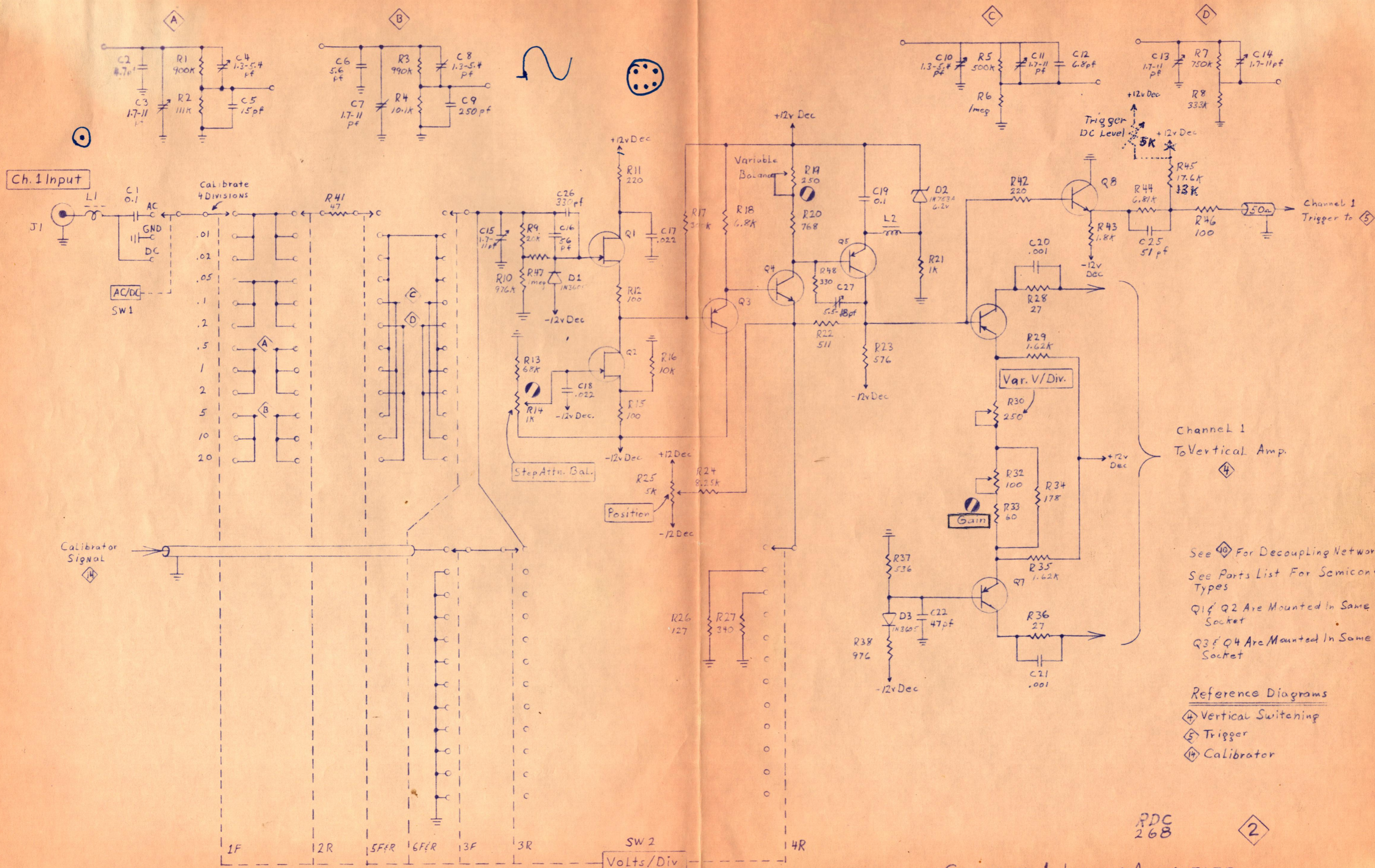


TYPE 245 OSCILLOSCOPE

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1

BLOCK DIAGRAM



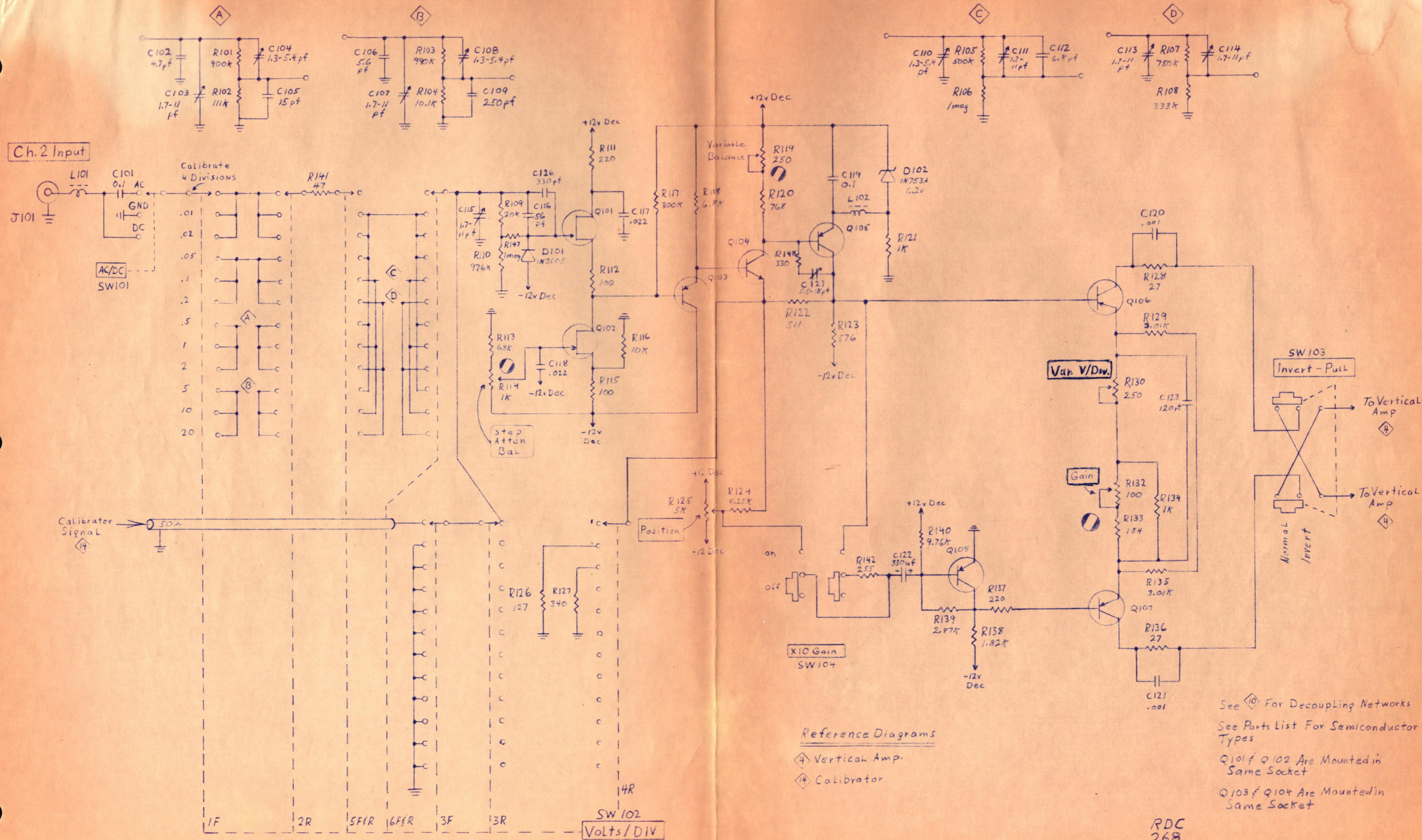
See 10 For Decoupling Networks
 See Parts List For Semiconductor Types
 Q1 & Q2 Are Mounted In Same Socket
 Q3 & Q4 Are Mounted In Same Socket

Reference Diagrams
 4 Vertical Switching
 5 Trigger
 14 Calibrator

RDC
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2

CHANNEL 1 INPUT AMPLIFIER



TYPE 245 OSCILSCOPE

CHANNEL 2 INPUT AMPLIFIER

3

Reference Diagrams

- ④ Vertical Amp
- ④ Calibrator

See ⑩ For Decoupling Networks
 See Parts List For Semiconductor Types
 Q101 & Q102 Are Mounted in Same Socket
 Q103 & Q104 Are Mounted in Same Socket

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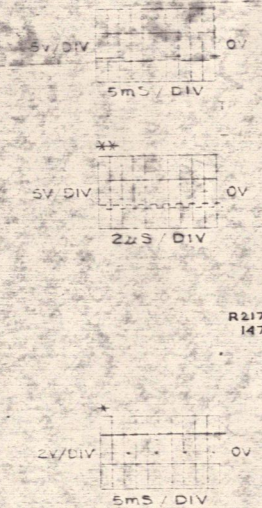
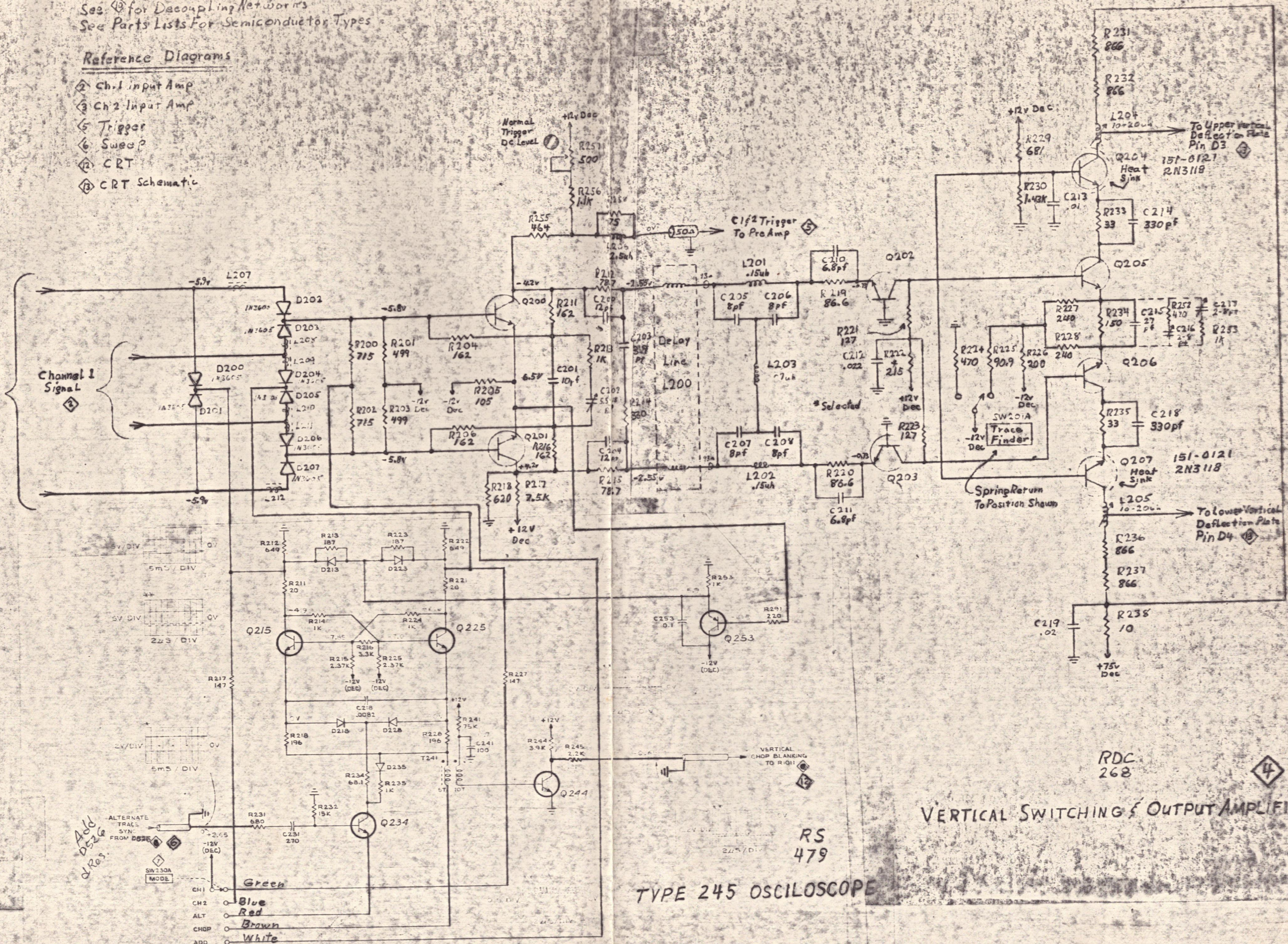
See ④ for Decoupling Networks
See Parts Lists for Semiconductor Types

