

SERVICE MANUAL



FISHER

INTEGRATED STEREO AMPLIFIER

CA-1224

EUROPE

132 306 44

This Service Manual is prepared for Model CA-1224. As only the components in the chart below differ, refer to the Service Manual CA-224 (WM-17165) for other components.

Ref. No.	CA-224	CA-1224	Description	Q'ty	Remark
	PACKAGE 131-6-1169-19901	131-6-1169-19902	Box Corrugate-Exp.	1	
	ACCESSORIES 142-6-4119-32973	142-6-4119-33027	Explanatory Booklet	1	
6	CABINET 141-0-1129-23901 141-2-1129-49601	141-0-1129-23902 141-2-1129-49602	Cabinet Front Assy Cabinet Front	1 1	
13	131-2-3306-41101	131-2-3306-41102	Panel Rear	1	

Add this sheet to the Model CA-224 Service Manual (WM-17165).

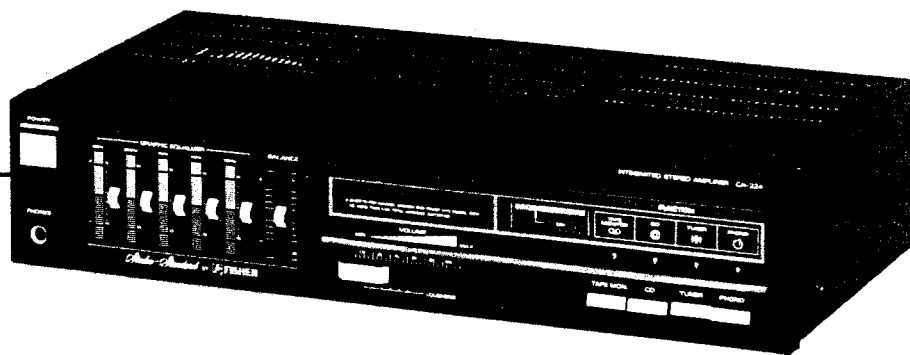
SERVICE MANUAL



FISHER

CA-224

Integrated
Stereo Amplifier
(EUROPE)

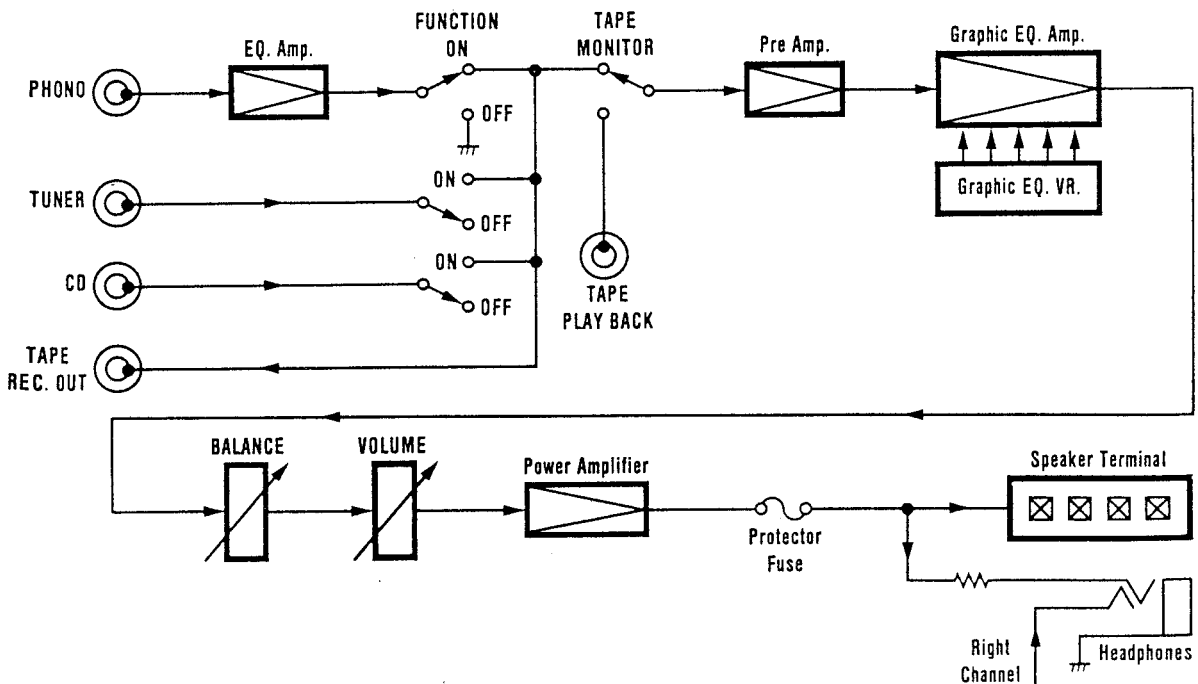


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FUNCTIONAL BLOCK DIAGRAM



SPECIFICATIONS

AMPLIFIER	CA-224
POWER AMPLIFIER SECTION	
Minimum RMS sine wave power per channel within stated bandwidth at no more than stated distortion and with 8-ohm load	35 Watts
Power Bandwidth	20 Hz – 20 kHz
Total Harmonic Distortion	0.5 %
I.M. Distortion	0.5 %
Speaker Damping	> 20
PREAMPLIFIER SECTION	
Frequency Response	
Phono (RIAA)	±1 dB
Aux (20 Hz – 20 kHz)	±1 dB
Input Sensitivity and Impedance	
Phono	2.5 mV/50 kΩ
Tape Monitor	150 mV/50 kΩ
Tuner/CD	150 mV/50 kΩ
Phono Max. Input Capability	150 mV
Graphic Equalizer	
63 Hz	±10 dB
250 Hz	±10 dB
1 kHz	±10 dB
4 kHz	±10 dB
16 kHz	±10 dB
Hum & Noise (IHF Short Circuit, A Network)	
Phono	68 dB
Tape Monitor	85 dB
Tuner/CD	85 dB
GENERAL	
Power Requirements (50 Hz)	220 V AC
Power Consumption	180 Watts
Dimensions (W x H x D)	400 x 91 x 202 mm
Weight (approx.)	4.1 kg

Because its products are subject to continuous improvement, Fisher Corporation reserves the right to modify product designs and specifications without notice and without incurring any obligation.

