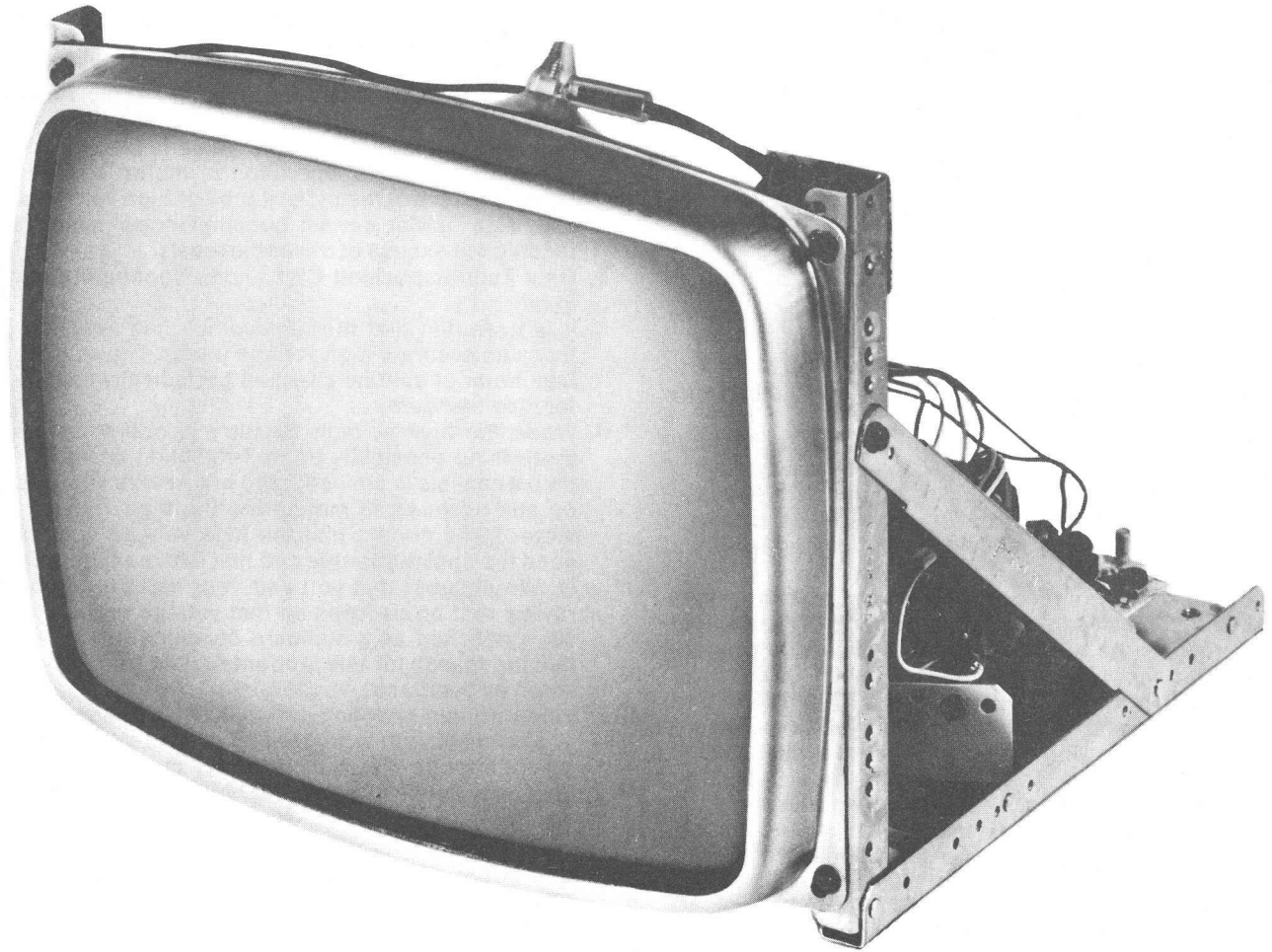


DT2

DT2

SERVICE MANUAL



DT2

D12 SERIES DATA DISPLAY TERMINALS

ZENITH RADIO CORPORATION

1000 MILWAUKEE AVENUE, GLENVIEW, ILLINOIS 60025

PRODUCT SAFETY SERVICING GUIDELINES FOR ZENITH DATA DISPLAY TERMINALS

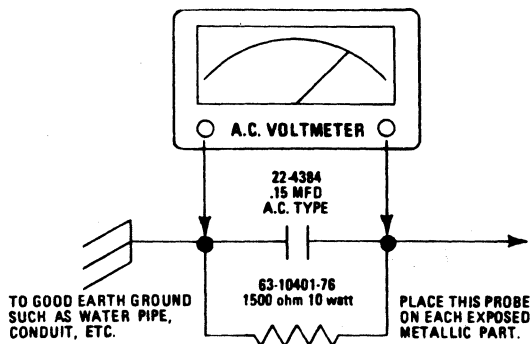
CAUTION: No modification of any circuit should be attempted. Service work should be performed only after you are thoroughly familiar with all of the following safety checks and servicing guidelines. To do otherwise increases the risk of potential hazards and injury to the user.

SAFETY CHECKS

After the original service problem has been corrected, a check should be made of the following:

SUBJECT: FIRE & SHOCK HAZARD

1. Be sure that all components are positioned in such a way to avoid possibility of adjacent component shorts. This is especially important on those chassis which are transported to and from the repair shop.
2. Never release a repair unless all protective devices such as insulators, barriers, covers, shields, strain reliefs, and other hardware have been reinstalled per original design.
3. Soldering must be inspected to uncover possible cold solder joints, frayed leads, damaged insulation, solder splashes or sharp solder points. Be certain to remove all loose foreign material.
4. Check "across-the-line" capacitor (if used) and other components for physical evidence of damage or deterioration and replace if necessary. Follow original layout, lead length and dress.
5. No lead or component should touch a resistor rated at 1 watt or more. Lead tension around protruding metal surfaces must be avoided.
6. All critical components (shaded on the schematic diagram and parts lists) such as: fuses, flameproof resistors, capacitors, etc., must be replaced with exact Zenith types. Do not use replacement components other than those specified or make unrecommended circuit modifications.
7. After re-assembly of the terminal always perform an AC leakage test on all exposed metallic parts of the cabinet and screws to be sure the terminal is safe to operate without danger of electrical shock. **DO NOT USE A LINE ISOLATION TRANSFORMER DURING THIS TEST.** Use an AC voltmeter having 5000 ohms per volt or more sensitivity in the following manner: Connect a 1500 ohm 10 watt resistor (63-10401-76), paralleled by a 0.15 mfd., 150V AC type capacitor (22-4384) between a known good earth ground (water pipe, conduit, etc.) and the exposed metallic parts, one at a time. Measure the AC voltage across the combination 1500 ohm resistor and 0.15 mfd. capacitor. Reverse the AC plug and repeat AC voltage measurements for each exposed metallic part. Voltage measured must not exceed 0.75 volts RMS. This corresponds to 0.5 milliamp AC. Any value exceeding this limit constitutes a potential shock hazard and must be corrected immediately.



SUBJECT: IMPLOSION PROTECTION

1. All Zenith picture tubes are equipped with an integral implosion protection system, but care should be taken to avoid damage during installation. Avoid scratching the tube.
2. Use only Zenith replacement tubes.

SUBJECT: X-RADIATION

1. Be sure procedures and instructions to all service personnel cover the subject of X-radiation. The only potential source of X-rays is the picture tube. However, this tube does not emit X-rays when the HV is at the factory-specified level. It is only when the HV is excessive that X-radiation can be generated. The basic precaution which must be exercised is to keep the HV at the factory-recommended level. Refer to the X-ray Precaution Label which is located inside each terminal for the correct high voltage. The proper value is also given in the schematic diagram. Operation at higher voltages may cause a failure of the picture tube or high voltage supply and, also, under certain circumstances, may produce radiation in excess of desirable levels.
2. Only Zenith-specified CRT anode connectors must be used.
3. It is essential that the serviceman has available at all times an accurate high voltage meter. The calibration of this meter should be checked periodically against a reference standard.
4. When the high voltage circuitry is operating properly there is no possibility of an X-radiation problem. Every time a chassis is serviced, the brightness should be run up and down while monitoring the high voltage with a meter to be certain that the high voltage does not exceed the specified value and that it is regulating correctly. We suggest that you and your service organization review test procedures so that voltage regulation is always checked as a standard servicing procedure, and that the reason for this prudent routine be clearly understood by everyone.
5. When trouble shooting and making test measurements in a terminal with a problem of excessive high voltage, do not operate the chassis longer than is necessary to locate the cause of excessive voltage.

IMPORTANT NOTE: DAG GROUNDING.

Each unit provides for grounding of the main P.C. Board and CRT socket board to the dag of the CRT through the dag grounding spring.

The ground wires are connected to the shell bond or T-band through a terminal lug. Upon installing the Video Display in a terminal, this grounding procedure should be followed to provide adequate high voltage filtering and arc protection. This especially pertains to mounting the video display as a kit version.

CAUTION

NO WORK SHOULD BE ATTEMPTED ON ANY EXPOSED MONITOR CHASSIS BY ANYONE NOT FAMILIAR WITH SERVICING PROCEDURES AND PRECAUTIONS.

GENERAL INFORMATION

This service manual introduces the Zenith D12 series of Video Displays. The series includes three basic forms: the D12-PF which is complete with power supply and frame, the D12-NF without power supply, the D12-NK in kit form which comes without frame or power supply.

The D12 series incorporate precision CRT's which provide uniformity of display and controlled spot size and geometry. The display may be operated from a standard 15 volt D.C. supply (or optional 12 V.D.C.) or from 120 volts A.C.

Input and output connections for the displays are made through a 10 pin edge connector on the main circuit board. Provision has been made for an optional remote brightness control. Schematic reference numbers are printed on

the circuit board to aid in the location and identification of components for servicing.

Vertical and horizontal linearity is maintained within specifications without the use of linearity controls or adjustable devices. Excellent vertical linearity is assured by the extensive use of current feedback and horizontal linearity is achieved with a fixed saturable reactor.

Vertical and horizontal deflection systems sustain scan even in the absence or interruption of synchronizing signals. Vertical and horizontal synchronization is automatic and stable throughout the entire specified operating frequency range.

SPECIFICATIONS

CATHODE RAY TUBE

12" diagonal measure, 90° deflection, 12.5KV nominal high voltage at 50 μ A. beam current. Available with bonded anti-reflective face plate option. P4 phosphor is standard and other EIA phosphors are available.

NOMINAL DISPLAY AREA

51 sq. in. defined by a rectangle 8 1/2" \times 6" centered on the CRT. (Other display dimensions optional.)

INPUT SIGNALS (TTL LEVEL)

HORIZONTAL

4 to 40 μ sec. duration (positive going standard).

