TA-3200F

US Model
(Serial No. 810,001 and later)
E Model
(Serial No. 510,001 and later)
Canadian Model
(Serial No. 710,001 and later)

STEREO POWER AMPLIFIER

SPECIFICATIONS

Dynamic power output: (IHF)	320 watts (8 ohms) 500 watts (4 ohms)
Continuous RMS power output: (rated output) [Less than 0.1 % THD]	At 1 kHz 140/140 watts (8 ohms) 200/200 watts (4 ohms) Per channel operating 110 + 110 watts (8 ohms) 130 + 130 watts (4 ohms) Both channels driven simultaneously At 20 Hz-20 kHz 100 + 100 watts/8 ohms Both channels driven simultaneously
Power bandwidth: (IHF)	5 Hz–35 kHz
Harmonic distortion: (20 Hz-20 kHz)	Less than 0.1 % at rated output Less than 0.05 % at 1 watt output
IM distortion:	Less than 0.1 % at rated output Less than 0.03 % at 1 watt output
Frequency response:	5 Hz–200 kHz $^{+0}_{-2}$ dB (at 1 watt output, NORMAL/TEST switch set at TEST) NORMAL setting cuts low frequencies below 30 Hz 6 dB/octave.
S/N ratio:	110 dB, short-circuited
Residual noise:	Less than 0.003 μ watt/8 ohms
Inputs:	Sensitivity 1.4 volts (for rated output) Impedance: 75 k ohms Two pairs of inputs equipped with level controls.
Outputs:	Accepts 4–16 ohm speakers. Equipped with two pairs of speaker outputs.
Power requirements:	120 volts ac (USA and Canada Model) 100, 120, 220 or 240 volts ac (General Export Model)
Power consumption:	280 watts (USA Model) 610 watts (IEC standards) 600 VA (Canada Model)
Ac outlets:	Switched 1, Unswitched 1 Total 300 watts
Dimensions:	400 (w) x 149 (h) x 323 (d) mm 15¾ (w) x 5⅞ (h) x 12¾ (d) inches
Net weight:	14.0 kg (30 lb 10 oz)
Shipping weight:	16.7 kg (36 lb 14 oz)

E Model = General Export Model

SONY®
SERVICE MANUAL

SECTION 1
TECHNICAL DESCRIPTION

1-1. CIRCUIT DESCRIPTION DIGEST

The following describes the newly adopted circuit that might help you in repair work. Refer to the schematic diagram on page 11.

(1) Low Filter Switch S2

C101 and R102 form a low-cut filter 6 dB/oct below 30 Hz for eliminating extremely low frequencies when the LOW FILTER switch is set to NORMAL.

(2) Preamplifier (Q101, Q102, Q103, Q104)

This is a modified paraphase amplifier but output signal is extracted from the emitter circuit of Q102. Note that Q101 and Q102 are in a Darlington configuration and Q104 acts as a constant current source. These circuits have various advantages in a direct-coupling system. One is high stability despite temperature variation and another is high input impedance without reducing the amplifier gain. The ac output appears across R108 in the emitter circuit of Q102 while the decoupling circuit is formed by the emitter-base resistance of Q103, C104 and R109. C104 and R109 form a frequency-selective ac bypass to reduce amplifier gain at very low frequencies. Q104 keeps the dc current flow constant in Q101, Q102 and Q103, thus increasing the dc stability.

Noise Suppressor

D101 connected to Q104 reduces the popping noise due to unbalanced current flow in the following stages when the power switch is turned off.

Dc Balance

R105 provides a stabilized bias voltage for transistor Q101 to set the output terminal voltage at zero dc. This also enables TA-3200F to provide same but opposite poled output to the load.

(3) Pre-Driver Q106

Though this stage is a conventional flat amplifier it determines the output voltage swings because the following stages are basically emitter-followers. The ac load resistor for this stage is R112 (4.7 k).

Dc Bias Adj.

Q105 is biased into conduction and operates as a small resistance providing the necessary forward bias on the two cascaded emitter followers. R116 controls the base bias of Q105, determining its emitter-collector impedance and thereby controls the dc bias voltage for the following circuit. D102 provides thermal compensation for the following complementary and power transistor circuits. D102 is attached to the power transistor heat sink to detect temperature increase in the power transistors.

(4) Protection Circuit

Two kinds of protection circuits are used in this power amplifier. One is a power transistor protection and the other is a speaker protection circuits.

Power Transistor Protection

Referring to Fig. 1-1, the protection circuit operates as follows: (Since the protection circuit is identical for positive-and negative-half cycles, only the positive half cycle operation is described.) During normal operation, Q107 and Q114 are cut off (the load impedance is 2 ohms or more) and have no effect upon power tran-

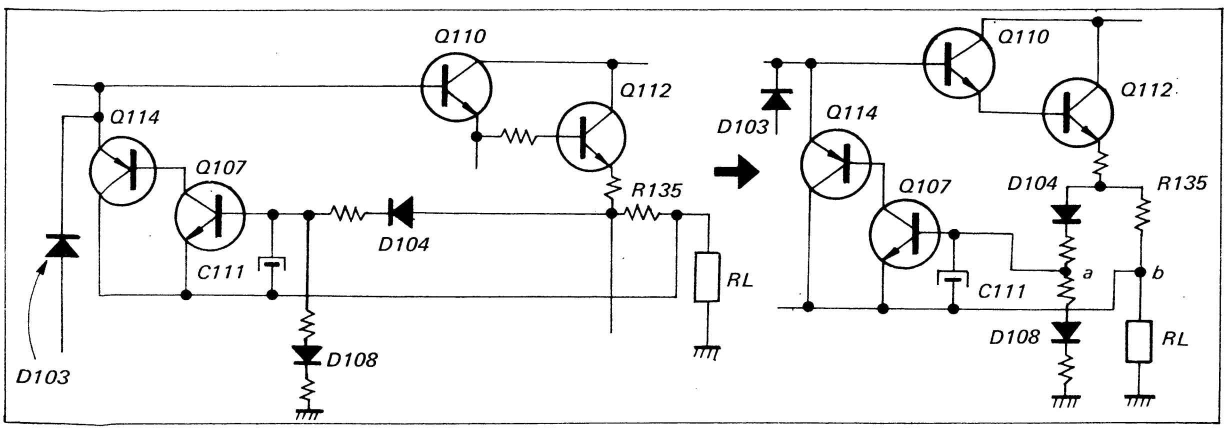


Fig. 1-1. Simplified power transistor protection circuit

 TA-3200F

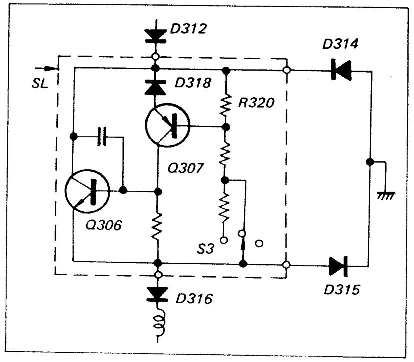


Fig. 1-5. Detail of limiter switch SL

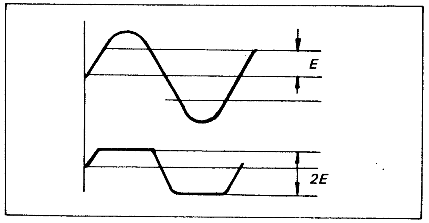
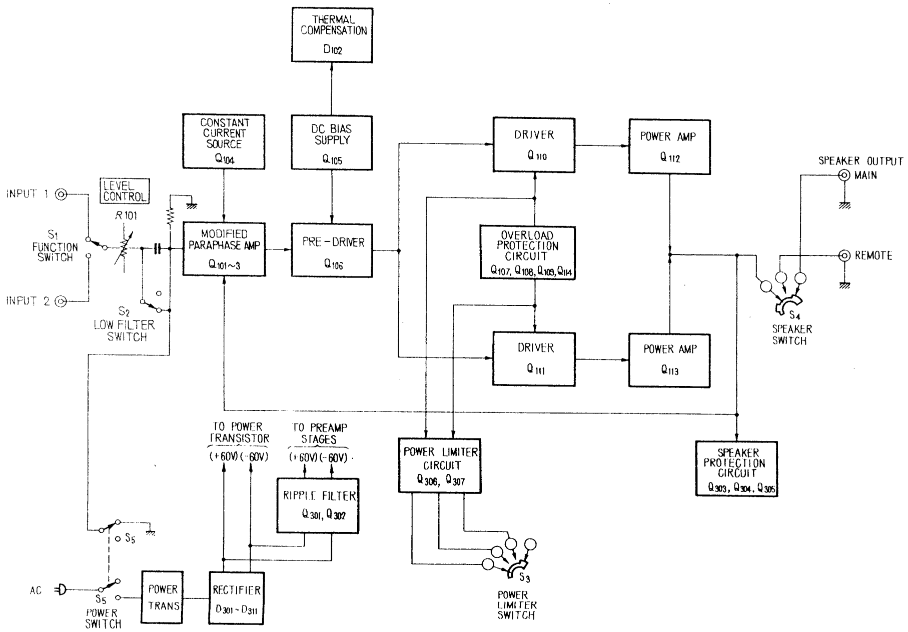