Reference Diagrams

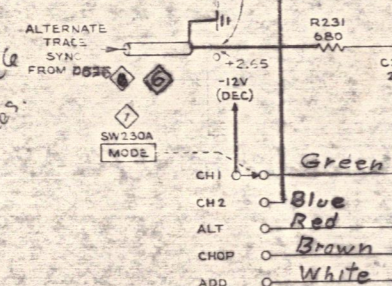
- ② Ch. 1 Input Amp
- ③ Ch. 2 Input Amp
- ⑤ Trigger
- ⑥ Sweep
- ⑩ CRT
- ⑬ CRT Schematic

Channel 2 Signal ③

Channel 1 Signal ②



Add 0.526
d Res.



Important
Q204
Q207
Matched
Pair

VERTICAL SWITCHING & OUTPUT AMPLIFIER

TYPE 245 OSCILLOSCOPE

RS
479

RDC
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④

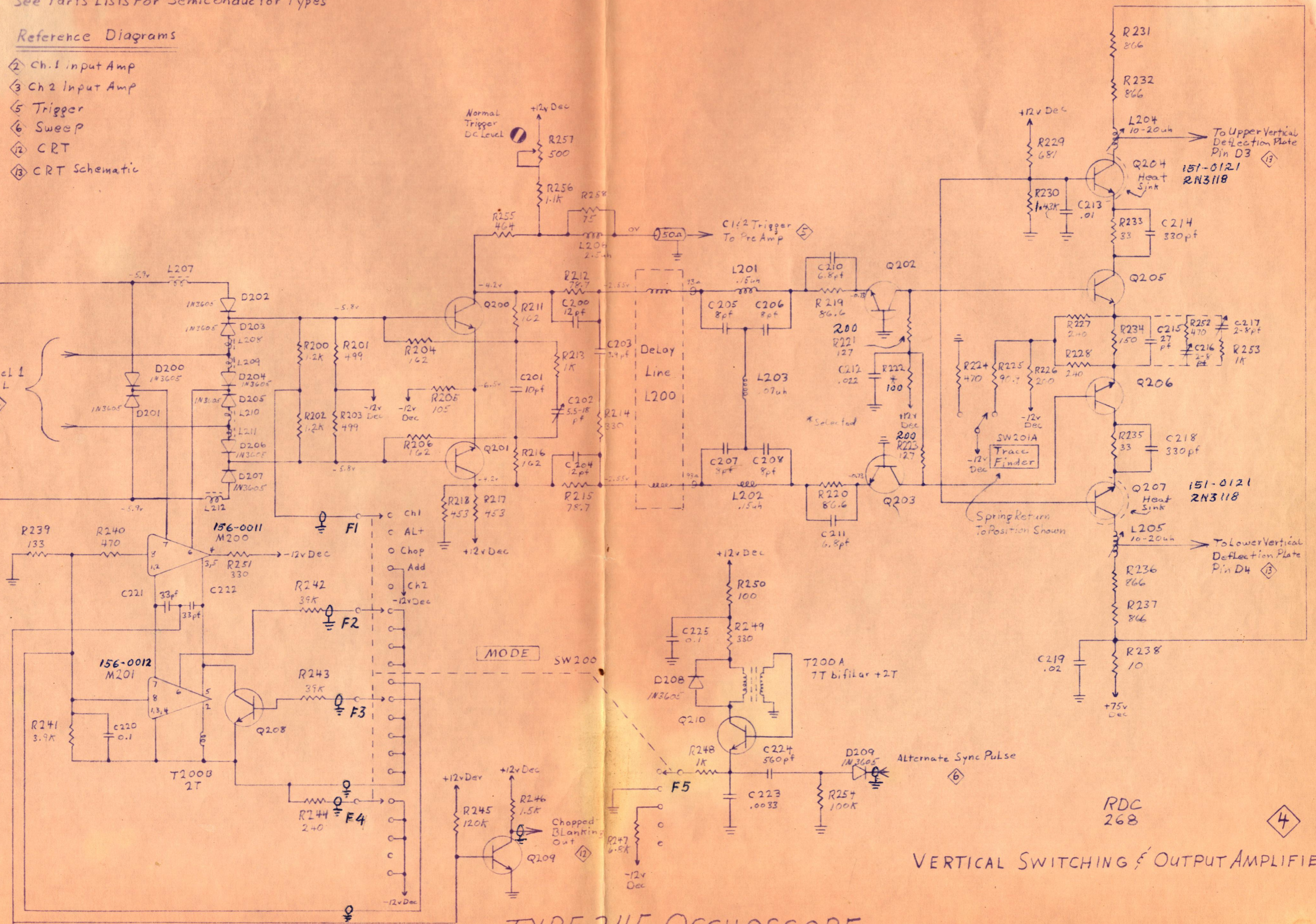
See 10 for Decoupling Networks
 See Parts Lists For Semiconductor Types

Reference Diagrams

- 2 Ch. 1 Input Amp
- 3 Ch 2 Input Amp
- 5 Trigger
- 6 Sweep
- 12 CRT
- 13 CRT Schematic

