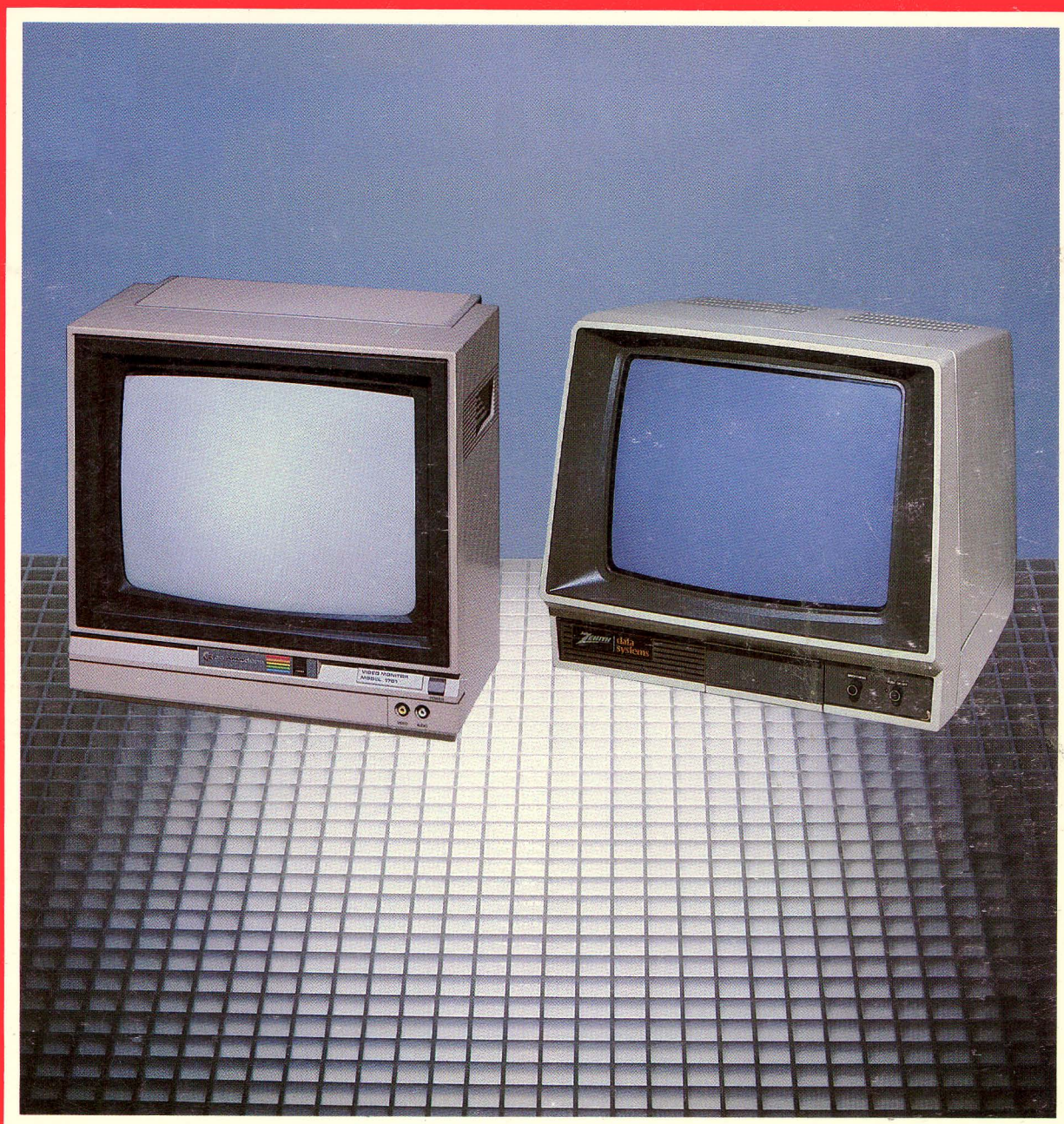


MONITOR:

COMMODORE MODEL 1701™

ZENITH® MODEL ZVM-135



TECHNICAL SERVICE DATA FOR YOUR MONITOR

PRELIMINARY SERVICE CHECKS

This data provides the user with a time-saving service tool designed for quick isolation and repair of Monitor malfunctions.

Check all interconnecting cables for good connection and correct hookup before making service checks.

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

Remove four screws holding cabinet back, lift up and remove back from set. Lay set facedown and remove two screws from cabinet bottom. Lift cabinet top from set. Remove two screws holding top brace to chassis. Remove two screws holding rear jack panel and two screws holding Audio/Video Sync Board guides. Disconnect all cables from Audio/Video Sync Board and remove board from set.

Remove four screws holding HV/Horizontal Sweep Board to bottom chassis. Disconnect all cables from HV/Horizontal Sweep Board and lift board assembly from cabinet.

Remove four screws holding Main Board to cabinet bottom.

Release two plastic retaining clips holding Main Board. Disconnect all cables from Main Board and lift board from cabinet.

CRT REMOVAL

Follow "Chassis Removal" procedure and lay set facedown on a soft protective surface. Disconnect HV anode lead, degaussing coil Connector (3T8), deflection yoke Connector (3S3A and 2A3), speaker Connector (4P4), front panel control Connectors (3S8, TP7, 2A7 and 2B7). Remove four screws holding cabinet front to chassis. Disconnect Power Indicator Connector (Z) and remove cabinet front from set. Remove four screws holding CRT to chassis. Disconnect ground connectors and lift CRT from set.

TEST EQUIPMENT AND TOOLS

TEST EQUIPMENT

Digital Volt/Ohm Meter
High Voltage Probe
CRT Tester
Crosshatch Generator
Degaussing Coil

TOOLS

Phillips Screwdriver
Low Voltage Soldering Iron
Desoldering Tool

PARTS LIST AND DESCRIPTION

Item	Part No.	Description	Item	Part No.	Description
#FX3201	136-113-23	AC Fuse, 4A @250V Fast Acting	R3441	63-10857	Control, Horizontal Centering (100 Ohms)
CR3224	103-330	Diode 330G1	SW001	85-1628	Switch, Green/White
CR3231	103-315-06	Rectifier Diode 315-6C G1	SW1701	85-1640-01	Switch, RGB/Comp.
CR3232/33	103-315-06	Rectifier Diodes H315F4	S3201	85-1559-02	Switch, Power
CR3234	103-315-06	Rectifier Diode 315-6C G1			PCB, Audio/Video Sync (9-230)
IC2376	221-179-01	IC, Chroma/Luminance Processor (221-179-1)			PCB, Main (9-227)
Q3208		Transistor, Horizontal Output (TZ1029-01)			PCB, HV/Horizontal Sweep (9-247)
R2125	63-09063-02	Control, Vertical Centering (550 Ohms)			PCB, Video Output
RX3299A	95-3603-01	Focus, Part of Trans- former (TX3204) Assembly			PCB, Start-up
					PCB, Width
					PCB, Control

For SAFETY use only equivalent replacement part.

SAMS™

Howard W. Sams & Co., Inc.

4300 West 62nd Street, P.O. Box 7092, Indianapolis, Indiana 46206 U.S.A.

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed.

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PRELIMINARY SERVICE CHECKS (Continued)

SERVICE CHECKS

SEE INTERCONNECTING DIAGRAM, PLACEMENT CHART, AND PHOTOS TO MATCH THE NUMBER IN THE CIRCLES WITH THOSE IN THE FOLLOWING DATA FOR SERVICE CHECKS TO BE PERFORMED.

1. DEAD MONITOR

- (A) Check for 120VAC between pins 1 and 3 of Connector 3R8. If voltage is missing, check Power Cord and Connector 3R8.
- (B) If Power Cord is good, check Power Switch (S3201) and Connector 3S8.
- (C) If the 120VAC is present at Connector 3R8, check AC Fuse (FX3201). If Fuse is open, check Power Rectifiers (CR3231 thru CR3234).
- (D) If Power Rectifiers (CR3231 thru CR3234) are good, check the Horizontal Output Transistor (Q3208). If Transistor Q3208 is defective, replace it and check for 156V at the collector of Transistor Q3208.
- (E) If Transistor Q3208 is good, but the 156V at the collector of Transistor Q3208 is missing, check for 26.9V at the cathode of Diode CR3224.
- (F) If the 26.9V is missing, replace the Main Board (9-227).
- (G) If the 26.9V is present and the Monitor still does not operate, replace the HV/Horizontal Sweep Board (9-247).

2. NO DISPLAY

- (A) Check the RGB/Comp Switch (SW1701), it may be defective or in wrong position.
- (B) If there is no display when using only composite video, replace the Chroma/Luminance Processor (IC2376) on the Audio/Video Sync Board.
- (C) If the video display does not return, replace the Audio/Video Sync Board (9-230).

- (D) If there is no display when using either RGB or Composite Video inputs, check for 95V at TP3 on the HV/Horizontal Sweep Board. If the voltage is missing, replace the HV/Horizontal Sweep Board (9-247).
- (E) Check CRT and CRT socket on Video Output Board.

3. NO COLOR

- (A) If there is no color when using only composite video input, replace the Chroma/Luminance Processor (IC2376) on the Audio/Video Sync board.
- (B) If the color does not return, replace the Audio/Video Sync Board (9-230).
- (C) If there is no color when using RGB input, check the Green/White Switch (SW001).
- (D) If only one color is missing, check the Video Output Board by substitution.

4. NO FOCUS

- (A) Check the Focus Control (RX3299A) by substitution.
- (B) If the characters on the display are still out of focus, check the Video Output Board by substitution.

5. DISPLAY DOES NOT FIT ON CRT

- (A) Check connectors P1A and P2 on the With Board.
- (B) Adjust Horizontal (R3441) and Vertical (R2125) Centering controls.

PRELIMINARY SERVICE CHECKS (Continued)
MISCELLANEOUS ADJUSTMENTS

VIDEO INPUT CUTOFF ADJUSTMENT

Preset the Red (R1708) and Blue (R1714) Cutoff Controls for MINIMUM. Adjust Screen (R3499B) until a dim raster appears. Adjust each Cutoff Control until a gray raster is obtained. Readjust the Screen Control until raster just disappears.

APC ADJUSTMENT

Connect a color bar signal generator to the Video Input 75 Ohm Jack (P7). Rotate Service Plug (A1) 90 degrees to Color Set-Up position. Adjust APC Control (R2390) for MINIMUM movement of color. Return Plug A1 to Normal position.

RGB CUTOFF ADJUSTMENT

Preset the Red (R2505), Green (R2516), and Blue (R2527) Cutoff Controls for MINIMUM. Adjust Screen Control (RX3499B) until a dim raster appears. Adjust each Cutoff Control until a gray raster is obtained. Readjust Control RX3499B until raster disappears.

RGB DRIVE ADJUSTMENT

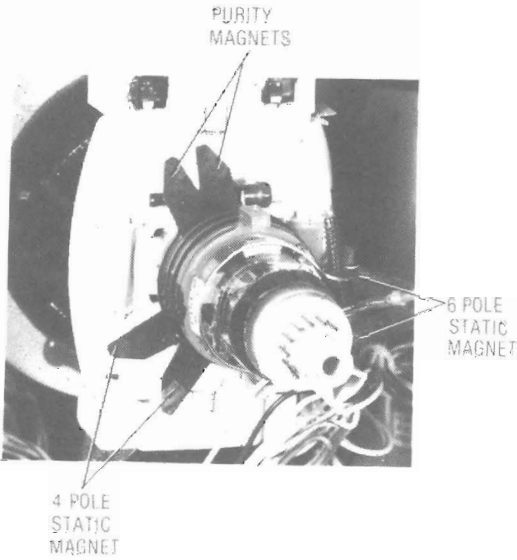
Connect a video generator to Video Input 75 Ohm Jack (P7). Set video generator for an all white raster signal. Adjust the Red (R2506), Green (R2517) and Blue (R2528) Drive Controls for a white raster.

VERTICAL CENTERING AND HEIGHT ADJUSTMENT

Adjust Screen Control (RX3499B) until a raster appears. Adjust Vertical Height Control (R3418) and the Vertical Centering Control (R2125) so the top of raster is 1/2 inch from top of CRT and the bottom of raster is 1/2 inch from bottom of CRT. Readjust Control (RX3499B) until raster disappears.

SWEEP OSCILLATOR ADJUSTMENT

Adjust Sweep Oscillator Coil (L3402) for a stable picture.



CRT NECK ASSEMBLY

95V ADJUSTMENT

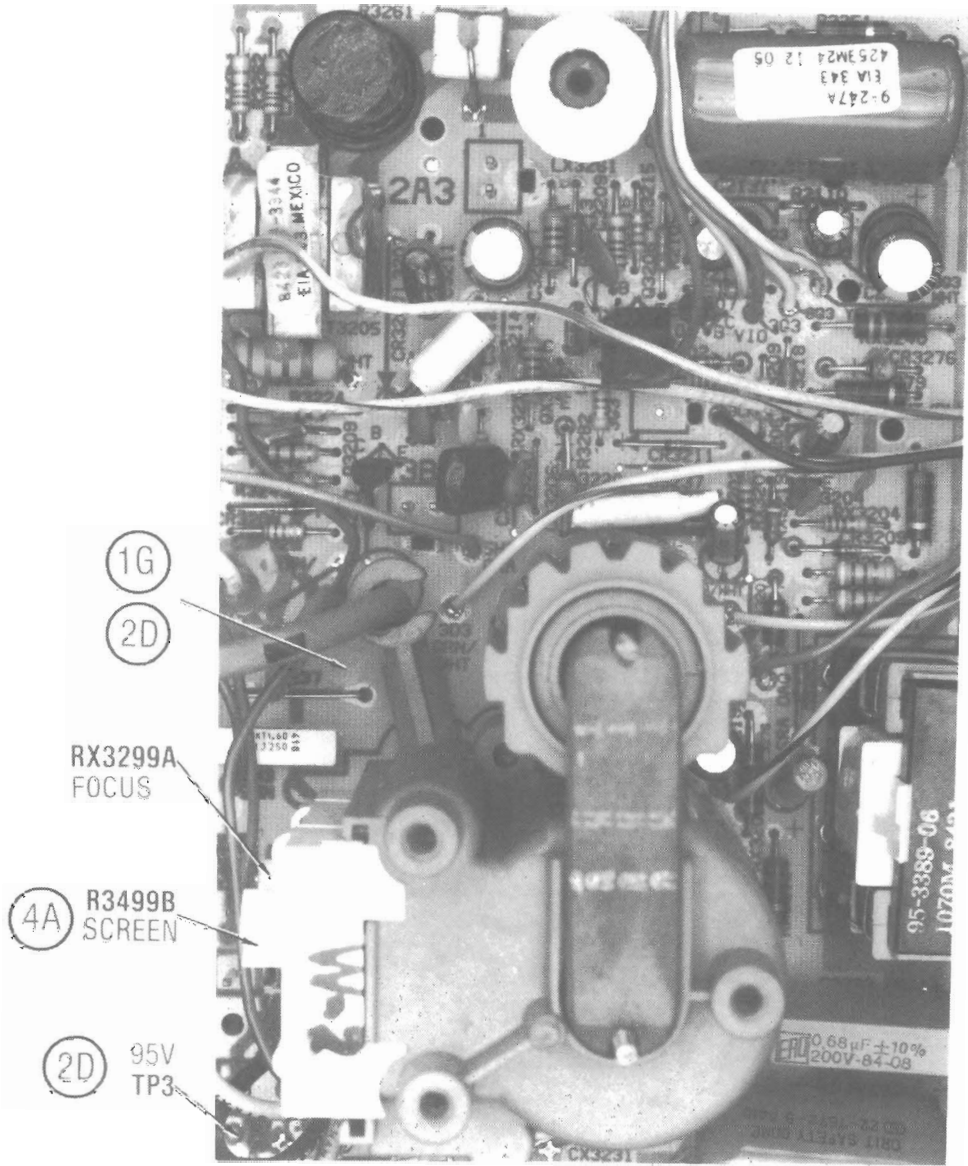
Connect a DC meter to TP3 (pin G of Horizontal Output Transformer TX3204). Adjust 95V Adjust Control (R3409) for 95V.

PURITY ADJUSTMENT

If the CRT appears to be magnetized use a degaussing coil to demagnetize the CRT and mounting brackets. If necessary, perform center convergence. Before proceeding with the purity adjustment, the Screen Control (RX3499B) must be adjusted. Set the Color Level, Black Level and Picture Controls to MINIMUM. Set the Red (R2505), Green (R2516) and Blue (R2527) Cutoff Controls to MINIMUM. Advance Screen Control until a dim raster appears. Advance the Green Cutoff, Black Level and Picture Controls to produce a green screen. Move deflection yoke back to produce a green stripe. Adjust the Purity Tabs to center the green stripe. Turn Green Cutoff Control to MINIMUM. Advance the Red Cutoff Control to produce a red stripe. Slide the deflection yoke forward until a uniform red screen is obtained. If necessary, readjust the Purity Tabs to obtain a pure red screen. Check the purity of all three colors by advancing each Cutoff Control one at a time.

CONVERGENCE ADJUSTMENTS

Connect a crosshatch generator to the Video Input 75 Ohm Jack (P7) and tune in a crosshatch pattern. Rotate the Tabs of the Four Pole Static Magnet to converge the Red and Blue Horizontal Lines. Rotate the Tabs of the Four Pole Static Magnet around the neck of the CRT to converge the Red and Blue Vertical Lines. Rotate the Tabs of the Six Pole Static Magnet to converge the Red/Blue and Green Horizontal Lines. Rotate the Tabs of the Six Pole Static Magnet around the neck of the CRT to converge the Red/Blue and Green Vertical Lines.

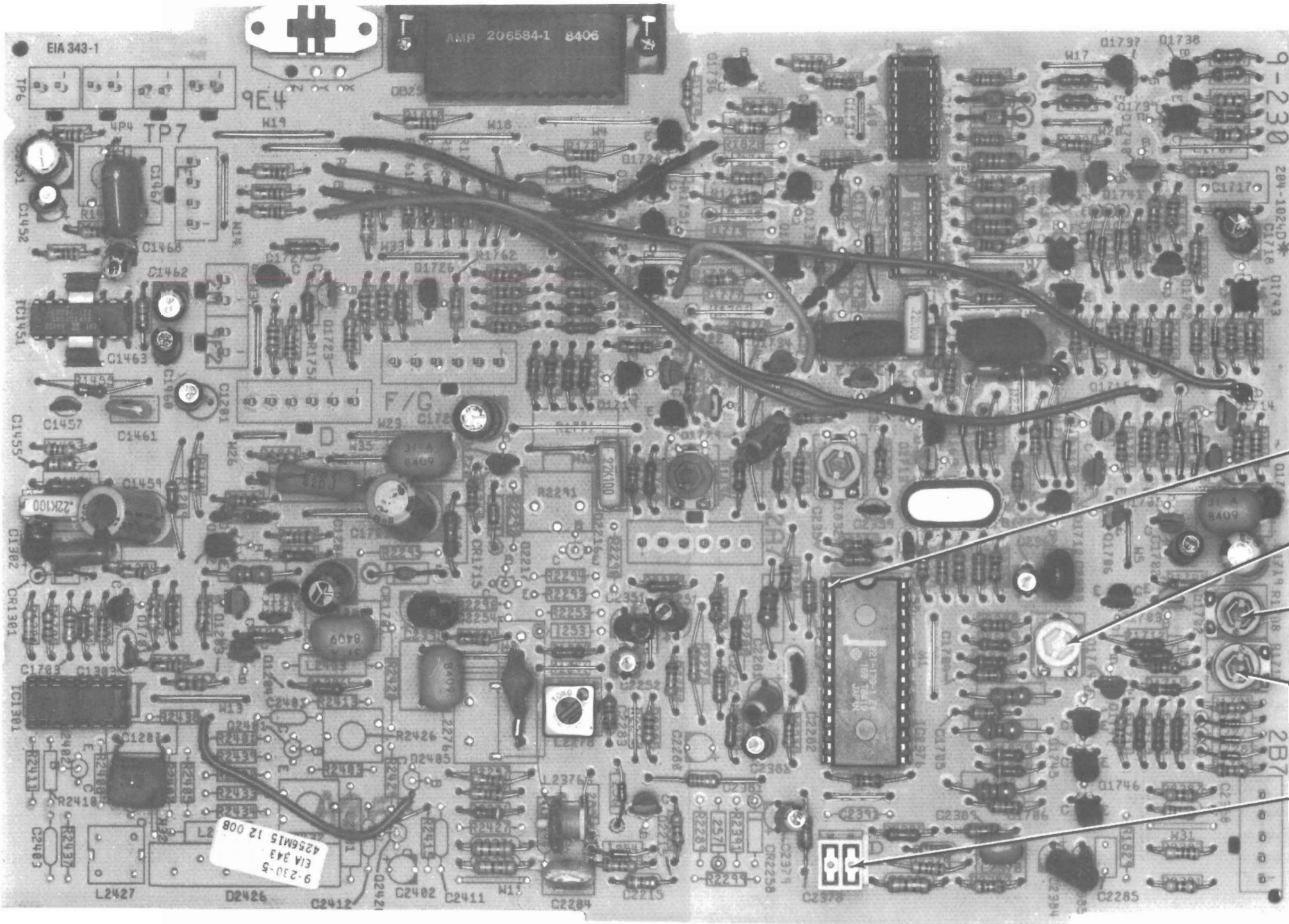


HV/HORIZONTAL SWEEP BOARD

PRELIMINARY SERVICE CHECKS (Continued)

