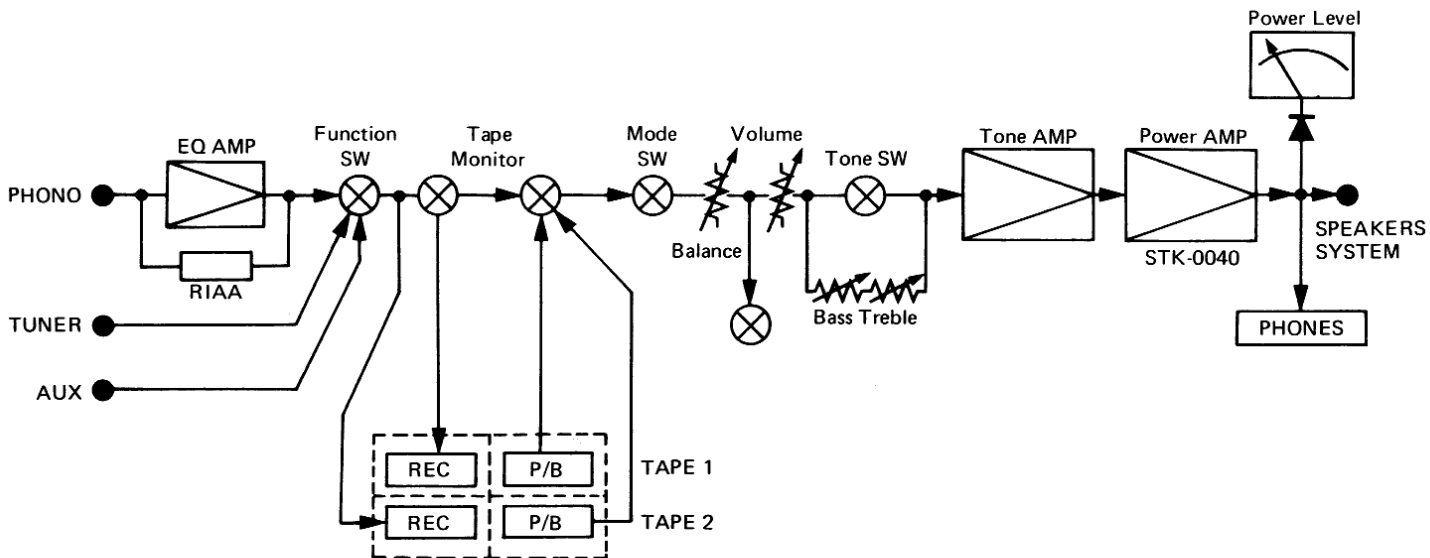


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## FUNCTIONAL BLOCK DIAGRAM



# SPECIFICATIONS

AMPLIFIER	CA-2221	
<b>POWER AMPLIFIER SECTION</b>		
Continuous RMS sine wave power per channel within stated bandwidth at no more than stated distortion and with an 8 ohm load.	<b>30 Watts</b>	
Power Band Width	<b>20 Hz - 20 kHz</b>	
Total Harmonic Distortion at Rated Power	<b>0.03 %</b>	
I.M. Distortion	0.03 %	
Speaker Damping	50	
<b>PREAMPLIFIER SECTION</b>		
Frequency Response	Phono (20 Hz - 20 kHz)	±0.5 dB
	Aux. (20 Hz - 20 kHz)	±0.5 dB
Input Sensitivity and Impedance	Phono	2.5 mV/50k Ω
	Tape Monitor 1	150 mV/50k Ω
	Tape Monitor 2	150 mV/50k Ω
	Tuner	150 mV/50k Ω
	Auxiliary	150 mV/50k Ω
Phono Max. Input Capability	Phono	230 mV
Tone Control	Bass (100 Hz)	±10 dB
	Treble (10 kHz)	±10 dB
Loudness Contour (100 Hz/10 kHz)	+8 dB/+3 dB	
Hum and Noise (IHF Short Circuit, A Net Work)	Phono	80 dB
	Tape Monitor	95 dB
	Tuner	95 dB
	Auxiliary	95 dB
<b>GENERAL</b>		
Power Requirements	AC: 110/220 V 200 W/250 VA	
Dimensions (W x D x H)	440 x 310 x 89.5 mm	
Weight (approx.)	7.6 kg	

*Because Fisher products are subject to continuous improvement, Fisher reserves the right to modify, change, or alter any design or specifications without notice and without incurring any obligation. Fisher reserves the right to make changes and improvements upon its products without any obligation to install such changes upon any of its products previously manufactured.*

# RECOMMENDED TEST EQUIPMENTS

The following test equipments are recommended to completely test and align the Amplifier:

- Line Voltage Isolation Transformer
- AC DC Multimeter.
- Accurately Calibrated AC Voltmeter.
- Oscilloscope (Flat to 100 kHz Minimum)
- Low-Distortion Audio Sine-Wave Generator
- Harmonic Distortion Analyzer
- Two (2) Load Resistors 8-ohms, 250 Watts (Minimum Rating)

## HARMONIC DISTORTION TEST

**CAUTION:** Limit the following tests to no more than ten minutes each. Use 8-ohm resistors, with a minimum power rating of 250 watts when connecting a load across the SPEAKERS terminal.

### CONTROL SETTINGS:

Unplug the AC power cord and set the front panel controls as follows:

- BASS, TREBLE, and BALANCE controls to center positions.
- POWER switch to OFF
- SPEAKERS switch to OFF
- FUNCTION switch to AUX
- MODE switch to STEREO
- TAPE MONITOR switch to SOURCE
- TONE CONTROLS switch to OFF
- LOUDNESS switch to OFF
- VOLUME control to MINIMUM position
- LEFT CHANNEL DRIVEN

### ONE CHANNEL DRIVEN:

- 1) Connect a low distortion audio generator to LEFT AUX IN jack. Set generator frequency to 1 kHz and output to minimum.
- 2) Connect an 8-ohm load resistor between SPEAKERS MAIN LEFT and COM terminals. Connect a Harmonic Distortion Analyzer and an AC VTVM in parallel across the 8-ohm load.
- 3) Connect the AC power cord and set SPEAKERS switch to MAIN. Turn VOLUME control to MAX.
- 4) Increase generator output for 30 Watts RMS (15.5 V across the 8-ohm load). Harmonic Distortion Analyzer should measure 0.03 % distortion or less.
- 5) Repeat steps 1 through 4 for RIGHT CHANNEL.

### BOTH CHANNELS DRIVEN

Connect 8-ohm load resistors across LEFT and RIGHT MAIN SPEAKERS terminals. Set MODE switch to "MONO". Adjust generator output and "BALANCE" control for 30 Watts at Left and Right Channels (15.5 volts across the 8-ohm loads). Harmonic Distortion Analyzer should measure 0.03 % distortion or less at each channel.

**CAUTION:** This precision high-fidelity instrument should be serviced only by qualified personnel, trained in the repair of transistor equipment and printed circuitry.

# ADJUSTMENT OF POWER AMPLIFIER P.C.BOARD

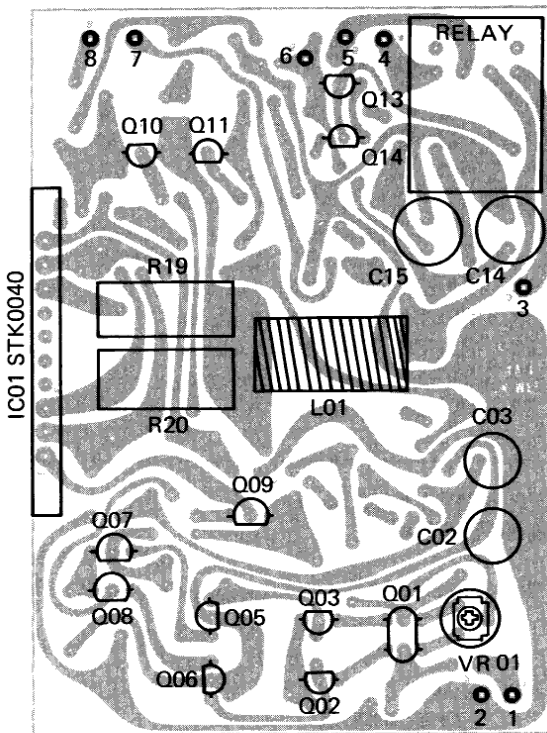
## BEFORE ADJUSTMENT

1. After the power switch is turned ON, allow a few minutes before making adjustment, to be sure of the most stable operation.
2. Connect dummy load resistors (8 ohms) to the SPEAKERS terminals.
3. Use a DC V.T.V.M. (input impedance: More than 50k ohms/V).

