

CONTENTS

Specifications	1
Disassembly Instructions	2
Theory of Operation	3
Location of Controls	4
Electrical Adjustments	5
Timing Char	8
Troubleshooting Guide	10
1. NO POWER	10
2. NO RASTER	11
3. PICTURE OR COLOR MISSING	12
4. H.V. SYNC IS ABNORMAL	13
5. 31K AND 35K MODE CHANGE IS ABNORMAL	13
6. ABNORMAL BLANKING	14
7. NO VERTICAL SCAN OR VERTICAL SIZE CAN NOT ADJUST	14
Video Waveforms	15
Block Diagram	18
IC/Transistor Block Diagrams	20
PCB Views	21
Schematic Diagrams	23
Exploded View/Parts List	24
Electrical Replacement Parts List	25

Specifications

* Picture Tube:	Size and Deflection: 14" diagonal & 90 degree
	Dot Pitch : 0.28/0.39/0.42mm
	Phosphor : P22
* Input Signal:	a.Video : Analog
	b.Sync : Separate TTL level
* Scanning Frequency:	a.HOR : 29 - 38 KHz
	b.VER : 47 - 100 Hz
* Display Area	a.HOR : 250 ± 5 mm (VGA 640x480)
	b.VER : 180 ± 5 mm
* Bandwidth:	45 MHz (-3dB)
* Resolution:	1024 X 768 (interlace)
* Power Source:	Auto- Switching regulator 100 - 240 Vac 50/60 Hz
* Power Consumption:	80 W (MAX)
* Input Connector:	D-15 PIN
* Display Color:	Limited only by the video display adapter.
* Front Control:	Power SW/Brightness/Contrast/H-Phase/H-Width /V-Center /V-Size
* Rear Control:	T-DIST/SPCC/Screen/Focus
* Environment:	a.Operating Temperature : 0°C to 40°C Humidity : 20% to 80%(relative)
	b.Nonoperating Temperatur: -20°C to 65°C Humidity : 10% to 85%(relative)
* Dimensions:	364mm(W)x371mm(H)x383mm(D)(With Base)
* Weight:	Approx.12 Kgs(NET)

TRL CX469

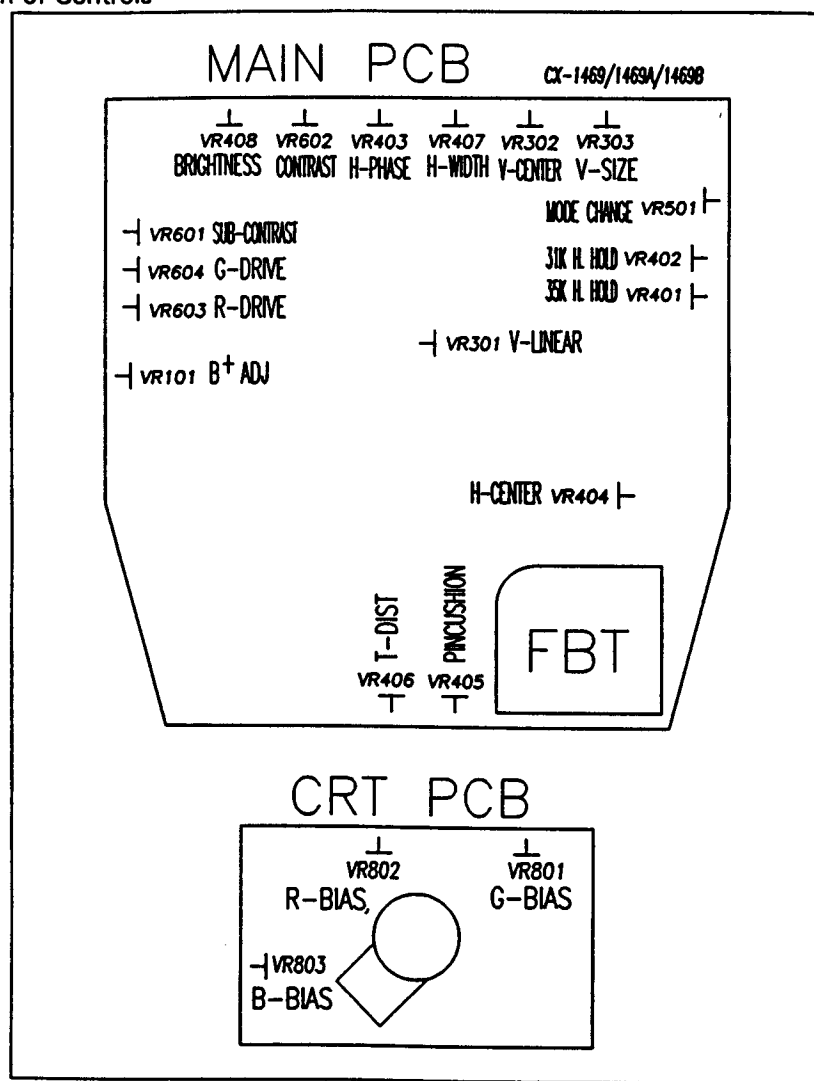


Figure 4

Display Mode:		
MODE 1: 640x350 31KHZ	MODE 4: 1024x768 35KHZ	MODE 7: 720x400 37KHZ
MODE 2: 640x400 31KHZ	MODE 5: 640x480 35KHZ	MODE 8: 800x600 35KHZ
MODE 3: 640x480 31KHZ	MODE 6: 640x350 37KHZ	MODE 9: 800x680 37KHZ

1. B+ (94V) ADJUSTMENT (VR101)

- (1). Set the monitor to MODE 3 (31KHZ)
- (2). Turn Brightness and contrast controls to full clockwise position.
- (3). Connect Digital Voltmeter between B+ and GND.
- (4). Adjust B+ to 94V ($\pm 0.5V$) by turning VR101.

