

Service Manual

Equalizer

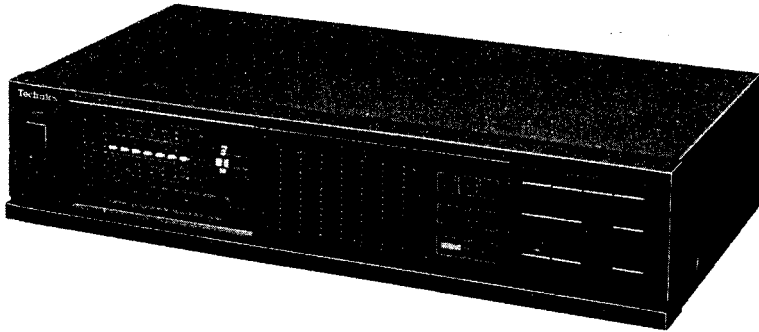
Stereo Graphic Equalizer

(with spectrum analyzer)

SH-8046

Color

(S) ... Silver Type
(K) ... Black Type



Color	Area
(S) (K)	[M] ... U.S.A.
(S) (K)	[MC] ... Canada
(S) (K)	[E] ... Continental Europe
(S) (K)	[EH] ... Holland
(S) (K)	[EB] ... Belgium
(S) (K)	[EF] ... France
(S) (K)	[EK] ... United Kingdom
(S) (K)	[EGA] ... F.R. Germany
(S) (K)	[Ei] ... Italy
(S) (K)	[XL] ... Australia
(S) (K)	[XA] ... Asia, Latin America, Middle Near East, Africa & Oceania
(S) (K)	[PA] ... Far East PX
(S) (K)	[PE] ... European Military

SPECIFICATIONS

(IHF '78)

Frequency response (center position) : 10 Hz~50 kHz, -1 dB
Maximum output voltage : 8 V (1 kHz, THD 0.03%)
Rated output voltage : 1 V
Rated input voltage : 1 V
Rated total harmonic distortion : 0.003% (20 Hz~20 kHz) 1 V output
Input sensitivity : 150 mV
Signal-to-noise ratio : above 113 dB/2 V, 107 dB/1 V (IHF'A)
Maximum input voltage : 8 V (1 kHz)
Input impedance : 22 kΩ
Gain : 0±1 dB
Direct-equalization-level controls : +12 dB~-12 dB (2 dB step)

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

GENERAL

Power supply : AC 120 V 60 Hz

Power consumption : 9 W

(With power switch OFF) : 7 W

Dimensions

(W×H×D)

: 430×97×230 mm
(16¹/₁₆"×3¹/₁₆"×9¹/₁₆"

Weight

: 3 kg (6.6 lb)

Specifications are subject to change without notice for further improvement.

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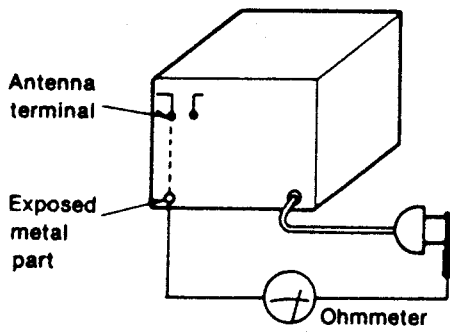
SAFETY PRECAUTION (This "safety precaution" is applied only in U.S.A.)

1. Before servicing, unplug the power cord to prevent an electric shock.
2. When replacing parts, use only manufacturer's recommended components for safety.
3. Check the condition of the power cord. Replace if wear or damage is evident.
4. After servicing, be sure to restore the lead dress, insulation barriers, insulation papers, shields, etc.
5. Before returning the serviced equipment to the customer, be sure to make the following insulation resistance test to prevent the customer from being exposed to a shock hazard.