Channel 2 Signal 3

Channel 1 Signal 2



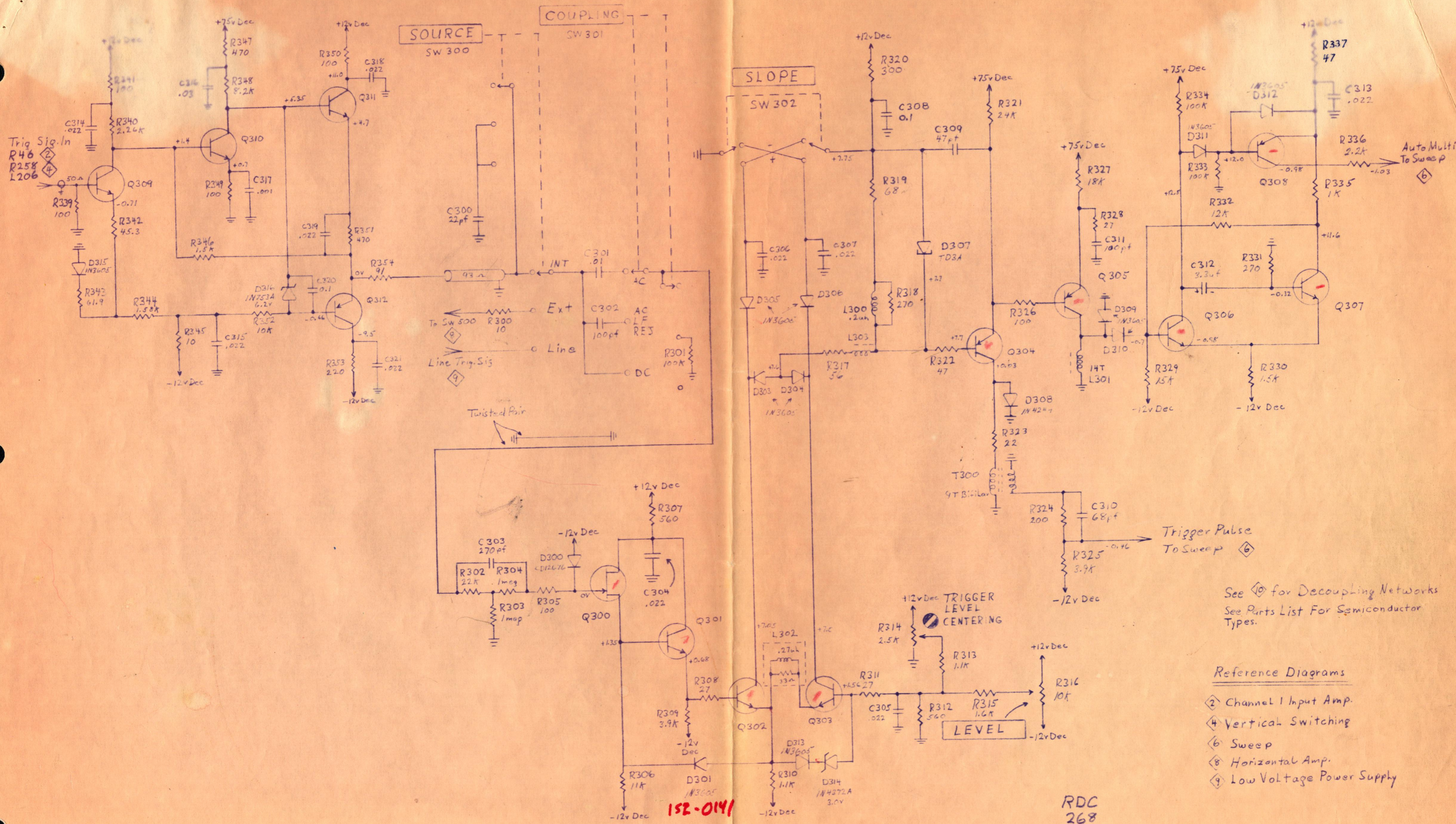
Important
 Q204
 Q207
 Matched
 Pair

TYPE 245 OSCILLOSCOPE

VERTICAL SWITCHING & OUTPUT AMPLIFIER

RDC 268

4

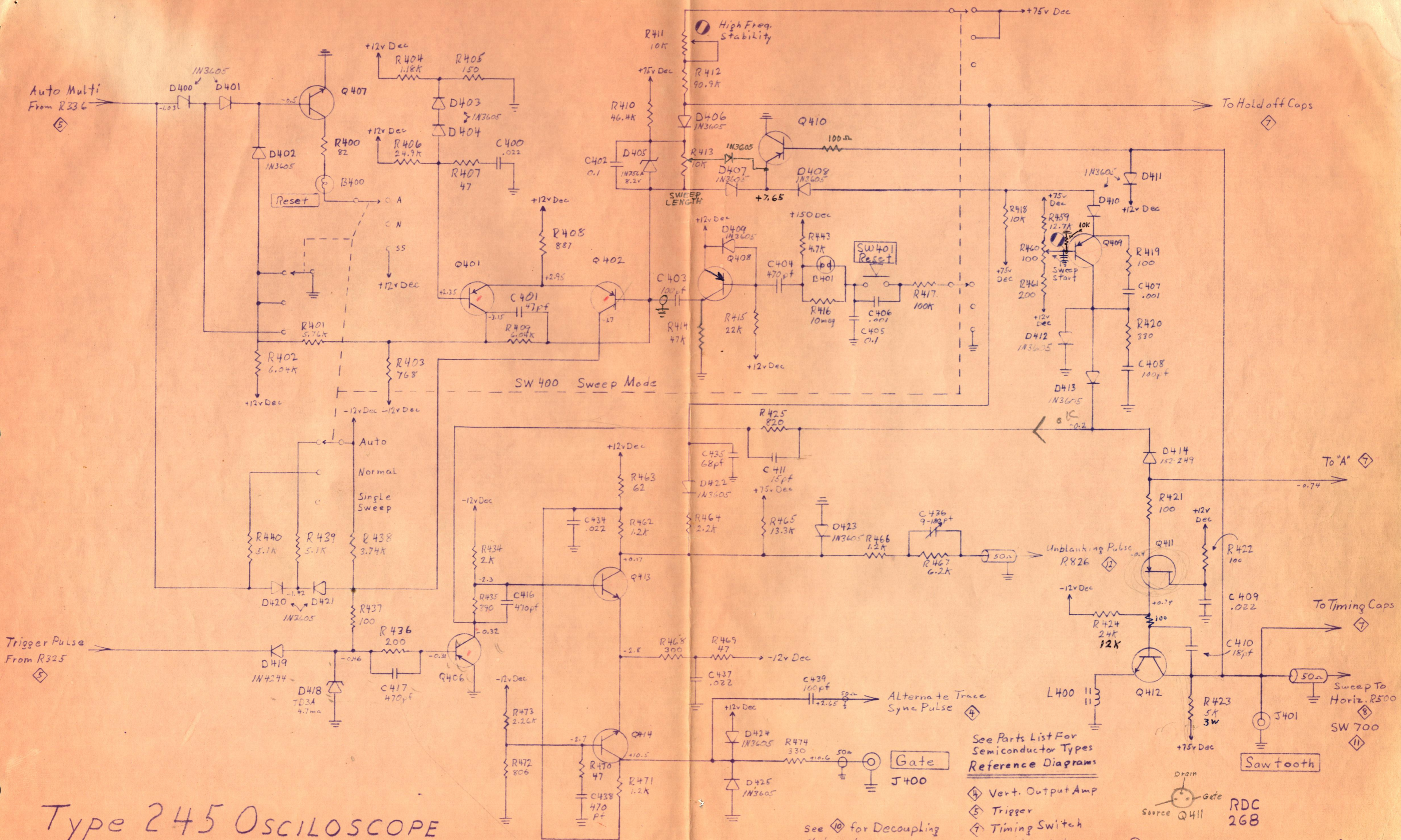


See [6] for Decoupling Networks
 See Parts List For Semiconductor Types.

Reference Diagrams

- [2] Channel 1 Input Amp.
- [4] Vertical Switching
- [6] Sweep
- [8] Horizontal Amp.
- [9] Low Voltage Power Supply

RDC
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 TRIGGER [5]

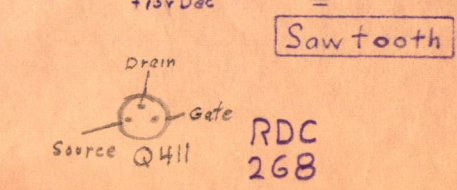


Type 245 Oscilloscope

See Parts List For
Semiconductor Types
Reference Diagrams

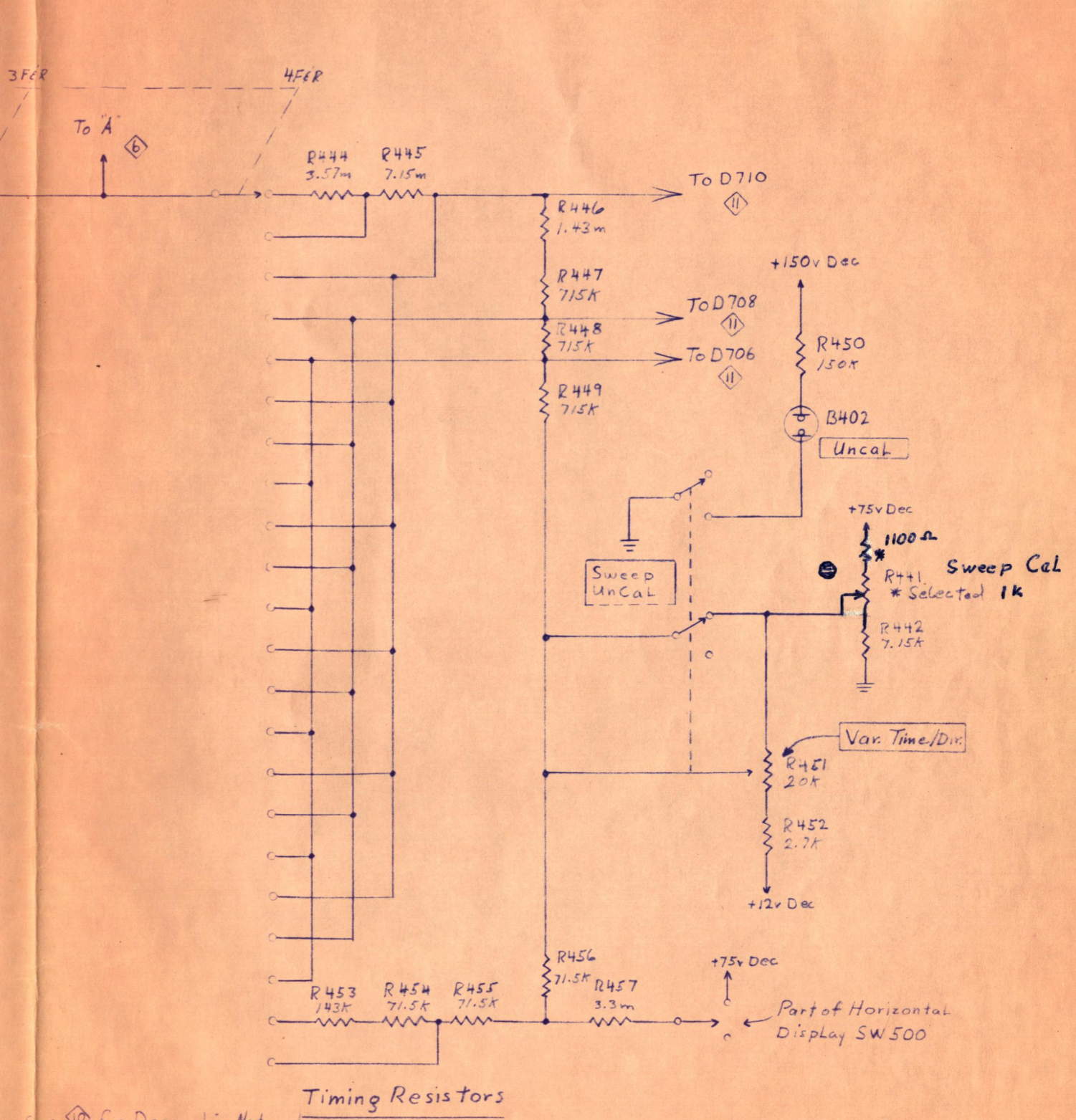
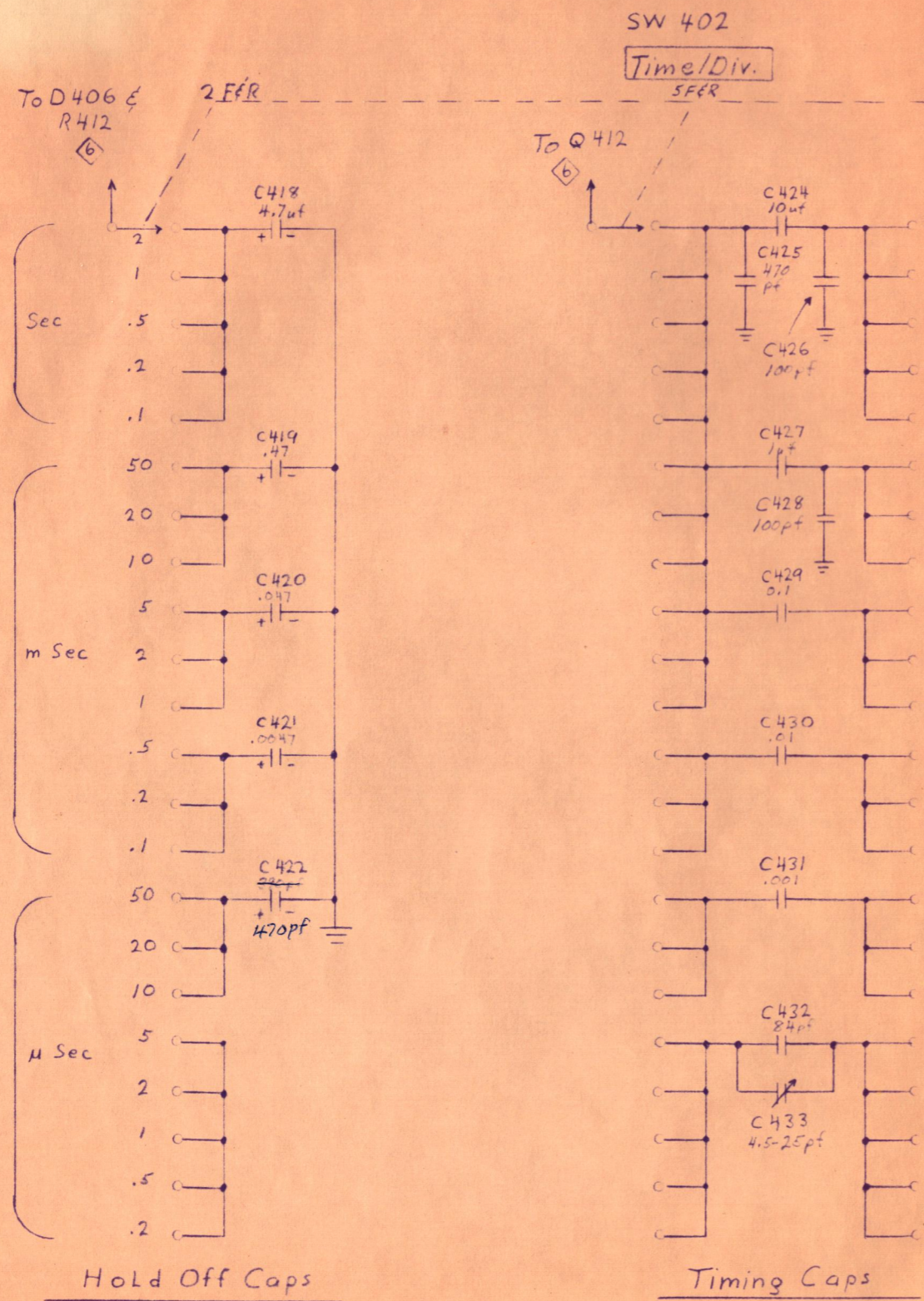
- ④ Vert. Output Amp
- ⑤ Trigger
- ⑦ Timing Switch
- ⑧ Horizontal
- ⑩ Delay Mag.
- ⑫ CRT

