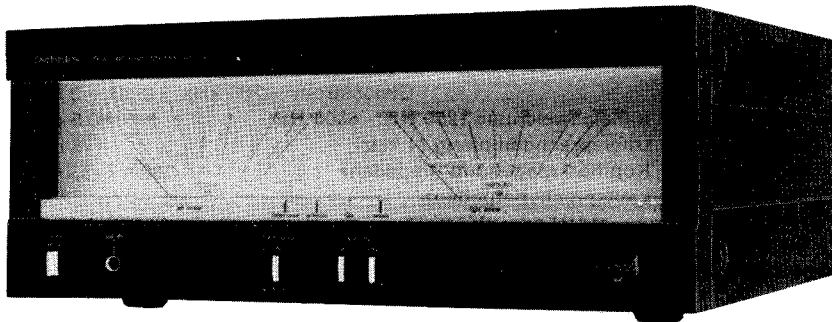


# Service Manual

Stereo DC Power Amplifier

## SE-A5(K)

[D],[EG],[EW],[EK],  
[EH],[EF],[EB],[XL],[XA]



\* The black type model is provided with (K) in the Service Manual. SE-A5(K)  
\* The colors of this model is black type only.

### Areas

- \* [D] and [EG] are available in Scandinavia and European except Switzerland, United Kingdom, Holland, France and Belgium.
- \* [EW] is available in Switzerland.
- \* [EK] is available in United Kingdom.
- \* [EH] is available in Holland.
- \* [EF] is available in France.
- \* [EB] is available in Belgium.
- \* [XL] is available in Australia.
- \* [XA] is available in Asia, Latin America, Middle East and Africa.

English

## Specifications

(Specifications are subject to change without notice for further improvement.)

(DIN 45 500)

### ■ AMPLIFIER SECTION

20 Hz~20 kHz continuous power output both channels driven	2 × 160W (4Ω) 2 × 120W (8Ω)
40 Hz~16 kHz continuous power output both channels driven	2 × 160W (4Ω) 2 × 120W (8Ω)
1 kHz continuous power output both channels driven	2 × 180W (4Ω) 2 × 130W (8Ω)
Total harmonic distortion	
rated power at 20 Hz~20 kHz	0.003% (4Ω) 0.002% (8Ω)
rated power at 40 Hz~16 kHz	0.003% (4Ω) 0.002% (8Ω)
rated power at 1 kHz	0.003% (4Ω) 0.002% (8Ω)
half power at 20 Hz~20 kHz	0.001% (8Ω)
half power at 1 kHz	0.0005% (8Ω)
-26 dB power at 1 kHz	0.001% (4Ω)
50 mW power at 1 kHz	0.001% (4Ω)
Intermodulation distortion	
rated power at 250 Hz: 8 kHz=4:1, 4Ω	0.003%
rated power at 60 Hz: 7 kHz=4:1, SMPTE, 8Ω	0.002%
TIM (Transient Intermodulation Distortion)	unmeasurably small
Power bandwidth	
both channels driven, -3 dB	
T.H.D. 0.007%	5 Hz~100 kHz (8Ω)
Residual hum and noise	0.1 mV

Damping factor	70 (4Ω), 140 (8Ω)
Input sensitivity and impedance	1 V/47kΩ
S/N	108 dB (123 dB, IHF, A)
Frequency response	DC~20 kHz, +0 dB, -0.1 dB DC~200 kHz, +0 dB, -3 dB
Channel balance, 250 Hz~6,300 Hz	±0.5 dB
Channel separation, 1 kHz	75 dB
Headphones output level and impedance	730 mV/330Ω
Load impedance	
MAIN or REMOTE	4Ω~16Ω
MAIN and REMOTE	8Ω~16Ω
Meter	
reading range	0.0001 W~300 W (8Ω) -60 dB~+5 dB (logarithmic compression)
frequency response (reading accuracy)	20 Hz~20 kHz ±2 dB (more than -50 dB) 20 Hz~20 kHz ±3 dB (less than -50 dB)

### ■ GENERAL

Power consumption	1000W
Power supply	AC 50 Hz/60 Hz, 110V/120V/220V/240V
Dimensions (W×H×D)	430 × 178 × 416 mm
Weight	18.4 kg

# Technics

Matsushita Electric Trading Co., Ltd.  
P.O. Box 288, Central Osaka Japan

**TECHNISCHE DATEN**

(Spezifikationen Können infolge von Verbesserungen ohne Ankündigung geändert werden.)

**(DIN 45 500)****■ VERSTÄRKERTEIL**

<b>Dauerton-Ausgangsleistung bei 20 Hz ~ 20 kHz</b>	
beide Kanäle ausgesteuert	2 · 160W (4 Ω) 2 · 120W (8 Ω)
<b>Dauerton-Ausgangsleistung bei 40 Hz ~ 16 kHz</b>	
beide Kanäle ausgesteuert	2 · 160W (4 Ω) 2 · 120W (8 Ω)
<b>Dauerton-Ausgangsleistung bei 1 kHz</b>	
beide Kanäle ausgesteuert	2 · 180W (4 Ω) 2 · 130W (8 Ω)
<b>Gesamtklirrfaktor</b>	
Nennleistung bei 20 Hz ~ 20 kHz	0,003% (4 Ω) 0,002% (8 Ω)
Nennleistung bei 40 Hz ~ 16 kHz	0,003% (4 Ω) 0,002% (8 Ω)
Nennleistung bei 1 kHz	0,003% (4 Ω) 0,002% (8 Ω)
halbe Nennleistung bei 20 Hz ~ 20 kHz	0,001% (8 Ω)
halbe Nennleistung bei 1 kHz	0,0005% (8 Ω)
-26 dB Leistung bei 1 kHz	0,001% (4 Ω)
50 mW Leistung bei 1 kHz	0,001% (4 Ω)
<b>Intermodulationsfaktor</b>	
Nennleistung bei 250 Hz: 8 kHz = 4:1, 4 Ω	0,003%
Nennleistung bei 60 Hz: 7 kHz = 4:1, nach SMPTE, 8 Ω	0,002%
<b>TIM (Intermodulationsverzerrung)</b>	unmeßbar
<b>Leistungsbandbreite</b>	
beide Kanäle ausgesteuert bei -3 dB	
T.H.D. 0,007%	5 Hz ~ 100 kHz (8 Ω)

<b>Restbrumm und Geräusch</b>	0,1 mV
<b>Dämpfungsfaktor</b>	70 (4 Ω), 140 (8 Ω)
<b>Eingangsempfindlichkeit und -impedanz</b>	1 V/47 kΩ
<b>Geräuschabstand</b>	108 dB (123 dB nach IHF, A)
<b>Frequenzgang</b>	Gleichstrom ~ 20 kHz, +0 dB, -0,1 dB Gleichstrom ~ 200 kHz, +0 dB, -3 dB
<b>Kanalabweichung (250 Hz ~ 6300 Hz)</b>	±0,5 dB
<b>Übersprechdämpfung (1 kHz)</b>	75 dB
<b>Kopfhörerpegel und -impedanz</b>	730 mV/330 Ω
<b>Lautsprecherimpedanz</b>	
<b>MAIN oder REMOTE</b>	4 Ω ~ 16 Ω
<b>MAIN und REMOTE</b>	8 Ω ~ 16 Ω
<b>Instrument</b>	
<b>Anzeigebereich</b>	0,0001 W ~ 300 W (8 Ω) -60 dB ~ +5 dB (logarithmisch)
<b>Frequenzbereich (Ablesegenauigkeit)</b>	20 Hz ~ 20 kHz ±2 dB (über -50 dB) 20 Hz ~ 20 kHz ±3 dB (unter -50 dB)

**■ ALLGEMEINE DATEN**

<b>Leistungsaufnahme</b>	1000 W
<b>Netzspannung</b>	Wechselstrom 50 Hz/60 Hz, 110V/120V/220V/240V
<b>Abmessungen (B · H · T)</b>	430 · 178 · 416 mm
<b>Gewicht</b>	18,4 kg

**CARACTERISTIQUES**

(Sujet à changement sans préavis.)

**(DIN 45 500)****■ SECTION AMPLIFICATEUR**

<b>Puissance de sortie continue de 20 Hz~20 kHz,</b>	
les deux canaux en circuit	2 · 160W (4Ω) 2 · 120W (8Ω)
<b>Puissance de sortie continue de 40 Hz~16 kHz,</b>	
les deux canaux en circuit	2 · 160W (4Ω) 2 · 120W (8Ω)
<b>Puissance de sortie continue à 1 kHz</b>	
les deux canaux en circuit	2 · 180W (4Ω) 2 · 130W (8Ω)
<b>Distorsion harmonique totale</b>	
à puissance nominale (20 Hz~20 kHz)	0,003% (4Ω) 0,002% (8Ω)
à puissance nominale (40 Hz~16 kHz)	0,003% (4Ω) 0,002% (8Ω)
à puissance nominale (1 kHz)	0,003% (4Ω) 0,002% (8Ω)
à demi-puissance (20 Hz~20 kHz)	0,001% (8Ω)
à demi-puissance (1 kHz)	0,0005% (8Ω)
puissance de -26 dB à 1 kHz	0,001% (4Ω)
puissance de 50 mW à 1 kHz	0,001% (4Ω)
<b>Distorsion d'intermodulation</b>	
à puissance nominale à 250 Hz: 8 kHz=4:1, 4Ω	0,003%
à puissance nominale à 60 Hz: 7 kHz=4:1, SMPTE, 8Ω	0,002%
<b>TIM (distorsion d'intermodulation transitoire)</b>	infiniment petite
<b>Réponse de fréquences</b>	
les deux canaux en circuit, -3 dB	
T.H.D. 0,007%	5 Hz~100 kHz (8Ω)

<b>Bruit et ronflement résiduels</b>	0,1 mV
<b>Coefficient d'amortissement</b>	70 (4Ω), 140 (8Ω)
<b>Sensibilité et impédance d'entrée</b>	1 V/47kΩ
<b>Signal/Bruit</b>	108 dB (123 dB, IHF, A)
<b>Réponse de fréquence</b>	CC~20 kHz, +0 dB, -0,1 dB CC~200 kHz, +0 dB, -3 dB
<b>Équilibrage des canaux, 250 Hz~6,300 Hz</b>	±0,5 dB
<b>Séparation des canaux, 1 kHz</b>	75 dB
<b>Niveau de sortie des casques et impédance</b>	730 mV/330Ω
<b>Impédance de charge</b>	
<b>PRINCIPALE ou AUXILIAIRE (MAIN or REMOTE)</b>	4Ω~16Ω
<b>PRINCIPALE et AUXILIAIRE (MAIN and REMOTE)</b>	8Ω~16Ω
<b>Indicateur</b>	
<b>gamme de lecture</b>	0,0001 W~300 W (8Ω) -60 dB~+5 dB (compression logarithmique)
<b>réponse de fréquence (précision de lecture)</b>	20 Hz~20 kHz ±2 dB (plus que -50 dB) 20 Hz~20 kHz ±3 dB (moins que -50 dB)

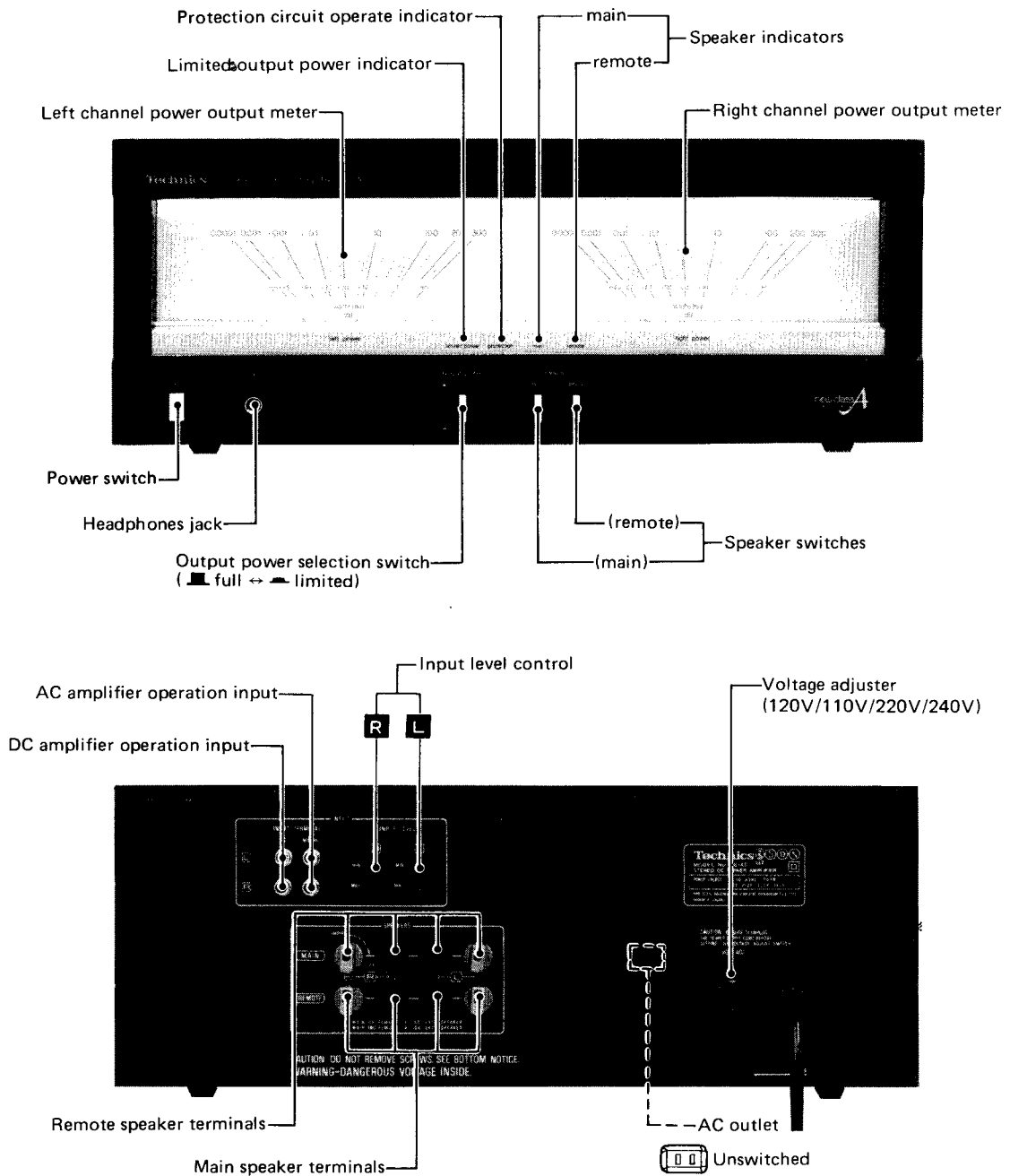
**■ DIVERS**

<b>Consommation</b>	1000W
<b>Alimentation</b>	CA 50 Hz/60 Hz, 110V/120V/220V/240V
<b>Dimensions (L · H · Pr)</b>	430 × 178 × 416 mm
<b>Poids</b>	18,4 kg

**CONTENTS**

	Page		Page
LOCATION OF CONTROLS . . . . .	3	CIRCUIT BOARD AND WIRING	
LFB AND LIMITED OUTPUT POWER . . . . .	4	CONNECTION DIAGRAM . . . . .	12 ~ 16
PRECAUTIONS FOR CONNECTIONS . . . . .	4	BLOCK DIAGRAM . . . . .	17
DISASSEMBLY INSTRUCTIONS . . . . .	5 ~ 6	REPLACEMENT PARTS LIST (Resistors and Capacitors) . . . . .	19
MEASUREMENT AND ADJUSTMENTS (English) . . . . .	6 ~ 7	REPLACEMENT PARTS LIST (Electrical parts) . . . . .	20
EINSTELLUNGSANWEISUNGEN (Deutsch) . . . . .	8	SCHEMATIC DIAGRAM . . . . .	21 ~ 24
INSTRUCTIONS DE REGLAGE (Français) . . . . .	9	EXPLODED VIEWS . . . . .	25 ~ 28
PROTECTION CIRCUITRY INDICATOR . . . . .	10	REPLACEMENT PARTS LIST (Cabinet & chassis) . . . . .	25 ~ 28
PRINTED CIRCUIT BOARDS LOCATION . . . . .	11	PACKING . . . . .	28

**LOCATION OF CONTROLS**



The products for destination [XA] is equipped with AC outlet.

