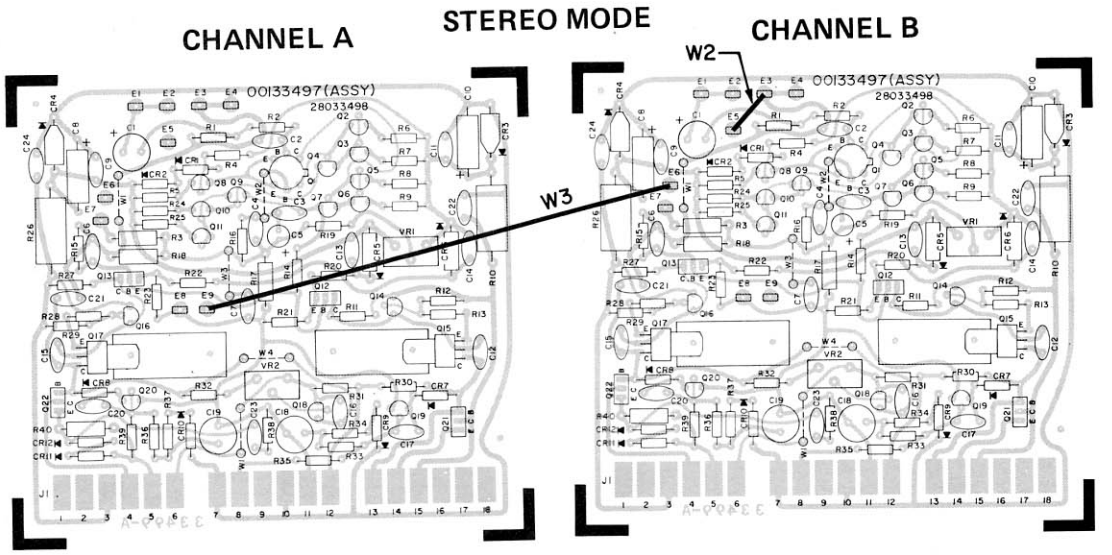


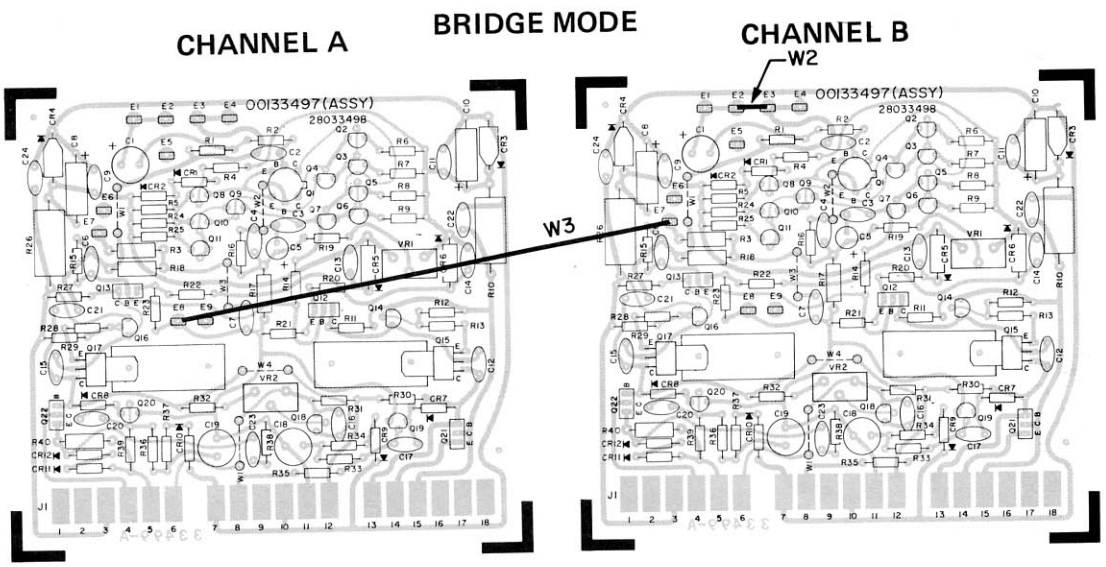


FIGURE I

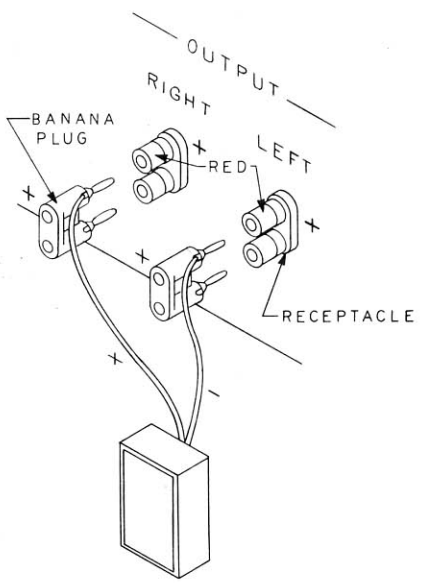
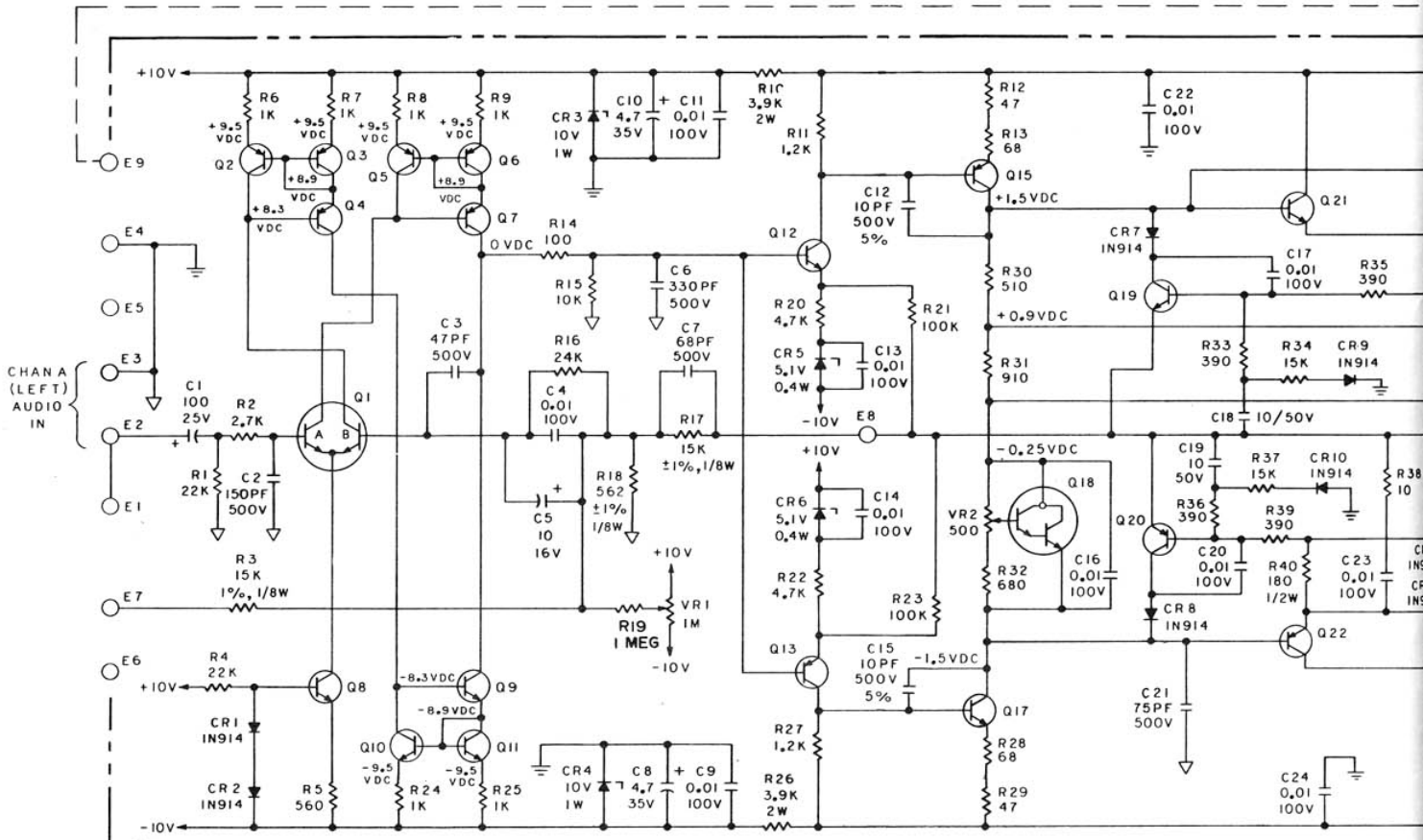