VERTICAL

50 to 2500 μ sec. duration (negative going standard).

VIDEO

1.0V to 2.5V P-P (internal or customer supplied 500 Ω contrast control for higher input levels).

Positive polarity for white characters. (Other polarities are available for horizontal and vertical sync.)

POWER SUPPLY

120V \pm 10% or 240V \pm 10%
(customer strappable) 47 to 63 Hz., or
15V DC at 800 ma. max., or
12V DC at 1100 ma. max.

BRIGHTNESS CONTROL

Internal or Customer supplied 100 K Ω potentiometer (accessible at pins 2, 3 and 4 of edge connector).

INTERCONNECT TO CUSTOMER SYSTEM

Via standard 10-pin edge connector.

VIKING #25V10S/1-2
AMP #225-21031-101
CINCH #250-10-30-170

RESOLUTION

900 vertical lines minimum at center of display and 700 vertical lines at the corners. Pulse rise time less than 20 nanoseconds, for 30V rise at CRT. Bandwidth is within 3db from 10 Hz. to 18 MHz.

GEOMETRY

NOTE: Measurements made with an input of 1.0-2.5V P-P and with the display adjusted to 6" high \times 8 1/2" wide.

VERTICAL

a. Height of display at left side shall be within \pm 2.0 percent of height at right side.

b. Top and bottom pincushion or barrel shall be within \pm 1.25% of the average height.

HORIZONTAL

a. Width of display at top shall be within \pm 2.5% of the width at bottom.
b. Side pincushion or barrel shall be within \pm 1.0% of the average width.

LINEARITY

No character shall vary in width or height by more than \pm 10% of the average width or height of all the characters in a row or column respectively. No specific character shall vary in width or height more than \pm 10% of an adjacent character.

SYNCHRONIZATION

HORIZONTAL

15.75 \pm 0.5KHz.
18.60 \pm 0.5KHz. (Optional)

Horizontal Blanking

9.0 μ sec. min.

Horizontal Phasing Control

11.0 μ sec. nominal range

VERTICAL

47 to 63 Hz.

VERTICAL RETRACE TIME

850 μ sec. max.

STORAGE

55° C. max. with bonded anti-reflective faceplate.
65° C. max. for plain faced CRT's.

ENVIRONMENT

Operating temperature

55° max. (free air temperature of display electronics).

Altitude

40,000 ft. + storage & shipment.
10,000 ft. max. operating.

WEIGHT

11.5 lbs. max. without optional power supply.
13.5 lbs. max. with optional power supply.
9.0 lbs. max. without frame.

THEORY OF OPERATION

POWER SUPPLY

Power Transformer TX201 is designed for use with 120V or 240V A.C. source. The secondary provides power to bridge rectifier (CR501, CR502, CR503 and CR504). The positive output of the bridge rectifier (junction of CR503 and CR504), forms the raw B+ supply ($\sim 20\text{VDC}$).

Voltage regulation is accomplished in the negative leg of the power supply through a feedback network consisting of transistors QX501 and QX502 and their associated circuitry. The emitter voltage of QX501 is maintained by diodes CR505, CR506 and CR507. The base voltage is provided by potentiometer RX506.

If B+ increases, diodes CR505, CR506 and CR507 will draw more current to maintain the emitter voltage of QX501. Additionally, the voltage developed across RX506 will increase, resulting in a higher positive voltage at the base of QX501 which will result in less conduction. This reduces the base current of QX502 since QX501 provides the emitter/base current path for QX502. When QX502 conducts less, the voltage drop across Q502 is increased thus lowering B+.

If B+ decreases, diodes CR505, CR506 and CR507 will reduce conduction to maintain the emitter voltage of QX501. Additionally, the base voltage provided by RX506 will decrease. Less voltage on the base of QX501 will cause it to increase conduction, resulting in a greater emitter/base current flow in QX502. With this condition the voltage drop for Q502 is less and B+ is increased.

HORIZONTAL

The low-level horizontal section, which consists of transistors Q101 and Q102 (and associated circuitry), functions as a variable time delay monostable multivibrator. The input trigger for this circuit is provided by the horizontal drive pulse. The pulse is injected into the base or emitter (for either positive or negative pulse respectively) of Q101 through injection network C101, C111, R101, R110 and CR101. By varying the recovery time of the multivibrator, potentiometer R104 adjusts video information position (with respect to raster scan). Output of the monostable multivibrator, derived at the collector of Q102, is injected through a coupling network consisting of C110 and CR103. The resulting "Lock" signal is rereceived by one side of a precision astable multivibrator at the

emitter of Q103. The astable multivibrator circuit is completed through Q104 and associated circuitry. This circuit will act as a free running oscillator until the "Lock" signal is received from the previous stage. Once locked, an output pulse is formed at the emitter of Q104 which is then D.C. coupled to the base of the horizontal driver transistor, Q105.

Remainder of the horizontal circuit is straightforward. Features to be noted are: Width and Linearity Coils LX102 and LX101 in series with the yoke (TX202). Linearity is fixed and an adjustable coil is provided for width. The linearity coil has a magnetically biased core which makes the inductance of the coil dependent upon its current. Pincushion and geometric corrections are made at the factory by the addition of rubber magnets around the plastic ring of the yoke. D.C. operation of 12 volts is accomplished by the (optional) addition of a boost circuit at the horizontal sweep transformer.

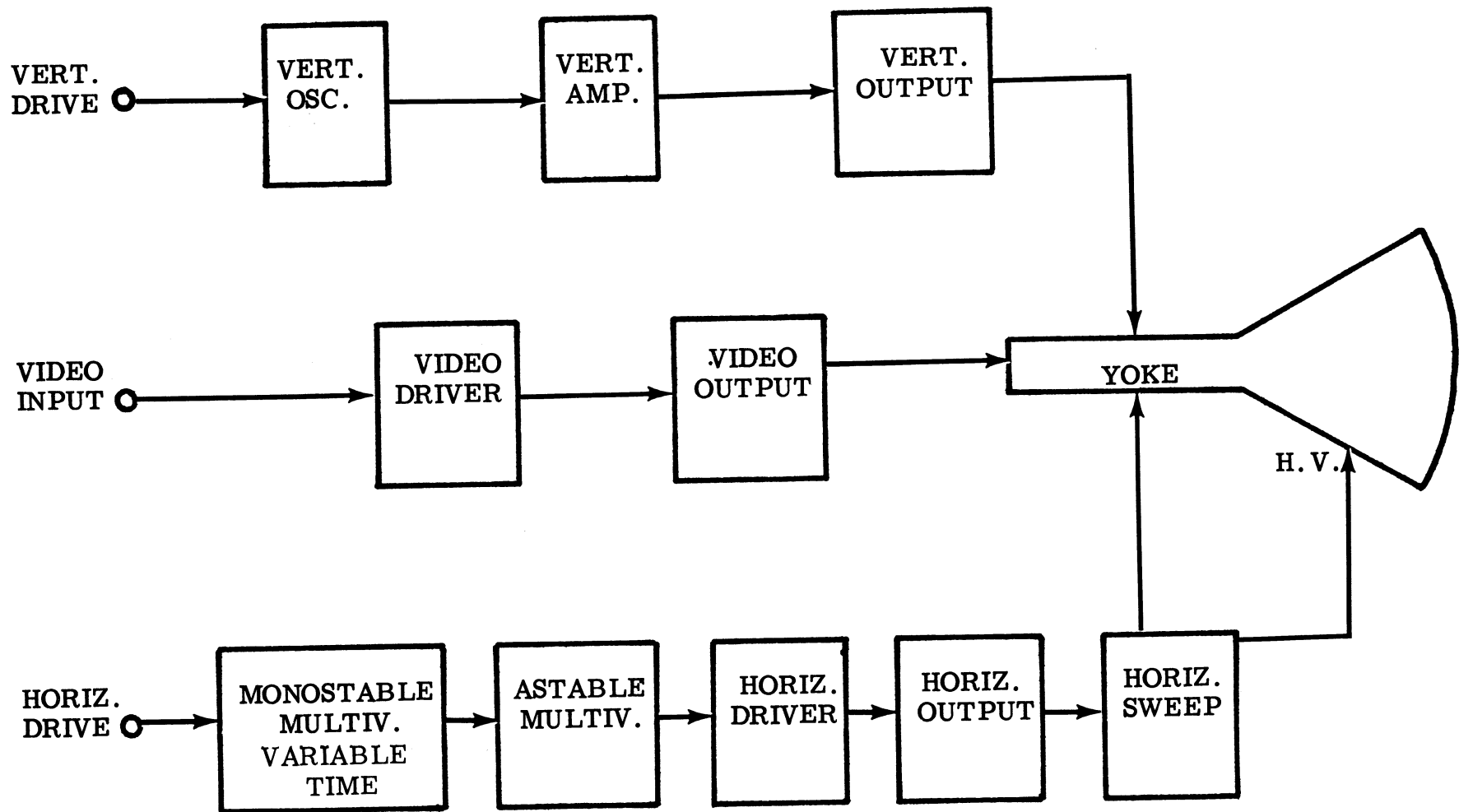
VERTICAL

The vertical circuit includes an oscillator consisting of transistors Q301 and Q302 and associated circuitry. Amplification is provided by transistors Q303 and Q304 with the emitter of Q304 feeding the base of the vertical driver Q305. The vertical output transistors, Q306 and Q307 are wired in the standard push-pull configuration. Transistor Q308 doubles B+ during retrace, maintaining less than 800 μ sec. of retrace time.

VIDEO

The video amplifier circuit consists of transistors Q401 and Q402 and associated circuitry. The circuit comprises a cascode amplifier which is triggered by a positive pulse at pin 8 of the edge connector. Upon receiving the input pulse, conduction is initiated and the collector voltage of Q402 is lowered. Amplification of low frequency voltage gain is fixed by the ratio of R407 and R408. Gain is maintained to 18 MHz by the bandwidth enhancing components R406, C403, and L401. Resistors R402 and R403 provide bias for the amplifier.

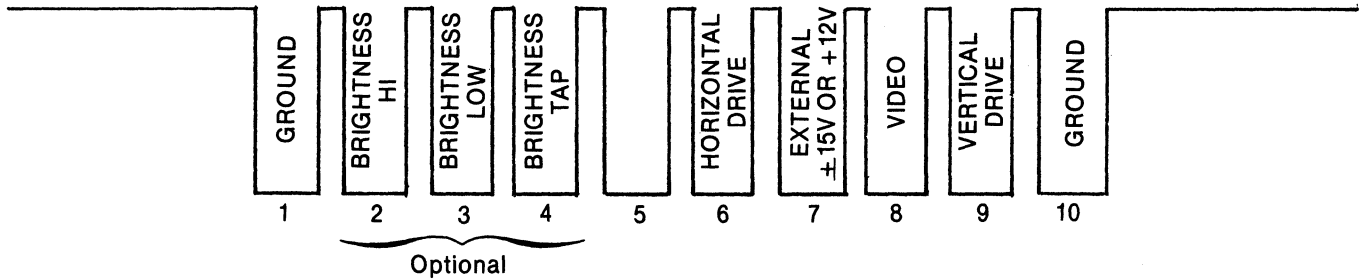
The collector output of Q401 is D.C. coupled to the cathode of the C.R.T. through resistor R201. Raster cut-off is adjusted with the brightness control R114 which is connected to G1 of the C.R.T.



