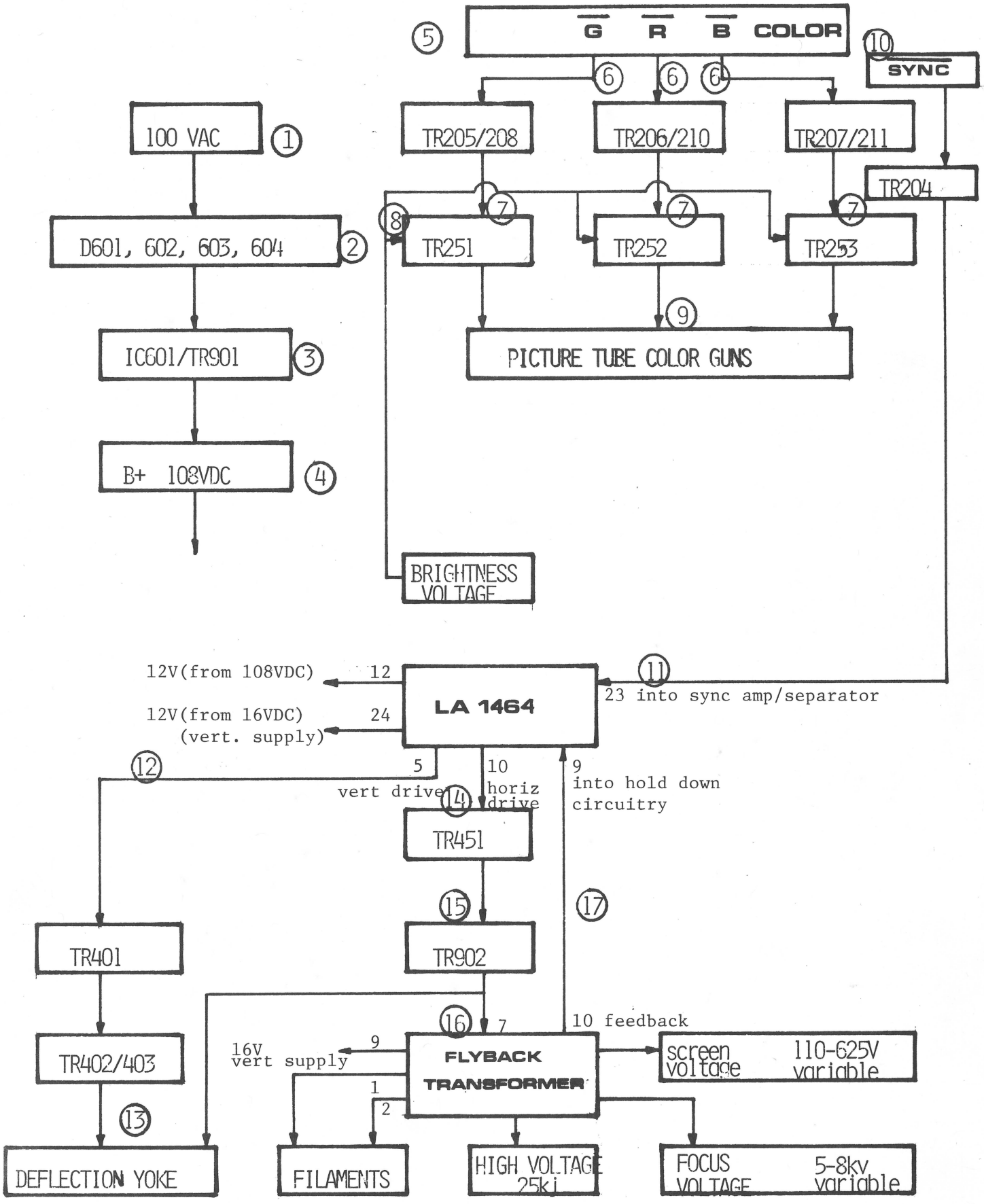
Nintendo

Video Monitor Block Diagram 4-1



DESCRIPTION OF VIDEO MONITOR BLOCK DIAGRAM

1 100VAC is applied

2 Rectified by D601, 602, 603, 604

3 IC601/TR901 form regulator for B+

4 B+ is distributed

---

5 $\overline{G}$, $\overline{R}$, $\overline{B}$ color signals applied

6 Amplified by the respective transistors

7 Amplified again at neck board

8 Bias provided by brightness voltage

9 Applied to picture tube guns

---

10 $\overline{\text{Sync}}$ is applied, buffered by TR204

11 Apply $\overline{\text{sync}}$ to 1464 sync amp & separator

---

12 Vertical pulse out of pin 5 is amplified by TR401, then by TR402/403

13 Vertical pulse applied to deflection yoke

---

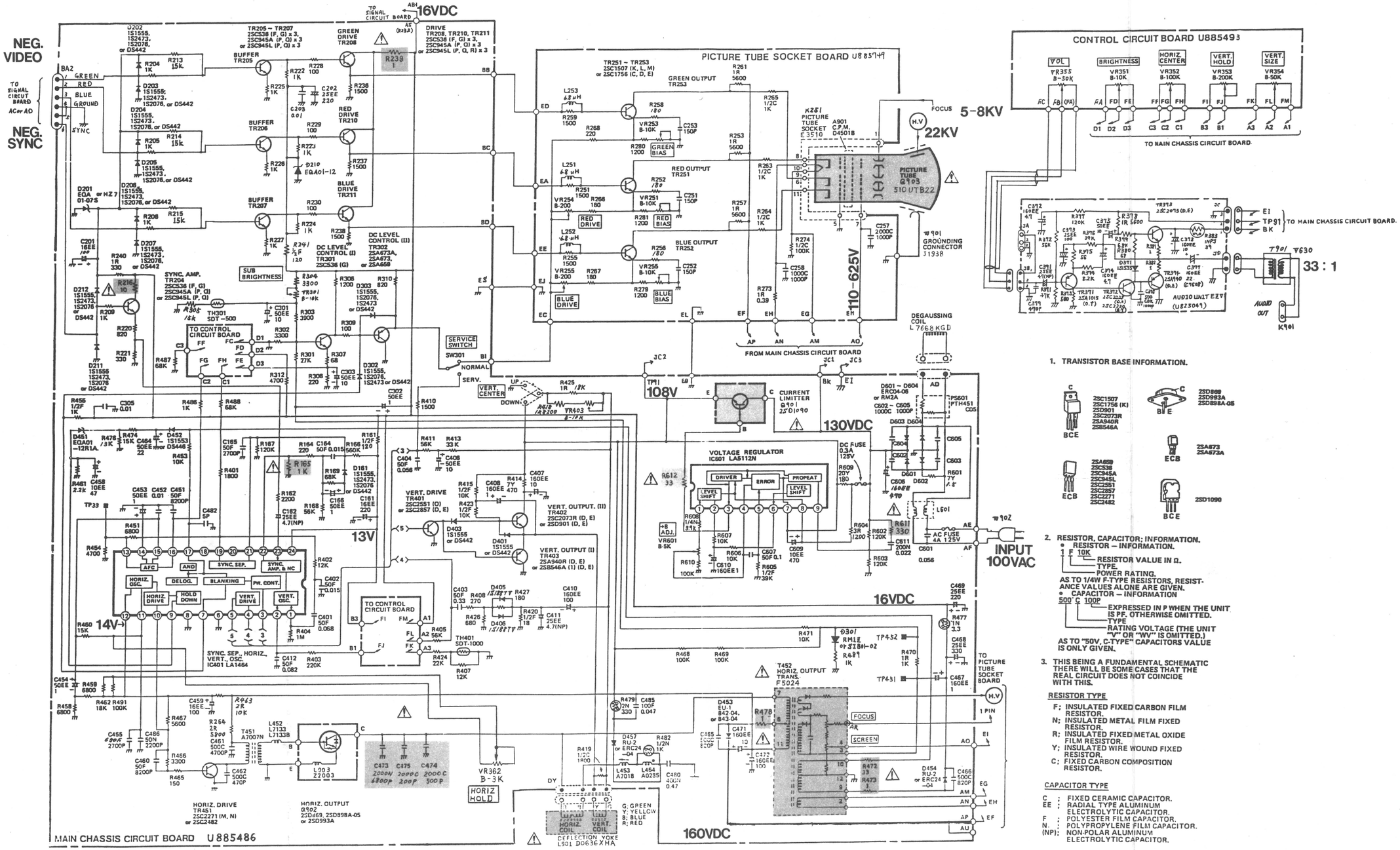
14 Horizontal drive pulse out of pin 10 is amplified by TR451

15 Amplified again by TR902 (horizontal output)

16 Applied to flyback transformer which distributes voltages

---

17 Feedback from flyback monitors pin 7 pulse and will apply hold-down pulse to pin 9 of 1464 should over voltage exist



1. TRANSISTOR BASE INFORMATION.

2. RESISTOR, CAPACITOR; INFORMATION.
   - RESISTOR — INFORMATION.
     1 F 10K
     - RESISTOR VALUE IN Ω.
     - TYPE.
     - POWER RATING.

     AS TO 1/4W F-TYPE RESISTORS, RESISTANCE VALUES ALONE ARE GIVEN.
   - CAPACITOR — INFORMATION
     500 C 100P
     - EXPRESSED IN P WHEN THE UNIT IS PF. OTHERWISE OMITTED.
     - TYPE
     - RATING VOLTAGE (THE UNIT "V" OR "WV" IS OMITTED.)

     AS TO "50V, C-TYPE" CAPACITORS VALUE IS ONLY GIVEN.

3. THIS BEING A FUNDAMENTAL SCHEMATIC THERE WILL BE SOME CASES THAT THE REAL CIRCUIT DOES NOT COINCIDE WITH THIS.

RESISTOR TYPE

- F; INSULATED FIXED CARBON FILM RESISTOR.
- N; INSULATED METAL FILM FIXED RESISTOR.
- R; INSULATED FIXED METAL OXIDE FILM RESISTOR.
- Y; INSULATED WIRE WOUND FIXED RESISTOR.
- C; FIXED CARBON COMPOSITION RESISTOR.

CAPACITOR TYPE

- C : FIXED CERAMIC CAPACITOR.
- EE : RADIAL TYPE ALUMINUM ELECTROLYTIC CAPACITOR.
- F : POLYESTER FILM CAPACITOR.
- N : POLYPROPYLENE FILM CAPACITOR.
- (NP): NON-POLAR ALUMINUM ELECTROLYTIC CAPACITOR.