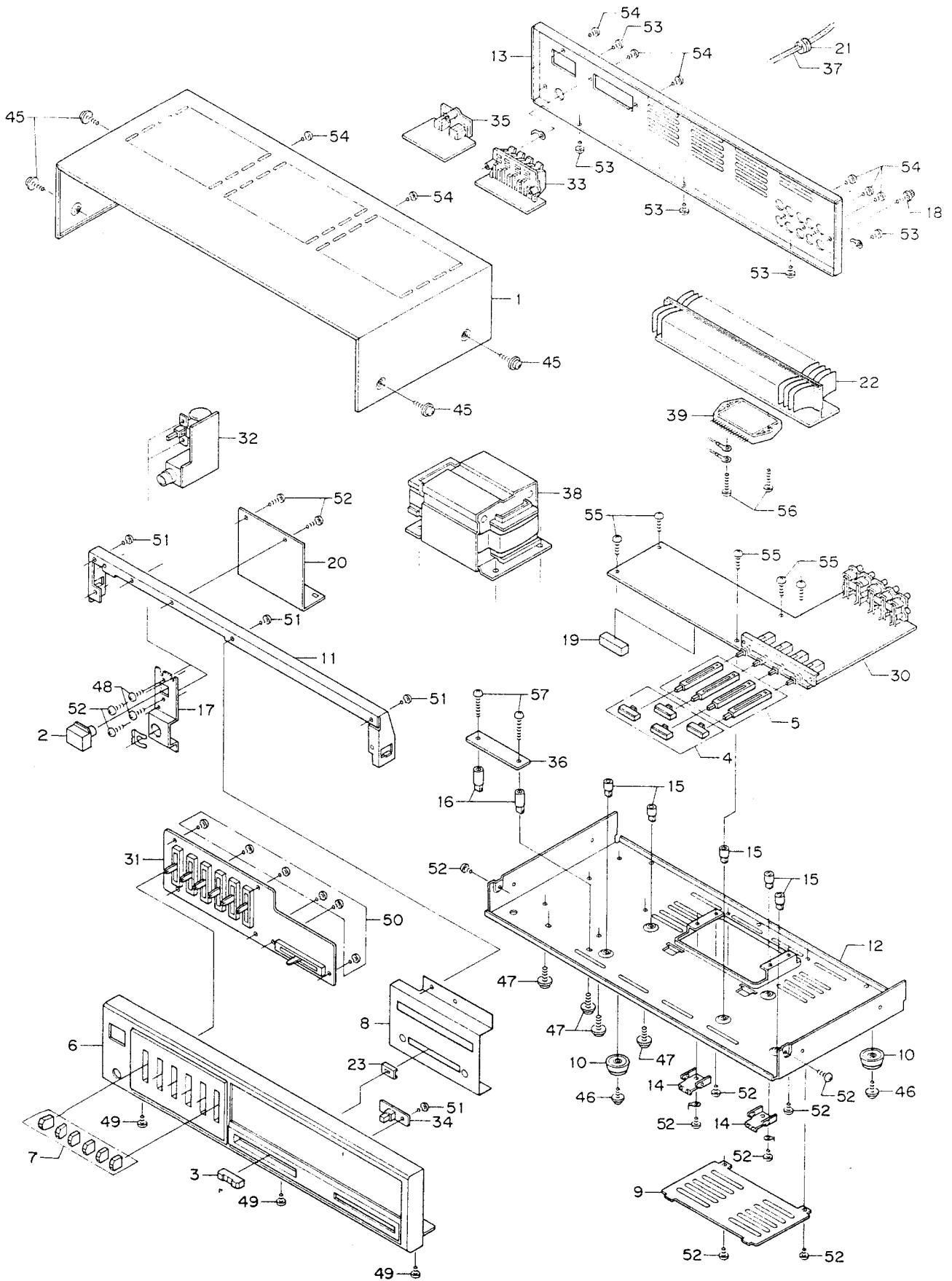
IMPORTANT NOTE

The amplifier has been Factory-adjusted for operation on 220V AC. The voltage can be changed for operation on 110V AC by making the following changes on the amplifier inside.

1. Remove the AC plug from the wall outlet.
2. Remove the screws securing the cover.
3. Disconnect Gray lead from AC Select P.C.Board Terminal No. 19, and then connect it to A C Select P.C.Board Terminal No. 16.
4. Disconnect Yellow lead from AC Select P.C.Board Terminal No. 19, and then connect it to A C Select P.C.Board Terminal No. 18.

The amplifier is now ready 110V operation. DO NOT attempt to operate the amplifier on 220V. Damage will result!

CABINET & CHASSIS EXPLODED VIEW



CABINET & CHASSIS PARTS LIST

PRODUCT SAFETY NOTICE

Each precaution in this manual should be followed during servicing. Components identified with the IEC symbol \triangle in the parts list and the schematic diagram designate components in which safety can be of special significance. When replacing a component identified with \triangle , use only the replacement parts designated, or parts with the same ratings of resistance, wattage or voltage that are designated in the parts list in this manual.

Leakage-current or resistance measurements must be made to determine that exposed parts are acceptably insulated from the supply circuit before returning the product to the customer.

