

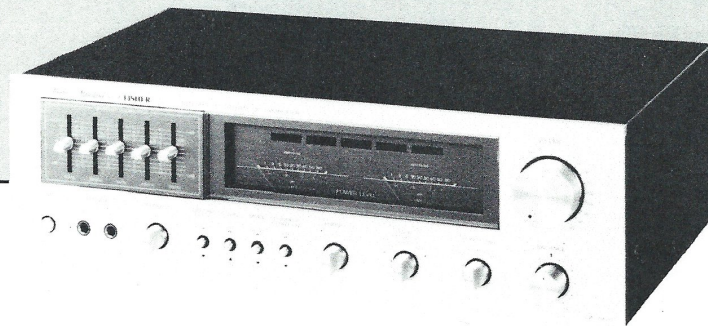
SERVICE MANUAL



FISHER

CA-2420

**Integrated Stereo
DC Amplifier**



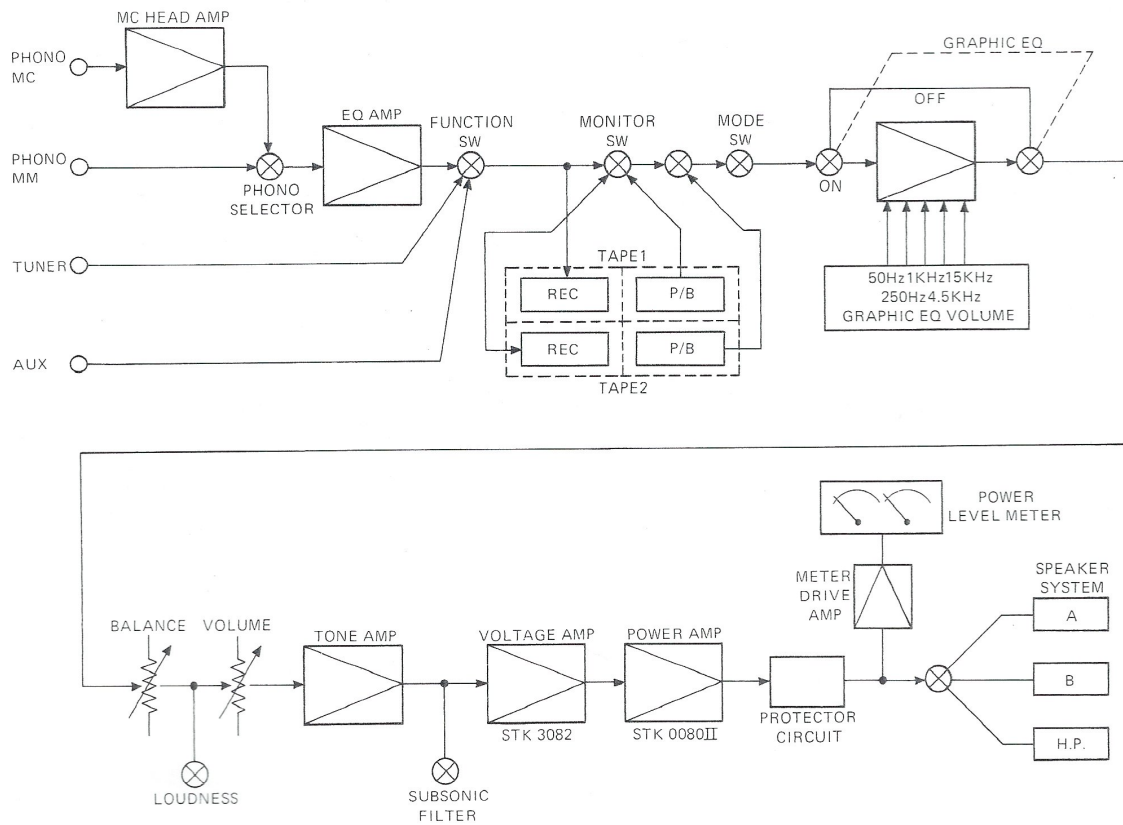
The first name in high fidelity

U.S.