2. HORIZONTAL HOLD ADJUSTMENT

- (1). Set the monitor to MODE 3 (31KHZ).
- (2). In the 31KHZ mode, measure the output waveform of IC502 (LM555), Pin 3. (TP3)
- (3). Adjust VR501 until $T = 2.5 \mu S (\pm 0.5 \mu S)$. (See Fig 5)



Figure 5

3. B+ CONFIRMATION

- (1). Connect Digital Voltmeter between B+ and GND
- (2). Confirm :
 - B+ = 94V $\pm 0.5V$ (31KHZ MODE)
 - B+ = 107V $\pm 1V$ (35KHZ MODE)

4. HORIZONTAL OSCILLATOR FREQUENCY ADJUSTMENT

- (1). Set the monitor to MODE 3 (31KHZ).
- (2). Short Pins 12 & 13 (TP2 and GND) of IC401 (TDA2595).
- (3). Adjust VR402 until the picture is stable.
- (4). Open Pins 12 & 13 (TP2 and GND) of IC401 (TDA2595).
- (5). Turn the power ON and OFF two times. If the horizontal picture is not stable, repeat steps 1 through 5.
- (6). Set the monitor to MODE 5 (35KHZ).
- (7). Short Pins 12 & 13 (TP2 and GND) of IC401 (TDA2595).
- (8). Adjust VR401 until the picture is stable.
- (9). Open Pins 12 & 13 (TP2 and GND) of IC401 (TDA2595).

Disassembly Instructions

CABINET BACK REMOVE (Figure 1)

1. Remove the 4 screws (A) located on the back cover of the monitor.
2. Gently slide the rear cover backwards until free of the monitor chassis.

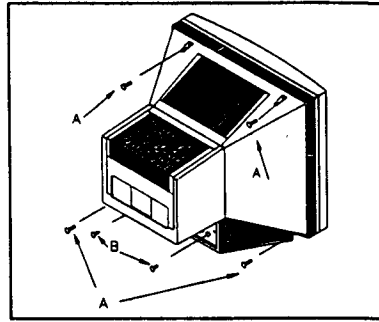


Figure 1

MAIN PCB REMOVAL (Figure 2)

1. Discharge the residual high voltage from the CRT Anode through a 100k ohm resistor to the flyback Transformer mounting bracket.
2. Remove the Anode Cap from the CRT.
3. Remove all connectors and jacks from the Main PCB.
4. Gently slide the Main PCB backwards until free of the mounting brackets. Be careful not to damage the switches and control shafts.

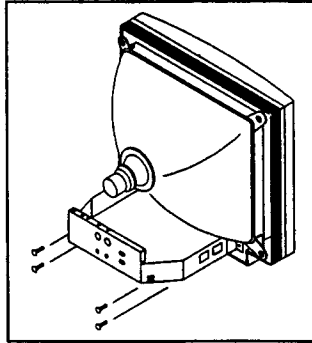


Figure 2

CRT REMOVAL (Figure 3)

NOTE: Do not move the deflection yoke and magnet assembly attached to the CRT neck. Handle these assembly carefully to avoid damaging them.

1. Place the monitor face down on a soft surface.
2. Remove the CRT and place it on a soft surface.

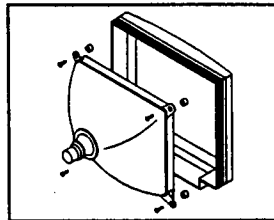


Figure 3

Theory of Operation

1. HORIZONTAL CIRCUIT

IC 401 (TDA 2595) is the Horizontal IC.

It's main function are:

- Horizontal Oscillator
- Phase Control
- Open Collect Output

Q402 is a driver transistor.

Q405, T403, D406 and C421, C422, D407 are used for Horizontal output and ETH generation.

2. VERTICAL PROCESS AND DEFLECTION CIRCUIT

IC 301 Controls the Vertical process.

It's main function are:

- Synchronization
- Circuit Oscillation
- Ramp Generation
- High Gain Power Amplification
- FBT Voltage Generation

20 Volts are applied at Pin 14 and the Deflection Waveform is output at Pin 1.

VR 303 is the Vertical Size Control.

VR 301 is the Vertical Linear Control.

3. VIDEO AMPLIFIER

IC 601 is a Video Preampifier with 3 sets of analog amplifiers:

- | | |
|-----------------|-------------------|
| Pin 4 - R Input | Pin 25 - R Output |
| Pin 6 - G Input | Pin 20 - G Output |
| Pin 9 - B Input | Pin 16 - B Output |

The Video signal from IC 601 is fed into the cascode-type Video Power Amplifiers.

4. SWITCHING POWER SUPPLY

AC power is rectified by D101, then filtered by C105.

Power is then transferred by T101 to the Secondary circuitry.

IC101 and IC102 control and stabilize the output voltage.

VR101 adjusts the output voltage.

Q102 is the Overvoltage Protector.

(10). Turn the power ON and OFF two times; the horizontal picture is not stable, repeat steps 6 through 10.

5. HORIZONTAL CENTER ADJUSTMENT

- Set the monitor to MODE 3(31KHZ).
- Adjust the FBT Screen control until the raster appears.
- Adjust VR404 until the raster is centered in the CRT (See Figure 6).
 $|A-B| \leq 2\text{mm}$

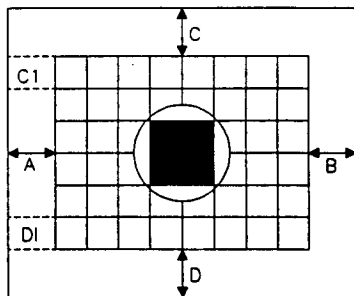


Figure 6

6. HORIZONTAL PHASE CONFIRMATION

- Set the monitor to the VGA 640x480 mode (Crosshatch Pattern).
- Adjust the Brightness and Contrast control to maximum.
- Adjust the VR403 until the picture in the center of raster.