Fig. 1-6. Peak limiting operation

1-2. BLOCK DIAGRAM



sistor operation because the voltage at point "a" is designed negative referred to point "b". When excessive current flows, that is the load impedance decreases extremely low value (less than 2 ohms or short), the voltage at point "a" becomes positive referred to point "b" thereby turning on Q107 and Q114. This effectively limits the input drive voltage to the power transistor and holds the current flow in the power transistor to 2A. D103 protects Q114 from break down between base and emitter during negative-half cycle when output is shorted.

Additional Power Transistor Protection Circuit

Referring to Fig. 1-2, D110, D111 form an additional power transistor protection circuit.

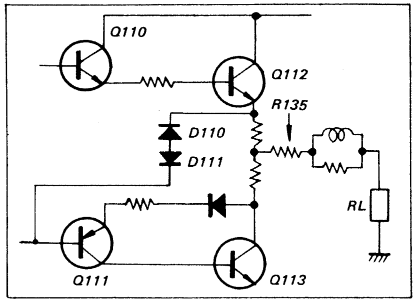


Fig. 1-2. Additional power transistor circuit

When the output terminal is shorted, zener diode D110 shorts the excessive negative half cycle drive voltage to ground through R135 and D111, limiting the drive voltage, thereby restricts excessive current flow in the power transistor Q113. D111 prevents D110 from turning on during the positive half cycle when supplying relatively high output power to the load.

Speaker Protection

In a direct-coupled power amplifier, some faults in a prior transistor cause a large unbalanced dc voltage at output terminal. This may damage a delicate speaker system. Therefore, the TA-3200F incorporates a speaker protection circuit which operates as follows: Referring to Fig. 1-3, the dc or very-low frequency component caused by transistor faults appears at output terminal and applied to the base of Q303 or Q304 through a lowpass filter (R317 or R316 and C316). Therefore Q304 or Q303 turns on corresponding to the polarity of input signal applied and short the base of Q110 (Q210)

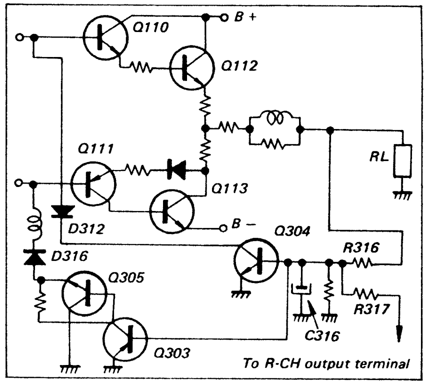


Fig. 1-3. Speaker protection circuit

or Q111 (Q211) to ground. This holds the output terminal to about 2 V dc and thus protecting the speaker system. Note that Q304 turns on due to positive input while Q303, Q305 operate due to negative input.

(5) Power Limiter Circuit

This determines the output power corresponding to the value selected by Power Limiter Switch S3. Referring to Fig. 1-4, this operates as a peak limiter of drive voltage as follows: When the instantaneous value of the positive drive voltage exceeds some specified value, switch SL closes and diode D312 and D315

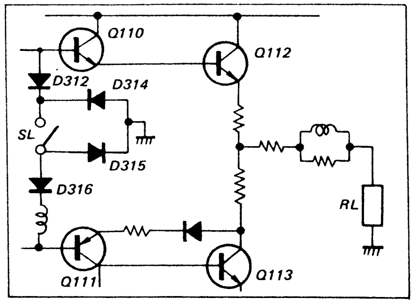


Fig. 1-4. Simplified power limiter circuit

conduct shorting the drive voltage to ground. In negative voltage case, D314 and D316 short the drive voltage. Switch SL is formed by Q306, Q307 and D318 as shown in Fig. 1-5 and operates as follows: When S3 is set to "½" or "¼", Q306 turns on only when voltage across R320 exceeds zener voltage of D318. Typical peak limiting operation is shown in Fig. 1-6.

 TA-3200F

SECTION 2

DISASSEMBLY AND REPLACEMENT

Note: All screws in this service manual are Phillips type (cross recess type) unless otherwise indicated.

2-1. FRONT PANEL REMOVAL

1. Remove the two screws at both sides of the top cover. This frees the top cover.
2. Take out all the knobs, then remove the three screws at front top and bottom of the chassis as shown in Figs. 2-1 and 2-2. This frees the front panel.

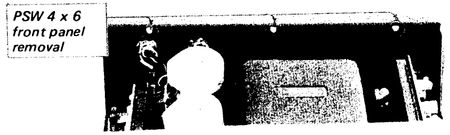


Fig. 2-1. Front panel removal

2-2. FRONT SUBCHASSIS REMOVAL

1. Remove the six screws from the bottom and two screws at both sides of the chassis as shown in Fig. 2-2. This frees the front subchassis.

2-3. CONTROL AND SWITCH REPLACEMENT

1. Remove the front panel and front subchassis as described in Procedures 2-1 and 2-2.
2. Remove the screws or nuts securing each component to the front subchassis as shown in Fig. 2-3.

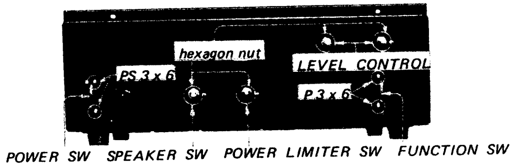


Fig. 2-3. Switch and control replacement

2-4. REAR PANEL REMOVAL

1. Remove the five screws at rear bottom and two screws at both sides of the chassis as shown in Fig. 2-2. This frees the rear panel.

2-5. POWER TRANSISTOR REPLACEMENT

1. Remove the heat sink on which the defective power transistor is mounted by taking out the screws as required shown in Fig. 2-2.
2. Always remove the pair of heat sinks when replacing or checking the power transistors mounted on one of them as the signal harness restricts the heat sink movement.
3. When replacing the power transistor, apply a coating of heat-transferring silicone grease to both sides of the mica washer. Any excess grease, squeezed out when the mounting screws are tightened, should be wiped off with a clean cloth to prevent the accumulation of conductive dust particles that might eventually cause a short.