20-EZV(R-C) SCHEMATIC

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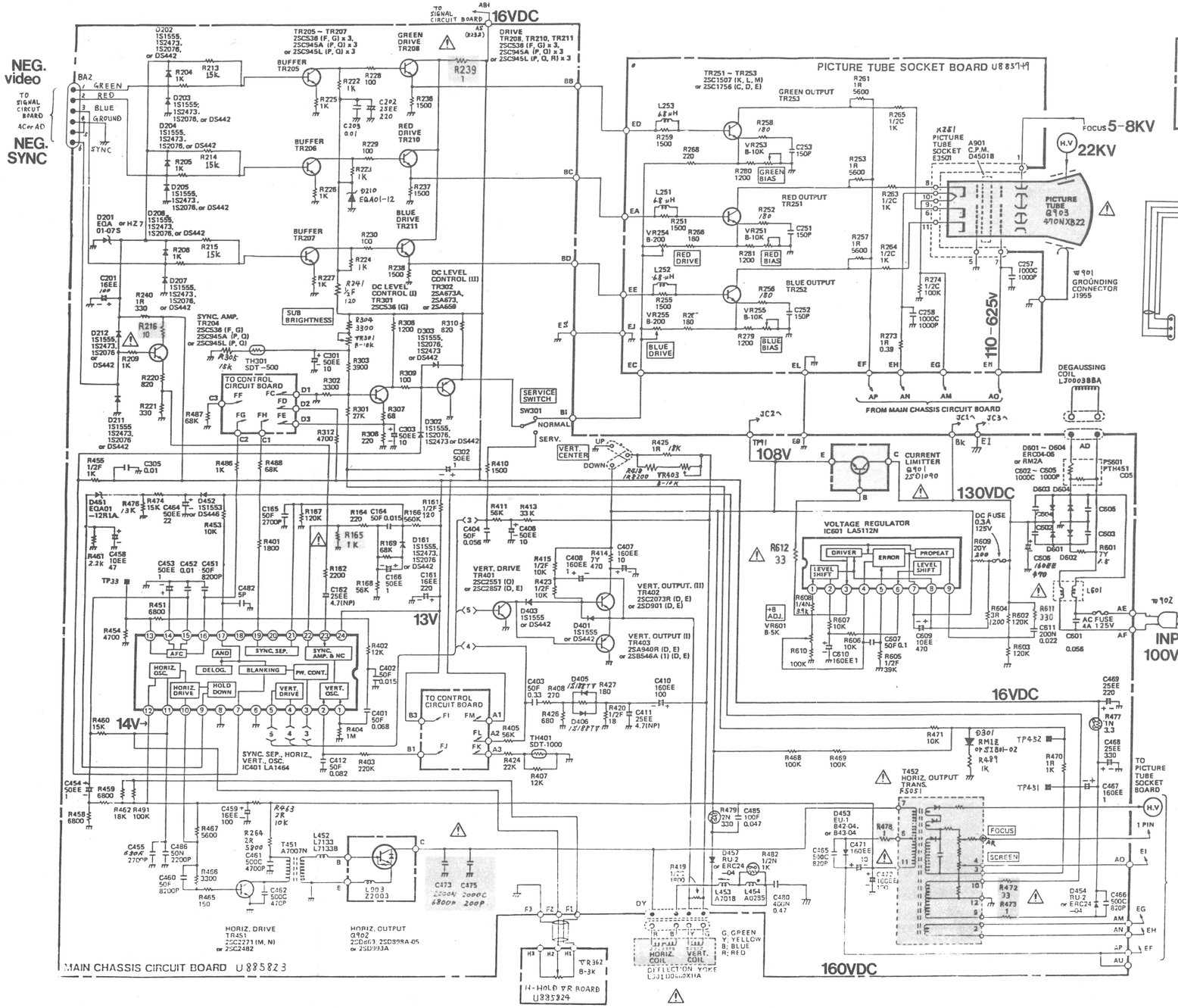

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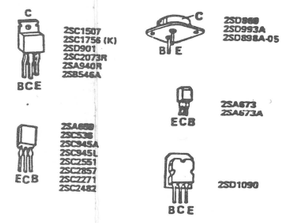

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18-Z2AB SCHEMATIC

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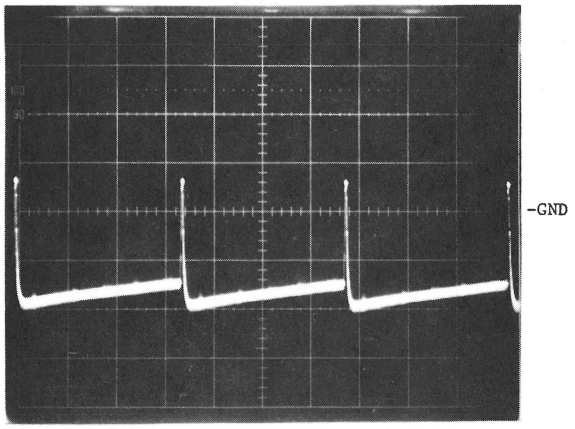
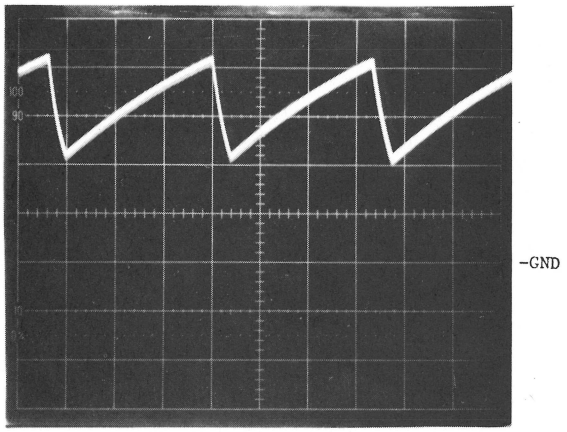
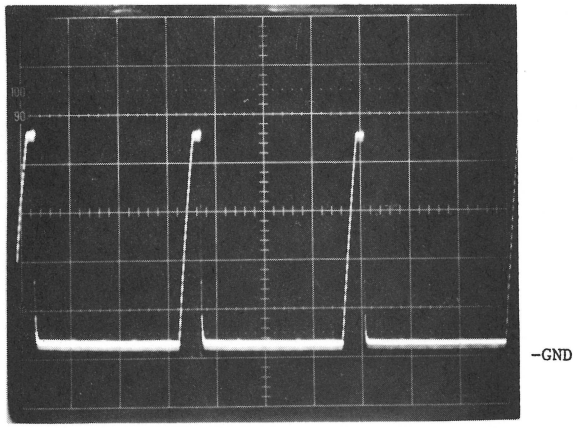