INSULATION RESISTANCE TEST

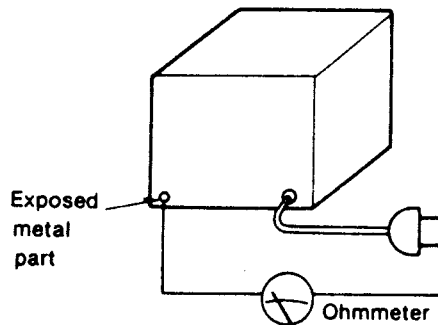
1. Unplug the power cord and short the two prongs of the plug with a jumper wire.
2. Turn on the power switch.
3. Measure the resistance value with ohmmeter between the jumpered AC plug and each exposed metal cabinet part, such as screwheads antenna, control shafts, handle brackets, etc. Equipment with antenna terminals should read between $3M\Omega$ and $5.2M\Omega$ to all exposed parts. (Fig. A) Equipment without antenna terminals should read approximately infinity to all exposed parts. (Fig. B)

Note: Some exposed parts may be isolated from the chassis by design. These will read infinity.



(Fig. A)

Resistance = $3M\Omega - 5.2M\Omega$

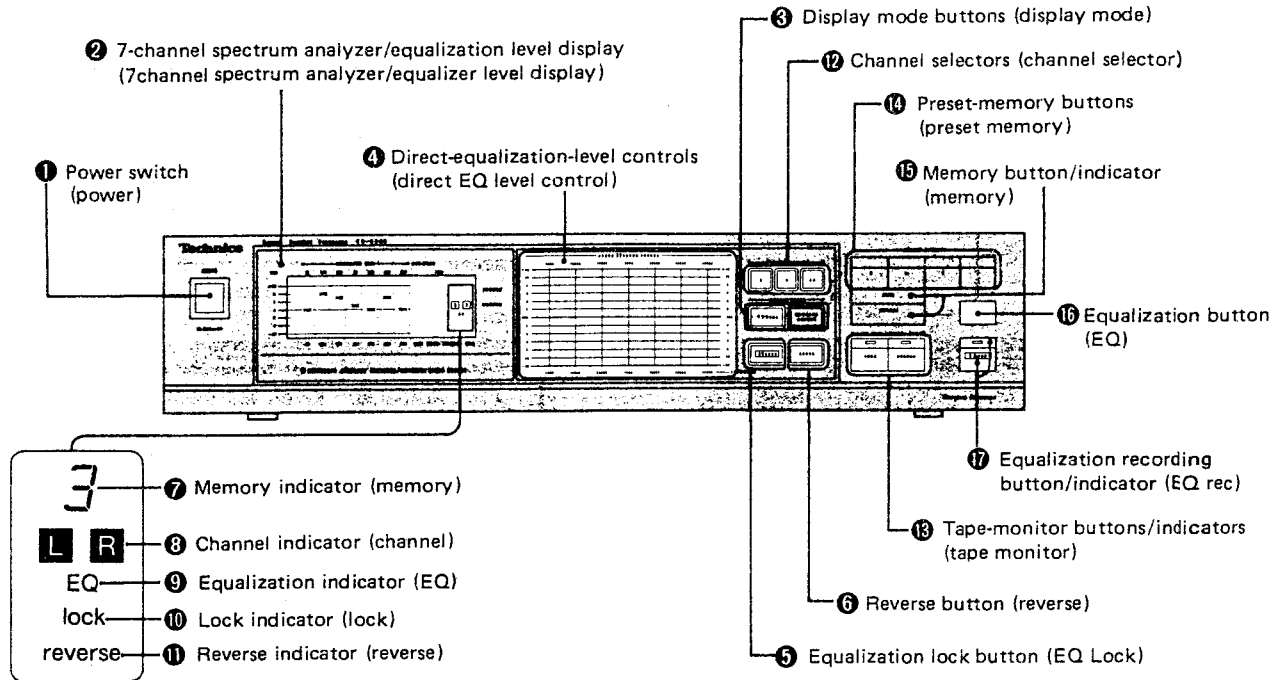


(Fig. B)

Resistance = Approx ∞

4. If the measurement is outside the specified limits, there is a possibility of a shock hazard. The equipment should be repaired and rechecked before it is returned to the customer.

