

SECTION VI REPLACEABLE PARTS

6-1 INTRODUCTION

6-2 This section contains information for ordering replacement parts. Table 6-4 lists parts in alphanumeric order by reference designators and provides the following information:

- a. Reference Designators. Refer to Table 6-1.
- b. Description. Refer to Table 6-2 for abbreviations.
- c. Total Quantity (TQ). Given only the first time the part number is listed except in instruments containing many sub-modular assemblies, in which case the TQ appears the first time the part number is listed in each assembly.
- d. Manufacturer's Part Number or Type.
- e. Manufacturer's Federal Supply Code Number. Refer to Table 6-3 for manufacturer's name and address.
- f. Hewlett-Packard Part Number.
- g. Recommended Spare Parts Quantity (RS) for complete maintenance of one instrument during one year of isolated service.
- h. Parts not identified by a reference designator are listed at the end of Table 6-4 under Mechanical and/or Miscellaneous. The former consists of parts belonging to and grouped by individual assemblies; the latter consists of all parts not immediately associated with an assembly.

6-3 ORDERING INFORMATION

6-4 To order a replacement part, address order or inquiry to your local Hewlett-Packard sales office (see lists at rear of this manual for addresses). Specify the following information for each part: Model, complete serial number, and any Option or special modification (J) numbers of the instrument; Hewlett-Packard part number; circuit reference designator; and description. To order a part not listed in Table 6-4, give a complete description of the part, its function, and its location.

Table 6-1. Reference Designators

A = assembly	E = miscellaneous
B = blower (fan)	electronic part
C = capacitor	F = fuse
CB = circuit breaker	J = jack, jumper
CR = diode	K = relay
DS = device, signaling (lamp)	L = inductor
	M = meter

Table 6-1. Reference Designators (Continued)

P = plug	V = vacuum tube, neon bulb, photocell, etc.
Q = transistor	
R = resistor	VR = zener diode
S = switch	X = socket
T = transformer	Z = integrated circuit or network
TB = terminal block	
TS = thermal switch	

Table 6-2. Description Abbreviations

A = ampere	mfr = manufacturer
ac = alternating current	mod. = modular or modified
assy. = assembly	mtg = mounting
bd = board	n = nano = 10^{-9}
bkt = bracket	NC = normally closed
°C = degree Centigrade	NO = normally open
cd = card	NP = nickel-plated
coef = coefficient	Ω = ohm
comp = composition	obd = order by description
CRT = cathode-ray tube	OD = outside diameter
CT = center-tapped	p = pico = 10^{-12}
dc = direct current	P.C. = printed circuit
DPDT = double pole, double throw	pot. = potentiometer
DPST = double pole, single throw	p-p = peak-to-peak
elect = electrolytic	ppm = parts per million
encap = encapsulated	pvr = peak reverse voltage
F = farad	rect = rectifier
°F = degree Fahrenheit	rms = root mean square
fxd = fixed	Si = silicon
Ge = germanium	SPDT = single pole, double throw
H = Henry	SPST = single pole, single throw
Hz = Hertz	SS = small signal
IC = integrated circuit	T = slow-blow
ID = inside diameter	tan. = tantalum
incnd = incandescent	Ti = titanium
k = kilo = 10^3	V = volt
m = milli = 10^{-3}	var = variable
M = mega = 10^6	ww = wirewound
μ = micro = 10^{-6}	W = Watt
met. = metal	

