KEYBOARD
POWER SUPPLY
SYSTEM BOARD

See Folder CSCS4

GMS BOARD

See Folder CSCS4-B

DISK DRIVE

See Folder CSCS4-C

GGS BOARD

See Folder CSCS4-A

CSCS4-D
EPSON MODEL QX-10

SAFETY PRECAUTIONS

See page 5

INDEX

SAMS™ Howard W. Sams & Co., Inc.
4300 West 62nd Street, P.O. Box 7092, Indianapolis, Indiana 46206 U.S.A.

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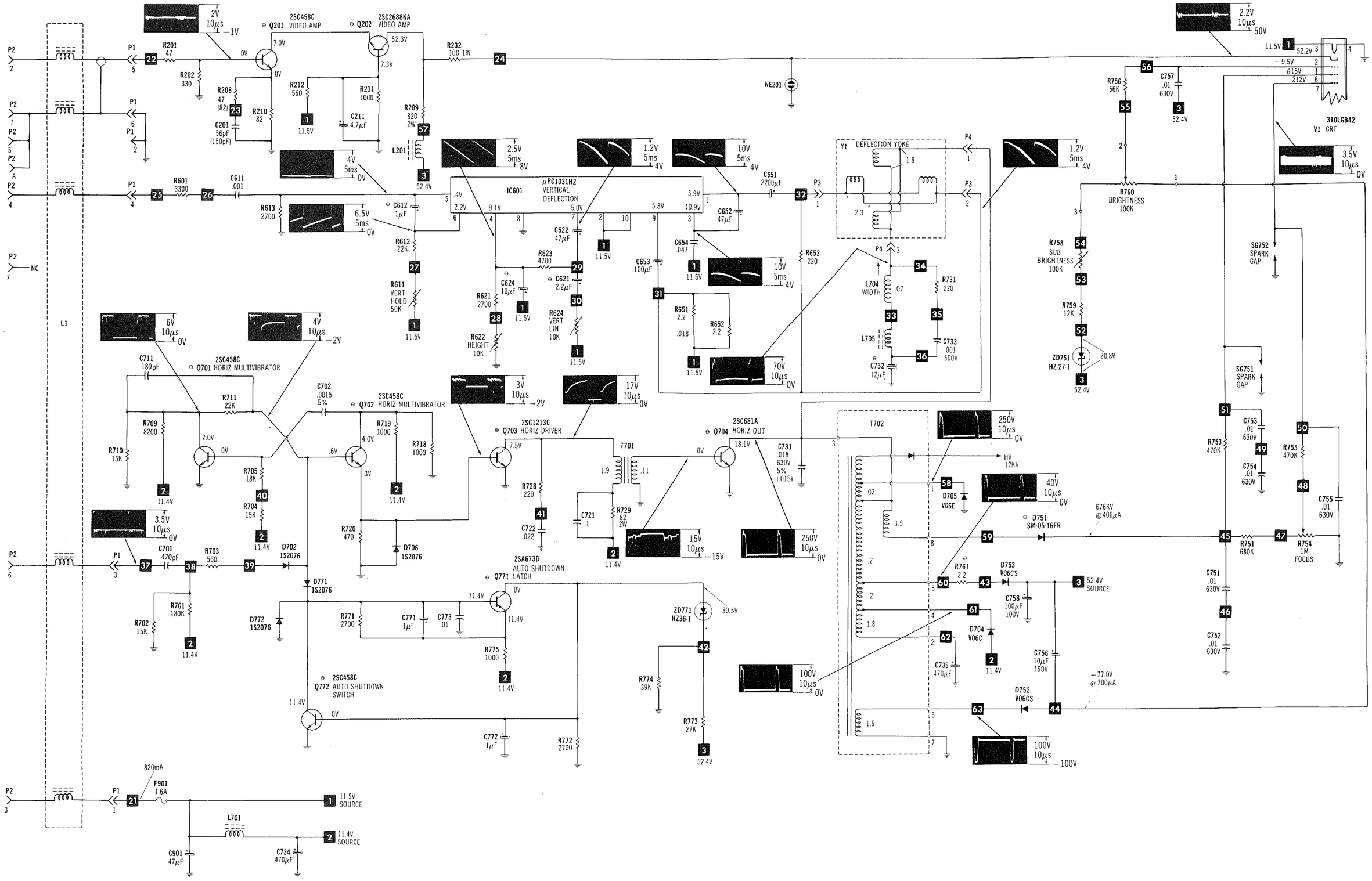


A PHOTOFACT STANDARD NOTATION SCHEMATIC WITH CIRCUITRACE®

TROUBLESHOOTING

POWER SUPPLY

Check for 11.5V at both ends of Fuse F901. If Fuse F901 is bad, check electrolytics C901, C734 and C735 for shorts. Check diodes D704, D705 and D706. Check Horizontal Output Transistor (Q704), Horizontal Driver Transistor (Q703) and Horizontal Output Transformer (T702). Replace defective parts.