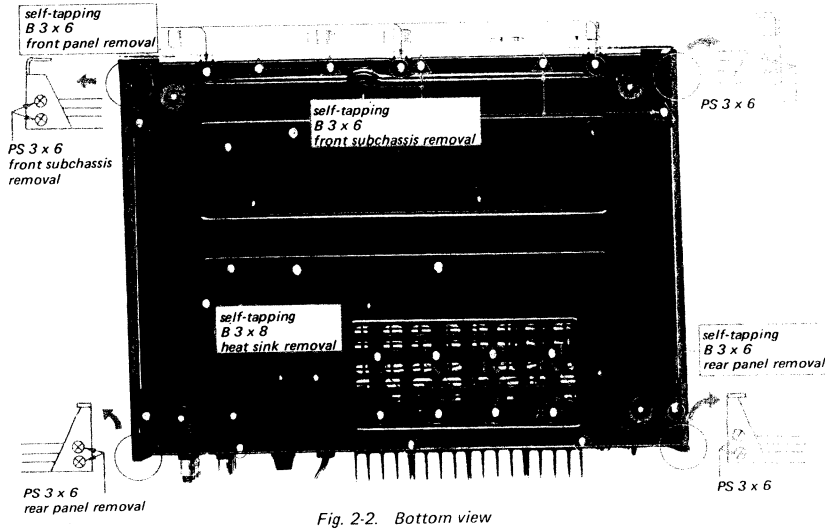


Fig. 2-2. Bottom view

2-6. REPLACEMENT OF COMPONENTS SECURED TO THE REAR PANEL BY RIVETS

1. Remove the rear panel as described in Procedure 2-4.
2. Bore out the rivets using a drill bit slightly larger in diameter than the rivet. See Fig. 2-4.
3. Punch out the remainder of the rivet with a nail set or prick punch.
4. Remove the defective component, and then install a new one.
5. Secure the new component with a suitable screw and nut or a repair rivet screw (part number 3-701-402-00).

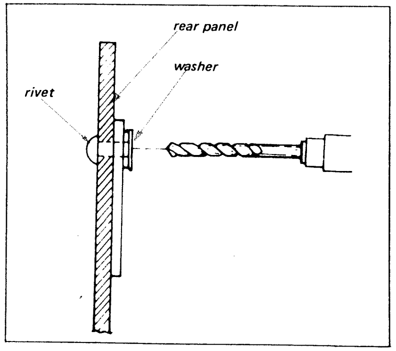
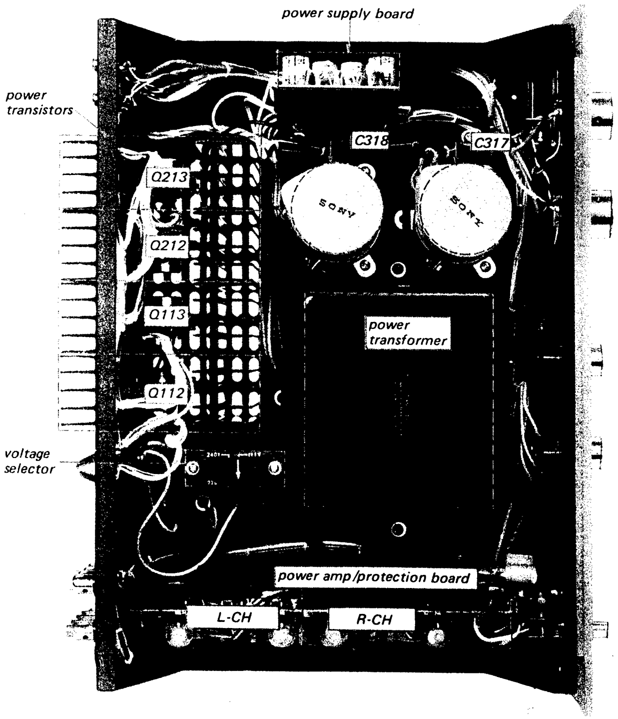


Fig. 2-4. Rivet removal

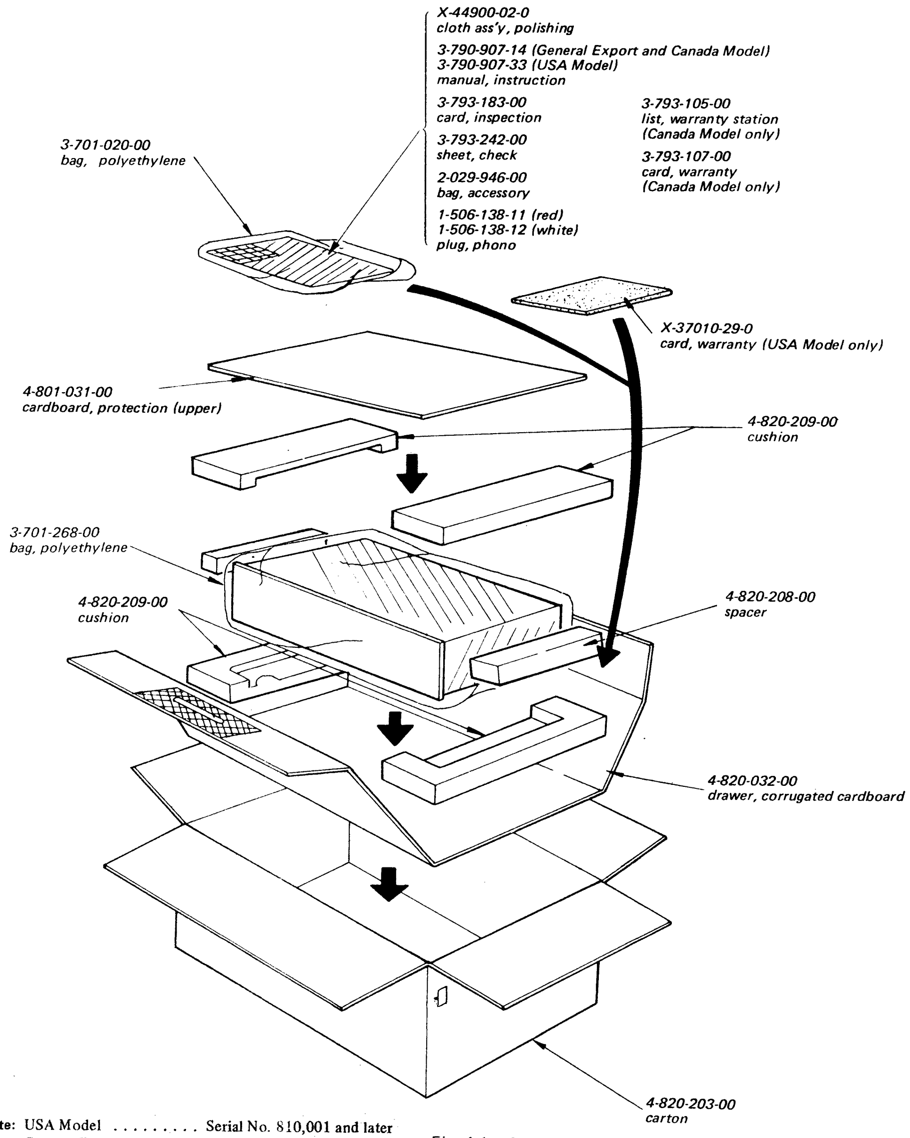
2-7. CHASSIS LAYOUT



SECTION 4

REPACKING

The TA-3200F original shipping carton and packing materials are the ideal containers for shipping the unit. However to secure the maximum protection, the TA-3200F must be repacked in these materials precisely as before. The proper repacking procedures are shown in Fig. 4-1.



Note: USA Model .... Serial No. 810,001 and later
General Export Model .. Serial No. 510,001 and later
Canada Model .... Serial No. 710,001 and later

Fig. 4-1. Repacking

SECTION 3

ADJUSTMENTS

Note: There are two adjustments in the power amplifier, a dc-bias adjustment and a dc-balance adjustment. These adjustment should be alternately, repeated two or three times after replacing any of the transistors in the power amplifier until the best operation is obtained.

3-1. DC BIAS ADJUSTMENT

Serious deficiencies in performance, such as break down or thermal runaway of power transistors, will result if this adjustment is improperly made.

CAUTION

To avoid accidental power transistor damage, increase the ac line voltage gradually (using a variable transformer) while measuring the voltage across the test points as shown in Fig. 3-1. Check to see that the reading does not exceed 25 mV. If it does, turn off the power immediately, then check and repair the trouble in the circuit board.

Test Equipment Required

1. Dc millivoltmeter
2. Variable transformer

Procedure

1. Connect the dc millivoltmeter across the test points on the circuit board, as shown in Fig. 3-1.
2. Set the adjustable resistors (screwdriver-adjust potentiometers) as follows:

   R116 (L-CH, dc bias) . . . . . fully counterclockwise
   R216 (R-CH, dc bias) . . . . . fully counterclockwise
   R105, R205 (dc balance) . . midposition

3. Turn on the POWER switch, then increase the line voltage up to the rated value.
4. Adjust R116, R216 to obtain a 25 mV reading on the meter, and then make the dc balance adjustment.

