

HP 13255

SWEEP MODULE

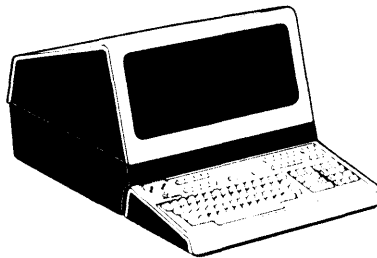
Manual Part No. 13255-91095

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AUG-01-76

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***DATA TERMINAL***  
**TECHNICAL INFORMATION**



HEWLETT  PACKARD

1.0 INTRODUCTION.

The Sweep Module interfaces the display controller of the terminal to the CRT. It generates all drive signals and specialized voltages required by the CRT display. Parts lists for the CRT Monitor Assembly (02644-60001) and Cable Assembly (02640-60138) are contained in section 13255-91001.

2.0 OPERATING PARAMETERS.

A summary of operating parameters for the Sweep Module is contained in tables 1.0 through 4.0.

Table 1.0 Physical Parameters

Part Number	Nomenclature	Size (L x W x D) +/-0.100 Inches	Weight (Pounds)
02640-60028	CRT Monitor Assembly	N/A	N/A
02640-60039	Sweep Cable Assembly	N/A	N/A
02640-60040	Yoke Cable Assembly	N/A	N/A
02640-60042	CRT Cable Assembly	N/A	N/A
02640-60084	CRT Yoke Assembly	N/A	N/A
02640-60095	Sweep PCA	16.6 x 7.6 x 2.8	2.25
02640-60138	Cable Assembly	N/A	N/A
02644-60001	CRT Monitor Assembly	N/A	N/A
02645-60008	Monitor Assembly	N/A	N/A
Number of Backplane Slots Required: N/A			

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NOTE: This document is part of the 264XX DATA TERMINAL product series Technical Information Package (HP 13255).

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02640-60138	Cable Assembly	N/A	N/A
02644-60001	CRT Monitor Assembly	N/A	N/A
02645-60008	Monitor Assembly	N/A	N/A
Number of Backplane Slots Required: N/A			

Table 2.0 Reliability and Environmental Information

Environmental:	( X ) HP Class B	( ) Other:
Restrictions:	Type tested at product level	
Failure Rate:	2.949	(percent per 1000 hours)

Table 3.0 Power Supply and Clock Requirements - Measured  
(At +/-5% Unless Otherwise Specified)

+5 Volt Supply	+12 Volt Supply	-12 Volt Supply	-42 Volt Supply
@ 50 mA	@ 300 mA	@ mA	@ 600 mA
		NOT APPLICABLE	(+10%, -5%)
115 volts ac		220 volts ac	
@ A		@ A	
NOT APPLICABLE		NOT APPLICABLE	
Clock Frequency:		MHZ	
NOT APPLICABLE			

Table 4.0 Connector Information

Connector and Pin No.	Signal Name	Signal Description	
P1, Pin 1	VIDEO	Video	} From
- 2	BUF HLF BRT	Negative True, Buffered Half-Bright	} Display } Timing } Assembly
- 3	VDR	Vertical Drive	
- 4	HDR	Horizontal Drive	
- 5	VIDEO GND	Video Return	
- 6		Not Used	
- 7	-42V	-42 Volts	} Power from
- 8	+5V	+5 Volts	} Power
- 9	+12V	+12 Volts	} Supply
-10	GND		} Assembly
P2, Pin 1	CRT CATHODE		}
- 2	FILAMENT GND		}
- 3	FILAMENT		}
P4, Pin 1	FOCUS GRID		} To
- 2		} Not	} CRT
- 3		} Used	} Cable
- 4	SCREEN GRID		} Assembly
- 5		} Not	}
- 6		} Used	}
- 7	AQUADAG GND		}
- 8	GRID#1		}
P3, Pin 1	VERTICAL YOKE		}
- 2	VERTICAL YOKE		}
- 3	VERTICAL YOKE		} To Yoke
- 4	YOKE GND		} Cable
- 5	HOR YOKE		} Assembly
- 6		} Not Used	}
- 7	HOR YOKE		}

3.0 FUNCTIONAL DESCRIPTION. Refer to the block diagram (figure 1), schematic diagram (figure 2), timing diagram (figure 3), component location diagram (figure 4), and parts lists (02640-60028, 02640-60039, 02640-60040, 02640-60042, 02640-60084, 02640-60095, and 02645-60008) located in the appendix.

The Sweep Module consists of video, vertical and horizontal drive circuits, a width voltage regulator and a high voltage power supply.

### 3.1 VIDEO DRIVE.

3.1.1 The function of the video drive circuit is to interface the low level logic input signals from the display section of the terminal to the higher levels required to drive the CRT.

3.1.2 The video amplifiers Q1 and Q2 are common emitter amplifiers with Q3 acting as an active pullup. Components R6 and CR2 protect the video transistors during CRT flashover. The video section is built on its own ground plane to prevent the very large and fast current transients that it generates (100 milliamperes in 20 nanoseconds) from interfering with the sweep circuits.

### 3.2 VERTICAL DRIVE.

3.2.1 The vertical drive circuit generates the vertical scanning waveform which causes the electron beam in the CRT to be moved from the top to the bottom of the screen.

3.2.2 Operational amplifier U2 is connected as an integrator. Components C2, R11, and R10 control the slope of integration and therefore, the height. FET Q4, discharges C2 during retrace and resets the integrator. Transistor Q13, interfaces the TTL Vertical Drive (VDR) signal to the levels required by the FET. The output of the integrator is ac coupled to the vertical output amplifier by capacitor C4. AC coupling is used at this point to center the vertical sweep about ground, thus providing positive and negative current to the yoke. A small offset is caused when the integrator resets rapidly and waits for the Vertical Drive to go high; but this offset can easily be corrected by the centering rings on the yoke.

Transistor array U3, and transistors Q5, Q6, Q7, and Q14 (with their associated components) form a differential input amplifier which is capable of driving the vertical deflection yoke. Yoke current is sensed by R17 and compared with the output of the integrator. The integrator output is adjustable from approximately 1 to 2 volts (100 to 200 millamperes deflection current).

