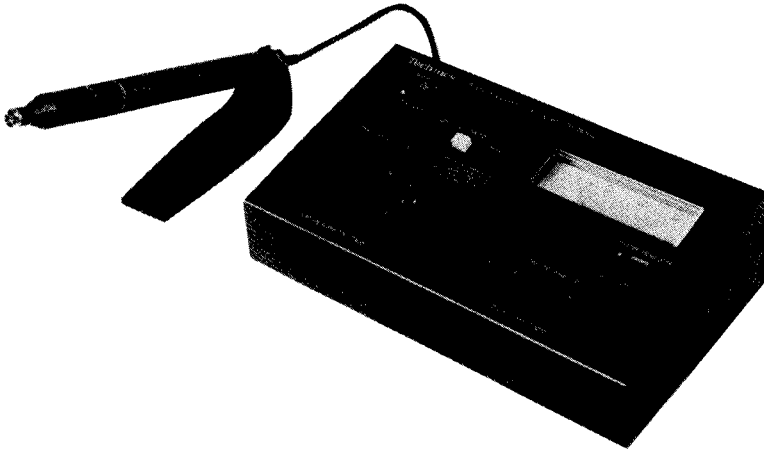


# Service Manual

Audio Frequency Analyzer

SH-8000 (K)

[XA]



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

## Specifications

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

### Overall frequency response

Frequency response: 20 Hz~20 kHz  $\pm 2$  dB

### Main unit

#### ■ Oscillation section

Oscillation signal: Warble tone  
(modulation frequency: 8 Hz)

#### Oscillation frequencies:

20, 25, 31.5, 40, 50, 63, 80, 100, 125,  
160, 200, 250, 315, 400, 500, 630, 800,  
1k, 1.25k, 1.6k, 2k, 2.5k, 3.15k, 4k,  
5k, 6.3k, 8k, 10k, 12.5k, 16k, 20k (Hz)  
(Measurement points: 31)

Frequency precision:  $\pm 6\%$  or less

Rated output/output impedance: 70 mV/1 k $\Omega$

#### ■ Meter section

##### Sound-pressure measurement range:

35 dB~105 dB SPL (0 dB =  $2 \times 10^{-4}$   $\mu$ bar)  
(50~90 dB: 10 dB steps, switchable in 5 ranges)

##### Meter response time:

<b>FAST:</b>	(attack time)	350 msec.
	(recovery time)	400 msec.
<b>SLOW:</b>	(attack time)	550 msec.
	(recovery time)	2 sec.

#### ■ General

Power source: DC 9V  
(National 006P (6F22) or equivalent)

Battery life: 10 hours (continuous operation,  
using National "006P" battery)

Dimensions (W×H×D): 215 × 62 × 122 mm  
(8-15/32" × 2-7/16" × 4-13/16")

Weight: 1.0 kg (2.2 lb.)

### Microphone

Type: Back-electret-condenser type

Directional characteristic: Non-directional

Sensitivity (front): -72 dBV/ $\mu$ bar (1 kHz)

Frequency response: 20 Hz~20 kHz

Maximum input sound pressure: 110 dB SPL  
(0 dB =  $2 \times 10^{-4}$   $\mu$ bar)

Output impedance: 600 $\Omega$  unbalanced

Power source: DC 1.5V  
(National SUM-3 (AA size) or equivalent)

Battery life: 1500 hours (continuous operation,  
using National "SUM-3" battery)

Cord length: 4 m (13 ft.)

## ■ CONTENTS

	Page		Page
FEATURES . . . . .	2	BLOCK DIAGRAM . . . . .	7, 8
LOCATION OF CONTROLS . . . . .	3	SCHEMATIC DIAGRAM . . . . .	9 ~ 11
ADJUSTMENTS . . . . .	4	RESISTORS & CAPACITORS . . . . .	9
DISASSEMBLY INSTRUCTIONS . . . . .	4	EXPLODED VIEW & REPLACEMENT PARTS LIST . . . . .	12, 13
PRINTED CIRCUIT BOARD WIRING VIEW . . . . .	5, 6	PACKINGS . . . . .	14

# Technics

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

## FEATURES

### (1) Outline of this unit

This unit consists of a warble tone oscillator, sound level meter, and non-directional high efficiency microphone, and is used to measure the general frequency characteristic (sound field frequency characteristic) of audio system including the listening room.

#### ● Warble tone

It is a measuring signal of which the frequency has been modulated (modulation frequency: 8Hz). For example, 1kHz warble tone is a signal that varies in a range of  $1\text{kHz} \pm 5\%$  (950Hz ~ 1050Hz), generating no standing wave, and it can be measured in a stage of signal closer to music signal.

### ■ Precautions for use

#### ● Battery check of microphone

- (1) Set the power switch of this unit to "on" and depress the meter sensitivity switch "90dB".
- (2) Make sure that the meter reading is more than "0dB" when a normal sound is made to the microphone being held close to your mouth. (Check the main body by the battery check switch.)

#### ● How to use this unit

- (1) Make the setting as shown on the right. (Measure it on each of the channels.)
- (2) Select the meter sensitivity switch position so that the meter reading is  $-10\text{dB}$  to  $-15\text{dB}$  when no sound is made.
- (3) Let it oscillate 1kHz.
- (4) Slowly increase the sound volume and set the meter reading to "0dB".
- (5) Write down each frequency level in the attached recording sheet, and obtain the average frequency value between the maximum and minimum sound pressure levels.
- (6) Let it oscillate a frequency at the average sound pressure level and adjust the amplifier volume so that the meter reading is "0dB".
- (7) Let it oscillate a frequency for the correction of your graphic equalizer, and correct the frequency level so that the meter reading is "0dB".

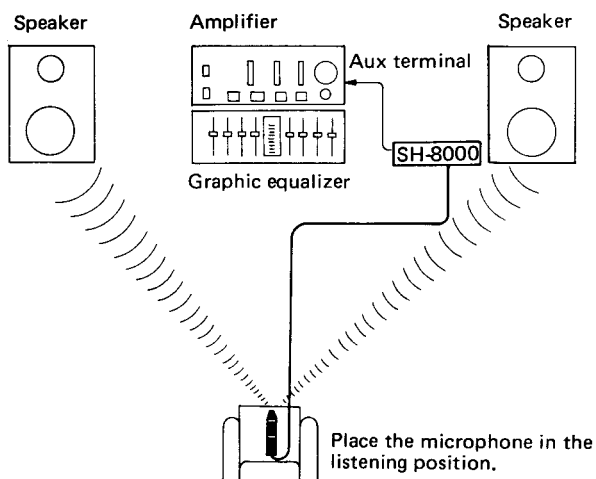
#### ● Precautions for use of speaker protector switch.

Set the frequency range switch to "x100" and the frequency to "80". Then 8kHz warble tone is produced.

When the frequency is at "100 ~ 200", the intended frequency is not oscillated. (It is below 10kHz.) In this case, press the "protector" button, then "10kHz ~ 20kHz" frequency is oscillated. But it is hard to hear the sound when the frequency is high, and if the amplifier volume or equalizer level is increased by mistake, it may cause breakdown of the tweeter.

#### ● Microphone

- (1) The microphone of this unit is designed for measurement. Do not use it for vocal purpose. Also it cannot be replaced by other microphone. If it is used for vocal purpose, shock noise will be produced when the microphone switch is turned off. (Note: A vocal microphone is directional, and often used are those with great allowable input and high frequency decreased.)
- (2) This unit has been adjusted together with the attached microphone. If a microphone of a different rank is used, it must be re-adjusted. When replacing the microphone, re-adjust it according to "Adjustment procedure".



## Audio Frequency Analyzer

## SH-8000 (K)

- This booklet contains the specifications and adjusting procedures for SH-8000 (K), written in German, French and Spanish.
- File this manual together with the SH-8000 (K) service manual (Order No. SD82092307C3).

