

Service Manual

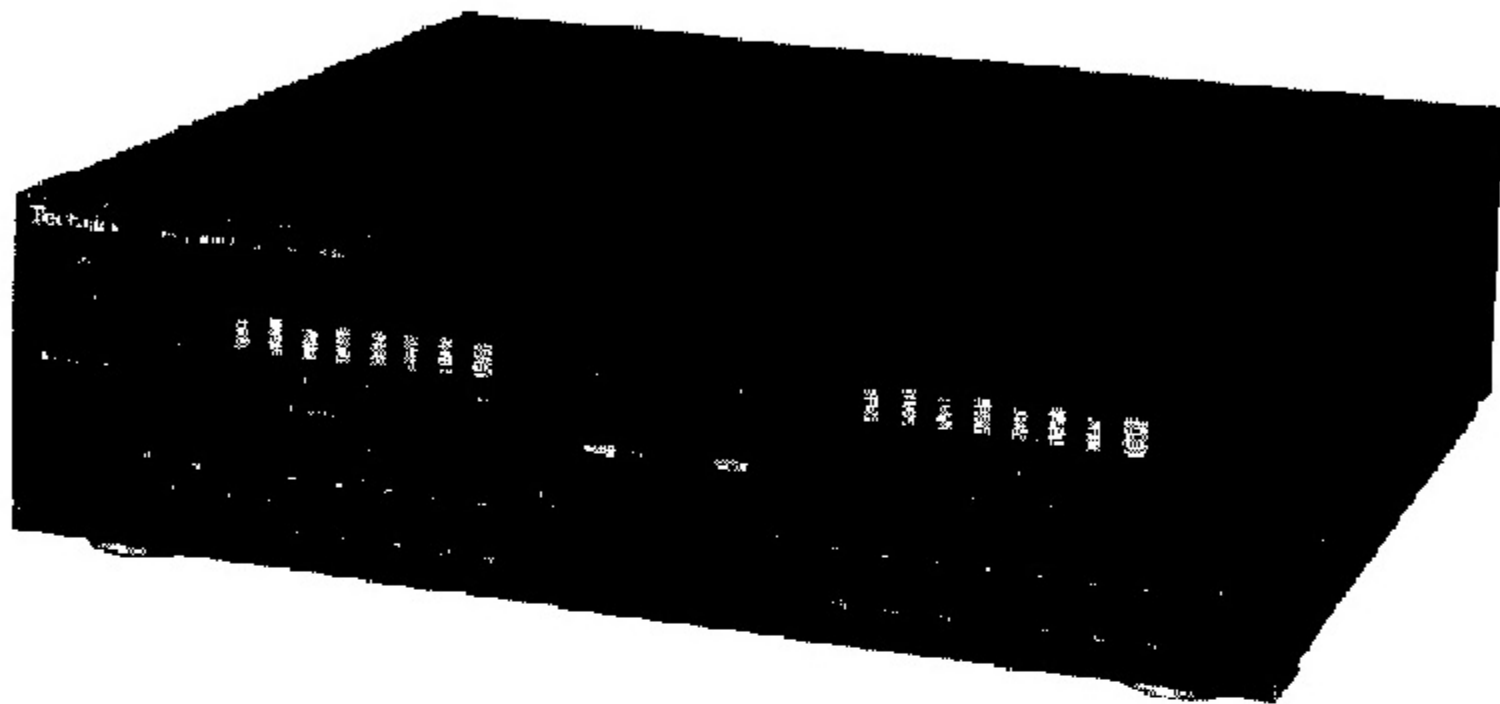
Stereo Graphic Equalizer

Equalizer

SH-E60

Color

(K)Black Type



Area	
Color	Area
(K)	(EX)Continental Europe.
(K)	(EW)Switzerland.
(K)	(Ei)Italy.
(K)	(EG).....F.R.Germany.
(K)	(EB).....Belgium.
(K)	(EK).....United Kingdom.
(K)	(EF)France.
(K)	(EH).....Holland.
(K)	(XL)Australia.
(K)	(XA).....Asia, Latin America, Middle Near East, Africa and Oceania.
(K)	(XB).....Saudi Arabia.

SPECIFICATIONS

(DIN 45 500)

Frequency response (center position) 5 Hz ~ 100 kHz, -3 dB

Maximum output voltage 7 V (1 kHz, THD 0.03%)

Rated output voltage 1 V

Rated total harmonic distortion 0.007% (20 Hz~ 20 kHz), at 1V output
0.005% (1 kHz), at 1V output

Input sensilivly 1 V

Signal-to-noise ratio 98dB/1V (105dB/1V, IHF'A)

Maximum input voltage 7 V (1 kHz)

Input impedance 47 kΩ

Gain 0±1 dB

Channel balance 250Hz ~ 6300Hz ± 0.5dB

Channel separation 1kHz 70dB

Equalization-level controls + 12 dB ~ -12dB
(7 elements continuously variable per channel)

Center frequency 63 Hz, 160 Hz, 400 Hz, 1 kHz
2.5 kHz, 6.3 kHz, 16 kHz

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GENERAL

Power supply

For Continental Europe AC 220 V, 50 Hz/60 Hz

For United Kingdom and Austraria AC 240 V, 50 Hz/60 Hz

For others AC 110 V ~ 127 V/220 V ~ 240 V,
50 Hz/60 Hz

Power consumption 11 W
(With power switch to STANDBY : 5W)

Dimensions (W x H x D) 360 x 91 x 287 mm
(14-3/16" x 3-19/32" x 11-5/16")

Weight 2.8 kg (6.2 lb.)

Specifications are subject to change without notice for further Improvement. Weight and dimensions are approximate.

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LOCATION OF CONTROLS

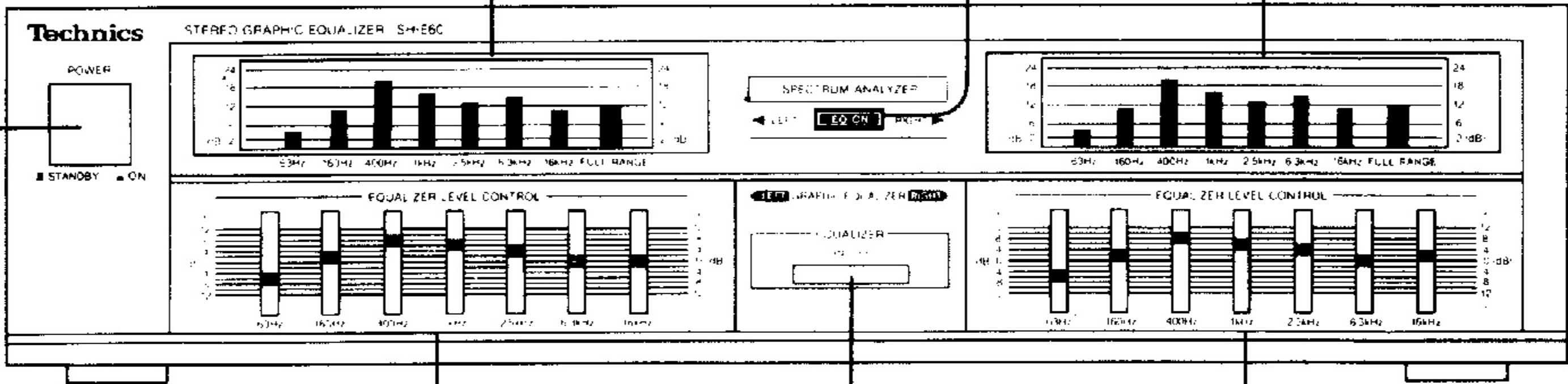
- **Power “STANDBY  • ON” switch (POWER)**
This switch turns ON and to STANDBY the secondary circuit power only. The unit is in the “STANDBY” condition when this switch is set to the “ ” () position. Regardless of the switch setting, the primary circuit is always “live” as long as the power cord is connected to an electrical outlet:
Note:
 - For this unit, even if this switch is switched to the “STANDBY” position, there is still a power consumption of about 5 watts; this is to assure the retention of the equalizer circuit function.