3-2. DC BALANCE ADJUSTMENT

Harmonic distortion at high levels will result if this adjustment is improperly made.

Test Equipment Required

1. Dc null meter or dc millivoltmeter
2. Screwdriver, with 3 mm (1/8") blade

Procedure

1. Connect the dc null-meter or millivoltmeter to the speaker output terminal.
2. Turn the POWER switch to ON, and then adjust R105 (R205) to obtain a OV reading on the meter.
3. After 10 minutes warm-up, alternately repeat this and the dc bias adjustment two or three times.

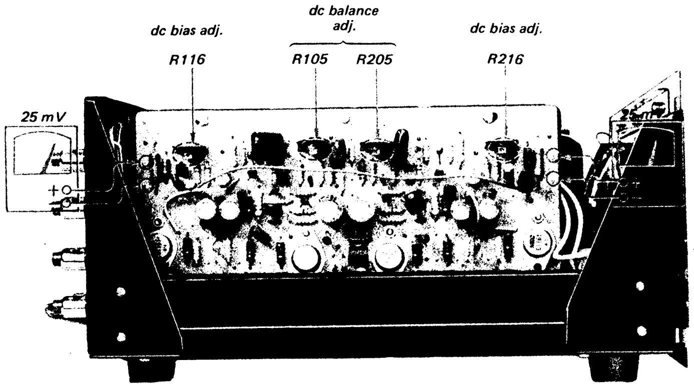
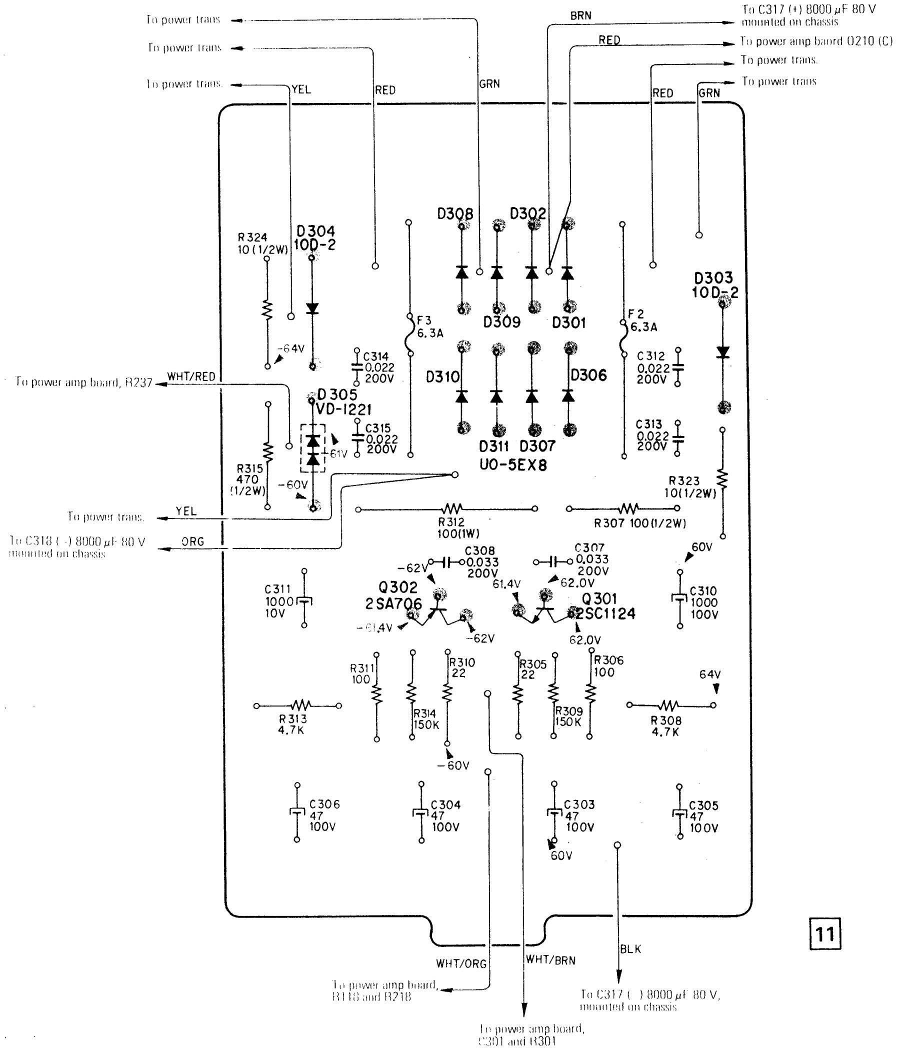


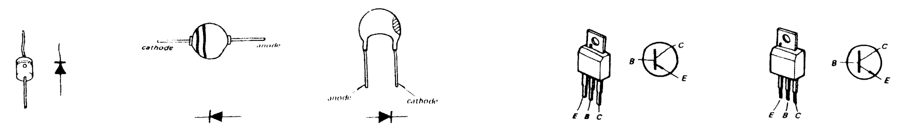
Fig. 3-1. Connection point of dc millivoltmeter and adjustment parts location

SECTION 5

DIAGRAMS

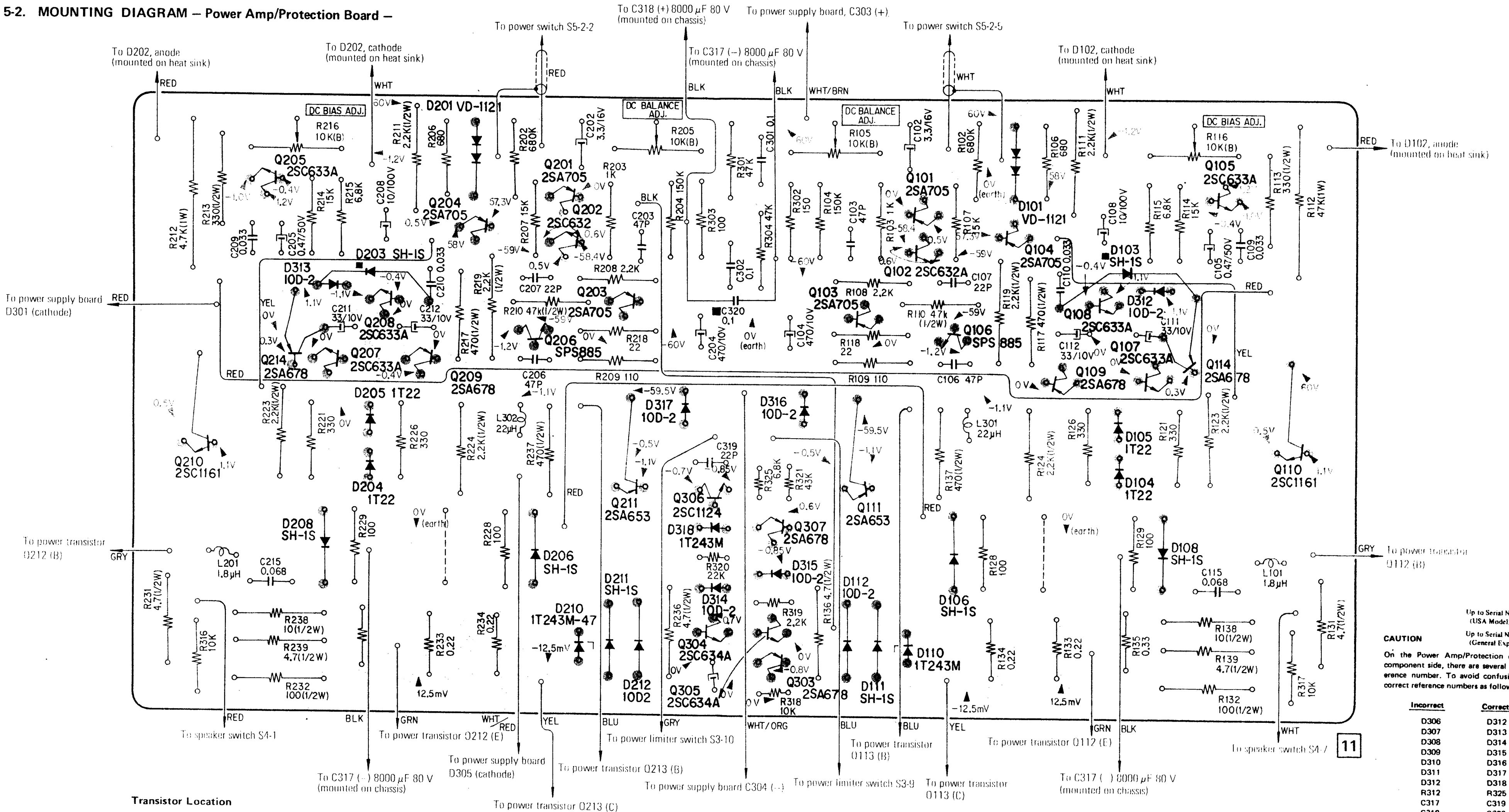
5-1. MOUNTING DIAGRAM – Power Supply Board –





