

# SERVICING INFORMATION



# MODEL 2160

1993 VERSION

## 60 MHz DUAL TRACE, DUAL TIMEBASE OSCILLOSCOPE

### PARTS LIST

CIRCUIT SYMBOL	DESCRIPTION	B+K PRECISION PART NUMBER	CIRCUIT SYMBOL	DESCRIPTION	B+K PRECISION PART NUMBER
<b>MAIN CHASSIS &amp; ACCESSORIES &amp; PACKING</b>					
<b>RESISTORS</b>					
R101,201	10 Ω, 5%, 1/2 W Carbon Film	002-102-5-100		Metal Link, 2.5 mm x 270 mm Long	265-056-9-005
R498	880 Ω, 5%, 15 W Wirewound	004-264-9-001		Cabinet	272-204-9-001
VR301,401	300 Ω Potentiometer	008-901-9-006	For Q501-503, 505,506	Insulating Washer	342-144-9-001
VR503	10 kΩ Potentiometer	008-901-9-004		Insulator	342-191-9-002
VR601,S601	10 kΩ Potentiometer with Switch	008-901-9-003	For Q501-503, 505,506		
VR704	1 kΩ Potentiometer	008-909-9-002		Cable Tie	380-311-9-001
VR811	5 kΩ Potentiometer	008-901-9-005		Wire Tie	380-529-9-001
<b>INDUCTORS</b>					
	Trace Rotation Coil	047-101-9-001		Wire Tie	380-529-9-001
	Power Transformer	065-263-9-001		Switch Coupler, Plastic	380-567-9-001
<b>SWITCHES</b>					
	Push Button Switch, Power	088-173-9-001		Switch Coupler, Plastic	380-585-9-001
S401	Push Button Switch	088-193-9-001		Leg, Tilt Stand	380-585-9-002
<b>DIODES &amp; TRANSISTORS</b>					
LED101,201,501, 503,701	LED, Red	158-094-9-001		Pot. Coupler, Plastic	380-585-9-005
LED502	LED, Green	158-111-9-001		CRT Bezel	380-636-9-004
Q501,502	2SB857C PNP Transistor	173-026-9-002		Rear Panel, Plastic	380-636-9-007
Q503,505,506	2SD880Y NPN Transistor	172-082-9-001		Front Panel, Plastic	380-636-9-008
<b>MISCELLANEOUS</b>					
	Delay Line	040-011-9-001		Grommet	381-190-9-001
(For 120 V)	630 mA, 250 V, 5x20 mm, Slow Blow Fuse	194-035-9-001		Grommet	381-190-9-002
(For 240 V)	315 mA, 250 V, 5x20 mm, Slow Blow Fuse	194-038-9-001		Grommet	381-190-9-003
	CRT, 150CTB31	230-041-9-001		Lever Switch Cover, Grey	384-106-9-001
	CRT Neck Clamp, Top	250-288-9-005		Push Button, Grey	384-106-9-003
	CRT Neck Clamp, Bottom	250-288-9-006		Lever Switch Cover, Grey	384-119-9-001
	Bracket (Illum., Beam Find, & Power Sw.)	250-288-9-007		Push Button, Red	384-136-9-001
	Bracket (H Pos. & Dly. Time Fine)	250-288-9-008		Power Switch Link Cushion	388-122-9-002
	Bracket, P.C. Board	250-288-9-009		Handle Cushion	388-122-9-003
	Bracket, Pos. A, Pos. B	250-296-9-002		Cushion, CRT Neck (Top)	388-132-9-001
	Rear Sub-Panel	254-136-9-003		Cushion, CRT Neck	388-132-9-002
	Side Frame, Left	254-136-9-006		Cushion, CRT Neck (Bottom)	388-132-9-003
	Center Frame	254-136-9-008		Cushion, CRT Front (Top)	388-132-9-005
	Front Sub-Panel, Metal	254-139-9-002		Cushion, CRT Front (Side)	388-132-9-006
	Side Frame, Right	254-141-9-002		Pilot Lamp (Blue Thread Color)	400-102-9-001
	Bracket	254-153-9-001		Pilot Lamp (Red Thread Color)	400-102-9-002
	CRT Shield	256-288-9-003		AC Cord	420-042-9-001
	CH1 Attn Shield, Bottom	256-288-9-007		Instruction Manual	480-635-9-001
	CH2 Attn Shield, Bottom	256-288-9-008		Addendum, Manual	491-346-9-001
	Inlay, Front Panel (Small)	260-508-9-002		Addendum, Manual	491-372-9-001
	Inlay, Front Panel (Large)	260-508-9-004		3 x 6 mm Round Head Mach. Screw	634-228-9-001
	CRT Ground Clip	261-224-9-001		3 x 8 mm Round Head Mach. Screw	634-228-9-002
	CRT Hold-Down, Front	261-224-9-002		3 x 18 mm Flat Head Mach. Screw	634-228-9-009
	Metal Link, 2.5 mm x 75 mm Long	265-049-9-001		3 x 8 mm Pan Washer Head Mach. Screw	634-228-9-011
	Plastic Shaft, 6 mm x 55 mm Long	265-052-9-002		3 x 8 mm Pan Washer Head Mach. Screw, Black	634-228-9-012
	Metal Link, 2.5 mm x 211.5 mm Long	265-056-9-001		3 x 16 mm Screw	634-228-9-015
	Metal Link, 2.5 mm x 117 mm Long	265-056-9-002		4 x 16 mm Pan Washer Head Mach. Screw	634-253-9-003
	Plastic Shaft, 6 mm x 111.5 mm Long	265-056-9-003		4 x 8 mm Mach Screw, Type "S"	634-253-9-004
	Plastic Shaft, 6 mm x 82 mm Long	265-056-9-004		3 x 10 mm Screw	634-253-9-005
				3 x 6 mm Screw	634-282-9-002
				4 x 3.2 mm Hex Nut	653-127-9-001
				3 x 10 mm Sheet Metal Screw, Type "B"	710-161-9-001
				3 x 8 mm Sheet Metal Screw, Type "B"	710-161-9-002
				3 x 6 mm Sheet Metal Screw, Type "B"	710-161-9-003
				<b>COMPOSITE</b>	
				<b>499-444-9-001</b>	

**PARTS LIST**

CIRCUIT SYMBOL	DESCRIPTION	B+K PRECISION PART NUMBER	CIRCUIT SYMBOL	DESCRIPTION	B+K PRECISION PART NUMBER
<b>MAIN CHASSIS &amp; ACCESSORIES &amp; PACKING (Continued)</b>					
	3 x 8 mm Sheet Metal Screw, Type "B" .....	710-161-9-004		Small Knob, Grey .....	751-334-9-002
	5.2 x 12 mm Steel Washer .....	724-092-9-003		Small Knob, Grey .....	751-334-9-005
	3.2 x 6 mm Steel Washer .....	724-092-9-007		Knob, Small .....	751-362-9-001
	3/8" IT Lockwasher .....	731-006-9-001		Knob, Large .....	751-362-9-002
	M4 x 15 mm Toothed Washer .....	731-115-9-001		Small Knob, Grey .....	751-362-9-003
	Rivet, Blind (Pop) .....	733-049-9-001		Graticule (CRT Screen) .....	753-049-9-001
	Cover, Handle Mounting Piece .....	746-087-9-004		Stand-Off .....	759-229-9-002
	Plastic Grip, Handle .....	746-100-9-002		AC Power Plug / Fuseholder / V-Select .....	770-030-9-001
	Handle Spring .....	746-100-9-003		BNC Connector .....	772-054-9-001
	Handle Mounting Piece .....	746-100-9-004		Banana Jack, Black .....	773-140-9-001
	Handle .....	746-100-9-006		Banana Jack, Red .....	773-147-9-001
	CRT Socket .....	749-120-9-002	For BD502	Test Pin, "CAL" .....	777-079-9-001
	Large Knob, Grey .....	751-334-9-001	Heatsink	Wireform, Heatsink Retainer .....	804-028-9-001

**VERTICAL ATTENUATOR & PRE-AMP P.C. BOARD ASSEMBLY  
546-069-9-001**

**RESISTORS**

Unlisted resistors are 5%, 1/4 W Metal Film.  
(See schematic diagram for value.)

