. Only qualified personnel should service.

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1. INTRODUCTION

This monitor has been manufactured only with the highest quality components and under the highest standards of quality control.

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2. FEATURES

This monitor specifically provides the following features:

- Microprocessor-based design with digital control
- Non-volatile memory for 10 factory preset and 10 user-defined timing modes
- Built-in switching regulator power circuit, can be used with 100-260V AC, 50/60Hz universal power supply
- Full screen
- Low electro-magnetic radiation emission (for L/AL model)
- OSD (on-screen display) control function
- Green machine (power saving)

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3. SPECIFICATIONS

PICTURE TUBE	Non-glare, flat-square, anti-static (for L/AL model) Phosphor P22, 0.28mm dot pitch
DISPLAY AREA	260mm (H) x 195mm (V) recommended
COMPATIBILITY	VGA, SVGA, 8514/A, XGA, VESA
RESOLUTION	VGA: 640 x 480 / 640 x 400 / 640 x 350 SVGA: 800 x 600 8514/A: 1024 x 768 (interlaced) XGA: 1024 x 768 (non-interlaced) VESA: 1024 x 768 at 72Hz (V) 1280 x 1024 (non-interlaced)
POWER MANAGEMENT	ON mode: 85W Standby mode: <30W Suspend mode: <5W
SYNCHRONIZATION (SCAN FREQUENCY)	Horizontal: 30KHz~64KHz Vertical: 50~90Hz
VIDEO-BANDWIDTH	100MHz
INPUT SIGNAL	Video: RGB analog, positive 0.7Vp-p/75Ω Sync: TTL separate, positive/negative
INPUT CONNECTOR	15-pin D-type connector
POWER REQUIREMENTS	Universal power supply: 100~260V AC, 50/60Hz, 85 Watts maximum consumption
GROSS WEIGHT	16kg

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4. ENVIRONMENTAL REQUIREMENTS

Temperature

- **ENCLOSED CABINET:** 0°C ~ 40°C (operating)
-20°C ~ 60°C (storage)

Humidity

- **OPERATING:** 10 ~ 80%, non-condensing
- **STORAGE:** 10 ~ 90%, non-condensing

Altitude

- **OPERATING:** up to 10,000 ft.
- **STORAGE:** up to 30,000 ft.

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5. SAFETY PRECAUTIONS

- **Power**

- Use the type of power indicated on the marking label.

- **Plugs**

- Do not remove any of the prongs of the monitor's three-pronged power plug.
- Disconnect the power plug from the AC outlet if you will not use it for an indefinite period of time.

- **Power and extension cords**

- Use the proper power cord with correct attachment plug type. If the power source is 120 V AC, use a power cord that has UL and CSA approvals. If the power source is a 240 V AC supply, use the tandem (T blade) type attachment plug with ground conductor power cord that meets the respective European country's safety regulations, such as VDE for Germany.
- Do not overload wall outlets or power cords. Ensure that the total of all units plugged into the wall outlet does not exceed 15 amperes.
- Ensure that the total ampere ratings on all units plugged into the extension cord is not above the cord's rating.

- **Environment**

- Place the monitor on a flat and leveled surface.
- Place the monitor in a well-ventilated place.
- Keep the monitor away from:
 - overly hot, cold or humid places
 - places directly under sunlight
 - dusty surroundings
 - equipments that generate strong magnetic fields

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6. INPUT SIGNAL TIMING

This monitor has been manufactured with 10 timing modes for different video resolutions. You can hold down STATUS and press SELECT ► to use the preset mode.

	mode 1	mode 2	mode 3	mode 4	mode 5
H FREQUENCY (KHz)	31.5	31.5	31.5	35.2	37.8
V FREQUENCY (Hz)	70	70	60	56	60
H FRAME BORDER (μs)	0.32	0.32	0.32	0	0
H TOTAL SIZE (μs)	31.776	31.776	31.776	28.410	26.4
H DISPLAY SIZE (μs)	25.42	25.42	25.42	22.195	20.0
H REAR PORCH (μs)	1.59	1.59	1.59	3.551	2.2
H SYNC WIDTH (μs)	3.81	3.81	3.81	1.998	3.2
H SYNC POLARITY	+	-	-	-	+
V FRAME BORDER (ms)	0.191	0.222	0.254	0	0
V TOTAL SIZE (ms)	14.269	14.269	16.680	17.785	16.579
V DISPLAY SIZE (ms)	11.118	12.716	15.252	17.046	15.84
V REAR PORCH (ms)	1.716	0.89	0.794	0.625	0.607
V SYNC WIDTH (ms)	0.064	0.064	0.064	0.057	0.106
V SYNC POLARITY	-	+	-	-	+
VIDEO DOT CLOCK (MHz)	25.172	25.172	25.172	36.044	40
RESOLUTION	640x350	640x400	640x480	800x600	800x600

*H: horizontal

*V: vertical

(to be continued)

	mode 6	mode 7	mode 8	mode 9	mode 10
H FREQUENCY (KHz)	48.0	35.5	48.363	56	63.75
V FREQUENCY (Hz)	72	87	60	70	59.747
H FRAME BORDER (μ s)	0	0	0	0	0
H TOTAL SIZE (μ s)	20.8	28.146	20.677	17.907	15.686
H DISPLAY SIZE (μ s)	16.0	22.802	15.754	13.808	11.626
H REAR PORCH (μ s)	1.28	1.158	2.462	1.294	1.997
H SYNC WIDTH (μ s)	2.4	3.919	2.092	2.373	1.489
H SYNC POLARITY	+	+	-	-	+
V FRAME BORDER (ms)	0	0	0	0	0
V TOTAL SIZE (ms)	13.853	11.498	16.667	14.290	16.737
V DISPLAY SIZE (ms)	12.48	10.808	15.880	13.663	16.062
V REAR PORCH (ms)	0.478	0.563	0.6	0.537	0
V SYNC WIDTH (ms)	0.125	0.113	0.124	0.072	0.047
V SYNC POLARITY	+	+	-	-	+
VIDEO DOT CLOCK (MHz)	50	44.908	65.0	74.16	110.16
RESOLUTION	800x600	1024x768 (interlaced)	1024x768	1024x768	1280x1024

*H: horizontal *V: vertical

(continued)

This monitor is also provided with 10 blank storage areas for saving timings. If you are not satisfied with the preset mode, you can define your own timings following this procedure:

1. Use SELECT ►/◄ on the control panel to select the option you want to adjust.
2. Use ADJUST +/- on the control panel to adjust the value of that option.
3. Press STATUS or SELECT ►/◄ to save this mode.

7. THEORY OF OPERATION

Switch Mode Power Supply

The current mode control IC is U801. To avoid the screen being interfered, its circuit applies SYNC trigger.

- Pin 6 of U801 directly drives MOSFET Q801 and oscillates T802 transformer, so that energy will be transferred from the primary voltage to the secondary voltage. The secondary voltage is rectified by D809, D810, D811, D812 and D813, to obtain output voltage by way of the π filter circuit.
- Pin 3 of U801 offers over current protection, which detects the source current of Q801 via R806. When the output is over the limit, the voltage will be cut to zero volts. The 16V input will be regulated to 12V output via regulator U804.
- TH801 is a positive temperature coefficient resistance. It performs degaussing function when the power is on.
- The power saving circuit consists of T803, Q804, Q805, R828, R829, R830, C844, C845, and ZD801. If the vertical SYNC signal doesn't appear, the voltage on pin 1 of U801 will shut down, and the SMPS (Switch Mode Power Supply) will be OFF.

See figure SD640012100011 - 2 of 2 (page 43).

Input Circuit

From the SYNC signal of U101, we know the shaping and polarity status. We also get positive horizontal SYNC output from pin 8, and positive vertical SYNC output from pin 6.

In order to make sure that the horizontal SYNC output and vertical SYNC output have the same pulse width, we use U102.

See figure SD640012100011 - 1 of 2 (page 43).

Horizontal Process Circuit

The horizontal process IC is U305.

- Pin 1 of U305 is the horizontal SYNC input point.
- Pin 6 of U305 provides the function of X-ray protection.
- AFC pulse comes from T502 pin 10. After being rectified by U303, the pulse goes through pin 3 of U305.
- Pin 9 and pin 10 control the duty cycle of pin 8.
- U301 applies F-V voltage from pin 1.
- U302 controls the horizontal free running.

See figure SD640012100011 - 1 of 2 (page 43).

Vertical Process Circuit

The vertical process IC is U201.

- Pin 5 is the input point of the vertical SYNC.
- Pin 13 is the output point of the blanking pulse .
- The vertical size is controlled by the current which passes through pin 7, the vertical free running is controlled by VR202, D204, C207, and the vertical linearity is controlled by C217, C206, R203, R208.
- The output point of vertical pulse is U201 pin 1.

See figure SD640012100011 - 1 of 2 (page 43).

Horizontal Driver Circuit

- The output point of the horizontal driver pulse is pin 8 of U305.
- Via Q301 and Q302 (the buffer), T501 increases the horizontal driver pulse current to drive Q501.
- T502 is a dump FBT. B+ parabolic wave flows into T502 via pin 1 to modify a pinchushion.
- C509, C510, C511 are controlled by Q529, Q507, and Q508 to get the horizontal linearity.

See figure SD640012100011 - 1 of 2 (page 43).

High Voltage Driver Circuit

- T503 increases the high voltage driver pulse current which drives Q601.
- The tuning capacitors C618 and C620, which are controlled by Q611, are used to keep the high voltage.
- T602 FBT generates 27V, -180V and the high voltage.

See figure SD640012100011 -1 of 2 (page 43).

Step-down B+ Circuit

- U601 is adopted to be a monostable circuit, triggered by pin 10 of T502. The square wave comes out from pin 3.
- Q612, D609, L601 and C613 generate the step-down B+.

See figure SD640012100011 -1 of 2 (page 43).

Video Amplifier Circuit

U701 is a pre-amplifier IC.

- R-gain, G-gain and B-gain are separately sent into pin 4, pin 8 and pin 10.
- The video amplifier circuit uses the traditional cascade circuit, while in R-bias, G-bias, and B-bias, we use the DC restore circuit.
- To promote band width, we use Single End Push Pull (SEPP) circuit.

See figure SD640012100051 - 1 of 1 (page 43).

Microprocessor Circuit

U4 is a 8-bit microprocessor.

- U1 is the EPROM which can hold 10 preset modes and 10 user-defined modes.
- U4 is a PWM converter with 6 pins to provide HORIZONTAL PHASE, HORIZONTAL WIDTH, VERTICAL CENTERING, VERTICAL SIZE, PINCUSHION, and TRAPEZOID function.

See figure SD640012100053, 5 -1 of 1 (page 43).

8. CONTROLS AND ADJUSTMENTS

Turn all of the variable resistors to the mid-position. Warm up for at least twenty minutes.

1. B^+ ADJUSTMENT

<a> 140V DC ADJUSTMENT

input timing: 31KHz 480L
input pattern: crosshatch
test point: JW163
test value: 140.5 ± 0.5 V DC
ADJ VR: VR801

 67.5V DC ADJUSTMENT

input timing: 31KHz 480L
input pattern: crosshatch
test point: JP3
test value: 67.5 ± 0.5 V DC
ADJ VR: VR601

<c> 4.3V DC ADJUSTMENT

input timing: 31KHz 480L
input pattern: crosshatch
test point: JP4
test value: 4.3V DC~4.35V DC
ADJ VR: VR304

<d>-20V DC ADJUSTMENT

input timing: 31KHz 480L
input pattern: crosshatch
test point: pin G1 of CRT PCB
brightness=max. (external control panel)
contrast=min. (external control panel)
test value: -20V DC~-20.5V DC
ADJ VR: VR602

2. HORIZONTAL FREE-RUNNING ADJUSTMENT

input timing: 48KHz
input pattern: full white
test point: JP1 (GND)
test result: the image is stable
ADJ VR: VR301

3. VERTICAL FREE-RUNNING ADJUSTMENT

input timing: mode 4, mode 7
input pattern: full white
test result: the two modes are stable
ADJ VR: VR202

4. HORIZONTAL WIDTH FULL-SCAN ADJUSTMENT

input timing: 31KHz 480L
input pattern: crosshatch
test point: horizontal width and + buttons on th external control panel (max.)
test result: full-scan
ADJ VR: VR429

5. CUT-OFF VLOTAGE ADJUSTMENT

input timing: 31KHz 480L
input pattern: raster only
test point: brightness=max. (external control panel)
contrast=min. (external control panel)
test value: G2 - Y=0.8~1F.L
VR704 - $x=281\pm10\%$
VR705 - $y=311\pm10\%$
VR706 - Y=0.8~1F.L.
ADJ VR: G2, VR704, VR705, VR706

6. WHITE BALANCE ADJUSTMENT

input timing: 31KHz 480L
input pattern: circle
test point: brightness=medium (external control panel)
contrast=maximum (external control panel)
test value: 1. VR701 - medium
2. VR703 - $x=281\pm10\%$
VR702 - $y=311\pm10\%$
(if you cannot get the precise value, repeat the process from step 1.)
3. VR700 - Y=55F.L.
ADJ VR: VR700, VR701 VR702, VR703