FIGURE II

REGULAR VOLTAGE SCHEMATIC DIAGRAM



Q22 C24 R40	VR2 CR12	
HIGHEST REF DES USED		REF DES NOT USED

CHAN A
DRIVER BOARD
00133497

CHASSIS COMPONENTS	
HIGHEST REF DES USED	REF DES NOT USED
F6 L2 SW3 DS2 T2 CR16 C14 R16	Q14, Q16 R3, R9

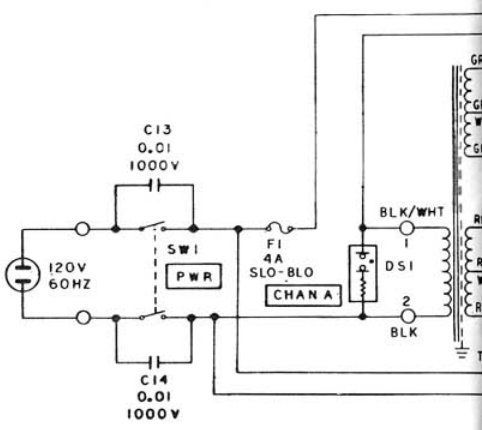
NOTES: UNLESS OTHERWISE SPECIFIED:

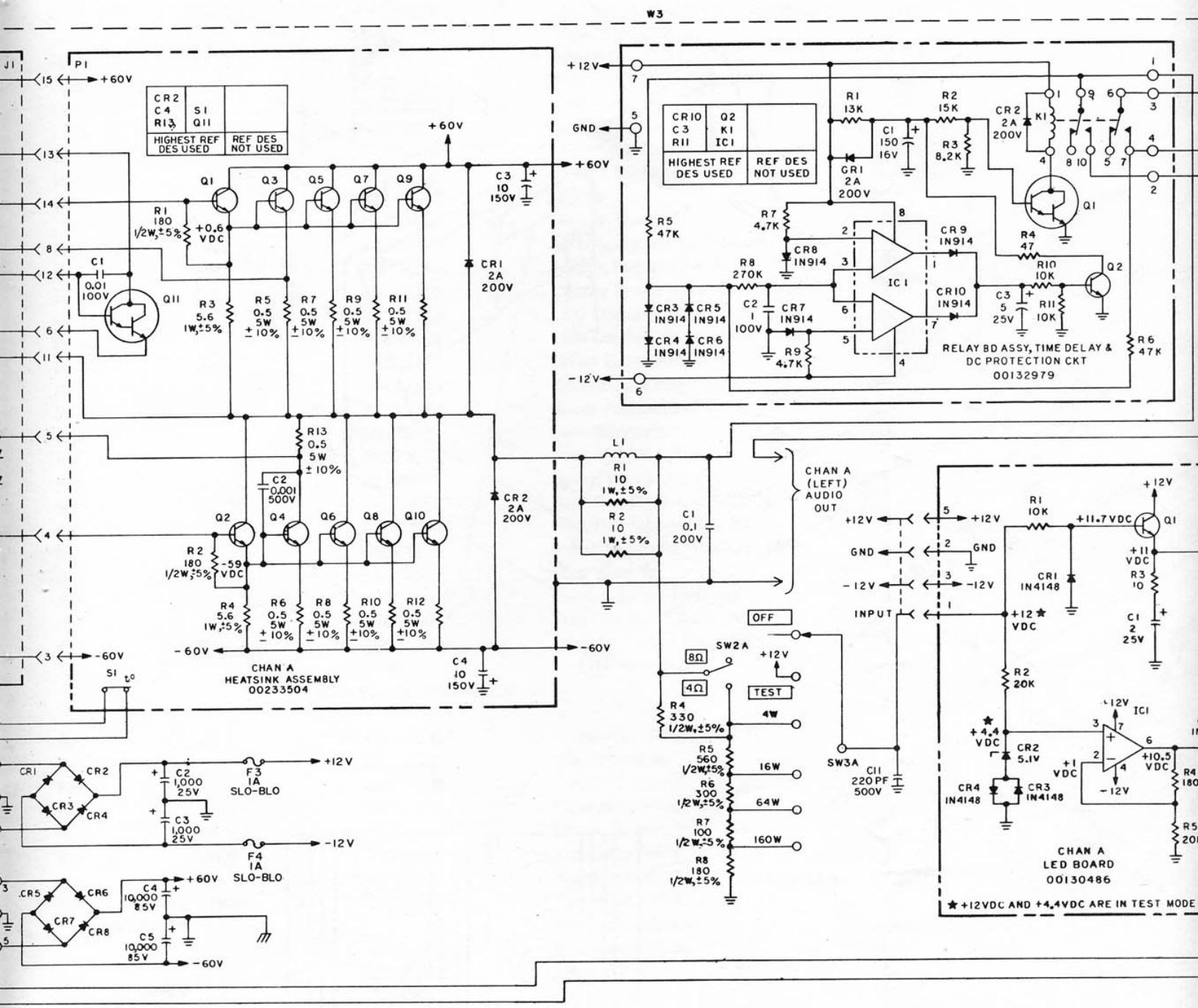
1. ALL CAPACITOR VALUES IN MICROFARADS.
2. ALL RESISTOR VALUES IN OHMS, ± 5%, 1/4W.
3. CR1–CR4, CR9–CR12, ARE 2 AMP, 200V. CR5–CR8, CR13–CR16, ARE 6 AMP, 200V.
4. UNIT IS NORMALLY WIRED IN STEREO MODE. TO PUT UNIT IN BRIDGE MODE THE FOLLOWING JUMPERS ARE AFFECTED W2 & W3. SEE TABLE I.

