

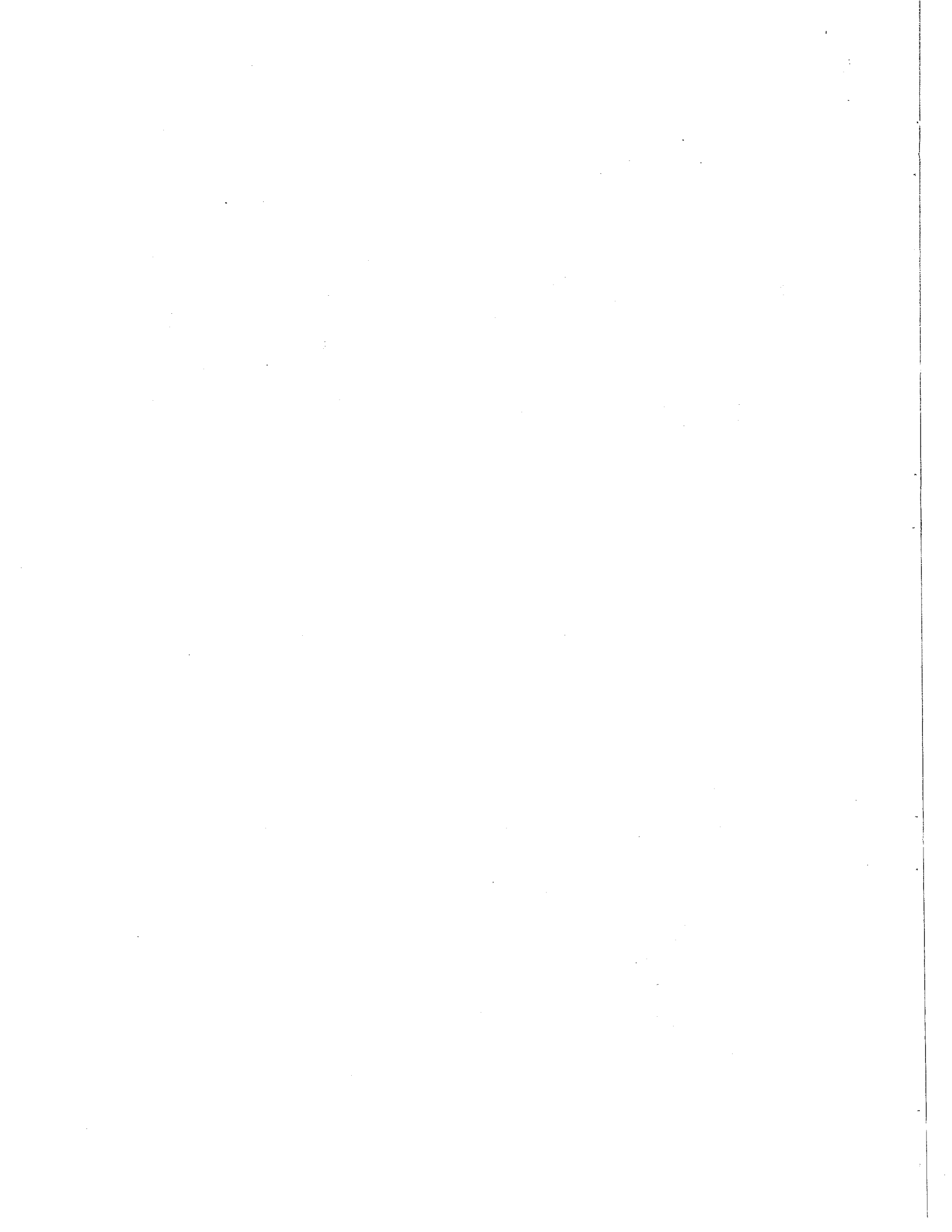
26

# CARVER

***Powerful • Musical • Accurate***

## **AV-405 5-CHANNEL POWER AMPLIFIER SERVICE MANUAL**

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# CARVER Corporation

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*SHIP TO:*

20121 48th Ave. West  
Lynnwood, WA 98036

*MAIL TO:*

P.O. Box 1237  
Lynnwood, WA 98046-1237

(206) 775-6245 .....	Customer Service and Technical Information
(206) 778-0509 .....	Repair Information
(206) 775-9180 .....	Customer Service Fax
(206) 775-1202 .....	Main Office, General Business
(206) 778-9453 .....	Main Office Fax

Published by:

CARVER Corporation  
20121 48th Avenue West  
Lynnwood, WA 98036  
(206) 775-6245

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# SAFETY INFORMATION

## WARNING.

Any person performing the procedures described in this manual will be exposed to hazardous voltages and the risk of electric shock.

Carver Corporation assumes that any person who removes the cover from the unit has been properly trained in protecting against avoidable injury and shock.

Therefore, the procedures described here are to be performed by qualified electronics service personnel only.

We recommend that the unit be tested only when line isolation is provided by an isolation transformer. The line cord of the unit must be disconnected and the power supply fully discharged before any components are replaced. Failure to do so may result in severe damage to the unit and the risk of electric shock.

The safety tests described below must be performed properly.

## CAUTION:

Before returning the unit to the customer, one of the following safety tests must be performed.

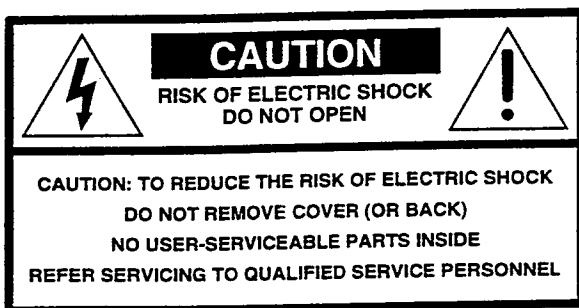
1. Check the leakage current. Connect the unit to 120 VAC supply and turn the power switch "ON". Using an ammeter, measure the current between the neutral side of the AC supply and chassis ground of the unit under test. If leakage current exceeds 0.5mA, the unit is defective.

Reverse the polarity of the AC supply and repeat.

2. Measure the resistance from either side of the linecord to chassis ground. If it is less than 500k ohms, the unit is defective.

**WARNING - DO NOT** return the unit to the customer if it fails one of these tests until the problem is located and corrected.

## CAUTION



The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure, that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user of the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

# SPECIFICATIONS

## AV-405 Specifications

### Power Output:

Continuous Average Output Power, all channels driven:

#### FRONT:

100 watts per channel into 8Ω from 20 Hz to 20 kHz, with no more than 0.2% THD

#### CENTER:

110 watts into 8Ω from 20 Hz to 20 kHz, with no more than 0.2% THD

#### SURROUND:

50 watts per channel into 8Ω from 20 Hz to 20 kHz, with no more than 0.2% THD

Dynamic Headroom: 1.5 dB @ 8 Ω

Frequency Response: 20Hz to 20kHz  
(+0,-0.5 dB)

Crosstalk: > 50dB @ 1kHz

Damping Factor: > 80 nominal

Input Impedance: 39 kilohms

### Sensitivity

#### FRONT/CENTER:

1V rms for rated power into 8 ohms at 1 kHz (±0.5 dB)

100mV for 1W into 8Ω (±0.5 dB)

#### SURROUND:

0.7V rms for rated power into 8 ohms at 1 kHz (±0.5 dB)

100mV for 1W into 8Ω (±0.5 dB)

Gain: 29 dB (± 1.0 dB)

Input to Output Phase: 0° (±20°)  
20Hz - 20kHz (Front/Center)  
0° (±35°)  
20Hz - 20kHz (Surround)

IM Distortion: <0.1%

THD: <0.2%

Signal-to-Noise Ratio: > 95 dB A-weighted,  
referenced to rated power  
> 75 dBW A-weighted,  
referenced to 1W

Slew Rate: >10V/μS

### Power Consumption:

45W at idle

300W with musical program

775W at full power into 8 ohms (continuous)

### Power Requirements:

120VAC/60Hz (USA and Canada)

Other voltages as required for export

### Size (H x W x D):

4.4" x 19" x 15"

112mm x 483mm x 381mm

with handles

4.4" x 17" x 13.75"

112mm x 432mm x 350mm

without handles

Net Weight: 30 lbs.  
(13.6 kgs)

Shipping Weight: 35 lbs.  
(15.9 kgs)

Carver constantly strives to incorporate new methods, materials, and technologies in order to further improve the quality of our products. Thus all specifications are subject to change without notice.