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FUNCTIONAL BLOCK DIAGRAM

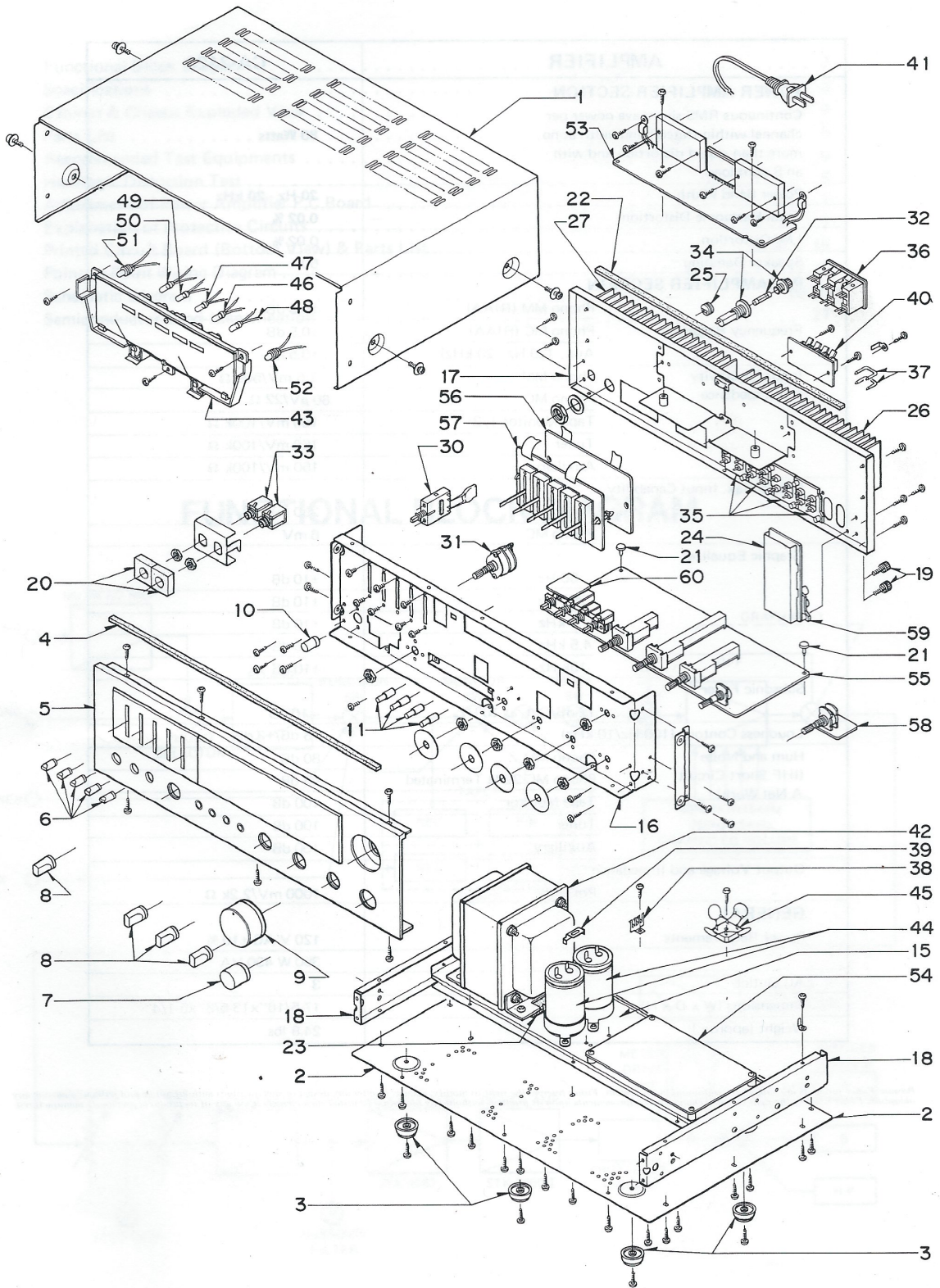


SPECIFICATIONS

AMPLIFIER	CA-2420	
POWER AMPLIFIER SECTION		
Continuous RMS sine wave power per channel within stated bandwidth at no more than stated distortion and with an 8 ohm load.		80 Watts
Power Band Width		20 Hz - 20 kHz
Total Harmonic Distortion		0.02 %
I.M. Distortion		0.02 %
Speaker Damping		50
PREAMPLIFIER SECTION		
Frequency Response	Phono MM (RIAA)	±0.5 dB
	Phono MC (RIAA)	±0.5 dB
	Aux. (20 Hz - 20 kHz)	±0.5 dB
Input Sensitivity and Impedance	Phono MM	2.5 mV/50k Ω
	Phono MC	60 μV/22 Ω
	Tape Monitor 1, 2	150 mV/100k Ω
	Tuner	150 mV/100k Ω
	Auxiliary	150 mV/100k Ω
Phono Max. Input Capability	Phono MM	230 mV
	Phono MC	6 mV
Graphic Equalizer	50 Hz	±10 dB
	250 Hz	±10 dB
	1 kHz	±10 dB
	4.5 kHz	±10 dB
	15k Hz	±10 dB
Subsonic Filter	12 dB/Oct. at 10 Hz	-10 dB
	Loudness Contour (100 Hz/10 kHz)	+8 dB/+3 dB
Hum and Noise (IHF Short Circuit, A Net Work)	Phono MM	80 dB
	Phono MC 22 Ω Terminated	65 dB
	Tape Monitor	100 dB
	Tuner	100 dB
	Auxiliary	100 dB
Output Voltage and Impedance	Pre Out	1000 mV/2.2k Ω
	GENERAL	
Power Requirements		120 V AC ±10 % 350 W 430 VA
AC Outlet		3
Dimensions (W x D x H)		17-5/16" x 13-5/8" x 5-1/4"
Weight (approx.)		24.8 lbs.

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.

CABINET & CHASSIS EXPLODED VIEW



PARTS LIST

PACKING PARTS LIST

Ref. No.	Parts Number	Description
	131 6 1139 78100	Box Corrugate-EXP
	131 6 2119 01362	Bag Polyethylene-EXP
	131 6 3009 28760	Pad (Right, Left)

ACCESSORIES PARTS LIST

Ref. No.	Parts Number	Description
	4 2342 00070	Fuse 8A
}	131 0 2013 11104	Sash Assy
	131 2 1311 44100	Sash (Bracket)
	131 2 4201 23500	Screw
	131 6 3069 16440	Patching Sheet
	131 2 1801 13900	Leg (Felt)
	131 6 4119 77200	Explanatory Booklet
	131 6 4319 10802	Service Station List
	131 6 4519 14400	Guarantee Card

CABINET PARTS LIST

Ref. No.	Parts Number	Description
1	131 2 1410 21700	Cover
2	131 2 1105 23600	Plate Bottom
3	131 2 1801 12900	Leg
4	131 2 5205 15300	Cushion

APPEARANCE PARTS LIST

Ref. No.	Parts Number	Description
5	131 0 1016 33500	Panel Decorative Assy
	131 2 1116 18200	Frame
	131 2 1203 46200	Panel Control
	131 2 1205 22000	Decorate Plate Dial
	131 2 5207 14200	Cloth
	131 2 6111 12600	Bushing
	131 2 6111 22200	Bushing
6	131 0 1001 45700	Knob (Slide VR)
7	131 0 1001 47901	Knob (Balance)
8	131 0 1001 48001	Knob (SP, Function)
9	131 0 1001 48202	Knob (Volume)
10	131 0 1001 49001	Knob (Power Push)
11	131 0 1001 49101	Knob (Push Switch)

CHASSIS PARTS LIST

Ref. No.	Parts Number	Description
15	* 131 2 3301 25400	Chassis
16	* 131 2 3305 26600	Panel Front
17	* 131 2 3306 29500	Panel Rear
18	* 131 2 3308 13400	Chassis Sub
19	131 2 4201 17800	Screw (GND)
20	131 2 4208 20400	Spacer
21	131 2 4221 00800	Rivet
22	131 2 5205 15300	Cushion
23	131 2 5205 22700	Cushion
24	131 2 6103 18700	Cover Shield
25	131 2 6111 11300	Bushing (Line Cord)
26	131 2 6201 26800	Plate Heat Sink
27	131 2 6201 26801	Plate Heat Sink

ELECTRICAL PARTS LIST

Ref. No.	Parts Number	Description
30	4 2312 02170	Switch Push Power
31	4 2312 02260	Switch Rotary (SP Selector)
32	4 2342 00070	Fuse 8A
33	4 2352 00030	Headphone Jack
34	4 2359 21110	Fuse Holder
35	4 2359 22710	Socket 4P
36	4 2359 23200	AC Outlet
37	4 2369 21220	Short Plug
38	4 2372 00140	Terminal GND
39	4 2372 00660	Terminal
40	4 2379 21560	Terminal 8P (SP Output)
41	4 2439 20720	Line Cord
42	4 2512 09200	Power Transformer
43	4 5112 00400	Meter VU
C01,02	C2HYDP103A	Ceramic 0.01 μ F 500V +100,-0%
	03,04	
	05	
44(C06,07)	4 2232 00230	Electrolytic 10000 μ F 67Vx2
C08	C1HYDZ473A	Ceramic 0.047 μ F 50V +80,-20%
45(D01)	DDD-S5VB20	Diode, S5VB20
46	4 6122 01300	Pilot Lamp (Phono, 6.3V 80 mA)
47	4 6122 00810	Pilot Lamp (Tuner, 6.3V 80 mA)
48	4 6122 01200	Pilot Lamp (Aux., 6.3V 80 mA)
49	4 6122 01300	Pilot Lamp (Tape, 6.3V 80 mA)
50	4 6122 01200	Pilot Lamp (Equal., 6.3V 80 mA)
51	4 6122 01120	Pilot Lamp (Meter, 8V 200 mA)
52	4 6122 00630	Pilot Lamp (Meter, 8V 200 mA)
53	* 131 0 4001 02510	Power AMP P.C.B. Assy
54	* 131 0 4001 02520	Power Supply P.C.B. Assy
55	* 131 0 4001 02530	Pre AMP P.C.B. Assy
56	* 131 0 4001 02540	Tone Control P.C.B. Assy
57	* 131 0 4001 02550	Tone Control VR P.C.B. Assy
58	* 131 0 4001 02560	Volume P.C.B. Assy
59	* 131 0 4001 02570	MC AMP P.C.B. Assy
60	* 131 0 4001 03050	Subsonic P.C.B. Assy

*—Not a service part.

