SERVICE MANUAL
ViewSonic
E641-2 / E41
Multiscan / Digital Control
14" Color Monitor

Table of Contents

SPECIFICATIONS

Application	A typical data display device for graphics & text PC applications
Power Input	80 watts (nominal) AC rated voltage. 100V to 264V AC
Video Signals	Analog: 0.7 Vp-p, RGB positive
Synchronization Signals	Separate Sync: horizontal/vertical, TTL, positive or negative
Synchronization Frequencies	Horizontal: 30 to 54 KHz Vertical: 55 to 90 Hz
Signal Connectors	15-pin, D-shell connector
Display Tube	14" 90 degrees, 0.28mm dot pitch, dot type black matrix, anti-static, non-glare screen
Display Area	250 x 187 mm (H x V) typical
Display Colors	Infinite
Display Characters	128 char. x 96 rows on a 8 x 8 matrix.
Maximum Resolution	Horizontal: 1024 dots maximum Vertical : 768 lines maximum
Misconvergence	A zone: ≤ 0.30 mm B zone: ≤ 0.40 mm
User Controls	Power on/off, contrast, brightness, horizontal width, horizontal phase, vertical size, vertical center, pincushion, trapezoid, memory recall, degauss
Service Controls	PWB-1325: R-bias (VR910), G-bias (VR940), B-bias (VR970) R-gain (VR 504) G-gain (VR534)

Service Controls (continued)	PWB-1312A: power voltage adjust (VR801) high voltage adjust (VR802) horizontal hold (VR408) ABL adjust (VR401) Raster centering adjust (VR402) Focus, Screen
Preset Modes	10 (see "Timing Chart" for details)
Environmental Conditions	Operation: 10°C to 35°C ambient Storage: 0°C to 55°C ambient Humidity: 5% to 95% (non-condensing) Altitude: up to 3000 m above sea level
Dimensions	382 x 370 x 429 mm (H x W x D)
Gross Weight	15 kgs
Net Weight	13 kgs

POWER MANAGEMENT

State*	LED Color	H. Sync	V. Sync	Power Consumption
ON	Green	Pulse	Pulse	Normal
STANDBY	Yellow	No Pulse	Pulse	< 15 watts
SUSPEND	Yellow	Pulse	No Pulse	< 15 watts
OFF	Amber	No Pulse	No Pulse	< 5 watts

*Note : These power-saving states are similiar to the Environmental Protection Agency (EPA) Energy Star requirements and the Video Electronics Standard Association (VESA) methodology for Display Power Management Signals.

SIGNAL CABLE PIN CONNECTIONS

Pin	Signal	Pin	Signal
1	red signal	9	no pin
2	green signal	10	digital ground
3	blue signal	11	ground
4	ground	12	SDA
5 *	NC	13	horizontal synchronization
6	red return	14	vertical synchronization
7	green return	15	SCL
8	blue return		

* This pin is used for power saving detection; at PC side, this pin has to be connected to ground.

SAFETY PRECAUTIONS AND NOTICES

Safety Precautions

1 Observe all cautions and safety related notes located inside the monitor cabinet and on the monitor chassis.

2 Operation of the monitor outside its cabinet or with the cover removed involves the risk of shock from the monitor power supply. Repair work on the monitor should not be attempted by anyone who is not thoroughly familiar with all necessary safety precautions and procedures for working on high voltage equipment.

3 Do not install, remove, or handle the picture tube in any manner unless shatter-proof goggles are worn. People not so equipped should be kept at a distance during handling of the picture tube. Keep the picture tube away from the body during handling.

4 The picture tube is constructed to limit X-radiation to 0.5mR/HR at 300 microamperes anode current. For continued protection, use the recommended replacement tube only, and adjust the voltages so that the designated maximum rating at the anode will not be exceeded.

Product Safety Notice

Many electrical and mechanical parts in this chassis have been specially inspected for safety, and the protection afforded by them cannot necessarily be obtained by using replacement components rated for higher voltage, wattage etc. Before replacing any of these components, read the spare parts list at the end of this manual carefully. The use of substitute replacement parts which do not have the same safety characteristics as those specified in the spare parts list may result in shock, fire, X-radiation or other hazards.

Service Notes

1 When replacing parts or circuit boards, clamp the lead wires around the terminals before soldering.

2 When replacing a high wattage resistor (> 0.5W metal oxide film resistor) in the circuit board, keep the resistor about 1 cm(1/2") away from the circuit board.

3 Keep wires away from high voltage or high temperature components.

4 Keep wires in their original positions so as to minimize interference.

Safety Test

Before returning a serviced monitor to customer, a thorough safety test must be performed to verify that the monitor is safe to operate without danger of shock. Always perform the AC leakage current check on the exposed metallic parts, such as screw heads, as follows:

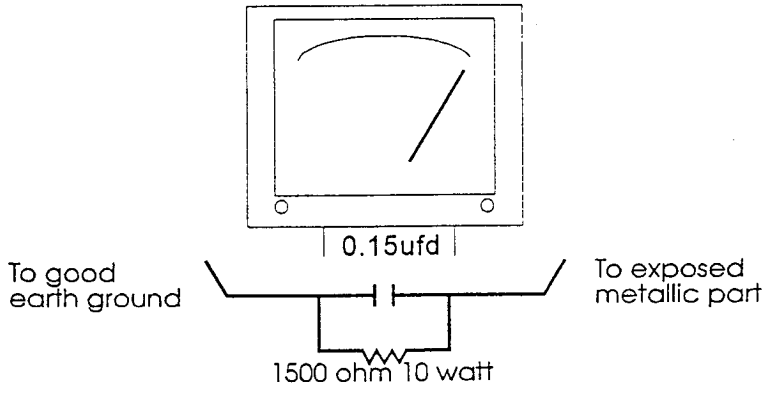
1 Plug the AC line cord directly into a rated AC outlet. Do not use a line isolation transformer during this check.

2 Use an AC voltmeter having at least 5000 ohms per volt sensitivity as follows:

Connect a 1500 ohms 10 watt resistor, paralleled by a 0.15uF, AC type capacitor between a known good earth ground (such as water pipe or conduit etc.) and the exposed metallic part simultaneously. Measure the AC voltage across the combination of 1500 ohms resistor and 0.15uF capacitor.

3 Reverse the AC plug at the AC outlet and repeat the steps for AC voltage measurements for each exposed metallic part.

4 Voltage measured must not exceed 0.3 volts RMS. This corresponds to 0.2 milli-amps AC. Any value exceeding this limit constitutes a potential shock hazard and must be corrected immediately.



OPERATION THEORY

This is a 15" full digital controlled Multi-Sync colour monitor complying with DDC1 & DDC2B plug & play VESA standard and is capable of following features:

1. Use Motorola MC68HC705BD3 processor (which has versatile digital user controlled geometry correction, contrast and brightness functions.)

   (1) Contrast
   (2) Brightness
   (3) Horiz. Size
   (4) Horiz. Position
   (5) Vert. Size
   (6) Vert. Position
   (7) Pincushion
   (8) Trapezoid

   In addition, it offers more functions as below:

   (1) Sync. processor, I/P & O/P
   (2) Horiz. F/V
   (3) Mute
   (4) Power saving (Suspend & Stand-by)
   (5) Power saving override
   (6) DDC1/DDC 2B
   (7) I^2C bus for auto-alignment through signal cable
   (8) CSO/CS1 for linearity and size compensation.
   (9) Balance/parallelogram for geometric alignment by CPU control.

2. (1) Stores 14 factory preset modes and 16 user modes.
   (2) Recall factory modes by pressing "+" & "-" buttons simultaneously.
   (3) Select parameter by "Select" button and adjust by "+" or "-" buttons. User mode data are stored automatically, but can not be recalled.