# DISASSEMBLY INSTRUCTIONS

## Top Cover

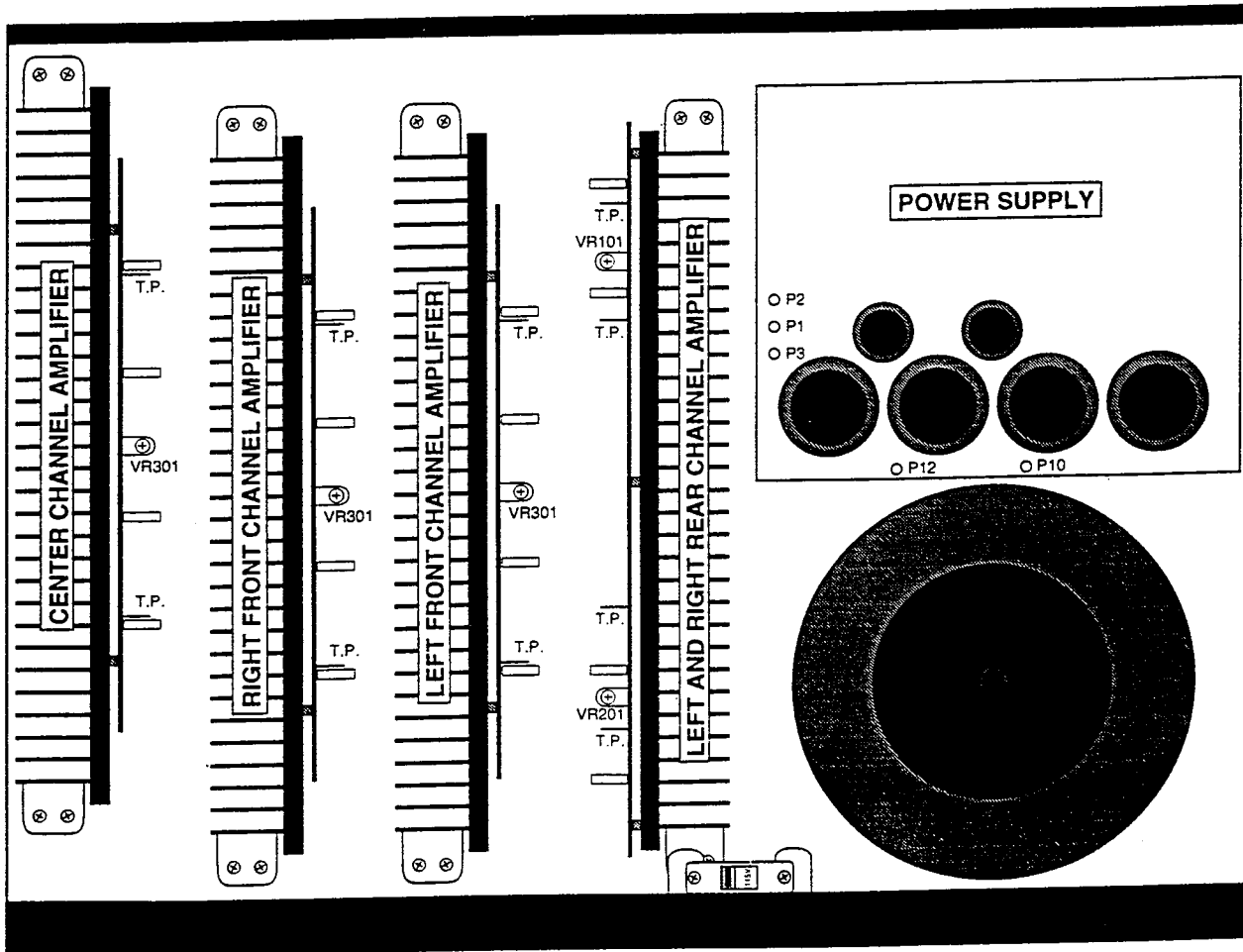
1. Remove 4 screws from each side (3 screws from each handle and 1 screw from rear of side).
2. Remove 3 screws from the top of the rear panel.
3. Lift up top cover and remove.

## Left and Right Rear Amp Module

1. Remove 1 screw from bottom panel, securing Amp Module to bottom panel.
2. Remove 2 screws from the Voltage Conversion Switch and slide it out of its bracket.
3. Remove 4 screws from the inside (2 screws on each end of the Amp Module).

## Center, Left and Right Front Amp Module

1. Remove 1 screw from bottom panel, securing Amp Module to bottom panel.
2. Remove 4 screws from the inside (2 screws on each end of the Amp Module).



AV-405 Internal View

# ADJUSTMENT PROCEDURE

## AV-405

### Voltage Verification

With no signal and no load verify the following DC voltages (referenced to chassis ground):

1. On the Power Supply Board (03-01468-01):

V+1 at P10	+56VDC	(+/-1.5V)
V-1 at P12	-56VDC	(+/-1.5V)
V+2 at P2	+42.5VDC	(+/-1.5V)
V-2 at P3	-42.5VDC	(+/-1.5V)

### Idle Bias Adjust

With no signal and no load:

1. On the Center Amplifier Board (03-01464-01):  
Connect a DC Voltmeter across T.P. at the emitter of Q316 and T.P. at the emitter of Q312.  
Adjust VR301 for 2.0mV DC ( $\pm 1.0\text{mV}$ ) as measured on the DC Voltmeter.  
Repeat for the Left and Right Front Amplifier Boards.
2. On the Left and Right Rear Amplifier Board (03-01463-01):  
Connect a DC Voltmeter across the emitters of Q111 and Q114.  
Adjust VR101 for 4.0mV DC ( $\pm 2.0\text{mV}$ ) as measured on the DC Voltmeter.  
Connect a DC Voltmeter across the emitters of Q211 and Q214.  
Adjust VR201 for 4.0mV DC ( $\pm 2.0\text{mV}$ ) as measured on the DC Voltmeter.

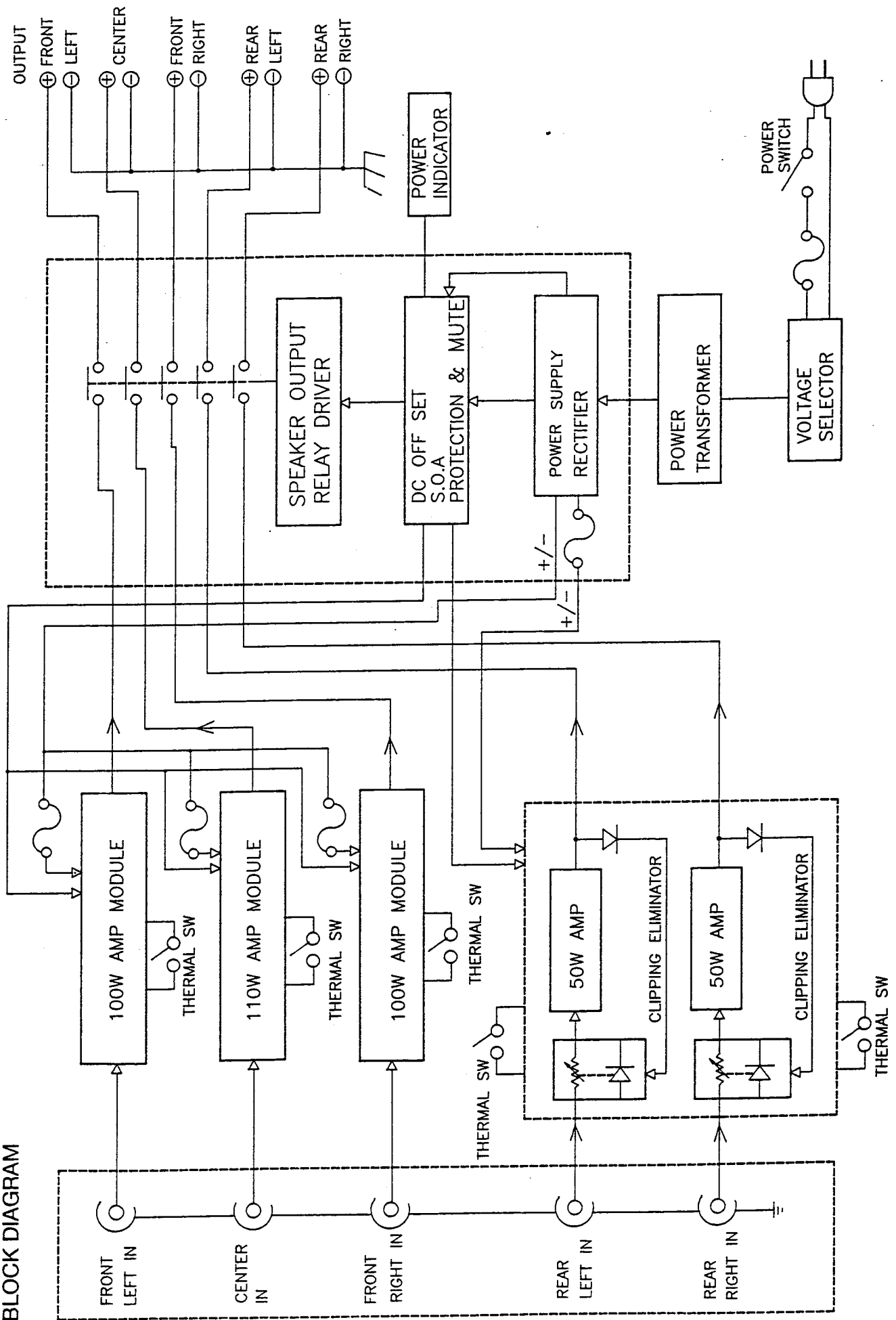
**Note:** These adjustments should be made after the amplifier has warmed up for about 5 minutes.