“Power-through” function
Discs, radio broadcasts, etc. can be heard even if the power of this unit is switched to STANDBY.
Note, however, that the power plug should be left connected to the AC outlet.

- **Left-channel spectrum display**
The display shows the left channel spectrum level. The “FULL RANGE” area on the right side displays the combined level of all of the frequency bands.

- **Equalization-mode indicator (EQ ON)**
When the equalization mode select button is pressed, the “EQ ON” indicator will illuminate.

- **Right-channel spectrum display**
The display shows the right channel spectrum level. The display of the spectrum or full range level is shown in the same way as the left-channel.

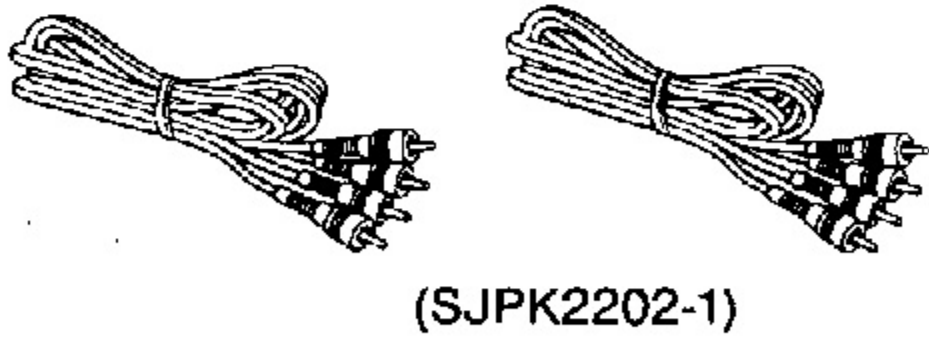


- **Left-channel band-level controls (EQUALIZER LEVEL CONTROL)**
These levers are used to adjust the 7 frequency levels that result from dividing the 63 Hz~16 kHz frequency range into 7. When these levers are moved in the “+ dB” direction, peak frequency characteristics are obtained. When they are moved in the “- dB” direction, dip frequency characteristics are obtained. These characteristics can be emphasized or attenuated a maximum of 12 dB.

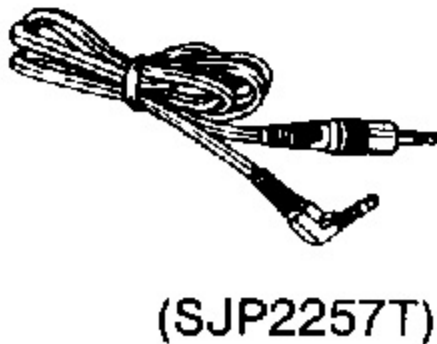
- **Right-channel band-level controls (EQUALIZER LEVEL CONTROL)**
These levers function in the same way as the left-channel band-level controls.

ACCESSORIES

- Stereo connection cables 2



- Remote-control cord 1



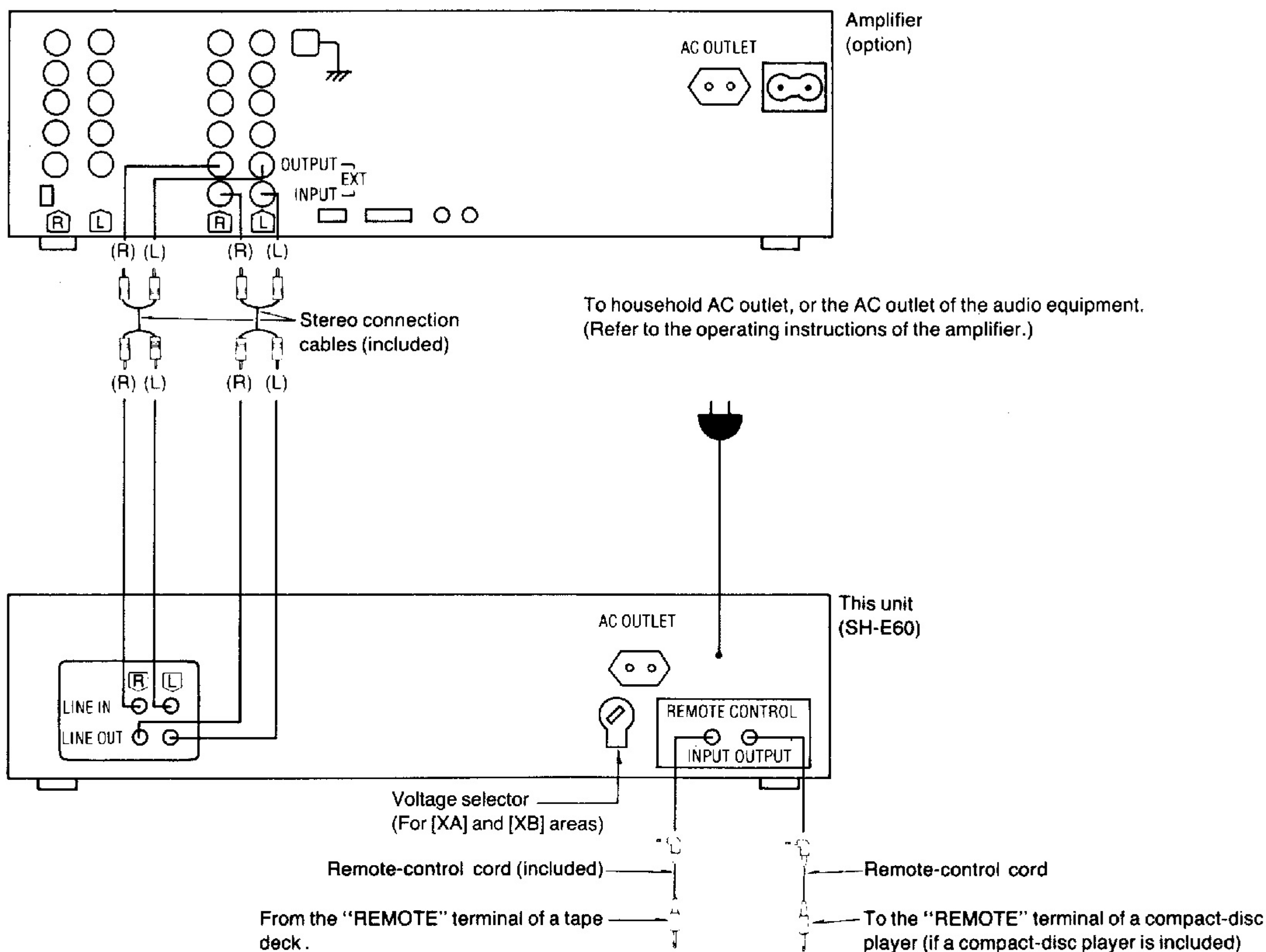
- **Equalization mode select button (EQUALIZER)**
This button can be used to select the type of equalization correction. When this button is pressed, the mode changes alternately to one or the other of the following modes.
ON: Select this mode to make an equalization correction. (The “EQ ON” indicator will illuminate.)
OFF: Select this mode if no equalization correction. By turning this button ON and OFF, the equalizer effect can also be checked.