Table 6-3. Code List of Manufacturers

CODE NO.	MANUFACTURER	ADDRESS	CODE NO.	MANUFACTURER	ADDRESS
00629	EBY Sales Co., Inc.	Jamaica, N. Y.	07138	Westinghouse Electric Corp.	
00656	Aerovox Corp.	New Bedford, Mass.		Electronic Tube Div.	Elmira, N. Y.
00853	Sangamo Electric Co.		07263	Fairchild Camera and Instrument Corp.	Mountain View, Calif.
	S. Carolina Div.	Pickens, S. C.		Semiconductor Div.	
01121	Allen Bradley Co.	Milwaukee, Wis.	07387	Birtcher Corp., The	Los Angeles, Calif.
01255	Litton Industries, Inc.	Beverly Hills, Calif.	07397	Sylvania Electric Prod. Inc.	
				Sylvania Electronic Systems	
01281	TRW Semiconductors, Inc.	Lawndale, Calif.		Western Div.	Mountain View, Calif.
			07716	IRC Div. of TRW Inc.	Burlington Plant Burlington, Iowa
01295	Texas Instruments, Inc.		07910	Continental Device Corp.	Hawthorne, Calif.
	Semiconductor-Components Div.				
		Dallas, Texas	07933	Raytheon Co. Components Div.	
01686	RCL Electronics, Inc.	Manchester, N. H.		Semiconductor Operation	
01930	Amerock Corp.	Rockford, Ill.			Mountain View, Calif.
02107	Sparta Mfg. Co.	Dover, Ohio	08484	Breeze Corporations, Inc.	Union, N. J.
02114	Ferroxcube Corp.	Saugerties, N. Y.	08530	Reliance Mica Corp.	Brooklyn, N. Y.
02606	Fenwal Laboratories	Morton Grove, Ill.	08717	Sloan Company, The	Sun Valley, Calif.
02660	Amphenol Corp.	Broadview, Ill.	08730	Vemaline Products Co. Inc.	Wyckoff, N. J.
02735	Radio Corp. of America, Solid State and Receiving Tube Div.	Somerville, N. J.	08806	General Elect. Co.	Minia- ture Lamp Dept.
03508	G. E. Semiconductor Products Dept.	Syracuse, N. Y.			Cleveland, Ohio
			08863	Nylomatic Corp.	Norrisville, Pa.
03797	Eldema Corp.	Compton, Calif.	08919	RCH Supply Co.	Vernon, Calif.
03877	Transitron Electronic Corp.	Wakefield, Mass.	09021	Airco Speer Electronic Components	
					Bradford, Pa.
03888	Pyrofilm Resistor Co. Inc.	Cedar Knolls, N. J.	09182	*Hewlett-Packard Co. New Jersey Div.	
					Berkeley Heights, N. J.
04009	Arrow, Hart and Hegeman Electric Co.	Hartford, Conn.	09213	General Elect. Co. Semiconductor Prod. Dept.	Buffalo, N. Y.
04072	ADC Electronics, Inc.	Harbor City, Calif.	09214	General Elect. Co. Semiconductor Prod. Dept.	Auburn, N. Y.
04213	Caddell & Burns Mfg. Co. Inc.	Mineola, N. Y.	09353	C & K Components Inc.	Newton, Mass.
			09922	Burdy Corp.	Norwalk, Conn.
04404	*Hewlett-Packard Co. Palo Alto Div.	Palo Alto, Calif.	11115	Wagner Electric Corp.	
				Tung-Sol Div.	Bloomfield, N. J.
04713	Motorola Semiconductor Prod. Inc.	Phoenix, Arizona	11236	CTS of Berne, Inc.	Berne, Ind.
			11237	Chicago Telephone of Cal. Inc.	So. Pasadena, Calif.
05277	Westinghouse Electric Corp. Semiconductor Dept.	Youngwood, Pa.	11502	IRC Div. of TRW Inc.	Boone Plant Boone, N. C.
05347	Ultronix, Inc.	Grand Junction, Colo.	11711	General Instrument Corp	
05820	Wakefield Engr. Inc.	Wakefield, Mass.		Rectifier Div.	Newark, N. J.
06001	General Elect. Co. Electronic Capacitor & Battery Dept.	Irmo, S. C.	12136	Philadelphia Handle Co. Inc.	
06004	Bassik Div. Stewart-Warner Corp.	Bridgeport, Conn.			Camden, N. J.
			12615	U. S. Terminals, Inc.	Cincinnati, Ohio
06486	IRC Div. of TRW Inc. Semiconductor Plant	Lynn, Mass.	12617	Hamlin Inc.	Lake Mills, Wisconsin
06540	Amatom Electronic Hardware Co. Inc.		12697	Clarostat Mfg. Co. Inc.	Dover, N. H.
		New Rochelle, N. Y.	13103	Thermalloy Co.	Dallas, Texas
06555	Beede Electrical Instrument Co.	Penacook, N. H.	14493	*Hewlett-Packard Co.	Loveland Div. Loveland, Colo.
06666	General Devices Co. Inc.	Indianapolis, Ind.	14655	Cornell-Dubilier Electronics Div.	
				Federal Pacific Electric Co.	Newark, N. J.
06751	Semcor Div. Components, Inc.	Phoenix, Arizona	14936	General Instrument Corp. Semiconductor Prod. Group	Hicksville, N. Y.
06776	Robinson Nugent, Inc.	New Albany, Ind.	15801	Fenwal Elect.	Framingham, Mass.
06812	Torrington Mfg. Co., West Div.	Van Nuys, Calif.	16299	Corning Glass Works, Electronic Components Div.	Raleigh, N. C.
07137	Transistor Electronics Corp.	Minneapolis, Minn.			

*Use Code 28480 assigned to Hewlett-Packard Co., Palo Alto, California

Table 6-3. Code List of Manufacturers (Continued)

CODE NO.	MANUFACTURER	ADDRESS
16758	Delco Radio Div. of General Motors Corp.	Kokomo, Ind.
17545	Atlantic Semiconductors, Inc.	Asbury Park, N. J.
17803	Fairchild Camera and Instrument Corp Semiconductor Div. Transducer Plant	Mountain View, Calif.
17870	Daven Div. Thomas A. Edison Industries McGraw-Edison Co.	Orange, N. J.
18324	Signetics Corp.	Sunnyvale, Calif.
19315	Bendix Corp. The Navigation and Control Div.	Teterboro, N. J.
19701	Electra/Midland Corp.	Mineral Wells, Texas
21520	Fansteel Metallurgical Corp.	No. Chicago, Ill.
22229	Union Carbide Corp. Electronics Div.	Mountain View, Calif.
22753	UID Electronics Corp.	Hollywood, Fla.
23936	Pamotor, Inc.	Pampa, Texas
24446	General Electric Co.	Schenectady, N. Y.
24455	General Electric Co. Lamp Div. of Con- sumer Prod. Group	Nela Park, Cleveland, Ohio
24655	General Radio Co.	West Concord, Mass.
24681	LTV Electrosystems Inc Memcor/Com- ponents Operations	Huntington, Ind.
26982	Dynacool Mfg. Co. Inc.	Saugerties, N. Y.
27014	National Semiconductor Corp.	Santa Clara, Calif.
28480	Hewlett-Packard Co.	Palo Alto, Calif.
28520	Heyman Mfg. Co.	Kenilworth, N. J.
28875	IMC Magnetics Corp.	
	New Hampshire Div.	Rochester, N. H.
31514	SAE Advance Packaging, Inc.	Santa Ana, Calif.
31827	Budwig Mfg. Co.	Ramona, Calif.
33173	G. E. Co. Tube Dept.	Owensboro, Ky.
35434	Lectrohm, Inc.	Chicago, Ill.
37942	P. R. Mallory & Co. Inc.	Indianapolis, Ind.
42190	Muter Co.	Chicago, Ill.
43334	New Departure-Hyatt Bearings Div. General Motors Corp.	Sandusky, Ohio
44655	Ohmite Manufacturing Co.	Skokie, Ill.
46384	Penn Engr. and Mfg. Corp.	Doylestown, Pa.
47904	Polaroid Corp.	Cambridge, Mass.
49956	Raytheon Co.	Lexington, Mass.
55026	Simpson Electric Co. Div. of American Gage and Machine Co.	Chicago, Ill.
56289	Sprague Electric Co.	North Adams, Mass.
58474	Superior Electric Co.	Bristol, Conn.
58849	Syntron Div. of FMC Corp.	Homer City, Pa.
59730	Thomas and Betts Co.	Philadelphia, Pa.
61637	Union Carbide Corp.	New York, N. Y.
63743	Ward Leonard Electric Co.	Mt. Vernon, N. Y.