## DEUTSCH

## TECHNISCHE DATEN

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

## Gesamt-Frequenzbereich

Frequenzbereich: 20 Hz~20 kHz  $\pm 2$  dB

## Gerät

## ■ Oszillatorteil

Schwingungssignal: Wobbelton  
(Modulationsfrequenz: 8 Hz)

## Schwingungsfrequenzen:

20 - 25 - 31,5 - 40 - 50 - 63 - 80 - 100 - 125,  
160 - 200 - 250 - 315 - 400 - 500 - 630 - 800,  
1k - 1,25k - 1,6k - 2k - 2,5k - 3,15k - 4k,  
5k - 6,3k - 8k - 10k - 12,5k - 16k - 20k (Hz)  
(Meßfrequenzen 31)Frequenzgenauigkeit: weniger als  $\pm 6\%$ Ausgangsnennspannung/Ausgangsimpedanz: 70 mV/1 k $\Omega$ 

## ■ Anzeigeteil

Schalldruck-Meßbereich: 35 dB~105 dB  
Schalldruckpegel (0 dB =  $2 \times 10^{-4}$   $\mu$ bar)  
(50~90 dB: 10 dB-Schritte, 5 Bereiche einstellbar)

## Ansprechverhalten:

FAST: 350 msec. (Ansprechzeit)  
400 msec. (Abfallzeit)  
SLOW: 550 msec. (Ansprechzeit)  
2 sec. (Abfallzeit)

## ■ Allgemeines

Stromversorgung: Gleichstrom 9V  
(National 006P-Batterien (6F22) oder gleichwertig)Betriebsdauer mit Batterien: 10 Std.  
(ununterbrochener Betrieb mit  
006P-Batterien von National)Abmessungen (B×H×T): 215 × 62 × 122 mm  
Gewicht: 1,0 kg

## Mikrofon

Bauart: Rück-Elektret-Kondensatormikrofon

Aufnahmecharakteristik: richtungsunabhängig

Empfindlichkeit (vorne): -72 dBV/ $\mu$ bar (1 kHz)

Frequenzbereich: 20 Hz~20 kHz

Max. Schalldruck: 110 dB Schalldruckpegel  
(0 dB =  $2 \times 10^{-4}$   $\mu$ bar)Ausgangsimpedanz: 600 $\Omega$  unsymmetrischStromversorgung: Gleichstrom 1,5V  
(SUM-3-Batterie (Größe AA) von National  
oder gleichwertig)Betriebsdauer: 1500 Std.  
(ununterbrochener Betrieb mit  
SUM-3-Batterie von National)

Kabellänge: 4 m

## MESSUNGEN UND JUSTIERUNGEN

## ■ Vorgehen für die Justierung

Anmerkung: VR201 und VR252 von der Rückseite der Leiterplatte her justieren. Das Meßinstrument zum Ablesen waagrecht halten.

## (1) Justierung der Konstanzspannung

- 1) Eine neue Batterie verwenden (9V).
- 2) **VR301** so justieren, daß die Spannung am Anschluß 9 von IC151, 152, 101, 201 oder 251 +2,4V beträgt.  
(Die Minusseite an das Chassis erden.)

## (2) Justierung der Meßgerätempfindlichkeit

- 1) Den Meßgerät-Empfindlichkeitsschalter auf "90dB" einstellen.
- 2) 100kHz, 1,58mV Sinuswelle an den Mikrofonanschluß anlegen.  
(Anmerkung: Der Mikrofonanschluß ist an das Chassis kurzgeschlossen, wenn er frei ist.)
- 3) **VR252** so justieren, daß die Anzeige des Pegelmeters "0dB" beträgt.

## (3) Justierung des Mikrofon-Frequenzverlaufs

- 1) Den Rang des Mikrofons überprüfen. (Abb. 1)
- 2) **VR201** entsprechend dem Rang wie nachstehend gezeigt justieren.

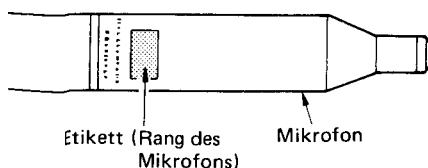


Abb. 1

Rang des Mikrofons	A	B	C	D, E, F
Position von VR201				
	Bis zum Anschlag im Gegenuhrzeigersinn drehen.	Position "B" auf der Rückseite.	Position "C" auf der Rückseite.	Bis zum Anschlag im Uhrzeigersinn drehen.

## FRANÇAIS

## CARACTERISTIQUES (Sujet à changement sans preavis.)

### Réponse de fréquence totale

Réponse de fréquence: 20 Hz~20 kHz  $\pm 2$  dB

### Unité principale

#### ■ Section des oscillations

Signal d'oscillation: sonorités de gazouillement  
(fréquence de modulation: 8 Hz)

#### Fréquences d'oscillation:

20, 25, 31.5, 40, 50, 63, 80, 100, 125,  
160, 200, 250, 315, 400, 500, 630, 800,  
1k, 1.25k, 1.6k, 2k, 2.5k, 3.15k, 4k,  
5k, 6.3k, 8k, 10k, 12.5k, 16k, 20k (Hz)  
(Points de mesure: 31)

Précision de fréquence:  $\pm 6\%$  ou moins

Sortie nominale/impédance de sortie: 70 mV/1 k $\Omega$

#### ■ Section du compteur

##### Portée de mesure de la pression sonore:

35 dB~105 dB SPL (0 dB =  $2 \times 10^{-4}$   $\mu$ bar)  
(50~90 dB: paliers de 10 dB,  
commutables en 5 portées)

##### Temps de réponse du compteur:

**RAPIDE:** (temps d'attaque) 350 msec.  
(durée de rétablissement) 400 msec.  
**LENT:** (temps d'attaque) 550 msec.  
(durée de rétablissement) 2 sec.

#### ■ Généralités

Alimentation: CC 9V

(National 006P (6F22) ou équivalent)

Durée de vie de la pile: 10 heures

(fonctionnement continu en utilisant  
une pile "006P" National)

Dimensions (L×H×P): 215 × 62 × 122 mm

Poids: 1,0 kg

### Microphone

Type: Type à condensateur électret arrière

Caractéristique directionnelle: Non directionnelle

Sensibilité (avant): -72 dBV/ $\mu$ bar (1 kHz)

Réponse de fréquence: 20 Hz~20 kHz

Pression sonore d'entrée maximum: 110 dB SPL  
(0 dB =  $2 \times 10^{-4}$   $\mu$ bar)

Impédance de sortie: 600 $\Omega$  non équilibré

Alimentation: CC 1,5V

(SUM-3 National (taille AA) ou équivalent)

Durée de vie de la pile: 1500 heures

(fonctionnement continu en utilisant  
une pile "SUM-3" National)

Longueur du cordon: 4 m

## MESURAGES ET RÉGLAGES

### ■ Procédure de mise au point

Nota: Ajuster VR201 et VR252 à partir de l'arrière de la plaquette à circuits imprimés. Lire le mesureur en le tenant horizontalement.

#### (1) Ajustement de la tension constante

- 1) Utiliser une nouvelle batterie (9V).
- 2) Ajuster **VR301** de telle sorte que la tension à la borne 9 de IC151, 152, 101, 201 ou 251 soit de +2,4V.  
(Relier au châssis le côté négatif.)

#### (2) Ajustement de la sensibilité du mesureur

- 1) Régler le commutateur de sensibilité du mesureur sur "90dB".
- 2) Appliquer une onde sinusoïdale de 1,58mV, 100Hz, à la borne du microphone.  
(Nota: La borne du microphone est court-circuitée au châssis lorsqu'elle est libre.)
- 3) Ajuster **VR252** de telle sorte que la lecture du mesureur de niveau soit de "0dB".

#### (3) Ajustement caractéristique de la fréquence du microphone

- 1) Vérifier la gamme de mesure du microphone. (Fig. 1)
- 2) Ajuster **VR201** selon la rangée montrée ci-dessous.

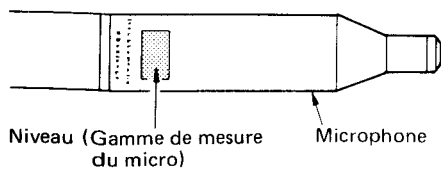


Fig. 1

Gamme de mesure microphone	A	B	C	D, E, F
Position VR201				
	Le tourner complètement dans le sens inverse des aiguilles d'une montre.	Position de "B" sur l'arrière.	Position de "C" sur l'arrière.	Le tourner complètement dans le sens des aiguilles d'une montre.