SH-E60

■ CONNECTIONS

This is an equalizer that provides effects both during tape recording and playback if it used while connected to an amplifier (such as models SU-X980D, SU-X950, etc.) that has "EXT IN/OUT" terminals.

If this unit is connected to an amplifier that does not have "EXT IN/OUT" terminals, its effects are limited to playback only.



■ CHARACTERISTICS OF EACH FREQUENCY RANGE

63 Hz Deep bass range

The sounds of the bass, drums, etc. are dramatically strengthened.

160 Hz Bass range

This range provides the sounds of the saxophone, trombone, etc. sounds can be clarified, if indistinct, by reducing this setting.

400 Hz Mid-bass range (the fundamental range for music)

This control can be used to reinforce the sounds of male vocals, etc.

1 kHz Mid-range

This control can be used to add clear presence and realism to female vocals, etc.

2.5 kHz Mid-high range

This range provides clarity and color variations to stringed instruments, etc.

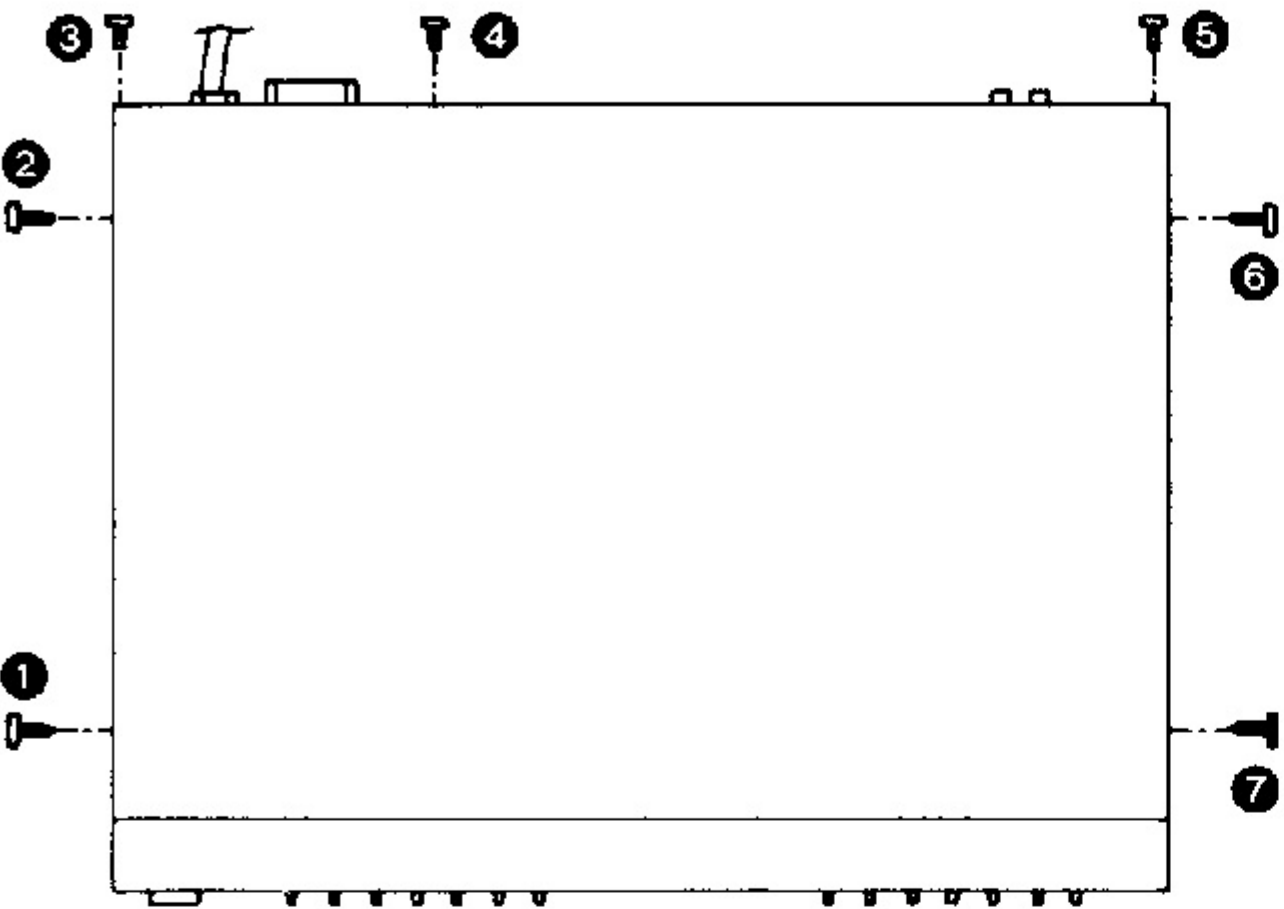
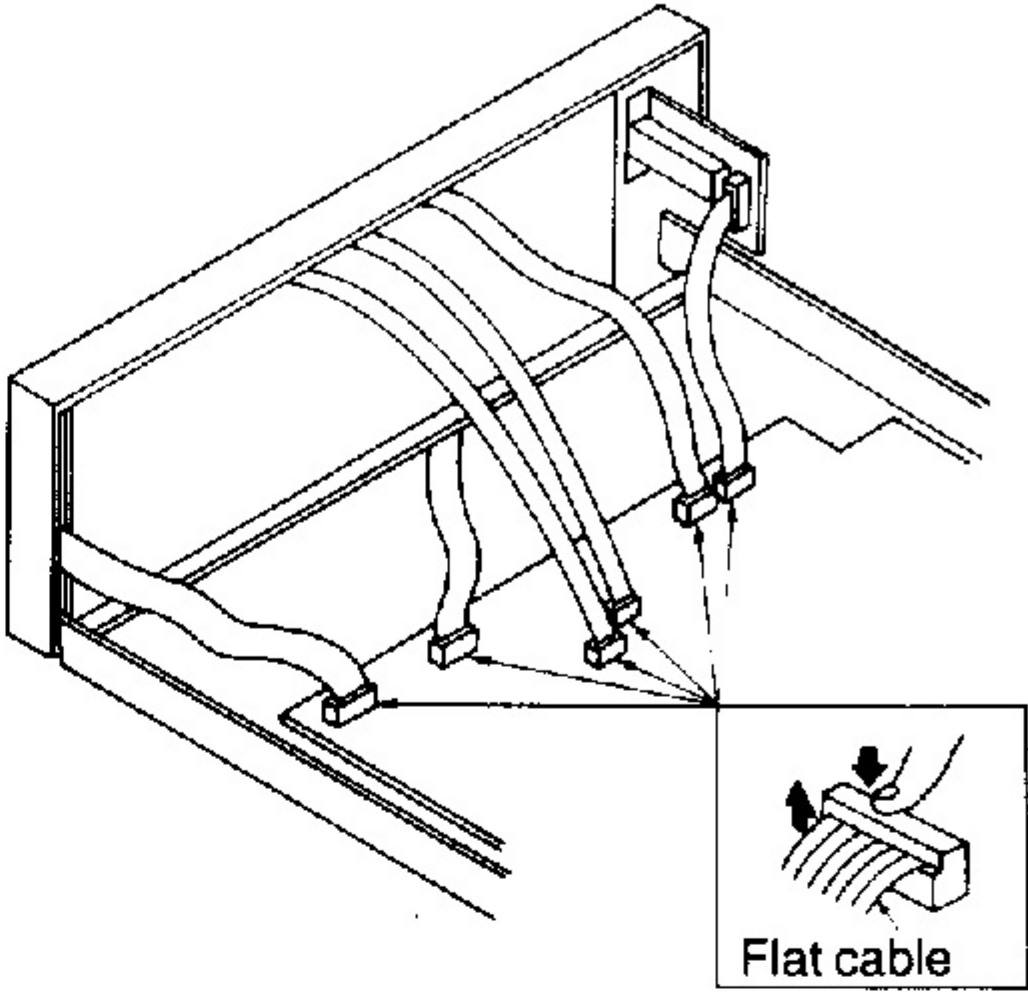
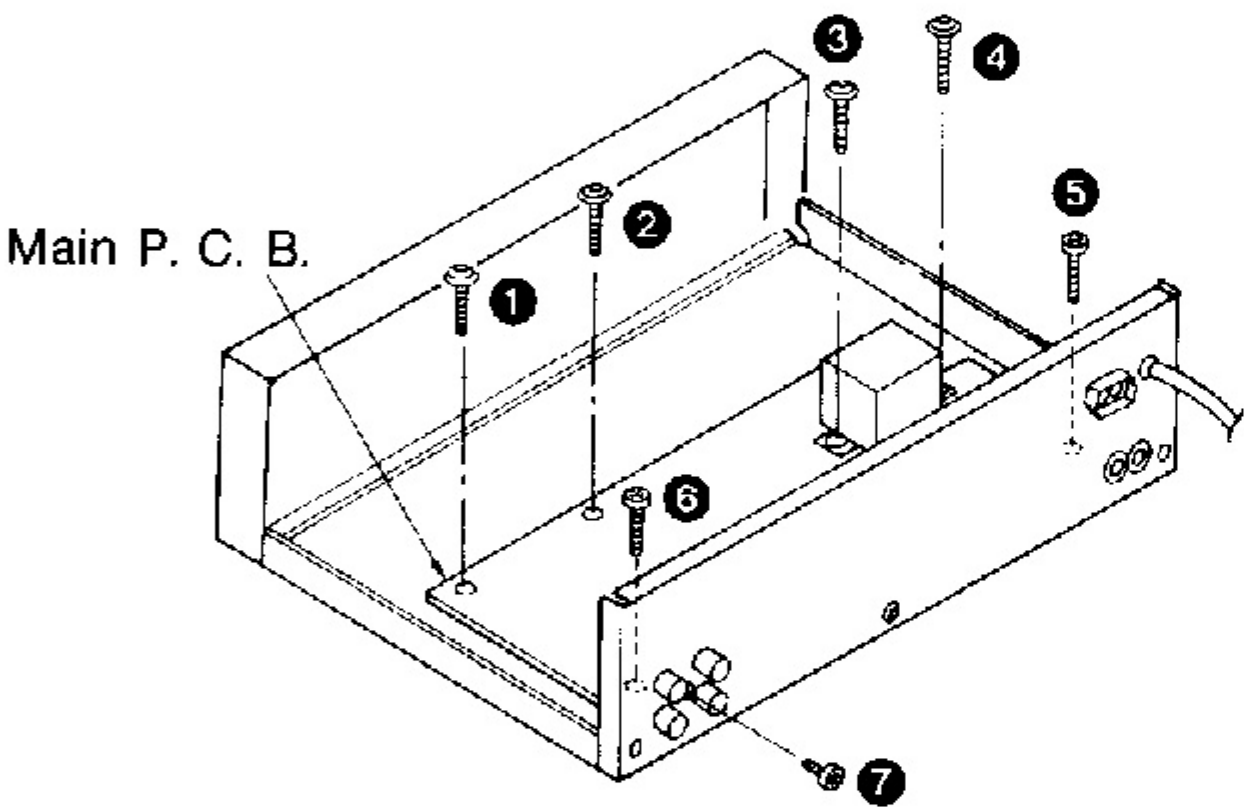
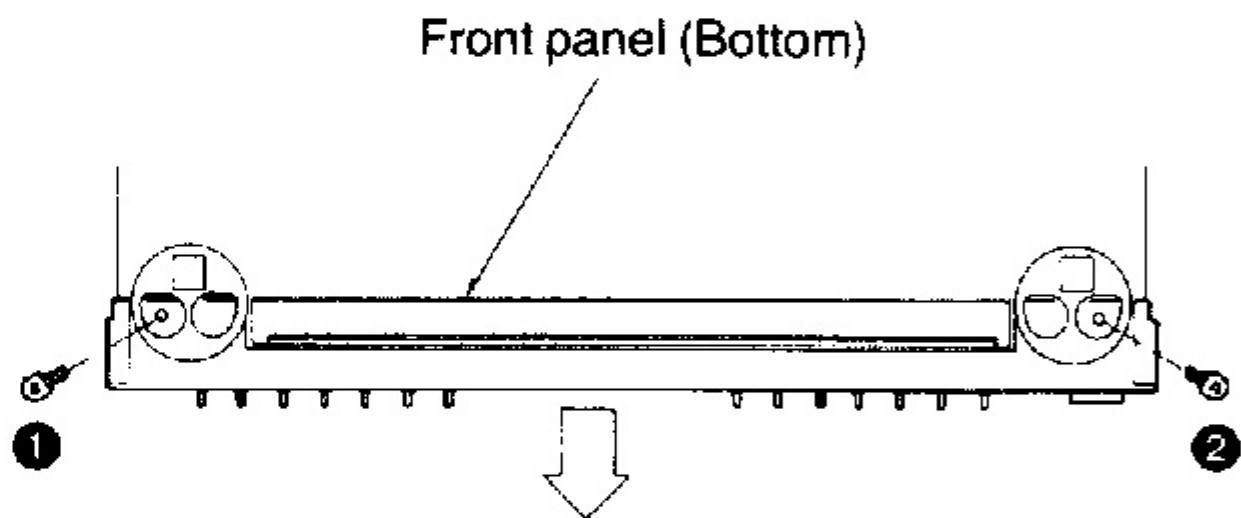
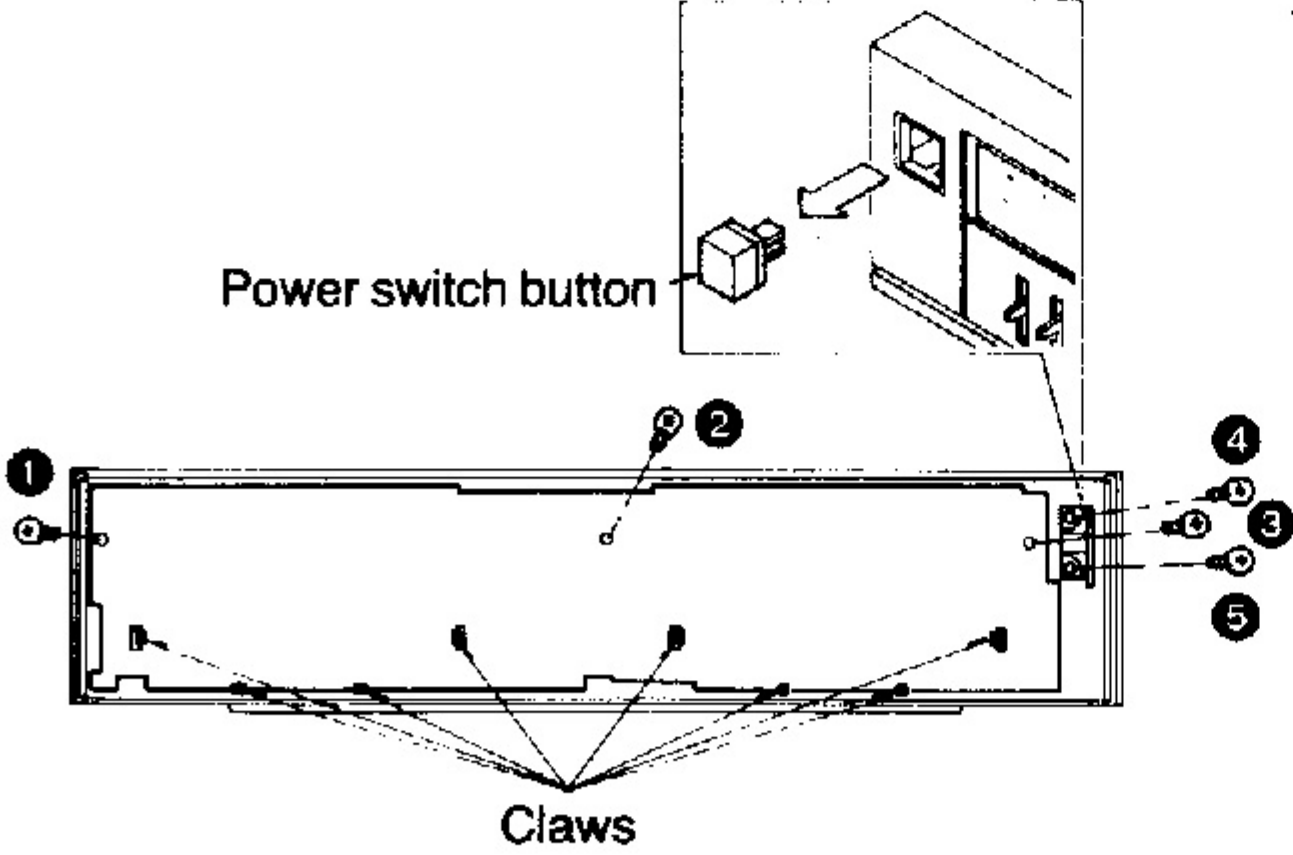
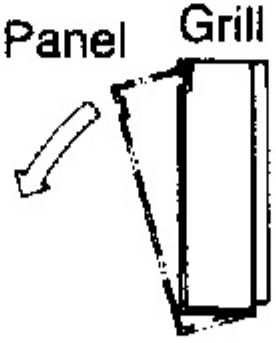
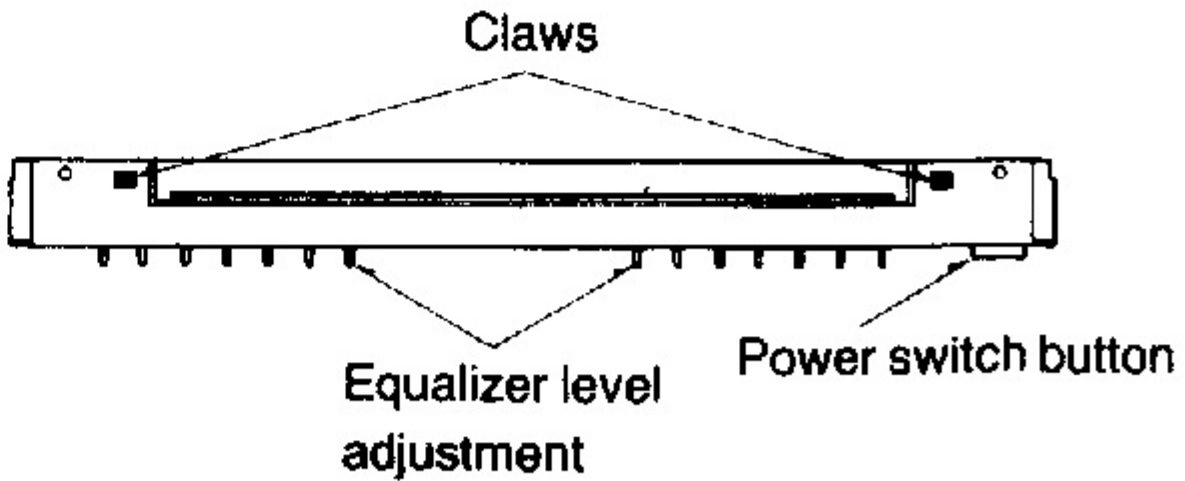
6.3 kHz Treble range