Check for 18.1V at the collector of transistor Q704. If the voltage is missing, check transistor Q704, Transformer T702 and diode D705. If the voltage is present at the collector of transistor Q704, use a High Voltage probe and check for 12KV at the anode of CRT. If high voltage is missing, refer to the "HORIZONTAL" section of this troubleshooting guide. If high voltage is present, check B+ voltages developed by transformer T702. Check for 676V at the cathode of diode D751, – 77.0V at the anode of diode D752 and 52.4V at the cathode of diode D753.

Check the HV shutdown circuit. If the HV shutdown circuit is activated, refer to the "HV Shutdown Circuit Description" and "HV Shutdown Circuit Defeat" sections of this Troubleshooting guide.

HORIZONTAL

No high voltage. Check connector P2 from the Computer. Turn On Computer. Check for a horizontal waveform at pin 3 of connector P1. If the horizontal waveform is missing, check the Computer. If the waveform is present, check the voltage at collector of Auto Shutdown Latch Transistor (Q771). If the voltage is 0.6V or more, the HV shutdown circuit is activated. Refer to the "HV Shutdown Circuit Description" of this Troubleshooting guide.

Check for a horizontal waveform at the base of Horizontal Multivibrator Transistor (Q702). Check for a horizontal waveform at the base of Horizontal Output Transistor (Q704). If the waveform is missing at the base of Q704, check voltages, waveforms and components associated with Horizontal Driver Transistor (Q703), diode D706 and Horizontal Driver Transformer (T701). Inject a horizontal signal at the base of transistor Q704. If the high voltage returns, check voltages, waveforms and components associated with transistors Q701, Q702 and Q703. If the high voltage does not return, check transistor Q704, diode D705, capacitor C731 and transformer T702.

VERTICAL

No vertical sweep. Check for 11.5V at pins 2 and 10 of Vertical Deflection IC (IC601). If the B+ voltage is missing, refer to the "Power Supply" section of this troubleshooting guide. If the 11.5V is present at pins 2 and 10 of IC601, check for a vertical waveform at pin 5 of IC601. If the waveform is present, check voltages, waveforms and components associated with IC601. Check electrolytic C651 and the vertical winding of the Deflection Yoke (Y1). Poor vertical linearity or foldover problems may be caused by the condition of electrolytics C621, C622, C624, C651, C652 and C653.

NO DISPLAY

High voltage is present, 12KV at the anode of CRT, but there is no display. Check for 52.4V at the cathode of diode D753. If the voltage is missing, check zener diode ZD751 by substitution, electrolytic C756, Sub Brightness Control (R758) and Brightness Control (R760). Check CRT filament and the CRT. Check for a video waveform at base of Video Amp Transistor (Q201). If the waveform is present, check for a video waveform at pin 2 of the CRT.

Video waveform is missing at base of Q201. Check the video section of the Computer. Check connector between the Computer and the Monitor.

HV SHUTDOWN CIRCUIT DESCRIPTION

When the high voltage exceeds safety limits, the B+ voltage at the cathode of diode D753 will increase to approximately 60V, causing zener diode ZD771 to conduct. Auto Shutdown Switch Transistor (Q772) turns On, grounding the Horizontal Multivibrator through diode D771, causing shutdown. Auto Shutdown Latch Transistor (Q771) turns On causing Q772 to stay On, keeping the high voltage shutdown.

HV SHUTDOWN CIRCUIT DEFEAT

To defeat the shutdown circuit disconnect one end of the zener diode ZD771. Use extreme caution. Excessive high voltage may damage the CRT, high voltage transformer, and other components. **NEVER** leave the shutdown circuit defeated after the unit is repaired.

TROUBLESHOOTING AID

NOTE: Waveforms taken with triggered scope, Computer in Power Up mode, Screen prompting "INSERT DISKETTE". Schematic voltages measured with digital meter, no signal. Controls adjusted for normal operation.

PICTURE OR SOUND

NO PIC, NO RASTER: Check AC power supply, sources generated from Horizontal Output Transformer (T702) and Video circuit. Refer to "Troubleshooting" Power Supply, Video and Horizontal circuits.

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

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

SWEEP

NO RASTER: Check HV Rectifier, Rectifier (Part of T702) and Horizontal circuit. Refer to "Troubleshooting" Horizontal circuit.

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

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

MISCELLANEOUS ADJUSTMENTS

SUB BRIGHTNESS ADJUSTMENT

Set the brightness control to maximum. Adjust Sub Brightness Control (R758) for maximum brightness without retrace lines.