ADJUSTMENT PROCEDURES FOR D12 VIDEO DISPLAY

1. External power is applied to the monitor through an AC line cord or a 4 pin molex connector. The unit is wired for 120 VAC 50/60 Hz operation. (240 VAC 50/60 Hz optional)
2. INPUT SIGNALS: Input signals are connected to the display board through a 10 pin edge connector.

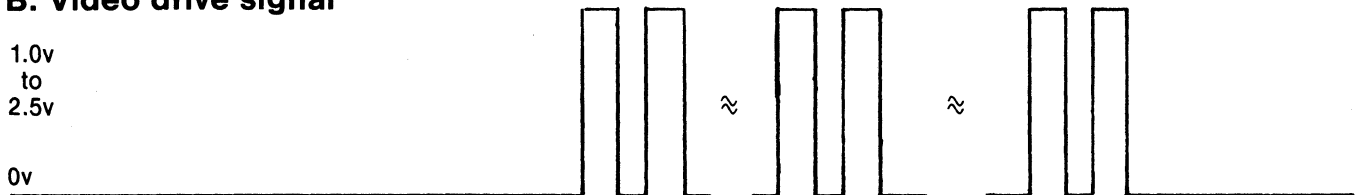
Component Side of Display Board



A. Horizontal drive signal — $15750\text{Hz} \pm 500\text{Hz}$, $18,600\text{Hz} \pm 500\text{Hz}$

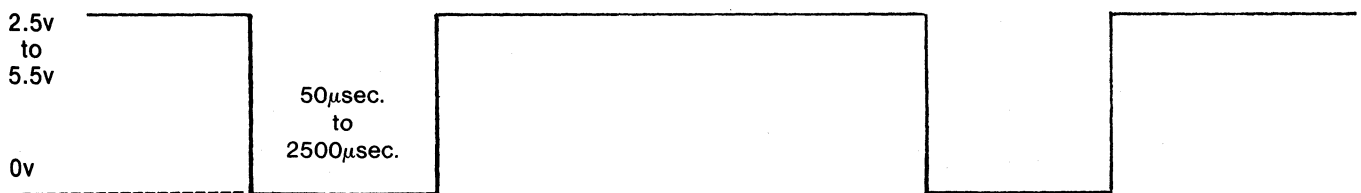


B. Video drive signal

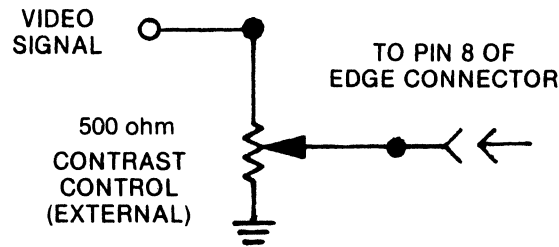


At a horizontal frequency of 15.7KHZ the video drive signal should start 11 microseconds $\pm 5 \mu\text{sec.}$ after the leading edge of horizontal sync, and 900 microseconds or greater after the leading edge of vertical sync.

C. Vertical drive signal — 47Hz to 63Hz



Should the video drive level exceed the 2.5 volts specified, an external contrast control must be provided. The video drive signal is connected to the top end of the 500Ω pot, the bottom end is grounded and the wiper arm connects to the video input of the edge connector as shown.

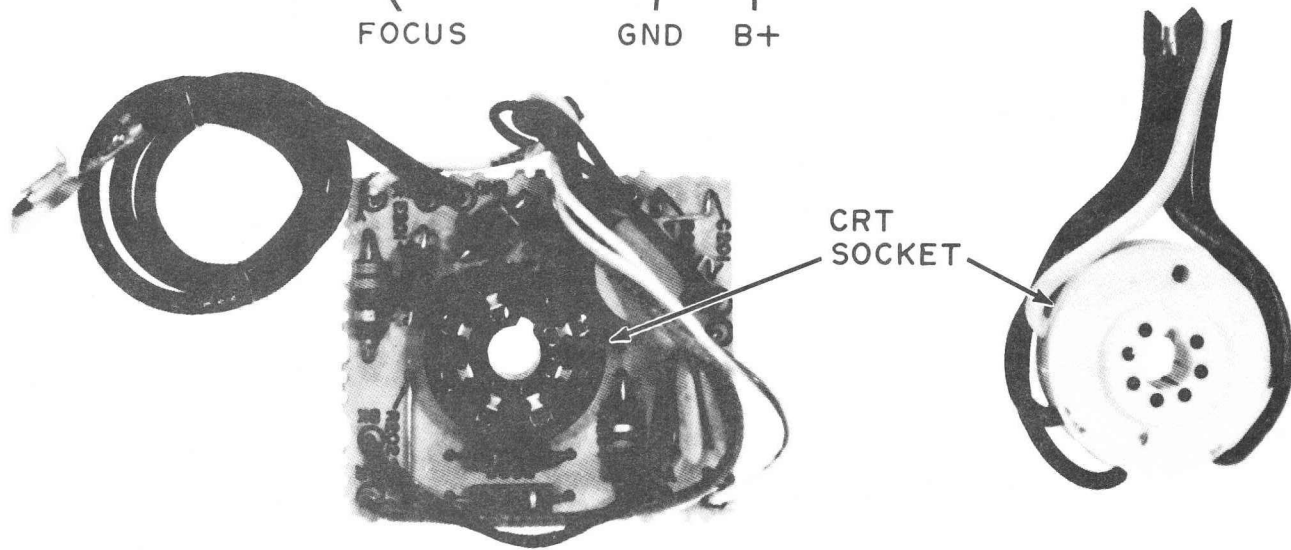
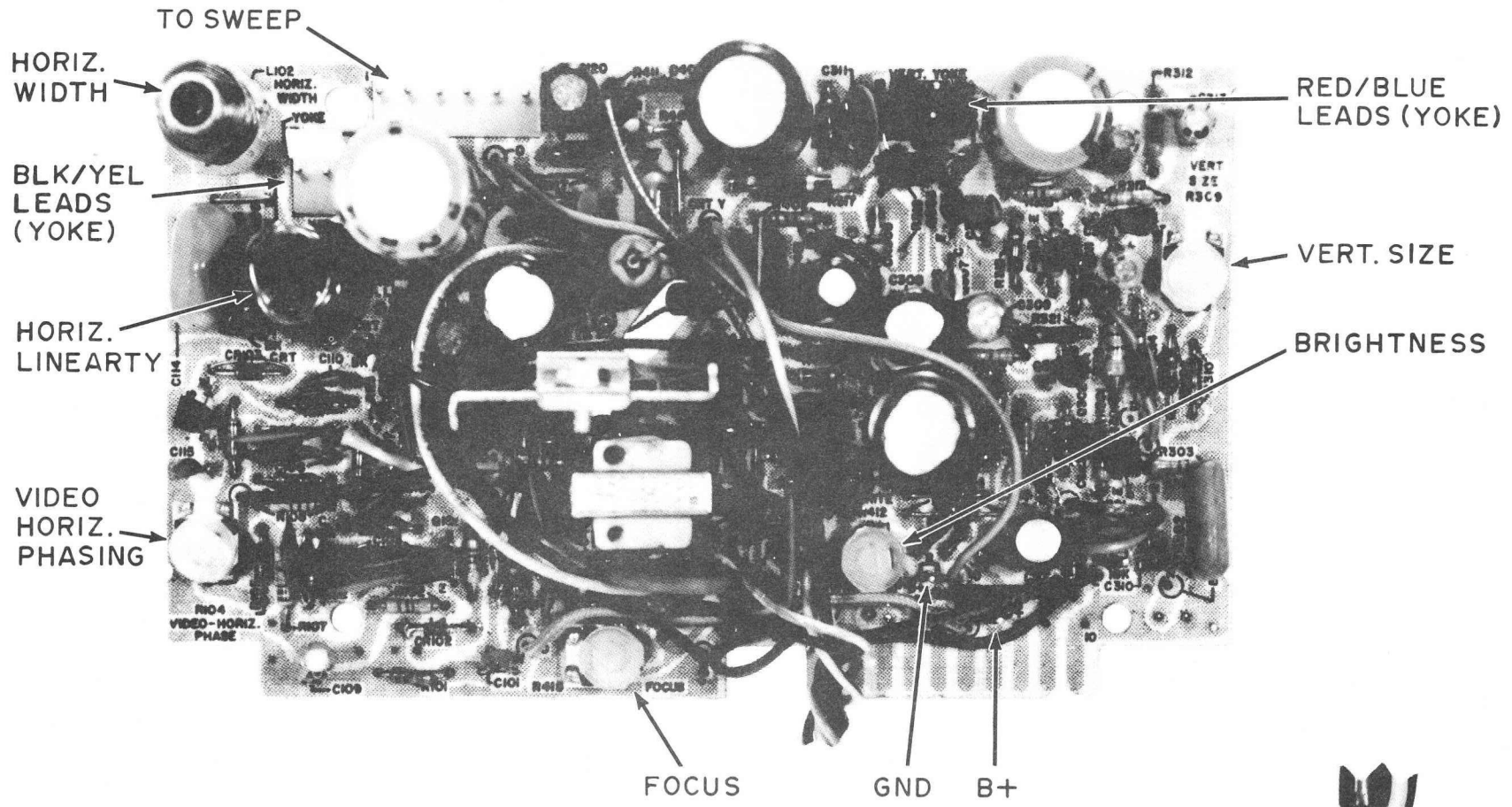


