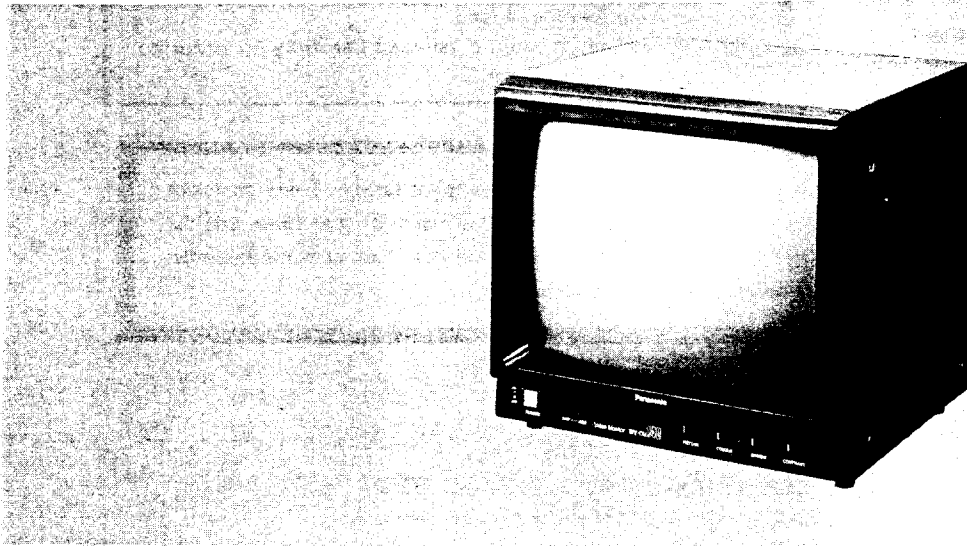


Service Manual

Colour Video Monitor
WV-CM140




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National/Panasonic


Matsushita Electric Industrial Co., Ltd.
Central P.O. Box 288, Osaka 530-91, Japan




CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN



CAUTION TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.





This symbol warns the user that uninsulated voltage within the unit may have sufficient magnitude to cause electric shock. Therefore, it is dangerous to make any kind of contact with any inside part of this unit.

This symbol alerts the user that important literature concerning the operation and maintenance of this unit has been included. Therefore, it should be read carefully in order to avoid any problems.

IMPORTANT SAFETY NOTICE

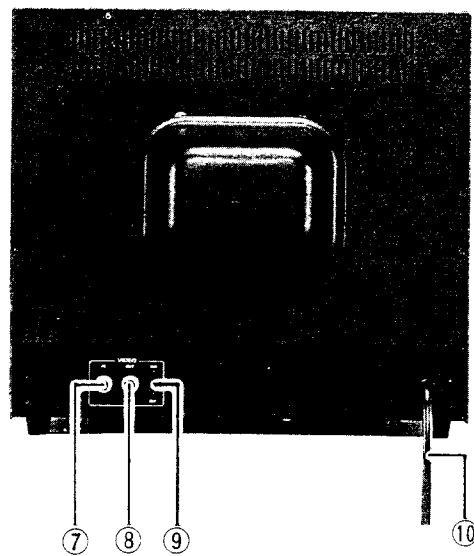
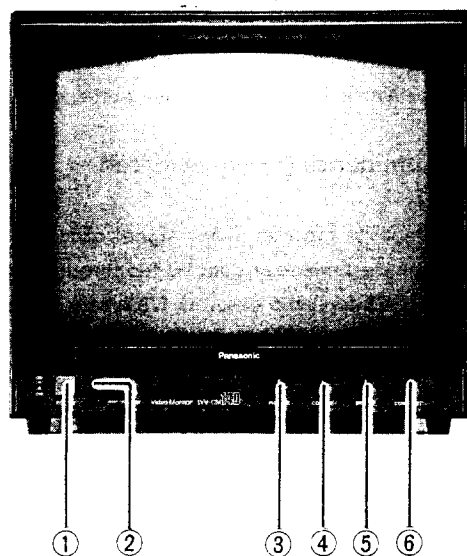
There are special components used in this equipment which are important for safety. These parts are shaded on the schematic diagram and on the replacement parts list. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent shock, fire, or other hazards. Do not modify the original design without permission of manufacturer.

SPECIFICATIONS

Power Source:	WV-CM140/A and WV-CM140/B: 240V AC 50Hz WV-CM140/C and WV-CM140/G: 220V AC 50Hz
Power Consumption:	Approx. 61 watts
Video Input:	1.0 ~ 2.0 Vp-p composite/75Ω or Hi-Z looping through
Horizontal Resolution:	280 lines at center
Maximum Video Gain:	35 dB ± 3 dB
Sweep Linearity:	Less than 5%
Sweep Geometry:	Less than 2%
Scanning Size:	Overscanning
Overscanning:	Approx. 8%
CRT:	14" diagonal
High Voltage:	DC 23.5 kV ± 1 kV
Ambient Operating Temperature:	14°F ~ 122°F (−10°C ~ +50°C)
Ambient Operating Humidity:	Less than 90%
Dimensions:	13-5/8"(W) × 12-1/2"(H) × 15-1/4"(D) 347(W) × 318(H) × 388(D) mm
Weight:	30.8 lbs (14 kg)

Weights and dimensions shown are approximate.
Specifications are subject to change without notice.

MAJOR OPERATING COMPONENTS



1 Power Switch (POWER)

This is a push type switch which turns the monitor on and off.

Push once and the switch remains down (■) for turning the monitor ON.

Push again, the switch comes up (■) for turning the monitor OFF.

2 Power Indicator

3 Picture Adjustment (PICTURE)

Turn this control clockwise for sharp picture and turn this control counterclockwise for soft picture.

4. Colour Control (COLOUR)

Turn this control clockwise to increase the picture colour and turn this control counterclockwise to decrease the picture colour.

5 Bright Control (BRIGHT)

Turn this control clockwise to increase the picture brightness.

6 Contrast Control (CONTRAST)

Turn this control clockwise to increase the picture contrast.

7 Video Input Connector (VIDEO, IN) (BNC)

8 Video Output Connector (VIDOE, OUT) (BNC)

9 Video Terminal Switch (VIDEO 75Ω/Hi-Z)

When bridging or looping through the video signal, set this switch to Hi-Z position, and for other cases this switch should be set to 75Ω position.

10 Power Cord

1. CIRCUIT DESCRIPTION

1-1 Power/Monitor Board

1-1-1 Power Circuit

The power circuit generates DC voltages, such as +115V, +24V and +12V.

When the power switch SW101 is turned ON, AC voltage is supplied to primary winding of T1 through L1.

The induced voltage obtained at secondary winding of T1 and rectified by D1 is divided by R7, VR1 (+115V ADJ) and R9. This is supplied to error amplifier consisting of Q5 and D6 where the DC voltage is compared with reference zener voltage and the error voltage is detected. When +115V DC is increased, Q5 is turned ON and switching transistor Q4 is turned OFF.

As a result, switching pulse whose width (pulse duty) controlled by error DC voltage is applied to switching transistor Q4 for switching it ON and OFF due to variation of error DC voltage.

- +115V DC, generated by rectifying the pulse, obtained at pin 1 of secondary winding T1 with D1 is supplied to H.deflection circuit.
- The induced pulse obtained at pin 3 of secondary winding T1 is rectified by D3 and obtained DC voltage is sent to +12V regulator IC2 where the regulated +12V DC is generated and obtained at pin 3 of IC2.
- The induced pulse obtained at pin 4 of secondary winding T1 is rectified by D2 and obtained DC voltage is sent to +24V regulator IC1 where the regulated +24V DC is generated and obtained at pin 3 of IC1.

1-1-2 Signal Processing Circuit

The single chip chroma video jungle IC which contains following circuit is used on the signal processing circuit.

- (A) Luminance (Y) signal circuit
- (B) Chroma processing circuit
- (C) Horizontal (H) deflection signal circuit
- (D) Vertical (V) deflection signal circuit

(A) Luminance (Y) signal circuit

The composite monitor video signal obtained at pin 3 of CN301 on the Connector board is fed through buffer Q12 and pin 42 of IC3 to clamp circuit in IC3 where the pedestal level of signal is clamped by clamp DC voltage. The clamped signal is fed through contrast circuit in IC3 which control for sharpness the edge of video signal, controlled by VR11 (CONTRAST). This signal is sent out through pin 43 of IC3 to low pass filter (L.P.F) consisting of R58 ~ R60, C106 and L6 and band pass filter (B.P.F) consisting of R41, R42, C38 ~ C40 and L4 respectively.

The L.P.F detects only luminance (Y) signal and B.P.F detects only chrominance (chroma) signal.

The detected chroma signal is supplied to chroma encoding circuit in IC3 through pin 3 of IC3.

The detected Y signal is supplied through pin 44 of IC3 to video tone circuit in IC3. The Y signal is also fed through differential circuit consisting R57, C60, C61, C93, C105, L5 and L8 to video tone circuit in IC3. The Y signal and differentiated Y signal is mixed at video tone circuit to compensate the video aperture. VR14 (PICTURE) is a control for setting the mixing level.

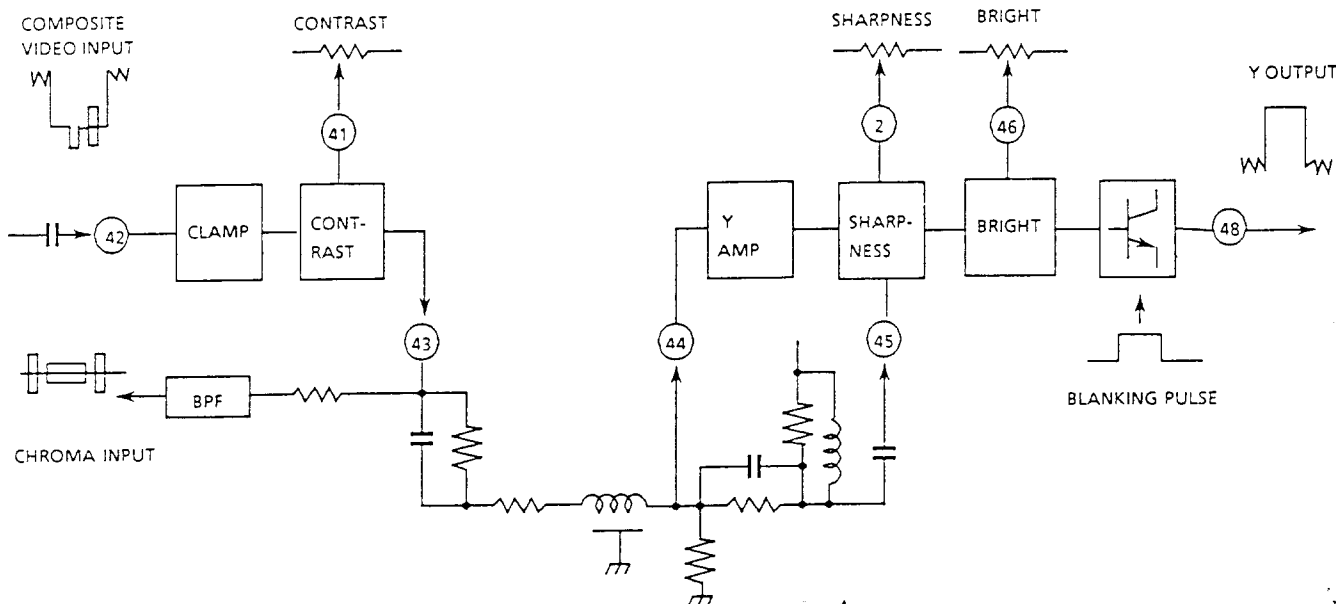


Fig. 1-1 Block Diagram of Y signal Circuit

The level controlled Y signal is then sent to blanking circuit where the horizontal (H) and vertical (V) blanking periods are treated by the H.flyback pulse from H.deflection circuit and V.blanking pulse generated in IC3. This signal is supplied to CRT socket board through Y amplifier in IC3 and buffer Q20.

Chroma processing circuit reproduces R-Y, B-Y and G-Y color difference signals from the composite video signal at the demodulator circuit through contrast amplifier, band pass filter (B.P.F) and automatic color control (ACC) amplifier circuit.

Subcarrier signal is generated by crystal oscillator which synchronize the APC loop.

The ACC circuit automatically controls the gain of carrier chrominance signal to maintain a constant color saturation. VR13 (COLOR) is a control for setting the gain of amplifier.

Chrominance signal is sent from pin 5 through ACC circuit in IC3 to this 1H delay circuit where the signal is delayed 1H and is supplied to R-Y, B-Y demodulation circuit through pins 7 and 9 of IC3 respectively.

The R-Y and B-Y demodulator circuits produce color difference signal by mixing the chroma signal, subcarrier signal and Y signal. The G-Y signal is produced at G-Y matrix circuit using R-Y and B-Y signals. The R-Y, B-Y and G-Y signals produced in IC3 is supplied to R, B and G output circuits on the CRT Socket board through respective pins 12, 11 and 13 of IC3 respectively.

The APC circuit is a control for the 4.43MHz oscillation frequency by comparing the phase of the subcarrier generated by the 4.43MHz oscillator circuit with the phase of reference burst signal.

If the killer circuit receives black and white signal, the luminance signal of around 4.43MHz and circuit noise appear as color noise on the screen. When black and white signal is supplied, the color killer circuit operates and kills the color control circuit and the 4.43MHz oscillator circuit in IC3.

The 4.43MHz oscillator circuit generates the subcarrier and amplifies it. The oscillator is consisting of crystal oscillator X1, R50, C51 and C52 connected at pins 17, 18 and 20 of IC3, and the oscillated signal is sent to the 4.43MHz oscillator circuit.

This circuit is a control for color phase and connected to the demodulator circuit, APC circuit and 4.43MHz oscillator circuit. VR7 (CHROMA PHASE) is a control for color phase.

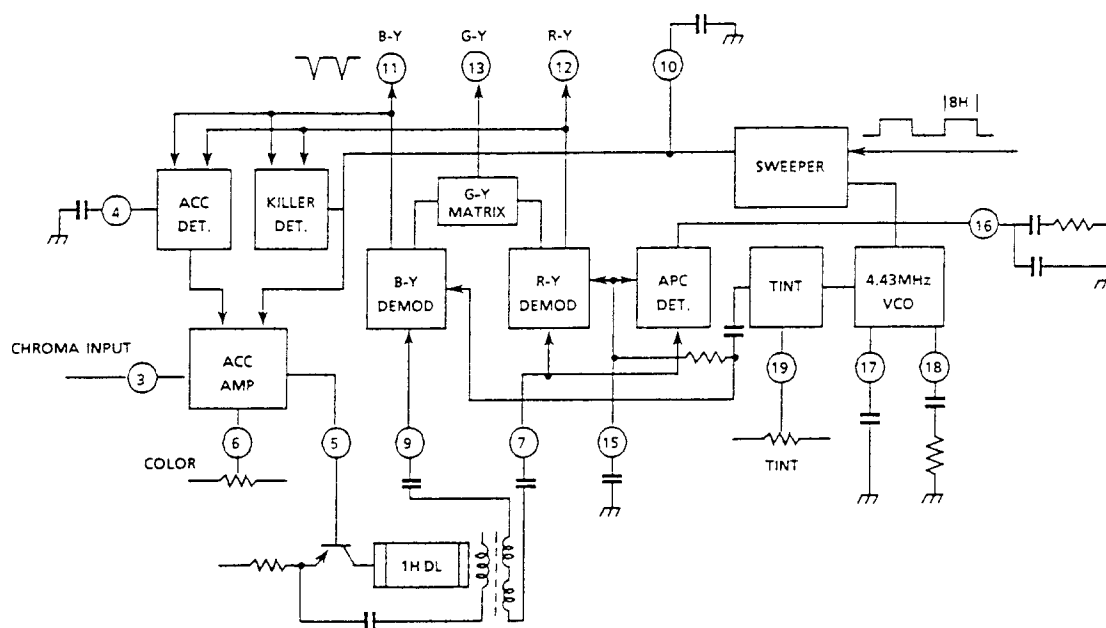


Fig. 1-2 Block Diagram of Chroma Processing Circuit

(C) Horizontal (H) deflection signal circuit

The composite monitor video signal from buffer Q12 is fed through pin 37 of IC3 to sync separator which detects composite sync pulse. The detected composite sync pulse is supplied to equalizing pulse and vertical sync pulse gate circuit for detecting only H sync signal. This signal is supplied to automatic frequency control-1 (AFC1) circuit.

The 32fH VCO (voltage controlled oscillator) circuit generates the clock pulse which is used for producing the H.drive pulse. The oscillator which consists of ceramic oscillator X2, R70 ~ R72 and C69 ~ C70 connected at pins 31, 32 and 33 of IC3, and the oscillated signal whose frequency is approx. 500KHz is sent to the 32fH VCO circuit. This is divided by 32 times at 1/32 divider circuit in IC3 and the divided pulse is supplied to AFC1 circuit where the signal is compared with H sync in phase automatically to control the oscillating frequency.

To produce the necessary pulse width and phase of H drive pulse, the pulse is sent to the another AFC circuit (AFC2) which contains variable phase shifter. The width and phase of H.drive pulse are controlled by the flyback pulse and VR6 (H.CENTER). The flyback pulse is differentiated by C63 and VR6, and the slant of differentiate pulse is controlled the phase of H.drive pulse. The pulse width is settled by the impedance at pin 29 of IC3.

The H sync signal from equalizing pulse and vertical sync pulse gate circuit and H drive pulse from 1/32 divider circuit is mixed at burst gate pulse circuit to produce the burst gate

pulse (B.G.P) and the B.G.P is supplied to Y signal circuit and chroma encoding circuit in IC3.

The H drive signal from AFC2 circuit is supplied to H.deflection circuit through H.drive circuit in IC3 and pin 27 of IC3.

The incident voltage come out at pin 9 of flyback transformer T3 rectified by D13 and is supplied to the emitter of Q24. When the monitor is normally operated, rectified voltage is low thus Q24 keeps OFF, however, if rectified voltage output becomes excessively high, the rectified voltage also becomes high and Q24 is turned ON.

As a result, DC voltage is supplied to the X-ray protector in IC3 through pin 26 for functioning the protector to stop the H drive signal supply.

(D) Vertical (V) deflection signal circuit

The H drive pulse generated at 1/32 divider circuit is sent to V/H divider circuit where the pulse is divided 262.3 times to produces 50Hz pulse. This pulse is synchronized by the V.sync signal which is sync separated from composite sync at V.sync separation circuit in IC3 to produces V.drive pulse.

This pulse is supplied to V.deflection circuit through V.driver in IC3 and pin 23 of IC3.