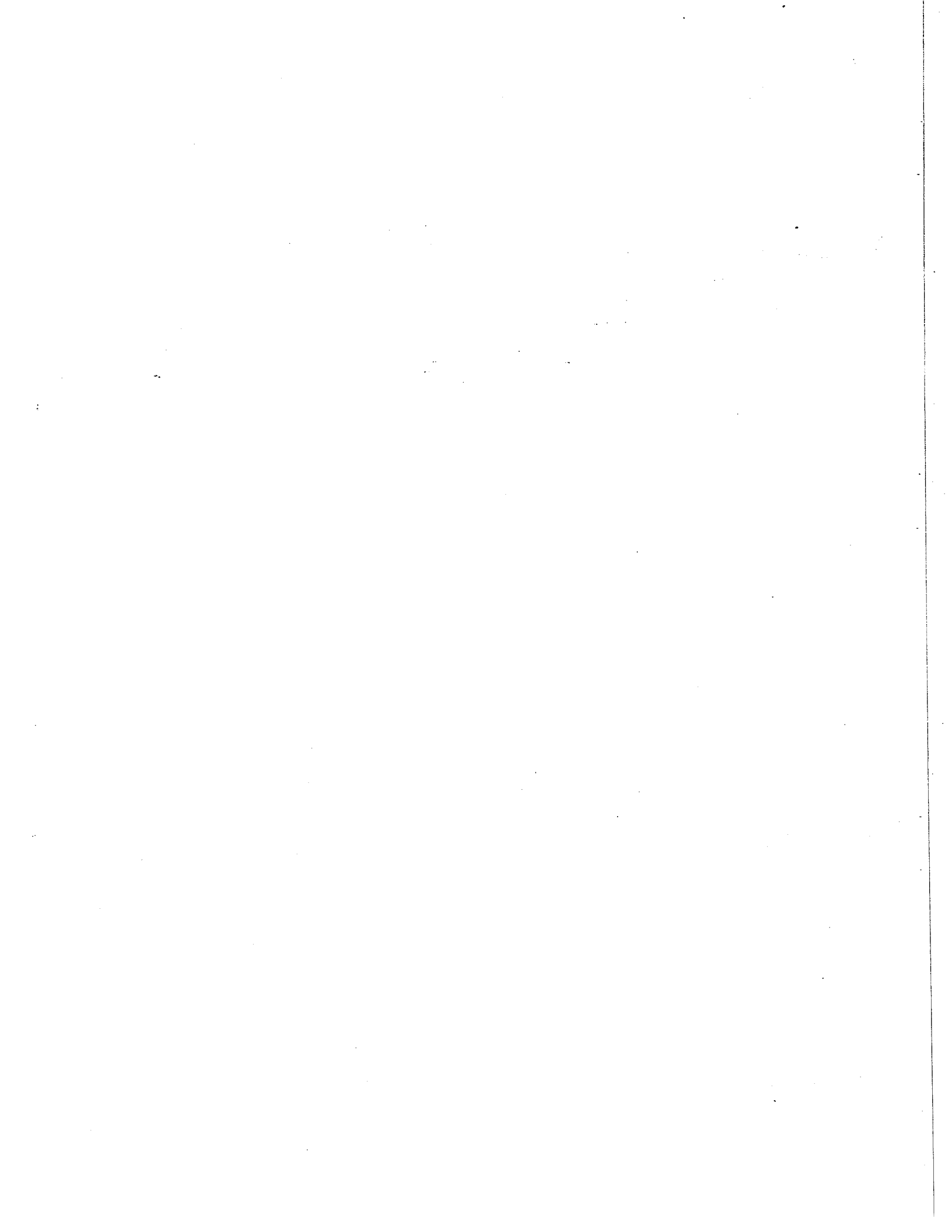
### DC Offset

With no signal and no load, measure the DC voltage between the red and black Speaker terminals. All speaker outputs should measure less than +/-50mVDC.