## ZERO BALANCE ADJUSTMENT

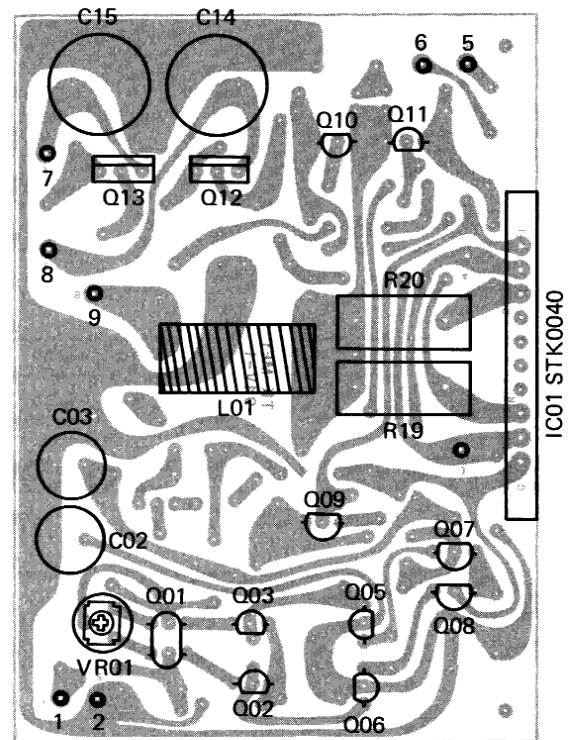
- Connect DC V.T.V.M. to the speaker output terminal and turn the volume control fully to the minimum position. Turn VR01 in each P.C.B. under the above condition until the output voltage becomes 0 V.

POWER AMP/PROTECT BOARD LAYOUT



(TOP VIEW)

POWER AMP/POWER SUPPLY BOARD LAYOUT



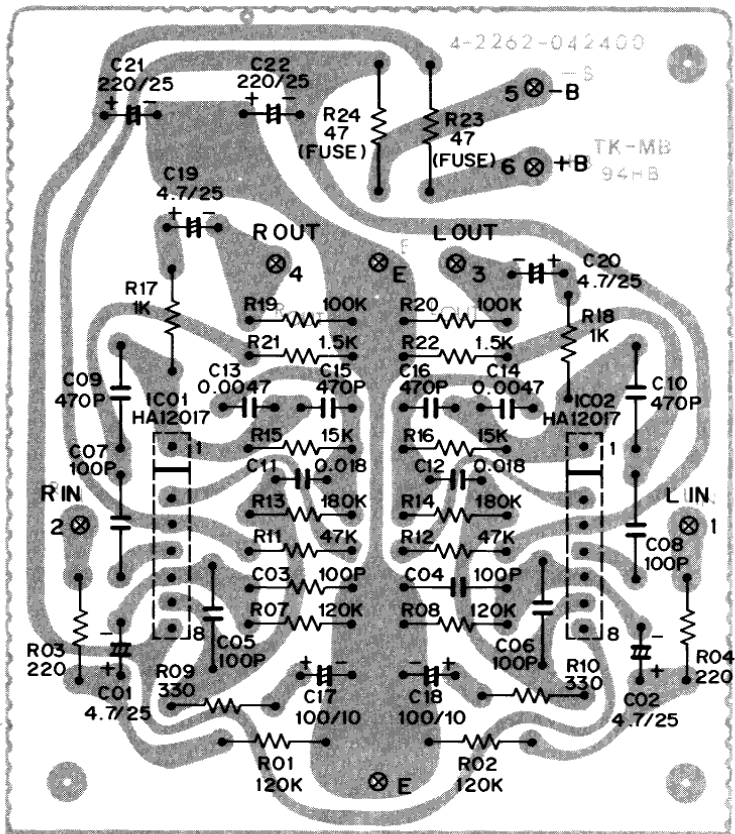
(TOP VIEW)

## EXPLANATION OF PROTECTIVE CIRCUITS

\*For about two seconds after the power switch is turned on, the speakers remain silent because the power muting circuit operates during this time.

\*If the speaker terminals are short-circuited or the ventilation holes at the cabinet top are blocked during long periods of operation, the internal temperature may rise abnormally. At about 90°C, the thermal sensor (temperature detection) circuit becomes activated and will interrupt the signal. If the cause is removed and the internal temperature is back to normal, the unit automatically resets itself to restore normal operation.

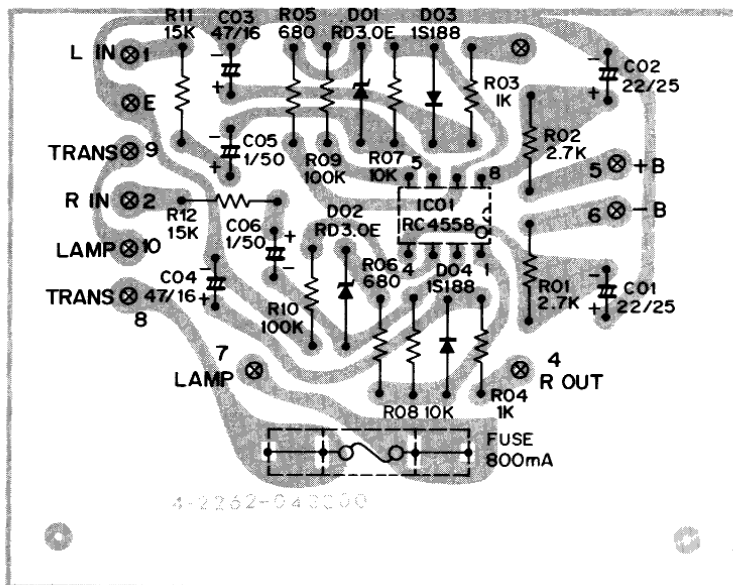
# EQ AMP P.C.BOARD (BOTTOM VIEW)



EQ AMP P.C.BOARD IC PIN NUMBERS DC VOLTAGES

SYMBOL No.	DEVICE	1	2	3	4	5	6	7	8
IC01,02	HA12017	-13mV	-	20.6V	-26V	-24.5V	23mV	21mV	26V

# METER DRIVE P.C.BOARD (BOTTOM VIEW)



METER DRIVE P.C.BOARD IC PIN NUMBERS DC VOLTAGES

SYMBOL No.	DEVICE	1	2	3	4	5	6	7	8
IC01	RC4558	7mV	7mV	7mV	-16V	7mV	7mV	7mV	16V

# PARTS LIST

EQ AMP P.C.B. Assy  
131 0 4001 02840

Ref. No. Parts Number Description

## CAPACITORS

C01,02	C1ERY-475LPA	Electrolytic	4.7 $\mu$ F	25V
C03,04	C1HCYK101APA	Ceramic	100 pF	50V $\pm$ 10%
05,06				
07,08				
C09,10	C1HYYK471RPA	Ceramic	470 pF	50V $\pm$ 10%
C11,12	C1HFAJ183A	Mylar	0.018 $\mu$ F	50V $\pm$ 5%
C13,14	C1HFAJ472A	Mylar	0.0047 $\mu$ F	50V $\pm$ 5%
C15,16	C1HYYK471RPA	Ceramic	470 pF	50V $\pm$ 10%
C17,18	C1ARB-107A	Electrolytic	100 $\mu$ F	10V
C19,20	C1ERY-475LPA	Electrolytic	4.7 $\mu$ F	25V
C21,22	C1ERB-227A	Electrolytic	220 $\mu$ F	25V