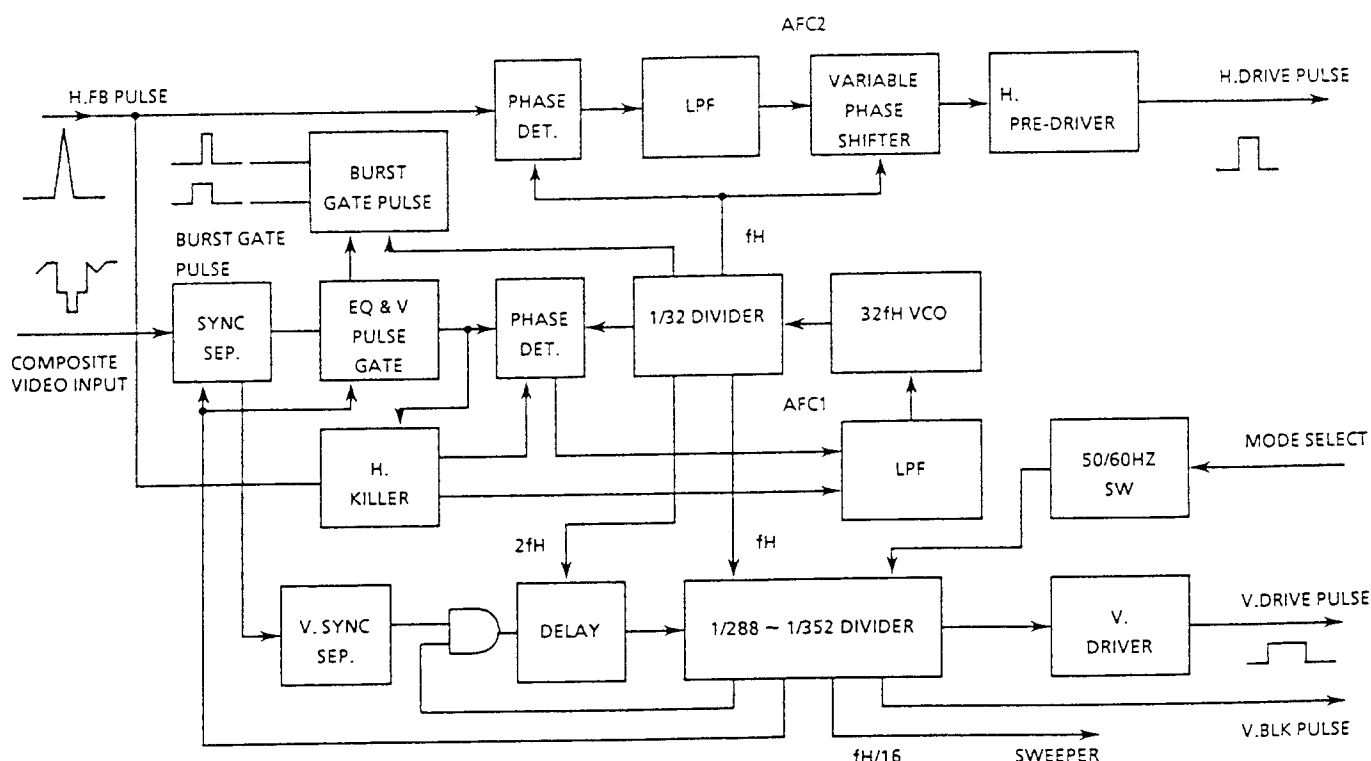


Fig. 1-3 Block Diagram of V and H Deflection Signal Circuit

1-1-3 Horizontal (H) Deflection Circuit

The oscillated H.drive pulse from pin 27 of IC3 is supplied to H.pulse switching amplifier consisting of Q10 and T2. The induced H.pulse obtained at secondary winding of T2 is supplied to CRT H.deflection coil through drive amplifier Q11.

1-1-4 Vertical (V) Deflection Circuit

The vertical drive pulse from pin 23 of IC3 is supplied through pin 4 of IC4 to booster circuit and V.deflection output circuit respectively. The booster circuit produces V.blanking pulse and boosted it to necessary level. The V.deflection output circuit produces V.sawtooth signal and the V.sawtooth signal is mixed with V.blanking pulse to produces V.deflection signal. This is supplied to CRT vertical deflection coil through pin 2 of IC4.

The V.sync signal obtained at pin 2 of IC3 is amplified by Q14 and Q15. The amplified V.sync signal is supplied through differential circuit composed of C75 and R76 to Q25 and Q17 respectively. At rise timing of differential signal, Q25 and Q17 turn ON and negative trigger is obtained at collectors. The negative trigger at collector of Q25 with differentiated V.deflection signal are mixed and fed back through pin 21 of IC3 to V.driver circuit. The negative trigger at collector Q17 with V.centering and V.size signal also mixed and fed back through pin 22 of IC3 to V.driver circuit. In the V.driver circuit phase of these signals are compared to compensate the start position of V.deflection signal.

VR2 (V.CENTER) is a centering control which controls the direct current flowing to V.deflection coil to set the V.scanning position on the CRT.

VR3 (V.SIZE) is a control for adjusting V.scanning size.

1-1-5 High Voltage Circuit

The flyback pulse supplied to the primary winding of flyback transformer (F.B.T) is stepped up by the F.B.T and the boosted pulses obtained at secondary winding of the F.B.T are rectified to generate high voltage.

2. CRT Socket Board

The R-Y, G-Y and B-Y signals from the Power/Monitor board are supplied to base of Q203, Q202 and Q201 respectively where the R-Y, G-Y and B-Y signals are mixed with luminance (Y) signal which is fed from the Power/Monitor board through SW201 (SERVICE SWITCH) to each emitters of Q203, Q202 and Q201, and amplified necessary level to drive the CRT. The R, G and B signals obtained at each collectors are supplied to respective cathode of CRT.

When the SW201 is set to the R position, the Y signal is only supplied to Q203 therefore, only R signals supplied to CRT. This position is used to purity adjustment.

When the SW201 is set to the SERVICE position, Y signal is fed back to the vertical (V) deflection, as a result, R-Y, G-Y and B-Y chroma signals are supplied to CRT and horizontally deflected R, G and B lines appeared at CRT screen. This position is used for adjusting the white balance.

ADJUSTMENT PROCEDURE

1. TEST EQUIPMENT REQUIRED

The following equipment is required for adjustment of WV-CM140 Color Video Monitor.

- Oscilloscope
- Color TV signal generator
- Digital voltmeter
- Degaussing coil
- Completely aligned Color Camera
- Underscanned color video monitor
- Resolution chart

2. DISASSEMBLY PROCEDURE FOR ADJUSTMENT

- Remove eight screws holding the cover and remove the cover by pulling it backward. (Fig. 2-1-1)

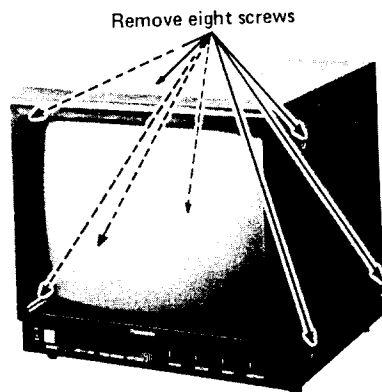


Fig. 2-1-1

3. REPLACEMENT PROCEDURE

CRT Replacement

- Remove the cover as previously described in Section 2.
- Remove three screws holding the printed circuit board (PCB) and slide back the PCB unit. (Fig. 3-1)

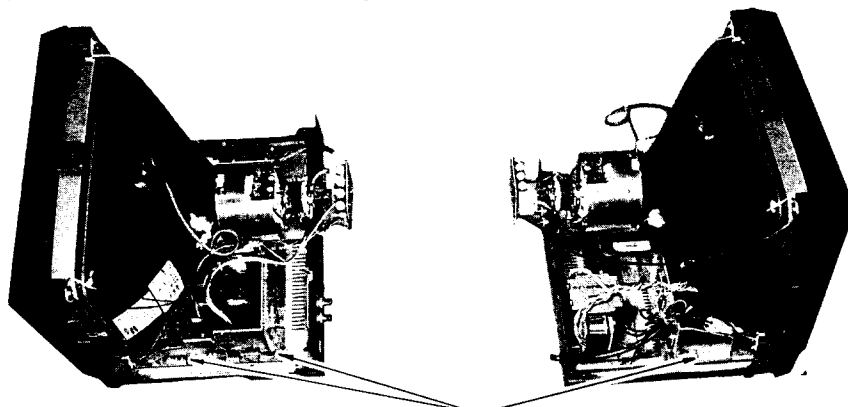


Fig. 3-1

- Disconnect the anode cap. (Fig. 3-2)

Caution: Make sure that the anode voltage is completely discharged by directly connected between anode terminal and chassis.

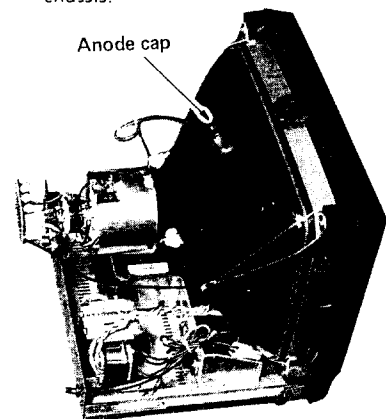


Fig. 3-2

- Disconnect the CRT socket board by pulling it backward. (Fig. 3-3)
- Remove four screws holding CRT and remove CRT.
- Remove deflection yoke shield cover.
- Loosen the screws holding deflection yoke and purity, convergence magnets assy and remove the yoke and magnets assy by pulling them backward.

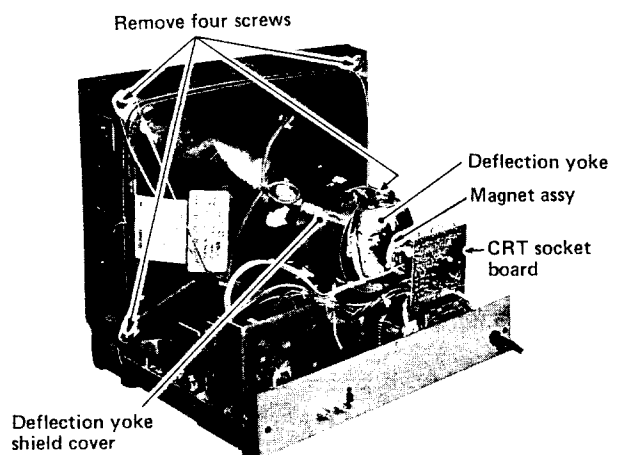


Fig. 3-3

4. ADJUSTMENT PROCEDURE

4-1 Connection and Setting Up for Adjustment

4-1-1 Connection

- Connect the coaxial cable between the VIDEO OUTPUT terminal of Color Camera and CAMERA INPUT connector of Color Video Monitor WV-CM140.
- Connect the coaxial cable between VIDEO OUTPUT connector of TV signal generator and VIDEO INPUT connector of Color Video Monitor WV-CM140.
- Connect the coaxial cable between VIDEO OUTPUT connector of Color Video Monitor WV-CM140 and color video monitor. (Fig. 4-1)

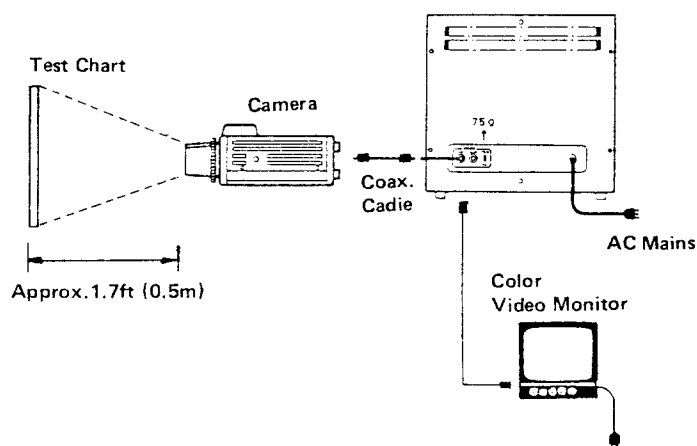


Fig. 4-1

4-1-2 Disassembling

- Disassemble the Video Monitor WV-CM140 according to Section 2 DISASSEMBLY PROCEDURE FOR ADJUSTMENT on page 7.

4-1-3 Position of Controls and Switches

- Set the controls and switches on the Video Monitor as follows;

Power ON/OFF switch	ON position
Color control	Center (Click) position
Contrast control	Center (Click) position
Bright control	Center (Click) position
Picture adjustment	Center (Click) position
Service switch (SW201) on the CRT socket board	Center (NOR) position

4-2 Adjustment Procedure

(1) 115V adjustment

Test point :	Resistor R6	Power/Monitor board
Adjust :	VR1	Power/Monitor board
	(115V ADJ)	

- Disconnect camera from the video input connector on the rear panel.
- Turn ON the power switch.
- Connect the digital voltmeter to resistor R6 on the Power/Monitor board.
- Adjust VR1 (115V ADJ) for $115V \pm 0.5V$.

(2) Focus coarse adjustment

Adjust :	VR9	Power/Monitor board
	(FOCUS)	(FLYBACK TRANSFORMER)
Observe :	Video Monitor	

- Supply the dots signal to VIDEO INPUT connector of Video Monitor.
- While observing Video Monitor, adjust VR9 (FOCUS) so that the dots on the CRT screen become as small/clear as possible.

(3) Screen cutoff adjustment

Adjusts :	VR15	Power/Monitor board
	(SCREEN)	(FLYBACK TRANSFORMER)
	VR204	CRT socket board
	(R CUTOFF)	
	VR202	CRT socket board
	(B CUTOFF)	
Observe :	Video Monitor	

- Supply the white raster signal to the VIDEO INPUT connector of Video Monitor.
- Set the service switch SW201 on the CRT socket board to SERVICE position.
- Turn VR204 (R CUTOFF) and VR202 (CUTOFF) fully counterclockwise.
- While observing Video Monitor, adjust VR15 (SCREEN) so that the green horizontal line just appears on the CRT screen.
- While observing Video Monitor, adjust VR204 (R CUTOFF) and VR202 (B CUTOFF) for same level/brightness as green line.
- Reset service switch SW201 to normal (NOR) position.

(4) Purity adjustment

Adjust :	Purity Magnet assy
Observe :	Video Monitor

- Remove the shield cover for deflection coil for easy adjustment.
- Remove three DY wedge for holding the position of deflection coil.
- Supply the white raster signal to the VIDEO INPUT connector of Video Monitor.
- Confirm that the purity magnet is positioned at 1-13/16" (46mm) from edge of CRT neck. (Fig. 4-2-1)

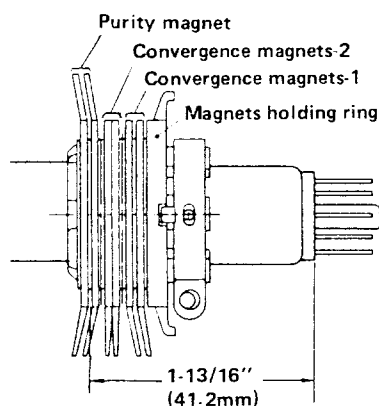


Fig. 4-2-1

- Set the service switch SW201 on the CRT socket board to R.DRIVE position for observing Red raster on the screen.
- Loosen the holding screw of deflection coil and move back the coil until it reaches to the magnet assy. (Fig. 4-2-2)

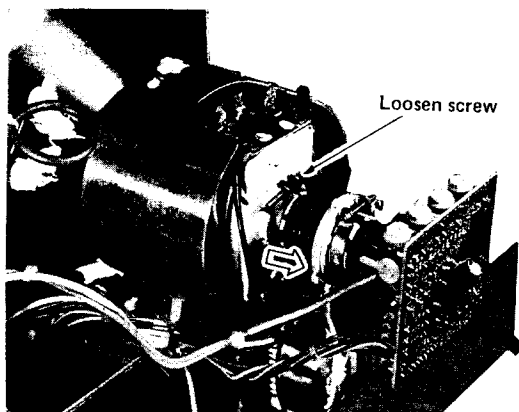


Fig. 4-2-2

- Degauss the CRT using degaussing coil.
- Loosen magnet holding ring (Fig. 4-2-3) by turning it approximately 90° counterclockwise.



Magnet holding ring

Fig. 4-2-3

- While observing Video Monitor, adjust purity magnets (Fig. 4-2-3) so that the red area positions at center of CRT screen. (Fig. 4-2-4)

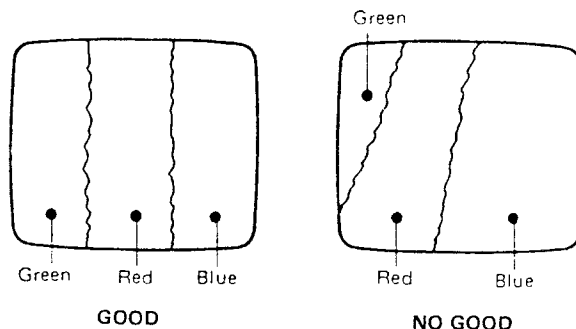


Fig. 4-2-4

- While observing Video Monitor, move deflection coil forward until red color fully occupies the screen and tighten the holding screw. (Fig. 4-2-5)
- The magnet holding ring will be fastened after completing next step.
- Reset service switch SW201 to normal (NOR) position.

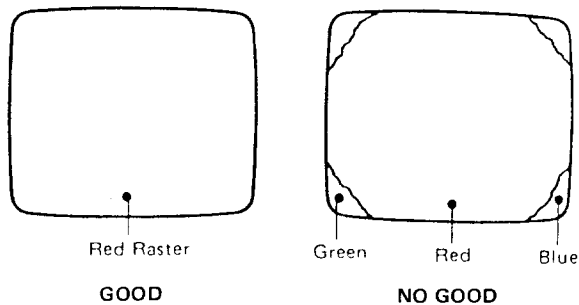


Fig. 4-2-5

(5) Convergence adjustment

Adjusts :	Convergence magnets-1	Magnet Assy
	Convergence magnets-2	Magnet Assy
Observe :	Video Monitor	

- Remove the shield cover for deflection coil.
- Remove the three DY wedge on the CRT, which hold the position of deflection coil.
- Supply the dots signal to VIDEO INPUT connector of Video Monitor.
- Loosen magnets holding ring (Fig. 4-2-3) by turning it approximately 90° counterclockwise, as previous step.
- While observing Video Monitor, adjust convergence magnets-1 (Fig. 4-2-1) so that the Red and Blue dots on the center area of CRT screen is overlapped.
- While observing Video Monitor, adjust convergence magnets-2 (Fig. 4-2-1) so that Green and Magenta (Red + Blue) dots on the center area of CRT screen is overlapped, that is, dots become white.
- Change the signal to crosshatch signal from dots signal.
- While observing Video Monitor, adjust convergence for corner of CRT by shift the front portion of deflection coil vertically, horizontally or diagonally and hold the deflection coil using three DY wedge.
- Fasten magnets holding ring.