SAFETY PRECAUTIONS

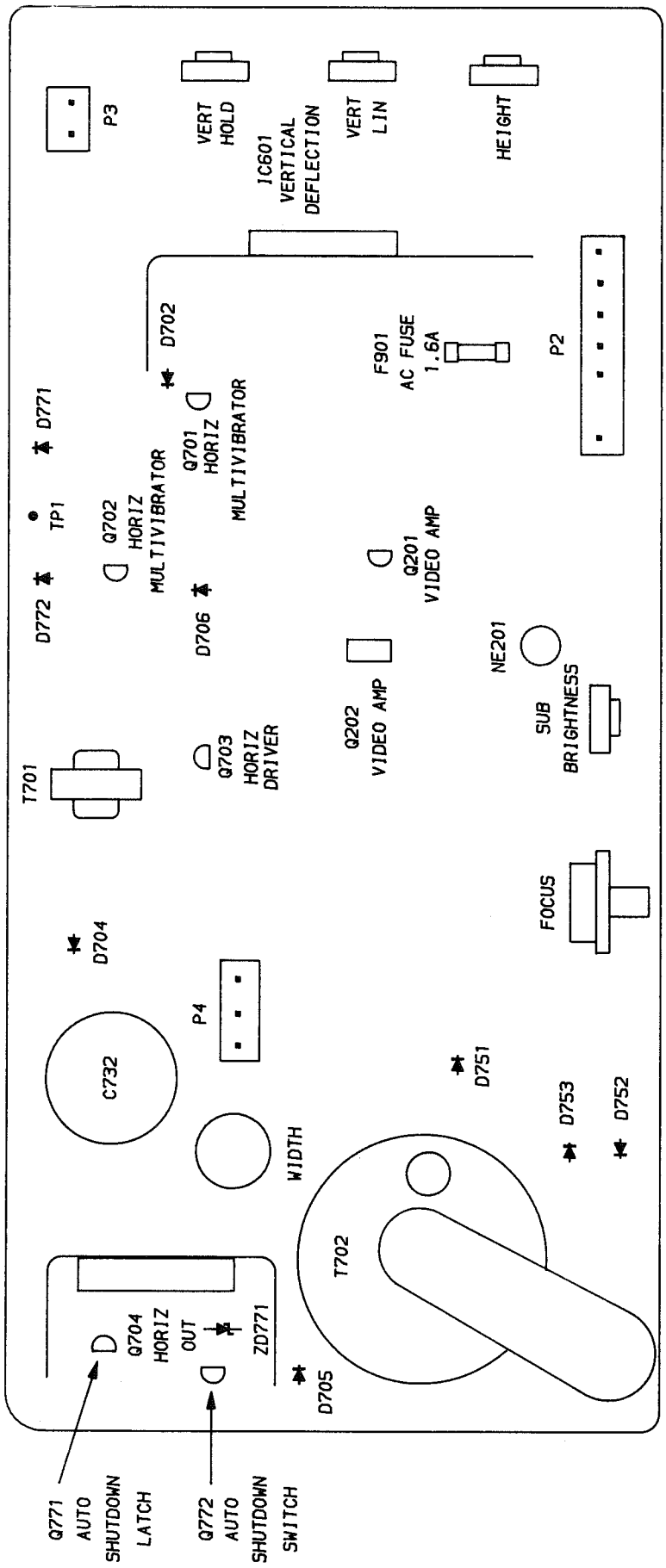
1. Use an isolation transformer for servicing.
2. Maintain AC line voltage at rated input.
3. Remove AC power from the monitor before servicing or installing electrostatically sensitive devices. Examples of typical ES devices are integrated circuits and semiconductor "chip" components.
4. Use extreme caution when handling the printed circuit boards. Some semiconductor devices can be damaged easily by static electricity. Drain off any electrostatic charge on your body by touching a known earth ground. Wear a commercially available discharging wrist strap device. This should be removed prior to applying power to the unit under test.
5. Use a grounded-tip, low voltage soldering iron.
6. Use an isolation (times 10) probe on scope.
7. Do not remove or install boards with monitor AC power On.
8. Do not use freon-propelled sprays. These can generate electrical charges sufficient to damage semiconductor devices.
9. This monitor is equipped with a grounded three-pronged AC plug. This plug must fit into a grounded AC power outlet. Do not defeat the AC plug safety feature.
10. Periodically examine the AC power cord for damaged or cracked insulation.
11. The monitor cabinet is equipped with vents to prevent heat build-up. Never block, cover, or obstruct these vents.
12. Instructions should be given, especially to children, that objects should not be dropped or pushed into the vents of the cabinet. This could cause shock or equipment damage.
13. Never expose the monitor to water. If exposed to water turn the unit off. Do not place the monitor near possible water sources.
14. Never leave the monitor unattended or plugged into the AC outlet for long periods of time. Remove AC plug from AC outlet during lightning storms.
15. Do not allow anything to rest on AC power cord.
16. Unplug AC power cord from outlet before cleaning monitor.
17. Never use liquids or aerosols directly on the monitor. Spray on cloth and then apply to the monitor cabinet. Make sure the monitor is disconnected from the AC power line.