## SEMICONDUCTORS

IC01,02	IKK-HA12017	IC, HA-12017
---------	-------------	--------------

## RESISTORS

R01,02	R2EDZJ124APA	Carbon	120k	1/4W	$\pm$ 5%
R03,04	R2EDZJ221APA	Carbon	220	1/4W	$\pm$ 5%
R07,08	R2EDZJ124APA	Carbon	120k	1/4W	$\pm$ 5%
R09,10	R2EDZJ331APA	Carbon	330	1/4W	$\pm$ 5%
R11,12	R2EDZJ473APA	Carbon	47k	1/4W	$\pm$ 5%
R13,14	R2EDZJ184APA	Carbon	180k	1/4W	$\pm$ 5%
R15,16	R2EDZJ153APA	Carbon	15k	1/4W	$\pm$ 5%
R17,18	R2EDZJ102APA	Carbon	1k	1/4W	$\pm$ 5%
R19,20	R2EDZJ104APA	Carbon	100k	1/4W	$\pm$ 5%
R21,22	R2EDZJ152APA	Carbon	1.5k	1/4W	$\pm$ 5%
R23,24	R2HZPK470A	Fuse	47	1/2W	$\pm$ 10%

METER DRIVE P.C.B. Assy  
131 0 4001 02900

Ref. No. Pars Number Description

	4 2349 21540	Fuse 800 mA Slow
	4 2352 00200	Fuse Clip

## CAPACITORS

C01,02	C1ERB-226A	Electrolytic	22 $\mu$ F	25V
C03,04	C1CRY-476APA	Electrolytic	47 $\mu$ F	16V
C05,06	C1HRY-105APA	Electrolytic	1 $\mu$ F	50V

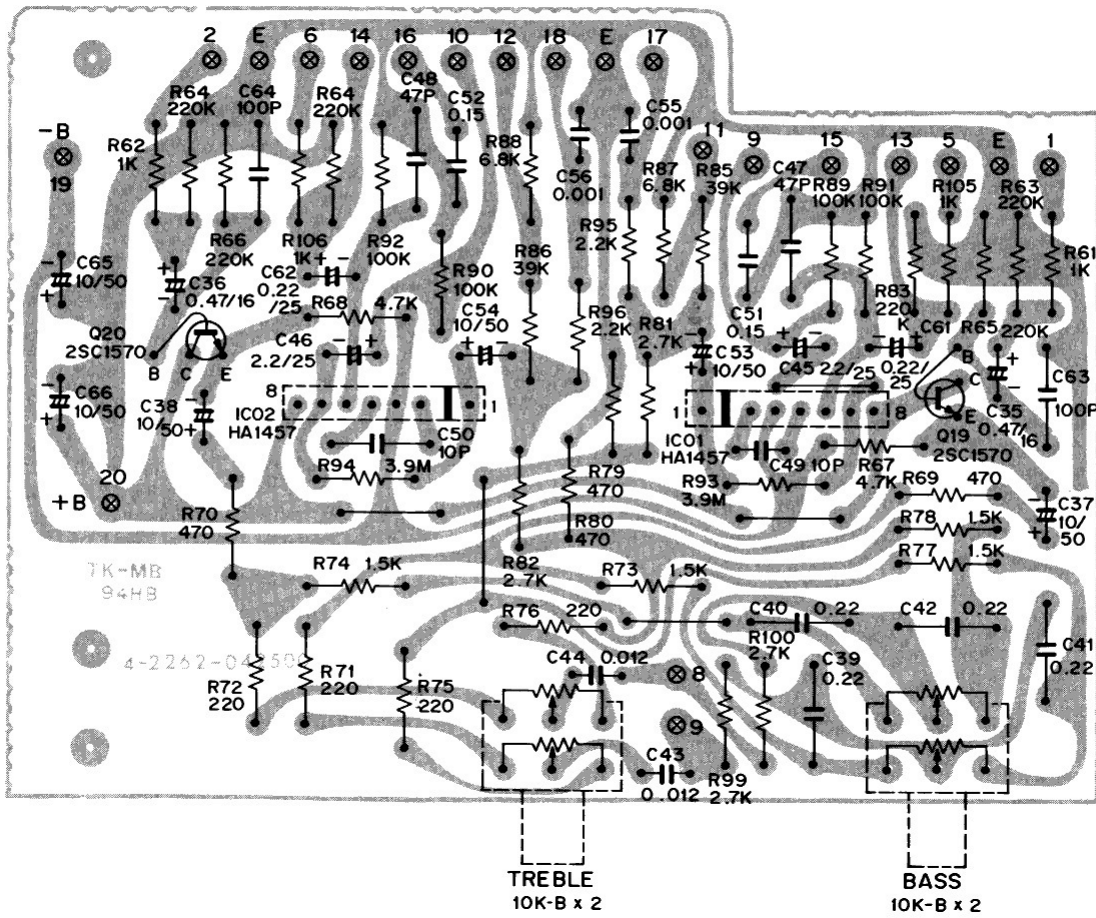
## SEMICONDUCTORS

D01,02	DNN-RD3.0E--BX	Diode, RD3.0 E
D03,04	202 5 9110 18820	Diode, 1S188FM1
IC01	III-RC4558	IC, RC4558

## RESISTORS

R01,02	R2EDZJ272APA	Carbon	2.7k	1/4W	$\pm$ 5%
R03,04	R2EDZJ102APA	Carbon	1k	1/4W	$\pm$ 5%
R05,06	R2EDZJ681APA	Carbon	680	1/4W	$\pm$ 5%
R07,08	R2EDZJ103APA	Carbon	10k	1/4W	$\pm$ 5%
R09,10	R2EDZJ104APA	Carbon	100k	1/4W	$\pm$ 5%
R11,12	R2EDZJ153APA	Carbon	15k	1/4W	$\pm$ 5%

# PRE TONE P.C.BOARD (BOTTOM VIEW)



PRE TONE P.C.BOARD IC PIN NUMBERS DC VOLTAGES									
SYMBOL No.	DEVICE	1	2	3	4	5	6	7	8
IC01,02	HA1457	1.6V	-	1.5V	-26.4V	-25.2V	-46mV	-0.2V	26.3V

PRE TONE P.C.B. TR DC VOLTAGES				
SYMBOL No.	DEVICE	B	C	E
Q19,20	2SC1570	-2.1V	26.4V	-2.7V

## PARTS LIST

**PRE TONE P.C.B. Assy**  
**131 0 4001 02850**

**Ref. No. Parts Number Description**  
VR01,02 4 2222 00980 VR 10k-Bx2 (Bass, Treble)

### CAPACITORS

C35,36 C1CUBX474A Sint. Alu. 0.47  $\mu$ F 16V +40,-20%  
 C37,38 C1HRE-106AL Electrolytic 10  $\mu$ F 50V  
 C39,40 C1HFRJ224A Mylar 0.22  $\mu$ F 50V  $\pm$ 5%  
 41,42  
 C43,44 C1HFAJ123A Mylar 0.012  $\mu$ F 50V  $\pm$ 5%  
 C45,46 C1EUBM225A Sint. Alu. 2.2  $\mu$ F 25V  $\pm$ 20%  
 C47,48 C1HCDK470SL Ceramic 47 pF 50V  $\pm$ 10%  
 C49,50 C1HCDD100SL Ceramic 10 pF 50V  $\pm$ 0.5%  
 C51,52 C1HFAK154A Mylar 0.15  $\mu$ F 50V  $\pm$ 10%  
 C53,54 C1HRE-106AL Electrolytic 10  $\mu$ F 50V  
 C55,56 C1HFAJ102A Mylar 0.001  $\mu$ F 50V  $\pm$ 5%  
 C61,62 C1EUBM224A Sint. Alu. 0.22  $\mu$ F 25V  $\pm$ 20%  
 C63,64 C1HCYK101APA Ceramic 100 pF 50V  $\pm$ 10%