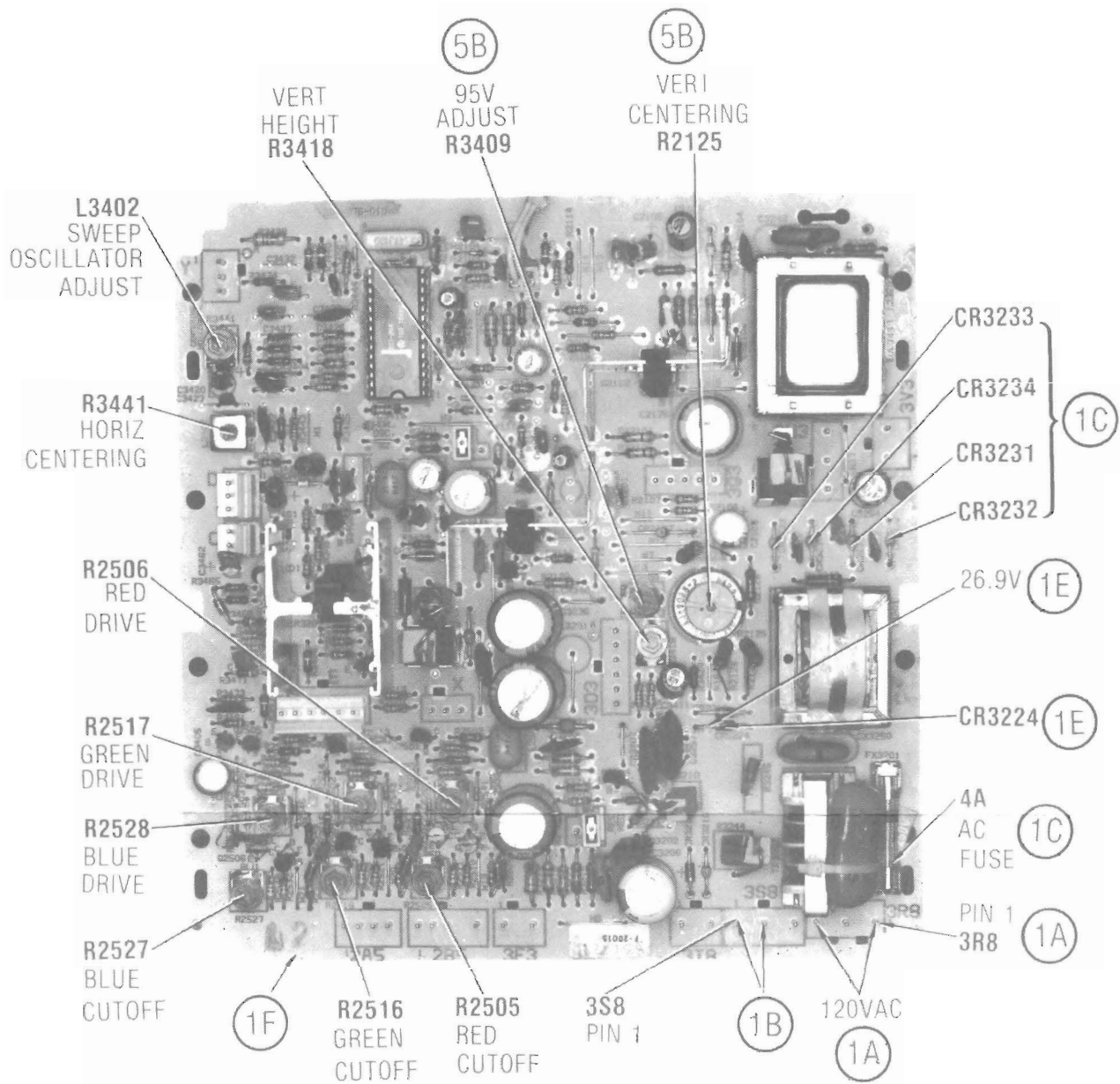


INTERCONNECTING DIAGRAM



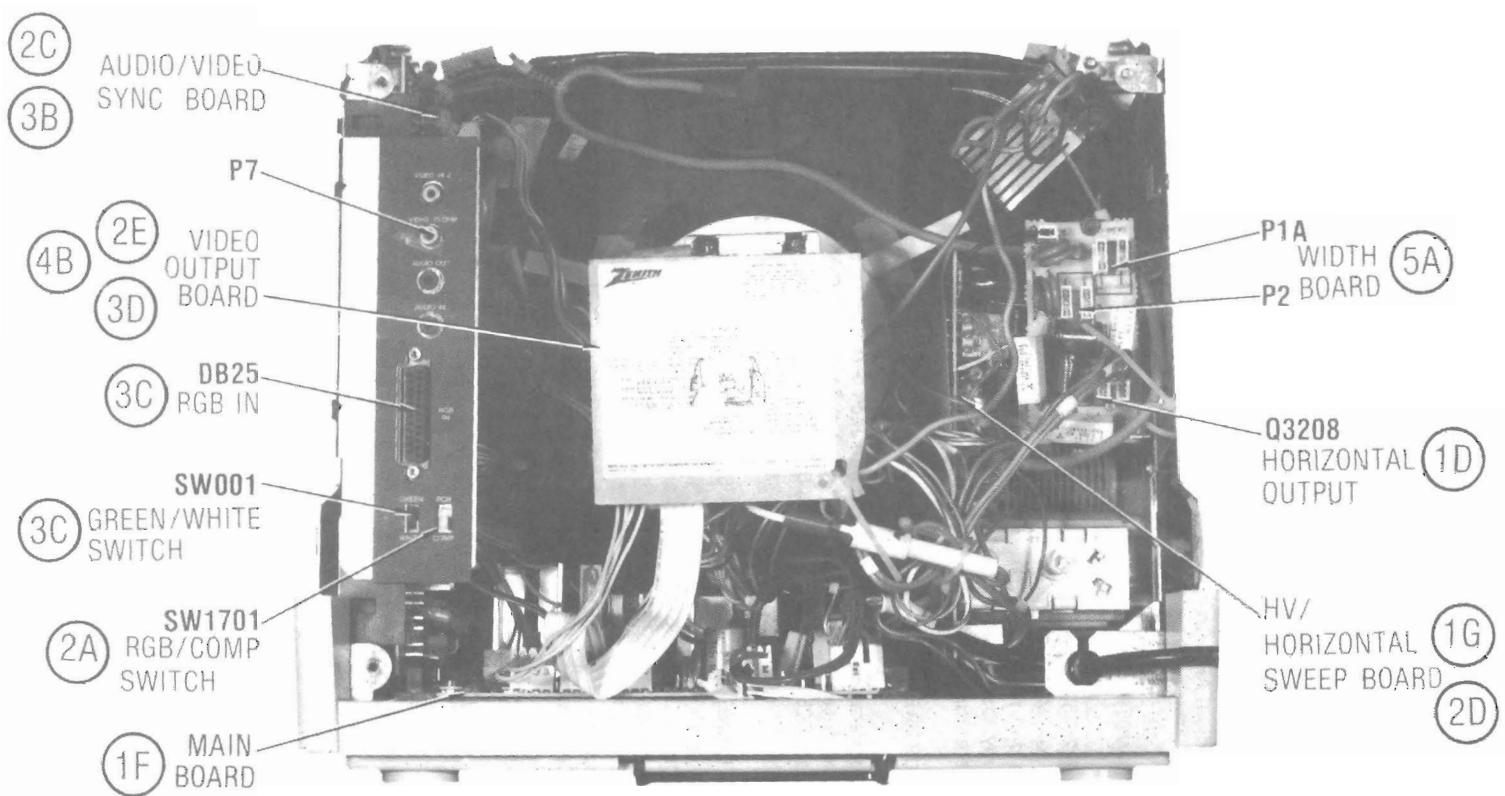
- PIN 1 IC2376 (2B, 3A)
- R2390 APC ADJUST
- R1708 RED CUTOFF
- R1714 BLUE CUTOFF
- A1 SERVICE PLUG

ZENITH
MODEL ZVM-135



PRELIMINARY SERVICE CHECKS (Continued)

PRELIMINARY SERVICE CHECKS (Continued)





Model ZVM-135

PRELIMINARY SERVICE CHECKS

ENCLOSED

SAFETY PRECAUTIONS

See pages 8, 9.

SERVICE INFORMATION

See page 5.

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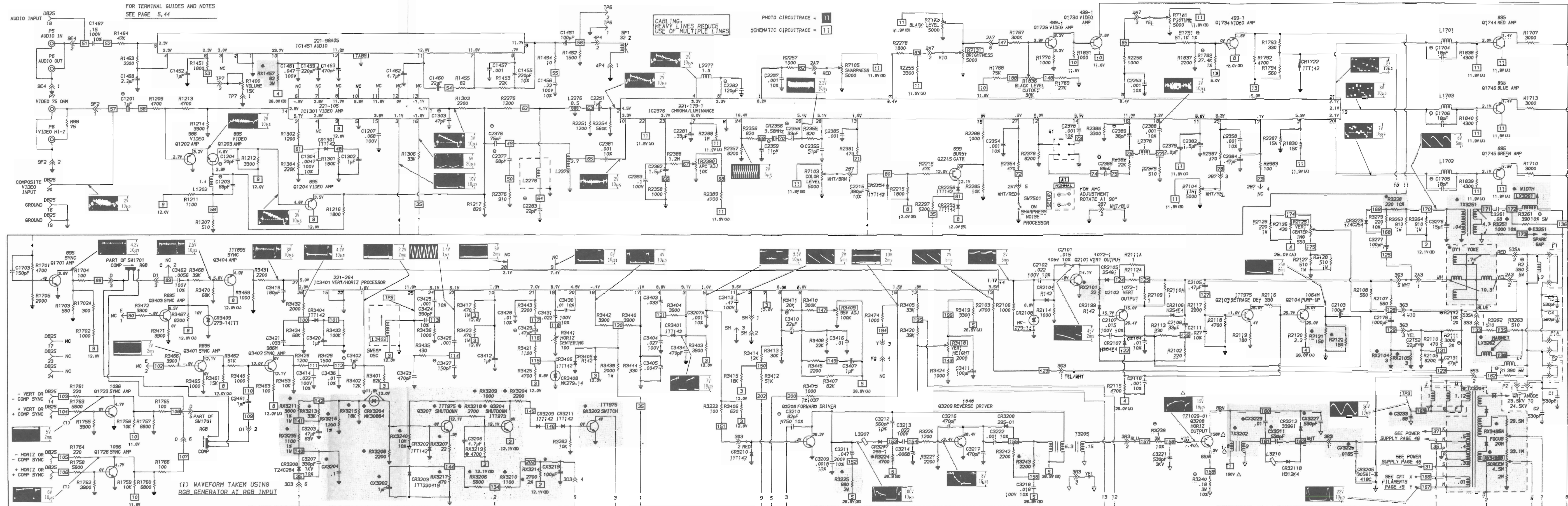
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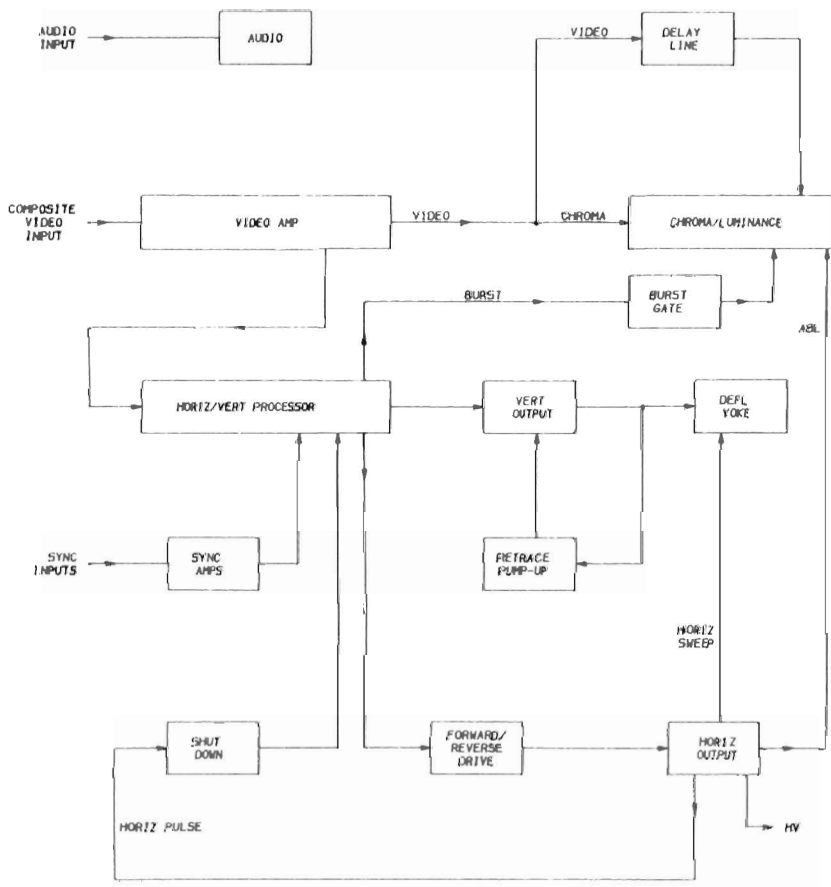
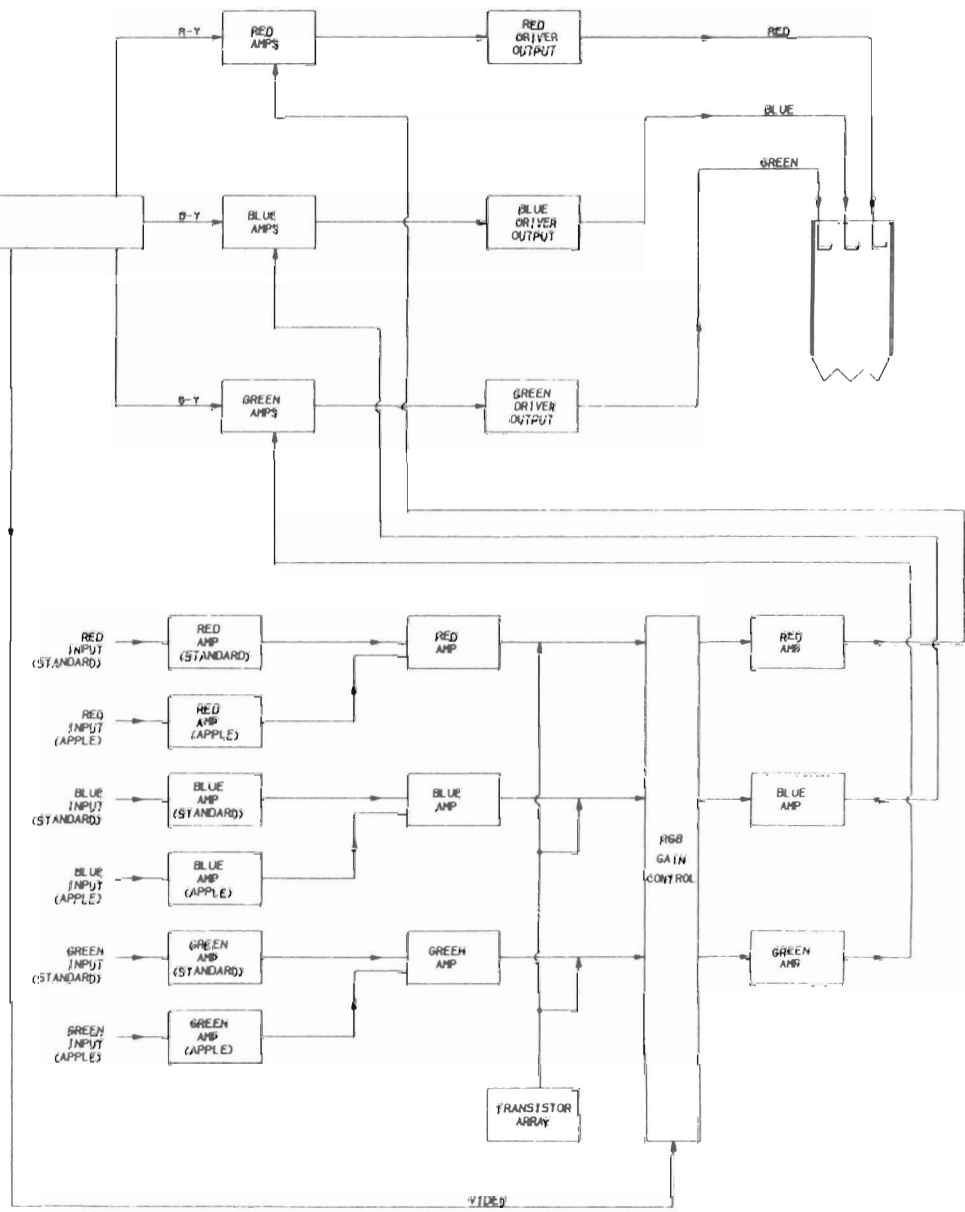
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BLOCK DIAGRAM

SERVICE INFORMATION

HIGH VOLTAGE SHUTDOWN DEFEAT

CAUTION: Care should be taken in defeating the High Voltage Shutdown Circuit which may cause excessive high voltage and damage to the Horizontal Output Transformer (TX3204), CRT or other circuits supplied B+ from Transformer TX3204. Monitor the high voltage, if it becomes excessive, do not defeat the shutdown circuit. To troubleshoot a set with excessive high voltage, use an isolation transformer with a stepdown control as an AC power supply.

To defeat the shutdown circuit unsolder one end of Diode CX3209 and lift from the board. If this does not defeat the shutdown circuit, check for a shorted Switch Transistor (QX3202). If the shutdown circuit is not working properly, check the voltages and components associated with Shutdown Transistors (QX3202, Q3204 and Q3207). See the "Shutdown Voltage Chart" for voltages measured with the monitor in shutdown.

SHUTDOWN VOLTAGE CHART

NOTE: Voltages are measured with monitor in shutdown.

ITEM	E	B	C
QX3202	0V	0.76V	0.02V
Q3204	7.1V	6.4V	7.03V
Q3207	1.5V	2.25V	1.51V

HIGH VOLTAGE SHUTDOWN CIRCUIT DESCRIPTION

The high voltage is monitored by rectifying the 60V P-P horizontal pulse, at pin N of the Horizontal Output Transformer (TX3204). The pulse, rectified by Diode CR3206, is applied to a resistor voltage divider network, Zener Diode CRX3204 then to the base of the Shutdown Transistor (Q3207). If the high voltage becomes excessive, the Diode CRX3204 will conduct, Transistor Q3207 will begin to conduct and apply enough voltage to the base of Shutdown Transistor Q3204 to cause it to conduct. When Transistor Q3204 conducts a bias voltage is applied to the base of Switch Transistor (QX3202) thru Resistor RX3204, Diodes CR3209 and CR3211, and causes Transistor QX3202 to conduct. When Transistor QX3202 conducts, it will cause the Forward Driver Transistor (Q3206) to conduct to disable the horizontal drive and shutdown the horizontal circuit. The shutdown circuit also monitors Transformer TX3204 at pin D thru Resistor RX3206. If Transformer TX3204 breaks down, the arc transient causes the emitter of Transistor Q3207 to go negative with respect to the base to start Transistor Q3207 conducting, activating the shutdown circuit.

ZENITH
CMT7-2
MODEL ZVM-135

SCHEMATIC NOTES

For SAFETY use only equivalent replacement part, see parts list.

—X— Circuitry not used in some versions

--- Circuitry used in some versions

⊕ See parts list

⊕ Ground

⏏ Chassis

▽ Common tie point

Waveforms and voltages taken from ground, unless noted otherwise.

Waveforms taken using a color bar signal applied at Video 75 Ohm Input Jack (P7) unless noted.

Time in μ sec. per cm, given with p-p reading at the end of each waveform.

Item numbers in rectangles appear in the alignment/adjustment instructions.

Supply voltages maintained as shown at input.

Voltages measured with digital meter, no signal.

Controls adjusted for normal operation.

Terminal identification may not be found on unit.

Capacitors are 50 volts or less, 5% unless noted.

Electrolytic capacitors are 50 volts or less, 20% unless noted.

Resistors are $\frac{1}{2}$ W or less, 5% unless noted.

Value in () used in some versions.

Measurements with switching as shown, unless noted.

6



MISCELLANEOUS ADJUSTMENTS

VIDEO INPUT CUTOFF ADJUSTMENT

Preset the Red (R1708) and Blue (R1714) Cutoff Controls for MINIMUM. Adjust Screen (R3499B) until a dim raster appears. Adjust each Cutoff Control until a gray raster is obtained. Readjust the Screen Control until raster just disappears.

APC ADJUSTMENT

Connect a color bar signal generator to the Video Input 75 Ohm Jack (P7). Rotate Service Plug (A1) 90 degrees to Color Set-Up position. Adjust APC Control (R2390) for MINIMUM movement of color. Return Plug A1 to Normal position.