## L.F.B. AND LIMITED OUTPUT POWER

- One of the important features of this unit is a linear feedback (LFB) circuit.

This circuit is the essence of multi-feedback technology of amplifier circuit, and is really an epoch-making circuit that can theoretically realize zero distortion and output impedance by forming an amplifier having infinite amplification within NF loop.

A brief explanation of NF amplifier is given below.

It is not too much to say that the technical innovation has been carried out in order to increase A (bare gain) and to minimize Zo (bare output impedance) and Do (bare distortion) for the improvement of NF amplifier.

When bare gain is increased through multi-stage amplification, the phase characteristic of high frequency range will worsen and it may result in worsening of performance and sound quality because of limitations on NF stability.

Also, if it is intended to reduce the bare distortion, it results in reduction of distortion due to the circuit configuration of SLPT (Super linear power transistor) or synchro bias circuit, but there exist theoretical limitations because of using active elements. The linear feedback circuit is the result of further development in realizing infinite bare gain without worsening the phase characteristic of high frequency range that is recognized as ideal for NF amplifier.

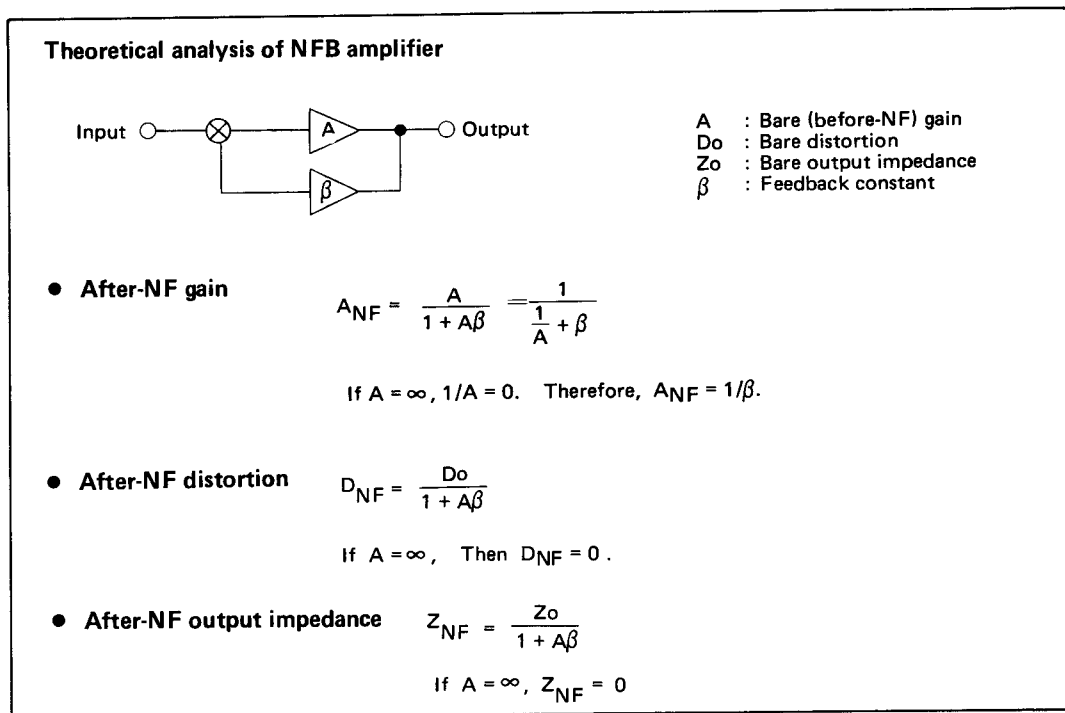


Fig. 1

- Another feature of this unit is an output power selector switch. High output of 120W + 120W is obtainable at "full", and 30W + 30W, at "limited".

Selecting the latter position means that the 30W amplifier is operated with a large 120W amplifier, and this is a luxurious pleasure in the silence of the night. When the switch is set to "limited", the meter lamp turns OFF.

## PRECAUTIONS FOR CONNECTIONS

Before making connections, be absolutely sure that the power to this unit and all other connected equipment is first turned off.

If connections are made while the power is on, a large input will be applied to the speaker systems, which might damage them, so special care should be taken concerning this point.

## DISASSEMBLY INSTRUCTIONS

- **How to remove the cabinet**  
Remove the 10 setscrews. ( ① ~ ⑩ in fig. 2)
- **How to remove the front panel**  
Remove the 4 setscrews. ( ⑪ ~ ⑭ in fig. 2)
- **How to remove the bottom board**  
Remove the 9 setscrews. ( ⑮ ~ ⑳ in fig. 3)
- **How to remove the power meter**
  1. Remove the cabinet, front panel and bottom board.
  2. Remove the 2 setscrews ⑳ and ㉑ (Fig. 4), and the clamp piece of lamps.
  3. Remove the meter circuit board setscrew ㉒ (Fig. 5).
  4. Remove the setscrews ( ㉓ ~ ㉖ in fig. 4) and pull out the front chassis.
  5. Remove the 6 meter setscrews. ( ㉗ ~ ㉚ in fig. 6)
  6. Remove the nut ㉛ (Fig. 7) to detach the meter from the chassis.

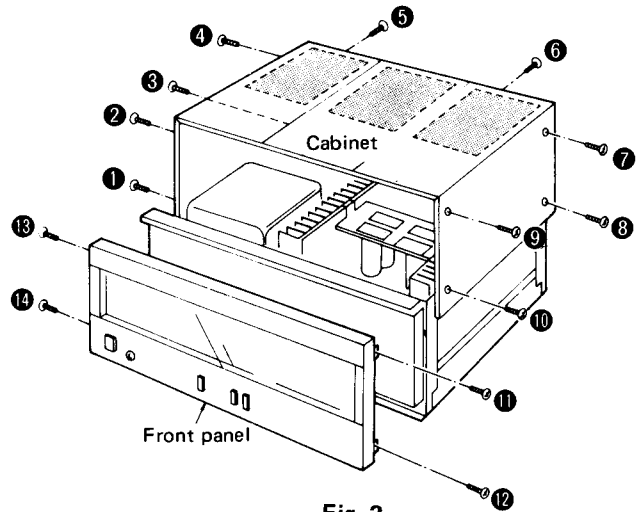


Fig. 2

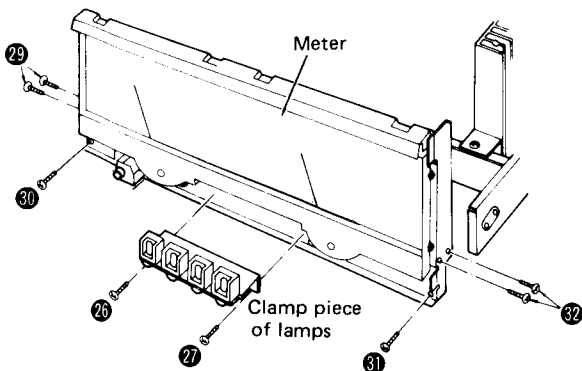


Fig. 4

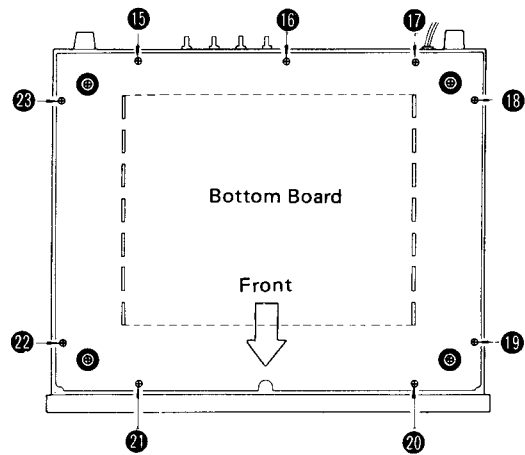


Fig. 3

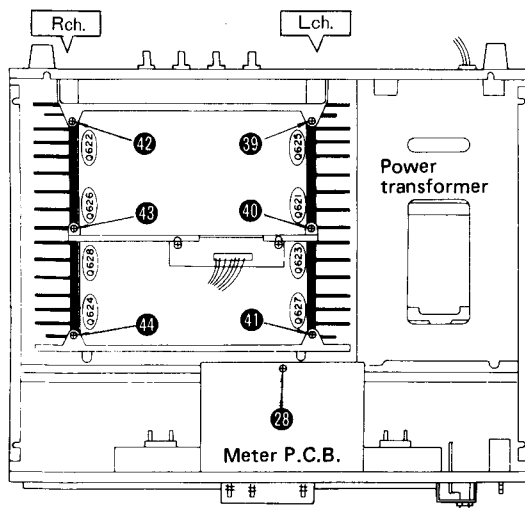


Fig. 5

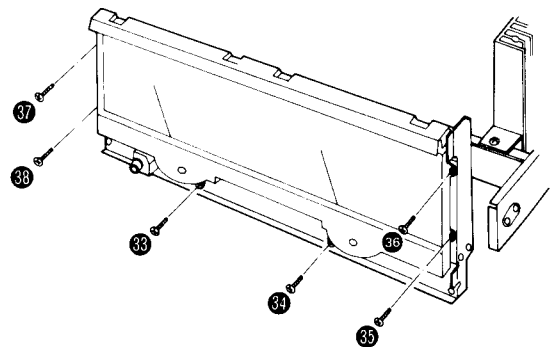


Fig. 6

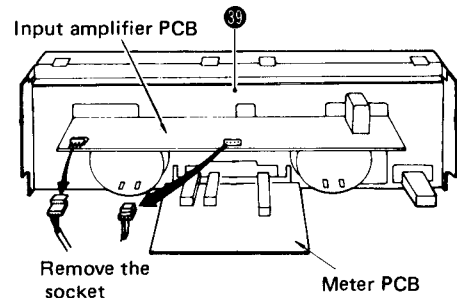


Fig. 7

● **Replacement of power transistor**

1. Remove the cabinet and the bottom board.
2. Remove the electrolytic condenser retainer for power source from the heat sink.
3. Unsolder the power transistor on the L or R channel.
4. Remove the heat sink setscrews (39 ~ 41) or (42 ~ 44) on the L or R channel as in fig. 5.
5. Remove the heat sink from the printed circuit board, and lift it.
6. Replace the power transistor.
7. When installing the transistor, apply heat diffusing agent to both sides of the mica plate.

Also, fasten the radiator plate on Q627 and Q624 with setscrew 45 as in Fig. 8.

Apply heat diffusing agent to the head of temperature compensation/bias control transistor, and press it with the radiator plate.

● **How to remove the synchro bias circuit cover (Fig. 9)**

The projections of the shield cover are inserted into the hole of printed circuit board and they are soldered.

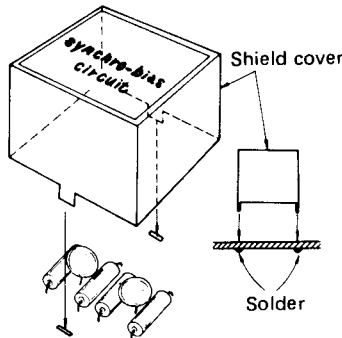


Fig. 9

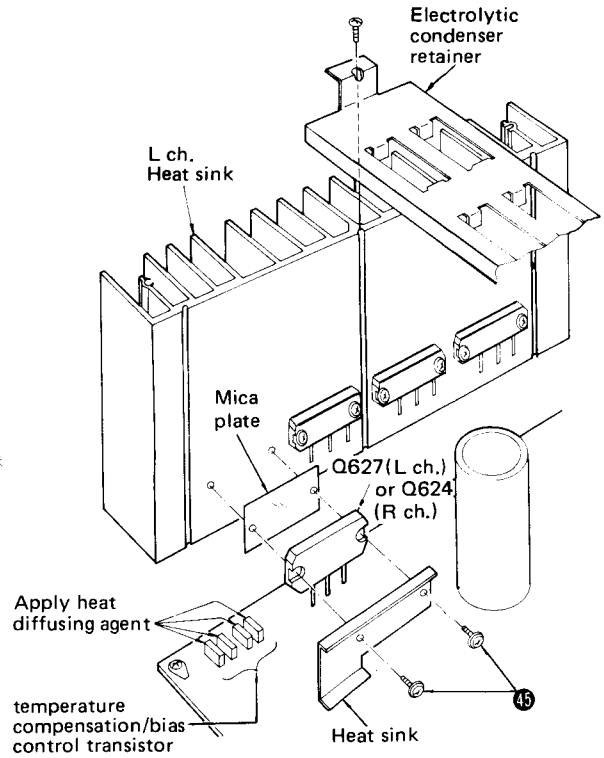


Fig. 8

## MEASUREMENT AND ADJUSTMENTS ENGLISH

● **Before starting the repairing**

Before adjusting or repairing, be sure to short-circuit opposite poles of the 10000 $\mu$ F capacitors (C405 ~ C408) with a resistor approximately of 10 $\Omega$ , 10W for discharging the charged voltage.

Short-circuiting with a screw driver and the like is not only dangerous, but may destroy transistors and diodes, and should therefore be avoided.

● **When it is necessary to adjust ICQ or clamp voltage after repair of the power amplifier, be sure to completely turn the semi-fixed variable resistors (VR601 ~ VR604) counterclockwise before turning on the power switch.**

● **When adjusting and measuring this set, perform ageing of the set in normal position for about 1 minute beforehand.**

● **Setting of controls and instruments to be used**

- |   |   |
|---|---|
| 1. Output power section switch . . . . . full   | 5. Oscilloscope                                   |
| 2. Speaker switch . . . . . main                | 6. Oscillator (1kHz oscillation, with attenuator) |
| 3. Input level volume (rear side) . . . . . MIN | 7. AC electronic voltmeter                        |
| 4. DC voltmeter (able to measure 0.1mV)         | 8. 8-ohm load resistor (100 Watts)                |

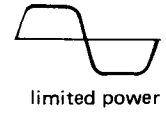
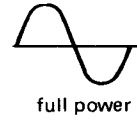
**1. Constant voltage check and DC balance adjustment**

Items	Connection of DC voltmeter	Adjusting parts	Adjustment
Constant voltage $\oplus$ power source check	Between TP401 and chassis (ground)	_____	Normal when it ranges from +23V to +25V.
Constant voltage $\ominus$ power source check	Between TP402 and chassis (ground)	_____	Normal when it ranges from -23V to -25V.