# ESPAÑOL

## ■ ESPECIFICACIONES (Estas especificaciones están sujetas a cualquier cambio sin previo aviso.)

<b>Respuesta de frecuencia total</b>		<b>■ Generalidades</b>	
<b>Respuesta de frecuencia:</b>	20 Hz~20 kHz ±2 dB	<b>Fuente de alimentación:</b>	CC 9V (National 006P (6F22) o equivalente)
<b>Unidad principal</b>		<b>Duración de las pilas:</b>	10 horas (funcionamiento continuo, con pilas National "006P")
<b>■ Sección de oscilación</b>		<b>Dimensiones (An.×Al.×Prof.):</b>	215 × 62 × 122 mm (8-15/32" × 2-7/16" × 4-13/16")
<b>Señal de oscilación:</b>	Tono ululante (frecuencia de modulación: 8 Hz)	<b>Peso:</b>	1,0 kg (2,2 lbs.)
<b>Frecuencias de oscilación:</b>	20, 25, 31,5, 40, 50, 63, 80, 100, 125, 160, 200, 250, 315, 400, 500, 630, 800, 1k, 1,25k, 1,6k, 2k, 2,5k, 3,15k, 4k, 5k, 6,3k, 8k, 10k, 12,5k, 16k, 20k (Hz) (Puntos de medición: 31)	<b>Micrófono</b>	
<b>Precisión de frecuencia:</b>	±6% o menos	<b>Tipo:</b>	Tipo condensador de electroto invertido
<b>Salida nominal/impedancia de salida:</b>	70 mV/1 kΩ	<b>Característica direccional:</b>	No direccional
<b>■ Sección del medidor</b>		<b>Sensibilidad (delantera):</b>	-72 dBV/μbara (1 kHz)
<b>Margen de medición de presión acústica:</b>	35 dB~105 dB SPL (0 dB = 2×10 <sup>-4</sup> μbaras) (50~90 dB: pasos de 10 dB, conmutable en 5 gamas)	<b>Respuesta de frecuencia:</b>	20 Hz~20 kHz
<b>Tiempo de respuesta del medidor:</b>		<b>Presión de sonido entrada máxima:</b>	110 dB SPL (0 dB = 2×10 <sup>-4</sup> μbaras)
<b>RAPIDO: (tiempo de ataque)</b>	350 mseg.	<b>Impedancia de salida:</b>	600Ω desequilibrada
<b>(tiempo de recuperación)</b>	400 mseg.	<b>Fuente de alimentación:</b>	CC 1,5V (una pila National SUM-3 (AA) o equivalente)
<b>TENTO: (tiempo de ataque)</b>	550 mseg.	<b>Duración de las pilas:</b>	1.500 horas (funcionamiento continuo, con pilas de National "SUM-3")
<b>(tiempo de recuperación)</b>	2 seg.	<b>Longitud del cable:</b>	4 m

## ■ MEDICIONES Y AJUSTES

### ■ Procedimiento de ajuste

Nota: Ajustar VR201 y VR252 desde de detrás del tablero de circuito impreso. Leer el medidor que lo sujeta horizontalmente.

- (1) **Ajuste de voltaje constante**
  - 1) Usar una pila nueva (9V).
  - 2) Ajustar **VR301** de manera que el voltaje en el terminal 9 de CI151, 152, 101, 201 ó 251 sea +2,4V.  
(Poner a tierra el lado menos al chasis.)
- (2) **Ajuste de sensibilidad de medidor**
  - 1) Poner el interruptor de sensibilidad de medidor en "90dB".
  - 2) Aplicar onda sinusoidal de 1,58mV, 100Hz al terminal de micrófono.  
(Nota: Terminal de Mic. está cortocircuitado al chasis cuando está libre.)
  - 3) Ajustar **VR252** de manera que la lectura del medidor de nivel sea "0dB".
- (3) **Ajuste de característica de frecuencia de micrófono**
  - 1) Comprobar el rango de micrófono. (Fig. 1)
  - 2) Ajustar **VR201** de acuerdo con el rango como mostrado abajo.

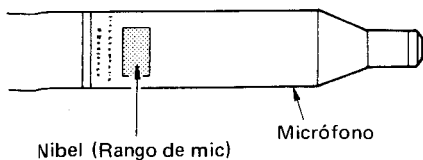


Fig. 1

Rango de mic.	A	B	C	D, E, F
Posición de VR201				
	Girarlo completamente a la izquierda.	Posición "B" detrás.	Posición "C" detrás.	Girarlo completamente a la derecha.

## ADJUSTMENTS

### Adjustment procedure

Note: Adjust VR201 and VR252 from the back of printed circuit board. Read the meter holding it horizontally.

#### 1. Voltage adjustment

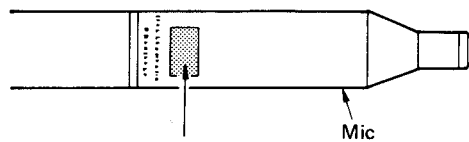
- (1) Use a new battery (9V).
- (2) Adjust **VR301** so that the voltage at terminal 9 of IC151, 152, 101, 201, or 251 is +2.4V.  
(Ground the minus side to chassis.)

#### 2. Meter sensitivity adjustment

- (1) Set the meter sensitivity switch to "90dB".
- (2) Apply 100Hz, 1.58mV sine wave to the microphone terminal.  
(Note: Mic terminal is short-circuited to chassis when it is free.)
- (3) Adjust **VR252** so that the level meter reading is "0dB".

#### 3. Microphone frequency characteristic adjustment

- (1) Check the rank of microphone. (Fig. 1)
- (2) Adjust **VR201** according to the rank as shown below.



Label (Rank of mic)

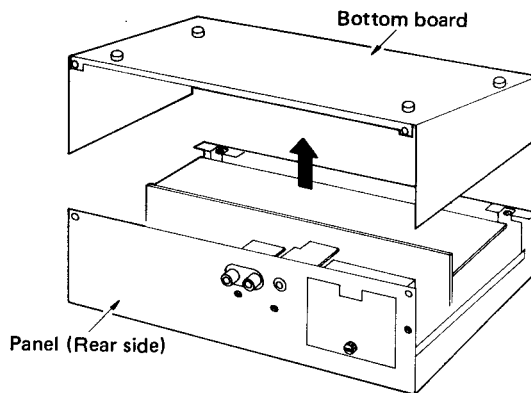
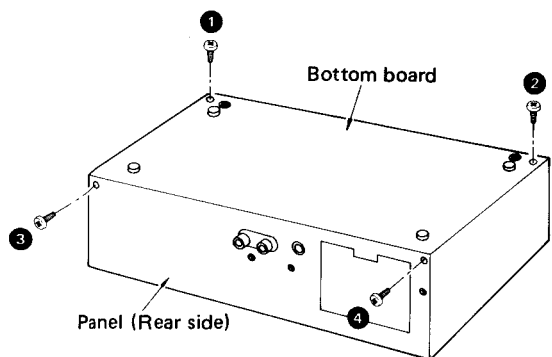
Mic

Fig. 1

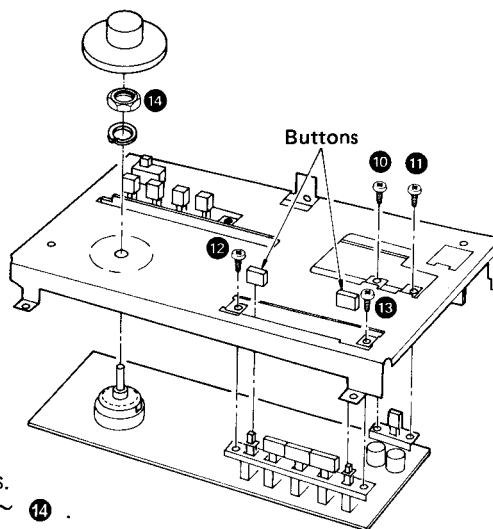
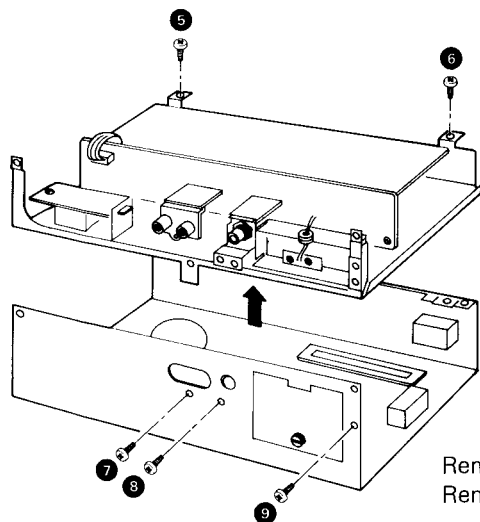
Rank of mic	A	B	C	D, E, F
Position of VR201				
	Completely turn it counterclockwise	Position "B" on the back	Position "C" on the back	Completely turn it clockwise