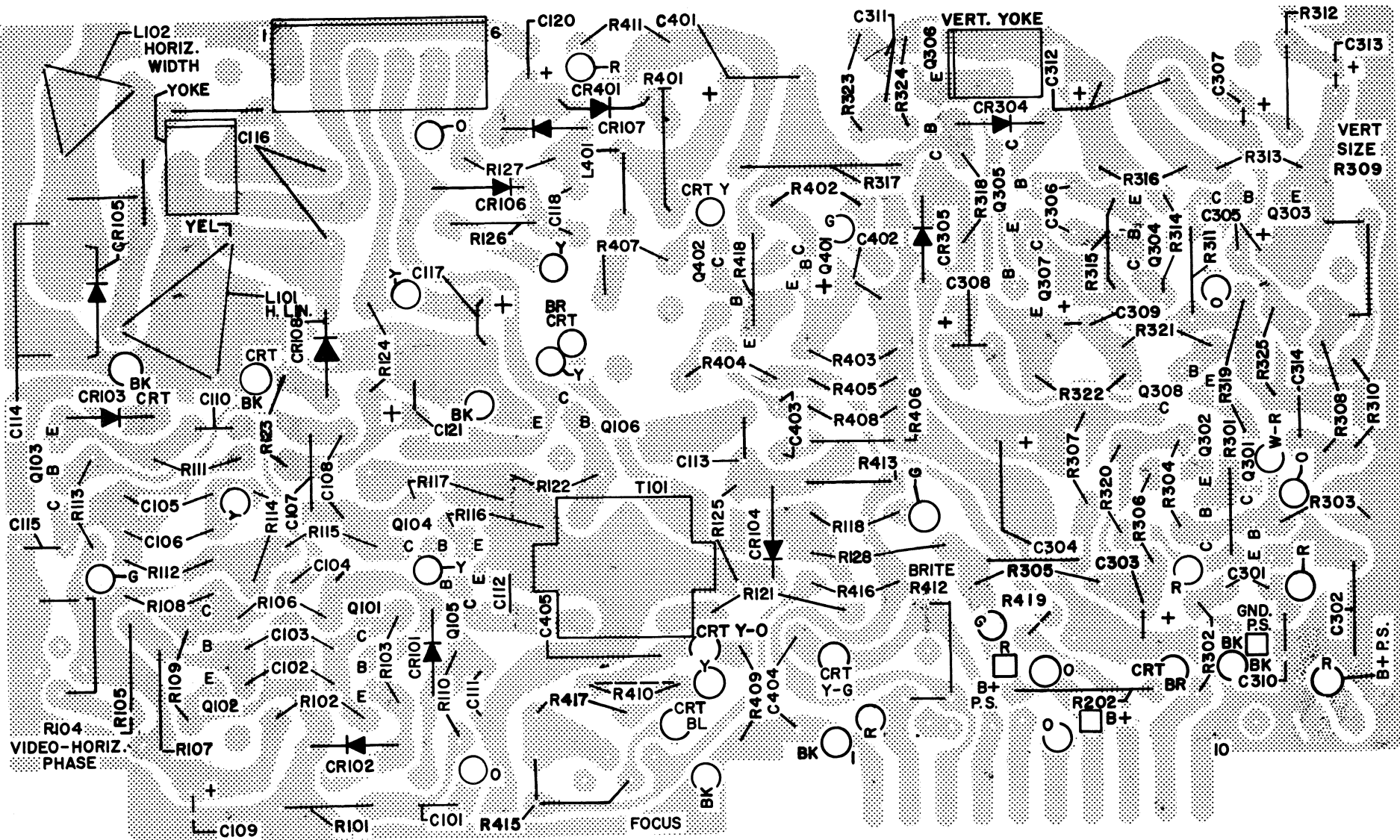
3. Once power is applied to the display and the input signals connected, adjust the brightness control until the edges of the raster are visible.
4. Depending on the requirements for height and width of the video presentation, the vertical size control and width coil should be adjusted accordingly.
5. The power supply board also has a control to adjust the regulated B+ of the monitor to +15V. Check for proper adjustment.
6. Adjust the phase control to center the video information within the raster. (The contrast control may have to be adjusted to obtain a display of the video information.)
7. Adjust brightness control for visual cutoff of the raster.
8. Adjust external contrast control for desired luminance.
9. Adjust focus control for best possible overall focus.

IMPORTANT NOTE: DAG GROUNDING.

Each unit provides for grounding of the main P.C. Board and CRT socket board to the dag of the CRT through the dag grounding spring.

The ground wires are connected to the shell bond or T-band through a terminal lug. Upon installing the Video Display in a terminal, this grounding procedure should be followed to provide adequate high voltage filtering and arc protection. This especially pertains to mounting the video display as a kit version.

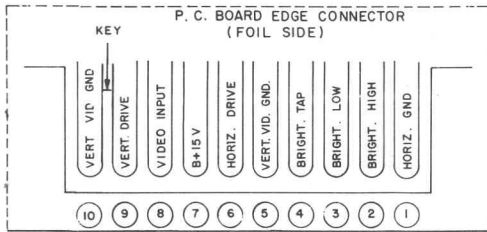
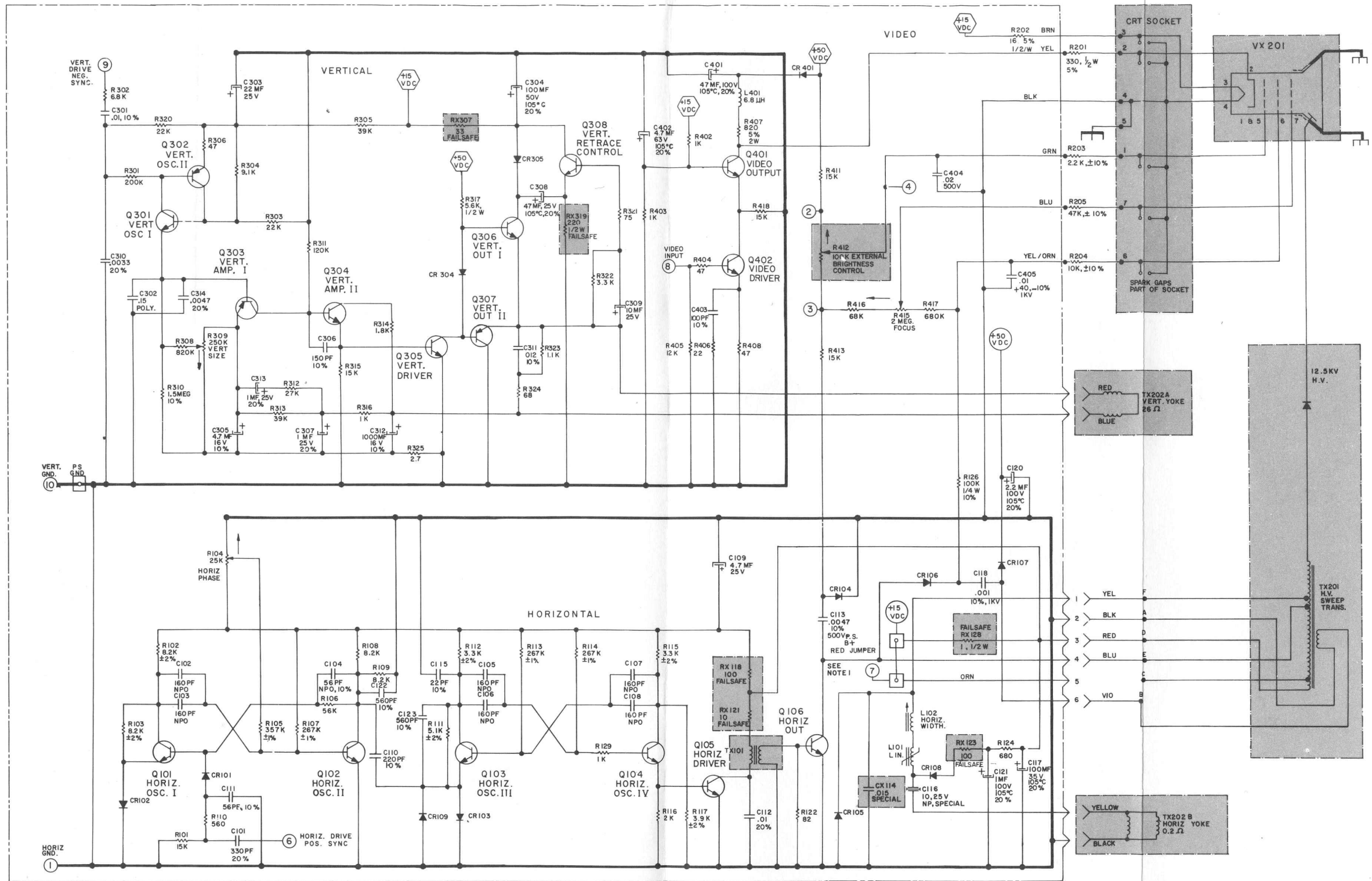