3. Powerful NEC uPC1883 which presents the following useful functions:

   (1) Pincushion
   (2) Trapezoid
   (3) Vert-position
   (4) Vert-Size
   (5) Vert. with "C" and "S" correction - not adjustable
   (6) Pincushion correction with Vert. position - not adjustable
   (7) Corner correction - not adjustable
   (8) Pincushion unbalance correction - factory adjust
   (9) Parallelogram distortion - factory adjust

4. Software controlled auto shut-off function if f H< 29KHz or f H> 56KHz

5. Full range AC input and simplified line filter design.

Deflection section

1. H/V Processor uPC1883 (NEC) I401

   The VCC 9V is regulated by Q404 from 12V to pin 16. Pin 14 of I401 is 5V reference, for the stability of peripheral circuitry, a voltage source with temperature compensation comes from this voltage and idvided by R358, R332, thru the control of Q303, R357 and Q301 to provide 4.5V DC.

   The main function of uPC1883 are:

   a. H/V sync.
   b. H/V osc.
   c. Geometry controls like *pin 1-corner setting, *pin 2-trapezoid, *pin 3-pincushion *pin 4-parallelogram, *pin 5-unbalance, *pin 8-V. size, *pin 11-vertical raster compensation vs vertical position, *pin 12-vertical "S" distortion comp., *pin 14-vertical "C" distortion comp. *pin 25-hor. position. It is an "all-in-one" processor.

2. Horizontal

   When pin 19 (H F/V) received the DC voltage from CPU thru R413, R430, R431, R410, R409, C408 and C411 to determine the H. osc, also H. sync comes into pin 17 thru R418 and C437 for AFC loop.

   H. driver (pin 18) output to Q401 via R422 and C421. The H. osc freq is determined by the DC voltage at pin 19 and pin 20 R407 VR408 setting, C406 is to fix the H. jitter.

   AFC filter contains R403, R404, C437, C404 and C403 at pin 24. The parallelogram and unbalance corrections are accomplished by pressing "Deg" and "(+)" or "(-)" when CPU in factory preset mode, and select function have been chosen in Pincushion or Trapzoid mode adjustment, then thru the inner loop in I401 pin 28 via C401 to pin 25 for horizontal phase compensation.

3. Vertical

Vertical sync from I701 pin 32 is divided by R302, R303 to about 3Vpp and coupled to I401 pin 27 thru C301. C309 at pin 6 will decide the V osc freq., C310 at pin 7 is for AGC compensation due to V size changing.

Vertical height control: PWM from I701 pin 37 is converted to a DC voltage (via R321, C312 and R324) which controls pin 8 of I401 for vertical size control. The controlled Vert. sawtooth is connected to I301 for final amplification thru pin 9 of I401.

Vertical "S" and "C" linearity are optimized by pin 12 and 13. Vertical centering is controlled by a DC from I701 pin 36 PWM to I301 Pin 7 (Vref) thru R338, R337, R333, R334, C318. At the same time, pin 7 will send a DC voltage to pin 11 of I401 to correct the trapezoid distortion due to vertical size change.

Vertical blanking: The V. blanking pulse width is decided by R332 and R358 at pin 14 of I401. The blanking pulse comes out from pin 29 of I401 (the pull-up resistor is R354, with that the O/P is Vert. blanking) thru C324, R345, R344, Q302 and couples with C327 to G1.

Pincushion and trapezoid correction: uPC1883 has built-in parabolla waveform generator and can control E-W or trapezoid correction by pin 2 or pin 3. Pin 10 of I401 will send a 0.7Vpp parabolla wave thru R347 to OP Amp. I302 and get 12Vpp O/P after amplification. This amplified waveform will be coupled to diode modulator thru C326 for final E-W trpazoid control.

4. Vertical O/P I301

Pin 1 of I301 receives a sawtooth voltage from pin 9 of I401 thru R339. To have quick vertical flyback time, a retrace pulse is generated by D301 and C322 between pin 3 & 6 of I301. The V. yoke winding will be damped by R342, R341 and C323 to have smooth flyback waveform.

I301 uses positive/negative 12 volts sources and the center DC voltage at pin 7 is around 1 volt for no DC centering shift. The V. centering shift will be obtained by changing the DC voltage level at pin 7 of I301 thru the control loop formed by R337, R333, R334 and I701 pin 36 PWM.

5. E-W Trapezoid and H. Width Controls

The H. O/P stage uses diode modulator with D409, D431, C416, C420 (& C444), L402 and H. Yoke of Hor. scan section and with D411, C417, L401, C418 of controlled section. The scan current (yoke current) is determined by B+ - Vm (Vm: controlled DC at C418) values and the pincushion control is accomplished by Q422, Q410 current amplifiers by coupling a parabola waveform from C326/I302. The DC control level is set at the base of Q422 thru I302, Q407 and controlled by pin 1 I701 PWM thru R446.

The DC and parabola levels are amplified thru Q407, Q422 and Q410 to R411 for H. size/pincushion control to diode modulator control section in the manner of the larger current thru Q410/L401 the smaller the H. size.

The H. width is controlled by PWM pin 1 I701 thru R444, C430, R446 to the I/P of I302. One additional loops are added to compensate the H. scan when H. Freq > 33KHz by pin 21 (CS 1) of I701 thru D420, R448 to noninverting I/P of I302.

Divider of R450, R451 sense B+ (mode depending) to compensate the H. size tolerance variation in different modes.

6. Contrast Control and ABL

When the picture becomes brighter, it means the anode current of CRT increases. In order to prolong the life of CRT, it is necessary to limit the beam current by ABL function. The beam current flows from 12V B+ via R435, VR401, R434, R445, flyback H.V. windings to the anode of CRT. When the anode current increases, the voltage drop accross R435, VR401 increases and voltage on C428 decreases accordingly.

The variation on C428 is sensed by R597/Q592 base to reflect the beam current changes. i.e. when the beam current is large to cause C428 drop enough, the conduction on Q592 increases and the contrast DC level drops to reduce the video gain and the ABL function completed.

The PWM from pin 3 of I701 control Q591 base thru R594, C592, R5A6 and R595. The conduction degree of Q591 will decide the contrast control value to the pin 13 of I501. By the auto-alignment, the proper limited values will be obtained and stored at E^2PROM to make sure the contrast level being consistent in every set.

7. X-ray protection

   To avoid X-ray hazard, a DC voltage on R420 which is proportional to HV. is generated from FBT pin 5, thru D412, C431 and divided by R419, R420. When this voltage is higher than zener voltage of ZD401, then Q414, Q413 combination will be activated to shutdown the 12V supply by turning off Q804 and Q806. After that all deflection circuitry stop working.

Power supply section

1. AC Rectifier: The circuit can accept 90V to 264V AC input through D801 -- D804 bridge diodes and C808 filtering to get DC 126V -- 364V for power conversion in T802.

2. The line filter consists of C801, C802, C803, C816 and T801 and meets EMI regulation.

3. Power LED's Status:

   3-1. The LED has 3 leads common cathode with green and amber colors for different power saving indications. Amber LED is supplied from line I/P thru rectifier D828 and R862. Green LED is supplied by SMPS auxiliary winding of T802 thru D806, R864.

   3-2. Normal: Green Light

   Amber LED is off because Q801 is turned on by sync pulse from FBT to shunt the current from R862, and Green LED is turned on by SMPS.

   3-3. Standby/Suspend: Yellow Light

   In the case of no FBT pulse, the amber LED is lighted by AC I/P. Green LED is on, the color is combination of Green and Amber.

   3-4. OFF: The amber LED is lighted by AC I/P, the amber light only.