LOCATION OF CONTROLS



For [M] [MC] only

1 This switch is used to turn the power on and off.

Note:

- With the power switch in the OFF position, there is still some power consumption (about 7 watts). This is to assure the retention of the "most recent" memory and the preset-memory functions.

For except [M] [MC]

1 This switch turns on and off 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 slight power consumption of about 6 watts; this is in order to assure the retention of the "most recent" memory and the preset-memory functions.

"Power-through" function

Discs, radio broadcasts, etc. can be heard even though the power of this unit is switched OFF.

When using this feature, set the amplifier's selector to the source you want to hear, and, before switching OFF the power of this unit, set the tape-monitor button to either "source" or "tape".

If a power failure occurs during "power through" operation, switch the power ON and then OFF after the power failure has ended. If this is not done, sound will not be emitted.

- 2 This display shows the spectrum or equalization level.
For the spectrum analysis display, a bar-type of display is used; for equalization level display, a dot-type of display is used.
- 3 These buttons are used to select either the display of the spectrum or of the equalization level.
- EQ level:** When this button is pressed, the equalization level is shown on the display.
- spectrum analyzer:** When this button is pressed, the bar-type spectrum is shown on the display. If this button is pressed once again, the display will return to the dot-type (=).

- 4 These controls are used for adjustment of the equalization level.
The adjustment can be made (in 2-dB steps) to ± 12 dB.
Note:
Be careful not to scratch the surface by tracing with a sharp edge.
- 5 This button is used to lock the direct equalization level control function. Locked when pressed; lock released when pressed again.
- 6 This button is used to reverse the equalization curve shown in the display.
This is convenient for reducing tape "hiss" noise, etc.
When this button is pressed, the equalization curve is reversed; when pressed again, the reversing process is released.
- 7 Shows the memory number (1 to 4) selected by the preset memory buttons.
- 8 Shows the channel (s) (L, R or L and R) selected by the channel selectors.
- 9 Illuminates when the equalization button is set to "on".
- 10 Illuminates when the equalization lock button is set to "on".
- 11 Illuminates when the reverse button is set to "on".

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- 12 These buttons are used to select the channel for display and equalization correction.

L: When this button is pressed, only the left channel is selected for equalization correction or spectrum display.

R: When this button is pressed, only the right channel is selected for equalization correction or spectrum display.

L.R: When this button is pressed, both the left and right channels are selected for simultaneous equalization correction (left channel bright, right channel dim) or spectrum display. For spectrum display, note that the value is that of the left and right channels combined.

- 13 These buttons are used to select the source to be heard. The indicator for the pressed button will illuminate.

source: Set to this position to listen to equipment (disc player, tuner, etc.) connected to the amplifier.

tape: Set to this position to listen to the tape deck connected to this unit, or to monitor a recording in progress.

Note:

Equalization correction is applied to monitored tape sound, but is not applied to the recorded sound.

- 14 These buttons are used to preset the equalization curves into the memory. After curves have been preset into the memory, it is then possible to quickly and easily select the desired curve by simply pressing the corresponding button. Four equalization curves can be memorized.

- 15 To enter an equalization curve into memory, first press this button, and then, while the indicator is flashing (about 4 seconds), press one of the preset-memory buttons to complete the memorization of the equalization curve.

- 16 This button is used to switch the equalization correction function ON and OFF.