LEGEND

ITEM NO.	PART NO.	DESCRIPTION		ITEM NO.	PART NO.	DESCRIPTION	
C101	22-7614-06A	330 PFD. CAPACITOR ±20% DISC.	50V	R205		47K OHM RESISTOR ±10% CARBON COMP	1/2W
C102	22-7619-39A	160 PFD CAPACITOR ±5% DISC. NPO	50V	R301	63-9922-27	200 K OHM RESISTOR ±5% FILM	1/4W
C103	22-7619-39A	160 PFD. CAPACITOR ±5% DISC. NPO	50V	R302	63-9921-92	6.8 K OHM RESISTOR ±5% FILM	1/4W
C104	22-7622-28A	56 PFD CAPACITOR ±10% DISC NPO	50V	R303	63-9922-04	22K OHM RESISTOR ±5% FILM	1/4W
C105	22-7619-39A	160 PFD CAPACITOR ±5% DISC NPO	50V	R304	63-9921-95	9.1 K OHM RESISTOR ±5% FILM	1/4W
C106	22-7619-39A	160 PFD CAPACITOR ±5% DISC NPO	50V	R305	63-9922-10	39K OHM RESISTOR ±5% FILM	1/4W
C107	22-7619-39A	160 PFD CAPACITOR ±5% DISC NPO	50V	R306	63-9921-40	47 OHM RESISTOR ±5% FILM	1/4W
C108	22-7619-39A	160 PFD CAPACITOR ±5% DISC NPO	50V	RX307	63-10559-36	33 OHM RESISTOR ±5% FAILSAFE	1/4W
C109	22-7152-03	4.7 MFD CAPACITOR ELEC. +100%-10%	25V	R308	63-9922-42	820K OHM RESISTOR ±5% FILM	1/4W
C110	22-7613-04A	220 PFD CAPACITOR ±10% DISC	50V	R309	63-10651-13	CONTROL 250K OHM VERT. SIZE	
C111	22-7622-28A	56 PFD CAPACITOR ±10% DISC	50V	R310	63-9924-48	1.5 MEG OHM RESISTOR ±10% FILM	1/4W
C112	22-7614-24A	.01 MFD CAPACITOR ±20% DISC	50V	R311	63-9922-22	120 K OHM RESISTOR ±5% FILM	1/4W
C113	22-7440	.0047 MFD CAPACITOR ±10% DISC	500V	R312	63-9922-06	27K OHM RESISTOR ±5% FILM	1/4W
CX114	22-7530-07	.015 MFD CAPACITOR SPECIAL..		R313	63-9922-10	39K OHM RESISTOR ±5% FILM	1/4W
C115	22-7656-13A	22 PFD CAPACITOR ±10% DISC	50V	R314	63-9921-78	1.8 K OHM RESISTOR ±5% FILM	1/4W
C116	22-7313	10 MFD CAPACITOR SPECIAL		R315	63-9922	15 K OHM RESISTOR ±5% FILM	1/4W
C117	22-7719-9-09	100 MFD CAPACITOR ±20% ELEC.	35V	R316	63-9921-72	1K OHM RESISTOR ±5% FILM	1/4W
C118	22-3748	.001 MFD CAPACITOR ±10% DISC	1KV	R317	63-7816	5.6 K OHM RESISTOR ±5% CARBON COMP	1/2W
C120	22-7722-02	2.2 MFD CAPACITOR, ±20% ELEC.	100V	R318			
C121	22-7722-01	1 MFD CAPACITOR, ±20% ELEC.	100V	RX319	63-10565-56	220 OHM RESISTOR ±5% FAILSAFE	1/2W
C122	22-7613-09	560 PFD CAPACITOR ±10% DISC.	50V	R320	63-9922-04	22K OHM RESISTOR ±5% FILM	1/4W
C123	22-7613-09	560 PFD CAPACITOR ±10% DISC.	50V	R321	63-9921-45	75 OHM RESISTOR ±5% FILM	1/4W
C301	22-7613-24A	.01 MFD CAPACITOR ±10% DISC	50V	R322	63-9921-84	3.3K OHM RESISTOR ±5% FILM	1/4W
C302	22-7548	.15 MFD CAPACITOR ±10% POLYESTER	50V	R323	63-9921-73	1.1K OHM RESISTOR ±5% FILM	1/4W
C303	22-7152-05	22 MFD CAPACITOR ±100-10% ELEC.	25V	R324	63-9921-44	68 OHM RESISTOR ±5% FILM	1/4W
C304	22-7720-09	100 MFD CAPACITOR ±20% ELEC. 105°C	50V	R325	63-9921-10	2.7 OHM RESISTOR ±5% FILM	1/4W
C305	22-7579-03	4.7 MFD CAPACITOR ELEC. ±10%	16V	R402	63-9921-72	1K OHM RESISTOR ±5% FILM	1/4W
C306	22-7613-02A	150 PFD CAPACITOR ±10% DISC	50V	R403	63-9921-72	1K OHM RESISTOR ±5% FILM	1/4W
C307	22-7389-02	1MFD CAPACITOR ±20% ELEC.	25V	R404	63-9921-40	47 OHM RESISTOR ±5% FILM	1/4W
C308	22-7718-08	47 MFD CAPACITOR ±20% ELEC.	25V	R405	63-8821	12K OHM RESISTOR ±5% FILM	1/4W
C309	22-7152-04	10 MFD CAPACITOR ±100-10% ELEC. 105°C	25V	R406	63-9921-32	22 OHM RESISTOR ±5% FILM	1/4W
C310	22-7614-18A	.0033 MFD CAPACITOR ±20% DISC	50V	R407	63-10371-70	820 OHM RESISTOR ±5% FILM	2W
C311	22-7613-25A	.012 MFD CAPACITOR ±10% DISC	50V	R408	63-9921-40	47 OHM RESISTOR ±5% FILM	1/4W
C312	22-7579-04	1000 MFD CAPACITOR ±10% ELEC.	16V	R411	63-9922-	15K OHM RESISTOR ±5% FILM	1/4W
C313	22-7389-02	1 MFD CAPACITOR ±20% ELEC.	25V	R412			
C314	22-7614-20A	.0047 MFD CAPACITOR ±20% DISC	50V	R413	63-9922-04	15K OHM RESISTOR ±5% FILM	1/4W
C401	22-7722-08	47 MFD CAPACITOR ±20% ELEC. 105°C	100V	R415	63-10812-01	CONTROL 2 MEG OHM FOCUS	
C402	22-7721-04	4.7 MFD CAPACITOR ±20% ELEC. 105°C	63V	R416	63-9922-16	68K OHM RESISTOR ±5% FILM	1/4W
C403	22-7613A	100 PFD CAPACITOR ±10% DISC	50V	R417	63-9922-40	680K OHM RESISTOR ±5% FILM	1/4W
C404	22-7724	.02 MFD. CAPACITOR ±80-20% DISC.	500V	R418	63-9922	15K OHM RESISTOR ±5% FILM	1/4W
C405	22-3512	.01 MFD CAPACITOR ±40-10% DISC	1KV	L101	20-3906	COIL, RCF LINEARITY	
R101	63-9922	15K OHM RESISTOR ±5% FILM	1/4W	L102	20-3882	COIL, RCF TUNABLE WIDTH	
R102	63-9919-94	8.2K OHM RESISTOR ±2% FILM	1/4W	L401	20-3887-10C	COIL, RCF 6.8 μh	
R103	63-9919-94	8.2K OHM RESISTOR ±2% FILM	1/4W	TX101	95-3138-03	TRANSFORMER HORIZ DRIVER	
R104	63-10651-11	CONTROL 25K OHM (HORIZ. PHASE)		TX201	95-3395-01	H.V. SWEEP TRANSFORMER	
R105	63-10533-05	357K OHM RESISTOR ±1% METAL FILM	1/4W	TX202	95-3397-02	DEFLECTION YOKE	
R106	63-9922-14	56K OHM RESISTOR ±5% FILM	1/4W	CR101	103-142-01	DIODE	
R107	63-10533-04	267K OHM RESISTOR ±1% METAL FILM	1/4W	CR102	103-142-01	DIODE	
R108	63-9921-94	8.2K OHM RESISTOR ±5% FILM	1/4W	CR103	103-142-01	DIODE	
R109	63-9921-94	8.2K OHM RESISTOR ±5% FILM	1/4W	CR104	103-295-03A	DIODE	
R110	63-9921-66	560 OHM RESISTOR ±5% FILM	1/4W	CR105	103-284	DIODE	
R111	63-10351-89	5.1K OHM RESISTOR ±2% FILM	1/4W	CR106	212-76 -02	DIODE	
R112	63-9919-84	3.3K OHM RESISTOR ±2% FILM	1/4W	CR107	103-298-05A	DIODE	
R113	63-10533-04	267K OHM RESISTOR ±1% METAL FILM	1/4W	CR108	212-76	DIODE	
R114	63-10533-04	267K OHM RESISTOR ±1% METAL FILM	1/4W	CR109	103-142-01	DIODE	
R115	63-9919-84	3.3K OHM RESISTOR ±2% FILM	1/4W	CR304	103-142-01	DIODE	
R116	63-9921-79	2K OHM RESISTOR ±5% FILM	1/4W	CR305	212-76	DIODE	
R117	63-9919-86	3.9K OHM RESISTOR ±2% FILM	1/4W	CR401	212-76	DIODE	
RX118	63-10559-48	100 OHM RESISTOR ±5% FAILSAFE	1/4W	Q101	121-975	TRANSISTOR	HORIZ. OSC. I
RX121	63-10559-24	10 OHM RESISTOR ±5% FAILSAFE	1/4W	Q102	121-975	TRANSISTOR	HORIZ. OSC. II
R122	63-9921-46	82 OHM RESISTOR ±5% FILM	1/4W	Q103	121-975	TRANSISTOR	HORIZ. OSC. III
RX123	63-10559-48	100 OHM RESISTOR ±5% FAILSAFE	1/4W	Q104	121-975	TRANSISTOR	HORIZ. OSC. IV
RX124	63-10559-68	680 OHM RESISTOR ±5% FAILSAFE	1/4W	Q105	121-819	TRANSISTOR	HORIZ DRIVER
R126	63-10184-20	100K OHM RESISTOR ±10% CARBON COMP	1/4W	Q106	121-1039	TRANSISTOR	HORIZ. OUTPUT
RX128	63-10565	1 OHM RESISTOR ±5% FAILSAFE	1/2W	Q301	121-975	TRANSISTOR	VERT. OSC. I
R129	63-8797	1K OHM RESISTOR ±5% FILM	1/4W	Q302	121-699	TRANSISTOR	VERT. OSC. II
R201		330 OHM RESISTOR ±5% CARBON COMP	1/2W	Q303	121-699	TRANSISTOR	VERT. AMP. I
R202		16 OHM RESISTOR ±5% CARBON COMP	1/2W	Q304	121-975	TRANSISTOR	VERT. AMP. II
R203	REFERENCE ONLY	2.2K OHM RESISTOR ±10% CARBON COMP	1/2W	Q305	121-972	TRANSISTOR	VERT. DRIVER
R204	REFERENCE ONLY	10 K OHM RESISTOR ±10% CARBON COMP	1/2W	Q306	121-819	TRANSISTOR	VERT. OUTPUT I
				Q307	121-973	TRANSISTOR	VERT. OUTPUT II
				Q308	121-819	TRANSISTOR	VERT. RETRACE
				Q401	121-1058	TRANSISTOR 121-1034 ALT.	VIDEO OUTPUT
				Q402	121-895	TRANSISTOR	VIDEO DRIVER
				VX201	100-684	12" CRT	
					OR 100-684-02	12" CRT	