RGB CUTOFF ADJUSTMENT

Preset the Red (R2505), Green (R2516), and Blue (R2527) Cutoff Controls for MINIMUM. Adjust Screen Control (RX3499B) until a dim raster appears. Adjust each Cutoff Control until a gray raster is obtained. Readjust Control RX3499B until raster disappears.

RGB DRIVE ADJUSTMENT

Connect a video generator to Video Input 75 Ohm Jack (P7). Set video generator for an all white raster signal. Adjust the Red (R2506), Green (R2517) and Blue (R2528) Drive Controls for a white raster.

VERTICAL CENTERING AND HEIGHT ADJUSTMENT

Adjust Screen Control (RX3499B) until a raster appears. Adjust Vertical Height Control (R3418) and the Vertical Centering Control (R2125) so the top of raster is 1/2 inch from top of CRT and the bottom of raster is 1/2 inch from bottom of CRT. Readjust Control (RX3499B) until raster disappears.

SWEEP OSCILLATOR ADJUSTMENT

Adjust Sweep Oscillator Coil (L3402) for a stable picture.

95V ADJUSTMENT

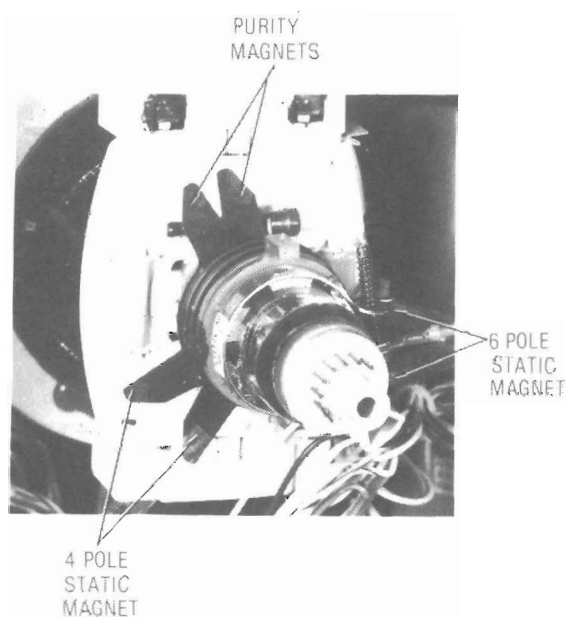
Connect a DC meter to TP3 (pin G of Horizontal Output Transformer TX3204). Adjust 95V Adjust Control (R3409) for 95V.

PURITY ADJUSTMENT

If the CRT appears to be magnetized use a degaussing coil to demagnetize the CRT and mounting brackets. If necessary, perform center convergence. Before proceeding with the purity adjustment, the Screen Control (RX3499B) must be adjusted. Set the Color Level, Black Level and Picture Controls to MINIMUM. Set the Red (R2505), Green (R2516) and Blue (R2527) Cutoff Controls to MINIMUM. Advance Screen Control until a dim raster appears. Advance the Green Cutoff, Black Level and Picture Controls to produce a green screen. Move deflection yoke back to produce a green stripe. Adjust the Purity Tabs to center the green stripe. Turn Green Cutoff Control to MINIMUM. Advance the Red Cutoff Control to produce a red stripe. Slide the deflection yoke forward until a uniform red screen is obtained. If necessary, readjust the Purity Tabs to obtain a pure red screen. Check the purity of all three colors by advancing each Cutoff Control one at a time.

CONVERGENCE ADJUSTMENTS

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CRT NECK ASSEMBLY

CMT7-2

ZENITH
MODEL ZVM-135

SAFETY PRECAUTIONS

PRODUCT SAFETY SERVICING GUIDELINES FOR COLOR TELEVISION RECEIVERS

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.

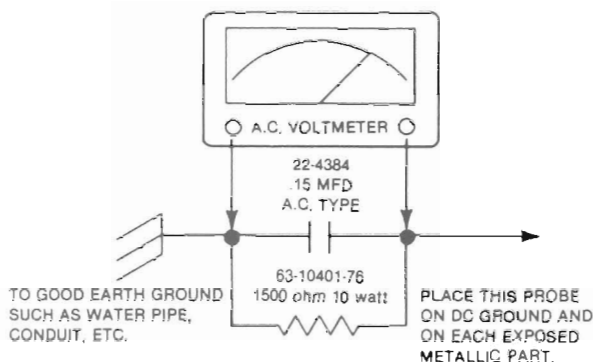
SAFETY CHECKS

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 as 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 discover possible cold solder joints, frayed leads, damaged insulation (including AC cord), solder splashes or sharp solder points. Be certain to remove all loose foreign particles.
4. Check the "across-the-line" capacitor 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 receiving tube or 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) 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.

After re-assembly of the set always perform an AC leakage test at DC ground test point and on all exposed metallic parts of the cabinet, (the channel selector knobs, antenna terminals, handle and screws) to be sure the set 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 .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 of 1500 ohm resistor and .15 mfd. capacitor. Reverse the AC plug and repeat AC voltage measurements for each exposed metallic part. Voltage measured must not exceed .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

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 recommended 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 in current TV receivers is the picture tube. However, this tube does not emit X-rays when the H.V. is at the factory specified level. It is only when the H.V. is excessive that X-radiation may be generated. Refer to the X-ray Precaution Label which is located inside each television receiver for the correct high voltage. The proper value is also given in the applicable service manual. Operation at higher voltages may cause a failure of the picture tube or high voltage supply and, under certain circumstances, may produce radiation in excess of desirable levels.
2. Only Zenith specified CRT anode connectors must be used. The degaussing shield also serves as an X-ray shield in color sets, do not defeat its purpose.
3. It is essential that the serviceman has available an accurate and reliable high voltage meter. The calibration of the meter should be checked periodically against a reference standard, such as the one available at your distributor.

Courtesy of the Manufacturer

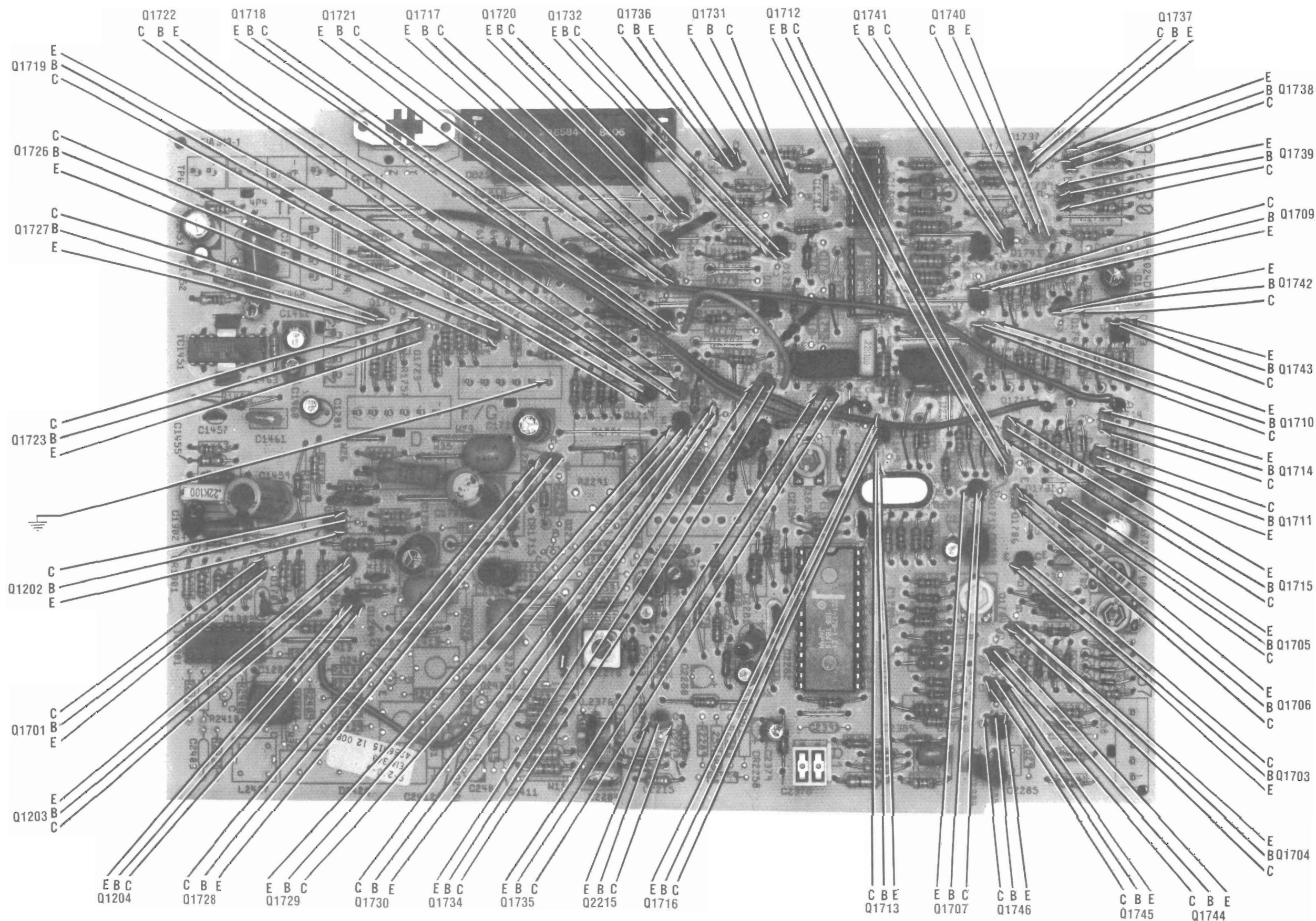
SAFETY PRECAUTIONS (Continued)

4. When the high voltage circuitry is operating properly there is no possibility of an X-radiation problem. Every time a color 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 high voltage reading be recorded on each customer's invoice.
5. When troubleshooting and making test measurements in a receiver with a problem of excessive high voltage, avoid being unnecessarily close to the picture tube and the high voltage compartment. Do not operate the chassis longer than is necessary to locate the cause of excessive voltage.
6. Color transistor sets manufactured after June, 1973 ("E" Line and later), use new type picture tubes specifically designed to withstand higher operating voltages without causing excessive X-radiation. It is strongly recommended that the C.R.T. shop fixture be equipped with the new type tube. Addition of a permanently connected H.V. meter to the H.V. anode of the shop C.R.T. fixture is advisable. The C.R.T.'s in these sets should never be replaced with any other tube types as that may result in excessive X-radiation and possible violation of the law.
7. Starting with late production "E" line color sets, a special four lead damper capacitor was used. Its feature, the interlocking four leads, should not be defeated. However, each time one of these sets is serviced, for whatever reason, the part number of the capacitor should be examined. If it is the 22-7233 type (used in "E" and "F" model lines only), that capacitor must be replaced with an improved recommended type (22-7504-01). Please refer to Zenith Tech Topics (Issue No. 87) for the details. Your distributor will answer any questions, or you may write to Zenith for further details.

SUBJECT: TIPS ON PROPER INSTALLATION

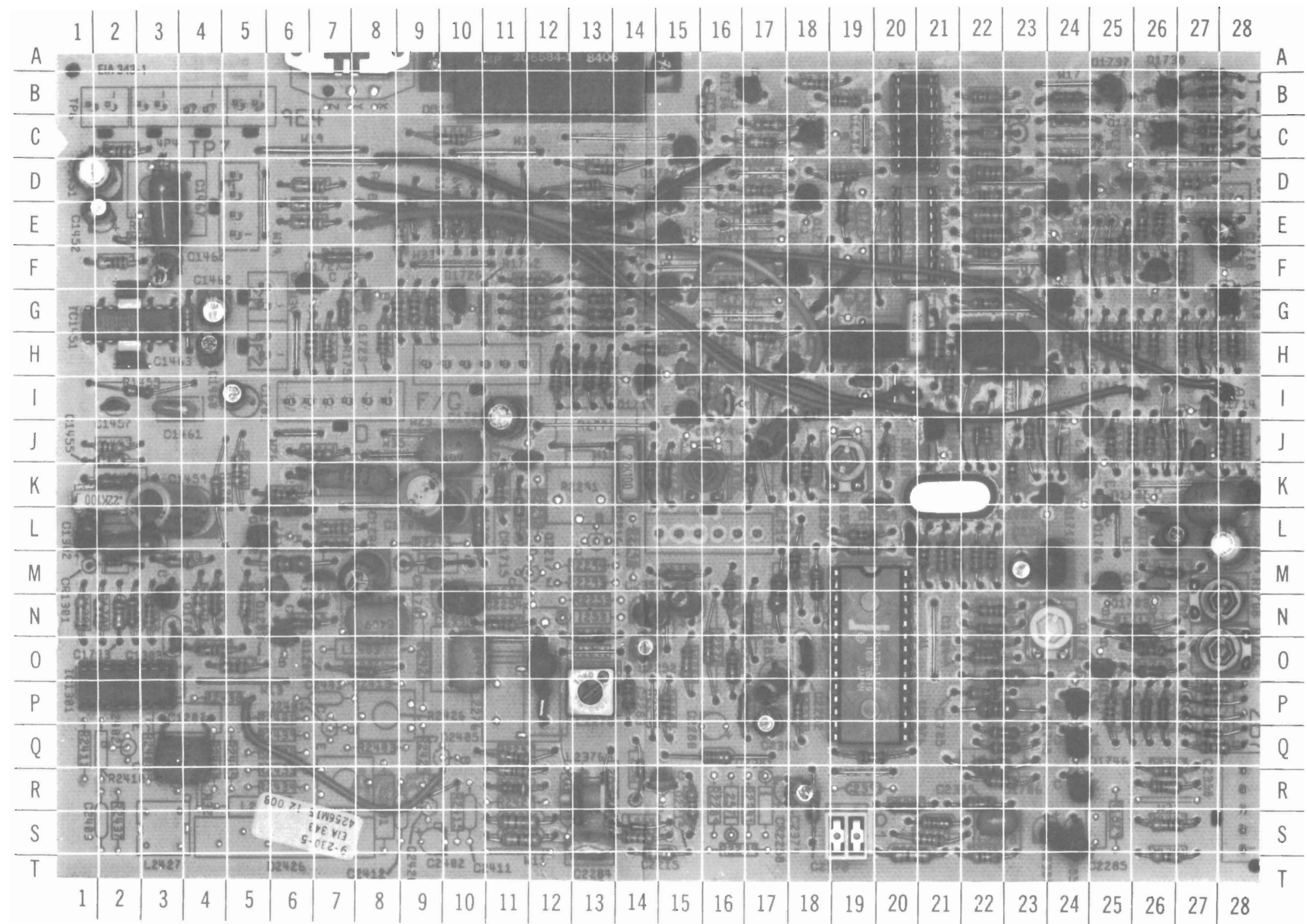
1. Never install any receiver in a closed-in recess, cubby-hole or closely fitting shelf space.
2. Never install a receiver over, or close to a heat duct, or in the path of heated air flow.
3. Avoid conditions of high humidity such as; outdoor patio installations where dew is a factor, near steam radiators where steam leakage is a factor, etc.
4. Avoid placement where draperies may obstruct rear venting. The customer should also avoid the use of decorative scarves or other coverings which might obstruct ventilation.
5. Wall and shelf mounted installations using a commercial mounting kit, must follow the factory approved mounting instructions.
6. A receiver mounted to a shelf or platform must retain its original feet (or the equivalent thickness in spacers) to provide adequate air flow across the bottom. Bolts or screws used for fasteners must not touch any parts or wiring. Perform leakage tests on customized installations.
7. Caution customers against the mounting of a receiver on a sloping shelf or in a tilted position, unless the receiver is properly secured.
8. A receiver in a roll-about cart should be stable in its mounting to the cart. Caution the customer on the hazards of trying to roll a cart with small casters across thresholds or deep pile carpets.
9. Caution customers against the use of a cart or stand which has not been listed by Underwriters Laboratories, Inc. for use with their specific model of television receiver.

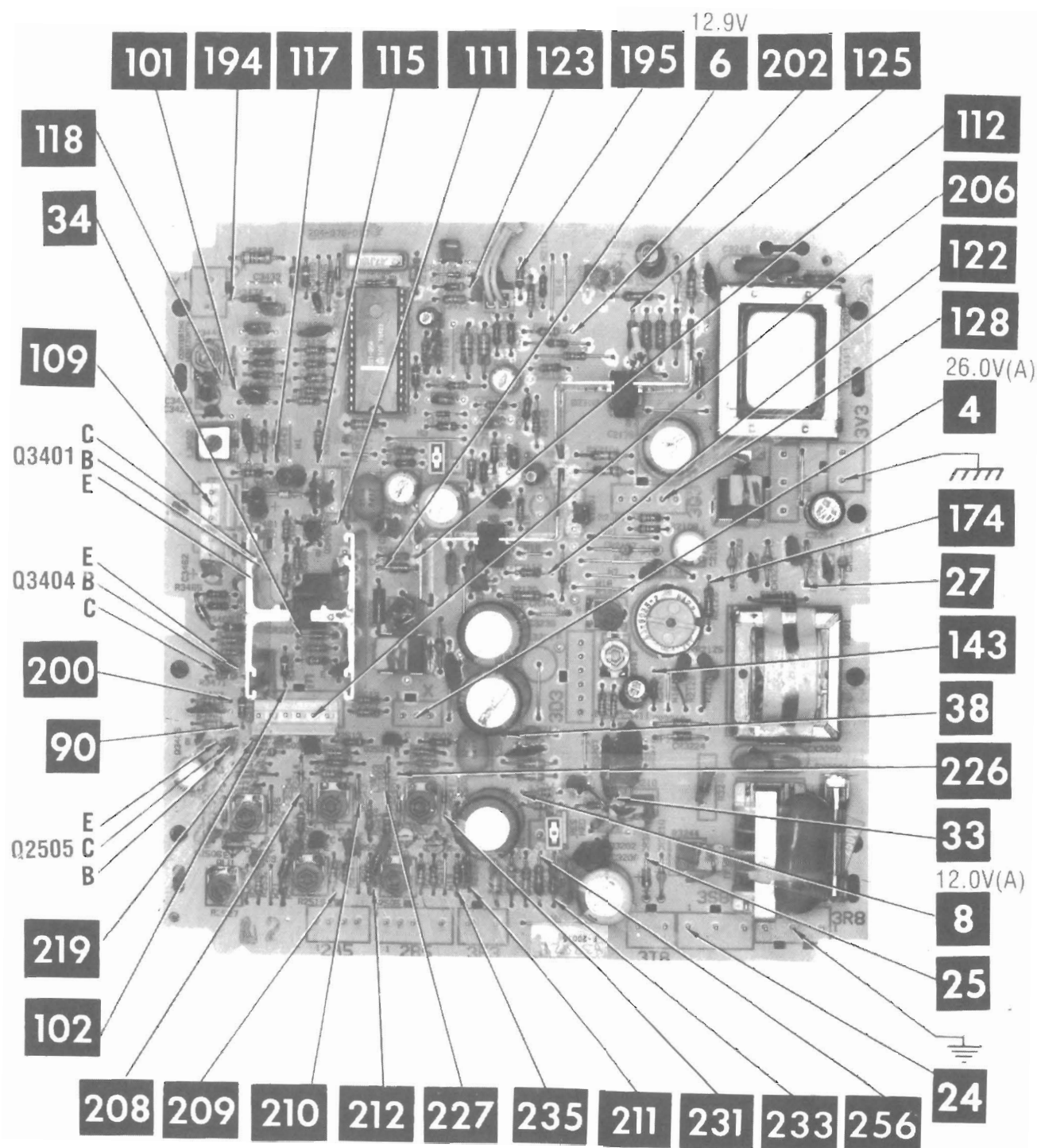
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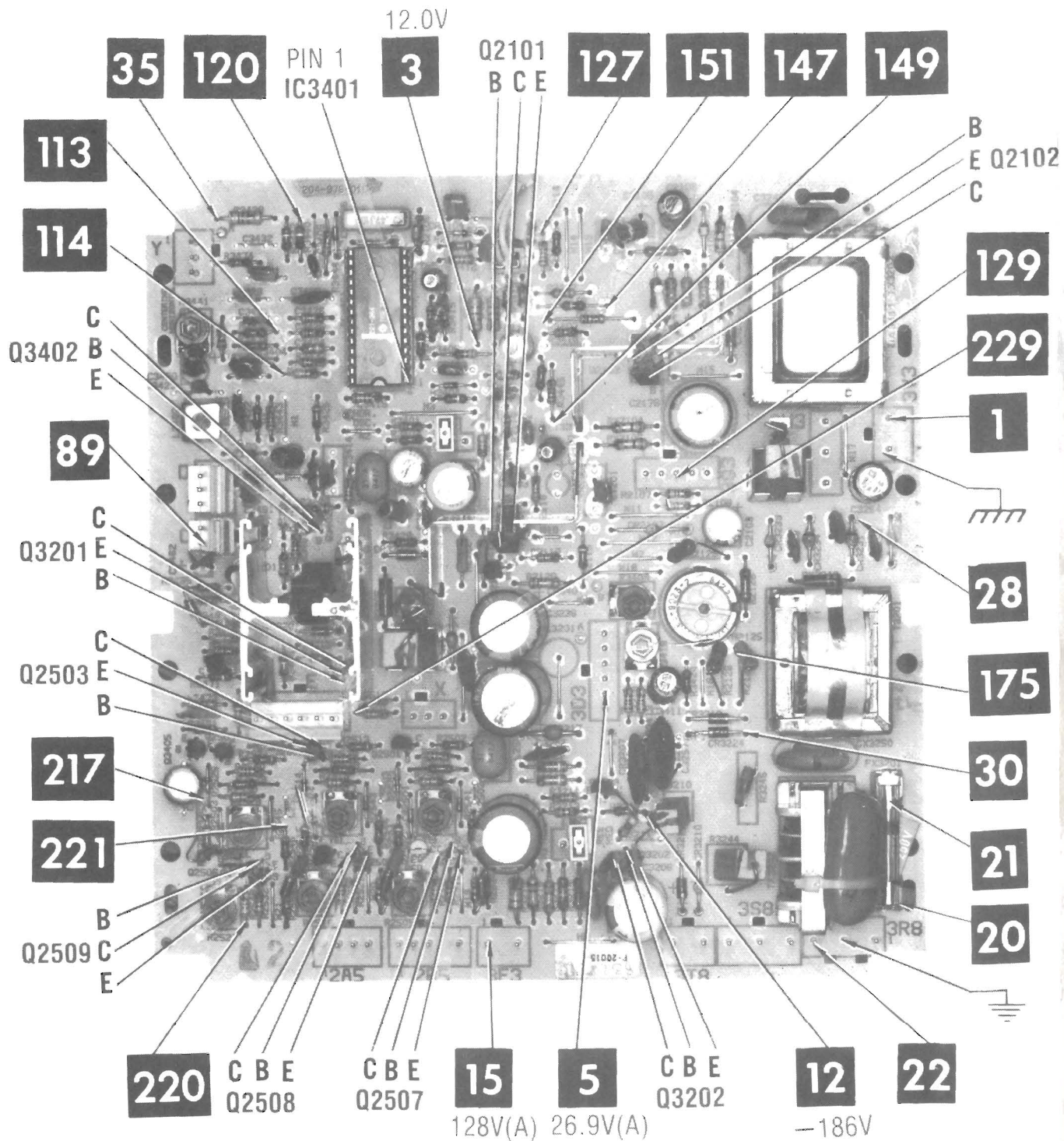