7. FOCUS ADJUSTMENT

input timing: 64KHz
input pattern: text mode
test value: the image is sharp
ADJ VR: G4

8. PIN BALANCE ADJUSTMENT

input timing: 31KHz 480L
input pattern: crosshatch
test value: square
ADJ VR: VR403

9. KEY BALANCE ADJUSTMENT

input timing: 31KHz 480L
input pattern: crosshatch
test value: square
ADJ VR: VR404

10. MICROPROCESSOR SETTING

You can define your own timings: (refer to page 12)

<a>HORIZONTAL WIDTH ADJUSTMENT

test point: $260 \pm 4\text{mm}$
ADJ SW: horizontal width and +/- buttons

HORIZONTAL PHASE ADJUSTMENT

test point: the image is on the center of the raster ($\pm 3\text{mm}$)
ADJ SW: horizontal phase and +/- buttons

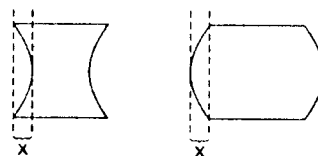
<c>VERTICAL SIZE ADJUSTMENT

test point: $195 \pm 4\text{mm}$
ADJ SW: vertical size and +/- buttons

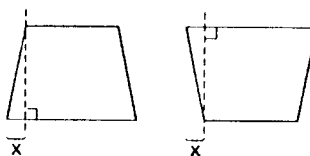
<d>VERTICAL CENTERING ADJUSTMENT

test point: the image is on the center of the raster ($\pm 3\text{mm}$)
ADJ SW: vertical centering and +/- buttons

<e>PINCUSHION ADJUSTMENT

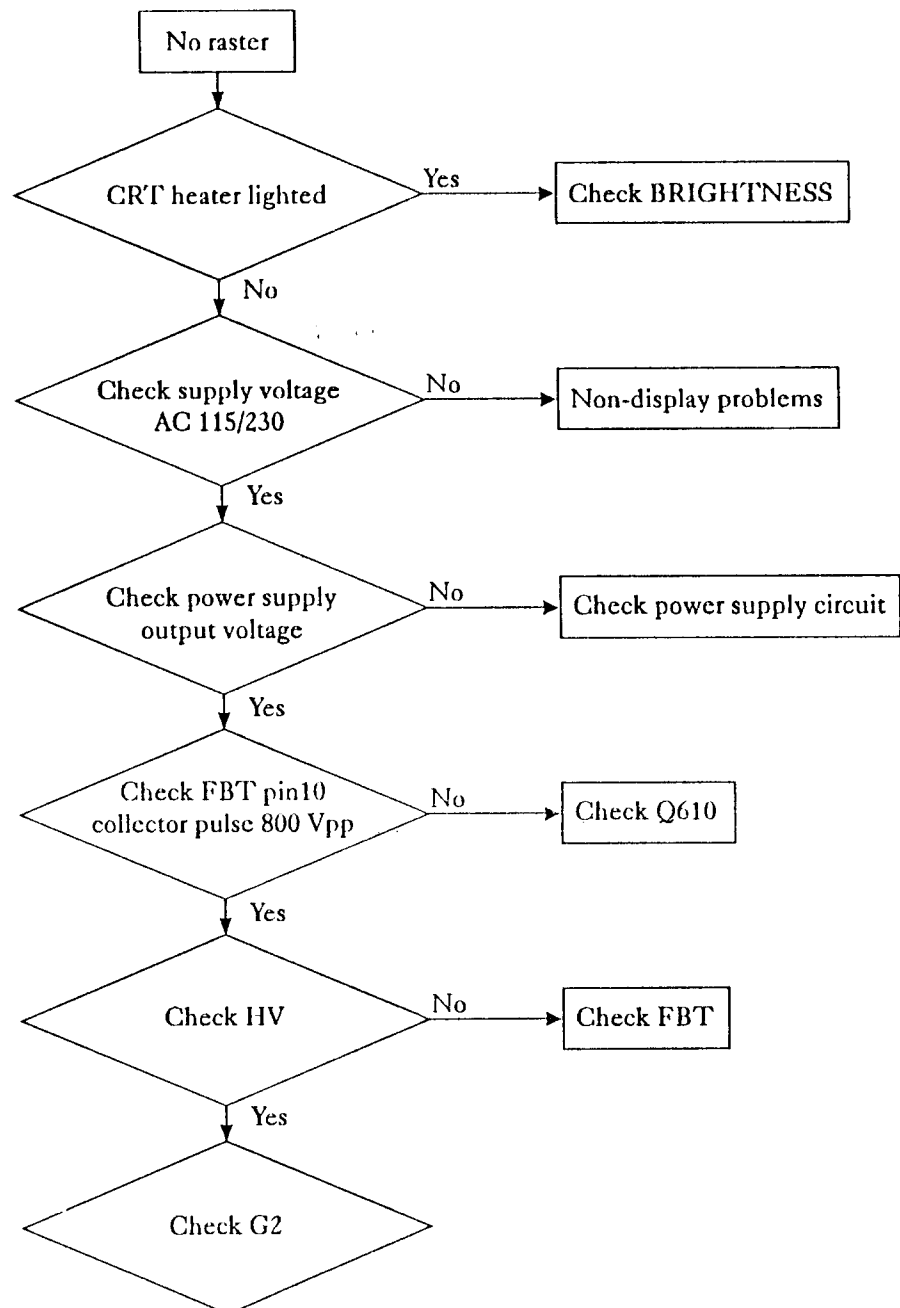
test point: $x \leq 1.5\text{mm}$ ADJ SW: **pin cushion** and +/- buttons

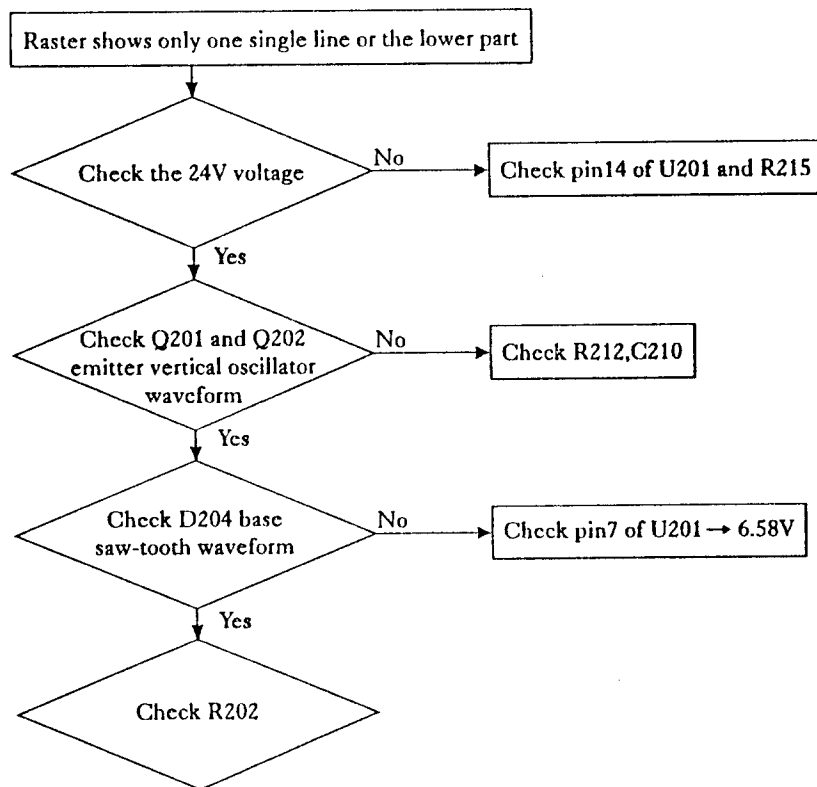
<f>TRAPEZOID ADJUSTMENT

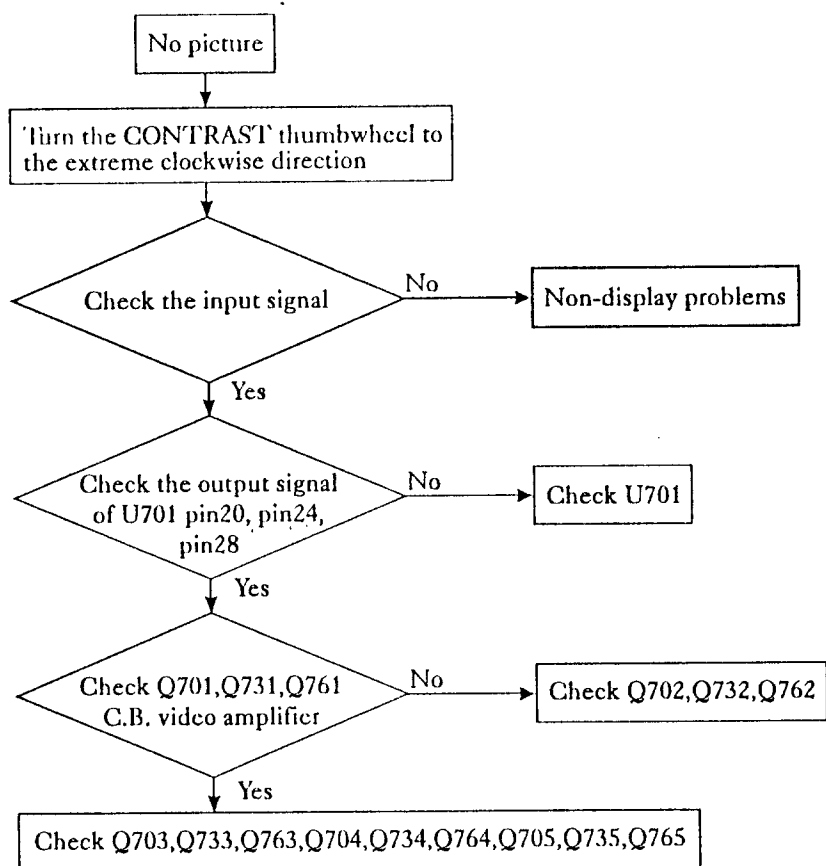
test point: $x \leq 3\text{mm}$ ADJ SW: **trapezoid** and +/- buttons

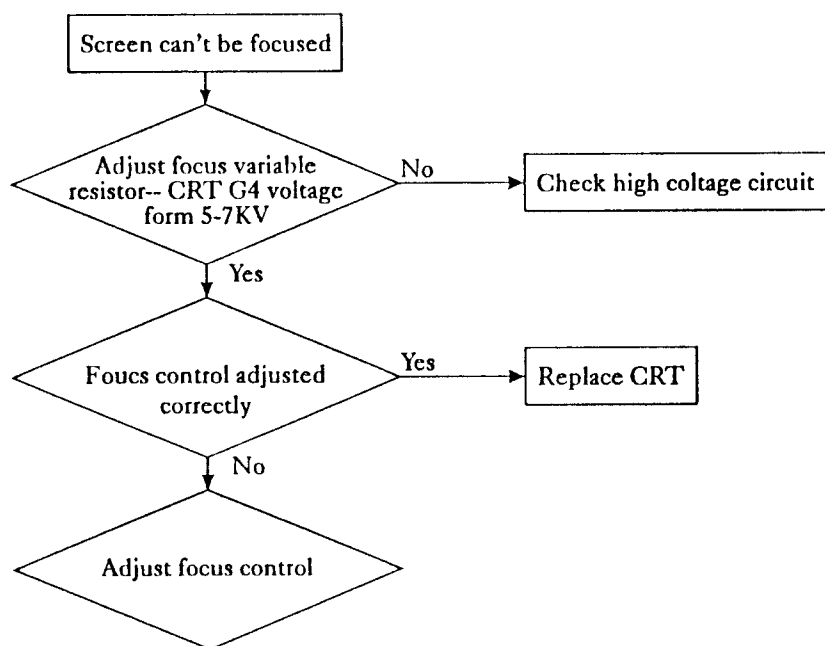
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9. TROUBLESHOOTING

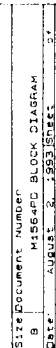








10. BLOCK DIAGRAM



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11. PARTS LIST

CRT BOARD

Name	Description	Part Number
PCB	PWA-M1564PD CRT BD	630012100011
CRT SOCKET	M1564P	633100050005
INSULATOR	TO220, M1420 COMM	634612000002