BLOCK DIAGRAM

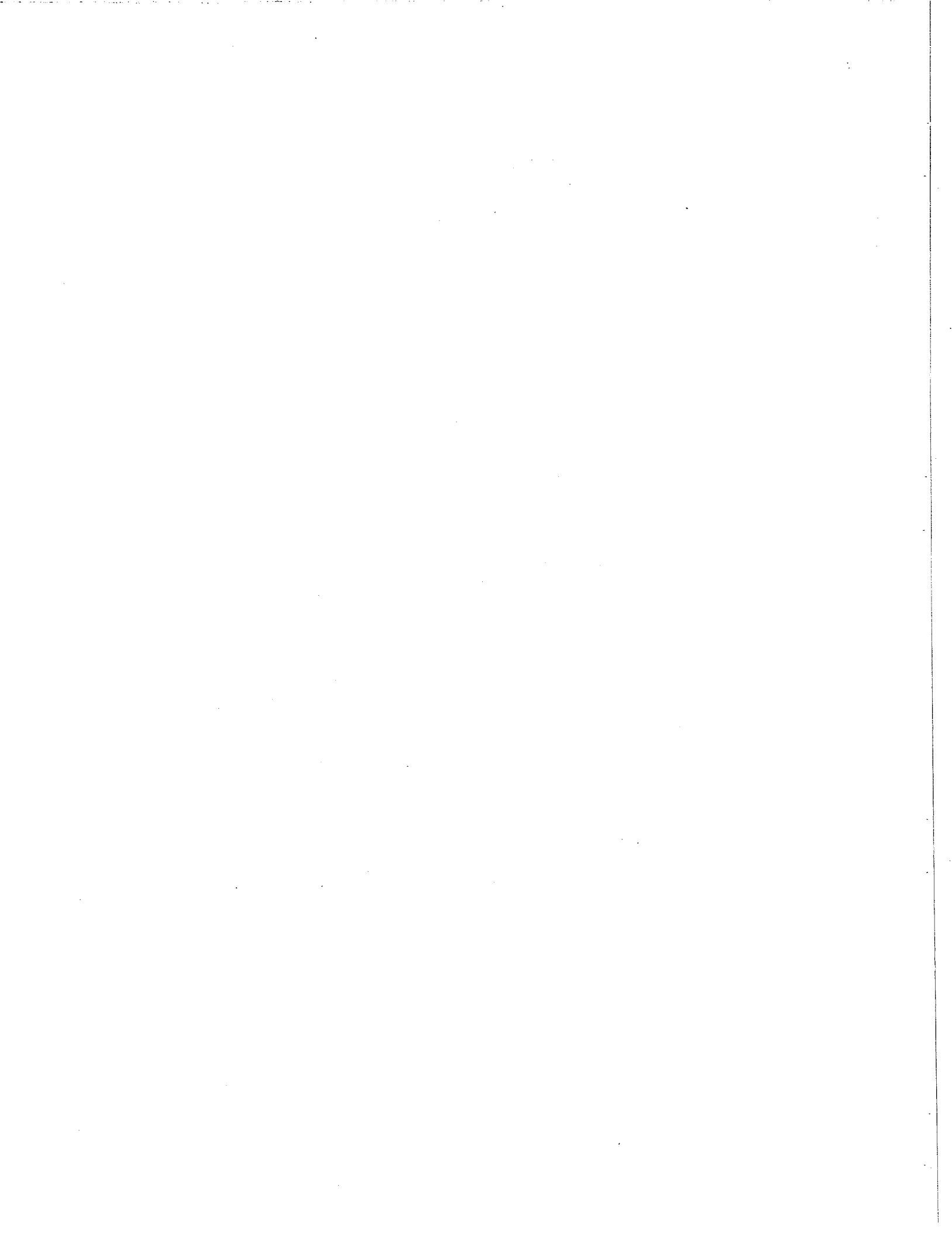




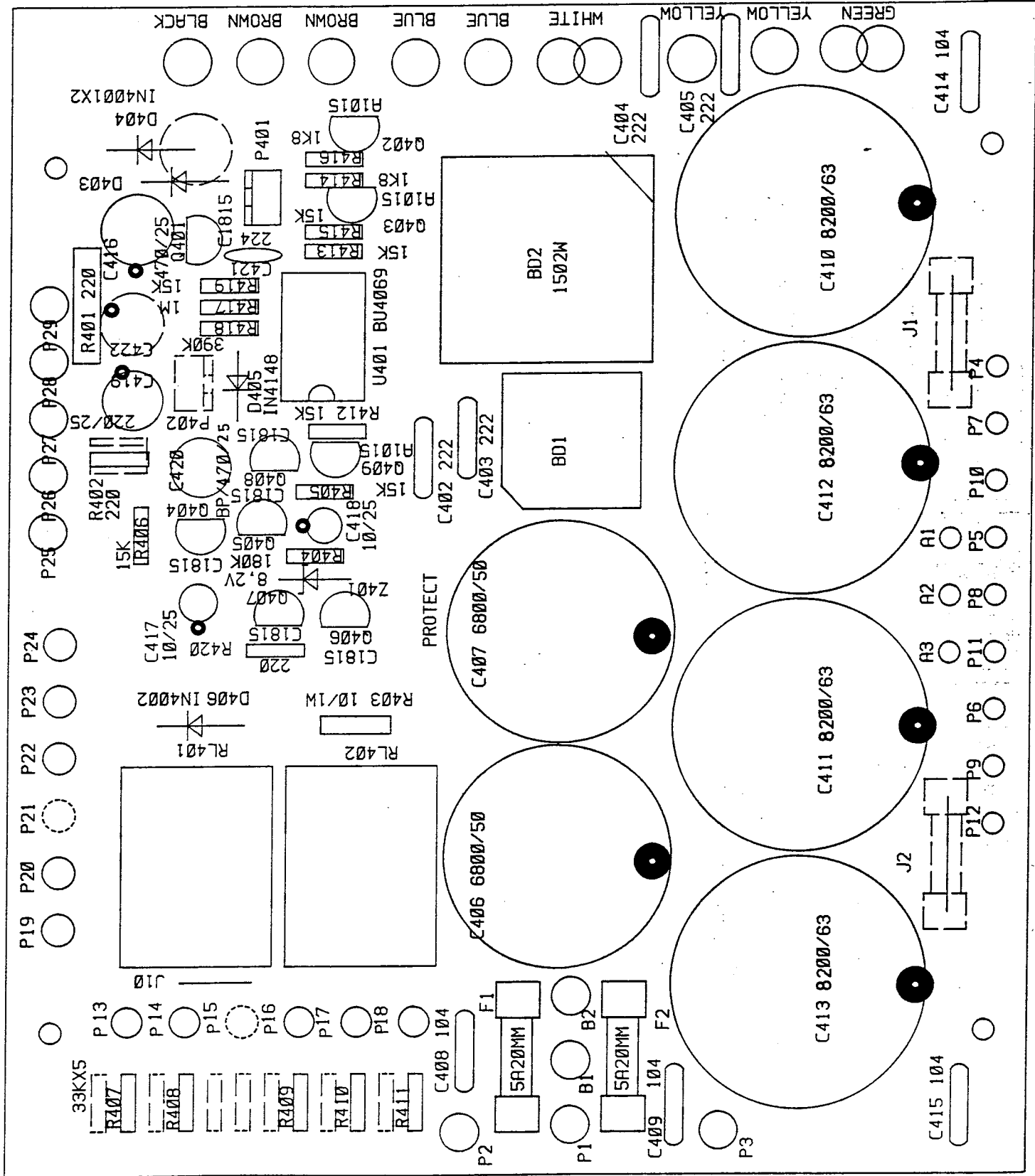


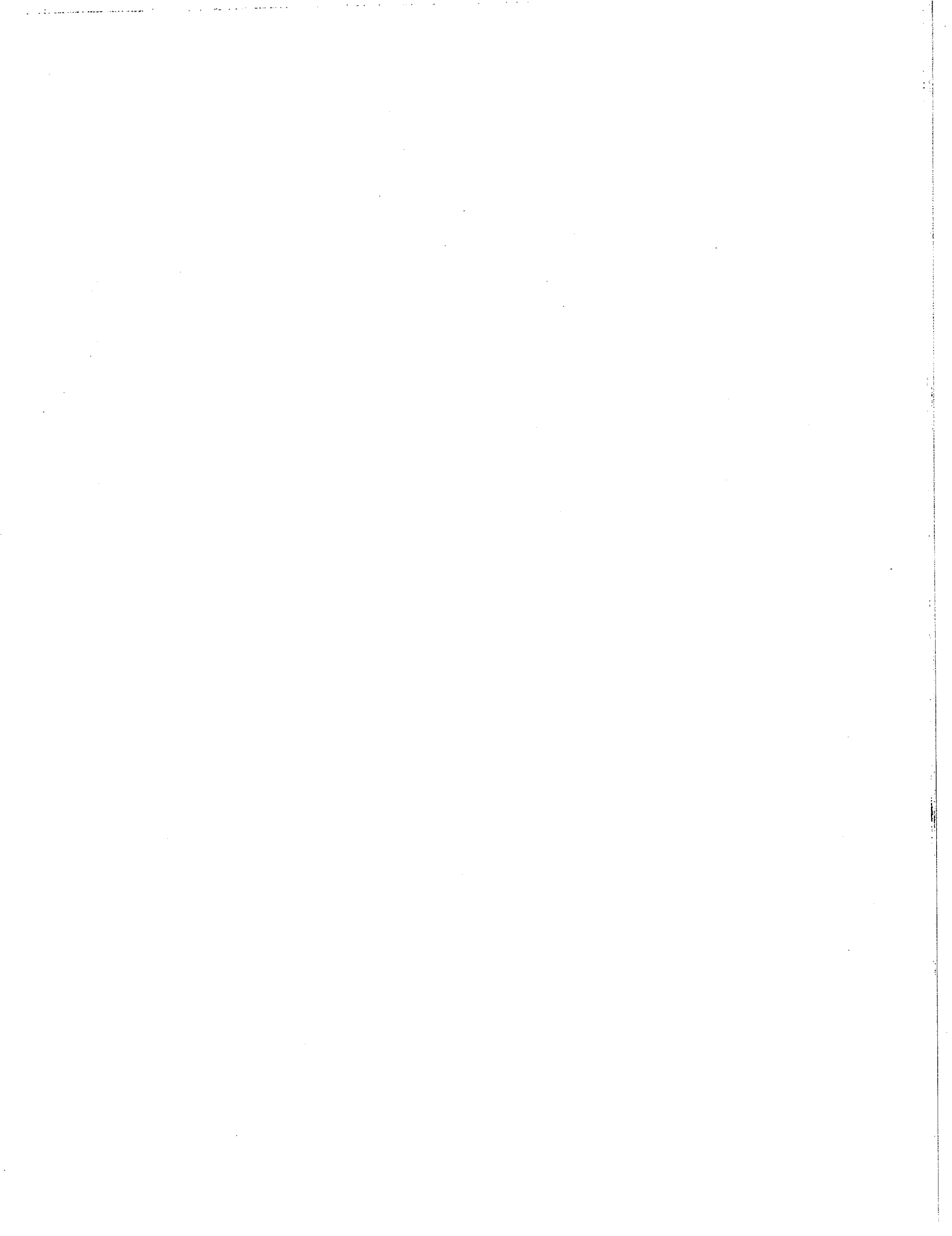






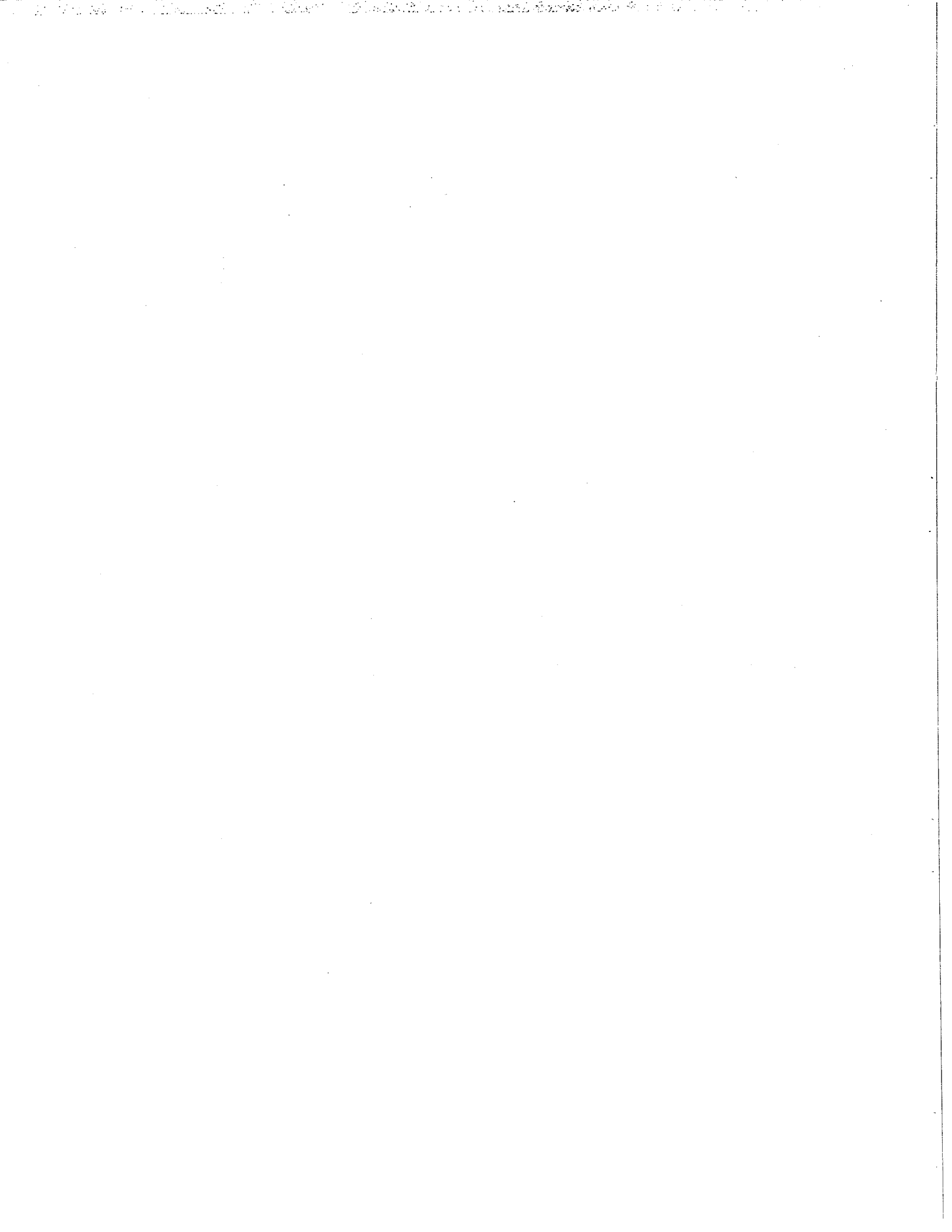
PCB COMPONENT SIDE VIEWS



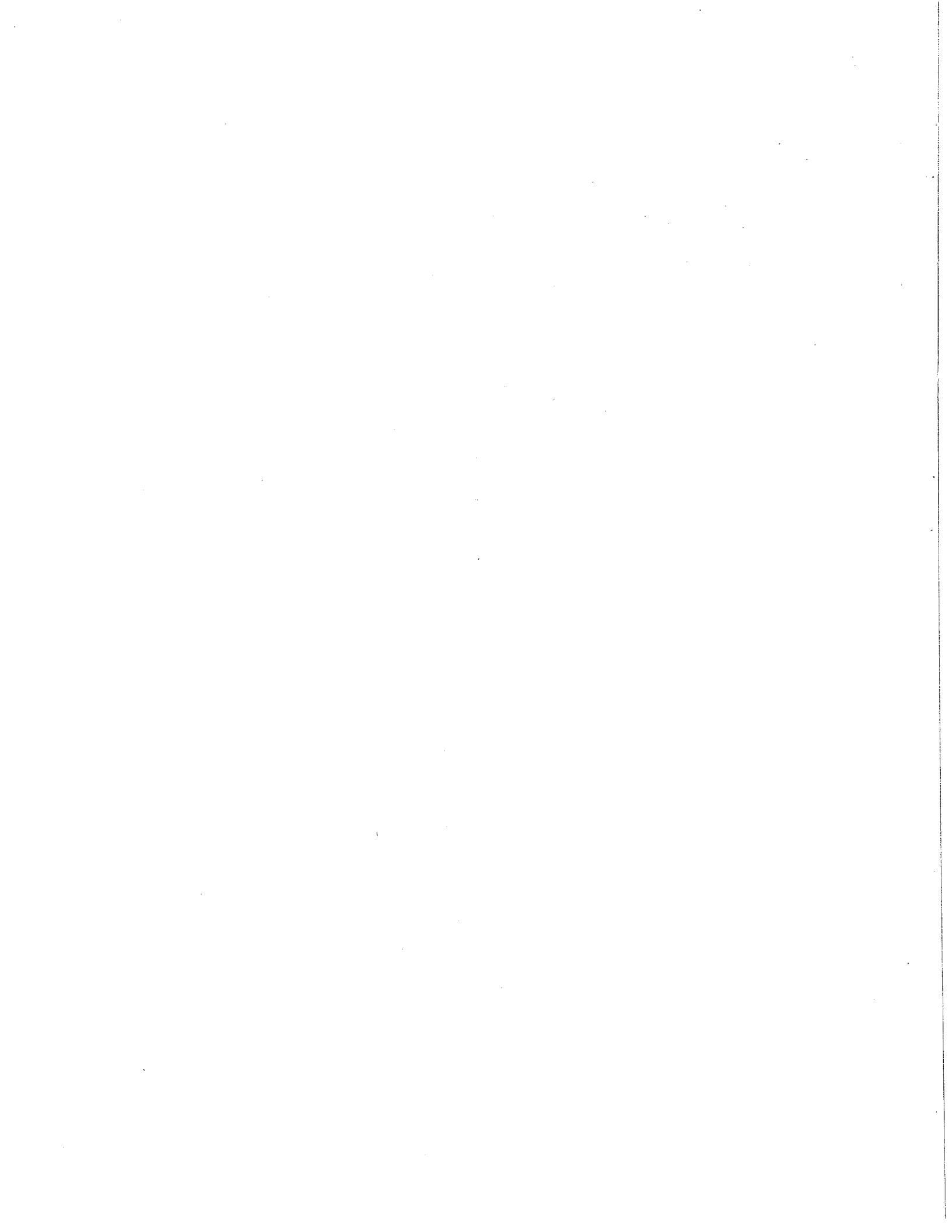


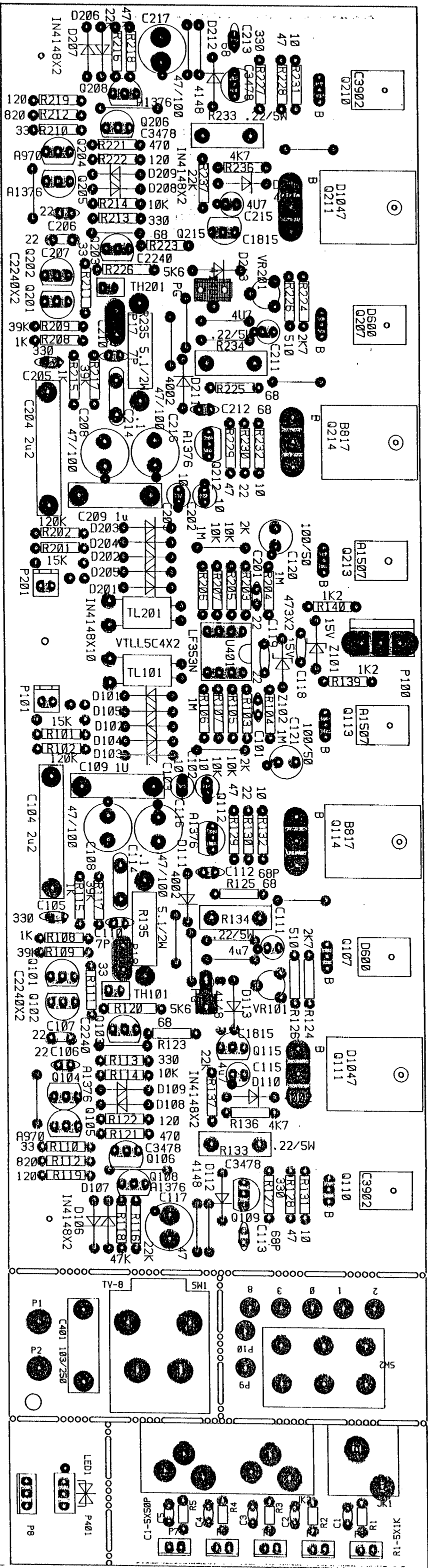






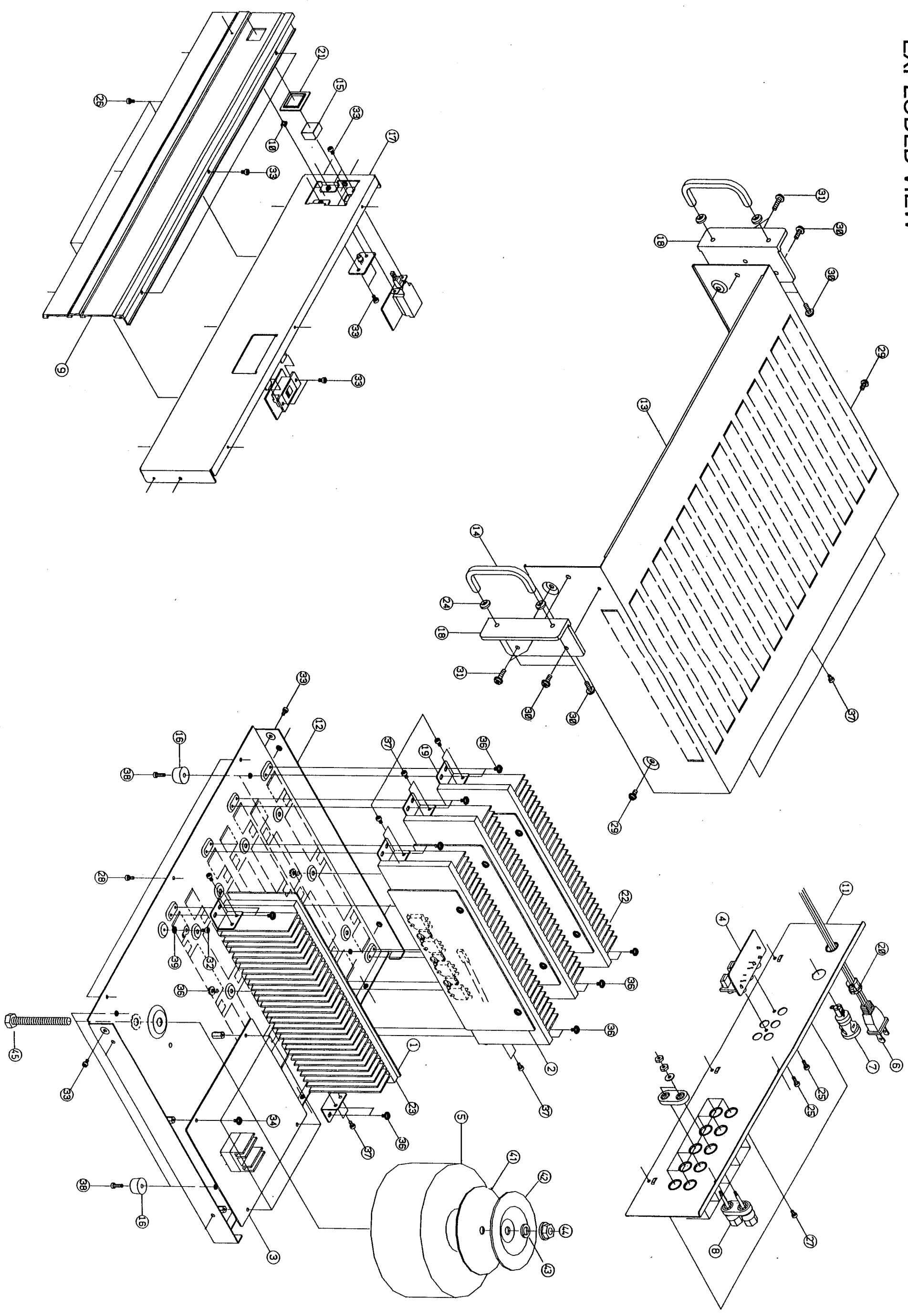


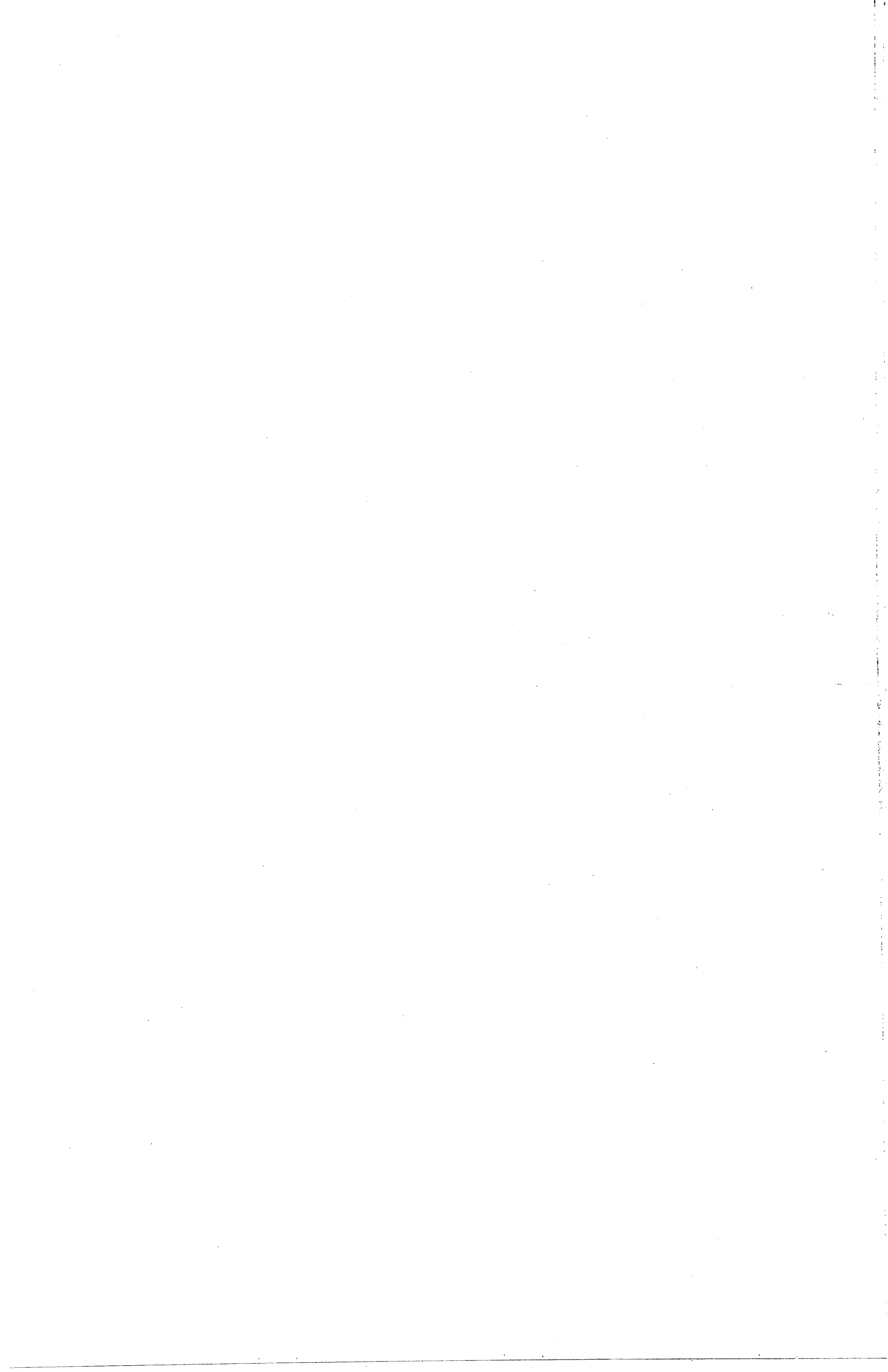




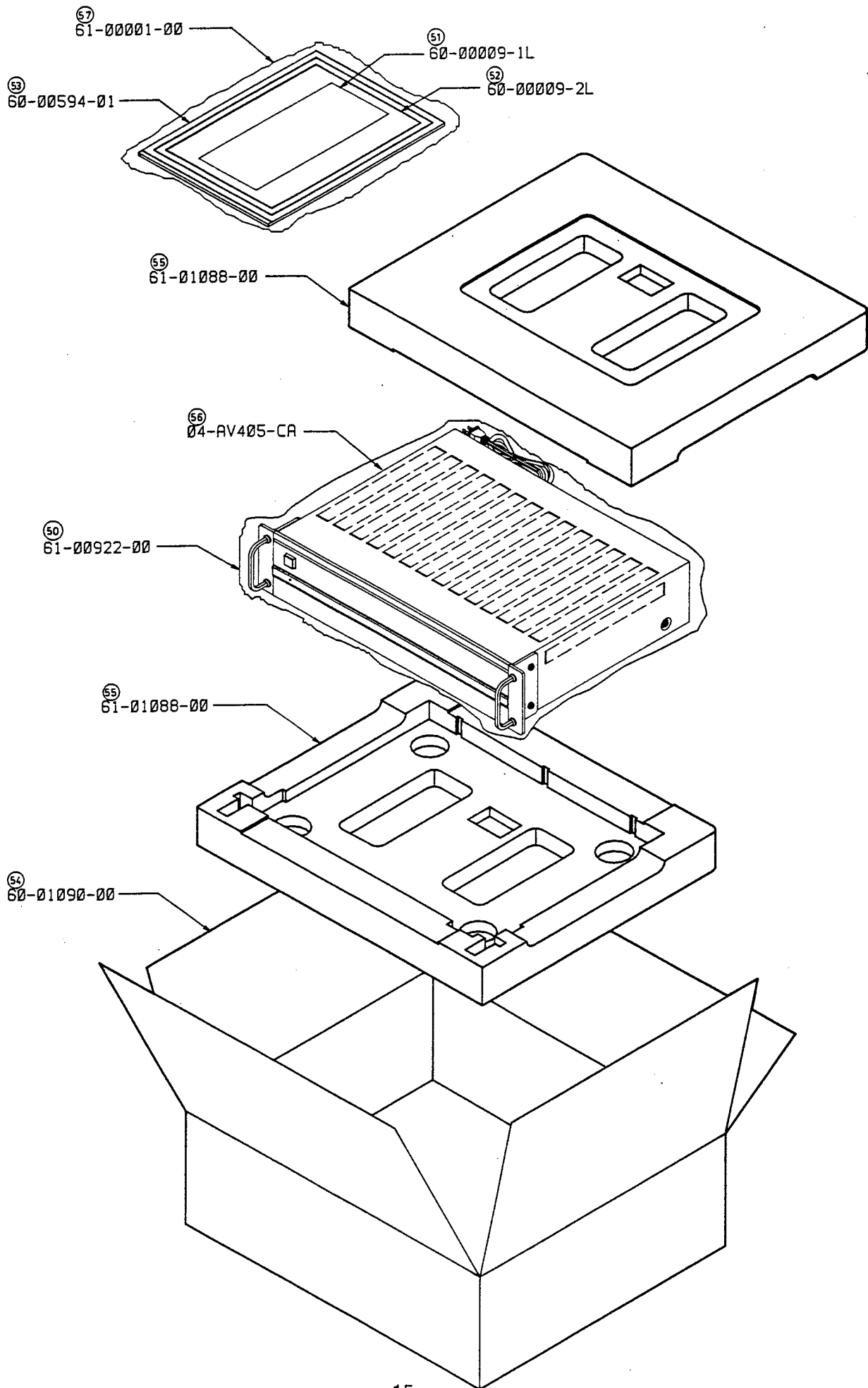


EXPLODED VIEW











