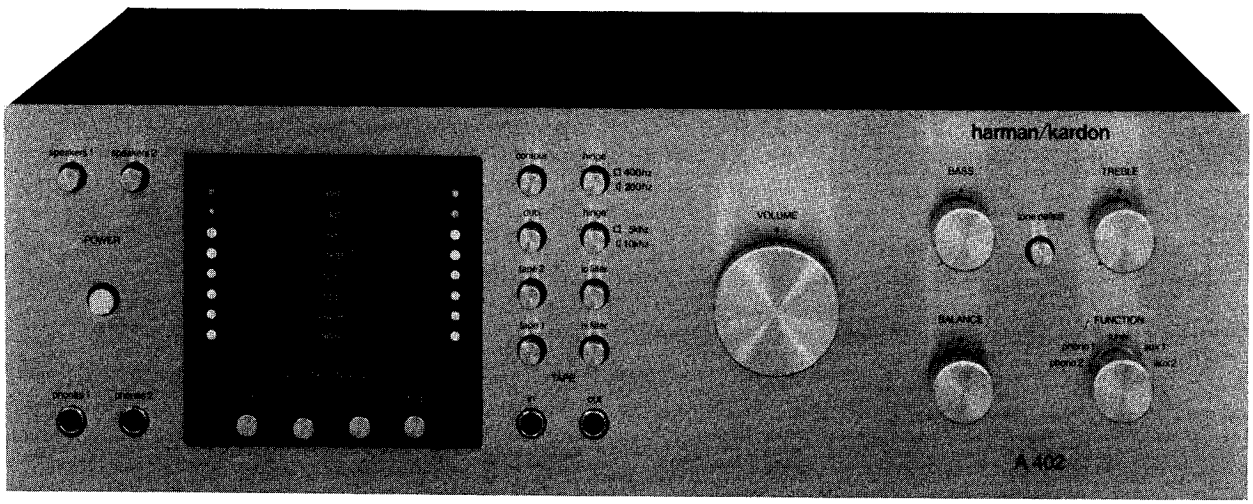
HiFi ENGINE®

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please visit www.hifiengine.com

The Harman/Kardon Model A-402

Amplifier/Preamplifier

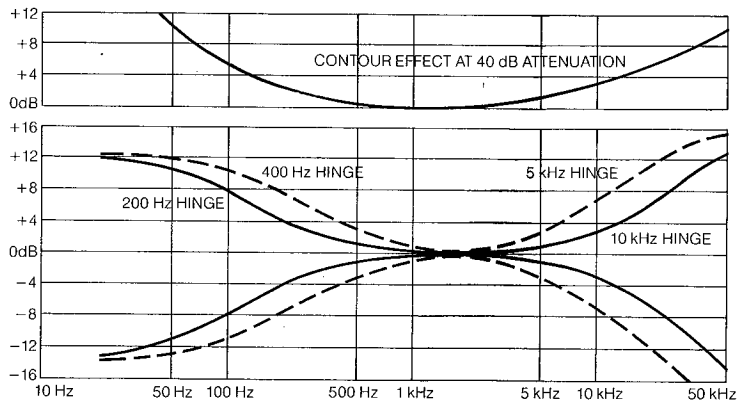
Technical Manual



harman/kardon

SPECIFICATIONS

Power Output:	40 watts RMS per channel both channels driven into 8 ohms from 20 Hz to 20kHz with less than 0.1% thd
Power Bandwidth:	below 10Hz to 60kHz with less than 0.1% thd, both channels driven simultaneously into 8 ohms, at 20 watts per channel
Frequency Response:	below 4Hz to 160kHz –3dB below 4Hz to 100kHz – 1dB
Square Wave Rise Time:	less than 2.0 microseconds
Square Wave Tilt:	less than 5% at 20Hz
Total Harmonic Distortion:	less than 0.1% from 250 milliwatts to 40 watts rms, both channels driven simultaneously into 8 ohms. 20Hz to 20kHz
Intermodulation Distortion: (SMPTE):	less than 0.8% at 40 watts less than 0.4% at 1 watt
System Hum and Noise:	better than 100dB below 40 watts (power amplifier)
Damping Factor:	greater than 50, 1kHz at 1 watt
Power Amp Input Impedance:	33k ohms
Power Amp Square **Wave Rise Time:**	1.5 microseconds
Preamp Input Sensitivity:	125 millivolts, aux 125 millivolts, tape mon 2.2 millivolts, phono
Preamp Input Impedance:	33k ohms, aux 33k ohms, tape mon 47k ohms, phono
Preamp Input S/N Ratio:	–77dB, aux –77dB, tape mon –69dB, phono
Preamp Harmonic Distortion:	0.1%, aux 0.1%, tape mon 0.5%, phono
Preamp Output Impedance:	less than 600 ohms
Phono Input Overload:	90 millivolts
RIAA Equalization:	±1.0dB, 20Hz to 20kHz
High Cut Filter:	–3dB at 3.5kHz 6dB per octave slope
Low Cut Filter:	–3dB at 65Hz 12dB per octave slope
Dimensions:	15½" W x 14¾" D x 5¼" H (394 mm x 375 mm x 134 mm)
Weight:	24 lbs 2 oz (11.0 kg)



TYPICAL A402 BASS, TREBLE AND CONTOUR EFFECT

PRECAUTIONS

1. Always disconnect the chassis from power line when soldering. Turning the power switch OFF is not enough. Power line leakage passing through the heating element may destroy the transistors.

2. Never attempt to do any work on the transistor amplifiers without first disconnecting the AC line cord and waiting until the power supply filter capacitors have discharged.

3. Replacement for output and driver transistors, if necessary, must be made from the same beta group as the original type.

4. If one output transistor burns out (open or short) always remove all the output transistors in that channel and check the bias adjustment, the control and other parts in the network with an ohmmeter before inserting a new transistor. All transistors in one channel will be destroyed if the base biasing circuit is open on the emitter end.

5. When mounting a replacement power transistor, be sure that the bottom of the flange, the mica insulators and the surface of the heat sink are free of foreign matter, for they may cause transistor failure.

6. Silicon grease must be applied between the transistor and the mica insulator, and between the mica insulator and the heat sink for better heat conduction.

7. Fuses must be replaced with size and type indicated. Use of other types can expose components to destructive current levels.

ALIGNMENT PROCEDURES

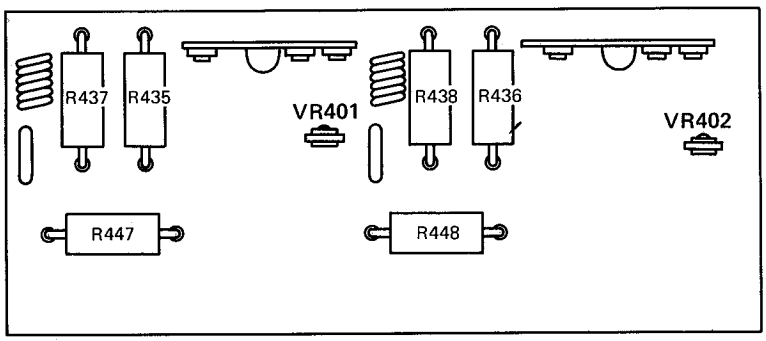
POWER AMPLIFIER IDLING ADJUSTMENT

INSTRUMENTS: DC VTVM

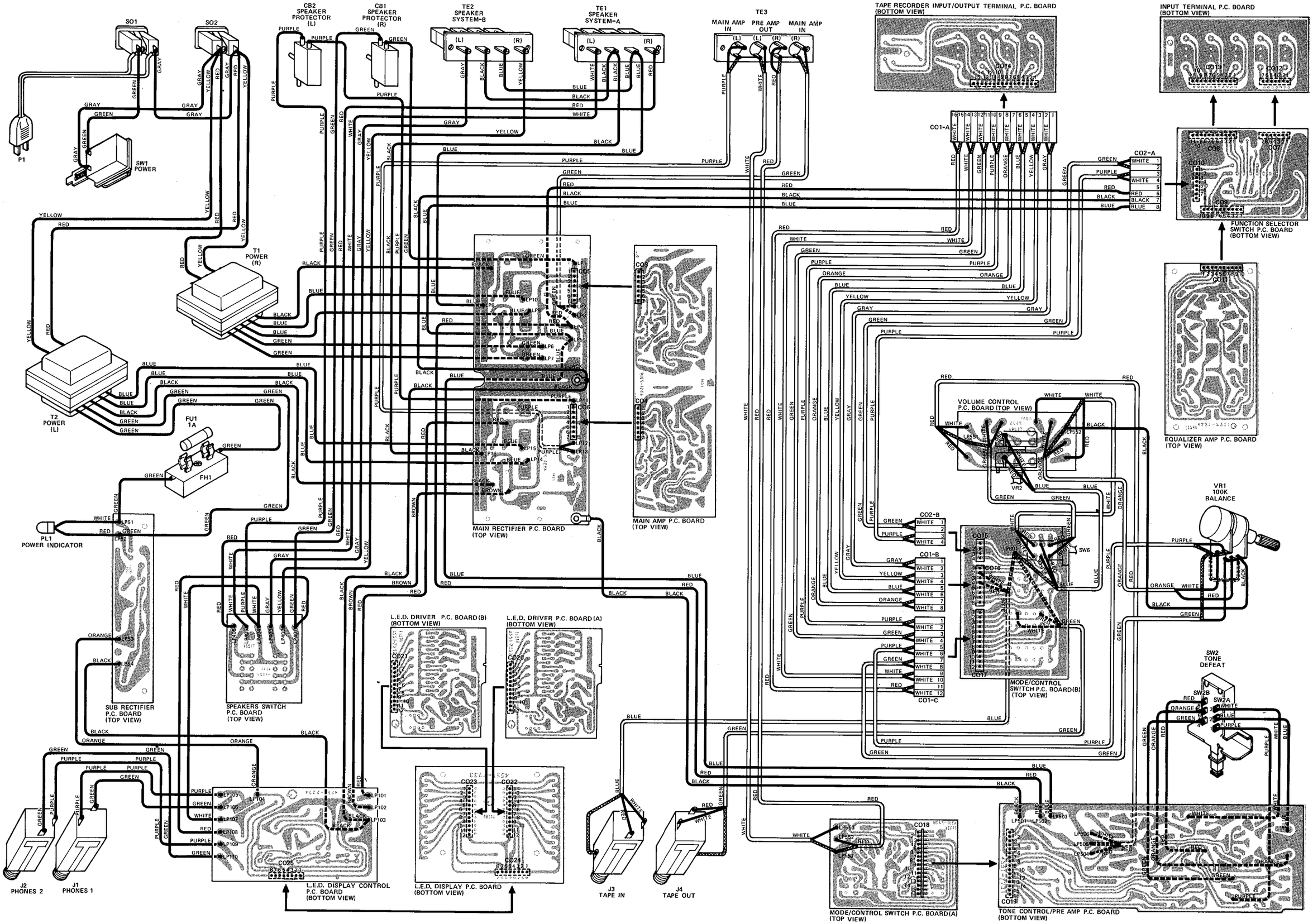
NOTES: Set Function Selector switch ot AUX position.
Set Volume Control to minimum and set Tone, Balance Control to mid position.
Set Mode/Control switch to OFF position.
Set Speaker switch to ON position.
Set Display Control switch to OFF position.
Connect 8 ohm (50 W) resistor across left and right speaker terminals.