10D-2 UO-5E VD-1221 2SA706 2SC1124

5-2. MOUNTING DIAGRAM – Power Amp/Protection Board –



CAUTION

Up to Serial No. 810,20 (USA Model)

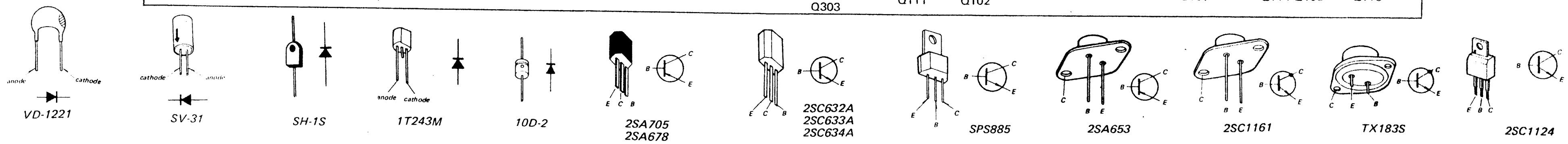
Up to Serial No. 511,101 (General Export Model)

On the Power Amp/Protection circuit board component side, there are several errors of reference number. To avoid confusion, note the correct reference numbers as follows:

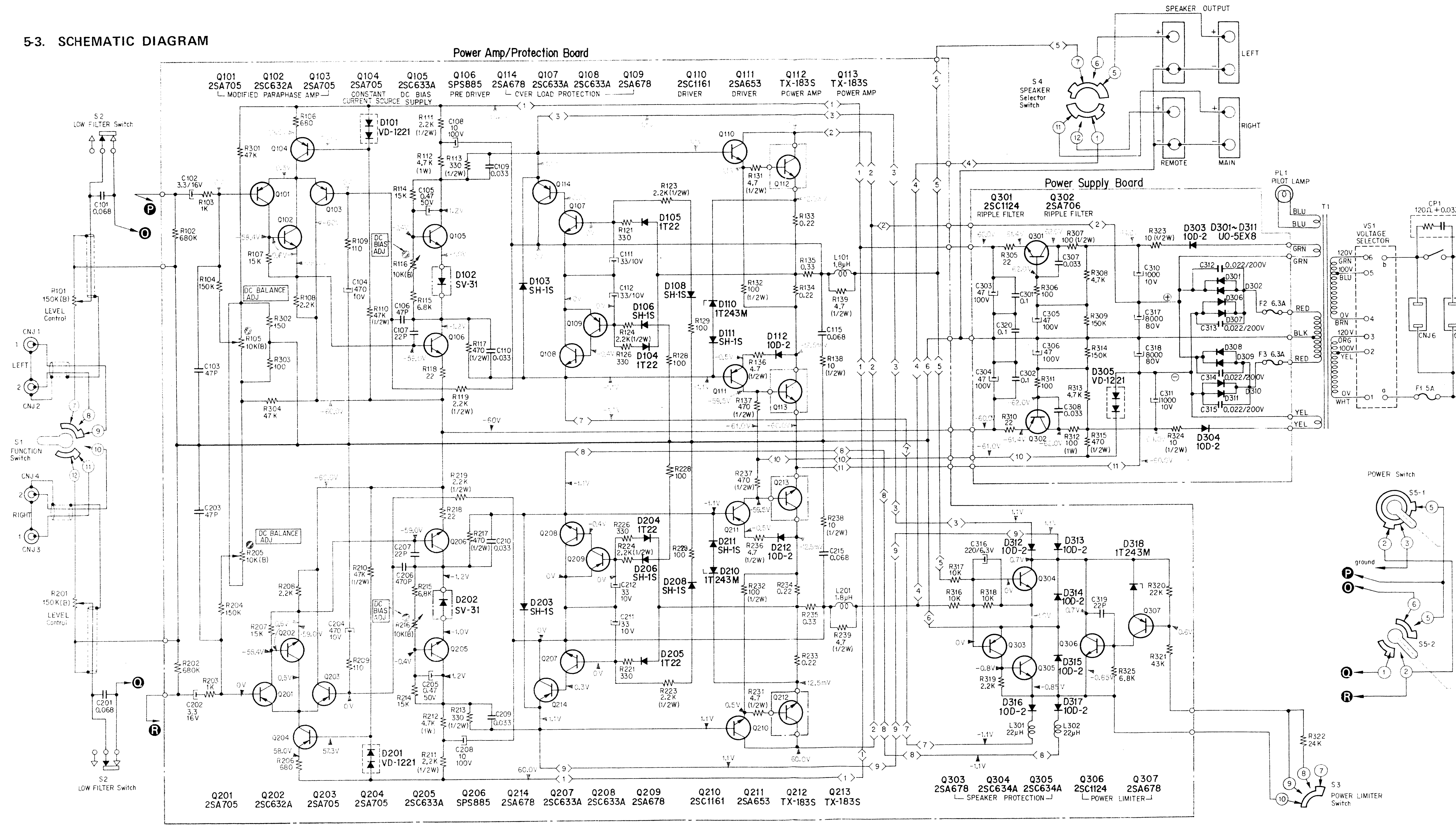
Incorrect	Correct
D306	D312
D307	D313
D308	D314
D309	D315
D310	D316
D311	D317
D312	D318
R312	R325
C317	C319
C318	C320

Transistor Location

Q210	Q205 Q214 Q207	Q208	Q209 Q204	Q201 Q206 Q202	Q203 Q211	Q306 Q304	Q307 Q305 Q303	Q103 Q111	Q101 Q102 Q106	Q104	Q109 Q108	Q107	Q114 Q105	Q110	



5-3. SCHEMATIC DIAGRAM



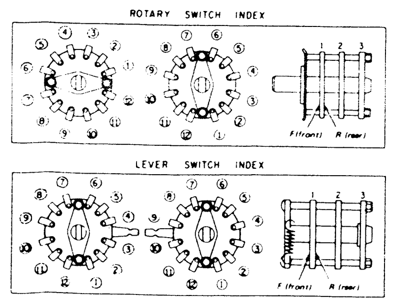
Ref. No.	Description	Position
S1	FUNCTION SW (1-2)	1
S2	LOW FILTER SW (TEST-NORMAL)	TEST
S3	POWER LIMITER SW (FULL-½-¼)	FULL
S4	SPEAKER SW (MAIN-REMOTE)	MAIN
S5	POWER SW	OFF

Note: All resistance values are in ohms. k = 1,000 M = 1,000 k.