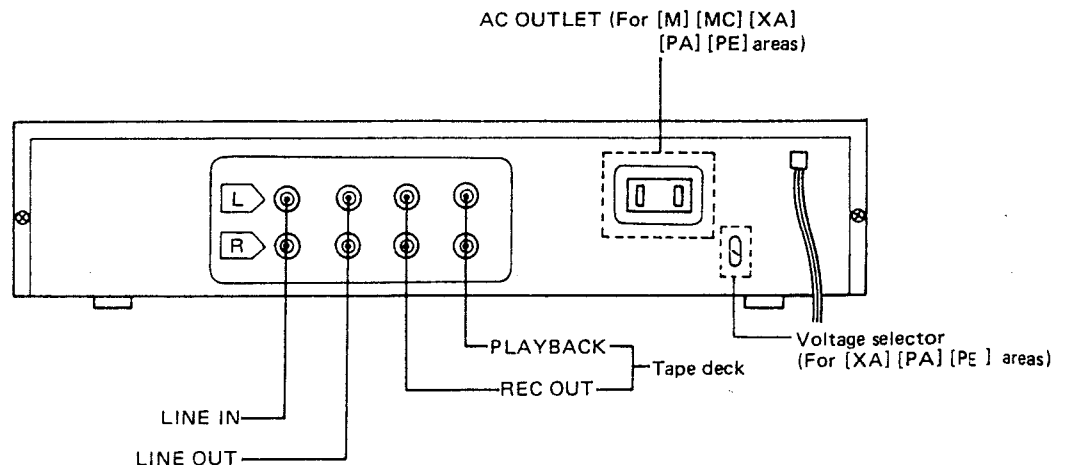
When this button is pressed, the indicator will illuminate; when it is pressed once again, the function is switched OFF, and the equalization function is not applied.

- 17 Press this button to record the sound corrected by the equalizer.

When the button is pressed, the indicator will illuminate: when it is pressed once again, the function is switched OFF, and equalization-corrected sound cannot be recorded.

Note:

For equalization recording, be sure to set the equalization button to "on" and the tape-monitor button to "source".