### 3.3 HORIZONTAL DRIVE.

3.3.1 The horizontal drive circuit generates the horizontal scan which sweeps the beam from left to right on the face of the CRT.

3.3.2 The Horizontal Drive (HDR) signal is buffered by open-collector gate U5 and applied to transistor Q11. When the Horizontal Drive is low, Q11 is on. Horizontal output transistor, Q12 is biased off, while the primary current of T1 increases to the value determined by R20 (about 200 millamperes). When the Horizontal Drive goes high, Q11 turns off and the primary current of T1 is transferred to the secondary and turns on Q12. During the time that Q11 is off, C8 charges to the supply voltage and supplies a large turnoff current for Q12 when the horizontal drive again goes low. Transistor Q15 and its circuitry regulate the +12 volt supply down to 11 volts so that the drive to the horizontal transistor is kept constant.

3.3.2.1 Components Q12, CR6, C9, C10, the horizontal yoke, and the flyback transformer primary form a "ringing" horizontal sweep circuit. Sweep is initiated from the center of the screen when Q12 is turned on. This causes C10 to start to charge toward VREG through the yoke. The current increases to 2.5 amperes while C10 charges to -5 volts. At this point, Q12 is turned off and the current flows through C9 charging it rapidly to 300 volts. By this time the yoke current has decayed to zero and reversed direction. The flyback (voltage across C9) now decays rapidly and would go to -300 volts except that diode CR6 clamps it to VREG. Since this fixes the voltage across the yoke, the current now starts decreasing linearly toward zero. The current has now reversed direction and discharges C10. When the current has almost decayed to zero, Q12 is turned on and the cycle is repeated.

3.3.2.2 The linearity coil (L1) is not necessary for operation of the horizontal circuit, but is used to compensate losses in the yoke during the sweep. The coil has an apparent negative resistance resulting from the core material used and the fact that it is applied in an inductive circuit. The primary of the flyback transformer is necessary to provide a ground return for the collector of Q12 and provides a convenient method of generating the bias voltages necessary to drive the CRT.



### 3.4 WIDTH VOLTAGE REGULATOR.

3.4.1 This circuit regulates the width of the display by varying the voltage applied to the horizontal drive circuitry.

3.4.2 The width supply is a negative supply regulator using a voltage regulator in conjunction with a complementary transistor Darlington. Transistor Q8, acts as a current limiter and restricts the current to 0.8 amperes. This is necessary to protect the printed-circuit board and the flyback transformer from being destroyed in the event that Q12 shorts. This circuit keeps the width constant during varying current requirements and allows a method of varying the width without using inductors.

### 3.5 HIGH VOLTAGE POWER SUPPLY.

3.5.1 The high voltage power supply generates the various voltages required by the CRT which are not supplied by the terminal power supply. These voltages are -100V, 30V, 500V, and 15,000V.

3.5.2 The lower voltages are all generated by half-wave peak rectification of the horizontal flyback pulse. The 30-volt supply for the video circuits is Zener regulated to protect the video transistors from high voltages which could destroy them. Gap Caps C18, C19, and C20 provide additional supply filtering and act as spark gap voltage transient protection during CRT flashover. The CRT Ultron supply voltage is generated by a tripler which multiplies the peak-to-peak output voltage of the flyback (approximately 5 kilovolts) by three, rectifies it, and filters it. The tripler also contains a bleeder resistor to discharge the CRT when the circuitry is off. This prevents potential shock from the CRT when it is disconnected during servicing. The bleeder also serves to improve supply regulation. Under light loads, the flyback output "rings" (due to leakage inductance in the transformer). The bleeder resistor damps this "ringing" and prevents it from causing poor regulation.