4. Auto Degaussing:

When SMPS works, the 6.3V power source is applied to Q802 and the initial CPU will send a few seconds voltage from pin 28 of I701 to Q802 base. So Q802 will turn on to drive the armature of RL801 to perform the degaussing function. During the monitor power on and CPU pin 28 in Auto degaussing function.

5. PWM control

5-1. Start up:

The I801 gets power from R805, R809, C812 and Pin 7 voltage reaches 16V for starting up. The I801 starts oscillation at 22KHz, saw-tooth on Pin 4 and pin 6 output to drive Q803/T802. Once Q803 switchs on, D806, C804 set up an 17.3V to keep I801 working through D808 auxiliary voltage.

5-2. Regulation:

The DC D/P voltage is proportional to the auxiliary voltage, so I801 Pin 2 senses the feedback voltage from the divider R808, VR801 and R821 to compare with built-in 2.5 volts reference voltage for error amplifier operation. Finally Pin 6 can modulate the different duty cycle by VR801 setting to achieve regulation purpose.

6. Synchronization:

6-1. Normal Mode:

Sync pulse from FBT (31KHz – 54KHz) via C815, R817, D809 & R816 to Pin 4 of I801 to keep I801 synchronized with horizontal sync input frequency.

6-2. Power Saving Modes: Stand By/Suspend

Because there is no pulse from FBT, so the free-run freq. is decided by R815 and C814 and the SMPS works at 22KHz.

6-3. Override:

The Hor. free run frequency is about 51KHz under override condition, SMPS is synchronized to this frequency.

7. O.V.P. If the auxiliary voltage is higher than zener voltage ZD807 (20 Volts) and makes Pin 3 of I801 higher than 1V, Pin 6 duty cycle is limited to have the OVP activated.

8. O.P.P. The excess current of T802 through R813 can develop enough voltage to Pin 3 then limit the power delivered because the Pin 6 duty cycle is limited too.

9. Power Saving:

   9-1. Stand By / Suspend mode is detected by I701(CPU), then pin 19 sends "low" level signal to turn off Q806 and cut off 12V source. Under this condition only the heater takes power.

   9-2. Override: When signal cable is connected to PC, Pin 10 of I701 is grounded and power saving works normally. But when the signal cable is disconnected from PC, the 5V source via R828 and CPU will be detected by pin 10, and pin 19 of I701 will send a high level to turn on Q804 and Q806 which operates like ON mode.

10. Step Up power supply for FBT:

    10-1. The 12 volts source from T802 to I802 Pin 7 through Q806 is for starting up. The sync signal from T402 Pin 5 via R836, D817, R858, C831 and C835 to Pin 4 of I802 for synchronization. Without it, the step-up converter can't work.

    10-2. The regulation and boost up (from 86V to 142V or more, on demand).

    The H.V. is set at 24.5KV (zero beam) by VR802 which senses the secondary O/P from FBT. The booster comprises Q807, L803, D824, C839 and I802 to offer the required B+ for different H. sync modes.

Video Amplifier Section

R.G.B. signal input are terminated by R501, R531 and R561, then pass thru the coupling capacitors C501, C531 and C561 to the IC501 KA2139S pre-amplifier.

The amplified R.G.B. signals (0--3Vpp) are adjusted by VR504(R), VR534(G). Pin 13 is for DC contrast control input, Pin 15 is for clamp pulse to set up the equal clamp level.

The video output stages are cascode amplifiers with buffer of complementary emitter followers, the stray capacitance is so small that the load resistor R906, R911, R936, R941, R966 and R971 can be 3.3K ohm and the power dissipation is minimized.

The R.G.B. cathodes cut off are adjusted by VR910, VR940 and VR970 with DC feedback to the end of R.G.B. clamp(+) (pin 20, 16 and 25) to keep the black level stable and proper raster white balance adjustment.

Under override condition, the self test signal is supplied by 12V source thru R5A1, C596, R5A2, L570, and formed by Q501 with horizontal rate (ie. the Hor. free run frequency) on main board. On video board the signal is clipped by D501, D502 (R) D531, D532 (G) & D561, D562 (B) to limit the self test signal level. When signal cable is connected to PC, D595 will shunt collector of Q501 to ground and no more self test signal.

Microcontrol Section

CPU uses Motorola MC68HC705BD3 CPU, it has 14 PWM O/P s, 8 I/O in port A, 6 I/O in port B, 2 ports for I^2C and H/V sync I/O processor. The VDD 5V is regulated by Q810 from SMPS 12V, I702/I705/I706 use this power source too. When H/V sync thru D-Sub signal cable P302 enters pin 39 & pin 40, the CPU makes frequency polarity detection and calculation and send H.F/V to PWM port, then reads the suitable data (mode, size etc.) from I702 (E^2PROM) and writes to each PWM ports (size, phase, pin , trap, contrast, bright, DPM, mute..etc), the above operation takes about 500ms. R703, ZD701, Q701, Q702 and D706 comprises a B+ reset circuitry for CPU. This circuitry will guarantee the CPU to work without error in disturbed B+ conditions.

The function controls are available at control key that connect to pins 12, 13 and 14. After applying the signals for 500ms to complete the judgement, CPU will send H F/V modulated signal from pin 27 to IC UPC 1883 to determine osc freq. About 100ms later, CPU will send H/V sync signals from pin 33/32 to uPC1883 for synchronization, 100ms later, pin 31(mute) will be high to show up the picture. When CPU detects the power saving modes in freq, pin 19 will be "low" to turn off

Q804 & Q806 and makes the monitor in power saving condition to save power. Pin 24 (SDA), pin 25 (SCL) are I^2C pins for DDC1/DDC2B or auto-aligmnent purposes. After alignment, the data will be stored at I702 24C04 (E^2PROM) thru pin 23 and 29 and to be read (recall) by CPU as needed. The CPU uses 4.2MHz crystal for timing sequence control.

There are 8 parameters controlled by digital data, these are Contrast, Brightness, H.size, H. phase, V.size, V.center, Pincushion, and Trapezoid. The factory preset modes are recalled by pressing "+" and "-" buttons simultaneously. The user control parameters are selected in sequence listed above by pressing the "Select" button in front panel, the selected parameter is indicated by an illuminated LED., press "Select" to shift the parameter leftward. When a particular parameter is chosen, use "+" and "-" button to adjust the value, LED will flash when reaching extreme value, which means the value cannot be increased or decreased anymore, when the adjustment is finished, press "Select" to choose next parameter. When all adjustment have been completed the user data can be stored into memory automatically after 3 sec. and LED extinguishes after 30 sec. if no any button is pressed.

Factory preset

To enter factory preset state, set S702 switch to alignment mode and press "+" "select" buttons simultaneously when switching the power "ON". The monitor will go into factory preset mode and alignment data of the chosen parameter will be saved in factory preset area for future recall.

** Please switch S702 to normal mode when the alignment is finished.

ALIGNMENT AND ADJUSTMENT

Adjustment Conditions

Power supply: Apply AC 115V or 220V

Warm-up time: The monitor should be powered on for at least 15 minutes before any adjustments are made, except for convergence, which 30 minutes are required.

Signal input:

1. Video — RGB Analog, 0.7Vp-p, positive
2. Synchronization — Horizontal and vertical separate, positive or negative
3. All adjustments should be made using a signal of FH= 31.468 KHz Fv= 60 Hz, unless otherwise defined.

Adjustment Equipment

- Volt-ohm-A meter (Sanwa FD-750C or equivalent)
- 30KV high voltage probe (HP34111A)
- Oscilloscope (TEK2235 or equivalent)
- Minolta Color Analyzer II
- Signal generator (IBM PC with proper display cards or Chroma 2000)
- Screwdriver

Switching Power Supply and Regulator Adjustment

The regulated B+ control has been pre-set in the factory and needs no adjustment. However, if any repairs are made on the power supply section, the following readjustment procedures are recommended.