Step	DC VOLTMETER CONNECTION	ADJUST	ADJUST FOR
1	Across R435 Resistor	VR401	15mV ±5mV
2	Across R436 Resistor	VR402	15mV ±5mV

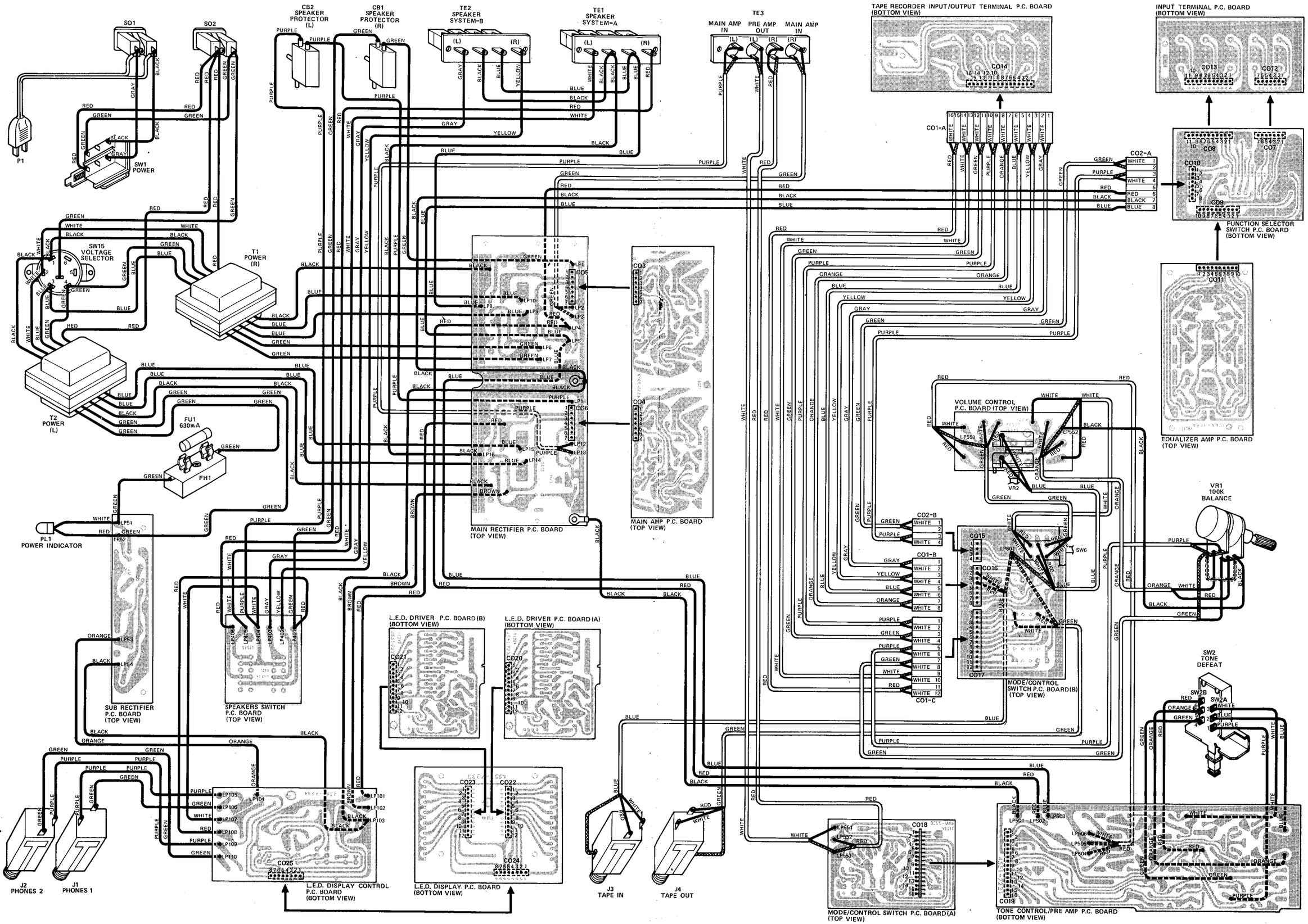
ALIGNMENT POINT
POWER AMPLIFIER IDLING ADJUSTMENT



WIRING DIAGRAM – REGULAR



WIRING DIAGRAM – MULTIVOLTAGE



SCHEMATIC NOTES & VOLTAGES

VOLTAGE CHART

AC120V	Volume Control at Minimum
No Signal	Tone Control at Mechanical Center
Chassis Ground	L.E.D. Display Control switch to TEST

+B1	+37.72V	+B4	+20.44V
+B2	+37.72V	+B5	+18.55V
+B3	+5.75V	+B6	+11.69V
−B1	−37.72V	−B4	−20.44V
−B2	−37.72V	−B5	−18.55V
−B3	0V	−B6	−11.69V

	base	emitter	collector
Q1	−0.61V	0V	−0.18V
Q2	6.13V	5.75V	9.46V
Q101,201	11.64V	11.01V	11.74V
Q102,202	1.32V	0V	0.69V
Q103,203	1.32V	0V	0.69V
Q104,204	1.34V	0V	0.69V
Q105,205	1.34V	0V	0.69V
Q106,206	0.77V	0V	0.08V
Q107,207	1.30V	0V	0.71V
Q108,208	1.31V	0V	0.71V
Q109,209	1.34V	0V	0.70V
Q401,402	−0.04V	−0.61V	36.65V
Q402,403	−0.03C	−0.60V	36.64V
Q405,406	−35.60V	−36.30V	−14.19V
Q407,408	36.93V	37.60V	0.61V
Q409,410	0.61V	0.02V	−0.63V
Q411,412	−36.22V	−36.90V	−0.63V
Q413,414	−0.63V	−0.01V	−37.00V
Q415,416	0.61V	0.03V	36.72V
Q417,418	36.71V	37.36V	0.02V
Q419,420	−36.70V	−37.29V	0.02V
Q501,502	0.01V	0.05V	−18.03V
Q503,504	−18.03V	−18.65V	1.31V
Q505,506	0.60V	0.03V	5.60V
Q507,508	5.60V	4.82V	18.45V
Q509,510	0V	−0.55V	17.01V
Q511,512	17.01V	17.70V	−0.57V
Q701,702	0V	0.57V	−11.22V
Q703,704	−11.22V	−11.90V	0V
Q705,706	−0.51V	−1.15V	15.26V

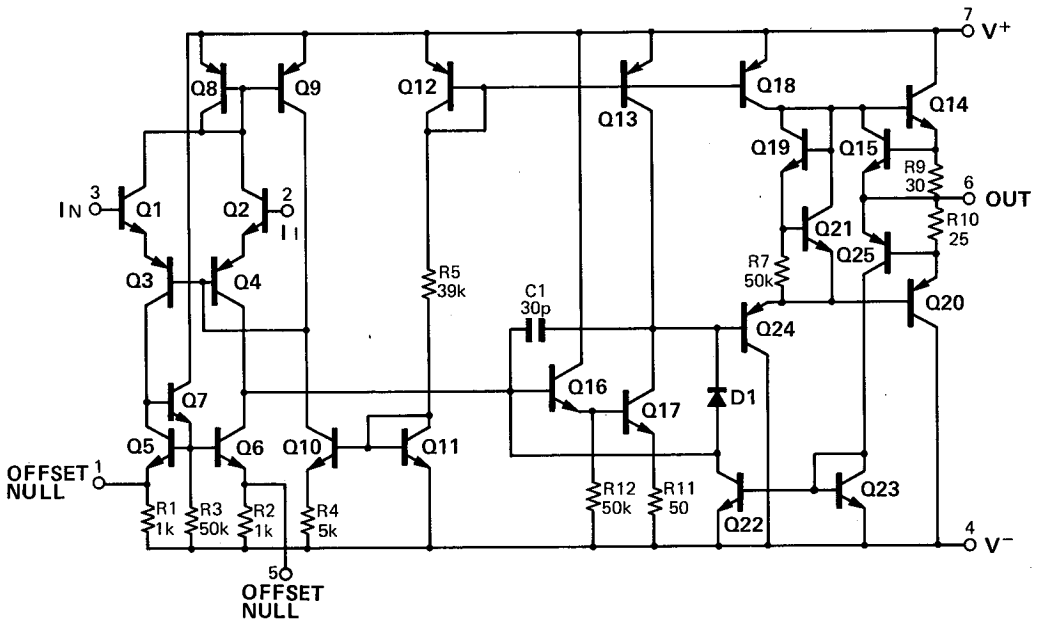
IC101, 201

1	−11.79V
2	+ 1.18V
3	+ 4.98V
4	−11.79V
5	−11.79V
6	+10.76V
7	+11.74V
8	+ 0.05V

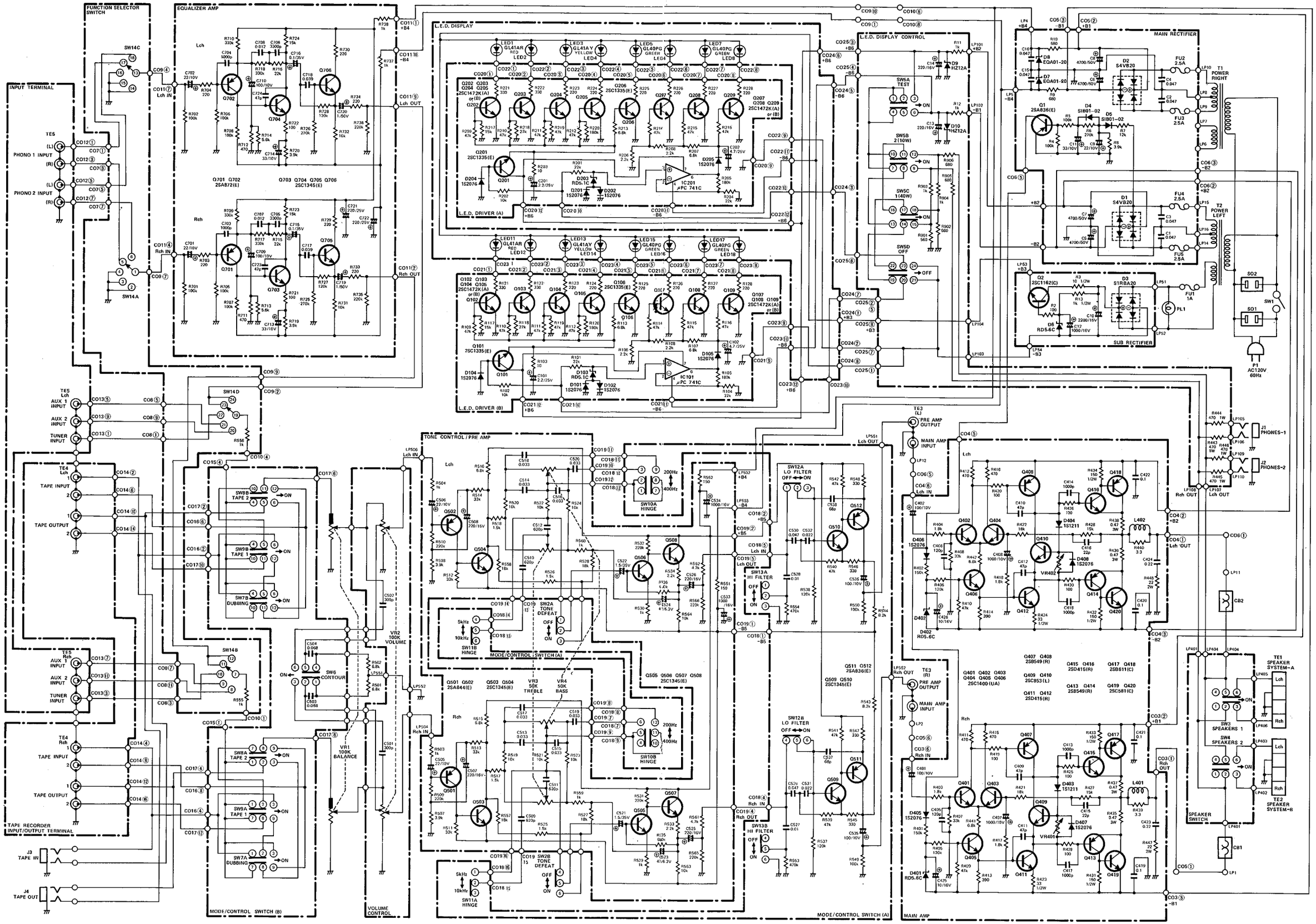
NOTES: Unless otherwise specified

1. All resistors are 1/4 watt, ±5%.
   Values are in ohms. k=1000 M=1000k
2. All capacitances values are in UF.
   PF=UUF
3. Function Selector switch (SW14) is in PHONO 1 position.