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
V1	INF	INF	FIL	FIL	NC	INF	1.4M							
IC601	INF	32.8	367	9478	2679	67K	300K(1)	0	INF	32.8				
ITEM	E	B	C		ITEM	E	B	C		ITEM	E	B	C	
Q201	82	234	INF		Q702	467	27K	506		Q771	1030	3714	2683	
Q202	INF	371	INF		Q703	0	467	114		Q772	0	2683	3714	
Q701	0	33K	5304		Q704	0	.16	INF						

(1) Reading may vary according to the condition of the electrolytic in the circuit.



PLACEMENT CHART

CSCS4-D

EPSON
MODEL QX-10

A Howard W. Sams CIRCUITRACE® Photo

MONITOR BOARD

PARTS LIST AND DESCRIPTION

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

SEMICONDUCTORS (Select replacement transistor for best results)

ITEM No.	TYPE No.	MFGR. PART No.	REPLACEMENT DATA					
			GENERAL ELECTRIC PART No.	NTE PART No.	PHILIPS ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
MONITOR BOARD								
D702	1S2076	Y130213041	GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
D704	u06C	Y130213042	GE-533	NTE525	ECG580	SK3925/525	WEP177/525	212-Z9010
D705	V06E	Y130213043	GE-504A	NTE116	ECG116	SK3017B	WEP158/116	212-76-02
D706	1S2076	Y130213041	GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
D751	SM-05-16FR V11N	Y130213044	GE-533	NTE525 NTE558	ECG525 ECG558	SK3925/525 SK3998/558	WEP177/525	212-Z9010
D752,3	V06CS	Y130213045	GE-511	NTE552	ECG552	SK9000/552	WEP172/506	103-287
D771,2	1S2076	Y130213041	GE-514	NTE519	ECG519	SK3100/519	WEP925/519	103-131
IC601	uPC1031H2	Y130213002		NTE1245	ECG1245	SK3878/1245	WEP2245/1245	905-165
Q201	2SC458C,D	Y130213003	GE-210	NTE85	ECG85	SK3124A/289A	WEP910/289	121-Z9065
Q202	2SC2688KA,K,L	Y130213004	GE-232	NTE157	ECG157	SK3747/157	WEP61/157	121-Z9016
Q701,2	2SC458C,D	Y130213003	GE-210	NTE85	ECG85	SK3124A/289A	WEP910/289	121-Z9065
Q703	2SC1213C,D	Y130213005	GE-268	NTE289A	ECG289A	SK3122	WEP910/289	121-Z9065
Q704	2SC681A,AYL	Y130213006	GE-36	NTE283	ECG283	SK3439A/163A	WEP707/162	121-Z9090
Q771	2SA673D,C	Y130213007	GE-269	NTE290A	ECG290A	SK9132	WEP911/290A	121-Z9003 *
Q772	2SC458C,D	Y130213003	GE-210	NTE85	ECG85	SK3124A/289A	WEP910/289	121-Z9065
	2SC1213C,D	Y130213005	GE-268	NTE289A	ECG289A	SK3122	WEP910/289	121-Z9065
ZD751	HZ-27-1	X330000230	GEZD-25	NTE5032A	ECG5032A	SK25A/5032A	WEP1434/5032	103-251
ZD771	HZ36-1	X330000570	GEZD-36	NTE5037A	ECG5037A	SK36A/5037A	WEP1439/5037	103-279-37

PARTS LIST AND DESCRIPTION (Continued)

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

CAPACITORS

ITEM No.	RATING	MFGR. PART No.
C612	1 25V 10%	Y130213017
C621	2.2 25V 10%	Y130213018

ITEM No.	RATING	MFGR. PART No.
C624	10 16V 10%	Y130213019
C732	12 25V NP	Y130213012

RESISTORS (Power and Special)

ITEM No.	RATING	REPLACEMENT DATA		
		MFGR. PART No.	NEW-TONE PART No.	WORKMAN PART No.
R761	2.2 5% 1/4W Fuse	X130213046		

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

ITEM NO.	FUNCTION	RESISTANCE	MFGR. PART NO.	NOTES
R611	Vert Hold	50K		
R622	Height	10K		
R624	Vert Linearity	10K		
R754	Focus	1M		
R758	Sub Brightness	100K		
R760	Brightness	100K		

COILS (RF-IF)

ITEM No.	FUNCTION	MFGR. PART No.
L1	RF Choke	
L201	Peaking (4.7uH)	Y130213031

ITEM No.	FUNCTION	MFGR. PART No.
L701	Filter (10uH)	Y130213032
L705	Linearity	Y130213034

COILS & TRANSFORMERS (Sweep Circuits)

ITEM No.	FUNCTION	MFGR. PART No.	OTHER IDENTIFICATION	NOTES
L601 and L703	Yoke 90° Horiz 93uH Vert 3.3mH	Y130213035	2441615	
L704	Width	Y130213033		
T701	Horiz Driver	Y130213036	2260013	
T702	Horiz Output		2433093	

PARTS LIST AND DESCRIPTION (Continued)