Items	Connection of DC voltmeter	Adjusting parts	Adjustment
DC balance	Main speaker terminals of L (left)	L (left) channel VR301 R (right) channel VR302	<ul style="list-style-type: none"> <li>Adjust it so that 0mV is indicated on DC voltmeter (30mV range).</li> <li>If it is not adjustable by variable resistor, cut off the jumper wire J301 (L channel) and J302 (R channel)</li> </ul>

**2. Inspection of limited power**

1. Connect the oscillator to input terminal (normal) and apply 1 kHz 700mV.
2. Connect the load resistance and oscilloscope in parallel to speaker terminal.
3. Set the input adjusting variable resistor to the maximum point.
4. Shift the output switch from "full" to "limited". Then the output waveform is clipped if the circuit is in normal conditions.



**3. Adjustment of clamp voltage**

\* No load is connected.

Channel	DC voltmeter connection	Part adjusted	Adjustment
Channel L (left)	Between <b>TP1</b> and <b>TP3</b>	VR 603	Adjust to 0.1 mV.
Channel R (right)	Between <b>TP2</b> and <b>TP4</b>	VR 604	Adjust to 0.1 mV.

**4. Adjustment of I<sub>CQ</sub>**

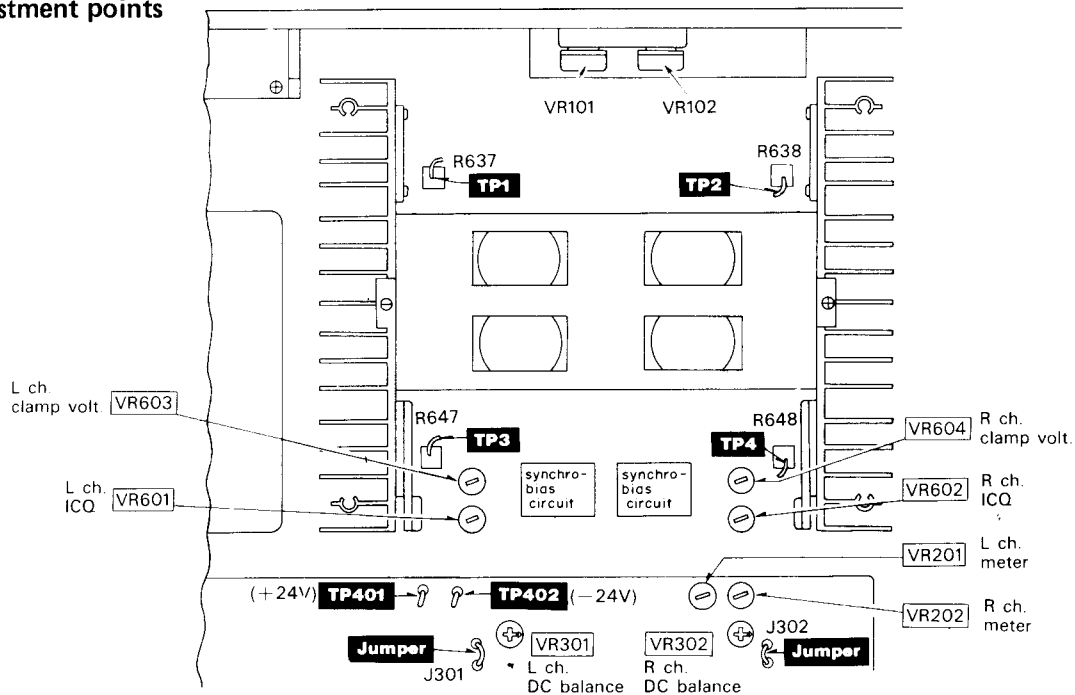
Channel	DC voltmeter connection	Part adjusted	Adjustment
Channel L (left)	Between <b>TP1</b> and <b>TP3</b>	VR 601	Adjust to 15 mV.
Channel R (right)	Between <b>TP2</b> and <b>TP4</b>	VR 602	Adjust to 15 mV.

(Note) Since I<sub>CQ</sub> is unstable for about 15 minutes after turning on the power supply, be sure to perform ageing for at least 15 minutes and make sure that the voltage is in a range of 1mV ~ 20mV.

**5. Meter adjustment**

1. Connect the oscillator to the input terminal (normal) and apply 1 kHz signal.
2. Connect the load resistance and AC voltmeter in parallel to the speaker terminal.
3. Set the input level adjusting VR to the maximum point.
4. Adjust the output level of the oscillator so that the output from the speaker terminal is 28.3V.
5. Adjust VR201 (L channel) and VR202 (R channel) so that the meter indicates 100W.

**• Adjustment points**



## EINSTELLUNGSANWEISUNGEN DEUTSCH

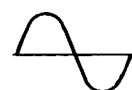
- Wenn es nach Reparatur des Leistungsverstärkers nötig ist, ICQ oder die Klemmschaltung zu justieren, die halb fest eingestellten Drehwiderstände (VR601~VR604) bis zum Anschlag entgegen dem Uhrzeigersinn drehen, bevor der Netzschalter eingeschaltet wird.
- Bevor an diesem Gerät irgendwelche Justier- und Meßarbeiten durchgeführt werden, muß es mindestens ca. 1 Minute lang in normalem Betrieb eingeschaltet sein.
- **Einstellung der zu verwendenden Regler und Instrumente**
  1. Ausgangsleistungs-Wahlschalter . . . . . full
  2. Lautsprecherschalter . . . . . main
  3. Eingangspegel-Volumen (Rückseite) . . . . . MIN
  4. Gleichstrom-Voltmeter (für Messung von 0,1mV geeignet)
  5. Oszilloskop
  6. Oszillator (1kHz-Oszillation, mit Dämpfer)
  7. Elektronisches Wechselstrom-Voltmeter
  8. 8Ohm-Belastungs-Widerstand (100Watt)

### 1. Prüfung der gleichbleibenden Spannung und Gleichstrom-Balance-Justierung

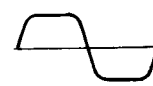
Posten	Gleichstrom-Voltmeter-Anschluß	Zu justierende Teile	Justierung
Prüfung der Stromversorgung mit gleichbleibender Spannung ⊕	Zwischen TP401 und Chassis (Masse)	_____	Normal, wenn innerhalb des Bereichs +23V bis +25V.
Prüfung der Stromversorgung mit gleichbleibender Spannung ⊖	Zwischen TP402 und Chassis (Masse)	_____	Normal, wenn innerhalb des Bereichs -23V bis -25V.
Gleichstrom-Balance	Hauptlautsprecher-Anschlüsse des linken Kanals	Linker Kanal VR301 Rechter Kanal VR302	<ul style="list-style-type: none"> <li>• So abstimmen, daß das Gleichstrom-Voltmeter 0mV anzeigt (30mV-Bereich).</li> <li>• Falls die Abstimmung mit dem Drehwiderstand nicht möglich ist, Schaltaderdrähte J301 (linker Kanal) und J302 (rechter Kanal) abtrennen.</li> </ul>

### 2. Überprüfung der begrenzten Ausgangsleistung

1. Den Oszillator an den Eingangsanschluß (normal) anschließen und 1kHz 700mV zuführen.
2. Belastungswiderstand und Oszilloskop in Parallelschaltung an den Lautsprecheranschluß anschließen.
3. Den Eingangsregelwiderstand auf Maximum einstellen.
4. Den Ausgangsschalter von "full" auf "limited" umschalten. Wenn die Schaltung in normalem Zustand ist, ist die Ausgangswellenform beschnitten.



Volle Leistung



Beschränkte Leistung

### 3. Justierung der Klemmspannung

\* Es ist keine Belastung angeschlossen.

Kanal	Gleichstrom-Voltmeter-Anschluß	Zu justierendes Teil	Justierung
Kanal L (links)	Zwischen TP1 und TP3	VR603	Auf 0,1mV abgleichen.
Kanal R (rechts)	Zwischen TP2 und TP4	VR604	Auf 0,1mV abgleichen.

### 4. ICQ-Justierung

Kanal	Gleichstrom-Voltmeter-Anschluß	Zu justierendes Teil	Justierung
Kanal (links)	Zwischen TP1 und TP3	VR601	Auf 15mV abgleichen.
Kanal R (rechts)	Zwischen TP2 und TP4	VR602	Auf 15mV abgleichen.

(Anmerkung) Da ICQ während ca. 15 Minuten nach dem Einschalten der Stromversorgung instabil bleibt, muß das Gerät vor der Justierung mindestens 15 Minuten lang warmlaufen.  
Überprüfen, daß die Spannung im Bereich 1mV ~ 20mV liegt.

### 5. Justierung des Meters

1. Den Oszillator an den Eingangsanschluß (normal) anschließen und 1kHz-Signal zuführen.
2. Den Belastungswiderstand und das Wechselstrom-Voltmeter parallel an den Lautsprecheranschluß anschließen.
3. Den Drehwiderstand, der den Eingangspegel regelt, auf Maximum einstellen.
4. Den Ausgangspegel des Oszillators so abstimmen, daß der Ausgang vom Lautsprecheranschluß 28,3V beträgt.
5. VR201 (linker Kanal) und VR202 (rechter Kanal) so abstimmen, daß das Meter 100W anzeigt.



## INSTRUCTIONS DE REGLAGE FRANÇAIS

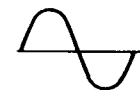
- Lorsqu'il est nécessaire de régler ICQ ou la tension de stabilisation après la réparation de l'amplificateur de puissance, s'assurer de tourner complètement les résistances variables semifixes (VR601~VR604) dans le sens inverse des aiguilles d'une montre avant de mettre en marche le commutateur d'alimentation.
- Lorsqu'on fait une mise au point et un mesurage de cet appareil, exécuter préalablement un vieillissement de l'équipement en position normale pendant à peu près 1 minute.
- Réglage des commandes et des appareils à utiliser
  1. Commutateur de la section de la puissance de sortie . . . . . à fond
  2. Commutateur de haut-parleur . . . . . principal
  3. Volume du niveau d'entrée (côté arrière) . . . . . MIN
  4. Voltmètre à C.C. (capable de mesurer 0,1mV)
  5. Oscilloscope
  6. Oscillateur (Oscillation de 1kHz, avec atténuateur)
  7. Voltmètre électronique à C.A.
  8. Résistance de charge de 8 ohms (100 watts)

### 1. Vérification de la tension constante et réglage de l'équilibrage à C.C.

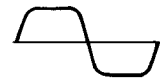
Points	Branchement du voltmètre à C.C.	Eléments à régler	Réglage
Vérification de la source d'énergie de la tension constante "⊕".	Entre TP401 et le châssis (masse)	_____	Normale lorsqu'elle s'étage de +23V à +25V.
Vérification de la source d'énergie de la tension constante "⊖".	Entre TP402 et le châssis (masse)	_____	Normale lorsqu'elle s'étage de -23V à -25V.
Equilibrage C.C.	Bornes du haut-parleur principal de L (gauche)	Canal L (gauche) VR301 Canal R (droite) VR302	<ul style="list-style-type: none"> <li>• Le régler de façon à ce que 0mV soit indiqué sur le voltmètre à C.C. (plage de 30mV).</li> <li>• S'il n'est pas réglable par la résistance variable, couper le fil de connexion J301 (canal de gauche) et J302 (canal de droite).</li> </ul>

### 2. Inspection de la puissance limitée

1. Brancher l'oscillateur à la borne d'entrée (ordinaire) et appliquer 1kHz 700mV.
2. Brancher la résistance de charge et l'oscilloscope en parallèle à la prise du haut-parleur.
3. Régler la résistance variable d'ajustement d'entrée au point maximal.
4. Déplacer la manette de puissance de sortie de "full" (total) à "limited" (limité). Ainsi, la forme d'onde de sortie sera coupée si le circuit est en conditions normales.



Pleine puissance



Puissance limitée

### 3. Mise au point de la tension de stabilisation

\* Aucune charge n'est mise en circuit.

Canal	Branchement du voltmètre C.C.	Pièce à régler	Ajustement
Canal L (gauche)	Entre TP1 et TP3	VR603	Ajuster sur 0,1mV.
Canal R (droite)	Entre TP2 et TP4	VR604	Ajuster sur 0,1mV.

### 4. Réglage de ICQ

Canal	Branchement du voltmètre C.C.	Pièce à régler	Ajustement
Canal L (gauche)	Entre TP1 et TP3	VR601	Ajuster sur 15mV.
Canal R (droite)	Entre TP2 et TP4	VR602	Ajuster sur 15mV.

(Nota) Etant donné que ICQ est instable pendant à peu près 15 minutes après la mise en marche de l'alimentation, s'assurer d'exécuter un vieillissement d'au moins 15 minutes et vérifier que la tension soit bien dans une plage de 1mV~20mV.

### 5. Réglage du mesureur

1. Brancher l'oscillateur dans la borne d'entrée (normale) et appliquer un signal de 1kHz.
2. Brancher en parallèle la résistance de charge et le voltmètre à C.A. à la borne du haut-parleur.
3. Régler l'ajustement VR du niveau d'entrée au point maximum.
4. Ajuster le niveau de sortie à l'oscillateur de façon à ce que la sortie de la borne du haut-parleur soit de 28,3V.
5. Ajuster VR201 (canal de gauche) et VR202 (canal de droite) de façon à ce que le mesureur indique 100W.

## PROTECTION CIRCUITRY INDICATOR

The indicator lights up when a trouble occurs in this unit.

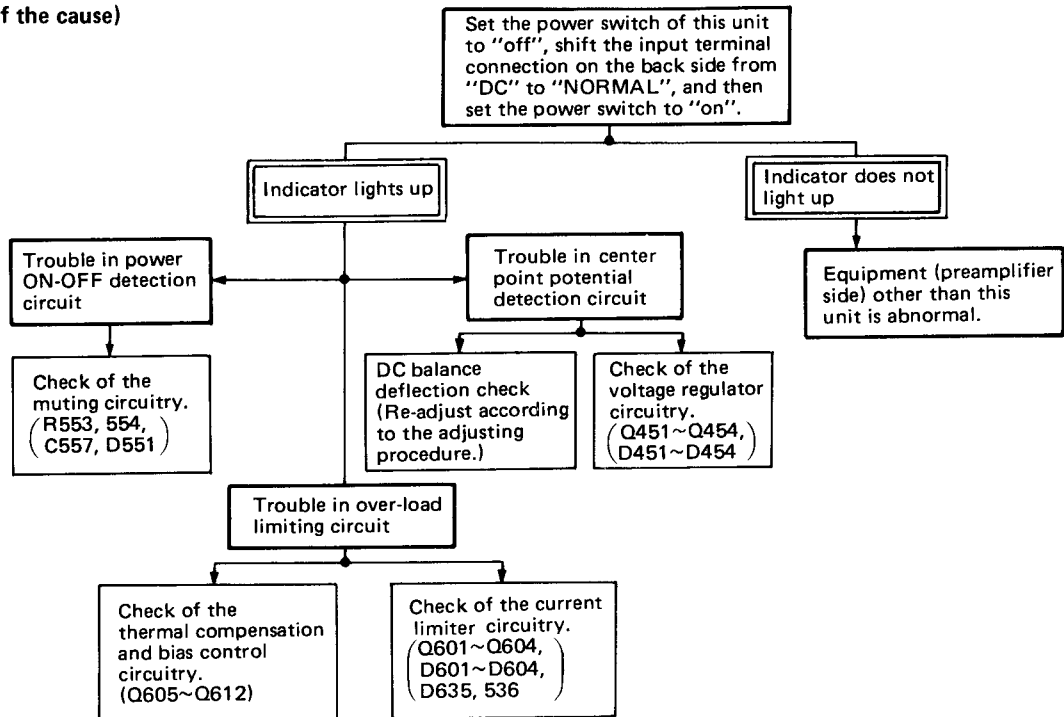
With the power switch set to "on", the indicator lights up, and it goes out when the unit is in normal operation (about 7 sec. later). If abnormality takes place during operation, the indicator lights up or blinks. In that case, set the power switch to "off" and check the cause according to the following procedure.