1 Allow the monitor to warm-up for about 15 minutes.

2 Apply VGA (31.468KHz/60Hz) signal to the monitor.

3 Connect a DC meter to **D814** cathode (on the main PCB), and adjust **VR801** for 12 ± 0.1V DC.

4 If a fuse is broken during adjustment, remember to replace it with the exact same type of fuse.

Alignment Procedures

A High Voltage Adjustment

Input signal: Cross Hatch Pattern

Connect DC meter to **TP2 and adjust VR802** to obtain a DC voltage of:
- 155 ± 1V DC

B Horizontal Hold Adjustment

Input Signal: Cross Hatch Pattern, 640 x 480/60Hz mode

Ground TP3, adjust **VR408** to get a synchronized picture, check 1024 x 768, 48K/60Hz mode must be synchronized.

C Screen And White Balance Adjustment

Input Signal: Cross Hatch Pattern

Adjust external pincushion control so that the trapezoid distortion is minimum,

Drive VRs: VR504, VR534
Bias VRs: VR910, VR940, VR970

Input Signal: No video

1a Set Brightness to -40V at G1 by pressing brightness key.
1b Adjust screen VR to 1 FL.
1c First, adjust VR940, VR970, VR910 to minimum position
Second, adjust VR970 so that Y= 0.280
Then, adjust VR910 so that X= 0.280

Input signal: 50mm x 50mm white block pattern

2a Set Brightness to cut-off (- 40V at G1) & Contrast to 25 FL
2b First adjust VR534 so that Y= 0.311
Then adjust VR504 so that X= 0.280

3a Set Brightness to -40V at G1 & Contrast to maximum.
3b Adjust screen VR to just before the raster disappears.
3c Adjust contrast function key to 48 ± 2 FL.

Input Signal: Full White Pattern

4a Set Brightness to cut-off & contrast to maximum.
4b Adjust **VR401** to 28 ± 1 FL.

5a Check the white balance in the VGA mode at 5FL and 25FL.
5b Repeat steps 1a to 5b until the best white balance is obtained

Note For EQ version the color point should be set to x= 0.281, y= 0.311

D Focus Adjustment

Input signal: Character "e" pattern

1 Set Brightness & Contrast for a normal display.

2 Adjust the focus control at the high voltage resistor block to obtain the best focus over the entire display area.

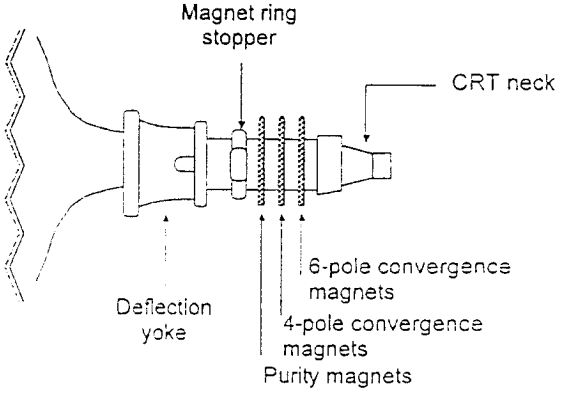
E Static Convergence Adjustment

Note The monitor should be operated for at least 30 minutes before any convergence adjustments are made.

Input Signal: Cross Hatch Pattern

1 Set Brightness & Contrast so that a well-defined pattern is obtained.

2 Ensure that the convergence magnets on the CRT are in the correct position.



3 Turn the 2 tab of the 4-pole magnets independently to adjust their angles. Align the red & blue vertical lines at the center of the screen.

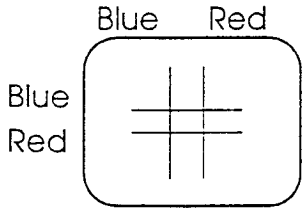
4 Turn the 2 tabs of the 4-pole magnets simultaneously to keep their angles constant. Align the red & blue horizontal lines at the center of the screen.

5 Turn the 2 tabs of the 6-pole magnets independently to superimpose the red or blue vertical line on the green one.

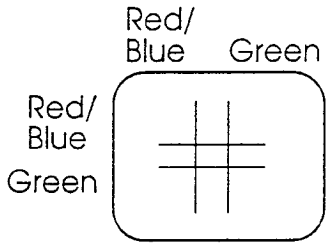
6 Turn the 2 tabs of the 6-pole magnets simultaneously to superimpose the red or blue horizontal line on the green one.

7 Repeat steps 3, 4, 5 & 6 until the best convergence is obtained.

Note The 4-pole magnets & the 6-pole magnets interact, making dot movements complex.



4-pole magnets movement



6-pole magnets movement

F Degaussing

Degaussing is required when poor color purity appears on the screen. This monitor uses an automatic degaussing circuit that is activated at power on. Automatic degaussing will be fully functional within 15 minutes.

The degaussing effect is confined to the picture tube since the coils are mounted at the front of the tube. Should any part of the chassis or cabinet becoming magnetized, it will be necessary to degauss the affected area with a manual degaussing coil.

A manual degaussing function is also equipped which can activate the degaussing at any time.

Manual Degaussing

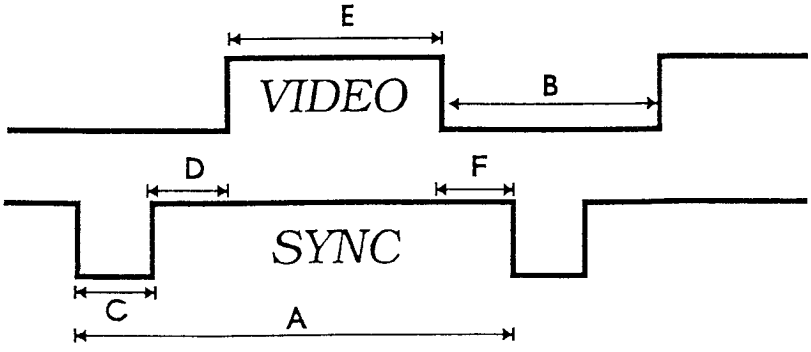
1 Apply line voltage to the degaussing coil and move it in a rotary motion over the front, sides , and top of the monitor. The coil should be kept away from the rear of the monitor to avoid damaging the magnetic neck components.

2 Slowly rotate and move the coil away from the monitor to about 6 feet beyond the point where no effect on the CRT will be noticeable.

For proper degaussing, it is essential that the field be gradually reduced by moving the coil slowly away from the monitor. The degaussing coil must never be shut off or disconnected while near the monitor, as this would introduce a strong field instead of canceling the effect of the stray fields.