(6) Subcontrast and subbright adjustment

Test point :	Pin 9 of CN202	CRT socket board
Adjust :	VR5 (SUBCONTRAST)	Power/Monitor board
	VR4 (SUBBRIGHT)	Power/Monitor board

- Supply the stairstep signal to the VIDEO INPUT connector of Video Monitor.
- Turn VR11 (CONTRAST) fully clockwise to maximum position and VR12 (BRIGHT) fully counterclockwise to minimum position.
- Connect the oscilloscope to pin 9 of CN202 (CRT Socket).
- Adjust VR5 (SUBCONTRAST) so that the blanking level to the top step of negative stairstep signal is 48Vp-p. (Fig. 4-2-6)

If the signal is suppressed, readjust VR4 (SUBBRIGHT) so that the signal is not suppressed.

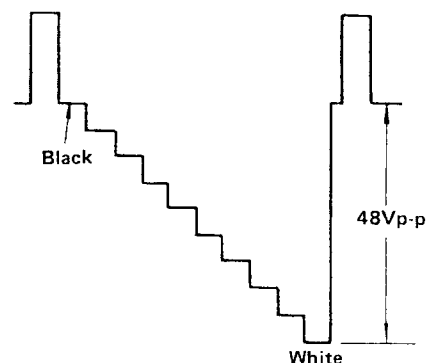


Fig. 4-2-6

- Connect the oscilloscope to pin 7 of CN202 (CRT Socket).
- Adjust VR203 (R DRIVE) so that the blanking level to the top step of negative stairstep signal is 48Vp-p.
- Connect the oscilloscope to pin 3 of CN202 (CRT Socket).
- Adjust VR201 (B DRIVE) so that the blanking level to the top step of negative stairstep signal is 48Vp-p.
- Turn VR11 (CONTRAST) AND VR12 (BRIGHT) to their mechanical center position.
- Adjust VR4 (SUBBRIGHT) so that the 2 steps from the black are suppressed to black color while observing the monitor screen. (Fig. 4-2-7)

If the black portion of stairstep is not black but other colors, fine-adjust VR204 (R LOW LIGHT) and VR202 (B LOW LIGHT) on CRT socket board for black color.

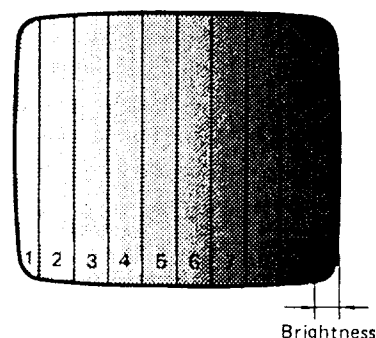


Fig. 4-2-7

(7) Chroma and delay adjustment

Test points:	TP3(R)	Power/Monitor board
	TP4(B)	Power/Monitor board
Adjusts:	VR7	Power/Monitor board
	(CHROMA PHASE)	
	VR8	Power/Monitor board
	(CHROMA GAIN)	
	L7	Power/Monitor board
	(DL MATCHING)	

- Supply the color bar signal to the VIDEO INPUT connector of Video Monitor.
- Turn VR14 (PICTURE) fully counterclockwise to minimum position, VR13 (COLOR) and VR10 (SUB COLOR) fully clockwise to maximum position.
- Set the oscilloscope to the X-Y functional mode.
- Connect the X probe of oscilloscope to TP3 (R) and the Y probe to TP4 (B).
- While observing oscilloscope, adjust VR7 (CHROMA PHASE) so that the brighter waveform and dark dots are roughly coincided. (Fig. 4-2-8)

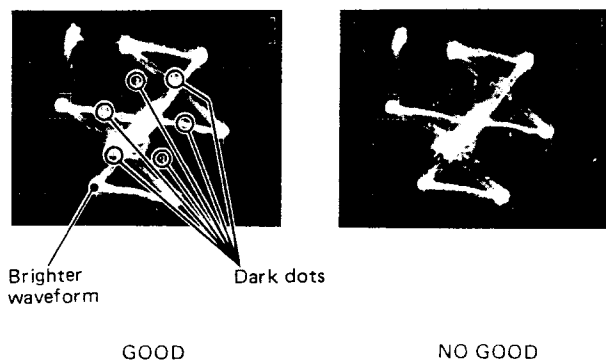
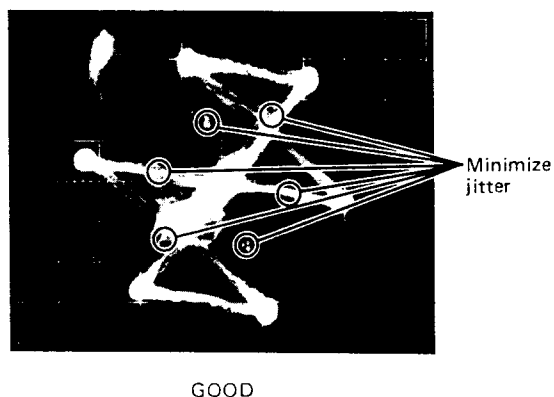


Fig. 4-2-8

- Turns VR8 (CHROMA GAIN) fully counterclockwise once and turns it back slowly and stop it where the jitter of dark dots are minimized. (Fig. 4-2-9)



GOOD



NO GOOD



NO GOOD

Fig. 4-2-9

- Adjust L7 (DL MATCHING) so that the brighter waveform is coincided. (Fig. 4-2-10)



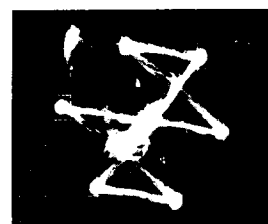
GOOD



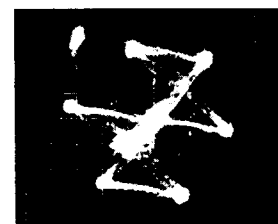
NO GOOD

Fig. 4-2-10

- Adjust VR7 (CHROMA PHASE) so that the brighter waveform is coincided. (Fig. 4-2-11)



GOOD



NO GOOD

Fig. 4-2-11

- Repeat adjusting VR7, VR8 and L7 so that the brighter waveform is coincided and jitter of dark dots are minimized.

(8) Sub color adjustment

Test point:	TP4 (B)	Power/Monitor board
Adjust:	VR10	Power/Monitor board (SUB COLOR)

- Supply the color bar signal to the VIDEO INPUT connector of Video Monitor.
- Turn VR13 (COLOR) to center position.
- Set the oscilloscope to the normal mode.
- Connect the oscilloscope to TP4(B) on the Power/Monitor board.
- Adjust VR10 (SUB COLOR) so that the waveform becomes 0.55V. (Fig. 4-2-12)

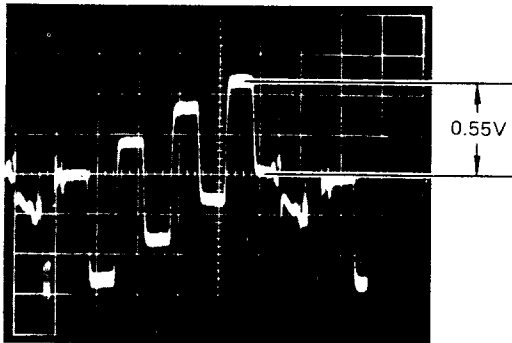


Fig. 4-2-12

(9) White balance adjustment

Adjusts :	VR203 (R DRIVE)	CRT socket board
	VR201 (B DRIVE)	CRT socket board
Observe :	Video Monitor	

- Supply the white raster signal to the VIDEO INPUT connector of Video Monitor.
- While observing Video Monitor, adjust VR203 (R DRIVE) and VR201 (B DRIVE) so that the raster on the CRT screen is white.

(10) H.centering, V.centering, V.size adjustment

Adjusts :	VR6	Power/Monitor board
	(H.CENTERING)	
	VR2	Power/Monitor board
	(V.CENTERING)	
	VR3	Power/Monitor board
	(V.SIZE)	
Observe :	Video monitor	

- Connect the completely aligned color camera to the CAMERA INPUT connector of Video Monitor WV-CM140.
- Aim the camera at the resolution chart (YWV1400RB99) so that the arrows of the chart touch to the edge of the raster on the underscanned color video monitor connected to the VIDEO OUT connector of WV-CM140.
- Adjust VR3 (V.SIZE) so that the circle of the resolution chart on the WV-CM140 monitor screen becomes true circle.
- Adjust VR6 (H.CENTERING) and VR 2 (V.CENTERING) so that the center of the resolution chart positions on the center of the monitor screen.

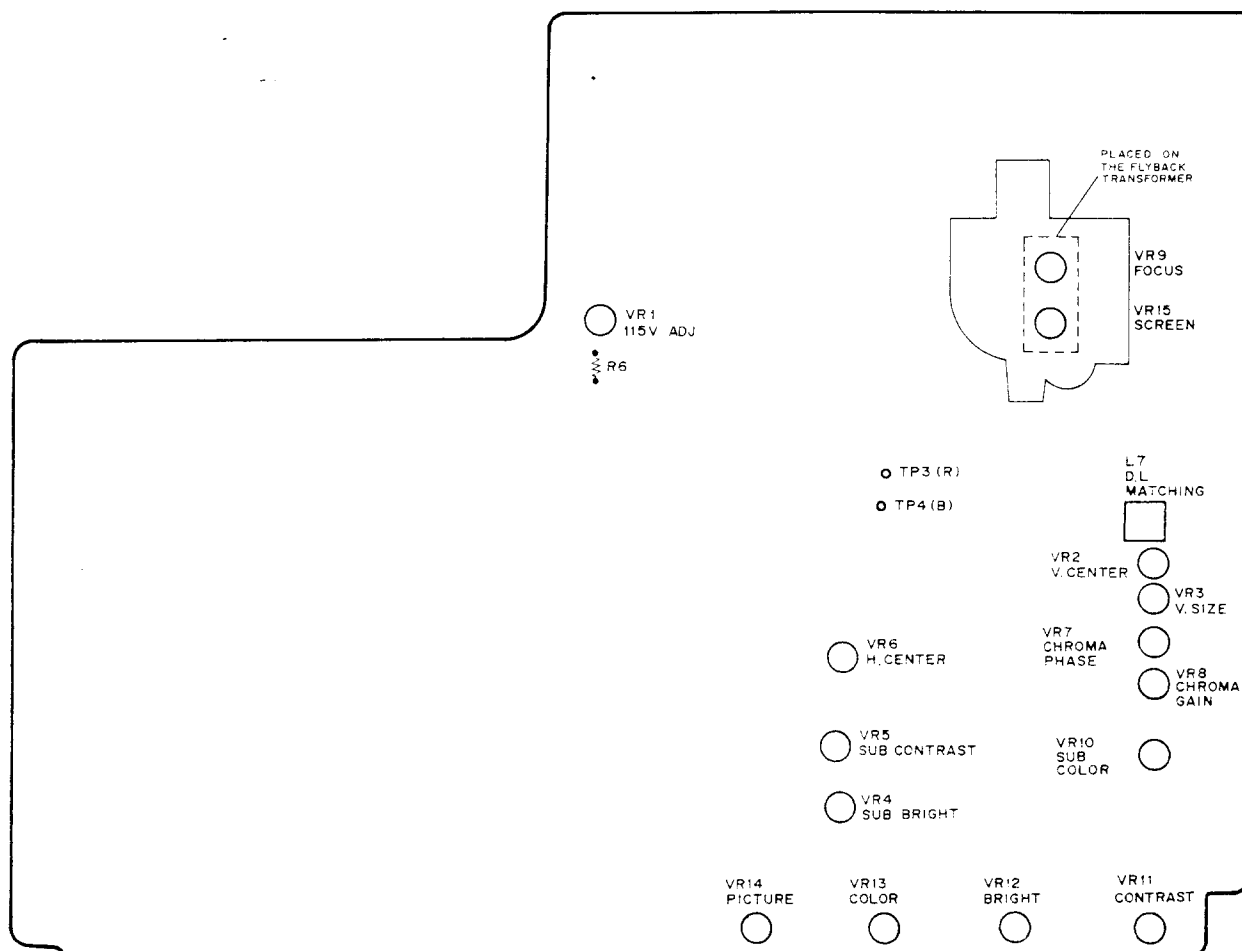
(11) Focus fine adjustment

Adjust :	VR9 (FOCUS)	Power/Monitor board (FLYBACK TRANSFORMER)
Observe :	Video Monitor	

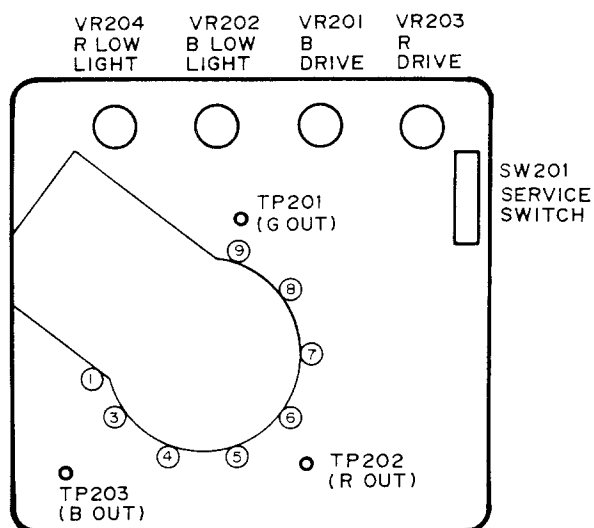
- Supply the dots signal to the VIDEO INPUT connector of Video Monitor.
- While observing Video Monitor, adjust VR9 (FOCUS) so that the dots on the CRT screen are as small/clear as possible.

LOCATION OF TEST POINTS AND ADJUSTING CONTROLS

POWER/MONITOR BOARD

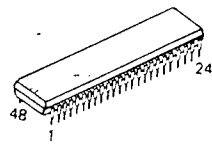


CRT SOCKET BOARD

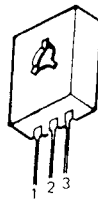


APPEARANCE OF IC, TRANSISTOR AND DIODE

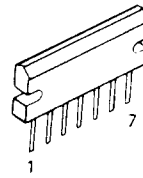
UPC1420CA



AN78M12
AN78M24

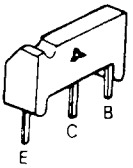


UPC1378H



2SB642-QRS
2SD637-RS
2SB643-RS
2SD639-RS

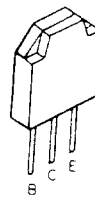
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2SD637-RS
2SB643-RS
2SD639-RS