R112,212	1.00 M $\Omega$ , 1%, 1/2 W Metal Film .....	015-124-1-004	C108,122,128,129, 208,222,228,229A	0.022 $\mu$ F, +80/-20%, 50 V Ceramic .....	020-423-9-03
R113,213	470 k $\Omega$ , 5%, 1/2 W Carbon Film .....	002-102-5-474	C109,110,209,210	0.01 $\mu$ F, 5%, 50 V Polyester .....	025-278-9-006
R116,118,216,218	681 $\Omega$ , 1%, 1/4 W Metal Film .....	015-144-6-810	C111	27 pF, 5%, 50 V Ceramic .....	020-423-9-011
R120,220	3.92 k $\Omega$ , 1%, 1/4 W Metal Film .....	015-144-3-921	C116,216	7 pF, $\pm$ 0.5 pF, 50 V Ceramic .....	020-423-9-019
R121,155,156, 221,255,256	392 $\Omega$ , 1%, 1/4 W Metal Film .....	015-144-3-920	C127,130,227,230	10 $\mu$ F, 20%, 50 V Electrolytic .....	022-441-9-002
R133,233	10.0 k $\Omega$ , 1%, 1/4 W Metal Film .....	015-144-1-002	VC105,205	22 pF Trimmer .....	028-116-9-001
R134,234	2.00 k $\Omega$ , 1%, 1/4 W Metal Film .....	015-144-2-001	<b>INDUCTORS</b>		
R135,235	1.21 k $\Omega$ , 1%, 1/4 W Metal Film .....	015-144-1-211	L101,102,201,202	68 $\mu$ H Coil .....	047-101-9-003
R139,140,239,240	221 $\Omega$ , 1%, 1/4 W Metal Film .....	015-144-2-210	<b>SWITCHES</b>		
R141,241	169 $\Omega$ , 1%, 1/4 W Metal Film .....	015-144-1-690	S101,201	Lever Switch .....	080-030-9-001
R144,145,244,245	475 $\Omega$ , 1%, 1/4 W Metal Film .....	015-144-4-750	S102,202	Rotary Switch .....	083-332-9-004
R146,246	1.10 k $\Omega$ , 1%, 1/4 W Metal Film .....	015-144-1-101	<b>TRANSISTORS</b>		
R149,150,249,250	3.01 k $\Omega$ , 1%, 1/4 W Metal Film .....	015-144-3-011	Q101,105,108,109, 201,205,208,209	2SC1907 NPN Transistor .....	176-174-9-001
VR101,102,201,202	20 k $\Omega$ Trimmer Pot .....	010-100-9-001	Q102,202	2SK168E FET .....	182-113-9-001
VR103,203	200 $\Omega$ Trimmer Pot .....	010-100-9-004	Q103,203	2SC945Q NPN Transistor .....	176-225-9-001
VR104,204	1 k $\Omega$ Trimmer Pot .....	010-100-9-011	Q104,204	2SA844D PNP Transistor .....	177-021-9-001
VR106,206	100 $\Omega$ Trimmer Pot .....	010-100-9-012	<b>INTEGRATED CIRCUITS</b>		
<b>CAPACITORS</b>			U101,201	LF411CN .....	307-338-9-004
C101,201	0.047 $\mu$ F, 10%, 400 V Polyester .....	025-278-9-004	U102,103,202,203	CA3127E (Transistor Array) .....	307-338-9-003
C104,204	2200 pF, 20%, 125 VAC Ceramic .....	020-448-9-002	<b>MISCELLANEOUS</b>		
C105,113,124, 213,224	0.1 $\mu$ F, 20%, 50 V Ceramic .....	020-480-9-003	P101,201	Attn. Shield Case, Top .....	256-288-9-002
C106,206	2 pF, $\pm$ 0.25 pF, 50 V Ceramic .....	020-423-9-022	J18	8-Pin PC Terminal .....	757-162-9-004
C107,114,207,214	0.1 $\mu$ F, +80/-20%, 50 V Ceramic .....	020-480-9-004		Jumper Wire .....	— — —

**VERTICAL AMPLIFIER P.C. BOARD ASSEMBLY  
546-069-9-002**

**RESISTORS**

Unlisted resistors are 5%, 1/4 W Metal Film.  
(See schematic diagram for value.)

R301,302,401,402, 445,446	121 $\Omega$ , 1%, 1/4 W Metal Film .....	015-144-1-210	R425,426, 3102,4102	1.00 k $\Omega$ , 1%, 1/4 W Metal Film .....	015-144-1-001
R303,313,403, 413,447	100 $\Omega$ , 1%, 1/4 W Metal Film .....	015-144-1-000	R427	150 $\Omega$ , 1%, 1/4 W Metal Film .....	015-144-1-500
R304,305,356, 357,404,405	301 $\Omega$ , 1%, 1/4 W Metal Film .....	015-144-3-010	R430,431	562 $\Omega$ , 1%, 1/4 W Metal Film .....	015-144-5-620
R306,307	54.9 $\Omega$ , 1%, 1/4 W Metal Film .....	015-144-5-498	R440,441	2.21 k $\Omega$ , 1%, 1/4 W Metal Film .....	015-144-2-211
R308,350,351, 352,353,408	221 $\Omega$ , 1%, 1/4 W Metal Film .....	015-144-2-210	R451	1 M $\Omega$ , 5%, 1/4 W Carbon Film .....	002-104-5-105
R309,310,409, 410,448,449	10.0 $\Omega$ , 1%, 1/4 W Metal Film .....	015-144-1-008	R472	6.81 k $\Omega$ , 1%, 1/4 W Metal Film .....	015-144-6-811
R3101,4101	33.2 k $\Omega$ , 1%, 1/4 W Metal Film .....	015-144-3-322	R473	33.2 k $\Omega$ , 1%, 1/4 W Metal Film .....	015-144-3-322
R3103,4103	33.2 $\Omega$ , 1%, 1/4 W Metal Film .....	015-144-3-328	R484A,485B, 486-495	1.2 k $\Omega$ , 5%, 3 W Metal Oxide .....	013-183-9-005
R311,312,411,412	12.1 k $\Omega$ , 1%, 1/4 W Metal Film .....	015-144-1-212	VR302,402	300 $\Omega$ Trimmer Pot .....	010-073-9-008
R315,417,418	332 $\Omega$ , 1%, 1/4 W Metal Film .....	015-144-3-320	VR304,404	5 k $\Omega$ Trimmer Pot .....	010-073-9-002
R318,444	470 $\Omega$ , 1%, 1/4 W Metal Film .....	015-144-4-700	VR305,409	200 $\Omega$ Trimmer Pot .....	010-073-9-007
R354,355	60.4 $\Omega$ , 1%, 1/4 W Metal Film .....	015-144-6-048	VR306,307,406,411	100 $\Omega$ Trimmer Pot .....	010-073-9-006
R415,416	86.6 $\Omega$ , 1%, 1/4 W Metal Film .....	015-144-8-668	VR407	500 k $\Omega$ Trimmer Pot .....	010-073-9-011
R424	866 $\Omega$ , 1%, 1/4 W Metal Film .....	015-144-8-660	VR408,501	500 $\Omega$ Trimmer Pot .....	010-073-9-009
<b>CAPACITORS</b>			C302,402	0.033 $\mu$ F, 5%, 50 V Polyester .....	025-278-9-010
			C303,403	220 pF, 5%, 50 V Ceramic .....	020-436-9-003
			C304,404	18 pF, 5%, 50 V Ceramic .....	020-423-9-007

CIRCUIT SYMBOL	DESCRIPTION	B+K PRECISION PART NUMBER	CIRCUIT SYMBOL	DESCRIPTION	B+K PRECISION PART NUMBER
<b>VERTICAL AMPLIFIER P.C. BOARD ASSEMBLY (Continued)</b>					
C305,306,313,314, 317,319,320,325, 405,407,409,424, 425,427,430	0.022 $\mu$ F, +80/-20%, 50 V Ceramic . . .	020-423-9-034	<b>DIODES &amp; TRANSISTORS</b>		
C307,318,406, 410,442	10 $\mu$ F, 20%, 50 V Electrolytic . . . . .	022-441-9-002	D301-304,309-316, 401-404	1N4154 Diode . . . . .	151-164-9-001
C308,412	15 pF, 5%, 50 V Ceramic . . . . .	020-423-9-005	D305-308,409-412	1N4148 Silicon Diode . . . . .	151-038-9-001
C309	10 pF, $\pm$ 0.5 pF, 50 V Ceramic . . . . .	020-423-9-002	Q301,302,401,402, 403,404	MPS3640 PNP Transistor . . . . .	177-014-9-001
C311,312,315,316	68 pF, 5%, 50 V Ceramic . . . . .	020-423-9-018	Q303,304,310,311	BC557B PNP Transistor . . . . .	177-105-9-003
C324,420	33 pF, 5%, 50 V Ceramic . . . . .	020-423-9-013	Q305	BC547B NPN Transistor . . . . .	176-206-9-002
C328	3 pF, $\pm$ 0.25 pF, 50 V Ceramic . . . . .	020-423-9-012	Q306,307,308,309	2SA1206K PNP Transistor . . . . .	177-065-9-001
C363A	0.0022 $\mu$ F, 5%, 50 V Polyester . . . . .	025-286-9-004	Q409,410,411,412	2SC3598E NPN Transistor . . . . .	176-225-9-002
C411	1 pF, $\pm$ 0.25 pF, 50 V Ceramic . . . . .	020-423-9-021	Q415	2SC945Q NPN Transistor . . . . .	176-225-9-001
C422	22 pF, 5%, 50 V Ceramic . . . . .	020-423-9-010	Q416,417	2SA1029C PNP Transistor . . . . .	177-108-9-003
C423	0.0039 $\mu$ F, 5%, 50 V Polyester . . . . .	025-300-9-002	<b>INTEGRATED CIRCUITS</b>		
C426	0.01 $\mu$ F, 10%, 500 V Ceramic . . . . .	020-448-9-006	U301	4013B Dual "D" Flip-Flop . . . . .	308-377-9-001
C429	100 $\mu$ F, 20%, 50 V Electrolytic . . . . .	022-441-9-006	U302,401	4011B Quad 2-Input NAND Gate . . . . .	308-114-9-001
C431,432	10 $\mu$ F, +50/-10%, 200 V Electrolytic . . . . .	021-087-9-004	U402	CA3127E Transistor Array . . . . .	307-338-9-003
C434	0.01 $\mu$ F, +80/-20%, 50 V Ceramic . . . . .	020-448-9-007	<b>MISCELLANEOUS</b>		
C443	0.001 $\mu$ F, 5%, 50 V Polyester . . . . .	025-320-9-001	For Q409-412	Insulator . . . . .	342-191-9-001
C444	0.01 $\mu$ F, 5%, 50 V Polyester . . . . .	025-278-9-006	For Q409-412	Insulator, Ceramic Washer . . . . .	347-137-9-003
C503A	0.47 $\mu$ F, 20%, 50 V Electrolytic . . . . .	022-411-9-007	Relay 401	Relay . . . . .	441-064-9-001
VC302,401,402	22 pF Trimmer . . . . .	028-116-9-001	For Q409-412	3 x 12 mm Philips Round Head Mach. Screw . . . . .	634-228-9-004
VC303,403	50 pF Trimmer . . . . .	028-113-9-003	For Q409-412	3 x 2.4 mm Hex Nut . . . . .	653-117-9-004
<b>INDUCTORS</b>			For Q409,411	Heat Sink . . . . .	747-183-9-001
L301,401	68 $\mu$ H, 10% Coil . . . . .	047-090-9-001	For Q410,412	Heat Sink . . . . .	747-183-9-002
L410,411	0.68 $\mu$ H Coil . . . . .	047-101-9-002	P302,304-309,314	2-Pin Polarized Plug (Small) . . . . .	757-140-9-006
<b>SWITCHES</b>			P310,311	3-Pin Polarized Plug (Small) . . . . .	757-140-9-007
S301	Push Button Switch . . . . .	088-175-9-001	P301	7-Pin Polarized Plug (Small) . . . . .	757-140-9-011
S302,303,304	Push Button Switch, 3-Station . . . . .	088-175-9-002	P312,313	3-Pin PC Terminal . . . . .	757-162-9-005