AUDIO/VIDEO SYNC BOARD

AUDIO/VIDEO SYNC BOARD



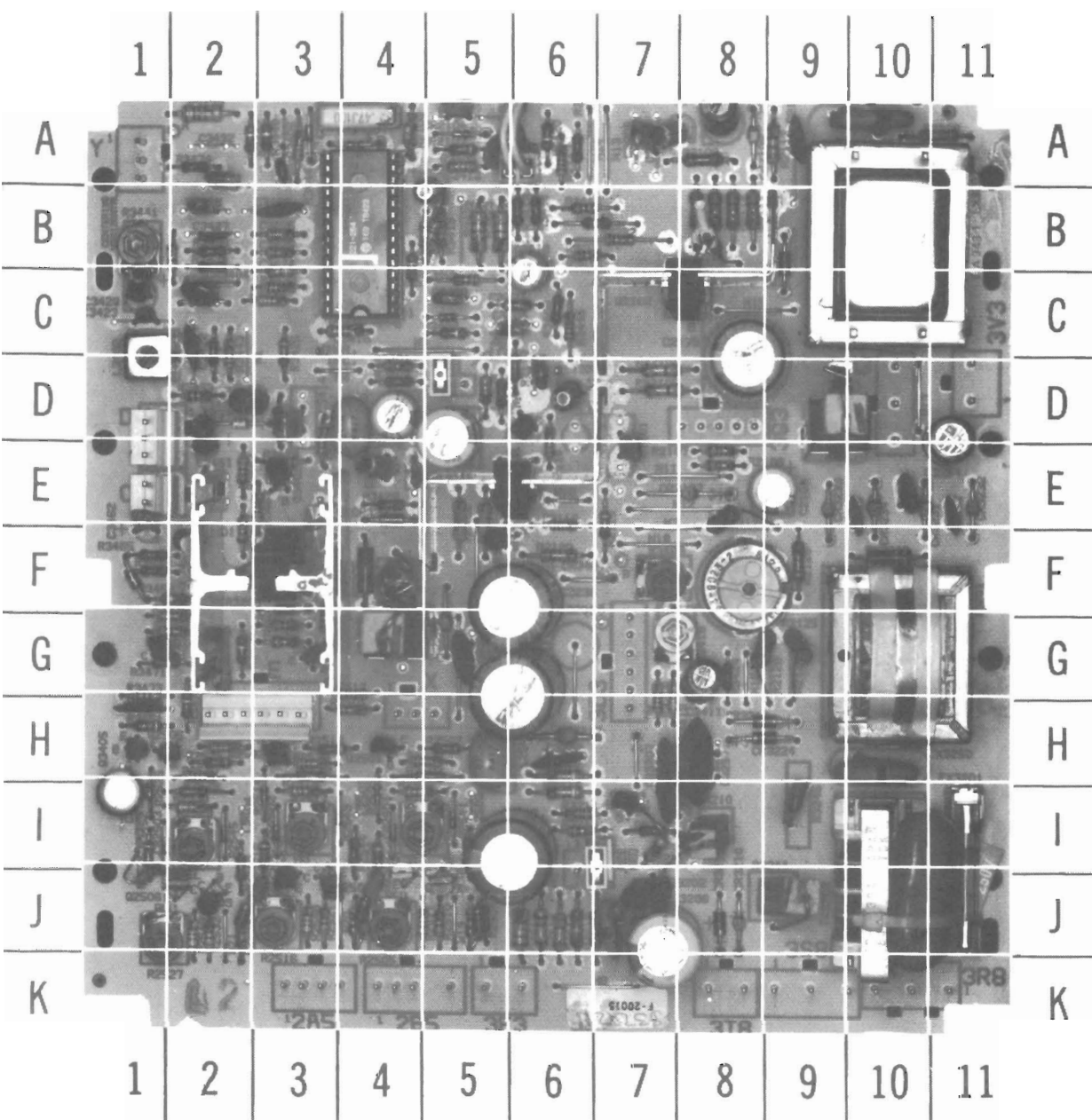


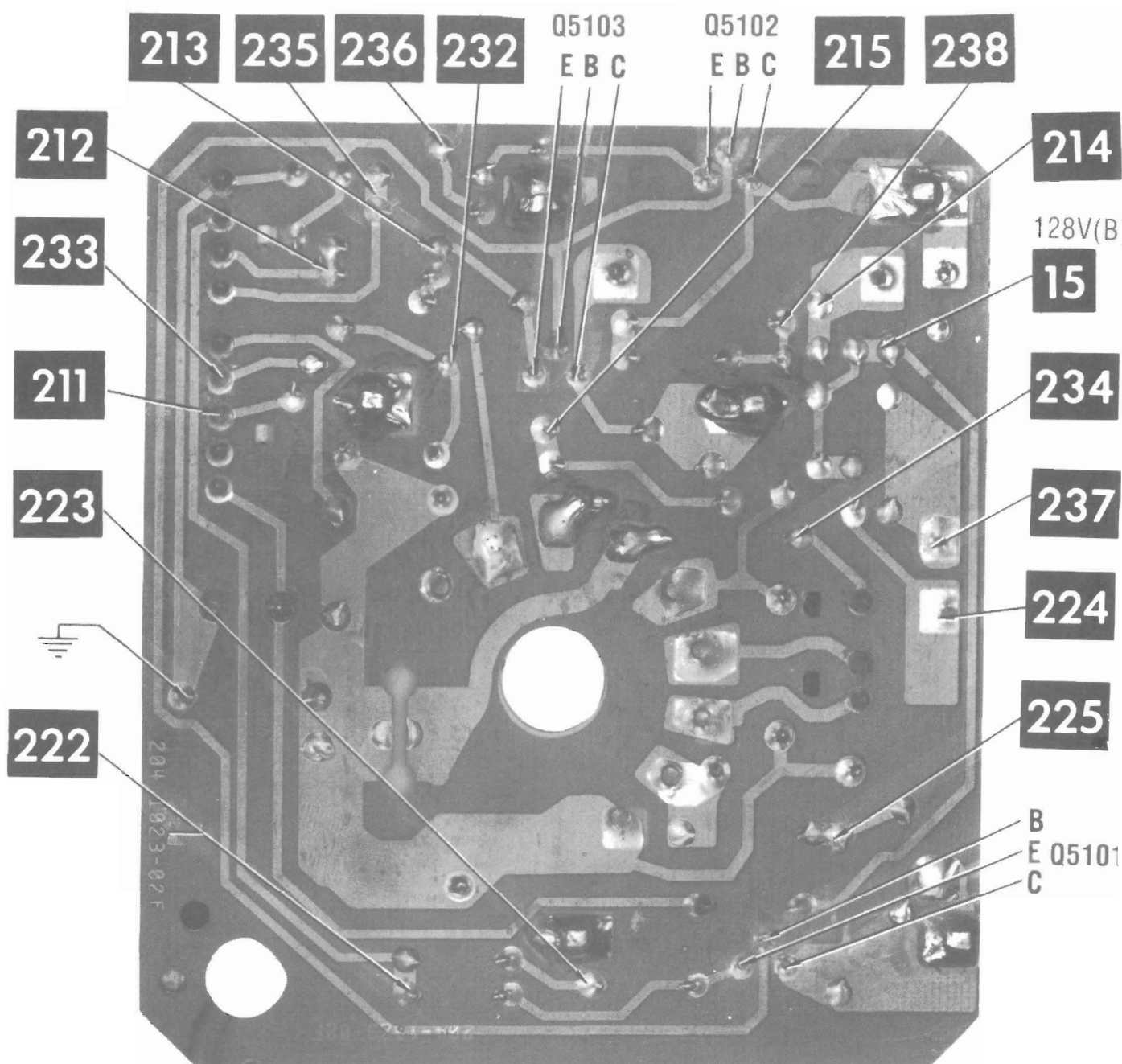


MAIN BOARD

A Howard W. Sams **CIRCUITRACE®** Photo

CMT7-2
ZENITH
MODEL ZVM-135



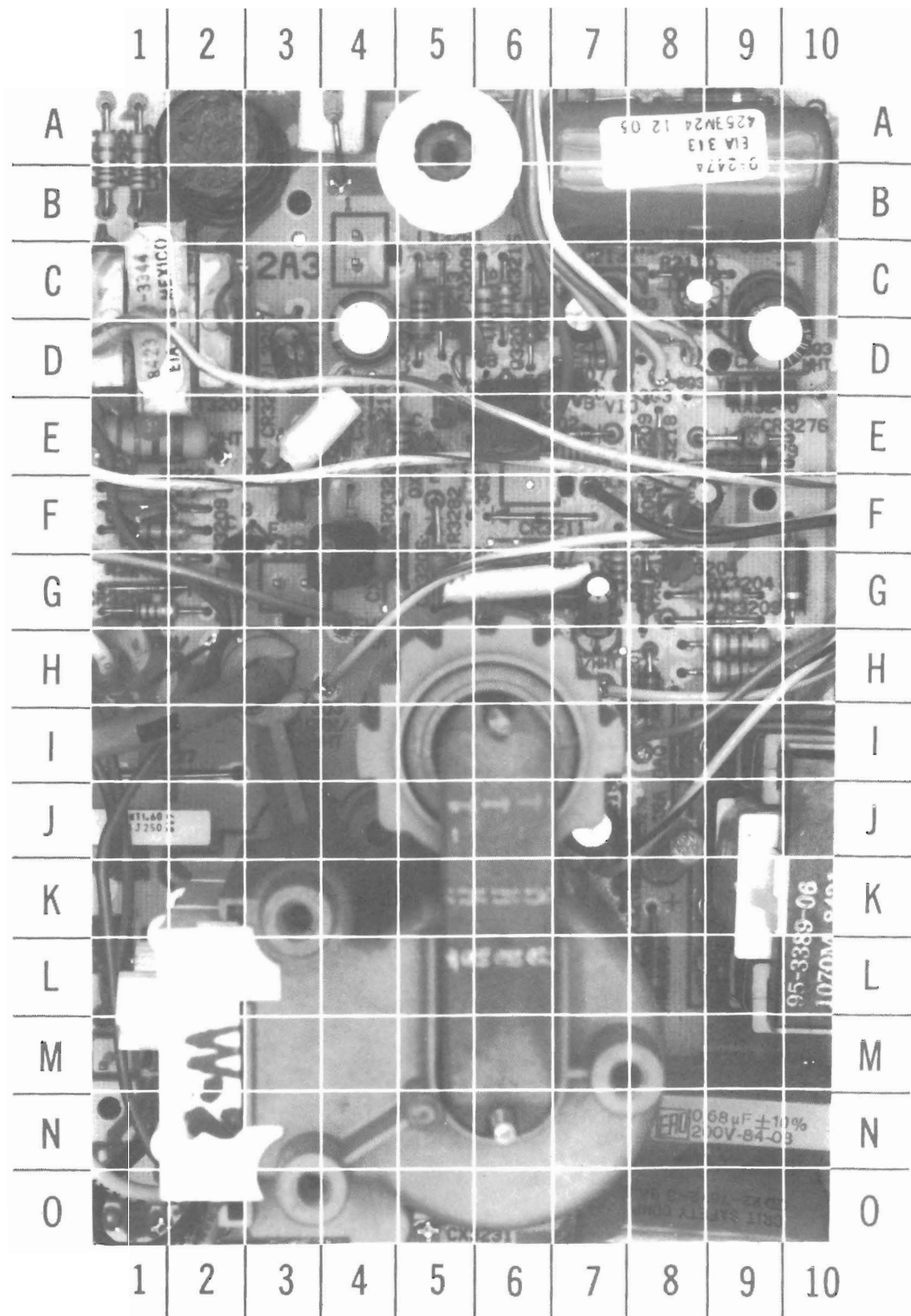


VIDEO OUTPUT BOARD

A Howard W. Sams CIRCUITRACE® Photo

HV/HORIZONTAL SWEEP BOARD GridTrace LOCATION GUIDE

C2131	C-7	RX3214	I-8	RX3218	E-8	TX3204	K-6	3R3	0-3
C2152	C-8	RX3215	C-6	RX3235	E-5	TX3251	K-10	3S3	0-1
C3202	G-7	RX3216	C-6	T3205	C-1	2A3	C-4		
C3203	D-4	RX3217	G-6	TP3	O-1	3B9	G-3		
C3206	F-8								
C3207	G-4								
C3209	D-5								
C3210	E-5								
C3211	D-3								
C3212	E-4								
C3213	F-4								
C3214	E-4								
C3216	F-3								
C3217	G-2								
C3218	F-1								
C3233	N-9								
C3244	J-1								
C3261	B-8								
C3276	K-8								
C3277	D-9								
CR3202	E-7								
CR3203	H-8								
CR3204	C-7								
CR3205	O-5								
CR3206	G-5								
CR3207	E-3								
CR3208	G-1								
CR3209	G-9								
CR3210	E-6								
CR3211	F-6								
CR3276	E-9								
CX3204	G-4								
CX3205	I-2								
CX3219	J-7								
CX3229	O-9								
E3251	A-7								
L3207	E-4								
L3220	G-6								
LX3261	A-5								
LX3262	A-2								
Q3204	G-8								
Q3206	E-6								
Q3209	F-2								
QX3202	E-2								
QX3207	D-7								
R2105	C-6								
R2110	C-8								
R2111	C-8								
R3207	G-7								
R3209	E-8								
R3219	G-8								
R3224	F-2								
R3225	E-1								
R3226	E-3								
R3227	F-4								
R3228	G-10								
R3242	F-1								
R3243	G-1								
R3244	M-1								
R3250	H-9								
R3251	A-9								
R3261	A-4								
R3262	A-1								
R3263	A-1								
R3264	H-9								
R3279	E-9								
R3282	F-5								
R3299A	L-1								
R3299B	L-1								
RX3206	J-8								
RX3208	E-7								
RX3210	L-8								
RX3211	C-5								
RX3213	C-5								



PARTS LIST AND DESCRIPTION

When ordering parts, state Model, Part Number, and Description

SEMICONDUCTORS (Select replacement for best results)

ITEM No.	TYPE No.	MFR. PART No.	REPLACEMENT DATA					
			GENERAL ELECTRIC PART No.	NEW-TONE NTE PART No.	PHILIPS ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
CR1301 CR1701 CR1703 thru CR1714	ITT142 H284D4 ITT142	103-142-01 103-254-01 103-142-01	GE-300 GE-504A GE-300	NTE177 NTE116 NTE177	ECG177 ECG116 ECG177	SK9091/177 SK3313/116 SK9091/177	WEP1062/177 WEP158/116 WEP1062/177	103-142-01 103-254-01 103-142-01
CR1715 CR1722 CR1724 CR1725	M33611 ITT142 TZ4E254 1N4739A	103-336-11 103-142-01 103-254-01 103-301-13	GEZD-5.6 GE-300 GE-504A GEZD-9.1	NTE5011A NTE177 NTE116 NTE139A	ECG5011A ECG177 ECG116 ECG139A	SK5A6/5011A SK9091/177 SK3313/116 SK9V1/139A	WEP1412/5011 WEP1062/177 WEP158/116 WEP1109/139	103-336-11 103-142-01 103-254-01 103-301-13
CR1726 thru CR1728 CR2104 CR2105	ITT142 R142 254G1	103-142-01 103-142-01 103-254-01	GE-300 GE-300 GE-504A	NTE177 NTE177 NTE116	ECG177 ECG177 ECG116	SK9091/177 SK9091/177 SK3313/116	WEP1062/177 WEP1062/177 WEP158/116	103-142-01 103-142-01 103-254-01
CR2106, 7 CR2108 CR2199 CR2254 thru CR2256	H254E4 MK279-14 R142 ITT142	103-254-01 103-279-14 103-142-01 103-142-01	GE-504A GEZD-6.8 GE-300 GE-300	NTE116 NTE5014A NTE177 NTE177	ECG116 ECG5014A ECG177 ECG177	SK3313/116 SK6A8/5014A SK9091/177 SK9091/177	WEP158/116 WEP1415/5014 WEP1062/177 WEP1062/177	103-254-01 103-279-14 103-142-01 103-142-01
CR2501 thru CR2503 CR2503A	ITT142 R142	103-142-01 103-142-01	GE-300 GE-300	NTE177 NTE177	ECG177 ECG177	SK9091/177 SK9091/177	WEP1062/177 WEP1062/177	103-142-01 103-142-01
CR2504 thru CR2506 CR2514	254G1 R142	103-254-01 103-142-01	GE-504A GE-300	NTE116 NTE177	ECG116 ECG177	SK3313/116 SK9091/177	WEP158/116 WEP1062/177	103-254-01 103-142-01

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

SEMICONDUCTORS (Select replacement for best results)(cont)

ITEM No.	TYPE No.	MFR. PART No.	REPLACEMENT DATA					
			GENERAL ELECTRIC PART No.	NEW-TONE NTE PART No.	PHILIPS ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
CR2525	R142	103-142-01	GE-300	NTE177	ECG177	SK9091/177	WEP1062/177	103-142-01
CR2541	1T142	103-142-01	GE-300	NTE177	ECG177	SK9091/177	WEP1062/177	103-142-01
CR2543	1T142	103-142-01	GE-300	NTE177	ECG177	SK9091/177	WEP1062/177	103-142-01
CR2545	1T142	103-142-01	GE-300	NTE177	ECG177	SK9091/177	WEP1062/177	103-142-01
CR3202	1T141 2142	103-142-01	GE-300	NTE177	ECG177	SK9091/177	WEP1062/177	103-142-01
CR3202A	330G1	103-330	GE-300	NTE177	ECG177	SK9091/177	WEP1062/177	103-330
CR3203	1T1330419	103-330	GE-300	NTE177	ECG177	SK9091/177	WEP1062/177	103-330
CR3205	305G1 418C	103-305	GE-533	NTE525	ECG525	SK3925/525	WEP177/525	103-305
CR3205A	309-01 1T1	103-309-01	GEZD-10	NTE5019A	ECG5019A	SK10A/5019A	WEP1420/5019	103-309-01
CR3206	TZ4C284	103-284	GE-511	NTE552	ECG552	SK9000/552	WEP172/506	103-284
CR3207	295-1	103-295-01	GE-300	NTE177	ECG177	SK9091/177	WEP1062/177	103-295-01
CR3208	295-01	F-16147 (1)	GE-300	NTE177	ECG177	SK9091/177	WEP1062/177	F-16147
CR3208A	TZ4A326	103-295-01	GE-511	NTE552	ECG552	SK9000/552	WEP172/506	103-295-01
CR3209	1T142	103-142-01	GE-300	NTE177	ECG177	SK9091/177	WEP1062/177	103-142-01
CR3210	1T142	103-142-01	GE-300	NTE177	ECG177	SK9091/177	WEP1062/177	103-142-01
CR3210A	H254E4	103-254-01	GE-504A	NTE116	ECG116	SK3313/116	WEP158/116	103-254-01
CR3211	1T142	103-142-01	GE-300	NTE177	ECG177	SK9091/177	WEP1062/177	103-142-01
CR3211A	254G1	103-254-01	GE-504A	NTE116	ECG116	SK3313/116	WEP158/116	103-254-01
CR3211B	H31 2K4							
CR3212	339G1	103-326	GE-511	NTE552	ECG552	SK9000/552	WEP172/506	103-326
CR3214	TZ4A326							
CR3217	TZ4F339-4							
CR3219	330G1	103-330	GE-300	NTE177	ECG177	SK9091/177	WEP1062/177	103-330
CR3223, 24	330G1	103-330	GE-300	NTE177	ECG177	SK9091/177	WEP1062/177	103-330
CR3231	315-6CG1	103-315-06						103-315-06
CR3232, 33	H315F4	103-315-06						103-315-06
CR3234	315-6CG1	103-315-06						103-315-06
CR3235	H284D4	103-284	GE-511	NTE552	ECG552	SK9000/552	WEP172/506	103-284
CR3276	TZ4C254	103-254-01	GE-504A	NTE116	ECG116	SK3313/116	WEP158/116	103-254-01