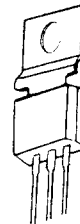
2SC1573BQR



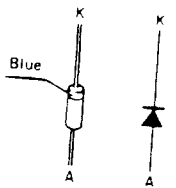
2SD1439LS



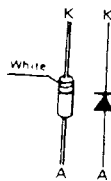
2SC2591-QRS
2SB817E



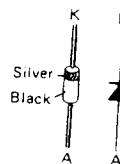
ERB1201RK
MA165



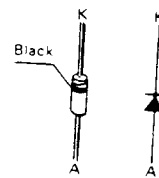
RD6.2JT1B2



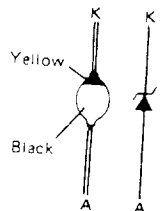
EU01V0



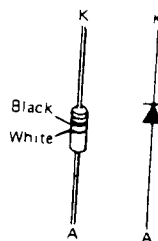
RD12ESB3T



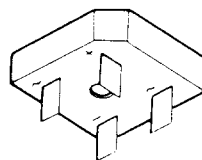
RD10ESB3T



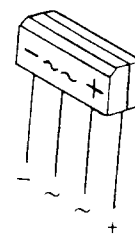
MA162



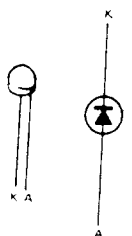
RB150
RB152



YWRB154

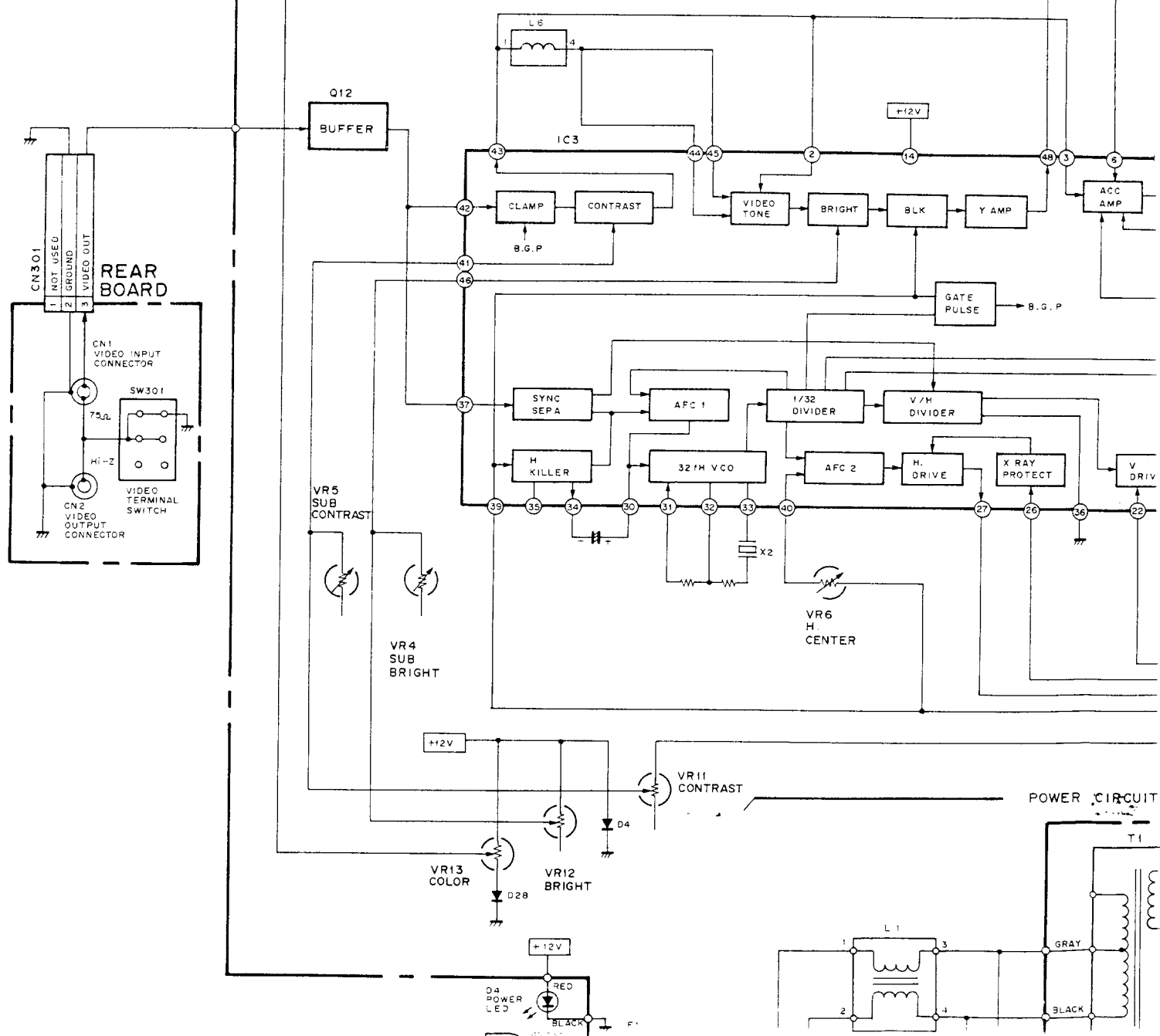


LN21RPH

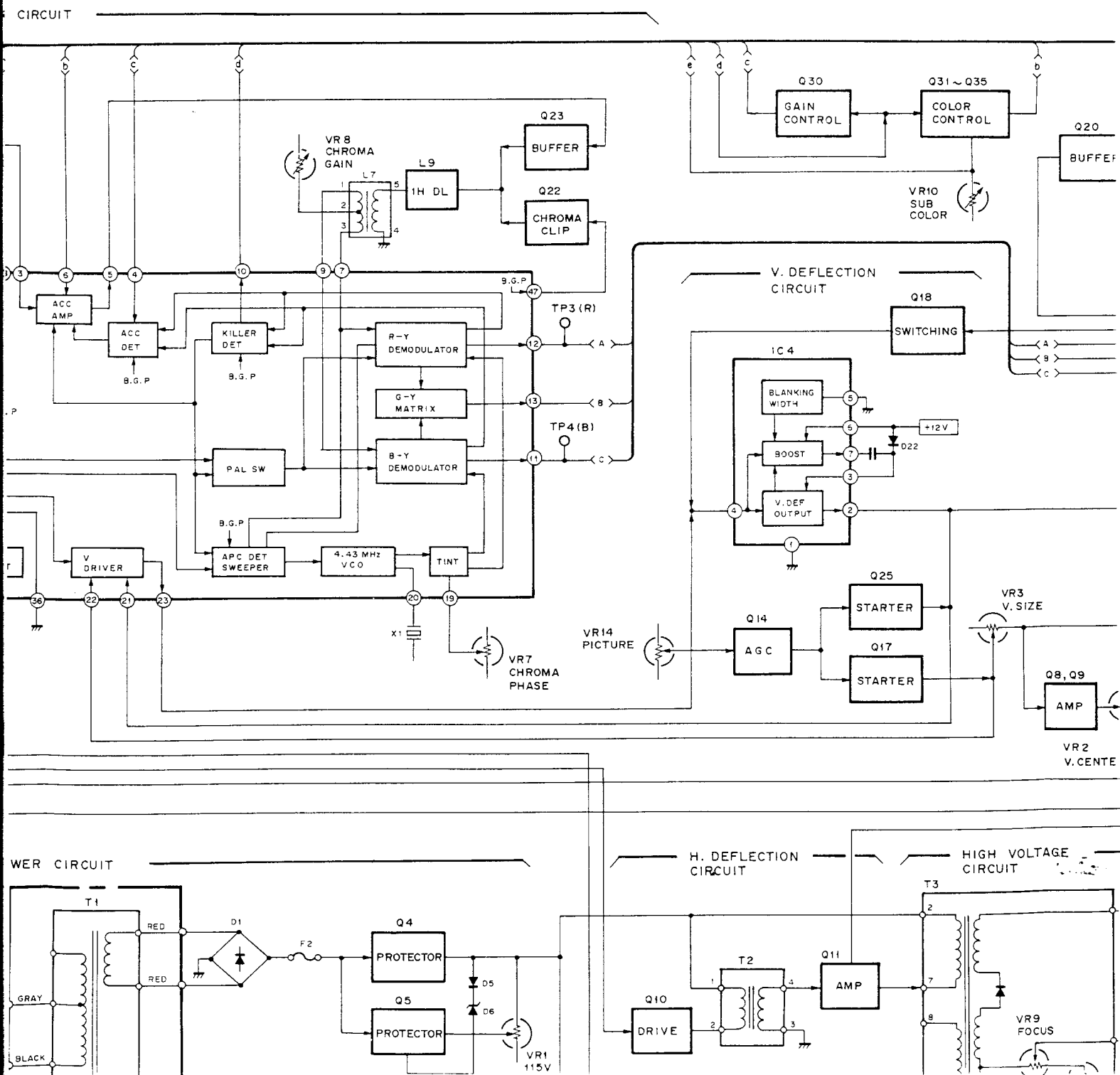


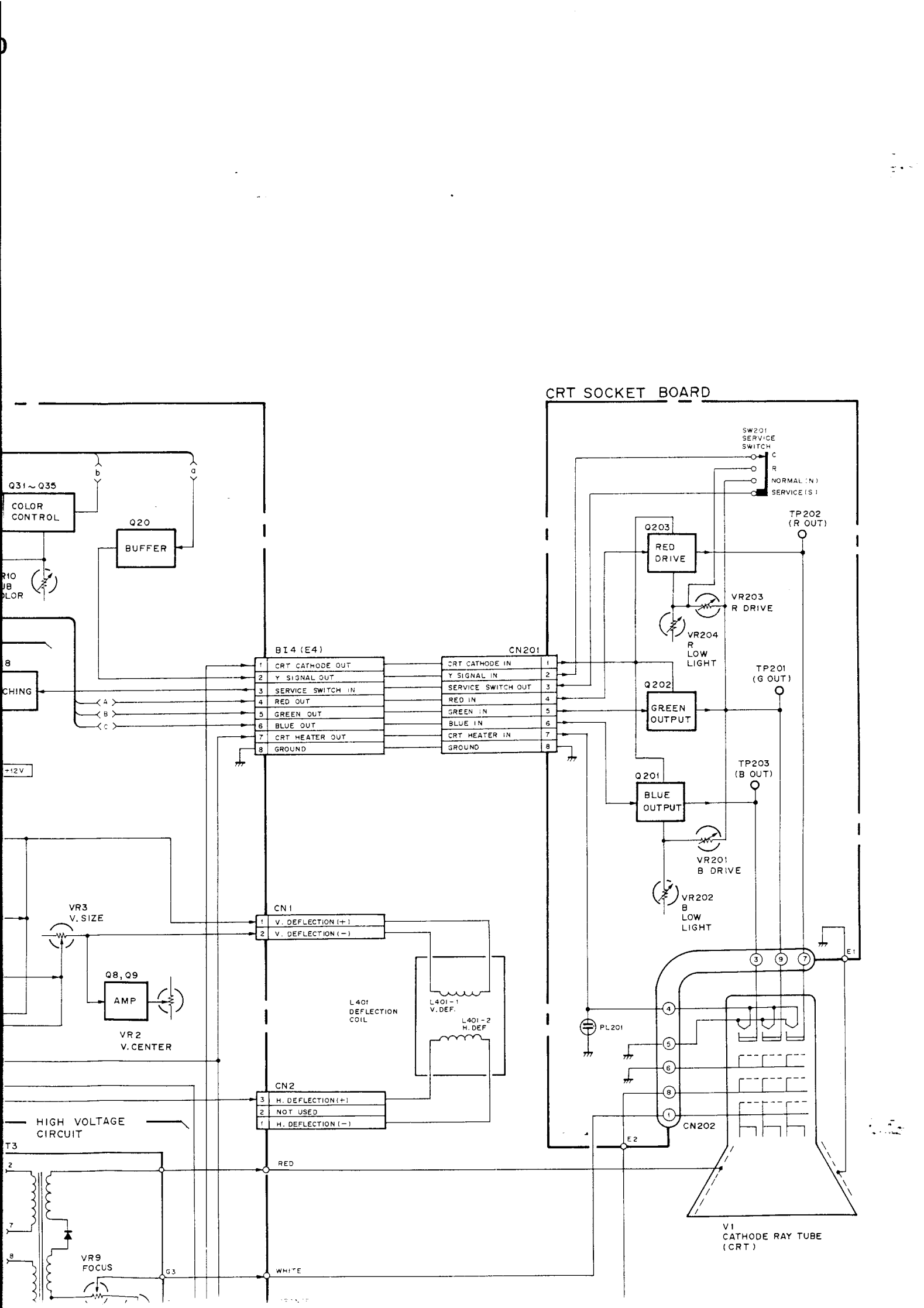
POWER/MONITOR BOARD

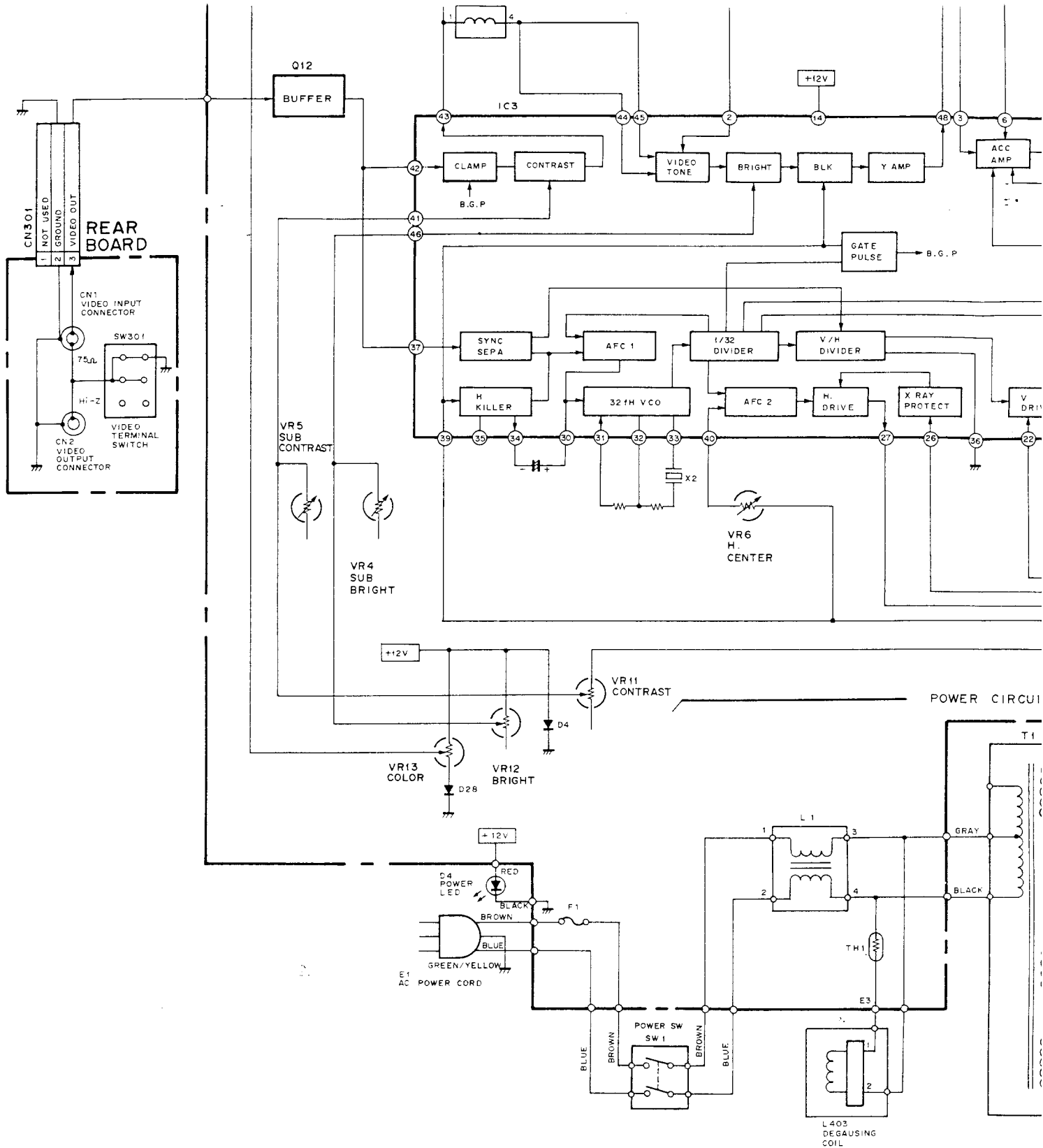
SIGNAL PROCESSING CIRCUIT

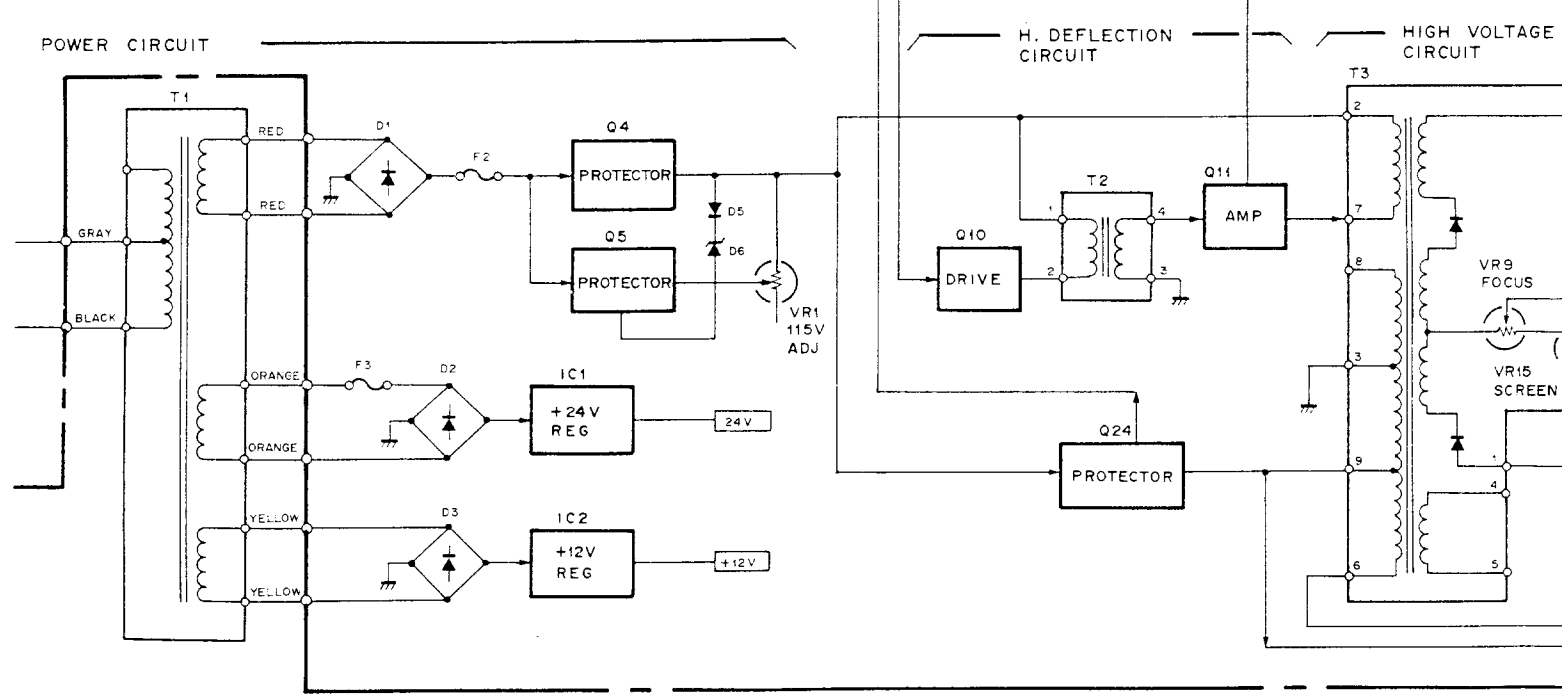
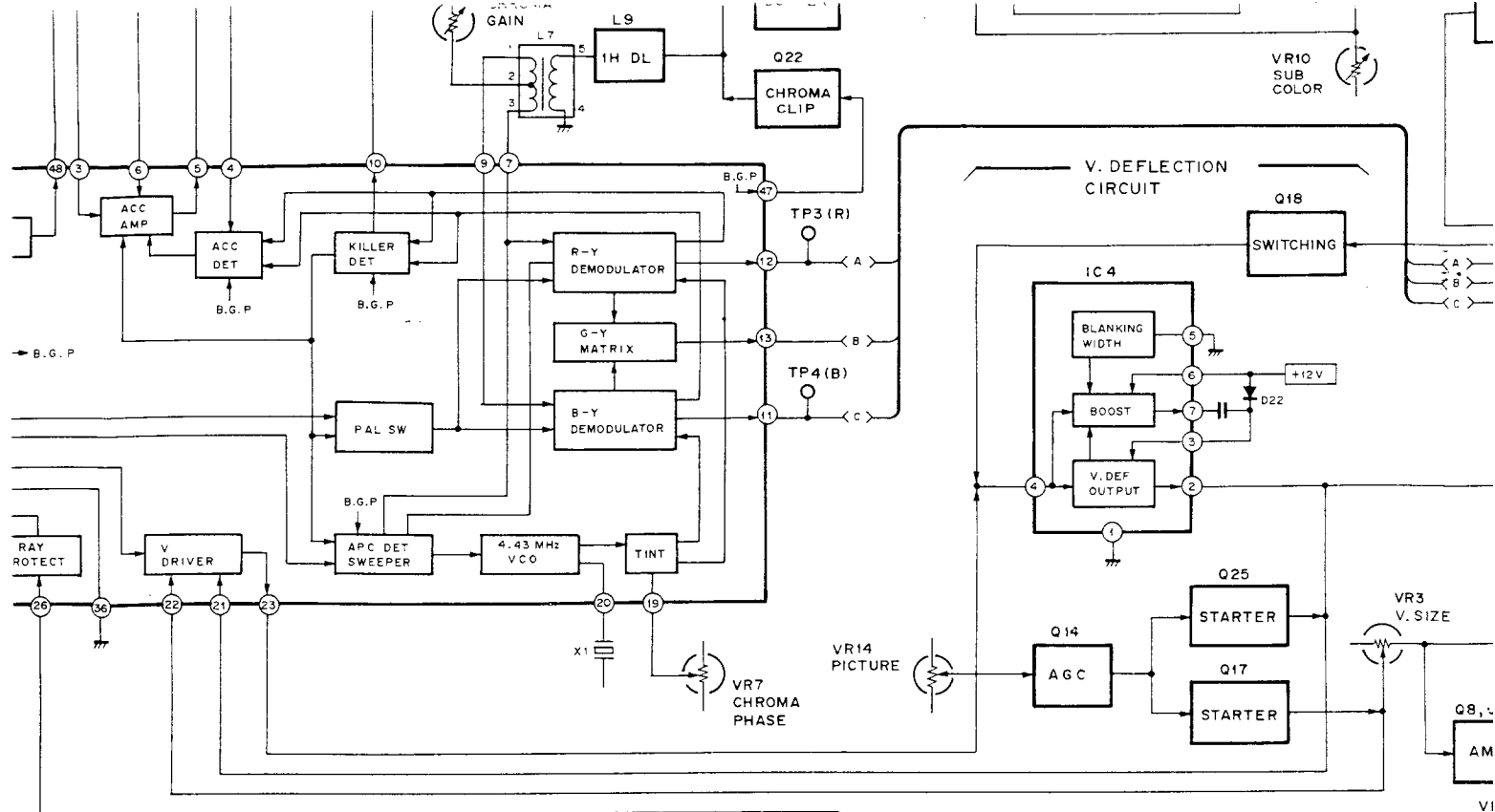