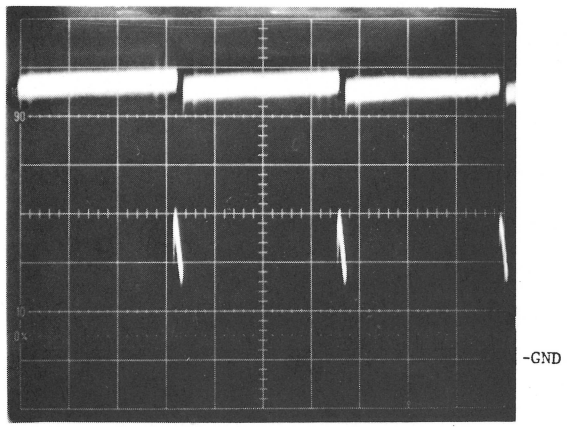
Pin 1, IC401 Vertical Oscillator 2V 5ms



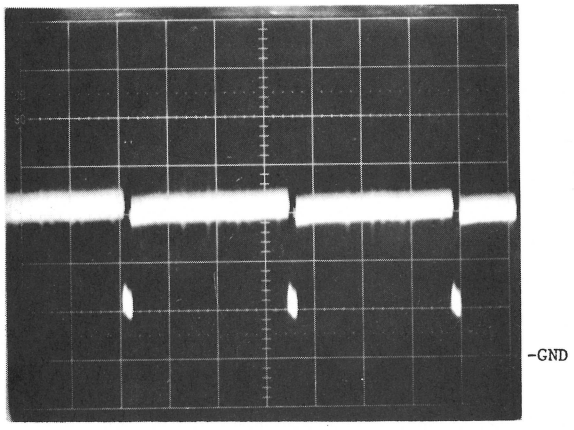
Pin 2, IC401 Vertical Oscillator 2V 5ms



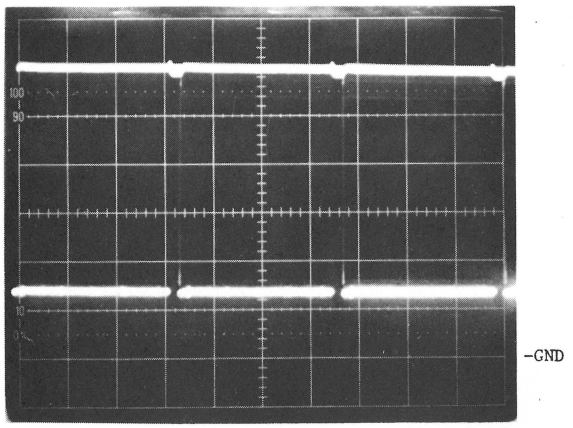
Pin 3, IC401 Vertical Feedback 2V 5ms



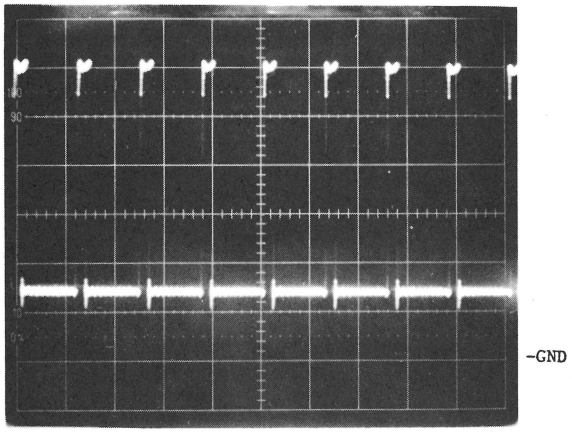
Pin 4, IC401 Vertical Size .2V 5ms



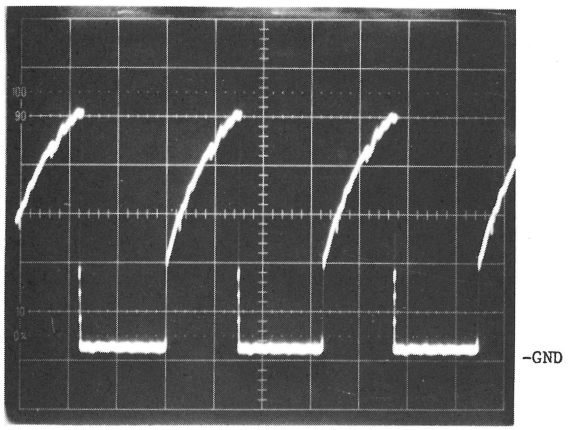
Pin 5, IC401 Vertical Out .2V 5ms



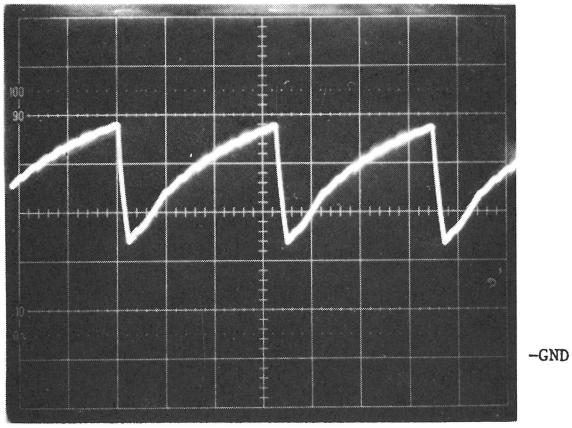
Pin 7, IC401 Blanking 2V 5ms



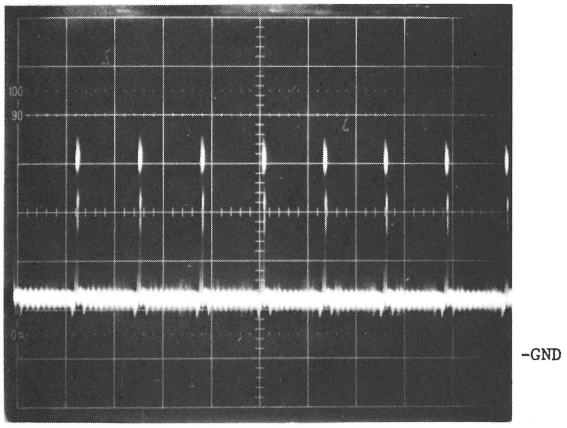
Pin 7, IC401 Blanking 2V 50μs



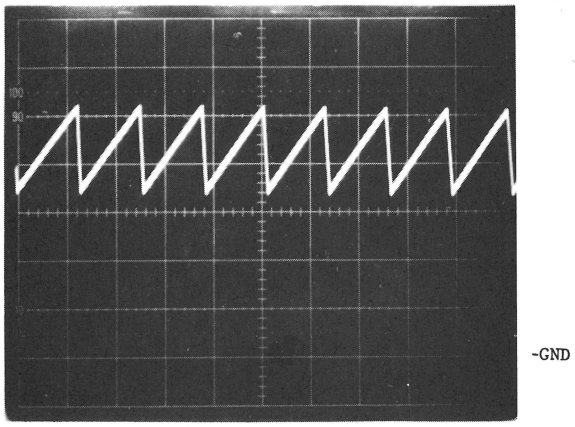
Pin 10, IC401 Horizontal Out 1V 20μs



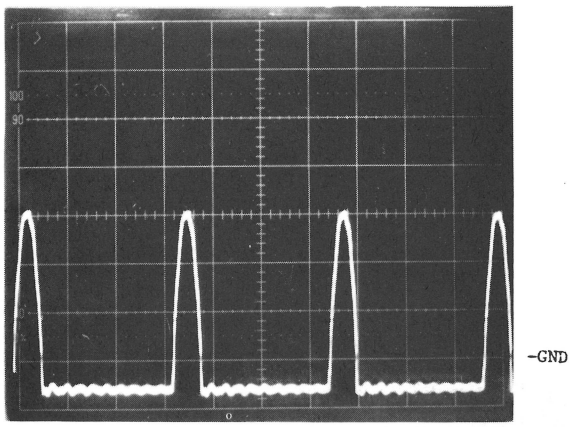
Pin 11, IC401 Horizontal Oscillator 2V 20μs