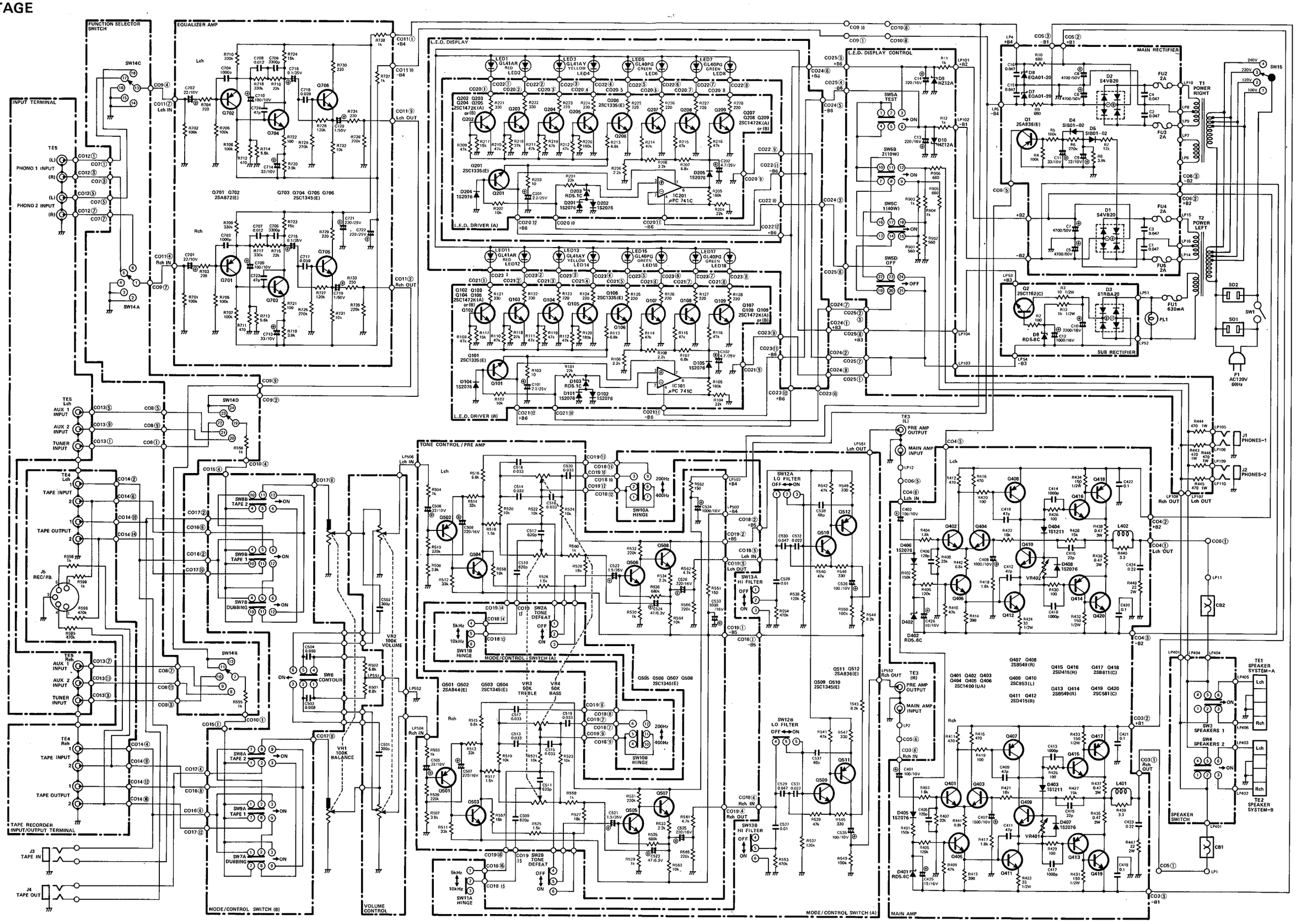
SCHEMATIC DIAGRAM
1C101 & 1C201



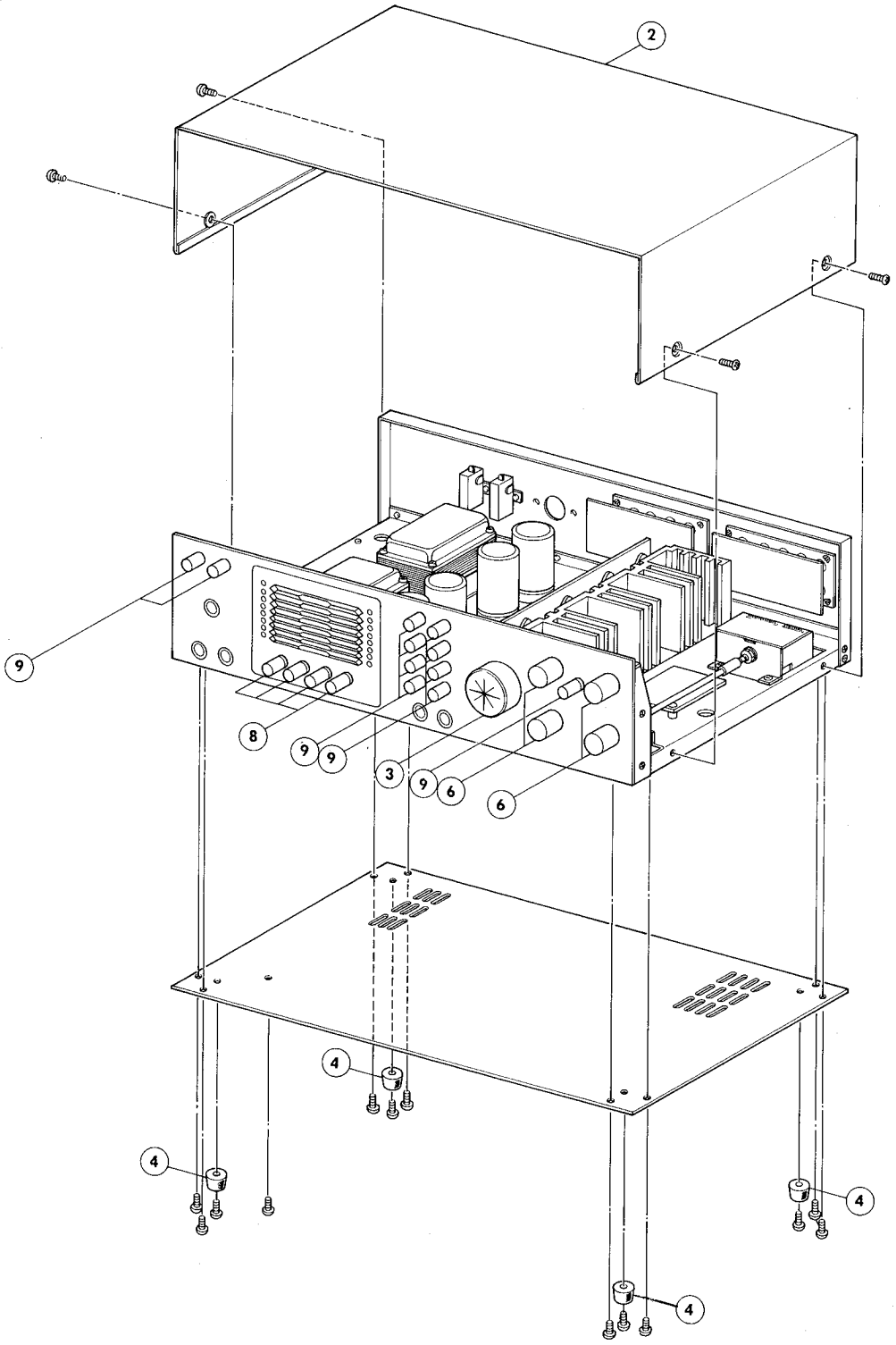
SCHEMATIC DIAGRAM – A402
REGULAR



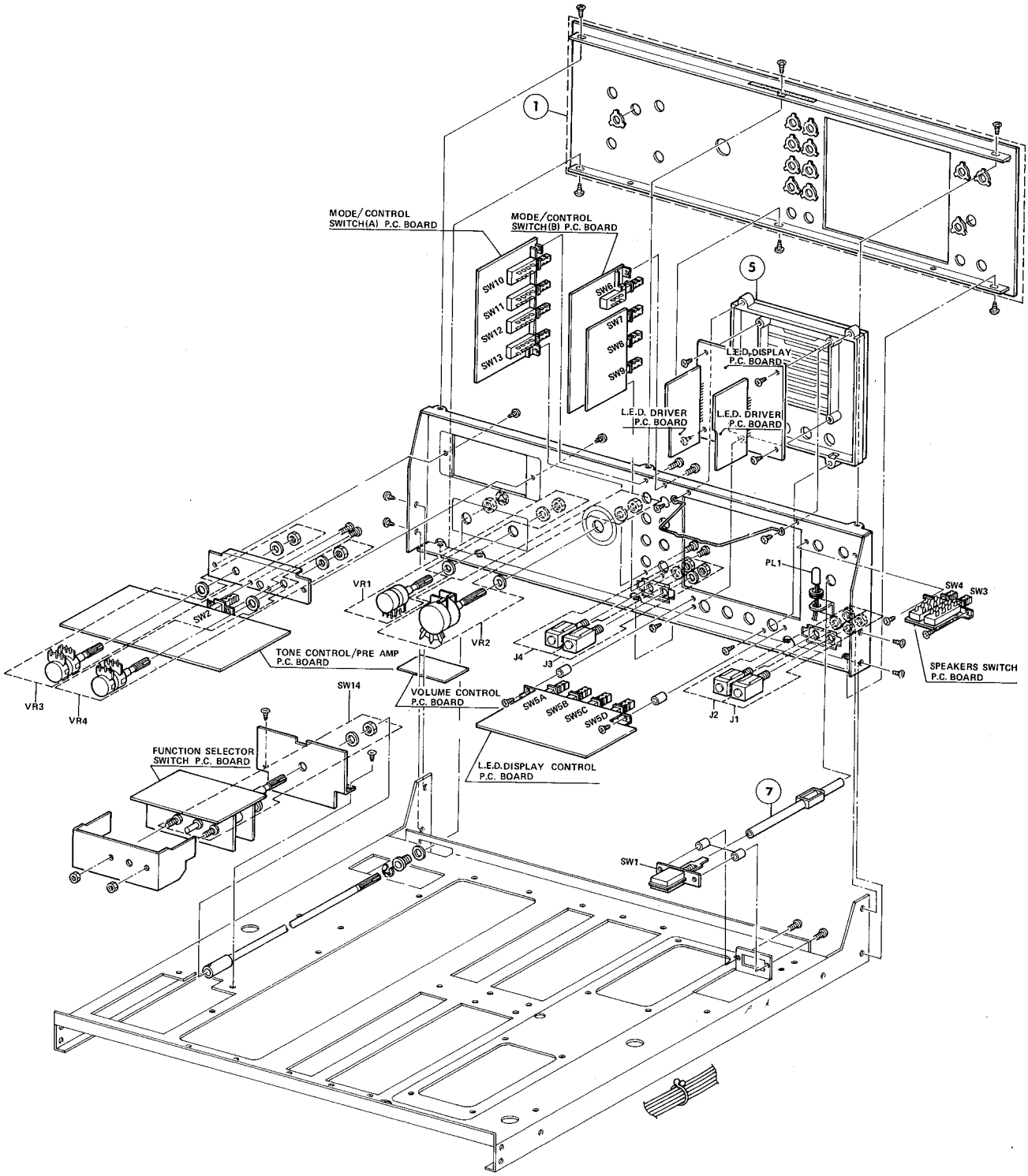
SCHEMATIC DIAGRAM – A402
MULTIVOLTAGE



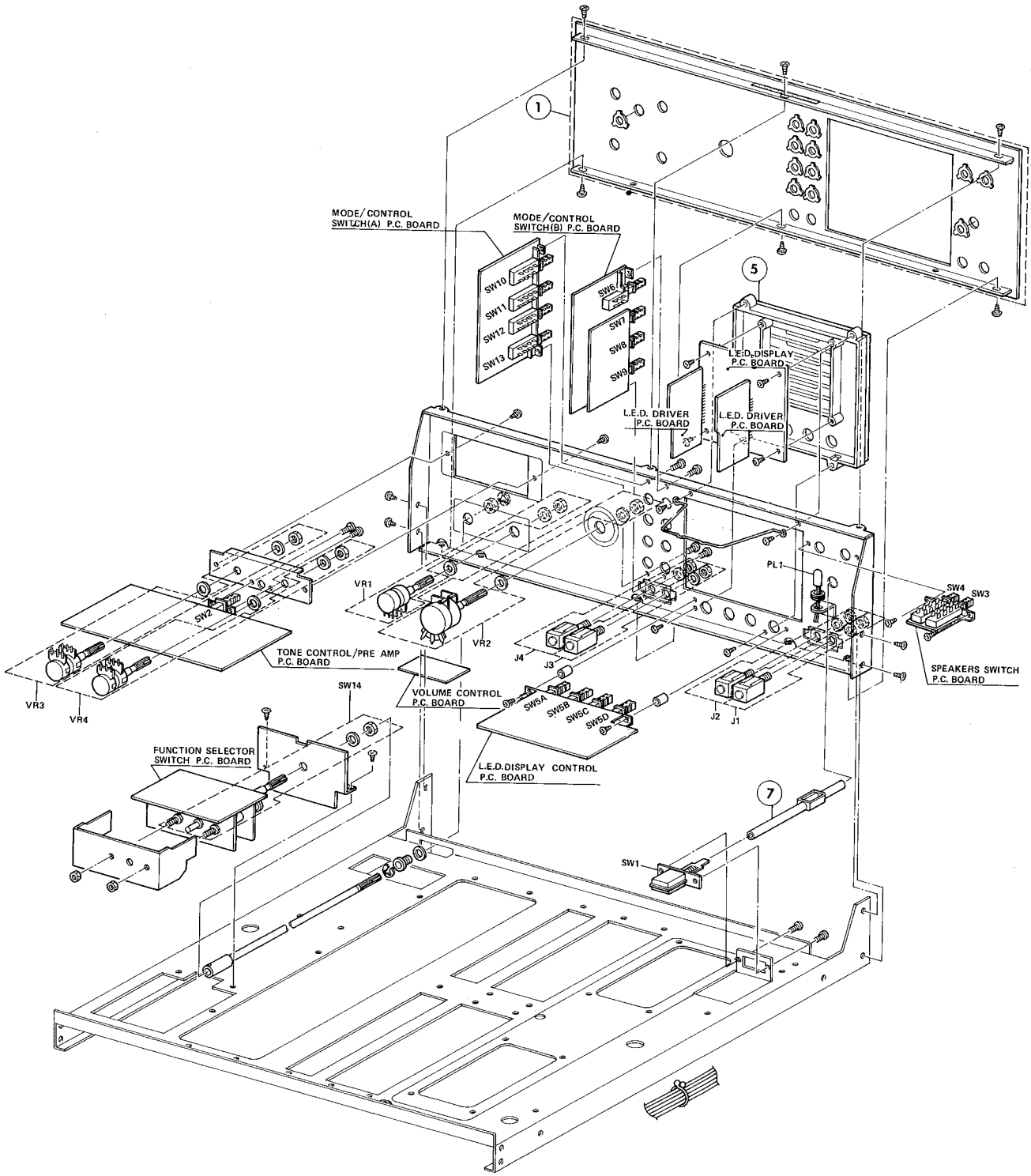
GENERAL UNIT EXPLODED VIEW



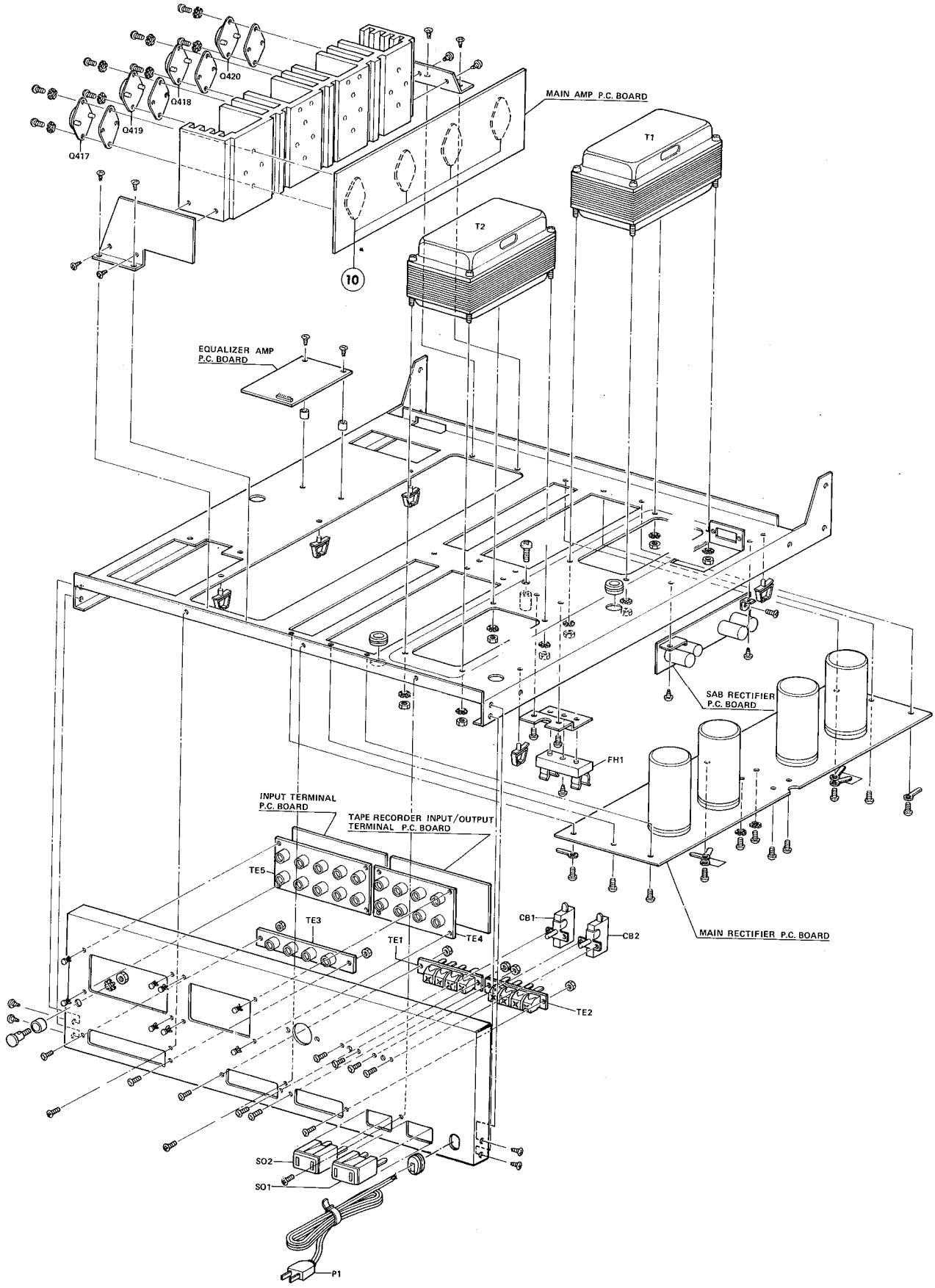
FRONT PANEL EXPLODED VIEW – REGULAR



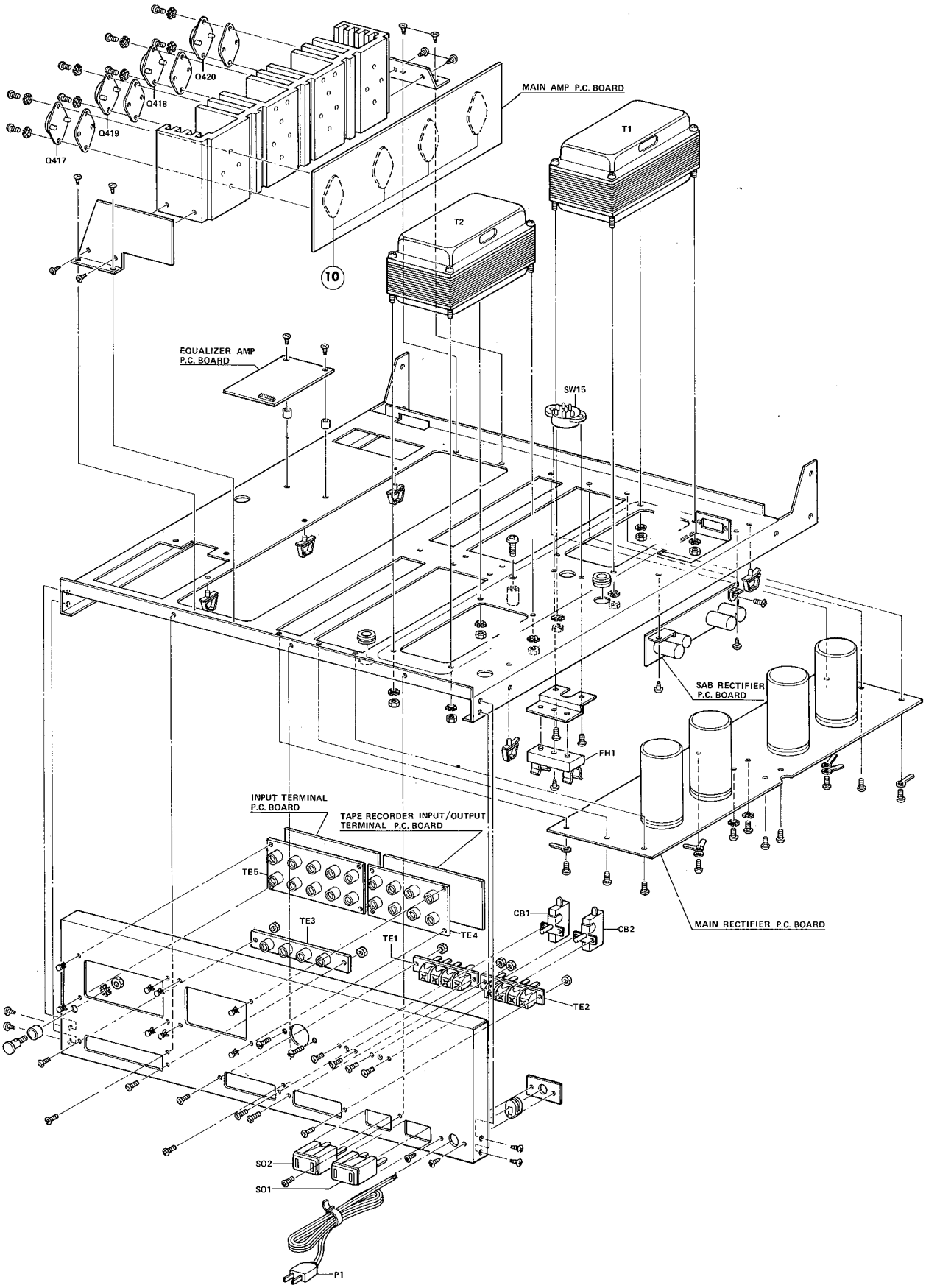