RES

Location	Description	Part Number
R707-708, 727-728, 747-748	470, 5%, 3W, MOF, F, MINI	631101150471
R770-772	100, 5%, 1/4, CF, AX	631100210101
R709-710, 729-730, 749-750	22, 5%, 1/4, CF, AX	631100210220
R712, 732, 752	100, 5%, 1/2W, CF, AX	631100220101
R767	22K, 5%, 1/2W, CF, AX	631100220223
R765	470, 5%, 1/2W, CF, AX	631100220471
R773, 760, 738, 783	1K, 5%, 1/6W, CF, AX	631100230102
R739, 774, 761, 789	10K, 5%, 1/6W, CF, AX	631100230103
R791-793	150, 5%, 1/6W, CF, AX	631100230151
R700	15K, 5%, 1/6W, CF, AX	631100230153
R794	2K, 5%, 1/6W, CF, AX	631100230202
R775, 703, 723, 743	22, 5%, 1/6W, CF, AX	631100230220
R782, 785, 788	220, 5%, 1/6W, CF, AX	631100230221
R786	2.2K, 5%, 1/6W, CF, AX	631100230222
R795	2.4K, 5%, 1/6W, CF, AX	631100230242
R713, 733, 753	220K, 5%, 1/6W, CF, AX	631100230224
R769, 715, 733, 753	330, 5%, 1/6W, CF, AX	631100230331
R711, 731, 751	330K, 5%, 1/6W, CF, AX	631100230334
R702, 722, 741	390, 5%, 1/6W, CF, AX	631100230391
R705, 725, 745	47, 5%, 1/6W, CF, AX	631100230470
R718, 763	4.7K, 5%, 1/6W, CF, AX	631100230472
R714, 734, 754	51K, 5%, 1/6W, CF, AX	631100230513
R704, 724, 744	62, 5%, 1/6W, CF, AX	631100230620
R716, 736, 756	6.8K, 5%, 1/6W, CF, AX	631100230682
R701, 721, 741	75, 5%, 1/6W, CF, AX	631100230750
R762	820, 5%, 1/6W, CF, AX	631100230821

VR

Location	Description	Part Number
VR700, 704-706	20K, 20%, .1W, B, V, 6MM, CARB	631120072031
VR701-703	5000, 20%, .1W, B, V, 6MM, CARB	631120075021

CAP

Location	Description	Part Number
C760-761	470U, 20%, 16V, ALU, 85°C	631202535477
C763	10.0U, 20%, 160V, ALU, 85°C	631202605106
C767-768	.01U, +80-20%, 1KV, HI-K, Z5U	631204157103
C794	100P, 5%, 50V, CD, NPO	631200013101
C705, 725, 745	82.0P, 5%, 50V, CD, NPO	631200013820
C780	100U, 20%, 16V, ALU, 85°C	631202535107
C703, 723, 743	22.0U, 20%, 16V, ALU, 85°C	631202535226
C770	220U, 20%, 16V, ALU, 85°C	631202535227
C701, 721, 741	47.0U, 20%, 16V, ALU, 85°C	631202535476
C704, 724, 744	4.7U, 20%, 50V, ALU, 85°C, ND	631202560475
C790, 710, 730, 750, 775, 781, 771-773	.01U, +80-20%, 50V, HI-K, Z5V	631204017103
C791-793	.01U, +80-20%, 500V, HI-K, Z5V	631204057103
C702, 722, 742, 762	1000P, 10%, 50V, HI-K, Y5P	631204374102

COIL

Location	Description	Part Number
L701, 703	CHOKE, 125UH, 10%	631300020002
L705-707	PEAKING, 3.3UH, 10%	631300010001

DIODE

Location	Description	Part Number
D704, 724, 744	ISS83, 0.4W, VRRM300V	632001010083
D707, 727, 703, 723, 743	1N4148	632001014148

CON

Location	Description	Part Number
J708	HDR, MA, 5P*1, 2MM, ST	633100110034
J705	HDR, SHROUDED, MA, 2P*1, ST, TIN	633100100202
J700, 706-707	HDR, SHROUDED, MA, 3P*1, ST, TIN	633100110203
J702	HDR, SHROUDED, MA, 5P*1, ST, TIN	633100110205
J701	HDR, SHROUDED, MA, 6P*1, ST, TIN	633100110206

PIN HOLDER

Location	Description	Part Number
J703, GND	D2.36MM, L14.2MM, H10.25MM	633100990001

TRANS

Location	Description	Part Number
Q761, 731, 701	BFQ262, NPN	632031010262
Q737	PH2369, NPN, TO-92	632030236901
Q705, 735, 765	BF423, PNP, 830MW	632031010423
Q706-707, 736, 766, 702, 732, 762	2SC945Q, NPN, TO-92, NEC ONLY	632031010946
Q704, 734, 764	2SA1145, PNP, TO-92MOD	632032114501
Q703, 733, 763	2SC2705, NPN, TO-92MOD	632032270501

IC

Location	Description	Part Number
U701	AN93B06K, VIDEO AMP, 28P	632209300601

CORE

Location	Description	Part Number
L708-710	BEAD, 650HM/100MHZ, RH-03506ST-B	631300110103

HEATSINK

Location	Description	Part Number
Q701, 731, 761	CRT BD, M1564P	634312100003

MAIN BOARD

Name	Description	Part Number
PCB	PWA-M1564P MAIN BD	630012100001

RES

Location	Description	Part Number
R505	180, 5%, 1W, MOF, AX, MINI	631101050181
R841	470K, 5%, 1W, MOF, F, MINI	631101130474
R840	910K, 5%, 1W, MOF, F, MINI	631101130914
R202	1.5, 5%, 2W, MOF, F, MINI	631101140159
R215	4.7, 5%, 2W, MOF, F, MINI	631101140479
R802, 803	39K, 5%, 3W, MOF, F, MINI	631101150393
R807	390, 5%, 5W, MOF, F, MINI	631101160391
R806	.22, 5%, 3W, WW, AX	631103020228
R502	180, 5%, 5W, CMNT, V	631121010181
R808	22K, 5%, 5W, CMNT, V	631121010223
R521	390, 5%, 5W, CMNT, V	631121010391
R203	105K, 1%, 1/4W, AX	631100011053
R211	27.4K, 1%, 1/4W, MF, AX	631100012742
R326	45.3K, 1%, 1/4W, MF, AX	631100014532
R315	22K, 1%, 1/8W, MF, AX	631100022202
R503, 529	.5, 5%, 1/4W, CF, AX	631100210059
R102, 214, 422	1.0K, 5%, 1/4W, CF, AX	631100210102
R407	10K, 5%, 1/4W, CF, AX	631100210103
R251	150, 5%, 1/4W, CF, AX	631100210151
R403	15K, 5%, 1/4W, CF, AX	631100210153
R353	1.8K, 5%, 1/4W, CF, AX	631100210182
R804	47, 5%, 1/4W, CF, AX	631100210470
R536, 504	56, 5%, 1/4W, CF, AX	631100210560
R813	68, 5%, 1/4W, CF, AX	631100210680
R818, 821	10, 5%, 1/2W, CF, AX	631100220100
R217	100, 5%, 1/2W, CF, AX	631100220101
R526	1K, 5%, 1/2W, CF, AX	631100220102
R535	10K, 5%, 1/2W, CF, AX	631100220103
R801	1M, 5%, 1/2W, CF, AX	631100220105
R614	120K, 5%, 1/2W, CF, AX	631100220124
R623	180K, 5%, 1/2W, CF, AX	631100220184
R622	200K, 5%, 1/2W, CF, AX	631100220204
R212	2.2, 5%, 1/2W, CF, AX	631100220229
R216	270, 5%, 1/2W, CF, AX	631100220271
R512	330, 5%, 1/2W, CF, AX	631100220331
R531	56, 5%, 1/2W, CF, AX	631100220560
R510	560, 5%, 1/2W, CF, AX	631100220561

Location	Description	Part Number
R819	68K, 5%, 1/2W, CF, AX	631100220683
R625 -	100, 5%, 1/6W, CF, AX	631100230101
R405, 809, 817, 820, 601 627, 628, 680, 541, 324 310, 309, 328, 110, 112 426, 427, 421, 431, 432 430, 205, 602, 318, 540 544, 644	1K, 5%, 1/6W, CF, AX	631100230102
R340, 626, 811, 805, 810 812, 649, 605, 603, 319 352, 320, 406, 312, 302 303, 311, 301, 307, 460 550, 452, 209, 404, 401 402, 437, 652	10K, 5%, 1/6W, CF, AX	631100230103
R306, 308, 118, 434, 423	100K, 5%, 1/6W, CF, AX	631100230104
R670	1M, 5%, 1/6W, CF, AX	631100230105
R206	120, 5%, 1/6W, CF, AX	631100230121
R226	12K, 5%, 1/6W, CF, AX	631100230123
R428	120K, 5%, 1/6W, CF, AX	631100230124
R305, 527, 225	13K, 5%, 1/6, CF, AX	631100230133
R250	1.5K, 5%, 1/6W, CF, AX	631100230152
R436	15K, 5%, 1/6W, CF, AX	631100230153
R130	18K, 5%, 1/6W, CF, AX	631100230183
R616, 608, 609, 314, 325	2K, 5%, 1/6W, CF, AX	631100230202
R630, 508, 507, 542, 543 334, 648, 332	20K, 5%, 1/6W, CF, AX	631100230203
R815, 335, 322	22, 5%, 1/6W, CF, AX	631100230220
R316, 313, 333, 204	2.4K, 5%, 1/6W, CF, AX	631100230242
R425	24K, 5%, 1/6W, CF, AX	631100230243
R330	27K, 5%, 1/6, CF, AX	631100230273
R451	3K, 5%, 1/6W, CF, AX	631100230302
R619, 615	33, 5%, 1/6W, CF, AX	631100230330
R111, 113	330, 5%, 1/6W, CF, AX	631100230331
R606, 117	3.3K, 5%, 1/6W, CF, AX	631100230332
R433, 213	33K, 5%, 1/6W, CF, AX	631100230333
R620, 329	3.6K, 5%, 1/6W, CF, AX	631100230362
R424, 419	39K, 5%, 1/6W, CF, AX	631100230393
R814, 114, 119	470, 5%, 1/6W, CF, AX	631100230471
R822, 650, 317, 227, 420 201, 323, 321	4.7K, 5%, 1/6W, CF, AX	631100230472
R304, 618	47K, 5%, 1/6W, CF, AX	631100230473
R438, 624	5.1K, 5%, 1/6W, CF, AX	631100230512
R327	51K, 5%, 1/6W, CF, AX	631100230513
R651, 533, 534	5.6K, 5%, 1/6W, CF, AX	631100230562
R229, 816	56K, 5%, 1/6W, CF, AX	631100230563
R208	560K, 5%, 1/6W, CF, AX	631100230564
R621, 331, 528	6.8K, 5%, 1/6W, CF, AX	631100230682
R450	68K, 5%, 1/6W, CF, AX	631100230683
R228	75, 5%, 1/6W, CF, AX	631100230750

Location	Description	Part Number
R604	750, 5%, 1/6W, CF, AX	631100230751
R207	75K, 5%, 1/6W, CF, AX	631100230753
R629, 435	82K, 5%, 1/6W, CF, AX	631100230823

VR

Location	Description	Part Number
VR301	1000, 20%, .1W, B, V, 6MM, CARB	631120071021
VR304	5000, 20%, .1W, B, V, 6MM, CARB	631120075021
VR404, 403	50K, 20%, .1W, B, V, 6MM, CARB	631120075031
VR602, 202	100K, 20%, .1W, B, H, 6MM, CARB	631120140141
VR801	500, 20%, .1W, B, H, 6MM, CARB	631120145011
VR601, 429	5000, 20%, .1W, B, H, 6MM, CARB	631120145021

NTCR

Location	Description	Part Number
TH802	50HM, 15%, DISK, 08SP005L	631120510509

PTCR

Location	Description	Part Number
TH801	200HM, 270V	631120550201

CAP

Location	Description	Part Number
C511	.68U, 5%, 250V, MPP	631201803684
C620	1200P, 5%, 2KV, MPP	631201853122
C503	5600P, 5%, 2KV, MPP	631201853562
C509	.1U, 5%, 250V, PP	631202013104
C510	.22U, 5%, 250V, PP	631202013224
C606	.047U, 5%, 250V, PP	631202013473
C508	.33U, 5%, 250V, PP, F	631202043334
C618	3300P, 5%, 400V, PP, F	631202053332
C610, 311, 210	.22U, 50V, 5%, MEF, RA, ST	631202093224
C408	.33U, 5%, 250V, MEF	631202123334
C204	2200U, 20%, 16V, ALU, 85°C	631202535228
C825	1000U, 20%, 35V, ALU, 85°C	631202555108
C826	470U, 20%, 35V, ALU, 85°C	631202555477
C830	100U, 20%, 100V, ALU, 85°C	631202595107
C832	100U, 20%, 200V, ALU, 85°C	631202615107
C834	47.0U, 20%, 200V, ALU, 85°C	631202615476