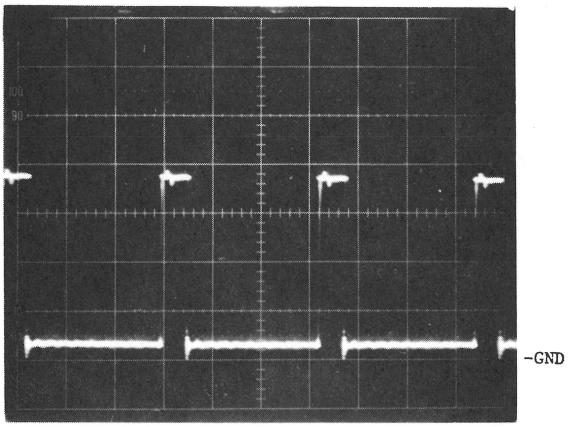
Pin 13, IC401 AFC .2V 50μs



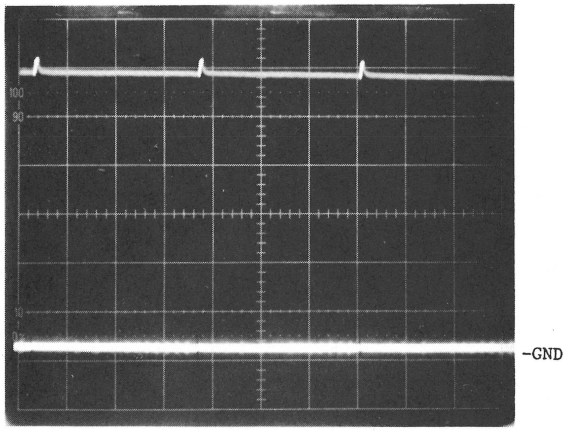
Pin 16, IC401 AFC 1V 50μs



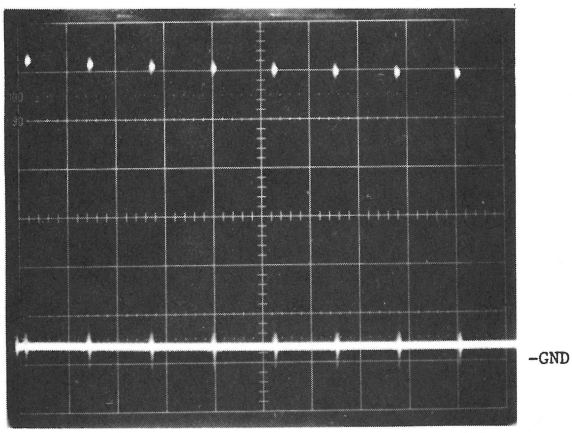
Pin 17, IC401 Blanking 2V 20μs



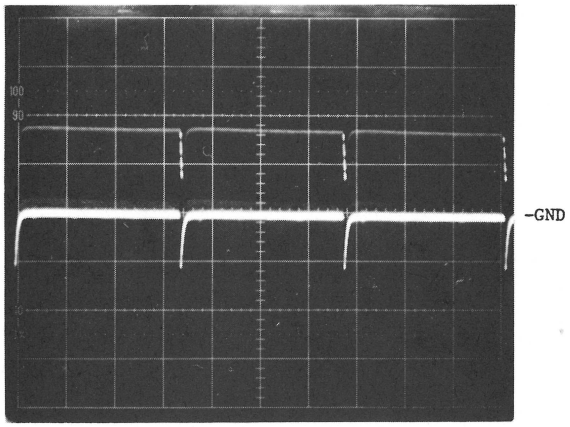
Pin 18, IC401 2V 20μs



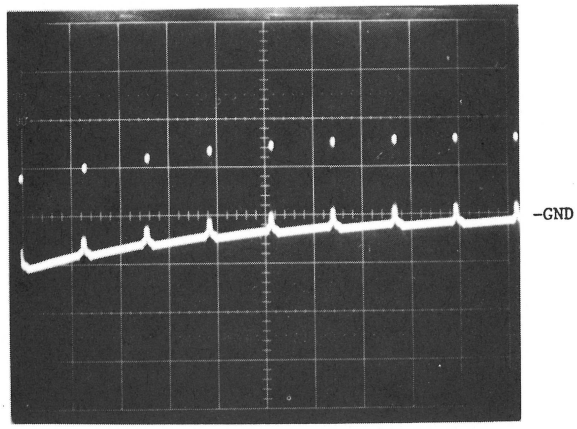
Pin 19, IC401 Sync Separator 2V 5ms



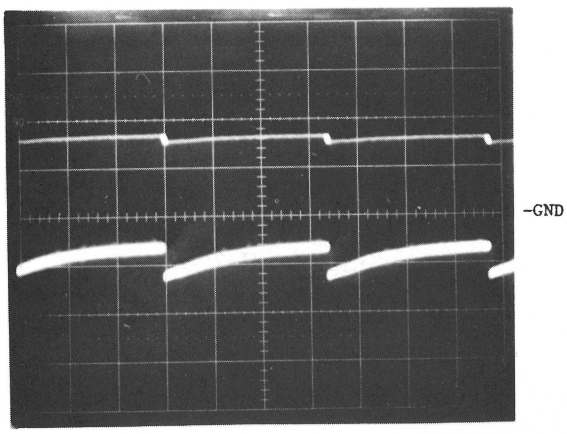
Pin 19, IC401 Sync Separator 2V 50μs



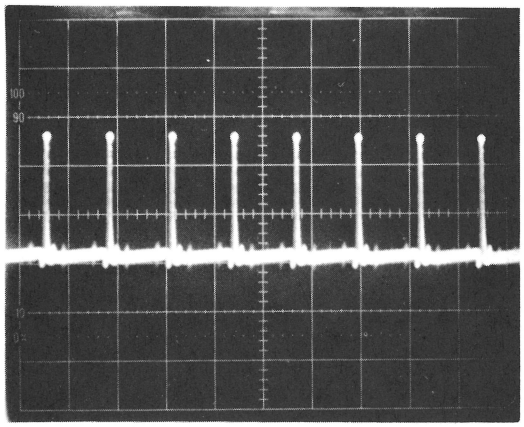
Pin 20, IC401 .5V 5ms



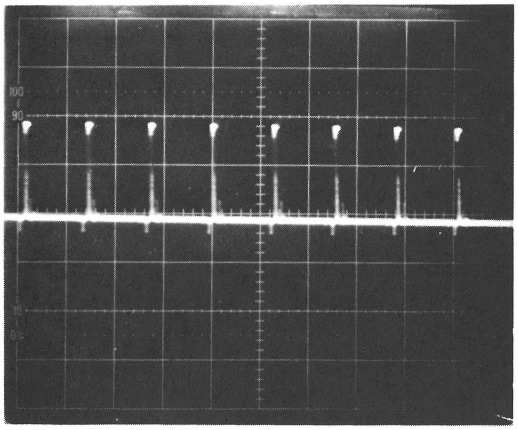
Pin 20, IC401 .5V 50μs



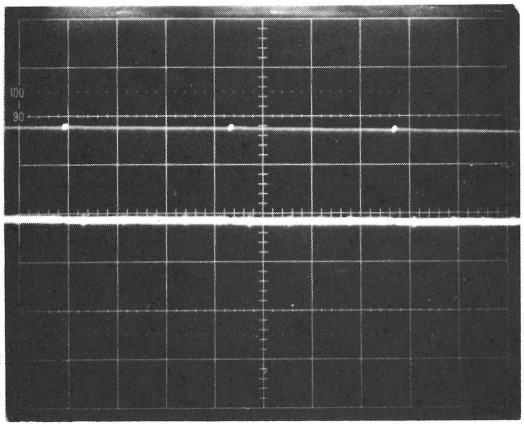
Pin 21, IC401 Sync Separator 1V 5ms



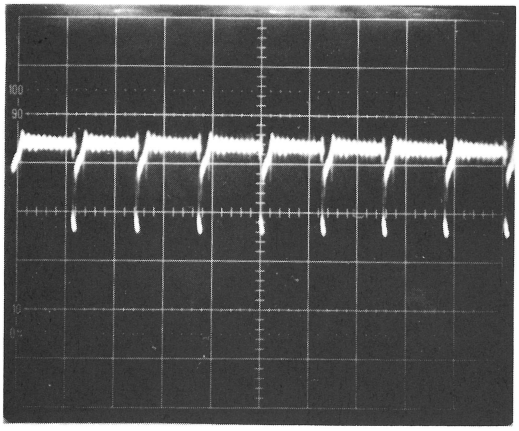
Pin 21, IC401 Sync Separator 1V 50μs



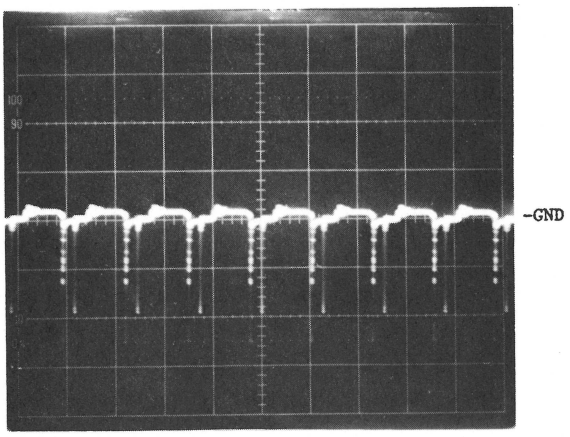
Pin 22, IC401 Sync Amp 2V 50μs



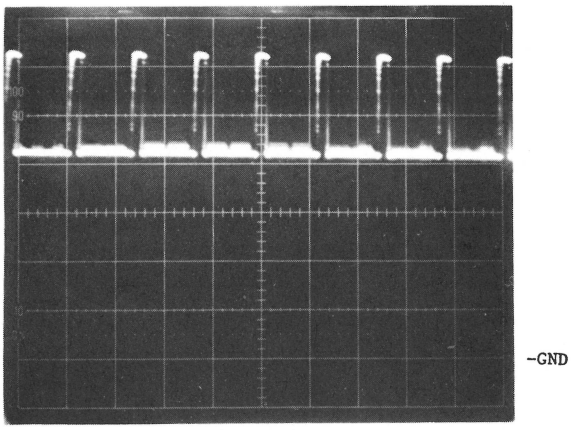
Pin 22, IC401 Sync Amp 2V 5ms



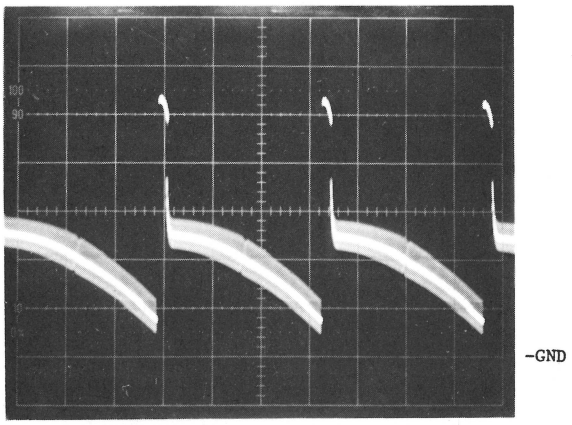
Pin 23, IC401 Sync In .5V 50μs



Base of TR902, Horizontal Drive 10V 50μs



Emitter TR302, Brightness Control 2V 50μs



Emitter TR403, Vertical Output 20V 5ms

Nintendo®

SERVICE MANUAL

model 31, 32, 35 color monitor

CONTENTS

1. Prior to Servicing

1-1. Powering

Be sure to use an isolation step-down transformer (from 120V to 100V) when powering up the chassis. Applying voltage in excess of 110V may cause damage.

1-2. X-ray Radiation

This chassis is designed so as to minimize x-ray radiation. Do not alter safety related circuits, such as high voltage, power regulator and hold-down circuits.

1-3. High Voltage

The color display unit contains HIGH VOLTAGE capable of delivering LETHAL quantities of energy. TO AVOID DANGER TO LIFE, don't attempt to service the chassis until all precautions necessary for working on HIGH VOLTAGE equipment have been observed.

1-4. CRT Handling

The picture tube encloses a high vacuum and due to the large surface area it is subject to extreme force. Care must be taken not to bump or scratch the picture tube as this may cause the tube to implode resulting in personal injury and property damage. Shatter-proof goggles must be worn by individuals while handling the CRT or installing it in the chassis. Do not handle the CRT by the neck.

1-5. To prevent fire or shock hazard DO NOT EXPOSE THIS DISPLAY TO RAIN OR MOISTURE.

1-6. In Line Picture Tube Adjustment

Convergence of the color beams in the precision In Line Color Tube is, unlike the Delta configuration tube, dependent upon the position and the mounting angle of the deflection yoke on the bell of the tube, and the proper adjustment of two pairs of convergence magnets that form an assembly located on the neck of the tube. (See Fig. 1) After these adjustments have been properly positioned, the deflection yoke and magnet assembly are securely cemented at the factory.

Therefore the readjustment of convergence is normally unnecessary in the field. However, readjustment of convergence may be required due to the inadvertent loosening of the cemented rings or replacement of the tube. If this is the case, refer to paragraph 3-3.

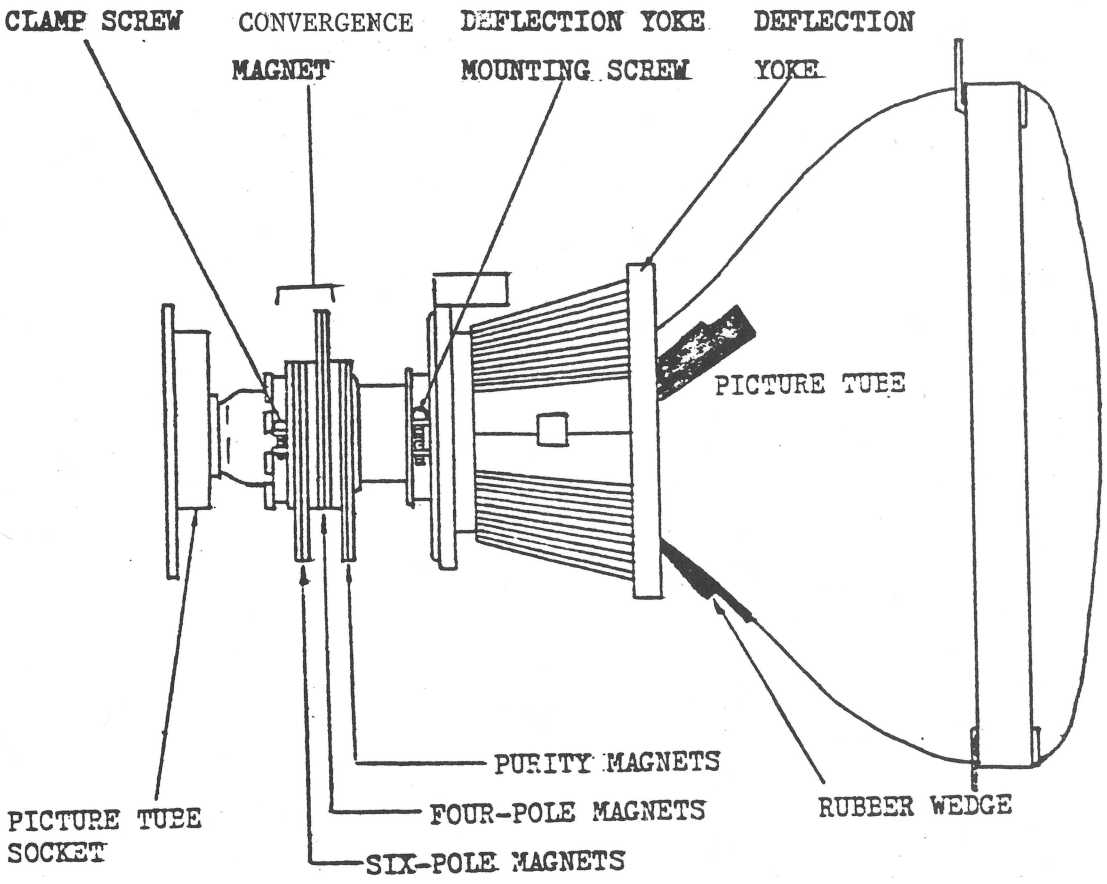


Fig. 1 PICTURE TUBE NECK COMPONENT

2. Specifications

2-1. Power Supply

Voltage: 90-110V

Frequency: 50/60Hz

Note: Apply supply voltage through an isolation STEP-DOWN transformer.

2-2. High Voltage

22 ± 1.5KV at zero beam current

2-3. Input Signal

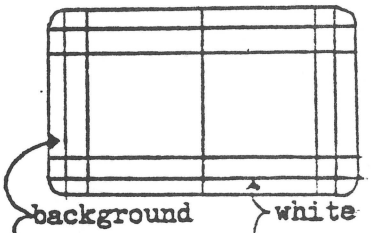
Terminal	Signal Input		
1	Green	.6V-4V color signal	4V = picture black .6V = picture white
2	Red		
3	Blue		
4,5	Ground		
6	Sync (2.5V-5V composite sync, negative)		

3. Adjustment Procedures

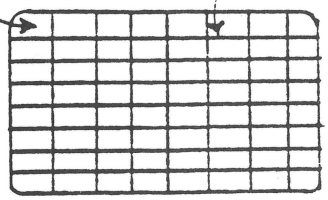
3-1. Standard Adjustment Condition

Input Frequency	: 60Hz
Input Voltage	: 100 ± 2V AC
Input Waveform Distortion	: 5% or less
Ambient Temperature	: 20 ± 2° C Unless anything questionable exists, adjustment may be made at 20 ± 15° C.
Ambient Humidity	: 65 ± 5% RH Unless anything questionable exists, adjustment may be made at 65 ± 20% RH.
Test Pattern	: Shall be the following or the equivalent.

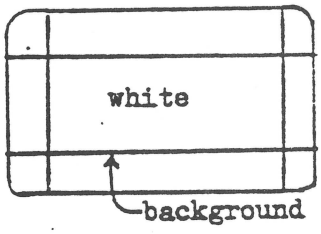
Test Pattern I



Test Pattern II



Test Pattern III



Duration of Aging	: Shall be aged for more than 30 minutes prior to adjustment. It, however, can be shortened into 2 minutes where nothing questionable occurs.
Ambient Brightness	: 200 lux. Unless anything questionable exists, adjustment may be made at anywhere between 50 and 1000 lux.
Direction of the Unit	: Unless otherwise specified, CRT screen shall be faced in the northerly direction.

3-2. Purity Adjustment

Note: If poor purity persists after demagnetizing the picture tube and the chassis using an external degaussing coil, follow steps described below.

a. Receive Test Pattern III.

b. Produce a red raster.

Turn the blue and green guns off by placing shorting jumpers between base and emitter of Blue Output (TR252) and Green Output (TR253). This will leave only red raster visible.

c. Loosen the deflection yoke.

-Loosen the screw binding the deflection yoke.

-Pull the yoke toward you till it hits purity magnet rings.

-Remove all of the three black rubber wedges from the tube with a razor blade. (See Fig. 2)

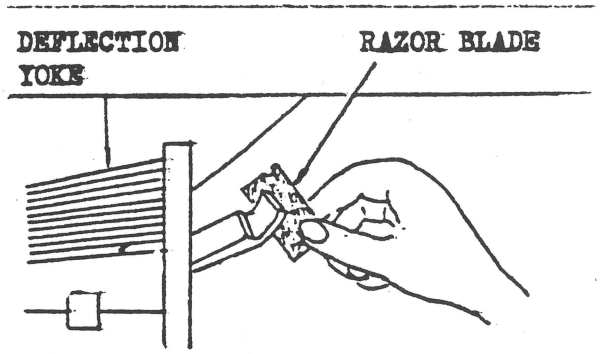


Fig. 2 RUBBER WEDGE REMOVAL

d. Center the vertical red belt.

Place the vertical red belt in the middle of the screen by closing, spreading and/or rotating the tabs of the two purity magnet rings. (See Fig. 3)

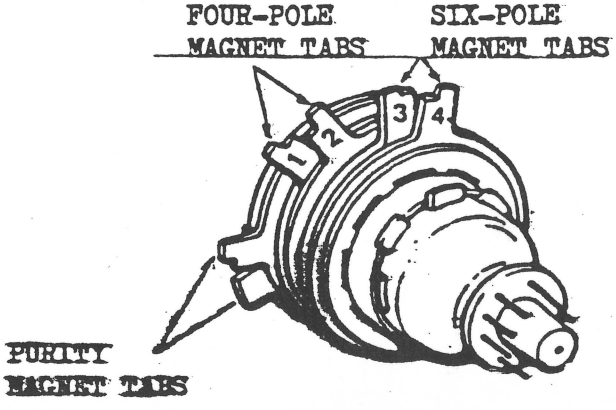


Fig. 3 PURITY AND CONVERGENCE MAGNET

e. Obtain a uniform red raster.

Slowly push the deflection yoke forward until a solid red raster is obtained.

f. Check uniformity of green, blue and white raster.

-Examine uniformity by turning off the remaining two colors. If poor purity exists, repeat procedures c through e (above) for that color.

-Turn on all three colors to produce a pure white raster.