### TIMEBASE P.C. BOARD ASSEMBLY 546-069-9-003

<b>RESISTORS</b>			<b>SWITCHES</b>		
Unlisted resistors are 5%, 1/4 W Metal Film. (See schematic diagram for value.)			Rotary Switch . . . . . 083-342-9-001		
R708	2.52 k $\Omega$ , 0.5%, 1/4 W Metal Film . . . . .	017-144-2-521	R702	Rotary Switch, 19-Position . . . . .	083-339-9-001
R709	5.05 k $\Omega$ , 0.5%, 1/4 W Metal Film . . . . .	017-144-5-051	<b>DIODES &amp; TRANSISTORS</b>		
R710	10.1 k $\Omega$ , 0.5%, 1/4 W Metal Film . . . . .	017-144-1-012	D701-703,725-738	1N4148 Silicon Diode . . . . .	151-038-9-001
R711	26.1 k $\Omega$ , 0.5%, 1/4 W Metal Film . . . . .	017-144-2-621	Q701	2SC1815Y NPN Transistor . . . . .	176-089-9-003
R712	51.1 k $\Omega$ , 0.5%, 1/4 W Metal Film . . . . .	017-144-5-112	Q702,705	2SC1815Y NPN Transistor . . . . .	176-089-9-003
R713	100 k $\Omega$ , 0.5%, 1/4 W Metal Film . . . . .	017-144-1-003	Q703	2N2369 NPN Transistor . . . . .	176-049-9-001
R725	50 k $\Omega$ , 1%, 1/4 W Metal Film . . . . .	015-144-5-002	Q704	BC557B PNP Transistor . . . . .	177-105-9-003
R777	38.3 $\Omega$ , 0.5%, 1/4 W Metal Film . . . . .	017-144-3-838	<b>INTEGRATED CIRCUITS</b>		
R778	249 $\Omega$ , 0.5%, 1/4 W Metal Film . . . . .	017-144-2-490	U707,708	4052B Mult/Demult . . . . .	308-434-9-001
R779	280 $\Omega$ , 0.5%, 1/4 W Metal Film . . . . .	017-144-2-800	U709	4028B Decoder . . . . .	308-320-9-001
R780	2.00 k $\Omega$ , 0.5%, 1/4 W Metal Film . . . . .	017-144-2-001	U710	4051B Analog 8-Ch Mult/Demult . . . . .	308-314-9-001
R781	5.62 k $\Omega$ , 1%, 1/4 W Metal Film . . . . .	015-144-5-621	<b>MISCELLANEOUS</b>		
VR707-710	20 k $\Omega$ Trimmer Pot . . . . .	010-100-9-001	P701,706	2-Pin Polarized Plug (Small) . . . . .	757-140-9-006
<b>CAPACITORS</b>			P704	4-Pin Polarized Plug (Small) . . . . .	757-140-9-008
C701	390 pF, 5%, 50 V Ceramic . . . . .	020-423-9-026	J1-8,10-19,R776	Jumper Wire . . . . .	— — —
C703,704,706, 707,712,714	0.022 $\mu$ F, +80/-20%, 50 V Ceramic . . . . .	020-423-9-034			
C705,716	10 $\mu$ F, 20%, 50 V Electrolytic . . . . .	022-441-9-002			
C708	68 pF, 5%, 50 V Ceramic . . . . .	020-423-9-018			
C710	1 $\mu$ F, 10%, 25 V Tantalum . . . . .	027-103-9-001			
C711,719	47 $\mu$ F, 10%, 20 V Tantalum . . . . .	027-120-9-002			

### DELAYED TIMEBASE P.C. BOARD ASSEMBLY 546-069-9-004

<b>RESISTORS</b>			<b>SWITCHES</b>		
Unlisted resistors are 5%, 1/4 W Metal Film (See schematic diagram for value.)			Rotary Switch . . . . . 083-342-9-001		
R748	2.52 k $\Omega$ , 0.5%, 1/4 W Metal Film . . . . .	017-144-2-521	R752	51.1 k $\Omega$ , 0.5%, 1/4 W Metal Film . . . . .	017-144-5-112
R749	5.05 k $\Omega$ , 0.5%, 1/4 W Metal Film . . . . .	017-144-5-051	R753	100 k $\Omega$ , 0.5%, 1/4 W Metal Film . . . . .	017-144-1-003
R750	10.1 k $\Omega$ , 0.5%, 1/4 W Metal Film . . . . .	017-144-1-012	R758	33.2 k $\Omega$ , 1%, 1/4 W Metal Film . . . . .	015-144-3-322
R751	26.1 k $\Omega$ , 0.5%, 1/4 W Metal Film . . . . .	017-144-2-612	R783	38.3 $\Omega$ , 0.5%, 1/4 W Metal Film . . . . .	017-144-3-838
			R784	249 $\Omega$ , 0.5%, 1/4 W Metal Film . . . . .	017-144-2-490
			R785	280 $\Omega$ , 0.5%, 1/4 W Metal Film . . . . .	017-144-2-800
			R786	2.00 k $\Omega$ , 0.5%, 1/4 W Metal Film . . . . .	017-144-2-001

## PARTS LIST

CIRCUIT SYMBOL	DESCRIPTION	B+K PRECISION PART NUMBER	CIRCUIT SYMBOL	DESCRIPTION	B+K PRECISION PART NUMBER
<b>DELAYED TIMEBASE P.C. BOARD ASSEMBLY (Continued)</b>					
R787	5.62 k $\Omega$ , 1%, 1/4 W Metal Film . . . . .	015-144-5-621	Q708	2N2369 NPN Transistor . . . . .	176-049-9-001
VR705	100 k $\Omega$ Trimmer Pot. . . . .	010-100-9-015	Q709	BC557B PNP Transistor . . . . .	177-105-9-003
VR706	5 k $\Omega$ Trimmer Pot. . . . .	010-100-9-008	ZD701	5.6 V, 500 mW Zener Diode . . . . .	152-180-9-003
VR711-714	20 k $\Omega$ Trimmer Pot. . . . .	010-100-9-001			

**CAPACITORS**

C720,730,731,741,742	0.022 $\mu$ F, +80/-20%, 50 V Ceramic . . . . .	020-423-9-034
C721,725,740	10 $\mu$ F, 20%, 50 V Electrolytic . . . . .	022-441-9-002
C722	4.7 $\mu$ F, 20%, 50 V Electrolytic . . . . .	022-441-9-001
C723	0.01 $\mu$ F, +80/-20%, 50 V Ceramic . . . . .	020-448-9-007
C724	100 pF, 5%, 50 V Ceramic . . . . .	020-423-9-003
C726	0.1 $\mu$ F, +80/-20%, 50 V Ceramic . . . . .	020-480-9-001
C728	220 pF, 5%, 50 V Ceramic . . . . .	020-436-9-003
C729	180 pF, 5%, 50 V Ceramic . . . . .	020-423-9-008
C741A	0.001 $\mu$ F, 10%, 50 V Ceramic . . . . .	020-423-9-029
C743	68 pF, 5%, 50 V Ceramic . . . . .	020-423-9-018
C746	100 $\mu$ F, 20%, 25 V Electrolytic . . . . .	022-411-9-009
C747	0.012 $\mu$ F, 5%, 50 V Polyester . . . . .	025-294-9-005
C749	1 $\mu$ F, 10%, 25 V Tantalum . . . . .	027-103-9-001
VC702	50 pF Trimmer . . . . .	028-113-9-003

**DIODES & TRANSISTORS**

D704-710,712-724,739,740	1N4148 Silicon Diode . . . . .	151-038-9-001
Q706,707,710	2SC1815Y NPN Transistor . . . . .	176-089-9-003

**INTEGRATED CIRCUITS**

U701	74LS74 Dual "D" Flip-Flop . . . . .	307-119-9-001
U702	710PC Voltage Comparator . . . . .	307-466-9-001
U703	308N Op-Amp . . . . .	307-423-9-002
U704	4011B Quad 2-Input NAND Gate . . . . .	308-114-9-001
U705	4028B Decoder . . . . .	308-320-9-001
U706	4052B Analog Mult/Demult . . . . .	308-434-9-001

**MISCELLANEOUS**

P709	2-Pin Polarized Plug (Small) . . . . .	757-140-9-006
P701,708	3-Pin Polarized Plug (Small) . . . . .	757-140-9-007
P703	4-Pin Polarized Plug (Small) . . . . .	757-140-9-008
P702	5-Pin Polarized Plug (Small) . . . . .	757-140-9-009
P707	6-Pin Polarized Plug (Small) . . . . .	757-140-9-010
J19-21,23,R782	Jumper Wire . . . . .	---
J2,3,6,7,9,11,12,14-17	Jumper Wire . . . . .	---
J4,5,10,13	Jumper Wire . . . . .	---

**HORIZONTAL SWEEP P.C. BOARD ASSEMBLY**

546-069-9-005

**RESISTORS**

Unlisted resistors are 5%, 1/4 W Metal Film  
(See schematic diagram for value.)