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:

- 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
- GRAPHIC EQUALIZER 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 80 Watts RMS (25.3 V across the 8-ohm load). Harmonic Distortion Analyzer should measure 0.02 % 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 80 Watts at Left and Right Channels (25.3 volts across the 8-ohm loads). Harmonic Distortion Analyzer should measure 0.02 % 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

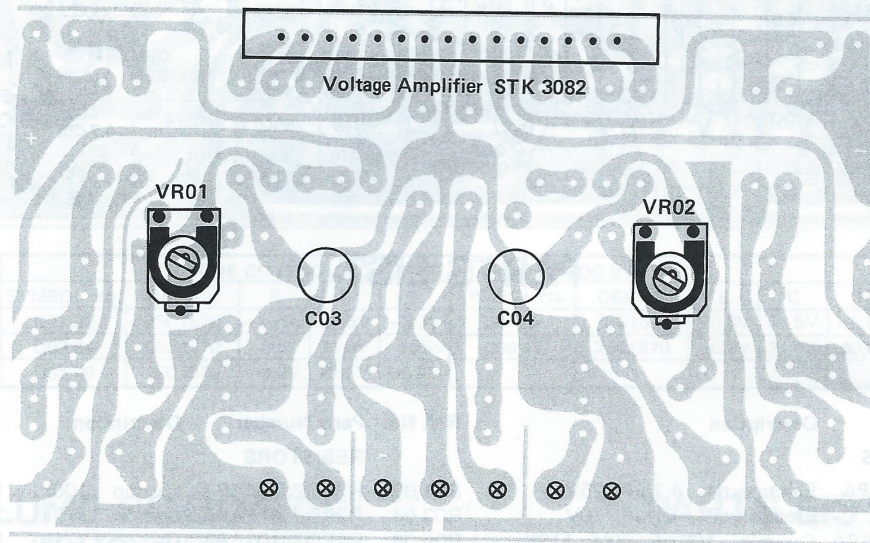
BEFORE ADJUSTMENT

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 VR01,02 in P.C.B. under the above condition until the output voltage becomes 0 V.

POWER AMPLIFIER BOARD LAYOUT



(TOP VIEW)

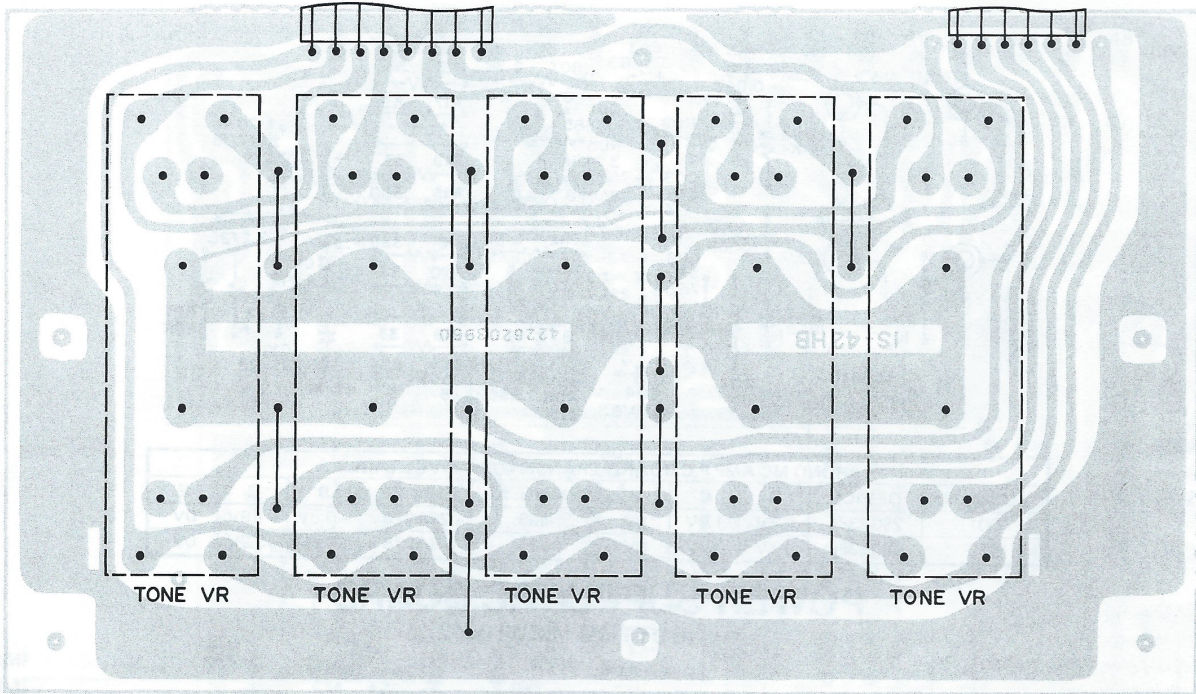
EXPLANATION OF PROTECTIVE CIRCUITS

*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.

TONE CONTROL VR P.C.BOARD

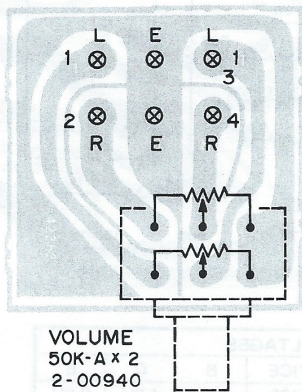
(BOTTOM VIEW)



TONE CONTROL P.C.BOARD TRANSISTOR DC VOLTAGES									
SYMBOL No.	DEVICE	B	C	E	SYMBOL No.	DEVICE	B	C	E
Q01,02	2SC1570	-1.25V	21.5V	-2.3V	Q07,08	2SC1570	-0.3V	21.5V	-0.9V
Q03,04	2SC1570	-0.5V	21.5V	-1.25V	Q09,10	2SC1570	-0.3V	21.5V	-0.9V
Q05,06	2SC1570	-0.3V	21.5V	-0.9V					

VOLUME P.C.BOARD

(BOTTOM VIEW)



PARTS LIST

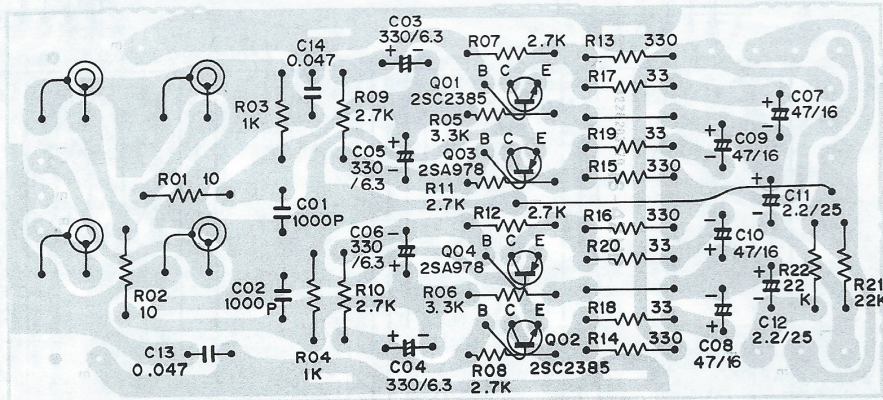
TONE CONTROL VR P.C.B. Assy
131 0 4001 02550

Ref. No.	Parts Number	Description
	4 2222 00130	VR Slide 250k-Wx2 (Tone Control)