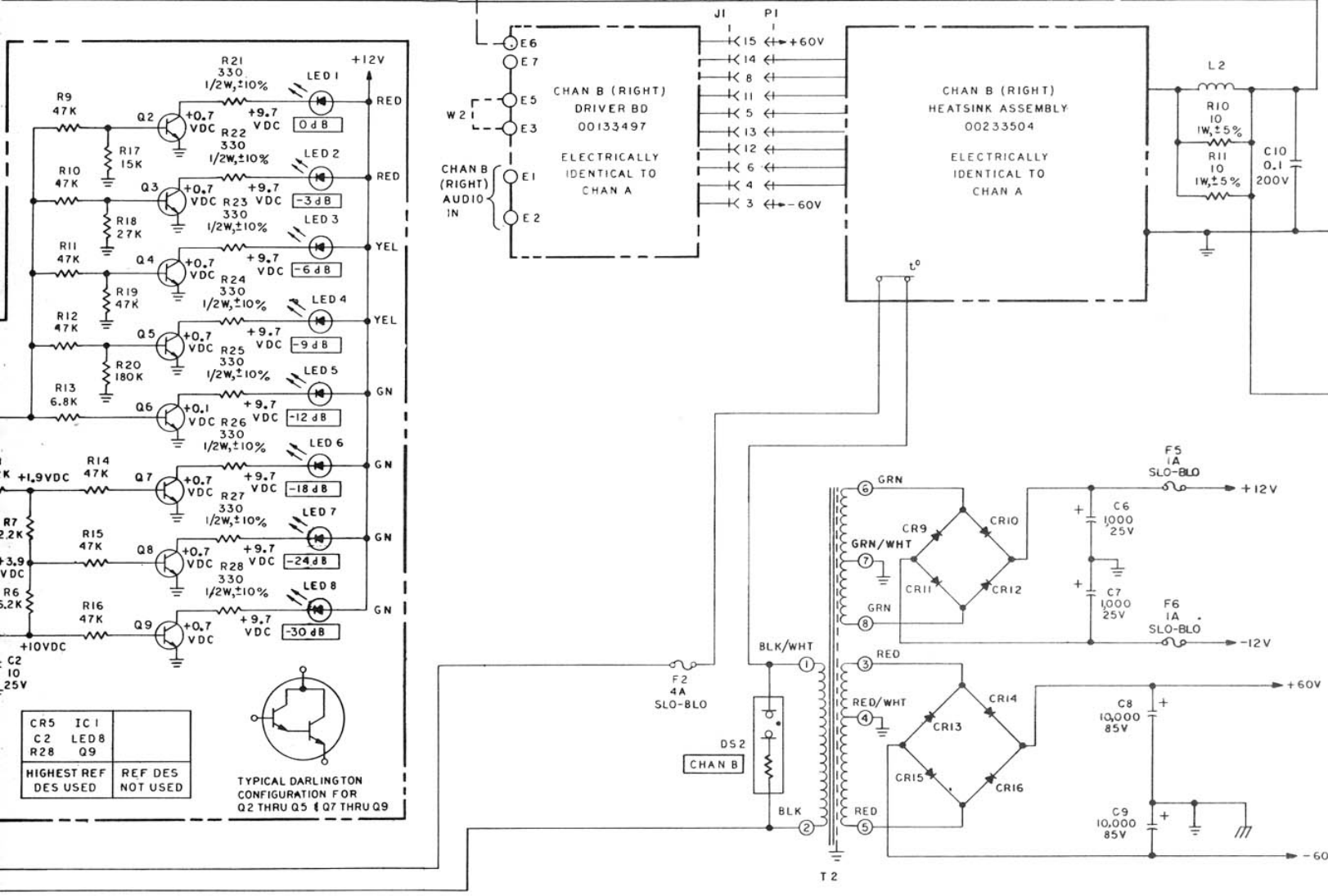
TABLE I

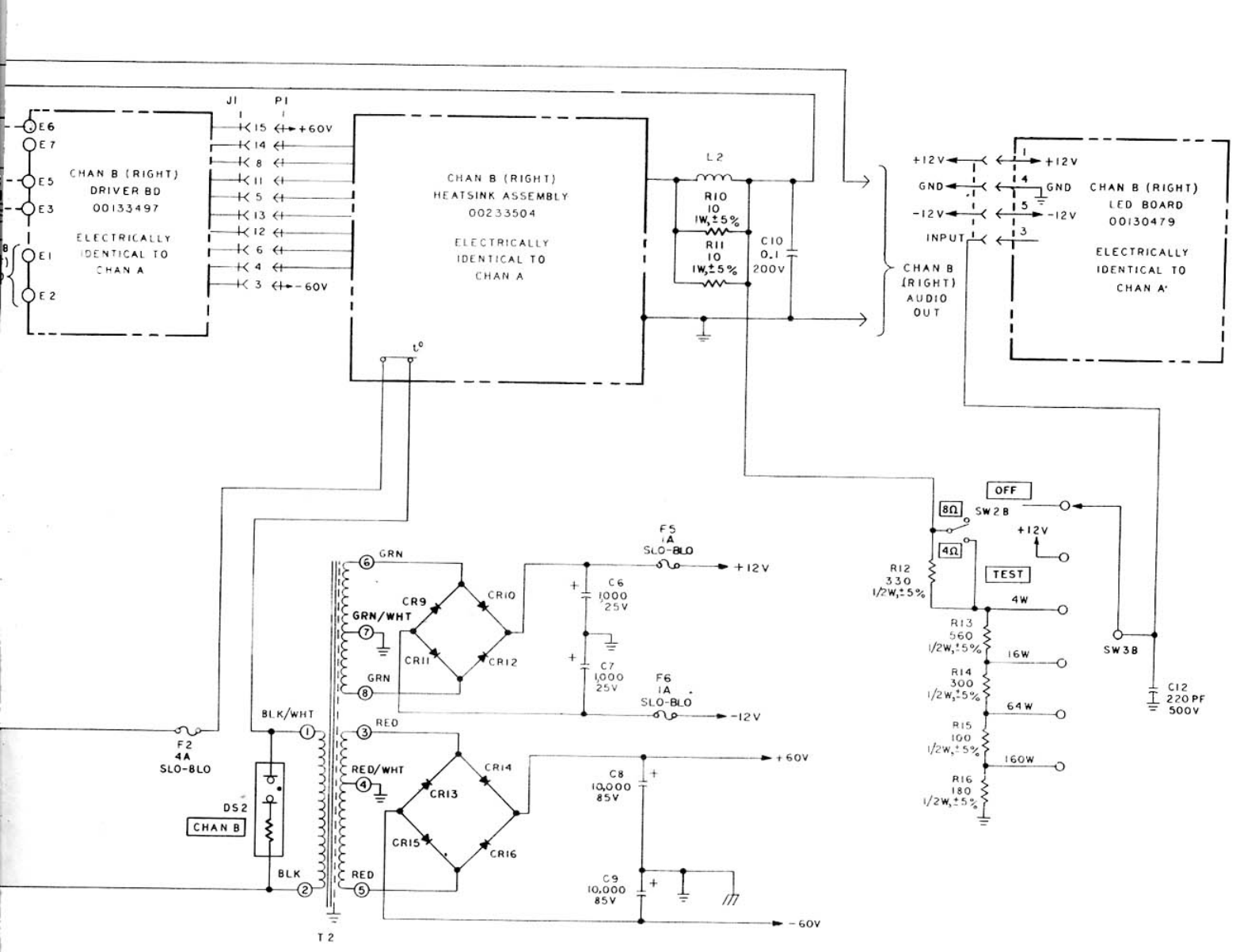
MODE	FROM		TO		JUMPER DESIG
	CHAN A	CHAN B	CHAN A	CHAN B	
STEREO		E3		E5	W2
	E9			E6	W3
BRIDGE		E3		E7	W2
	E8			E7	W3