see ⑩ for Decoupling
Networks



RDC 268

SWEEP GENERATOR ⑥



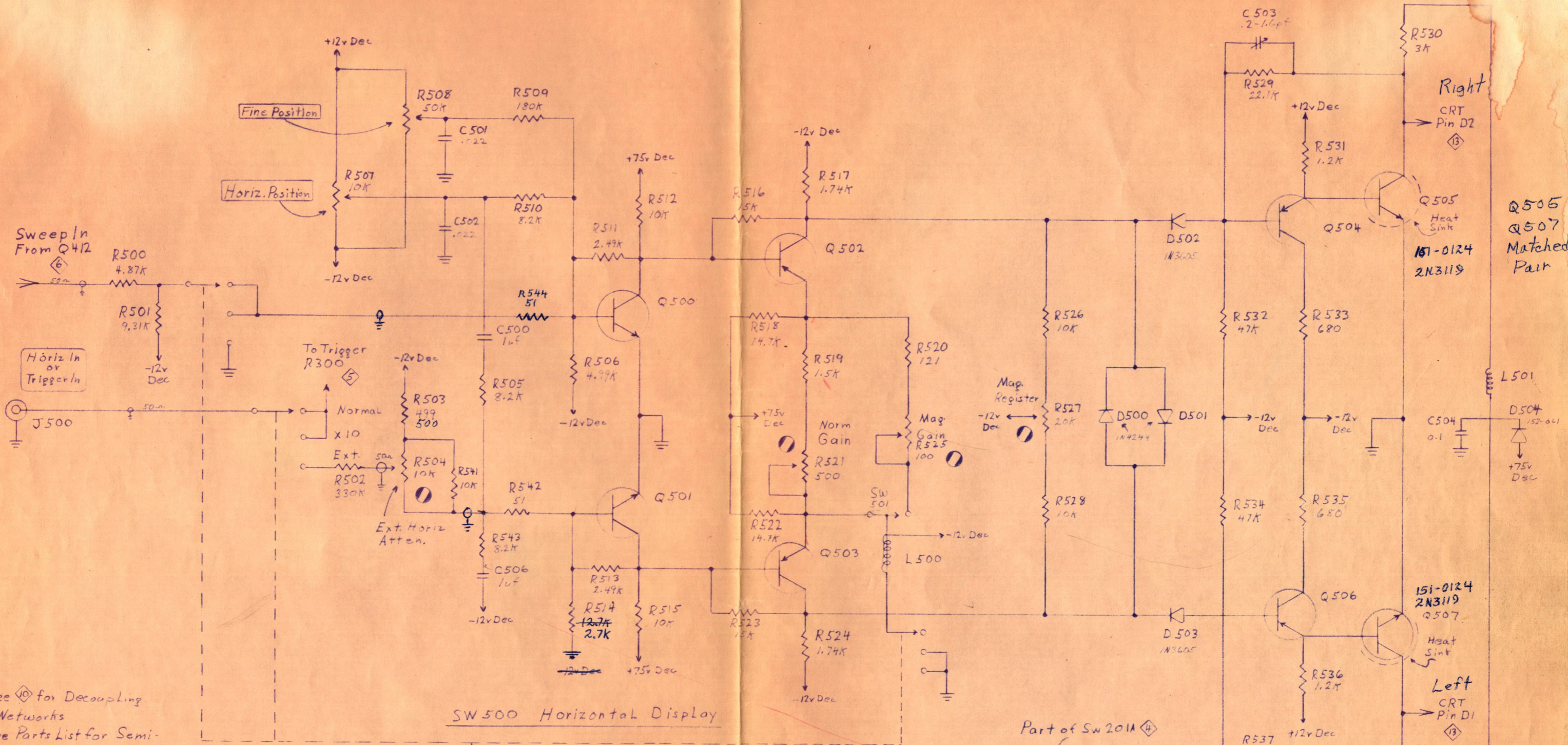
See \diamond for Decoupling Networks
Reference Diagrams

- \diamond Sweep
- \circ Horizontal
- \uparrow Delay Magnifier

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Time / Division Switch \diamond

TYPE 245 OSCILLOSCOPE



See \diamond for Decoupling Networks
 See Parts List for Semiconductor Types
 Reference Diagrams

- \diamond Vertical Amp
- \diamond Trigger
- \diamond Sweep
- \diamond Timing Switch
- \diamond CRT
- \diamond CRT Basing

Type 245 Oscilloscope

SW 500 Horizontal Display

See Timing Switch \diamond

Ext. Horiz. Unblanking To CRT R834 \diamond

Part of Sw 201A \diamond

Trace Finder
 R540 4.5K
 SW201B
 R539 470
 Spring Return To Position Shown

HORIZONTAL AMPLIFIER \diamond

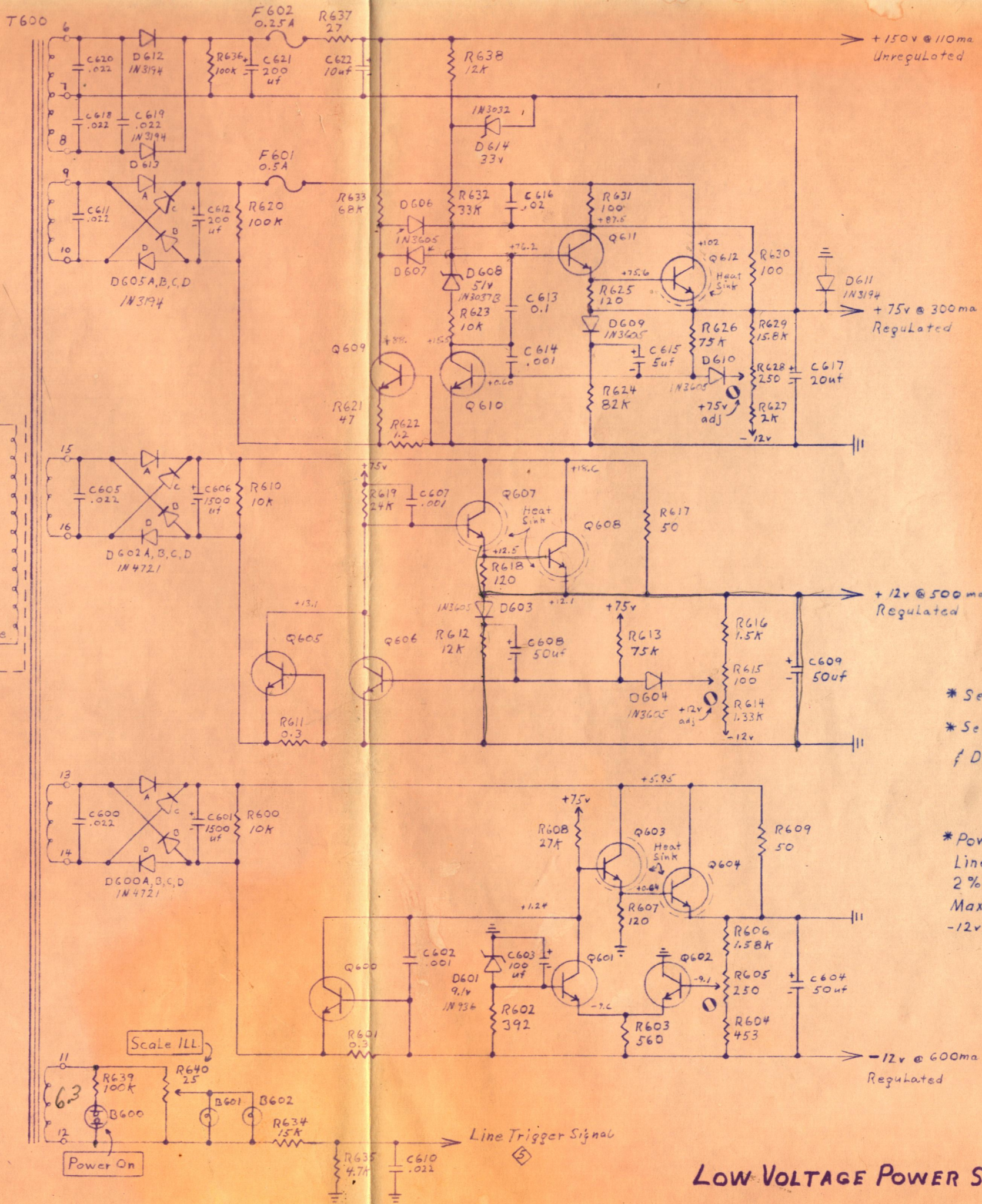
RDC 268

Q505
 Q507
 Matched Pair

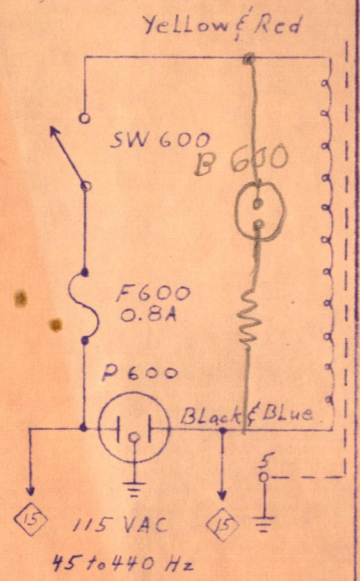
151-0124
 2N3119
 Q507
 Heat Sink

Left
 CRT
 Pin D1 \diamond

Right
 CRT
 Pin D2 \diamond



Handwritten notes on the right side of the page:

$$R = \frac{E}{I} = \frac{75}{3 \times 10^{-1}} = 250 \Omega$$


REFERENCE DIAGRAMS
 5 Sweep Trigger

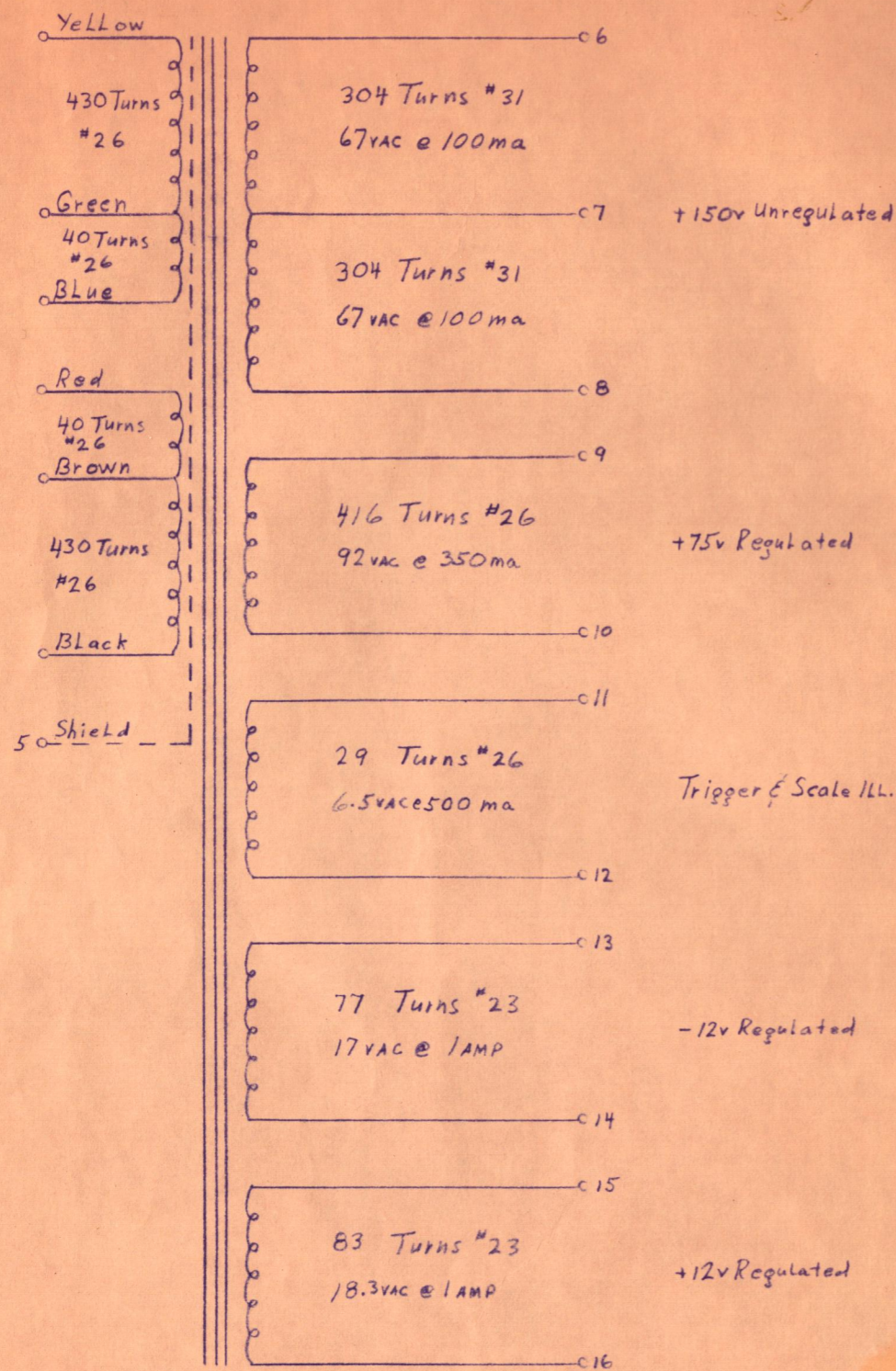
* See Parts List For Semiconductor Types.
 * See Drawing 10 For Transformer Schematic of Distribution Circuits.

* Power Consumption 100watts.
 Line Must Contain Less Than 2% Harmonic Distortion.
 Maximum Ripple 2mv On -12v, +12v, +75v Supplies.