Ref. No.	Part No.	Description	Q'ty	Ref. No.	Part No.	Description	Q'ty
PACKING PARTS LIST				ELECTRICAL PARTS LIST			
	131-6-1169-19901	Box Corrugate-Exp.	1	30	141-0-1939-17761	Main Amp. P.C.B. Assy	1
	131-6-3009-36250	Pad (Left)	1	31	141-0-1939-17770	Control Amp. P.C.B. Assy	1
	131-6-3009-36260	Pad (Right)	1	32	141-0-1939-17781	Power Switch P.C.B. Assy	1
	131-6-3069-16350	Patching Sheet	1	33	141-0-1939-17790	Speaker Out P.C.B. Assy	1
	131-6-4559-11200	Serial No. Sheet	2	34	141-0-1939-17800	Power Ind. P.C.B. Assy	1
	141-6-2519-22390	Sheet Polyethylene	1	35	141-0-1939-17810	Socket 2P P.C.B. Assy	1
				36	141-0-1939-17820	AC Select P.C.B. Assy	1
				37	\triangle 4-2432-00501	Power Cord	1
				38	\triangle 4-2512-33320	Power Trans	1
				39	205-5-3834-15240	IC, STK 4152 MK2 [IC301]	1
ACCESSORIES PARTS LIST				SCREW PARTS LIST			
	131-6-2719-10401	Bag Fan	1	45	141-2-4219-33101	Screw, Bind Hd. Tapping-B. +M3.0x8 Sems	4
	142-6-4119-32973	Explanatory Booklet	1	46	131-2-4201-25200	Screw, Brazier Hd. Tapping-B. +M3.0x6 Sems	2
				47	141-2-4219-43300	Screw, Bind Hd. Tapping-C. +M4.0x10 Sems	4
				48	101-3-1303-00611	Screw, Pan Hd., +M3.0x6	2
				49	143-3-1703-00818	Screw, Bind Hd. Tapping-B. +M3.0x8	3
				50	143-3-1302-60811	Screw, Pan Hd. Tapping-B. +M2.6x8	6
				51	143-3-1902-60811	Screw, Brazier Hd. Tapping-B. +M2.6x8	4
				52	143-3-1903-00611	Screw, Brazier Hd. Tapping-B. +M3.0x6	12
				53	143-3-1903-00618	Screw, Brazier Hd. Tapping-B. +M3.0x6	5
				54	143-3-1903-00818	Screw, Brazier Hd. Tapping-B. +M3.0x8	8
				55	143-3-1903-01211	Screw, Brazier Hd. Tapping-B. +M3.0x12	5
				56	143-3-1903-01611	Screw, Brazier Hd. Tapping-B. +M3.0x16	2
				57	143-3-1903-02011	Screw, Brazier Hd. Tapping-B. +M3.0x20	2
				C701	CC4-7-3500-ZG00C	Ceramic 0.047 μ F 50V $\pm 20\%$	1
				C702	CC4-7-3500-ZG00C	Ceramic 0.047 μ F 50V $\pm 20\%$	1
CABINET & CHASSIS PARTS LIST				NOTES:			
	4-2379-21520	Terminal Lug	1	1. Parts order must contain Model Number, Part Number and Description.			
	4-2379-21524	Terminal Lug	1	2. Ordering quantity of screws and resistors must be multiple of 10 pcs.			
	131-6-4559-11200	Serial No. Sheet	1				
1	131-2-1410-34400	Cover	1				
2	131-2-1601-86200	Knob (Power)	1				
3	131-2-1601-86504	Knob (Volume)	1				
4	131-2-1601-96700	Knob (Function)	4				
5	131-2-4219-20200	Shaft	4				
6	141-0-1129-23901	Cabinet Front Assy	1				
	131-2-1110-39604	Plate Decorate	1				
	131-2-1110-40300	Plate Decorate EQ.	1				
	131-2-1801-16200	Leg	2				
	141-2-1129-49601	Cabinet Front	1				
7	141-2-1659-35900	Knob Slide (EQ., Balance)	6				
8	141-2-3229-60000	Plate Shield	1				
9	131-2-1410-34900	Cover Bottom	1				
10	131-2-1801-12900	Leg	2				
11	131-2-3202-15900	Metal Reinforce	1				
12	131-2-3301-32300	Chassis	1				
13	131-2-3306-41101	Panel Rear	1				
14	131-2-3310-18400	Metal Support	2				
15	131-2-3614-20300	Mount P.C.B.	5				
16	131-2-3614-21800	Mount P.C.B.	2				
17	131-2-3701-30800	Mount Electric Part	1				
18	131-2-4201-17800	Screw Ground	1				
19	131-2-5205-34900	Cushion	1				
20	131-2-6101-31800	Plate Shield	1				
21	131-2-6111-14200	Bushing (4N-4)	1				
22	131-2-6201-37800	Plate Heat Sink	1				
23	141-2-3229-60100	Plate Earth	1				

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:

- GRAPHIC EQUALIZER to center position.
- BALANCE control to center position.
- POWER switch to OFF
- FUNCTION switch to CD
- VOLUME control to MINIMUM position
- LEFT CHANNEL DRIVEN

ONE CHANNEL DRIVEN:

- 1) Connect a low distortion audio generator to LEFT CD IN jack. Set generator frequency to 1 kHz and output to minimum.
- 2) Connect an 8-ohm load resistor between SPEAKERS SYSTEM 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. Turn VOLUME control to MAX.
- 4) Increase generator output for 35 Watts RMS (16.7 volts across the 8-ohm load). Harmonic Distortion Analyzer should measure 0.5 % distortion or less.
- 5) Repeat steps 1 through 4 for RIGHT CHANNEL.

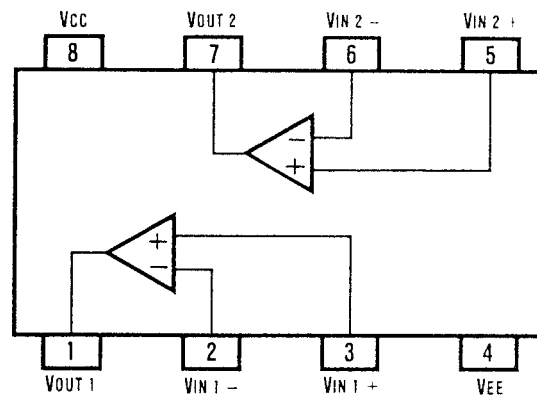
BOTH CHANNELS DRIVEN

Connect 8-ohm load resistors across LEFT and RIGHT SPEAKERS SYSTEM terminals. Adjust generator output and "VOLUME" control for 35 watts at Left and Right Channels (16.7 volts across the 8-ohm loads). Harmonic Distortion Analyzer should measure 0.5 % distortion or less at each channel.