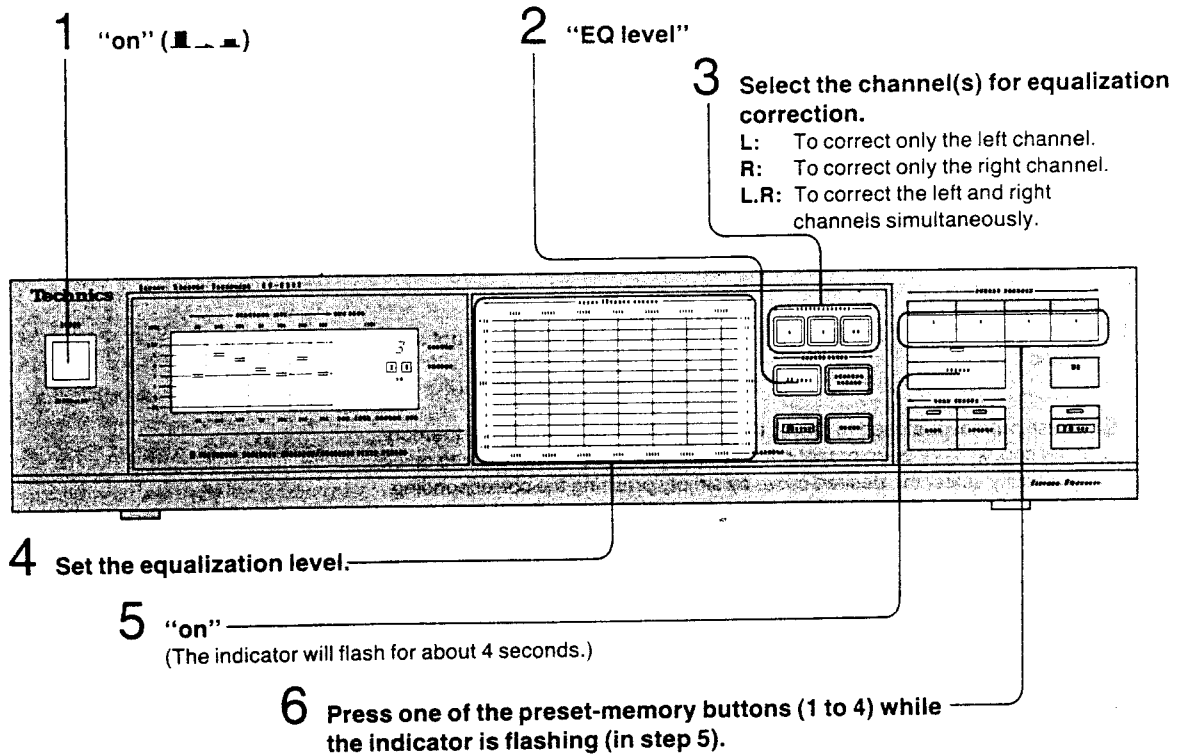


SH-8046

OPERATION

MEMORIZATION OF EQUALIZATION CURVES

For this model, four groups of equalization curves (in left/right pairs) can be stored in memory. After curves have been entered into memory, any one of them can be easily retrieved by simply pressing one of the preset memory buttons.



*If you want to change (re-draw) any of the equalization curves stored in the memory, follow steps 2 to 6 above again.

MEMORY RETRIEVAL-OUT

Press the preset-memory button for the equalization curve you want to retrieve from the memory.

Example:

When preset memory button 2 is pressed, memory number 2 will be displayed in the memory indicator part of the display, and, at the same time, that stored equalization curve will be displayed.

TO CANCEL A MEMORY RETRIEVAL-OUT

Press either a direct-equalization-level controls or a preset-memory button.

"MOST RECENT" MEMORY

The last position of the EQ level controls (whether in memory or done manually) will be automatically entered into the memory when the power is switched off. When the power is switched on, these positions will be recalled. This will not interfere any preset memory locations.

MEMORY BACK-UP

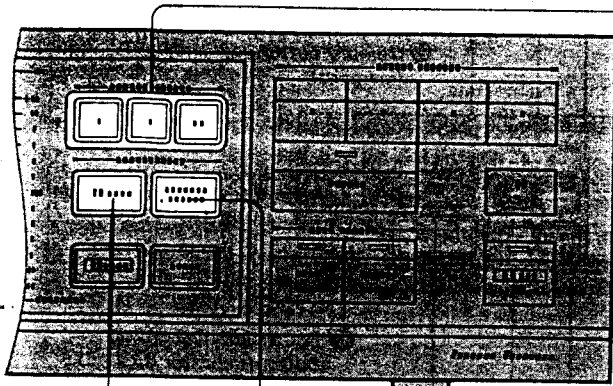
The equalization levels and equalization curves entered into the preset memories before the power is switched OFF will be held in the memory, by the gold capacitor, for about one week, even if the power cord plug is disconnected.

TO PREVENT MEMORY ERASURE

Be sure to connect this unit's power cord plug to an ordinary household electrical outlet, or to the UNSWITCHED outlet on the amplifier, in order to prevent memory erasure in the event the power of this unit is switched OFF for a week or more. Note that resettings are necessary if the memory is erased.

DISPLAY

The display can be used to display the spectrum or the equalization level.
 There are two types of display for spectrum analysis: bar display or dot (=) display.

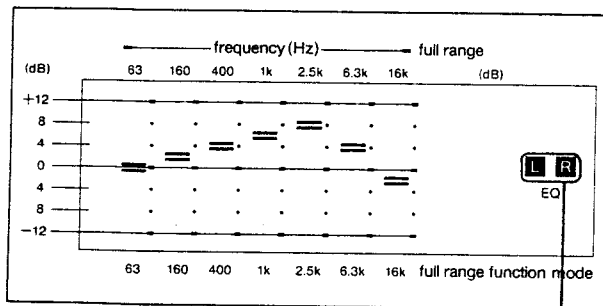


These buttons are used to select the channel for display and equalization correction.