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ZENITH
MODEL ZVM-135

When ordering parts, state Model, Part Number, and Description

SEMICONDUCTORS (Select replacement for best results) (cont)

ITEM No.	TYPE No.	MFGR. PART No.	REPLACEMENT DATA					
			GENERAL ELECTRIC PART No.	NEW-TONE NTE PART No.	PHILIPS ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
CR3401	ITT142	103-142-01	GE-300	NTE177	ECG177	SK9091/177	WEP1062/177	103-142-01
CR3404	ITT142	103-142-01	GE-300	NTE177	ECG177	SK9091/177	WEP1062/177	103-142-01
CR3405	R142	103-142-01	GE-300	NTE177	ECG177	SK9091/177	WEP1062/177	103-142-01
CR3406	ITT142	103-142-01	GE-300	NTE177	ECG177	SK9091/177	WEP1062/177	103-142-01
CR3408	MK279-14	103-279-14	GEZD-6.8	NTE5014A	ECG5014A	SK6A8/5014A	WEP1415/5014	103-279-14
CR3409	279-141TT	103-279-19	GEZD-10	NTE5019A	ECG5019A	SK10A/5019A	WEP1420/5019	103-279-19
CRX3204	MK30884	103-308						103-308
IC1301	221-105	221-105		NTE701	ECG701	SK9026/701		221-105
IC1451	221-98A05	221-98	GE-1231	NTE1231	ECG1231	SK3832/1231	WEP1231/1231	221-98
IC1701	221-290-01	221-290						221-290
IC1702	221-130	221-130						221-130
IC2376	221-179-1	221-179-01						221-179-01
IC3401	221-264	221-264						221-264
Q1202	986	121-986	GE-82	NTE159	ECG159	SK3466/159	WEP62/159	121-986
Q1203,4	895	121-895	GE-123AP	NTE123AP	ECG123AP	SK3854/123AP	WEP736/123A	121-895
Q1701 thru Q1707	895	121-895	GE-123AP	NTE123AP	ECG123AP	SK3854/123AP	WEP736/123A	121-895
Q1708 thru Q1716	1019	121-1019	GE-82	NTE159	ECG159	SK3466/159	WEP62/159	121-1019
Q1717 thru Q1722	1084	121-1084						121-1084
Q1723	1096	121-1096						121-1096
Q1726	1096	121-1096						121-1096
Q1727	895	121-895	GE-123AP	NTE123AP	ECG123AP	SK3854/123AP	WEP736/123A	121-895
Q1728	1064	121-1064						121-1064
Q1729,30	1096	121-1096						121-1096
Q1731 thru Q1733	499-1	121-499-01	GE-123AP	NTE123AP	ECG123AP	SK3854/123AP	WEP736/123A	121-499-01
Q1734	1019	121-1019	GE-82	NTE159	ECG159	SK3466/159	WEP62/159	121-1019
Q1735	499-1	121-499-01	GE-123AP	NTE123AP	ECG123AP	SK3854/123AP	WEP736/123A	121-499-01
	1019	121-1019	GE-82	NTE159	ECG159	SK3466/159	WEP62/159	121-1019

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

SEMICONDUCTORS (Select replacement for best results)(cont)

ITEM No.	TYPE No.	MFR. PART No.	REPLACEMENT DATA					
			GENERAL ELECTRIC PART No.	NEW-TONE NTE PART No.	PHILIPS ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
Q1736	1084	121-1084	GE-82	NTE159	ECG159	SK3466/159	WEP62/159	121-1084
Q1737	1019	121-1019	GE-61	NTE229	ECG229	SK3246A/229	WEP956/229	121-1019
Q1738	551	121-551	GE-123AP	NTE123AP	ECG123AP	SK3854/123AP	WEP736/123A	121-551
Q1739	895	121-895						121-895
Q1740 thru Q1743	1019	121-1019	GE-82	NTE159	ECG159	SK3466/159	WEP62/159	121-1019
Q1744 thru Q1746	895	121-895	GE-123AP	NTE123AP	ECG123AP	SK3854/123AP	WEP736/123A	121-895
Q2101,2	1072-1	121-1072-01 F-10896(2)	GE-302	NTE291	ECG291	SK3440/291	WEP780/291	121-1072-01 F-10896
Q2103	ITT975	121-975	GE-123AP	NTE123AP	ECG123AP	SK3854/123AP	WEP736/123A	121-975
Q2104	1064M	121-1064	GE-82	NTE159	ECG159	SK3466/159	WEP62/159	121-1064
Q2215	699	121-699	GE-82	NTE159	ECG159	SK3466/159	WEP62/159	121-699
Q2501	1019M	121-1019	GE-82	NTE159	ECG159	SK3466/159	WEP62/159	121-1019
Q2502	551M	121-551	GE-61	NTE229	ECG229	SK3246A/229	WEP956/229	121-551
Q2503	R1019	121-1019	GE-82	NTE159	ECG159	SK3466/159	WEP62/159	121-1019
Q2504	551M	121-551	GE-61	NTE229	ECG229	SK3246A/229	WEP956/229	121-551
Q2505	1019M	121-1019	GE-82	NTE159	ECG159	SK3466/159	WEP62/159	121-1019
Q2506	551M	121-551	GE-61	NTE229	ECG229	SK3246A/229	WEP956/229	121-551
Q2507	R1019	121-1019	GE-82	NTE159	ECG159	SK3466/159	WEP62/159	121-1019
Q2508,9	1019M	121-1019	GE-82	NTE159	ECG159	SK3466/159	WEP62/159	121-1019
Q3200	TZ966-03	121-966-02 F12737(2)	GE-66A	NTE152	ECG152	SK3893/152	WEP745/152	121-966-02 F12737
Q3201	R499-01-C	121-499-01	GE-123AP	NTE123AP	ECG123AP	SK3854/123AP	WEP736/123A	121-499-01
Q3202	TZ1034	121-1034	GE-27	NTE171	ECG171	SK3201/171	WEP702/171	121-1034
Q3203	1059M	121-1059	GE-82	NTE159	ECG159	SK3466/159	WEP62/159	121-1059
Q3204	ITT973	121-973	GE-82	NTE159	ECG159	SK3466/159	WEP62/159	121-973
Q3206	TZ1037	121-1037	GE-27	NTE171	ECG171	SK3201/171	WEP702/171	121-1037

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MODEL ZVM-135

ZENITH

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

SEMICONDUCTORS (Select replacement for best results) (cont)

ITEM No.	TYPE No.	MFR. PART No.	REPLACEMENT DATA					
			GENERAL ELECTRIC PART No.	NEW-TONE NTE PART No.	PHILIPS ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
# Q3207 Q3208 Q3209 Q3401	ITT975	121-975	GE-123AP	NTE123AP	ECG123AP	SK3854/123AP	WEP736/123A	121-975
	TZ1029-01		GE-38	NTE165	ECG165	SK3115/165	WEP740B/165	121-1029
	1040	121-1040	GE-123AP	NTE123AP	ECG123AP	SK3854/123AP	WEP736/123A	121-1040
	R895	121-895	GE-123AP	NTE123AP	ECG123AP	SK3854/123AP	WEP736/123A	121-895
	986M		GE-82	NTE159	ECG159	SK3466/159	WEP62/159	121-Z9003
Q3402 Q3403 Q3404 Q3405	R895	121-895	GE-123AP	NTE123AP	ECG123AP	SK3854/123AP	WEP736/123A	121-895
	ITT895	121-895	GE-123AP	NTE123AP	ECG123AP	SK3854/123AP	WEP736/123A	121-895
	R895	121-895	GE-123AP	NTE123AP	ECG123AP	SK3854/123AP	WEP736/123A	121-895
	TZ1088	121-1034	GE-27	NTE171	ECG171	SK3201/171	WEP702/171	121-1034
	1034	F-15684(2)	GE-123AP	NTE123AP	ECG123AP	SK3854/123AP	WEP736/123A	F-15684
# QX3202	ITT975	121-975						121-975

For SAFETY use only equivalent replacement part.

(1) Assembly, includes diode, ferrite bead & sleeve.

(2) Assembly, includes heat sink.

ELECTROLYTIC CAPACITORS

Item numbers not listed are normally available at local distributors.

ITEM No.	RATING	MFR. PART No.	ITEM No.	RATING	MFR. PART No.
C1201	1 50V NP	22-7487-01	C3429	.47 35V NP	22-7406
C1702	2.2 25V NP	22-7405-02	CX3202	1 50V	22-7862-01
C3284	22 100V NP	22-7900	CX3219	100 25V	22-7708-09
C3402	1 35V NP	22-7406-01	CX3240	1700 180V	22-7735-01 (1)
C3410	22 16V NP	22-7404-06	CX3240A	300 180V	F-13479 (1) (2)

For SAFETY use only equivalent replacement part.

(1) includes CX3240 and CX3240A.

(2) includes Lead Assembly.

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

CAPACITORS

Item numbers not listed are normally available at local distributors.

ITEM No.	RATING	MFGR. PART No.	ITEM No.	RATING	MFGR. PART No.
C1203	68 NPO 50V 5%	22-7633-29	C3209A	470 N1500 5%	22-7395
C1204	20 N330 50V		C3210	82 N750 10%	22-5995
C1303	47 N750 50V	22-7648-23	C3233	.68 200V 10%	22-7128
C1704	18 NPO 50V 5%	22-7743-18	C3234	470 N1500 5%	22-7395
C1705	18 NPO 50V 5%	22-7743-18	C3242	100 N1500 5%	22-5685
C1706	18 NPO 50V 5%	22-7743-18	C3257	470 N1500 5%	22-7395
C1723	68 NPO 50V 5%	22-76121-30	C3427	150 N750 50V 5%	22-7647-35
C2282	120 N150 50V 5%	22-7633-35	C3450	200 NPO 50V 5%	22-7619-41
C2283	22 NPO 50V 5%	22-7743-20	CX3204	.1 100V 5%	22-7773-24
C2355	51 NPO 50V 5%	22-7621-27	CX3205	.01 2KV	22-7523-01
C2356	33 NPO 50V 5%	22-7743-24	CX3211	530 N2200 3KV 10%	
C2359	11 NPO 50V	22-7621-11	CX3223	.01 2KV	
C2376	75 N470 50V 5%	22-7747-33	CX3227	530 N2200 3KV 10%	
C2377	68 N470 50V 5%	22-7749-32	CX3229	.0165	22-7672-08
C2386	68 N470 50V 5%	22-7749-32	CX3250	.0047 500V	22-7431-06
C2389	36 NPO 50V 5%	22-7743-25	CX3258	.1 125VAC	22-5854

For SAFETY use only equivalent replacement part.

CONTROLS (All wattages 1/2 watt, or less, unless listed)

ITEM NO.	FUNCTION	RESISTANCE	MFGR. PART NO.	NOTES
R1400	Volume	15K	63-10772-04 (1)	
R1708	Red Cutoff	5000	63-10857-11	
R1714	Blue Cutoff	5000	63-10857-31	
R1832	Black Level Reference	2000	63-10857-86 or 63-10857-88	
R1836	Black Level Cutoff	30K	63-10857-15	
R2125	Vert Centering	500	63-09063-02	
R2390	APC Adjust	10K	63-9023-2 (1)	
R2505	Red Cutoff	800	63-10857-12	
R2506	Red Drive	2500	63-10857-27	
R2516	Green Cutoff	800	63-10857-25	
R2517	Green Drive	2500		
R2527	Blue Cutoff	800	63-10857-26	
R2528	Blue Drive	2500		
R3409	95V Adjust	100K	63-10857-17	
R3418	Vert Height	2000	63-10857-08	
R3441	Horiz Centering	100	63-10857	
R7101	Picture	5000	63-10750	
R7102	Black Level	5000	63-10754	
		Detent @ 50%		
R7103	Color Level	5000	63-10751	
R7104	Tint	5000	63-10751	
R7105	Sharpness/Switch	5000	63-10766-01	
		Detent @ 50%		
R7131	Brightness	5000	63-10857-87	
RX3499A	Focus	20M	(2)	
RX3499B	Screen	4.5M	(2)	

For SAFETY use only equivalent replacement part.

(1) Number on unit.

(2) Part of Horizontal Output Transformer TX3204, Part No. 95-3603-01.

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

RESISTORS (Power and Special)

ITEM No.	RATING	REPLACEMENT DATA		
		MFGR. PART No.	NEW-TONE PART No.	WORKMAN PART No.
R1	390 5% 5W WW	63-10271	5W139	
R2	390 5% 5W WW	63-10442-86A (1)		
		63-10271	5W139	
# R1706	2 5% 1/2W Metal Oxide	63-10442-86A (1)		
R1772	698 1% 1/4W Carbon Film	63-10565-07	HW2D0	
R1776	698 1% 1/4W Carbon Film	63-10934-97		
R1779	698 1% 1/4W Carbon Film	63-10934-97		
R1781	1100 1% 1W Carbon Film	63-10936-84		
R1782	1100 1% 1W Carbon Film	63-10936-84		
R1784	1100 1% 1W Carbon Film	63-10936-84		
R1785	698 1% 1/4W Carbon Film	63-10934-97		
R1789	27.4K 1% 1/4W Carbon Film	63-10935-48		
R1791	51.1K 1% 1/4W Carbon Film			
R1799	100 1% 1/4W Carbon Film	63-10235-48		
R1800	100 1% 1/4W Carbon Film	63-10235-48		
R1801	100 1% 1/4W Carbon Film	63-10235-48		
R1803	100 1% 1/4W Carbon Film	63-10235-48		
# R1834	51 5% 1/4W Carbon Film		HW051	
# R1834A	39 5% 1/2W Carbon Film		HW039	22-2062
R2111	3000 2% 1/4W Carbon Film	63-10233-83	QW230	
R2112	10K 2% 1/4W Carbon Film	63-10233-96	QW310	22-2253
# R2121	150 5% 1/2W Carbon Film	63-10565-52	HW115	22-2076
# R2122	150 5% 1/2W Carbon Film	63-10565-52	HW115	22-2076
R2299	51 5% 10W WW			
R2507	1500 2% 1/4W Carbon Film	63-10235-76	QW215	22-2243
R2518	1500 2% 1/4W Carbon Film	63-10235-76	QW215	22-2243
R2529	1500 2% 1/4W Carbon Film	63-10235-76	QW215	22-2243
R3206	12 10% 10W WW	63-10460-50	10W012	
# R3224	4700 5% 1/2W Carbon Film	63-10243-88	HW247	22-2112
# R3225	680 5% 2W Metal Oxide		2W168	22-4092
	680 5% 2W WW	63-10836-68	2W168	
# R3228	220 10% 1/2W Carbon Film	63-7757	HW122	22-2080
# R3231	1 10% 2W WW	63-10422-24	2W1D0	WS1:0
R3239	1 10% 3W WW	63-10852 (1)		
R3240	.18 10% 3W WW	63-10852-01 (1)		
R3241	4 10% 10W WW	63-08246	10W3D9	24-4021
# R3243	2200 5% 1/2W Carbon Film	63-10243-80	HW222	22-2104
R3244A	47 10% 3W WW	63-10430-64 (1)		
	47 5% 3W Carbon Film	63-10840-40		
R3245	PTC 11 Cold	63-10710		FR605
		778413 (1)		
R3261	390 10% 5W WW	63-10444-86	5W139	
R5101	2000 5% 3W Carbon Film	63-10840-79		
R5112	2000 5% 3W Carbon Film	63-10840-79		
R5113	2000 5% 3W Carbon Film	63-10840-79		
# RX1457	82 5% 2W Metal Oxide	63-10235-46	2W082	22-4070
# RX2101	22 5% 1/2W Carbon Film	63-10565-32	HW022	22-2056
# RX2104	3 5% 1/2W Carbon Film	63-10243-11	HW3D0	
# RX2105	3 5% 1/2W Carbon Film	63-10243-11	HW3D0	
# RX3204	2200 5% 1/4W Carbon Film	63-10235-80	QW222	22-1104
# RX3206	5600 5% 1/2W Carbon	63-7816	HW256	22-2114
# RX3207	22 5% 1/2W Carbon Film	63-10235-32	HW022	22-2056
# RX3208	2200 5% 1/4W Carbon Film	63-10235-80	QW222	22-1104
# RX3209	1000 5% 1/4W Carbon Film	63-10235-72	QW210	22-1096
# RX3210	1100 5% 1/2W Carbon	63-7787	HW211	
# RX3211	3000 1% 1W Carbon Film	63-10818		
# RX3213	33K 5% 1/4W Carbon Film	63-10236-08	QW333	22-1132
# RX3214	2700 2% 1/4W Carbon Film	63-10233-82	QW227	
# RX3215	18K 5% 1/4W Carbon Film	63-10236-02	QW318	22-1126
# RX3216	1200 1% 1/2W Carbon Film	63-10810-06		
# RX3217	470 5% 1/2W Carbon	63-7770	HW147	22-2088
# RX3218	2700 5% 1/4W Carbon Film	63-10235-82	QW227	22-1106
# RX3219	4700 5% 1/4W Carbon Film	63-10235-88	QW247	22-1112
# RX3235	1100 1% 1W Carbon Film	63-10810		
# RX3240	10M 10% 1/2W Carbon	63-10657-04		
# RX3246	1.2M 10% 1/2W Carbon	63-10657-03		22-2170

For SAFETY use only equivalent replacement part. (1) Number on unit.

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

COILS (RF-IF)

ITEM No.	FUNCTION	MFGR. PART No.	ITEM No.	FUNCTION	MFGR. PART No.
L1	Width (120uH)	20-4031	L3401	RF Choke (663uH)	20-3831
L2	Width (120uH)	20-4031	L5102	RF Choke (10uH)	20-3907-12
L1202	RF Choke	28-3907-17	L5103	RF Choke (10uH)	20-3907-12
L1701	Peaking	20-3887-16	L5104	RF Choke (10uH)	20-3907-12
L1702	Peaking	20-3887-16	L5105	Peaking (8.2uH)	20-3907-11
L1703	Peaking	20-3887-16	L5106	Peaking (8.2uH)	20-3907-11
L2276	Delay Line	20-4136	L5107	Peaking (8.2uH)	20-3907-11
L2277	Peaking	20-3907-21	# LX1201	RF Choke	
L2278	RF Choke	20-3919	# LX1706	RF Choke	20-3801-01
L2376	Chroma Takeoff	45-3080	# LX1785	RF Choke	
L2377	RF Choke		# LX3262	Horiz Linearity	20-3975
L2378	Peaking	20-3887-20	# TX3202A	Line Choke	95-3439
L2501	RF Choke (663uH)	20-3831			

For SAFETY use only equivalent replacement part.

COILS & TRANSFORMERS (Sweep Circuits)

ITEM No.	FUNCTION	REPLACEMENT DATA		
		MFGR. PART No.	OTHER IDENTIFICATION	THORDARSON PART No.
# DY1	Yoke Horiz 1mH	HE-234-547 or		
	90° Vert 27mH	HE-234-455		
L3402	Sweep Oscillator	20-4026		
# LX3261	Width	20-3976		
T3201	Start Up	95-3558-03		
T3205	Horiz Driver	95-3344		
# TX3202	Regulator	95-3502-02		
# TX3204	Horiz Output	95-3603-01		
# TX3251	Pincushion	95-3389-06		

ZENITH
MODEL ZVM-135

For SAFETY use only equivalent replacement part.

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	CURRENT (Measured)	DC RES.	INDUCTANCE (0 CURRENT 1000~)	MFGR. PART No.	THORDARSON PART No.	
# LX3202	600mA	2.5	60mH	95-3501-02		

For SAFETY use only equivalent replacement part.

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

SPEAKER

ITEM No.	TYPE	REPLACEMENT DATA		NOTES
		MFGR. PART No.	QUAM PART No.	
SP1	2 1/4" X 3 1/2" PM 32 Ohms	49-1332		

FUSE DEVICES

ITEM NO.	DESCRIPTION	MFGR. PART NO.		NOTES
		DEVICE	HOLDER	
# FX3201	4A @ 250V Fast-Acting	136-113-23		

For SAFETY use only equivalent replacement part.