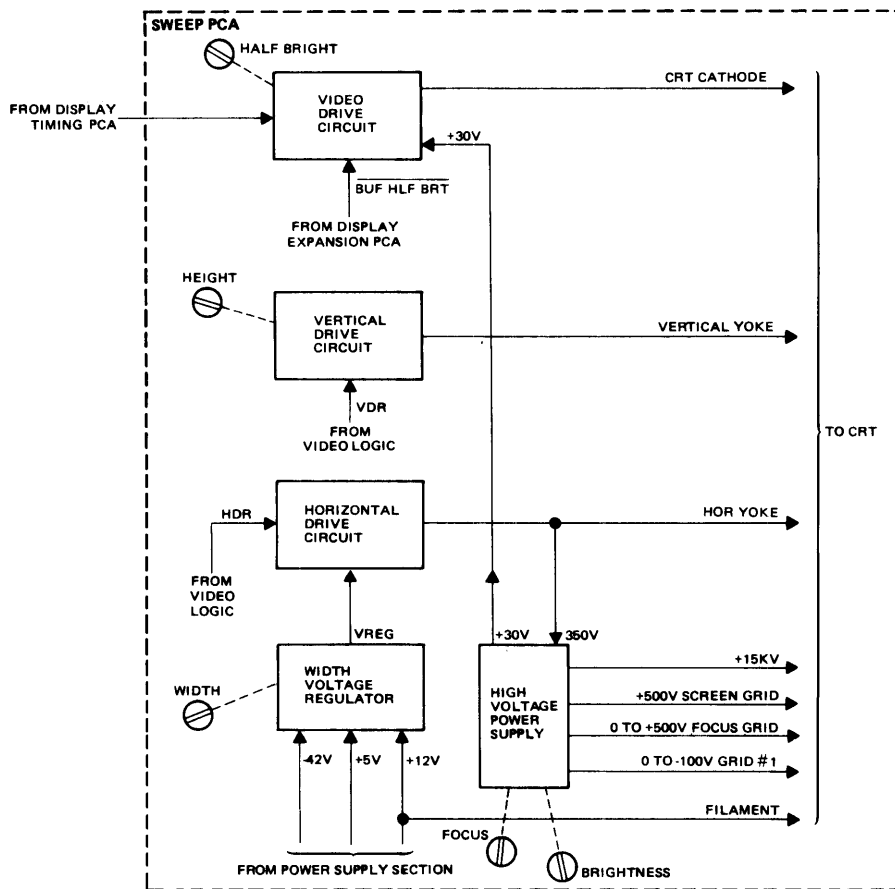
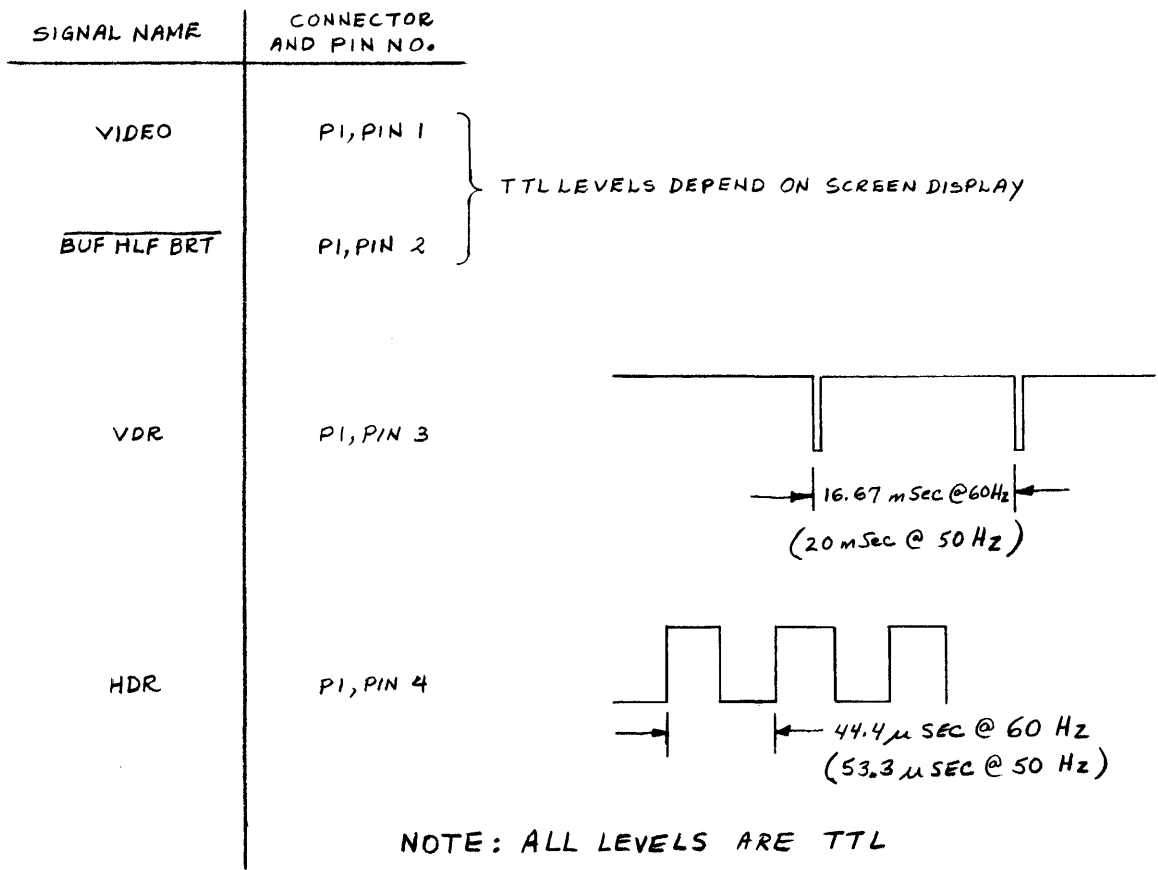