- L:** When this button is pressed, only the left channel is selected for equalization correction or spectrum display.
- R:** When this button is pressed, only the right channel is selected for equalization correction or spectrum display.
- L.R:** When this button is pressed, both the left and right channels are selected for simultaneous equalization correction (left channel bright, right channel dim) or spectrum display. For spectrum display, note that the value is that of the left and right channels combined.

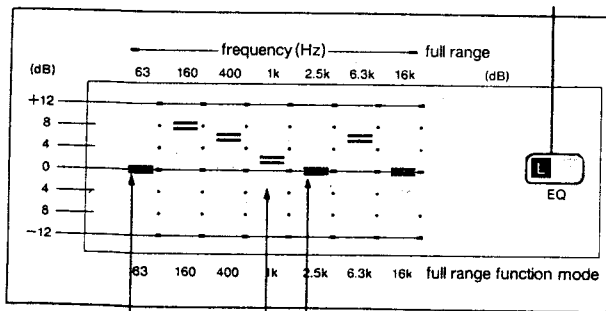
Equalization level display

■ Display of left (L) or right (R) channel only.



Left (L) or right (R) indicator illuminates.

■ Display of left and right (L.R) channels.



Left channel (bright)
 Right channel (dim)

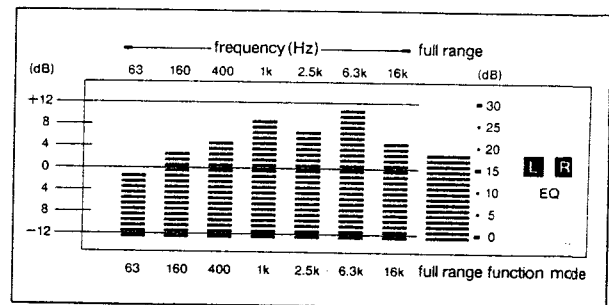
Left and right channels displayed bright at the same position.

※ If the equalization level of the left channel and of the right channel differs, the left channel indication will be bright and the right channel indication will be dim.

If the equalization level of the left and right channels is exactly the same, both indications (left and right) will be bright.

Spectrum analysis display

■ Bar-type display.



※ The "full range" area on the right side displays the combined level of all of the frequency bands.

※ If there is no input signal to this unit. The 1st row (0 dB) of all frequency bands is displayed.

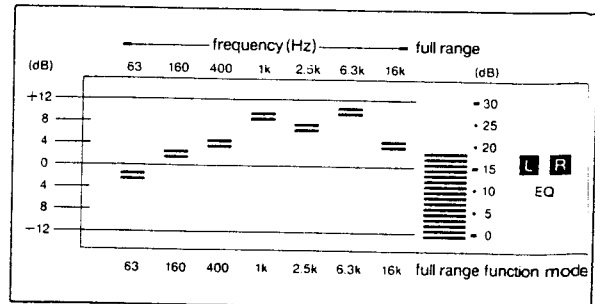
When button is pressed again...

Spectrum analysis is displayed by dots (=).

Note, however, that "full range" at extreme right remains a bar display.

When the button is pressed again, the display returns to the dot (=) mode.

■ Dot (=) display.



EXAMPLES OF APPLICATIONS UTILIZING THE SH-8046 FUNCTIONS

The sound level of the 7 frequency divisions in the 63 Hz~16 kHz frequency range can be easily and selectively corrected by means of the direct-equalization-level controls of this unit.

1. Complete audio room correction—including the correction of both stereo equipment and room acoustics.
2. Personalized sound quality control.
3. Creating an original tape collection of tapes tailored to your car, stereo, or tapes of live recordings, etc.
4. Reduction of noise, prevention of howling. These are merely a few of the possibilities that sound quality and room acoustic correction open up for the serious listener.