FRONT PANEL EXPLODED VIEW – MULTIVOLTAGE



CHASSIS EXPLODED VIEW – REGULAR

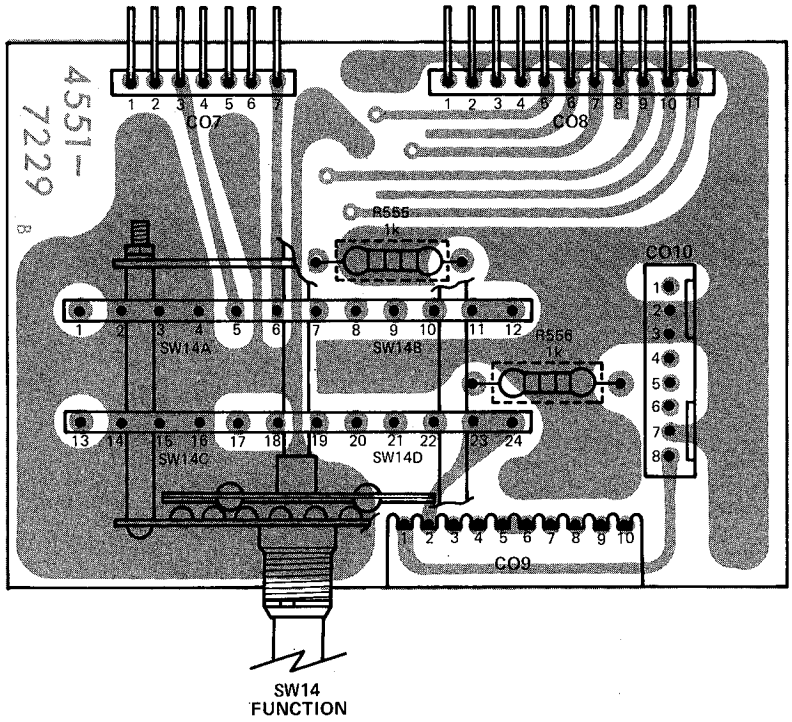


CHASSIS EXPLODED VIEW – MULTIVOLTAGE



FUNCTION SELECTOR SWITCH P.C. BOARD

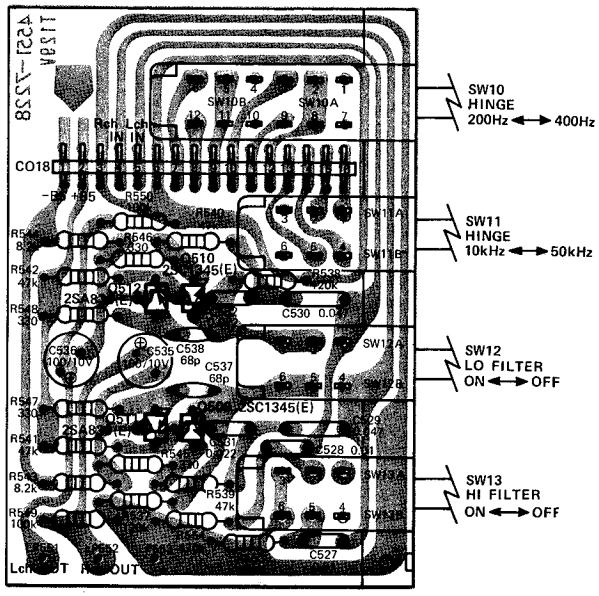
TOP SIDE



CIRCUIT REF.	H/K PART NO.	DESCRIPTION
	00133642	P.C. Board Assy., Function Selector Switch
SWITCH		
SW14	24033654	Function Selector