7. PINCUSHION and TILT ADJUSTMENT

- Set the monitor to the VGA 640x480 mode (Crosshatch Pattern).
- Adjust VR405 until Pincushion $X \leq 1.8\text{mm}$ (See Figure 7)
- Adjust VR406 until Tilt $Y \leq 1.8\text{mm}$ (See Figure 8)



Figure 7



Figure 8

8. VERTICAL CENTER ADJUSTMENT

- Set the monitor to the VGA 640x480 mode (Crosshatch Pattern).
- Adjust VR304 until $|C-D| \leq 2\text{mm}$ (See Figure 6).

- Set the monitor to the VGA 640x480 mode (Crosshatch Pattern).
- Adjust VR301 until $|C1-D1| \leq 2\text{mm}$ (See Figure 6).
- Reconfirm Vertical Center adjustment.

10. VERTICAL SIZE ADJUSTMENT

- Set the monitor to the VGA 640x480 mode (Crosshatch Pattern).
- Adjust VR303 until Vertical Size = $180 \pm 5\text{mm}$

11. HORIZONTAL WIDTH ADJUSTMENT

- Set the monitor to the VGA 640x480 mode (Crosshatch Pattern).
- Adjust VR407 then check $240 \pm 5\text{mm} \leq \text{horizontal width} \leq 270\text{mm} \pm 5\text{mm}$
- Adjust VR407 until horizontal width = $250\text{mm} \pm 2\text{mm}$

12. WHITE BALANCE ADJUSTMENT

- Degauss the monitor before performing White Balance Adjustment
- Set the monitor to the VGA 640x480 mode (Full White Pattern).
- Set the Contrast Control to minimum.
- Set the Brightness Control to maximum (only display raster).
- Adjust the FBT Screen VR until the CRT center is $1 \pm 0.2\text{FL}$
- Adjust VR801, VR802 and VR803 until:
 $x = 0.281 \pm 0.015$
 $y = 0.311 \pm 0.015$
- Set Brightness and Contrast controls to maximum.
- Adjust VR603 and VR604 until:
 $x = 0.281 \pm 0.015$
 $y = 0.311 \pm 0.015$

13. LIGHT ADJUSTMENT

- Set the monitor to the VGA 640x480 mode (Crosshatch with white circle Pattern).
- Set the Contrast and Brightness controls to maximum.
- Adjust VR601 until the light from the white circle = $40 \pm 3\text{FL}$

Timing Char

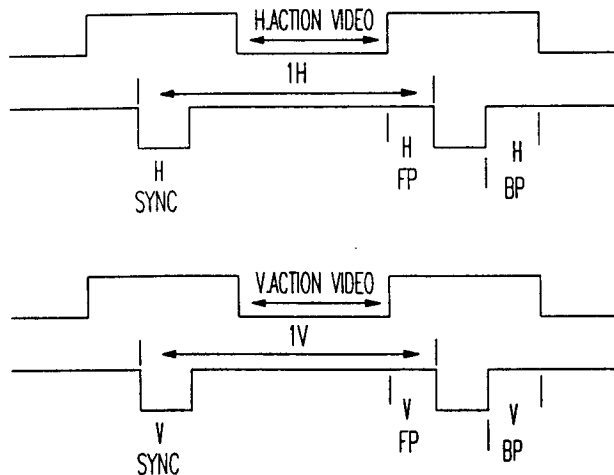


Figure 9

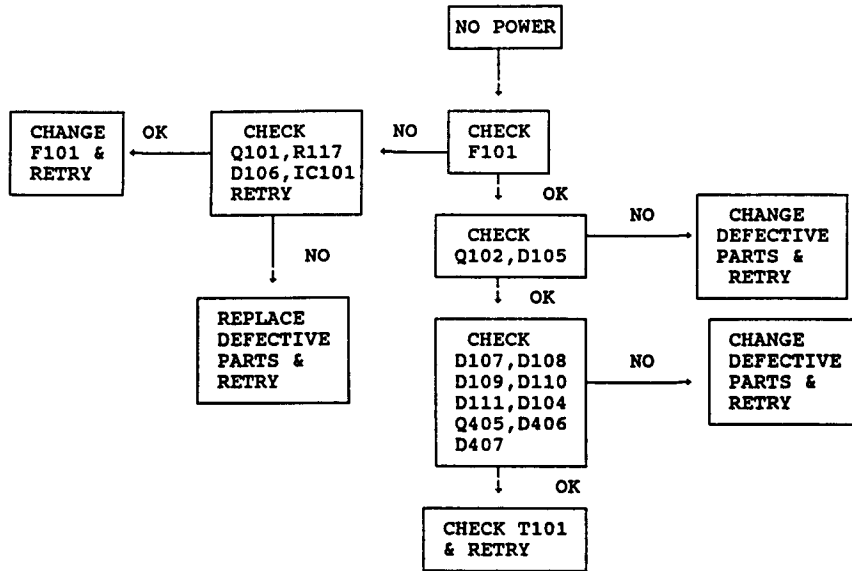
STANDARD	IBM/VGA	IBM/VGA	IBM/VGA	IBM/8514A
COMPATIBILIY	MODE 1	MODE 2	MODE 3	MOE 4
RESOLUTION	640x350	640x400	640x480	1024x768
H.POLARITY	+	-	-	+
H.FREQ	31.398KHz	31.573KHz	31.392KHz	35.524KHz
H.FRONT PORCH	0.622 uS	0.67 uS	0.637 uS	0.1782 uS
H.SYNC	3.806 uS	3.808 uS	3.829 uS	3.9196 uS
H.BACK PORCH	1.921 uS	1.864 uS	1.919 uS	1.2475 uS
H.ACTION VIDEO	25.5 uS	25.33 uS	25.47 uS	22.805 uS
V.POLARITY	-	+	-	+
V.FRONT PORCH	1.2075 mS	0.397 mS	0.3505 mS	0.014 mS
.SYNC	0.062 mS	0.0175 mS	0.0695 mS	0.1126 mS
V.BACK PORCH	1.8795 mS	1.071 mS	1.108 mS	0.563 mS
V.FREQ.	69.76 Hz	69.83 Hz	59.53 Hz	87 Hz
V.ACTION VIDEO	11.12 mS	12.71 mS	15.25 mS	10.81 mS