### SEMICONDUCTORS

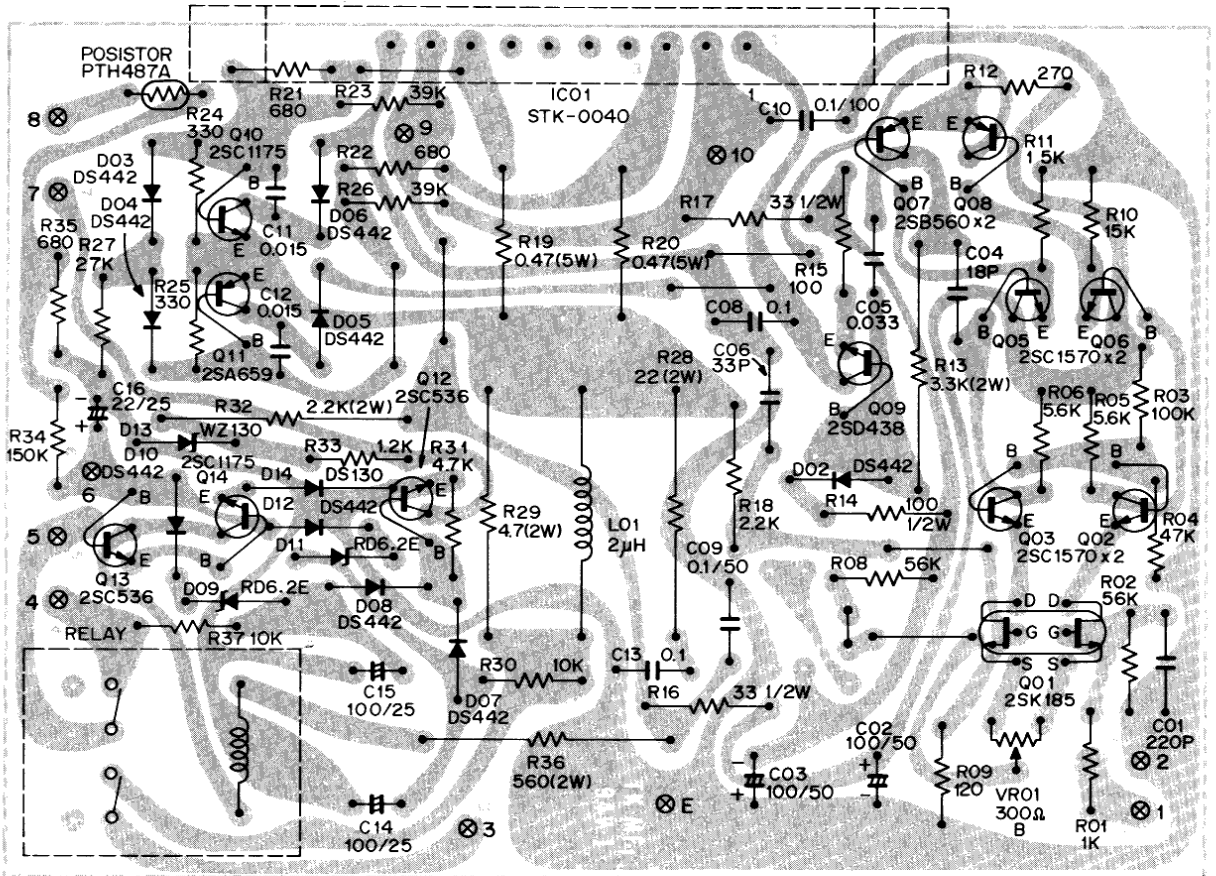
IC01,02 1KK-HA1457 IC, HA1457  
 Q19,20 203 5 5251 57079 TR 2SC1570 GL, HL

**Ref. No. Parts Number Description**

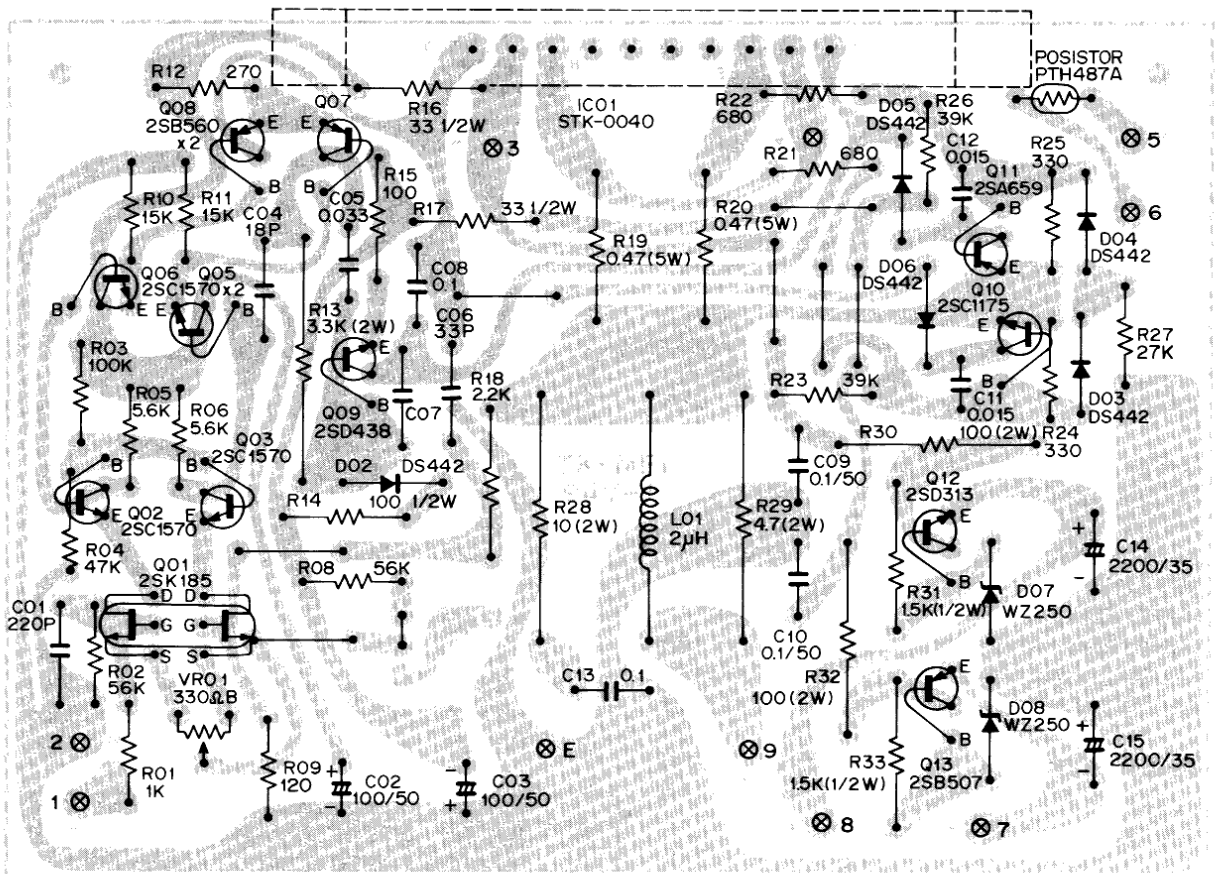
### RESISTORS

R01,02 R2EDZJ104APA Carbon 100k 1/4W  $\pm$ 5%  
 R61,62 R2EDZJ102APA Carbon 1k 1/4W  $\pm$ 5%  
 R63,64 R2EDZJ224APA Carbon 220k 1/4W  $\pm$ 5%  
 65,66  
 R67,68 R2EDZJ472APA Carbon 4.7k 1/4W  $\pm$ 5%  
 R69,70 R2EDZJ471APA Carbon 470 1/4W  $\pm$ 5%  
 R71,72 R2EDSJ221A Carbon 220 1/4W  $\pm$ 5%  
 R73,74 R2EDZJ152APA Carbon 1.5k 1/4W  $\pm$ 5%  
 R75,76 R2EDSJ221A Carbon 220 1/4W  $\pm$ 5%  
 R77,78 R2EDZJ152APA Carbon 1.5k 1/4W  $\pm$ 5%  
 R79,80 R2EDZJ471APA Carbon 470 1/4W  $\pm$ 5%  
 R81,82 R2EDZJ272APA Carbon 2.7k 1/4W  $\pm$ 5%  
 R83,84 R2EDZJ224APA Carbon 220k 1/4W  $\pm$ 5%  
 R85,86 R2EDZJ393APA Carbon 39k 1/4W  $\pm$ 5%  
 R87,88 R2EDZJ682APA Carbon 6.8k 1/4W  $\pm$ 5%  
 R89,90 R2EDZJ104APA Carbon 100k 1/4W  $\pm$ 5%  
 91,92  
 R93,94 R2EDPJ395A Carbon 3.9M 1/4W  $\pm$ 5%  
 R95,96 R2EDZJ222APA Carbon 2.2k 1/4W  $\pm$ 5%  
 R99,100 R2EDSJ272A Carbon 2.7k 1/4W  $\pm$ 5%  
 R105,106 R2EDZJ102APA Carbon 1k 1/4W  $\pm$ 5%