R506	121 k $\Omega$ , 1%, 1/4 W Metal Film . . . . .	015-144-1-213	C506,508,509,526,529,545,553,558,559,568,570,605	10 $\mu$ F, 20%, 50 V Electrolytic . . . . .	022-441-9-002
R507	10.0 k $\Omega$ , 1%, 1/4 W Metal Film . . . . .	015-144-1-002	C507	220 $\mu$ F, 20%, 10 V Electrolytic . . . . .	022-441-9-014
R508,510	1.2 k $\Omega$ , 5%, 3W Metal Oxide . . . . .	013-183-9-006	C511	15 pF, 5%, 50 V Ceramic . . . . .	020-423-9-005
R509	10 $\Omega$ , 5%, 2W Metal Oxide . . . . .	013-183-9-007	C513	330 pF, 10%, 50 V Ceramic . . . . .	020-423-9-009
R514	1 $\Omega$ , 5%, 2W Metal Oxide . . . . .	013-152-9-005	C515	0.1 $\mu$ F, 5%, 100 V Polyester . . . . .	025-278-9-016
R516	33 $\Omega$ , 5%, 3W Wirewound . . . . .	006-003-5-330	C516,533	39 pF, 5%, 50 V Ceramic . . . . .	020-423-9-014
R517,518,519	5.62 k $\Omega$ , 1%, 1/4 W Metal Film . . . . .	015-144-5-621	C517	0.033 $\mu$ F, 5%, 50 V Polyester . . . . .	025-278-9-010
R521	34.0 k $\Omega$ , 1%, 1/4 W Metal Film . . . . .	015-144-3-402	C518	0.047 $\mu$ F, +80/-20%, 50 V Ceramic . . . . .	020-448-9-010
R522	82.5 k $\Omega$ , 1%, 1/4 W Metal Film . . . . .	015-144-8-252	C519,520,524,525,527,530,541,546,554,563,564,571,572,573,601,606	0.022 $\mu$ F, +80/-20%, 50 V Ceramic . . . . .	020-423-9-034
R527	2.2 $\Omega$ , 5%, 2 W Metal Oxide . . . . .	013-152-9-006	C521,523	0.001 $\mu$ F, 10%, 50 V Ceramic . . . . .	020-423-9-029
R529	47 $\Omega$ , 5%, 3 W Metal Oxide . . . . .	013-152-9-008	C528,557	100 pF, 5%, 50 V Ceramic . . . . .	020-423-9-003
R530,531	12.1 k $\Omega$ , 1%, 1/4 W Metal Film . . . . .	015-144-1-212	C532	150 pF, 5%, 50 V Ceramic . . . . .	020-423-9-006
R534	51 $\Omega$ , 5%, 1/2 W Carbon Film . . . . .	002-102-5-510	C542,543	0.001 $\mu$ F, 5%, 50 V Polyester . . . . .	025-320-9-001
R546	121 $\Omega$ , 1%, 1/4 W Metal Film . . . . .	015-144-1-210	C544	2 pF, $\pm$ 0.25 pF, 50 V Ceramic . . . . .	020-423-9-022
R554,559,563	1.21 k $\Omega$ , 1%, 1/4 W Metal Film . . . . .	015-144-1-211	C548,549,604,609	0.1 $\mu$ F, 5%, 50 V Polyester . . . . .	025-278-9-007
R555,556	604 $\Omega$ , 1%, 1/4 W Metal Film . . . . .	015-144-6-040	C550	0.1 $\mu$ F, +80/-20%, 50 V Ceramic . . . . .	020-480-9-001
R557	200 $\Omega$ , 1%, 1/4 W Metal Film . . . . .	015-144-2-000	C555	4 pF, $\pm$ 0.25 pF, 50 V Ceramic . . . . .	020-444-9-001
R558,562,587	825 $\Omega$ , 1%, 1/4 W Metal Film . . . . .	015-144-8-250	C556,561,562,566,569	47 pF, 5%, 50 V Ceramic . . . . .	020-423-9-015
R561	2.21 k $\Omega$ , 1%, 1/4 W Metal Film . . . . .	015-144-2-211	C567	68 pF, 5%, 50 V Ceramic . . . . .	020-423-9-018
R564	511 $\Omega$ , 1%, 1/4 W Metal Film . . . . .	015-144-5-110	C607,608	0.01 $\mu$ F, 10%, 250 V Polyester . . . . .	025-294-9-004
R672	3.65 k $\Omega$ , 1%, 1/4 W Metal Film . . . . .	015-144-3-651	C610,611,807	0.1 $\mu$ F, 10%, 250 V Polyester . . . . .	025-294-9-003
R673,675	68 k $\Omega$ , 5%, 1/2 W Carbon Film . . . . .	002-102-5-683	C611A	0.01 $\mu$ F, 10%, 500 V Ceramic . . . . .	020-448-9-006
R679,680,681,682	33 k $\Omega$ , 5%, 2 W Metal Oxide . . . . .	013-152-9-002	VC501	50 pF Trimmer . . . . .	028-113-9-003
VR502,504,505,506,603	1 k $\Omega$ Trimmer Pot. . . . .	010-065-9-001			
VR511,512	500 k $\Omega$ Trimmer Pot. . . . .	010-046-9-010	L502	1 $\mu$ H, 5% Coil . . . . .	047-085-9-003
VR513,S503	10 k $\Omega$ Pot. with Switch . . . . .	008-077-9-001	L601,602	12 $\mu$ H Peaking Coil . . . . .	047-067-9-002
VR514	5 k $\Omega$ Trimmer Pot. . . . .	010-046-9-008			
VR602,604	300 $\Omega$ Trimmer Pot. . . . .	010-046-9-006			
VR703,S504	100 k $\Omega$ Pot. with Switch . . . . .	008-888-9-001	S501,502	Lever Switch . . . . .	080-030-9-002
VR806	100 k $\Omega$ Trimmer Pot. . . . .	010-073-9-013	S505,506,507	Push Button Switch . . . . .	088-193-9-002
			S602	Rotary Switch, 4-Position . . . . .	083-327-9-001

**CAPACITORS**

C501	47 $\mu$ F, +50/-10%, 250 V Electrolytic . . . . .	021-087-9-001
C502	1 $\mu$ F, +50/-10%, 250 V Electrolytic . . . . .	021-087-9-002
C503	2.2 $\mu$ F, +50/-10%, 250 V Electrolytic . . . . .	021-087-9-003
C504,505	2200 $\mu$ F, 20%, 25 V Electrolytic . . . . .	022-441-9-013

**INDUCTORS****SWITCHES****DIODES & TRANSISTORS**

BD501,502	Bridge Rectifier . . . . .	157-045-9-001
D501-503,506-508,510-514,518-528	1N4148 Silicon Diode . . . . .	151-038-9-001
D509	FDH333 Diode . . . . .	151-150-9-001

CIRCUIT SYMBOL	DESCRIPTION	B+K PRECISION PART NUMBER	CIRCUIT SYMBOL	DESCRIPTION	B+K PRECISION PART NUMBER
<b>HORIZONTAL SWEEP P.C. BOARD ASSEMBLY (Continued)</b>					
D516,517	1N4154 Diode	151-164-9-001	U505	MC34002P JFET Dual Op-Amp	308-436-9-005
D601,602	BAV21 (200mA, 250 V) Diode	151-158-9-001	U506	74S74N Dual "D" Flip-Flop	307-027-9-001
Q504	2SA1029C PNP Transistor	177-108-9-003	U507	74LS122 Monostable Multivibrator	307-474-9-001
Q507,510-512, 514,516,520	2SC1907 NPN Transistor	176-174-9-001	U508	74LS00 Quad 2-Input NAND Gate	307-100-9-001
Q508,509,518,521	2SA1206K PNP Transistor	177-065-9-001	U509	4011B Quad 2-Input NAND Gate	308-114-9-001
Q513	2N5199 Dual FET	182-113-9-002	<b>MISCELLANEOUS</b>		
Q515,517,522, 524-529	BC547B NPN Transistor	176-206-9-002	For Q607-610	Insulator	342-191-9-001
Q519,523,602, 603,604	BC557B PNP Transistor	177-105-9-003	For Q607-610	3 x 6 mm Philips Round Head Machine Screw	634-228-9-001
Q601	2SC1815Y NPN Transistor	176-089-9-003	For Q607-610	Heat Sink	747-160-9-002
Q605,606	BF199 NPN Transistor	176-214-9-003	For BD502	Heat Sink	747-183-9-003
Q607,610	BF470 PNP Transistor	177-115-9-001	P602	4-Pin Polarized Plug (Large)	757-140-9-003
Q608,609	BF458 NPN Transistor	176-214-9-001	P601	5-Pin Polarized Plug (Large)	757-140-9-004
ZD501,503	13 V, 500 mW Zener Diode	152-197-9-002	P603,605,608, 611-613	2-Pin Polarized Plug (Small)	757-140-9-006
ZD502,506,507	5.6 V, 500 mW Zener Diode	152-180-9-003	P303,606,607, 610,811	3-Pin Polarized Plug (Small)	757-140-9-007
<b>INTEGRATED CIRCUITS</b>			P609	4-Pin Polarized Plug (Small)	757-140-9-008
U501,502	4558C Dual Op-Amp	307-475-9-001	P403,614	5-Pin Polarized Plug (Small)	757-140-9-009
U503	NE529N Voltage Comparator	307-172-9-004	For R516	Tubular Stand-off	759-272-9-003
U504	741C Op-Amp	307-016-9-001	For U506,509	14-Pin IC Socket	762-014-9-001