STANDARD	VESA	VESA	VESA	VESA
COMPATIBILITY	MODE 5	MODE 6	MODE 7	MODE 8
RESOLUTION	640x480	640x350	720x400	800x600
H.POLARITY	-	+	-	+/-
H.FREQ.	37.860KHz	37.860KHz	37.736KHz	37.879KHz
H.FRONT PORCH	0.762 uS	0.762 uS	0.750 uS	1.000 uS
H.SYNC	1.270 uS	1.270 uS	1.250 uS	3.200 uS
H.BACK PORCH	4.603 uS	4.063 uS	4.500 uS	2.200 uS
H.ACTION VIDEO	20.317 uS	20.317 uS	20.00 uS	20.000 uS
V.POLARITY	-	-	+	+
V.FRONT PORCH	0.238 mS	0.924 mS	0.239 mS	0.026 mS
V.SYNC	0.079 mS	0.079 mS	0.080 mS	0.106 mS
V.BACK PORCH	0.740 mS	1.638 mS	0.981 mS	0.607 mS
V.FREQ.	72.809 Hz	84.136 Hz	80.044 Hz	60.3165Hz
V.ACTION VIDEO	12.678 mS	9.244 mS	10.600 mS	15.840 mS

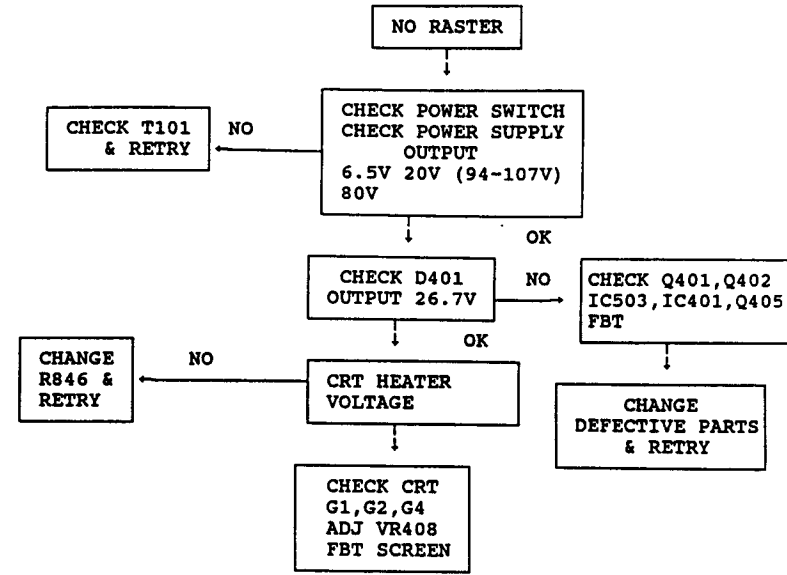
STANDARD	VESA
COMPATIBILITY	MODE 9
RESOLUTION	800x600
H.POLARITY	+/-
H.FREQ.	35.156KHz
H.FRONT PORCH	0.667 uS
H.SYNC	2.000 uS
H.BACK PORCH	3.556 uS
H.ACTION VIDEO	22.222 uS
V.POLARITY	+/-
V.FRONT PORCH	0.028 mS
V.SYNC	0.057 mS
V.BACK PORCH	0.626 mS
V.FREQ.	56.250Hz
V.ACTION VIDEO	17.067 mS