TIMING CHART

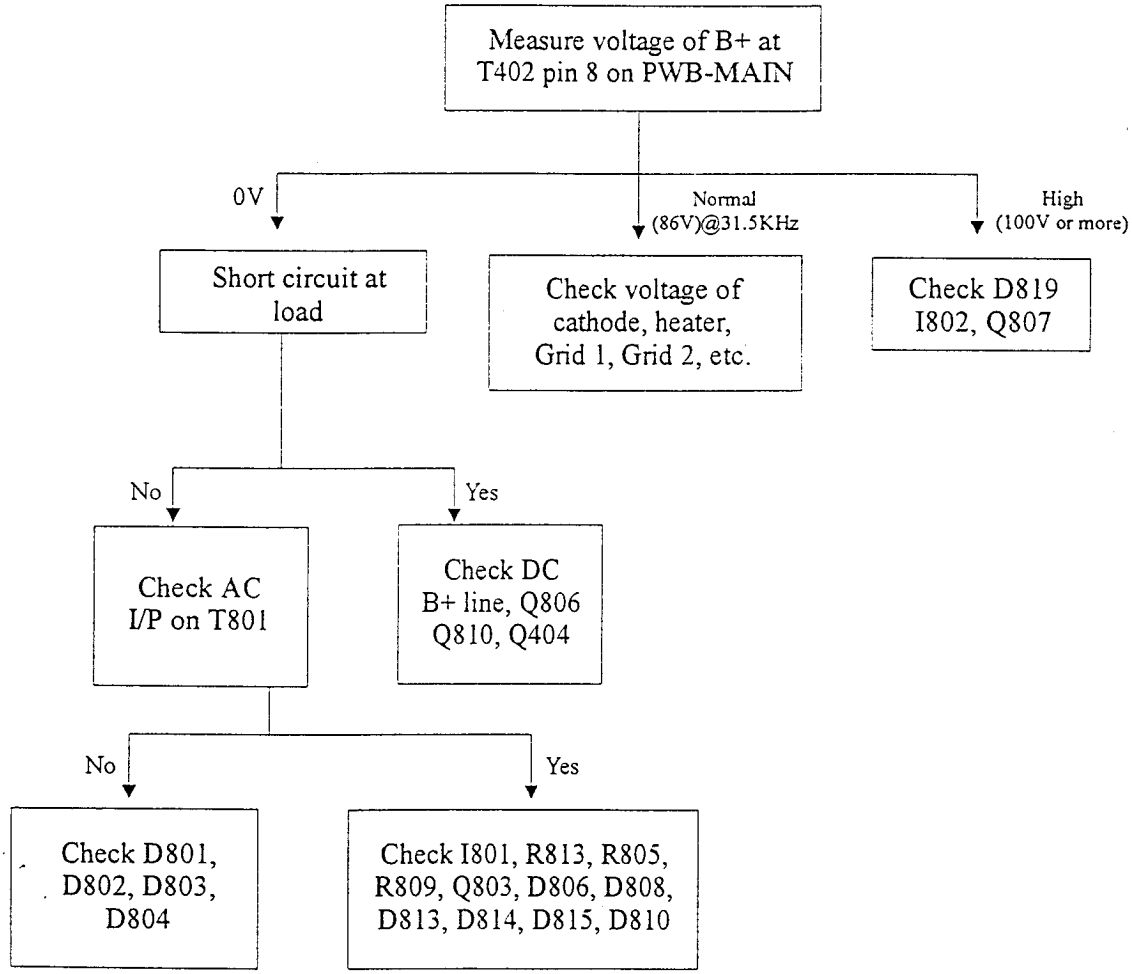
Mode	1	2	3	4	5
Hori. Dots	640	640	640	640	640
Vert. Lines	400	480	480	480	480
Hori. Freq. (KHz)	31.47	31.47	37.5	43.3	35
Sync. Polarity	NEG	NEG	NEG	NEG	NEG
A Period us	31.78	31.78	26.666	23.111	28.57
B Blking us	6.356	6.356	6.35	5.333	7.41
C Sync. us	3.81	3.81	2.03	1.556	2.12
D B.P. us	1.907	1.907	3.81	2.222	3.18
E Active us	25.42	25.42	20.32	17.778	21.16
F F.P. us	0.636	0.636	0.51	1.556	3.18
Vert. Freq. (Hz)	70.08	59.94	75	85	66.67
Sync. Polarity	POS	NEG	NEG	NEG	NEG
A Period ms	14.27	16.68	13.33	11.764	15
B Blking ms	1.557	1.43	0.533	0.67	1.286
C Sync. ms	0.064	0.064	0.08	0.069	0.086
D B.P. ms	1.112	1.048	0.427	0.578	1.114
E Active ms	12.71	15.25	12.8	11.093	13.71
F F.P. ms	0.413	0.318	0.027	0.023	0.086



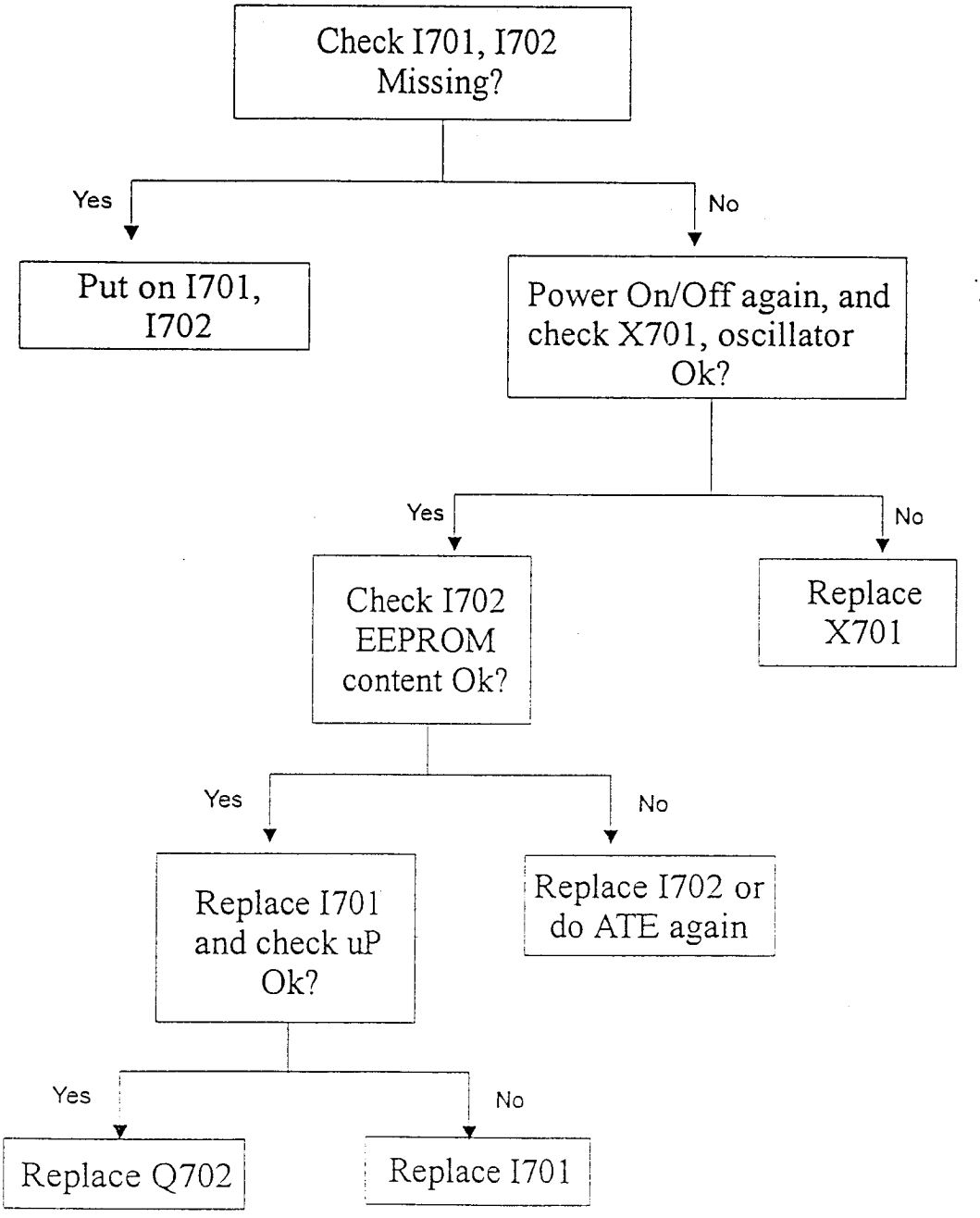
Mode	6	7	8	9	10
Hori. Dots	800	800	800	832	1024
Vert. Lines	600	600	600	624	768
Hori. Freq. (KHz)	48.08	46.875	53.674	49.7	48.36
Sync. Polarity	POS	POS	POS	NEG	NEG
A Period us	20.8	21.333	18.6	20.11	20.677
B Blking us	4.8	5.172	4.409	5.58	4.923
C Sync. us	2.4	1.616	1.138	1.12	2.09
D B.P. us	1.28	3.232	2.702	3.91	2.462
E Active us	16	16.162	14.222	14.53	15.75
F F.P. us	1.12	0.323	0.569	0.56	0.369
Vert. Freq. (Hz)	72.18	75	85	75	60
Sync. Polarity	POS	POS	POS	NEG	NEG
A Period ms	13.87	13.333	11.8	13.42	16.67
B Blking ms	1.373	0.533	0.578	0.87	0.786
C Sync. ms	0.125	0.064	0.056	0.06	0.124
D B.P. ms	0.478	0.448	0.503	0.784	0.6
E Active ms	12.51	12.8	11.179	12.55	15.88
F F.P. ms	0.770	0.021	0.019	0.02	0.062