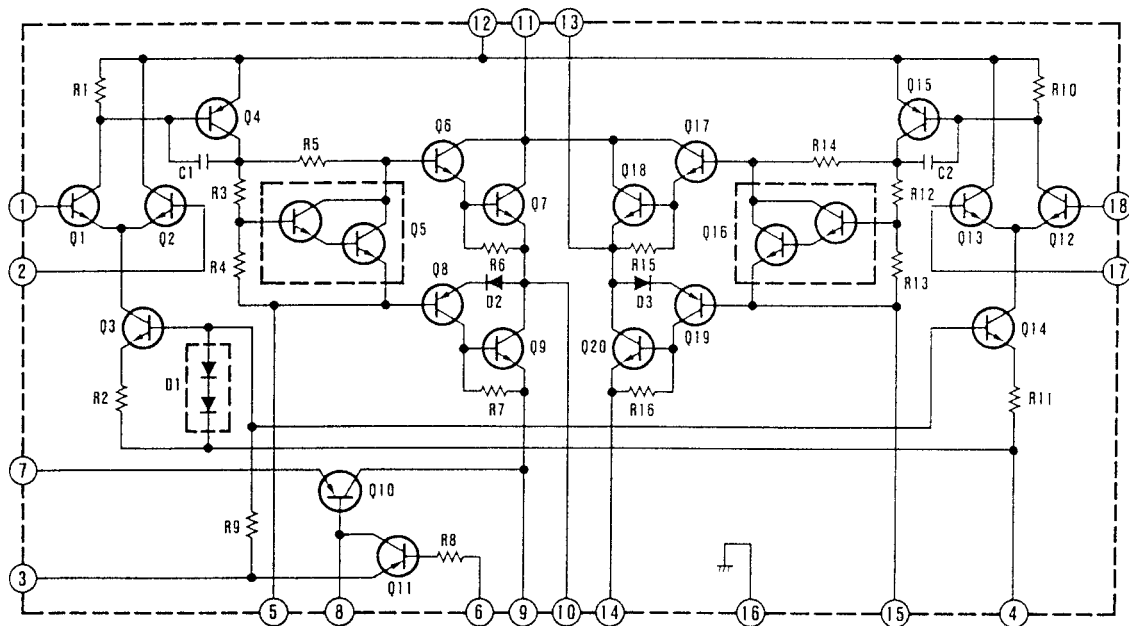
CAUTION: This precision high-fidelity instrument should be serviced only by qualified personnel, trained in the repair of transistor equipment and printed circuitry.