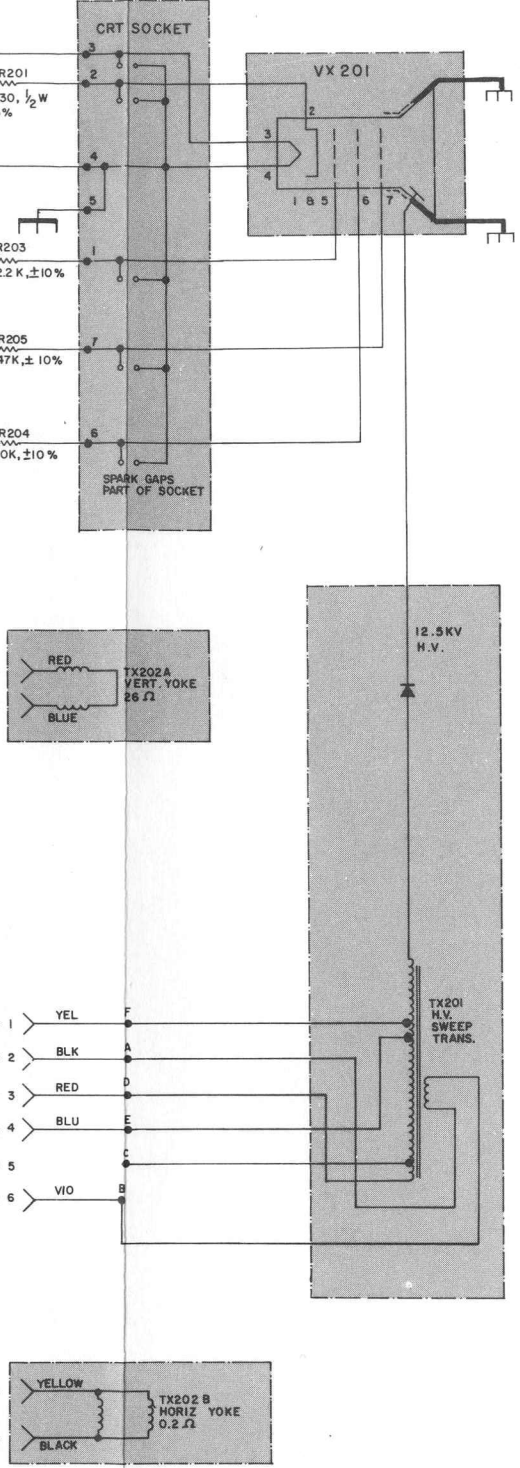
D12 VIDEO DISPLAY 15.7KHz



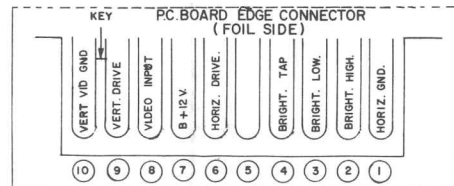
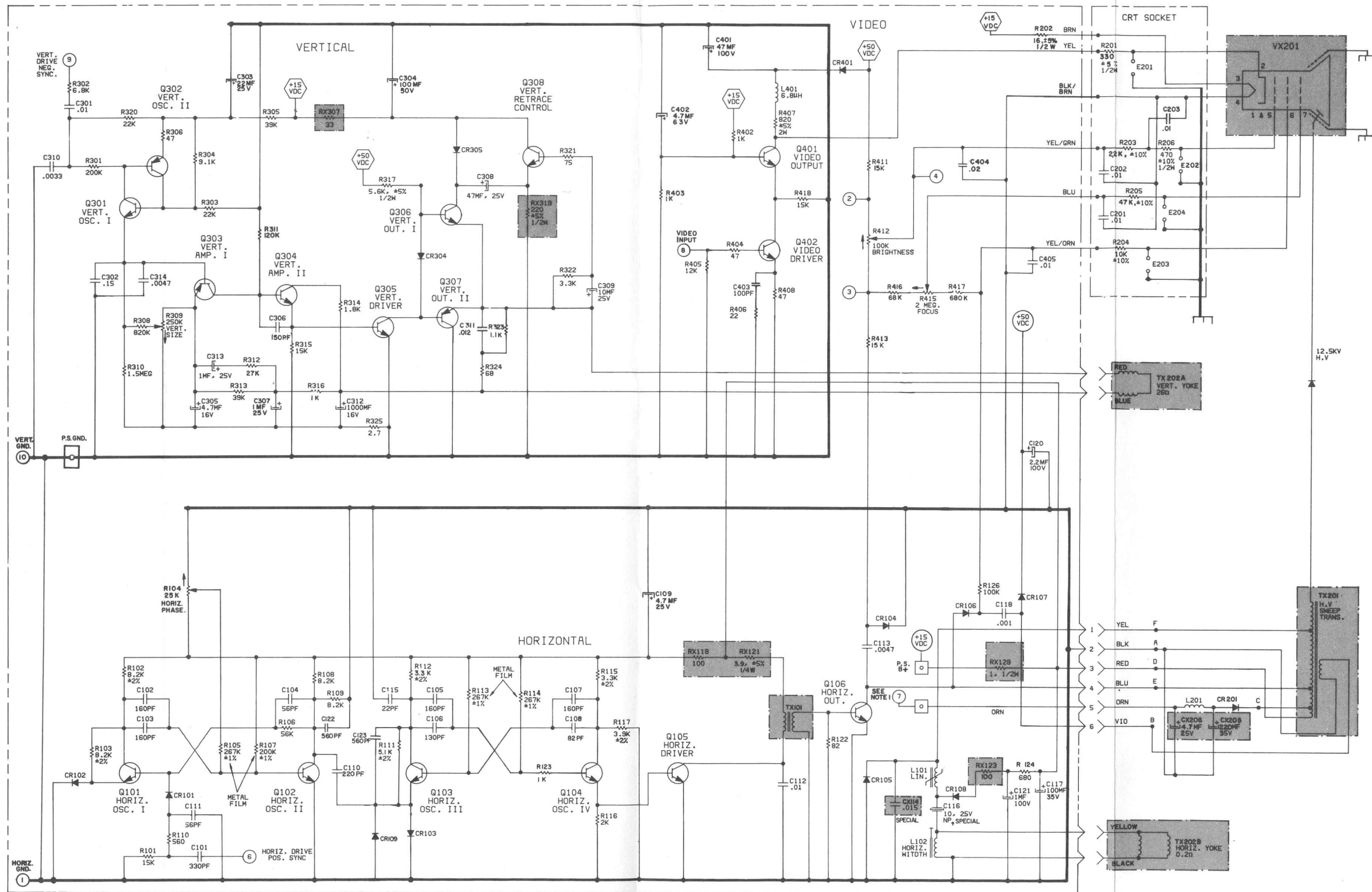
○ = DC VOLTAGE SOURCE
 ⬡ = DC VOLTAGE APPLIED
 NOTE 1. CUSTOMER SUPPLIED EXTERNAL DC SOURCE ON PIN 7 EDGE CONNECTOR

IMPORTANT SAFETY NOTICE
 When servicing this chassis, under no circumstances should the original design be modified or altered without permission from the Zenith Radio Corporation. All components should be replaced only with types identical to those in the original circuit. Special components are used to prevent shock and fire hazard. These critical components are shaded on the schematic and parts list for easy identification.
 This circuit diagram may occasionally differ from the actual circuit used. This way, implementation of the latest safety and performance improvement changes into the set is not delayed until the new service literature is printed.

IMPORTANT SAFETY NOTICE
FOR X-RADIATION, FIRE OR SHOCK HAZARD PREVENTION, CERTAIN SPECIAL OR REDUNDANT PARTS ARE USED. USE ONLY EXACT REPLACEMENTS. DO NOT ALTER THE CIRCUIT OR DEFEAT THE FUSES. FAILURE TO COMPLY MAY BE UNLAWFUL.



D12 VIDEO DISPLAY 18.6KHZ



○ = DC VOLTAGE SOURCE
 ◡ = DC VOLTAGE APPLIED
 NOTE L CUSTOMER SUPPLIED EXTERNAL DC SOURCE ON PIN 7 EDGE CONNECTOR

IMPORTANT SAFETY NOTICE

When servicing this chassis, under no circumstances should the original design be modified or altered without permission from the Zenith Radio Corporation. All components should be replaced only with types identical to those in the original circuit. Special components are used to prevent shock and fire hazard. These critical components are shaded on the schematic and parts list for easy identification.

This circuit diagram may occasionally differ from the actual circuit used. This way, implementation of the latest safety and performance improvement changes into the set is not delayed until the new service literature is printed.

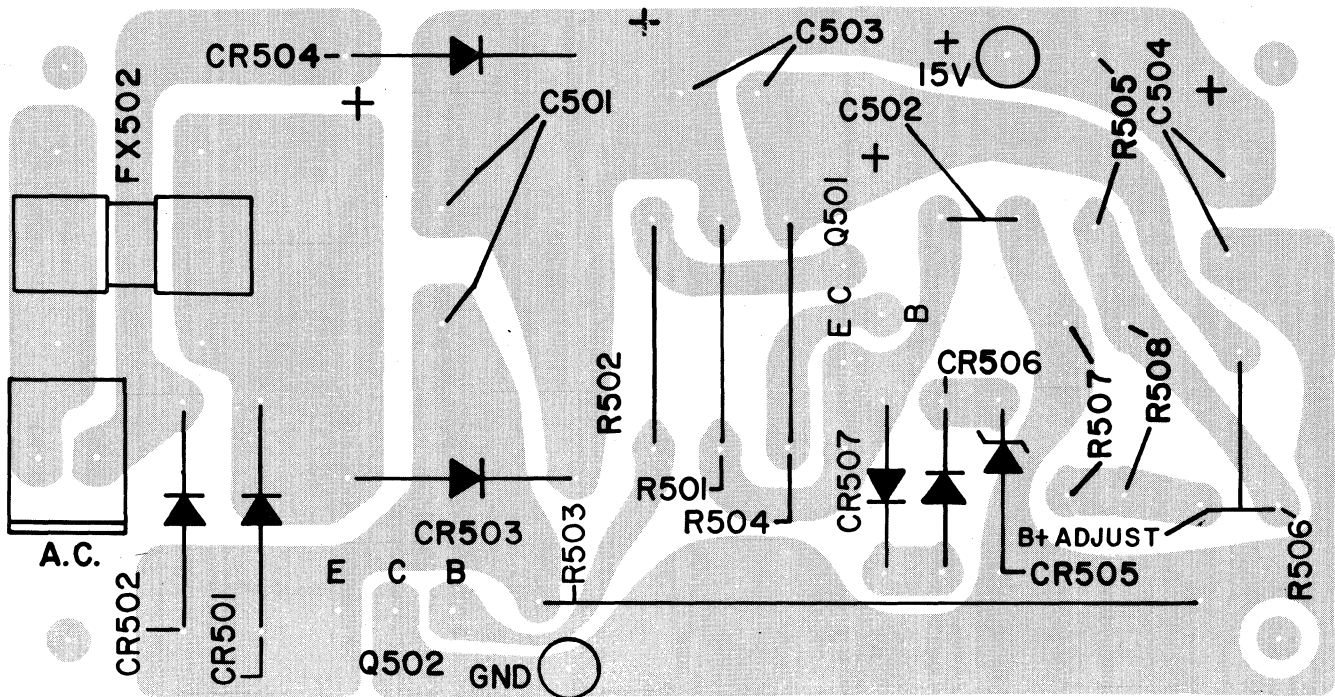
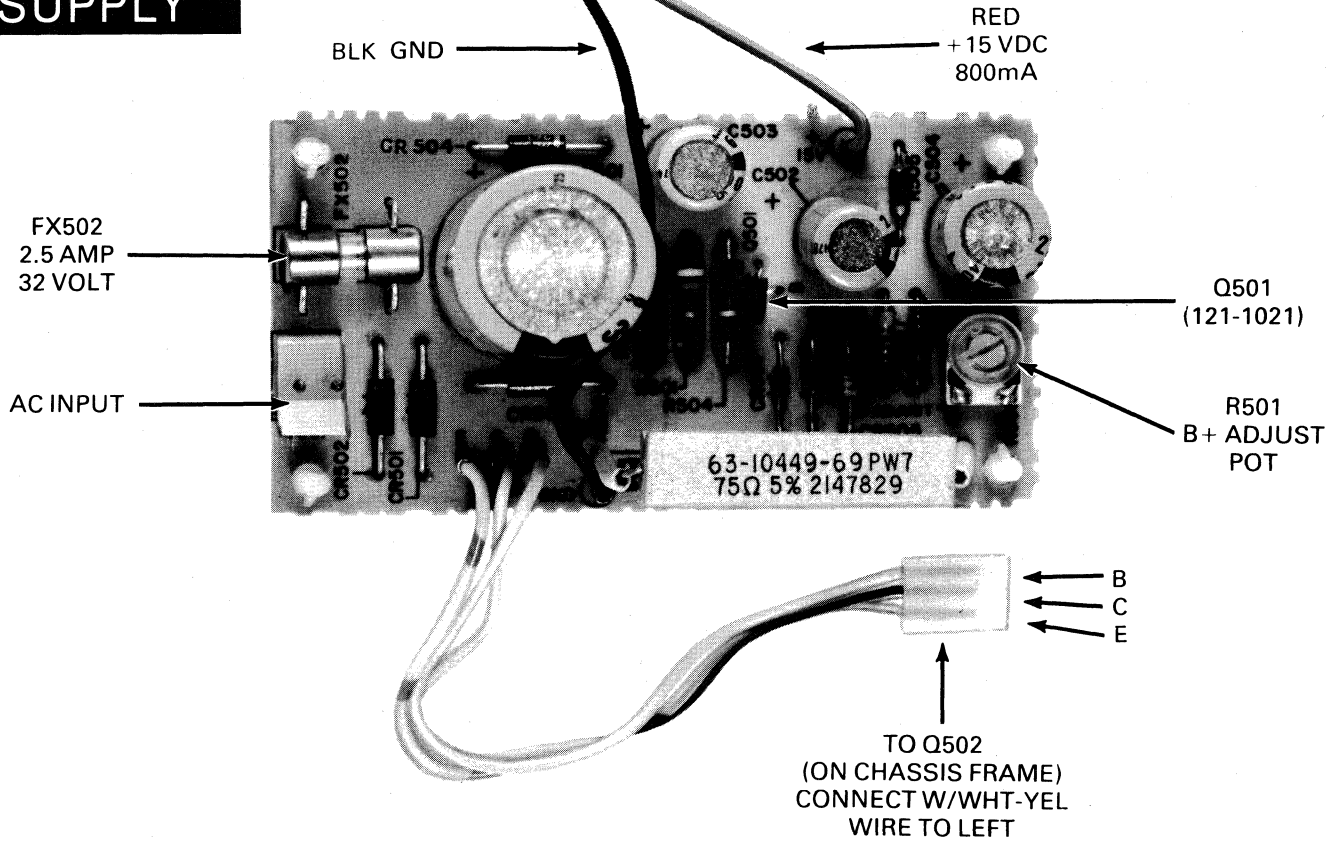
IMPORTANT SAFETY NOTICE