VOLUME P.C.B. Assy
131 0 4001 02560

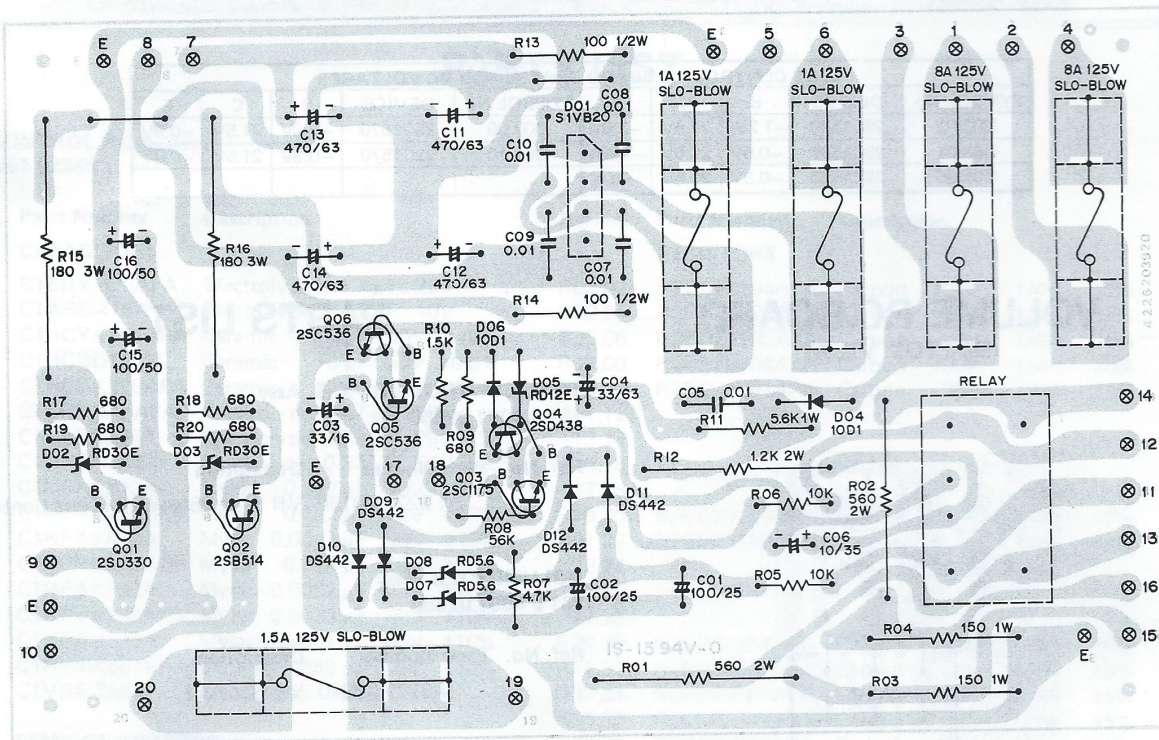
Ref. No.	Parts Number	Description
	4 2222 00940	VR 50k-Ax2

PHONO MC AMP P.C.BOARD (BOTTOM VIEW)



PHONO MC AMP P.C.BOARD TRANSISTOR DC VOLTAGES									
SYMBOL No.	DEVICE	B	C	E	SYMBOL No.	DEVICE	B	C	E
Q01	2SC2385	0.6V	1.9V	0V	Q03	2SA978	-0.6V	-1.9V	0V
Q02	2SC2385	0.6V	3.9V	0V	Q04	2SA978	-0.6V	-3.9V	0V

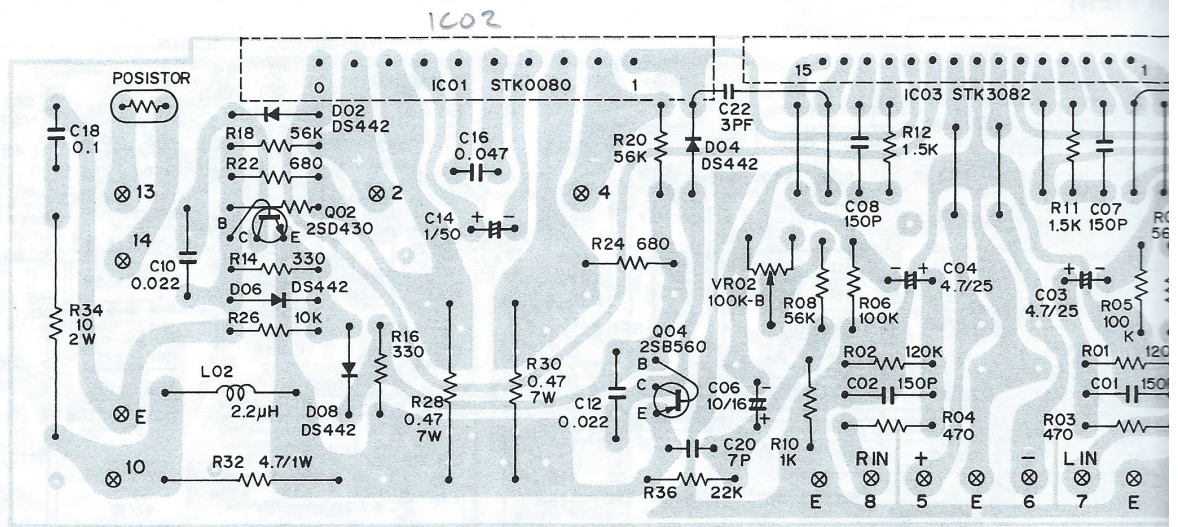
POWER SUPPLY P.C.BOARD (BOTTOM VIEW)



POWER SUPPLY P.C.BOARD TRANSISTOR DC VOLTAGES									
SYMBOL No.	DEVICE	B	C	E	SYMBOL No.	DEVICE	B	C	E
Q01	2SD330	30V	40V	29.4V	Q04	2SD438	1.3V	4.6V	0.6V
Q02	2SB514	-29.5V	-39V	-29V	Q05	2SC536	0V	4.5V	0V
Q03	2SC1175	-1.9V	4.6V	1.3V	Q06	2SC536	0V	4.5V	0V

POWER AMP PRINT

(BOTTOM)



PARTS LIST

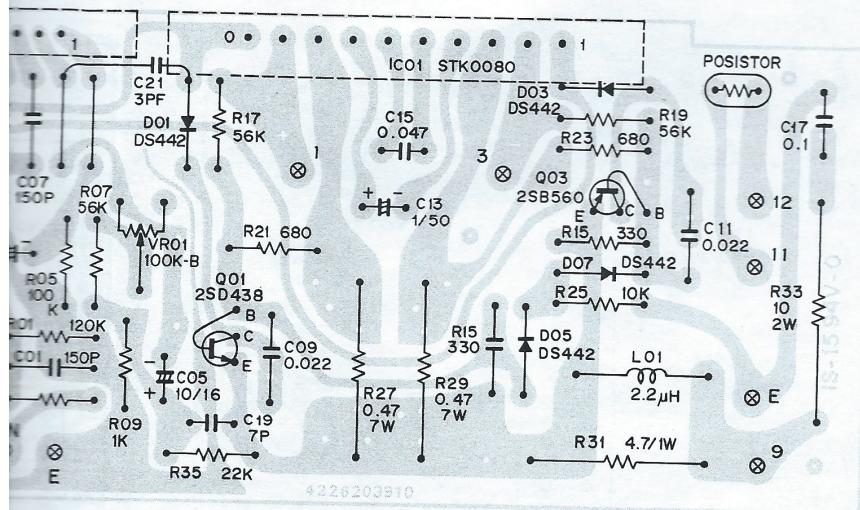
MC AMP P.C.B. Assy 131 0 4001 02570

Ref. No.	Parts Number	Description
	4 2352 00380	Pin Jack 4P
CAPACITORS		
C01,02	C1HYYZ102APA	Ceramic 0.001 μ F 50V +80,-20%
C03,04	C0JRE-337A	Electrolytic 330 μ F 6.3V
05,06		
C07,08	C1CRY-476APA	Electrolytic 47 μ F 16V
C09	C1CRE-476A	Electrolytic 47 μ F 16V
C10	C1CRY-476APA	Electrolytic 47 μ F 16V
C11,12	C1EUBM225A	Sint. Alu. 2.2 μ F 25V \pm 20%
C13,14	C1HYYZ473APA	Ceramic 0.047 μ F 50V +80,-20%
SEMICONDUCTOS		
Q01,02	TMM-2SC2385-F	TR 2SC2385 F, G
Q03,04	TMM-2SA978-F	TR 2SA978 F, G
RESISTORS		
R01,02	R2EDZJ100APA	Carbon 10 1/4W \pm 5%
R03,04	R2EDZJ102APA	Carbon 1k 1/4W \pm 5%
R05,06	R2EDZJ332APA	Carbon 3.3k 1/4W \pm 5%
R07,08	R2EDZJ272APA	Carbon 2.7k 1/4W \pm 5%
09,10		
11,12		
R13,14	R2EDZJ331APA	Carbon 330 1/4W \pm 5%
15,16		
R17,18	R2EDZJ330APA	Carbon 33 1/4W \pm 5%
19,20		
R21,22	R2EDZJ223APA	Carbon 22k 1/4W \pm 5%