Figure 1  
 Sweep Module Block Diagram  
 AUG-01-76 13255-91095



**Figure 3**  
**Sweep Module Timing Diagram**  
**AUG-01-76 13255-91095**

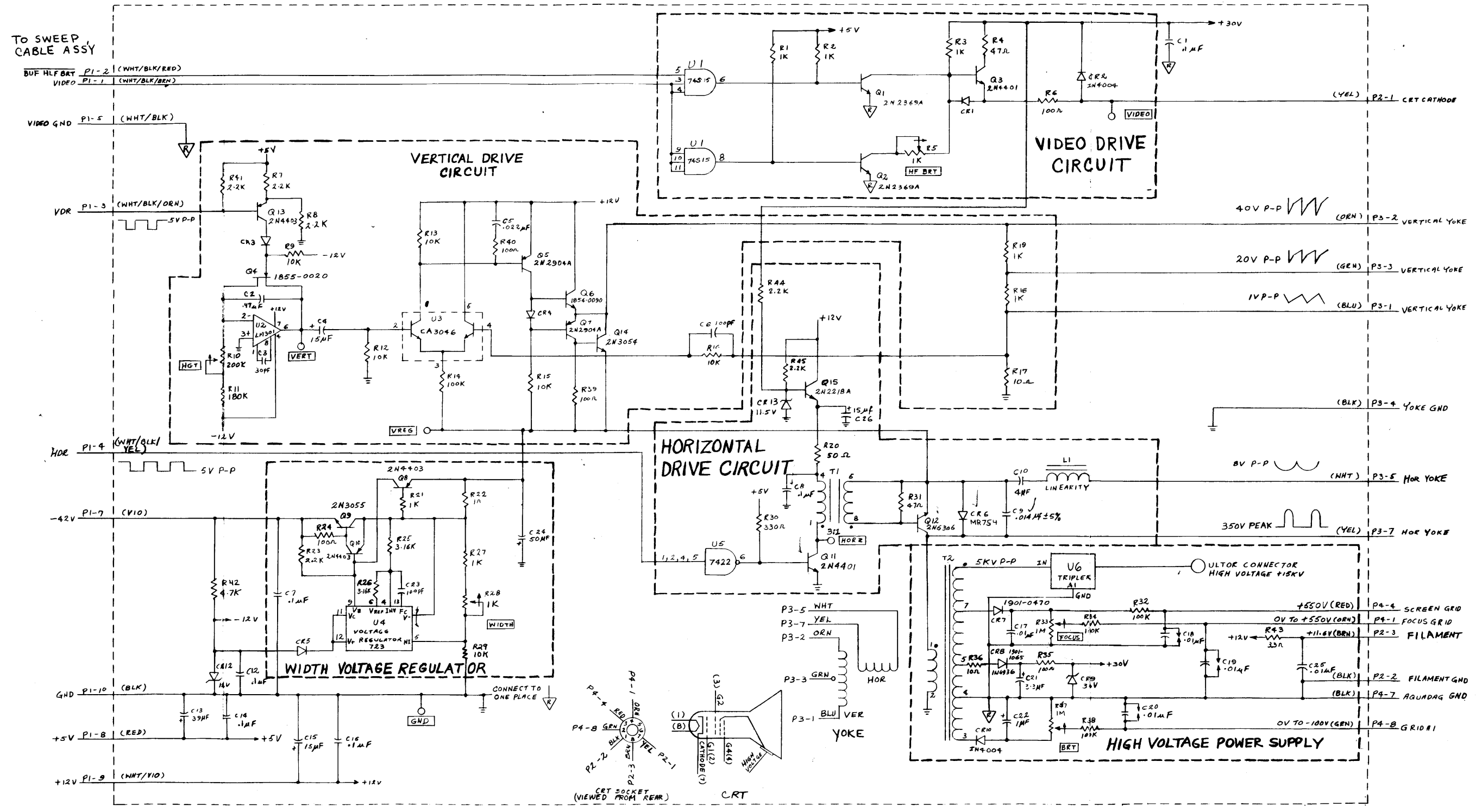


Figure 2  
Sweep PCA Schematic Diagram  
AUG-01-76 13255-91095

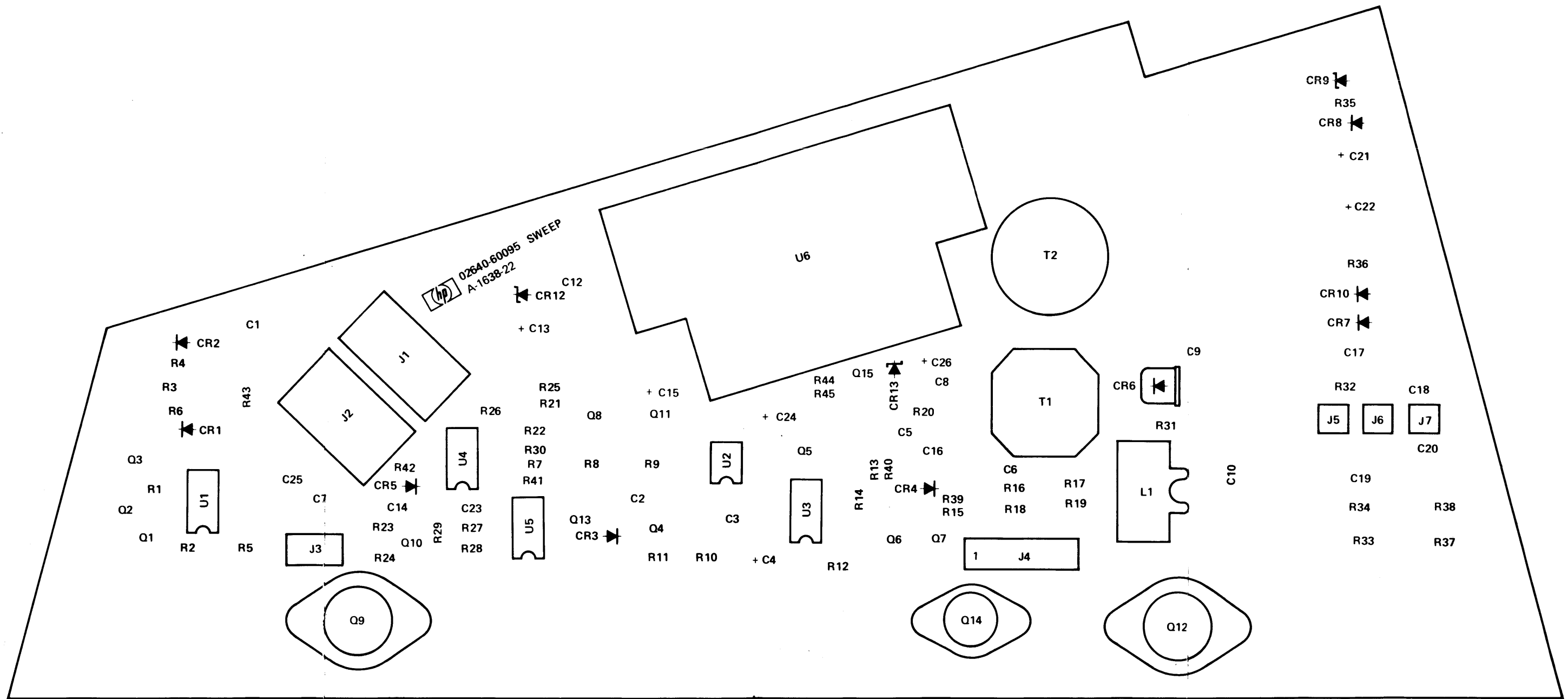


Figure 4  
Sweep PCA Component Location Diagram  
AUG-01-76 13255-91095

*Replaceable Parts*

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
	02640-60028	1	CKT MONITOR ASSEMBLY REVISION DATE: 06-07-76	28480	02640-60028
	0570-0528	2	STUD, PRESS-IN 5/16"	00000	080
	1460-0440	2	CABLE TIE .062-1.75-DIA .184-WD NYL	59730	TY 35M
	1460-0687	1	WIREFORM .432-IN-W 1.271-IN-LG MUM	28480	1460-0687
	1460-0688	1	WIREFORM .432-IN-W 1.271-IN-LG MUM	28480	1460-0688
	1480-0069	2	PIN:GROOVED 6 PIN 1/8" DIA	28480	1480-0069
	2150-0010	1	WASHER-LK EXT T NO.-8 .168-IN-ID	06791	2-820-8C
	2150-0017	4	WASHER-LK HLCL NO.-8 .168-IN-ID	28480	2190-0017
	2150-0451	2	WASHER:RECT. FGR #4 OR #5 HDN	95987	06-128
	2150-0918	8	WASHER-LK HLCL NO.-6 .141-IN-ID	28480	2190-0918
	2360-0196	4	SCREW-MACH 6-32 .375-IN-LG 100 DEG	28480	2360-0196
	2360-0201	8	SCREW-MACH 6-32 .5-IN-LG PAN-HD-POZI	28480	2360-0201
	2510-0107	4	SCREW-MACH 8-32 .5-IN-LG PAN-HD-POZI	28480	2510-0107
	3050-0001	4	WASHER-FL MTLCL NO.-8 .172-IN-ID	28480	3050-0001
	3050-0066	8	WASHER-FL MTLCL NO.-6 .147-IN-ID	28480	3050-0066
	3110-0099	2	HINGE-DTCHBL-LF STL 1-LG .059-THK STL	28480	3110-0099
	02640-00044	1	SCREEN	28480	02640-00044
	02640-00046	1	SCREEN	28480	02640-00046
	02640-00055	1	SUPPRT, RETAINER	28480	02640-00055
	02640-40002	1	DISPLAY, TOP	28480	02640-40002
	02640-40022	1	SIDE, RIGHT	28480	02640-40022
	02640-40023	1	SIDE, LEFT	28480	02640-40023
	02640-60039	1	ASSY, CABLE, SWEEP	28480	02640-60039
	02640-60042	1	ASSY, CABLE, CRT	28480	02640-60042
	02640-60084	1	ASSY, CRT/YCKE	28480	02640-60084
	02640-60095	1	ASSY, SWEEP	28480	02640-60095

*Replaceable Parts*

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
	02640-60039	1	SWEEP CABLE ASSEMBLY REVISION DATE: 05-15-76	28480	02640-60039
	0850-0006		TUBING-FLEX .204-ID PVC .02-WALL	96904	400/461 FR-1
	0890-0311		TUBING-HS .125-D/.062-RCVD .02-WALL	06090	RNF-100-1/8-BLK
	1251-0312	1	CONNECTOR 5-PIN F POST TYPE	27264	09-50-7051
	1251-0627	3	POLARIZING KEY-PCST CONN	28480	1251-0627
	1251-0679	1	CONTACT-CONN U/W-POST-TYPE FEM CRP	27264	08-50-0106
	1251-3073	18	CONTACT-CONN FEM CRP	27264	08-50-0107
	1251-3278	1	CONNECTOR 8-PIN F POST TYPE	27264	09-50-7081