INTEGRATED CIRCUIT BLOCK DIAGRAM

PHONO / GRAPHIC EQUALIZER AMP IC LA 6458 D



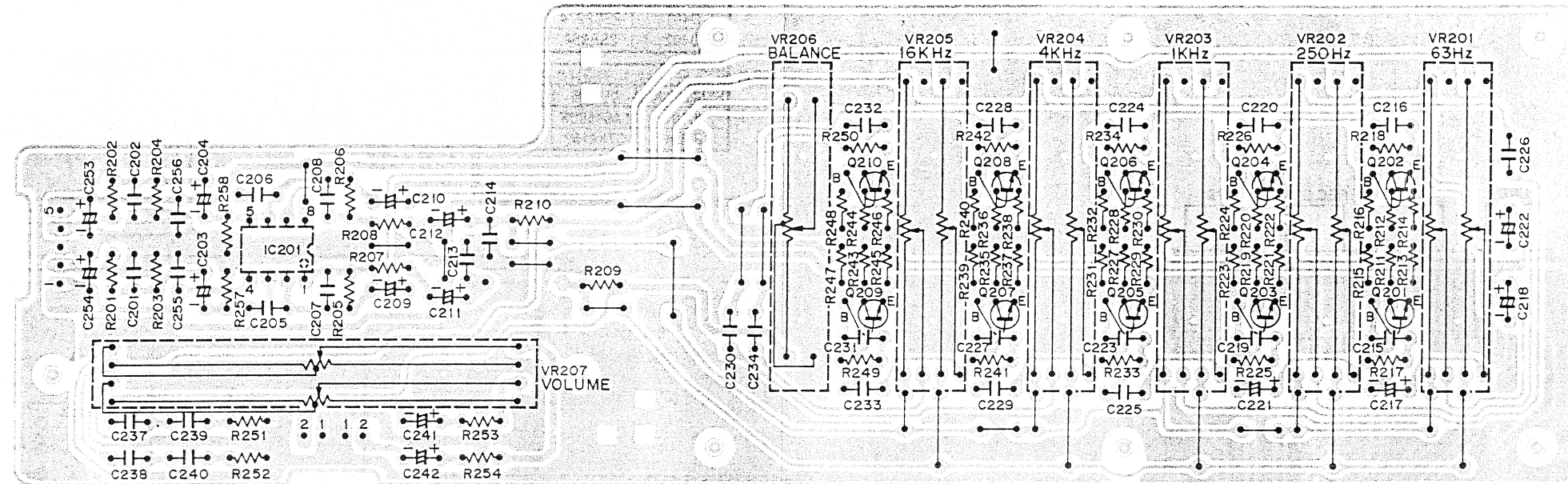
STK 4152 MK2 EQUIVALENT CIRCUIT



P.C.BOARD PARTS LIST

Ref. No.	Part No.	Description	Q'ty	Ref. No.	Part No.	Description	Q'ty
MAIN AMP. P.C.B. ASSY				C316	CD1-0-7500-0001V	Electrolytic 100μF 50V	1
30	141-0-1939-17761	Main Amp. P.C.B. Assy	1	C317	CD1-0-6500-0001V	Electrolytic 10μF 50V	1
	4-2262-29520	Main Amp. P.C.B.	1	C318	CB4-7-5500-0000V	None-polar 4.7μF 50V	1
S1	4-2319-79560	Push Switch 4Key (Function, Tape Monitor)	1	C319	CD2-2-7250-0001V	Electrolytic 220μF 25V	1
L301	4-2532-00420	RF Filter (5μH)	1	C320	CD4-7-6350-0001V	Electrolytic 47μF 35V	1
L302	4-2532-00420	RF Filter (5μH)	1	C401	CC4-7-3151-ZG00C	Ceramic 0.047μF 150V +80 -20%	1
	△ 4-2349-20570	Fuse T2.5A	2	C402	CC4-7-3151-ZG00C	Ceramic 0.047μF 150V +80 -20%	1
	△ 4-2349-20580	Fuse T3.15A	2	C403	CC4-7-3151-ZG00C	Ceramic 0.047μF 150V +80 -20%	1
	4-2352-01700	Pin Jack 4P (Tape)	1	C404	CC4-7-3151-ZG00C	Ceramic 0.047μF 150V +80 -20%	1
	4-2352-01780	Pin Jack 6P (Phono, Tuner, CD)	1	C405	CD3-3-8500-0005V	Electrolytic 3300μF 50V	1
	4-2352-01940	Fuse Clip	8	C406	CD3-3-8500-0005V	Electrolytic 3300μF 50V	1
	111-2-6220-11100	Wire Wrap Terminal	3	C407	CD4-7-5250-0001V	Electrolytic 4.7μF 25V	1
	131-2-7103-52607	Label Fuse T3.15Ax2	1	C408	CD4-7-5250-0001V	Electrolytic 4.7μF 25V	1
	131-2-7103-52610	Label Fuse T2.5Ax2	1	C703	CC4-7-3500-ZG00C	Ceramic 0.047μF 50V +80 -20%	1
				C704	CC4-7-3500-ZG00C	Ceramic 0.047μF 50V +80 -20%	1
				C705	CC1-0-1500-KD00C	Ceramic 100pF 50V ±10%	1
				C706	CC1-0-1500-KD00C	Ceramic 100pF 50V ±10%	1
				C707	CC1-0-3500-ZG00C	Ceramic 0.01μF 50V +80 -20%	1
				C708	CC1-0-3500-ZG00C	Ceramic 0.01μF 50V +80 -20%	1
C101	CC3-3-1500-KD00C	Ceramic 330pF 50V ±10%	1	SEMICONDUCTORS			
C102	CC3-3-1500-KD00C	Ceramic 330pF 50V ±10%	1	D101	202-5-1410-00110	Diode, GMA 01	1
C103	CC3-3-1500-KD00C	Ceramic 330pF 50V ±10%	1	D102	202-5-1410-00110	Diode, GMA 01	1
C104	CC3-3-1500-KD00C	Ceramic 330pF 50V ±10%	1	D201	202-5-9600-44610	Diode, DS 446	1
C105	CD4-7-5250-0001V	Electrolytic 4.7μF 25V	1	D301	202-5-9600-44610	Diode, DS 446	1
C106	CD4-7-5250-0001V	Electrolytic 4.7μF 25V	1	D302	205-5-9040-44210	Diode, DS 442	1
C107	CC3-3-1500-KD00C	Ceramic 330pF 50V ±10%	1	D401	212-5-9360-01258	Diode, DSA 12B	1
C108	CC3-3-1500-KD00C	Ceramic 330pF 50V ±10%	1	D402	212-5-9360-01258	Diode, DSA 12B	1
C109	CD4-7-6100-0001V	Electrolytic 47μF 10V	1	D403	212-5-9360-01258	Diode, DSA 12B	1
C110	CD4-7-6100-0001V	Electrolytic 47μF 10V	1	D404	212-5-9360-01258	Diode, DSA 12B	1
C111	CM1-8-3500-K00SV	Mylar 0.018μF 50V ±10%	1	D405	202-5-3210-18012	Zener Diode, GZA 18Y	1
C112	CM1-8-3500-K00SV	Mylar 0.018μF 50V ±10%	1	D406	202-5-3210-18012	Zener Diode, GZA 18Y	1
C113	CM4-7-2500-J00SV	Mylar 0.0047μF 50V ±5%	1	D601	202-5-3210-27012	Zener Diode, GZA 27Y	1
C114	CM4-7-2500-J00SV	Mylar 0.0047μF 50V ±5%	1	IC101	206-5-2726-45810	IC, LA 6458 DS	1
C115	CD1-0-5500-0001V	Electrolytic 1μF 50V	1	Q301	203-5-5000-53670	Transistor, 2SC 536	1
C116	CD1-0-5500-0001V	Electrolytic 1μF 50V	1	Q401	203-5-7252-27460	Transistor, 2SC 2274	1
C117	CC3-3-1500-KD00C	Ceramic 330pF 50V ±10%	1	Q402	203-5-6820-98460	Transistor, 2SA 984	1
C118	CC3-3-1500-KD00C	Ceramic 330pF 50V ±10%	1	RESISTORS			
C119	CC2-2-1500-KD00C	Ceramic 220pF 50V ±10%	1	R101	401 025 7805	CARBON 2.2K JA 1/6W	1
C120	CC2-2-1500-KD00C	Ceramic 220pF 50V ±10%	1	R102	401 025 7805	CARBON 2.2K JA 1/6W	1
C121	CC2-2-1500-KD00C	Ceramic 220pF 50V ±10%	1	R103	401 024 7707	CARBON 100K JA 1/6W	1
C122	CC2-2-1500-KD00C	Ceramic 220pF 50V ±10%	1	R104	401 024 7707	CARBON 100K JA 1/6W	1
C123	CC2-2-1500-KD00C	Ceramic 220pF 50V ±10%	1	R105	401 024 7707	CARBON 100K JA 1/6W	1
C124	CC2-2-1500-KD00C	Ceramic 220pF 50V ±10%	1	R106	401 024 7707	CARBON 100K JA 1/6W	1
C125	CC2-2-1500-KD00C	Ceramic 220pF 50V ±10%	1	R107	401 026 3905	CARBON 330 JA 1/6W	1
C126	CC2-2-1500-KD00C	Ceramic 220pF 50V ±10%	1	R108	401 026 3905	CARBON 330 JA 1/6W	1
C127	CD4-7-6160-0001V	Electrolytic 47μF 16V	1	R109	401 025 8703	CARBON 220K JA 1/6W	1
C128	CD4-7-6160-0001V	Electrolytic 47μF 16V	1	R110	401 025 8703	CARBON 220K JA 1/6W	1
C129	CC4-7-3500-ZG00C	Ceramic 0.047μF 50V +80 -20%	1	R111	401 025 1902	CARBON 15K JA 1/6W	1
C130	CC4-7-3500-ZG00C	Ceramic 0.047μF 50V +80 -20%	1	R112	401 025 1902	CARBON 15K JA 1/6W	1
C131	CC3-3-1500-KD00C	Ceramic 330pF 50V ±10%	1	R113	401 024 7707	CARBON 100K JA 1/6W	1
C132	CC3-3-1500-KD00C	Ceramic 330pF 50V ±10%	1	R114	401 024 7707	CARBON 100K JA 1/6W	1
C133	CC3-3-1500-KD00C	Ceramic 330pF 50V ±10%	1	R115	401 012 5708	CARBON 1K JA 1/4W	1
C134	CC4-7-3500-ZG00C	Ceramic 0.047μF 50V +80 -20%	1	R116	401 012 5708	CARBON 1K JA 1/4W	1
C301	CC2-2-1500-KE01R	Ceramic 220pF 50V ±10%	1	R117	401 012 5708	CARBON 1K JA 1/4W	1
C302	CC2-2-1500-KE01R	Ceramic 220pF 50V ±10%	1	R118	401 012 5708	CARBON 1K JA 1/4W	1
C303	CC2-2-1500-KE01R	Ceramic 220pF 50V ±10%	1	R119	401 012 5708	CARBON 1K JA 1/4W	1
C304	CC2-2-1500-KE01R	Ceramic 220pF 50V ±10%	1	R120	401 012 5708	CARBON 1K JA 1/4W	1
C305	CC2-2-1500-KE01R	Ceramic 220pF 50V ±10%	1	R121	401 012 5708	CARBON 1K JA 1/4W	1
C306	CC2-2-1500-KE01R	Ceramic 220pF 50V ±10%	1	R122	401 012 5708	CARBON 1K JA 1/4W	1
C307	CD4-7-663A-0001V	Electrolytic 47μF 6.3V	1	R123	401 012 5708	CARBON 1K JA 1/4W	1
C308	CD4-7-663A-0001V	Electrolytic 47μF 6.3V	1	R124	401 012 5708	CARBON 1K JA 1/4W	1
C309	CD4-7-6500-0001V	Electrolytic 47μF 50V	1	R125	401 016 2604	CARBON 220 JA 1/4W	1
C310	CD4-7-6500-0001V	Electrolytic 47μF 50V	1				
C311	CC4-7-3500-ZG00C	Ceramic 0.047μF 50V +80 -20%	1				
C312	CC4-7-3500-ZG00C	Ceramic 0.047μF 50V +80 -20%	1				
C313	CD1-0-6500-0001V	Electrolytic 10μF 50V	1				
C314	CD1-0-6500-0001V	Electrolytic 10μF 50V	1				
C315	CD1-0-7500-0001V	Electrolytic 100μF 50V	1				