MISCELLANEOUS

ITEM No.	PART NAME	MFGR. PART No.	NOTES
CR71	LED		Power Indicator, Red
CR2356	Crystal	103-15201	3.58MHz
E3251	Spark Gap	52-2240-08	
E5101	Spark Gap	52-2240-06	
E5102	Spark Gap	52-2240-06	
E5103	Spark Gap	52-2240-06	
L3201	Degaussing Coil		
L3207	Ferrite Bead	149-454	
L3210	Ferrite Bead		
L3220	Ferrite Bead		
P1	Power Cord	A-11847	AC, Polarized
S3201	Switch		Power
S001	Switch	85-1628	White/Green
SW1701	Switch		Composite/RGB
SW7501	Switch	63-10766-01	Noise Processor (Part of Sharpness Control R7105)
V1	CRT	M33AAW00X02 (1) HE-234-547 or HE-234-455	
	P.C. Board	9-230-5 (1)	Audio/Video Sync
	P.C. Board		Control
	P.C. Board	A-9522-05 (1) 204-840-03	HV/Horizontal Sweep
	P.C. Board	9-247A (1)	Main
	P.C. Board	9-227-5A (1)	Video Output
	P.C. Board	204-1023-02	
	P.C. Board	9-155-12 (1)	
	P.C. Board	A-11056	Video Output (Assembly Includes CRT Socket)
	P.C. Board	204-979-01	Width
	Power Cord	A-10530 (1)	
	Power Cord	50-347	AC, Assembly
	Socket	125-198-07	AC, Strain Relief
		78-2993-02	CRT

(1) Number on unit.

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

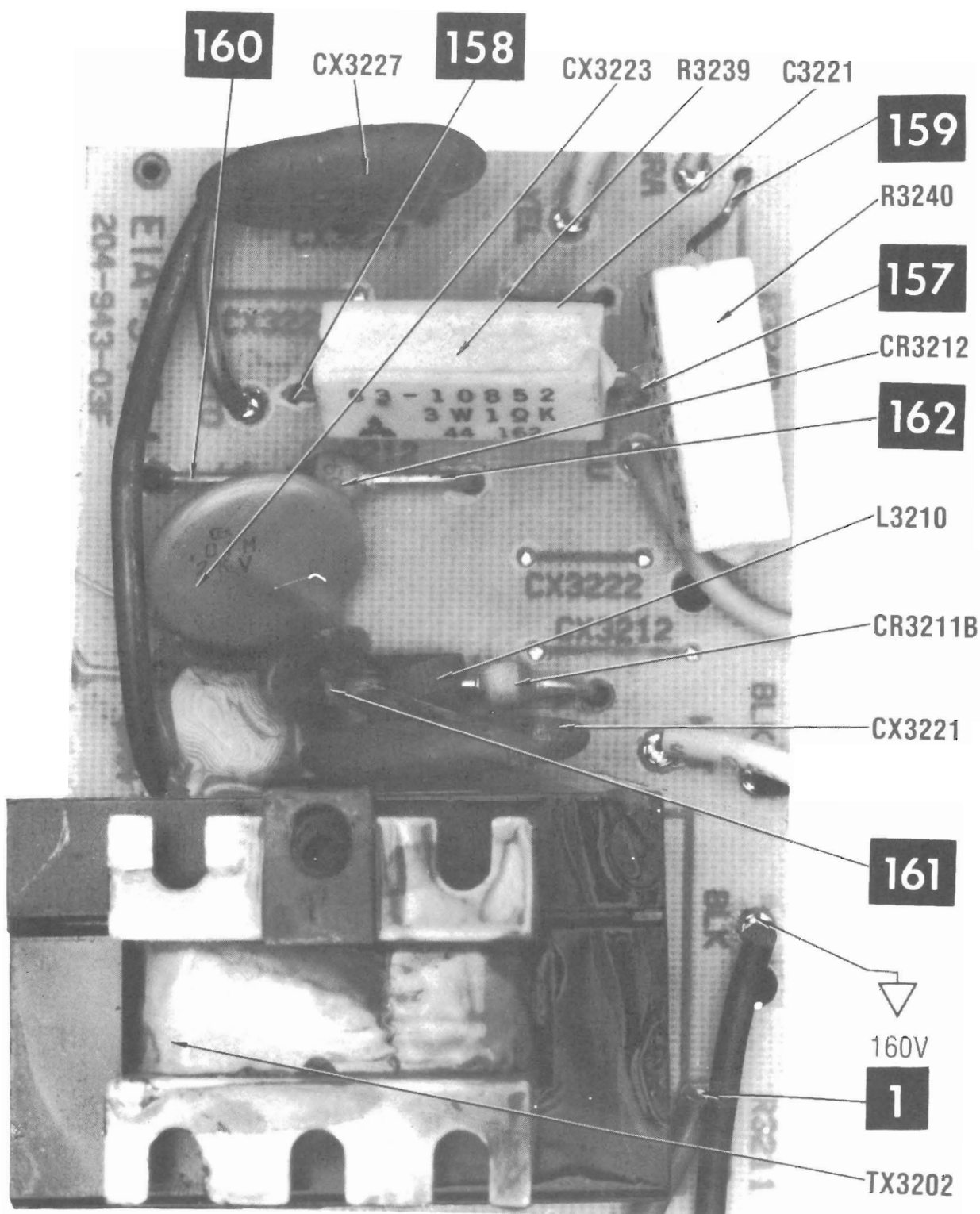
CABINET & CABINET PARTS (When ordering specify model, chassis & color)

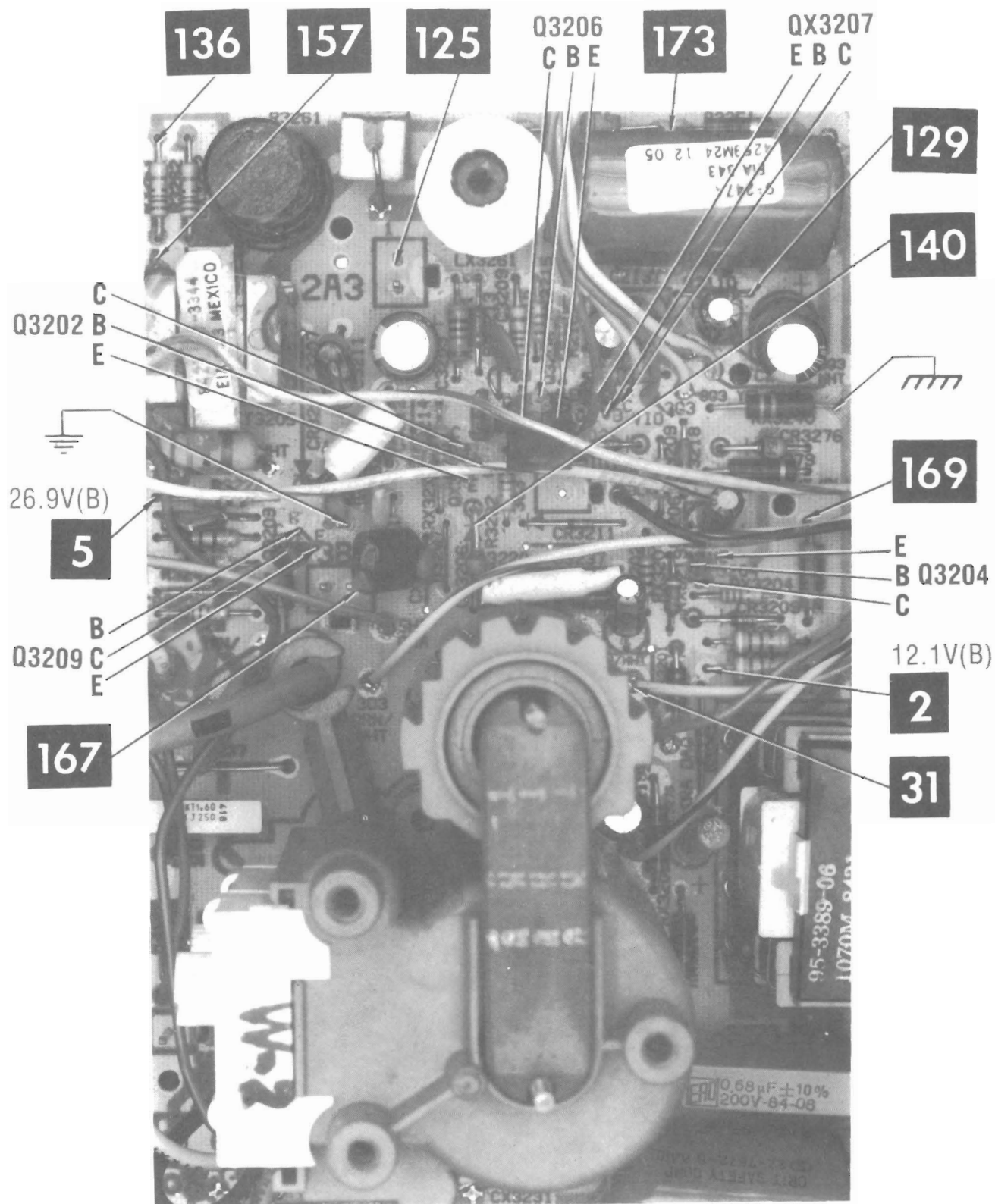
ITEM	PART No.	ITEM	PART No.
Top Cover	14-11529-01	Knob-Volume	46-10333
Bottom Plate	12-8215	Knob Assembly-Volume	A-08846
Perforated Bottom Plate	12-8416	Knob Retaining Spring-Volume	80-02166
Knob -On/Off	49-1332		

WIRING DATA

High Voltage Lead	Use BELDEN No. 9867 (30 KV)
Shielded Hook-up Wire	Use BELDEN No. 8401 or 8421 (Single-Conductor)
	8208 (Two-Conductor)
General-use Unshielded Hook-up Wire	Use BELDEN No. 8529 (Solid) Available in 13 Colors
	8522 (Stranded) Available in 13 Colors

ZENITH
MODEL ZVM-135





HV/HORIZONTAL SWEEP BOARD

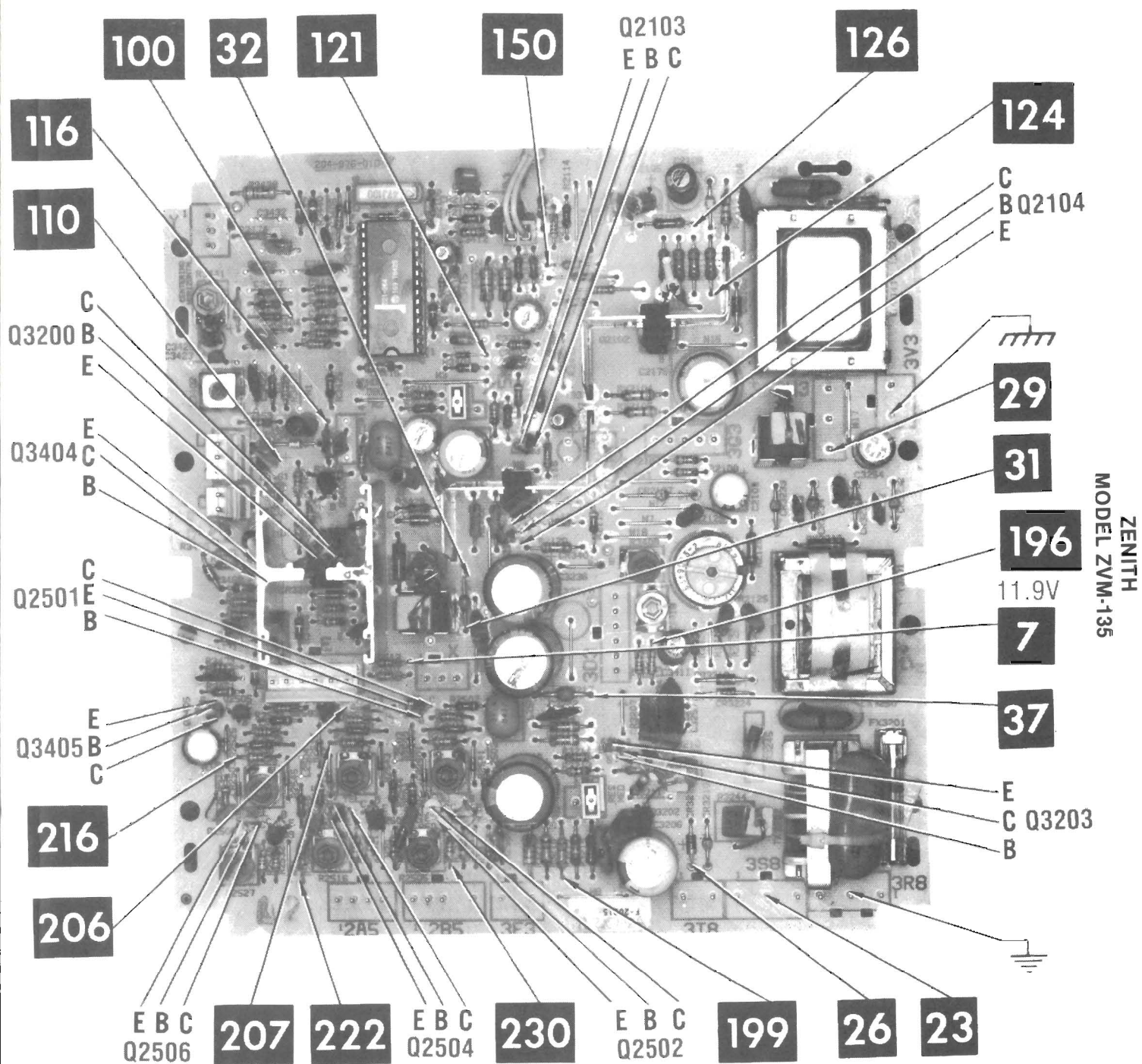
A Howard W. Sams **CIRCUITRACE®** Photo

C5101	F-10	L5101	J-4	Q5103	C-6	R5112	C-1	R5124	K-7
C5102	A-9	L5102	D-2	R5101	H-1	R5113	C-4	R5125	B-8
C5103	E-8	L5103	D-2	R5102	J-4	R5114	A-8	5A2	A-11
C5104	K-5	L5104	D-3	R5104	L-7	R5115	B-8	5C2	D-11
C5105	A-7	L5105	J-2	R5105	C-10	R5119	C-8	5H3	G-2
C5106	B-7	L5106	C-5	R5106	E-4	R5120	J-2	5X3	F-2
C5101	I-3	L5107	D-5	R5108	E-5	R5121	C-5		
C5102	E-7	Q5101	J-3	R5110	D-3	R5122	D-6		
C5103	G-3	Q5102	A-4	R5111	C-9	R5123	A-8		



MAIN BOARD GridTrace LOCATION GUIDE

C	E-1	CR2541	I-5	R2123	E-5	R3408	C-6
C2101	E-7	CR2543	I-4	R2125	F-8	R3409	F-7
C2102	A-5	CR2545	I-2	R2126	F-9	R3410	B-7
C2103	E-9	CR3202A	F-3	R2127	G-9	R3411	B-5
C2104	A-9	CR3205A	G-3	R2128	G-9	R3412	B-6
C2105	A-7	CR3208A	H-8	R2129	E-8	R3413	B-6
C2106	A-8	CR3210A	J-8	R2502	H-5	R3414	B-6
C2107	A-7	CR3211A	J-8	R2504	I-4	R3415	B-5
C2110	E-6	CR3214	G-5	R2505	J-4	R3417	B-5
C2111	D-6	CR3217	H-6	R2506	I-4	R3418	G-7
C2176	C-8	CR3219	H-9	R2507	H-5	R3419	H-7
C2504	I-1	CR3223	E-4	R2508	I-4	R3420	A-6
C3201	F-3	CR3224	H-9	R2510	J-5	R3421	D-3
C3205	J-7	CR3231	E-10	R2511	J-5	R3423	B-5
C3206A	K-7	CR3232	E-11	R2512	G-4	R3424	G-8
C3207A	C-6	CR3233	E-9	R2513	H-3	R3425	C-3
C3209A	H-7	CR3234	E-10	R2515	I-3	R3428	E-3
C3234	G-5	CR3235	H-8	R2516	J-3	R3429	E-4
C3236	F-6	CR3401	C-5	R2517	I-3	R3431	E-3
C3242	H-6	CR3404	C-2	R2518	H-3	R3432	C-3
C3246	I-6	CR3405	A-4	R2519	I-3	R3433	B-2
C3247	D-5	CR3406	A-3	R2521	J-3	R3434	B-2
C3249	A-10	CR3408	D-2	R2523	H-2	R3435	C-3
C3251	E-10	CR3409	F-1	R2524	H-2	R3436	B-2
C3252	E-11	GX3250	H-10	R2526	I-1	R3439	A-2
C3253	E-10	GX3258	J-10	R2527	J-1	R3440	A-3
C3254	D-11	D1	D-1	R2528	I-2	R3441	B-1
C3256	G-6	E	H-2	R2529	I-2	R3442	A-2
C3257	H-8	FX3201	J-11	R2530	I-2	R3443	C-2
C3402	E-4	IC3401	B-4	R2532	J-2	R3444	A-3
C3403	C-5	L2501	H-5	R2534	J-5	R3445	C-6
C3404	C-6	L3401	D-4	R2538	H-5	R3446	E-2
C3405	A-3	L3402	D-1	R2539	H-3	R3451	H-1
C3407	D-6	LX3202	B-10	R2540	H-2	R3452	J-1
C3409	D-4	Q2101	E-6	R2542	I-5	R3453	D-2
C3410	C-6	Q2102	C-8	R2544	I-4	R3461	F-2
C3411	G-8	Q2103	D-6	R2546	J-2	R3462	E-2
C3412	B-5	Q2104	F-5	R2548	J-3	R3463	E-3
C3413	A-4	Q2501	H-4	R2549	J-2	R3465	F-1
C3414	D-3	Q2502	J-4	R2550	J-5	R3466	G-2
C3416	B-5	Q2503	H-3	R2552	J-4	R3467	G-2
C3419	C-4	Q2504	J-3	R2554	J-2	R3468	F-2
C3420	C-1	Q2505	H-2	R3201	G-3	R3469	F-1
C3421	C-2	Q2506	J-2	R3202	G-3	R3470	G-2
C3422	C-2	Q2507	J-5	R3203	G-3	R3471	G-1
C3423	C-1	Q2508	J-3	R3205	F-4	R3472	H-2
C3424	C-3	Q2509	J-2	R3206	G-4	R3473	H-1
C3425	B-3	Q3200	F-3	R3210	I-8	R3474	A-2
C3426	B-3	Q3201	G-3	R3212	I-7	R3475	C-2
C3427	B-2	Q3202	J-7	R3213	I-6	RX2101	B-8
C3428	B-2	Q3203	I-7	R3214	I-6	RX2104	D-7
C3429	D-2	Q3401	F-1	R3215	J-6	RX2105	D-7
C3430	B-3	Q3402	E-3	R3216	J-6	RX3246	F-10
C3431	A-2	Q3403	G-1	R3217	J-6	T3201	G-10
C3434	D-5	Q3404	G-2	R3218	H-7	TX3202A	J-10
C3436	E-4	Q3405	H-1	R3219A	J-6	X	H-4
C3450	H-1	R2102	A-8	R3222	B-7	Y	A-1
C3461	E-2	R2103	A-5	R3231	F-4	2A5	K-3
C3462	E-1	R2106	A-4	R3233	I-6	2B5	K-4
CR2104	A-5	R2107	E-8	R3234	H-6	2M	A-6
CR2105	B-9	R2108	E-8	R3239A	A-11	3D3	G-7
CR2106	A-8	R2109	B-8	R3241	D-9	3F3	K-5
CR2107	E-8	R2110A	B-8	R3244A	J-9	3G3	D-8
CR2108	A-4	R2111A	B-8	R3245	I-9	3R8	K-10
CR2199	B-8	R2112A	B-8	R3260	J-7	3S8	K-9
CR2501	I-4	R2113	A-9	R3261A	I-7	3T8	K-8
CR2502	I-3	R2114	A-6	R3262A	I-8	3V3	D-11
CR2503	I-1	R2115	E-7	R3401	D-4	3W3	D-10
CR2503A	I-4	R2116	E-6	R3402	D-4	5M	D-5
CR2504	J-5	R2117	E-6	R3403	B-4		
CR2505	J-4	R2118	D-6	R3404	C-5		
CR2506	J-2	R2119	D-5	R3405	A-5		
CR2514	I-3	R2120	F-6	R3406	C-5		
CR2525	I-1	R2122	E-5	R3407	B-6		