### HV GENERATOR P.C. BOARD ASSEMBLY 546-069-9-006

RESISTORS			INDUCTORS		
R901	15 k $\Omega$ , 5%, 1/2 W Metal Film	011-102-5-153	CVT901	CVT Transformer	063-019-9-002
R902	220 $\Omega$ , 5%, 1/4 W Metal Film	011-104-5-221	L901,902	220 $\mu$ H Coil	047-085-9-001
R903	68 $\Omega$ , 5%, 1/4 W Metal Film	011-104-5-680	<b>DIODES &amp; TRANSISTORS</b>		
R904	510 $\Omega$ , 5%, 1/4 W Metal Film	011-104-5-511	D901,903	R5000 Diode	151-176-9-001
R905	1.00 M $\Omega$ , 1%, 1/4 W Metal Film	015-144-1-004	Q901	BD237 NPN Transistor	176-214-9-002
R906	10.0 k $\Omega$ , 1%, 1/4 W Metal Film	015-144-1-002	RECT901	High Voltage Rectifier	157-051-9-001
R907	49.9 k $\Omega$ , 1%, 1/4 W Metal Film	015-144-4-992	ZD901	12 V, 500 mW Zener Diode	152-197-9-001
R908	18.2 k $\Omega$ , 1%, 1/4 W Metal Film	015-144-1-822	<b>INTEGRATED CIRCUITS</b>		
R909	1 k $\Omega$ , 5%, 1/4 W Metal Film	011-104-5-102	U901	741C Op-Amp	307-016-9-001
R910	6.8 M $\Omega$ , 5%, 1/2 W Metal Glaze	013-139-9-001	<b>MISCELLANEOUS</b>		
R911	1.5 M $\Omega$ , 5%, 1/2 W Metal Glaze	013-152-9-001	High Voltage Shield Cover	256-288-9-006	
R912	22.1 k $\Omega$ , 1%, 1/4 W Metal Film	015-144-2-212	Insulator	342-191-9-001	
VR901	50 k $\Omega$ Trimmer Potentiometer	010-073-9-001	Wire Tie	380-529-9-001	
<b>CAPACITORS</b>			3 x 8 mm Philips Round Head Machine Screw	634-228-9-002	
C901,902	0.1 $\mu$ F, 1 kV Polyester	025-294-9-002	3 x 8 mm Philips Pan Washer Head Mach. Screw	634-228-9-011	
C903	100 $\mu$ F, 20%, 50 V Electrolytic	022-441-9-006	3 x 2.4 mm Hex Nut	653-117-9-004	
C904,905	0.047 $\mu$ F, 5%, 50 V Polyester	025-278-9-012	3 x 7 mm Steel Washer	724-092-9-004	
C906	10 $\mu$ F, 20%, 35 V Tantalum	027-120-9-004			
C907,909	0.022 $\mu$ F, +80/-20%, 50 V Ceramic	020-423-9-034			
C908,910	10 $\mu$ F, 20%, 50V Electrolytic	022-441-9-002			
C911	0.01 $\mu$ F, +80/-20%, 2 kV Ceramic	020-448-9-004			
C912	120 pF, 10%, 1kV Ceramic	020-448-9-001			

### CRT CONTROL P.C. BOARD ASSEMBLY 546-069-9-007

RESISTORS			CAPACITORS		
R801	100 k $\Omega$ , 5%, 1/4 W Metal Film	011-104-5-104	C801	120 pF, 5%, 50 V Ceramic	020-423-9-004
R802	1 k $\Omega$ , 5%, 1/4 W Metal Film	011-104-5-102	C802,803,804	68 pF, 10%, 2 kV Ceramic	020-423-9-001
R803,805	100 $\Omega$ , 5%, 1/4 W Metal Film	011-104-5-101	C805	0.33 $\mu$ F, 10%, 100 V Polyester	025-294-9-001
R804	82 $\Omega$ , 5%, 1/4 W Metal Film	011-104-5-820	C806	0.1 $\mu$ F, 5%, 100 V Polyester	025-278-9-016
R806,809,810	10 k $\Omega$ , 5%, 1/4 W Metal Film	011-104-5-103	C808	10 $\mu$ F, 20%, 50 V Electrolytic	022-441-9-002
R807,812,814	51 $\Omega$ , 5%, 1/4 W Metal Film	011-104-5-510	C809,811	0.0047 $\mu$ F, +80/-20%, 2 kV Ceramic	020-423-9-032
R808	1.5 M $\Omega$ , 5%, 1/4 W Metal Film	011-104-5-155	C810	0.1 $\mu$ F, 5%, 50 V Polyester	025-278-9-007
R811	330 $\Omega$ , 5%, 1/4 W Metal Film	011-104-5-331	<b>DIODES &amp; TRANSISTORS</b>		
R813	220 k $\Omega$ , 5%, 1/4 W Metal Film	011-104-5-224	D801-804,806,807	1N4148 Silicon Diode	151-038-9-001
R815	1.5 M $\Omega$ , 5%, 1/2 W Carbon Film	002-102-5-155	D805	1N4007 (1A, 1000V) Silicon Diode	151-053-9-001
R816,817	1.5 M $\Omega$ , 5%, 1/2 W Carbon Film	002-102-5-155	Q801	BF450 PNP Transistor	177-108-9-002
R818	10 k $\Omega$ , 5%, 1/2 W Carbon Film	002-102-5-103	Q802,804	2SA1029C PNP Transistor	177-108-9-003
R823	4.7 k $\Omega$ , 5%, 1/4 W Metal Film	011-104-5-472	Q803	2SC1815Y NPN Transistor	176-089-9-003
VR801	5 k $\Omega$ Trimmer Pot	010-046-9-008	Q805	BF199 NPN Transistor	176-214-9-003
VR802,803	500 k $\Omega$ Trimmer Pot	010-046-9-010	U801	4N25 Photo Diode	158-094-9-002
VR804,805	500 k $\Omega$ Pot	008-877-9-003	ZD801	1N4764A (100 V, 5%, 1 W) Zener Diode	152-180-9-005
			ZD802	33V, 500 mW Zener Diode	152-180-9-002

**PARTS LIST**

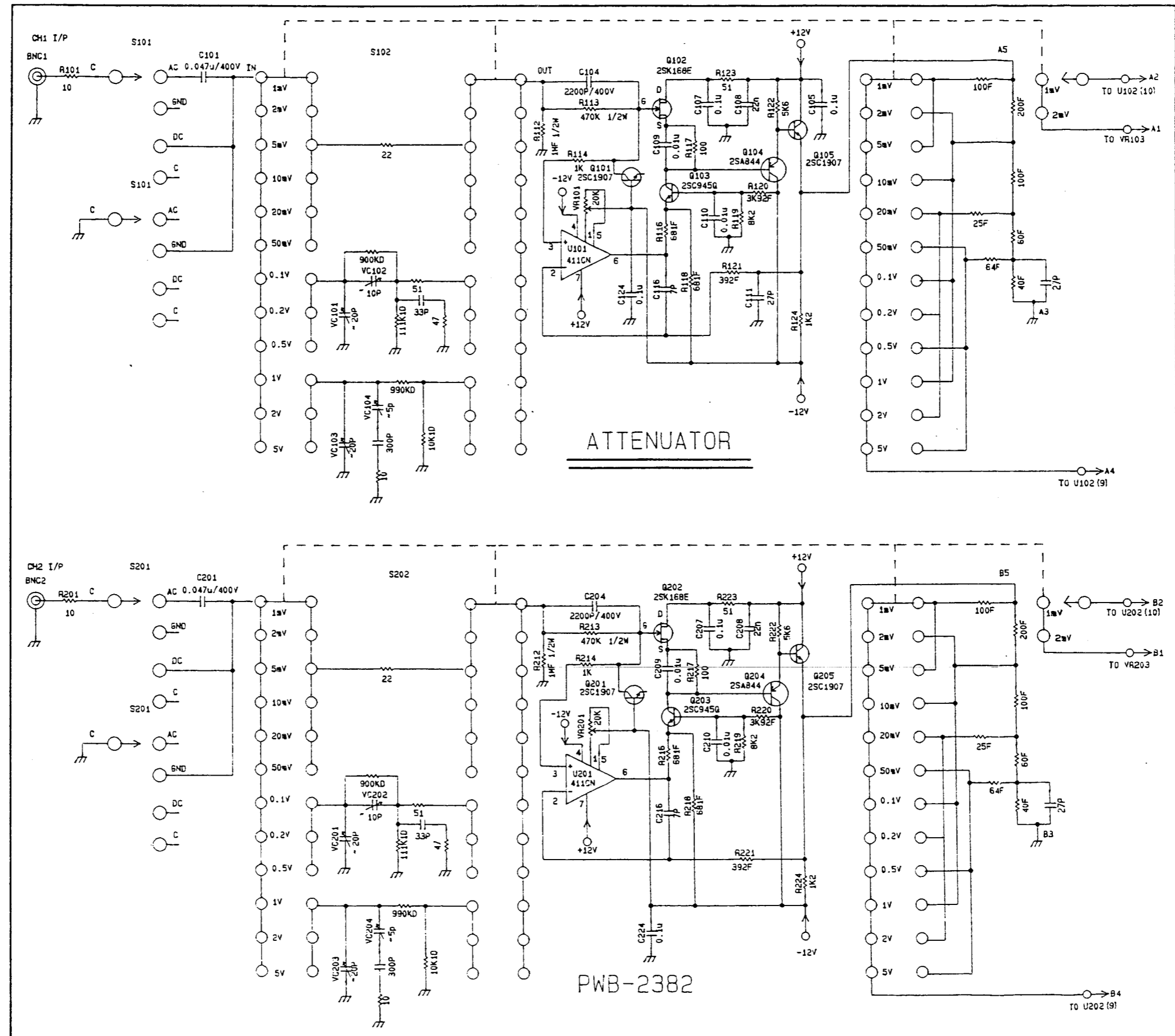
<b>CIRCUIT SYMBOL</b>	<b>DESCRIPTION</b>	<b>B+K PRECISION PART NUMBER</b>	<b>CIRCUIT SYMBOL</b>	<b>DESCRIPTION</b>	<b>B+K PRECISION PART NUMBER</b>
<b>CRT CONTROL P.C. BOARD ASSEMBLY (Continued)</b>					
<b>MISCELLANEOUS</b>					
P802,803	2-Pin Polarized Plug (Small) . . . . .	757-140-9-006	P804	5-Pin PC Terminal . . . . .	757-162-9-003
P801	3-Pin Polarized Plug (Small) . . . . .	757-140-9-007	J1,3,4,6,7	Jumper Wire . . . . .	---
P805	2-Pin PC Terminal . . . . .	757-162-9-001	J5	Jumper Wire . . . . .	---
P806	3-Pin PC Terminal . . . . .	757-162-9-002			

**PARTS ORDERING INFORMATION**

There is a minimum charge for each invoice. Orders will be shipped C.O.D. unless previous open account arrangements have been made or remittance accompanies order. Advance remittance must cover handling and postage or express charges. Specify model and serial number when ordering replacement parts.