POWER SUPPLY P.C.B. Assy 131 0 4001 02520

Ref. No.	Parts Number	Description
	4 2322 00090	Relay DC-24V
	4 2342 00010	Fuse 1A
	4 2342 00070	Fuse 8A
	4 2349 20321	Fuse 1.5A
	4 2379 21410	Fuse Hold Clip
CAPACITORS		
C01,02	C1EAEN107A	Electrolytic 100 μ F 25V \pm 30%
C03	C1CRE-336A	Electrolytic 33 μ F 16V
C04	C1JRE-336A	Electrolytic 33 μ F 63V
C05	C2HYDP103A	Ceramic 0.01 μ F 500V +100,-0%
C06	C1VRE-106A	Electrolytic 10 μ F 35V
C07,08	C2HYS103A	Ceramic 0.01 μ F 500V +100,-0%
09,10		
C11,12	C1JRE-477A	Electrolytic 470 μ F 63V
13,14		
C15,16	C1HRE-107A	Electrolytic 100 μ F 50V
SEMICONDUCTORS		
D01	DDD-S1VB20	Diode, S1VB20
D02,03	DNN-RD30E	Zener Diode, RD3.0E
D04	DCC-10D1----NA	Diode, 10D1
D05	DNN-RD12E	Zener Diode, RD12E
D06	DCC-10D1----NA	Diode, 10D1
D07,08	DNN-RD5.6E	Zener Diode, RD5.6E
D09,10	205 5 9040 44210	Diode, DS-442
11,12		
Q01	203 5 8570 33050	TR 2SD330 E, F
Q02	203 5 8530 51450	TR 2SB514 E, F
Q03	203 5 6701 17540	TR 2SC1175 D, E
Q04	203 5 6830 43840	TR 2SD438 D, E
Q05,06	203 5 5000 53660	TR 2SC536 F, G

PRINTED CIRCUIT BOARD (BOTTOM VIEW)



SYMBOL No.	DEVICE	B	C	E
Q01,02	2SD438	0.18V	2.5V	80mV
Q03,04	2SB560	-0.3V	-2.7V	80mV

SYMBOL No.	DEVICE	1	2	3	4	5	6	7	8	9	10
IC01,02	STK-0080II	-2.9V	-58V	-44mV	-1.8V	-0.6V	0.5V	1.8V	-17mV	58V	2.9V

Ref. No. Parts Number Description

RESISTORS

R01,02	R3DXBJ561A	Oxide Metal Film 560 2W ±5%
R03,04	R3AXBJ151A	Oxide Metal Film 150 1W ±5%
R05,06	R2EDZJ103APA	Carbon 10k 1/4W ±5%
R07	R2EDZJ472APA	Carbon 4.7k 1/4W ±5%
R08	R2EDZJ563APA	Carbon 56k 1/4W ±5%
R09	R2EDZJ681APA	Carbon 680 1/4W ±5%
R10	R2EDZJ152APA	Carbon 1.5k 1/4W ±5%
R11	R3AXBJ562A	Oxide Metal Film 5.6k 1W ±5%
R12	R3DXBJ122A	Oxide Metal Film 1.2k 2W ±5%
R13,14	R2HXBJ101A	Oxide Metal Film 100 1/2W ±5%
R15,16	R3WXB181A	Oxide Metal Film 180 3W ±5%
R17,18	R2EDZJ681APA	Carbon 680 1/4W ±5%
19,20		

POWER AMP P.C.B. Assy 131 0 4001 02510

Ref. No.	Parts Number	Description
L01,02	4 2532 00050	RF Coil 2.2 μH
VR01,02	4 2222 00960	Semi-Fixed 100k-B

CAPACITORS

C01,02	C1HCZK151BPA	Ceramic 150 pF
C03,04	C1ERY-475APA	Electrolytic 4.7 μF 25V
C05,06	C1CRY-106APA	Electrolytic 10 μF 16V
C07,08	C1HCZK151BPA	Ceramic 150 pF
C09,10	C1ECZN223XPA	Ceramic 22000 pF 25V ±30%
11,12		
C13,14	C1HRY-105APA	Electrolytic 1 μF 50V
C15,16	C1HYYZ473APA	Ceramic 0.047 μF 50V +80,-20%
C17,18	C1HFAK104A	Mylar 0.1 μF 50V ±10%
C19,20	C1HCDD070SL	Ceramic 7 pF 50V ±0.5%
C21,22	C1HCDD030SL	Ceramic 3 pF 50V ±0.5%

Ref. No. Parts Number Description

SEMICONDUCTORS

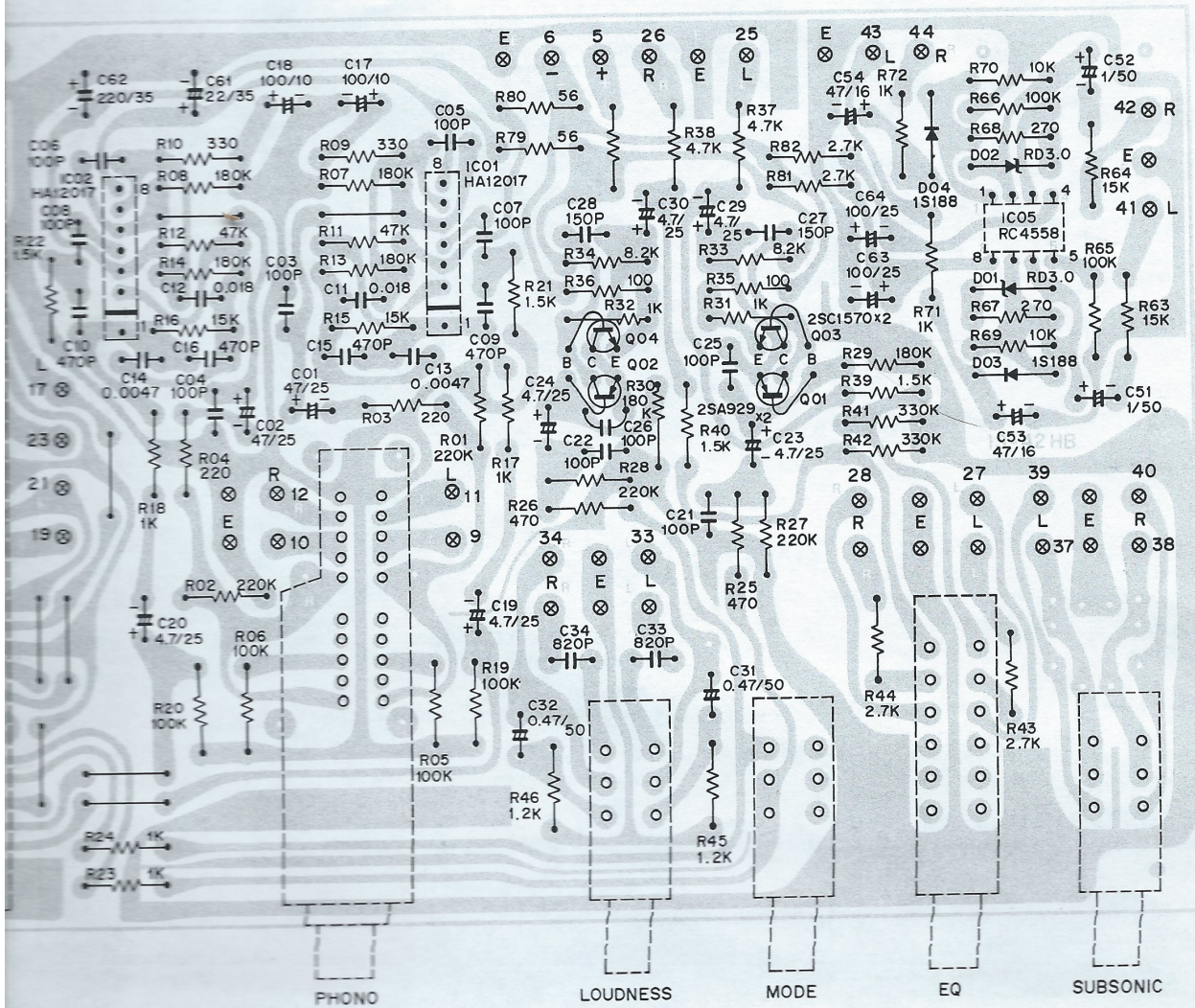
D01,02	205 5 9040 44210	Diode, DS-442
03,04		
05,06		
07,08		
IC01,02	206 5 5880 08010	IC, STK0080II
IC03	206 5 5053 08210	IC, STK3082
	H11-PTH487A-BE	Posistor PTH487A
Q01,02	203 5 6830 43840	TR 2SD438D, E
Q03,04	203 5 6840 56040	TR 2SB560D, E