Location	Description	Part Number
C612	10.0U, 20%, 250V, ALU, 85°C	631202625106
C613	100U, 20%, 160V, ALU, 85°C, F	631202745107
C805	220U, 20%, 400V, ALU, 85°C	631202785227
C807	.47U, +80-20%, 1KV, HI-K, Z5V	631204067473
C803	.22U, 20%, 250VAC, X2-CAP	631209010224
C801, 802, 841	4700P, 20%, 250VAC, SFTY, Y-CAP, UL	631209210472
C812	100P, 5%, 50V, CD, NPO	631200013101
C312	2.2U, 10%, 25V, TT, F	631201144225
C809, 817, 819, 445, 442	.1U, 20%, 50V, SEMI, Y5V, F	631201675104
C810, 604, 304, 414, 212 211, 413, 314	.01U, 50V, 5%, MEF, RA, F	631202203103
C816, 501, 521, 515, 527 206, 217, 207, 201	.1U, 50V, 5%, MEF, RA, F	631202203104
C601, 120, 113, 302, 317, 115, 313	1000P, 5%, 50V, PE, F	631202243102
C650	2200P, 5%, 50V, PE, F	631202243222
C318, 811	3300P, 5%, 50V, PE, F	631202243332
C312, 818	4700P, 5%, 50V, PE, F	631202243472
C320	5600P, 5%, 50V, PE, F	631202243562
C813, 220	8200P, 5%, 50V, PE, F	631202243822
C441, 444, 350	10U, 20%, 16V, ALU, 85°C, NP	631202535106
C524, 322, 412	100U, 20%, 16V, ALU, 85°C	631202535107
C842, 316, 422	220U, 20%, 16V, ALU, 85°C	631202535227
C835, 636, 111, 443, 440 218, 401, 403	47.0U, 20%, 16V, ALU, 85°C	631202535476
C315	470U, 20%, 16V, ALU, 85°C	631202535477
C419	47U, 20%, 25V, ALU, 85°C	631202540476
C814	100U, 20%, 25V, ALU, 85°C	631202545107
C829, 208	220U, 20%, 25V, ALU, 85°C	631202545227
C525	33.0U, 20%, 25V, ALU, 85°C	631202545336
C203, 351, 315	47.0U, 20%, 25V, ALU, 85°C	631202545476
C828	470U, 20%, 25V, ALU, 85°C	631202545477
C319	100U, 20%, 35V, ALU, 85°C	631202555107
C215	10U, 20%, 50V, ALU, 85°C	631202560106
C607, 214, 415, 205	1.0U, 20%, 50V, ALU, 85°C	631202565105
C831, 300, 112, 219, 450 202, 528	10.0U, 20%, 50V, ALU, 85°C	631202565106
C230	22.0U, 20%, 50V, ALU, 85°C	631202565226
C209	330U, 20%, 50V, ALU, 85°C	631202565337
C420	.47U, 20%, 50V, ALU, 85°C	631202565474
C611	4.7U, 20%, 50V, ALU, 85°C	631202565475
C833	47.0U, 20%, 100V, ALU, 85°C	631202595476
C651	1.0U, 20%, 160V, ALU, 85°C	631202605105
C505	10.0U, 20%, 160V, ALU, 85°C	631202605106
C512	4.7U, 20%, 160V, ALU, 85°C	631202605475
C608	.47U, 20%, 250V, ALU, 85°C	631202625474

Location	Description	Part Number
C116, 605, 306, 303, 638 637, 615, 621, 530, 531 - 513, 452, 451	.01U, +80-20%, 50V, HI-K, Z5V	631204017103
C117	4700P, +80-20%, 50V, HI-K, Z5V	631204017472
C820, 821, 822, 823, 824, 502	1000P, 20%, 1KV, HI-K, Z5V	631204155102
C614, 609, 409, 404	1000P, 10%, 50V, HI-K, Y5P	631204374102
C149, 150	220P, 20%, 50V, HI-K, Y5P	631204375221
C635, 520	560P, 20%, 50V, HI-K, Y5P	631204375561
C808	100P, 20%, 1KV, HI-K, Y5P	631204425101

COIL

Location	Description	Part Number
L801, 802	CHOKE DIFFERENTIAL, 125UH	631300020011
L503	CHOKE, 1mH, D.3, 154T, 10*12	631300020019
L601	CHOKE, 3mH, D.45, 227.5T	631300020021
L805, 806, 807, 808	CHOKE, 60UH, 10%, 8*10	631300020023
T502	CHOKE, DUMMY, FLYBACK, M1564P	631300020024
L501	LINEARITY, M1564P	631300030008

CORE

Location	Description	Part Number
L809, 810	BEAD, 650HM/100MHZ, RH-03506ST-B	631300110103

XSFORMER

Location	Description	Part Number
T501, 503	HOR, DRIVE, EE-19, M1564P	631360030003
T802	PWR, EE42-15, M1564P	631360070008
T801	LINE FILTER, 15MH	631360110009

DIODE

Location	Description	Part Number
D809	BYR29F-600, VRRM600V, SOT-186	632010002901
D501	BY359F-1500, VRRM1500V, SOT-186	632010035901
D801, 802, 803, 804	20D10, VRRM1000V	632001010020
	BYM26B, VRRM400V	632001010026
D810	BYM26C, VRRM600V	632001010027
D805	HER107, VRRM800V, DO-41	632001010107
D202	1N4002, ID1A, VRRM100V, DO41	632001014001

Location	Description	Part Number
D807, 808, 621, 607, 602 305, 608, 605, 508, 201 505, 101, 203, 301, 302	1N4148	632001014148
D403, 304	HZ5C2, ZENER, 5V, 5%	632002010005
D610	HZ11C2, ZENER	632002010011
D622, 400	HZ7C2, ZENER	632002010072
D603	HZ9C1, ZENER	632002010091
D815	HZ15-3, ZENER	632002010153
D814	HZ20-2, ZENER, 20V, .4V, 0.5W	632002010202
D204	BZX55C3V6, ZENER, 3.6V, 5%, DO35	632002015536
D811, 812, 813	BYD73D, VRRM200V, SOD81	632010007301
D806, 504, 303	HER102, VRRM100V/1A, DO-41	632010010201
D506, 509, 530, 507	HER103, VRRM200V/1A, DO-41	632010010301
D510, 606, 604	HER106, VRRM600V/1A, DO-41	632010010601
U805	BT169D, VDRM/VRRM400V, TO-92	632010016901

TRANS

Location	Description	Part Number
Q610	BU2508DF NPN, SOT199	632030250801
Q501	BU2525AF, NPN, SOT199	632030252501
Q503	2SB649AC, PNP	632031010649
Q504	2SD669AC, NPN	632031010669
Q502	2SD921, NPN	632031012921
Q303, 509	2SK357, MOSFET, N-CHNL, TO220AB	632032010357
Q507, 508, 529	2SK1221, MOSFET, N-CHNL, TO220AB	632032011221
Q612	IRF9620, MOSFET, P-CHNL, TO220AB	632032019620
Q801	2SK1118, N-MOSFET, SC-67	632032111801
Q611	2SK1377, N-MOS, SC-67	632032137701
Q510, 511	2SC2705, NPN, TO-92MOD	632032270501
Q605	BF423, PNP, 830MW	632031010423
Q604, 302, 201, 608	2SA733Q, PNP	632031010733
Q631, 630, 624, 620, 601 412, 607, 606, 609, 204 404, 421, 403, 405, 520 203, 420, 419, 103, 603	2SC945Q, NPN, TO-92, NEC ONLY	632031010946

OPTOCOUPLER

Location	Description	Part Number
U802	CNX82A	632033150082

IC

Location	Description	Part Number
U804	7812, VOLT REGULATOR, TO-220, 3P	632200110080
U201	TDA1675A, VERTICAL PROCESSOR, 15P	632200311675
U305	AN5790N, HORIZONTAL, PROCESSOR	632200315790
U403	UPC1406HA, ATTENUATOR, 9P	632230140601
U101	74LS86A, QUAD 2I/P XOR GATES	632100090086
U102	74LS221N, 16P	632100090221
U401, 302	LM358, DUAL OP/AMP	632200010358
U303	LM393, COMPARTOR	632200010393
U803, 602	TL431CLP	632200310431
U601	NE555, TIMER, 8P	632200310555
U801	3842, CURRENT-MODE PWM CTLR	632200313842
U301	XR-4151CP, V/F CONVERTER, 8P	632230415101

CON

Location	Description	Part Number
CN802	HDR, MA, 2P*1, ST, TIN, 7.5MM	633100110002
DY CONNECTOR	HDR, MA, 4P*1, ST, TIN, PIN2.36MM	633100110024
CN104	HDR, SHROUNDED, MA, 2P*1, ST, TIN	633100110202
FOR BRT.	HDR, SHROUNDED, MA, 3P*1, ST, TIN	633100110203
CN801	WFR, MA, 3P*1, ST	633100110303
CN101	HDR, FM, 15P*1, 2.5MM	633100110415

JUMPER WIRE

Location	Description	Part Number
JW191, 188, 189, 115, 141, 186 172, 220, 184, 151, 116, 203, 184 128, 170, 150, 190, 196, 171, 180 175, 120, 187, 148, 177, 131, 174 201, 135, 160, 169, 168, 118, 147 163, 140, 134, 142, 205, 145, 101 165, 154, 162, 102, 164, 107, 105 124, 123, 110, 132, 192, 138, 114 197, 157, 137, 113, 159, 146, 139 156, 144, 158, 166, 112, 149, 195 TP1, TP3, TP4, 214, 212, 213, C852	D.6MM, TIN	633200050004

OTHERS

Name	Description	Part Number
LED	RECT, GRN, 2*5, .1	633400010001
FUSE	250V/3A, SLO, UL/CSA	633500010001
FUSE	HOLDER, 5*20MM, FC-04-01	633500020001
WIRE	A-A, D-D, 1007, #24, YEL, 110MM, 7/7	633200012401
WIRE	E-E, 1007, #24, ORG, 165MM, 7/7	633200012413
WIRE	B-B, 1007, #24, RED, 200MM, 7/7	632200012435
WIRE	F-F, 1015, #24, BLK, 120MM, 5/5	632200022410
WIRE ASSY	FOR 85V, 1007, #24, 2P, 260MM, PIN	642200010033
WIRE ASSY	2W FOR LED[150MM], 2P, 1007, #24, 150MM	642200010108
WIRE ASSY	3W H-V-C, 4P, 350MM, SCN	642200010130
WIRE ASSY	5W HEATER/GND/G1 ABL/12V, 5P, 230MM, 7	642200010131
WIRE ASSY	FOR CY GND, 1015, #18, BLK, 150MM, SIN	642200010164
FBT	CT-8136, M1564P	631360010017
FBT	CF0562MT1780, M1564P	631360010018

INT BD

Name	Description	Part Number
PCB	PWA-M1564PD INT. BD	630012100012
F/W ASSY	PCF8582, M1564PD	648112100003
IC SOCKET	8P, DIP, TIN, DUAL CONTACT	331652608014

XTAL

Location	Description	Part Number
X1	10MHZ, 50PPM, HC-49/U	631411000401

RES

Location	Description	Part Number
R13, 15, 60	1.0K, 5%, 1/4W, CF, AX	631100210102
R005	22K, 5%, 1/4W, CF, AX	631100210223
R032, 030, 014, 012, 049, 051, 036, R011, 008, 050, 016-017, 065, 070 R75, 080, 085, 073, 090	1K, 5%, 1/6W, CF, AX	631100230102
R007, 074, 078, 009, 095	10K, 5%, 1/6W, CF, AX	631100230103
R006, 010	6.2M, 5%, 1/6W, CF, AX	631100230625
R082	15K, 5%, 1/6W, CF, AX	631100230153
R091-094	1.5K, 5%, 1/6W, CF, AX	631100230152
R061, 066, 071, 076, 081, 086-087 R067, 072	2K, 5%, 1/6W, CF, AX	631100230202
R077, 089	20K, 5%, 1/6W, CF, AX	631100230203
R34-35	22K, 5%, 1/6W, CF, AX	631100230223
R069	2.4K, 5%, 1/6W, CF, AX	631100230242
R084	30K, 5%, 1/6W, CF, AX	631100230303
R064	3.9K, 5%, 1/6W, CF, AX	631100230392
R062	4.7K, 5%, 1/6W, CF, AX	631100230472
R063	5.1K, 5%, 1/6W, CF, AX	631100230512
R079	5.6K, 5%, 1/6W, CF, AX	631100230562

CAP

Location	Description	Part Number
C008	470U, 20%, 16V, ALU, 85°C	631202535477
C004, 017	.1U, 20%, 50V, SEMI, Y5V, F	631201675104
C007	100U, 20%, 16V, ALU, 85°C	631202535107
C90	1000P, 10%, 50V, HI-K, Y5P	631204374102
C020, 009	1.0U, 20%, 50V, ALU, 85°C	631202565105
C010-016	10.0U, 20%, 50V, ALU, 85°C	631202565106
C001	2700P, 10%, 50V, HI-K, Y5P	631204374272

DIODE

Location	Description	Part Number
D001-002	1N4148	632001014148

TRANS

Location	Description	Part Number
Q012-016	2SA733Q, PNP	632031010733
Q003-008, 011, 017	2SC945Q, NPN	632031010945

IC

Location	Description	Part Number
U3	7805, VOLT REGULATOR, TO-220, 3P	632200110082
U4	PCE84C886, MICROCONTROLLER, 42P	632418488601