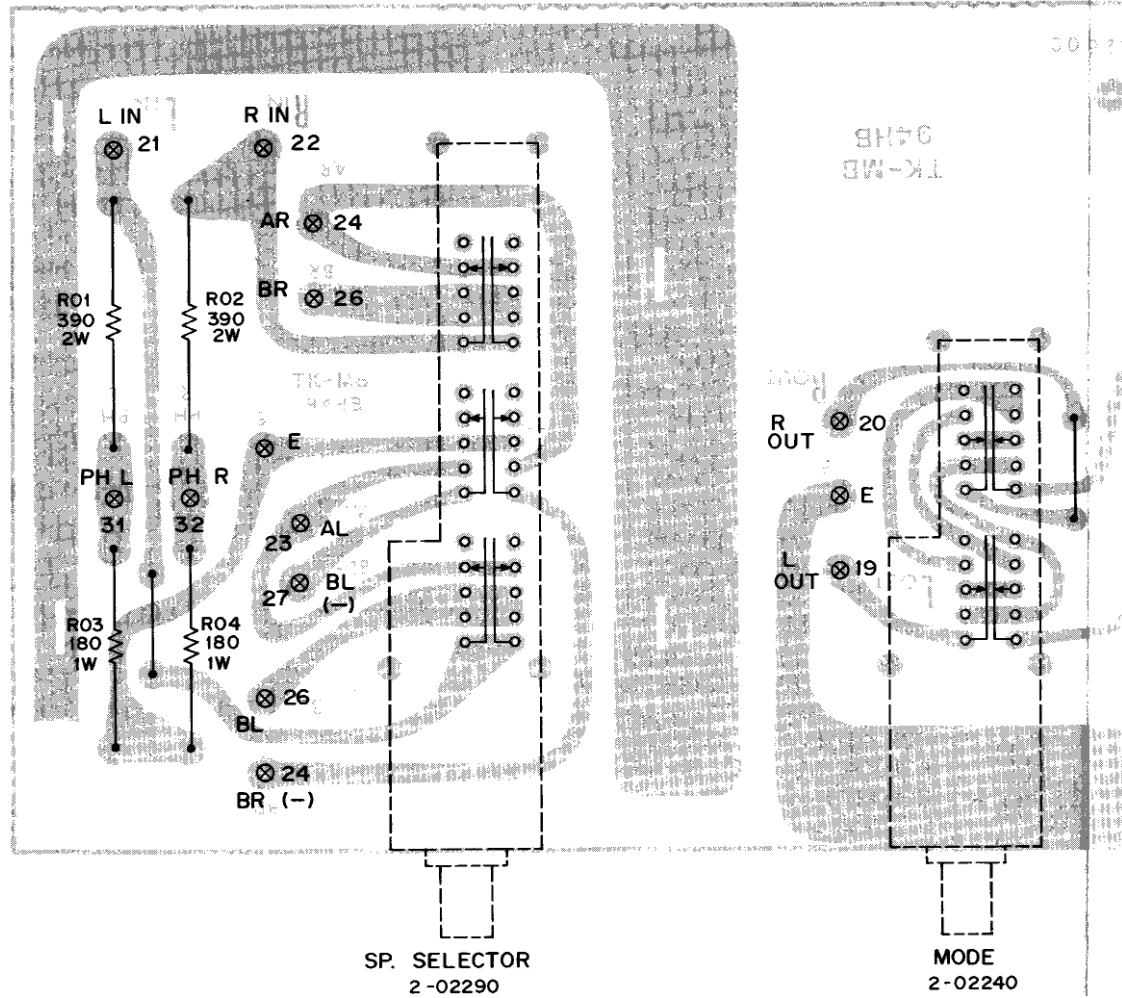
# POWER AMP/PROTECT P.C.BOARD (BOTTOM VIEW)



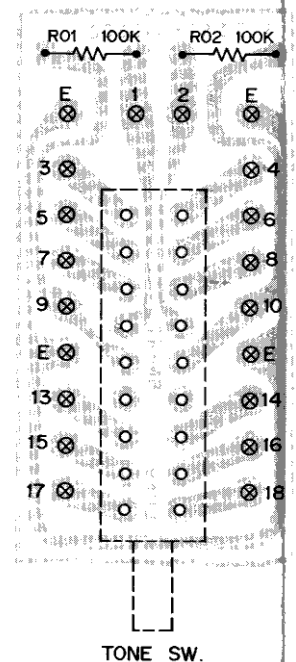
# POWER AMP/POWER SUPPLY P.C.BOARD (BOTTOM VIEW)



# FUNCTION SP, (BOTTOM)



# TONE SW P.C.BOARD (BOTTOM VIEW)



POWER AMP P.C.BOARD TRANSISTOR DC VOLTAGES

SYMBOL No.	DEVICE	B	C	E	SYMBOL No.	DEVICE	B	C	E
Q02	2SC1570	13.3V	39.6V	12.8V	Q08	2SB560	39.0V	1.2V	39.7V
Q03	2SC1570	13.3V	39.7V	12.8V	Q09	2SD438	-41.3V	-1.2V	-41.9V
Q05	2SC1570	39.7V	41.9V	39.0V	Q10	2SC1175	0.2V	1.0V	0V
Q06	2SC1570	39.7V	41.9V	39.0V	Q11	2SA659	-0.2V	-1.0V	0V
Q07	2SB560	39.0V	-29V	39.7V					