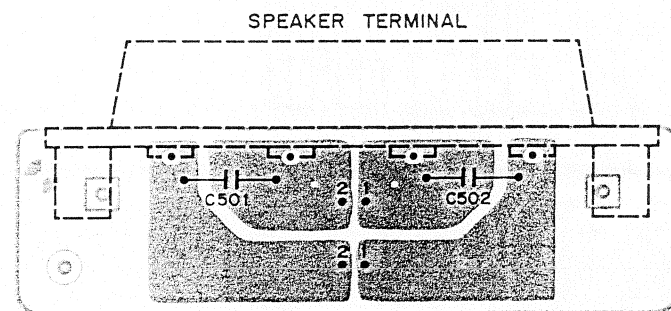
CONTROL AMPLIFIER P.C.BOARD (BOTTOM VIEW)



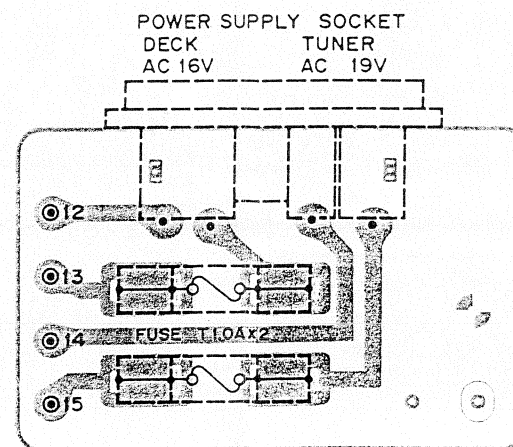
IC PIN NUMBERS DC VOLTAGES									
SYMBOL No.	DEVICE	1	2	3	4	5	6	7	8
IC201	LA6458DS	0V	0V	0V	-16.5V	0V	0V	0V	16.5V

TRANSISTOR DC VOLTAGES									
SYMBOL No.	DEVICE	B	C	E	SYMBOL No.	DEVICE	B	C	E
Q201,202	2SC536	-0.4V	16.2V	-1.0V	Q207,208	2SC536	-0.1V	16.2V	-0.7V
Q203,204	2SC536	-0.3V	16.2V	-0.9V	Q209,210	2SC536	-0.1V	16.2V	-0.7V
Q205,206	2SC536	-0.1V	16.2V	-0.7V					

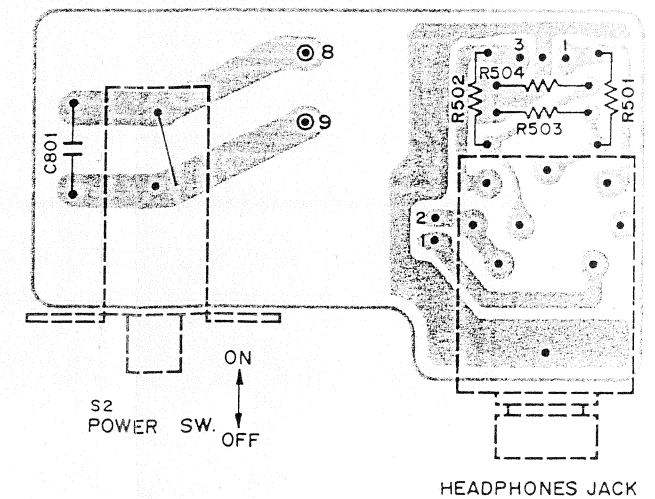
SPEAKER OUT P.C.BOARD (BOTTOM VIEW)



SOCKET 2P P.C.BOARD (BOTTOM VIEW)