### When the indicator lights up:

#### (Cause)

1. Due to troubles in other equipment (preamp., etc.), direct current is applied to the input, causing the protection circuit to operate.
2. This unit is in trouble, causing the protective circuit to operate.

#### (Check of the cause)

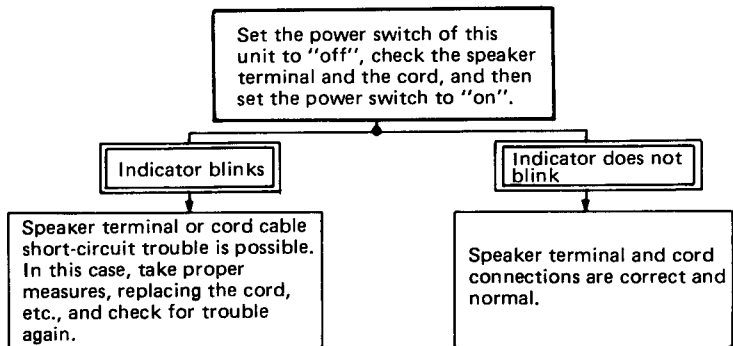


### When the indicator blinks:

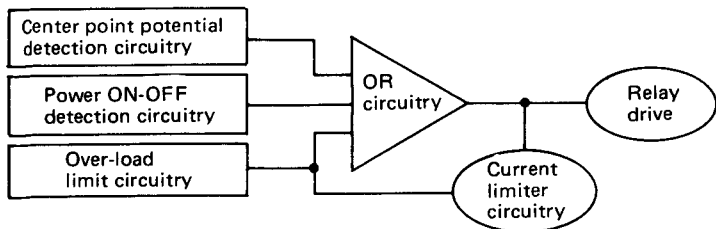
#### (Cause)

The speaker terminals or the power cord cable (positive and negative) are short-circuited, causing the protection circuit to operate.

#### (Check of the cause)

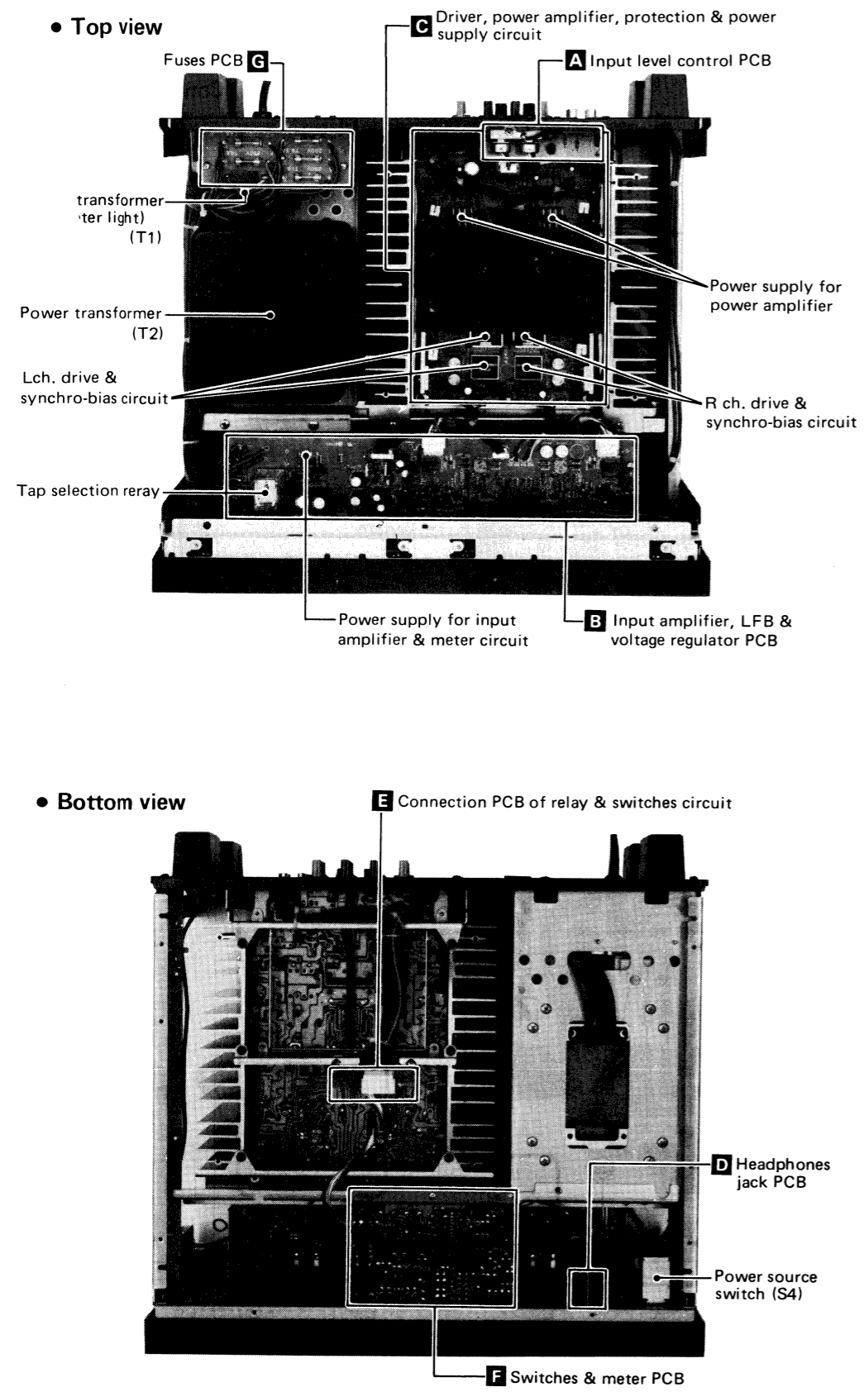


### The block diagram of the protection circuit is shown below.

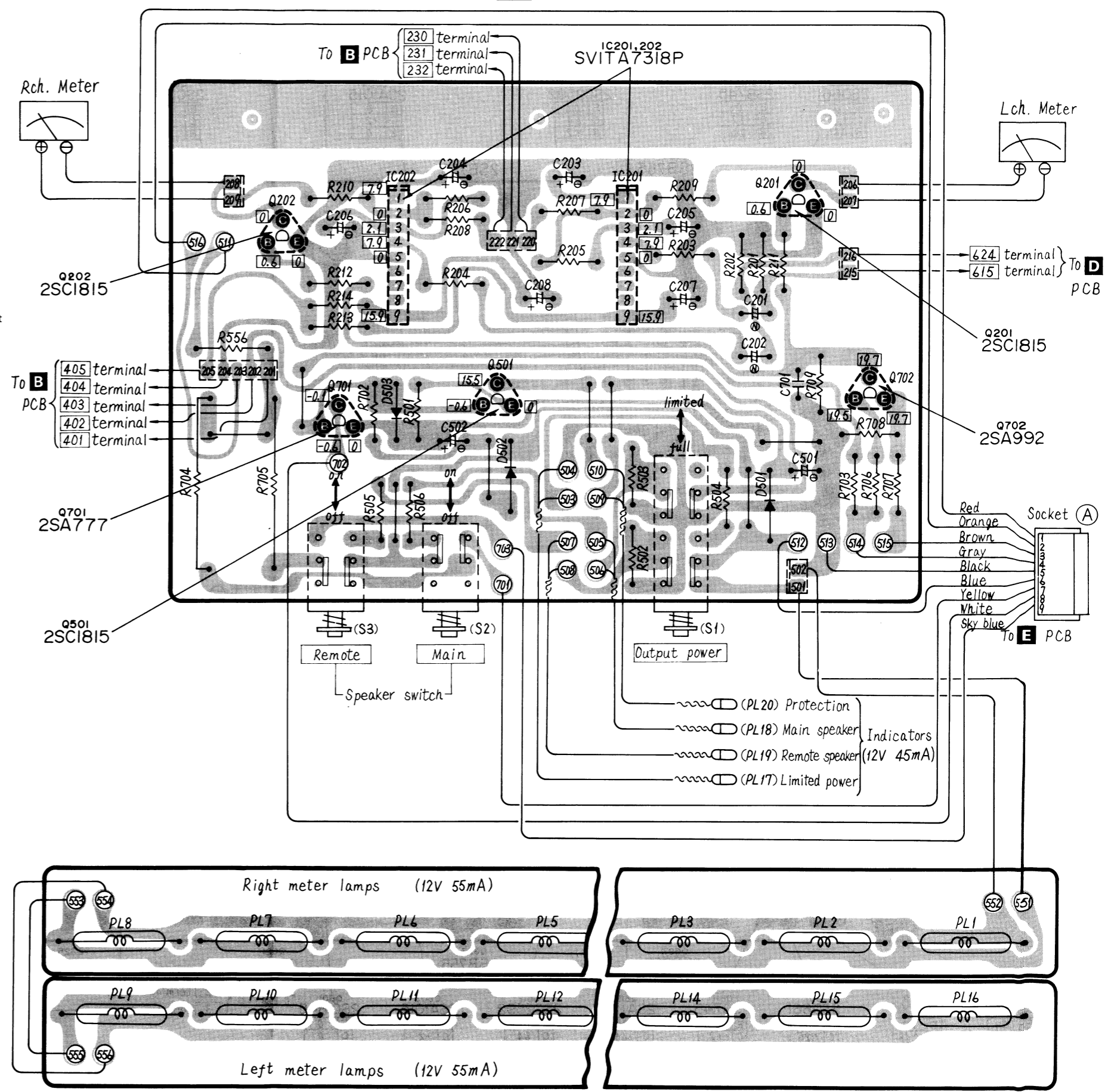


\* If the speaker impedance is too low (less than 3Ω), the limiter circuit operates and power is extremely reduced. (Relay does not operate.)

PRINTED CIRCUIT BOARDS LOCATION



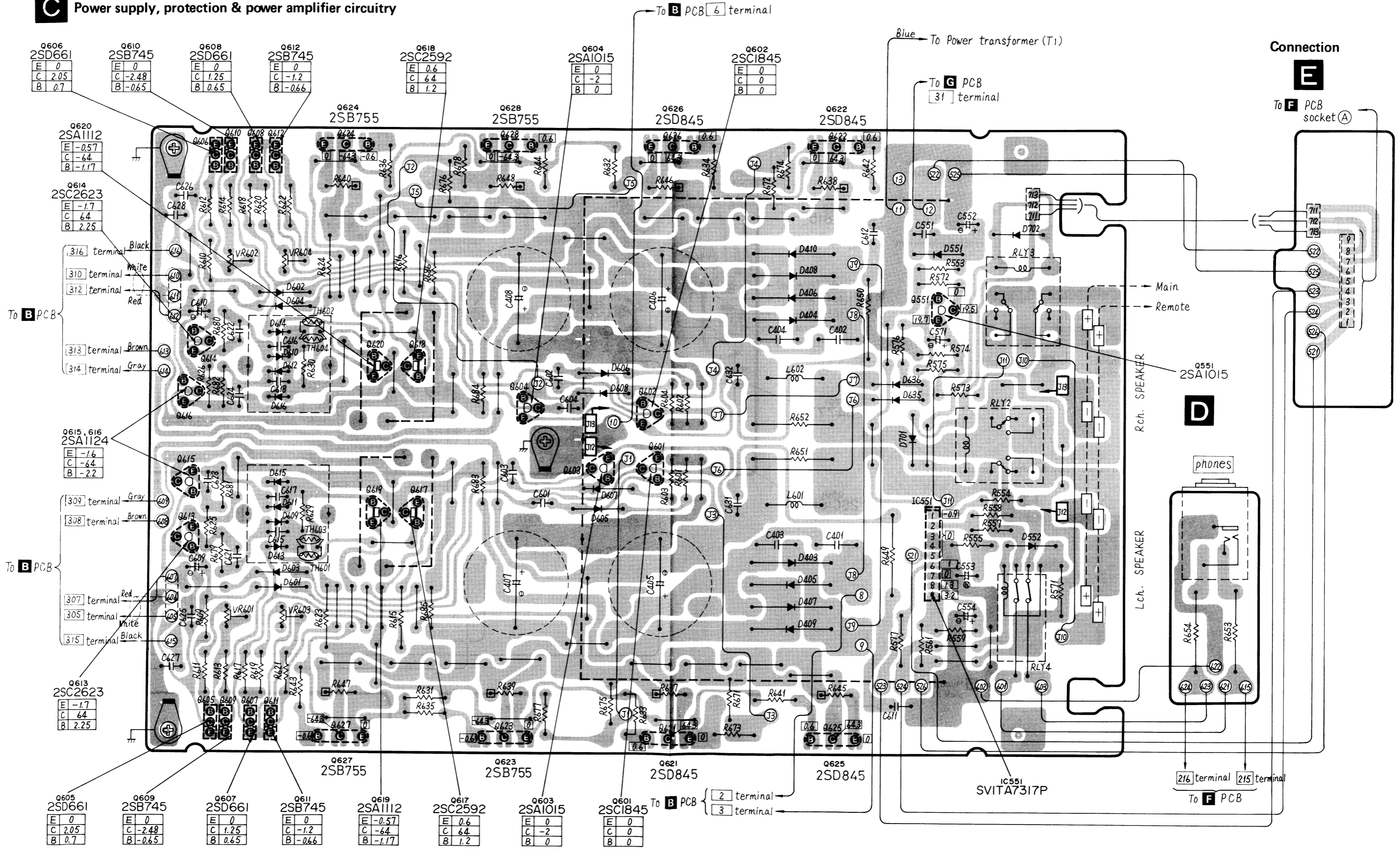
CIRCUIT BOARD AND WIRING CONNECTION DIAGRAM