	1251-3537	1	CONNECTOR 10-PIN F POST TYPE	27264	09-50-7101
	1251-3753	1	POLARIZING KEY-PCST CCNN	28480	1251-3753
	1400-0249	9	CABLE TIE .062-.625-DIA .091-WD NYL	59730	TY8-23M-8
	8120-2121		CABLE-UNSHLD 22AWG 2-CNDCT UL-1061	28480	8120-2121
	8120-2122		CABLE-UNSHLD 22AWG 2-CNDCT UL-1061	28480	8120-2122
	8150-1540		WIRE 22AWG BK 300V PVC 7X30 80C	28480	8150-1540
	8150-1542		WIRE 22AWG R 300V PVC 7X30 80C	28480	8150-1542
	8150-1547		WIRE 22AWG V 300V PVC 7X30 80C	28480	8150-1547
	8150-1550		WIRE 22AWG W/BK 300V PVC 7X30 80C	28480	8150-1550
	8150-1552		WIRE 22AWG W/R 300V PVC 7X30 80C	28480	8150-1552
	8150-1559		WIRE 22AWG W/BK/BR 300V PVC 7X30 80C	28480	8150-1559
	8150-1560		WIRE 22AWG W/BK/R 300V PVC 7X30 80C	28480	8150-1560

*Replaceable Parts*

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
	02640-60040	1	YOKE CABLE ASSEMBLY REVISION DATE: 05-15-76	28480	02640-60040
	1251-0670	6	CONTACT-CONN U/W-POST-TYPE FEM CRP	27264	08-50-0105
	1251-3278	1	CONNECTOR 8-PIN F POST TYPE	27264	09-50-7081
	1251-3753	1	POLARIZING KEY-POST CONN	28480	1251-3753
	1400-0249	3	CABLE TIE .062-.625-DIA .091-WC NYL	59730	TYB-23M-8
	9100-3580	1	DEFLECTION YOKE, 70 HORIZ DEFL 35 VERT	50783	C-9100-3580-1



*Replaceable Parts*

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
	02640-60042	1	CKT CABLE ASSEMBLY REVISION DATE: 05-26-76	28480	02640-60042
	0362-0395	1	TERMINAL-CRIMP TNG-R #.164 22-18-AWG RED	98410	AA-521-08-T
	1200-0543	1	SOCKET, STRIP	00000	08D
	1251-0670	7	CONTACT-CONN U/W-POST-TYPE FEM CRP	27264	08-50-0105
	1251-3201	1	CONNECTOR 3-PIN F POST TYPE	27264	09-50-7031
	1251-3278	1	CONNECTOR 8-PIN F POST TYPE	27264	09-50-7081
	1251-3753	1	POLARIZING KEY-POST CONN	28480	1251-3753
	1400-0249	8	CABLE TIE .062-.625-DIA .091-WD NYL	59730	TYB-23M-8

*Replaceable Parts*

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
	02640-60084	1	CRT/YOKE ASSEMBLY REVISION DATE: 06-09-76	28480	02640-60084
	0470-0251 2090-0028 9160-0249 9160-0250 9160-0251	1	ADHESIVE-SEALANT TUBE-ELECTRON CRT PINCUSHION, MAG PINCUSHION, MAG PINCUSHION, MAG	36003 28480 28480 28480 28480	CLEAR SEAL 2090-0028 9160-0249 9160-0250 9160-0251
	9160-0252 9160-0253 9160-0254 9160-0255 9160-0256		PINCUSHION, MAG PINCUSHION, MAG PINCUSHION, MAG PINCUSHION, MAG PINCUSHION, MAG	28480 28480 28480 28480 28480	9160-0252 9160-0253 9160-0254 9160-0255 9160-0256
	9160-0257 02640-60040	1	PINCUSHION, MAG ASSY, CABLE, YOKE	28480 28480	9160-0257 02640-60040

### Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
	02640-60095	1	SWEET ASSEMBLY DATE CODE: A-1638-22 REVISION DATE: 08-21-76	28480	02640-60095
C1	0150-0121	6	CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0150-0121
C2	0160-0970	1	CAPACITOR-FXD .47UF +-10% 80WVDC POLYE	28480	0160-0970
C3	0160-2199	1	CAPACITOR-FXD 30PF +-5% 300WVDC MICA	28480	0160-2199
C4	0160-1746	3	CAPACITOR-FXD 15UF+-10% 20VDC TA	56289	1500156X902082
C5	0160-0162	1	CAPACITOR-FXD .022UF +-10% 200WVDC POLYE	56289	292P22392
C6	0160-2204	2	CAPACITOR-FXD 100PF +-5% 300WVDC MICA	28480	0160-2204
C7	0150-0121	1	CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0150-0121
C8	0150-0121	1	CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0150-0121
C9	0160-4435	1	CAPACITOR-FXD .014UF +-5% 600WVDC POLYE	28480	0160-4435
C10	0160-4242	1	CAPACITOR-FXD 4UF +-10% 200WVDC MET	28480	0160-4242
C12	0150-0121	1	CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0150-0121
C13	0160-0393	1	CAPACITOR-FXD 39UF+-10% 10VDC TA	56289	1500396X901082
C14	0150-0121	1	CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0150-0121
C15	0160-1746	1	CAPACITOR-FXD 15UF+-10% 20VDC TA	56289	1500156X902082
C16	0150-0121	1	CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0150-0121
C17	0160-2902	2	CAPACITOR-FXD .01UF +-20% 1000WVDC CER	28480	0160-2902
C18	0160-4230	3	CAPACITOR-FXD .01UF +80-20% 1000WVDC CER	71590	GAP-103
C19	0160-4230	1	CAPACITOR-FXD .01UF +80-20% 1000WVDC CER	71590	GAP-103
C20	0160-4230	1	CAPACITOR-FXD .01UF +80-20% 1000WVDC CER	71590	GAP-103
C21	0160-2141	1	CAPACITOR-FXD 3.3UF+-10% 50VDC TA	56289	1500335X905082
C22	0160-0269	1	CAPACITOR-FXD 1UF+75-10% 150VDC AL	56289	30010561508A2
C23	0160-2204	1	CAPACITOR-FXD 100PF +-5% 300WVDC MICA	28480	0160-2204
C24	0160-0141	1	CAPACITOR-FXD 50UF+75-10% 50VDC AL	56289	30050668500D2
C25	0160-2902	1	CAPACITOR-FXD .01UF +-20% 1000WVDC CER	28480	0160-2902
C26	0160-1746	1	CAPACITOR-FXD 15UF+-10% 20VDC TA	56289	1500156X902082
CR1	19C1-0040	4	DIODE-SWITCHING 30V 50MA 2NS DC-35	28480	1901-0040
CR2	19C1-0159	2	DIODE-PWR RECT 400V 750MA DO-41	04713	SR1358-4
CR3	19C1-0040	1	DIODE-SWITCHING 30V 50MA 2NS DC-35	28480	1901-0040
CR4	19C1-0040	1	DIODE-SWITCHING 30V 50MA 2NS DC-35	28480	1901-0040
CR5	19C1-0040	1	DIODE-SWITCHING 30V 50MA 2NS DC-35	28480	1901-0040
CR6	19C1-0781	1	DIODE-SILICON		
CR7	19C1-0470	1	DIODE-MV RECT 1KV 600MA DO-41	04713	SR1358-14
CR8	19C1-1065	1	DIODE-PWR RECT 1N4936 400V 1A 100NS	04713	MR886
CR9	19C2-0644	1	DIODE-ZNR 1N5363B 30V 5% PD=5W TC=+29MV	28480	1902-0645
CR10	19C1-0159	1	DIODE-PWR RECT 400V 750MA DO-41	04713	SR1358-4
CR12	19C2-3182	1	DIODE-ZNR 12.1V 5% DO-7 PD=.4W TC=+.064%	28480	1902-3182
CR13	19C2-3177	1	DIODE-ZNR 11.5V 2% DO-7 PD=.4W TC=+.063%	28480	1902-3177
E1	0360-0124	5	TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-0124
E2	0360-0124	1	TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-0124
E3	0360-0124	1	TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-0124
E4	0360-0124	1	TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-0124
E5	0360-0124	1	TERMINAL-STUD SGL-PIN PRESS-MTG	28480	0360-0124
J1	1251-3873	1	CONNECTOR 4-PIN M POST TYPE	27264	09-88-2041
J2	1251-3848	1	CONNECTOR 5-PIN M POST TYPE	27264	09-88-2051
J3	1251-3192	1	CONNECTOR 3-PIN M POST TYPE	27264	09-60-1031(2403-03A1
J4	1251-3767	1	CONNECTOR 7-PIN M POST TYPE	27264	09-60-1071
J5	1251-3618	3	CONNECTOR 2-PIN M POST TYPE	27264	09-60-1021
J6	1251-3618	1	CONNECTOR 2-PIN M POST TYPE	27264	09-60-1021
J7	1251-3618	1	CONNECTOR 2-PIN M POST TYPE	27264	09-60-1021
L1	91C0-3569	1	COIL 1.063HG	28480	9100-3569
Q1	1854-0019	2	TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
Q2	1854-0019	1	TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
Q3	1854-0467	2	TRANSISTOR NPN 2N4401 SI TO-92 PD=310MW	04713	2N4401
Q4	1855-0020	1	TRANSISTOR J-FET N-CHAN D-MODE TO-18 SI	28480	1855-0020
Q5	1853-0612	2	TRANSISTOR PAP 2N2904A SI TO-5 PD=600MW	01295	2N2904A
Q6	1854-0090	1	TRANSISTOR NPN SI TO-39 PD=1W FT=100MHZ	28480	1854-0090
Q7	1853-0012	1	TRANSISTOR PNP 2N2904A SI TO-5 PD=600MW	01295	2N2904A
Q8	1853-0271	3	TRANSISTOR PNP 2N4403 SI TO-92 PD=310MW	04713	2N4403
Q9	1854-0063	1	TRANSISTOR NPN 2N3055 SI TO-3 PD=115W	28480	1854-0064
Q10	1853-0271	1	TRANSISTOR PAP 2N4403 SI TO-92 PD=310MW	04713	2N4403
Q11	1854-0467	1	TRANSISTOR NPN 2N4401 SI TO-92 PD=310MW	04713	2N4401
Q12	1854-0623	1	TRANSISTOR NPN 2N6306 SI TO-3 PD=125W	04713	2N6306
Q13	1853-0271	1	TRANSISTOR PNP 2N4403 SI TO-92 PD=310MW	04713	2N4403
Q14	1854-0072	1	TRANSISTOR NPN 2N3054 SI TO-66 PD=25W	02735	2N3054
Q15	1854-0013	1	TRANSISTOR NPN 2N2218A SI TO-5 PD=800MW	04713	2N2218A
R1	0683-1025	3	RESISTOR 1K 5% .25W FC TC=-400/+600	01121	C81025
R2	0683-1025	1	RESISTOR 1K 5% .25W FC TC=-400/+600	01121	C81025
R3	0652-1025	1	RESISTOR 1K 5% 2W CC TC=0/+647	01121	H81025
R4	0686-4705	1	RESISTOR 47 5% .5W CC TC=0/+412	01121	E84705
R5	21C0-3352	2	RESISTOR-TRMR 1K 10% C SIDE-ADJ 1-TRM	73138	72-143-0

Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
			SWEEP ASSEMBLY, CONT'D.		
R6	0666-1015	2	RESISTOR 100 5% .5W CC TC=0+529	01121	EB1015
R7	0663-2225	6	RESISTOR 2.2K 5% .25W FC TC=-400/+700	01121	CB2225
R8	0663-2225		RESISTOR 2.2K 5% .25W FC TC=-400/+700	01121	CB2225
R9	0663-1035	5	RESISTOR 10K 5% .25W FC TC=-400/+700	01121	CB1035
R10	2100-3356	1	RESISTOR-TRMR 200K 10% C SIDE-ADJ 1-TRM	73138	72-151-0
R11	0663-1845	1	RESISTOR 180K 5% .25W FC TC=-800/+900	01121	CB1845
R12	0663-1035		RESISTOR 10K 5% .25W FC TC=-400/+700	01121	CB1035
R13	0663-1035		RESISTOR 10K 5% .25W FC TC=-400/+700	01121	CB1035
R14	0663-1045	1	RESISTOR 100K 5% .25W FC TC=-400/+800	01121	CB1045
R15	0663-1035		RESISTOR 10K 5% .25W FC TC=-400/+700	01121	CB1035
R16	0663-1035		RESISTOR 10K 5% .25W FC TC=-400/+700	01121	CB1035
R17	0663-1005	1	RESISTOR 10 5% .25W FC TC=-400/+500	01121	CB1005
R18	0666-1025	2	RESISTOR 1K 5% .5W CC TC=0+647	01121	EB1025
R19	0666-1025		RESISTOR 1K 5% .5W CC TC=0+647	01121	EB1025
R20	0811-1854	1	RESISTOR 50 5% 5W PW TC=0+-20	91637	RS-5
R21	0663-1025		RESISTOR 1K 5% .25W FC TC=-400/+600	01121	CB1025
R22	0811-3069	1	RESISTOR 1 5% .5W PW TC=0+-150	75042	8M20-1-1R0-J
R23	0663-2225		RESISTOR 2.2K 5% .25W FC TC=-400/+700	01121	CB2225
R24	0663-1015	3	RESISTOR 100 5% .25W FC TC=-400/+500	01121	CB1015
R25	0757-0279	2	RESISTOR 3.16K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3161-F
R26	0757-0279		RESISTOR 3.16K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3161-F
R27	0757-0280	1	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
R28	2100-3352		RESISTOR-TRMR 1K 10% C SIDE-ADJ 1-TRM	73138	72-143-0
R29	0757-0442	1	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
R30	0663-3315	1	RESISTOR 330 5% .25W FC TC=-400/+600	01121	CB3315
R31	0663-4705	1	RESISTOR 47 5% .25W FC TC=-400/+500	01121	CB4705
R32	0666-1045	3	RESISTOR 100K 5% .5W CC TC=0+882	01121	EB1045
R33	2100-3358	2	RESISTOR-TRMR 1M 20% C SIDE-ADJ 1-TRM	73138	72-154-0
R34	0666-1045		RESISTOR 100K 5% .5W CC TC=0+882	01121	EB1045
R35	0666-1015		RESISTOR 100 5% .5W CC TC=0+529	01121	EB1015
R36	0669-1005	1	RESISTOR 10 5% 1W CC TC=0+412	01121	GB1005
R37	2100-3358		RESISTOR-TRMR 1M 20% C SIDE-ADJ 1-TRM	73138	72-154-0
R38	0666-1045		RESISTOR 100K 5% .5W CC TC=0+882	01121	EB1045
R39	0663-1015		RESISTOR 100 5% .25W FC TC=-400/+500	01121	CB1015
R40	0663-1015		RESISTOR 100 5% .25W FC TC=-400/+500	01121	CB1015
R41	0663-2225		RESISTOR 2.2K 5% .25W FC TC=-400/+700	01121	CB2225
R42	0663-4725	1	RESISTOR 4.7M 5% .25W FC TC=-400/+700	01121	CB4725
R43	0666-0335	1	RESISTOR 3.3 5% .5W CC TC=0+412	01121	EB3335
R44	0663-2225		RESISTOR 2.2K 5% .25W FC TC=-400/+700	01121	CB2225
R45	0663-2225		RESISTOR 2.2K 5% .25W FC TC=-400/+700	01121	CB2225
T2	9100-3581	1	TRANSFORMER, FLYBACK;PC MOUNT	50783	-8-9100-3581-1
U1	1820-0687	1	IC-DIGITAL SN74S15N TTL S TPL 3 AND	01295	SN74S15N
U2	1820-0477	1	IC LM 301A GP AMP	27014	LM301AN
U3	1821-0001	1	TRANSISTOR ABRAY DIP	02735	CA3046
U4	1826-0049	1	IC UA 723C V RGLTR	07263	7230C
U5	1820-1256	1	IC-DIGITAL SN7422N TTL DUAL 4 NAND	01295	SN7422N
U6	0960-0420	1	TRIPLER	18546	MH1204X20
	0340-0180	1	INSULATOR-XSTR MICA	08530	RM-967
	1200-0077	2	INSULATOR-TRANSISTOR, MICA	16037	#112
	1200-0185	3	INSULATOR-XSTR NYLON	13103	7717-86N RED
	2150-0003	3	WASHER-LK HLCL NO.-4 .115-IN-ID	28480	2190-0003
	2150-0006	2	WASHER-LK HLCL NO.-6 .141-IN-ID	28480	2190-0006
	2150-0007	6	WASHER-LK INTL T NO.-6 .141-IN-ID	78189	1906-00
	2200-0145	1	SCREW-MACH 4-40 .438-IN-LG PAN-HD-POZI	28480	2200-0145
	2260-0001	3	NUT-HEX-DBL-CHAM 4-40-THD .094-THK	28480	2260-0002
	2360-0197	3	SCREW-MACH 6-32 .375-IN-LG PAN-HD-POZI	28480	2360-0197
	2360-0199	6	SCREW-MACH 6-32 .438-IN-LG PAN-HD-POZI	28480	2360-0199
	2360-0201	2	SCREW-MACH 6-32 .5-IN-LG PAN-HD-POZI	28480	2360-0201
	2420-0001	3	NUT-HEX-W/LK&R 6-32-THD .109-THK	28480	2420-0002
	2420-0002	2	NUT-HEX-DBL-CHAM 6-32-THD .109-THK	28480	2420-0003
	2420-0003	6	NUT-HEX-DBL-CHAM 6-32-THD .094-THK	28480	2420-0004
	3050-0066	2	WASHER-FB NT&C NO.-6 .147-IN-ID	28480	3050-0066
	3050-0222	1	WASHER-FB MTLC NO.-4 .125-IN-ID	28480	3050-0222
	6040-0239	1	GREASE-SILICONE COMPOUND	05820	120-5GM
	7120-4626	2	LABEL, INFO	28480	7120-4626
	8150-1540	1	WIRE 22AWG BK 300V PVC 7X30 80C	28480	8150-1540
	9100-3859	1	TRANSFORMER, POT CORE	28480	9100-3859
	02640-00002	1	HEAT SINK, SWEEP	28480	02640-00002