CON

Location	Description	Part Number
	HDR, MA, 5P*1, 2MM, ST	633100110034
J1	HDR, MA, 6P*1, 2MM, ST	633100110035
J2	HDR, SHROUDED, MA, 15P*1, R/A, TIN	633100120015

SW BD

Name	Description	Part Number
PCB	PWA-M1564PD SW BD	630012100013
WIRE ASSY	1061 #26, 5P/6P, CORE	642200010074

SW

Location	Description	Part Number
SW002-006	TACTILE, 15V/20MA	633700150001

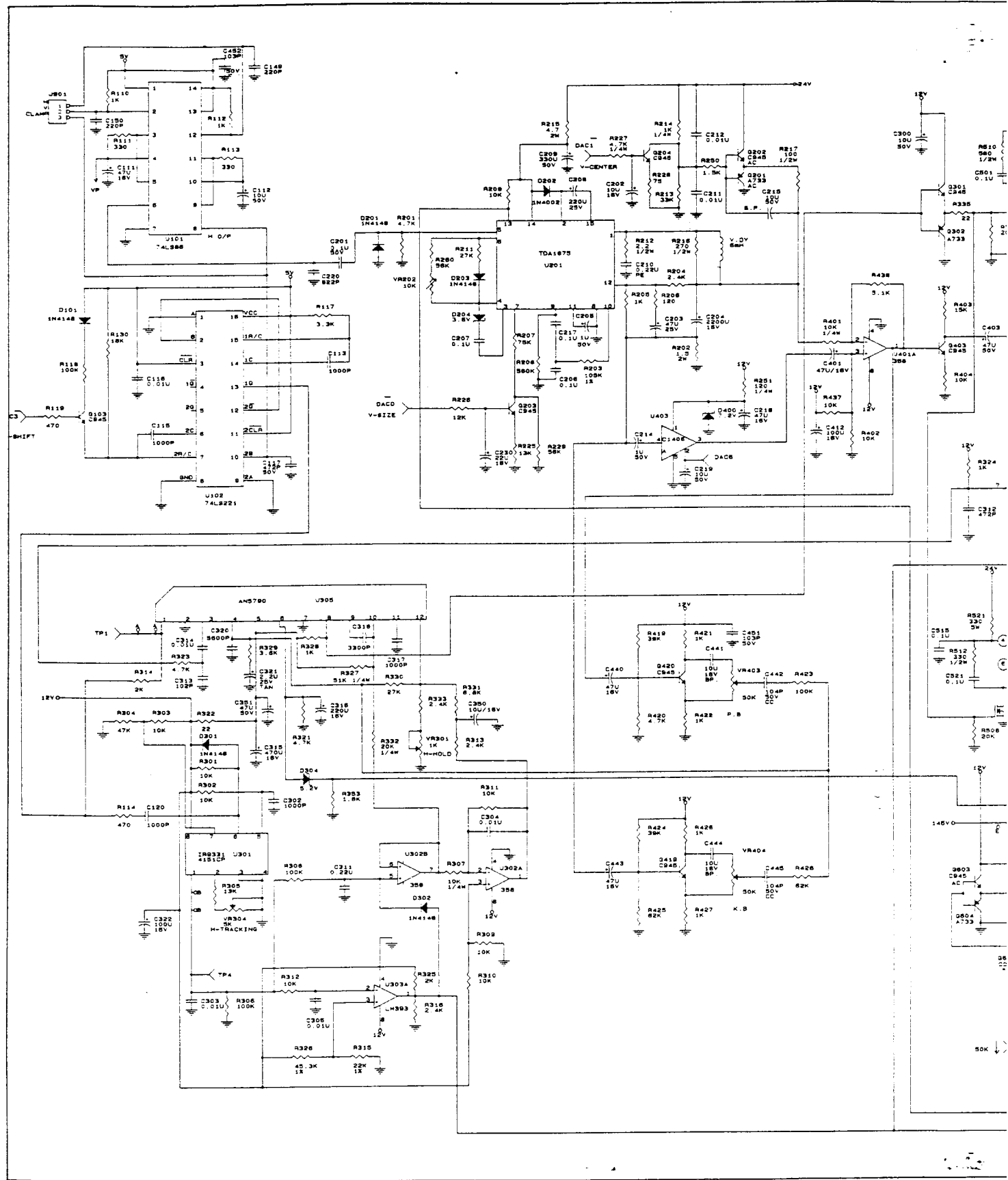
BRT. & CONT. BD

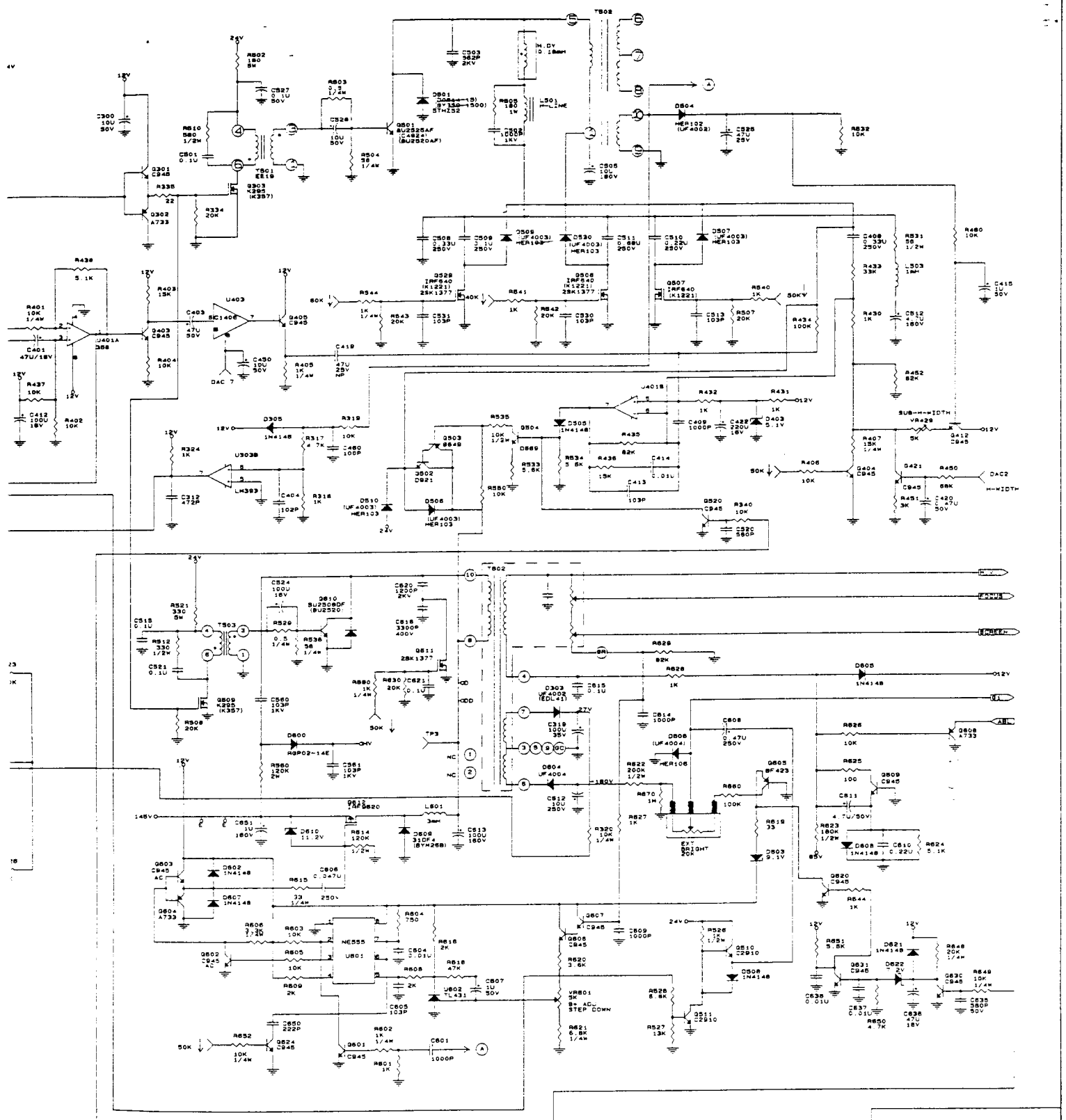
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WIRE ASSY	3P, 1007, #24, 420MM, CONT.	642200010102
WIRE ASSY	3P, 1007, #24, 320MM, BRT.	642200010103
VR	10K, 20%, .5W, B, H, D10MM	631120130103
VR	20K, 20%, .5W, B, H, D10MM	631120130203

12. SERVICE DIAGRAMS

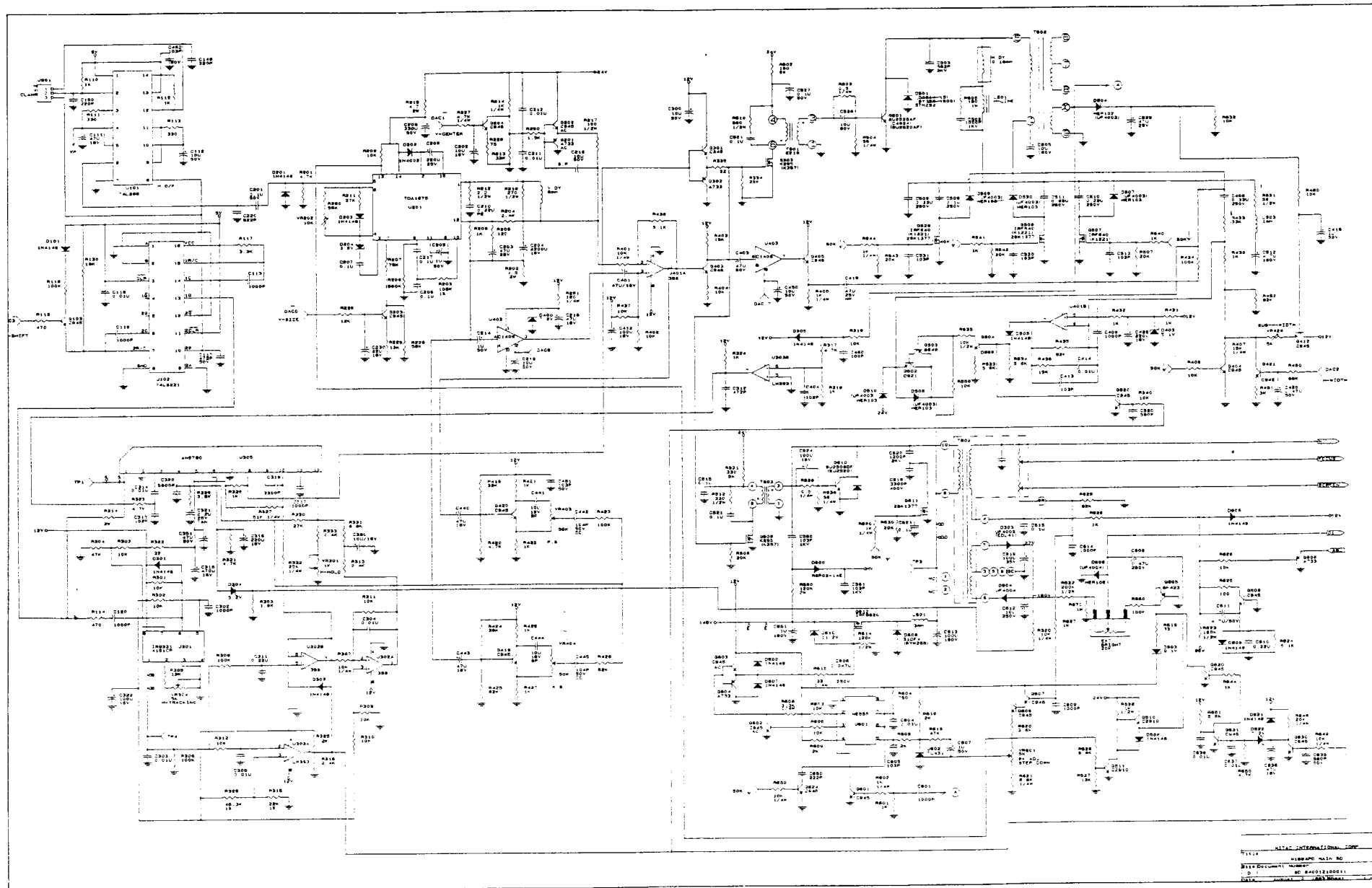
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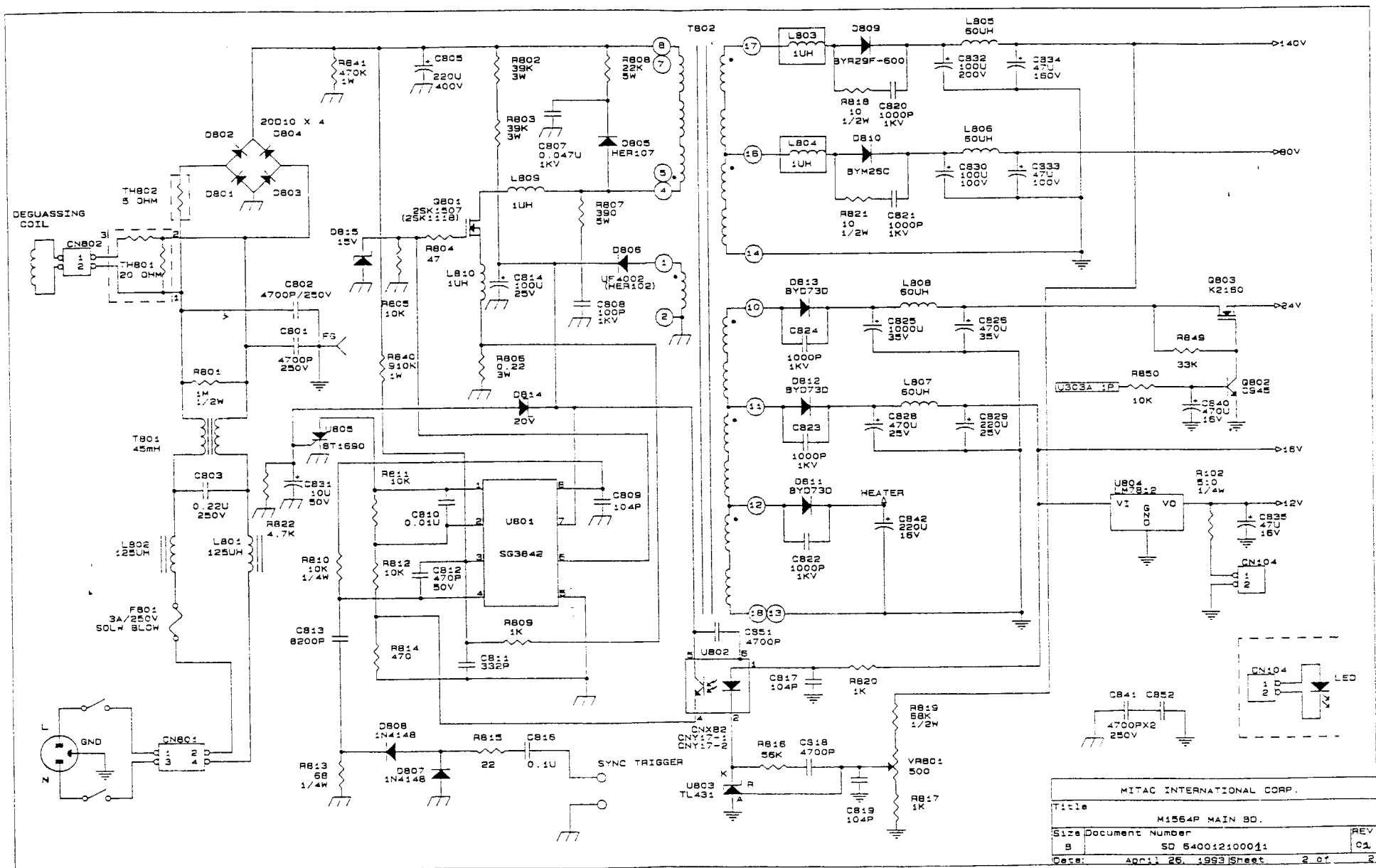
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SD640012100051	CRT BD	R00	1 sheet
SD640012100053	INT BD, CONTROL BD	R00	1 sheet
AD645012100152	MONITOR ASSY	R00	1 sheet
AM630012100001	TEXT SIDE	R0E	1
	COPPER SIDE	R0E	1
	BACK TEXT SIDE	R0E	1
AM640012100011~13	TEXT SIDE	R0A	1
	COPPER SIDE	R0A	1
	BACK TEXT SIDE	R0A	1