This control can be used to brighten the sounds of the flute and similar instruments. If sounds seem too jarring, a softness can be applied by reducing the setting.

16 kHz Super-treble range

This control can be used provide an extra measure of delicate vibration to the sounds of the cymbals, triangle, etc. If tape "hiss" noises are annoying, this control's setting can be reduced to alleviate such noises.

■ DISASSEMBLY INSTRUCTIONS

Ref. No. 1	How to remove the cabinet	Ref. No. 2	How to remove the connector
Procedure 1	●Remove the 7 screws (①~⑦).	Procedure 1→2	●Disconnect the lead ties of the 6 connectors (J1, J2, J3, J4, J5, J6)
			
Ref. No. 3	How to remove the main P.C.B.	Ref. No. 4	How to remove the front panel
Procedure 1→3	1. Remove the 6 screws (①~③). 2. Remove a screw (⑦) from the jack P.C.B.	Procedure 1→2→4	●Remove the 2 screws (①, ②) on the bottom of the front panel in the direction of the arrows.
			
Ref. No. 5	How to remove FL/VR P.C.B.	Ref. No. 6	How to remove the equalizer level adjustment controls
Procedure 1→4→5	1. Remove the 3 screws (①~③). 2. Remove the 8 claws.	Procedure 1→4→5→6	1. Remove the 2 claws on the lower side of the front panel. 2. Take the panel and grill apart in the direction of the arrow. 3. Pull out the equalizer level adjustment controls.
●Power switch P.C.B. 1. Pull out the power switch button. 2. Remove the 2 screws (④, ⑤) 		  Note: The power switch button is turned on.	