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

FUSE DEVICES

ITEM NO.	DESCRIPTION	MFGR. PART NO.		NOTES
		DEVICE	HOLDER	
F901	1.6A @ 125V AC Slow-Blow	Y130213039		

MISCELLANEOUS

ITEM No.	PART NAME	MFGR. PART No.	NOTES
NE201	Neon Lamp	Y130213037	
SG751 and SG752	Spark Gap	Y130213038	
V1	CRT	310LGB42	
	P.C. Board	Y130213001	Main

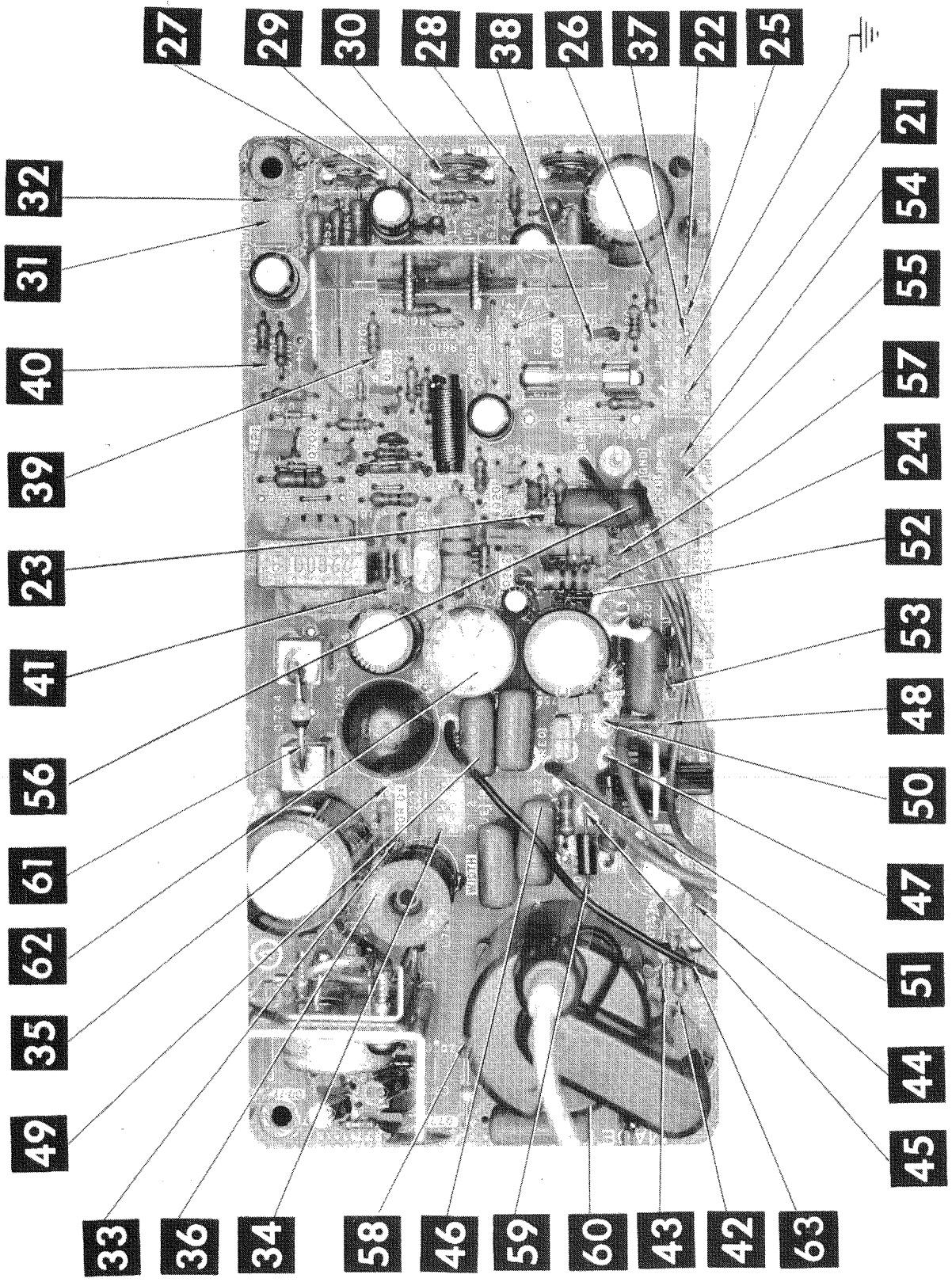
CABINETS & CABINET PARTS (When ordering specify model, chassis & color)

ITEM	PART No.
Cabinet, Front	Y132000001
Cabinet, Rear	Y132008001

ITEM	PART No.
Knob, Brightness	X550030020

WIRING DATA

High Voltage Lead	Use BELDEN No.	8869 (17 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