TYPE 245 OSCILLOSCOPE

LOW VOLTAGE POWER SUPPLY

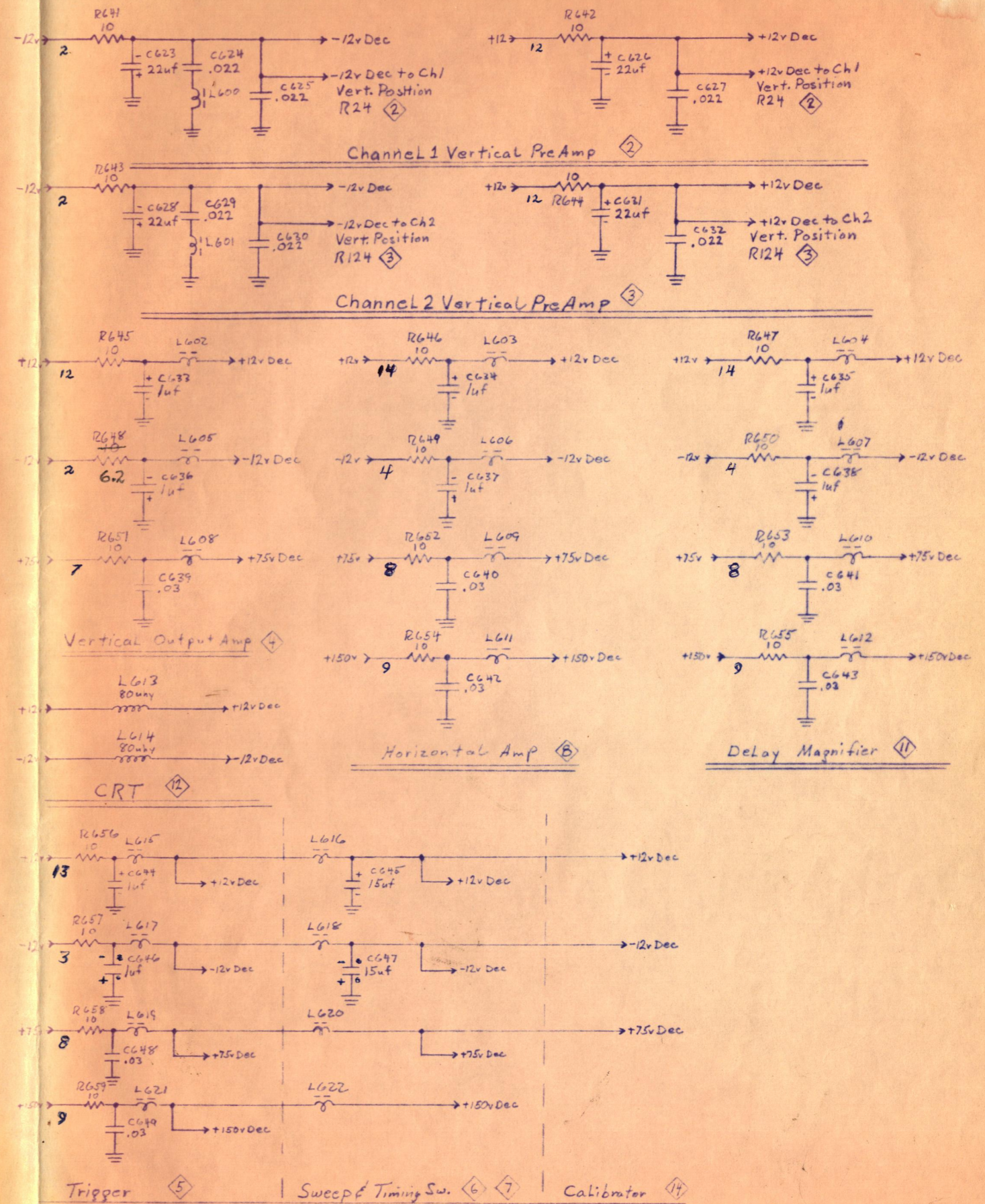
RDC 567 9



T600 Low Voltage Power Transformer

CONNECTIONS FOR DUAL PRIMARY

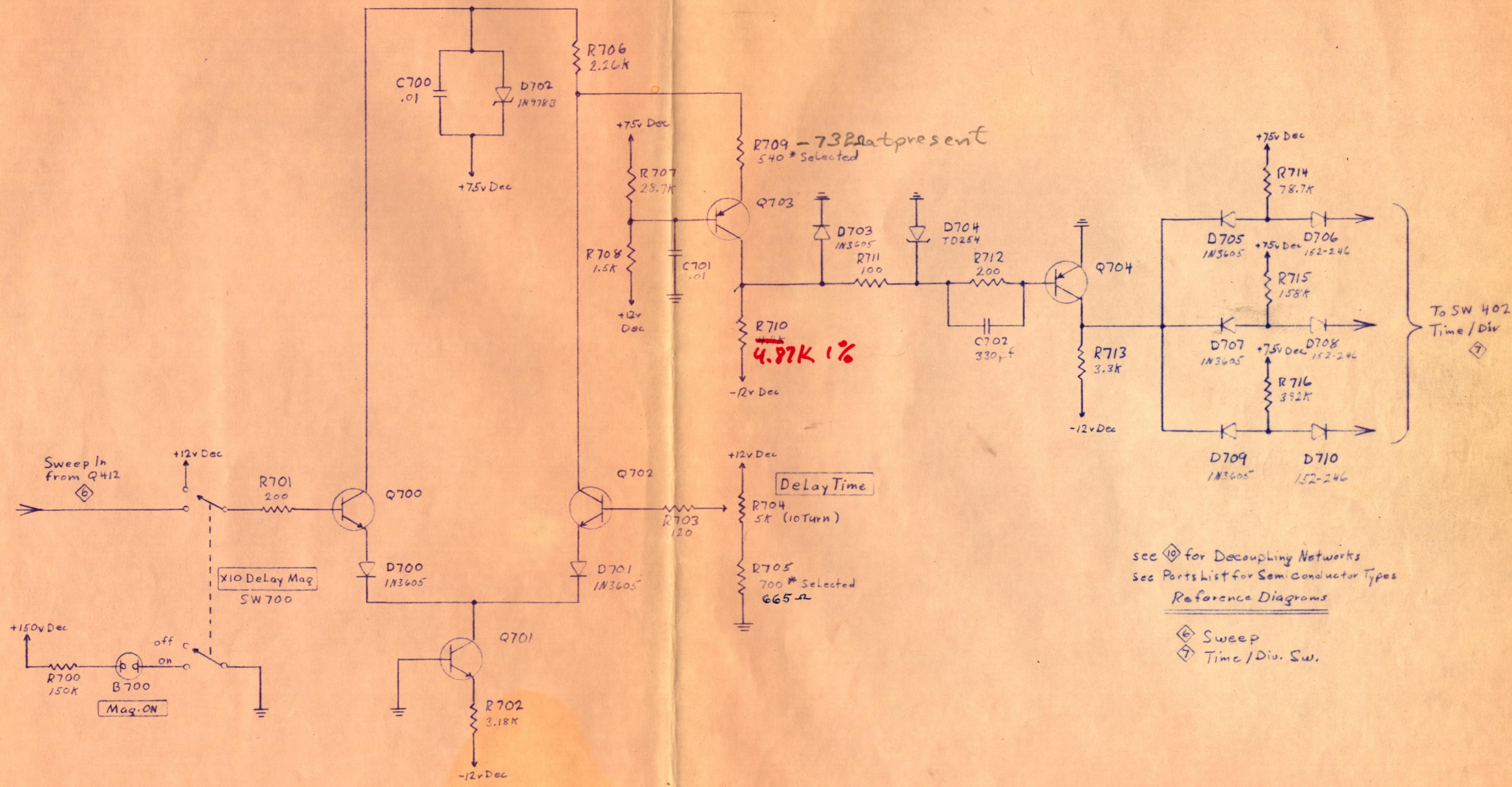
- 117VAC Operation:
 Normal Range - 103 to 137VAC - Line 1 to Yellow & Red
 Line 2 to Black & Blue
 Low Range - 96 to 127VAC - Line 1 to Yellow & Brown
 Line 2 to Black & Green
- 234VAC Operation:
 Normal Range - 206 to 274VAC - Line 1 to Yellow
 Line 2 to Black
 Connect Red to Blue
 Low Range - 192 to 254VAC - Line 1 to Yellow
 Line 2 to Black
 Connect Brown to Green



TYPE 245 OSCILLOSCOPE

POWER TRANSFORMER & Distribution

TYPE 245 OSCILLOSCOPE

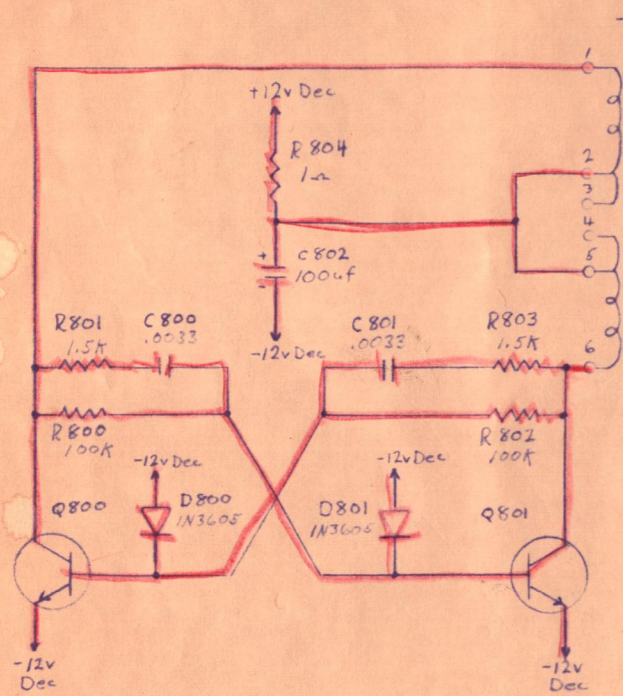


see \diamond for Decoupling Networks
 see Parts list for Semiconductor Types
Reference Diagrams

- \diamond Sweep
- \diamond Time/Div. Sw.

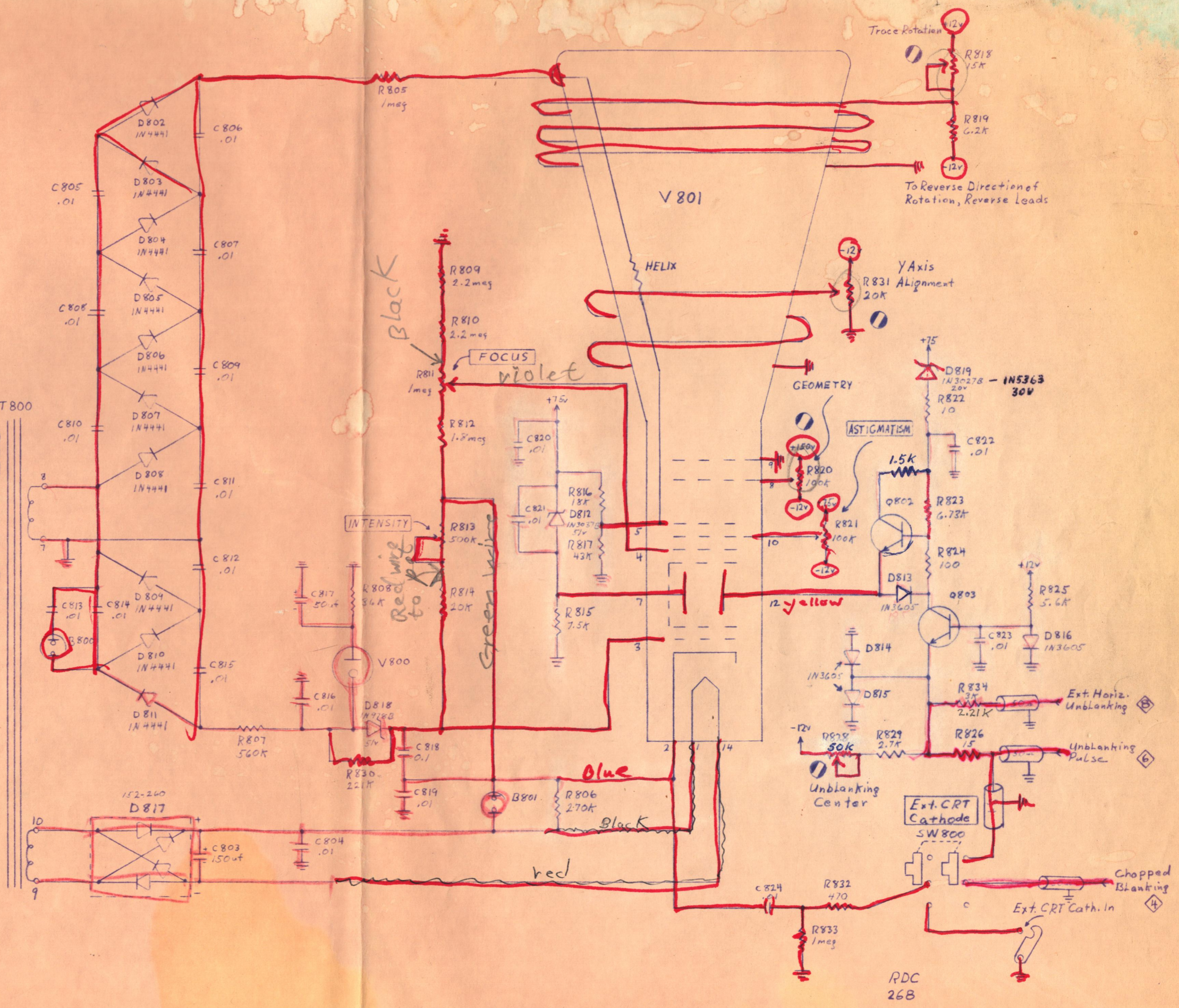
RDC
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DELAY MAGNIFIER \diamond

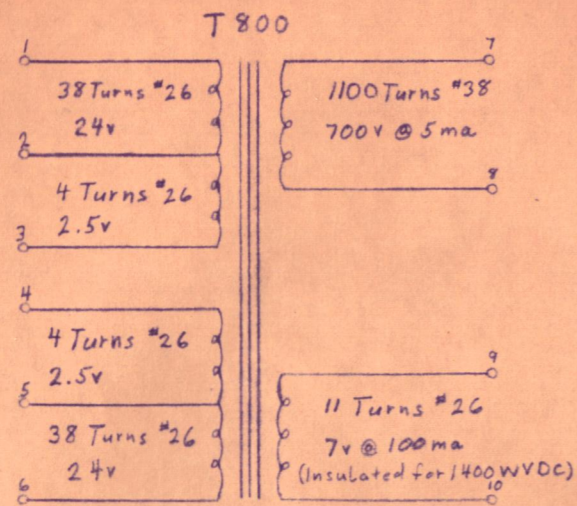


see ⑩ for Decoupling Networks
 see Parts List for Semiconductor Types
Reference Diagrams