FUNCTION OF IC TERMINALS

●Microcomputer IC14 (HD614042 SH12)

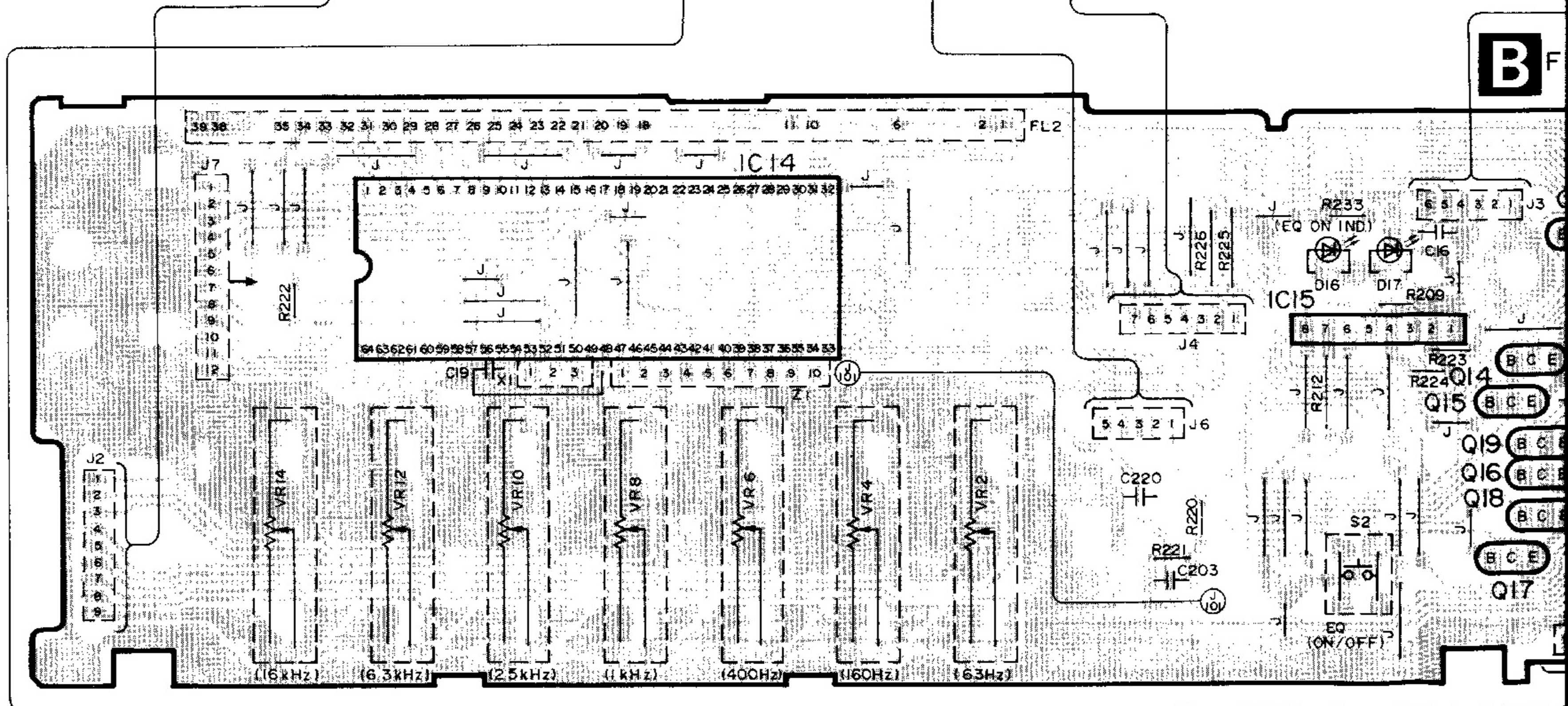
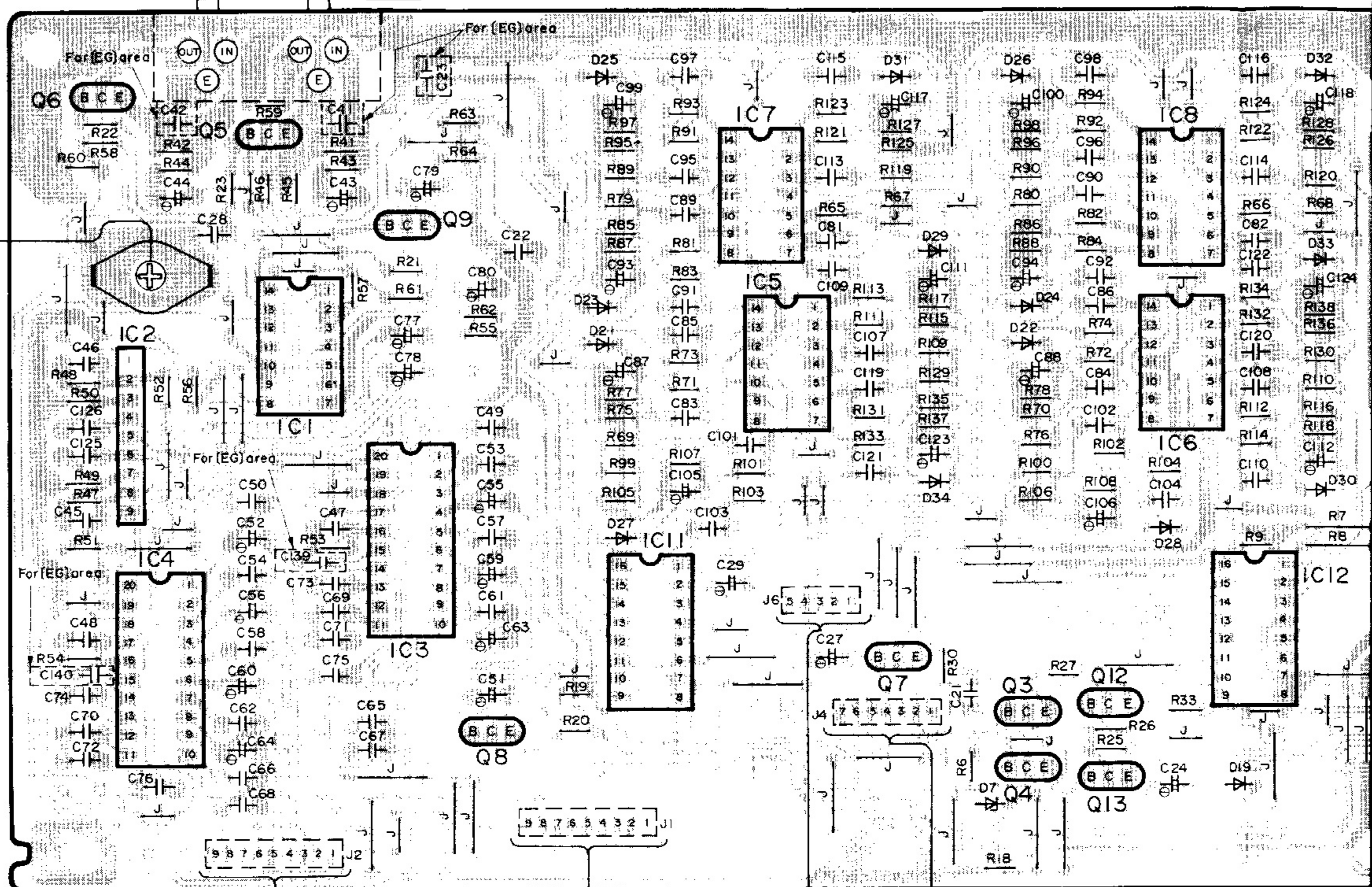
Pin No.	Symbol	I/O	Function
1	D11	O	2 dB segment output to FL meter. (Rch)
2	D12	O	4 dB segment output to FL meter. (Rch)
3	D13	O	6 dB segment output to FL meter. (Rch)
4	D14	O	8 dB segment output to FL meter. (Rch)
5	D15	O	24 dB segment output to FL meter. (Lch)
6	R00	O	10 dB segment output to FL meter. (Rch)
7	R01	O	12 dB segment output to FL meter. (Rch)
8	R02	O	14 dB segment output to FL meter. (Rch)
9	R03	O	16 dB segment output to FL meter. (Rch)
10	R10	O	18 dB segment output to FL meter. (Rch)
11	R11	O	20 dB segment output to FL meter. (Rch)
12	R12	O	22 dB segment output to FL meter. (Rch)
13	R13	O	24 dB segment output to FL meter. (Rch)
14	R20	O	22 dB segment output to FL meter. (Lch)
15	R21	O	20 dB segment output to FL meter. (Lch)
16	R22	O	18 dB segment output to FL meter. (Lch)
17	R23	O	16 dB segment output to FL meter. (Lch)
18	RA0	I	A/D input, high withstand voltage.
19	RA1	I	Output power supply (−32 V) for high withstand voltage terminals.
20	R30	O	Muting output H: Muting off, L: Muting on.
21	R31	O	Equalizer ON/OFF control. H: OFF L: ON
22	R32	I	Power switch on/off detection. H: on, L: off.
23	R33	—	—
24	R50	O	FL meter's 16 kHz grid output.
25	R51	O	FL meter's all-band grid output.
26	R52	O	FL meter's 160 Hz grid output.
27	R53	O	FL meter's 63 Hz grid output.
28	R60	O	MPX data A output
29	R61	O	MPX data B output
30	R62	O	MPX data C output
31	R63	—	—
32	VCC	I	5 V power supply.