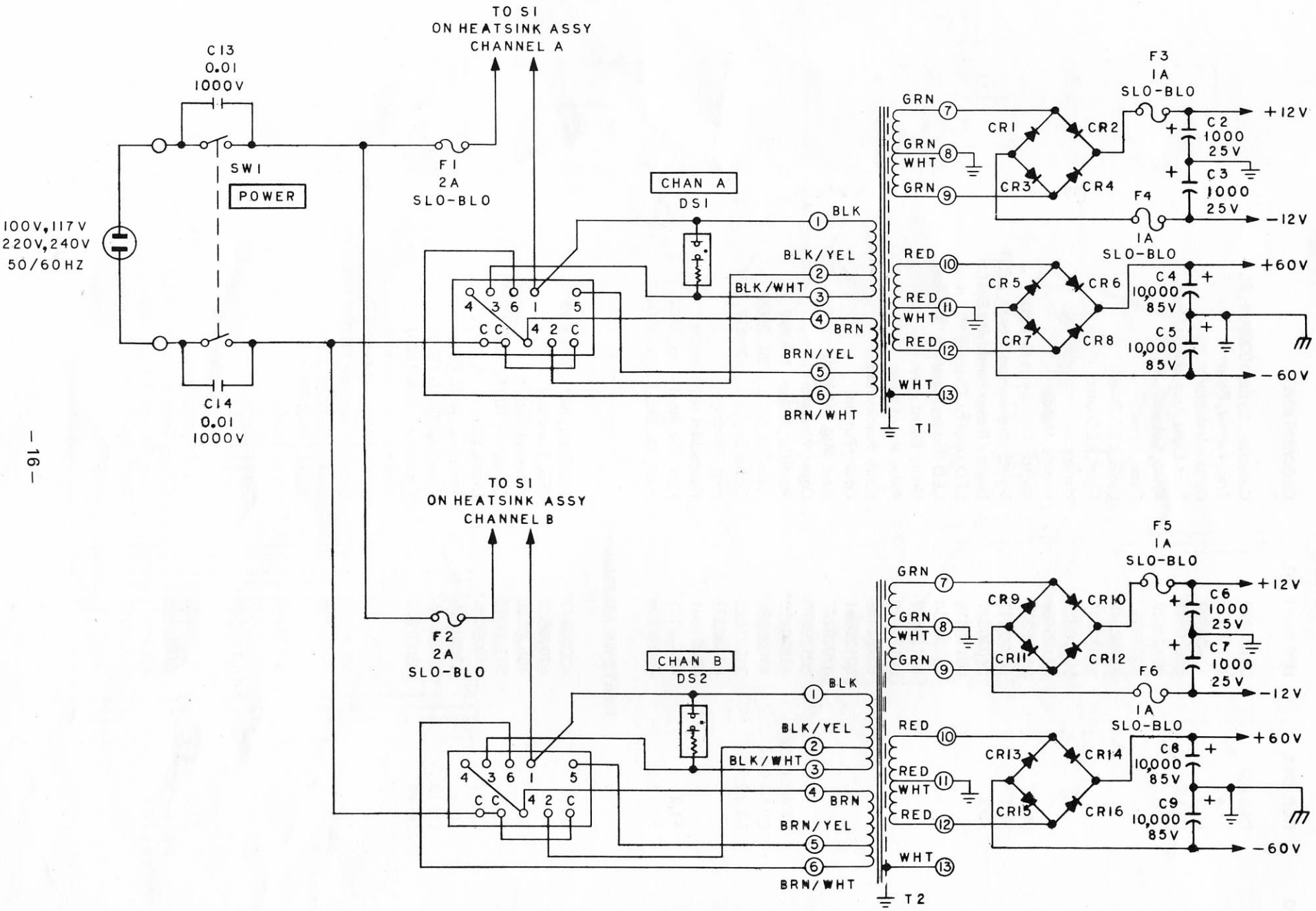
5. D.C. VOLTAGES ON LED BOARD ARE SHOWN WITH SW3 IN TEST POSITION.