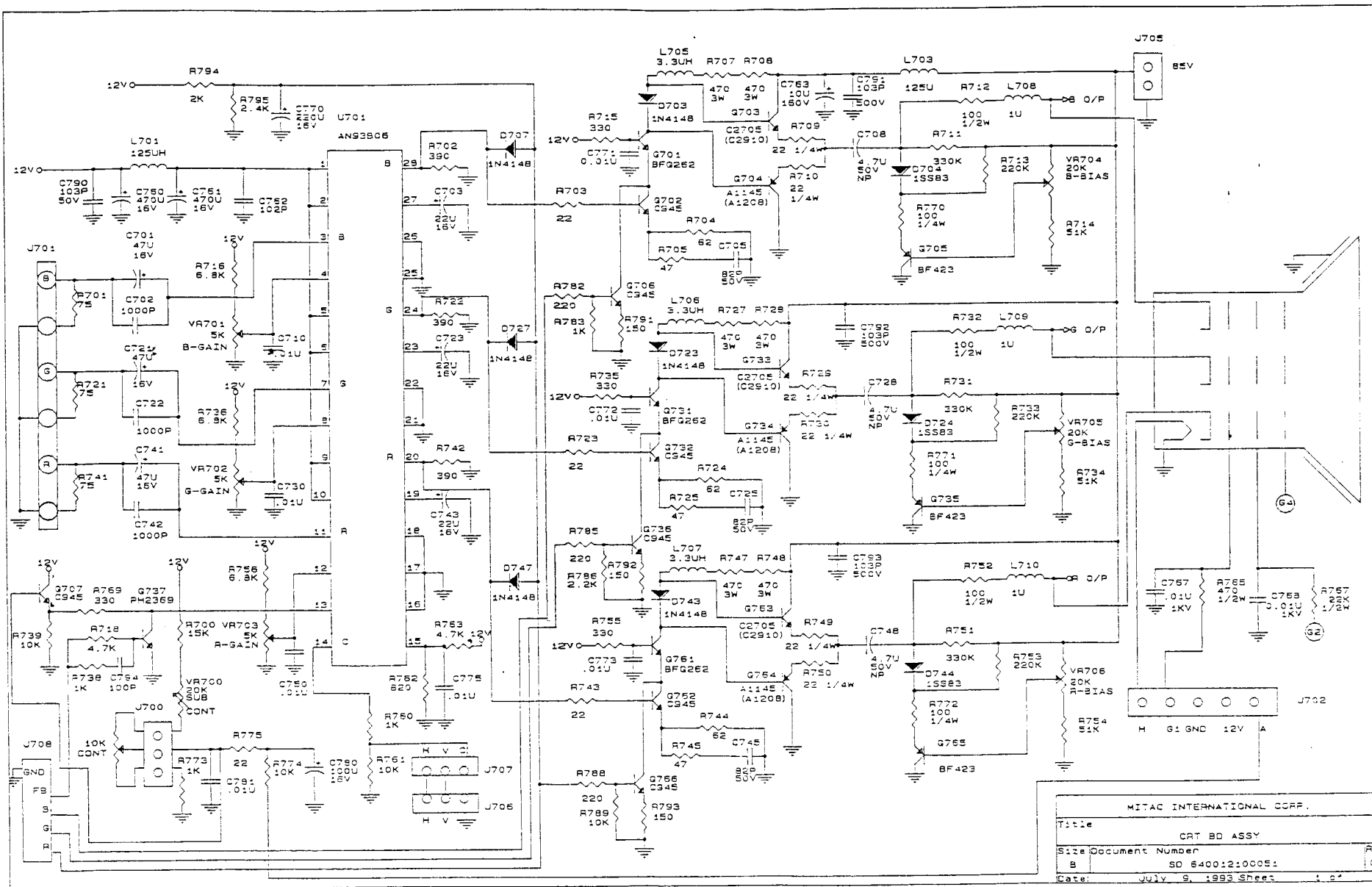




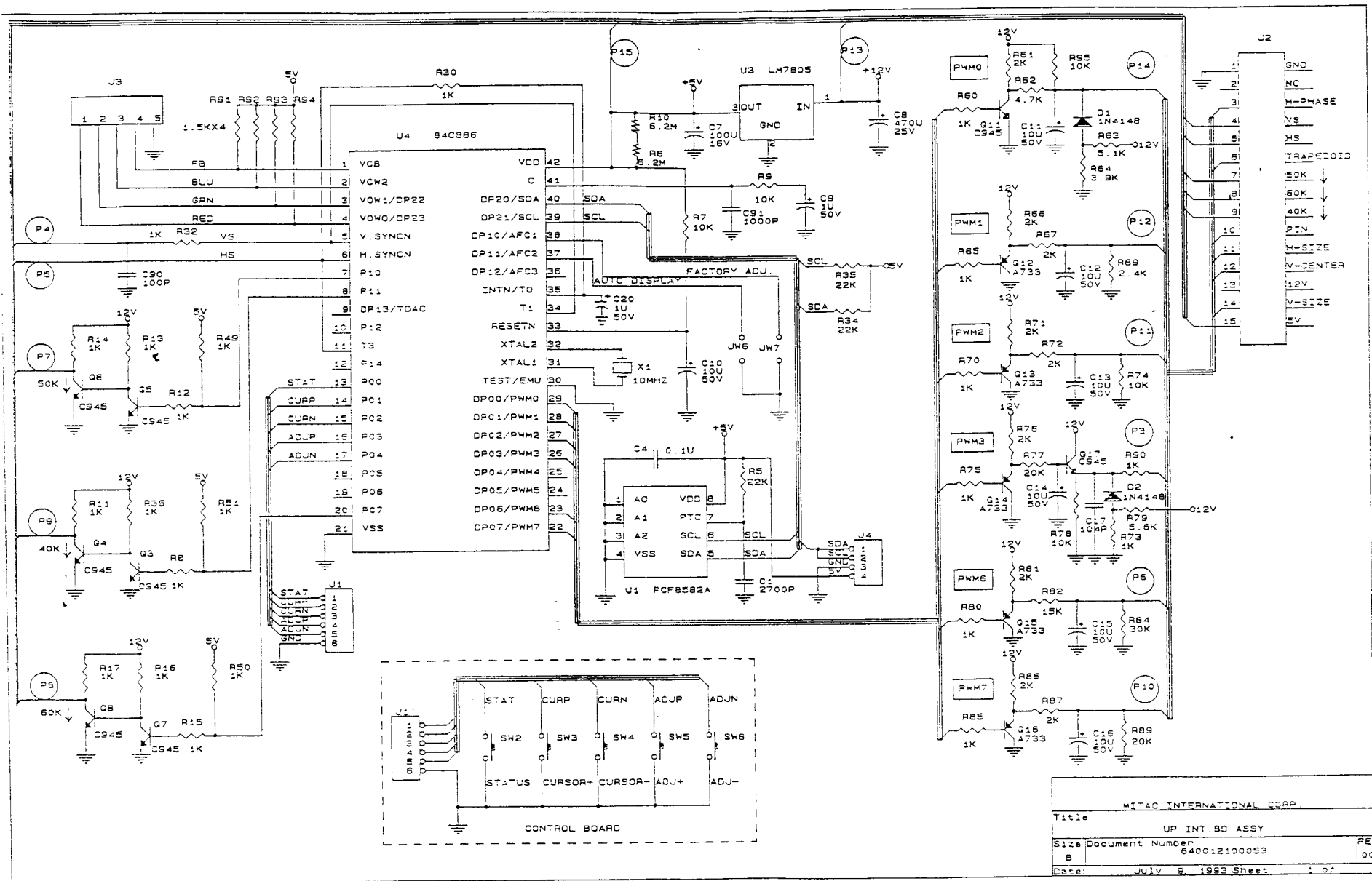
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Date	AUGUST 2, 1993