CODE NO.	MANUFACTURER	ADDRESS
70563	Amperite Co. Inc.	Union City, N. J.
70901	Beemer Engrg. Co.	Fort Washington, Pa.
70903	Belden Corp.	Chicago, Ill.
71218	Bud Radio, Inc.	Willoughby, Ohio
71279	Cambridge Thermionic Corp.	Cambridge, Mass.
71400	Bussmann Mfg. Div. of McGraw & Edison Co.	St. Louis, Mo.
71450	CTS Corp.	Elkhart, Ind.
71468	I. T. T. Cannon Electric Inc.	Los Angeles, Calif.
71590	Globe-Union Inc.	
	Centralab Div.	Milwaukee, Wis.
71700	General Cable Corp. Cornish Wire Co. Div.	Williamstown, Mass.
71707	Coto Coil Co. Inc.	Providence, R. I.
71744	Chicago Miniature Lamp Works	Chicago, Ill.
71785	Cinch Mfg. Co. and Howard B. Jones Div.	Chicago, Ill.
71984	Dow Corning Corp.	Midland, Mich.
72136	Electro Motive Mfg. Co. Inc.	Willimantic, Conn.
72619	Dialight Corp.	Brooklyn, N. Y.
72699	General Instrument Corp.	Newark, N. J.
72765	Drake Mfg. Co.	Harwood Heights, Ill.
72962	Elastic Stop Nut Div. of Amerace Esna Corp.	Union, N. J.
72982	Erie Technological Products Inc.	Erie, Pa.
73096	Hart Mfg. Co.	Hartford, Conn.
73138	Beckman Instruments Inc.	
	Helipot Div.	Fullerton, Calif.
73168	Fenwal, Inc.	Ashland, Mass.
73293	Hughes Aircraft Co. Electron Dynamics Div.	Torrance, Calif.
73445	Amperex Electronic Corp.	Hicksville, N. Y.
73506	Bradley Semiconductor Corp.	New Haven, Conn.
73559	Carling Electric, Inc.	Hartford, Conn.
73734	Federal Screw Products, Inc.	Chicago, Ill.
74193	Heinemann Electric Co.	Trenton, N. J.
74545	Hubbell Harvey Inc.	Bridgeport, Conn.
74868	Amphenol Corp. Amphenol RF Div.	Danbury, Conn.
74970	E. F. Johnson Co.	Waseca, Minn.
75042	IRC Div. of TRW, Inc.	Philadelphia, Pa.
75183	*Howard B. Jones Div. of Cinch Mfg. Corp.	New York, N. Y.
75376	Kurz and Kasch, Inc.	Dayton, Ohio
75382	Kilka Electric Corp.	Mt. Vernon, N. Y.
75915	Littlefuse, Inc.	Des Plaines, Ill.
76381	Minnesota Mining and Mfg. Co.	St. Paul, Minn.
76385	Minor Rubber Co. Inc.	Bloomfield, N. J.
76487	James Millen Mfg. Co. Inc.	
		Malden, Mass.
76493	J. W. Miller Co.	Compton, Calif.

*Use Code 71785 assigned to Cinch Mfg. Co., Chicago, Ill.

Table 6-3. Code List of Manufacturers (Continued)