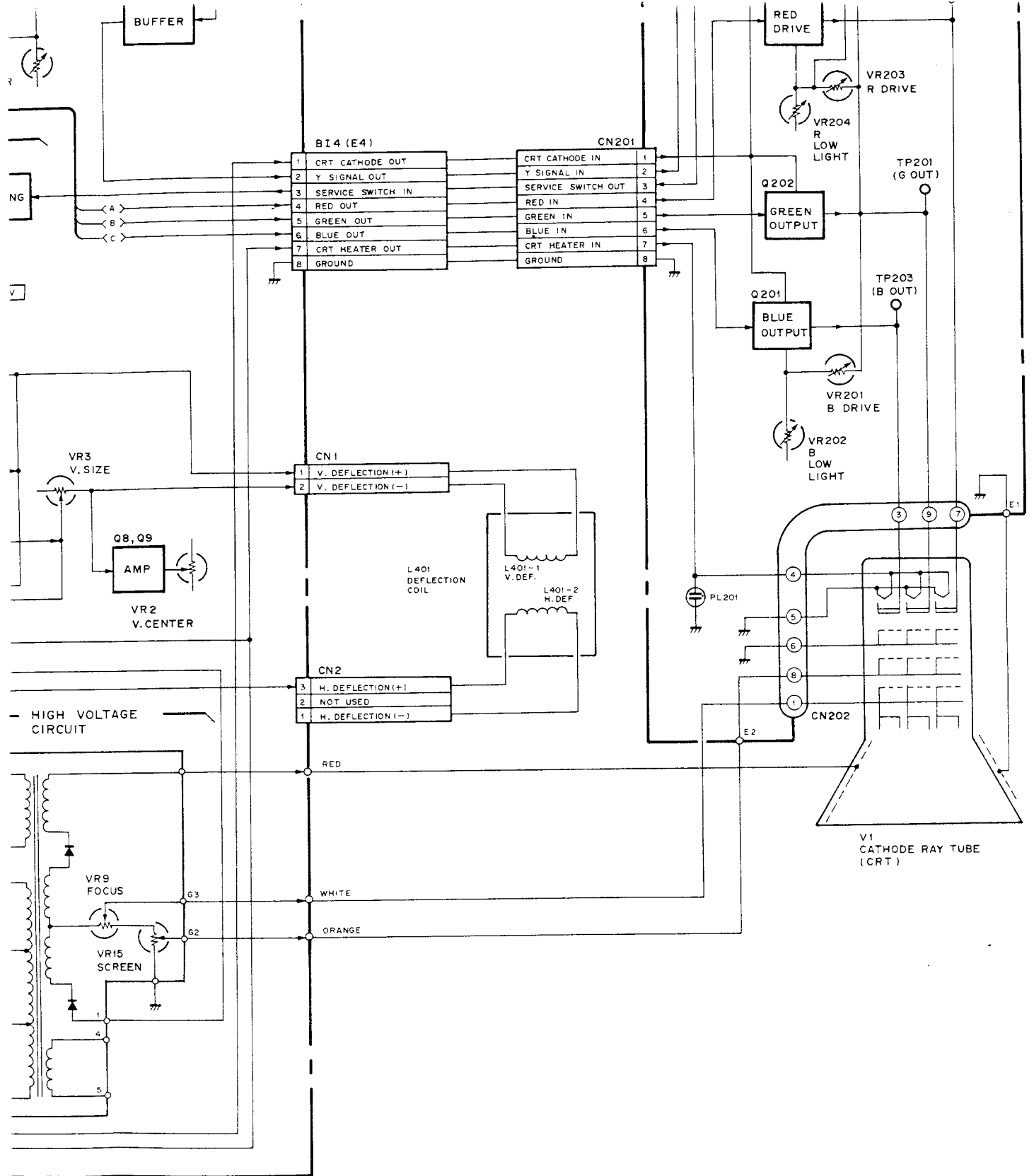
BLOCK DIAGRAM OF COLOUR VIDEO MONITOR WV-CM140





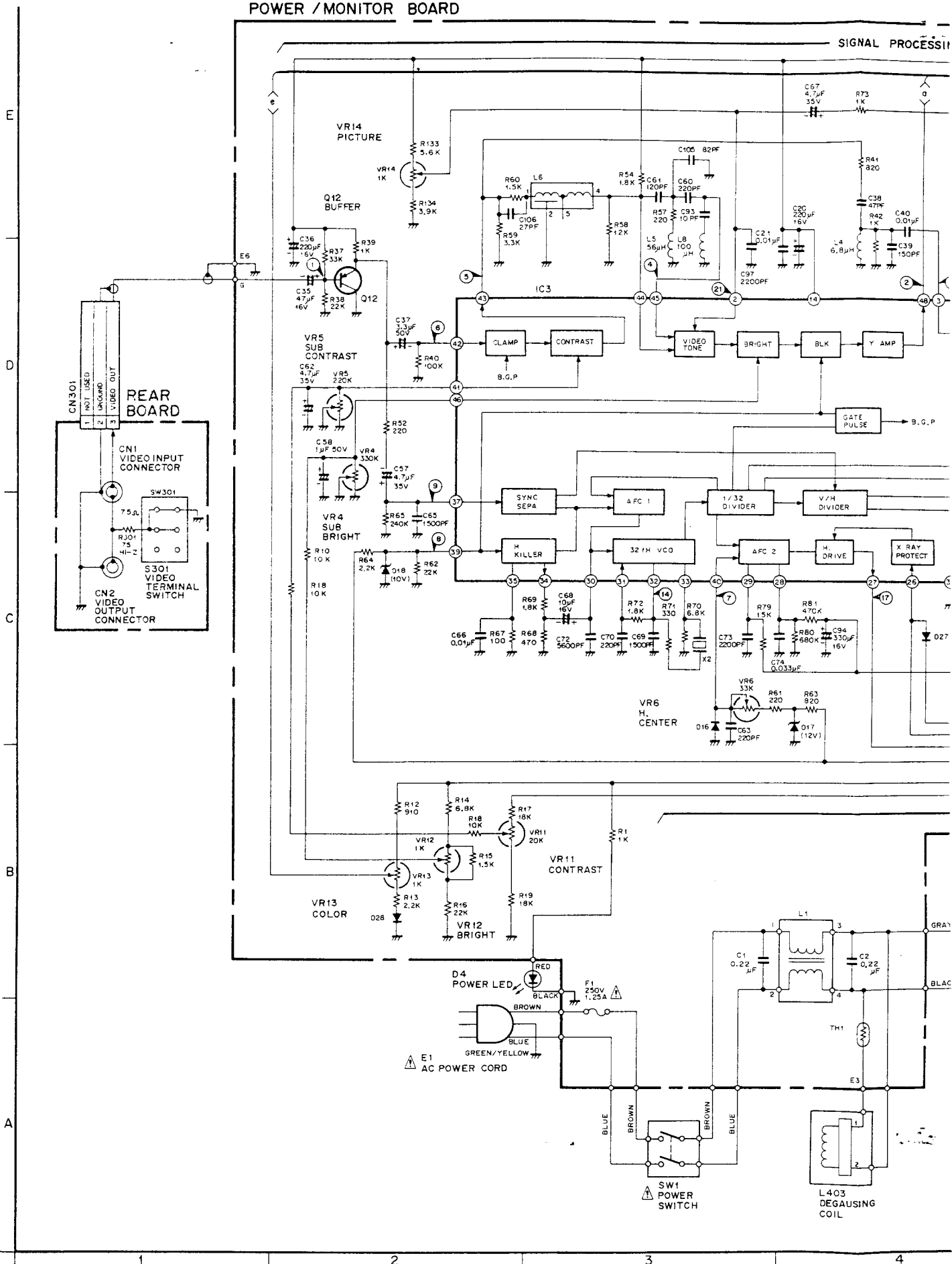






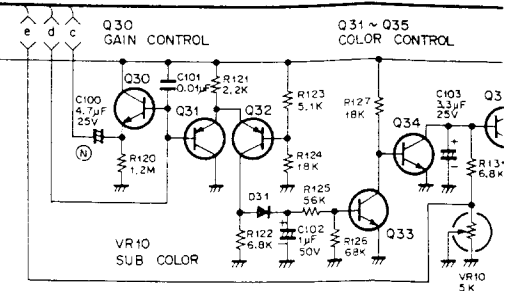
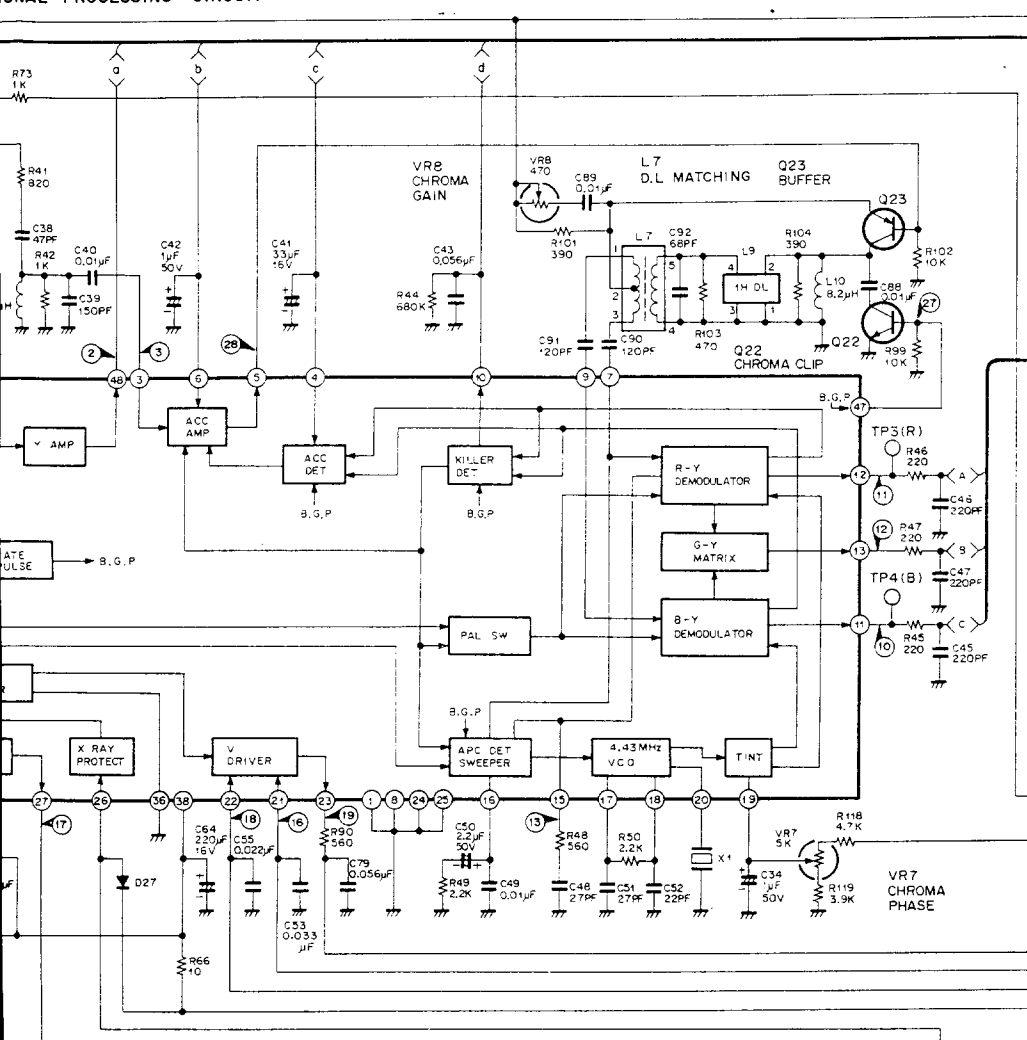
POWER / MONITOR BOARD

SIGNAL PROCESSING

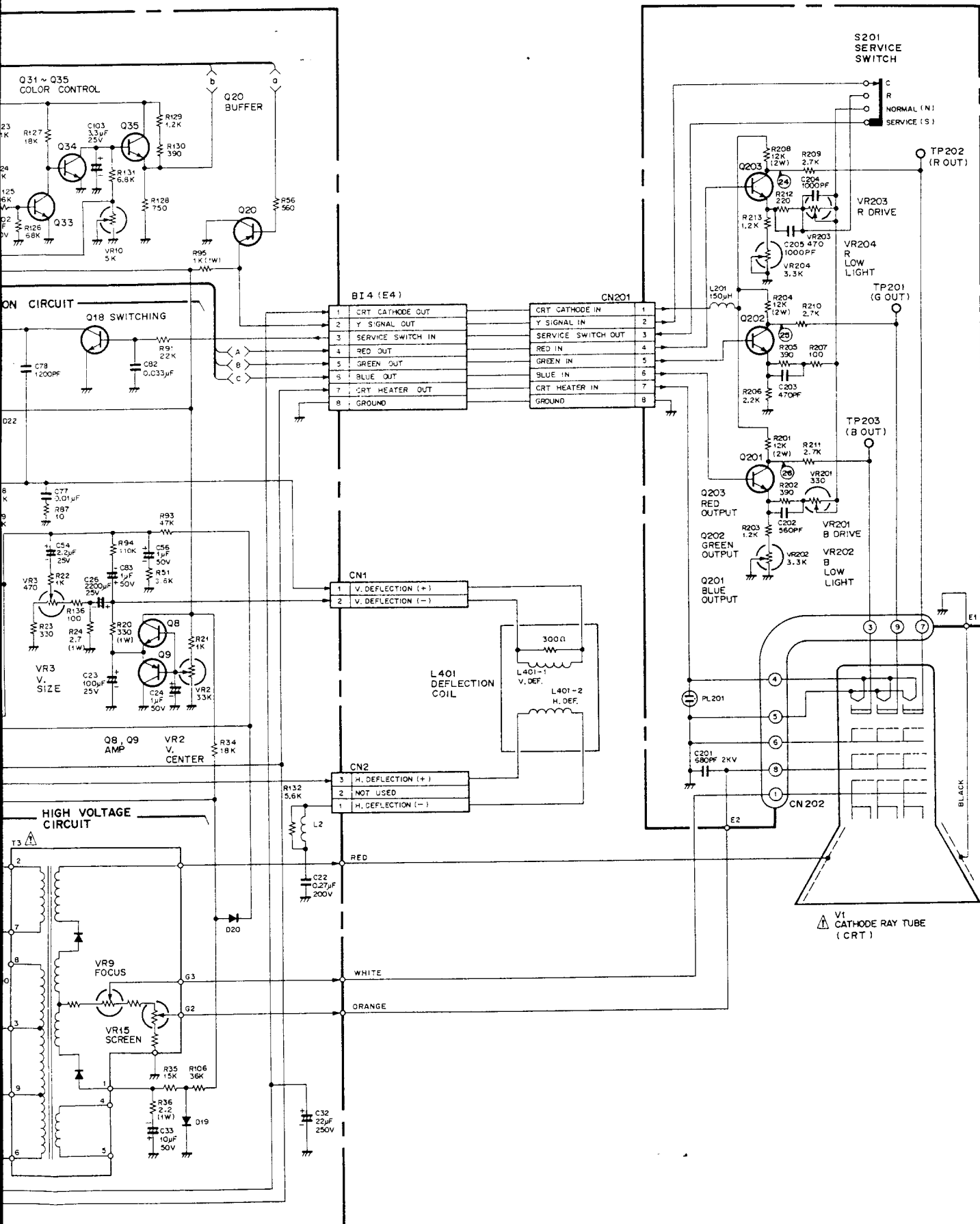


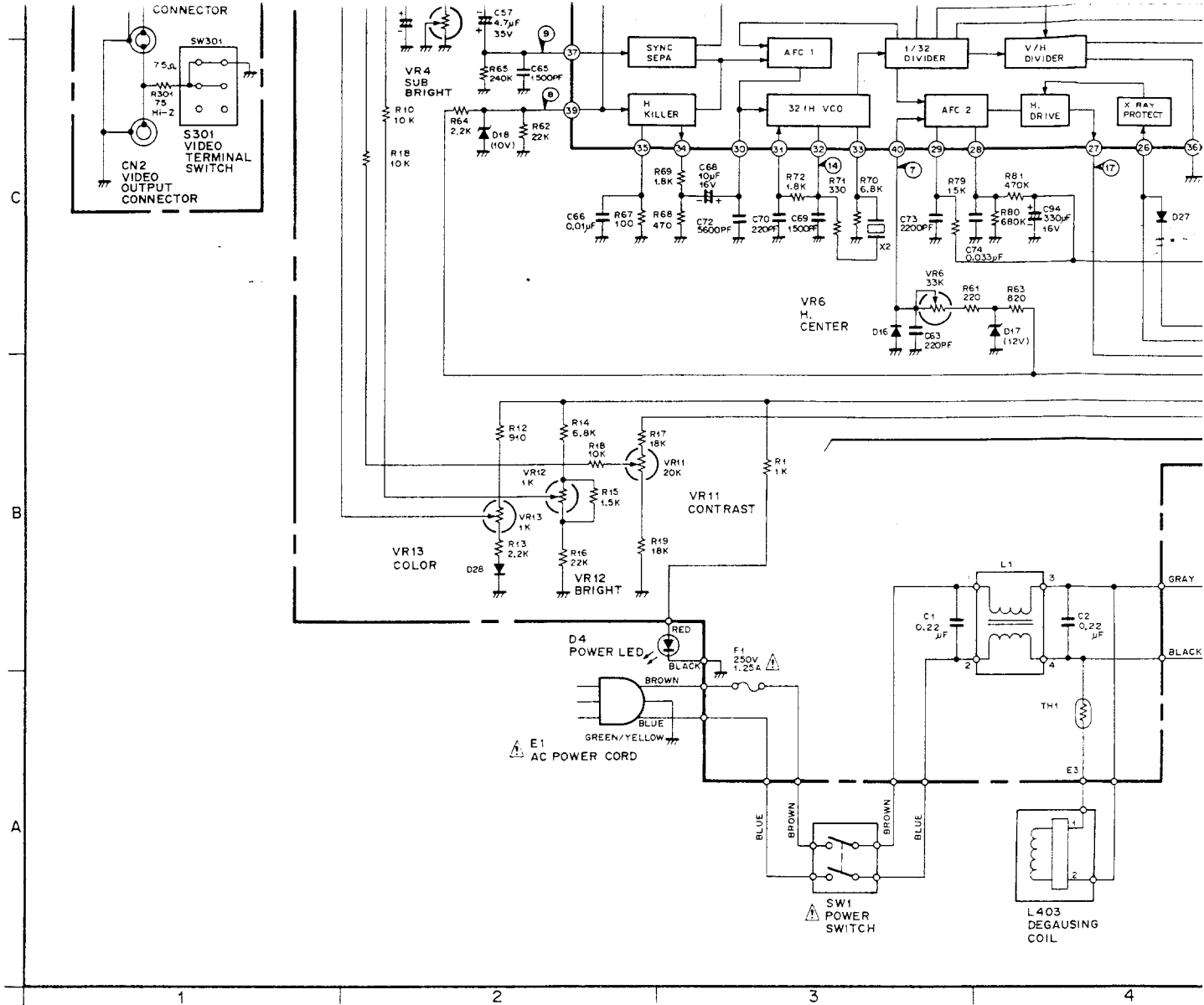
SCHEMATIC DIAGRAM OF COLOUR VIDEO MONITOR WV-CM140