# PARTS ORDERING

Please provide the Model numbers of the units involved when ordering genuine CARVER replacement parts. Also provide the CARVER part number and the generic part number to confirm the correct part needed.

The Carver Parts Department is open Monday thru Friday, 7:00 a.m. to 4:45 p.m. PST.  
The following phone number is to be used for part orders only!  
Technical assistance is not available on this line.

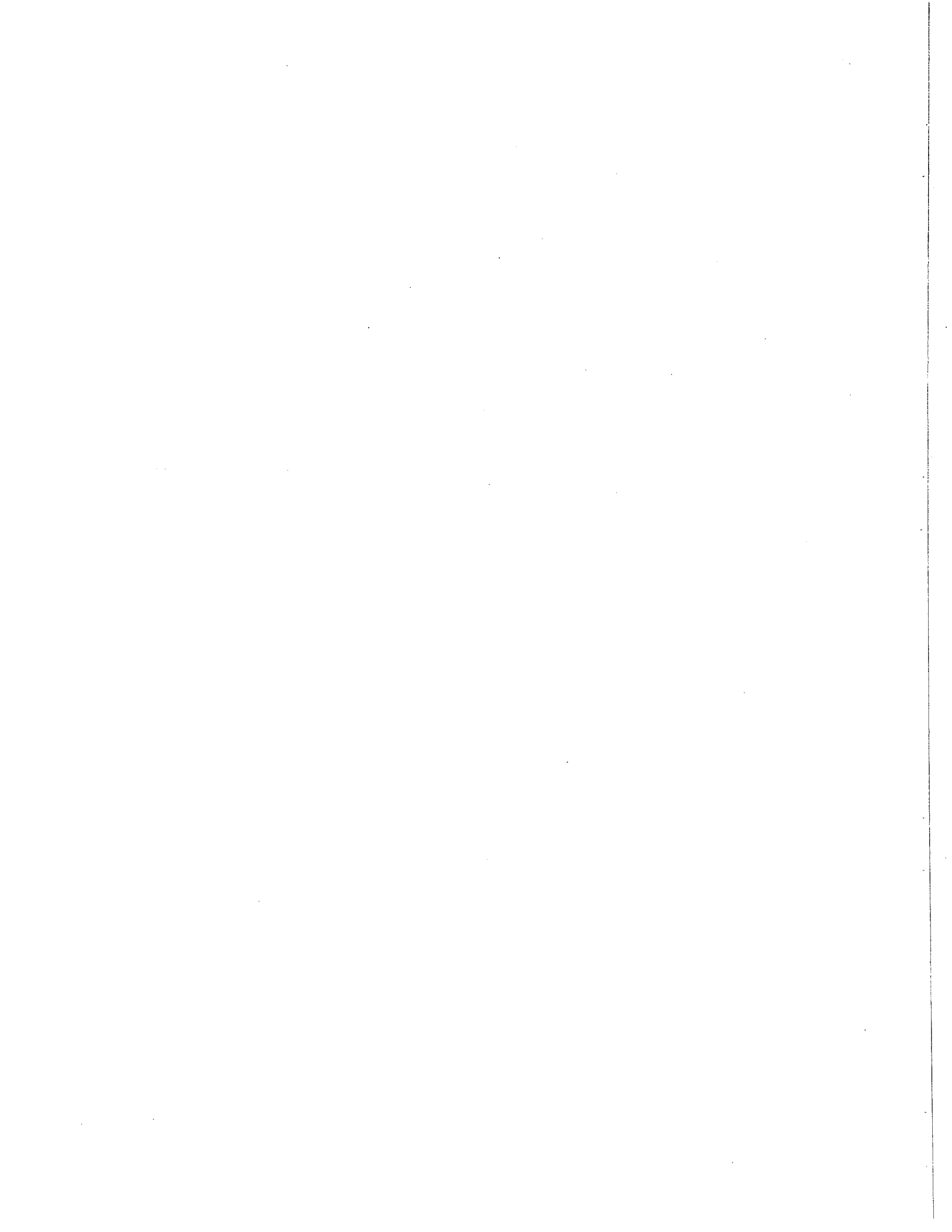
**1-800-433-0547**

Or if you prefer to FAX in your part order, please use the following FAX number:

**1-206-775-9180**

From time to time, when it is necessary, we may make a substitution for the original part ordered, due to circuit revisions or part availability.

Random deviation from the original CARVER designated part is not recommended!  
Complete PCB replacement is not recommended. You must have prior approval for warranty repair should PCB replacement be necessary.