CODE NO.	MANUFACTURER	ADDRESS
76530	Cinch	City of Industry, Calif.
76854	Oak Mfg. Co. Div. of Oak	Crystal Lake, Ill.
77068	Bendix Corp., Electrodynamics Div.	No. Hollywood, Calif.
77122	Palnut Co.	Mountainside, N. J.
77147	Patton-MacGuyer Co.	Providence, R. I.
77221	Phaostron Instrument and Electronic Co.	South Pasadena, Calif.
77252	Philadelphia Steel and Wire Corp.	Philadelphia, Pa.
77342	American Machine and Foundry Co.	Princeton, Ind.
77630	Potter and Brumfield Div. TRW Electronic Components Div.	Camden, N. J.
77764	Resistance Products Co.	Harrisburg, Pa.
78189	Illinois Tool Works Inc. Shakeproof Div.	Elgin, Ill.
78452	Everlock Chicago, Inc.	Chicago, Ill.
78488	Stackpole Carbon Co.	St. Marys, Pa.
78526	Stanwyck Winding Div. San Fernando Electric Mfg. Co., Inc.	Newburgh, N. Y.
78553	Tinnerman Products, Inc.	Cleveland, Ohio
78584	Stewart Stamping Corp.	Yonkers, N. Y.
79136	Waldes Kohinoor, Inc.	L. I. C., N. Y.
79307	Whitehead Metals Inc.	New York, N. Y.
79727	Continental-Wirt Electronics Corp.	Philadelphia, Pa.
79963	Zierick Mfg. Co.	Mt. Kisco, N. Y.
80031	Mepco Div. of Sessions Clock Co.	Morristown, N. J.
80294	Bourns, Inc.	Riverside, Calif.
81042	Howard Industries Div. of Msl Ind. Inc.	Racine, Wisc.
81073	Grayhill, Inc.	La Grange, Ill.
81483	International Rectifier Corp.	El Segundo, Calif.
81751	Columbus Electronics Corp.	Yonkers, N. Y.
82099	Goodyear Sundries & Mechanical Co. Inc.	New York, N. Y.
82142	Airco Speer Electronic Components	Du Bois, Pa.
82219	Sylvania Electric Products Inc. Electronic Tube Div. Receiving Tube Operations	Emporium, Pa.
82389	Switchcraft, Inc.	Chicago, Ill.
82647	Metals and Controls Inc. Control Products Group	Attleboro, Mass.
82866	Research Products Corp.	Madison, Wis.
82877	Rotron Inc.	Woodstock, N. Y.
82893	Vector Electronic Co.	Glendale, Calif.
83058	Carr Fastener Co.	Cambridge, Mass.
83186	Victory Engineering Corp.	Springfield, N. J.
83298	Bendix Corp. Electric Power Div.	Eatontown, N. J.
83330	Herman H. Smith, Inc.	Brooklyn, N. Y.
83385	Central Screw Co.	Chicago, Ill.
83501	Gavitt Wire and Cable Div. of Amerace Esna Corp.	Brookfield, Mass.

CODE NO.	MANUFACTURER	ADDRESS
83508	Grant Pulley and Hardware Co.	West Nyack, N. Y.
83594	Burroughs Corp. Electronic Components Div.	Plainfield, N. J.
83835	U. S. Radium Corp.	Morristown, N. J.
83877	Yardeny Laboratories, Inc.	New York, N. Y.
84171	Arco Electronics, Inc.	Great Neck, N. Y.
84411	TRW Capacitor Div.	Ogallala, Neb.
86684	RCA Corp. Electronic Components	Harrison, N. J.
86838	Rummel Fibre Co.	Newark, N. J.
87034	Marco & Oak Industries a Div. of Oak Electro/netics Corp.	Anaheim, Calif.
87216	Philco Corp. Lansdale Div.	Lansdale, Pa.
87585	Stockwell Rubber Co. Inc.	Philadelphia, Pa.
87929	Tower-Olschan Corp.	Bridgeport, Conn.
88140	Cutler-Hammer Inc. Power Distribution and Control Div. Lincoln Plant	Lincoln, Ill.
88245	Litton Precision Products Inc, USECO Div. Litton Industries	Van Nuys, Calif.
90634	Gulton Industries Inc.	Metuchen, N. J.
90763	United-Car Inc.	Chicago, Ill.
91345	Miller Dial and Nameplate Co.	El Monte, Calif.
91418	Radio Materials Co.	Chicago, Ill.
91506	Augat, Inc.	Attleboro, Mass.
91637	Dale Electronics, Inc.	Columbus, Neb.
91662	Elco Corp.	Willow Grove, Pa.
91929	Honeywell Inc. Div. Micro Switch	Freeport, Ill.
92825	Whitso, Inc.	Schiller Pk., Ill.
93332	Sylvania Electric Prod. Inc. Semiconductor Prod. Div.	Woburn, Mass.
93410	Essex Wire Corp. Stemco Controls Div.	Mansfield, Ohio
94144	Raytheon Co. Components Div. Ind. Components Oper.	Quincy, Mass.
94154	Wagner Electric Corp. Tung-Sol Div.	Livingston, N. J.
94222	Southco Inc.	Lester, Pa.
95263	Leecraft Mfg. Co. Inc.	L. I. C., N. Y.
95354	Methode Mfg. Co.	Rolling Meadows, Ill.
95712	Bendix Corp. Microwave Devices Div.	Franklin, Ind.
95987	Weckesser Co. Inc.	Chicago, Ill.
96791	Amphenol Corp. Amphenol Controls Div.	Janesville, Wis.
97464	Industrial Retaining Ring Co.	Irvington, N. J.
97702	IMC Magnetics Corp. Eastern Div.	Westbury, N. Y.
98291	Seaelectro Corp.	Mamaroneck, N. Y.
98410	ETC Inc.	Cleveland, Ohio
98978	International Electronic Research Corp.	Burbank, Calif.
99934	Renbrandt, Inc.	Boston, Mass.