POWER AMP IC PIN NUMBERS DC VOLTAGES

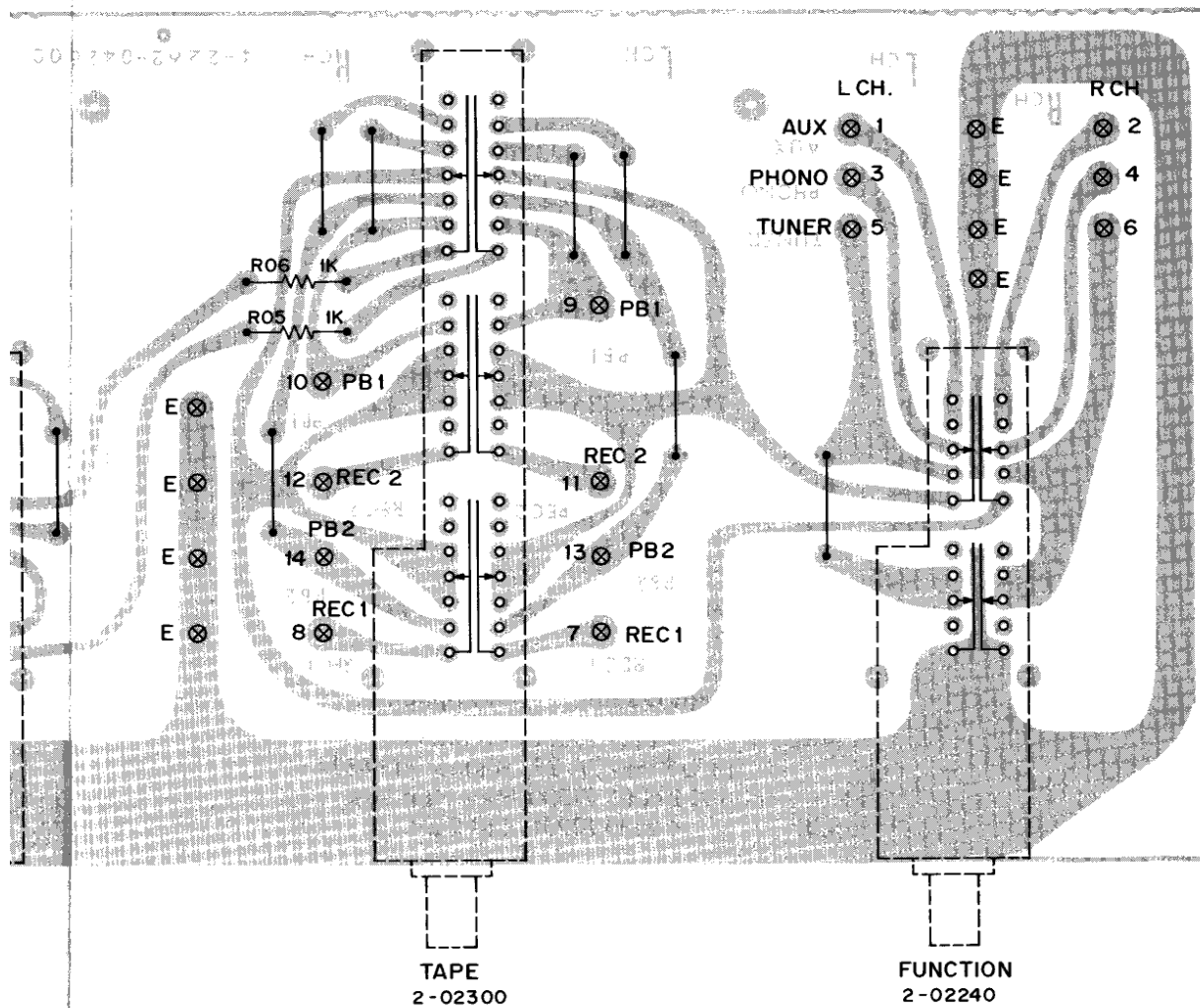
SYMBOL No.	DEVICE	1	2	3	4	8	10
IC01	STK0040	-1.2V	-42V	-	+42V	-	1.2V

POWER SUPPLY P.C.B. TR DC VOLTAGES

SYMBOL No.	DEVICE	B	C	E
Q12	2SD313	26.7V	38.4V	26.2V
Q13	2SB507	-26.7V	-38.4V	-26.2V



# SP, SW P.C.BOARD (BOTTOM VIEW)

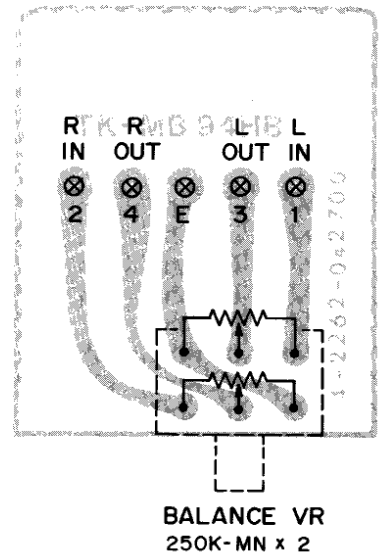
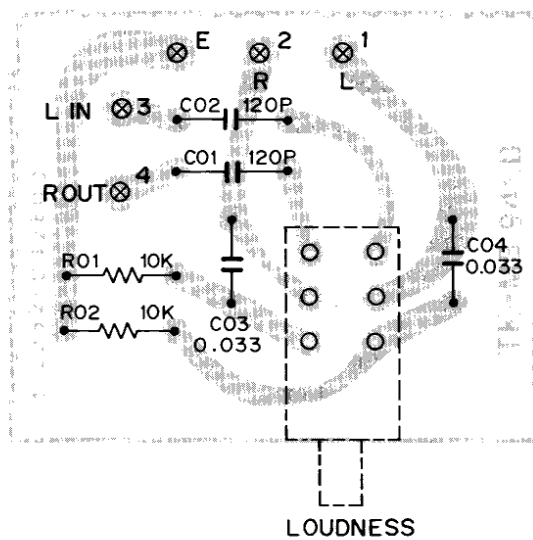


# BOARD (BOTTOM VIEW)

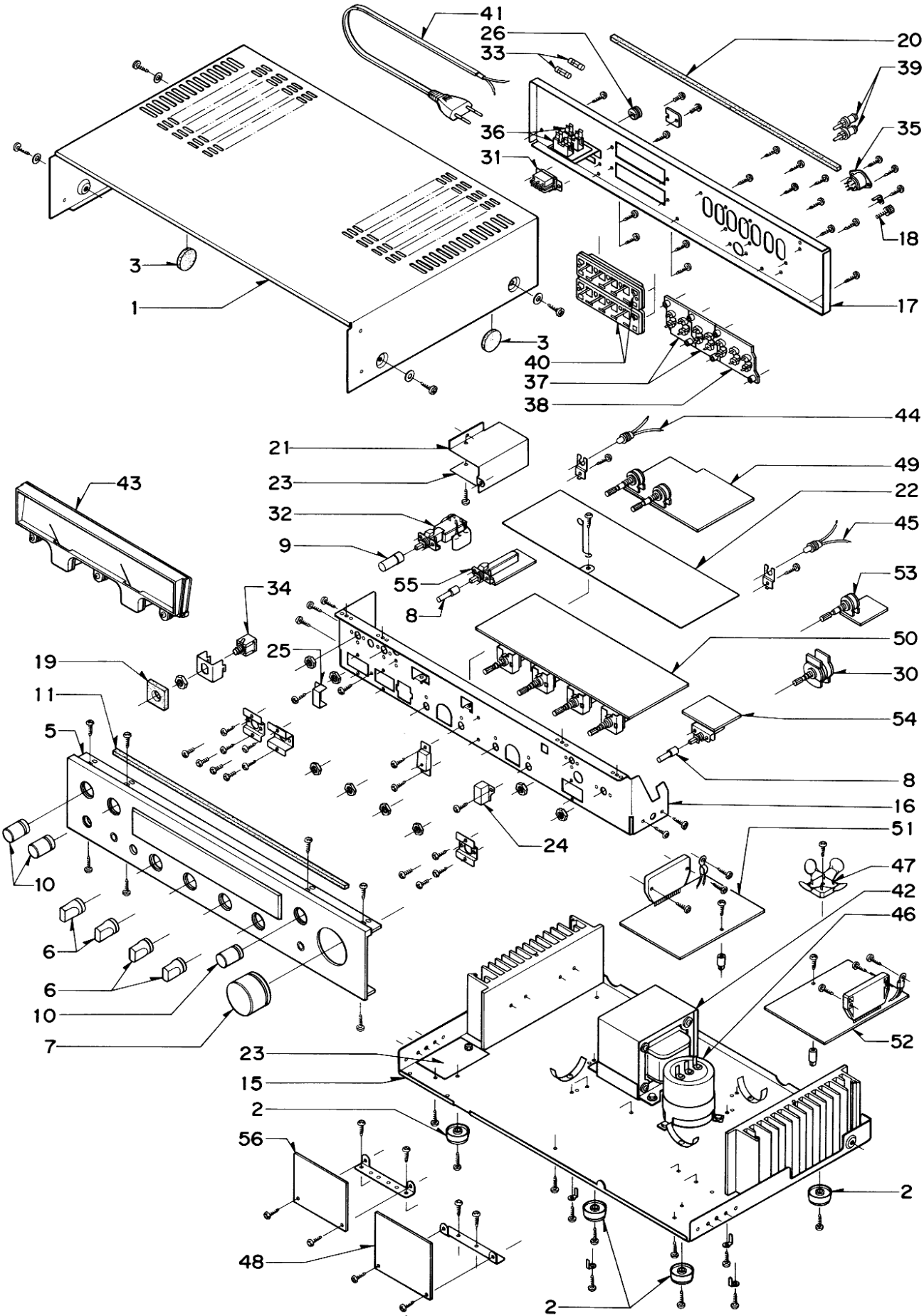
# LOUDNESS SW P.C.BOARD (BOTTOM VIEW)