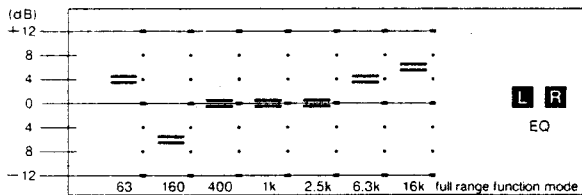
Correcting room acoustics

Each room has its own particular effects on frequency characteristics. These effects are determined by a number of conditions, such as room size, furnishings, etc.

The 7 separate divisions of the band level control on the SH-8046 make it possible to selectively correct only the frequency ranges necessary to suit the conditions of each listening room.

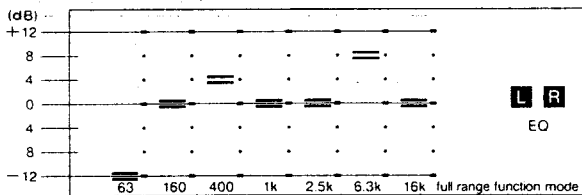
An example of room acoustics correction

In order to correct the peaks and dips in bass sounds caused by reflection, reduce the 160 Hz level 4~6 dB and then, raise the level of sounds below 63 Hz and above 6.3 kHz slightly.



Cutting the noise from live recording tapes

Live tapes recorded outdoors generally contain popping noises caused by wind and various other noises from the surrounding area. In order to effectively eliminate wind noise, cut bass sounds below 63 Hz and raise the level of sounds in the 400 Hz range. Then control sounds made by birds, etc., with a 6.3 kHz adjustment.

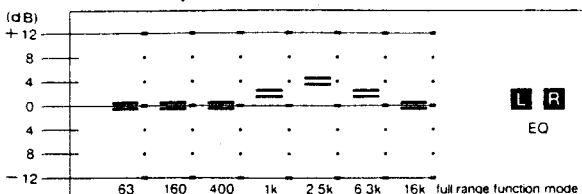


Producing clear vocals

For female vocals, raise the level of the 1 kHz~2.5 kHz range by 2~4 dB. To rectify omission, raise the level of the 6.3 kHz vicinity slightly.

Male vocals can be improved by raising the level of the 400 Hz~2.5 kHz range.

Below is an example of a female vocal correction.

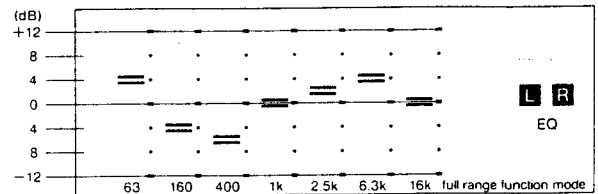


Making tapes for car stereos

Tapes can be made exclusively for the listening conditions inside a vehicle. Merely raise the 63 Hz level 3~4 dB.

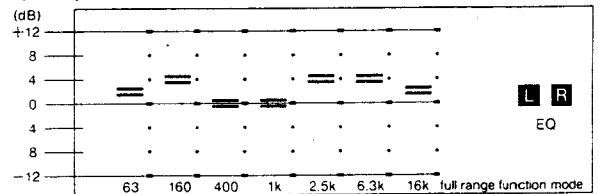
For medium and low frequencies, centering on the 400 Hz

vicinity, lower the modulating effect by raising the 2.5 kHz~6.3 kHz vicinity by 2~4 dB.



Adding some power to disco music

Increase the power of bass guitars and bass drums by raising the level of the 63 Hz~160 Hz range, and raise the level of sounds from 2.5 kHz to 16 kHz. The result will be greatly emphasized low frequency sounds and strong, clear high frequency sounds.

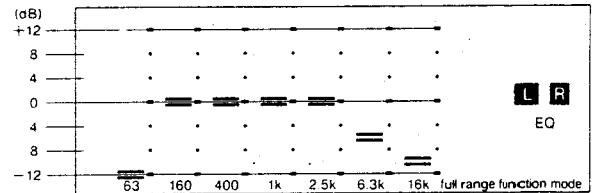


Cutting noise from discs

Noises from warped discs are low frequency noise components. Lowering the sound level of the 63 Hz vicinity can eliminate these.