## DISASSEMBLY INSTRUCTIONS

### How to remove the bottom board

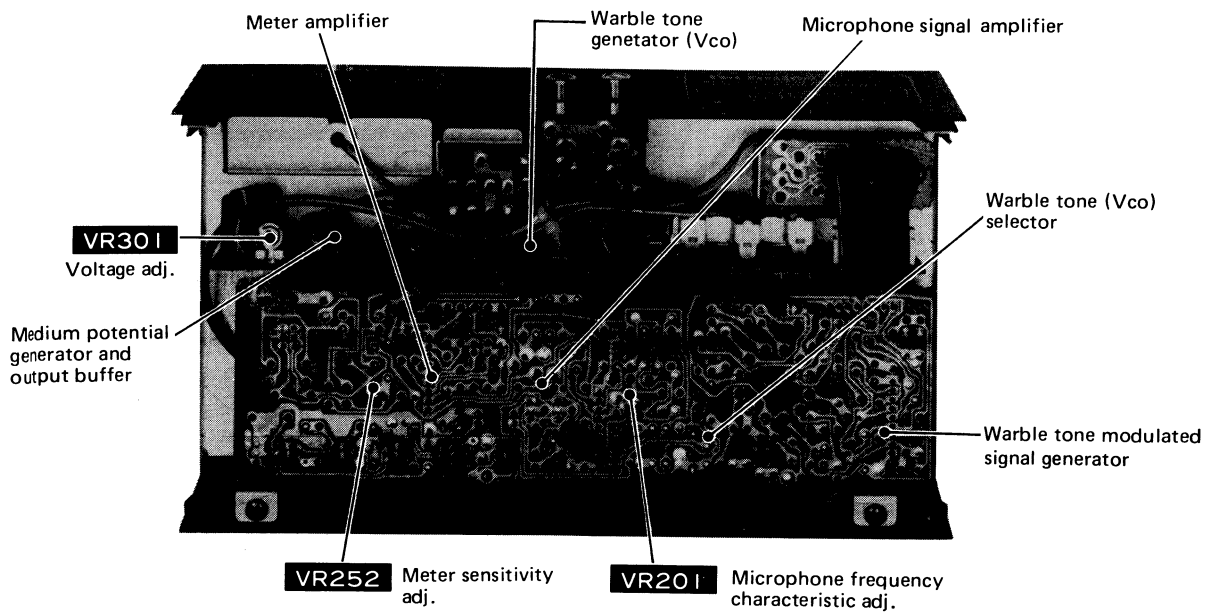
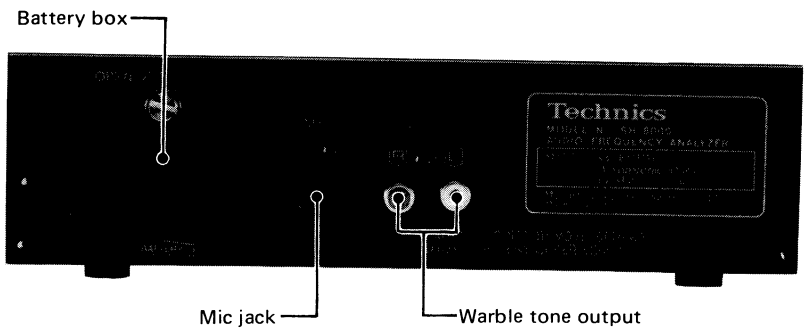
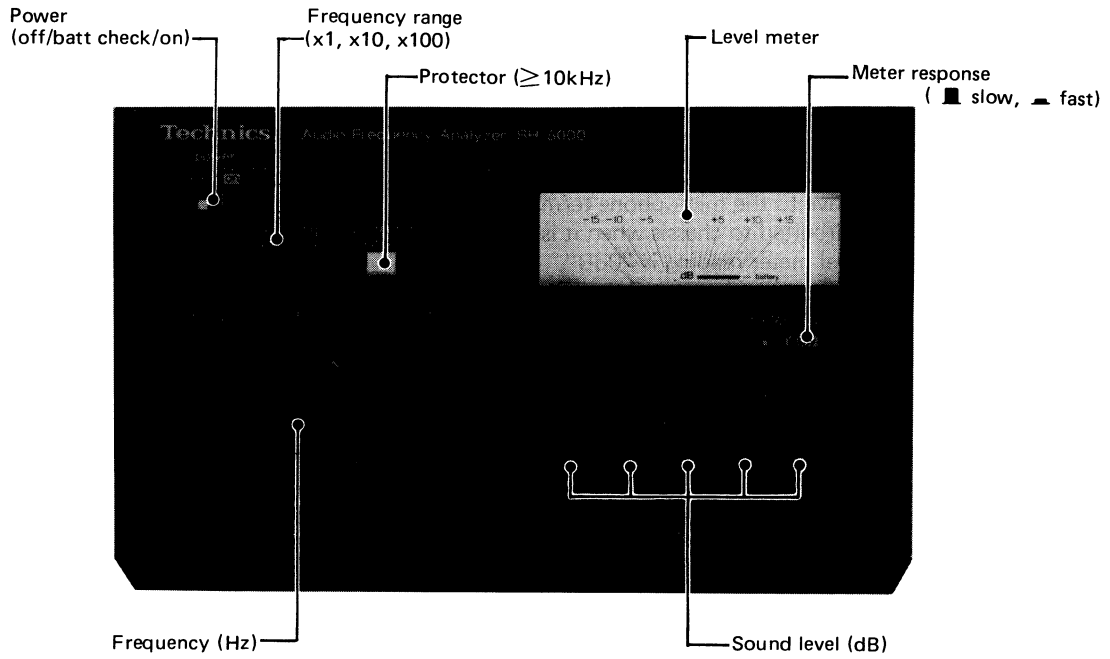


### How to remove the P.C.B.



Remove 50dB ~ 90dB buttons.  
Remove screws and nuts 10 ~ 14.