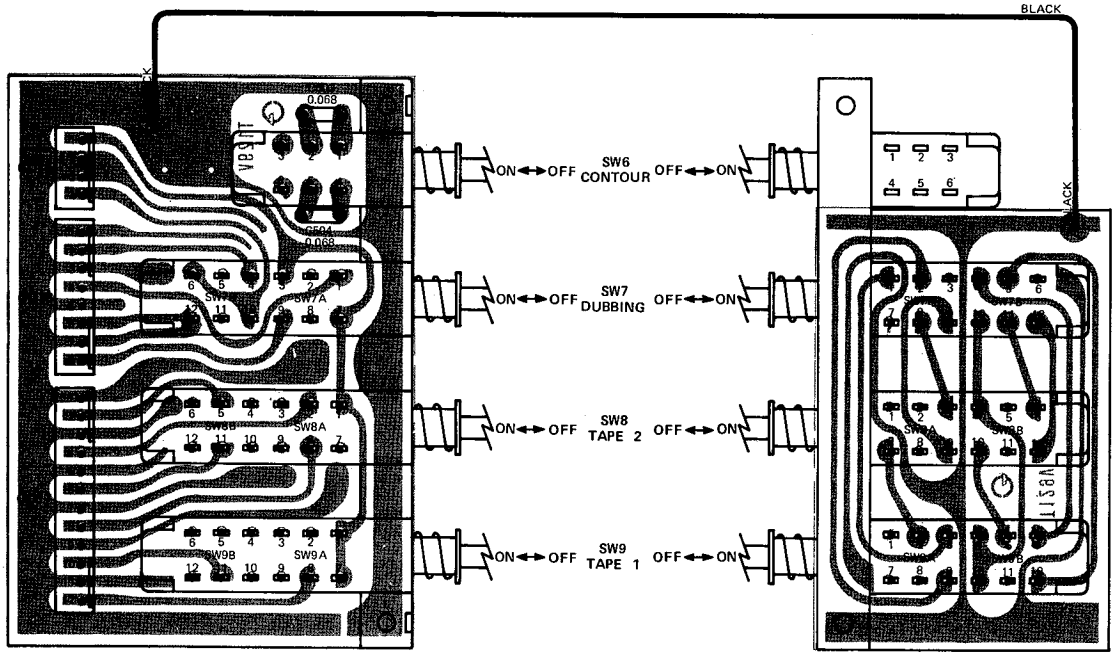
MODE CONTROL SWITCH P.C. BOARD – A & B

(A)



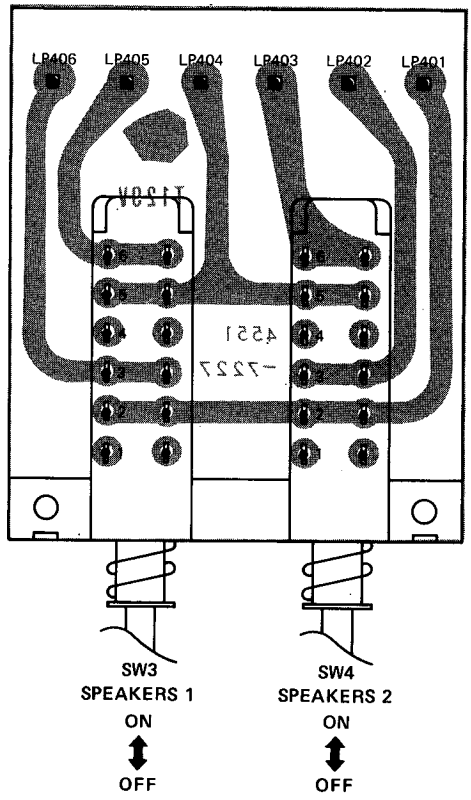
CIRCUIT REF.	H/K PART NO.	DESCRIPTION
	00133636	P.C. Board Assy., Mode Control Switch (A)
TRANSISTOR		
Q509, 510	43029483*	2SC1345 (E) Low-Hi Filter
Q511, 512	43032132*	2SA836 (E) Low-Hi Filter
SWITCH		
SW10, 11, 12, 13	25033697	Push, Hinge (400HZ-200HZ) Hinge (5KHZ-10KHZ), Low, Hi Filter

(B)