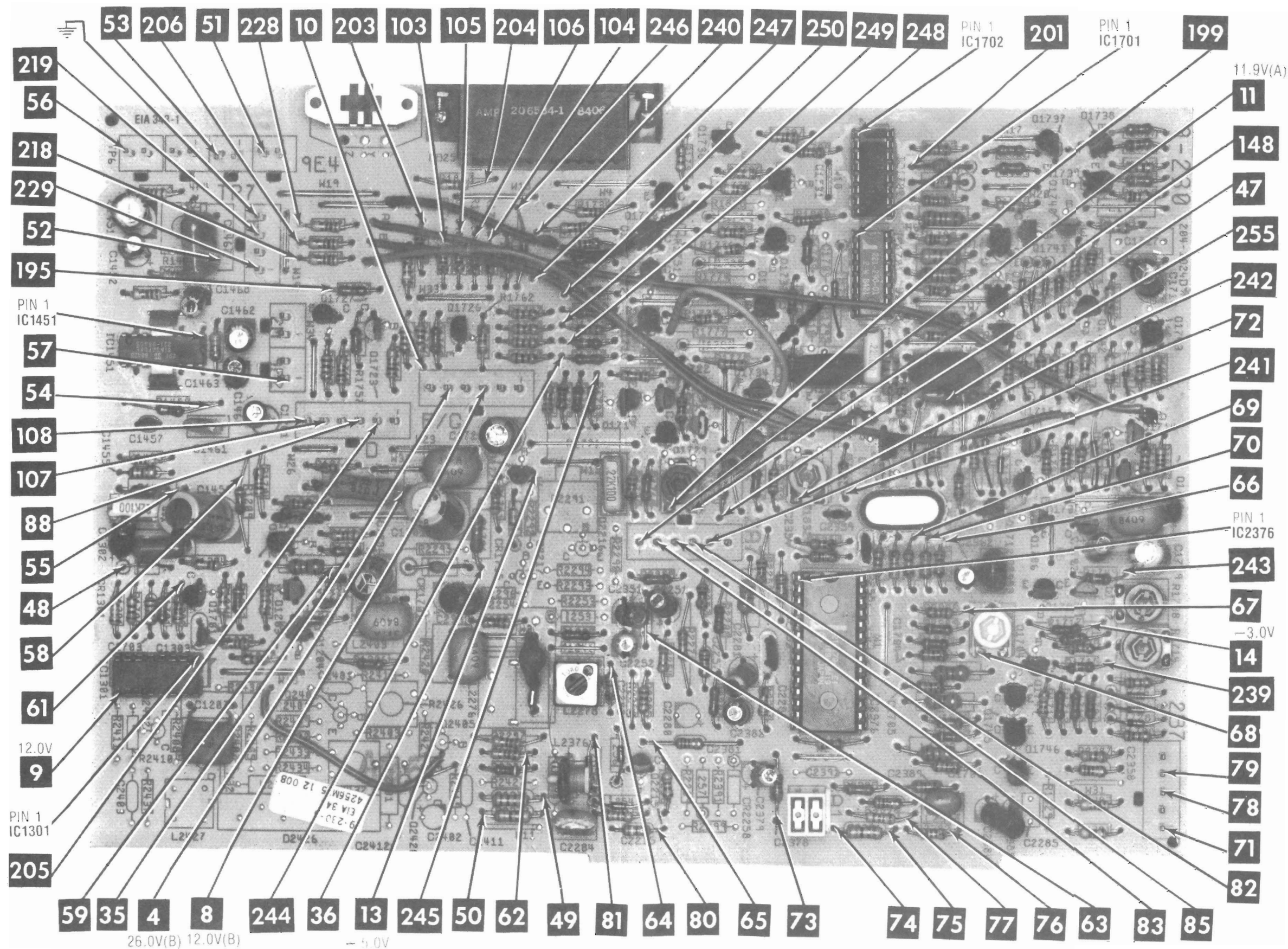


MAIN BOARD

AUDIO/VIDEO SYNC BOARD GridTrace LOCATION GUIDE

A1	S-19	CR1714	J-22	Q1741	D-25	R1747	F-12	R1836	K-16
C1201	I-5	CR1715	L-11	Q1742	F-26	R1748	G-12	R1837	H-19
C1203	M-17	CR1722	F-20	Q1743	G-28	R1750	H-12	R1838	O-22
C1204	N-7	CR1724	C-22	Q1744	P-24	R1755	E-9	R1839	O-23
C1206	M-8	CR1725	C-22	Q1745	Q-24	R1756	G-9	R1840	O-23
C1207	Q-4	CR1726	P-27	Q1746	R-24	R1757	G-7	R1841	B-27
C1302	L-1	CR1727	P-27	Q2215	R-15	R1758	E-10	R1842	D-7
C1303	O-3	CR1728	Q-27	R1206	Q-8	R1759	G-9	R1843	E-7
C1304	L-2	CR2254	S-14	R1207	L-7	R1760	G-9	R1844	E-7
C1452	E-2	CR2255	R-13	R1209	K-4	R1761	E-9	R1847	F-7
C1456	K-2	CR2256	R-14	R1211	L-7	R1762	G-11	R1848	E-9
C1459	K-3	CR2356	K-21	R1212	N-6	R1763	E-11	R1849	H-6
C1460	H-4	DB25	A-10	R1213	N-4	R1764	E-10	R1876	R-11
C1461	I-3	E1	E-5	R1214	N-4	R1765	H-7	R2215	S-14
C1462	Q-4	F/G	H-10	R1216	N-5	R1766	H-8	R2216	R-15
C1463	G-4	IC1301	P-2	R1217	O-5	R1767	K-17	R2251	N-11
C1467	D-3	IC1451	G-3	R1301	N-1	R1768	K-15	R2253	M-18
C1468	F-3	IC1701	E-21	R1302	N-3	R1769	K-18	R2254	O-15
C1701	K-9	IC1702	B-21	R1303	O-4	R1770	K-14	R2255	M-15
C1702	L-26	IC2376	O-19	R1304	M-3	R1772	C-17	R2257	N-16
C1703	N-2	L1202	M-6	R1452	C-2	R1773	D-17	R2276	R-11
C1704	O-22	L1701	O-23	R1453	J-2	R1775	F-16	R2278	O-16
C1705	P-22	L1702	P-22	R1454	K-2	R1776	E-17	R2285	P-15
C1707	K-14	L1708	R-22	R1455	I-2	R1778	H-17	R2286	Q-19
C1708	G-21	L2276	O-12	R1456	D-3	R1779	F-16	R2287	P-16
C1711	H-22	L2277	N-17	R1463	F-2	R1780	D-22	R2288	M-18
C1712	H-19	L2278	P-13	R1464	E-3	R1781	D-22	R2297	Q-11
C1718	E-28	L2376	R-13	R1701	N-2	R1782	E-22	R2299*	K-9
C1719	L-28	L2377	O-10	R1702A	L-6	R1783	H-21	R2354	L-19
C1720	I-11	L2378	S-22	R1702B	L-6	R1784	F-22	R2355	M-21
C1721	D-12	L2379	R-18	R1703	K-6	R1785	I-18	R2356	M-21
C1723	K-28	L2382	T-22	R1704	K-5	R1786	J-20	R2357	M-21
C1724	J-17	LX1201	N-8	R1705	N-2	R1787	F-22	R2358	M-22
C1786	R-22	LX1705	L-27	R1706	L-10	R1788	G-26	R2378	P-18
C1858	H-22	LX1706	J-10	R1707	P-26	R1789	H-18	R2379	S-21
C2215	T-15	Q1202	L-5	R1708	N-28	R1791	J-17	R2381	T-26
C2251	N-15	Q1203	M-6	R1709	M-26	R1792	G-18	R2383	S-26
C2257	O-16	Q1204	N-6	R1710	P-26	R1793	E-19	R2385	R-20
C2278	P-14	Q1701	N-3	R1711	K-11	R1794	F-18	R2387	R-26
C2281	P-17	Q1702	M-26	R1712	N-26	R1795	B-16	R2388	N-22
C2282	O-18	Q1703	M-25	R1713	P-25	R1796	C-17	R2389	N-22
C2284	S-13	Q1704	O-25	R1714	O-28	R1797	B-18	R2390	N-24
C2354	M-19	Q1705	L-26	R1715	O-26	R1799	B-19	RX1457*	K-7
C2355	L-20	Q1706	L-25	R1716	P-25	R1800	D-19	SW001	A-7
C2356	M-22	Q1707	K-24	R1717	O-26	R1801	C-22	TP6	B-2
C2358	R-26	Q1708	G-21	R1718	P-13	R1803	B-22	TP7	B-4
C2359	K-20	Q1709	F-24	R1719	J-26	R1804	H-27	2M1	G-6
C2362	M-23	Q1710	G-24	R1720	H-27	R1805	J-28	4P4	B-3
C2376	S-11	Q1711	J-24	R1721	P-22	R1806	H-25	9E4	B-5
C2377	S-11	Q1712	K-24	R1722	J-28	R1807	J-26	9F2	H-5
C2378	S-18	Q1713	J-21	R1723	J-23	R1808	H-25		
C2379	R-18	Q1714	I-27	R1724	H-26	R1810	C-10		
C2381	Q-16	Q1715	J-25	R1725	O-26	R1811	J-7		
C2382	Q-17	Q1716	J-21	R1726	J-25	R1812	B-24		
C2384	S-24	Q1717	D-15	R1727	J-22	R1815	C-27		
C2385	S-24	Q1718	E-15	R1728	H-24	R1816	C-27		
C2386	T-20	Q1719	I-14	R1729	Q-27	R1817	B-27		
C2388	S-21	Q1722	I-15	R1730	K-23	R1818	C-27		
C2389	R-22	Q1723	G-8	R1731	E-12	R1819	E-26		
C2390	N-10	Q1726	G-10	R1732	E-11	R1820	E-27		
C2393	M-24	Q1727	F-6	R1733	H-13	R1821	F-25		
CR1301	M-2	Q1728	J-11	R1734	D-13	R1822	F-27		
CR1701	M-8	Q1729	I-15	R1735	E-13	R1823	H-28		
CR1703	F-25	Q1730	I-16	R1736	H-14	R1824	C-24		
CR1704	H-27	Q1731	C-18	R1737	F-13	R1825	D-27		
CR1705	F-25	Q1732	D-18	R1738	E-13	R1826	D-24		
CR1706	H-26	Q1733	F-18	R1739	E-13	R1827	E-26		
CR1707	F-24	Q1734	H-18	R1740	F-13	R1830	Q-13		
CR1708	H-24	Q1735	I-19	R1741	G-13	R1831	I-16		
CR1709	J-26	Q1736	B-17	R1742	G-14	R1832	J-19		
CR1710	J-27	Q1737	B-25	R1743	H-13	R1833	K-18		
CR1711	J-23	Q1738	B-26	R1744	I-13	R1834A	H-23		
CR1712	J-24	Q1739	C-26	R1745	H-13	R1834B	I-23		
CR1713	J-22	Q1740	D-26	R1746	I-12	R1835	E-22		

* Located other side of board.



AUDIO/VIDEO SYNC BOARD

TROUBLESHOOTING AID

NOTE: Waveforms taken with triggered scope, Keyed-Rainbow generator. Schematic voltages measured with digital meter, no signal. Controls adjusted for normal operation.

PICTURE OR SOUND

NO PIC, NO SOUND, NO RASTER: Check AC power supply and sources generated from Horizontal Output Transformer (TX3204). Refer to "Troubleshooting" Power Supply and Horizontal circuits.

NO PIC, HAS SOUND, NO RASTER: Check Horizontal Output Transformer (TX3204) sources and Video circuit. Refer to "Troubleshooting" Horizontal and Video circuits.

NO PIC, HAS SOUND, HAS RASTER: Refer to "Troubleshooting" Video circuit.

HAS PIC, NO SOUND: Refer to "Troubleshooting" Audio circuit.

LOW OR EXCESSIVE BRIGHTNESS: Check Video and Luminance circuits. Refer to "Troubleshooting" Video circuit.

SWEEP

NO RASTER, HAS SOUND: Check HV rectifier (Part of Horizontal Output Transformer TX3204) and Horizontal circuit. Refer to "Troubleshooting" Horizontal circuit.

NO RASTER, NO SOUND: Refer to "Troubleshooting" Horizontal circuit.

NO VERT DEFLECTION: Refer to "Troubleshooting" Vertical circuit.

POOR VERT LIN OR FOLDOVER: Refer to "Troubleshooting" Vertical circuit.

POOR HORIZ LIN OR FOLDOVER: Refer to "Troubleshooting" Horizontal circuit.

NARROW PICTURE: Refer to "Troubleshooting" Horizontal circuit.

VERT OFF FREQUENCY: Refer to "Troubleshooting" Vertical circuit.

HORIZ OFF FREQUENCY: Refer to "Troubleshooting" Horizontal circuit.

SYNC

NO VERT/HORIZ SYNC: Refer to "Troubleshooting" Sync circuit.

RASTER

YELLOW (NO BLUE): Check Chroma and Blue Output circuits. Refer to "Troubleshooting" Raster circuit.

CYAN (NO RED): Check Chroma and Red Output circuits. Refer to "Troubleshooting" Raster circuit.

MAGENTA (NO GREEN): Check Chroma and Green Output circuits. Refer to "Troubleshooting" Raster circuit.

COLOR (B/W operating normally)

NO COLOR: Refer to "Troubleshooting" Chroma circuit.

NO GREEN: Check Chroma and Green Output circuits. Refer to "Troubleshooting" Raster circuit.

NO BLUE: Check Chroma and Blue Output circuits. Refer to "Troubleshooting" Raster circuit.

NO RED: Check Chroma and Red Output circuits. Refer to "Troubleshooting" Raster circuit.

TROUBLESHOOTING

POWER SUPPLY

Check the AC Fuse (FX3201). If Fuse FX3201 is open, check for possible shorts at Bridge Rectifier Diodes (CR3231 thru CR3234), Capacitors C3251 thru C3253, Degaussing Coil (L3201), Line Choke Coil (TX3202) and Connectors 3R8 and 3S8. Use the "Resistance Measurements" chart to check for a shorted Horizontal Output Transistor (Q3208) or Vertical Output Transistors (Q2101 and Q2102).

Apply 120VAC and check for 120VAC from the cathode of Diode CR3232 to the cathode of Diode CR3233. If the 120VAC is missing, check the Power Switch (S3201), Coil TX3202, Fuse FX3201, and Connectors 3R8 and 3S8. If the 120VAC is present, check for 160V (measured to common tie point) at pin 2 of Connector 3V3. If the 160V is missing, recheck all the parts mentioned above.

If the monitor is not operating when turned On, check for 26.9V at the cathode of Diode CR3224 and check for 12.1V at the cathode of Diode CR3223. If the voltages are missing, check Diodes CR3219, CR3224 and CR3223, Electrolytic C3247 and Start Up Transformer (T3201), check for possible shorts to ground. Check the source voltages developed from the Horizontal Output Transformer (TX3204) and rectified by Diodes CR1701, CR3235, CR3214, CR3208A and CR3217. If the source voltages are not regulated, check the voltages and components associated with pins 6 and 8 of the Vertical/Horizontal Processor IC (IC3401). If all voltages are missing, check the voltage at the base of the shutdown Switch Transistor (QX3202) to determine if the monitor is in shutdown, refer to the "High Voltage Shutdown Defeat" section of the Service Information. If the monitor is not in shutdown, refer to the "Horizontal" section of this Troubleshooting guide.

HORIZONTAL

To determine if the monitor is in shutdown, check the voltage on the base of the shutdown Switch Transistor (QX3202). The voltage should measure about 0.78V if the monitor is in shutdown. If the monitor is in shutdown, refer to the "High Voltage Shutdown Defeat" section of the Service Information.

Check for 160V (measured to common tie point) at pin 2 of Connector 3V3. If the 160V is missing, refer to the "Power Supply" section of this Troubleshooting guide.

Inject a horizontal signal at the base of the Horizontal Output Transistor (Q3208). If the high voltage returns, check the sweep oscillator circuit at pins 23, 24 and 25 of the Vertical/Horizontal Processor IC (IC3401). Check voltages, waveforms and components associated with pins 3, 4, 5 and 16 thru 21 of IC3401 and the Reverse Driver Transistor (Q3209). If high voltage is missing, check Transistor Q3208, Diodes CR3212, CR3211B and CR3205, Deflection Yoke (DY1), Connector 3R3, Horizontal Output Transformer (TX3204) and associated components. Check for shorted sources developed from Transformer TX3204 that could load down the horizontal circuit. Check the sources rectified by Diodes CR1701, CR3235, CR3214, CR3208A and CR3217. The high voltage rectifier is part of Transformer TX3204 and may be defective.

Poor horizontal linearity or foldover may be caused by the condition of Capacitors C3221, CX3211, CX3223, CX3229 and CX3227 and Diodes CR3211B and CR3212.

If the horizontal sweep is off frequency, check the sweep oscillator circuit at pins 23, 24 and 25 of IC3401 and check the adjustment of the Horizontal Oscillator Coil (L3402).

VERTICAL

No vertical sweep. Check voltages, waveforms and components associated with the Vertical Output Transistors (Q2101 and Q2102). If the voltage is low or missing at the collector of Transistor Q2102, check Diodes CR2106 and CR2107, Pump-Up Transistor (Q2104), Electrolytic C2103 and associated circuitry. Inject a vertical signal at pin 14 of the Vertical/Horizontal Processor IC (IC3401). If the vertical deflection returns, check voltages, waveforms and components associated with pins 1, 7 and 11 thru 14 of IC3401. If the vertical deflection does not return, check voltages, waveforms and components associated with Transistors Q2101, Q2102 and Q2104 and the Retrace Detector Transistor (Q2103). Check Diodes CR2105, CR2106 and CR2107 and check the Deflection Yoke (DY1).

Vertical linearity or foldover problems can be caused by vertical feedback and bias circuits. Check Electrolytics C2103, C2105, C2106, C2131, C2152 and C3277, Pincushion Transformer (TX3251) and associated components. Use the "Resistance Measurements" chart to check for possible changes in feedback and bias circuitry resistances.

If the vertical is off frequency, check the voltages and components associated with pins 10, 12, 23, 24 and 25 of IC3401 and check the frequency of the sweep oscillator at pin 25 of IC3401.

VIDEO INPUT JACK

Connect a video color bar signal to the Video 75 Ohm Input Jack (P7) and check for a waveform at pin 2 of Chroma/Luminance IC (IC2376). If the waveform is missing, check voltages, waveforms and components associated with Video Amp IC (IC1301), Video Amp Transistors (Q1204, Q1203 and Q1202), Delay Line (L2276) and Electrolytic C2251.

If the waveform is present at pin 2 of IC2376, check waveforms at pins 19, 20 and 21 of IC2376. If the waveforms are missing, check voltages, waveforms and components associated with pins 22 and 23 of IC2376 and check IC2376 by substitution.

If the waveforms are present at pins 19, 20 and 21 of IC2376, check for waveform at the collector of the Red, Green and Blue Cutoff Transistors (Q1702, Q1703 and Q1704). If the waveform is missing at the collector of Transistor Q1702, check voltages and components associated with Red Amp Transistor (Q1744) and Transistor Q1702. If the waveform is missing at the collector of Transistor Q1703, check voltages and components associated with Green Amp Transistor (Q1745) and Transistor Q1703. If the waveform is missing at the collector of Transistor Q1704, check voltages and components associated with Blue Amp Transistor (Q1746) and Transistor Q1704. If the waveforms are all present but video is still missing, check voltages, waveforms and components associated with Red Amp Transistors (Q1705 and Q1711), Green Amp Transistors (Q1706 and Q1712) and Blue Amp Transistors (Q1707 and Q1713).

TROUBLESHOOTING (Continued)

VIDEO RGB BOARD

Connect a color bar signal from an RGB generator to the RGB Input Connector (DB25). Use a scope and check the waveform at the base of Red Amp Transistor (Q1731), waveform at the base of Green Amp Transistor (Q1732) and waveform at the base of Blue Amp Transistor (Q1733). If any or all of these waveforms are missing, check waveforms, voltages and components associated with Red, Green and Blue Driver (Standard) Transistors (Q1720, Q1721 and Q1722) or Red, Green and Blue Driver (Apple) Transistors (Q1717, Q1718 and Q1719) according to input terminals and signal path used.

If the waveforms are present at the base of Transistors Q1731, Q1732 and Q1733, check waveforms at pins 15, 12 and 9 of the RGB Gain Control IC (IC1701). If these waveforms are missing, check voltages, waveforms and components associated with IC1701, Transistor Array IC (IC1702) and Transistors Q1731, Q1732 and Q1733.

If the waveforms are present at pins 15, 16 and 17 of IC1701, check the waveforms at the emitter of Red, Green and Blue Amp Transistors (Q1714, Q1715 and Q1716). If these waveforms are missing, check voltages, waveforms and components associated with Red Amp Transistor (Q1708 and Q1714), Green Amp Transistors (Q1709 and Q1715) and Blue Amp Transistors (Q1710 and Q1716).

No red. Check for a waveform at pin 8 of the CRT socket. If the waveform is missing, check voltages, waveforms and components associated with Red Output Transistor (Q5102), Red Amp Transistors (Q2507, Q2502, Q2501 and Q1714) and White/Green Switch (SW001).

No green. Check for a waveform at pin 6 of the CRT Socket. If the waveform is missing, check voltages, waveforms and components associated with Green Output Transistor (Q5103), Green Amp Transistors (Q2508, Q2504, Q2503 and Q1715).

No blue. Check for a waveform at pin 11 of the CRT Socket. If the waveform is missing, check voltages, waveforms and components associated with Blue Output Transistor (Q5101), Blue Amp Transistors (Q2509, Q2506, Q2505 and Q1716) and White/Green Switch (SW001).

If the intensity of color is incorrect, check voltages, waveforms and components associated with Intensity Transistor (Q1736), IC1702 and associated circuitry.