-If any portion of the raster area is discolored, repeat above steps c through f again.

g. Fasten the screw of the deflection yoke.

3-3. Convergence Adjustment

Note: Reconvergence is not recommendable. However, before replacing a CRT due to convergence or purity defect, reconvergence may be attempted as described below.

3-3-1. Center Area Convergence

a. Receive the Test Pattern II.

b. Place shorting jumper between base and emitter of Green Output (TR253). This will leave only blue and red lines visible in crosshatch pattern.

c. Converge red and blue vertical lines in the center area by spreading or closing the tabs of magnet 1 and 2. (See Fig. 3)

d. Converge red and blue horizontal lines in the center area by rotating the above tabs together while keeping the mutual angle between the two tabs. (See Fig. 4)

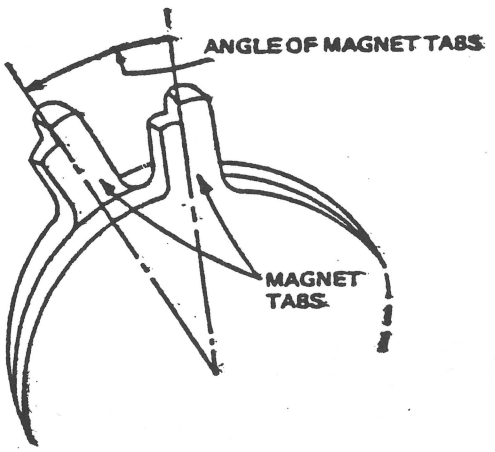
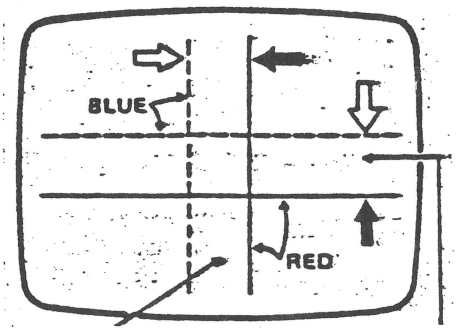


Fig. 4 MUTUAL ANGLE OF CONVERGENCE MAGNET

e. With red and blue lines converged, remove the shorting jumper between base and emitter of TR253. Green horizontal and vertical lines should now be visible.

f. Converge green and red/blue lines, both vertically and horizontally, by adjusting magnet 3 and 4 in the same way as step c and d.

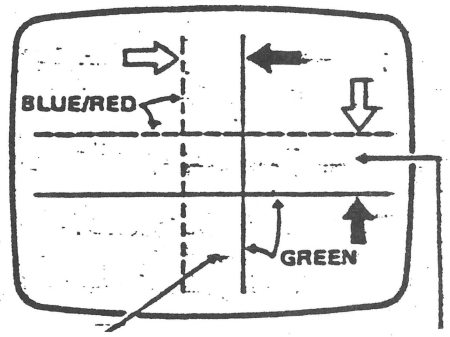
g. After completing step f, recheck steps b through e. If readjustment is required, repeat step f.



Adjust the angle between tabs of magnet 1 and 2 to converge blue and red vertical lines.

Rotate tabs together to converge red and blue horizontal lines.

Fig. 5 BLUE AND RED LINE MOVEMENT



Adjust the angle between tabs of magnet 3 and 4 to converge red/blue and green vertical lines.

Rotate tabs together to converge red/blue and green horizontal lines.

Fig. 6 BLUE/RED AND GREEN LINE MOVEMENT

3-3-2. Peripheral Area Convergence

a. Slightly loosen the screw holding the deflection yoke.

b. Converge the lines in peripheral area of raster by moving the front edge of the deflection yoke in radial direction. (See Fig. 7,8 and 9)

c. Insert three rubber wedges between the tube bell and the yoke as illustrated. (Rubber wedges are to be glued to the tube bell.)

d. Tighten the screw holding the yoke.

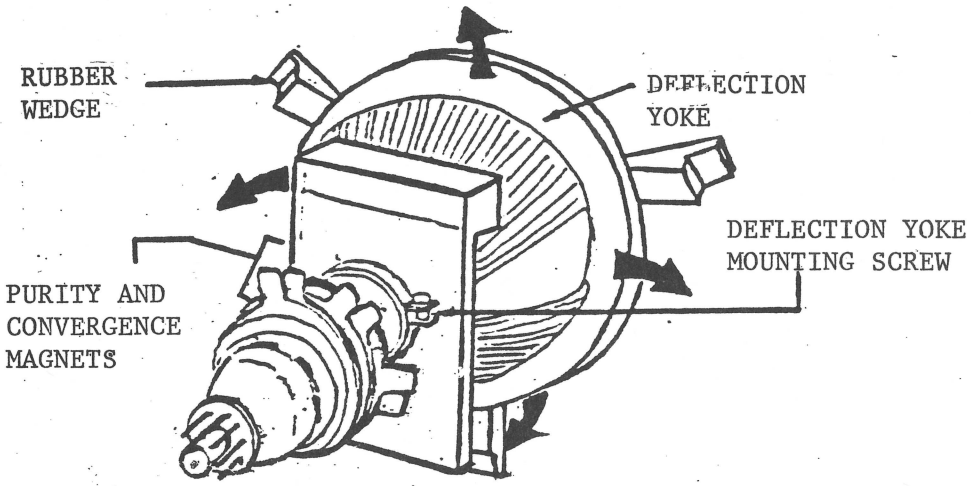


Fig. 7 ADJUSTMENT OF DEFLECTION YOKE FOR PERIPHERAL CONVERGENCE

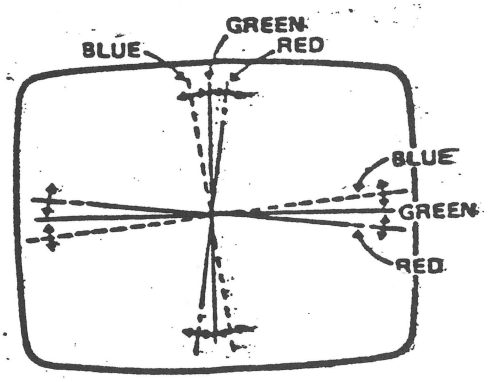


Fig. 8 LINE MOVEMENT WHEN MOVING DEFLECTION YOKE FRONT UP AND DOWN

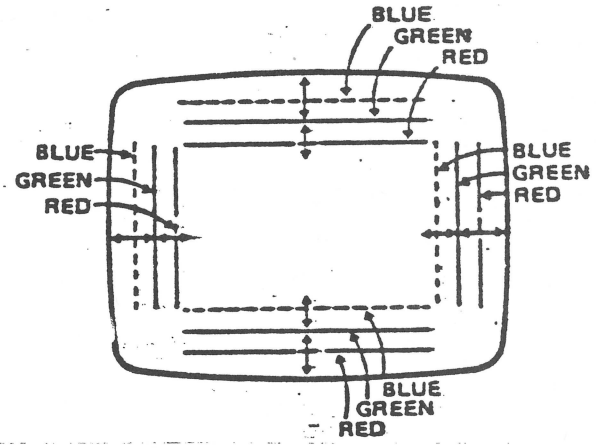


Fig. 9 LINE MOVEMENT WHEN MOVING DEFLECTION YOKE FRONT SIDEWAYS

3-4. Gray Scale Adjustment

a. Receive Test Pattern III

b. Set Red and Blue Drive controls (VR254 & 255) to mid position.

c. Turn Red, Blue and Green Bias controls (VR251,252 & 253) and screen voltage control (mounted on the flyback transformer) fully counter-clockwise.

d. Tumble the service (vertical collapse) switch forward.

e. Rotate the screen voltage control clockwise until any one horizontal color line that is barely visible appears.

f. Overlay the remaining two colors to make the line white by adjusting the bias controls for the two colors.

g. Tumble the service switch back to "NORMAL" position.

h. Adjust Red and/or Blue Drive controls (VR254 & 255) to produce normal black and white image at any brightness level.

i. Turn the service switch forward again to make sure that the single narrow horizontal line is white. Should it not be white, repeat steps e through g without readjusting the drive controls.

3-5. +B Voltage Adjustment

a. Turn brightness control fully clockwise.

b. Connect a DC voltmeter to "TP91" and ground.

c. Adjust VR601 to obtain a reading of 108 volts on the voltmeter.

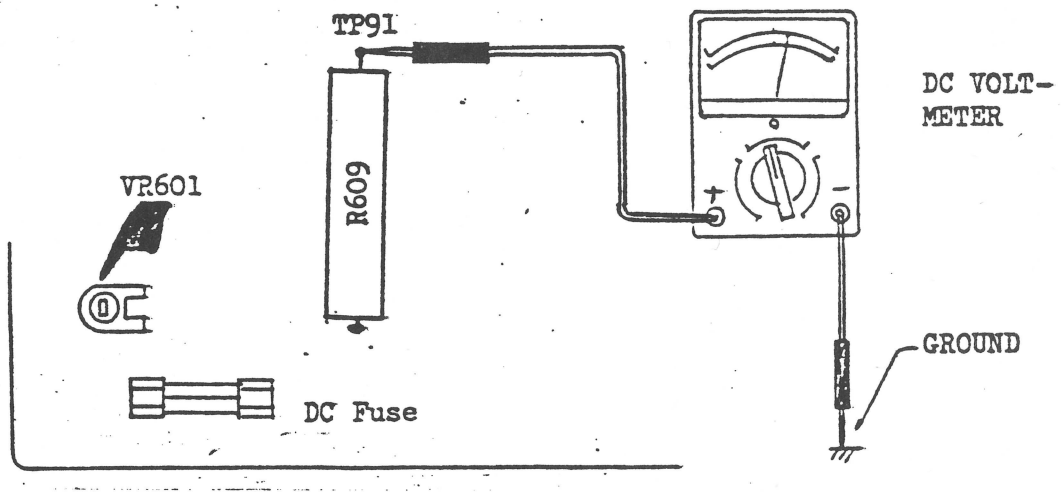


Fig. 10 CONNECTION OF DC VOLTMETER

3-6. Brightness Level Adjustment

a. Disconnect the 6-pin connector. (Give no input signal to the chassis.)

b. Turn VR301 fully clockwise.

c. Connect a DC voltmeter with its (+) lead to TP452 and (-) lead to TP451 as illustrated below. I.5-3 V range is recommendable.

d. Adjust VR301 to 0.75 volt.

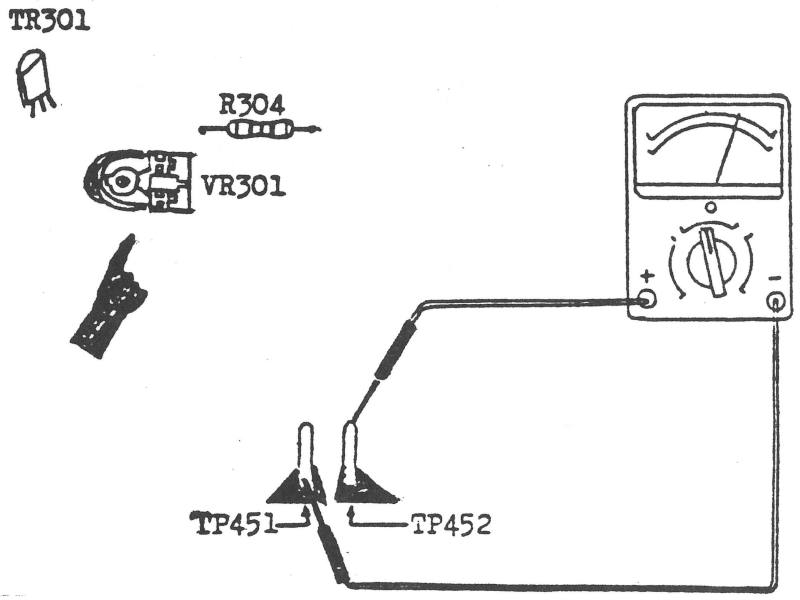


Fig. 11 CONNECTION OF DC VOLTMETER

3-7. Horizontal Positioning Adjustment

Removing D457 moves raster to the left.