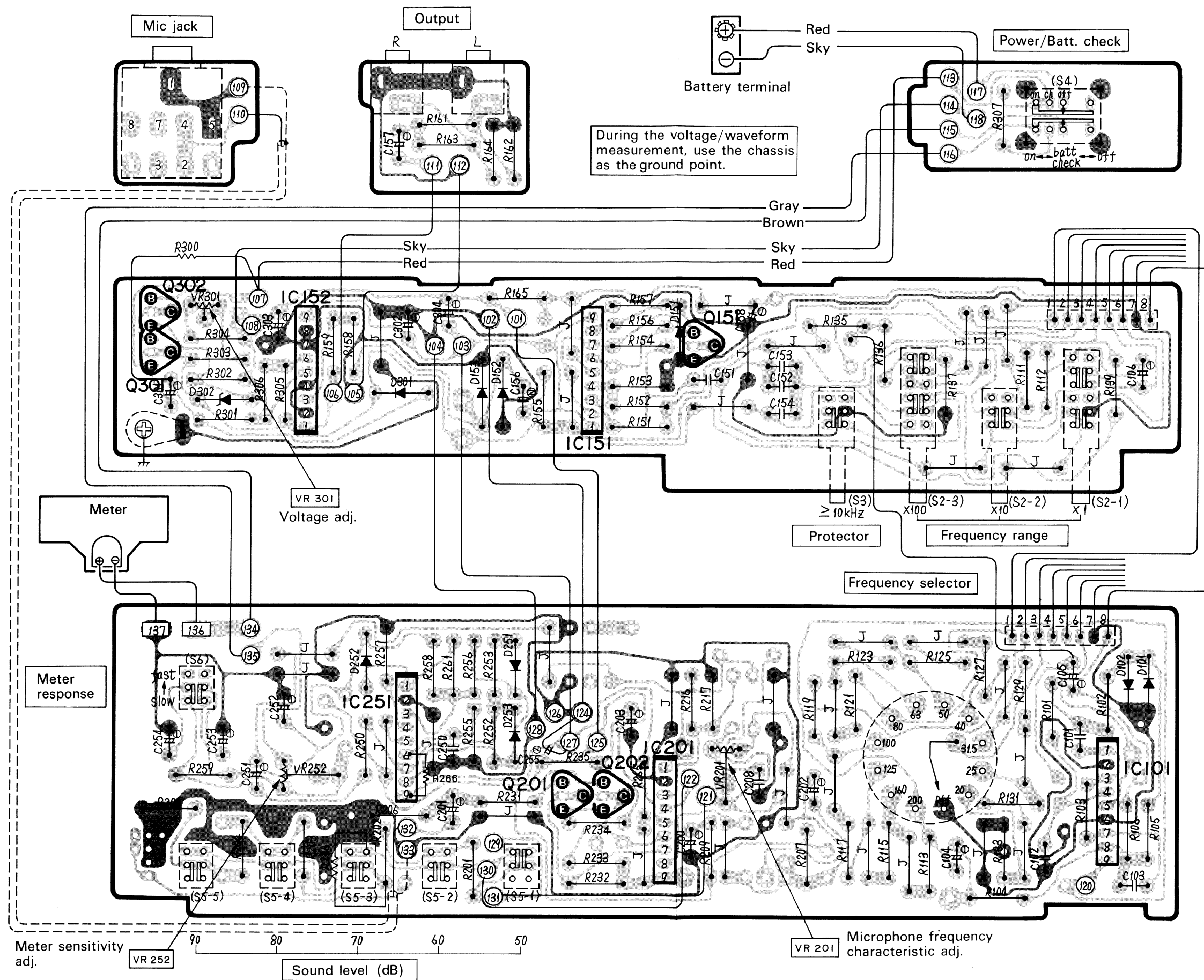
**LOCATION OF CONTROLS**



# SH-8000 SH-8000

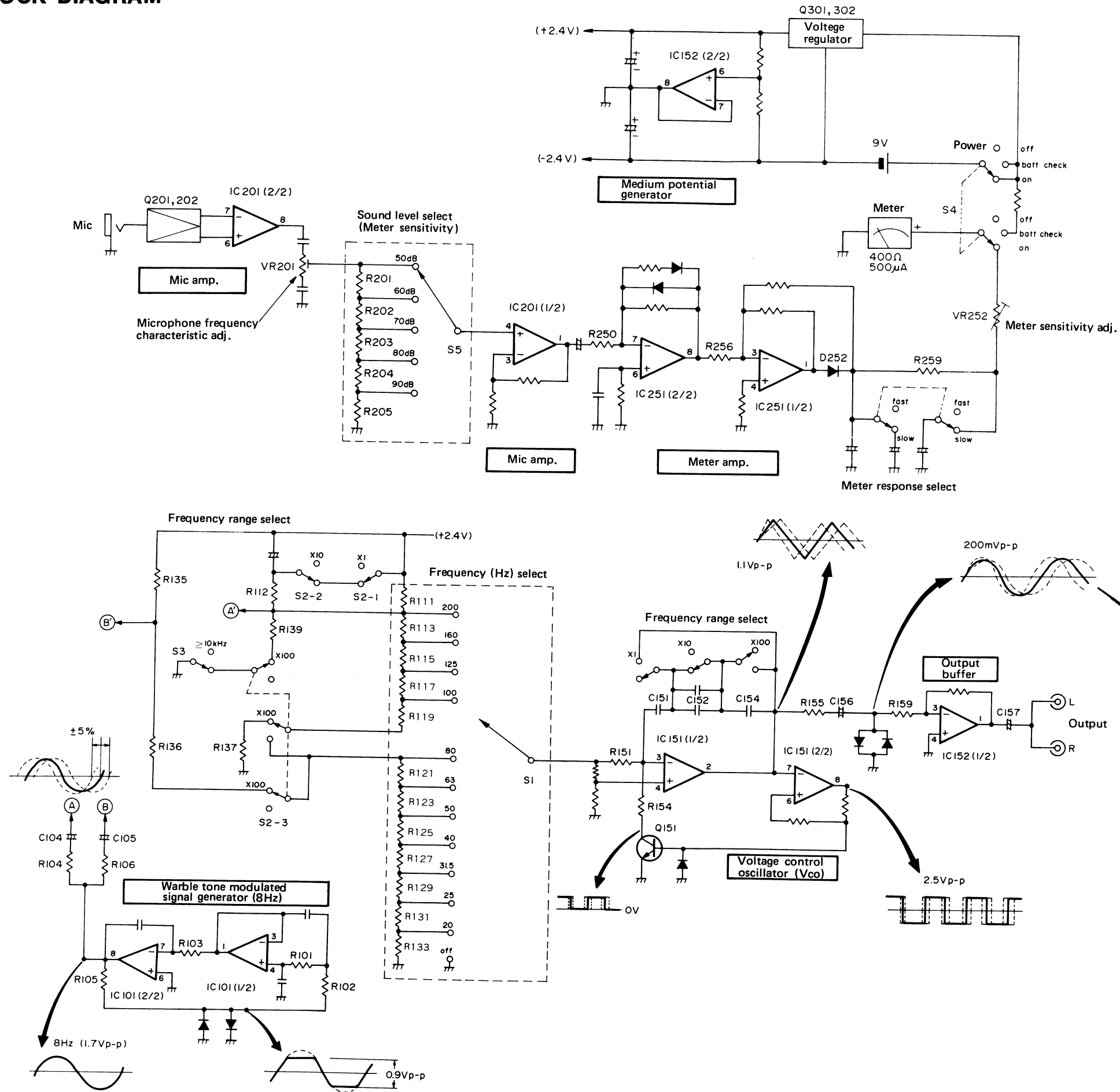
## PRINTED CIRCUIT BOARD WIRING VIEW

Ground (Earth) Lines

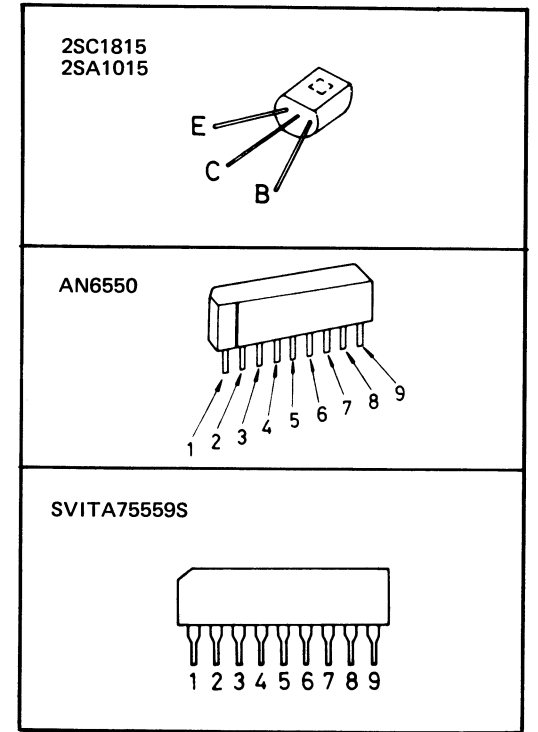




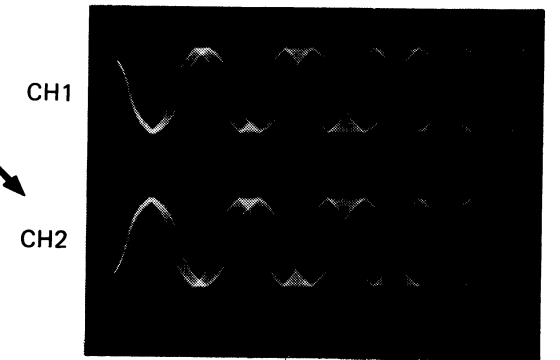
## BLOCK DIAGRAM



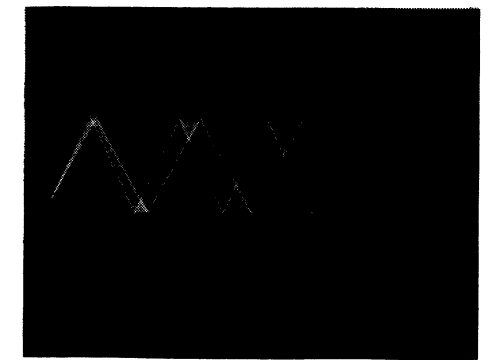
### Terminal guide of transistors, IC's and diodes