**PARTS LIST  
EXPLODED VIEW**

ITEM	PART NO.	PART NAME	Q'TY	REMARK
1	03-01483-01	PCB ASS'Y	1	
2	03-01484-01	PCB ASS'Y	3	
3	03-01488-01	P.S. PCB ASS'Y	1	
4	03-01489-01	RCA JACK/SH/LED	1	
5	15-02243-01	TRANSFORMER	1	
6	21-02138-01	AC CORD	1	
7	26-02258-01	FUSE HOLDER	1	
8	28-02279-01	SP TERMINAL	5	
9	51-01012-00	AL PLATE	1	
10	51-01019-00	INDICATE PLATE	1	
11	52-00791-00	REAR COVER	1	
12	52-00799-00	BOTTOM COVER	1	
13	52-00882-00	TOP COVER	1	
14	53-00479-00	HANDEL	2	
15	53-00489-00	PUSH BUTTON	1	
16	54-00058-00	RUBBER FOOT	4	
17	54-00015-00	FRONT BRACKET	1	
18	54-00016-00	HANDEL BRACKET	2	
19	54-00018-00	BRACKET	8	
20	55-00117-00	CORD BUSHING	1	
21	55-00953-00	SOCKET	1	
22	56-00433-00	HEAT SINK	3	
23	58-00434-00	HEAT SINK	1	
24	58-00168-00	COLLAR	4	
25	S2-PP430-08	TAPPING SCREW	2	M3, 0X0 2N
26	SM-FP430-05	MACHINE SCREW	2	M3.0P0.5x5
27	SM-PP430-05	MACHINE SCREW	3	M3.0P0.5x5
28	SM-PP430-06	MACHINE SCREW	3	M3.0P0.5x6
29	SM-PP440-W6	MACHINE SCREW	2	M4.0P0.7xW8
30	SM-PP44W-10	MACHINE SCREW	6	M4.0P0.7x10.0w
31	SM-PP44W-14	MACHINE SCREW	4	M4.0P0.7x14 P+
32	SM-PP530-04	MACHINE SCREW	1	M3.0P0.5x4
33	SM-PP530-05	MACHINE SCREW	19	M3.0P0.5x5
34	SM-PP530-W5	MACHINE SCREW	4	M3.0P0.5xW5
35	SM-PP540-W6	MACHINE SCREW	4	M4.0P0.7x6.0W
36	SM-PP530-W4	MACHINE SCREW	18	M3.0P0.5x4.0W
37	ST-PP430-05	MACHINE SCREW	11	M3.0X5.0 P+
38	ST-PP43H-10	MACHINE SCREW	4	M3.0Wx10
39	WG-00330-00	GEAR WASHER	1	M3.0
40	29-02231-08	FUSE 8A SLO-BLO	1	115V VERSION $\triangle$
40	29-02231-04	FUSE 4A SLO-BLO	1	230 VERSION $\triangle$
41	32-02128-01	RUBBER INSULATOR	1	
42	54-00830-00	TRANSFORMER BRACKET	1	
43	WS-57066-00	SPRING WASHER	1	
44	NM-OH57000	NOT M8F	1	
45	SM-HP480-70	MACHINE SCREW	1	M8.0x70
50	61-00922-00	PLASTIC BAG	1	1
51	60-00009-1L	WARRANTY CARD	1	1
52	60-00009-2L	REGISTRATION CARD	1	1
53	60-00594-01	OWNER'S MANUAL	1	1
54	60-01090-00	CARTON	1	1
55	61-01088-00	SNOW BOX	2	2
56	04-AV405-CA	CARVER AMP	1	1
57	61-00001-00	PLASTIC BAG	1	1

**POWER SUPPLY PCB ASS'Y**

REF NO.	Q'TY	PARTS NO.	DESCRIPTION
PCB	1	02-01468-01	PCB 165 x 140 x 1.6trmm
R417	1	08-41055-03	RES 1M 1/4W
R405, R406, R412, R13, R415, R419 R414, R416	6	08-41535-03	RES 15K 1/4W
R404	2	08-41825-03	RES 1.8K 1/4W
R401, R402, R420	1	08-41845-03	RES 180K 1/4W
R407-R411	3	08-42215-03	RES 220 1/4W
R418	5	08-43335-03	RES 33K 1/4W
R403	1	08-43945-03	RES 390K 1/4W
C417, C418	1	09-11005-02	RES 10 1W
C419	2	13-00005-06	E/C 10UF 16V
C410-C413	1	13-00005-49	E/C 220UF 25V
C408, C409, C414, C415	4	13-00005-99	E/C 8200UF/80V
C406, C407	4	13-00006-46	M/C .1/100V
C420	2	13-00015-12	E/C 6800UF 63V
C402-C405	1	13-00015-27	E/C 470UF 25V (NP)
C421	4	13-01090-08	POLYPROPYLENE 222/250V
C416	1	13-22246-52	C/C .22
RL402	1	13-A0005-89	E/C 470UF/25v
RL401	1	20-02198-01	RELAY SD205P 12V
U401	1	20-02222-01	RELAY 12V 5A
Q407	1	22-01542-01	IC NJM4069
Q401, Q404-Q406, Q408	1	23-00920-01	TRANSISTOR 2SD592A.R
Q402, Q403, Q409	5	23-01545-01	TRANSISTOR 2SC1815GR
D405	3	23-01645-01	TRANSISTOR 2SA1015GR
BD401	1	24-00026-05	DIODE 1N4148
D403, D404, D406	1	24-00209-01	ZENER DIODE 8.2V 1/2W
BD2	3	24-00654-01	RECTIFIER DIODE IN4002
BD1	1	24-02208-01	BRIDGE DIODE KBPC1502w
F1, F2	1	24-02213-01	B.D. PBPC804
P401	4	26-00871-01	FUSE SOCKET
P4-P6, PRO, P18	2	29-00052-05	FUSE (MFG 5A) G-AL-20A/250V
P7-P9, PRO, P17	1	33-02341-01	LEAD WIRE 9-200-9 #16 BL
P10-P12, PRO, P16	1	37-02026-31	WAFER 3P
P1-P3	1	37-02365-01	HOUSING 5P 530mm #18
	1	37-02366-01	HOUSING 5P 440mm #18
	1	37-02367-01	HOUSING 5P 300mm #18
	1	37-02368-01	HOUSING 5P 300mm #18

REAR AMP PCB ASS'Y

REF NO.	Q'TY	PART NO.	DESCRIPTION
PCB	1	02-01463-01	AMP PCB 260 x 87 x 1.6trmm
R131, R132, R231, R232	4	08-41005-03	RES 10 1/4W
R108, R208, R115, R215	4	08-41025-03	RES 1K 1/4W
R105, R205, R107, R207, R114, R214	6	08-41035-03	RES 10K 1/4W
R104, R106, R204, R206	4	08-41055-03	RES 1M 1/4W
R119, R219, R122, R222	4	08-41215-03	RES 120 1/4W
R130, R140	2	08-41225-03	RES 1.2K 1/4W
R102, R202	2	08-41245-03	RES 120K 1/4W
R101, R201	2	08-41535-03	RES 15K 1/4W
R103, R203	2	08-42025-03	RES 2K 1/4W
R130, R230	2	08-42205-03	RES 22 1/4W
R116, R136, R216, R236	4	08-42235-03	RES 22K 1/4W
R124, R224	2	08-42725-03	RES 2.7K 1/4W
R110, R111, R210, R211	4	08-43305-03	RES 33 1/4W
R113, R213, R127, R227	4	08-43315-03	RES 330 1/4W
R109, R117, R209, R217	4	08-43935-03	RES 39K 1/4W
R128, R129, R228, R229	4	08-44705-03	RES 47 1/4W
R121, R221	2	08-44715-03	RES 470 1/4W
R137, R237	2	08-44725-03	RES 4.7K 1/4W
R118, R218	2	08-44735-03	RES 47K 1/4W
R126, R226	2	08-45115-03	RES 510 1/4W
R123, R125, R223, R225	4	08-46805-03	RES 68 1/4W
R112, R212	2	08-48215-03	RES 820 1/4W
R120, R220	2	08-55625-02	RES 5.6K 1/2W 5%
R135, R235	2	09-25195-02	RES 5.1 2W
R133, R134, R233, R234	4	10-52285-01	RES .22 5W
VR101, VR201	2	11-02102-01	SVR 220 OHMS/B
C114, C214	2	13-00002-02	POLYESTER 104J/50V
C104, C204	2	13-00002-24	POLYESTER 2.2/100V
C109, C209	2	13-00002-25	POLYESTER 1UF/100V
C115, C215	2	13-00015-03	E/C 4.7UF/25V
C120, C121	2	13-00015-05	E/C 100UF/50V
C108, C116, CC117, C216, C217	6	13-00015-10	E/C 47UF/100V
C111, C211	2	13-00015-11	E/C 4.7UF/63V
C110, C210	2	13-20078-11	C/C 7P
C118, C119	2	13-34733-12	C/C .047
C112, C113, C213, C213	4	13-40688-11	C/C 68P
C105, C205	2	13-43308-11	C/C 330P
C106, C206	6	13-50228-11	C/C 22P
TH101, TH201	2	18-02210-01	THERMOS SWITCH UP-62/85C UP-62/85C
Q105, Q205	2	23-00353-01	TRANSISTOR 2SA970-GR
Q101-Q103, Q201-Q203	6	23-00356-01	TRANSISTOR 2SC2240-GR
Q114, Q214	2	23-01240-01	TRANSISTOR 2SB817E
Q111, Q211	2	23-01241-01	TRANSISTOR 2SD1047E
Q115, Q215	2	23-01545-01	TRANSISTOR 2SC1815GR
Q106, Q109, Q206, Q209	1	23-02214-01	TR 2SC3478
Q107, Q207	2	23-02215-01	TR 2SD600
Q110, Q210	2	23-02216-01	TR 2SC3902
Q113, Q213	2	23-02217-01	TR 2SA1507
Q104, Q108, Q204, Q208, Q112, Q211	6	23-02218-01	TR 2SA1376

**REAR AMP PCB ASS'Y**

REF NO.	Q'TY	PARTS NO.	DESCRIPTION	
D101-D109, D201-D209	22	24-00026-05	DIODE	IN4148
D110, D111, D210, D211	4	24-02212-01	DIODE	IN4004
ZD401, ZDd402	2	21-02217-01	ZENER DIODE	IN4744A
TL101, TL201	2	25-02125-01	VACTROL	VTL5C4
	3	26-02206-01	AMP TYPE	CAA-100
	1	32-02124-01	INSULATOR	AV-405
	1	33-02342-01	LEAD WIRE	9-180-9#22GND
P101, P201	2	37-02154-21	WAFER	2P
P100	1	37-02368-31	WAFER	3P
	1	56-00434-00	HEAT SINK	AV-405 50W x 2
	3	58-00180-00	SUPPORT	AV-405
	.03	SM-PP330-W5	MACHINE SCREW	M3.0P0.5 x W5
U401	1	22-01837-01	IC	JRC 353D
C102, C103, C202, C203	4	13-00005-06	E/C	10UF/16V

**MISCELLANEOUS**

REF NO.	Q'TY	PARTS NO.	DESCRIPTION	
PCB	1	02-01469-01	PCB AV-405	58 x 30 x 1.6mm
R1-R5	5	08-61025-02	RES	1K 1/16W
C401	1	13-01090-07	ACROSS LINE CAP	0.01UF250V UL $\Delta$
C1-C5	5	13-50508-11	C/C	50P
SW1	1	18-02205-01	POWER SW	A3107L1-ES $\Delta$
SW2	1	18-02224-01	SW 10A/125V	3331.KIPIB2T4DD $\Delta$
LED1	1	25-02114-01	LED	SRG301
JACK1	1	26-02276-02	RCA JACK	HTJ.032.08BWG
JACK2	1	26-02280-04	RCA JACK	4P (WHITE/GOLD)