RASTER

Check the CRT and CRT voltages and waveforms.

If the raster is magenta, check voltages, waveforms and components associated with the Green Output Transistor (Q5103) and pin 6 of the CRT.

If the raster is yellow, check the voltages, waveforms and components associated with the Blue Output Transistor (Q5101) and pin 11 of the CRT.

If the raster is cyan, check the voltages, waveforms and components associated with the Red Output Transistor (Q5102) and pin 8 of the CRT.

If the raster has a keystone shape, check the Deflection Yoke (DY1).

If the raster has height or width problems, refer to the "Vertical", "Horizontal" or "Power Supply" sections of this Troubleshooting guide.

AUDIO

Inject an audio signal at pin 2 of Connector 9E4 and check for sound from the speaker. No sound, from speaker, check for 23.7V at pin 10 of Audio IC (IC1451). If 23.7V is missing at pin 10 of IC1451, check Resistor RX1457 and check for shorted IC1451. Check voltages and components associated with IC1451. Also check the speaker and Volume Control (R1400).

SYNC

No vertical or horizontal sync. Check waveforms at pins 1 and 27 of the Vertical/Horizontal Processor IC (IC3401). Check voltages and components associated with pins 1 and 25 thru 28 of IC3401.

No horizontal sync. Check voltages, waveforms and components associated with pins 25, 26 and 27 of IC3401, Sync Amp Transistors (Q3403 and Q3404).

No vertical sync. Check voltages, waveforms and components associated with pins 1 and 28 of IC3401, Sync Amp Transistors (Q3401 and Q3402).

CHROMA

No color when a composite video signal is applied to the monitor thru the Video 75 Ohm Input Jack (P7). Check voltages, waveforms and components associated with pins 2, 4, 10, 11, 19, 20, 21, 24 and 26 of Chroma/Luminance IC (IC2376). If the waveform is incorrect at pin 2 of IC2376, check voltages, waveforms and components associated with Video Amp IC (IC1301) and Video Amp Transistors (Q1202, Q1203 and Q1204). Check the 3.58MHz Oscillator Crystal (CR2356) by checking the waveforms and components associated with pins 24, 26 and 28 of IC2376.

If there is no color when using RGB input and green is the only color present, check the White/Green Switch (SW001).

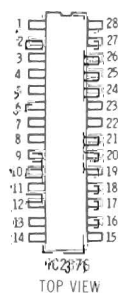
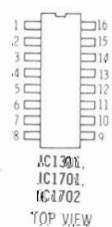
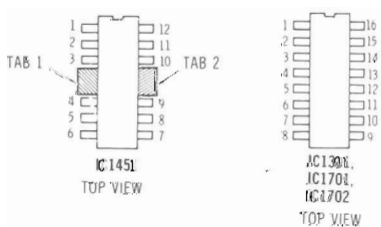
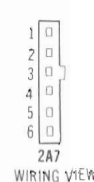
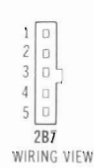
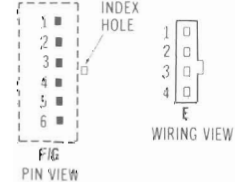
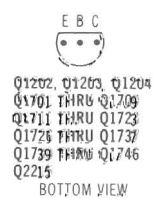
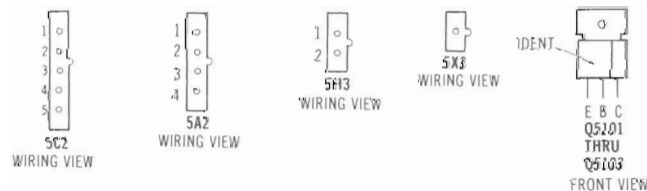
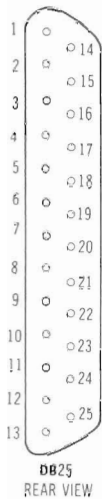
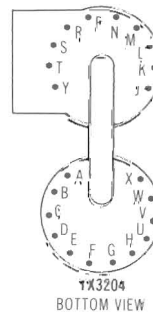
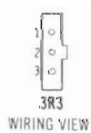
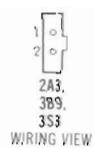
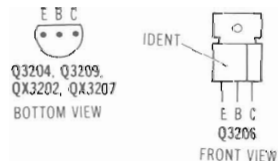
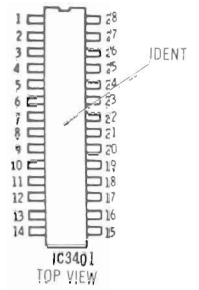
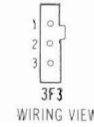
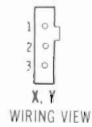
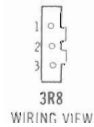
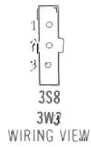
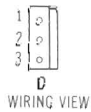
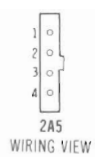
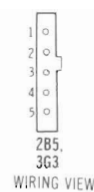
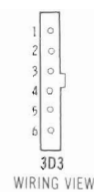
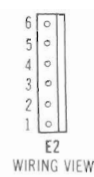
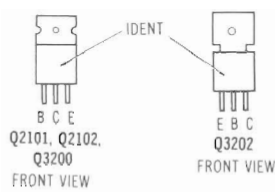
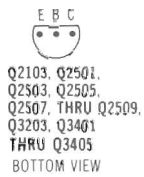
RESISTANCE MEASUREMENTS

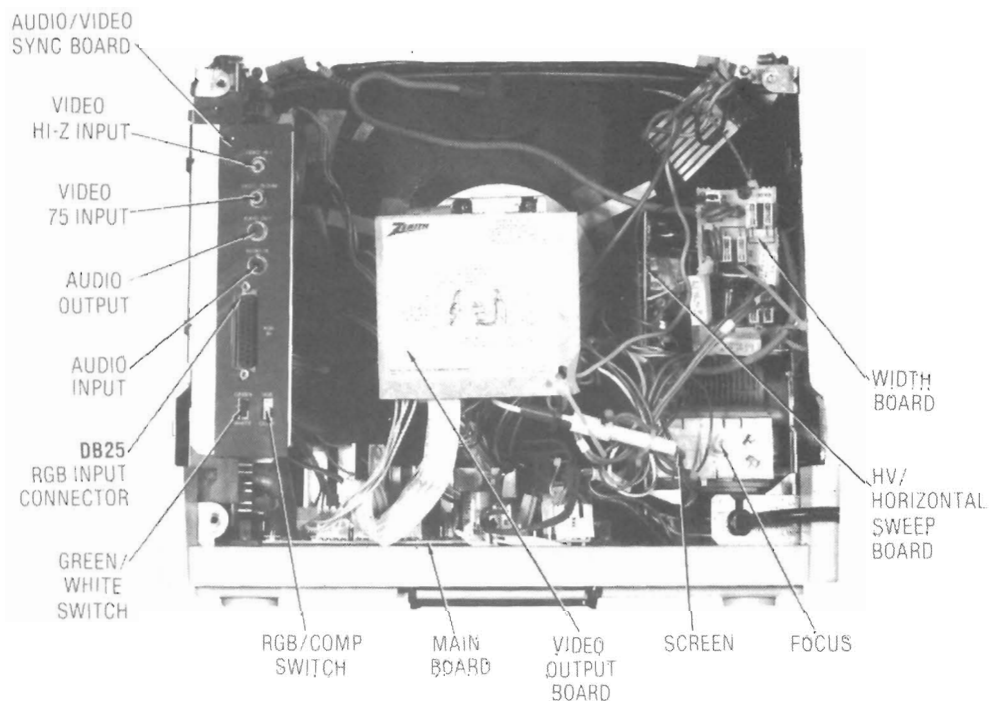
MEASUREMENTS TAKEN WITH LOW POWER OHMS METER														
ITEM	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	PIN 9	PIN 10	PIN 11	PIN 12	PIN 13	PIN 14
IC1301	2702	INF	4283	11K	0	INF	8702	INF	94	INF	INF	INF	INF	3850
													PIN 15	PIN 16
													INF	10K
IC1451	0	0	15K	4790	7052	3470	INF	INF	INF	216	4000	INF		
IC1701	INF	7090	INF	7340	INF	7340	1	INF	10K	1218	364	7580	1219	449
													PIN 15	PIN 16
													7615	1220
IC1702	INF	INF	INF	6687	6590	INF	INF	6690	INF	INF	6690	INF	INF	INF
													PIN 15	PIN 16
													6690	INF
IC2376	2000	INF	7500	INF	1976	INF	INF	0	1447	4340	INF	8190	1218	6245
	PIN 15	PIN 16	PIN 17	PIN 18	PIN 19	PIN 20	PIN 21	PIN 22	PIN 23	PIN 24	PIN 25	PIN 26	PIN 27	PIN 28
	11K	3290	102	6976	4423	4400	4426	94	19K	8194	1450	16K	410	16K
IC3401	11K	0	4366	24K	1036	11K	409	10K	INF	643	INF	60K	7048	997
	PIN 15	PIN 16	PIN 17	PIN 18	PIN 19	PIN 20	PIN 21	PIN 22	PIN 23	PIN 24	PIN 25	PIN 26	PIN 27	PIN 28
	0	3456	313	5316	11K	22K	33K	0	18K	19K	406	69K	3233	INF
V1	INF	-	-	102K	INF	INF	INF	INF	FIL	FIL	INF	0		
ITEM	E	B	C		ITEM	E	B	C		ITEM	E	B	C	
Q1202	INF	4570	0		Q1727	0	10K	17K		Q2503	INF	1320	0	
Q1203	INF	315	3358		Q1728	6583	INF	INF		Q2504	283	1498	INF	
Q1204	476	3358	101		Q1729	1000	24K	1115		Q2505	INF	1321	0	
Q1701	0	1793	400		Q1730	8120	4846	94		Q2506	287	1369	INF	
Q1702	9666	7790	18K		Q1731	INF	10K	INF		Q2507	INF	INF	0	
Q1703	9564	7800	18K		Q1732	INF	10K	INF		Q2508	INF	INF	0	
Q1704	9615	7800	18K		Q1733	INF	10K	INF		Q2509	INF	INF	0	
Q1705	8577	18K	94		Q1734	7340	2029	94		Q3200	INF	970	3000(1)	
Q1706	8607	18K	94		Q1735	INF	769	INF		Q3201	0	120	1270	
Q1707	8570	18K	94		Q1736	INF	6020	94		Q3202	INF	2M	INF	
Q1708	2318	7612	6590		Q1737	609	2240	0		Q3203	911	4313	INF	
Q1709	2325	7590	6590		Q1738	294	609	1102		Q3204	407	5170	3200	
Q1710	2325	7586	6590		Q1739	7521	1102	94		Q3206	0	1132	89K(1)	
Q1711	1699	8577	6588		Q1740	566	7520	8130		Q3207	468	2200	7860	
Q1712	1683	8607	6594		Q1741	2353	8128	6590		Q3208	.1	1.6	INF	
Q1713	1683	8560	6590		Q1742	7848	714	8384		Q3209	0	2224	INF	
Q1714	1153	9247	6590		Q1743	2360	8380	6590		Q3401	1000	INF	16K	
Q1715	1180	9279	6588		Q1744	22K	4430	94		Q3402	196	66K	9900	
Q1716	1177	9310	6590		Q1745	22K	4404	94		Q3403	3950	INF	7880	
Q1717	10K	3064	94		Q1746	22K	4429	94		Q3404	1000	29K	91	
Q1718	10K	3106	94		Q2101	0	1000	INF		Q3405	0	3630	6770	
Q1719	10K	3138	94		Q2102	348	INF	INF		Q5101	INF	15K	INF	
Q1720	10K	4820	94		Q2103	180	4745	5226		Q5102	INF	12K	INF	
Q1721	10K	4810	94		Q2104	154	4892	76		Q5103	INF	10K	INF	
Q1722	10K	4848	94		Q2215	INF	50K	10K		QX3202	0	10K	1134	
Q1723	0	3864	4084		Q2501	INF	1305	0						
Q1726	0	3876	4073		Q2502	285	1594	INF						

ZENITH
MODEL ZVM-135

(1) This reading will vary depending upon the condition of the electrolytic in the circuit.

TERMINAL GUIDES





CABINET-REAR VIEW DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

Remove four screws holding cabinet back, lift up and remove back from set. Lay set facedown and remove two screws from cabinet bottom. Lift cabinet top from set. Remove two screws holding top brace to chassis. Remove two screws holding rear jack panel and two screws holding Audio/Video Sync Board and remove board from set.

Remove four screws holding HV/Horizontal Sweep Board to bottom chassis. Disconnect all cables from HV/Horizontal Sweep Board and lift board assembly from cabinet.

Remove four screws holding Main Board to cabinet bottom.

Release two plastic retaining clips holding Main Board. Disconnect all cables from Main Board and lift board from cabinet.

CRT REMOVAL

Follow "Chassis Removal" procedure and lay set facedown on a soft protective surface. Disconnect HV anode lead, degaussing coil Connector (3T8), deflection yoke Connector (3S3A and 2A3), speaker Connector (4P4), front panel control Connectors (3S8, TP7, 2A7 and 2B7). Remove four screws holding cabinet front to chassis. Disconnect Power Indicator Connector (Z) and remove cabinet front from set. Remove four screws holding CRT to chassis. Disconnect ground connectors and lift CRT from set.

SERVICING IN THE FIELD

CRT IMPLOSION PROTECTION AND CLEANING

Implosion protection is an integral part of the picture tube, cleaning accomplished without CRT removal.

FUSE DEVICES

A 4-amp fuse is used for AC line protection. (See Placement Chart.)

WIDTH

The width may be varied by adjusting the width coil (LX3261). (See Placement Chart.)

Coarse adjustment of width may be varied by connecting the width jumper to various width points P1 and P2. (See Placement Chart.)

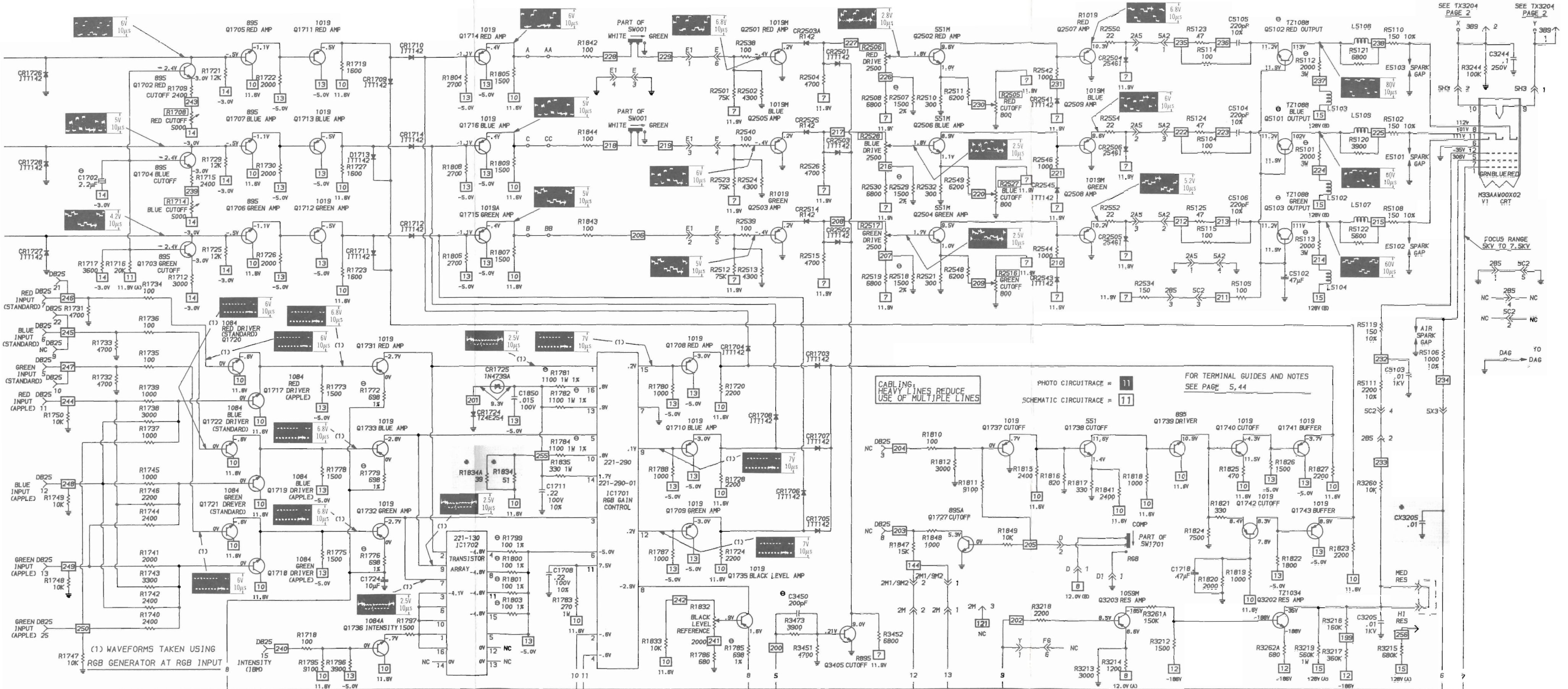
FOCUS

The focus may be varied by a focus control (RX3499A). (See photo, Cabinet - Rear View.)

CENTERING

Horizontal centering is accomplished by proper adjustment of the horizontal centering control (R3441). (See Placement Chart.)

Vertical centering is accomplished by proper adjustment of the vertical centering control (R2125). (See Placement Chart.)



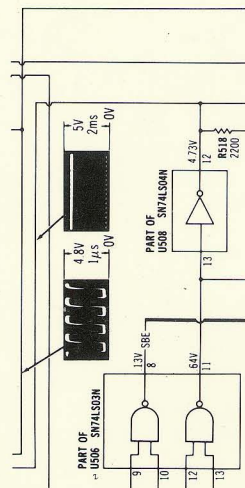
If seal is broken, nonreturnable.

SAWS

COMPUTERFACTS™ put easy to use, informative technical data right at your fingertips. Each edition includes specific service information on the individual component, along with some overall troubleshooting hints.

The following information is just a sample of the many valuable time saving features contained in this exclusive Sams **COMPUTERFACTS** publication:

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- SAMS famous industry accepted standardized notation schematics containing CIRCUIT TRACE[®], GRID TRACE[™], waveforms, voltages and stage identification.

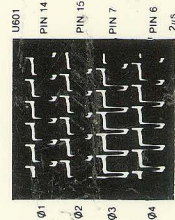


- Step by Step Troubleshooting guides the technician through the necessary procedures to quickly locate the problem.

TROUBLESHOOTING

MICROPROCESSOR CHIP (CPU) OPERATION

Verify the processor is functioning by checking the signals on the address lines (pins 10 thru 24 of IC U6000) and the data lines (pins 41 thru 56) using a logic probe or a scope. If a logic probe is used, refer to the "Logic Chart" for the correct readings. If a scope is used, the waveforms on the address lines (except pins 22 and 23) which have no signal in Power Up mode) should be similar to Figure 1. The waveforms on the data lines should be similar to Figure 2.

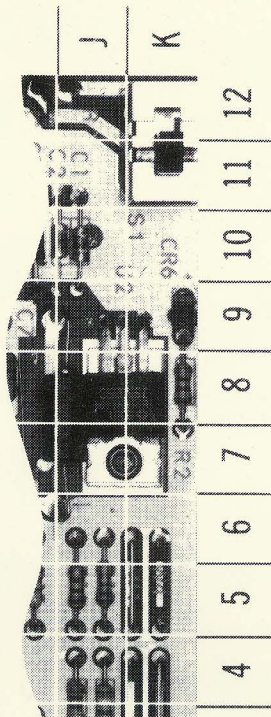


- Logic Chart containing logic probe readings to isolate defective circuitry and components.

LOGIC

PIN NO.	IC U100	PIN NO.	IC U100	PIN NO.	IC U102	IC U103	IC U104	IC U105	IC U106	IC U107	IC U108	IC U109
1	P	21	P	1	P	P	P	P	P	P	P	P
2	P	22	P	2	P	P	P	P	P	P	P	P
3	P	23	P	3	P	P	P	P	P	P	P	P

- Quick Component Location using the SAMS exclusive GRIDTRACE, CIRCUITTRACE, and component photographs:



- Complete Components Parts List in an easy to use format with field replacements shown when possible. SAMS unique semiconductor, chip and IC cross-reference gives you many replacements to choose from and is available at your Electronic Distributor.

SEMICONDUCTORS (Select replacement for best results)

ITEM No.	TYPE No.	MFR. PART No.	REPLACEMENT DATA						
			EGG PART No.	GENERAL ELECTRIC PART No.	MOTOROLA PART No.	NTE PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
0102	IS553	1149-25 76	EGG919	GE-514	1N4935	NTE519	SK9091/1777	MEP926/519	103-131
0103	IN60FM	1149-2227	EGG109	IN60	1N609	NTE109	SK9098	MEP134/109	103-12001
D201	IN4004G	1201-4205	EGG116	GE-5044	1N4004	NTE116	SK3312	MEP157	212-76-02
D901	IS553	1149-25 76	EGG919	GE-514	1N4935	NTE519	SK9091/1777	MEP925/519	103-131

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