Reference Designator	Description	Quantity	Mfr. Part # or Type	Mfr.	Mfr. Code	Stock No.	RS
C1	fxd, elect 4.7 μ f 50vdc	1	150D475X9050B2	Sprague	56289	0180-1731	1
C2, 18	fxd, film .01 μ f 200vdc	2	192P10392	Sprague	56289	0160-0161	1
C3	fxd, film 0.1 μ f 200vdc	1	192P10492	Sprague	56289	0160-0168	1
C4, 7, 8, 11, 13, 15, 17	NOT ASSIGNED	-	-	-	-	-	-
C5	fxd, film .001 μ f 200vdc	1	192P10292	Sprague	56289	0160-0153	1
C6	fxd, elect 20 μ f 15vdc	1	30D206G015BB4	Sprague	56289	0180-0300	1
C9	fxd, elect 4.7 μ f 35vdc	1		HLAB	09182	0180-0100	1
C10	fxd, elect 100 μ f 50vdc	1		HLAB	09182	0180-1852	1
C12, 20	fxd, elect 490 μ f 85vdc	2	D38618	HLAB	09182	0180-1888	1
C14	fxd, elect 1600 μ f 85vdc	1		HLAB	09182	0180-1986	1
C16	fxd, ceramic .05 μ f 500vdc	1	33C17A	Sprague	56289	0150-0052	1
C19	fxd, elect 15 μ f 50vdc	1	150D156X0050B2	Sprague	56289	0180-1834	1
CR1-5, 19, 20, 30, 32	Rect. si. 200ma 200prv 250mw	9		HLAB	09182	1901-0033	6
CR6-10, 12-16, 21, 28, 29, 31, 33	NOT ASSIGNED	-	-	-	-	-	-
CR11, 18, 34	Rect. si. 3A 200prv	3	MR1032B	Motorola	04713	1901-0416	3
CR17, 22-27	Rect. si. 900ma 200prv	7	1N5059	G. E.	03508	1901-0327	6
DS1	Lamp, neon part of si. ass'y	Ref		HLAB	09182	2140-0244	1
F1	Fuse cartridge 2A @ 250V 3AG	1	3Y2002	Littlefuse	75915	2110-0002	5
Q1, 2, 11	SS NPN diff. amp. si.	3		HLAB	09182	1854-0229	3
Q3, 5, 8, 10, 12, 14, 15	SS PNP si.	7	2N2907A	Sprague	56289	1853-0099	6
Q4	Power PNP si.	1	MJ 2268	Motorola	04713	1853-0063	1
Q6, 7	Power NPN si.	2		HLAB	09182	1854-0225	2
Q9, 16	SS NPN si.	2	4JX16A1014	G. E.	03508	1854-0071	2
Q13	NOT ASSIGNED	-	-	-	-	-	-
R1	fxd, ww 1K Ω \pm 5% 3w	1	242E1025	Sprague	56289	0813-0001	1
R2, 22, 23, 86	fxd, met. film 6.2K Ω \pm 1% 1/8w	4	Type CEA T-O	I. R. C.	07716	0698-5087	1
R3	fxd, met. film 15K Ω \pm 1% 1/8w	4	Type CEA T-O	I. R. C.	07716	0757-0446	1
R4, 64, 65	fxd, met. film 20K Ω \pm 1% 1/8w	3	Type CEA T-O	I. R. C.	07716	0757-0449	1
R5, 26, 29, 76, 77	fxd, met. film 1.5K Ω \pm 1% 1/8w	5	Type CEA T-O	I. R. C.	07716	0757-0427	1
R6, 25	fxd, comp 360K Ω \pm 5% 1/2w	2	EB-3645	A. B.	01121	0686-3645	1
R7	fxd, met. film 61.9K Ω \pm 1% 1/8w	1	Type CEA T-O	I. R. C.	07716	0757-0460	1
R8, 28	fxd, comp 560K Ω \pm 5% 1/2w	2	EB-5645	A. B.	01121	0686-5645	1
R9, 11, 17, 27, 32, 37, 48, 55, 78	NOT ASSIGNED	-	-	-	-	-	-
R10	var. ww DUAL 10K-100 Ω	1		HLAB	09182	2100-0997	1
R12	fxd, ww 1.3K Ω \pm 5% 3w	1	242E1325	Sprague	56289	0811-1803	1
R13, 19	fxd, comp SELECTED \pm 5%	2	Type EB	A. B.	01121		1
R14	fxd, comp 3.3 Ω \pm 5% 1/2w	1	EB-0335	A. B.	01121	0686-0335	1
R15	fxd, comp 330K Ω \pm 5% 1/2w	2	EB-3345		01121	0686-3345	1
R16	var. ww DUAL 900-10 Ω	1		HLAB	09182	2100-0994	1
R18	fxd, ww 5K Ω \pm 5% 3w	1	242E5025	Sprague	56289	0811-2188	1
R20	fxd, met. film 1K Ω \pm 1% 1/4w	1	Type CEB T-O	I. R. C.	07716	0757-0338	1