Troubleshooting Guide

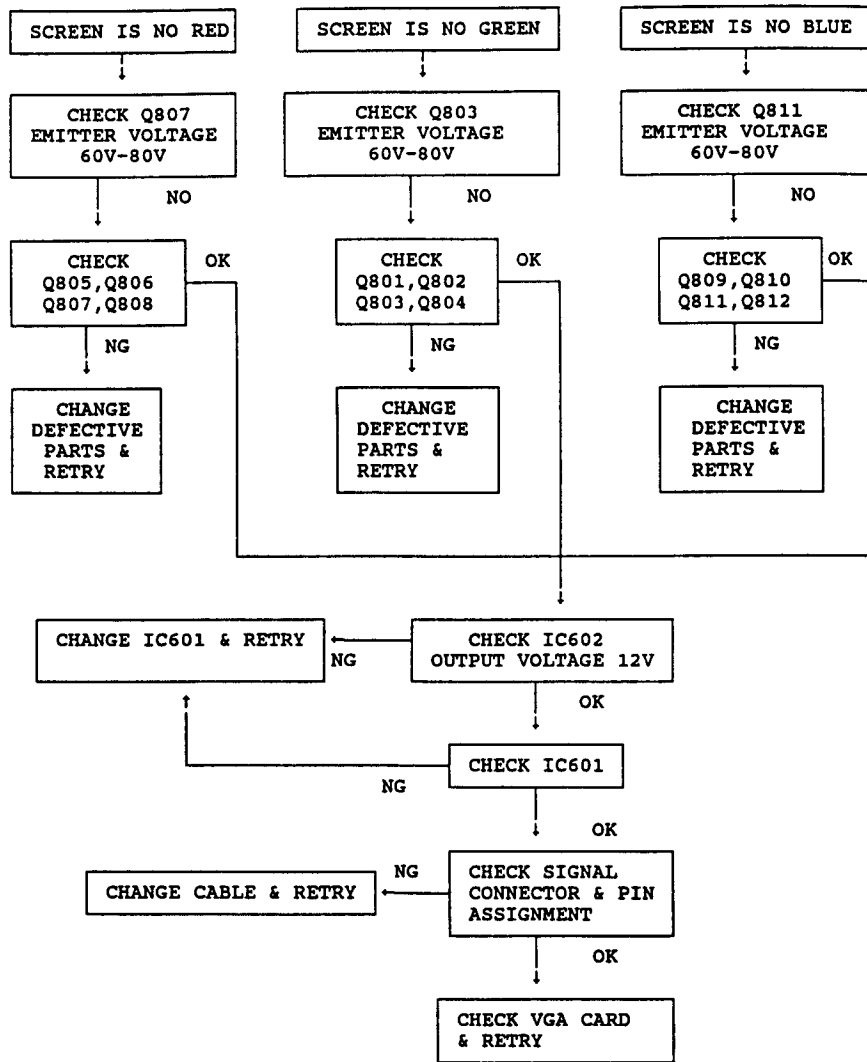
1. NO POWER



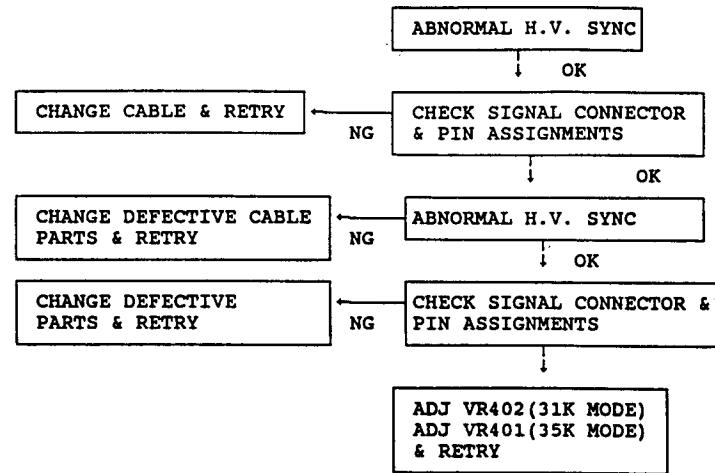
2. NO RASTER



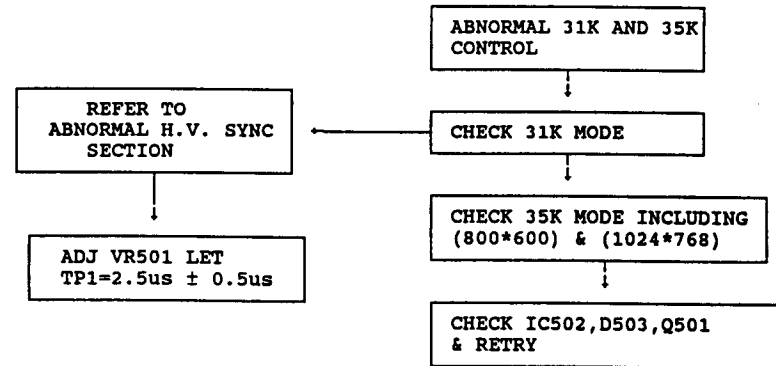
3. PICTURE OR COLOR MISSING



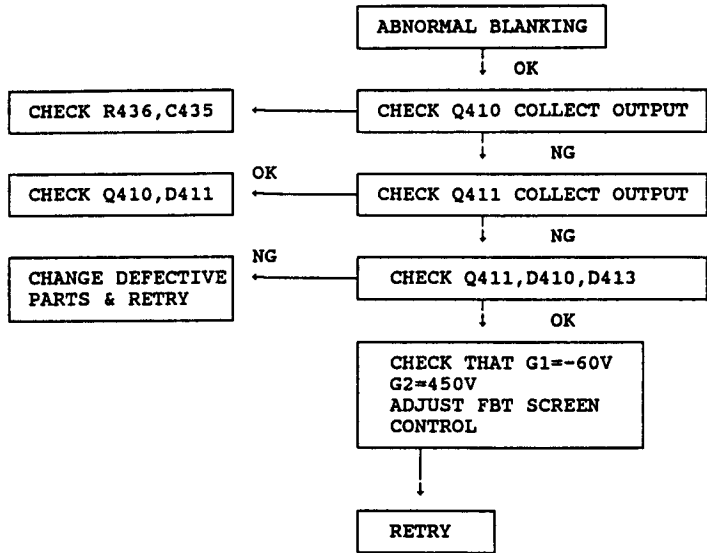
4. H.V. SYNC IS ABNORMAL



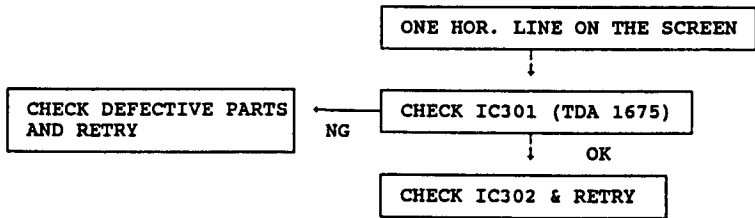
5. 31K AND 35K MODE CHANGE IS ABNORMAL



6. ABNORMAL BLANKING



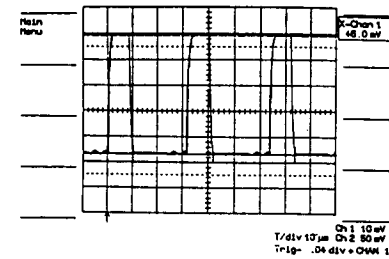
7. NO VERTICAL SCAN OR VERTICAL SIZE CAN NOT ADJUST



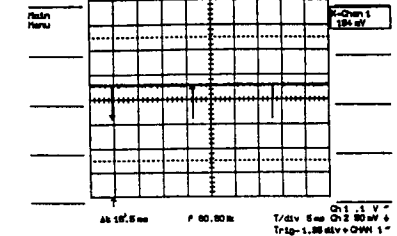
Video Waveforms

Note: All waveform are tested in 640x480 mode(31KHz) full white pattern.