RESISTORS

R01,02	R2EDZJ124APA	Carbon 120k 1/4W ±5%
R03,04	R2EDZJ471APA	Carbon 470 1/4W ±5%
R05,06	R2EDZJ104APA	Carbon 100k 1/4W ±5%
R07,08	R2EDZJ563APA	Carbon 56k 1/4W ±5%
R09,10	R2EDZJ102APA	Carbon 1k 1/4W ±5%
R11,12	R2EDZJ152APA	Carbon 1.5k 1/4W ±5%
R13,14	R2EDZJ331APA	Carbon 330 1/4W ±5%
15,16		
R17,18	R2EDZJ563APA	Carbon 56k 1/4W ±5%
19,20		
R21,22	R2EDZJ681APA	Carbon 680 1/4W ±5%
23,24		
R25,26	R2EDZJ103APA	Carbon 10k 1/4W ±5%
R27,28	4 2219 20420	Cemen 0.47 7W ±10%
29,30		
R31,32	R3AXBJ4R7A	Oxide Metal Film 4.7k 1W ±5%
R33,34	R3DXBJ100A	Oxide Metal Film 10 2W ±5%
R35,36	R2EDZJ223APA	Carbon 22 1/4W ±5%

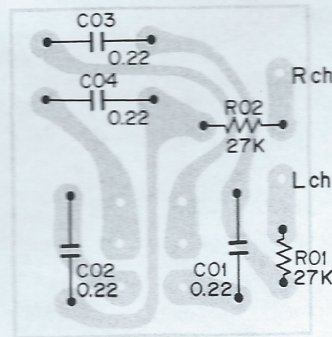
D CIRCUIT BOARD

(TOP VIEW)



SUBSONIC P.C.BOARD

(BOTTOM VIEW)



P.C. BOARD IC PIN NUMBERS DC VOLTAGES							
1	2	3	4	5	6	7	8
0V	-	18.5V	-22.5V	-21.5V	0V	30mV	23V
-0.1V	-	-0.1V	-22.5V	-21V	-27mV	-47mV	22.5V

PARTS LIST

PRE AMP P.C.B. Assy 131 0 4001 02530

Ref. No.	Parts Number	Description
S01	4 2312 02240	Rotary Slide (Phono Selector)
S02	4 2312 02230	Rotary Slide (Function)
S03	4 2312 02250	Rotary Slide (Tape)
S04	4 2312 02270	Switch Push 4 key
VR01	4 2222 00950	VR 100k-Wx1 (Balance)

CAPACITORS

C01,02	C1ERY-475LPA	Electrolytic 4.7 μ F 25V
C03	C1HCYK101APA	Ceramic 100 pF 50V \pm 10%
C04	C1HCSK101SL	Ceramic 100 pF 50V \pm 10%
C05,06	C1CHYK101APA	Ceramic 100 pF 50V \pm 10%
07,08		
C09,10	C1HYK471RPA	Ceramic 470 pF 50V \pm 10%
C11,12	C1HFAJ183A	Mylar 0.018 μ F 50V \pm 5%
C13,14	C1HFAJ472A	Mylar 0.0047 μ F 50V \pm 5%
C15,16	C1HYK471RPA	Ceramic 470 pF 50V \pm 10%
C17,18	C1ARE-107A	Electrolytic 100 μ F 10V
C19,20	C1ERY-475LPA	Electrolytic 4.7 μ F 25V
C21,22	C1HCYK101APA	Ceramic 100 pF 50V \pm 10%
C23,24	C1ERY-475APA	Electrolytic 4.7 μ F 25V
C25,26	C1HCYK101APA	Ceramic 100 pF 50V \pm 10%
C27,28	C1HCSK151SL	Ceramic 150 pF 50V \pm 10%
C29,30	C1ERY-475APA	Electrolytic 4.7 μ F 25V
C31,32	C1HAEN474A	Electrolytic 0.47 μ F 50V \pm 30%
C33,34	C1HYK821RPA	Ceramic 820 pF 50V \pm 10%
C35,36	C1ERY-475APA	Electrolytic 4.7 μ F 25V
C37,38	C1HCSK101SL	Ceramic 100 pF 50V \pm 10%
C39,40	C1HCYK101APA	Ceramic 100 pF 50V \pm 10%
C41,42	C1HCDD100SL	Ceramic 10 pF 50V \pm 0.5%
C43,44	C1ARE-107A	Electrolytic 100 μ F 10V
C45,46	C1ERY-475APA	Electrolytic 4.7 μ F 25V
C47,48	C1HFAK472A	Mylar 0.0047 μ F 50V \pm 10%
C51,52	C1HRY-105APA	Electrolytic 1 μ F 50V
C53,54	C1CRY-476APA	Electrolytic 47 μ F 16V
C55,56	C1VRE-477A	Electrolytic 470 μ F 35V
C57,58	C1ARE-108A	Electrolytic 1000 μ F 10V
C59,60	C1VRE-107A	Electrolytic 100 μ F 35V
C61,62	C1VRE-227A	Electrolytic 220 μ F 35V
C63,64	C1ERE-107A	Electrolytic 100 μ F 25V