TROUBLE SHOOTING CHART

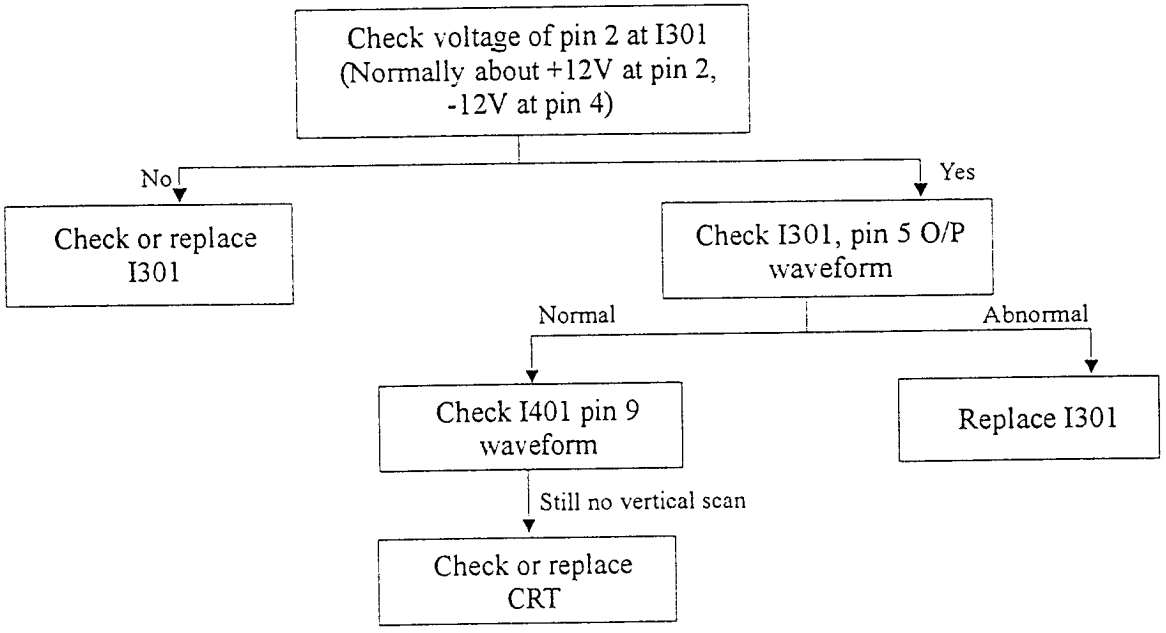
No Raster



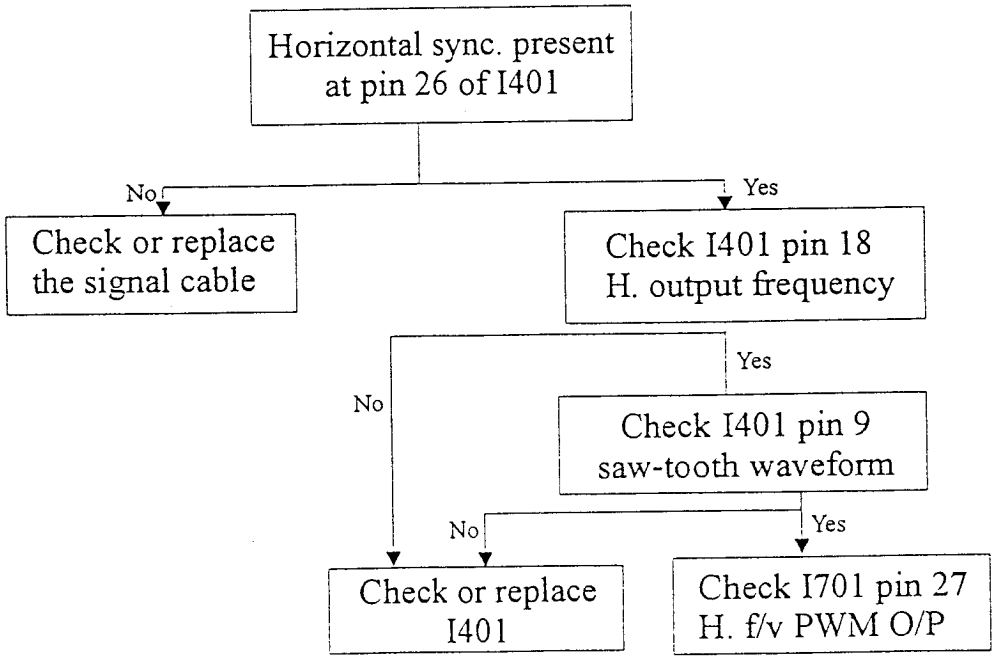
Function Key and LED Abnormal



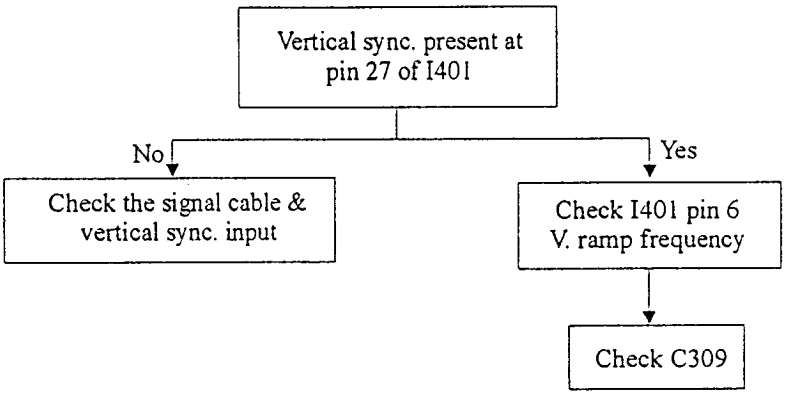
No Vertical Scan (Raster is one horizontal line)