Reference Designator	Description	Quantity	Mfr. Part # or Type	Mfr.	Mfr. Code	Stock No.	RS
R21	fxd, comp 39 Ω \pm 5% $\frac{1}{2}$ w	1	EB-3905	A. B.	01121	0686-3905	1
R24	fxd, met. film 4.75K Ω \pm 1% $\frac{1}{8}$ w	1	Type CEA T-O	I. R. C.	07716	0757-0437	1
R30	var. ww 5K Ω (Modify)	1	Type 110-F4	C. T. S.	11236	2100-1824	1
R31	fxd, comp 1K Ω \pm 5% $\frac{1}{2}$ w	1	EB-1025	A. B.	01121	0686-1025	1
R33, 38	fxd, comp 10K Ω \pm 5% $\frac{1}{2}$ w	2	EB-1035	A. B.	01121	0686-1035	1
R34	fxd, comp 160 Ω \pm 5% $\frac{1}{2}$ w	1	EB-1615	A. B.	01121	0686-1615	1
R35	fxd, comp 200 Ω \pm 5% $\frac{1}{2}$ w	1	EB-2015	A. B.	01121	0686-2015	1
R36	fxd, ww 500 Ω \pm 5% 10w	1		HLAB	09182	0811-1909	1
R39	fxd, met. film 1.21K Ω \pm 1% $\frac{1}{8}$ w	1	Type CEA T-O	I. R. C.	07716	0757-0274	1
R40, 57, 60, 62	fxd, met. film 900 Ω \pm 1% $\frac{1}{8}$ w	4	Type CEA T-O	I. R. C.	07716	0757-1099	1
R41	fxd, comp 12K Ω \pm 5% $\frac{1}{2}$ w	1	EB-1235	A. B.	01121	0686-1235	1
R42	fxd, comp 6.8K Ω \pm 5% $\frac{1}{2}$ w	1	EB-6825	A. B.	01121	0686-6825	1
R43	fxd, met. film 422 Ω \pm 1% $\frac{1}{4}$ w	1	Type CEB T-O	I. R. C.	07716	0698-4590	1
R44	fxd, comp 47K Ω \pm 5% $\frac{1}{2}$ w	1	EB-4735	A. B.	01121	0686-4735	1
R45	fxd, comp 5.1K Ω \pm 5% $\frac{1}{2}$ w	1	EB-5125	A. B.	01121	0686-5125	1
R46	fxd, comp 100K Ω \pm 5% $\frac{1}{2}$ w	1	EB-1045	A. B.	01121	0686-1045	1
R47	fxd, comp 470 Ω \pm 5% $\frac{1}{2}$ w	1	EB-4715	A. B.	01121	0686-4715	1
R49	fxd, ww 900 Ω \pm 5% 15w	1		HLAB	09182	0811-0957	1
R50	fxd, comp 10 Ω \pm 5% $\frac{1}{2}$ w	1	EB-1005	A. B.	01121	0686-1005	1
R51	fxd, comp 30K Ω \pm 5% $\frac{1}{2}$ w	1	EB-3035	A. B.	01121	0686-3035	1
R52	fxd, comp 22K Ω \pm 5% $\frac{1}{2}$ w	1	EB-2235	A. B.	01121	0686-2235	1
R53	fxd, comp 3K Ω \pm 5% $\frac{1}{2}$ w	1	EB-3025	A. B.	01121	0686-3025	1
R54	fxd, ww 0.66 Ω C. T. \pm 5% 20w	1		HLAB	09182	0811-1818	1
R56	var. ww 1K Ω (Modify)	1	Type 110-F4	C. T. S.	11236	2100-0391	1
R58, 59	fxd, met. film 100 Ω \pm 1% $\frac{1}{8}$ w	1	Type CEA T-O	I. R. C.	07716	0757-0401	1
R61	fxd, met. film 47.5K \pm 1% $\frac{1}{8}$ w	1	Type CEA T-O	I. R. C.	07716	0757-0457	1
R63	var. ww 10K Ω	1	Type 110-F4	C. T. S.	11236	2100-0396	1
R66, 67	fxd, met. film 3.40K Ω \pm 1% $\frac{1}{4}$ w	2	Type CEB T-O	I. R. C.	07716	0698-4642	1
R68, 69	fxd, met. film 365 Ω \pm 1% $\frac{1}{4}$ w	2	Type CEB T-O	I. R. C.	07716	0757-0723	1
R70, 71, 75, 85	fxd, met. film 3K Ω \pm 1% $\frac{1}{8}$ w	4	Type CEA T-O	I. R. C.	07716	0757-1093	1
R72	var. ww 250 Ω (Modify)	1	Type 110-F4	C. T. S.	11236	2100-0439	1
R73	fxd, met. film 750 Ω \pm 1% $\frac{1}{8}$ w	1	Type CEA T-O	I. R. C.	07716	0757-0420	1
R74	fxd, met. film 9.09K Ω \pm 1% $\frac{1}{8}$ w	1	Type CEA T-O	I. R. C.	07716	0757 0288	1
R80	fxd, comp 33K Ω \pm 5% $\frac{1}{2}$ w	1	EB-3335	A. B.	01121	0686-3335	1
R81-83	fxd, ww 120 Ω \pm 5% 75w	3	Type 68R-37	H. H.	73978	0811-1971	1
S1	Switch-pilot lt. (red) ON/Off SPDT	1	54-61681 26A1H	Oak	87034	3101-0100	1
S2	Switch, meter	1		HLAB	09182	3100-1910	1
T1	Power transformer	1		HLAB	09182	9100-1838	1
VR2	Diode, zener 6.2V 1w	2	ECG-137A 1N821	N. A. Elect.	06486	1902-0761	2
VR1	Diode, zener 6.2V	2	ECG-137A 1N821	N. A. Elect.	06486	1902-0761	2
VR3	Diode, zener 4.22V 400mw	1		HLAB	09182	1902-3070	1
VR4, 5	Diode, zener 4.3V 1 watt	2	ECG-5068A	HLAB	09182	1902-0797	2
	Outrigger-chassis	1		HLAB	09182	5000-6081	
	Bracket-transformer	1		HLAB	09182	5000-6083	
	Outrigger-cover	1		HLAB	09182	5000-6077	
	Angle -guard	1		HLAB	09182	5020-5540	
	Cover	2		HLAB	09182	5000-6061	
	P. C. Board assembly (includes Components)	1		HLAB	09182	06289-60021	
	Printed Circuit Board (blank)	1		HLAB	09182	5020-5598	
	Chassis assembly - right	1		HLAB	09182	5060-6129	