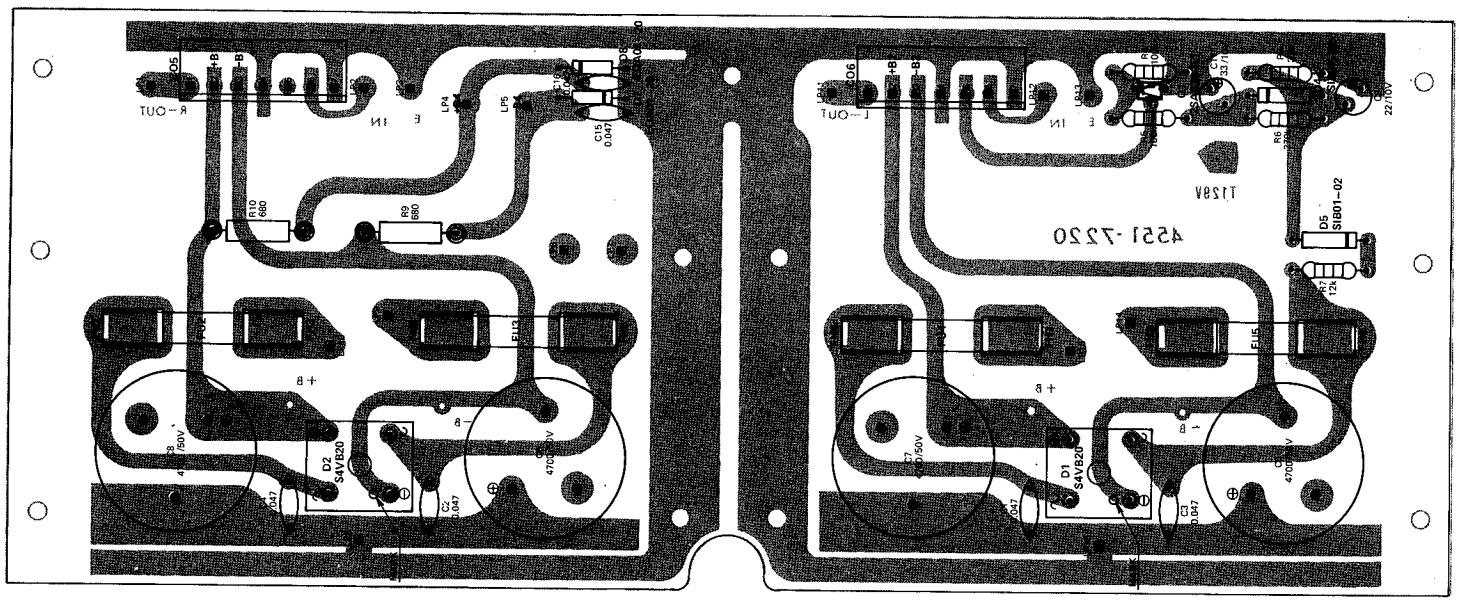
CIRCUIT REF.	H/K PART NO.	DESCRIPTION
	00133643	P.C. Board Assy., Mode Control Switch (B)
SWITCH		
SW6, 7, 8, 9	25033655	Push, Contor, Dubbing, Tape 2, Tape 1

SPEAKERS SWITCH P.C. BOARD



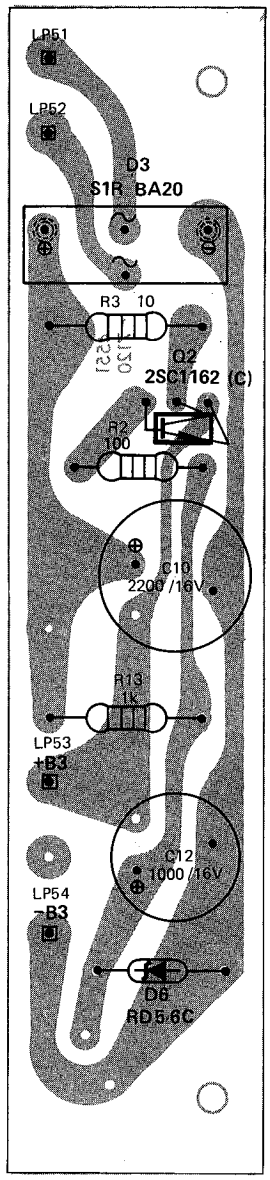
CIRCUIT REF.	H/K PART NO.	DESCRIPTION
	00133644	P.C. Board Assy., Speakers Switch
SWITCH		
SW 3, 4	25033656	Push, Spkr Sys 1&2

MAIN RECTIFIER P.C. BOARD



CIRCUIT REF.	H/K PART NO.	DESCRIPTION
	00133638	P.C. Board Assy., Main Rectifier (Without Fuse)
CAPACITOR		
C5, 6, 7, 8	31832157	4700UF +50%-10%, 50V Electrolytic
TRANSISTOR		
Q1	43032132*	2SA836(E) Voltage Regulator
DIODE		
D1, 2	42132159*	Bridge Silicon, S4VB20
D4, 5	41631295*	SIB01-02
D7, 8	42033301*	Zener, EQA01-20
MISCELLANEOUS		
FH2-9	65431463	Fuse Holder

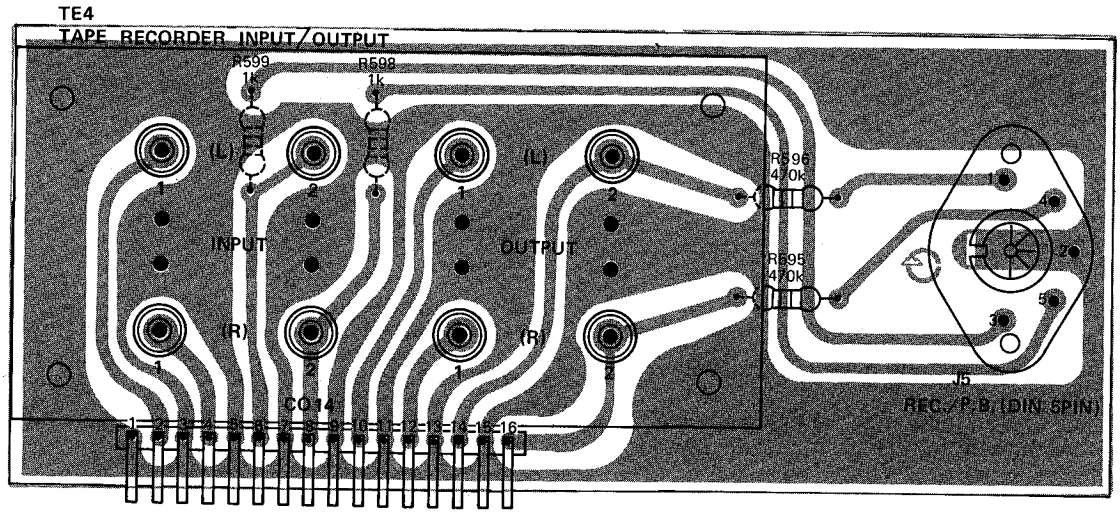
SUB RECTIFIER P.C. BOARD



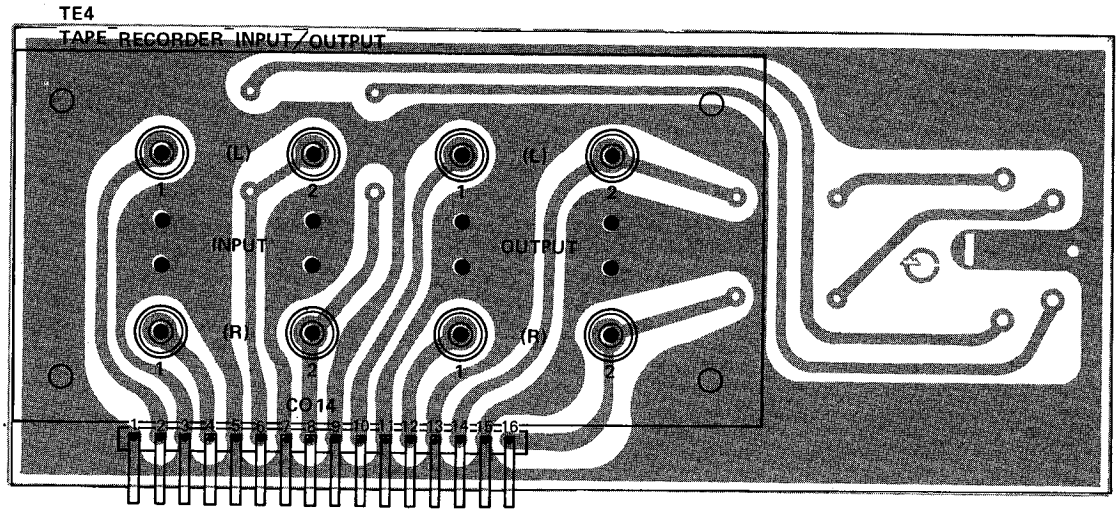
CIRCUIT REF.	H/K PART NO.	DESCRIPTION
	00133639	P.C. Board Assy., Sub Rectifier
CAPACITOR		
C10	31832161	2200UF +50%-10%, 16V Electrolytic
C12	31831472	1000UF +50%-10%, 16V Electrolytic

TAPE RECORDER INPUT/OUTPUT TERMINAL P.C. BOARD

MULTIVOLTAGE

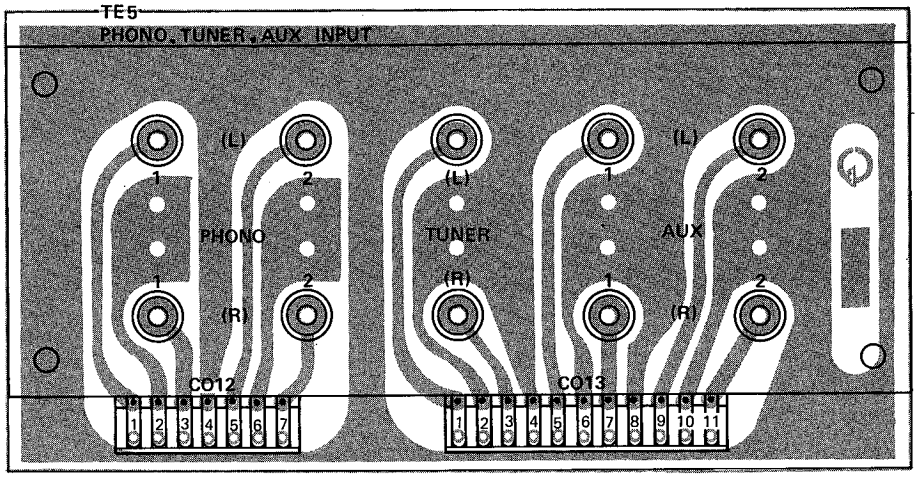


REGULAR



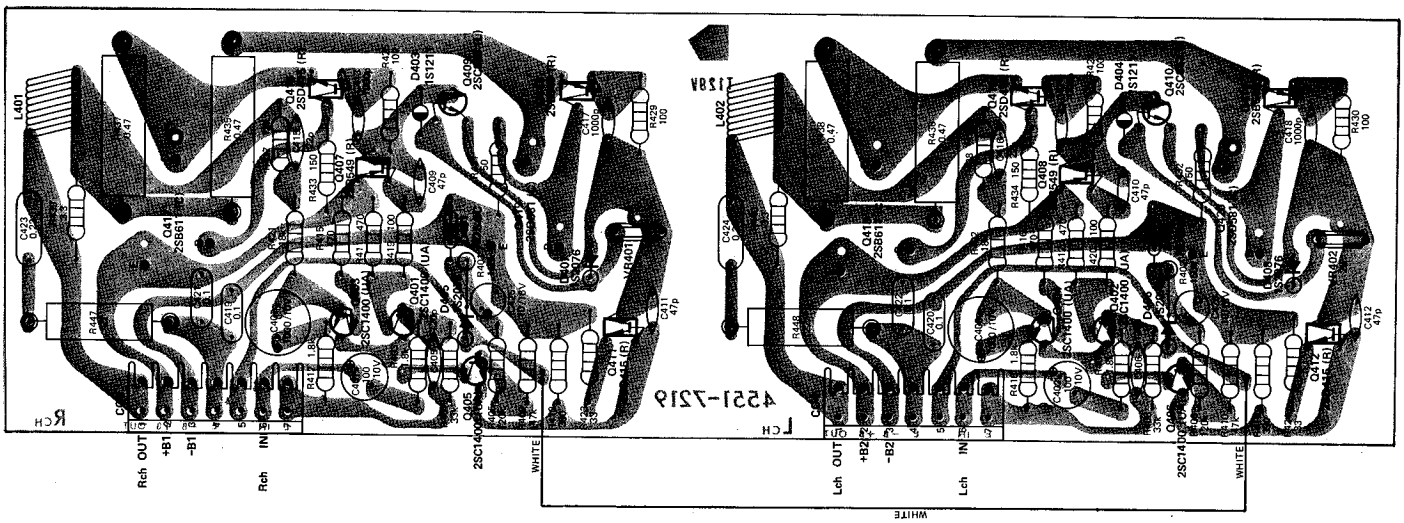
CIRCUIT REF.	H/K PART NO.	DESCRIPTION
	00133640	P.C. Board Assy., Tape Recorder Input/Output Terminal
JACK TE4	65433652	8 Pin Jack