**CIRCUIT BOARD AND WIRING CONNECTION DIAGRAM**

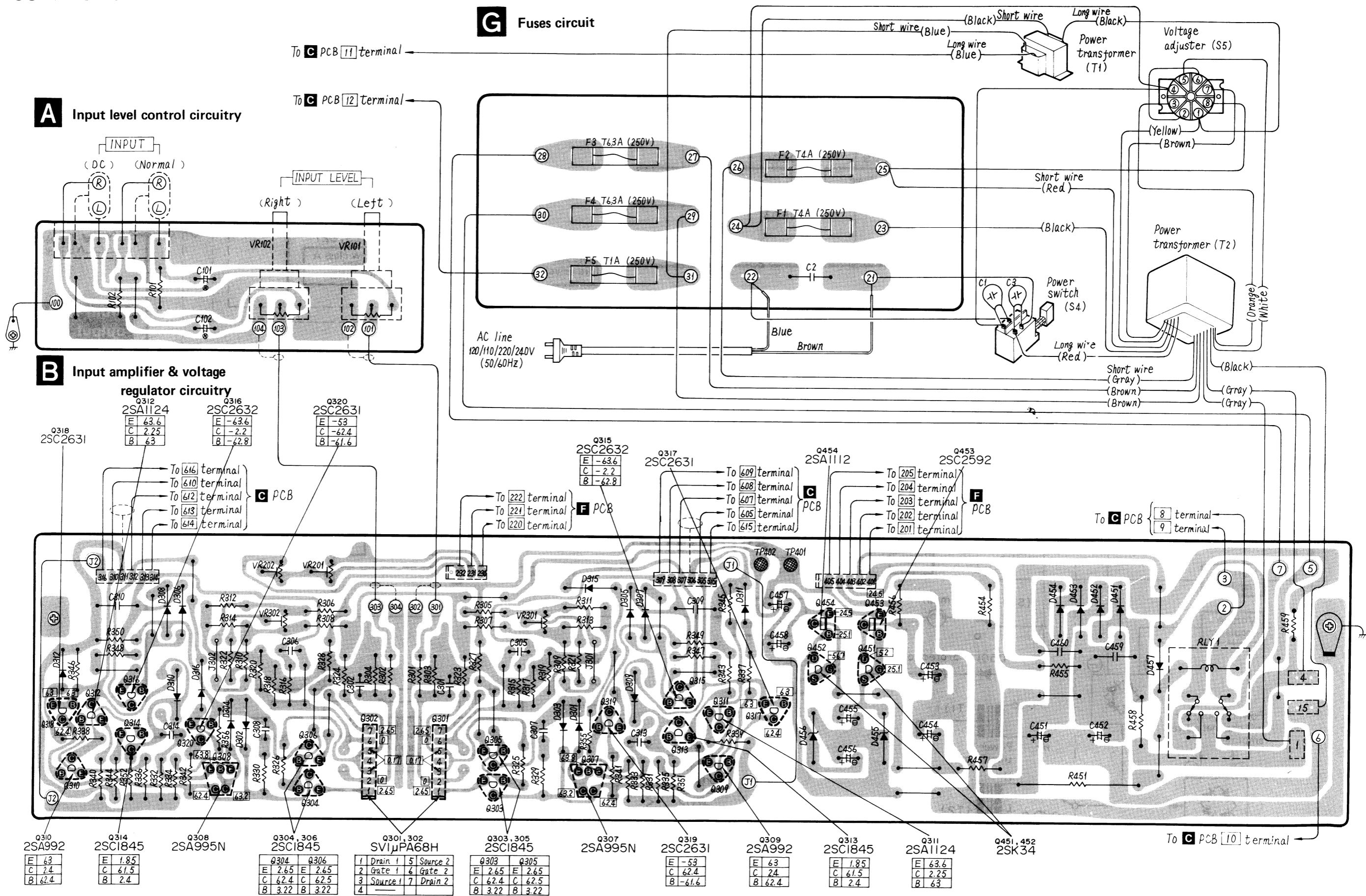
Ground (Earth) lines

**C** Power supply, protection & power amplifier circuitry



**CIRCUIT BOARD AND WIRING CONNECTION DIAGRAM**

Ground (Earth) lines



**A** Input level control circuitry

**B** Input amplifier & voltage regulator circuitry

**G** Fuses circuit

**C** PCB

**E** PCB

**F** PCB

Q310	2SA992
E	63
C	2.4
B	62.4

Q314	2SC1845
E	1.85
C	61.5
B	2.4

Q308	2SA995N
E	63
C	2.4
B	62.4

Q304, 306	2SC1845
Q304	Q306
E	2.65
E	2.65
C	62.4
C	62.5
B	3.22
B	3.22

Q301, 302	SV1μPA68H
1	Drain 1
2	Gate 1
3	Source 1
4	
5	Source 2
6	Gate 2
7	Drain 2

Q303, 305	2SC1845
Q303	Q305
E	2.65
E	2.65
C	62.4
C	62.5
B	3.22
B	3.22

Q307	2SA995N
E	63
C	2.4
B	62.4

Q319	2SC2631
E	53
C	62.4
B	61.6

Q309	2SA992
E	63
C	2.4
B	62.4

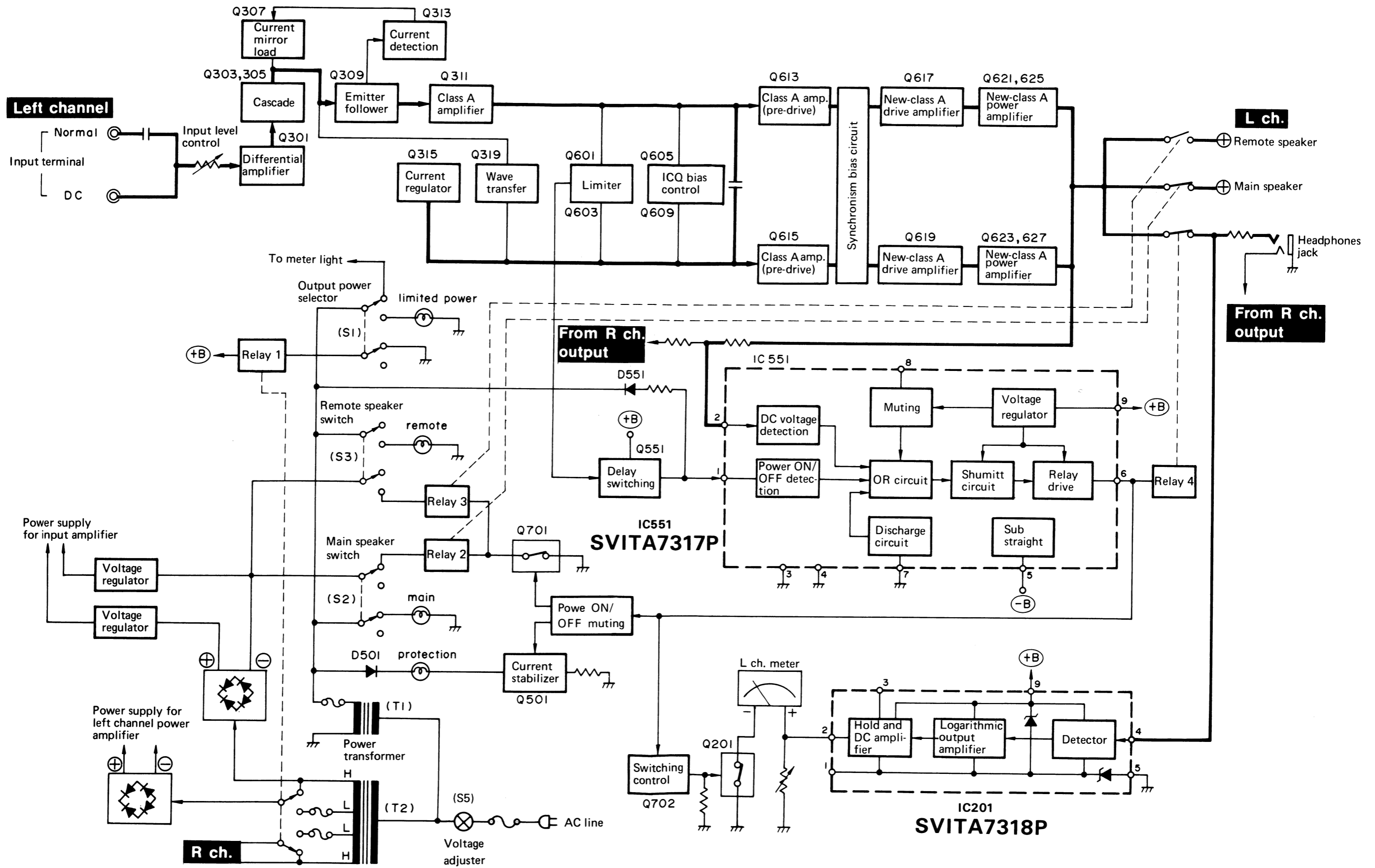
Q313	2SC1845
E	1.85
C	61.5
B	2.4

Q311	2SA1124
E	63.6
C	2.25
B	63

Q451, 452	2SK34
E	63.6
C	2.25
B	63

# SE-A5 SE-A5

## ■ BLOCK DIAGRAM



# REPLACEMENT PARTS LIST (Resistors and Capacitors)

Notes: 1. Part numbers are indicated on most mechanical parts.

Please use this part number for parts orders.

2. Important safety notice

Components identified by  $\Delta$  mark have special characteristics important for safety.

When replacing any of these components, use only manufacturer's specified parts.