Reference Designator	Description	Quantity	Mfr. Part # or Type	Mfr.	Mfr. Code	Stock No.	RS
	Chassis assembly - left	1		HLAB	09182	5060-6130	
	Panel ass'y - front	1		HLAB	09182	06289-60001	
	Sink ass'y - heat	1		HLAB	09182	5060-6128	
	5 Way binding post (maroon)	1	DF21 Mn	HLAB	09182	1510-0040	1
	5 Way binding post (black)	2	DF21 BC	Superior	58474	1510-0039	1
	Cable clamp $\frac{1}{4}$ I. D.	1	T4-4	Whitehead	79307	1400-0330	1
	Line cord plug PH151 $7\frac{1}{2}$ ft.	1	KH-4096	Beldon	70903	8120-0050	1
	Spacer - captive	2		HLAB	09182	0380-0742	1
	Strain relief bushing	1	SR-5P-1	Heyco	28520	0400-0013	1
	Knob $17/64$ insert pointer	2		HLAB	09182	0370-0101	1
	Knob $3/16$ insert	2		HLAB	09182	0370-0179	1
	Barrier strip	1		HLAB	09182	0360-1234	1
	Jumper	8	422-13-11-013	Cinch	71785	0360-1143	2
	Rubber bumper	4	MB 50	Stockwell	87575	0403-0088	1
	Knob $\frac{1}{4}$ insert pointer	1		HLAB	09182	0370-0084	1
	Fuse holder assembly	1	342014	Littlefuse	75915	1400-0084	1
	Mica insulator	2	734	Reliance	08530	0340-0174	2
	Meter $2\frac{1}{4}$ " DUAL scale 0-50V 0-1.8A	1		HLAB	09182	1120-1139	1
	Bezel $1/6$ MOD	1		HLAB	09182	4040-0295	1
	Spring	4		HLAB	09182	1460-0720	1
	Fastener	10	C8091-632-248	Tinnerman	89032	0510-0275	2
	Insulator, transistor pin	4		HLAB	09182	0340-0166	4
	Insulator	4		HLAB	09182	0340-0168	4
	Rubber bumper	3	4072	Stockwell	87575	0403-0086	1

APPENDIX A

Option 11, Overvoltage Protection "Crowbar"

DESCRIPTION:

This option is installed in DC Power Supplies, 6253A, 6255A, 6281A, 6284A, and 6289A, and tested at the factory. It consists of a printed circuit board, screwdriver-type front panel potentiometer, and six wires that are soldered to the main power supply board.

The crowbar monitors the output voltage of the power supply and fires an SCR that shorts the output when it exceeds the preset trip voltage. The trip voltage is determined by the setting of the CROWBAR ADJUST control on the front panel. The trip voltage range is as follows:

Model	6253A	6255A	6281A	6284A	6289A
Trip Voltage Range	2.5-23V	2.5-44V	2.5-10V	2.5-23V	2.5-44V

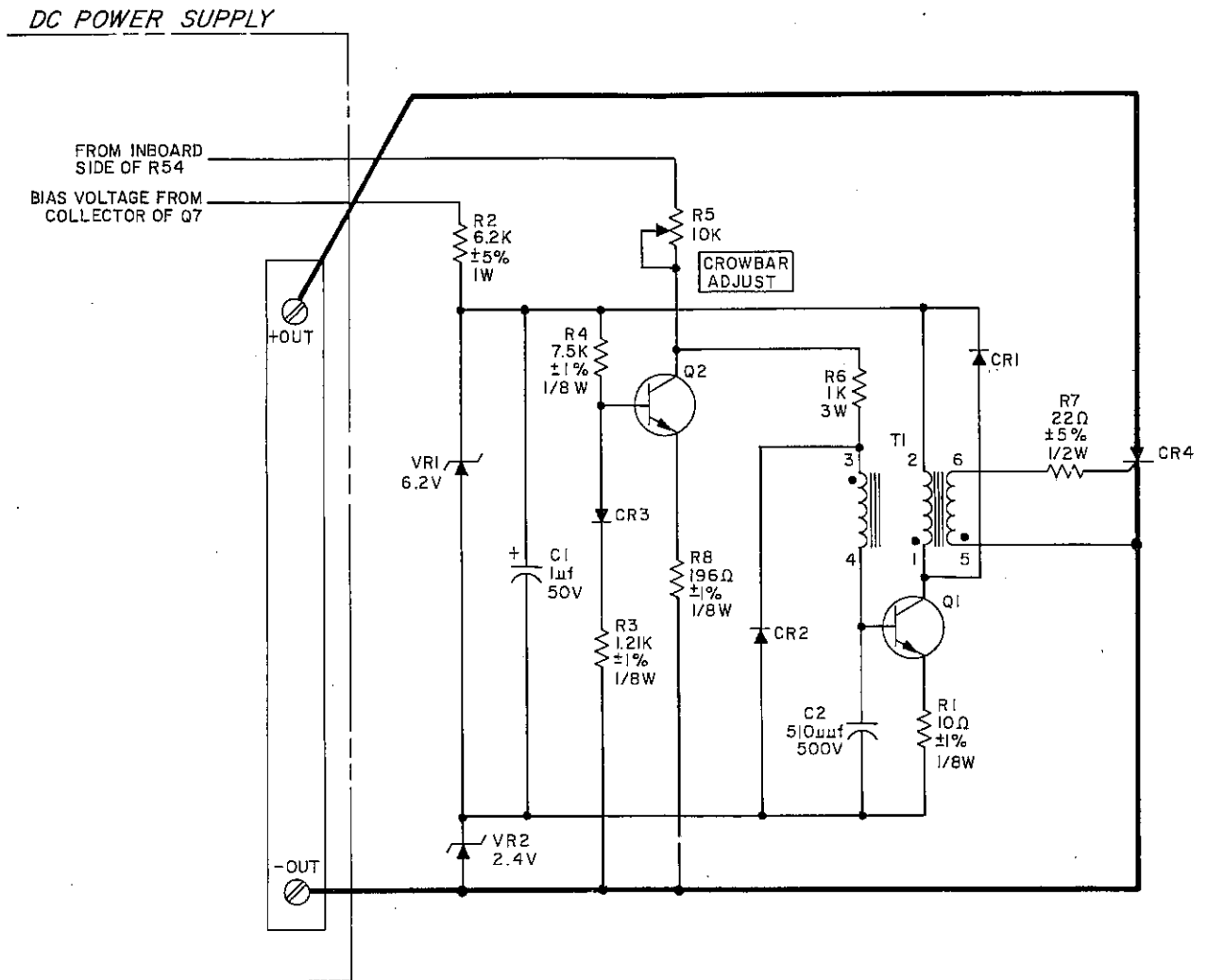
To prevent transients from falsely tripping the crowbar, the trip voltage must be set higher than the power supply output voltage by the following margin: 4% of the output voltage plus 2V. The margin represents the minimum crowbar trip setting for a given output voltage; the trip voltage can always be set higher than this margin.