Turning VR452 counterclockwise also moves raster to the left.

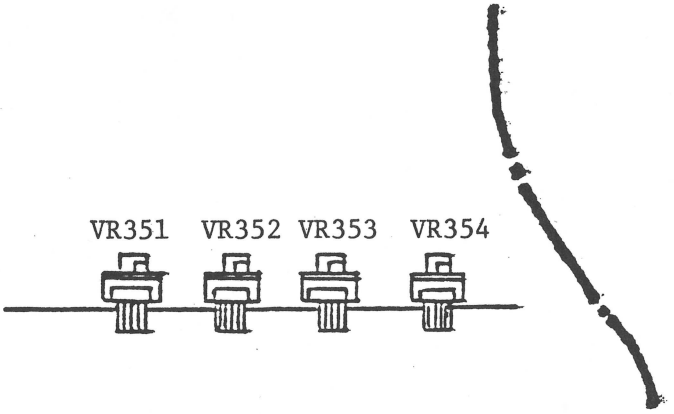


Fig. 12 LOCATION OF VR452

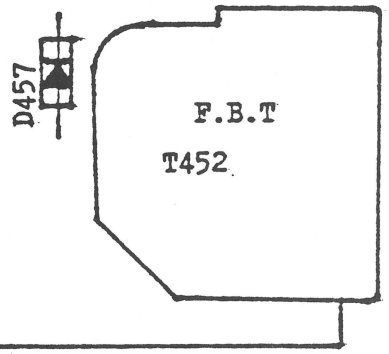


Fig. 13 LOCATION OF D457

3-8. Width Adjustment

Turning L453 clockwise widens raster.

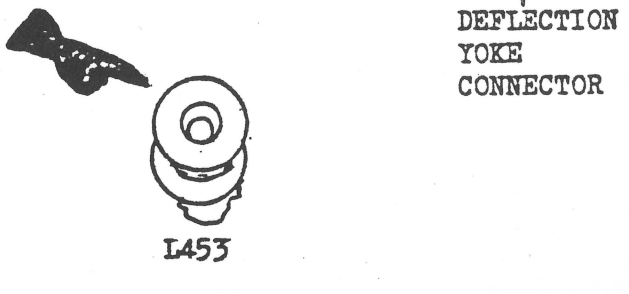


Fig. 14 LOCATION OF L453

4. Operation of Safety Circuit

General Information

In order to prevent the generation of overvoltage, a Hold-Down Circuit and a Constant Voltage (power regulator) Circuit are provided in this chassis. For safety purposes DO NOT tamper with these circuits. The following is a summary of their operation:

4-1. Hold-Down Circuit

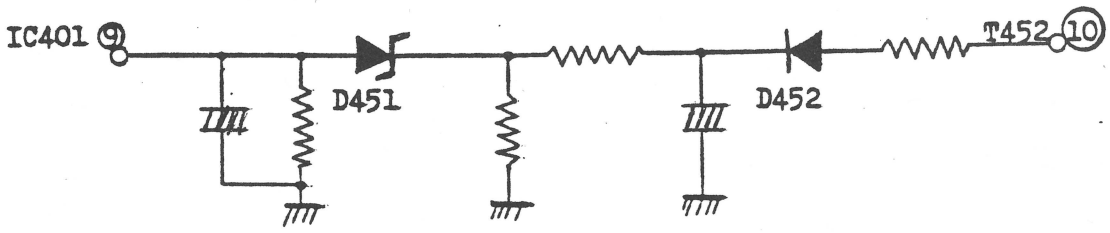


Fig. 15 HOLD-DOWN CIRCUIT

In case of a malfunction of the power regulator or high voltage circuits, the CRT anode voltage may rise above normal operating conditions. This will cause pin 10 of the flyback to rise proportionally. This pulse from pin 10 is rectified by D452, applied to pin 9 of IC401 and horizontal oscillation is shut down. This prevents overvoltage. Once the "hold-down" circuit is activated, horizontal oscillation will not restart until the cause of the overvoltage condition is removed, and the power switch is turned off for a few seconds and turned back on.

Note: Make sure that:

1. high voltage ceases when impressing 32 volts DC on cathode of D452.
2. high voltage remains ceasing after removing the impression of the 32 volts DC mentioned above.

4-2. Constant Voltage Circuit (Power Regulator)

IC601 is the regulator. It has error detection and regulating circuitry built in and is capable of automatically monitoring and controlling B+ voltage. (108V)

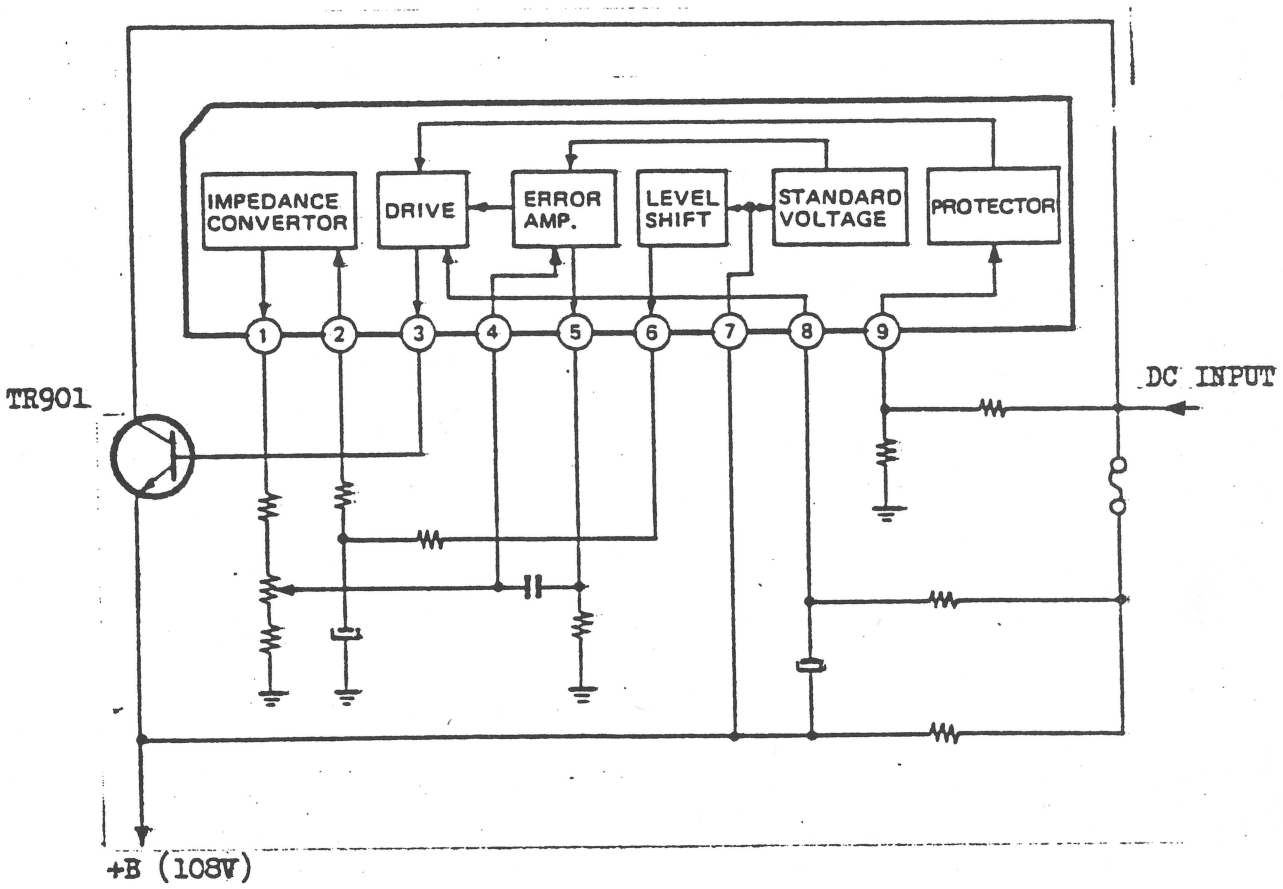
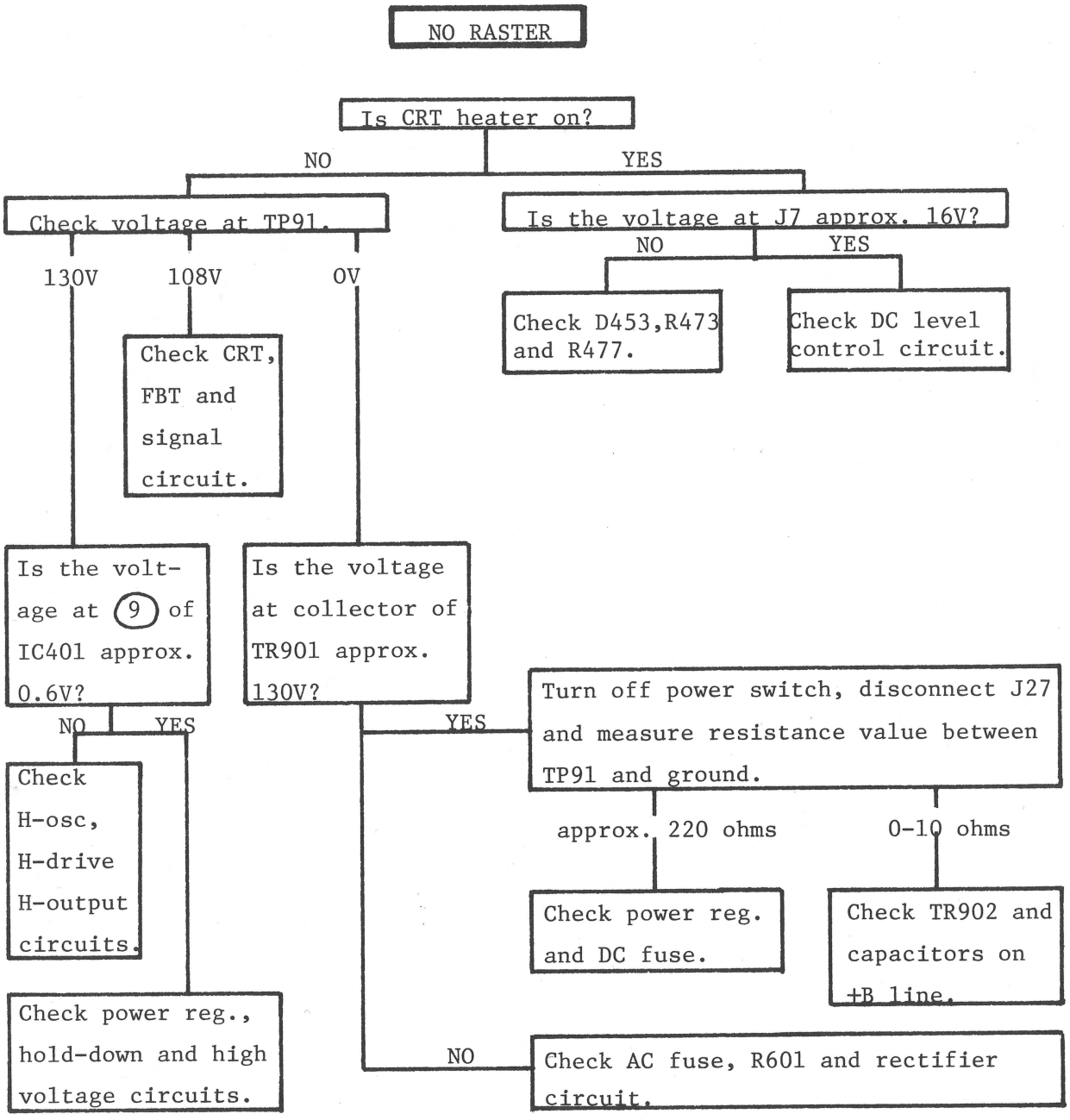


Fig. 16 STRUCTURE OF IC601

5. Servicing Procedures Classified by Symptoms

The following are the troubleshooting procedures to use in case of some known typical symptoms. The following flowcharts should be of help in narrowing down the defective section and circuitry at fault.