Pin No.	Symbol	I/O	Function
33	R40	I	Remote control data. Communication data clock input.
34	R41	I	Remote control data. Communication data input.
35	R42	O	Chip select of MPX (Lch)
36	R43	O	Chip select of MPX (Rch)
37	R70	O	A/D conversion data bit 7 output.
38	R71	O	A/D conversion data bit 6 output.
39	R72	O	A/D conversion data bit 5 output.
40	R73	O	A/D conversion data bit 4 output.
41	R80	O	A/D conversion data bit 3 output.
42	R81	O	A/D conversion data bit 2 output.
43	R82	O	A/D conversion data bit 1 output.
44	R83	O	A/D conversion data bit 0 output.
45	R90	—	—
46	R91	I	Power switch on/off detection. H: on, L: off.
47	R92	I	Equalizer key signal input.
48	R93	—	—
49	RESET	I	Reset signal input.
50	TEST	—	—
51	OSC1	I	Clock signal input.
52	OSC2	O	Clock signal output.
53	GND	I	Grounding
54	D0	O	FL meter's 2.5 kHz grid output.
55	D1	O	FL meter's 1 kHz grid output.
56	D2	O	FL meter's 400 Hz grid output.
57	D3	O	FL meter's 6.3 kHz grid output.
58	D4	O	2 dB segment output to FL meter. (Lch)
59	D5	O	4 dB segment output to FL meter. (Lch)
60	D6	O	6 dB segment output to FL meter. (Lch)
61	D7	O	8 dB segment output to FL meter. (Lch)
62	D8	O	10 dB segment output to FL meter. (Lch)
63	D9	O	12 dB segment output to FL meter. (Lch)
64	D10	O	14 dB segment output to FL meter. (Lch)

■ CIRCUIT BOARDS AND WIRING CONNECTION DIAGRAM

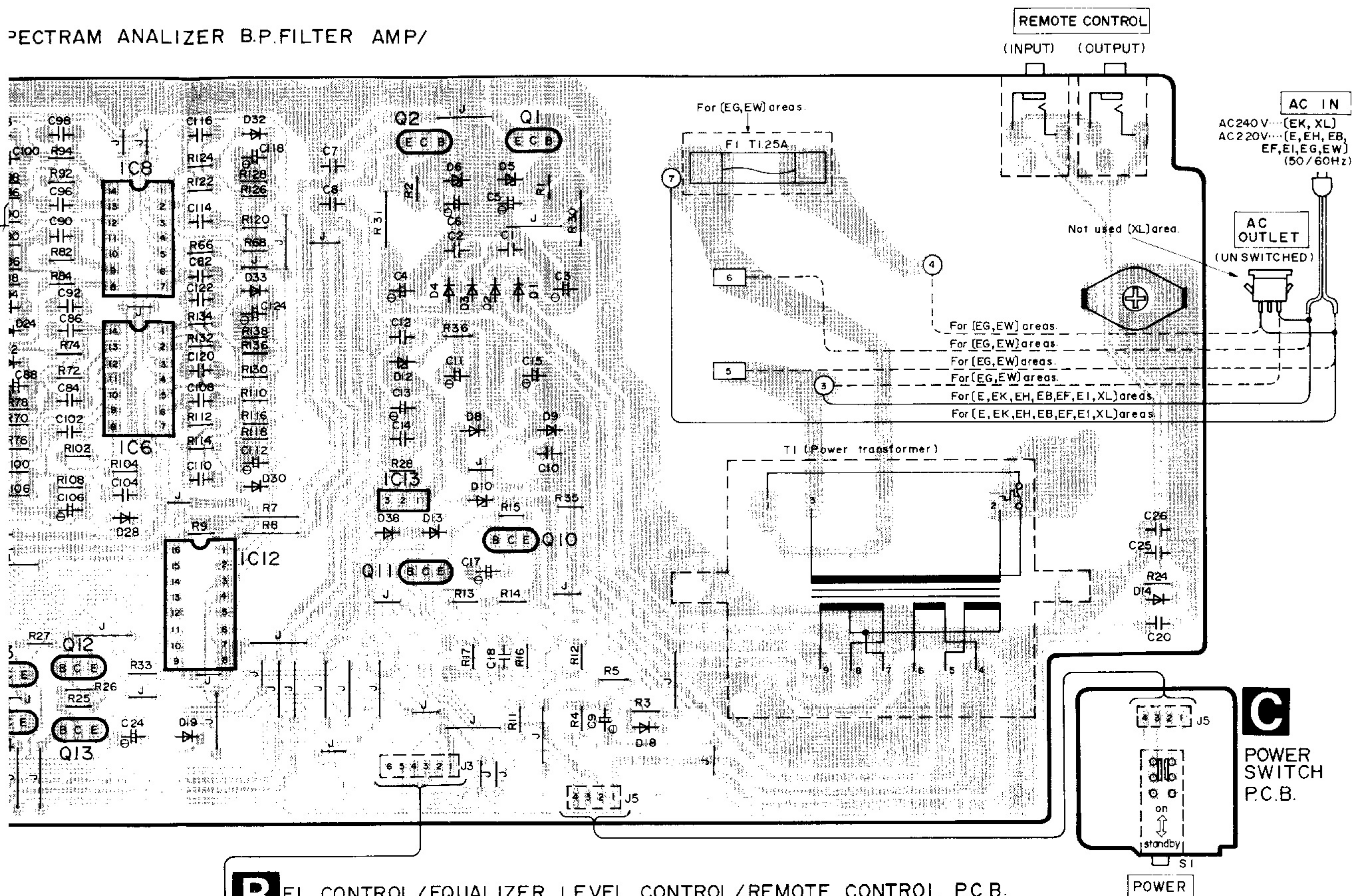
L c h

INPUT, OUTPUT TERMINAL/ B.P. FILTER AMP/ SPECTRAM ANALIZER B.P.FI
POWER SUPPLY P.C.B.