OPERATION:

1. Turn the CROWBAR ADJUST fully clockwise to set the trip voltage to maximum.
2. Set the power supply VOLTAGE control for the desired crowbar trip voltage. To prevent false crowbar tripping, the trip voltage should exceed the desired output voltage by the following amount: 4% of the output voltage plus 2V.
3. Slowly turn the CROWBAR ADJUST ccw until the crowbar trips, output goes to 0 Volt.
4. The crowbar will remain activated and the output shorted until the supply is turned off. To reset the crowbar, turn the supply off, then on.
5. If the CROWBAR must be completely disabled, remove the lead attached to the CROWBAR ADJUST potentiometer R5.

A-1. Replaceable Parts

REF. DESIG.	DESCRIPTION	TQ	MFR. PART NO.	MFR. CODE	HP PART NO.	RS
C1	fxd, elect 1 μ F 50Vdc	1	30D105G050BA2	56289	0180-0108	1
C2	fxd, mica 510 μ F 500Vdc	1	RCM15E511J	04062	0140-0047	1
CR1-CR3	Diode, Si, 200mA 200prv	3		09182	1901-0033	3
CR4	SCR 7.4A 100prv	1	C20A	03508	1884-0031	1
Q1, 2	SS NPN Si.	2	2N3417	03508	1854-0087	2
R1	fxd, met. film 10 Ω \pm 1% 1/8W	1	Type CEA T-O	07716	0757-0346	1
R2	fxd, comp 6.2K Ω \pm 5% 1W	1	GB-6225	01121	0689-6225	1
R3	fxd, met. film 1.21K Ω \pm 1% 1/8W	1	Type CEA T-O	07716	0757-0274	1
R4	fxd, met. film 7.5K Ω \pm 1% 1/8W	1	Type CEA T-O	07716	0757-0440	1
R5	var. ww 10K Ω \pm 5%	1		09182	2100-1854	1
R6	fxd, ww 1K Ω \pm 5% 3W	1	242E1025	56289	0813-0001	1
R7	fxd, comp 22 Ω \pm 5% 1/2W	1	EB-2205	01121	0686-2205	1
R8	fxd, met. film 196 Ω \pm 1% 1/8W	1	Type CEA T-O	07716	0698-3440	1
T1	Transformer, Pulse	1		09182	5080-7122	1
VR1	Diode, zener 6.19V \pm 5%	1		09182	1902-0049	1
VR2	Diode, zener 2.37V \pm 5%	1		09182	1902-3002	1
MISCELLANEOUS						
	Heat Sink, CR4	1		09182	5000-6229	
	Insulator, CR4	1		09182	0340-0462	1
	Mica Washer, CR4	1		09182	2190-0709	1
	Cable Clamp	1	T4-4	79307	1400-0330	1
	Bushing, Potentiometer, R5	1		09182	1410-0052	
	Nut, Hex, R5	1		09182	2950-0034	
	Label, Information, (Crowbar Adj.)	1		09182	7124-0389	
	Printed Circuit Board Assembly, Includes Components	1		09182	5060-6176	
	Modified Front Panel, Includes Components	1		09182	06289-60003	



CIRCUIT PATENTS APPLIED FOR, LICENSE TO USE MUST BE OBTAINED IN WRITING FROM HEWLETT-PACKARD CO. HARRISON DIVISION.

Figure A-1. Model 6255A and 6289A Overvoltage Protection Crowbar