5-1. No Raster



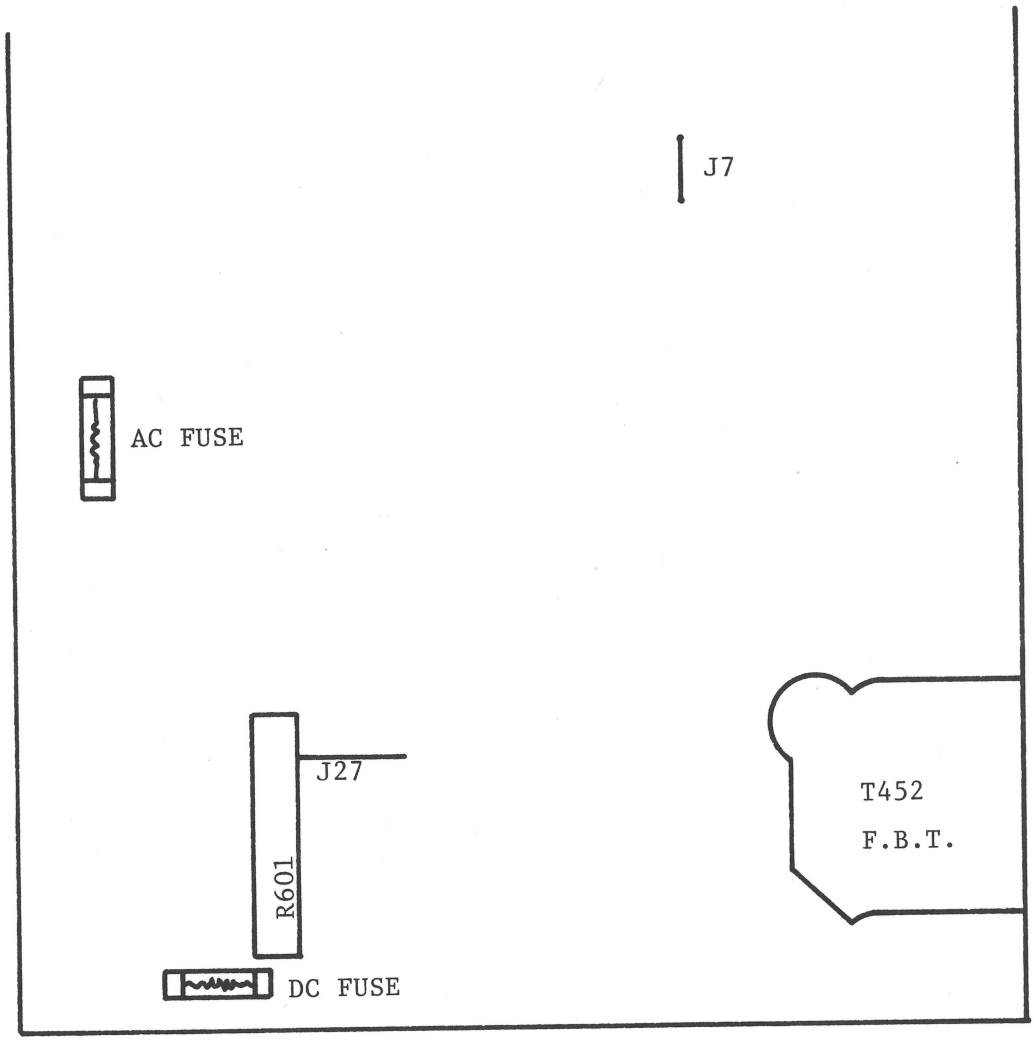
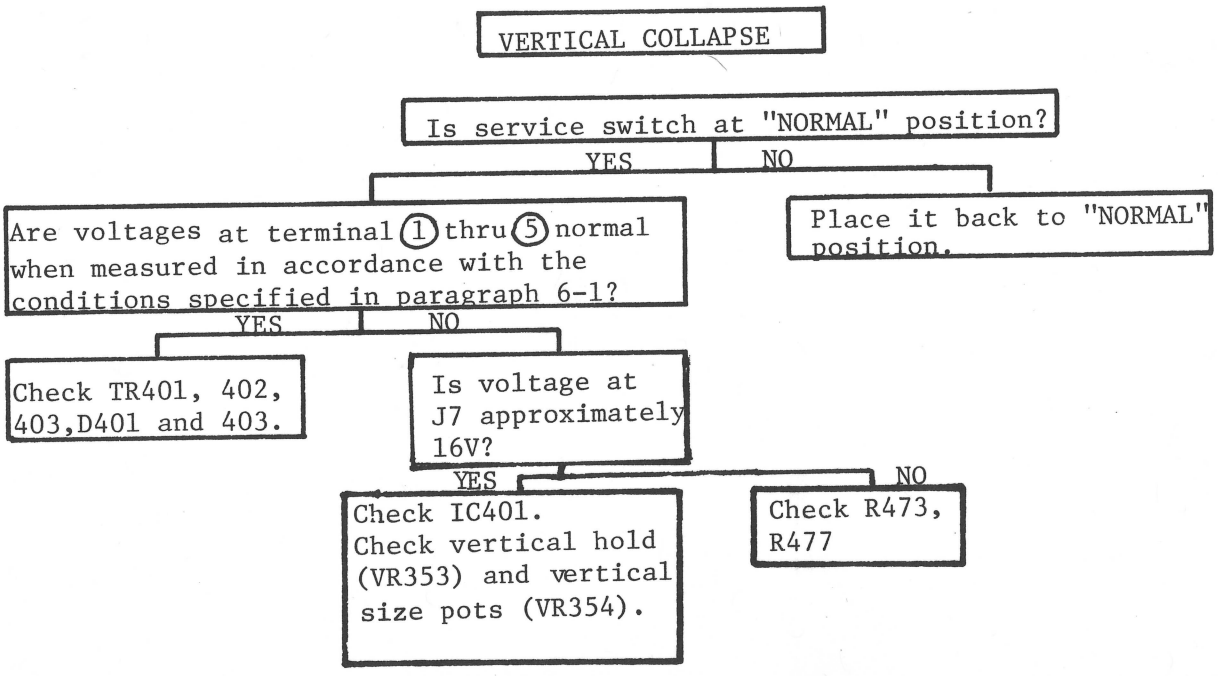
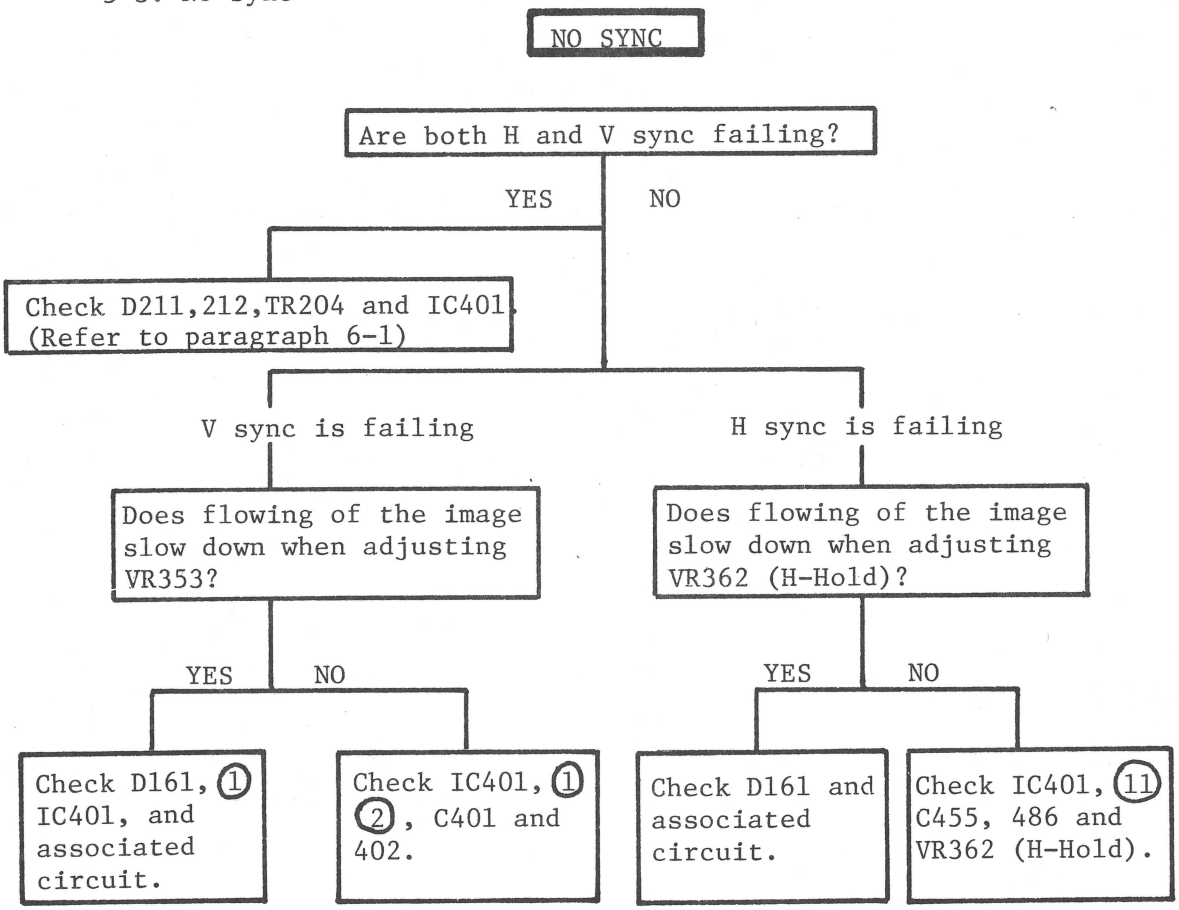