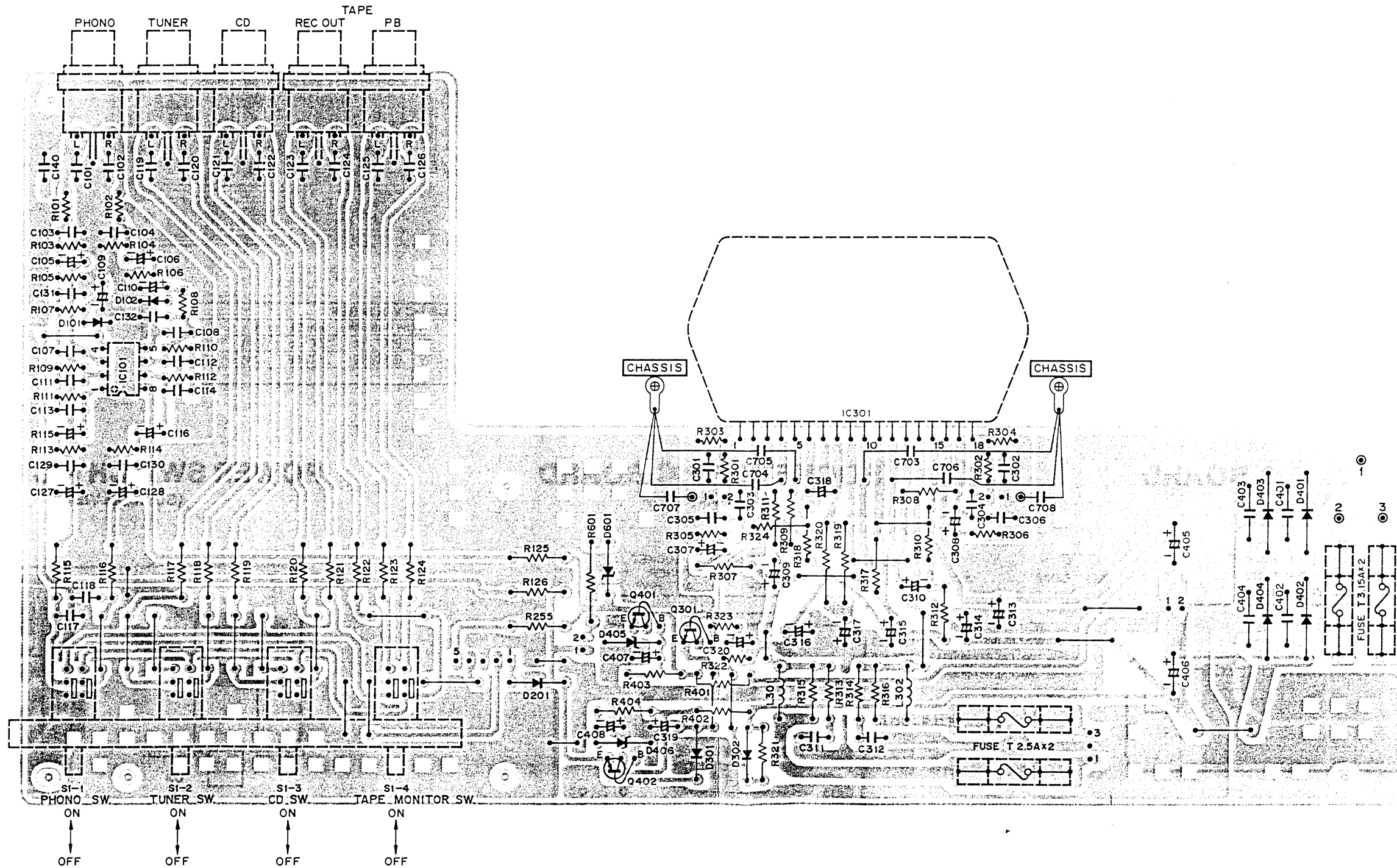
POWER SWITCH P.C.BOARD (BOTTOM VIEW)



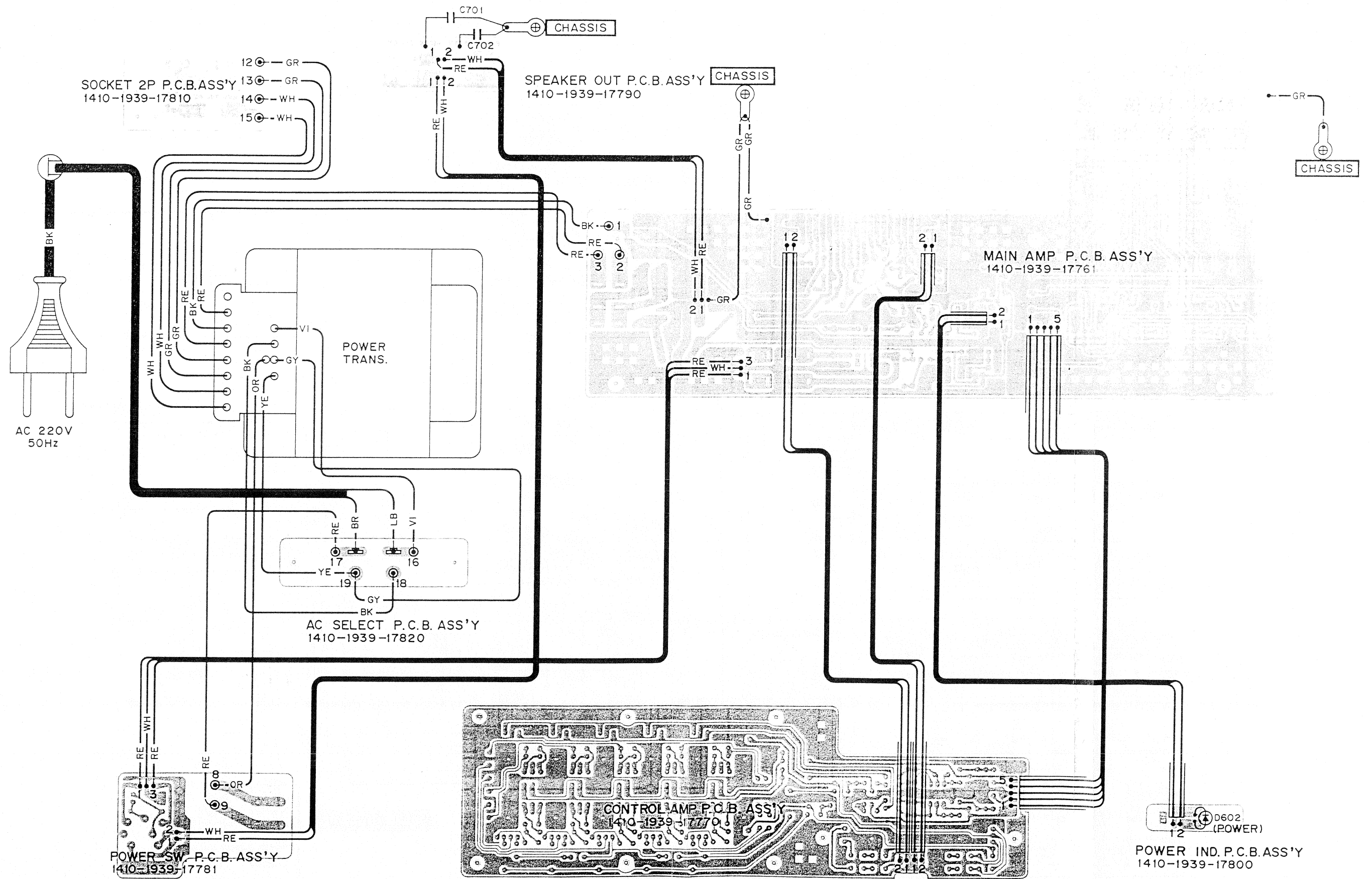
MAIN PRINTED CIRCUIT BOARD

TRANSISTOR DC VOLTAGES				
SYMBOL No.	DEVICE	B	C	E
Q301	2SC536	-24.7V	0V	-17.6V
Q401	2SC2274	18.5V	31.2V	18.0V
Q402	2SA984	-18.5V	-31.3V	-18.0V