SIGNAL PROCESSING CIRCUIT



CRT SOCKET BOARD





< ADDRESS INFORMATION > < VOLTAGES >

POWER/MONITOR BOARD

REF No. ADDRESS

	Q4	Q5	Q8	Q9	Q10	Q11	Q12	Q14	Q17	Q18	Q20
B	142	110	0	0	0.3	0	5.2	12.8	0	0	5.9
C	117	142	23.6	0	82.7	38.0	0	3.7	3.3	0.9	0
E	143	110	8.2	8.3	0	0	5.9	12.0	0	0	6.5

IC1 A5
 IC2 A5
 IC3 D4
 IC4 D7
 Q 4 B6
 Q 5 B6
 Q 8 C8
 Q 9 C8
 Q10 B7
 Q11 B7
 Q12 D2
 Q14 C7
 Q17 C7
 Q18 D8
 Q20 E8
 Q22 D6
 Q23 E6
 Q24 A7
 Q25 C7
 Q30 E7
 Q31 E7
 Q32 E7
 Q33 E8

	Q22	Q23	Q24	Q25	Q30	Q31	Q32	Q33	Q34	Q35
B	0.1	8.5	28.8	0	11.2	11.2	9.2	0.9	0	5.2
C	0	0	0	0.2	12.0	0	6.0	0	5.2	12.0
E	0	9.2	20.3	0	10.7	9.9	9.9	0	0	4.6

Q34	E8	D22	D7
Q35	E8	D26	A7
D 1	B5	D27	C4
D 2	A5	D28	B2
D 3	A5	D31	E7
D 4	B3		
D 5	B6		
D 6	B6		
D13	A7		
D14	A7		
D16	C3		
D17	C4		
D18	C2		
D19	A8		
D20	B8		

CRT SOCKET BOARD

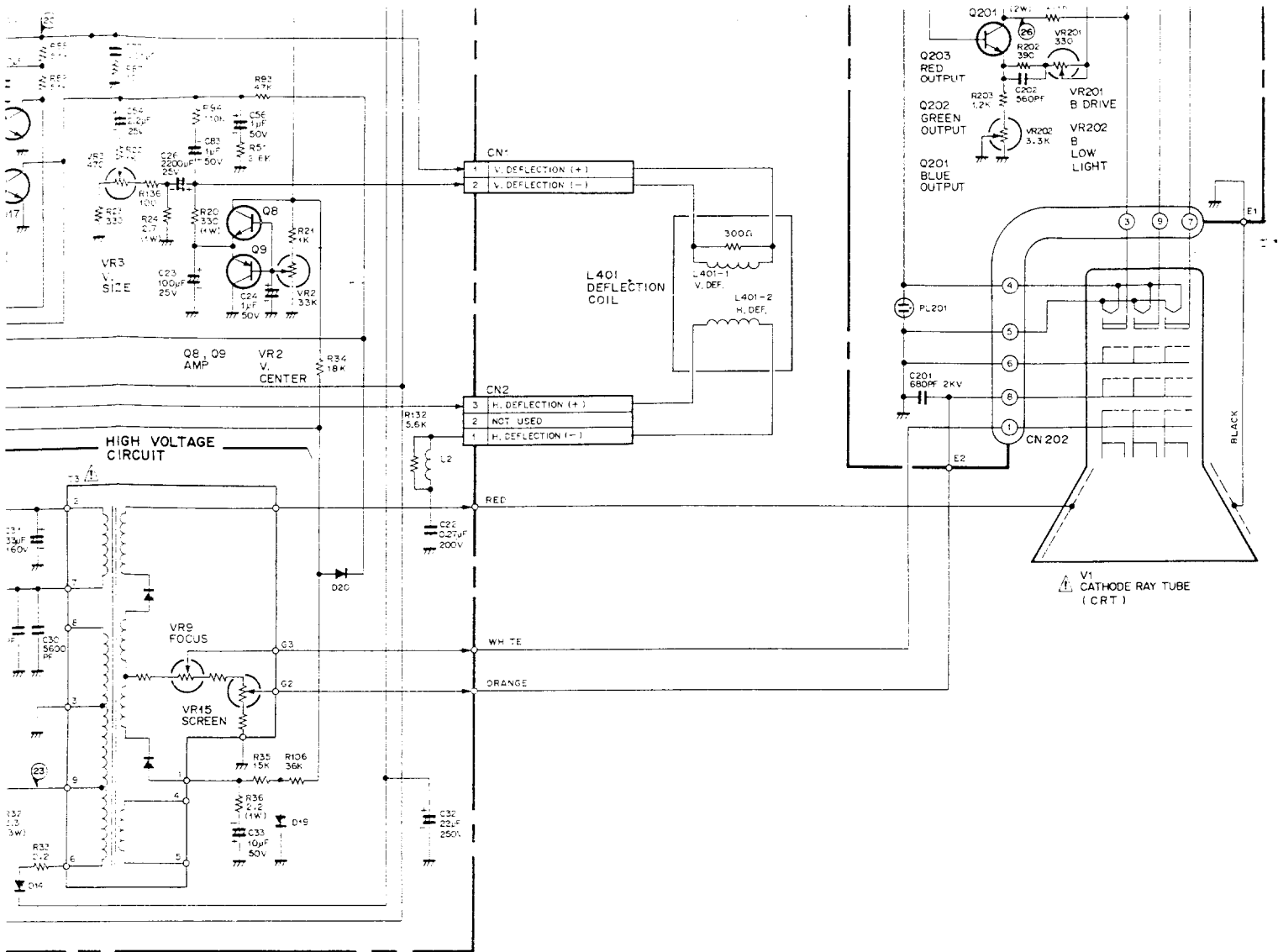
REF No.	ADDRESS
Q201	D10
Q202	D10
Q203	E10

Pin 1	0	Pin 13	7.0	Pin 25	0	Pin 37	8.3
2	4.8	14	12.0	26	0	38	12.0
3	4.6	15	5.1	27	0.4	39	0.7
4	8.5	16	5.8	28	7.4	40	1.0
5	8.5	17	9.0	29	6.2	41	4.0
6	4.7	18	9.0	30	3.3	42	2.4
7	4.3	19	5.8	31	4.8	43	9.2
8	0	20	5.3	32	4.8	44	9.8
9	4.3	21	0.3	33	9.7	45	5.6
10	11.3	22	3.4	34	0	46	8.2
11	7.0	23	0.9	35	0	47	0.1
12	7.0	24	0	36	0	48	5.9

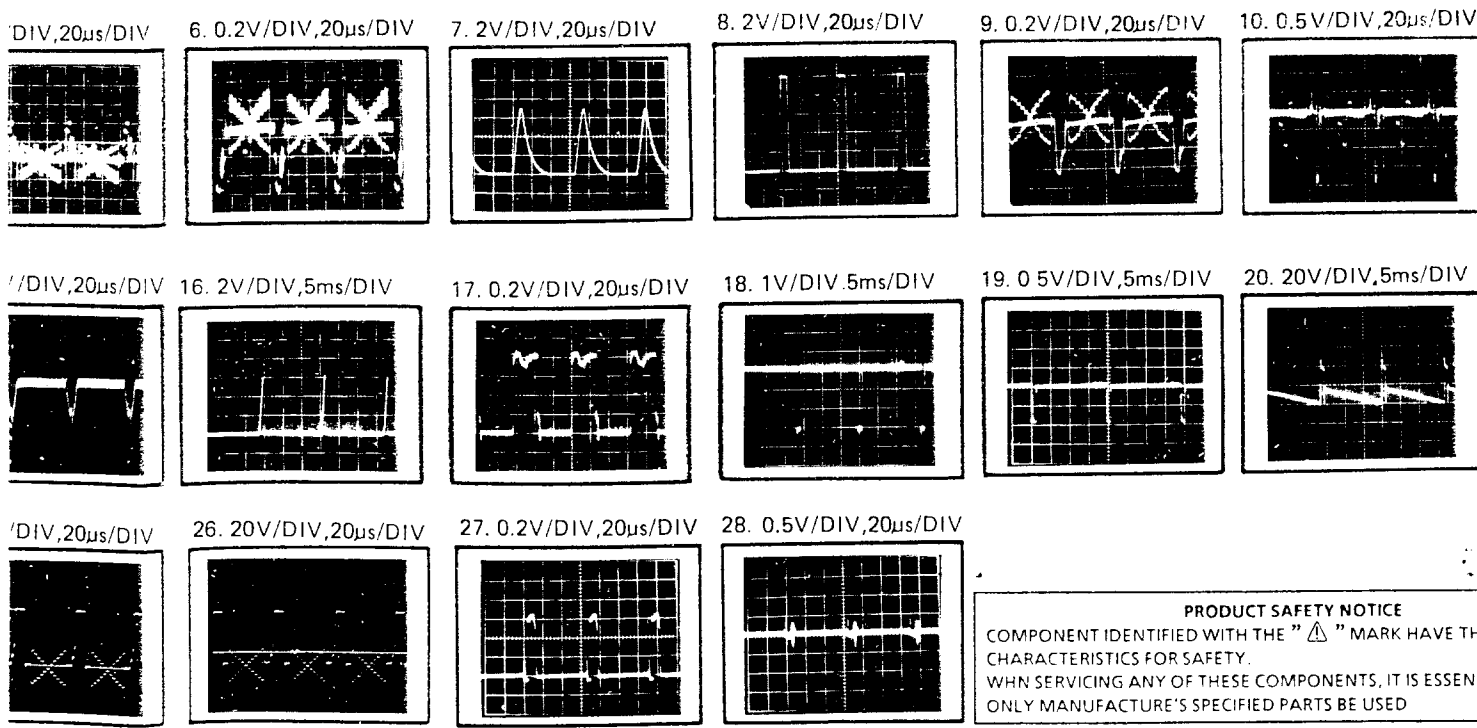
	IC1	IC2	IC4
Pin 1	—	18.6	0
2	0	0	11.3
3	24.0	12.0	24.0
4			0.9
5			0
6			23.6
7			2.4

CRT SOCKET BOARD

	Q201	Q202	Q203
B	7.0	7.1	7.0
C	112	110	112
E	7.0	7.1	7.1



8 9 10 11



PRODUCT SAFETY NOTICE
 COMPONENT IDENTIFIED WITH THE "⚠" MARK HAVE THE SPECIAL CHARACTERISTICS FOR SAFETY.
 WHEN SERVICING ANY OF THESE COMPONENTS, IT IS ESSENTIAL THAT ONLY MANUFACTURER'S SPECIFIED PARTS BE USED

This exploded view diagram illustrates the assembly of a control panel. The components are labeled as follows:

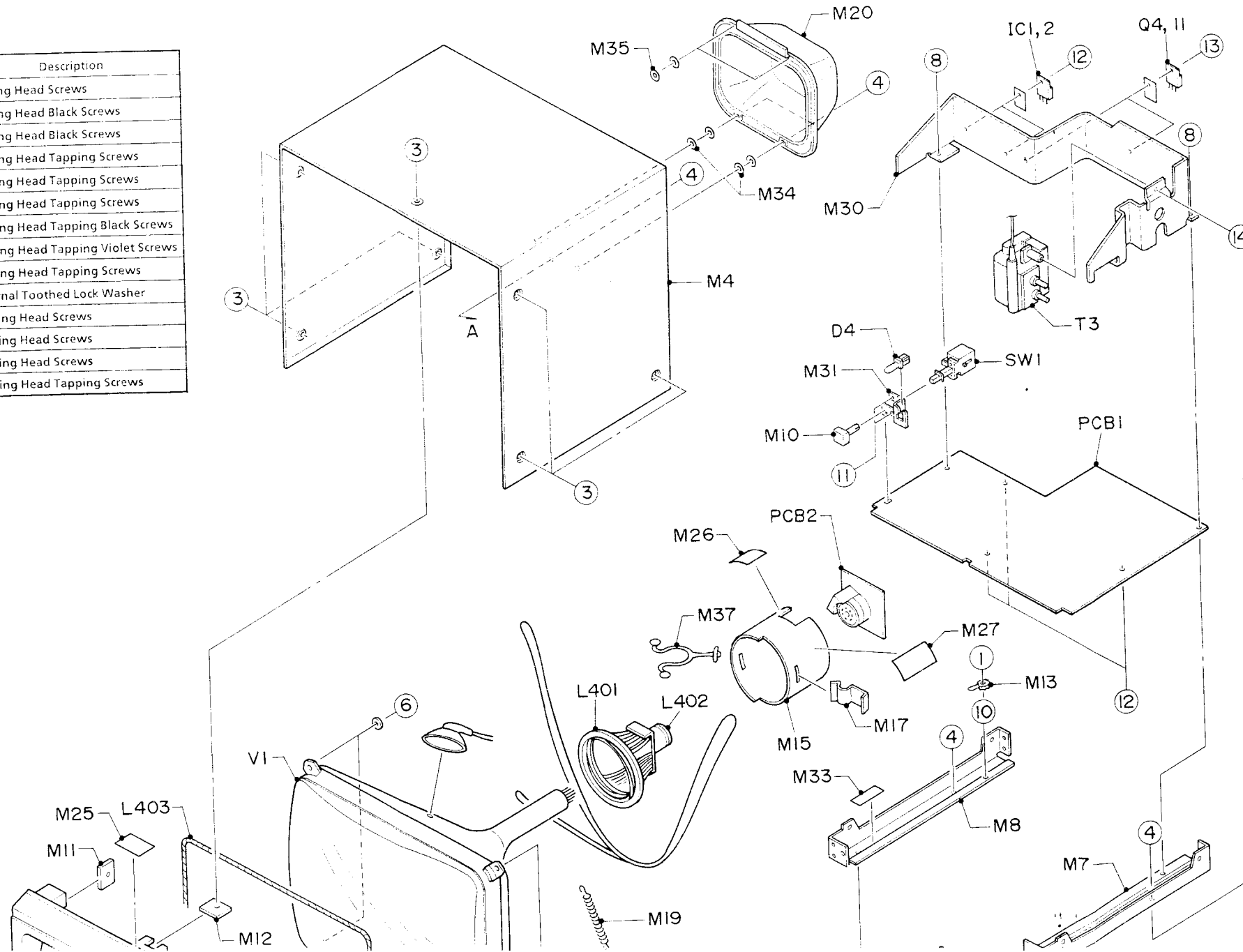
- Panel and Mounting:** M4 (main panel), M30 (top mounting bracket), M34 (side mounting bracket), M35 (screws), M20 (top cover), M36 (cable clamp), M24 (cable bracket), M23 (cable bracket), M28 (cable bracket), M2 (bottom panel), M18 (top panel), M14 (bottom panel), M7 (bottom panel), M8 (bottom panel), M33 (bottom panel), M15 (bottom panel), M17 (bottom panel), M13 (bottom panel), M10 (bottom panel), M31 (bottom panel), D4 (bottom panel), M26 (bottom panel), M37 (bottom panel), L401 (bottom panel), L402 (bottom panel), M19 (bottom panel).
- Electrical Components:** T1 (transformer), T3 (transformer), SW1 (switch), ICI, 2 (indicator light), Q4, 11 (indicator light), PCB1 (printed circuit board), PCB2 (printed circuit board), PCB3 (printed circuit board), E1 (cable), M13 (cable), M14 (cable), M15 (cable), M17 (cable), M18 (cable), M23 (cable), M24 (cable), M28 (cable), M36 (cable), M37 (cable), L401 (cable), L402 (cable), M19 (cable).
- Fasteners and Hardware:** 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14.
- Other Labels:** A (arrow), Serial No. Label, PACKAGING.