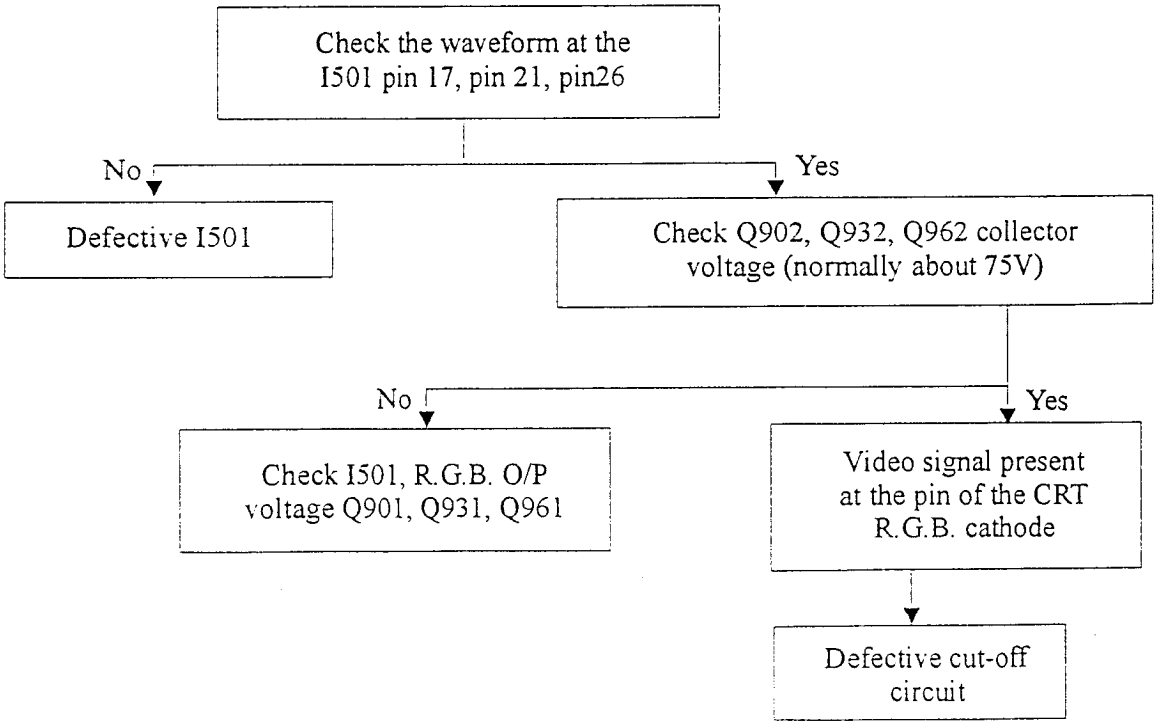
Out of Horizontal Synchronization



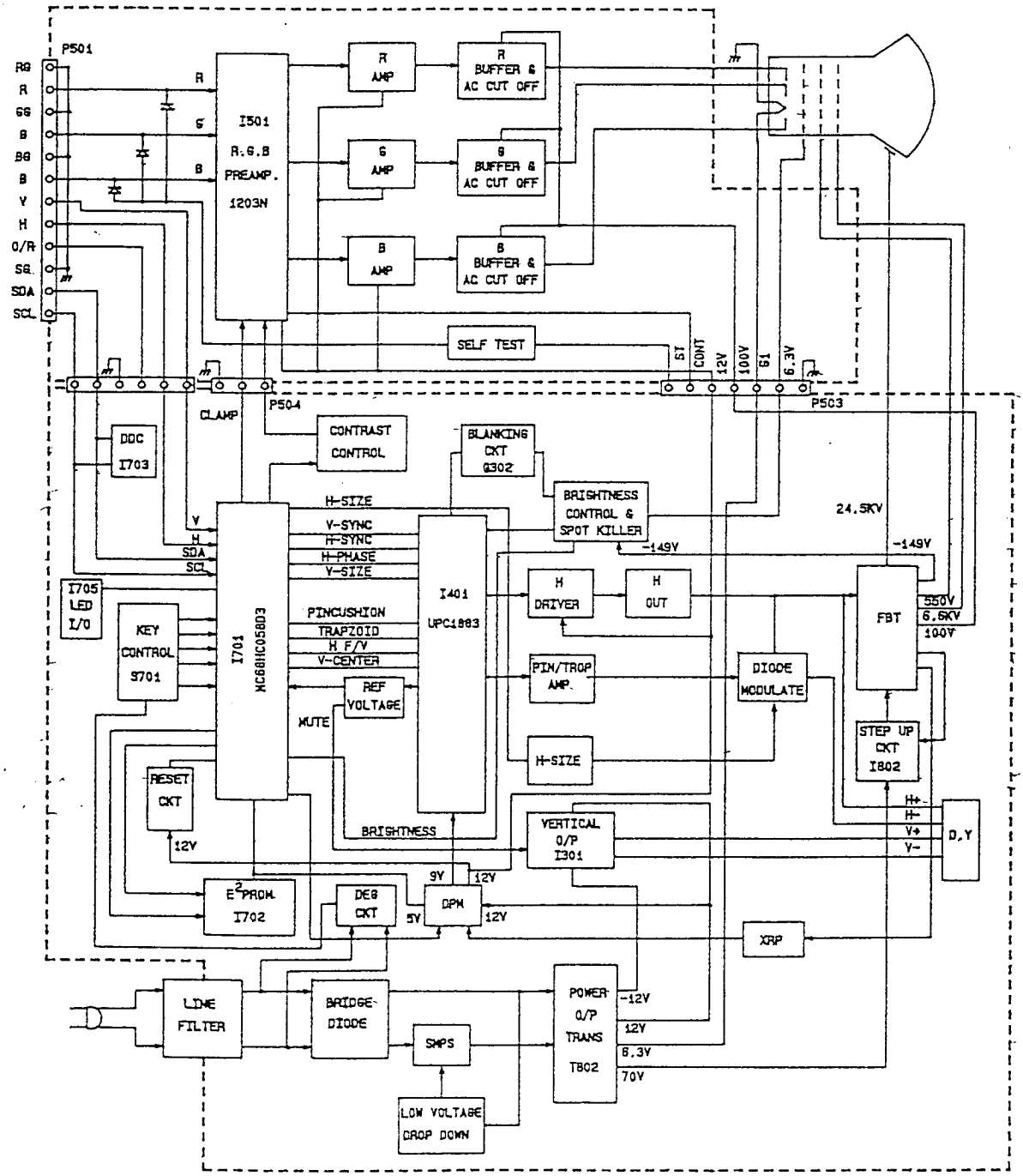
Out of Vertical Synchronization



R. G. B. Video AMP Abnormal



BLOCK DIAGRAM



SPARE PARTS LIST

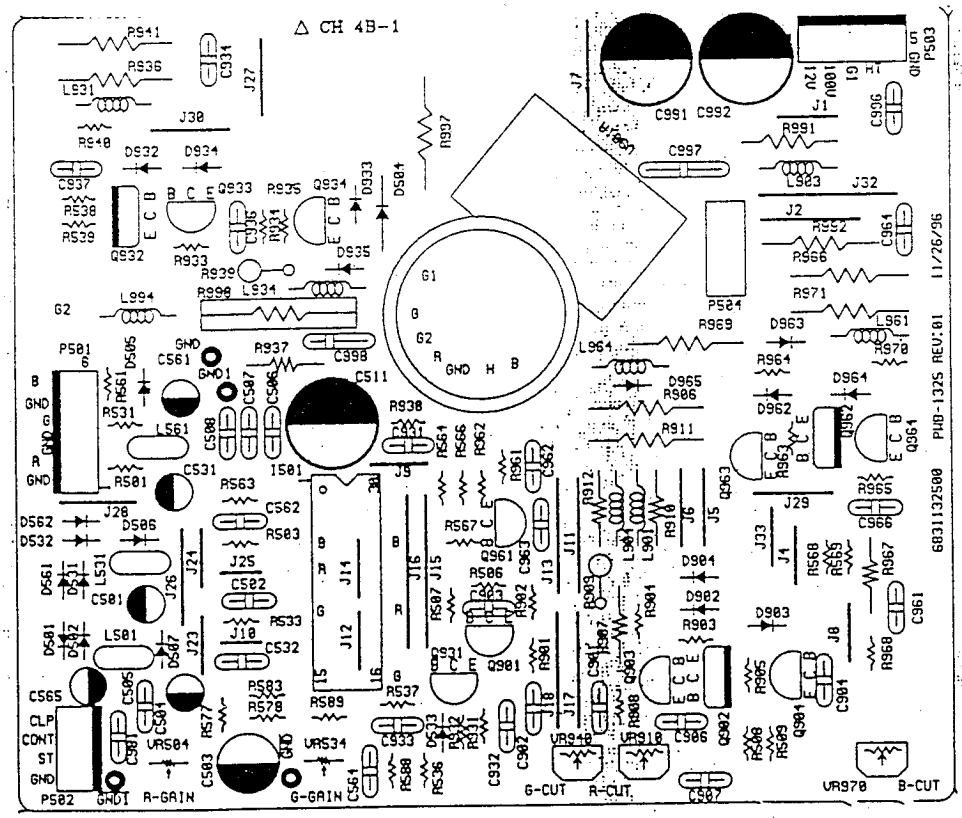
Location	Part Number	Description
00000	5197700738	CRT BD VSC1454NEL
VR504	6242201101	VR,OHM,200,0.1 W,SA,B,6D,F
0C991	6312247002	ALU uF 47 160V F 85C 13X25
0C997	6335533115	CD,PF,330,1000V,Y5P
0C998	6336510307	CD uF 0.01 1000V M Z5U
0D504	6412011404	DIODE 1N4937 T26 1A/600V LITEON
0I501	6442000510	IC MM1203SD 30P MINI TYPE
0J002	6881000377	BEAD CORE R35X7.5X0.8 T52
0J005	6881000387	BEAD CORE K5B RH 3.5X8X0.8 T52
0P501	6611060010	PLUG 6P 2.5MM IL-G-6P-S3T2-E
0P502	6611040031	PLUG 4P 2.5 JST-B4B-XH-A
0P503	6611050021	PLUG 5P 2.5 IL-G-5P-S372-E
0Q901	6422002105	TR NPN 2SC 1906
0Q902	6421001500	TR NPN KSC3953-D
0Q903	6424000025	TR PNP BF423(TPE2)
0Q904	6421002805	TR NPN KSC1845-P-TA (SAMSUNG)
Z801	6852501137	SPARK GAP DSP-501M-A21F T52
00000	5197801775	MAIN BD VSC1454NEL
LD701	6418001300	LED LTL-4231NHA 2.9D & HOLDER
LD801	6418001400	LED LTL-30EDJHA 5DIA & HOLDER
S702	6853000803	SW SLIDE
RL801	6854000140	RELAY JW2aHN-DC6V/AJW55103
ZD301	6414240004	DIODE ZNR HZ24-2TD 24V T26

Note: The components identified by mark "⚠" are critical for X-radiation safety. Replace only with same parts specified.

Location	Part Number	Description
ZD401	6414063004	DIODE ZNR UZL-6H3TA 6.3V T26
ZD403	6414100014	DIODE ZNR MTZJ T-77 10B T26
ZD701	6414036024	DIODE ZNR MTZJT-77 3.6A
ZD801	6414180004	DIODE ZNR MTZJ T-77 18C T26
ZD807	6414200014	DIODE ZNR MTZJ T-77 20B T26
0C309	6356133455	MEM,UF,0.33,50V,J,T
0C326	6356110555	MEM,uF,1,50V,J,T
⚠ 0C416	6325441223	PPS,pF,4100,2000V,G,F P= 22.5
⚠ 0C417	6322310352	PPN uF 0.01 400V J F P= 10
0C418	6321110552	MEF,uF 1.0,100V,J,F,P= 15
0C419	6338410215	CD PF 1000 500V K X7R T
0C420	6326330452	MPP uF 0.3 400V J F P= 22.5 TAI
0C423	6335468115	CD,PF,680,500V,K,Y5P,T
0C426	6312347002	ALU uF 47 200V F 85C 13X25
0C443	6357147255	PEM,PF,4700,50V,J,T
0C444	6326218452	MPP uF 0.18 250V J F P= 15