EPSON
MODEL QX-10

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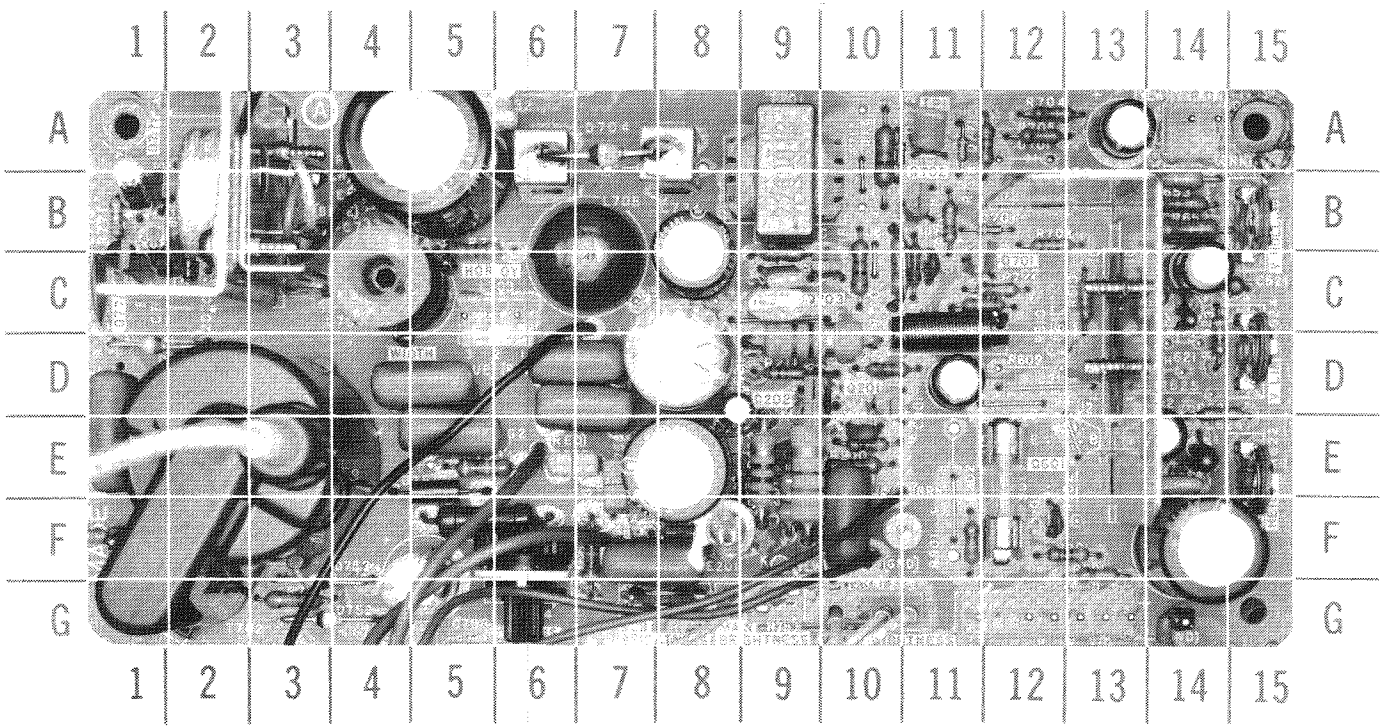
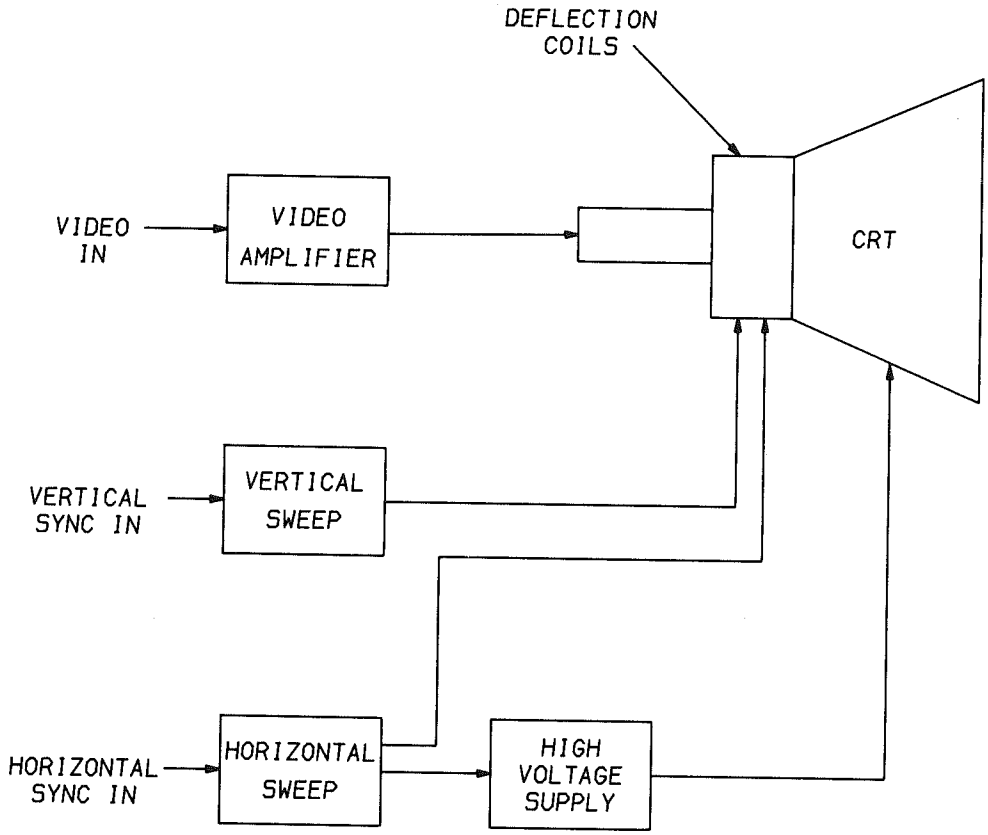
MONITOR BOARD