Ref. No.	Part No.	Part Name & Description	Ref. No.	Part No.	Part Name & Description
<b>RESISTORS</b>					
R101, 102	ERD25TJ224	Carbon, 220k $\Omega$ , 1/4W, $\pm 5\%$	R629, 630	ERD25TJ823	Carbon, 82k $\Omega$ , 1/4W, $\pm 5\%$
R201, 202	ERD25TJ104	Carbon, 100k $\Omega$ , 1/4W, $\pm 5\%$	R631, 632	$\Delta$ ERD25FJ221	Carbon, 220 $\Omega$ , 1/4W, $\pm 5\%$
R203, 204	ERD25CKF1962	Metal Film, 19.6k $\Omega$ , 1/4W, $\pm 5\%$	R633, 634	$\Delta$ ERD25FJ2R2	Carbon, 2.2 $\Omega$ , 1/4W, $\pm 5\%$
R205, 206	ERD25TJ824	Carbon, 820k $\Omega$ , 1/4W, $\pm 5\%$	R635, 636	$\Delta$ ERD25FJ2R2	Carbon, 2.2 $\Omega$ , 1/4W, $\pm 5\%$
R207, 208	ERD25FJ221	Carbon, 220 $\Omega$ , 1/4W, $\pm 5\%$	ERF3RK R33	Non-Flammable, 0.33 $\Omega$ , 3W, $\pm 10\%$	
R209, 210	ERD25FJ471	Carbon, 470 $\Omega$ , 1/4W, $\pm 5\%$	R639, 640	$\Delta$ ERF3RK R33	Non-Flammable, 0.33 $\Omega$ , 3W, $\pm 10\%$
R211, 212	ERD25TJ104	Carbon, 100k $\Omega$ , 1/4W, $\pm 5\%$	R641, 642	$\Delta$ ERD25FJ2R2	Carbon, 2.2 $\Omega$ , 1/4W, $\pm 5\%$
R213, 214	$\Delta$ ERD25FJ102	Carbon, 1k $\Omega$ , 1/4W, $\pm 5\%$	R643, 644	$\Delta$ ERD25FJ2R2	Carbon, 2.2 $\Omega$ , 1/4W, $\pm 5\%$
R301, 302	ERD25FJ102	Carbon, 1k $\Omega$ , 1/4W, $\pm 5\%$	R645, 646	$\Delta$ ERF3RK R33	Non-Flammable, 0.33 $\Omega$ , 3W, $\pm 10\%$
R303, 304	ERD25TJ104	Carbon, 100k $\Omega$ , 1/4W, $\pm 5\%$	R647, 648	$\Delta$ ERF3RK R33	Non-Flammable, 0.33 $\Omega$ , 3W, $\pm 10\%$
R305, 306	ERD25TJ223	Carbon, 22k $\Omega$ , 1/4W, $\pm 5\%$	R649, 650	ERG2ANJ120	Metal Oxide, 12 $\Omega$ , 2W, $\pm 5\%$
R307, 308	ERD25TJ223	Carbon, 22k $\Omega$ , 1/4W, $\pm 5\%$	R651, 652	ERG2ANJ120	Metal Oxide, 12 $\Omega$ , 2W, $\pm 5\%$
R309, 310	ERD25FJ182	Carbon, 1.8k $\Omega$ , 1/4W, $\pm 5\%$	ERG2ANJ331	Metal Oxide, 330 $\Omega$ , 2W, $\pm 5\%$	
R311, 312	ERD25FJ182	Carbon, 1.8k $\Omega$ , 1/4W, $\pm 5\%$	R671, 672	$\Delta$ ERD25FJ681	Carbon, 680 $\Omega$ , 1/4W, $\pm 5\%$
R313, 314	ERD25FJ182	Carbon, 1.8k $\Omega$ , 1/4W, $\pm 5\%$	R673, 674	$\Delta$ ERD25FJ331	Carbon, 330 $\Omega$ , 1/4W, $\pm 5\%$
R315, 316	ERD25CKF1502	Metal Film, 15k $\Omega$ , 1/4W, $\pm 1\%$	R675, 676	$\Delta$ ERD25FJ681	Carbon, 680 $\Omega$ , 1/4W, $\pm 5\%$
R317, 318	$\Delta$ ERD25FJ561	Carbon, 560 $\Omega$ , 1/4W, $\pm 5\%$	R677, 678	$\Delta$ ERD25FJ331	Carbon, 330 $\Omega$ , 1/4W, $\pm 5\%$
R319, 320	ERD25FJ562	Carbon, 5.6k $\Omega$ , 1/4W, $\pm 5\%$	R679, 680	$\Delta$ ERD25FJ681	Carbon, 680 $\Omega$ , 1/4W, $\pm 5\%$
R321, 322	ERD25TJ183	Carbon, 18k $\Omega$ , 1/4W, $\pm 5\%$	R681, 682	$\Delta$ ERD25FJ681	Carbon, 680 $\Omega$ , 1/4W, $\pm 5\%$
R323, 324	ERD25FJ562	Carbon, 5.6k $\Omega$ , 1/4W, $\pm 5\%$	R683, 684	$\Delta$ ERD25FJ2R2	Carbon, 2.2 $\Omega$ , 1/4W, $\pm 5\%$
R325, 326	ERD25FJ103	Carbon, 10k $\Omega$ , 1/4W, $\pm 5\%$	R685, 686	$\Delta$ ERD25FJ2R2	Carbon, 2.2 $\Omega$ , 1/4W, $\pm 5\%$
R327, 328	ERD25TJ683	Carbon, 68k $\Omega$ , 1/4W, $\pm 5\%$	R702, 703	ERD25TJ183	Carbon, 18k $\Omega$ , 1/4W, $\pm 5\%$
R329, 330	ERD25FJ680	Carbon, 68 $\Omega$ , 1/4W, $\pm 5\%$	R704, 705	ERG3ANJ122	Metal Oxide, 1.2k $\Omega$ , 3W, $\pm 5\%$
R331, 332	$\Delta$ ERD2FCG181	Carbon, 180 $\Omega$ , 1/4W, $\pm 2\%$	R706	ERD25TJ104	Carbon, 100k $\Omega$ , 1/4W, $\pm 5\%$
R333, 334	$\Delta$ ERD2FCG181	Carbon, 180 $\Omega$ , 1/4W, $\pm 2\%$	R707	ERD25FJ392	Carbon, 3.9k $\Omega$ , 1/4W, $\pm 5\%$
R335, 336	$\Delta$ ERD2FCG392	Carbon, 3.9k $\Omega$ , 1/4W, $\pm 2\%$	R708	ERD25TJ393	Carbon, 39k $\Omega$ , 1/4W, $\pm 5\%$
R337, 338	ERD25FJ562	Carbon, 5.6k $\Omega$ , 1/4W, $\pm 5\%$	R709	ERD25TJ563	Carbon, 56k $\Omega$ , 1/4W, $\pm 5\%$
R339, 340	$\Delta$ ERD25FJ560	Carbon, 56 $\Omega$ , 1/4W, $\pm 5\%$	<b>CAPACITORS</b>		
R341, 342	ERD25FJ103	Carbon, 10k $\Omega$ , 1/4W, $\pm 5\%$	C1, 3	$\Delta$ ECKDKC103PF	Ceramic, 0.01 $\mu$ F, 400VAC, $\pm 100\%$
R343, 344	ERD25FJ562	Carbon, 5.6k $\Omega$ , 1/4W, $\pm 5\%$	C2	$\Delta$ ECQE2A473MCS	Polyester, 0.047 $\mu$ F, 250VAC, $\pm 20\%$
R345, 346	ERD25TJ683	Carbon, 68k $\Omega$ , 1/4W, $\pm 5\%$	C101, 102	$\Delta$ ECEA1HN2R2S	Non-Polar Electrolytic, 2.2 $\mu$ F, 50V
R347, 348	$\Delta$ ERD25FJ680	Carbon, 68 $\Omega$ , 1/4W, $\pm 5\%$	C201, 202	$\Delta$ ECEA1EN3R3S	Non-Polar Electrolytic, 3.3 $\mu$ F, 25V
R349, 350	ERD25TJ473	Carbon, 47k $\Omega$ , 1/4W, $\pm 5\%$	C203, 204	ECEA50ZR47	Electrolytic, 0.47 $\mu$ F, 50V
R351, 352	$\Delta$ ERD25FJ822	Carbon, 8.2k $\Omega$ , 1/4W, $\pm 5\%$	C205, 206	ECEA50ZR47	Electrolytic, 0.47 $\mu$ F, 50V
R355, 356	ERD25TJ183	Carbon, 18k $\Omega$ , 1/4W, $\pm 5\%$	C207, 208	ECEA1ES470	Electrolytic, 47 $\mu$ F, 25V
R451	ERG3ANJ122	Metal Oxide, 1.2k $\Omega$ , 3W, $\pm 5\%$	C301, 302	ECCD1H151K	Ceramic, 150pF, 50V, $\pm 10\%$
R454, 455	$\Delta$ ERD25FJ220	Carbon, 22 $\Omega$ , 1/4W, $\pm 5\%$	C305, 306	ECCD1H270K	Ceramic, 27pF, 50V, $\pm 10\%$
R456, 457	$\Delta$ ERD25FJ471	Carbon, 470 $\Omega$ , 1/4W, $\pm 5\%$	C307, 308	ECKD1H471KB	Ceramic, 470pF, 50V, $\pm 10\%$
R458, 459	$\Delta$ ERD25FJ2R2	Carbon, 2.2 $\Omega$ , 1/4W, $\pm 5\%$	C309, 310	ECKD2H103PE	Ceramic, 0.01 $\mu$ F, 500V, $\pm 100\%$
R501	$\Delta$ ERD25FJ180	Carbon, 18 $\Omega$ , 1/4W, $\pm 5\%$	C313, 314	ECKD1H471KB	Ceramic, 470pF, 50V, $\pm 10\%$
R502, 503	$\Delta$ ERD25FJ680	Carbon, 68 $\Omega$ , 1/4W, $\pm 5\%$	C401, 402	ECKD2H103PE	Ceramic, 0.01 $\mu$ F, 500V, $\pm 100\%$
R504	$\Delta$ ERD25FJ151	Carbon, 150 $\Omega$ , 1/4W, $\pm 5\%$	C403, 404	ECKD2H103PE	Ceramic, 0.01 $\mu$ F, 500V, $\pm 100\%$
R505, 506	$\Delta$ ERD25FJ680	Carbon, 68 $\Omega$ , 1/4W, $\pm 5\%$	C405, 406	ECE T71R103Y	Electrolytic, 10000 $\mu$ F, 71V
R553	ERD25FJ822	Carbon, 8.2k $\Omega$ , 1/4W, $\pm 5\%$	C407, 408	ECET71R103Y	Electrolytic, 10000 $\mu$ F, 71V
R554	ERD25TJ224	Carbon, 220k $\Omega$ , 1/4W, $\pm 5\%$	C451, 452	ECEA2AS101	Electrolytic, 100 $\mu$ F, 100V
R555	ERD25TJ822	Carbon, 220k $\Omega$ , 1/4W, $\pm 5\%$	C453, 454	ECEA1JS470	Electrolytic, 47 $\mu$ F, 63V
R556	ERD25TJ333	Carbon, 33k $\Omega$ , 1/4W, $\pm 5\%$	C455, 456	ECEA1JS330	Electrolytic, 33 $\mu$ F, 63V
R557, 558	$\Delta$ ERD50FJ153	Carbon, 15k $\Omega$ , 1/2W, $\pm 5\%$	C457, 458	ECEA1JS330	Electrolytic, 33 $\mu$ F, 63V
R559	ERD50TJ683	Carbon, 68k $\Omega$ , 1/4W, $\pm 5\%$	C459, 460	ECKD2H103PE	Ceramic, 0.01 $\mu$ F, 500V, $\pm 100\%$
R561	ERD25TJ224	Carbon, 220k $\Omega$ , 1/4W, $\pm 5\%$	C501	ECEA1ES101	Electrolytic, 100 $\mu$ F, 25V
R571	$\Delta$ ERD50FJ152	Carbon, 1.5k $\Omega$ , 1/2W, $\pm 5\%$	C502	ECEA50Z3R3	Electrolytic, 3.3 $\mu$ F, 50V
R572	ERD25FJ103	Carbon, 10k $\Omega$ , 1/4W, $\pm 5\%$	C551	ECKD1H102MD	Ceramic, 0.001 $\mu$ F, 50V, $\pm 20\%$
R573, 574	ERD25TJ223	Carbon, 22k $\Omega$ , 1/4W, $\pm 5\%$	C552	ECEA50Z3R3	Electrolytic, 3.3 $\mu$ F, 50V
R575	ERD25TJ153	Carbon, 15k $\Omega$ , 1/4W, $\pm 5\%$	C553	$\Delta$ ECEA16N220	Non-Polar Electrolytic, 220 $\mu$ F, 16V
R576	ERD25TJ104	Carbon, 100k $\Omega$ , 1/4W, $\pm 5\%$	C554	ECEA1CS330	Electrolytic, 33 $\mu$ F, 16V
R577	$\Delta$ ERD50FJ152	Carbon, 1.5k $\Omega$ , 1/2W, $\pm 5\%$	C571	ECEA1AS470	Electrolytic, 47 $\mu$ F, 10V
R601, 602	$\Delta$ ERD25FJ272	Carbon, 2.7k $\Omega$ , 1/4W, $\pm 5\%$	C601, 602	ECKD1H103MD	Ceramic, 0.01 $\mu$ F, 50V, $\pm 20\%$
R603, 604	$\Delta$ ERD25FJ272	Carbon, 2.7k $\Omega$ , 1/4W, $\pm 5\%$	C603, 604	ECKD1H103MD	Ceramic, 0.01 $\mu$ F, 50V, $\pm 20\%$
R609, 610	$\Delta$ ERD25FJ182	Carbon, 1.8k $\Omega$ , 1/4W, $\pm 5\%$	C609, 610	ECEA2AS100	Electrolytic, 10 $\mu$ F, 100V
R611, 612	$\Delta$ ERD25FJ122	Carbon, 1.2k $\Omega$ , 1/4W, $\pm 5\%$	C611, 612	ECQM1H104KZ	Polyester, 0.1 $\mu$ F, 50V, $\pm 10\%$
R613, 614	$\Delta$ ERD25FJ182	Carbon, 1.8k $\Omega$ , 1/4W, $\pm 5\%$	C615, 616	ECKD1H681K	Ceramic, 680pF, 50V, $\pm 10\%$
R615, 616	ERG1ANJ822	Metal Oxide, 8.2k $\Omega$ , 1W, $\pm 5\%$	C617, 618	ECKD1H681K	Ceramic, 680pF, 50V, $\pm 10\%$
R617, 618	ERD25FJ821	Carbon, 820 $\Omega$ , 1/4W, $\pm 5\%$	C621, 622	ECKD1H102MD	Ceramic, 0.001 $\mu$ F, 50V, $\pm 20\%$
R619, 620	$\Delta$ ERD25FJ152	Carbon, 1.5k $\Omega$ , 1/4W, $\pm 5\%$	C623, 624	ECKD1H102MD	Ceramic, 0.001 $\mu$ F, 50V, $\pm 20\%$
R621, 622	$\Delta$ ERD25FJ821	Carbon, 820 $\Omega$ , 1/4W, $\pm 5\%$	C625, 626	ECCD2H150K	Ceramic, 15pF, 500V, $\pm 10\%$
R623, 624	ERG1ANJ822	Metal Oxide, 8.2k $\Omega$ , 1W, $\pm 5\%$	C627, 628	ECKD2H222KB	Ceramic, 0.0022 $\mu$ F, 500V, $\pm 10\%$
R625, 626	$\Delta$ ERD25FJ102	Carbon, 1k $\Omega$ , 1/4W, $\pm 5\%$	C631, 632	ECQM1H104KZ	Polyester, 0.1 $\mu$ F, 50V, $\pm 10\%$
			C701	ECKD1H103MD	Ceramic, 0.01 $\mu$ F, 50V, $\pm 20\%$

## REPLACEMENT PARTS LIST (Electrical parts)

- Notes:** 1. Part numbers are indicated on most mechanical parts.  
Please use this part number for parts orders.
2. Important safety notice  
Components identified by  $\Delta$  mark have special characteristics important for safety.  
When replacing any of these components, use only manufacturer's specified parts.

Ref. No.	Part No.	Part Name & Description
<b>INTEGRATED CIRCUITS</b>		
IC201, 202 IC551	SVITA7318P SVITA7317P	IC, Meter Amplifier IC, Protection
<b>TRANSISTORS</b>		
Q201, 202 Q301, 302	2SC1815-Y SV1UPA68H-KL	Transistor, Meter Driver (Use in ranks Y or O) Transistor, Input Differential (Use in ranks K or L)
Q303~306 Q307, 308	2SC1845-E 2SA995N-G	Transistor, Cascade (Use in ranks E or F) Transistor, Current Mirror (Use in ranks F or G)
Q309, 310 Q311, 312 Q313, 314	2SA992 2SA1124-R 2SC1845-E	Transistor, Pre-Drive (Use in ranks E or F) Transistor, Pre-Drive (Use in ranks R or S) Transistor, Linear Feed Back (Use in ranks E or F)
Q315, 316	2SC2632-R	Transistor, Current Stabilizer (Use in ranks R or S)
Q317~320 Q451, 452 Q453	2SC2631-R 2SK34-D1 2SC2592-R	Transistor, Clamper (Use in ranks Q, R or S) Transistor, Voltage Regulator [FET] Transistor, Voltage Regulator (Use in ranks Q, R or S)
Q454	2SA1112-R	Transistor, Voltage Regulator (Use in ranks Q, R or S)
Q501	2SC1815-Y	Transistor, Current Stabilizer (Use in ranks Y or O)
Q551 Q601, 602 Q603, 604 Q605~608 Q609~612 Q613, 614 Q615, 616	2SA1015-Y 2SC1845-E 2SA1015-Y 2SD661-S 2SB745-S 2SC2632-R 2SA1124-R	Transistor, Switching (Use in ranks Y or O) Transistor, Limiter (Use in ranks E or F) Transistor, Limiter (Use in ranks Y or O) Transistor, Bias Control (Use in ranks R or S) Transistor, Bias Control (Use in ranks R or S) Transistor, Driver (Use in ranks R or S) Transistor, Driver (Use in ranks R or S) (Use pair ranks as same as Q613, 614, 615 and 616)
Q617, 618	2SC2592-R	Transistor, Drive Amplifier
Q619, 620 Q621, 622, 625, 626 Q623, 624, 627, 628	2SA1112-R 2SD845-R 2SB755-R	Transistor, Drive Amplifier Transistor, Power Amplifier (Use in ranks R or O) Transistor, Power Amplifier (Use in ranks R or O) (Use pair ranks as same as Q621~627 and 628)
Q701	2SA777-Q	Transistor, Relay Switching (Use in ranks Q or R)
Q702	2SA992	Transistor, Meter Switching (Use in ranks E or F)
<b>DIODES</b>		
D301~304 D305~308 D309, 310, 315, 316	MA162A MA27A2 MA162A	Diode, Current Mirror Diode, 1.2V Bias Supply Diode, Bias Supply

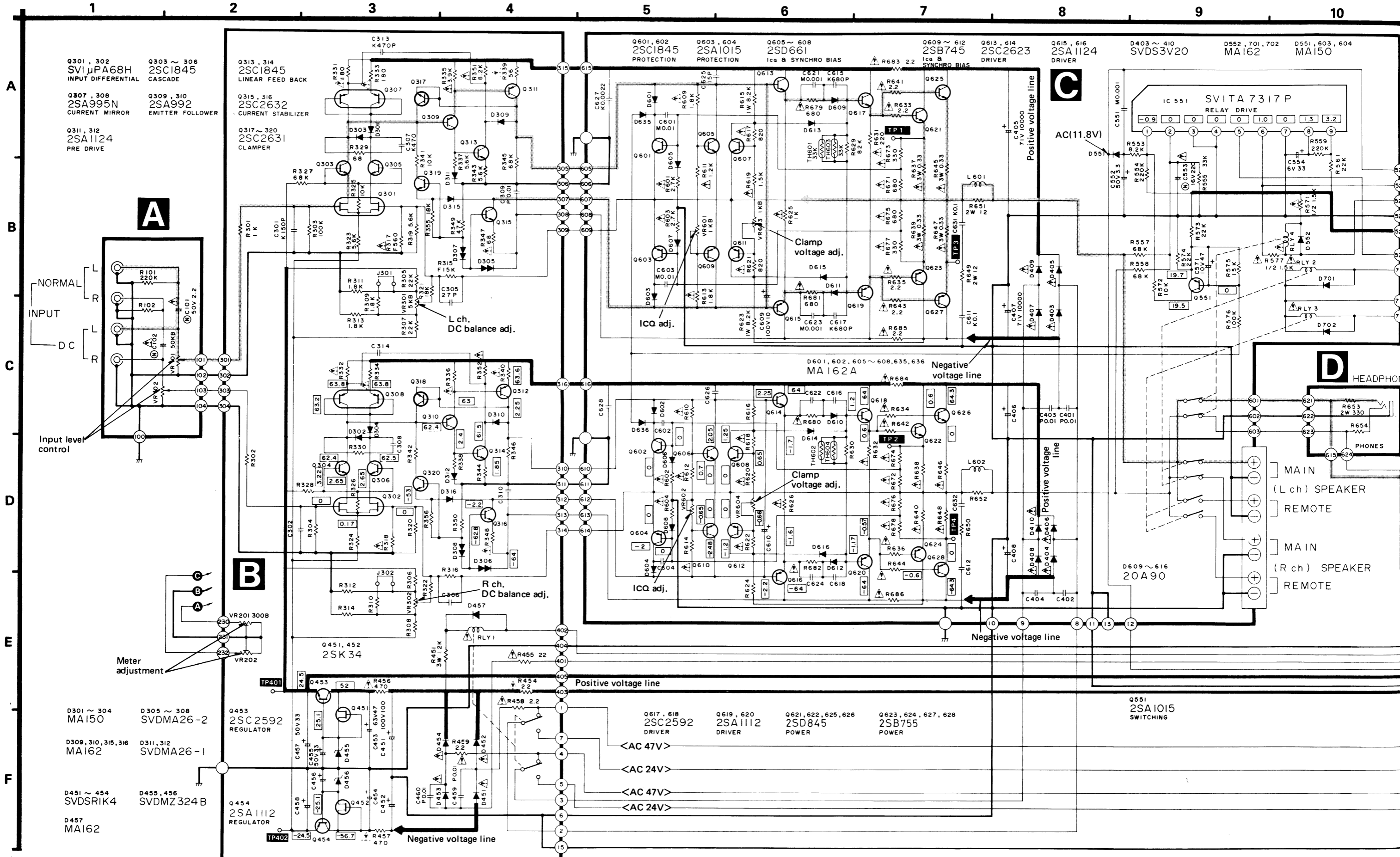
Ref. No.	Part No.	Part Name & Description
D311, 312 D403~410 D451~454 D455, 456 D457 D501	$\Delta$ MA27A1 $\Delta$ SVDS3V40 SVDSR1K4 SVDZM324B MA162A SVDSR1K2	Diode, Bias Supply Rectifier, Power Amplifier Rectifier, Pre-Amplifier Diode, 24V Zener Diode, Pulse Killer Rectifier, Lamp Power Supply
D502, 551, 603, 604 D503 D552 D601, 602, 605~608, 635, 636 D609~616 D701, 702	MA162A MA27A2 MA162A MA162A 20A90 MA162A	Diode Diode, 1.2V Bias Supply Diode, Pulse Killer Diode, Limiter & Switching Diode, Synchronism Bias Diode, Pulse Killer
<b>TRANSFORMERS</b>		
T1 T2	$\Delta$ SLT5K117 $\Delta$ SLT5S51	Transformer, Meter Lamp Power Transformer, Power
<b>COILS</b>		
L601, 602	SLQY16G-1U	Coil, Output Choke
<b>VARIABLE RESISTORS</b>		
VR101, 102 VR201, 202 VR301, 302 VR601~604	EVH6UA524B54 EVTR4SA00B32 EVMH9GA00B53 EVTR4SA00B13	Input Level Control, 50k $\Omega$ (B) Meter Adjustment, 300 $\Omega$ (B) DC Balance Adjustment, 5k $\Omega$ (B) ICQ & Clamp Voltage Adjustment, 1k $\Omega$ (B)
<b>THERMISTERS</b>		
TH601~604	ERTD2FHL333S	Thermister, 33k $\Omega$
<b>LAMPS</b>		
PL1~16 PL17~20	$\Delta$ XAMR74S10 $\Delta$ XAMR48T250	Lamp, Meter (12V, 55mA) Lamp, Indicators (12V, 45mA)
<b>FUSES</b>		
F1, 2 F3, 4 F5	$\Delta$ XBA2C40TRO $\Delta$ XBA2C63TRO $\Delta$ XBA2C10TRO	Fuse, T4A (250V) Fuse, T6.3A (250V) Fuse, T1A (250V)
<b>SWITCHES</b>		
S1, 2, 3 S4 S5	$\Delta$ SSH391 $\Delta$ ESB9997S $\Delta$ ESE37200	Switch, Speaker Switch, Power Switch, Voltage Adjuster
<b>RELAYS</b>		
PLY1 RLY2, 3 RLY4	$\Delta$ SSY47 $\Delta$ SSY19-3 $\Delta$ SSY9	Relay, Transformer Tap Select of Secondary Relay, Speaker Select Relay, Headphones & Meter Circuit
<b>METER</b>		
	SSM161N	Meter