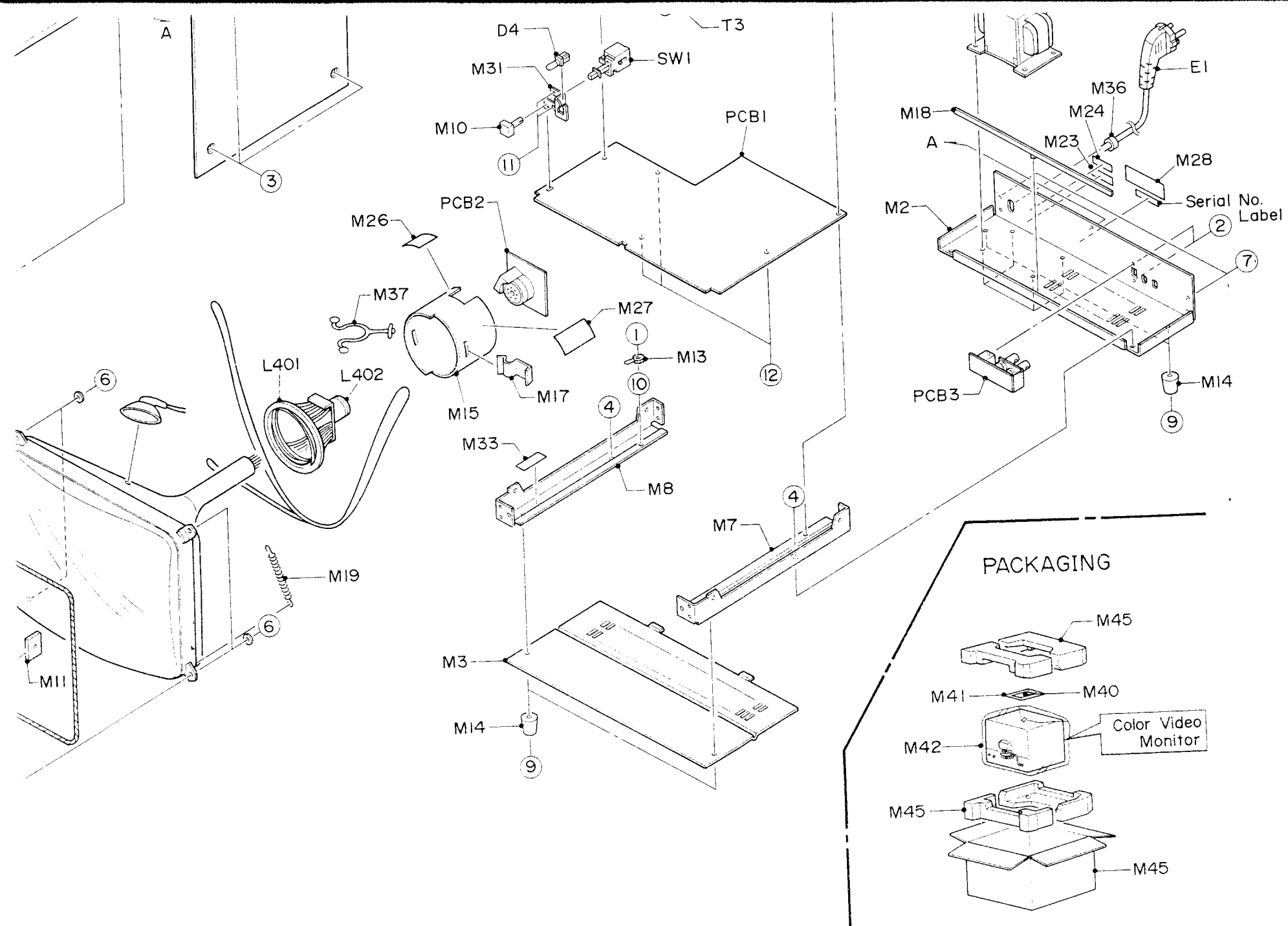
PACKAGING

EXPLODED VIEW OF COLOUR VIDEO MONITOR WV-CM140

Numbers show screws.

No.	Screws	Description
①	XSB4 + 6FX	Binding Head Screws
②	XSB26 + 4FXK	Binding Head Black Screws
③	XSB4 + 6FXK	Binding Head Black Screws
④	XTB3 + 6FX	Binding Head Tapping Screws
⑤	XTB3 + 8FX	Binding Head Tapping Screws
⑥	XTB4 + 20BFX	Binding Head Tapping Screws
⑦	XTB3 + 6FXK	Binding Head Tapping Black Screws
⑧	XTB3 + 8FXV	Binding Head Tapping Violet Screws
⑨	XTB3 + 12FX	Binding Head Tapping Screws
⑩	XWC4BFX	External Toothed Lock Washer
⑪	XSB3 + 4FX	Binding Head Screws
⑫	XSB3 + 8FX	Binding Head Screws
⑬	XSB3 + 12FX	Binding Head Screws
⑭	XTB4 + 12BFX	Binding Head Tapping Screws





CONDUCTOR VIEW OF COLOUR VIDEO MONITOR WV-CM140

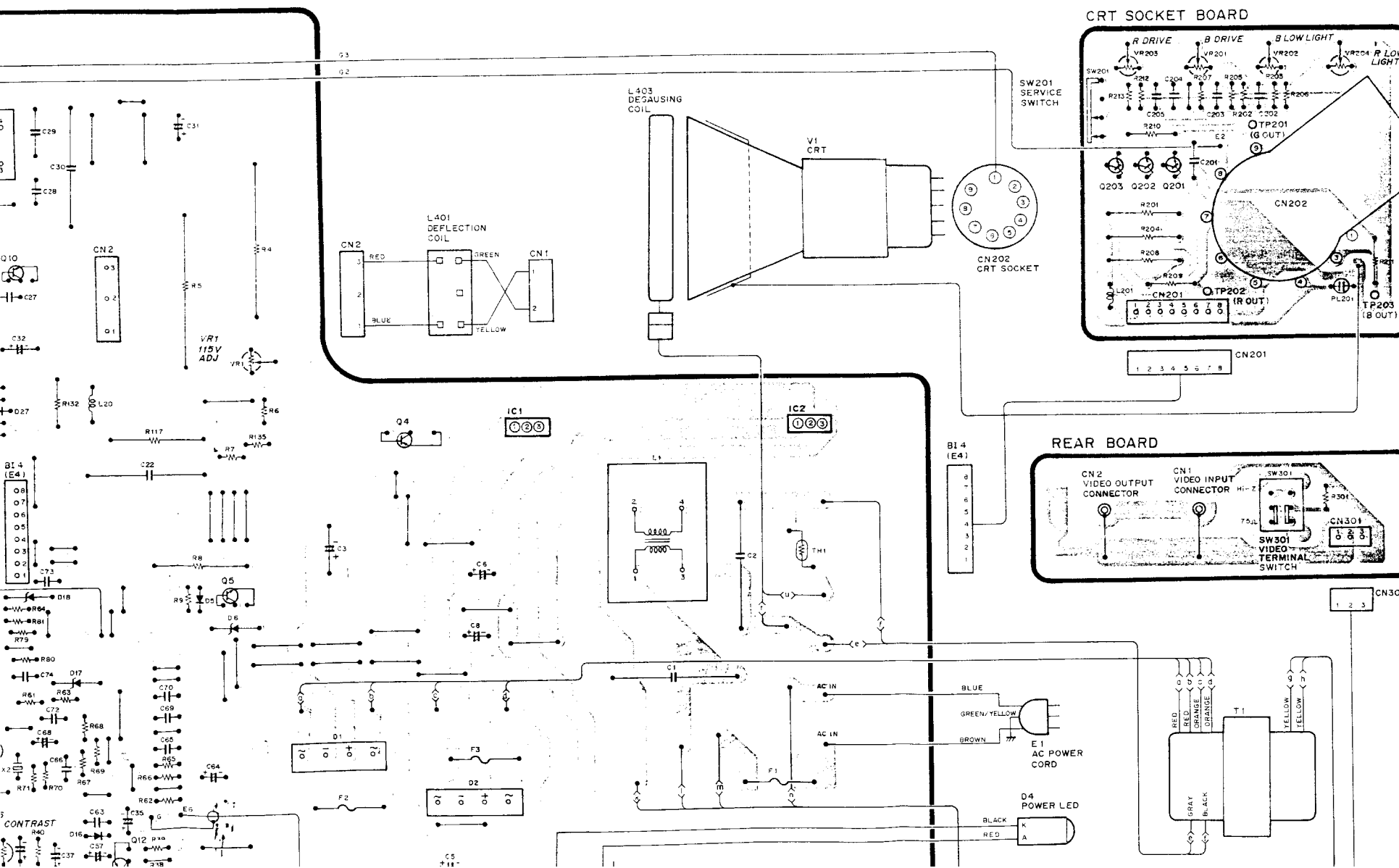
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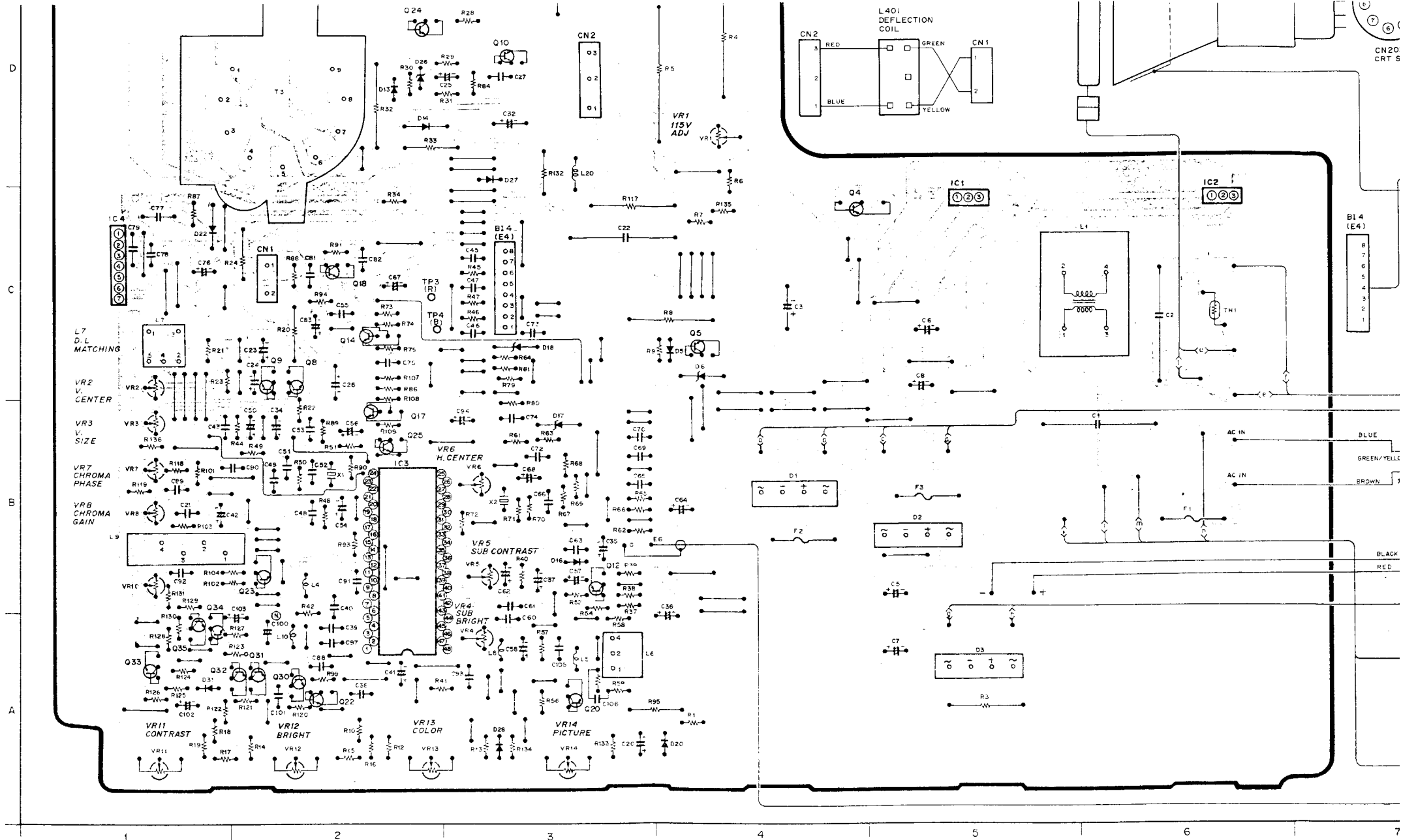
POWER/MONITOR
BOARD
REF No. ADDRESS

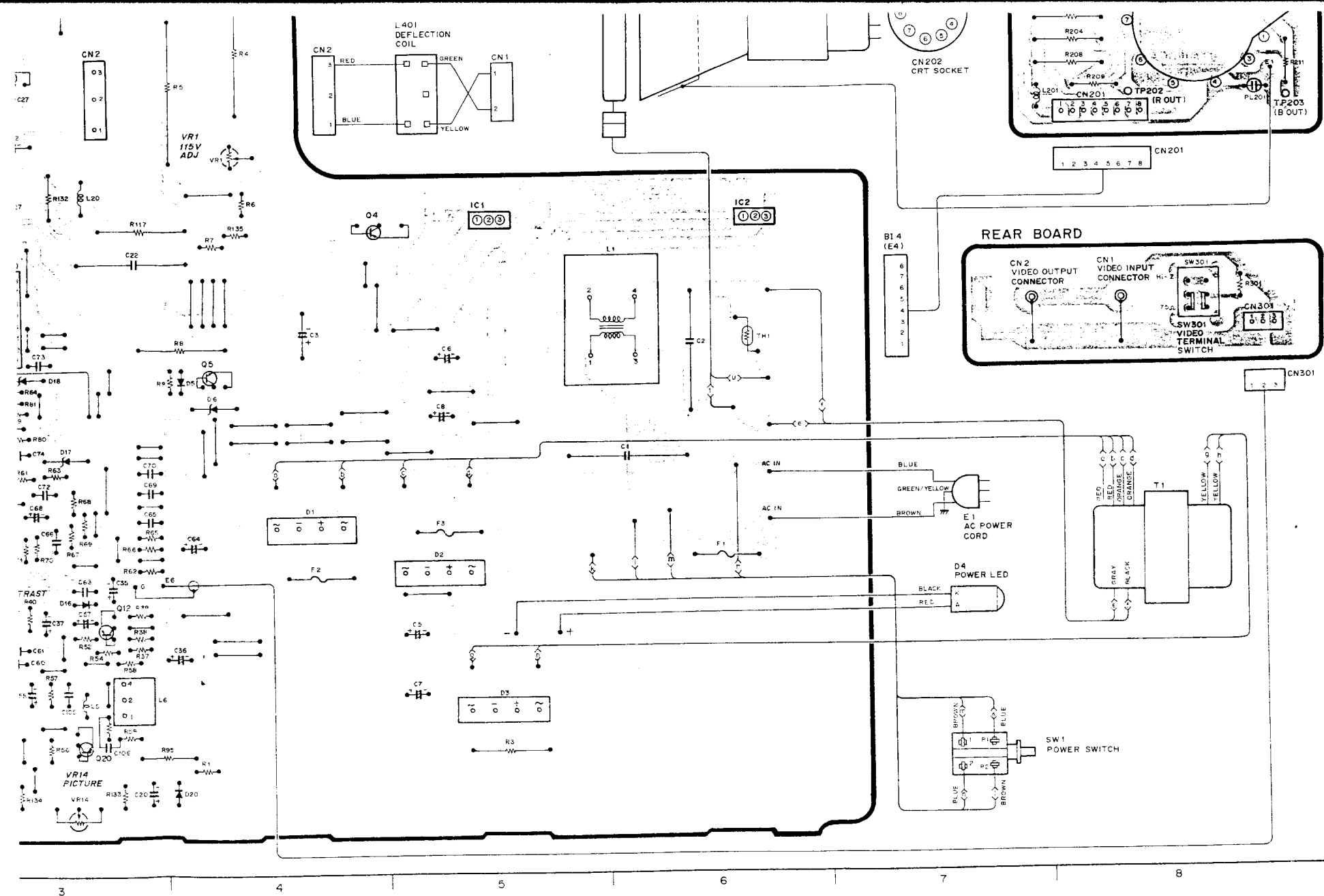
IC1	C5
IC2	C6
IC3	B2
IC4	C1
Q 4	C4
Q 5	C4
Q 8	C2
Q 9	C2
Q10	D3
Q11	E2
Q12	B3
Q14	C2
Q17	B2
Q18	C2
Q20	A3
Q22	A2
Q23	B2
Q24	D2
Q25	B2
Q30	A2
Q31	A2
Q32	A2
Q33	A1
Q34	A1
Q35	A1
D 1	B4
D 2	B5
D 3	A5
D 4	B5
D 5	C4
D 6	C4
D13	D2
D14	D2
D16	B3
D17	B3
D18	C3
D19	E1
D20	A4
D22	C1
D26	D2
D27	D3
D28	A3
D31	A1

CRT SOCKET BOARD

REF No.	ADDRESS
Q201	E8
Q202	E8
Q203	E7







REPLACEMENT PARTS LIST

Important Notice

- Components identified by "⚠" mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.
- Printed circuit board assembly with mark (NLA) is no longer available after production discontinuation of the complete set.

REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
MISCELLANEOUS					
V1 ⚠	A34JRD90X	Cathode Ray Tube	M28 ⚠	YWV7QA1740A4	Main Label for WV-CM140/B
L401	KY10292M	Deflection Coil	⚠	YWV7QA1753A4	Main Label for WV-CM140/A
L402	ETC26X1S	Magnet Coil	⚠	YWV7QA1754A4	Main Label for WV-CM140/C
L403	KAVM140	Coil	⚠	YWV7QA1755A4	Main Label for WV-CM140/G
T1 ⚠	YWPT1070E02	Power Transformer	M33	YWS-CULRB03	Fuse Label
SW1 ⚠	YWESB99682V	Push Switch	M34	YFV1KA0015A4	Washer
CN1,2	31-10T	BNC Connector	M35	YFV1KA0021A4	Washer
E1 ⚠	YFKPGTSA25	AC Power Cord for WV-CM140/A	M36	YWSR6W-1	Cord Clamp
⚠	YFH8S308B	AC Power Cord for WV-CM140/B	M37	CLIP0534	Support
⚠	YWCE009908FA	AC Power Cord for WV-CM140/C	POWER/MONITOR BOARD		
⚠	YWVM009908A	AC Power Cord for WV-CM140/G	PCB1 (NLA)	YWVKBM140E1A	Printed Circuit Board assy
M1	YWV5WA0901A3	Operating Panel	IC1	AN78M24	IC
M2	YWV5EA0658A2	Rear Cover	IC2	AN78M12	IC
M3	YWV5EA0659A3	Bottom Cover	IC3	UPC1420CA	IC
M4	YWV5KA0816A2	Upper Case	IC4	UPC1378H	IC
M5	YWV5BA0064A1	Escutcheon	Q4	2S8817E	Transistor
M6	YFV5DA0024A4	Ornament	Q5	2SC2591QRS	Transistor
M7	YWV2KA0497A3	Chassis	Q8	2SD639RS	Transistor
M8	YWV2KA0499A3	Chassis	Q9	2SB644-QRS	Transistor
M9	YFV5RA0056A4	Knob (X4)	Q10	2SC1573BQR	Transistor
M10	YWV6JB0034A4	Button	Q11	2SD1439LS	Transistor
M11	YFV2CA0005A4	Hold Plate A (X2)	Q12,14	2SB641-QR	Transistor
M12	YFV2CA0006A4	Hold Plate B	Q17,18	2SD636-QRS	Transistor
M13	YW-BCG-EM01	Earth Lag	Q20	2SB643-RS	Transistor
M14	YWS-WB02	Rubber Foot	Q22	2SD636-QRS	Transistor
M15	YWV2HA0427B3	Shield Parts	Q23	2SB641-QR	Transistor
M16	YFV2NA0044B4	Spacer for York	Q24	2SB642-QRS	Transistor
M17	YFV2NA0073A4	Spacer	Q25	2SD636-QRS	Transistor
M18	YWV2PA0303A4	Insulator for Rear Plate	Q30	2SD637-RS	Transistor
M19	YFV4JA0118A4	CRT Earth Spring	Q31,32	2SB642-QRS	Transistor
M20	YFV6BA0010A2	CRT Hood	Q33-35	2SD637-RS	Transistor
M21	YFV2VA0001A4	Earth Plate	D1	YWRB154	Diode
M22	NA-538PB7	Badge	D2	RB152	Rectifier
M23 ⚠	YWV7MA0015A4	Caution Label for WV-CM140/G	D3	RB150	Diode
M24	YFV7MA00081A4	Earth Label for WV-CM140/G	D4	LN21RPH	LED (Red)
M25 ⚠	YFV7MA0166B4	X-Ray Label for WV-CM140/G	D5	MA150	Diode
M26 ⚠	YWV7MA0167A4	Service Man Label	D6	RD6.2JT1B2	Diode
M27 ⚠	YFV7MA0192A4	High Voltage Label for WV-CM140/G	D13	MA162	Diode
			D14	EU01V0	Diode
			D16	MA165	Diode
			D17	RD12ESB3T	Diode

REF.NO.	PART NO.	DESCRIPTION		REF.NO.	PART NO.	DESCRIPTION	
D18	RD10ESB3T	Diode		R59	ERDAS2CF3301	Metal	3.3K ohms 1/4W
D19,20	MA165	Diode		R60	ERDAS2CF1501	Metal	1.5K ohms 1/4W
D22	ERB1201RK	Diode		R61	ERDS2TJ221	Carbon	220 ohms 1/4W
D26	YWRD30JSB3	Diode		R62	ERDS2TJ223	Carbon	22K ohms 1/4W
D27,28	MA165	Diode		R63	ERDS2TJ821	Carbon	820 ohms 1/4W
D31	MA165	Diode		R64	ERDS2TJ222	Carbon	2.2K ohms 1/4W
TH1	ERPZ580N180A	Thermistor		R65	ERDS2TJ244	Carbon	240K ohms 1/4W
R1	ERDS2TJ102	Carbon	1K ohms 1/4W	R66	ERD2FCG100	Carbon	10 ohms 2W
R3	ERQ12HJ1R0	Fuse Resistor	1 ohms 1/4W	R67	ERDS2TJ101	Carbon	100 ohms 1/4W
R4,5	ERF15ZVJ102	Metal	1K ohms	R68	ERDS2TJ471	Carbon	470 ohms 1/4W
R6	ERDS2TJ102	Carbon	1K ohms 1/4W	R69	ERDS2TJ182	Carbon	1.8K ohms 1/4W
R7	ERDAS2CF2001	Metal	2K ohms 1/4W	R70	ERDS2TJ682	Carbon	6.8K ohms 1/4W
R8	ERG3SJ183P	Metal	18K ohms 3W	R71	ERDS2TJ331	Carbon	330 ohms 1/4W
R9	ERDAS2CF5602	Metal	56K ohms 1/4W	R72	ERDS2TJ182	Carbon	1.8K ohms 1/4W
R10	ERDS2TJ103	Carbon	10K ohms 1/4W	R73	ERDS2TJ102	Carbon	1K ohms 1/4W
R12	ERDS2TJ911	Carbon	910 ohms 1/4W	R74	ERDS2TJ333	Carbon	33K ohms 1/4W
R13	ERDS2TJ222	Carbon	2.2Kohms1/4W	R76	ERDS2TJ684	Carbon	680K ohms 1/4W
R14	ERDS2TJ682	Carbon	6.8K ohms 1/4W	R79	ERDS2TJ153	Carbon	15K ohms 1/4W
R15	ERDS2TJ152	Carbon	1.5K ohms 1/4W	R80	ERDS2TJ684	Carbon	680K ohms 1/4W
R16	ERDS2TJ223	Carbon	22K ohms 1/4W	R81	ERDS2TJ474	Carbon	470K ohms 1/4W
R17	ERDS2TJ183	Carbon	18K ohms 1/4W	R84	ERDS2TJ101	Carbon	100 ohms 1/4W
R18	ERDS2TJ103	Carbon	10K ohms 1/4W	R86	ERDS2TJ182	Carbon	1.8K ohms 1/4W
R19	ERDS2TJ183	Carbon	18K ohms 1/4W	R87	ERDS2TJ100	Carbon	10 ohms 1/4W
R20	ERG1SJ331	Metal	330 ohms 1W	R88,89	ERDAS2CF5102	Metal	51K ohms 1/4W
R21	ERDS2TJ102	Carbon	1K ohms 1/4W	R90	ERDS2TJ561	Carbon	560 ohms 1/4W
R22	ERDAS2CF1001	Metal	1K ohms 1/4W	R91	ERDS2TJ223	Carbon	22K ohms 1/4W
R23	ERDAS2CF3300	Metal	3.3K ohms 1/4W	R93	ERDS2TJ473	Carbon	47K ohms 1/4W
R24	ERX1SJ2R7P	Metal	2.7 ohms 1W	R94	ERDS2TJ114	Carbon	110K ohms 1/4W
R25,26	ERG3SJ682P	Metal	6.8K ohms 3W	R95	ERG1SJ102P	Metal	1K ohms 1W
R27	ERG2SJ103	Metal	10K ohms 2W	R99	ERDS2TJ103	Carbon	10K ohms 1/4W
R28	ERDAS2CF9102	Metal	91K ohms 1/4W	R101	ERDS2TJ391	Carbon	390 ohms 1/4W
R29	ERDAS2CF3002	Metal	30K ohms 1/4W	R102	ERDS2TJ103	Carbon	10K ohms 1/4W
R30	ERDS2TJ562	Carbon	5.6K ohms 1/4W	R103	ERDS2TJ471	Carbon	470 ohms 1/4W
R31	ERDS2TJ103	Carbon	10K ohms 1/4W	R104	ERDS2TJ391	Carbon	390 ohms 1/4W
R32	ERX3SG3R3P	Fuse Resistor	3.3 ohms 3W	R105	ERG3SJ682P	Metal	6.8K ohms 3W
R33	ERQ14AJ2R2	Fuse Resistor	2.2 ohms 3W	R106	ERDS2TJ363	Carbon	36K ohms 1/4W
R34	ERDS2TJ183	Carbon	18K ohms 1/4W	R107	ERDS2TJ222	Carbon	2.2K ohms 1/4W
R35	ERDS2TJ153	Carbon	15K ohms 1/4W	R108,109	ERDS2TJ562	Carbon	5.6K ohms 1/4W
R36	ERX1SJ2R2P	Metal	2.2 ohms 1W	R118	ERDS2TJ472	Carbon	4.7K ohms 1/4W
R37	ERDS2TJ333	Carbon	33K ohms 1/4W	R119	ERDS2TJ392	Carbon	3.9K ohms 1/4W
R38	ERDS2TJ223	Carbon	22K ohms 1/4W	R120	ERDS2TJ125T	Carbon	1.2M ohms 1/4W
R39	ERDS2TJ102	Carbon	1K ohms 1/4W	R121	ERDS2TJ222	Carbon	2.2K ohms 1/4W
R40	ERDS2TJ104	Carbon	100K ohms 1/4W	R122	ERDS2TJ682	Carbon	6.8K ohms 1/4W
R41	ERDS2TJ821	Carbon	820 ohms 1/4W	R123	ERDS2TJ512	Carbon	5.1K ohms 1/4W
R42	ERDS2TJ102	Carbon	1K ohms 1/4W	R124	ERDS2TJ183	Carbon	18K ohms 1/4W
R44	ERDS2TJ684	Carbon	680K ohms 1/4W	R125	ERDS2TJ563	Carbon	56K ohms 1/4W
R45-47	ERDS2TJ221	Carbon	220 ohms 1/4W	R126	ERDS2TJ683	Carbon	68K ohms 1/4W
R48	ERDS2TJ561	Carbon	560 ohms 1/4W	R127	ERDS2TJ183	Carbon	18K ohms 1/4W
R49,50	ERDS2TJ222	Carbon	2.2K ohms 1/4W	R128	ERDAS2CF7500	Metal	750 ohms 1/4W
R51	ERDS2TJ362	Carbon	3.6K ohms 1/4W	R129	ERDAS2CF1201	Metal	1.2K ohms 1/4W
R52	ERDS2TJ221	Carbon	220 ohms 1/4W	R130	ERDAS2CF3900	Metal	390 ohms 1/4W
R54	ERDAS2CF1801	Metal	1.8K ohms 1/4W	R131	ERDS2TJ682	Carbon	6.8K ohms 1/4W
R56	ERDS2TJ561	Carbon	560 ohms 1/4W	R132	ERG1SJ562P	Metal	5.6K ohms 1/8W
R57	ERDAS2CF2200	Metal	2.2K ohms 1/4W	R133	ERDS2TJ562	Carbon	5.6K ohms 1/4W
R58	ERDAS2CF1202	Metal	12K ohms 1/4W	R134	ERDS2TJ392	Carbon	3.9K ohms 1/4W

REF.NO.	PART NO.	DESCRIPTION		REF.NO.	PART NO.	DESCRIPTION	
R135	ERDS2TJ104	Carbon	100K ohms 1/4W	C54	ECSF1EE225	Electrolytic	2.2 μ F 25V
R136	ERSB39G101	Metal	100 ohms	C55	ECQB1H223JZ	Plastic	0.022 μ F 50V
VR1	H1022A2R2K	Variable Resistor	2.2K ohms	C56	ZCEA1HU010B	Electrolytic	1 μ F 50V
VR2	EVND1AA00BY4	Variable Resistor	33Kohms	C57	ECEA1VU4R7B	Electrolytic	4.7 μ F 35V
VR3	EVM31GA00BQ2	Variable Resistor	470 ohms	C58	ZCEA1HU010B	Electrolytic	1 μ F 50V
VR4	H1052A330KB	Variable Resistor	330K ohms	C60	ECCR1H221J5	Ceramic	220 pF
VR5	H1052A220KB	Variable Resistor	220K ohms	C61	ECCR1H121J5	Ceramic	120 pF
VR6	YFH1052A33KB	Variable Resistor	33K ohms	C62	ECEA1VU4R7B	Electrolytic	4.7 μ F 35V
VR7	EVND1AA00B53	Variable Resistor	5K ohms	C63	ECQP1H221JZ	Plastic	220 pF 50V
VR8	EVND1AA00BQ2	Variable Resistor	470 ohms	C64	ECEA1CU221	Electrolytic	220 μ F 16V
VR10	EVND1AA00B53	Variable Resistor	5K ohms	C65	ECKF1H152KB	Ceramic	1500 pF 50V
VR11	EWHRPAS15B24	Variable Resistor	20K ohms	C66	ECQB1H103JZ	Plastic	0.01 μ F 50V
VR12-14	EWHRPAS15B13	Variable Resistor	1K ohms	C67	ECEA1VU4R7B	Electrolytic	4.7 μ F 35V
C1,2	ECQU2A224KN	Plastic	0.22 μ F	C68	ZCEA1CU100B	Electrolytic	10 μ F 16V
C3	ECOS2DG681T	Electrolytic	680 μ F	C69	ECQP1H152JZ3	Plastic	1500 pF 50V
C5	ECEA1HFE471	Electrolytic	470 μ F 50V	C70	ECCF1H221JC	Ceramic	220 pF 50V
C6	ECEA1VGE471	Electrolytic	470 μ F 35V	C72	ECQB1H562JZ	Plastic	5600 pF 50V
C7	ECEA1EGE471	Electrolytic	470 μ F 25V	C73	ECQP1H222JZ3	Plastic	2200 pF 50V
C8	ECEA1EGE221	Electrolytic	220 μ F 25V	C74	ECQM1H333KZ	Plastic	0.033 μ F 50V
C20	ECEA1CF221	Electrolytic	220 μ F 16V	C75	ECQB1H103JZ	Plastic	0.01 μ F 50V
C21	ECQB1H103JZ	Plastic	0.01 μ F 50V	C76	ECEA1VU101	Electrolytic	100 μ F 35V
C22	ECQF2274JZ	Plastic	0.27 μ F 250V	C77	ECQP1103GZ	Plastic	0.01 μ F 100V
C23	ECEA1EU101	Electrolytic	100 μ F 25V	C78	ECKD2H122KB2	Ceramic	1200 pF 500V
C24	ZCEA1HU010B	Electrolytic	1 μ F 50V	C79	ECQM1H563JZ	Plastic	0.056 μ F 50V
C25	ZCEA1CU100B	Electrolytic	10 μ F 16V	C81	ECQV1H473JZ	Plastic	0.047 μ F 50V (TF)
C26	ECEA1EU222	Electrolytic	2200 μ F 25V	C82	ECQM1H333KZ	Plastic	0.033 μ F 50V
C27	ECCD2H100DC	Ceramic	10 pF 500V	C83	ZCEA1HU010B	Electrolytic	1 μ F 50V
C28	ECKD2H102KB	Ceramic	1000 pF 500V	C88,89	ECQB1H103JZ	Plastic	0.01 μ F 50V
C29	ECKD3D681KBN	Ceramic	680 pF 2KV	C90,91	ECQP1H121JZ3	Plastic	120 pF 50V
C30	ECWH15H562HD	Plastic	5600 pF	C92	ECCF1H680JC	Ceramic	68 pF 50V
C31	ECEA2CG330S	Electrolytic	220 μ F 160V	C93	ECCF1H100DC	Ceramic	10 pF 50V
C32	ECEA2ES220	Electrolytic	22 μ F 125V	C94	ECEA1CU331	Electrolytic	330 μ F 16V
C33	ECEA1HU100	Electrolytic	10 μ F 50V	C97	ECKF1H222KB	Ceramic	2200 PF 50V
C34	ZCEA1HU010B	Electrolytic	1 μ F 50V	C100	ECEA1EKN4R7	Electrolytic	4.7 μ F 25V
C35	ECEA1CU470	Electrolytic	47 μ F 16V	C101	ECQB1H103JZ	Plastic	0.01 μ F 50V
C36	ECEA1CF221	Electrolytic	220 μ F 16V	C102	ZCEA1HU010B	Electrolytic	1 μ F 50V
C37	ECEA1HU3R3	Electrolytic	3.3 μ F 50V	C103	ECEA25V3R3T	Electrolytic	3.3 μ F 25V
C38	ECCF1H470JC	Ceramic	47 pF 50V	C105	ECCF1H820JC	Ceramic	82 PF 50V
C39	ECQP1H151JZ	Plastic	150 p 50V	C106	ECCF1H270JC	Ceramic	27 PF 50V
C40	ECQB1H103JZ	Plastic	0.01 μ F 50V	L1	YFELF18D650P	Coil	65 μ H
C41	ECEA1CU330	Electrolytic	33 μ F 16V	L2	ELH5L60	Coil	
C42	ZCEA1HU010B	Electrolytic	1 μ F 50V	L4	EL05SI6R8K	Coil	6.8 μ H
C43	ECQM1H563JZ	Plastic	0.056 μ F 50V	L5	EL05SI560K	Coil	56 μ H
C45-47	ECKF1H221KB	Ceramic	220 pF 50V	L6	ELT10Z383	Coil	
C48	ECCF1H270JC	Ceramic	27 pF	L7	YW29188EG	Coil	
C49	ECQB1H103JZ	Plastic	0.01 μ F 50V	L8	EL05SI101K	Coil	100 μ H
C50	ECEA1HU2R2	Electrolytic	2.2 μ F 50V	L9	EFDEN645A11G	Coil	
C51	ECCF1H270JC	Ceramic	27 pF	L10	EL05SI8R2K	Coil	8.2 μ H
C52	ECCF1H220JC	Ceramic	22 PF 50V	T2	TLH15412	Low Freq Transformer	
C53	ECQV1H273JZ	Plastic	0.027 μ F 50V	T3	ETF39L46AZ	Flyback Transformer	

REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION
			REAR BOARD		
X1 X2 F1 Δ F2,3 Δ CN1	YWN8R4R43 YWCSB500F2 XBA2C12ET0A XBA2C05ET0A 521902A	Crystal Oscillator Crystal Oscillator Current Fuse 1.25A 250V Current Fuse 500mA 250V 2 pin Connector	PCB3 R301 SW301 CN301	YWVKDM140E1A ERDS2TJ750 YWSSC-322A EMCS0351ML	Printed Board Carbon 75 ohms 1/4W Slide Switch 3 pin Connector
CN2 E5 E12-17 E18,19 M30	521903A YFSN005001 YWSN5053 YW32BM12R5 YVW7DA0223A2	3 pin Connector LED Holder Fuse Holder Terminal Heat Sink			
M31	YVW2CA0265A4	Mounting Plate for Power Switch			
CRT SOCKET BOARD			ACCESSORY PARTS/PACKAGING PARTS		
PCB2 (NLA) Q201-203 R201 R202 R203 R204	YWVKCM140E1A 25C1573A-QRS ERG2SJ123 ERDS2TJ391 ERDS2TJ122 ERG2SJ123	Printed Circuit Board Assy Transistor Metal 12K ohms 2W Carbon 390 ohms 1/4W Carbon 1.2K ohms 1/4W Metal 12K ohms 2W	M40 M41 M42 M43	YWV8QA1675AN YWT20X35C03 YWT80X90X1 YVW9CA1207AN	Operating Instructions Polyethylene Bag Polyethylene Bag Packaging
R205 R206 R207 R208 R209-211	ERDS2TJ391 ERDS2TJ222 ERDS2TJ101 ERG2SJ123 ERD25FJ272	Carbon 390 ohms 1/4W Carbon 2.2K ohms 1/4W Carbon 100 ohms 1/4W Metal 12K ohms 2W Carbon 2.7K ohms 1/4W			
R212 R213 VR201 VR202 VR203	ERDS2TJ221 ERDS2TJ122 H1052A331B H1052A3R3KB H1052A471B	Carbon 220 ohms 1/4W Carbon 1.2K ohms 1/4W Variable Resistor 330 ohms Variable Resistor 3.3K ohms Variable Resistor 470 ohms			
VR204 C201 C202 C203 C204,205	H1052A3R3KB ECKD3D681KBN ECCF1H561J ECCF1H471J ECCF1H102J	Variable Resistor 3.3Kohms Ceramic 680PF 2KV Ceramic 560 PF 50V Ceramic 470 PF 50V Ceramic 1K ohms			
L201 SW201 PL201 CN201	YFEL06S1151K EVQR0BL12 YFSA-80D EMCS0852M	Coil 150 μ H Lever Switch Neon Lamp 8 pin Connector			