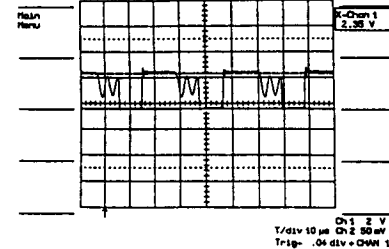
Q101 base



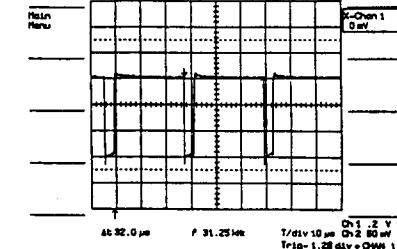
V-SYNC I/P



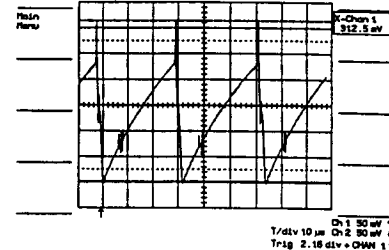
Q101 collect



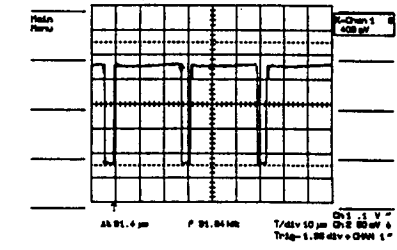
H-SYNC I/P



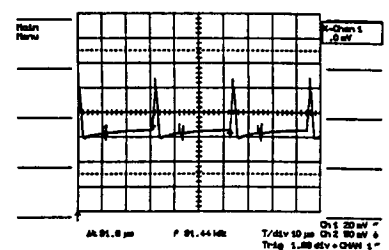
IC101 Pin 4



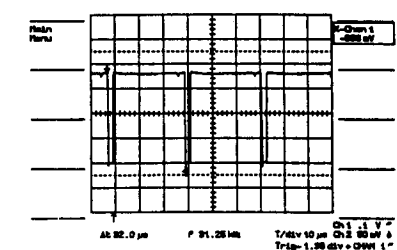
IC501 Pin 6



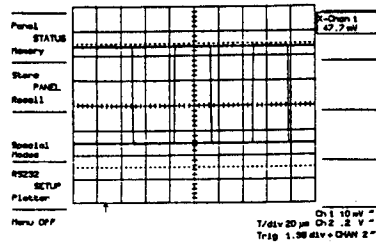
R113



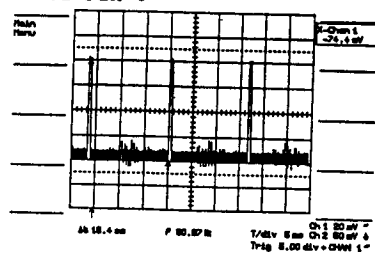
TP1



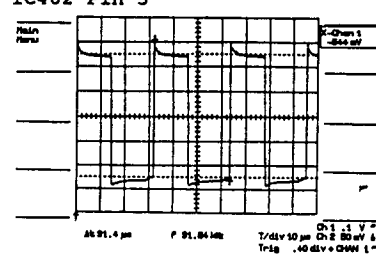
IC401 Pin4



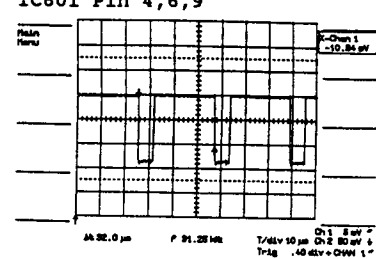
IC301 Pin 6



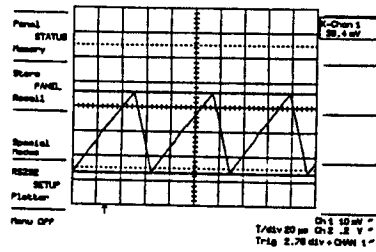
IC402 Pin 5