FOR X-RADIATION, FIRE OR SHOCK HAZARD PREVENTION, CERTAIN SPECIAL OR REDUNDANT PARTS ARE USED. USE ONLY EXACT REPLACEMENTS. DO NOT ALTER THE CIRCUIT OR DEFEAT THE FUSES. FAILURE TO COMPLY MAY BE UNLAWFUL.

LEGEND

ITEM NO.	PART NO.	DESCRIPTION		ITEM NO.	PART NO.	DESCRIPTION	
C101	22-7614-06A	330 PFD. CAPACITOR ±20% DISC.	50V	R304	63-9921-95	9.1 K OHM RESISTOR ±5% FILM	1/4W
C102	22-7619-39A	180 PFD. CAPACITOR ±5% DISC. NPO	50V	R305	63-9922-10	39K OHM RESISTOR ± 5% FILM	1/4W
C103	22-7619-39A	180 PFD. CAPACITOR ±5% DISC NPO	50V	R306	63-9921-40	47 OHM RESISTOR ±5% FILM	1/4W
C104	22-7622-28A	56 PFD CAPACITOR ±10% DISC	50V	RX307	63-10559-36	33 OHM RESISTOR ± 5% FAILSAFE	1/4W
C105	22-7619-39A	180 PFD CAPACITOR ±5% DISC NPO	50V	R308	63-9922-42	820K OHM RESISTOR ± 5% FILM	1/4W
C106	22-7619-37A	130 PFD CAPACITOR ±5% DISC NPO	50V	R309	63-10651-13	CONTROL 250K OHM VERT. SIZE	1/4W
C107	22-7619-39A	180 PFD CAPACITOR ±5% DISC NPO	50V	R310	63-9924-48	1.5 MEG OHM RESISTOR ±10% FILM	1/4W
C108	22-7619-32A	82 PFD CAPACITOR ±5% DISC NPO	50V	R311	63-9922-22	120K OHM RESISTOR ±5% FILM	1/4W
C109	22-7152-03	4.7 MFD CAPACITOR +100%-10% ELEC.	25V	R312	63-9922-06	27K OHM RESISTOR ± 5% FILM	1/4W
C110	22-7613-04A	220 PFD CAPACITOR ±10% DISC	50V	R313	63-9922-10	39K OHM RESISTOR ± 5% FILM	1/4W
C111	22-7622-28A	56 PFD CAPACITOR ±10% DISC	50V	R314	63-9921-78	1.8K OHM RESISTOR ± 5% FILM	1/4W
C112	22-7614-24A	.01 MFD CAPACITOR ± 20% DISC	50V	R315	63-9922	15K OHM RESISTOR ± 5% FILM	1/4W
C113	22-7440	.0047 MFD CAPACITOR ±10% DISC	500V	R316	63-9921-72	1.000 OHM RESISTOR ±5% FILM	1/4W
C114	22-7530-07	.015 MFD CAPACITOR SPECIAL		R317	63-7616	5.6K OHM RESISTOR ± 5% CARBON COMP.	1/2W
C115	22-7656-13A	22 PFD CAPACITOR ±10% DISC	50V	RX319	63-10559-58	220 OHM RESISTOR ± 5% FAILSAFE	1/2W
C116	22-7313	10 MFD CAPACITOR SPECIAL		R320	63-9921-04	22K OHM RESISTOR ±5% FILM	1/4W
C117	22-7719-09	100 MFD CAPACITOR ±20% ELEC. 105°C	35V	R321	63-9921-45	75 OHM RESISTOR ± 5% FILM	1/4W
C118	22-3748	.001 MFD CAPACITOR ±10% DISC	1KV	R322	63-9921-84	3.3K OHM RESISTOR ± 5% FILM	1/4W
C120	22-7722-02	2.2 MFD CAPACITOR ±20% ELEC. 105°C	100V	R323	63-9921-73	1100 OHM RESISTOR ±5% FILM	1/4W
C121	22-7722-01	1 MFD CAPACITOR ±20% ELEC. 105°C	100V	R324	63-9921-44	68 OHM RESISTOR ±5% FILM	1/4W
C122	22-7613-09	560 PFD CAPACITOR ±10% DISC	50V	R325	63-9921-10	2.7 OHM RESISTOR ± 5% FILM	1/4W
C123	22-7613-09	560 PFD CAPACITOR ±10% DISC	50V	R402	63-9921-72	1K OHM RESISTOR ± 5% FILM	1/4W
C201	22-4905-01	.01 MFD CAPACITOR +80-20% DISC.	500V	R403	63-9921-72	1K OHM RESISTOR ± 5% FILM	1/4W
C202	22-4905-01	.01 MFD CAPACITOR +80-20% DISC.	500V	R404	63-9921-40	47 OHM RESISTOR ± 5% FILM	1/4W
C203	22-4905-01	.01 MFD CAPACITOR +80-20% DISC.	500V	R405	63-8821	12K OHM RESISTOR ± 5% FILM	1/4W
RX205	22-7144-09	220 MFD CAPACITOR ±100%-10% ELEC.	35V	R406	63-9921-32	22 OHM RESISTOR ± 5% FILM	1/4W
RX206	22-7142-09	4.7 MFD CAPACITOR ±100%-10% ELEC.	25V	R407	63-10371-70	820 OHM RESISTOR ± 5% FILM	2W
C301	22-7613-24A	.01 MFD CAPACITOR ±10% DISC	50V	R408	63-9921-40	47 OHM RESISTOR ±5% FILM	1/4W
C302	22-7548	.15 MFD CAPACITOR ±10% POLYESTER	50V	R411	63-9922	15K OHM RESISTOR ±5% FILM	1/4W
C303	22-7152-05	22 MFD CAPACITOR +100-10% ELEC.	25V	R412	63-10651-12	CONTROL 100 K OHM BRIGHTNESS	
C304	22-7720-09	100 MFD CAPACITOR ±20% ELEC. 105°C	50V	R413	63-9922	15K OHM RESISTOR ±5% FILM	1/4W
C305	22-7579-03	4.7 MFD CAPACITOR ±10% ELEC.	16V	R415	63-10812-01	CONTROL 2 MEG OHM FOCUS	
C306	22-7613-02A	150 PFD CAPACITOR ±10% DISC	50V	R416	63-9922-16	68K OHM RESISTOR ±5% FILM	1/4W
C307	22-7389-02	1 MFD CAPACITOR ±20% ELEC.	25V	R417	63-9922-40	680K OHM RESISTOR ±5% FILM	1/4W
C308	22-7718-08	47 MFD CAPACITOR ±20% ELEC. 105°C	25V	R418	63-9922	15K OHM RESISTOR ±5% FILM	1/4W
C309	22-7152-04	10 MFD CAPACITOR +100-10% ELEC.	25V	CR101	103-142-01	DIODE	
C310	22-7614-19A	.0033 MFD CAPACITOR ±20% DISC	50V	CR102	103-142-01	DIODE	
C311	22-7613-23A	.012 MFD CAPACITOR ±10% DISC.	50V	CR103	103-142-01	DIODE	
C312	22-7579-04	1000 MFD CAPACITOR ±10% ELEC.	16V	CR104	103-295-03A	DIODE	
C313	22-7389-02	1 MFD CAPACITOR ±20% ELEC.	25V	CR105	103-284	DIODE	
C314	22-7614-20A	.0047 MFD CAPACITOR ±20% DISC	50V	CR106	212-76-02	DIODE	
C401	22-7722-08	47 MFD CAPACITOR ±20% ELEC. 105°C	100V	CR107	103-298-05A	DIODE	
C402	22-7721-04	4.7 MFD CAPACITOR ±20% ELEC. 105°C	63V	CR108	212-76-02	DIODE	
C403	22-7613A	100 PFD CAPACITOR ±10% DISC	50V	CR109	103-142-01	DIODE	
C404	22-7724	.02 MFD CAPACITOR +80%-20% DISC.	500V	CR201 A	103-280-04	DIODE	
C405	22-3512	.01 MFD CAPACITOR +40-10% DISC	1KV	CR304	103-142-01	DIODE	
R101	63-9922	15K OHM RESISTOR ± 5% FILM	1/4W	CR305	212-76-02	DIODE	
R102	63-9919-94	8.2K OHM RESISTOR ±2% FILM	1/4W	CR401	212-76-02	DIODE	
R103	63-9919-94	8.2K OHM RESISTOR ± 2% FILM	1/4W	L101	20-3906-02	COIL, RCF LINEARITY	
R104	63-10651-11	CONTROL 25K OHM (HORIZ., PHASE)		L102	20-3905	COIL, RCF TUNABLE WIDTH	
R105	63-10533-04	267K OHM RESISTOR ± 1% (METAL FILM)	1/4W	L201	20-3824	COIL, HORIZ. FILTER CHOK	
R106	63-9922-14	56K OHM RESISTOR ± 5% FILM	1/4W	L401	20-3887-10C	COIL, RCF 6.8 UH	
R107	63-10533-11	200K OHM RESISTOR ± 1% METAL FILM	1/4W	TX101	95-3128-03	TRANSFORMER HORIZ. DRIVER	
R108	63-9921-94	8.2K OHM RESISTOR ±5% FILM	1/4W	TX201	95-3395-01	H.V. SWEEP TRANSFORMER	
R109	63-9921-94	8.2K OHM RESISTOR ±5% FILM	1/4W	TX202	95-3387-02	DEFLECTION YOKE	
R110	63-9921-66	560 OHM RESISTOR ± 5%	1/4W	Q101	121-975	TRANSISTOR HORIZ. OSC. I	
R111	63-10351-89	5.1KOHM RESISTOR ± 2% FILM	1/4W	Q102	121-975	TRANSISTOR HORIZ. OSC. II	
R112	63-9919-84	3.3K OHM RESISTOR ±2% FILM	1/4W	Q103	121-975	TRANSISTOR HORIZ. OSC. III	
R113	63-10533-04	267K OHM RESISTOR 1% METAL FILM	1/4W	Q104	121-975	TRANSISTOR HORIZ. OSC. IV	
R114	63-10533-04	267K OHM RESISTOR ± 1% METAL FILM	1/4W	Q105	121-819	TRANSISTOR HORIZ. DRIVER	
R115	63-9919-84	3.3K OHM RESISTOR ±2%	1/4W	Q106	121-1039	TRANSISTOR HORIZ. OUTPUT	
R116	63-9921-79	2K OHM RESISTOR 5% FILM	1/4W	Q301	121-975	TRANSISTOR VERT. OSC. I	
R117	63-9919-86	3.9K OHM RESISTOR ± 2% FILM	1/4W	Q302	121-899	TRANSISTOR VERT. OSC. II	
RX118	63-10559-48	100 OHM RESISTOR ±5% FAILSAFE	1/4W	Q303	121-899	TRANSISTOR VERT. AMP. I	
RX121	63-10559-14	3.9 OHM RESISTOR ± 5% FAILSAFE	1/4W	Q304	121-875	TRANSISTOR VERT. AMP. II	
R122	63-9921-46	82 OHM RESISTOR ± 5%	1/4W	Q305	121-972	TRANSISTOR VERT. DRIVER	
RX123	63-10559-48	100 OHM RESISTOR ± 5% FAILSAFE	1/4W	Q306	121-819	TRANSISTOR VERT. OUTPUT I	
R124	63-9321-68	680 OHM RESISTOR ±5% FILM	1/4W	Q307	121-973	TRANSISTOR VERT. OUTPUT II	
R126	63-10814-20	100K OHM RESISTOR ± 5% CARBON COMP.	1/4W	Q308	121-819	TRANSISTOR VERT. RETRACE CONTROL	
RX128	63-10565-	1 OHM RESISTOR ±5% FAILSAFE	1/2W	Q401	121-1058	TRANSISTOR VIDEO OUTPUT 121-1034 ALT.	
R201	63-7763	330 OHM RESISTOR ±5% CARBON COMP.	1/2W	Q402	121-895	TRANSISTOR VIDEO DRIVER	
R202	63-7710	16 OHM RESISTOR ±5% CARBON COMP.	1/2W	E201	52-2240-01	SPARK GAP (PART OF CRT SOCKET ASSY)	
R203	63-7799	2.2KOHM RESISTOR ±10% CARBON COMP.	1/2W	E202	52-2240-01	SPARK GAP (PART OF CRT SOCKET ASSY)	
R204	63-7827	10K OHM RESISTOR ±10% CARBON COMP.	1/2W	E203	52-2240-01	SPARK GAP (PART OF CRT SOCKET ASSY)	
R205	63-7855	47K OHM RESISTOR ±10% CARBON COMP.	1/2W	E204	52-2240-01	SPARK GAP (PART OF CRT SOCKET ASSY)	
R206	63-7771	470 OHM RESISTOR ±10% CARBON COMP.	1/2W	YX201	100-884	12" CRT	
R301	63-9922-27	200 K OHM RESISTOR ±5% FILM	1/4W	OR			
R302	63-9921-92	6.8 K OHM RESISTOR ±5% FILM	1/4W	100-884-02	12" CRT		
R303	63-9922-04	22K OHM RESISTOR ±5% FILM	1/4W				