CH1 : Output waveform of No. ① pin (IC152)  
 CH2 : Input waveform of IC152



Output waveform of No. ② pin (IC151)



# SCHEMATIC DIAGRAM

(This schematic diagram may be modified at any time with the development of new technology.)

## Notes:

- S1:** Frequency (Hz) switch in "off" position.  
(off ↔ 20 ↔ 25 ↔ 31.5 ↔ 40 ↔ 50 ↔ 63 ↔ 80 ↔ 100 ↔ 125 ↔ 160 ↔ 200)
- S2-1 ~ S2-3:** Frequency range switch in "x100" position.  
S2-1: X1 S2-2: X10 S2-3: X100
- S3:** Protector switch in "off" position. (off ↔ ≥ 10kHz)
- S4:** Power source switch in "on" position. (off ↔ batt. check ↔ on)
- S5:** Sound level meter switch in "50dB" position. (50 ↔ 60 ↔ 70 ↔ 80 ↔ 90)
- S6:** Meter response switch in "slow" position. (slow ↔ fast)
- Indicates value are the reference voltage of this unit measured by DC electronic volt-meter on the basis of the chassis with supply voltage of 9V and oscillation at 1kHz. Some difference may be generated due to the internal impedance of the measuring instrument and setting.
- Positive (+B) voltage lines
- Warble tone oscillator signal lines
- Mic signal lines
- Modulated wave lines

# RESISTORS & CAPACITORS

## Notes:

- Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
- The "S" mark is service standard parts and may differ from production parts.
- Unless otherwise specified.  
All resistors are in OHMS (Ω) K = 1000Ω, M = 1000kΩ  
All capacitors are in MICROFARADS (μF) P = μμF

## Numbering System of Resistor

Example  
ERD 25 F J 101

Type	Wattage	Shape	Tolerance	Value
Resistor Type	Wattage	Shape	Tolerance	Value
ERD : Carbon	25 : 1/4W	F	J : ±1%	101
ERO : Metal Film			G : ±2%	
			J : ±5%	

## Numbering System of Capacitor

Example  
ECKD 1H 103 Z F

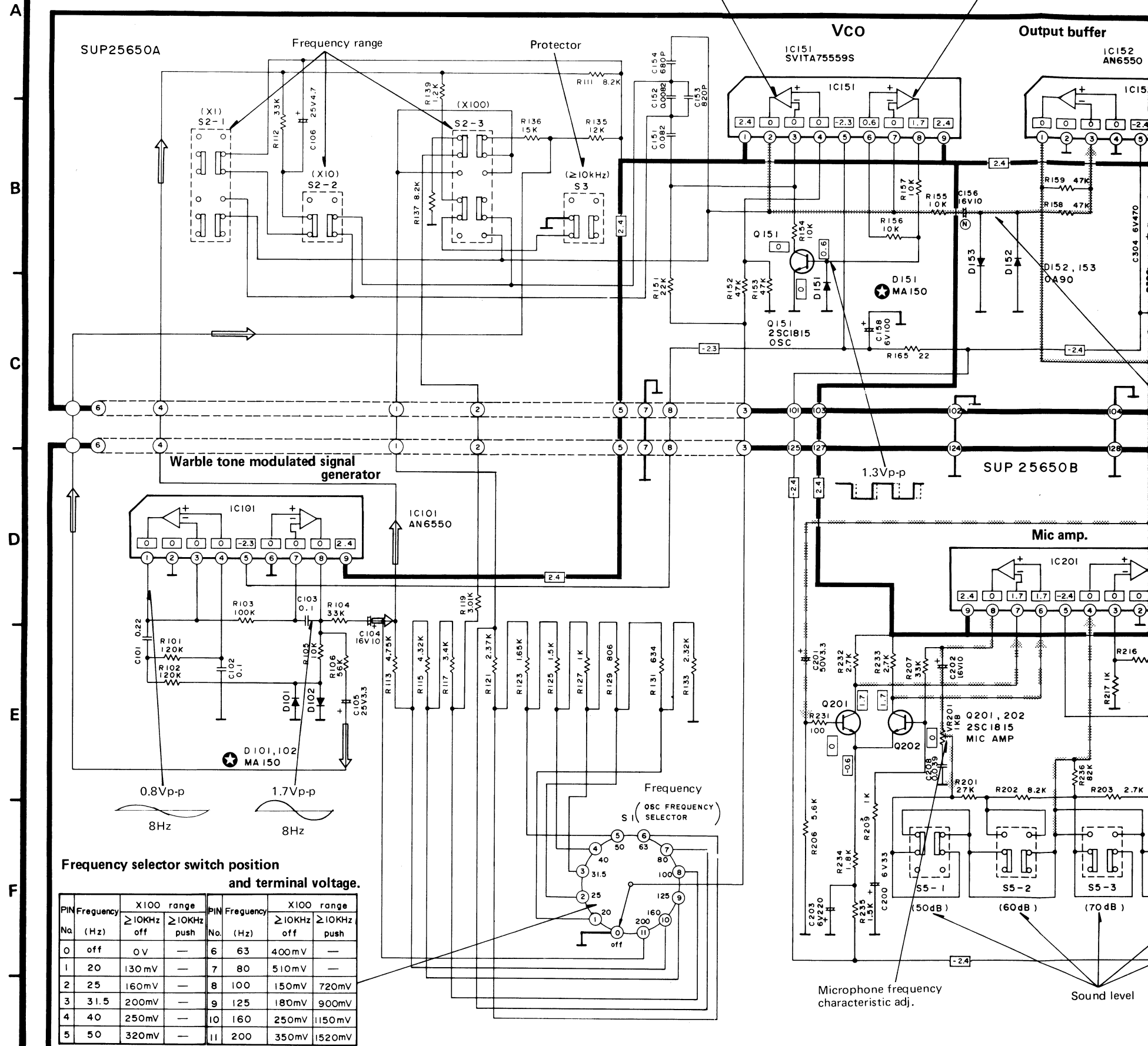
Type	Voltage	Value	Tolerance	Peculiarity	ECEA Type	50 Voltage	M Peculiarity use	R47 Value	R Special use
Capacitor Type	Voltage	Value	Tolerance	Peculiarity	ECEA Type	50 Voltage	M Peculiarity use	R47 Value	R Special use
ECEA : Electrolytic	1A : 10V	1H : 50V DC	J : ±5%						
ECEA ...N : Non Polar Electrolytic	1C : 16V	1 : 100V DC	K : ±10%						
ECKD : Ceramic	1E : 25V (ECQP)		G : ±2%						
ECQM : Polyester	1H : 50V	1 : 125V DC							
ECQP : Polypropylene	50 : 50V (ECQS)								
ECQS : Polystyrene	25 : 25V								