INPUT TERMINAL P.C. BOARD



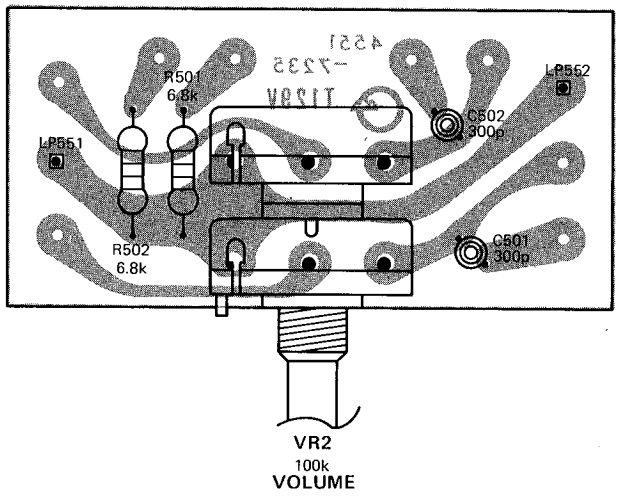
CIRCUIT REF.	H/K PART NO.	DESCRIPTION
	00133641	P.C. Board Assy., Input Terminal
JACK		
TE5	65433653	10 Pin Jack, Phono/ Tuner/Aux. Input

MAIN AMP P.C. BOARD



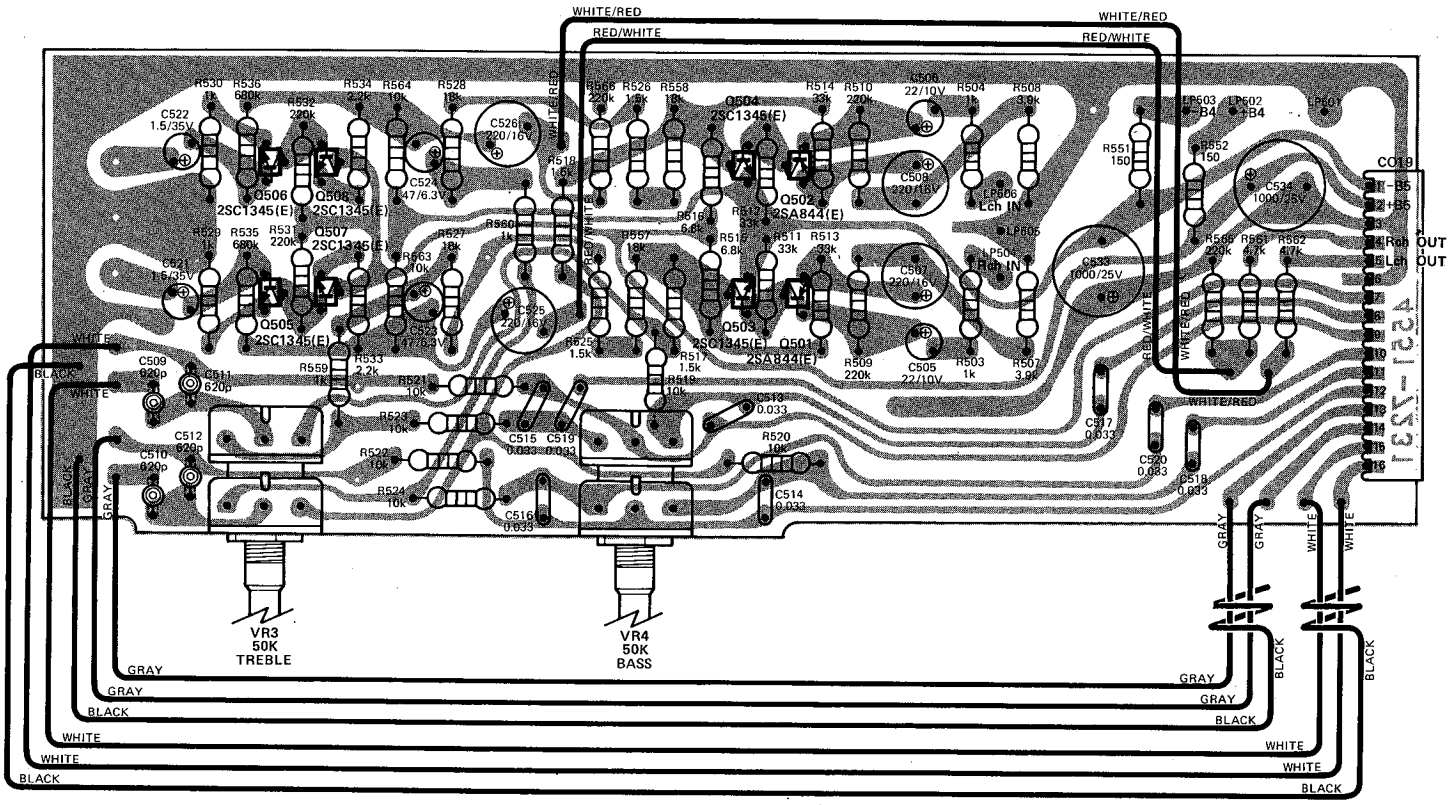
CIRCUIT REF.	H/K PART NO.	DESCRIPTION
	00133637	P.C. Board Assy., Main Amp.
RESISTOR		
R435, 436, 437, 438	33514781	0.47 ohm, 3W, Cement
VR401, 402	23532752	Variable, 2k ohm
CAPACITORS		
C407, 408	31831465	1000UF +50%-10%, 10V Electrolytic
TRANSISTOR		
Q401, 402, 403, 404	43032163*	2SC1400 (UA) Differential Amp
Q405, 406	43032163*	2SC1400 (UA) Current Regulator
Q407, 408	43032164*	2SB549 (R) Driver
Q409, 410	43032165*	2SC853 (L) Bias Stabilization
Q411, 412	43032166*	2SD415 (R) Current Regulator
Q413, 414	43032164*	2SB549 (R) Complement
Q415, 416	43032166*	2SD415 (R) Complement
DIODE		
D401, 402	42033668*	Zener, RD5.6C
D403, 404	41632167*	Varistor, 1S1211
D405, 406, 407, 408	41030552*	1S2076
COIL		
L401, 402	12033168	RF Choke

VOLUME CONTROL P.C. BOARD



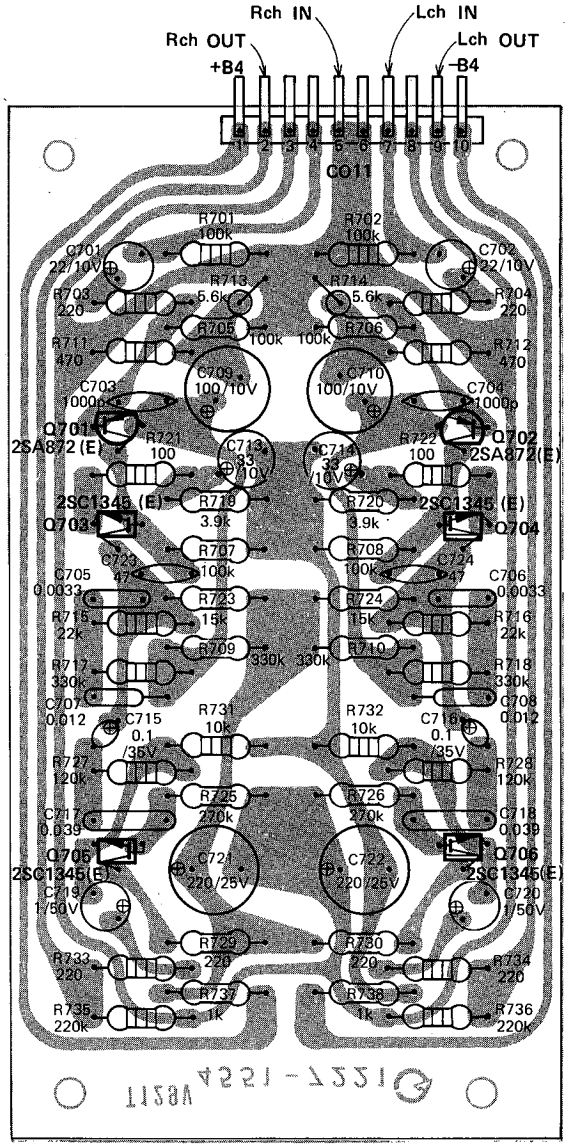
CIRCUIT REF.	H/K PART NO.	DESCRIPTION
	00133635	P.C. Board Assy., Volume Control
RESISTOR		
VR2	22033651	Variable, 100k ohm, Volume Control

TONE CONTROL/PREAMP, P.C. BOARD



CIRCUIT REF.	H/K PART NO.	DESCRIPTION
	00133634	P.C. Board Assy., Tone Control/Pre Amp.
RESISTOR		
VR3, 4	22033650	Variable, 50k ohm, Treble and Bass Control
CAPACITOR		
C533, C534	31832153	1000UF +50%-10%, 25V Electrolytic
TRANSISTOR		
Q501, 502	43031312*	2SA844 (E) Preamp.
Q503, 504, 505, 506, 507, 508	43029483*	2SC1345 (E) Preamp.