POWER SUPPLY

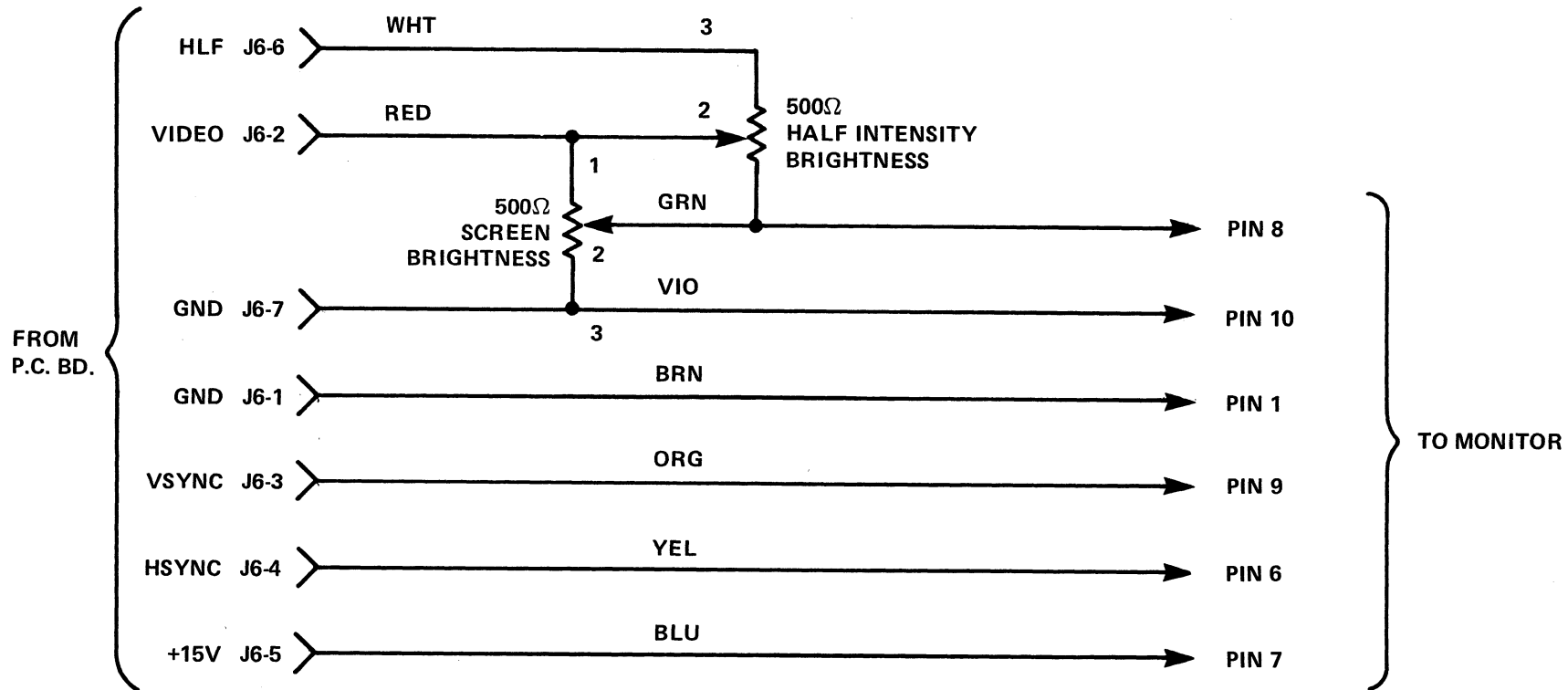


LEGEND

REF NO	PART NO	DESCRIPTION	REF NO	PART NO	DESCRIPTION
C501	22-7154-13	2200 MFD CAP ELECT « 100% -10% 35V	RX508	63-9921-58	270 Ω RESISTOR 5% FILM 1/4W
C502	22-7152-08	100 μF CAP ELECT « 100% - 10% 25V	T201	95-3396	TRANSFORMER, POWER 110/220V
C503	22-7717-09	100 μF CAP ELECT 20% 16V	CR501	212-76	DIODE
C504	22-7154-08	100μF CAP ELECT ±100% -10% 35V	CR502	212-76	DIODE
R501	63-7769	430Ω RESISTOR 5% CARBON 1/2W	CR503	212-76	DIODE
R502	63-7715	22Ω RESISTOR 10% CARB COMP 1/2W	CR504	212-76	DIODE
R503	63-10449-69	75Ω RESISTOR WW 5% 7W	CR505	103-279-09A	DIODE ZENER 4.7V
R504	63-7743	100Ω RESISTOR 10% CARB COMP 1/2W	CR506	103-142-01	DIODE
RX505	63-9921-72	1K Ω RESISTOR 5% FILM 1/4W	CR507	103-142-01	DIODE
RX506	63-10651-01	CONTROL 1K Ω (B ± ADJ)	Q501	121-1021	TRANSISTOR ERROR AMP
RX507	63-9921-66	560 Ω RESISTOR 5% FILM 1/4W	QX502	121-9992-01	TRANSISTOR VOLTAGE CONTROL
			FX502	136-120-06	FUSE 2.5 AMP 32V

COMPONENT EQUIVALENTS

Zenith No.	Description	Equivalent
103-142-01	Diode	1N4148
103-261-02A	Diode	1N7000
103-261-04A	Diode	1N7000
103-263A	Diode	1N4007
103-280-02	Diode	(2)1N4007's in parallel
103-284	Diode	1N4820
103-295-02A	Diode	BA245
103-295-03A	Diode	1N4148
103-298-04	Diode	1N4822
103-298-05A	Diode	1N5398
212-76	Diode	1N4005
212-76-02	Diode	1N5061
121-699	Transistor	MPSA 70
121-819	Transistor	MPSA 05
121-895	Transistor	2N5210
121-972	Transistor	2N4048 or 2N3700
121-973	Transistor	MPSA 70
121-975	Transistor	MPSA 20
121-1034	Transistor	2N1893 or 2N2854
121-1039	Transistor	BU409 or 2SD724
121-1058	Transistor	2N1893 or 2N2854



DIAG. VIDEO CABLE