SEMICONDUCTORS

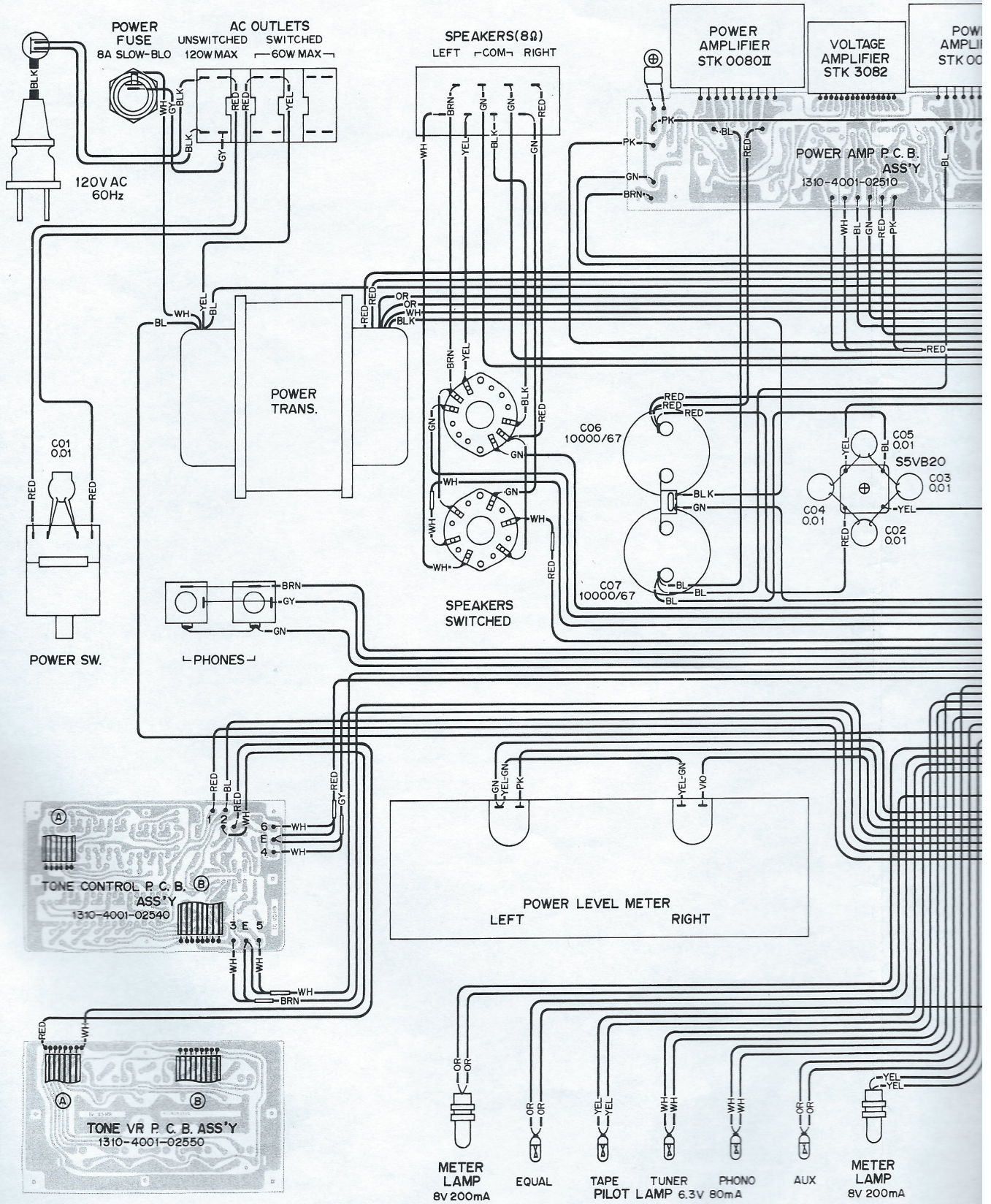
D01,02	DNN-RD3.0E--BX	Diode, RD3.0E
D03,04	202 5 9110 18820	Diode, 1S188FM1
IC01,02	IKK-HA12017	IC, HA-12017
IC03,04	IKK-HA1457	IC, HA1457
IC05	III-RC4558	IC, RC4558
Q01,02	203 5 7000 92970	TR 2SA929G, H
Q03,04	203 5 5251 57070	TR 2SC1570G, H

Ref. No.	Parts Number	Description
RESISTORS		
R01,02	R2EDZJ224APA	Carbon 220k 1/4W \pm 5%
R03,04	R2EDZJ221APA	Carbon 220 1/4W \pm 5%
R07,08	R2EDZJ184APA	Carbon 180k 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	R2EDZJ102APA	Carbon 1k 1/4W \pm 5%
R25,26	R2EDZJ471APA	Carbon 470 1/4W \pm 5%
R27,28	R2EDZJ224APA	Carbon 220k 1/4W \pm 5%
R29,30	R2EDZJ184APA	Carbon 180k 1/4W \pm 5%
R31,32	R2EDZJ102APA	Carbon 1k 1/4W \pm 5%
R33,34	R2EDZJ822APA	Carbon 8.2k 1/4W \pm 5%
R35,36	R2EDZJ101APA	Carbon 100 1/4W \pm 5%
R37,38	R2EDZJ472APA	Carbon 4.7k 1/4W \pm 5%
R39,40	R2EDZJ152APA	Carbon 1.5k 1/4W \pm 5%
R41,42	R2EDZJ334APA	Carbon 330k 1/4W \pm 5%
R43,44	R2EDZJ272APA	Carbon 2.7k 1/4W \pm 5%
R45,46	R2EDZJ122APA	Carbon 1.2k 1/4W \pm 5%
R47,48	R2EDZJ104APA	Carbon 100k 1/4W \pm 5%
R49,50	R2EDZJ471APA	Carbon 470 1/4W \pm 5%
R51,52	R2EDZJ104APA	Carbon 100k 1/4W \pm 5%
R53,54	R2EDZJ331APA	Carbon 330 1/4W \pm 5%
R55,56	R2EDZJ332APA	Carbon 3.3k 1/4W \pm 5%
R57,58	R2EDZJ471APA	Carbon 470 1/4W \pm 5%
R59,60	R2EDZJ104APA	Carbon 100k 1/4W \pm 5%
R63,64	R2EDZJ153APA	Carbon 15k 1/4W \pm 5%
R65,66	R2EDZJ104APA	Carbon 100k 1/4W \pm 5%
R67,68	R2EDZJ271APA	Carbon 270 1/4W \pm 5%
R69,70	R2EDZJ103APA	Carbon 10k 1/4W \pm 5%
R71,72	R2EDZJ102APA	Carbon 1k 1/4W \pm 5%
R73,74	R3AXBJ820A	Oxide Metal Film 82 1W \pm 5%
R75,76	R3AXBJ102A	Oxide Metal Film 1k 1W \pm 5%
R77,78	R2EDZJ821APA	Carbon 820 1/4W \pm 5%
R79,80	R2EDZJ560APA	Carbon 56 1/4W \pm 5%
R81,82	R2EDZJ272APA	Carbon 2.7k 1/4W \pm 5%
R83,84	R2EDZJ120APA	Carbon 12 1/4W \pm 5%