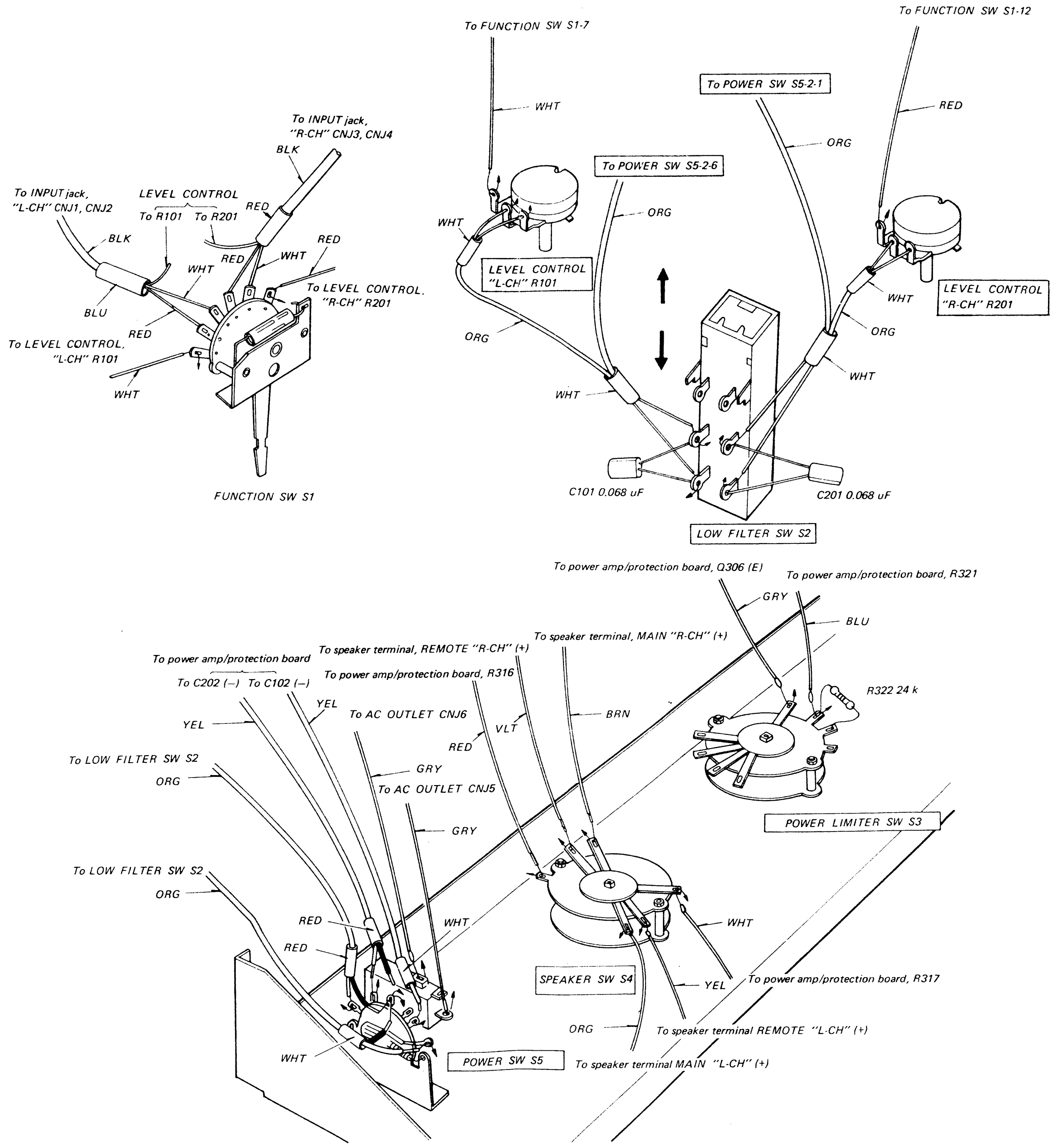
All capacitance values are in μF except as indicated with p, which means $\mu\mu F$.

All voltages are dc measured with a VOM having 20 k ohms/volt input impedance. No signal in.

Voltage variations may be noted due to normal production tolerances.