**PARTS LIST**  
**FRONT/CENTER AMP PCB ASS'Y**

REF NO.	Q'TY	PARTS NO.	DESCRIPTION
PCB	1	02-01464-01	AMP PCB 196 x 87 x 1.61mm
R324-R326, R328	4	08-41005-03	RES 10 1/4W
R301	1	08-41025-03	RES 1K 1/4W
R307	1	08-41035-03	RES 10K 1/4W
R312, R315	2	08-41215-03	RES 120 1/4W
R308	1	08-41325-03	RES 1.3K 1/4W
R333, R334	2	08-41515-03	RES 150 1/4W
R323	1	08-42205-03	RES 22 1/4W
R309, R336	2	08-42235-03	RES 22K 1/4W
R317	1	08-42725-03	RES 2.7K 1/4W
R303, R304	2	08-43305-03	RES 33 1/4W
R306, R320	2	08-43315-03	RES 330 1/4W
R302, R310	2	08-43935-03	RES 39K 1/4W
R321, R322	2	08-44705-03	RES 47 1/4W
R314	1	08-44715-03	RES 470 1/4W
R335	1	08-44725-03	RES 4.7K 1/4W
R311	1	08-44735-03	RES 47K 1/4W
R319	1	08-45115-03	RES 510 1/4W
R316, R318	2	08-46805-03	RES 68 1/4W
R305	1	08-48215-03	RES 820 1/4W
R313	1	08-55625-02	RES 5.6K 1/2W 5%
R332	1	09-25195-02	RES 5.1 2W
R327, R329-R331	4	10-52285-01	RES .22 5W
VR1	1	11-02102-01	SVR 220 OHMS/B
C311	1	13-00002-02	POLYESTER 104J/50V
C301	1	13-00002-24	POLYESTER 2.2/100V
C306	1	13-00002-25	POLYESTER 1UF/100V
C316, C317	2	13-00006-46	M/C .1/100V
C318	1	13-00015-03	E/C 4.7UF/25V (NP)
C305, C312-C315	5	13-00015-10	E/C 47UF 100V
C308	1	13-00015-11	E/C 4.7UF 63V
C307	1	13-20078-11	C/C 7P
C309, C310	2	13-40688-11	C/C 68P
C302	1	13-43308-11	C/C 330P
C303, C304	2	13-50228-11	C/C 22P
TS	1	18-02212-02	THERMOS SWITCH UP.62/85C 50mm
Q305	1	23-00353-01	TRANSISTOR 2SA970-GR
Q301-Q303	3	23-00356-01	TRANSISTOR 2SC2240-GR
Q315, Q316	2	23-01240-01	TRANSISTOR 2SB817E
Q311, Q312	2	23-01241-01	TRANSISTOR 2SD1047E
Q317	1	23-01545-01	TRANSISTOR 2SC1815GR
Q306, Q309	2	23-02214-01	TR 2SC3478
Q307	1	23-02215-01	TR 2SD600
Q310	1	23-02216-01	TR 2SC3902
Q304, Q314	2	23-02217-01	TR 2SA1507
Q308, Q313	2	23-02218-01	TR 2SA1376
D301-D304, D307, D308	6	24-00026-05	DIODE IN-4148
D305, D306	2	24-02212-01	DIODE IN4004
S1-S4	4	26-00871-01	FUSE SOCKET
FUSE1-FUSE2	2	29-02231-05	FUSE (SLOT) 5TT/20mm/125V
P301	1	37-02154-21	WAFER 2P
P3002	1	37-02365-05	WAFER 5P
	1	55-00828-01	FUSE COVER
	1	32-02123-01	INSULATOR AV-405

# VOLTAGE CONVERSION

## AV-405 Voltage Conversion Instructions

### Bill of Materials

Q'ty	Part No.	Description
1	29-02231-08	Fuse 8A Slo-Blo
1	29-02231-04	Fuse 4A Slo-Blo
1	530-10094-00	Label 230V 50 Hz

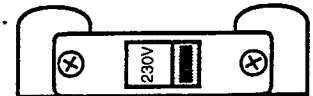
### Directions for Change (115V to 230V)

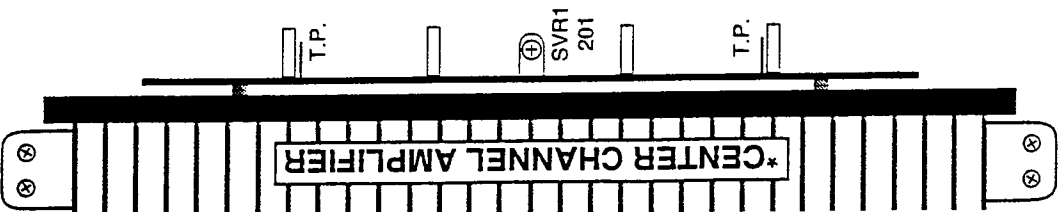
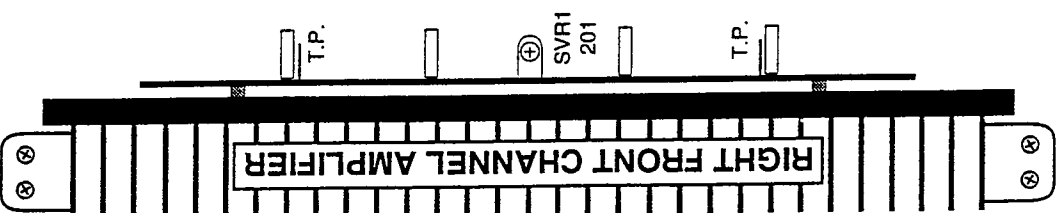
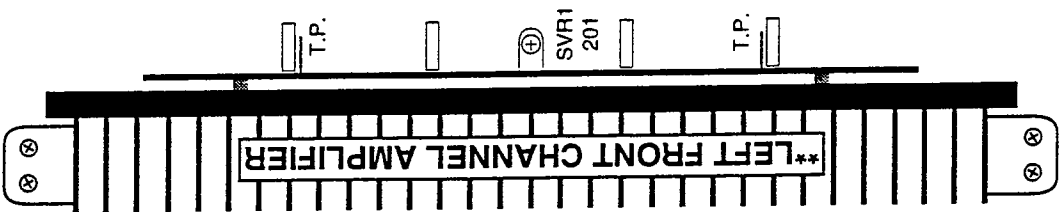
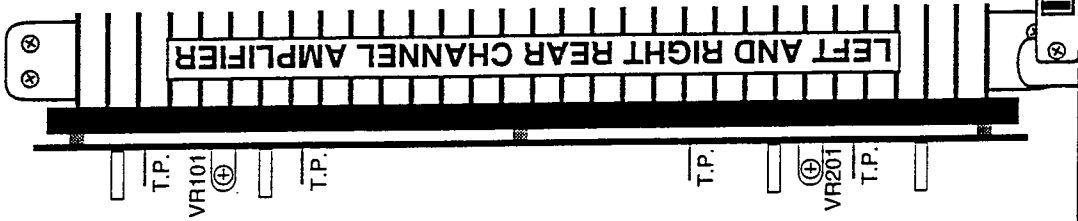
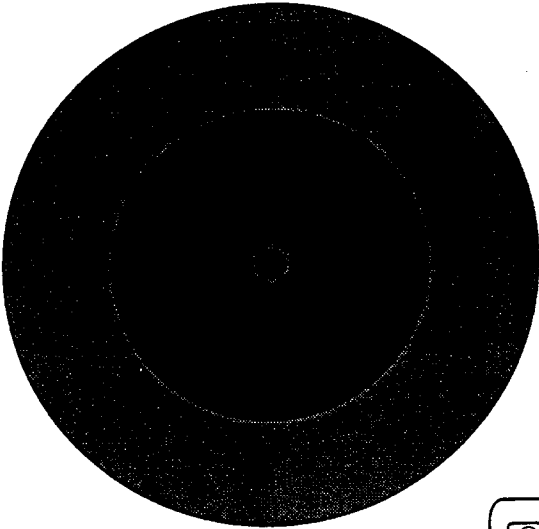
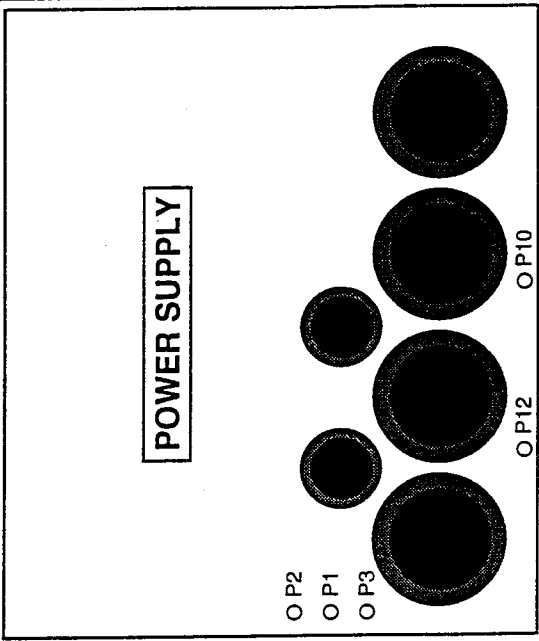
1. DISCONNECT THE AV-405 FROM THE AC POWER OUTLET.
2. Remove the top cover as described in the Disassembly Section.
3. Move the AC Selector Switch near the front panel to the 230V position.
4. Replace the 8A Slo-Blo fuse with a 4A Slo-Blo fuse.
5. Place 230V AC 50 Hz label (530-10094-00) over "120VAC - 60Hz" screening near linecord.



### Directions for Change (230V to 115V)

1. DISCONNECT THE AV-405 FROM THE AC POWER OUTLET.
2. Remove the top cover as described in the *Disassembly* Section.
3. Move the AC Selector Switch near the front panel to the 115V position.
4. Replace the 4A Slo-Blo fuse with an 8A Slo-Blo fuse.
5. Remove 230V AC 50 Hz label (530-10094-00) located near linecord.





\* Left Front Channel Amplifier after S/N 94075200001

\*\* Center Channel Amplifier after S/N 94075200001









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