### • Terminal guide of IC's and transistors

<p>2SA777, 2SC1815 2SA992, 2SC1845 2SA1015, 2SC2631 2SA1124, 2SC2632</p>	<p>2SA1112, 2SC2592</p>	<p>SV1<math>\mu</math>PA68H</p>	<p>2SB745, 2SD661</p>
<p>2SA995N</p>	<p>2SA1094, 2SC2564</p>	<p>2SK34</p>	<p>SVITA7317P SVITA7318P</p>



# SCHEMATIC DIAGRAM



**Q301, 302**  
 SV1 $\mu$ PA68H  
 INPUT DIFFERENTIAL

**Q303 ~ 306**  
 2SC1845  
 CASCADE

**Q307, 308**  
 2SA995N  
 CURRENT MIRROR

**Q309, 310**  
 2SA992  
 EMITTER FOLLOWER

**Q311, 312**  
 2SA1124  
 PRE DRIVE

**Q313, 314**  
 2SC1845  
 LINEAR FEED BACK

**Q315, 316**  
 2SC2632  
 CURRENT STABILIZER

**Q317 ~ 320**  
 2SC2631  
 CLAMPER

**Q601, 602**  
 2SC1845  
 PROTECTION

**Q603, 604**  
 2SA1015  
 PROTECTION

**Q605 ~ 608**  
 2SD661  
 IC<sub>A</sub> & SYNCHRO BIAS

**Q609 ~ 612**  
 2SB745  
 IC<sub>B</sub> & SYNCHRO BIAS

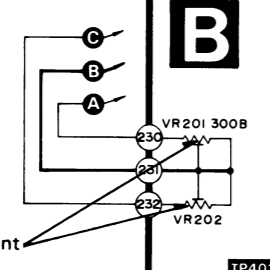
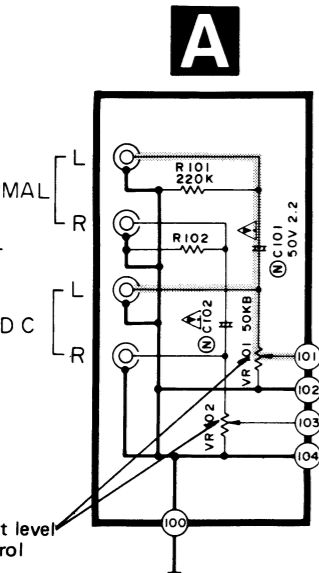
**Q613, 614**  
 2SC2623  
 DRIVER

**Q615, 616**  
 2SA1124  
 DRIVER

**D403 ~ 410**  
 SVDS3V20

**D552, 701, 702**  
 MA162

**D551, 603, 604**  
 MA150



**D301 ~ 304**  
 MA150

**D305 ~ 308**  
 SVDMA26-2

**D309, 310, 315, 316**  
 MA162

**D311, 312**  
 SVDMA26-1

**D451 ~ 454**  
 SVDSRIK4

**D455, 456**  
 SVDZM324B

**Q453**  
 2SC2592  
 REGULATOR

**Q454**  
 2SA1112  
 REGULATOR

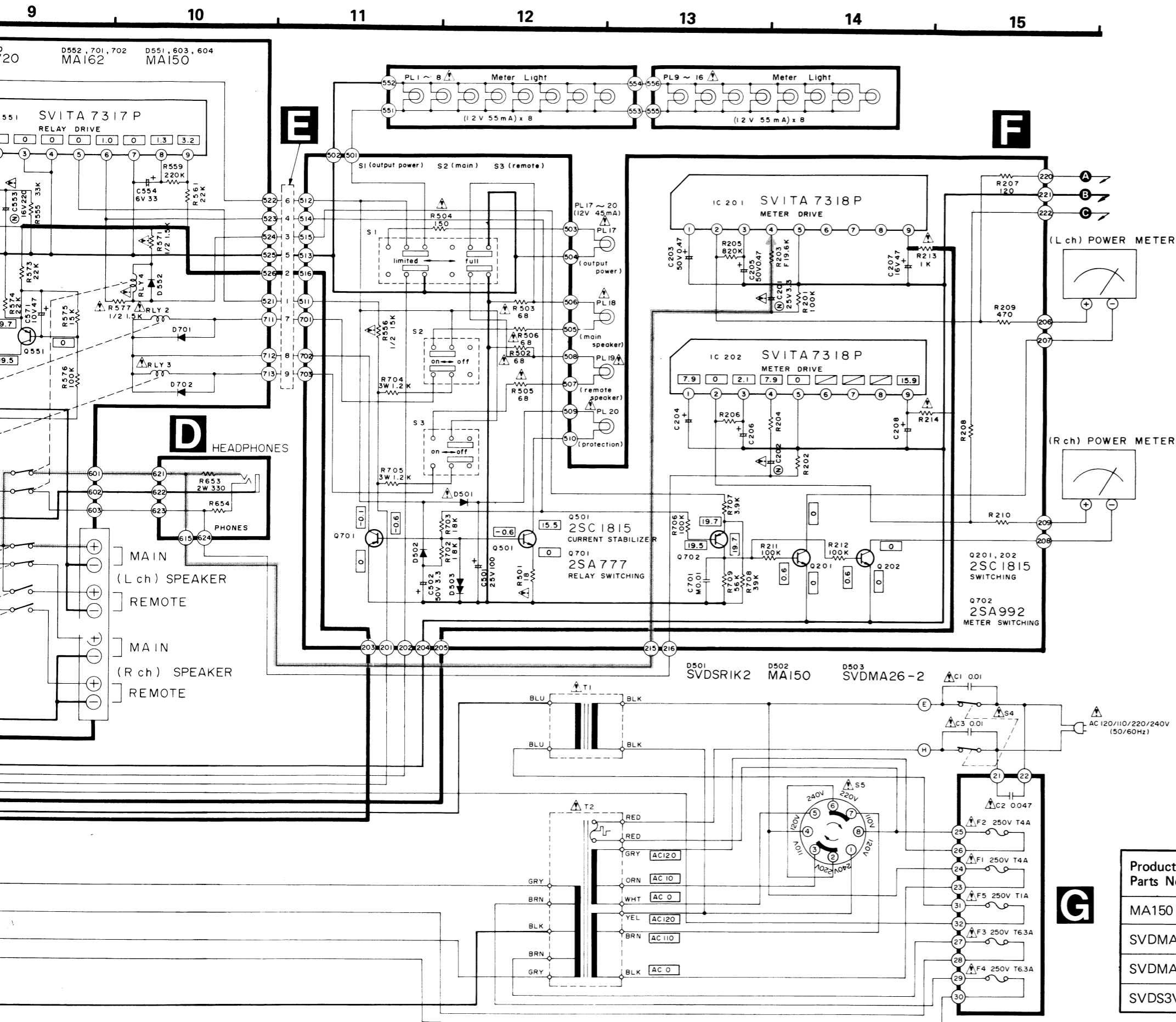
**Q617, 618**  
 2SC2592  
 DRIVER

**Q619, 620**  
 2SA1112  
 DRIVER

**Q621, 622, 625, 626**  
 2SD845  
 POWER

**Q623, 624, 627, 628**  
 2SB755  
 POWER

**Q551**  
 2SA1015  
 SWITCHING



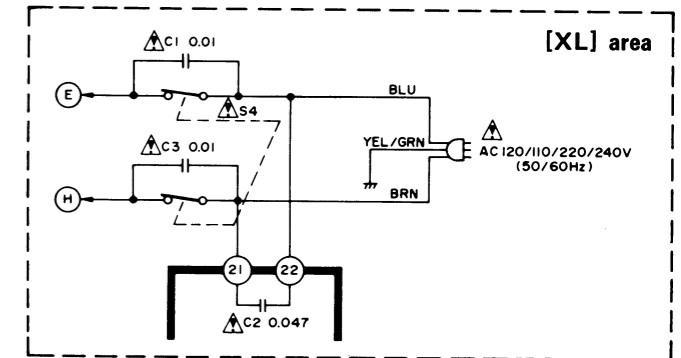
**Notes:**

1. S1: Output power selector switch in "full" position. (full ↔ limited)
2. S2: Main speaker switch in "on" position.
3. S3: Remote speaker switch in "off" position.
4. S4: Power source switch in "on" position.
5. S5: Voltage adjustment switch in "220V" position. (240V ↔ 220V ↔ 110V ↔ 120V)
6. Indicated voltage values are the standard values for the unit measured by the DC electronic circuit tester (high-impedance) with the chassis taken as standard. Therefore, there may exist some errors in the voltage values, depending on the internal impedance of the DC circuit tester.
7. Signal lines of left channel
8. Positive (+B) voltage lines.
9. indicate capacitors are non-polar electrolytic capacitor.
10. Important safety notice  
Components identified by mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.

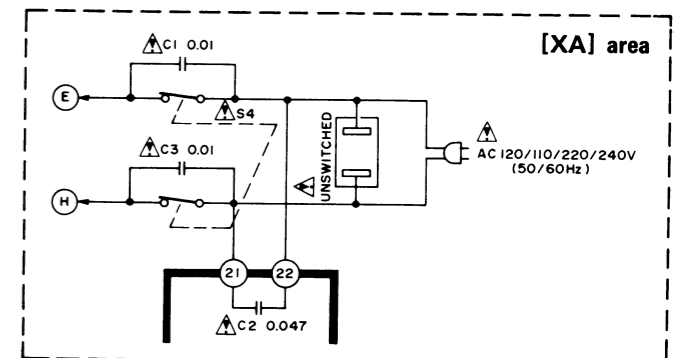
• **Power source circuit**

These schematic diagrams are available in Australia [XL] Asia, Latin America, Middle East and Africa [XA].

\* For Australia.

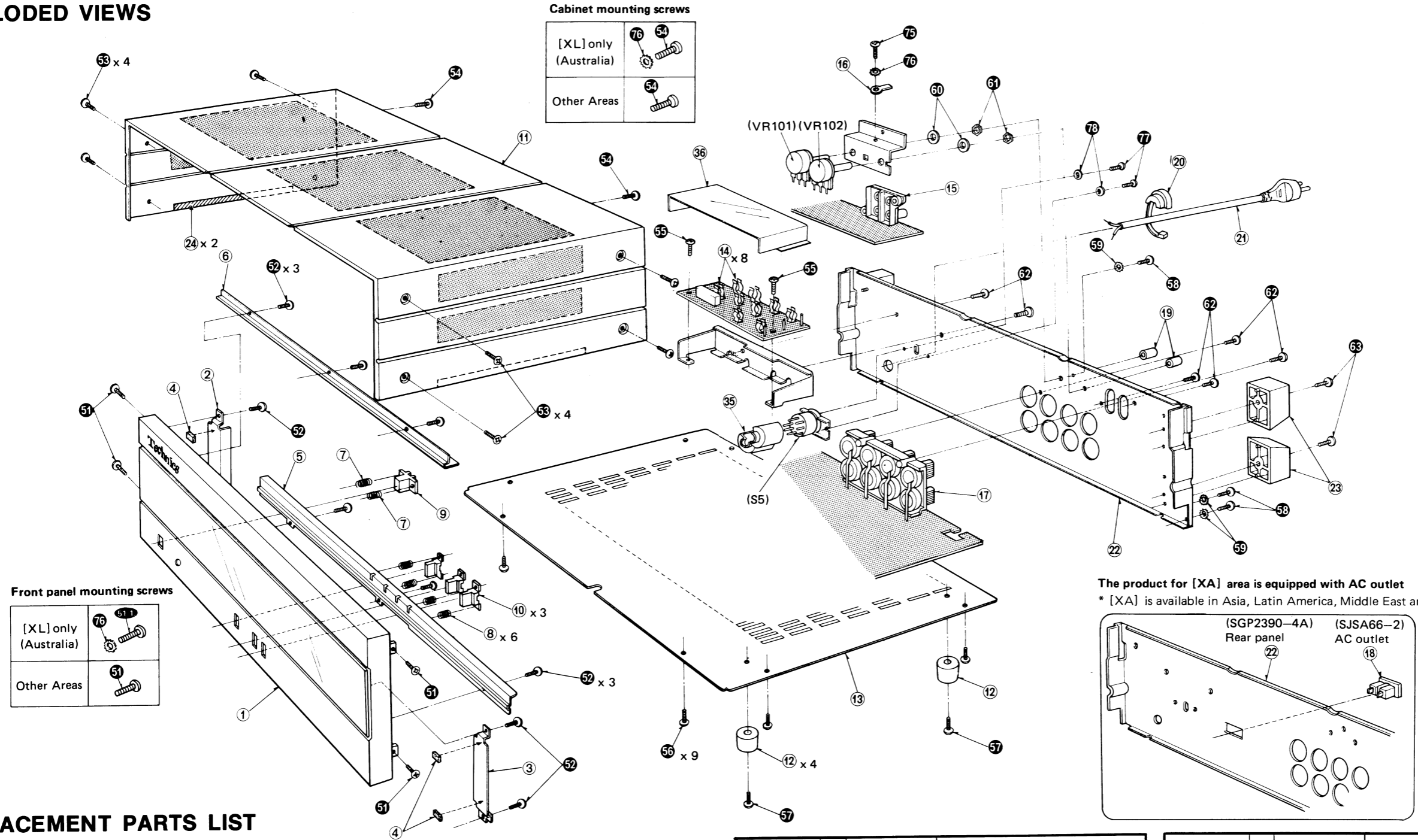


\* For Asia, Latin America, Middle East and Africa.