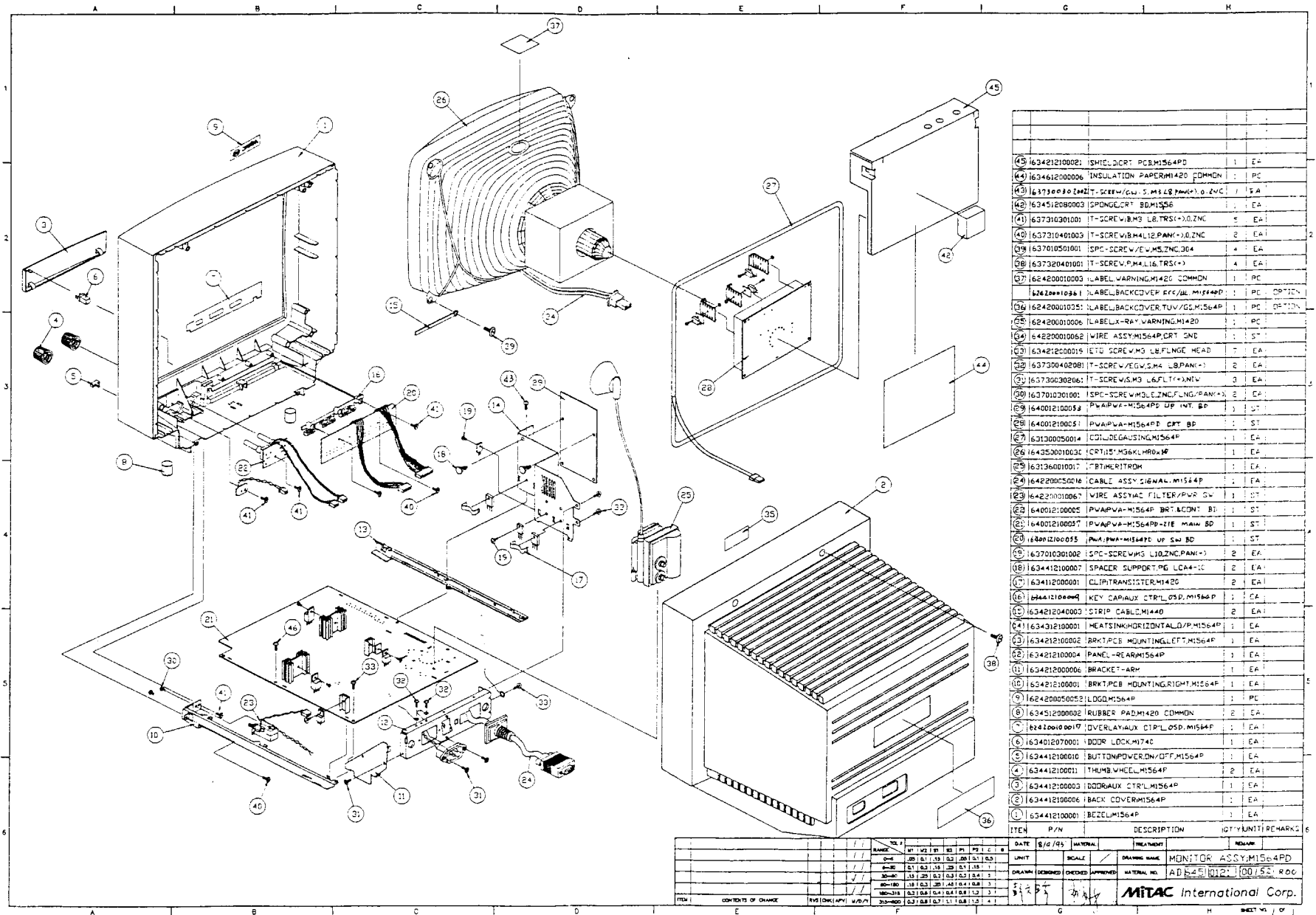


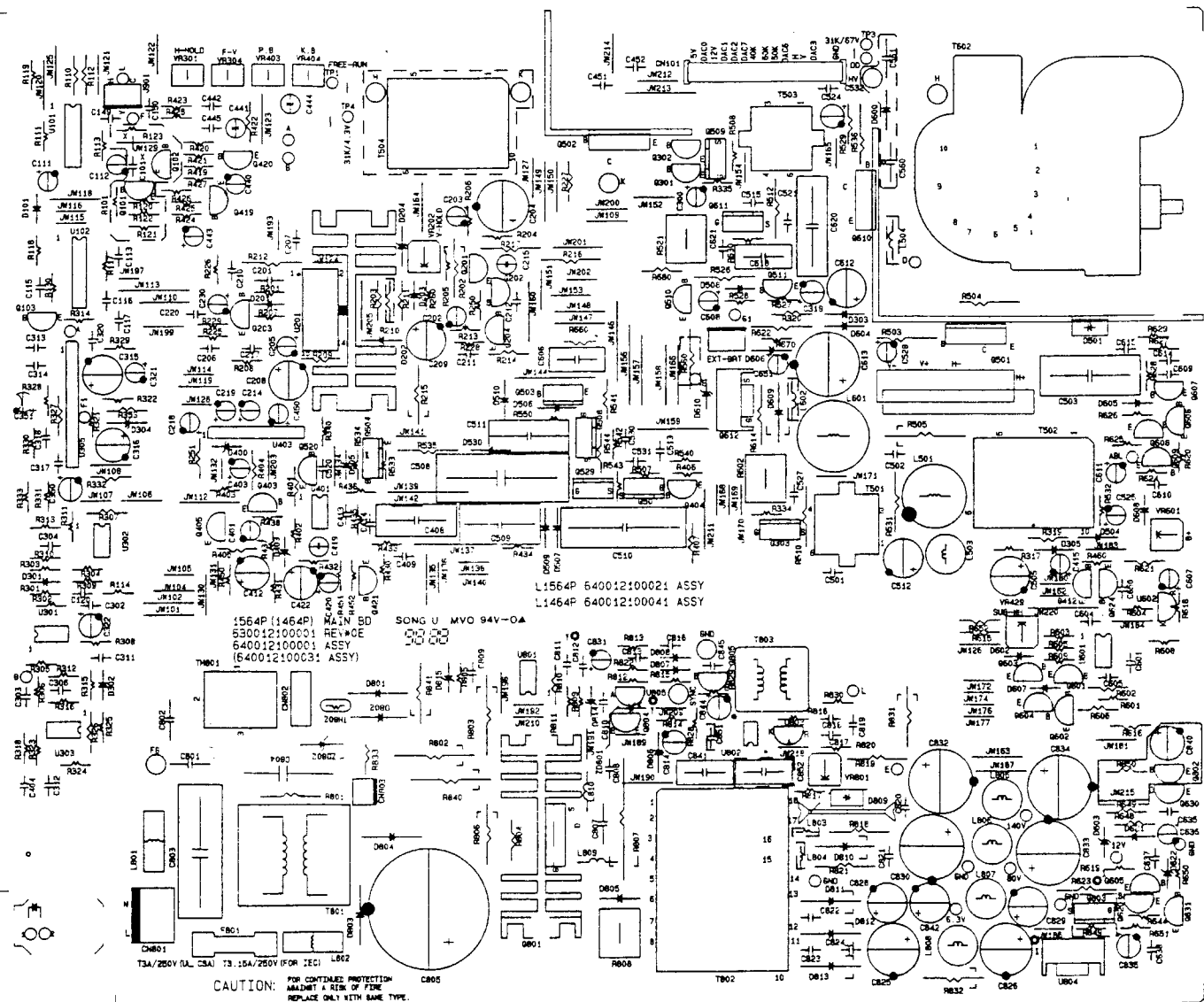


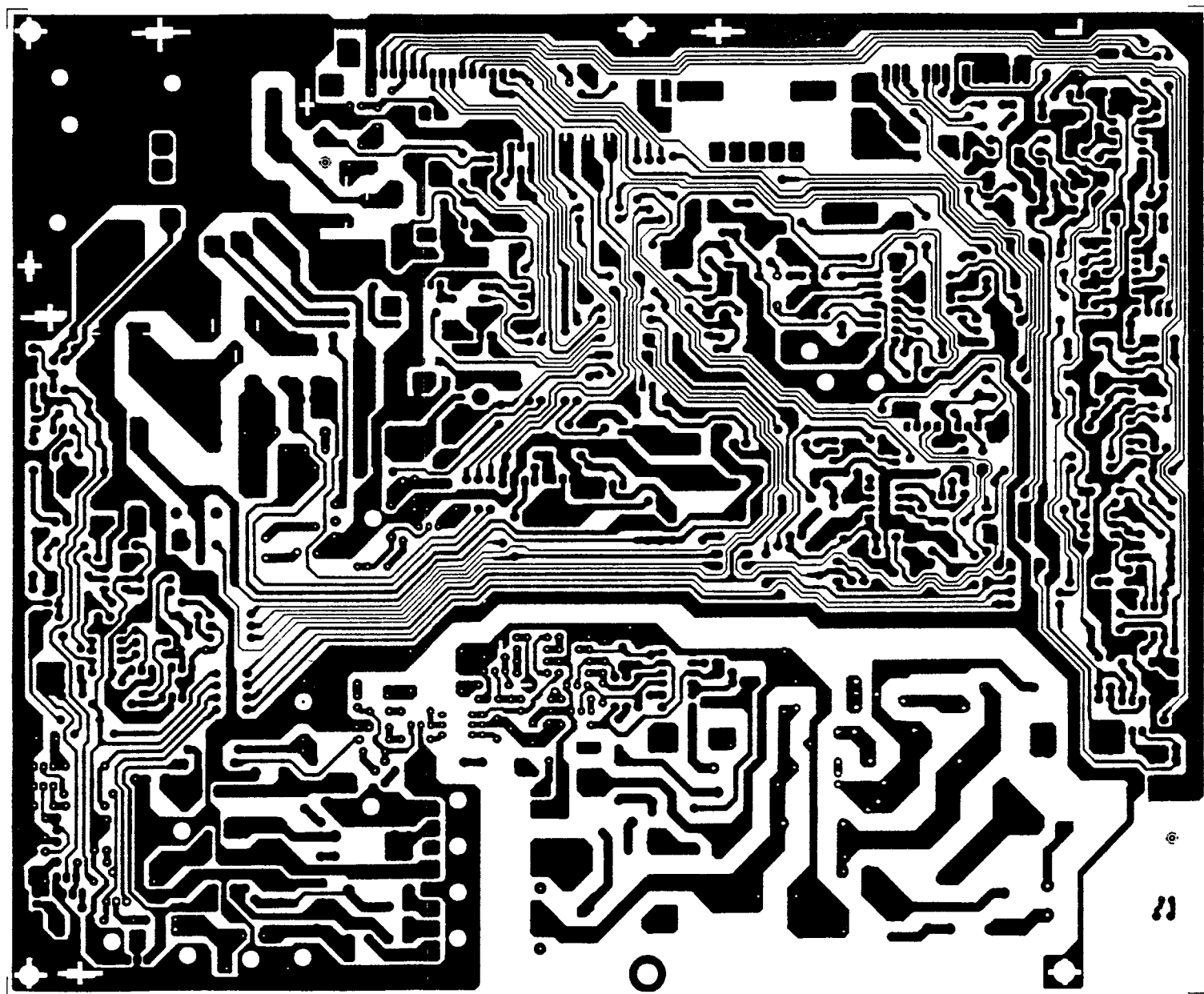
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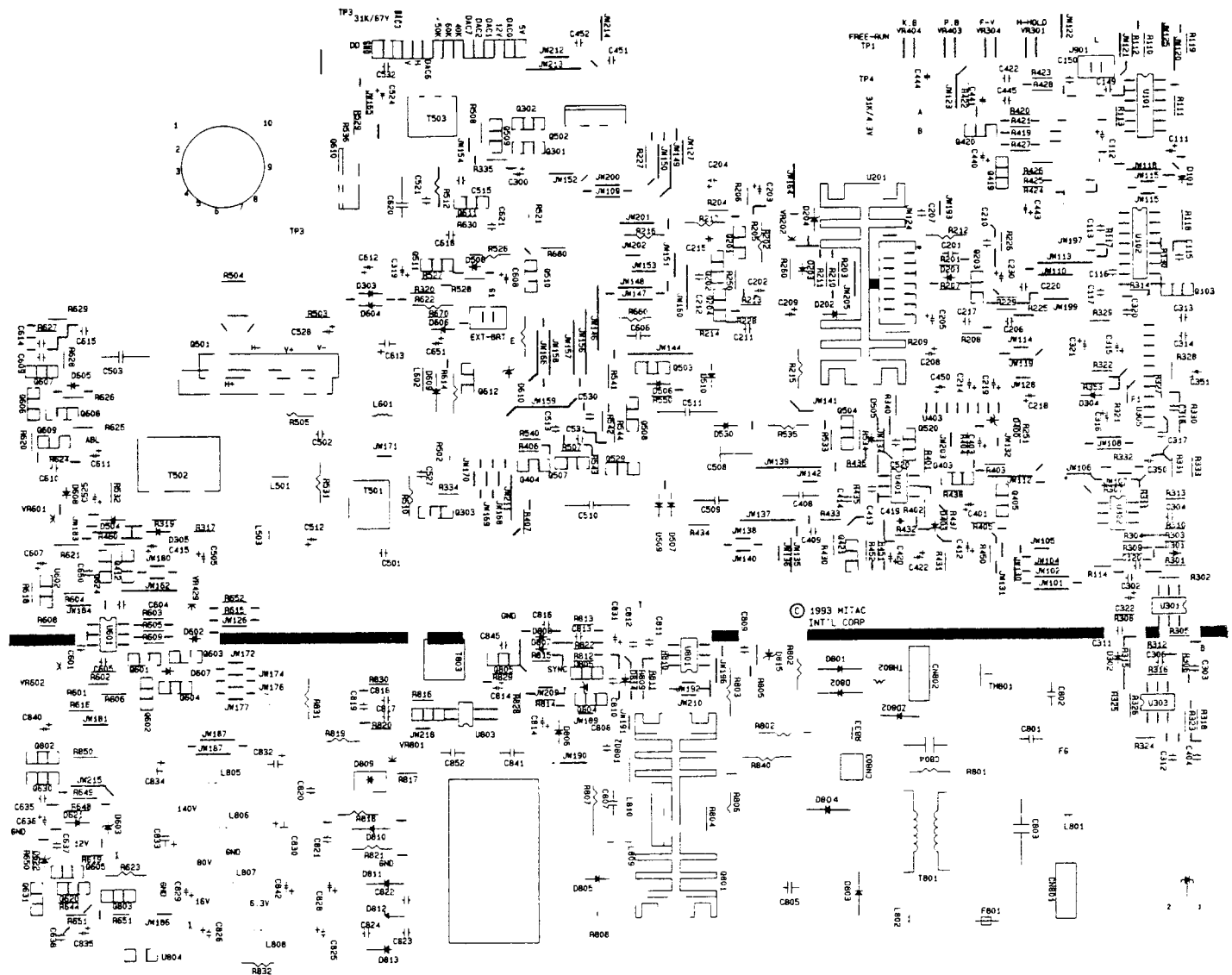