Fig. 17 LOCATIONS OF J7 AND J27

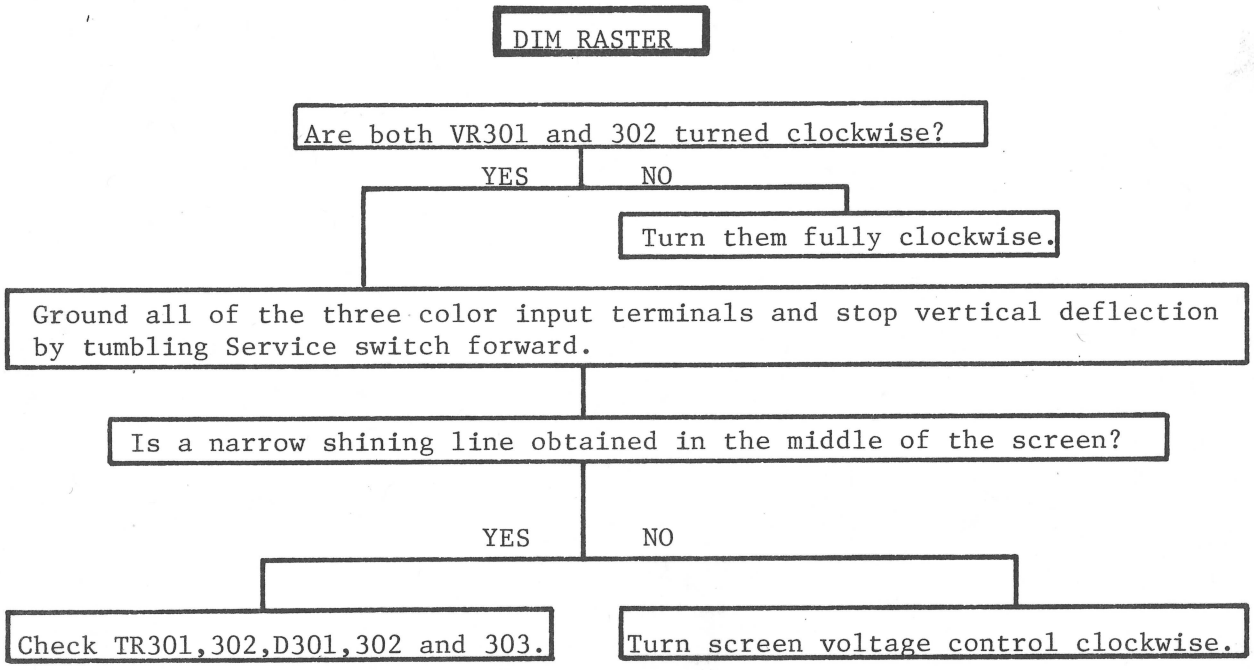
5-2. Vertical Collapse



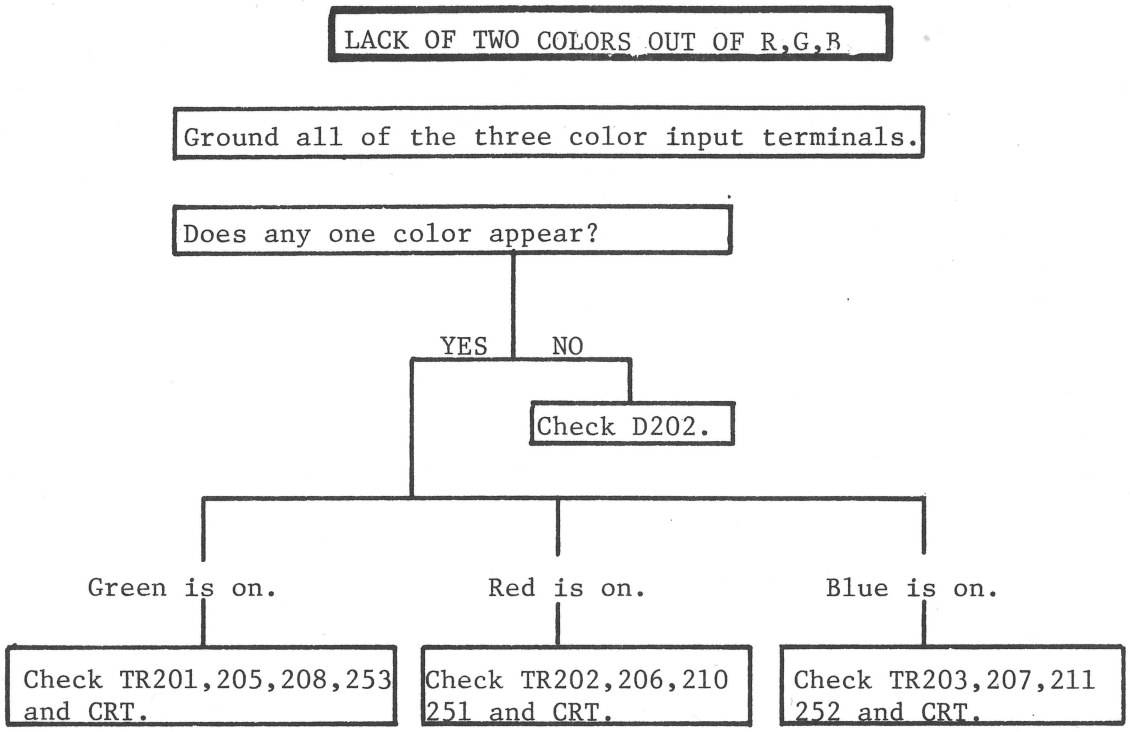
5-3. No Sync



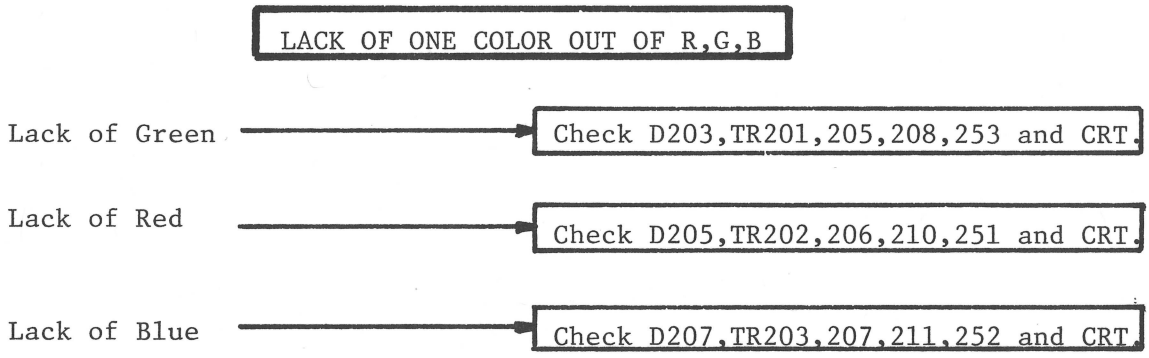
5-4. Dim Raster



5-5. Lack of Two Colors out of R,G,B,



5-6. Lack of One Color out of R,G,B



5-7. Deflection Incomplete

Left side of screen appears to "wrap-around"

Replace C407 10uF/160VDC

5-8. Wave Problem

Waves across entire screen

Replace TR901 (2SD1090) Replace IC601 (LA5112)

5-9. Blooming White Screen

Screen voltage rises causing screen to go white.

Check R478 (1 ohm, 1/2 watt)

6. Terminal Voltages of IC (Reference Information)

6-1. IC401 LA1464 (Deflection)

Terminal No.	Voltages when the chassis is in normal operation	
	At IC terminals	At PWB terminals corresponding to IC terminals when IC401 is removed
	V DC	V DC
1	(-3.61V)	0
2	6.16V	0
3	1.46V	29.5
4	1.15V	0
5	.61V	0
6	.01V	0
7	4.45V	0
8	.01V	0
9	.10V	0
10	1.90V	22
11	7.52V	30.5
12	14.12V	31
13	.29V	0
14	3.62V	0
15	7.49V	30
16	4.23V	0
17	(-.86V)	0
18	1.50V	0
19	1.65V	0
20	(-0.01V)	0
21	(-1.09V)	0
22	5.18V	0
23	2.11V	0
24	12.64V	0

Table 1

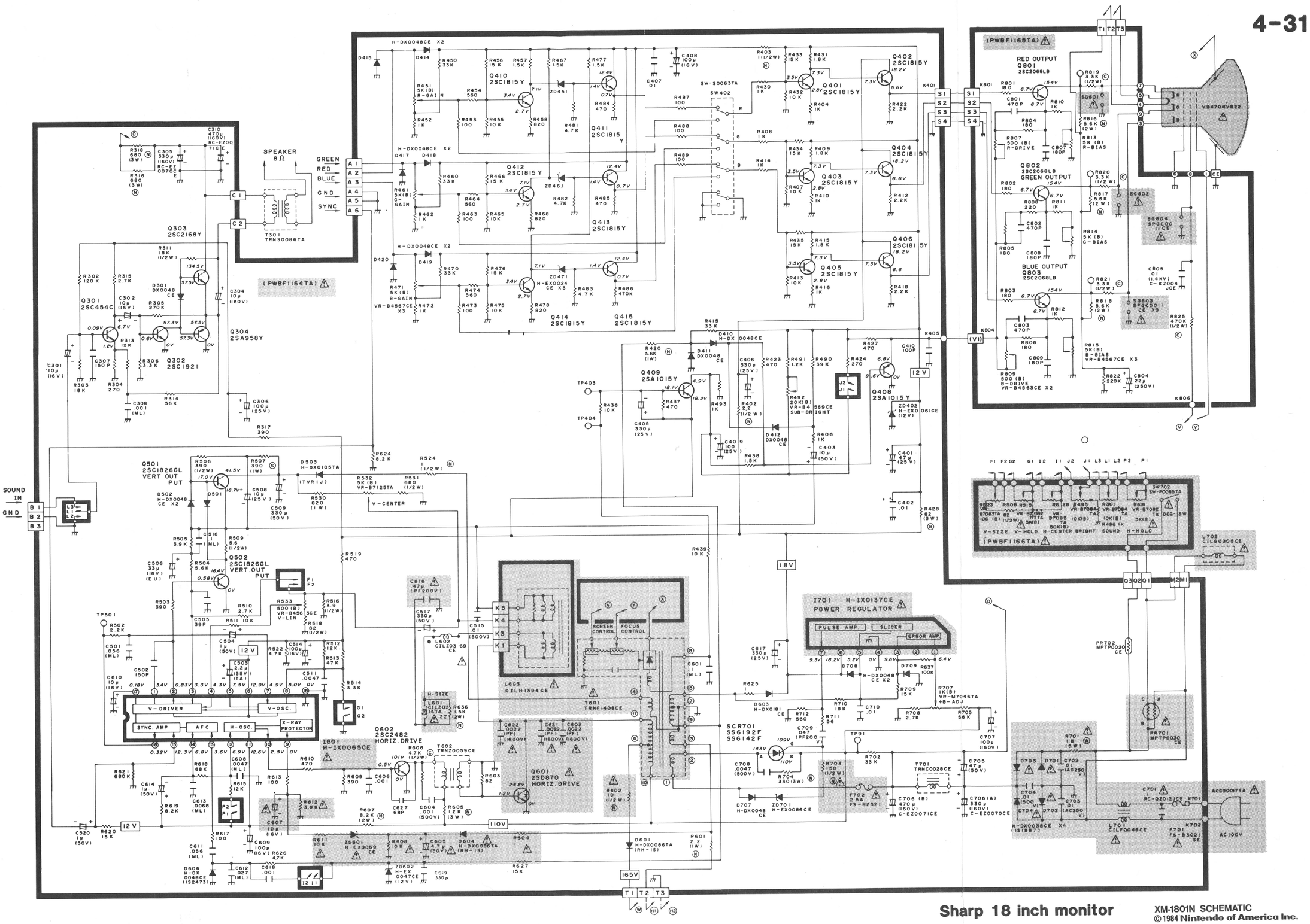
NOTE: Voltages given above are averages. Variances of ± 10% would not necessarily indicate a failure.

6-2. IC601 LA5112N (Constant Voltage)

Terminal No.	Voltages at IC terminals	
	In normal operation	When "Hold-Down" occurs
	V DC	
1	108	going up
2	106	"
3	109	"
4	101	"
5	95	"
6	110	"
7	108	"
8	115	"
9	107.5	"

Table 2

NOTE: Voltages given above are averages. Variances of ± 10% would not necessarily indicate a failure.



Sharp 18 inch monitor

XM-1801N SCHEMATIC

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NOTES