Production Parts No.	Standardized Parts No.
MA150	MA162A
SVDMA26-2	MA27A2
SVDMA26-1	MA27A1
SVDS3V20	SVDS3V40

EXPLODED VIEWS



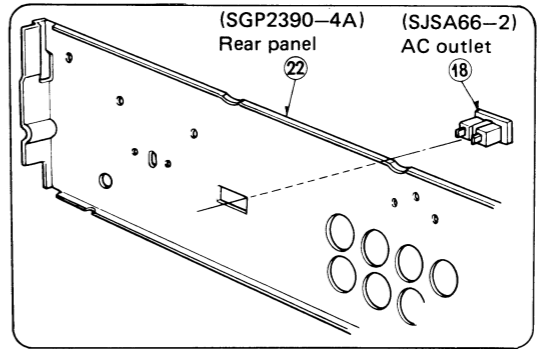
Cabinet mounting screws

[XL] only (Australia)	76	54
Other Areas	54	

Front panel mounting screws

[XL] only (Australia)	76	51
Other Areas	51	

The product for [XA] area is equipped with AC outlet  
 \* [XA] is available in Asia, Latin America, Middle East and Africa.



REPLACEMENT PARTS LIST

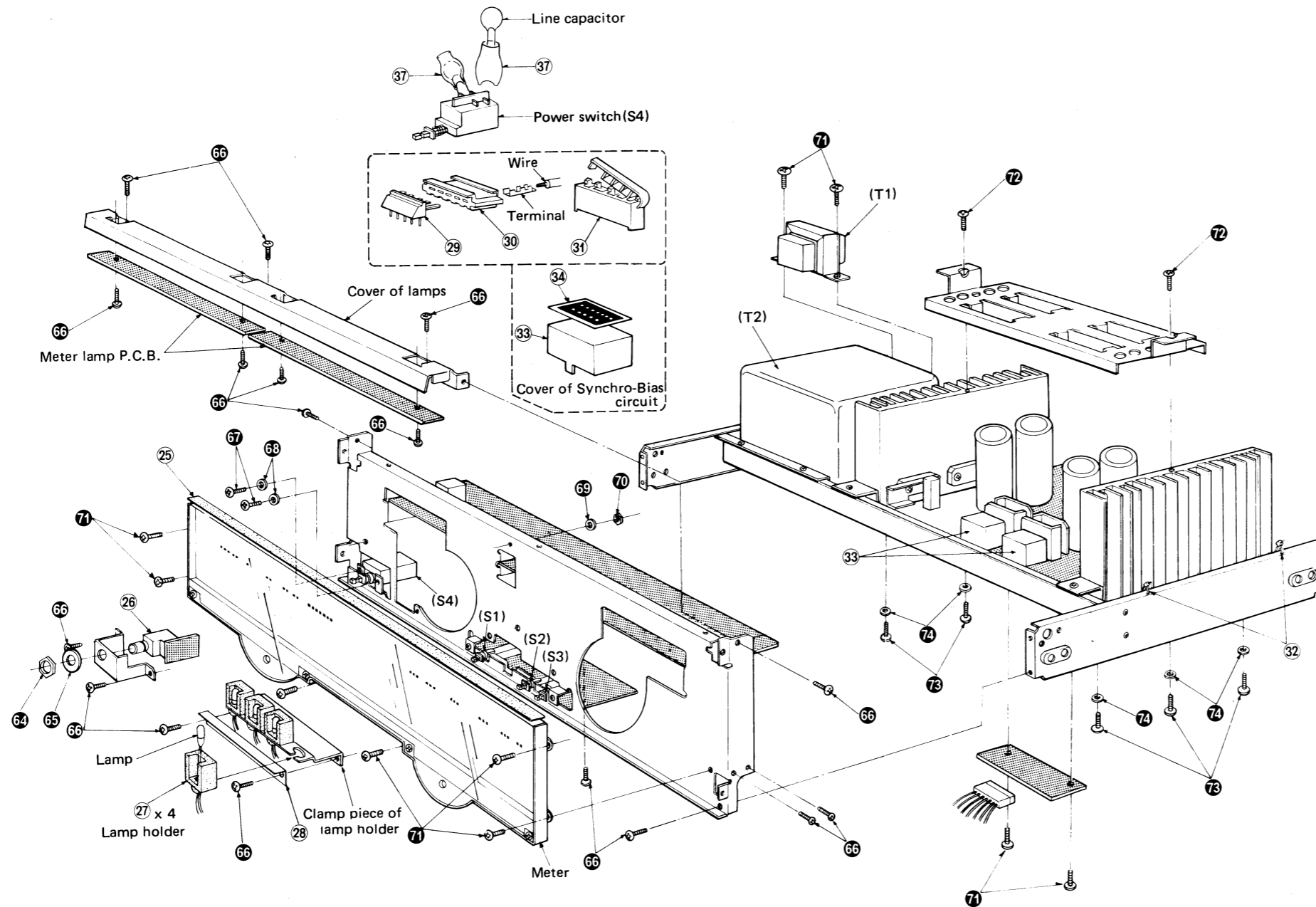
Notes: 1. Parts numbers are indicated on most mechanical parts. Please use this part number for parts orders.  
 2. Important safety notice: Components identified by Δ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.  
 3. Bracketed indications in Ref. No. columns specify the area. Parts without these indications can be used for all areas.

\* [D] and [EG] are available in Scandinavia and European except Switzerland, United Kingdom, Holland, France and Belgium.  
 \* [EW] is available in Switzerland.  
 \* [EK] is available in United Kingdom.  
 \* [EH] is available in Holland.  
 \* [EF] is available in France.  
 \* [EB] is available in Belgium.  
 \* [XL] is available in Australia.  
 \* [XA] is available in Asia, Latin America, Middle East and Africa.

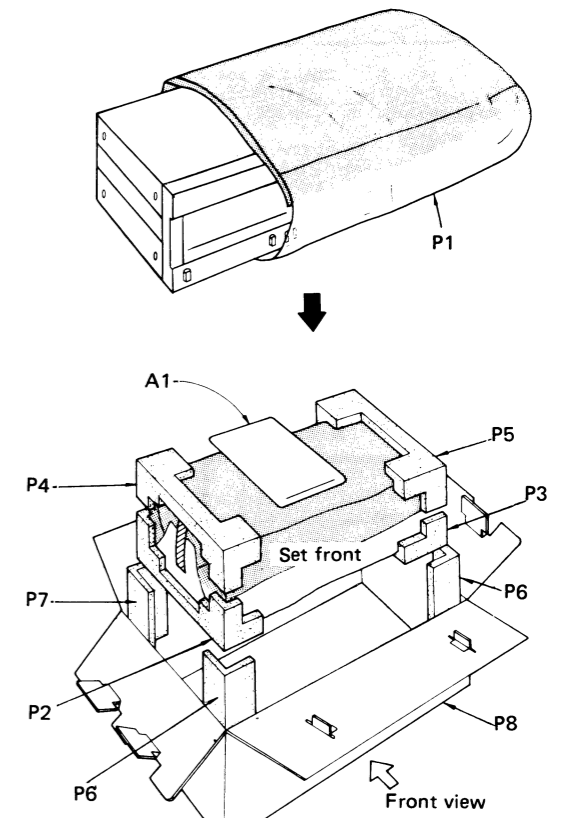
Ref. No.	Part No.	Part Name & Description
<b>CABINET and CHASSIS PARTS</b>		
1	SGWEA5E	Panel, Front Ass'y (with Glass)
2	SGE629-1	Panel, Left Side
3	SGE629	Panel, Right Side
4	SHG6123	Cushion, Glass
5	SGEEA5N	Panel, Lower Ass'y (with Panel Lights)
6	SGE627	Panel, Upper
7	SUS193	Spring, Power Switch Buttons
8	SUS159	Spring, Speakers Select Buttons
9	SBC261-1	Button, Power Switch
10	SBC219-2	Button, Speakers Select
11	SKC530B1	Cabinet
12	SKL247	Foot, Bottom
13	SKU8210-2	Bottom Board
14	SJT347	Holder, Fuse
15	SJF3431A	Terminal, Input

Ref. No.	Part No.	Part Name & Description
16	RJT202B	Terminal, Ground (1 pin)
17	SJF4813-1	Terminal, Speakers
18 [XA] only	SJSA66-2	Socket, AC Outlet
19	SBN613	Knob, Input Level Control
20 [EW, XA]	SF5R4N4	Bushing, AC Cord
20 [D, EG, XL]	SHR131	Bushing, AC Cord
20 [EK]	SHR129	Bushing, AC Cord
21 [D, EG]	SJA123	AC Cord
21 [EW]	SJA111	AC Cord
21 [EK]	QFC1205M	AC Cord
21 [XL]	QFC1207MA	AC Cord
21 [XA]	SJA121	AC Cord
22 [D, EH, EB, EF]	SGP2390-2A	Rear Panel
22 [EW]	SGP2390-3A	Rear Panel
22 [XA]	SGP2390-4A	Rear Panel
22 [EK]	SGPEA5EK	Rear Panel, SGP2390-3A with Name Plate SGT23550
22 [EG]	SGPEA5E	Rear Panel, SGP2390-2A with Name Plate SGT23550
22 [XL]	SGPEA5XL	Rear Panel, SGP2390-2A with Name Plate SGT23570

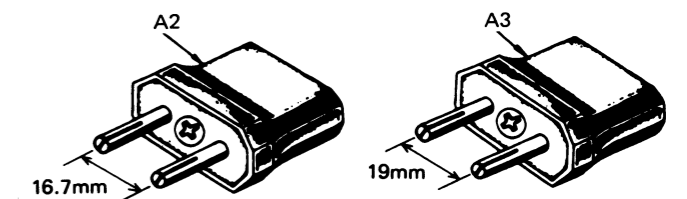
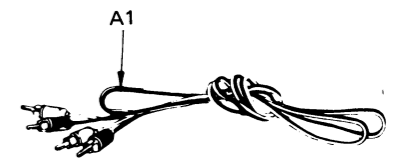
Ref. No.	Part
23	SKL241
24	SHS2437
25	SDU35-1
26	XCJ6P21
27	SHG1575
28	SHR5103
29	SJT3209
29	SJT3609
30	SJS5213
30	SJS5621
30	SJS5905
31	SJS5327
31	SJS5519
32	SHR301
33	SUV423
34	SGK1347
35	SUV453
36	SMX405
37	SMXA65
<b>SCREWS, NUTS and WASHERS</b>	
51 [XL] only	XTB3+8E
51	XTS3+8E
52	XTB3+8E



PACKING



Accessories



Ref. No.	Part No.	Part Name & Description
23	SKL241	Foot, Rear
24	SHS2437	Fiber, Cabinet
25	SDU35-1	Filter, Meter Light
26	XCJ6P21B-A1	Jack, Headphones
27	SHG1575	Rubber Holder, Lamp
28	SHR5103	Clamper, Wire
29	SJT3209	Terminal, 2 pin
29	SJT3609	Terminal, 6 pin
30	SJS5213	Socket, 2 pin
30	SJS5621	Socket, 6 pin
30	SJS5905	Socket, 9 pin
31	SJS5327	Connector, 3 pin
31	SJS5519	Connector, 5 pin
32	SHR301	Clamper, Wire
33	SUV423	Cover, Synchronism Bias Circuit
34	SGK1347	Label, Synchro-Bias
35	SUV453	Cover, Voltage Adjuster
36	SMX405	Cover, Fuse P.C.B.
37	SMXA65	Cover, Line Capacitor

**SCREWS, NUTS and WASHERS**

51 [XL] only	XTB3+8BFZ	Screw, Tapping, 3x8 (Front Panel)
51	XTS3+8B	Screw, Tapping, 3x8 (Front Panel)
52	XTB3+8BFN	Screw, Tapping, (Right & Left Side Panel)

Ref. No.	Part No.	Part Name & Description
53	XSS5+12F1S	Screw, Tapping, 3 x 8 (Cabinet)
54	XTB3+10BFZ	Screw, Tapping, 3 x 10 (Cabinet)
55	XTB3+8BFN	Screw, Tapping, 3 x 8 (P.C.B.)
56	XTB3+8BFZ	Screw, Tapping, 3 x 8 (Bottom Board)
57	XTB3+12BFZ	Screw, Tapping, 3 x 12 (Bottom Feet)
58	XTB3+8BFZ	Screw, Tapping, 3 x 8 (Rear Panel)
59	XWC3B	Washer, External Toothed Lock, φ3
60	XWV8	Washer, Spring, φ8
61	XNS8	Nut, M8 (Volume)
62	XTB3+8BFZ	Screw, Tapping, 3 x 8 (Rear Panel)
63	XTB4+12BFZ	Screw, Tapping, 4 x 12 (Rear Feet)
64	XNS12	Nut, M12 (Headphone Jack)
65	SNE59-1	Washer, Wave
66	XTB3+8BFN	Screw, Tapping, 3 x 8 (Chassis)
67	XSN3+6S	Screw, 3 x 6 (Switch)
68	XWA3B	Washer, Spring, φ3
69	XWA3B	Washer, Spring, φ3
70	XNG3ES	Nut, M3 (Meter)
71	XTB3+8BFN	Screw, Tapping, 3 x 8 (P.T. & Meter)
72	XTB3+8BFZ	Screw, Tapping, 3 x 8 (P.T. & Meter)
73	XTN3+10B	Screw, Tapping, 3 x 10 (Heat Sink)
74	XWG3	Washer, Plain, φ3
75	XTB3+8BFN	Screw, Tapping, 3 x 8 (Ground Terminal)
76	XWC3B	Washer, External Toothed Lock, φ3
77	XSN3+8BVS	Screw, 3x8 (Voltage Adjuster)
78	XWA3BFZ	Washer, Spring φ3

Ref. No.	Part No.	Part Name & Description
<b>PACKING PARTS (For [EW], [EK] and [XA] areas)</b>		
P1	SPP653	Polyethylene Bag
P2	SPS2959	Pad, Left Lower
P3	SPS2961	Pad, Right Lower
P4	SPS2963	Pad, Left Upper
P5	SPS2965	Pad, Right Upper
P6	SPS2987	Pad, Front Corner
P7	SPS2989	Pad, Rear Corner
P8	SPG2885	Carton Box
P9 [XA]	SQF10709	Instructions Book, Printed Matter
P9 [EW, EK]	SQF10707	Instructions Book, Printed Matter
<b>PACKING PARTS (For [D], [EG], [EF], [EH], [EB] and [XL] areas)</b>		
P1	SPP653	Polyethylene Bag
P2	SPS2959-1	Pad, Left Lower
P3	SPS2961-1	Pad, Right Lower
P4	SPS2963	Pad, Left Upper
P5	SPS2965	Pad, Right Upper
P6	SPS3049	Pad, Front Corner
P7	SPS3051	Pad, Rear Corner
P8 [EF] only	SPG2897	Carton Box
P8 [Other Areas]	SPG2883	Carton Box
P9	SQF10707	Instructions Book, Printed Matter

Ref. No.	Part No.	Part Name & Description
<b>ACCESSORIES</b>		
A1	SJP2239	Cord, Stereo Pin Type Connection
A2 [XA] only	RJP74-1	Plug Adaptor, AC Power Source
A3 [XA] only	RJP75	Plug Adaptor, AC Power Source