- ④ Vertical
- ⑥ Sweep
- ⑧ Horizontal

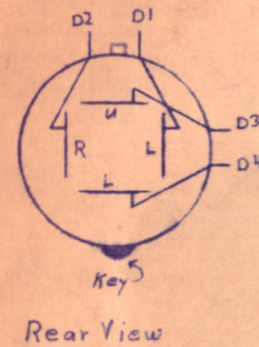
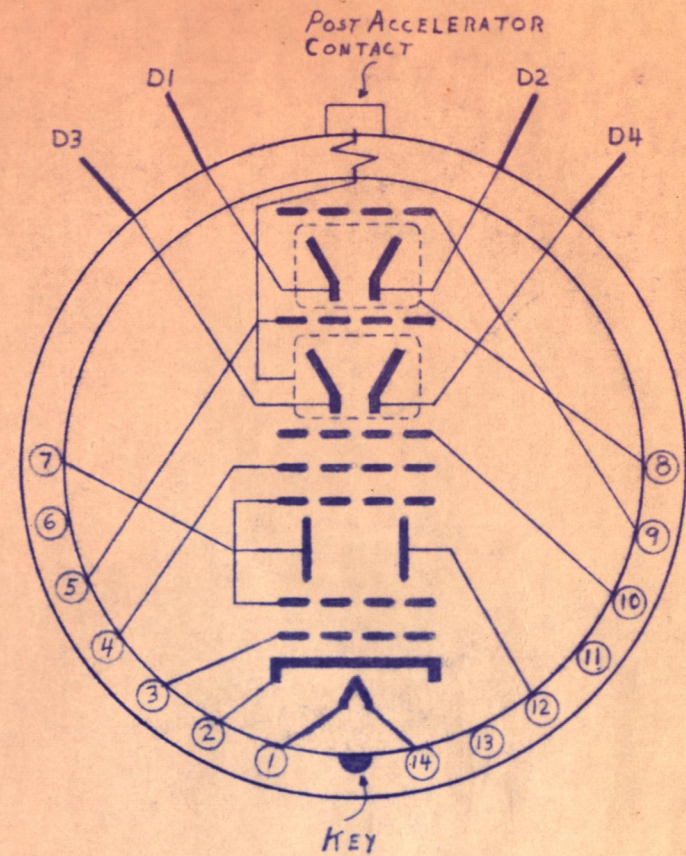
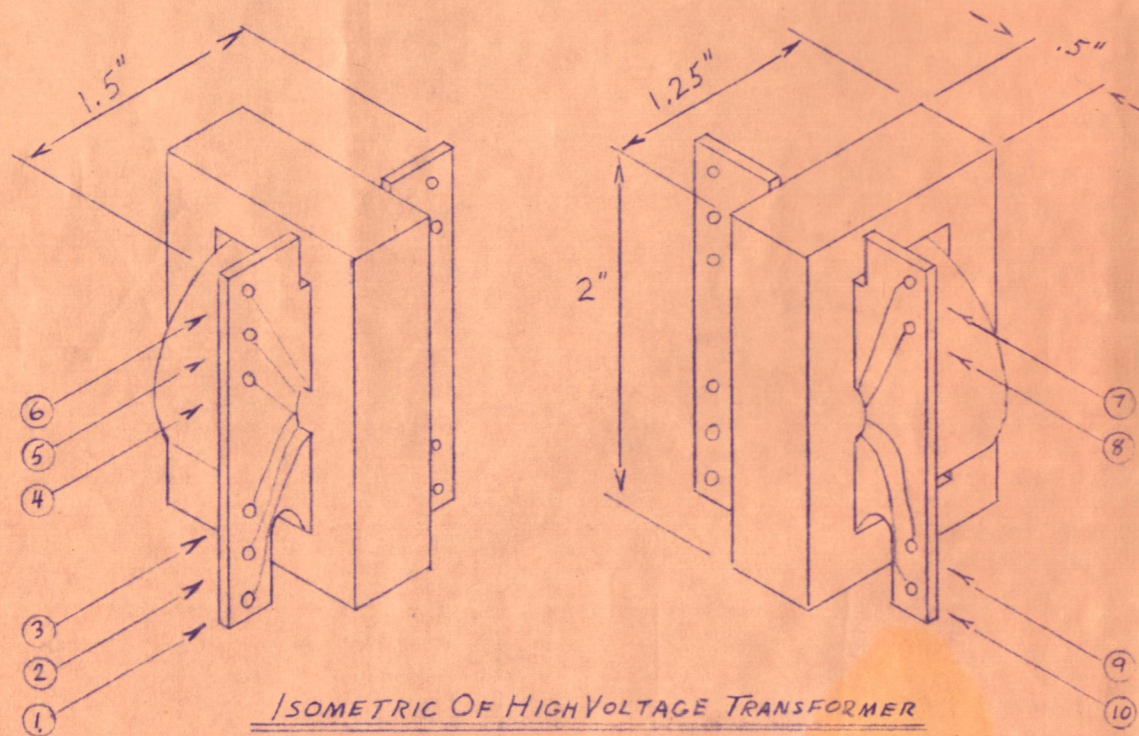


Part #
120-0378-02



Operating Frequency: 15 to 25 KC Sq. Wave

SCHEMATIC OF HIGH VOLTAGE TRANSFORMER

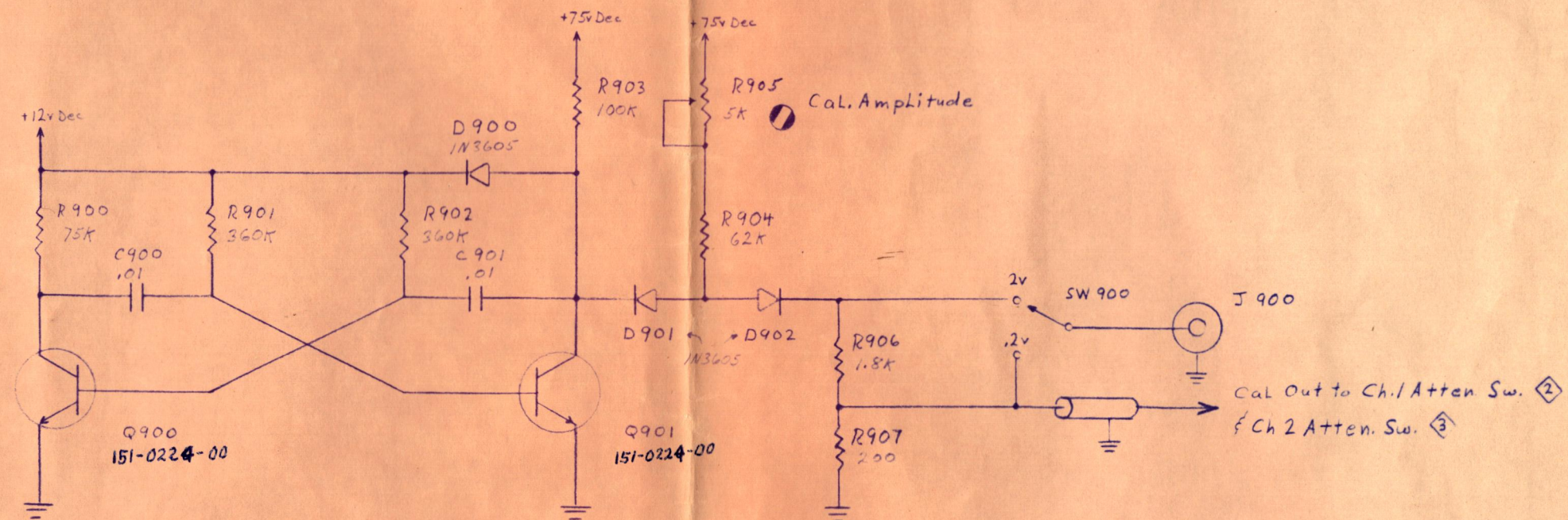


Pin	Connection	Voltage (to Cathode except #2)
1 & 14	Heater	+6.3v @ 90 ma
2	Cathode	-1361v to ground
3	Grid No. 1	+55 to 75v for cutoff
4	Focusing Electrode	+320 to 520v
5	Isolation Shield & Lower Helix	+1400v
6 & 11 & 13	Grid No. 1 - Internal Connection	
7	Accelerator, B1 Blanking Plate Return	+1373v
8	D1 & D2 Shield	+1388 to 1495v
9	Post Accelerator Grid	+1361v
10	Astigmatism Electrode	+1388 to 1455v
12	B2 Blanking Plate	±15v @ 750 ma to unblank
D1	Left Horizontal Deflection Plate	Aver. Voltage +1400v " to ground +35 to 40v
D2	Right Horizontal Deflection Plate	
D3	Upper Vertical Deflection Plate	
D4	Lower Vertical Deflection Plate	
-	Post Accelerator Contact	+4600v

CRT SCHEMATIC & BASE CONNECTIONS
CRT # T4220-PART No. 154-0466-05

CRT &
HIGH VOLTAGE TRANSFORMER

13



See Parts List For Semiconductor Types
 See 10 for Decoupling Network
Reference Diagrams

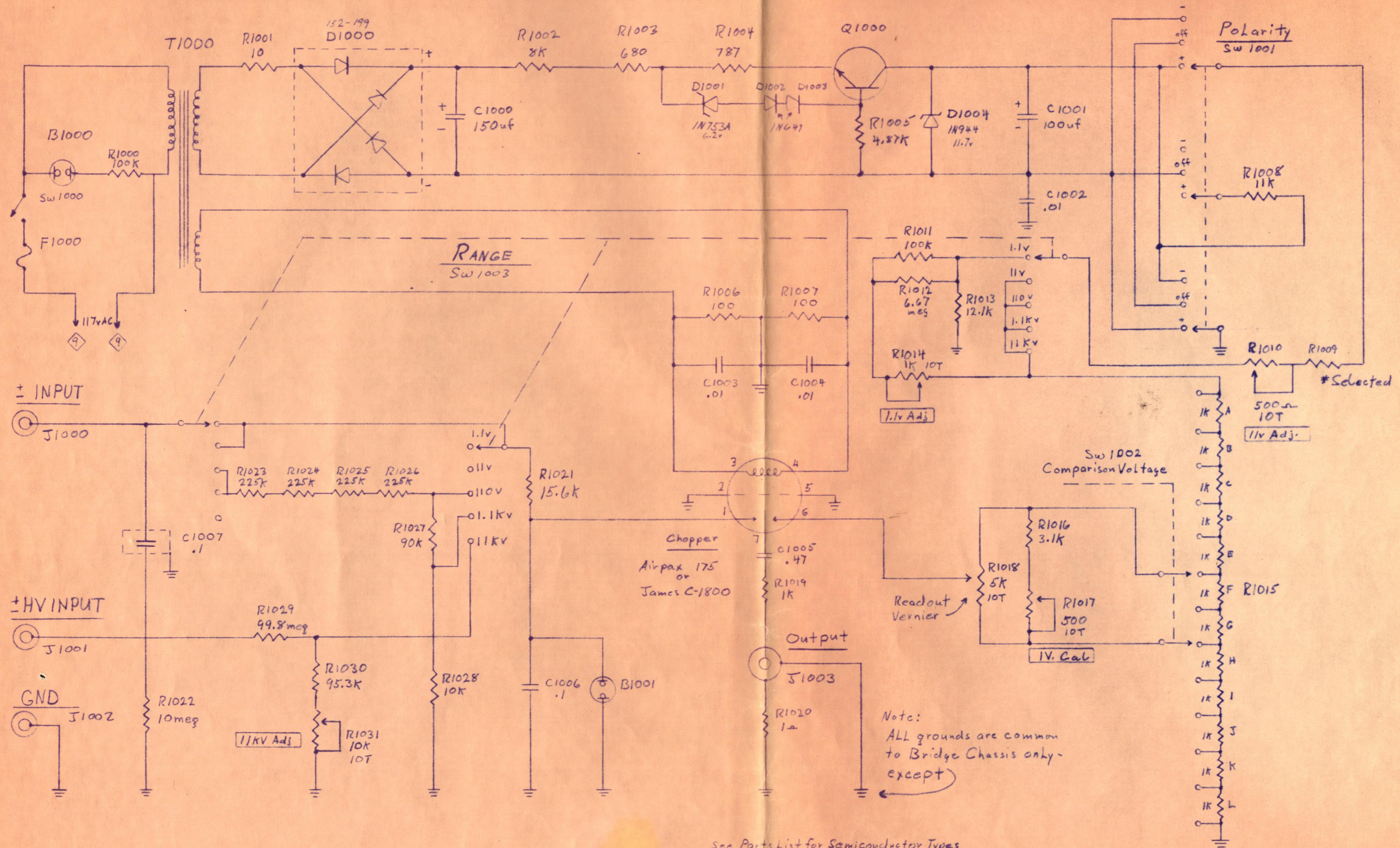
- ② Ch.1 Input
- ③ Ch.2 Input

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CALIBRATOR

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TYPE 245 OSCILLOSCOPE



See Parts List for Semiconductor Types
 Reference Diagrams
 ♦ Low Voltage Power Supply