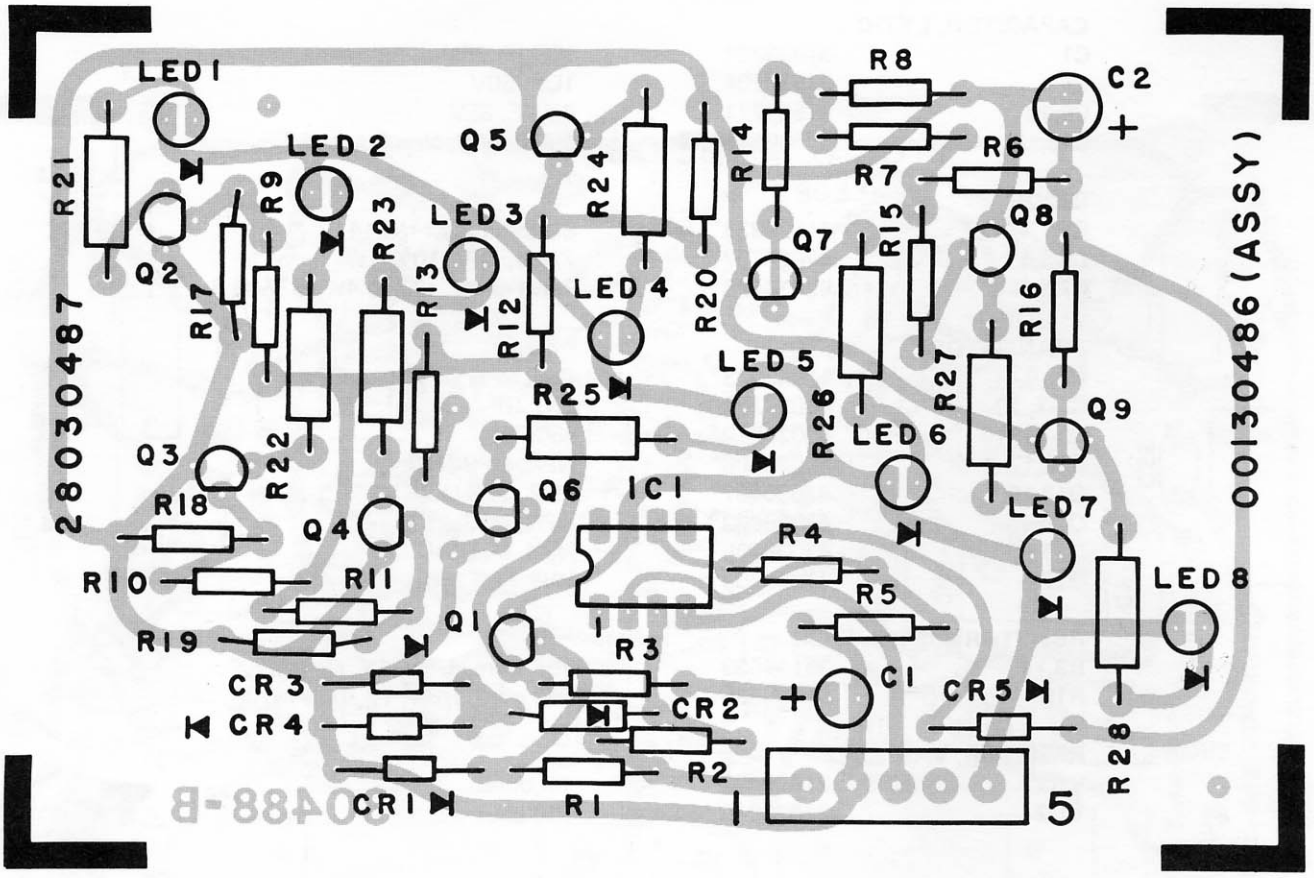

W3
J1
P1
+60V
-60V
+12V
-12V
GND
CR2 C4 R13 | S1 Q11 | HIGHEST REF DES USED | REF DES NOT USED
CR10 C3 R11 | Q2 K1 IC1 | HIGHEST REF DES USED | REF DES NOT USED
Q1 Q3 Q5 Q7 Q9
Q2 Q4 Q6 Q8 Q10
Q11
R1 180 1/2W,±5% +0.6 VDC
R2 180 1/2W,±5% -59 VDC
R3 5.6 1W,±5%
R4 5.6 1W,±5%
R5 0.5 5W ±10%
R6 0.5 5W ±10%
R7 0.5 5W ±10%
R8 0.5 5W ±10%
R9 0.5 5W ±10%
R10 0.5 5W ±10%
R11 0.5 5W ±10%
R12 0.5 5W ±10%
R13 0.5 5W ±10%
C1 0.01 100V
C2 0.001 500V
C3 10 150V
C4 10 150V
CR1 2A 200V
CR2 2A 200V
CHAN A HEATSINK ASSEMBLY 00233504
S1
L1
R1 10 1W,±5%
R2 10 1W,±5%
C1 0.1 200V
CHAN A (LEFT) AUDIO OUT
OFF
SW2A
8Ω
4Ω
TEST
4W
16W
64W
160W
R4 330 1/2W,±5%
R5 560 1/2W,±5%
R6 300 1/2W,±5%
R7 100 1/2W,±5%
R8 180 1/2W,±5%
SW3A
C11 220PF 500V
R1 13K
R2 15K
R3 8.2K
C1 150 16V
GR1 2A 200V
CR2 2A 200V
K1
Q1
R4 47
R5 47K
R6 47K
R7 4.7K
R8 270K
R9 4.7K
R10 10K
R11 10K
C2 1 100V
C3 5 25V
CR3 IN914
CR4 IN914
CR5 IN914
CR6 IN914
CR7 IN914
CR8 IN914
CR9 IN914
CR10 IN914
IC1
Q2
RELAY BD ASSY, TIME DELAY & DC PROTECTION CKT 00132979
CR1 CR2 CR3 CR4
C2 1,000 25V
C3 1,000 25V
F3 1A SLO-BLO
F4 1A SLO-BLO
CR5 CR6 CR7 CR8
C4 10,000 85V
C5 10,000 85V
R1 10K
+11.7VDC
+11 VDC
R3 10
C1 2 25V
CR1 IN4148
+12 ★ VDC
R2 20K
+4.4 VDC
CR2 5.1V
+1 VDC
+10.5 VDC
CR4 IN4148
CR3 IN4148
IC1
CHAN A LED BOARD 00130486
★ +12VDC AND +4.4VDC ARE IN TEST MODE


+12V
R21 330 1/2W,±10%
LED 1
R9 47K
Q2 +0.7 VDC
+9.7 VDC
0 dB
RED
R17 15K
R22 330 1/2W,±10%
LED 2
R10 47K
Q3 +0.7 VDC
+9.7 VDC
-3 dB
RED
R18 27K
R23 330 1/2W,±10%
LED 3
R11 47K
Q4 +0.7 VDC
+9.7 VDC
-6 dB
YEL
R19 47K
R24 330 1/2W,±10%
LED 4
R12 47K
Q5 +0.7 VDC
+9.7 VDC
-9 dB
YEL
R20 180K
R25 330 1/2W,±10%
LED 5
R13 6.8K
Q6 +0.1 VDC
+9.7 VDC
-12 dB
GN
R26 330 1/2W,±10%
LED 6
+1.9VDC
R14 47K
Q7 +0.7 VDC
+9.7 VDC
-18 dB
GN
R27 330 1/2W,±10%
LED 7
R15 47K
Q8 +0.7 VDC
+9.7 VDC
-24 dB
GN
R28 330 1/2W,±10%
LED 8
R16 47K
Q9 +0.7 VDC
+9.7 VDC
-30 dB
GN
+10VDC
C2 10 25V
CR5 IC1
C2 LED8
R28 Q9
HIGHEST REF DES USED
REF DES NOT USED
TYPICAL DARLINGTON CONFIGURATION FOR Q2 THRU Q5 & Q7 THRU Q9
J1
P1
E6
E7
E5
W2
E3
CHAN B (RIGHT) AUDIO IN
E1
E2
CHAN B (RIGHT) DRIVER BD 00133497
ELECTRICALLY IDENTICAL TO CHAN A
15
14
8
11
5
13
12
6
4
3
+60V
-60V
CHAN B (RIGHT) HEATSINK ASSEMBLY 00233504
ELECTRICALLY IDENTICAL TO CHAN A
t°
L2
R10 10 1W,±5%
R11 10 1W,±5%
C10 0.1 200V
F5 1A SLO-BLO
+12V
GRN
GRN/WHT
GRN
CR9
CR10
CR11
CR12
C6 1000 25V
C7 1000 25V
F6 1A SLO-BLO
-12V
F2 4A SLO-BLO
BLK/WHT
RED
RED/WHT
BLK
RED
DS2 CHAN B
CR13
CR14
CR15
CR16
C8 10,000 85V
C9 10,000 85V
+60V
-60
T2