*Replaceable Parts*

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
	02645-60008	1	CRT MONITOR ASSEMBLY REVISION DATE: 09-02-76	28480	02645-60008
	0570-0528	2	STUD, PRESS-IN 5/16"	00000	OBD
	1460-0440	2	CABLE TIE .062-1.75-DIA .184-WD NYL	59730	TY 35M
	1460-0687	1	WIREFORM .432-IN-W 1.271-IN-LG MUM	28480	1460-0687
	1460-0688	1	WIREFORM .432-IN-W 1.271-IN-LG MUM	28480	1460-0688
	1460-0069	2	PIN:GROOVED & PIN 1/8" DIA	28480	1480-0069
	2150-0010	1	WASHER-LK EXT T NO.-8 .168-IN-ID	06791	2-820-8C
	2150-0017	4	WASHER-LK HLCL NO.-8 .168-IN-ID	28480	2190-0017
	2150-0918	13	WASHER-LK HLCL NO.-6 .141-IN-ID	28480	2190-0918
	2360-0196	4	SCREW-MACH 6-32 .375-IN-LG 100 DEG	28480	2360-0196
	2360-0197	3	SCREW-MACH 6-32 .375-IN-LG PAN-HD-POZI	28480	2360-0197
	2360-0201	6	SCREW-MACH 6-32 .5-IN-LG PAN-HD-POZI	28480	2360-0201
	2360-0205	2	SCREW-MACH 6-32 .75-IN-LG PAN-HD-POZI	28480	2360-0205
	2420-0001	2	NUT-HEX-W/LKWR 6-32-THD .109-THK	28480	2420-0002
	2510-0107	4	SCREW-MACH 8-32 .5-IN-LG PAN-HD-POZI	28480	2510-0107
	3030-0064	4	SCREW-SKT HD CAP 6-32 .625-IN-LG ALY STL	28480	3030-0064
	3050-0001	4	WASHER-FL MTLG NO.-8 .172-IN-ID	28480	3050-0001
	3050-0066	6	WASHER-FL MTLG NO.-6 .147-IN-ID	28480	3050-0066
	3110-0099	2	HINGE-DTCHBL-LF STL 1-LG .059-THK STL	28480	3110-0099
	3160-0208	1	FAN-TBAX 45-CFM 115V 50/60-HZ 1.5-THK	28480	3160-0208
	02640-00034	1	SHIELD	28480	02640-00034
	02640-00046	1	SCREEN	28480	02640-00046
	02640-00055	1	SUPPORT, RETAINER	28480	02640-00055
	02640-00066	1	SHROUD FAN	28480	02640-00066
	02640-40002	1	DISPLAY, TOP	28480	02640-40002
	02640-40022	1	SIDE, RIGHT	28480	02640-40022
	02640-40023	1	SIDE, LEFT	28480	02640-40023
	02640-60039	1	ASSY, CABLE, SWEEP	28480	02640-60039
	02640-60042	1	ASSY, CABLE, CRT	28480	02640-60042
	02640-60084	1	ASSY, CRT/YGKE	28480	02640-60084
	02640-60095	1	ASSY, SWEEP	28480	02640-60095
	02640-60138	1	ASSY, CABLE	28480	02640-60138