**ORDER REPLACEMENT PARTS FROM**

**B+K Precision, Factory Service Operations**  
**Maxtec International Corporation**  
 6470 West Cortland Street  
 Chicago, Illinois 60635  
 Telephone: (312) 889-1448



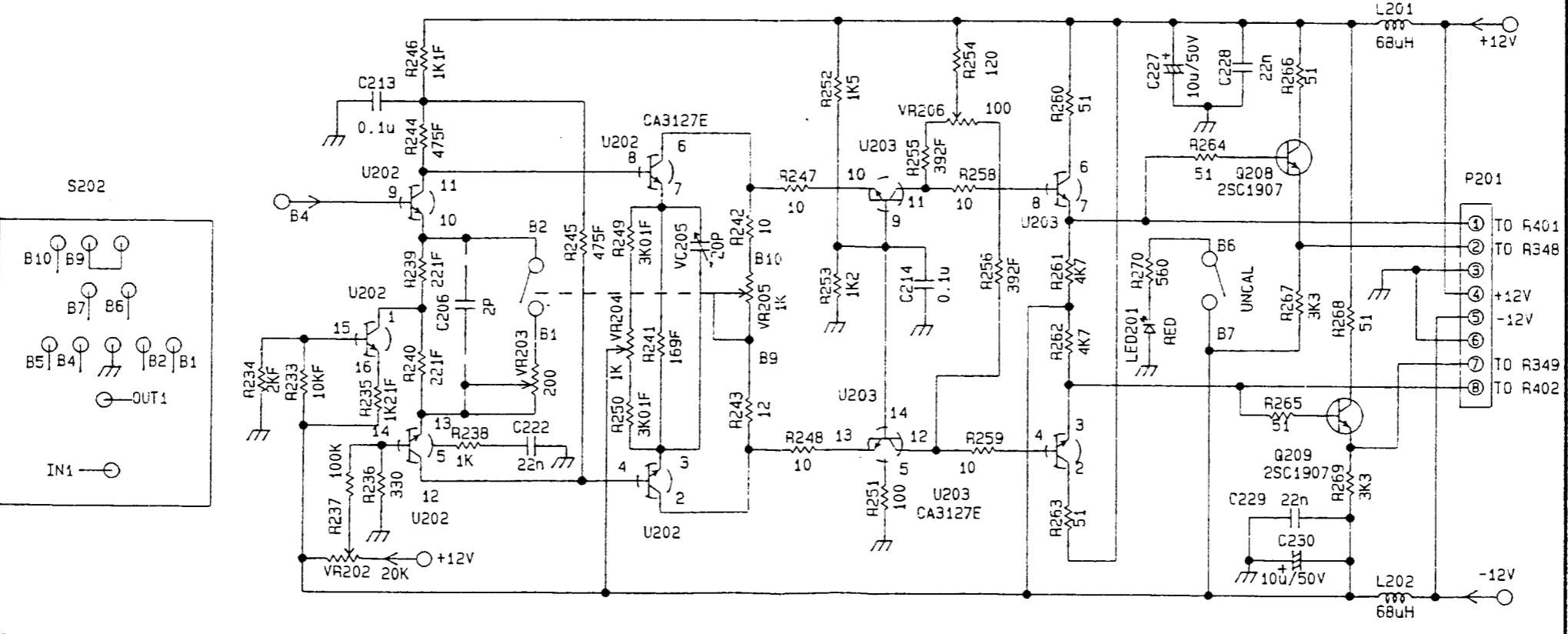
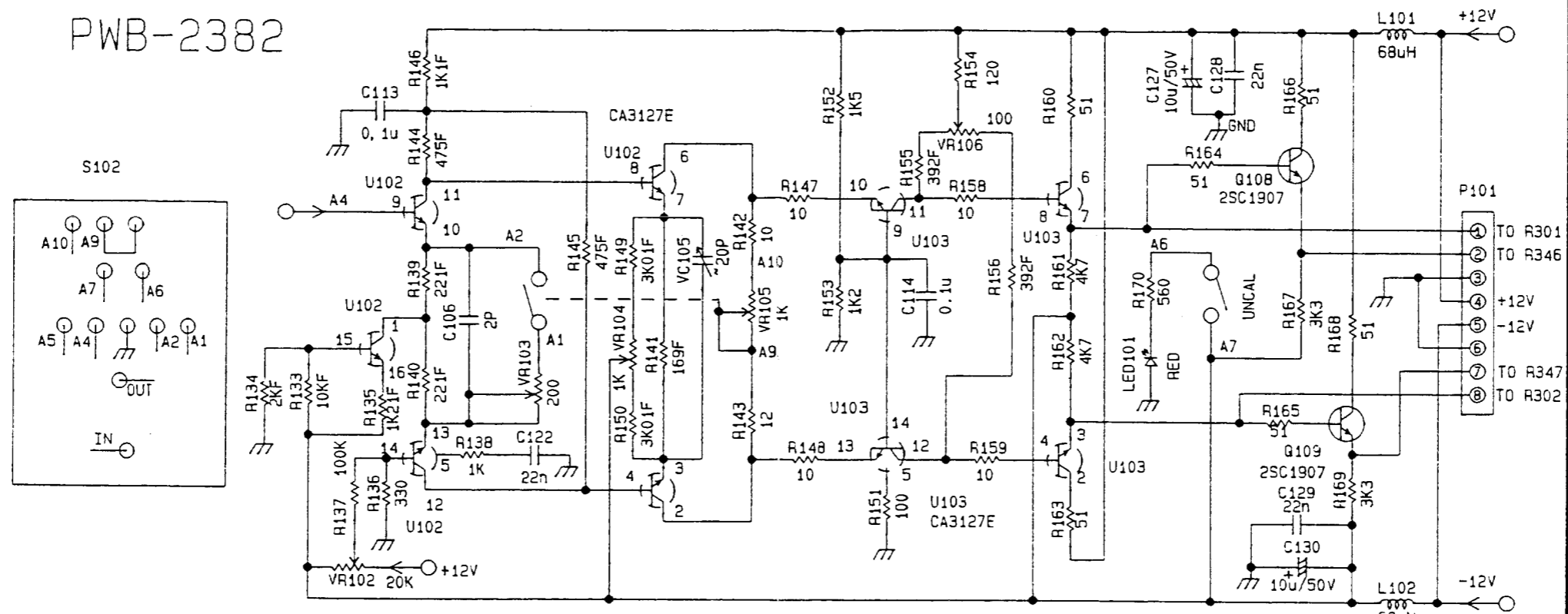
ATTENUATOR