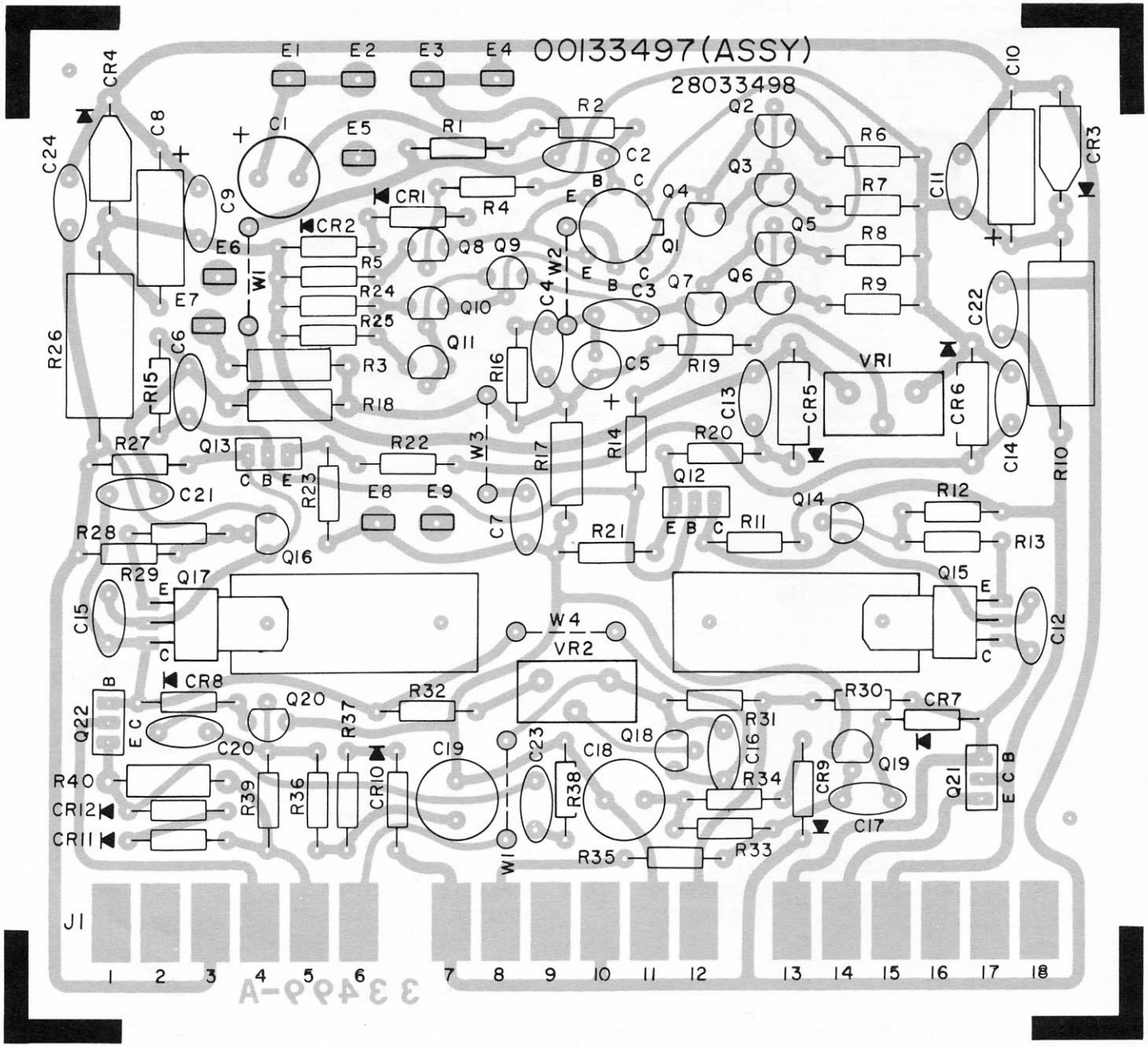

J1
P1
E6
E7
E5
E3
E1
E2
CHAN B (RIGHT)
DRIVER BD
00133497
ELECTRICALLY
IDENTICAL TO
CHAN A
15
14
8
11
5
13
12
6
4
3
+60V
-60V
CHAN B (RIGHT)
HEATSINK ASSEMBLY
00233504
ELECTRICALLY
IDENTICAL TO
CHAN A
L2
R10
10
1W, ±5%
R11
10
1W, ±5%
C10
0.1
200V
CHAN B
(RIGHT)
AUDIO
OUT
+12V
GND
-12V
INPUT
CHAN B (RIGHT)
LED BOARD
00130479
ELECTRICALLY
IDENTICAL TO
CHAN A'
OFF
8Ω
SW2B
4Ω
TEST
R12
330
1/2W, ±5%
4W
R13
560
1/2W, ±5%
16W
R14
300
1/2W, ±5%
64W
R15
100
1/2W, ±5%
160W
R16
180
1/2W, ±5%
SW3B
C12
220PF
500V
F5
1A
SLO-BLO
+12V
C6
1000
25V
C7
1000
25V
F6
1A
SLO-BLO
-12V
GRN
GRN/WHT
GRN
CR9
CR10
CR11
CR12
BLK/WHT
RED
RED/WHT
BLK
RED
CR13
CR14
CR15
CR16
+60V
C8
10,000
85V
C9
10,000
85V
-60V
F2
4A
SLO-BLO
DS2
CHAN B
T2


TO S1
ON HEATSINK ASSY
CHANNEL A
C13
0.01
1000V
SW1
POWER
100V, 117V
220V, 240V
50/60HZ
C14
0.01
1000V
F1
2A
SLO-BLO
CHAN A
DS1
BLK
BLK/YEL
BLK/WHT
BRN
BRN/YEL
BRN/WHT
4 3 6 1 5
C C 4 2 C
T1
GRN
GRN
WHT
GRN
RED
RED
WHT
RED
WHT
CR1
CR2
CR3
CR4
CR5
CR6
CR7
CR8
F3
1A
SLO-BLO
F4
1A
SLO-BLO
+12V
-12V
+60V
-60V
C2
1000
25V
C3
1000
25V
C4
10,000
85V
C5
10,000
85V
TO S1
ON HEATSINK ASSY
CHANNEL B
F2
2A
SLO-BLO
CHAN B
DS2
T2
CR9
CR10
CR11
CR12
CR13
CR14
CR15
CR16
F5
1A
SLO-BLO
F6
1A
SLO-BLO
C6
1000
25V
C7
1000
25V
C8
10,000
85V
C9
10,000
85V