Ref. No.	Part No.	Value
<b>RESISTORS</b>		
R101, 102	S ERD25TJ124	120K
R103	S ERD25TJ104	100K
R104	S ERD25TJ333	33K
R105	S ERD25FJ103	10K
R106	S ERD25TJ563	56K
R111	S ERO25CKF8201	8.2K
R112	S ERO25CKF3302	33K
R113	S ERO25CKF4751	4.75K
R115	S ERO25CKF4321	4.32K
R117	S ERO25CKF3401	3.4K
R119	S ERO25CKF3011	3.01K
R121	S ERO25CKF2371	2.37K
R123	S ERO25CKF1651	1.65K
R125	S ERO25CKF1501	1.5K
R127	S ERO25CKF1001	1K
R129	S ERO25CKF8060	806
R131	S ERO25CKF6340	634
R133	S ERO25CKF2321	2.32K
R135	S ERO25CKF1202	12K
R136	S ERO25CKF1502	15K
R137	S ERO25CKF8201	8.2K
R139	S ERD25FJ122	1.2K
R151	S ERD25TJ223	22K
R152, 153	S ERD25TJ473	47K
R154, 155	S ERD25FJ103	10K
R156, 157	S ERD25FJ103	10K
R158, 159	S ERD25TJ473	47K
R161	S ERD25FJ102	1K
R162	S ERD25TJ104	100K
R163	S ERD25FJ102	1K
R164	S ERD25TJ104	100K
R165	S ERD25FJ220	22

Ref. No.	Part No.	Value
R201	S ERD25TJ273	27K
R202	S ERD25TJ822	8.2K
R203	S ERD25FJ272	2.7K
R204	S ERD25FJ821	820
R205	S ERD25FJ391	390
R206	S ERD25FJ562	5.6K
R207	S ERD25TJ333	33K
R209	S ERD25FJ102	1K
R216	S ERD25TJ183	18K
R217	S ERD25FJ102	1K
R231	S ERD25FJ101	100
R232, 233	S ERD25FJ272	2.7K
R234	S ERD25FJ182	1.8K
R235	S ERD25FJ152	1.5K
R236	S ERD25TJ823	82K
R250	S ERD25FJ182	1.8K
R252	S ERD25TJ683	68K
R253	S ERD25TJ223	22K
R255	S ERD25TJ183	18K
R256, 257	S ERD25FJ103	10K
R258	S ERD25FJ682	6.8K
R259	S ERD25FJ391	390
R261	S ERD25TJ104	100K
R265	S ERD25FJ220	22
R266	S ERD25TJ824	820K
R300	S ERD25TJ104	100K
R301	S ERD25FJ562	5.6K
R302	S ERD25FJ332	33K
R303, 304	S ERD25FJ822	8.2K
R305, 306	S ERD25FJ103	100K
R307	S ERD25TJ153	15K

Ref. No.	Part No.	Value
<b>CAPACITORS</b>		
C101	S ECQM1H224JZ	0.22
C102, 103	S ECQM1H104JZ	0.1
C104	S ECEA1HS100	10
C105	S ECEA50Z3R3	3.3
C106	S ECEA25Z4R7	4.7
C151	S ECQP1823GZ	0.082
C152	S ECQP1822GZ	0.0082
C153	S ECKD1H821KB	820P
C154	S ECQS1681GZ	680P
C156	S ECEA1CN100S	10
C157	S ECEA1HS100	10
C158	S ECEA1AS101	100
C200	S ECEZ1CS330	33
C201	S ECEA50M3R3R	3.3
C202	S ECEA1HS100	10
C203	S ECEA1AS221	220
C208	S ECQM1H393JZ	0.039
C250	S ECQM1H103JZ	0.01
C251	S ECEA1ES470	47
C252	S ECEA1AS101	100
C253, 254	S ECEA0JS471	470
C255	S ECEA1AS101	100
C301	S ECEA1CS331	330
C302, 303	S ECEA1AS470	47
C304	S ECEA0JS471	470

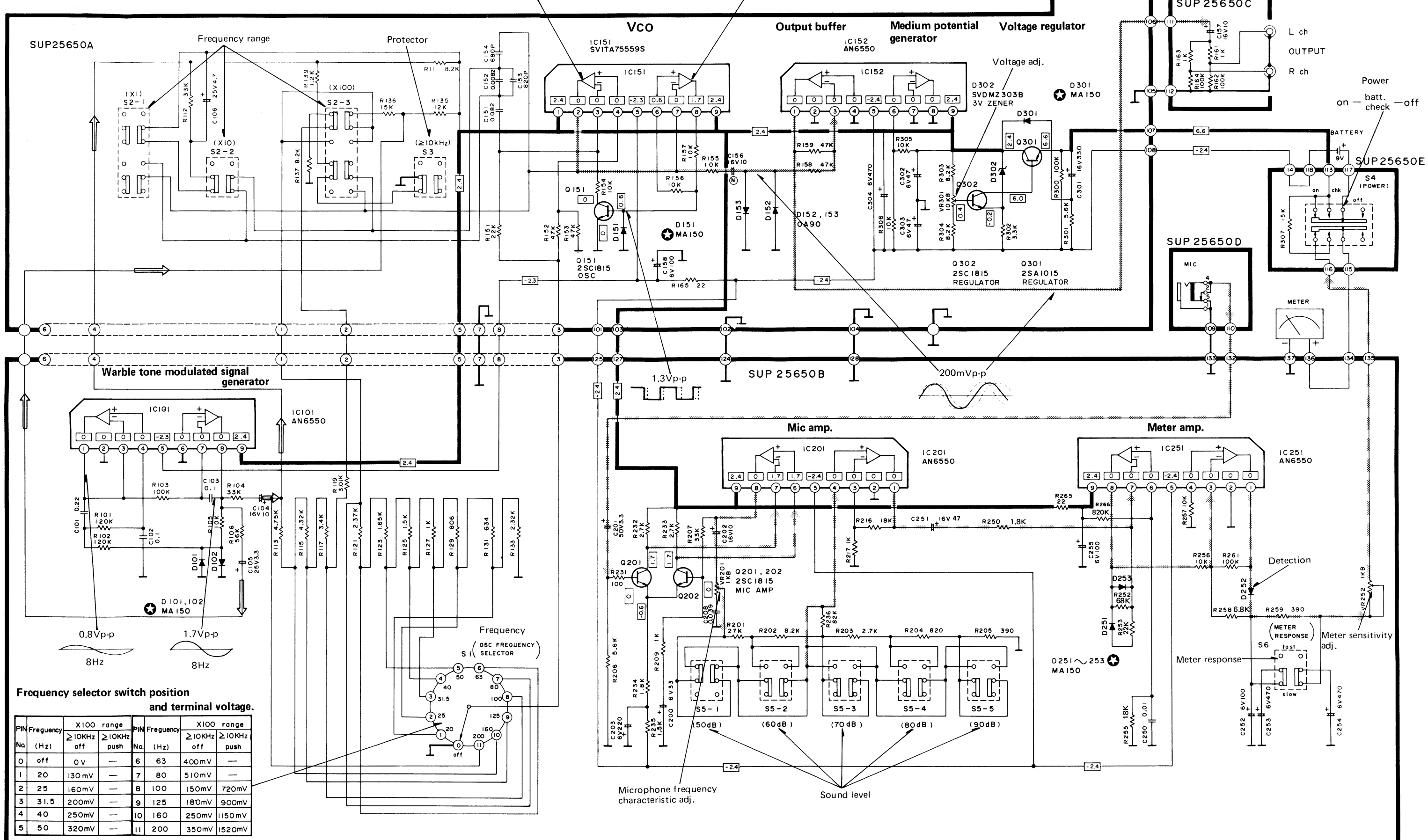
\* The part No. of transistors, IC and diodes mentioned in the schematic diagram stand for production part No. Regarding the part No. with ⊙ mark, the production part No. are different from the replacement part No. Therefore, when placing an order for replacement parts, please use the part No. in the replacement parts list.



Frequency selector switch position and terminal voltage.

Pin No.	Frequency (Hz)	X100 range	Pin No.	Frequency (Hz)	X100 range
0	off	0V	6	63	400mV
1	20	130mV	7	80	510mV
2	25	160mV	8	100	150mV
3	31.5	200mV	9	125	180mV
4	40	250mV	10	160	250mV
5	50	320mV	11	200	350mV

\* The part No. of transistors, IC and diodes mentioned in the schematic diagram stand for production part No. Regarding the part No. with  $\odot$  mark, the production part No. are different from the replacement part No. Therefore, when placing an order for replacement parts, please use the part No. in the replacement parts list.