Note:
 ALL grounds are common
 to Bridge Chassis only -
 except

Type 245 Oscilloscope

DC VOLTAGE BRIDGE

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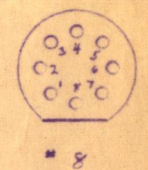
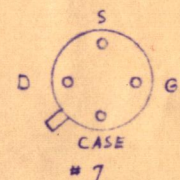
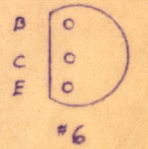
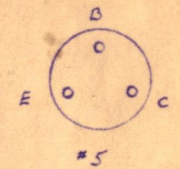
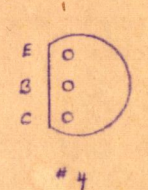
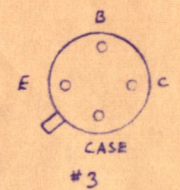
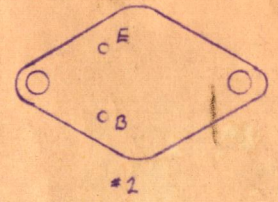
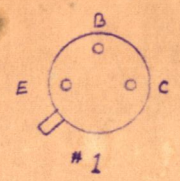
Part No.	Use	Type	Mfg. No	P _V (Max) Volts	I _F (Max)	I _R (Max)	Reverse Leakage I _R (Max) @V _R	For. Conductance I _F (Min) @ V _F	Junction Cap. C _J (Max) @ V _R	Recovery Time T _{rr} (Max) nsec	Case				
152-0061	Signal	SIL	CD2559	2	100ma		5ua	175	100ma	1.0	8pf	0	700nsec	DO-7	
152-0066	Rect.	SIL	1N3194	400	5Amp		10ua	400	750ma	1.0				A-50	
152-0107	Signal	SIL	1N647 / TIG0	400	400ma		1ua	300	400ma	1.0				A-1 A-84a	
152-0125	Tunnel	Ger	TD3A / STD704 1N3717		25 ma						15pf			A-82	I _p = 4.7ma ± .12ma, I _p /I _v min = 7.6, V _p max = 72mv, V _v min = 315mv, V _f @ I _p max = 535mv
152-0141	Signal	SIL	1N3605	40	75ma		50ma	30	20ma	.88	2pf	0	4ns I 2ns E	DO-7	Color Coded 6141
152-0150	Zener	SIL	1N3037B		16ma									A-31A	5V, 10%, 1watt I _{ZT} = 5ma Z _{ZT} = 95Ω @ I _{ZT}
152-0153	Signal	SIL	1N4244	15	50ma		100na	10	20ma	1	1pf	0	.75ns I	DO-7	
152-0166	Zener	SIL	1N753A		60ma									DO-7	6.2v, 5%, .4watts I _{ZT} = 5ma Z _{ZT} = 10Ω @ I _{ZT}
152-0170	Rect	SIL	1N4441	1500	25ma		1ua	1500	25ma	4			1000ns	A83-A	Color Coded 6170
152-0171	Zener	SIL	1N944		40ma									DO-7	11.7v, 5%, .5watts TC ± .001%/°C - 200ppm/Yr, I _{ZT} = 7.5ma, Z _{ZT} = 30Ω @ I _{ZT}
152-0185	Signal	SIL	CDG538	40	75ma	50ua	50na	30	20ma	1.15	2pf	0	4ns I 2ns E	DO-7	Color Coded 6185
152-0198	Rect.	SIL	MR1032A / 1N4721	200	3 Amp		500ua	200	1A 3A	.85 .90				A-174	Axial Lead
152-0199	Bridge	SIL	MDA 9423 / 10082A	200	1.5Amp		50ua	200	750ma	1.1					
152-0212	Zener	SIL	1N936		50ma									DO-7	9.0v, 5%, TC ± .005%/°C, 500mw Z _{ZT} = 20Ω @ I _{ZT}
152-0213	Zener	SIL	1N3032		26ma									A-31A	33v, 20%, 1watt I _{ZT} = 7.5ma Z _{ZT} = 45Ω @ I _{ZT}
152-0214	Tunnel	Ger	TD252		5 ma						6pf			M-214	I _p = 4.7ma ± .5ma, I _p /I _v min = 7.0, V _p = 80mv, V _v min = 390mv, V _f @ I _p = 650mv, P _d max = 3.5mw
152-0217	Zener	SIL	1N756A		45ma									DO-7	8.2v ± 5%, .4watt I _{ZT} = 20ma, Z _{ZT} = 5Ω @ I _{ZT}
152-0246	Signal	SIL	CD12676 / FD3375	50			100pa 1na	3 30	20ma	1	6pf 3pf	0 3	5000nsec	DO-7	
152-0249	Signal	SIL												-	Series Assembly of 1ea 152-0245 + 152-0246
152-0255	Zener	SIL	1N978B		5.9ma									DO-7	51v ± 5%, .4watts I _{ZT} = 2.5ma, Z _{ZT} = 125Ω @ I _{ZT}
152-0260	Bridge	SIL	UBR 261	100	1.5Amp		2ua	100	900ma	1			2000nsec I		
152-0278	Zener	SIL	1N4372A		120ma									DO-7	3v ± 5%, .4watts, I _{ZT} = 20ma, Z _{ZT} = 29Ω @ I _{ZT}
152-0245	Signal	SIL	CDG1165	50			10na	5	20ma	1	2pf	0	2nsec E 4nsec I	DO-7	
152-0291	Zener	SIL	1N3027B		42ma									A-31A	20v ± 5%, 1watt, I _{ZT} = 12.5ma, Z _{ZT} = 22Ω @ I _{ZT}

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DIODE PARAMETERS

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Part No.	Polarity/Type	Mfg No.	V _{CEO} Volts	V _{CE0} Volts	V _{EB0} Volts	I _c (Max) Amp	P _d (Max) Watts	F _t Typ MHz	F _t @ I _c (Min) MHz Amps	C _{ob} pf	h _{fe} Typ	h _{fe} min @ V _{CE} I _c Volts Amps	I _{cbo}	Case	Lead Ident.	
151-0096	NPN SiL	2N 1893	120	100	7	0.2	3.0	120	40 .05	15	80	20 10 .05	10na @ 90v	TO-5	1	
151-0103	NPN SiL	2N2219-MM488	60	30	5	0.8	3.0	350	250 .02	8	200	275 10 .01	10na @ 50v	TO-5	1	
151-0108	NPN SiL	2N2501	40	20	6	-	1.2	350	350 .01	4	50	40-150 1 .01	.025ua @ 20v	TO-18	1	
151-0120	NPN SiL	2N2475	8	8	2	2.5	.3	850	600 .02	3	70	30 .4 .02	50na @ 5v	TO-18	1	
151-0121	NPN SiL	2N3118 / 2N3500 / TA1938	80	60	4	0.5	4.0	380	150 .05	3.5	160	50 20 .01	100na @ 30v	TO-5	1	
151-0124	NPN SiL	2N3501 / 2N3119	120	120	4	.25	4.0	500	150 .05	4.5	120	50 20 .01	50na @ 60v	TO-5	1	
151-0127	NPN SiL	2N2369 / S6075	40	15	4.5	.5	1.2	800	400 550 .04 .02	4	80	50-120 1 .01	400na @ 20v	TO-18	1	
151-0131	PNP Ger	2N964 / 2N3320	15	15	2.5	.1	.3	460	300 .02	2.2	80	70 .3 .01	3ua @ 6v	TO-18	1	
151-0133	PNP SiL	MM 999	60	40	5	-	1.2	-	300 .02	4	-	80-240 1 .01	-	TO-18	1	
151-0136	NPN SiL	2N3053 / 40053	60	40	5	.7	.5	-	100 .05	15	125	50 10 .01- .15	250na @ 30v	TO-5	1	
151-0140	NPN SiL	2N3055	100	60	7	15	115	40	.3 1	-	45	20-70 30-150 4 .5	5ma @ 100v	TO-3	2	
151-0148	NPN SiL	40250	50	40	5	4.0	25.0	-	.5 .15	-	40	25 100 4 .15	-	TO-66	2	
151-0149	NPN SiL	2N3441	160	140	7	3.0	25.0	-	.4 .1	-	35	20 80 4 .5 1.0	-	TO-66	2	
151-0151	NPN SiL	2N 929 / 2N920	60	40	6	.03	.6	60	50 .001	8	200	100 10 .0005- .01	10na @ 45v	TO-18	1	
151-0164	PNP SiL	2N3702 / T1503	40	25	5	.2	.3	-	100 .05	12	-	60-300 5 .05	-	TO-92	6	
151-0180	NPN SiL	TA2526 / 40235	35	35	3	.05	.18	-	1200 .001	75	-	40-170 6 .001	.02ua @ 1v	TO-104	3	
151-0188	PNP SiL	2N3906	40	40	5	.2	.31	400	250 .01	4.5	200	150-300 1 .01	.05ua @ 40	TO-92	4	
151-0190	NPN SiL	2N3904	60	40	6	.2	.31	600	300 .01	4	200	100-300 1 .01	.05ua @ 40	TO-92	4	
151-0220	PNP SiL	2N4122	40	40	5	.1	.5	900	400 .01	4.5	300	100-150 1 .0001- .01	25ua @ 40	RO-97A	5	
151-0221	PNP SiL	2N4258	12	12	4.5	-	.5	700	.01	3	-	15 .5 30 1 .05	-	RO-97A	5	
151-0223	NPN SiL	2N4275	40	15	4.5	.1	.8	400	.01	4	-	18 1 35-120 1 .01	-	RO-97A	5	
151-1005	FET- N Channel Junction	41490	P _d = 300 mw., I _g = .1na, B _r min = 30v, I _{dss} = 2-6ma, V _p max = 6, C _{iss} = 6pf, C _{rss} = 2pf, G _m (min) = 2000 umhos @ 15v D to B + I _d = I _{dss}										7			
153-0524	Matched Pair of 151-0141		Matched for hb - reverse voltage transfer ratio, open-circuit [Common base]										RO-97B			
156-0011	RTL	41914 / 9923 SL3021	Dual Two		Input Gate										IC3	8



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TRANSISTOR PARAMETERS