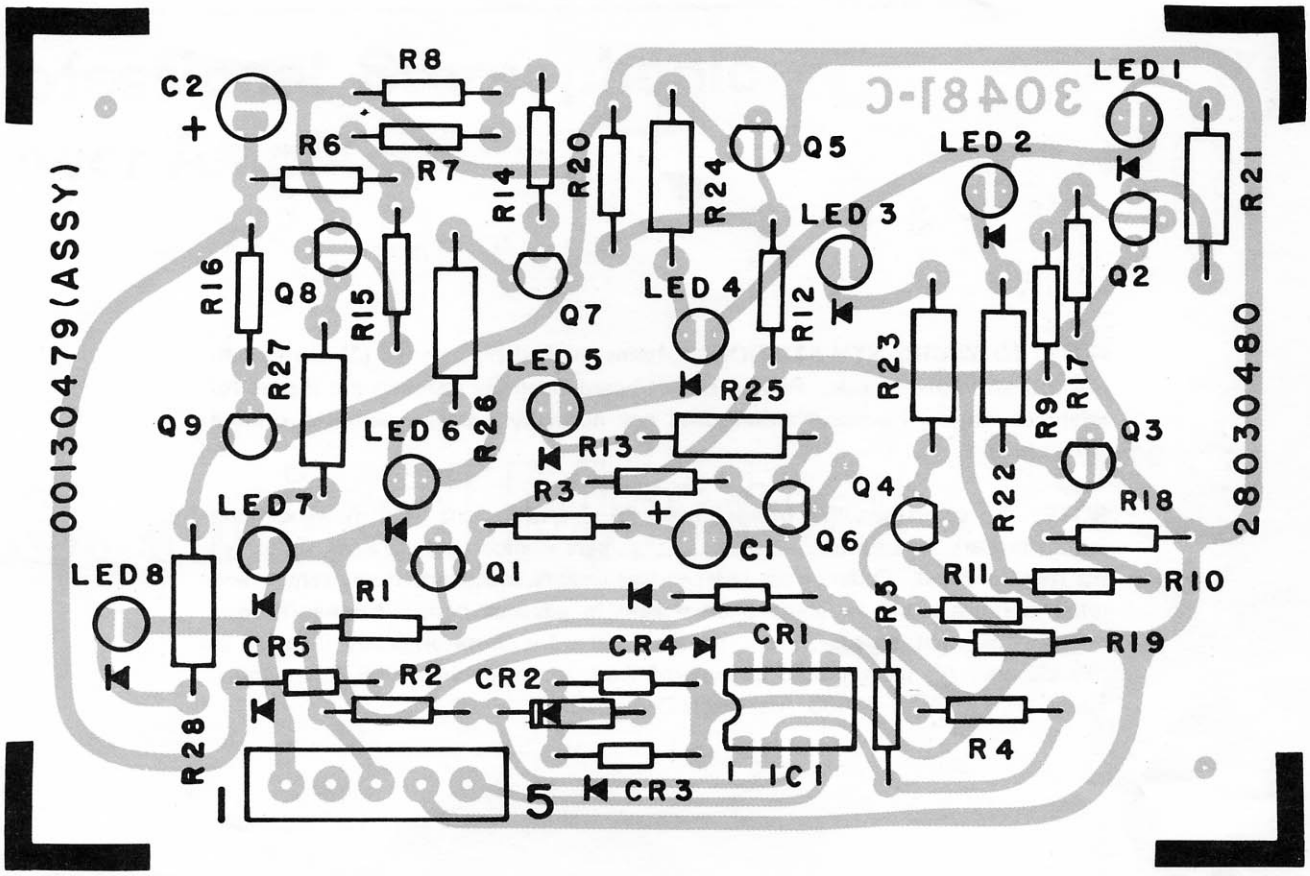
LED BOARD CHANNEL A



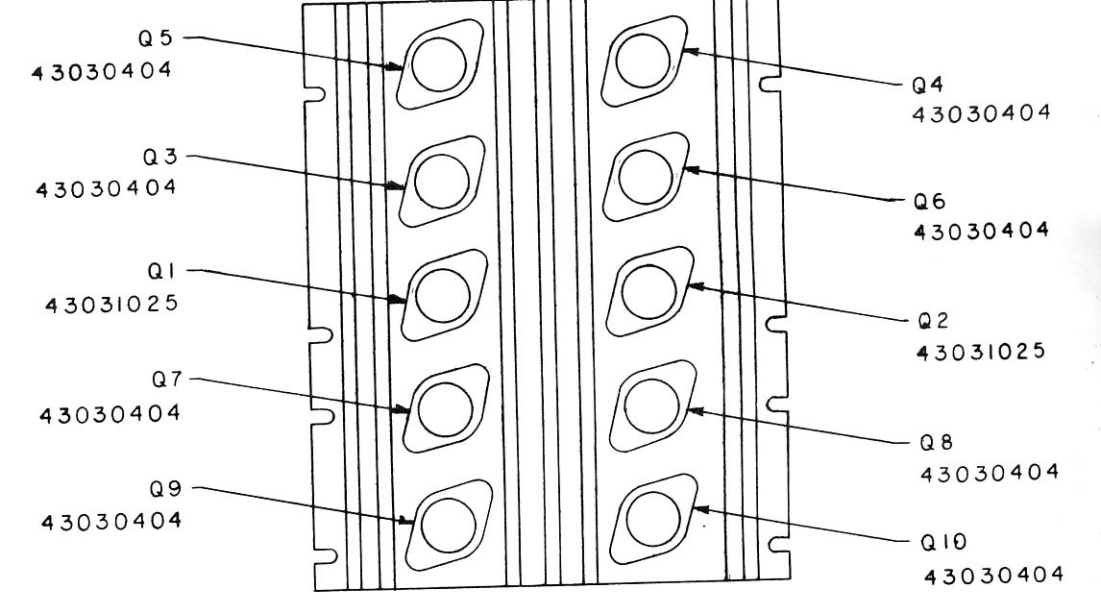
CIRCUIT REF. NO.	H/K PART NO.	DESCRIPTION
	00130486	P.C. Board Assy., Led Display Chan. "A"
CAPACITOR, LYTIC		
C1	31827111	2UF, 35V
C2	31819176	10UF, 25V
DIODE		
CR1,3,4,5	41629897*	IN4148
CR2	42030498*	Zener 5.1V, 0.4W, 10% MOT MZ500-9
INTEGRATED CIRCUIT		
IC1	43130636*	Operational Ampl. MC1741C
TRANSISTOR		
Q1,6	43025972*	NPN GP
Q2-5,7,8,9	43029832*	MPS-A13
LAMP SOLID STATE		
LED1,2	46730574*	LED, Red
LED3,4	46730575*	LED, Yellow
LED5-8	46730576*	LED, Green


00133497(ASSY)
28033498
E1
E2
E3
E4
E5
E6
E7
E8
E9
CR1
CR2
CR3
CR4
CR5
CR6
CR7
CR8
CR9
CR10
CR11
CR12
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
C13
C14
C15
C20
C21
C22
C23
C24
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
R17
R18
R19
R20
R21
R22
R23
R24
R25
R26
R27
R28
R29
R30
R31
R32
R33
R34
R35
R36
R37
R38
R39
R40
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q11
Q12
Q13
Q14
Q15
Q16
Q17
Q18
Q19
Q20
Q21
Q22
VR1
VR2
W1
W2
W3
W4
J1
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18

LED BOARD CHANNEL B



CIRCUIT REF. NO.	H/K PART NO.	DESCRIPTION
	00130479	P.C. Board Assy., Led Display Chan. "B"
CAPACITOR, LYTIC		
C1	31827111	2UF, 35V
C2	31819176	10UF, 25V
DIODE		
CR1,3,4,5	41629897*	IN4148
CR2	42030498*	Zener 5.1V, 0.4W, 10% MOT MZ500-9
INTEGRATED CIRCUIT		
IC1	43130636*	Operational Ampl. MC1741C
TRANSISTOR		
Q1,6	43025972*	NPN GP
Q2-5,7,8,9	43029832*	MPS-A13
LAMP SOLID STATE		
LED1,2	46730574*	LED, Red
LED3,4	46730575*	LED, Yellow
LED5-8	46730576*	LED, Green


Q5
43030404
Q3
43030404
Q1
43031025
Q7
43030404
Q9
43030404
Q4
43030404
Q6
43030404
Q2
43031025
Q8
43030404
Q10
43030404

CITATION SIXTEEN SPECIFICATIONS

Power Output:	150 watts min. rms per channel, Both channels driven into 8 ohms from 20Hz to 20kHz, with less than 0.05% THD
Power Bandwidth:	From 5Hz to 45kHz at less than 0.05% THD into 8 ohms, both channels driven simultaneously at 75 watts per channel
Frequency Response:	From 4Hz to 120kHz, +0dB −3dB, both channels driven simultaneously at 1 watt per channel, into 8 ohms
Square Wave Rise Time:	Better than 3 microseconds
Slew Rate:	Greater than 30V/μsec
Total Harmonic Distortion:	Less than 0.05% from 1 watt to 150 watts RMS, both channels driven simultaneously into 8 ohms from 0.5Hz to 20kHz
Intermodulation Distortion:	Less than 0.05% at from 0.015 watts to 150 watts
Hum and Noise:	Better than 100dB below 150 watts
Damping Factor:	300:1
Input Impedance:	22k ohms
Input Sensitivity:	1.25 volts for 150 watts
Phase Shift:	Less than 0.5 degrees at 20Hz, less than 12 degrees at 20kHz
Inputs:	One RCA type input terminal per channel
Outputs:	Instrument type binding posts. Accepts speakers from 4 to 16 ohms
Dimensions:	9 1/8" H x 19 1/8" W x 13 9/16" D (complete with metal cage) (23.2 cm H x 48.6 cm W x 34.4 cm D)
Weight:	55 pounds (24.9Kg)