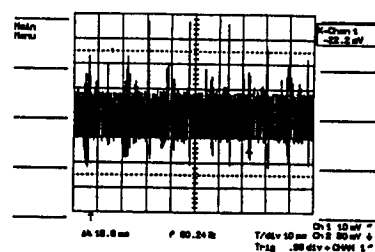
IC601 Pin 4,6,9



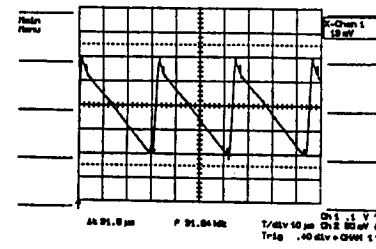
IC401 Pin 16



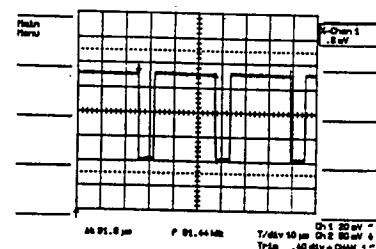
IC301 Pin 4



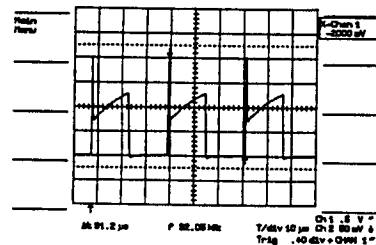
IC402 Pin 8



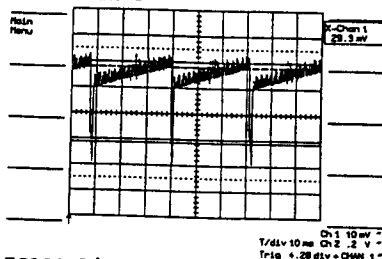
IC601 Pin 25,20,16



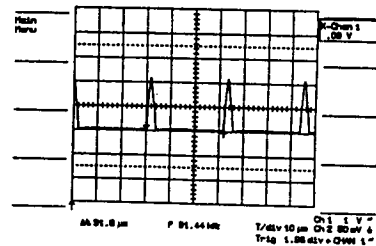
Q402 collect



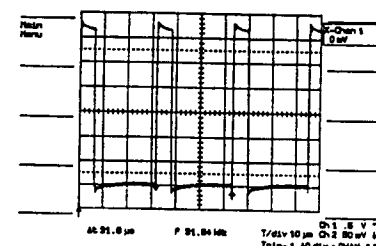
IC301 Pin 3



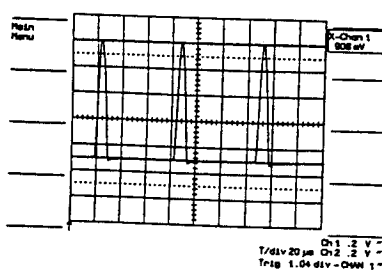
D407



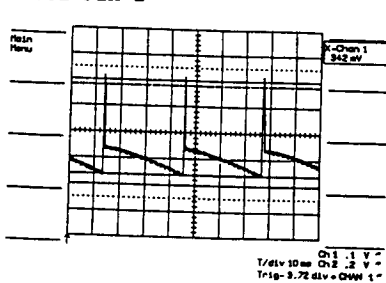
R809, R824, R839

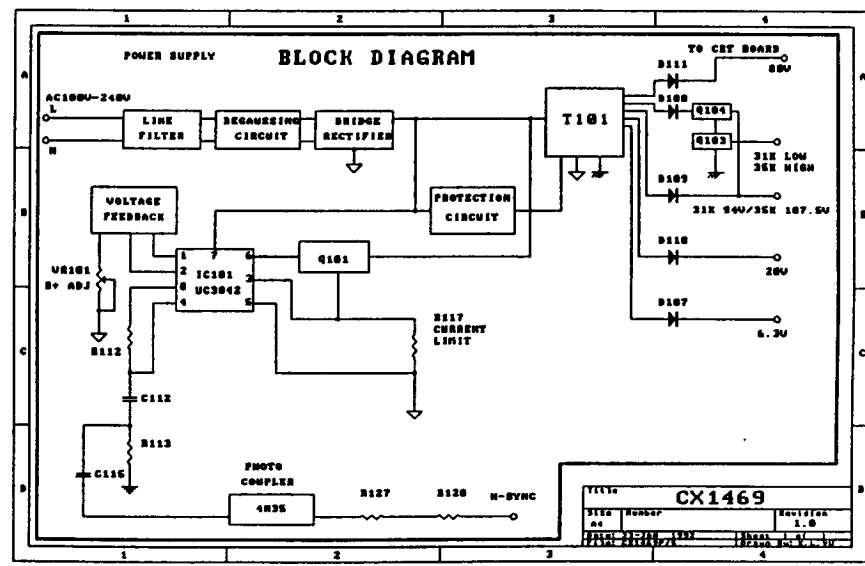
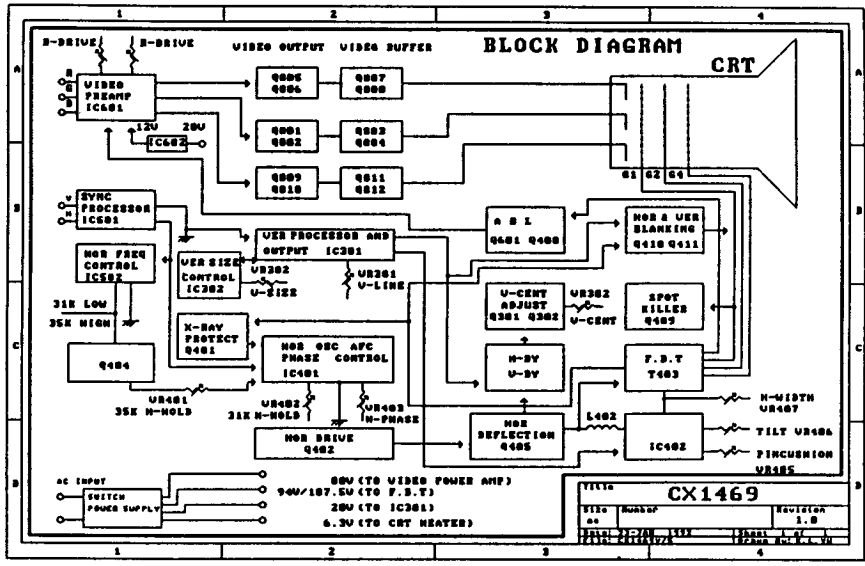