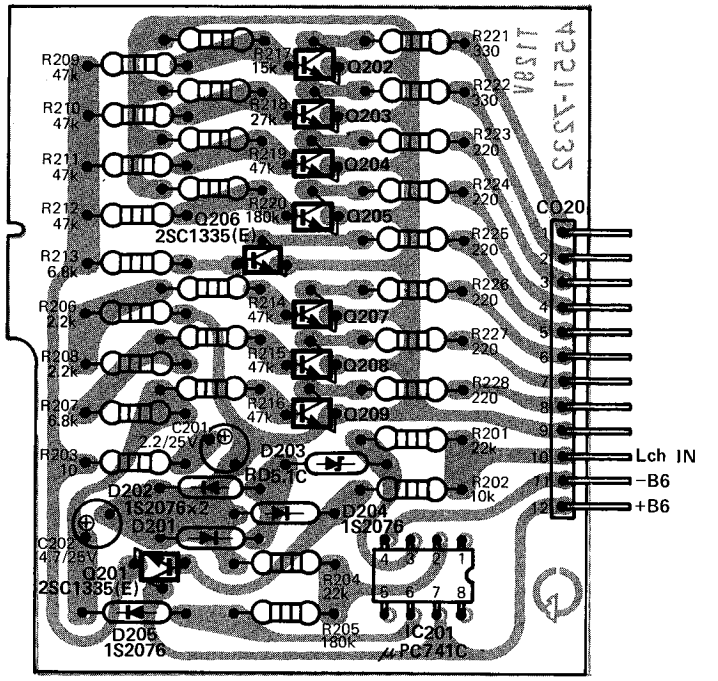
EQUALIZER AMP (MAGNETIC PHONO PREAMP) P.C. BOARD



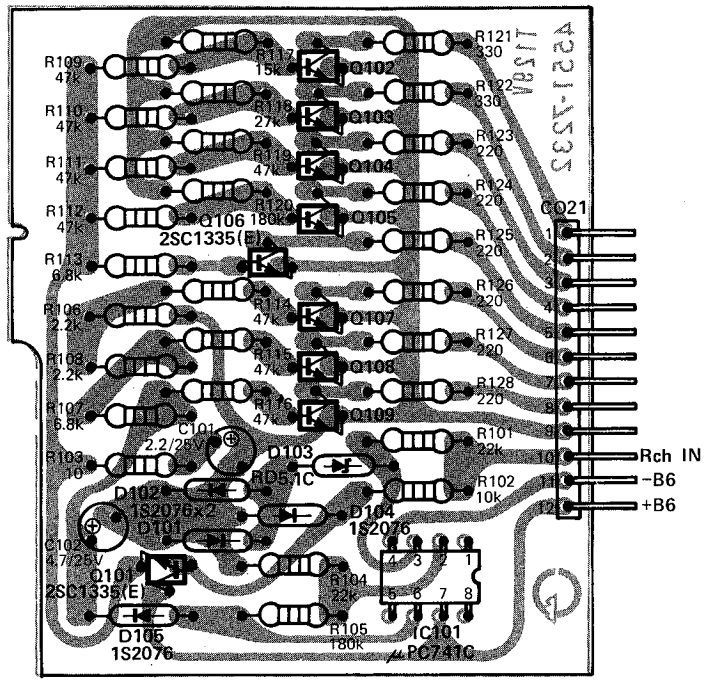
CIRCUIT REF.	H/K PART NO.	DESCRIPTION
	00133633	P.C. Board Assy. Equalizer Amp.
TRANSISTOR		
Q701, 702	43032151*	2SA872 (E) Equalizer Amp
Q703, 704, 705, 706	43029483*	2SC1345 (E) Equalizer Amp

L.E.D. DRIVER P.C. BOARD – A & B

(A)

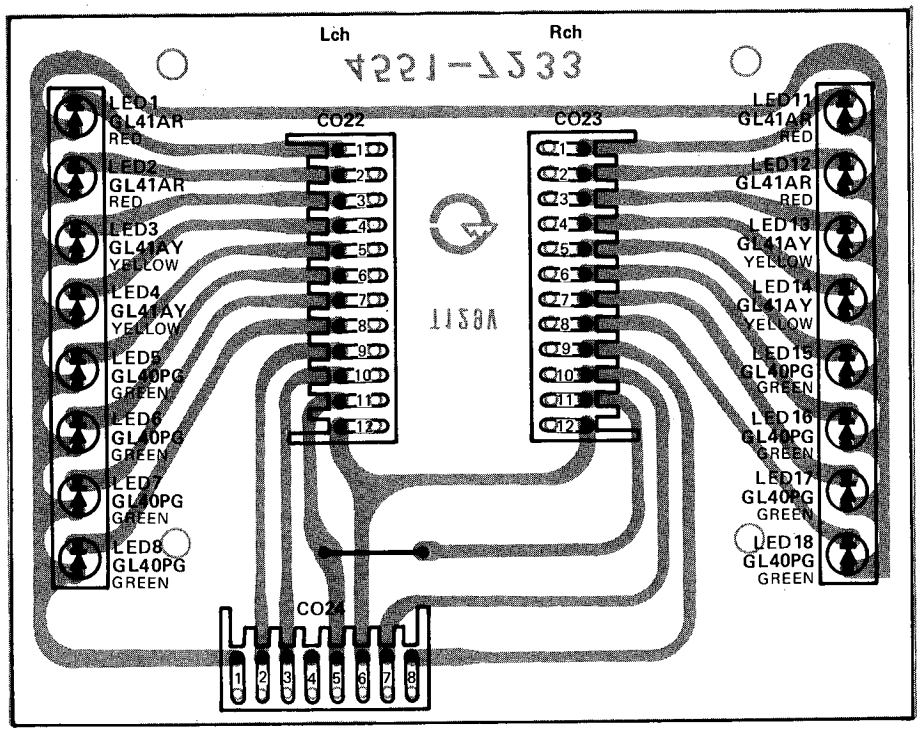


(B)



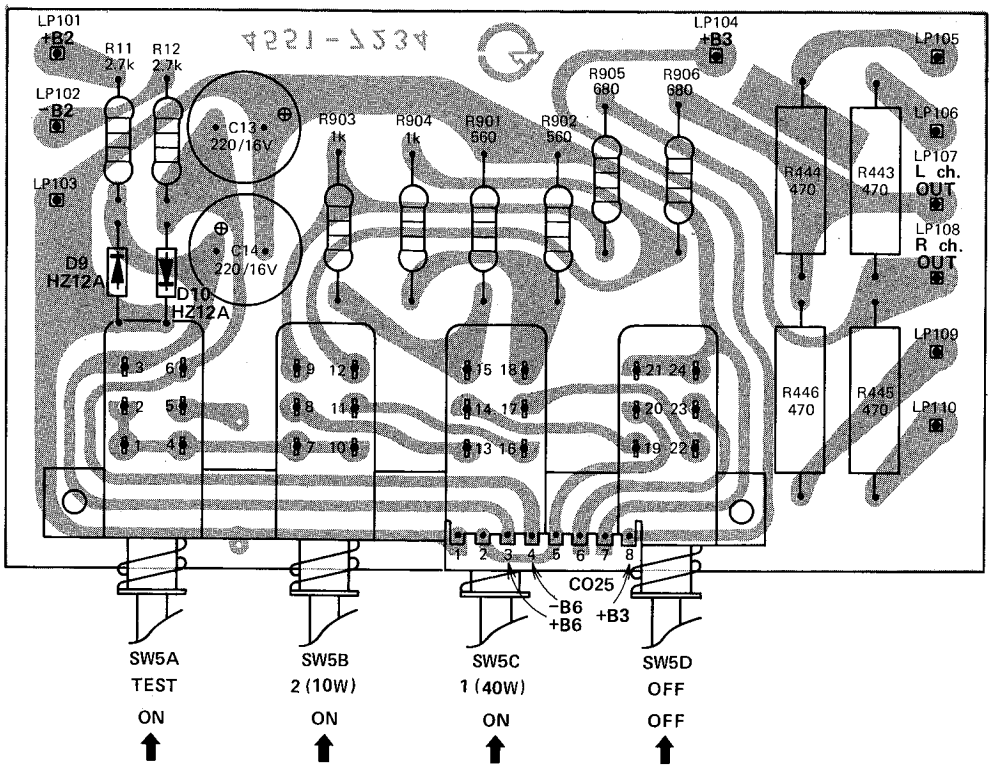
CIRCUIT REF.	H/K PART NO.	DESCRIPTION
	00133631	P.C. Board Assy., L.E.D. Driver (A) and (B)
TRANSISTOR		
Q101, 106, 201, 206	43030569*	2SC1335 (E) Buffer Amp., L.E.D. Driver
Q102, 103, 104, 105, 107, 108, 109, 202, 203, 204, 205, 207, 208, 209	43033647*	2SC1472K (A) or (B) L.E.D. Driver
INTEGRATED CIRCUIT		
IC101, 201	43133648*	μPC741C L.E.D. Indicator Amp.
DIODE		
D101, 102, 104, 105, 201, 202, 204, 205	41030552*	Switching, 1S2076
D103, 203	42033649*	Zener, RD5.1C

L.E.D. DISPLAY P.C. BOARD



CIRCUIT REF.	H/K PART NO.	DESCRIPTION
	00133630	P.C. Board Assy., L.E.D. Display
POWER INDICATOR		
LED 1, 2, 11, 12	46731897*	L.E.D., GL41AR (Red)
LED 3, 4, 13, 14	46731899*	L.E.D., GL41AY (Yellow)
LED 5, 6, 7, 8, 15, 16, 17, 18	46731898*	L.E.E., GL40PG (Green)

L.E.D. DISPLAY CONTROL P.C. BOARD



CIRCUIT REF.	H/K PART NO.	DESCRIPTION
	00133632	P.C. Board Assy., L.E.D. Display Control
DIODE		
D9, D10	42033600*	Zener, HZ12A
SWITCH		
SW5A-D	25033601	Push, L.E.D. Display Control

CHASSIS PARTS LIST

IDENT. NO.	REF. DES.	H/K PART NO.	DESCRIPTION
	T1, 2	10131225	Power Transformer
	S01, 2	65431485	External AC Socket, Unswitched and Switched
	Q417, 418	43033594*	Transistor, 2SB611(C) Power Amp.
	Q419, 420	43033595*	Transistor, 2SD581(C) Power Amp.
	CB1, 2	45532124	Circuit Breaker
	TE1, 2	65431366	Speaker Output Terminal
	TE3	65433597	4 Pin Jack, Main Amp. Input/Pre Amp. Output
	PL1	46533598*	Power Indicator Lamp (9V 65mA)
	FH1	65431365	Fuse Holder
	FU1	45032123*	Fuse, 1A
	FU2, 3, 4, 5	45032122*	Fuse, 2.5A
	VR1	22033599	Variable Resistor, 100k ohm, Balance Control
	SW1	25032117	Push Switch, Power
	SW2	25032116	Push Switch, Tone Defeat
	J1, 2, 3, 4	65432119	Jack, Phones 1, Phones 2, Tape in, Tape Out
1		00233657	Front Panel Asst.
2		00233658	Cabinet Top Assy.
3		00233659	Knob Assy, Volume Control
4		62033660	Leg, Cabinet Bottom Cover (X4)
5		63033661	Panel, L.E.D. Display
6		63231376	Knob Assy., Base, Treble, Balance Control and Function Selector
7		63233662	Push Button, Power
8		63233663	Push Button Assy., L.E.D. Display (X4)
9		63231377	Push Button Assy., Model/Control, Speakers and Tone Defeat (X11)
10		66033596	Power Transistor Mounting Socket
		57532091	Pin, Main Amp Input/Pre Amp Output Jack (X2)
MULTI VOLTAGE RECEIVER			
		00133645	Main Rectifier P.C. Board (Without Fuse)
		00133646	Tape Recorder Input/Output Terminal P.C. Board
	J5	65432127	Rec./P.B. Jack (Din 5 Pin) (On Tape Recorder Input/Output) Terminal P.C. Board
	SW15	24031338	Rotary Switch, Power Source Voltage Selector
	T1, 2	10133664	Power Transformer
	FH1	65433665	Fuse Holder
	FU1	45033666*	Fuse, 630mA
	FU2, 3, 4, 5	45033667*	Fuse, 2A
	SW1	25033336	Push Switch, Power

NOTE TO WARRANTY STATIONS: Items marked by asterisk (*) are recommended spare parts stock. Printed circuit board assembly numbers are shown for reference only. Harman/Kardon does not normally supply assembled printed circuit boards.

NOTE: To speed handling of your order be sure to include both the model and serial numbers, in addition to the quantity, part number and part description of the items ordered. Orders from independent dealers, independent servicemen, and retail customers will be shipped on a cash in advance basis. Harman/Kardon reserves the right to substitute equivalent parts for those originally installed in this chassis. All parts should be ordered from Harman/Kardon, 55 Ames Court, Plainview, L.I., N.Y. 11803, Att: Parts Department.