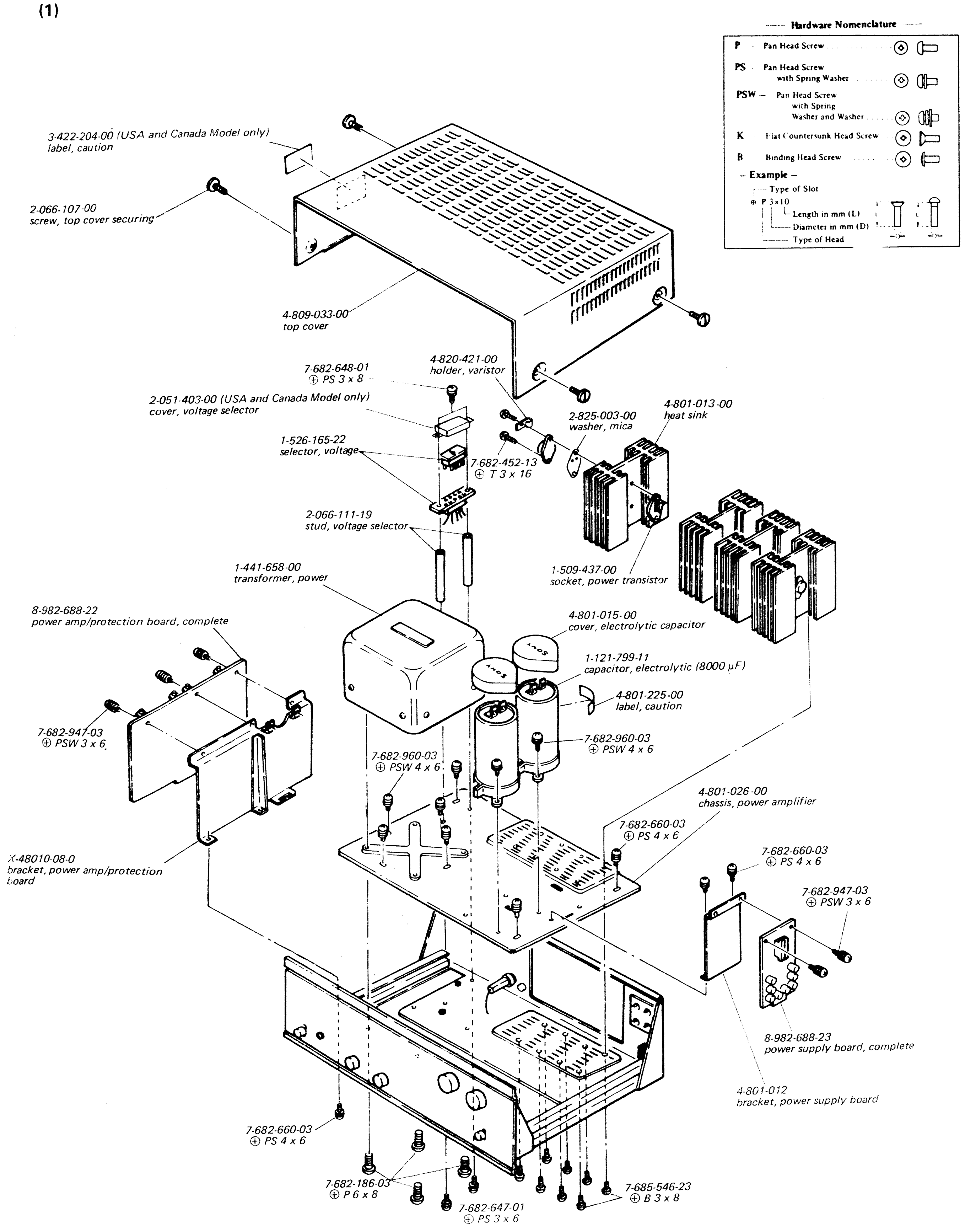
5-4. WIRING DIAGRAM
– Front Panel –



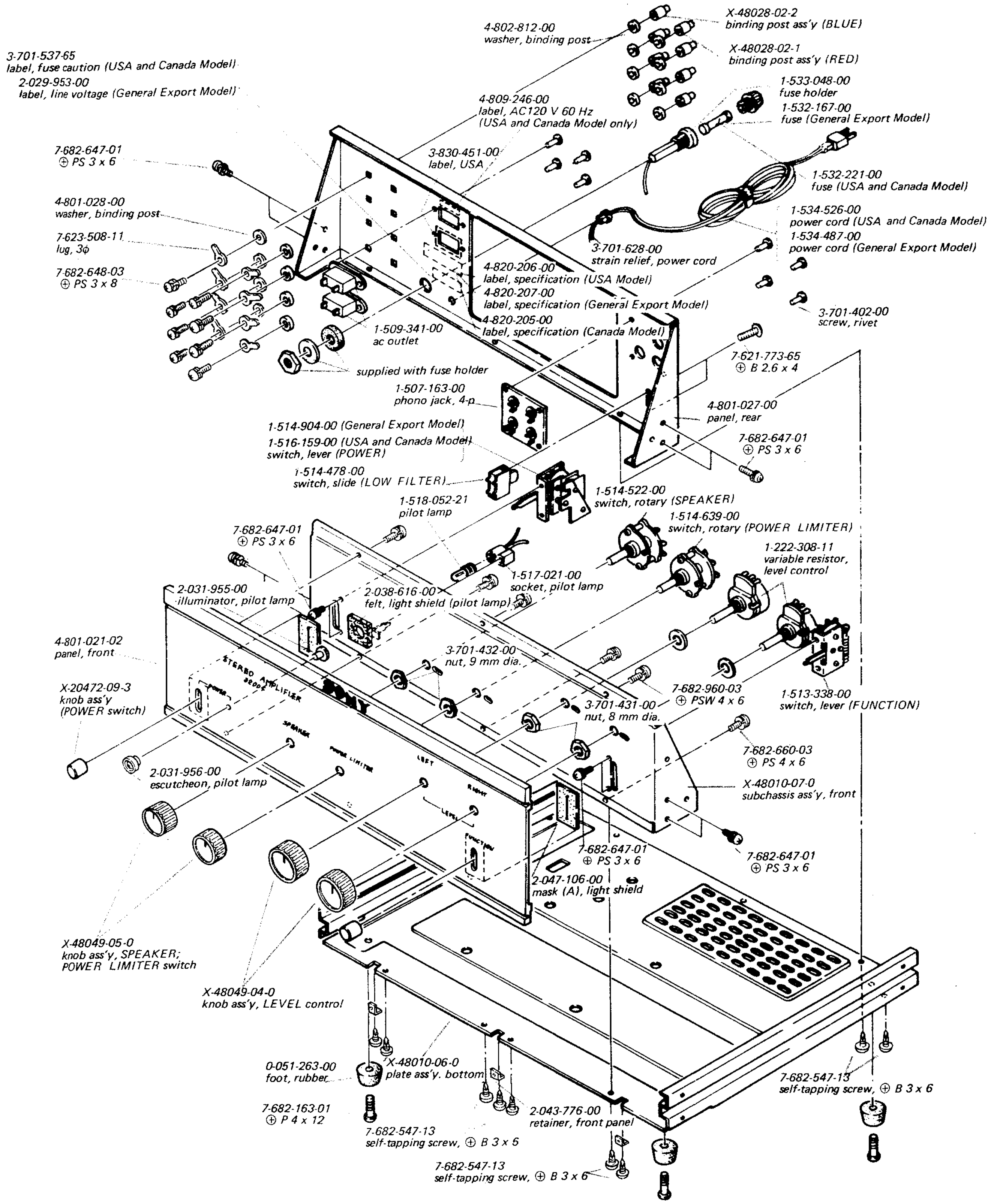
SECTION 6
EXPLODED VIEWS

Note:
USA Model . . . . Serial No. 810,001 and later
General Export Model . . Serial No. 510,001 and later
Canada Model . . . . Serial No. 710,001 and later

(1)



(2)


X-48028-02-2
binding post ass'y (BLUE)
4-802-812-00
washer, binding post
X-48028-02-1
binding post ass'y (RED)
3-701-537-65
label, fuse caution (USA and Canada Model)
2-029-953-00
label, line voltage (General Export Model)
1-533-048-00
fuse holder
4-809-246-00
label, AC120 V 60 Hz
(USA and Canada Model only)
1-532-167-00
fuse (General Export Model)
7-682-647-01
⊕ PS 3 x 6
3-830-451-00
label, USA
1-532-221-00
fuse (USA and Canada Model)
4-801-028-00
washer, binding post
1-534-526-00
power cord (USA and Canada Model)
1-534-487-00
power cord (General Export Model)
7-623-508-11
lug, 3ϕ
3-701-628-00
strain relief, power cord
7-682-648-03
⊕ PS 3 x 8
4-820-206-00
label, specification (USA Model)
4-820-207-00
label, specification (General Export Model)
3-701-402-00
screw, rivet
4-820-205-00
label, specification (Canada Model)
1-509-341-00
ac outlet
7-621-773-65
⊕ B 2.6 x 4
supplied with fuse holder
1-507-163-00
phono jack, 4-p
4-801-027-00
panel, rear
1-514-904-00 (General Export Model)
1-516-159-00 (USA and Canada Model)
switch, lever (POWER)
7-682-647-01
⊕ PS 3 x 6
1-514-478-00
switch, slide (LOW FILTER)
1-514-522-00
switch, rotary (SPEAKER)
1-518-052-21
pilot lamp
1-514-639-00
switch, rotary (POWER LIMITER)
7-682-647-01
⊕ PS 3 x 6
1-222-308-11
variable resistor,
level control
1-517-021-00
socket, pilot lamp
2-031-955-00
illuminator, pilot lamp
2-038-616-00
felt, light shield (pilot lamp)
4-801-021-02
panel, front
3-701-432-00
nut, 9 mm dia.
X-20472-09-3
knob ass'y
(POWER switch)
7-682-960-03
⊕ PSW 4 x 6
1-513-338-00
switch, lever (FUNCTION)
3-701-431-00
nut, 8 mm dia.
7-682-660-03
⊕ PS 4 x 6
2-031-956-00
escutcheon, pilot lamp
X-48010-07-0
subchassis ass'y, front
7-682-647-01
⊕ PS 3 x 6
7-682-647-01
⊕ PS 3 x 6
2-047-106-00
mask (A), light shield
X-48049-05-0
knob ass'y, SPEAKER;
POWER LIMITER switch
X-48049-04-0
knob ass'y, LEVEL control
0-051-263-00
foot, rubber
X-48010-06-0
plate ass'y, bottom
7-682-547-13
self-tapping screw, ⊕ B 3 x 6
7-682-163-01
⊕ P 4 x 12
2-043-776-00
retainer, front panel
7-682-547-13
self-tapping screw, ⊕ B 3 x 6
7-682-547-13
self-tapping screw, ⊕ B 3 x 6

SECTION 7

ELECTRICAL PARTS LIST

Note:

USA Model . . . . Serial No. 810,001 and later
General Export Model . . Serial No. 510,001 and later
Canada Model. . . . . Serial No. 710,001 and later

COMPLETE CIRCUIT BOARDS

Ref. No.	Part No.	Description	
	8-982-688-22	power amp/protection board	
	8-982-688-23	power supply board	

SEMICONDUCTORS

Ref. No.	Part No.	Description	
D101(D201)		diode	VD1221
D102(D202)		diode	SV-31
D103(D203)		diode	SH-1S
D104(D204)		diode	SH-1S
D105(D205)		diode	SH-1S
D106(D206)		diode	SH-1S
D107(D207)		diode	SH-1S
D108(D208)		diode	SH-1S
D109(D209)		diode	SH-1S
D110(D210)		diode	1T243M
D111(D211)		diode	SH-1S
D112(D212)		diode	10D-2
D301		diode	UO-5E
D302		diode	UO-5E
D303		diode	10D-2
D304		diode	10D-2
D305		diode	VD-1221
D306		diode	UO-5E
D307		diode	UO-5E
D308		diode	UO-5E
D309		diode	UO-5E
D310		diode	UO-5E
D311		diode	UO-5E
D312		diode	10D-2
D313		diode	10D-2
D314		diode	10D-2
D315		diode	10D-2
D316		diode	10D-2
D317		diode	10D-2
D318		diode	1T243M
Q101(Q201)		transistor	2SA705
Q102(Q202)		transistor	2SC632A
Q103(Q203)		transistor	2SA705
Q104(Q204)		transistor	2SA705
Q105(Q205)		transistor	2SC633A
Q106(Q206)		transistor	SPS885
Q107(Q207)		transistor	2SC633A
Q108(Q208)		transistor	2SC633A
Q109(Q209)		transistor	2SA678
Q110(Q210)		transistor	2SC1161
Q111(Q211)		transistor	2SA653
Q112(Q212)		transistor	TX183S
Q113(Q213)		transistor	TX183S
Q114(Q214)		transistor	2SA678
Q301		transistor	2SC1124
Q302		transistor	2SA706
Q303		transistor	2SA678
Q304		transistor	2SC634A
Q305		transistor	2SC634A
Q306		transistor	2SC1124
Q307		transistor	2SA678

TRANSFORMER & INDUCTORS

Ref. No.	Part No.	Description
L101(L201)	1-407-592-00	inductor, micro 1.8 μH
L301(L302)	1-407-161-00	inductor, micro 22 μH
T1	1-441-658-00	transformer, power

CAPACITORS

All capacitors are in μF except as indicated with p, which means μμF.