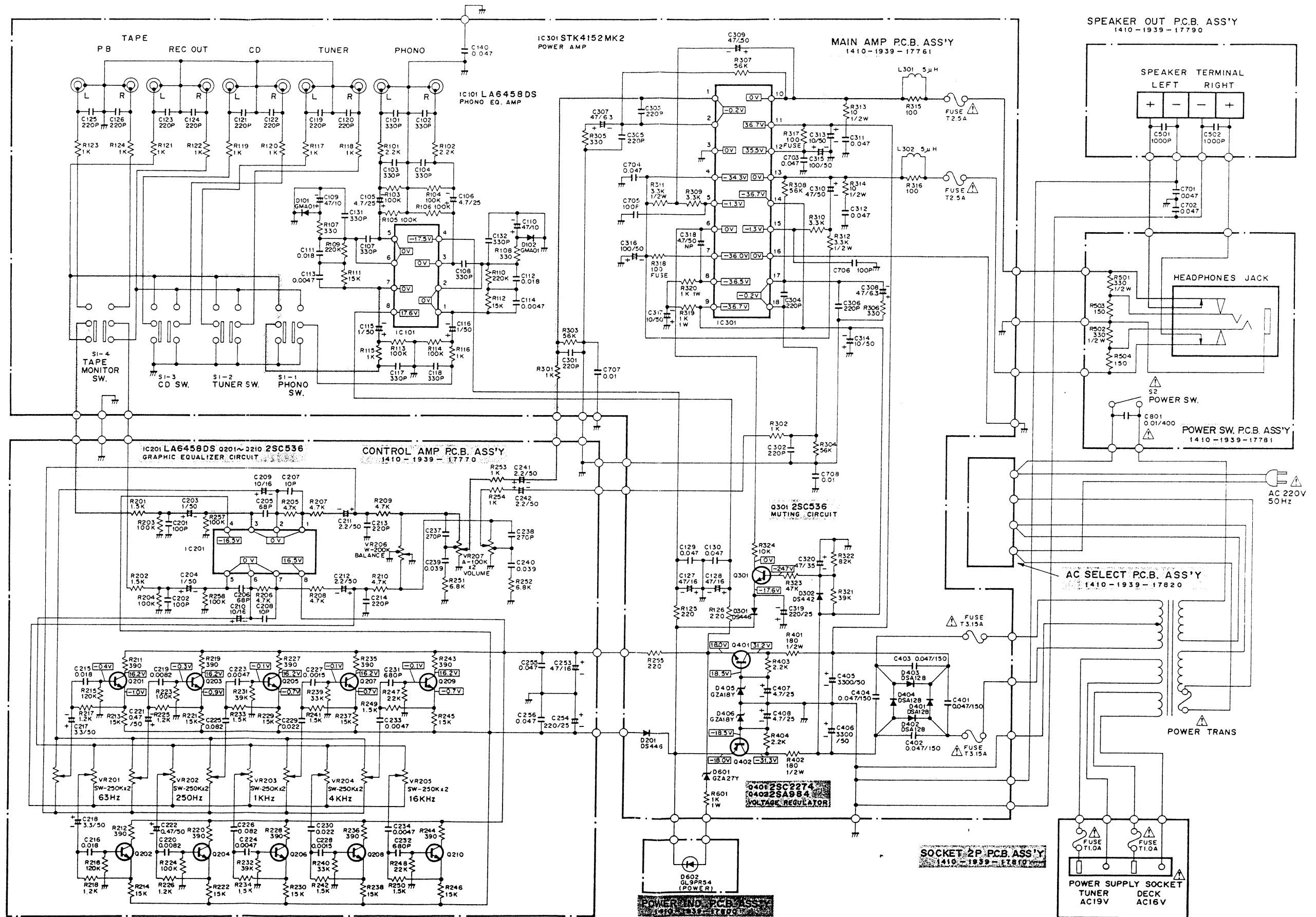
IC PIN NUMBERS DC VOLTAGES																			
SYMBOL No.	DEVICE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
IC101	LA6458DS	0V	0V	0V	-17.5V	0V	0V	0V	17.6V										
IC301	STK4152	-0.2V	-0.2V	0V	-34.3V	-1.3V	0V	-36.0V	-36.5V	-36.7V	0V	36.7V	35.5V	0V	-36.7V	-1.3V	0V	-0.2V	-0.2V



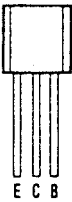
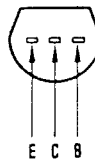
POINT TO POINT WIRING DIAGRAM



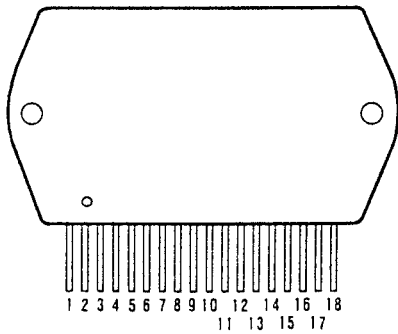
SCHEMATIC DIAGRAM



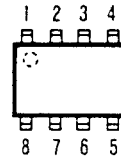
SEMICONDUCTOR LEAD IDENTIFICATION

TRANSISTOR	FRONT VIEW	BOTTOM VIEW
2SA 984 2SC 536 2SC 2274		
TERMINAL NAME		
B → BASE C → COLLECTOR E → EMITTER		

STK 4152 MK2 BOTTOM VIEW



LA 6458 BOTTOM VIEW



SWITCH POSITION TABLE

No.	Name	Position	No.	Name	Position
S1-1	PHONO Switch	OFF	S1-4	TAPE MONITOR Switch	OFF
S1-2	TUNER Switch	OFF	S2	POWER Switch	OFF
S1-3	CD Switch	OFF			

PRODUCT SAFETY NOTICE

Each precaution in this manual should be followed during servicing. Components identified with the IEC symbol Δ in the parts list and the schematic diagram designate components in which safety can be of special significance. When replacing a component identified with Δ , use only the replacement parts designated, or parts with the same ratings of resistance, wattage or voltage that are designated in the parts list in this manual. Leakage-current or resistance measurements must be made to determine that exposed parts are acceptably insulated from the supply circuit before returning the product to the customer.

NOTES:

1. All resistors values are indicated in "ohm" ($K=10^3$, $M=10^6$).
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.
 - b. All voltages $\pm 10\%$ with respect to chassis ground
 - c. No signals at input terminals
 - d. AC input at 220 volts 50 Hz
4. This is a basic schematic diagram.

Because Fisher products are subject to continuous improvement, Fisher Corporation reserves the right to make any changes or modifications without notice.