Frequency selector switch position and terminal voltage.

PIN No.	Frequency (Hz)	X100 range		PIN No.	Frequency (Hz)	X100 range	
		$\geq 10\text{kHz}$ off	$\geq 10\text{kHz}$ push			$\geq 10\text{kHz}$ off	$\geq 10\text{kHz}$ push
0	off	0V	—	6	63	400mV	—
1	20	130mV	—	7	80	510mV	—
2	25	160mV	—	8	100	150mV	720mV
3	31.5	200mV	—	9	125	180mV	900mV
4	40	250mV	—	10	160	250mV	1150mV
5	50	320mV	—	11	200	350mV	1520mV

EXPLODED VIEW & REPLACEMENT PARTS LIST

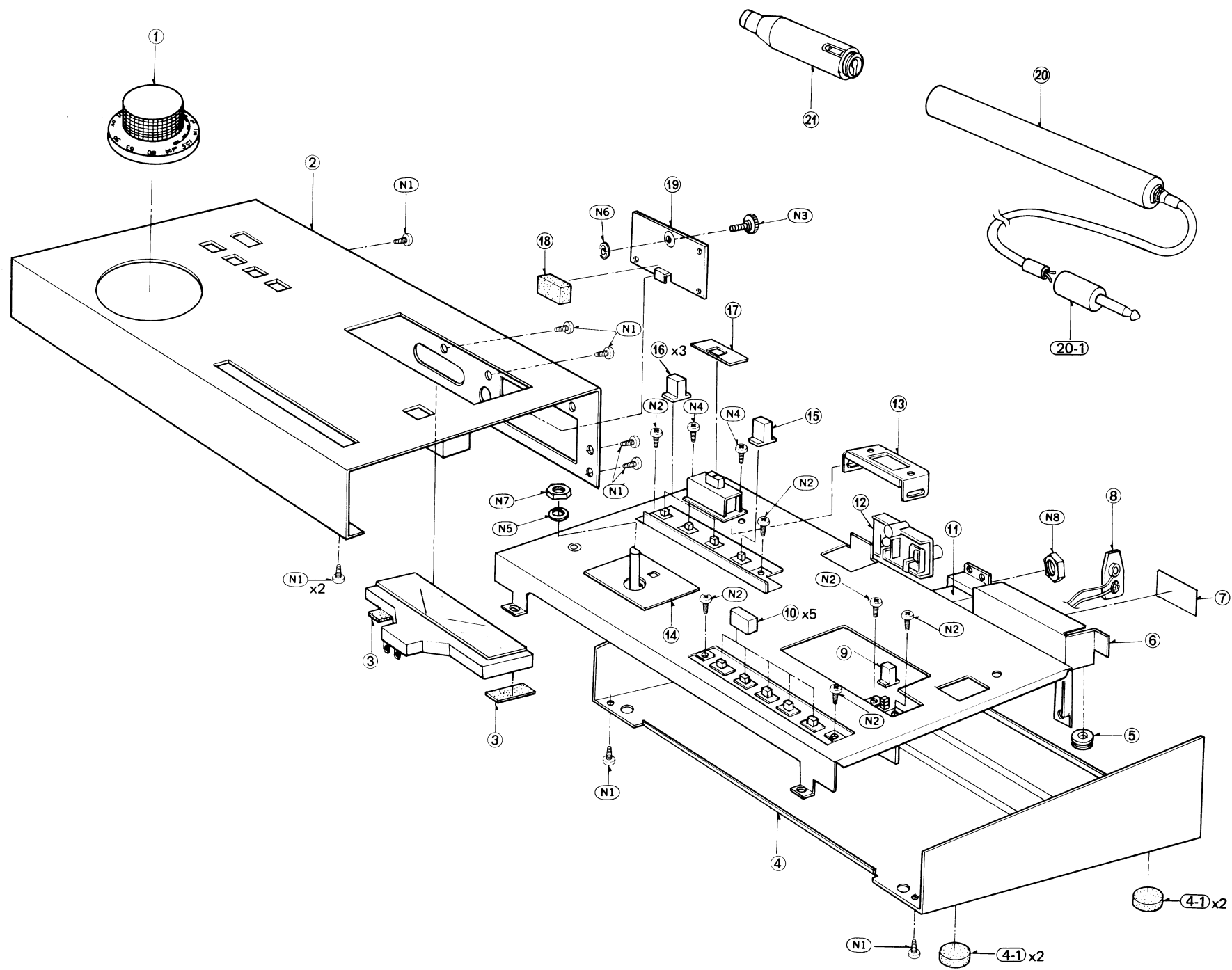
PACKING

Notes:

1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. The "S" mark is service standard parts and may differ from production parts.
3. The parenthesized numbers in the column of description stand for the quantity per set.

Ref. No.	Part No.	Description
<b>INTEGRATED CIRCUITS</b>		
IC101, 152, 201, 251	AN6550	Operation Amplifier Vco
IC151	SVITA75559S	
<b>TRANSISTORS</b>		
Q151, 201, 202, 302	2SC1815-Y	Oscillator, Mic Amplifier and Regulator
Q301	2SA1015-Y	Regulator
<b>DIODES</b>		
D101, 102, 151, 251, 252, 253	MA162A	Switching
D152, 153	20A90	Switching
D302	SVDMZ303BM	Zener, 3V
<b>VARIABLE RESISTORS</b>		
VR201, 252	EVNK6AA00B13	Mic Frequency Adj. Meter Adj. 1kΩ (B)
VR301	EVNM0AA00B14	Voltage Adj. 10kΩ (B)
<b>METER</b>		
	SSM177	Level Meter
<b>SWITCHES</b>		
S1	SSR181	Frequency Range, Protector
S2, 3	ESB62684	Power
S4	SSS57-1	Sound Level
S5	ESB63202	Meter Response
S6	ESB63212	

Ref. No.	Part No.	Description & Pcs
<b>CABINET and CHASSIS PARTS</b>		
1	SBN1145-1	Knob, Frequency Selector (1)
2	SGWH8000KX	Panel (1)
3	SHR6013	Rubber, Level Meter (2)
4	SKUH8000KX	Bottom Board (1)
4-1	[SKL245-3	Foot (4)
5	SHGA204	Rubber, Bracket (1)
6	SMN1843	Bracket (1)
7	SQT4907-1	Label (1)
8	RJB5001Y	Terminal (1)
9	SBC527	Button, Meter Response (1)
10	SBC525	Button, Sound Level (5)
11	SJJ63EK	Jack (1)
12	SJF3207-5N	Terminal Board (1)
13	SMN1841	Bracket (1)
14	SHP9323	Plate (1)
15	SBC527-1	Button, Protector (1)
16	SBC527	Button, Frequency Range (3)
17	SHR5127-1	Sheet (1)
18	SHR9493	Cushion Battery Case (1)
19	SUV517	Cover Battery Case (1)
20	YPM-SE033AA	Case, Mic (1)
20-1	[QJP0201	Plug (1)
21	YPM-SE032AA	Mic (1)
<b>SCREWS</b>		
N1	S XTB3+8BFZ	Tapping, ⊕3x8 (9)
N2	S XSS3+6S	⊕3x6 (6)
N3	RHK15ZAS	Tapping (1)
N4	S XTS3+8B	Tapping, ⊕3x8 (2)
<b>WASHERS</b>		
N5	S XWV9	φ9 (1)
N6	S XUC3FT	Circlip (Stop ring) φ3 (1)
<b>NUTS</b>		
N7	S XNS9	φ9 (1)
N8	S XNS12	φ12 (1)
<b>ACCESSORIES</b>		
A1	SJP2251	Cord (1)
A2	SJM3	Mic Stand (1)
A3	SQF11477-1	Instruction Book (1)
<b>PACKING PARTS</b>		
P1	SPP695	Polyethylene Bag (1)
P2	SPS3901	Pad, Bottom (1)
P3	SPS3903	Pad, Upper (1)
P4	SPS3799	Handle (1)
P5	SPK57-1	Carton Box (1)
P6	SPG4165-1	Cotton Box (Outside) (1)



PACKINGS