Ref. No.	Part No.	Description			
C101(C201)	1-105-683-12	0.068	±10 %	50 V	mylar
C102(C202)	1-131-197-11	3.3		16 V	tantalum
C103(C203)	1-101-881-11	47 p	±10 %	50 V	ceramic
C104(C204)	1-121-425-11	470		10 V	electrolytic
C105(C205)	1-121-726-11	0.47		50 V	electrolytic
C106(C206)	1-101-881-11	47 p	±10 %	50 V	ceramic
C107(C207)	1-102-967-11	22 p	±10 %	50 V	ceramic
C108(C208)	1-123-080-11	10		100 V	electrolytic
C109(C209)	1-105-679-12	0.033	±10 %	50 V	mylar
C110(C210)	1-105-679-12	0.033	±10 %	50 V	mylar
C111(C211)	1-121-402-11	33		10 V	electrolytic
C112(C212)	1-121-402-11	33		10 V	electrolytic
C113(C213)		---------------			
C114(C214)		---------------			
C115(C215)	1-105-683-12	0.068	±10 %	50 V	mylar
C301	1-105-725-12	0.1	±10 %	100 V	mylar
C302	1-105-725-12	0.1	±10 %	100 V	mylar
C303	1-123-083-11	47		100 V	electrolytic
C304	1-123-083-11	47		100 V	electrolytic
C305	1-123-083-11	47		100 V	electrolytic
C306	1-123-083-11	47		100 V	electrolytic
C307	1-105-679-12	0.033	±10 %	50 V	mylar
C308	1-105-679-12	0.033	±10 %	50 V	mylar
C309		---------			
C310	1-121-736-11	1,000		100 V	electrolytic
C311	1-121-736-11	1,000		100 V	electrolytic
C312	1-105-757-12	0.022	±10 %	200 V	mylar
C313	1-105-757-12	0.022	±10 %	200 V	mylar
C314	1-105-757-12	0.022	±10 %	200 V	mylar
C315	1-105-757-12	0.022	±10 %	200 V	mylar
C316	1-123-419-11	220		6.3 V	electrolytic
C317	1-121-799-11	8,000		80 V	electrolytic
C318	1-121-799-11	8,000		80 V	electrolytic
C319	1-102-967-11	22 p	±10 %	50 V	ceramic
C320	1-105-685-12	0.1	±10 %	50 V	mylar

RESISTORS

All resistors are in Ω, ± 5 %, ¼ W and carbon type unless otherwise indicated.

Ref. No.	Part No.	Description		
R101(R201)	1-222-308-11	150 k (B), variable (LEVEL control)		
R102(R202)	1-244-741-11	680 k		
R103(R203)	1-244-673-11	1 k		
R104(R204)	1-244-725-11	150 k		
R105(R205)	1-221-967-11	10 k (B), adjustable (dc balance)		
R106(R206)	1-244-669-11	680		
R107(R207)	1-244-701-11	15 k		
R108(R208)	1-244-681-11	2.2 k		
R109(R209)	1-244-650-11	110		
R110(R210)	1-202-613-31	47 k	½ W	carbon
R111(R211)	1-244-881-11	2.2 k	½ W	carbon
R112(R212)	1-206-101-11	4.7 k	1 W	metal-oxide
R113(R213)	1-202-561-11	330	½ W	composition
R114(R214)	1-244-701-11	15 k		
R115(R215)	1-244-693-11	6.8 k		
R116(R216)	1-221-967-11	10 k (B), adjustable (dc bias)		
R117(R217)	1-202-565-11	470	½ W	composition
R118(R218)	1-244-633-11	22		
R119(R219)	1-244-881-11	2.2 k	½ W	carbon
R120(R220)		---------------		
R121(R221)		---------------		
R122(R222)		---------------		
R123(R223)	1-202-581-11	2.2 k	½ W	composition
R124(R224)	1-202-581-11	2.2 k	½ W	composition
R125(R225)		---------------		
R128(R228)	1-244-649-11	100		
R129(R229)	1-244-649-11	100		
R130(R230)		---------------		
R131(R231)	1-202-517-11	4.7	½ W	composition
R132(R232)	1-202-549-11	100	½ W	composition
R133(R233)	1-217-156-11	0.22	5 W	metal
R134(R234)	1-217-156-11	0.22	5 W	metal
R135(R235)	1-217-157-11	0.33	5 W	metal
R136(R236)	1-202-517-11	4.7	½ W	composition
R137(R237)	1-202-565-11	470	½ W	composition
R138(R238)	1-202-525-11	10	½ W	composition
R139(R239)	1-202-517-11	4.7	½ W	composition
R301	1-244-713-11	47 k		
R302	1-244-653-11	150		
R303	1-244-649-11	100		
R304	1-244-713-11	47 k		
R305	1-244-633-11	22		
R306	1-244-649-11	100		
R307	1-211-614-11	100	½ W	carbon
R308	1-244-689-11	4.7 k		
R309	1-244-725-11	150 k		
R310	1-244-633-11	22		
R311	1-244-649-11	100		
R312	1-206-081-11	100	1 W	metal-oxide
R313	1-244-689-11	4.7 k		
R314	1-244-725-11	150 k		
R315	1-202-565-11	470	½ W	composition
R316	1-244-697-11	10 k		
R317	1-244-697-11	10 k		
R318	1-242-697-11	10 k		
R319	1-242-681-11	2.2 k		
R320	1-242-705-11	22 k		
R321	1-242-712-11	43 k		
R322	1-244-706-11	24 k		
R325	1-242-693-11	6.8 k		

SWITCHES

Ref. No.	Part No.	Description
S1	1-513-338-00	lever (FUNCTION)
S2	1-514-478-00	slide (LOW FILTER)
S3	1-514-639-00	rotary (POWER LIMITER)
S4	1-514-522-00	rotary (SPEAKER)
S5	1-514-904-00	lever/rotary (POWER) (General Export Model)
	1-516-159-00	lever/rotary (POWER) (USA and Canada Model)

MISCELLANEOUS

Ref. No.	Part No.	Description
CP1	1-231-057-00	encapsulated component, 120 Ω + 0.033 μF
CNJ1,2,3,4	1-507-163-00	jack, phono, 4-p
CNJ5,6	1-509-341-00	outlet, ac
F1	1-532-167-00	fuse, 5 A (General Export Model)
	1-532-221-00	fuse, 5 A (USA and Canada Model)
F2,3	1-532-227-00	fuse, 6.3 A (USA and Canada Model)
	1-532-256-00	fuse, 6.3 A (General Export Model)
PL1	1-518-052-21	lamp, pilot 2.5 V
VS1	1-526-165-22	selector, voltage
	1-506-346-00	connector
	1-535-055-00	connector
	1-509-437-00	socket, power transistor
	1-517-021-00	socket, pilot lamp
	1-533-048-00	holder, fuse
	1-534-487-00	cord, power (General Export Model)
	1-534-526-00	cord, power (USA and Canada Model)
	1-536-353-00	terminal post, U-shaped
	1-536-354-00	terminal post