Q405 collect

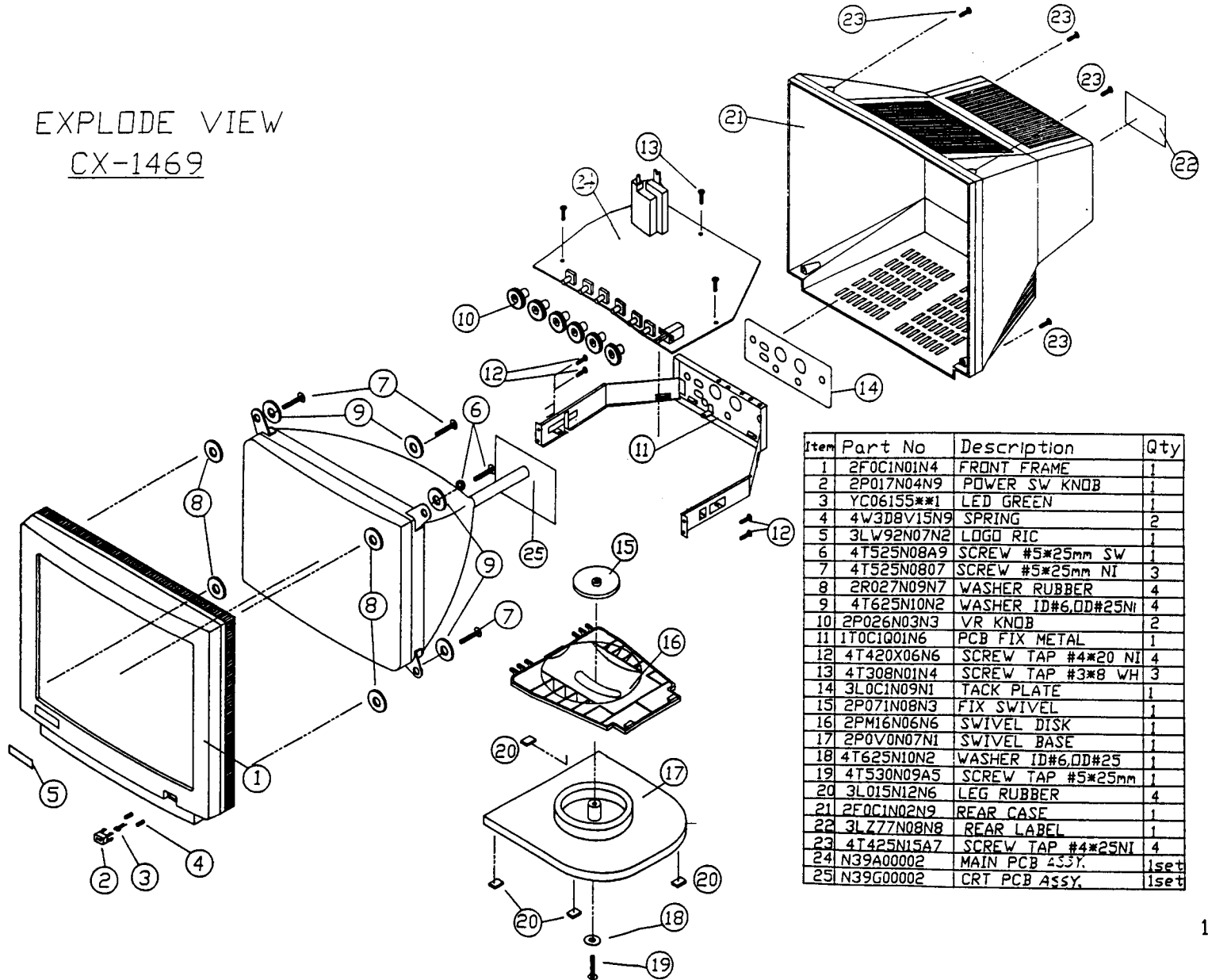


IC301 Pin 1





EXPLODE VIEW
CX-1469



Item	Part No	Description	Qty
1	2F0C1N01N4	FRONT FRAME	1
2	2P017N04N9	POWER SW KNOB	1
3	YC06155**1	LED GREEN	1
4	4W3DBV15N9	SPRING	2
5	3LW92N07N2	LOGO RIC	1
6	4T525N08A9	SCREW #5*25mm SW	1
7	4T525N0807	SCREW #5*25mm NI	3
8	2R027N09N7	WASHER RUBBER	4
9	4T625N10N2	WASHER ID#6.0D#25Ni	4
10	2P026N03N3	VR KNOB	2
11	1T0C1Q01N6	PCB FIX METAL	1
12	4T420X06N6	SCREW TAP #4*20 NI	4
13	4T308N01N4	SCREW TAP #3*8 WH	3
14	3L0C1N09N1	TACK PLATE	1
15	2P071N08N3	FIX SWIVEL	1
16	2PM16N06N6	SWIVEL DISK	1
17	2P0V0N07N1	SWIVEL BASE	1
18	4T625N10N2	WASHER ID#6.0D#25	1
19	4T530N09A5	SCREW TAP #5*25mm	1
20	3L015N12N6	LEG RUBBER	4
21	2F0C1N02N9	REAR CASE	1
22	3L777N08N8	REAR LABEL	1
23	4T425N15A7	SCREW TAP #4*25NI	4
24	N39A00002	MAIN PCB ASSY.	1set
25	N39G00002	CRT PCB ASSY.	1set