PWB-2382

2160 ATTENUATOR SCHEMATIC

PRE-AMP

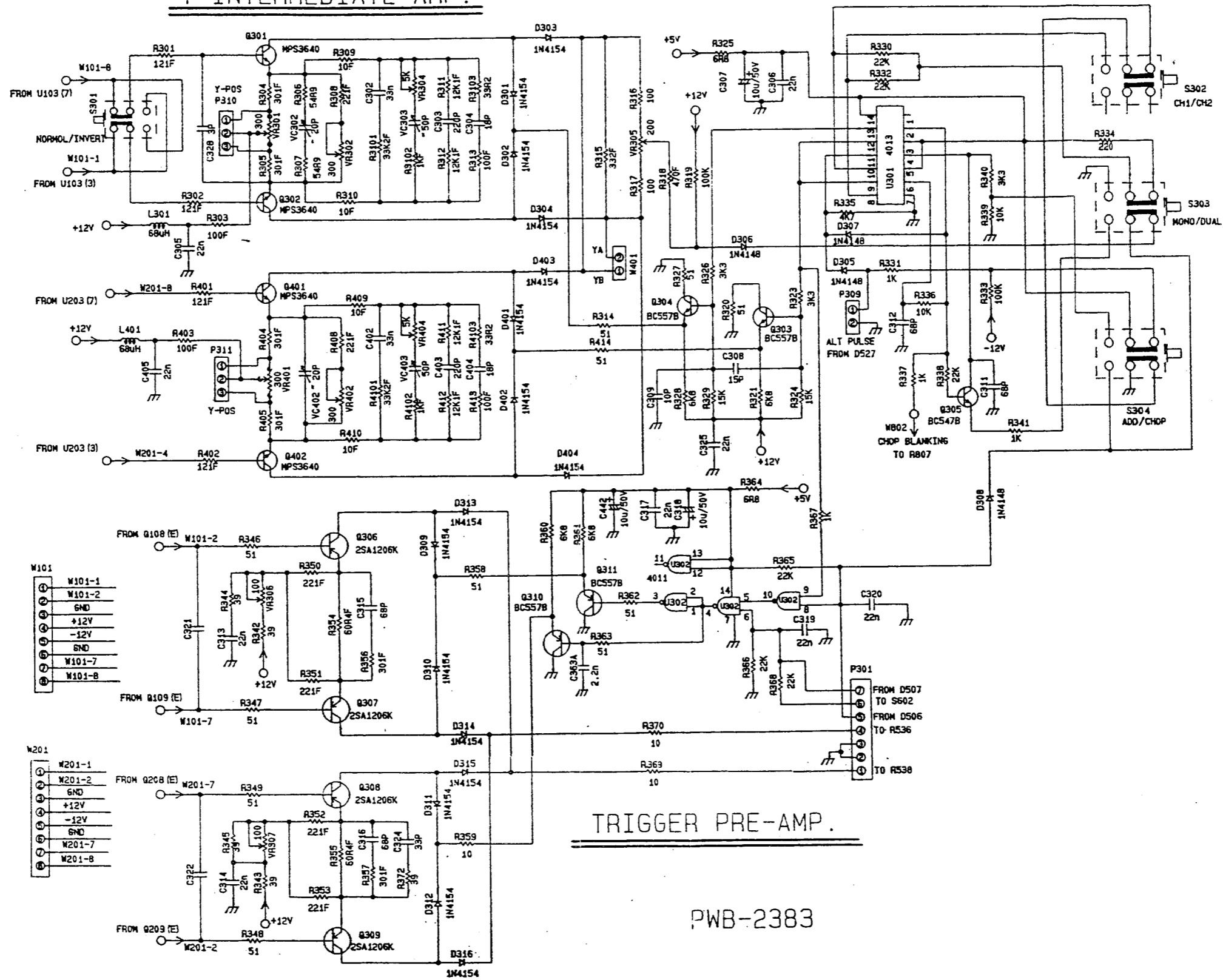
PWB-2382



2160 PRE-AMP. SCHEMATIC

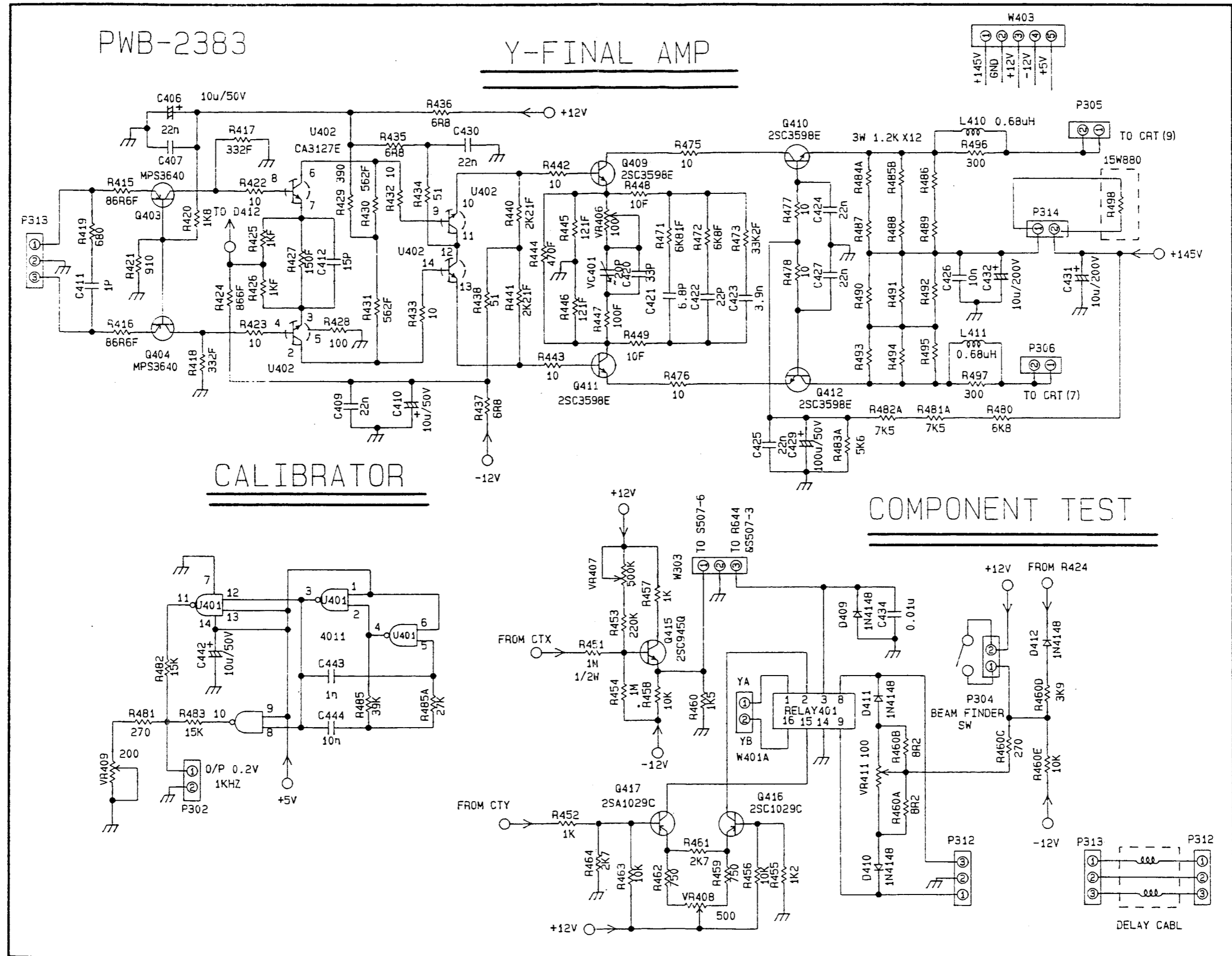


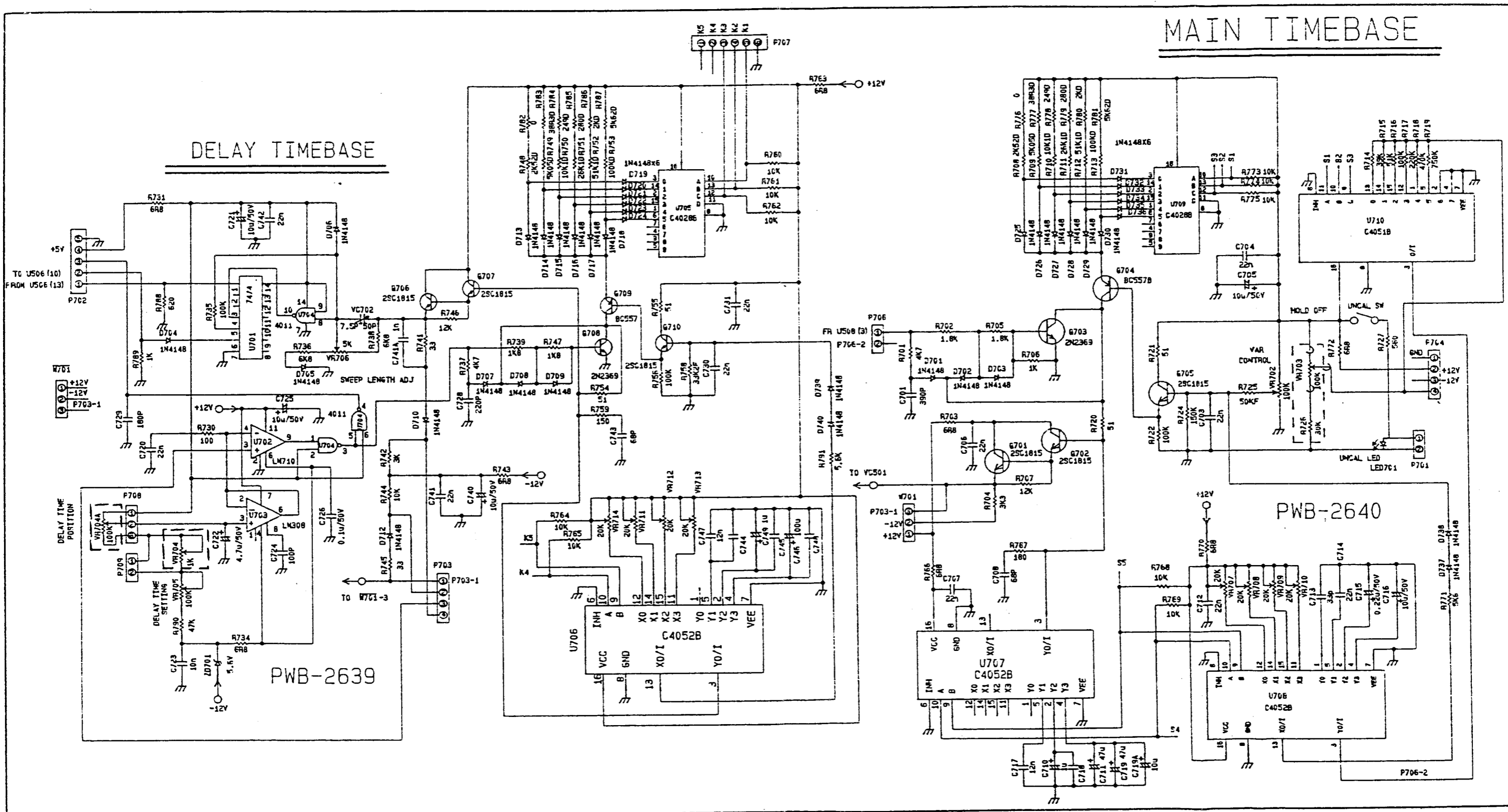
Y-INTERMEDIATE AMP.