MAIN CHASSIS PARTS LIST

FIG. NO.	REF. DES.	H/K PART NO.	DESCRIPTION
III-1	C4,5,8,9	31130322	Capacitor, Lytic, 10000UF, 85V
III-2	T1,2	10130339	Transformer, Power
III-4	L1,2	12030402	Output Inductor
IV-1	DS1,2	47626247	Pilot Light Assy, (Neon) Red
IV-2		00233528	Knob, Subassy
IV-3		6303305	Panel, Dress
IV-4		63033548	Panel, LED Dress
IV-5		63033549	Panel, LED Dress
IV-6		62130377	Handle
IV-7		62130466	Ferrule, Handle
IV-8	SW2	24030338	Switch, Impedance Selector
IV-9	SW1	25032217	Switch, Pushbutton, Power, DPST
IV-10	SW3	24030337	Display Range Sensitivity Switch
IV-11		00130479	LED Display, Channel "B" Assy,
IV-12		00130486	LED Display, Channel "A" Assy.
IV-13		00133497	Driver Board Assy.
IV-14		00132979	Relay Board Assy.
IV-15		63232189	Knob, Pushbutton
Ref.		60129981	Cover, Bottom
Ref.		62029267	Feet, Mtg, 3/4 High
Ref.		60129979	Cover, Wraparound
Ref.	CR-58,13-16	41630450*	Rectifier, Silicon, MR752
Ref.	CR1-4,9-12	41029089*	Rectifier, Silicon, 2A, 200V
Ref.	C2,3,6,7	31521625	Capacitor, Lytic, 1000UF, 25V
Ref.		65430392	Post, Binding
Ref.		65427001	Fuseholder w/Hardware
Ref.	F1,2	45023101*	Fuse, Slo Blo 4 Amp., MDX
Ref.	F3,4,5,6	45032236*	Fuse, Slo Blo, 1 Amp, MDL-1
		HEATSINK ASSEMBLY	
Ref.	Q11	43029832*	Transistor, NPN, MPS A13
Ref.		67029563	Clip, Transistor
Ref.	S1	45530336	Terminal Cutout
Ref.	C3,4	31530452	Capacitor, 10UF, 150V
Ref.	CR1,2	41029089*	Diode, Silicon, 2A, 200V
Ref.	Q1,2	43031025*	Transistor, NPN, Power
Ref.	Q3-10	43030404*	Transistor (RCA 1B05)
Ref.	Q3-10	43032928*	Transistor (RCA 1B04) Alternate Replacement Part for 43030404
Ref.		66030343	Socket, Transistor TO-3
Ref.		61632266	Cover, Insulating TO-3
Ref.		85520110	Washer, Mica TO-3
Ref.		60130413	Cover, Heatsink
		MULTIVOLTAGE	
III-2	T1,2	10130639	Transformer, Power
III-3		65427580	Voltage Selector Connector Set
Ref.	F1,2	45031093	Fuse, Slo Blo, 2 Amp, MDX
Ref.		65430519	Fuseholder

CIRCUIT REF. NO.	H/K PART NO.	DESCRIPTION
	00133497	P.C. Board Assy, Driver
CAPACITOR, LYTIC		
C1	31833231	100UF, 25V
C5	31833204	1UF, 50V
C8,10	31531721	4.7UF, 35V
C18,19	31833565	10UF, 50V, Non-Polar
DIODE		
CR1,2,7-12	41629338*	Silicon, Signal IN914
CR3,4	42020737*	Zener, 10V, 10%, 1W
CR5,6	42030498*	Zener 5.1V, 10%, 0.4W, MZ500-9
TRANSISTOR		
Q1	43034373*	Dual NPN Differential Pair
Q2-7, 20	43027722*	PNP GP
Q8-11, 19	43025972*	NPN GP
Q12,17	43030406*	NPN, MPS-U10
Q13,15	43030407*	PNP, MPS-U60
Q18	43029832*	NPN, MPS-A13
Q21	43030408*	NPN, MJE340
Q22	43030409*	PNP, MJE350
RESISTOR, METAL FILM		
R3,17	35111533	15K ohm, 1/8w, 1%, Dale M20P
R18	35130659	562 ohm, 1/8w, 1%, Dale M20P
RESISTOR, VARIABLE		
VR1	21630493	1M ohm
VR2	21629833	500 ohm

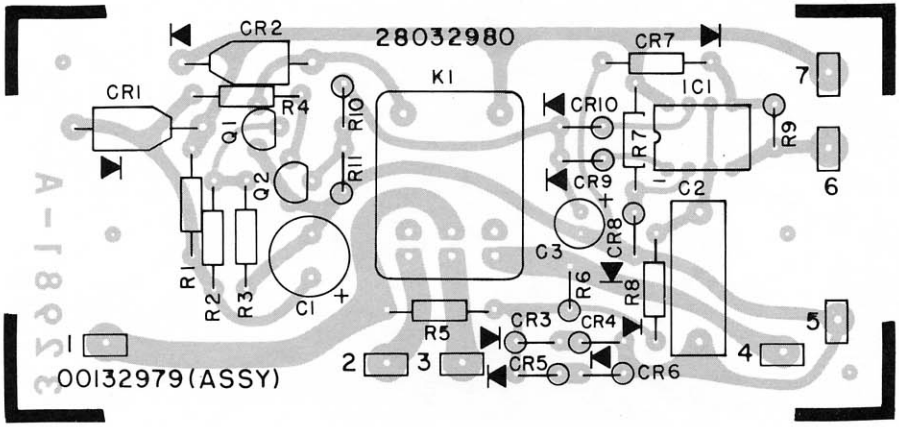
ALIGNMENT PROCEDURE ADJUSTMENTS

There are only two adjustments, the null pot VR1 and the idling current pot VR2. Both of these adjustments are to be made with no signals and no load. VR1 should be set so that the output of the amplifier is less than ±10 millivolts D.C.

VR2 should be set for about 50 millivolts D.C. across one of the 0.5 ohm emitter resistors when the set is cold.

The easiest way to do this is to pur one meter lead on the emitter of the upper left-hand output device on the heat sink and the other lead to the output terminal.

The 50 millivolt D.C. reading will change as the set haets up. Continue to readjust VR2 until the readings stabilize. This will be approximately 30 minutes. The heatsinks will now be at a temperature of approximately 60°C which is its quiescent value. At this time recheck the output of the amplifier and readjust VR1 if required.



CIRCUIT REF. NO.	H/K PART NO.	DESCRIPTION
	00131202	P.C. Board Assy. Relay Board
CAPACITOR, LYTIC		
C1	31840006	150UF, 16V
C3	31818905	4.7UF, 25V
DIODE		
CR1, 2	41029089*	Silicon Pwr. 2A 200V
CR3-10	41629338*	Signal, Silicon, 1N914
TRANSISTOR		
Q1	43029832*	MPS-A-13
Q2	43025972*	NPN, GP
RELAY		
K1	13031208	Potter Brumfield, R10-E2-W2-V185
INTEGRATED CIRCUIT		
IC1	43133061*	OP Amp, MC1458CP1