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Date:	July 9, 1993	Sheet : 9

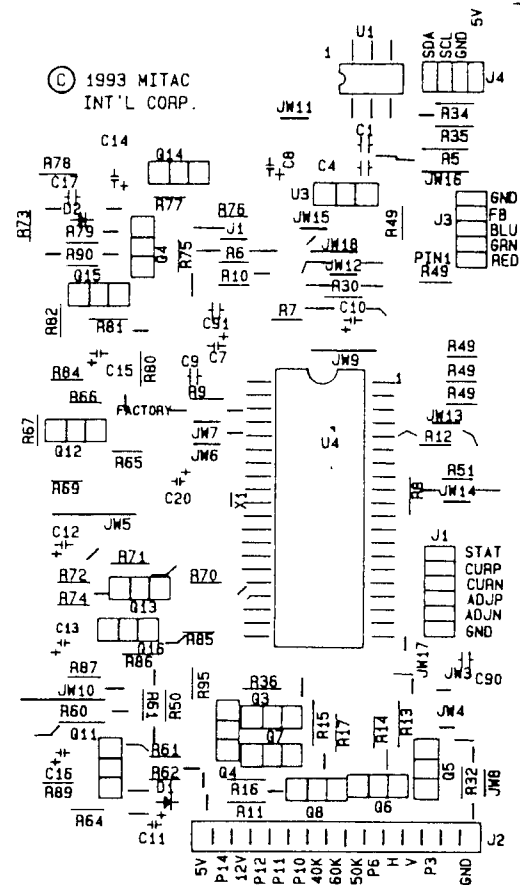
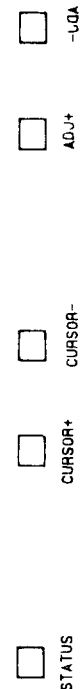
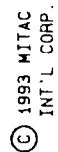
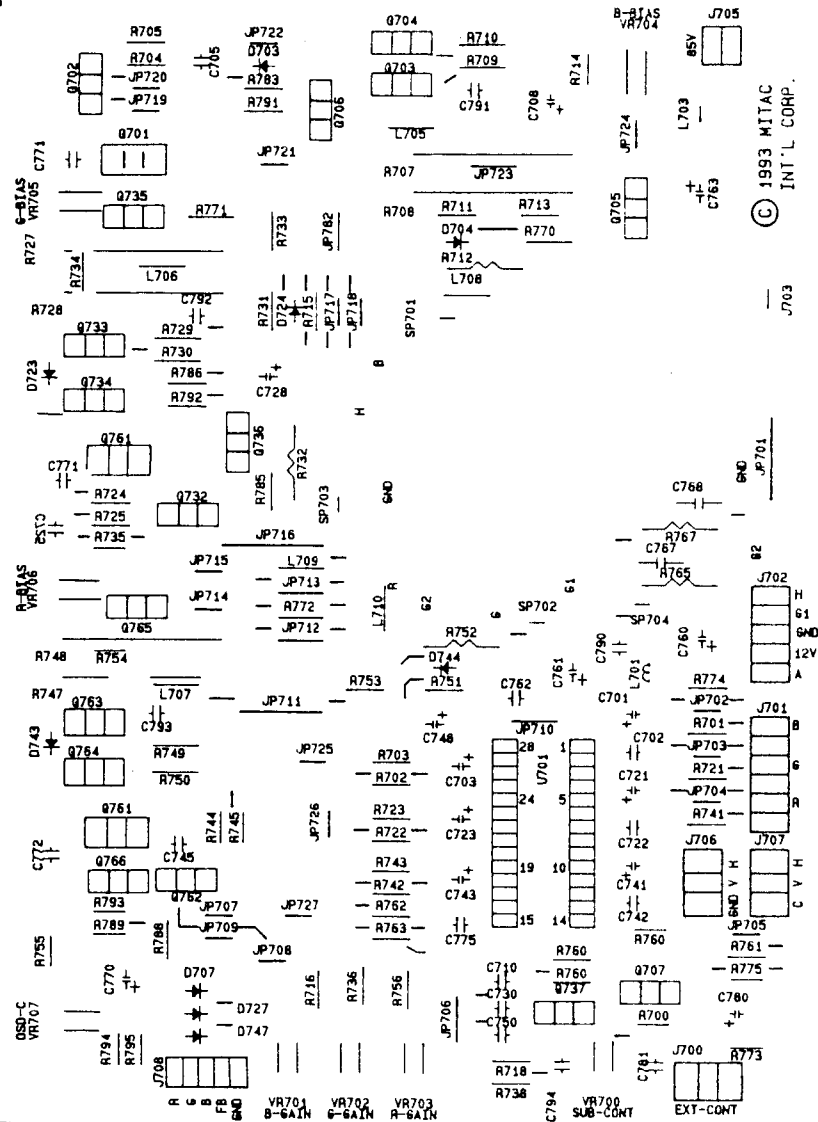


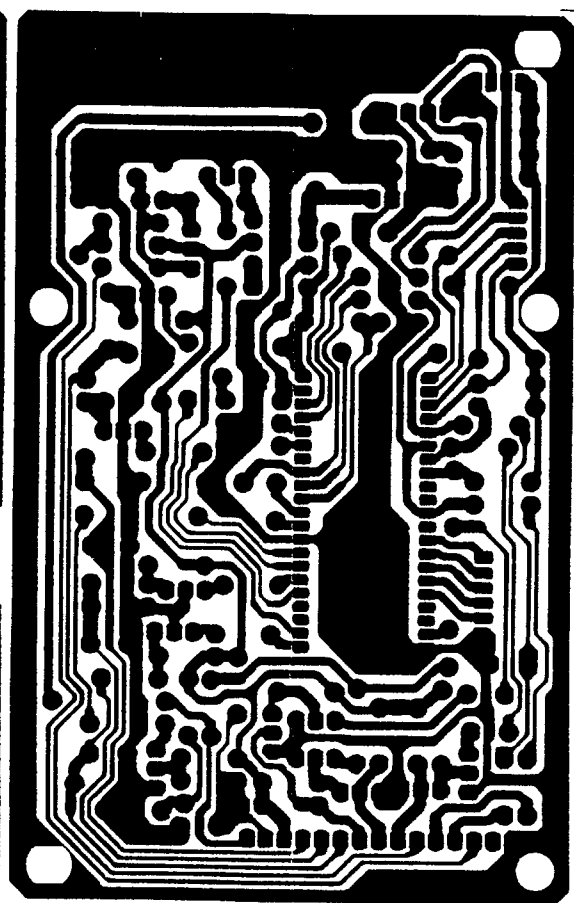
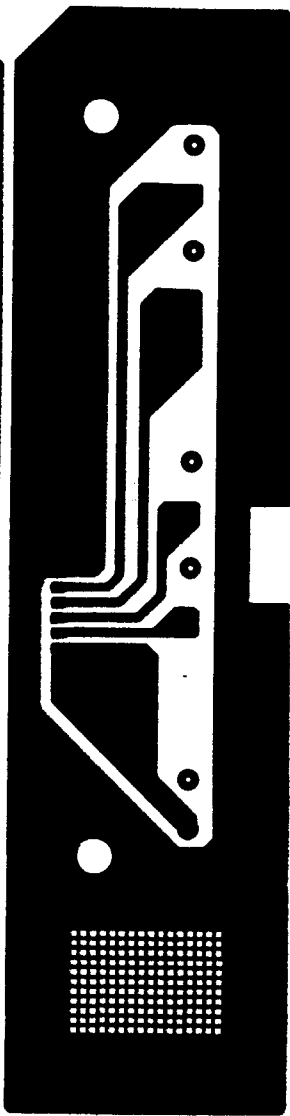
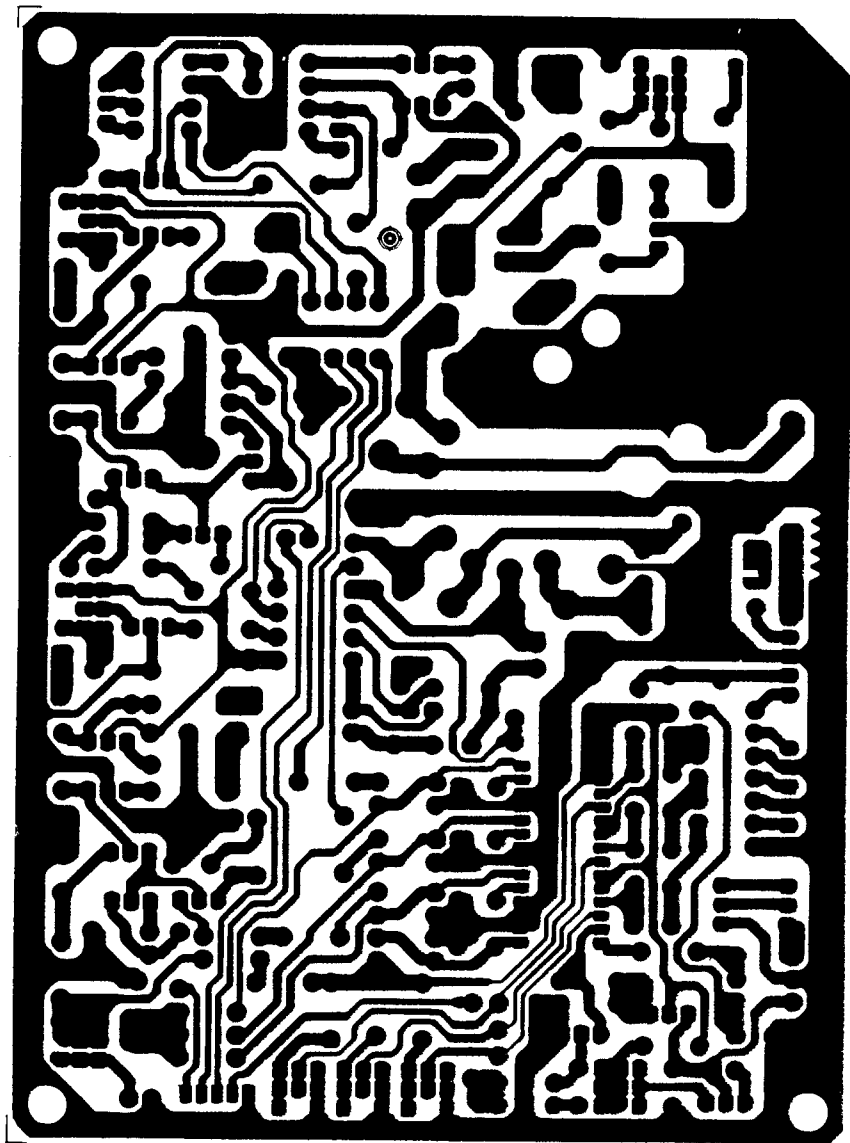


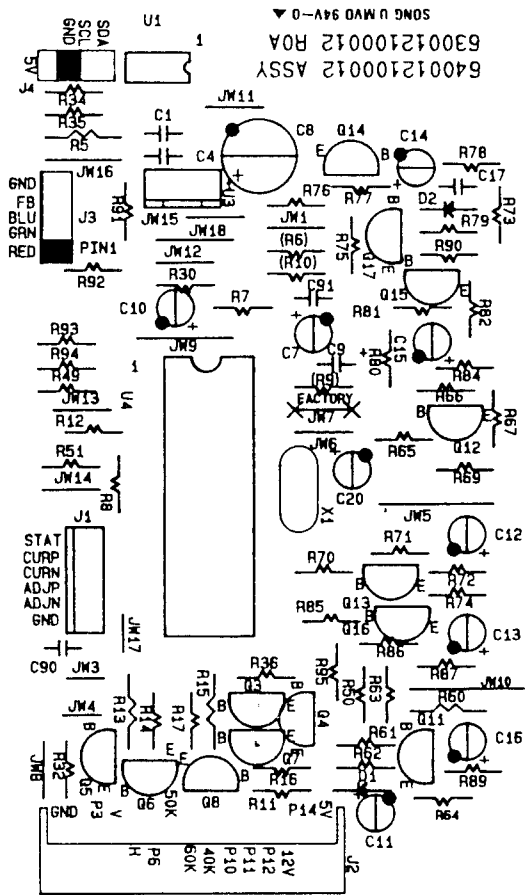




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