# BALANCE VR P.C.BOARD (BOTTOM VIEW)

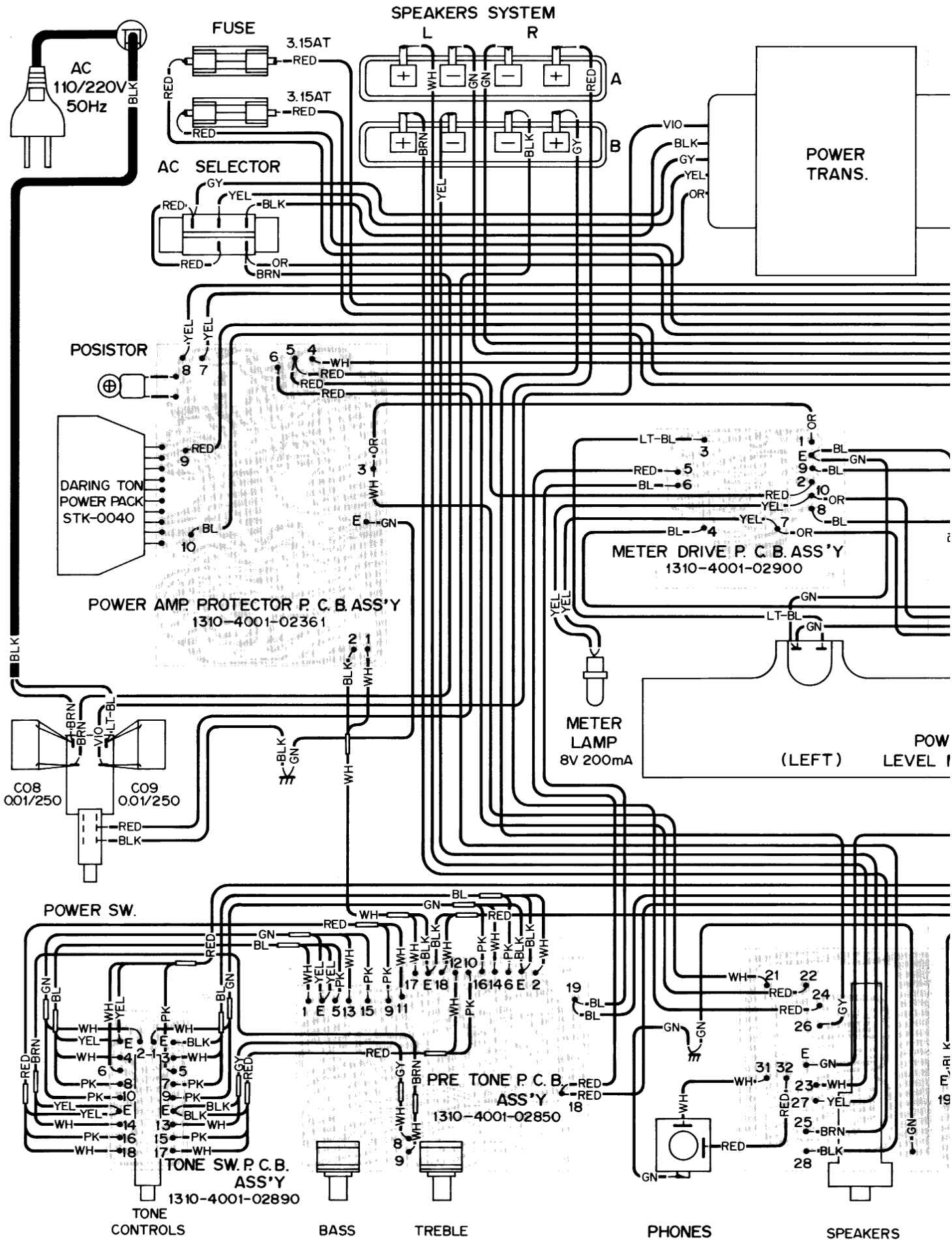
- 100K
- E
- 4
- 6
- 8
- 10
- E
- 14
- 16
- 18