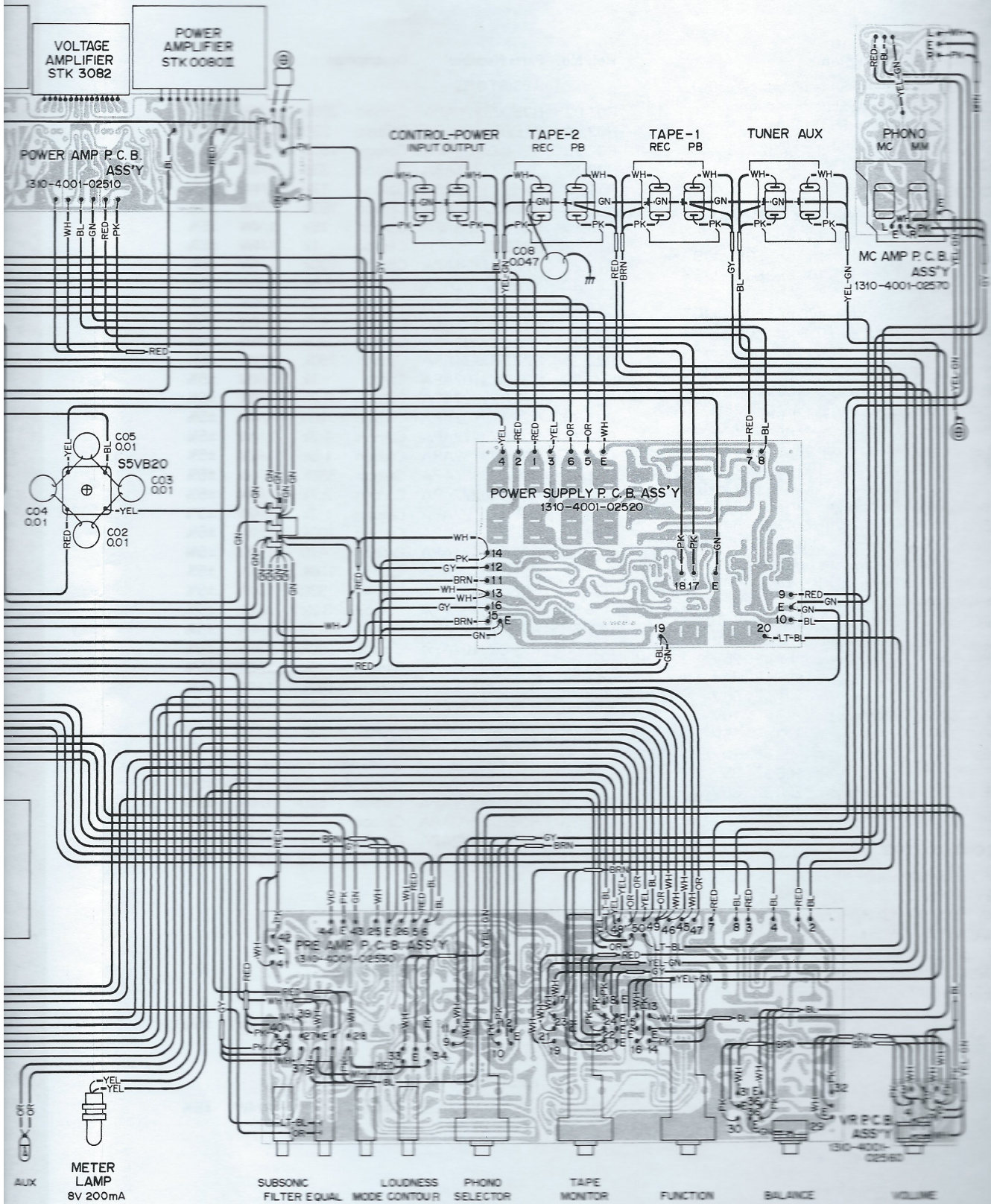
SUBSONIC P.C.B. Assy 131 0 4001 03050

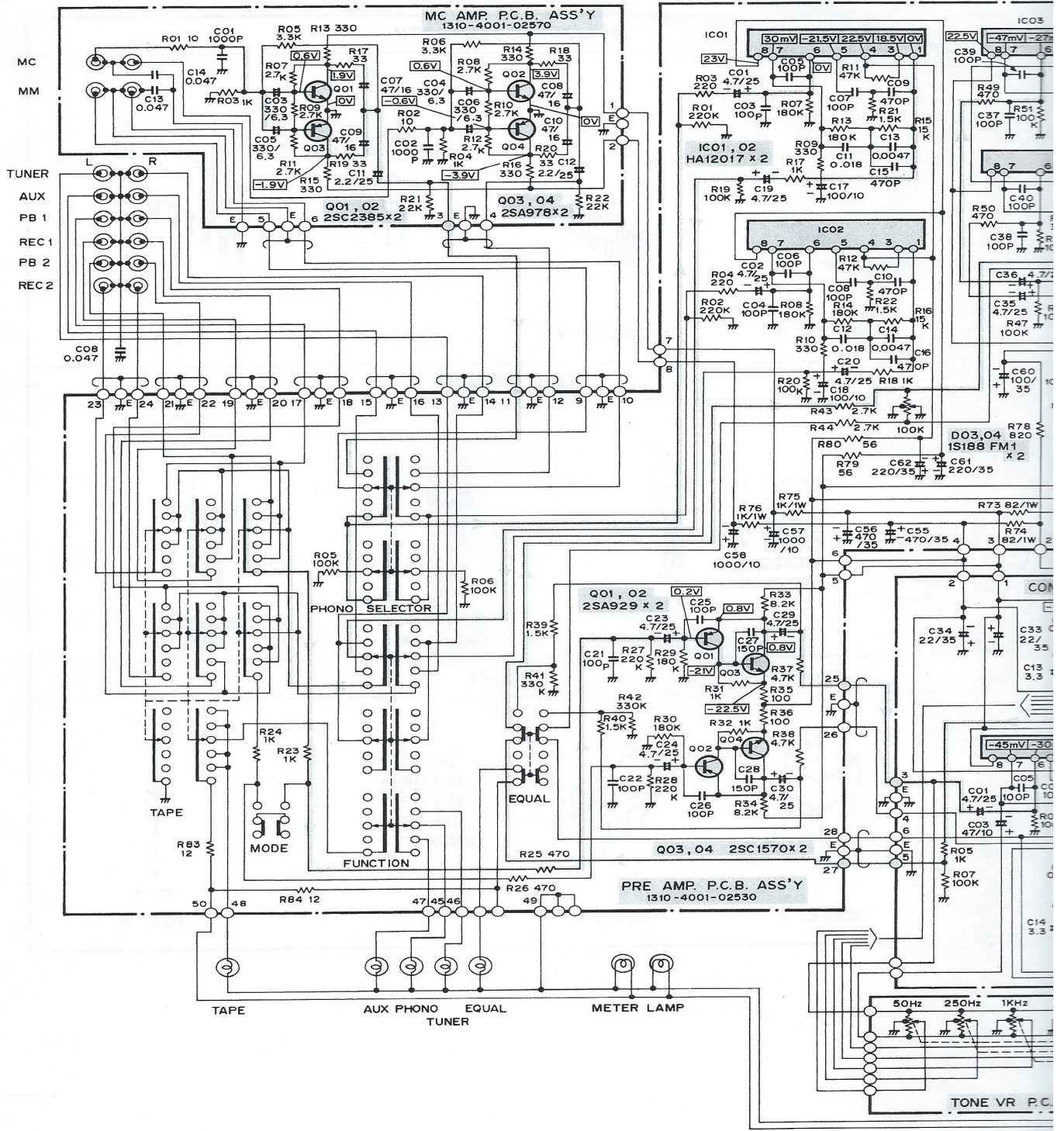
Ref. No.	Parts Number	Description
CAPACITORS		
C01,02	C1HFRJ224A	Mylar 0.22 μ F 50V \pm 5%
03,04		
RESISTORS		
R01,02	R2EDUJ273A	Carbon 27k 1/4W \pm 5%

POINT TO POINT WIRING



POINT WIRING DIAGRAM

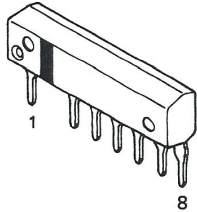




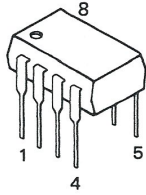
- NOTES:**
1. All resistors values are indicated in "ohm" (K=10³, M=10⁶).
 2. All capacitors values are indicated in "μF" (P=10⁻¹²).
 3. All voltages indicated on the schematics are measured under the following conditions.
 - a. Use a V.T.V.M.

SEMICONDUCTOR LEAD IDENTIFICATION

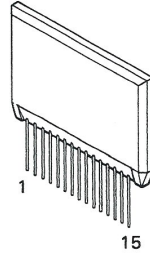
INTEGRATED CIRCUITS



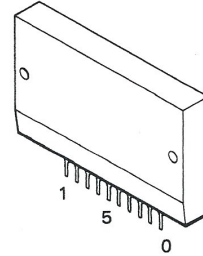
- HA1457
- HA12017



- RC4558

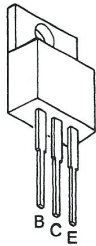


- STK3082



- STK0080II

TRANSISTORS



- 2SD330
- 2SB514

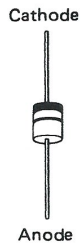


- 2SD438
- 2SB560

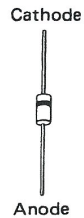


- 2SC1570
- 2SC1175
- 2SC536
- 2SA929
- 2SA978
- 2SC2385

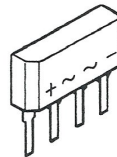
DIODES



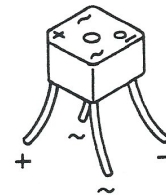
- 10D1



- DS-442
- RD-5.6E
- RD-3.0E
- RD-12E
- 1S188FM



- S1VB20



- S5VB20