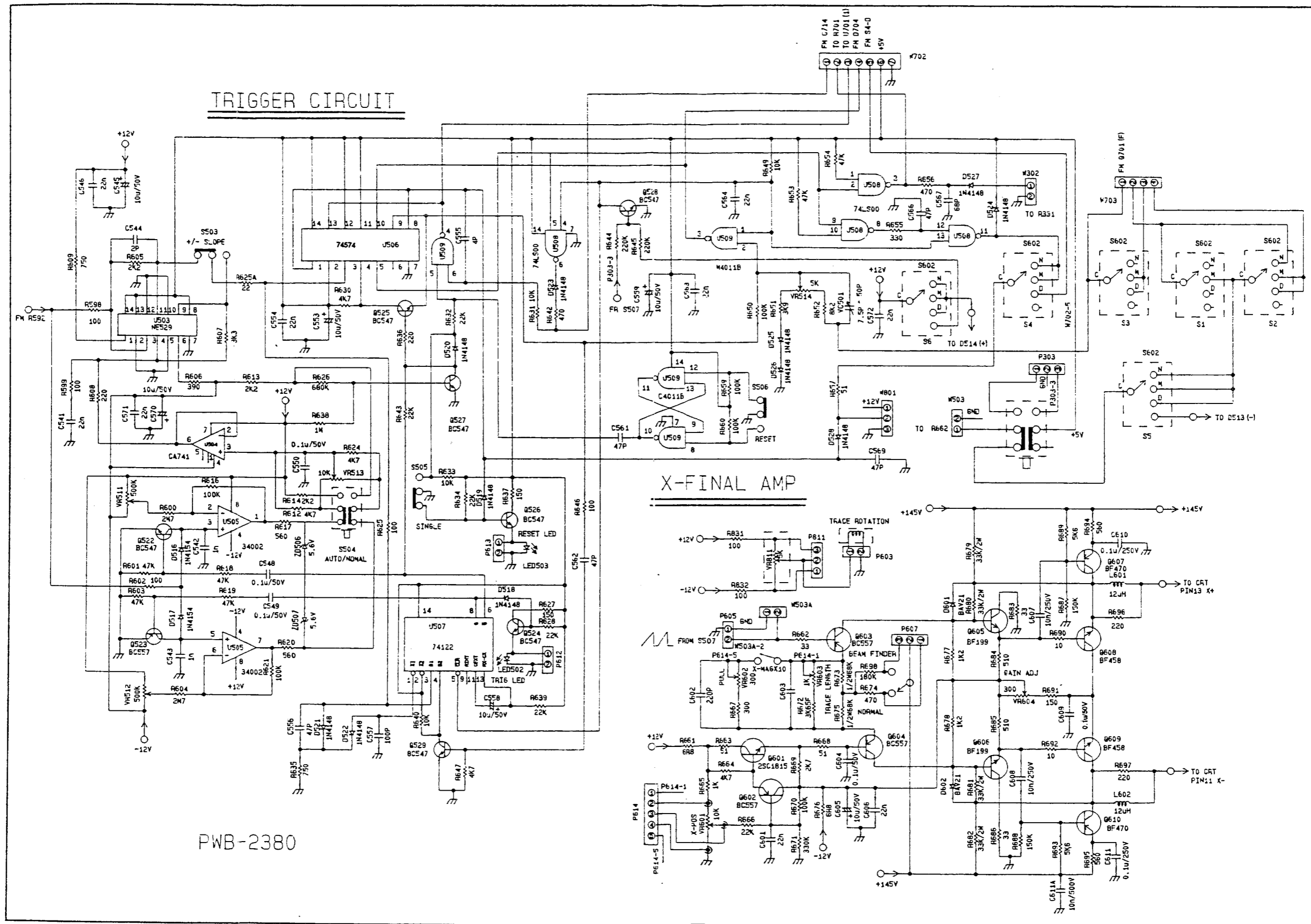
PWB-2383

2160 Y-INTERMEDIATE AMP. SCHEMATIC

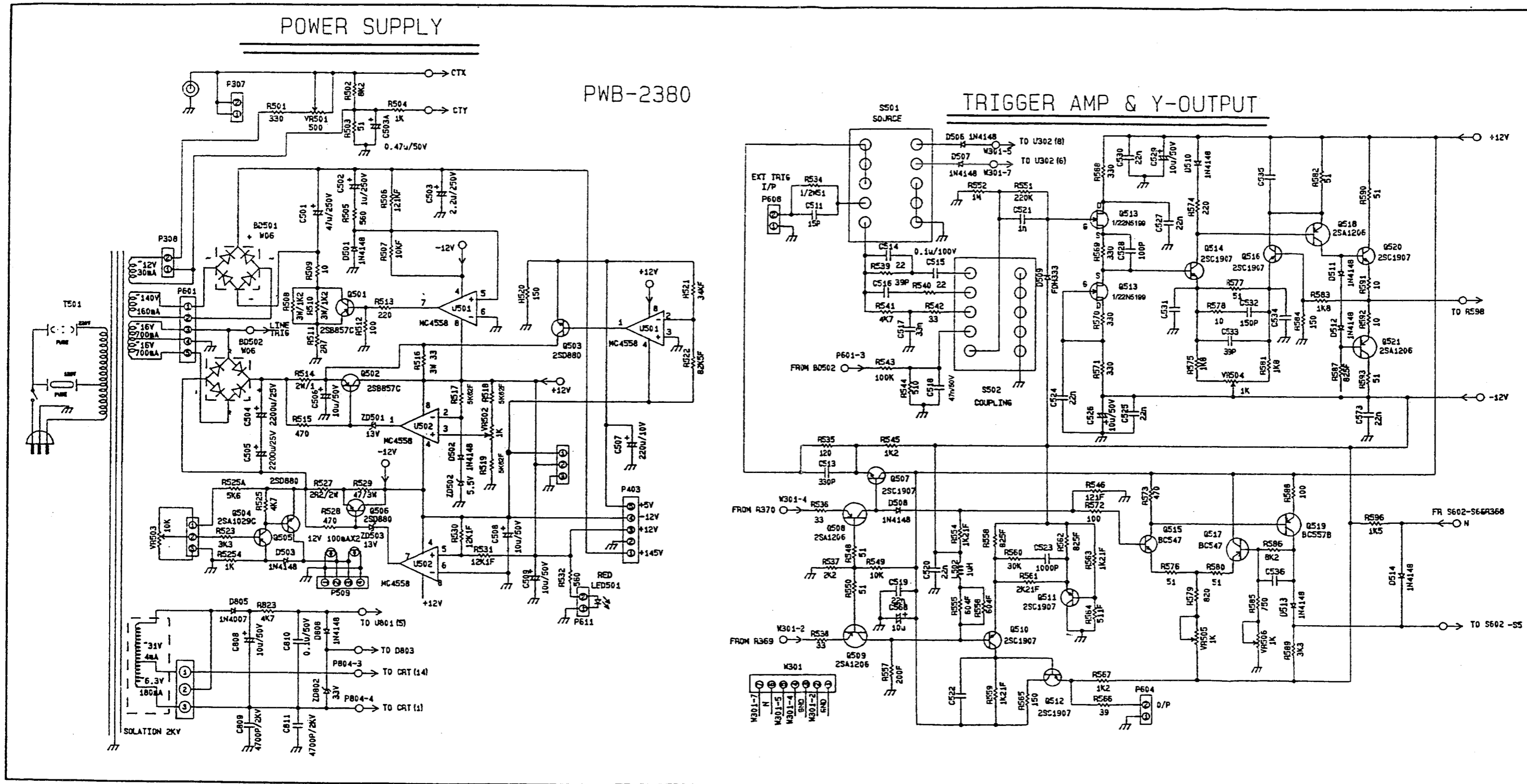




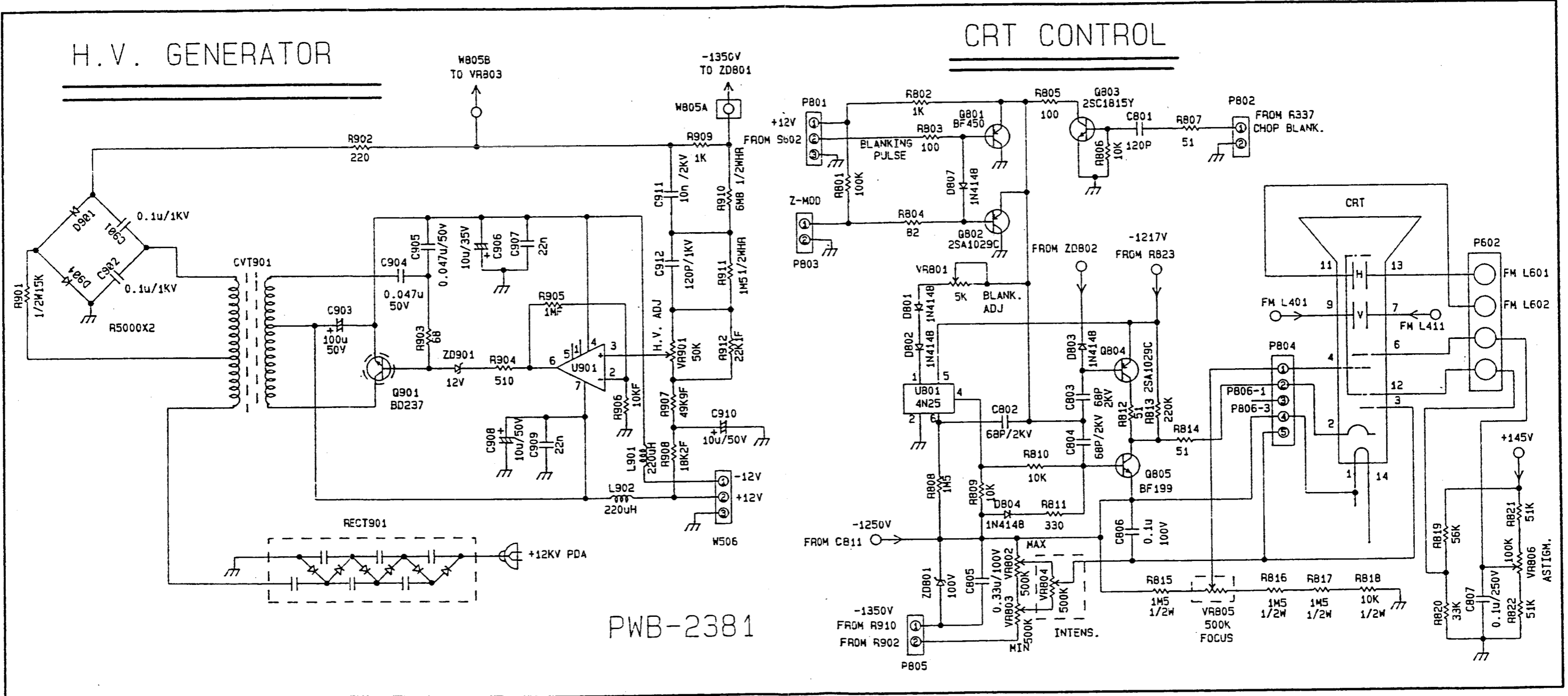
2160 MAIN TIMEBASE & DELAY TIMEBASE



2160 TRIGGER & X-FINAL AMP. SCHEMATIC



2160 POWER SUPPLY & TRIGGER AMP. & Y-OUT SCHEMATIC



2160 H.V. GENERATOR & CRT CONTROL SCHEMATIC