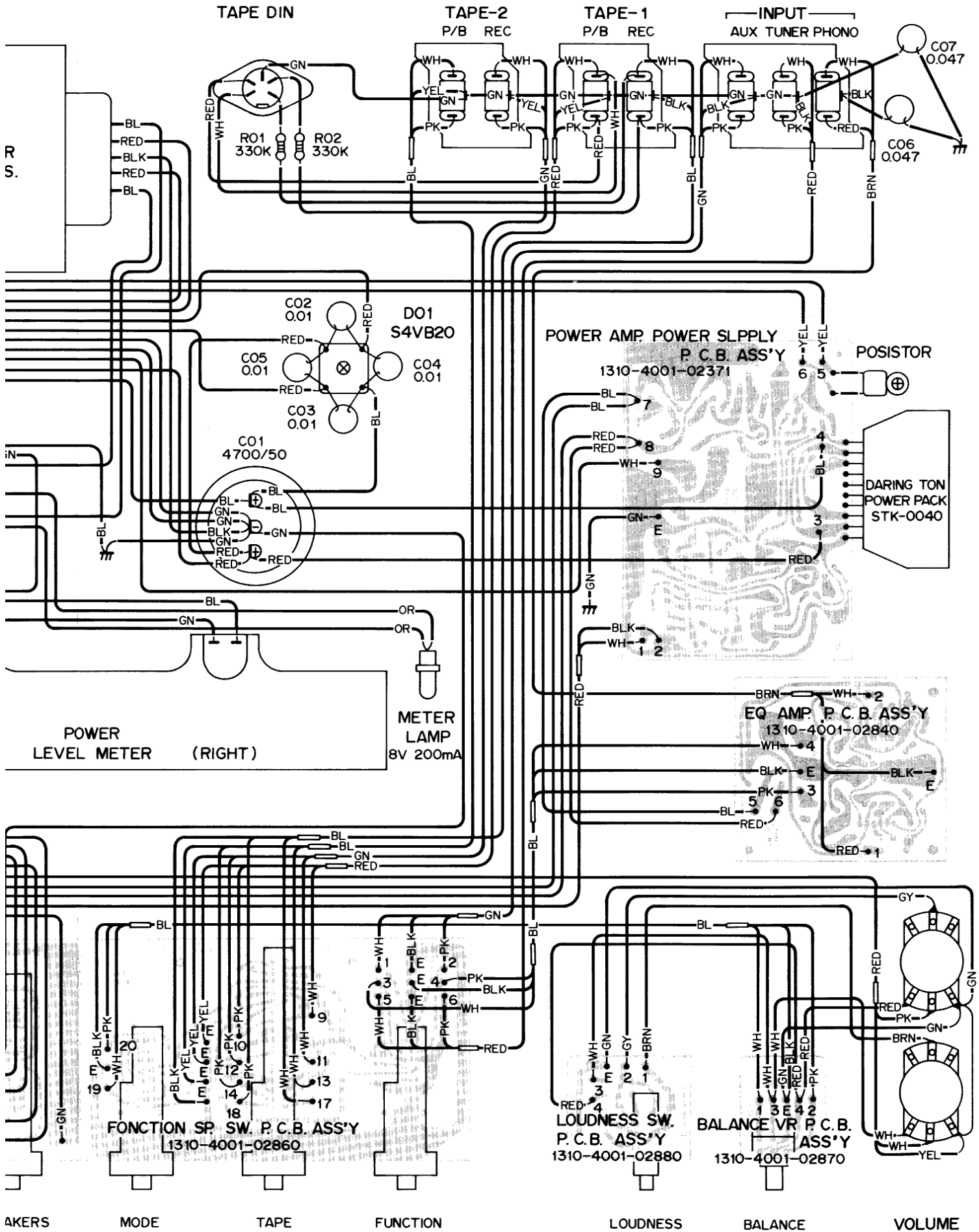
# CABINET & CHASSIS EXPLODED VIEW



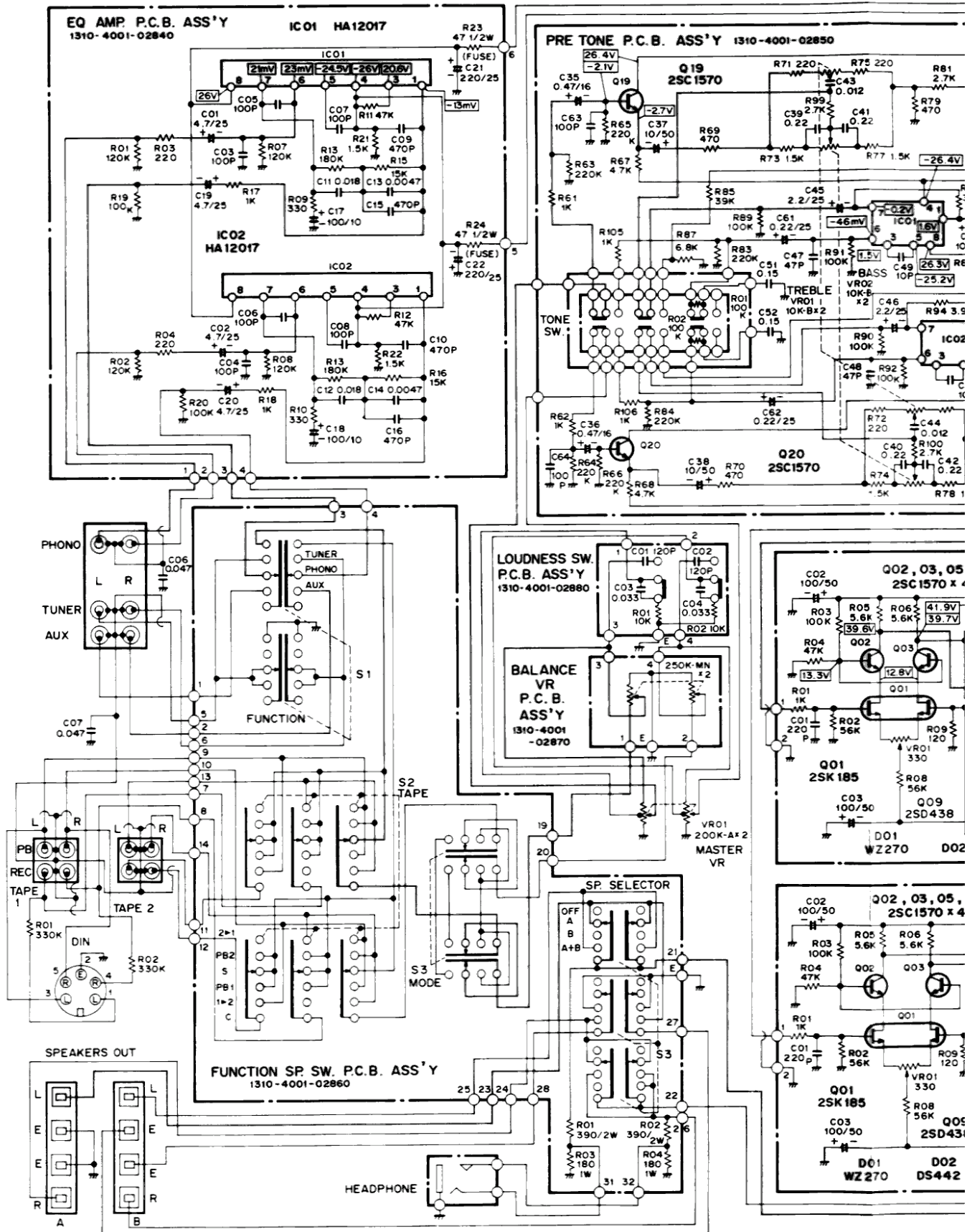
# POINT TO POINT



# POINT WIRING DIAGRAM



# SCHEMATIC DIAGRAM

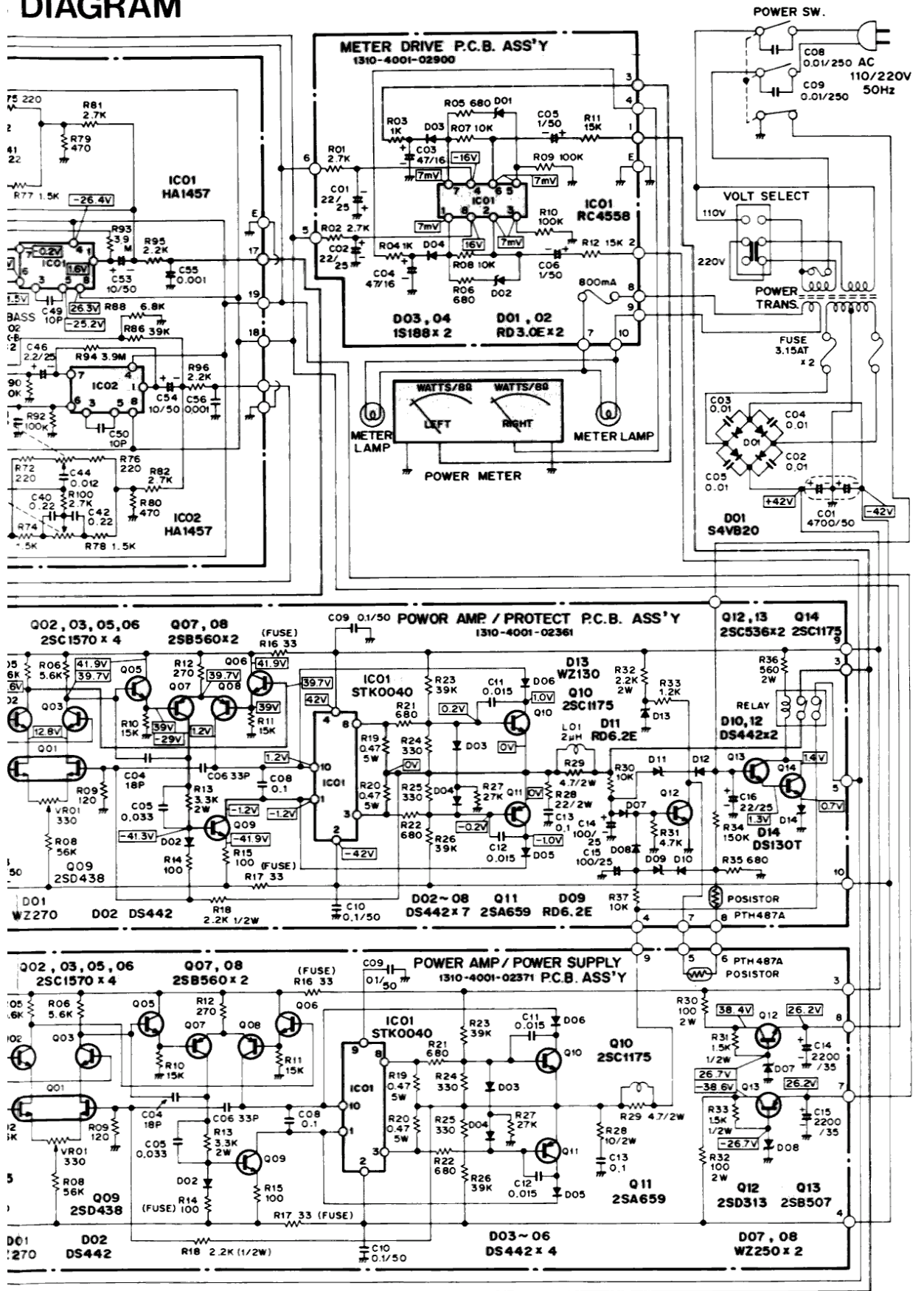


## NOTES:

1. All resistors values are indicated in "ohm" ( $K=10^3$ ,  $M=10^6$ ).
2. All capacitors values are indicated in " $\mu F$ " ( $P=10^{-12}$ ).
3. All voltages indicated on the schematics are measured under the following conditions.
  - a. Use a V.T.V.M.

- b. A
- c. N
- d. A
4. This
- be m

# DIAGRAM



- b. All voltages  $\pm 10\%$  with respect chassis ground
- c. No signals at input terminals
- d. AC input 220 volts 50 Hz
- 4. This is a fundamental schematics diagram. Some products may be modified without notice.