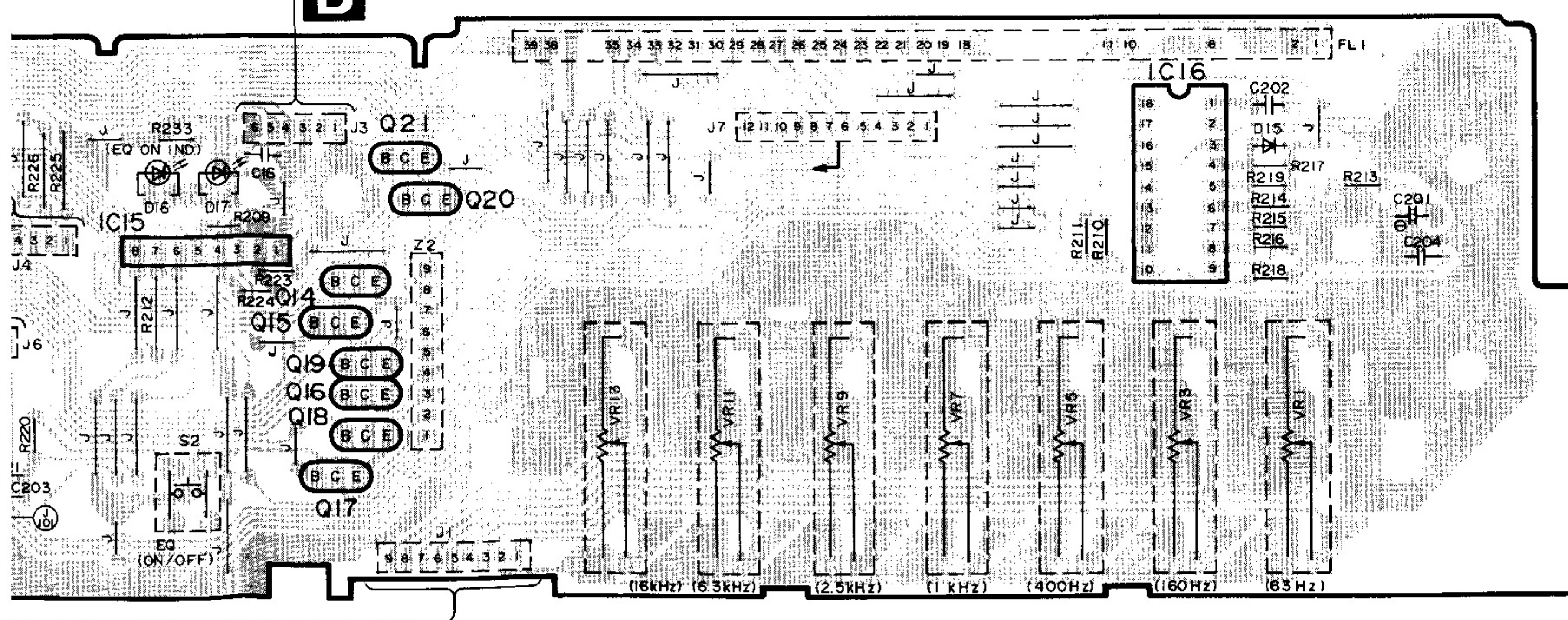


AM

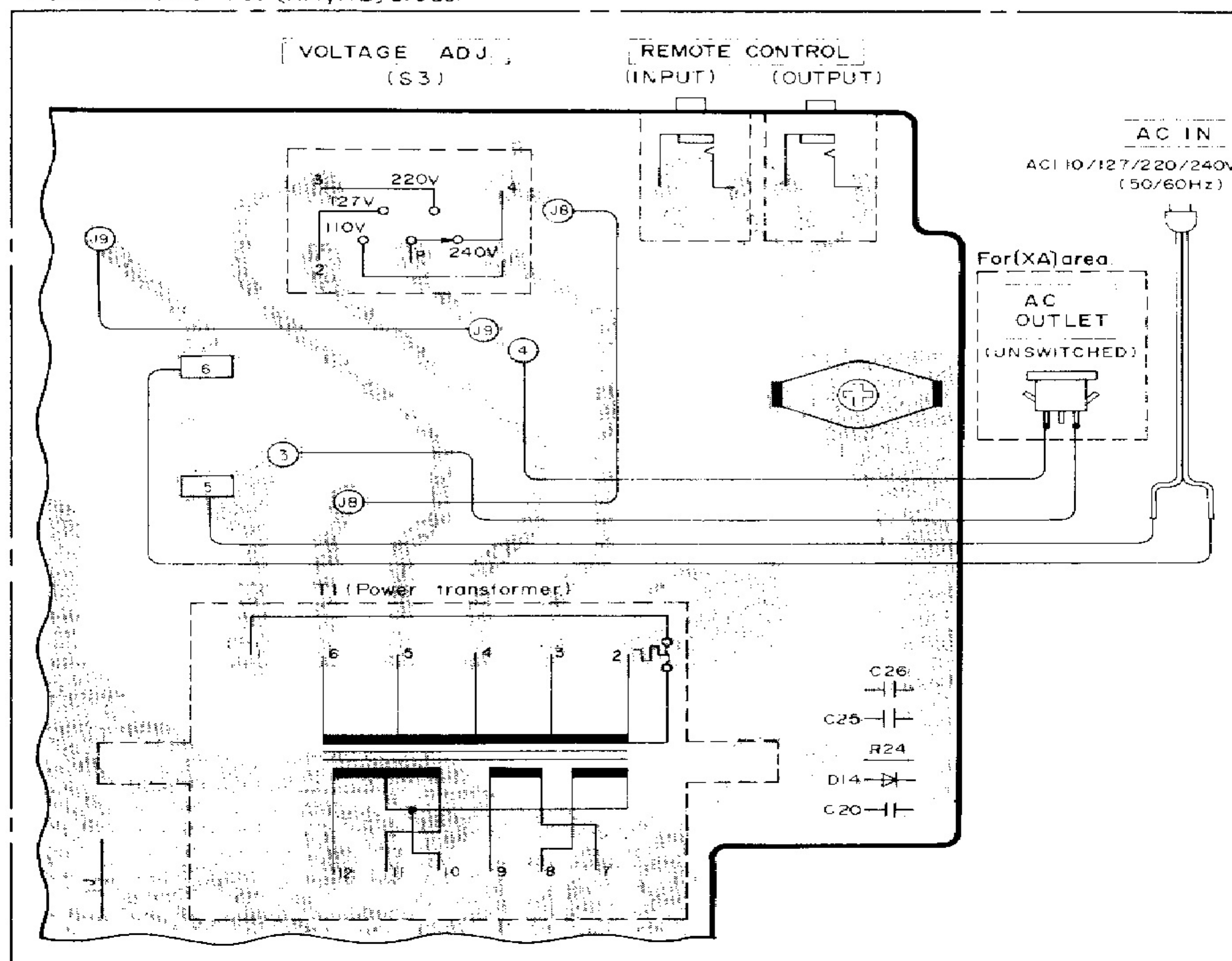
SPECTRAM ANALYZER B.P.FILTER AMP/



B FL CONTROL/EQUALIZER LEVEL CONTROL/REMOTE CONTROL P.C.B.



Power Source For [XA,XB] areas.



• TERMINAL GUIDE OF TRANSISTORS, DIODES AND IC's

LC4066BH LA6324N 14pin NJU4051BD 16pin LC6528C3189 18pin AN7337 20pin HD614042SH12 64pin 	M5223L 8 Pin NJM4559S 9 Pin 	AN78N05 	2SD1762, 2SB1185 	UN4211, 2SD1915, UN4111 2SC3311
	2SA1015 	RL1N4003N02 1SS178TPA7 MA700 	MA4120, MA4068 MA4030, MA4051 	LN31GCPH