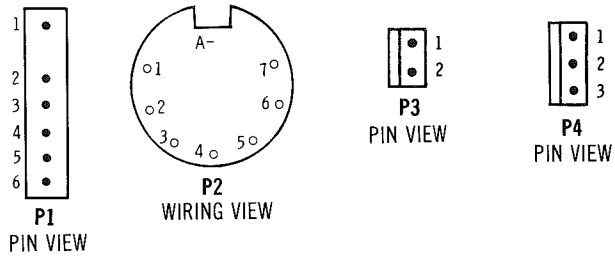
MONITOR BOARD GridTrace LOCATION GUIDE

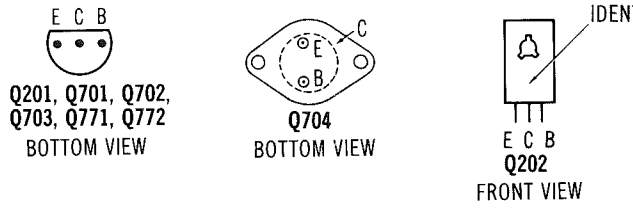
C201	E-10	C734	B-8	D752	G-3	Q704	B-2	R651	B-14	R754	F-6
C211	D-8	C735	D-8	D753	F-3	Q771	B-1	R652	B-14	R755	F-7
C611	C-13	C751	E-5	D771	A-11	Q772	C-1	R653	B-14	R756	F-10
C612	C-14	C752	D-5	D772	A-10	R201	F-13	R701	C-12	R758	G-8
C621	C-15	C753	D-7	F901	F-12	R202	F-11	R702	C-12	R759	F-8
C622	C-14	C754	D-7	IC601	D-13	R208	E-10	R703	B-12	R761	F-1
C624	E-14	C755	F-7	L201	E-9	R209	E-9	R704	A-12	R771	B-1
C651	F-14	C756	G-5	L701	C-11	R210	E-10	R705	A-12	R772	B-2
C652	E-14	C757	F-10	L704	C-4	R211	D-9	R709	A-12	R773	G-3
C653	A-13	C758	E-8	L705	B-7	R212	D-10	R710	C-11	R774	B-2
C654	E-14	C771	B-1	NE201	F-8	R232	E-9	R711	B-11	R775	A-2
C701	F-12	C772	B-1	P1	G-12	R601	F-13	R718	C-10	SG751	E-6
C702	A-11	C773	C-1	P3	A-14	R611	B-15	R719	A-10	SG752	E-7
C711	C-11	C901	D-11	P4	C-6	R612	C-14	R720	C-10	T701	A-9
C721	C-9	D702	B-12	Q201	D-10	R613	C-13	R728	C-9	T702	E-2
C722	C-9	D704	A-7	Q202	D-9	R621	D-14	R729	D-9	ZD751	E-9
C731	E-1	D705	D-1	Q701	C-12	R622	E-15	R731	B-5	ZD771	C-2
C732	A-5	D706	C-10	Q702	B-11	R623	C-14	R751	F-5		
C733	B-4	D751	E-5	Q703	C-10	R624	D-15	R753	E-5		

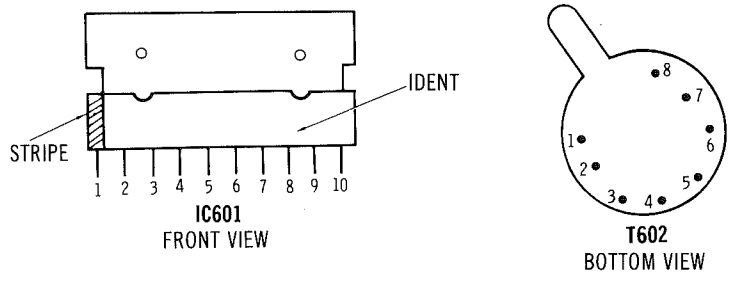


BLOCK DIAGRAM

TERMINAL GUIDES
MONITOR







SCHEMATIC NOTES

—✱— 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.