0C801	6302147202	CD,pF,4700,400VAC,M,SC,P= 10,Y
0C803	6328247409	X2MEF,0.47uF,250V,X-CAP
0C805	6335547115	CD,pF,470,1000V,K,Y5P,T
0C807	6302447202	CD pF 4700 400V M SC P= 10 Y TD
0C808	6312622126	ALU uF 220 400V F 85C 25X31
0C813	6335182115	CD,pF,820,50V,K,Y5P,T
0C814	6357147255	PEM,pF,4700,50V,J,T
0C837	6338547115	CD,PF,470,1000V,K,Y5P,T
0D409	6412005137	DIODE BYW96E-113 3A/1KV
0D801	6412010907	DIODE LT2A06 T52 2A/800V

Location	Part Number	Description
0D810	6412010707	DIODE BYM26B T52 2A/400V
0D813	6412012800	DIODE 31DF6 3A/600V 35nS
0D813	6412000520	DIODE RL4A 3A/600V 50NS
0F801	6851504050	FUSE TIME LAG H-BRK 4A/250V
0I301	6442006200	IC TDA8172 7P
0I302	6442005900	IC LM324 14P
0I401	6448007200	IC uPC1883CT 30P PLASTIC DIP
0I701	6448009200	IC LSC435129 40P (MASK)PDIP
0I702	6448007900	IC 24C04A/P(MICROCHIP)
⚠ 0I801	6442002500	IC SG3842M 8P
⚠ 0I802	6442006720	IC KA3843B
0I803	6442001200	IC 4N35 6P(MOTOROLA)
0I804	6442011600	IC WT8048N5 8P PDIP(WELTREND)
0L401	6111155134	COIL CHOKE 150uH P3B DRWW14X15
⚠ 0L402	6119004100	COIL LINEAR
0L803	6111155172	COIL CHOKE 150uH K DRWW 10X16LI
0Q301	6421000325	TR NPN 2SC1815YTPE2
0Q401	6421002705	TR NPN KSD1616A-G-TA TO-92 TAP
0Q402	6421001300	TR NPN 2SC5150
0Q403	6422002905	TR NPN BF422 TAPING (TOSHIBA)
0Q404	6421001405	TR NPN KSC2328A T/B TAPPING
0Q404	6421000265	TR NPN 2SC2236-Y(TPE6) TOSHIBA
0Q406	6421001405	TR NPN KSC2328A-Y-TA
0Q406	6421000265	TR NPN 2SC2236-Y(TPE6) TOSHIBA
0Q410	6422006000	TR NPN 2SD2012 TO-220 (IS)
0Q413	6423000115	TR PNP KSA733C from KSA1015-U-TA

Location	Part Number	Description
0Q416	6426001800	FET N-CHNL IRFS630 TO-220F
0Q422	6423000015	TR PNP 23A1015(TPE2) TAPING
0Q803	6426001000	FET N-CHNL SSS6N60 (SAMSUNG)
0Q806	6423000035	TR PNP 2SA965-Y TAPING
0R313	6212110254	CF KOHM 1 1/4W J T26 MINI
0R326	6224111024	MF KOHM 11 1/8W F T26
0R330	6224190914	MF KOHM 9.09 1/8W F T26
0R450	6221268352	MOF KOHM 68 2W J HOR
0R453	6221251252	MOF,KOHM,5.1,2W,J,HOR
0T402	6133048230	FBT SAMPO
0T802	6131041800	POWER X'FORMER
05C02	7748704600	CABLE BRACKET


△ CH 4B-1
PHD-1325 REV:01 11/26/96
6831132500
R-GAIN
G-GAIN
G-CUT
R-CUT
B-CUT