Voltages, Waveforms and Logic probe readings taken with computer turned On, no keys pressed, unless otherwise noted.

Waveforms taken with triggered scope and Sweep/Time switch in Calibrate position, scope input set for DC coupling on 0 reference voltage waveforms. Switch to AC input to view waveforms after DC reference is measured when necessary. Each waveform is 7 cm. width with DC reference voltage given at the bottom line of each waveform.

Time in μsec. 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.

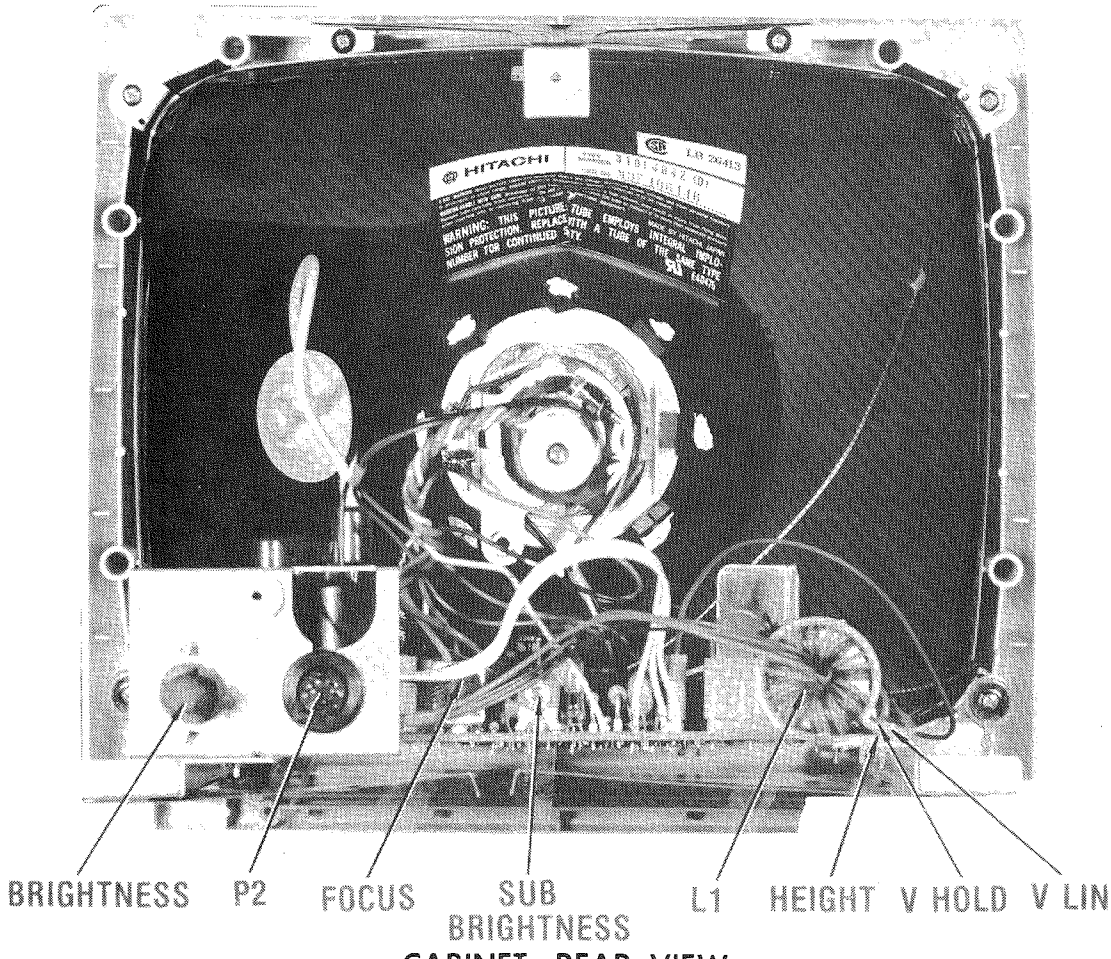
Resistors are ½W or less, 5% unless noted.

Value in ( ) used in some versions.

Measurements with switching as shown, unless noted.

Logic Probe Display
L = Low
H = High
P = Pulse
* = Open (No light On)

TERMINAL GUIDES AND SCHEMATIC NOTES



CABINET—REAR VIEW

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

Lay monitor face down on a soft protective surface. Remove four screws holding cabinet rear and lift from cabinet front. Most components are now accessible for servicing.

CRT REMOVAL

To remove CRT, disconnect CRT socket, HV anode lead, deflection yoke connectors, and ground leads. Remove four screws holding CRT to cabinet front. Lift CRT from cabinet. **Do not** lift CRT by the neck.

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 1.6-amp fuse is used for low-voltage power-supply protection. (See Placement Chart.)

WIDTH

The width may be varied by adjusting the width coil (L704). (See Placement Chart.)

FOCUS

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