To cut noise in old discs, set all direct-equalization level controls to the "flat" (center) position, and then move them individually to the -12 dB position to find the noise component.

Then, working from this clue, cut the noise so as not to deteriorate the tone quality.

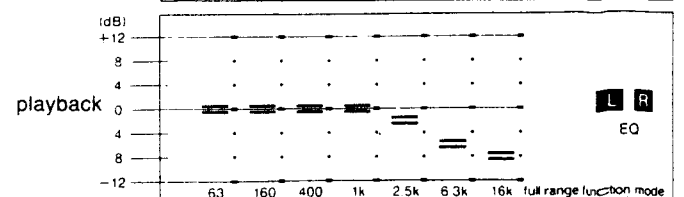
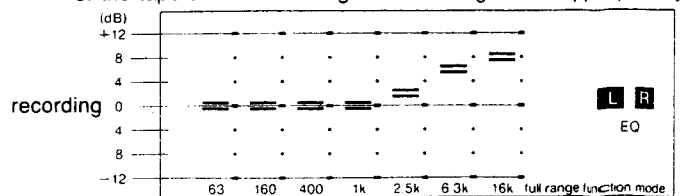


Reducing tape hiss

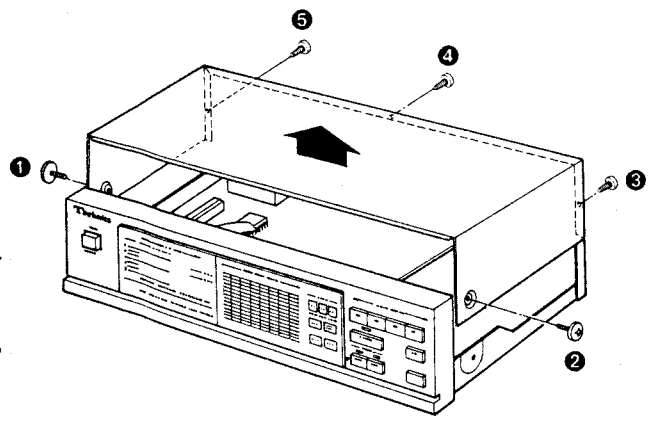
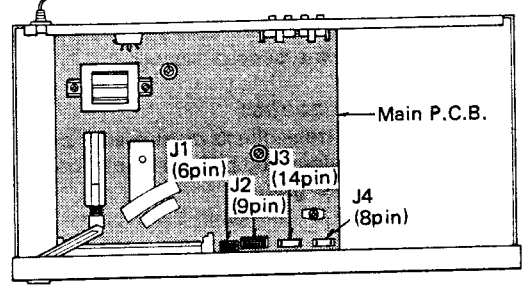
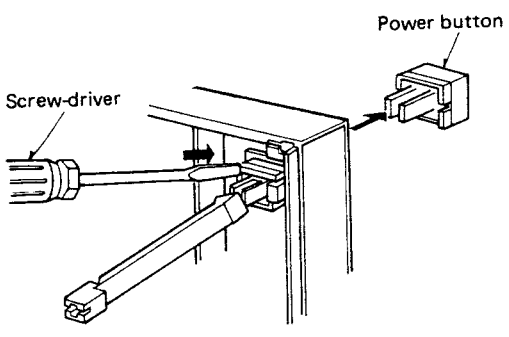
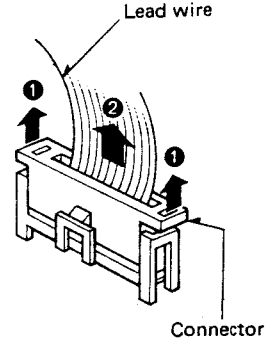
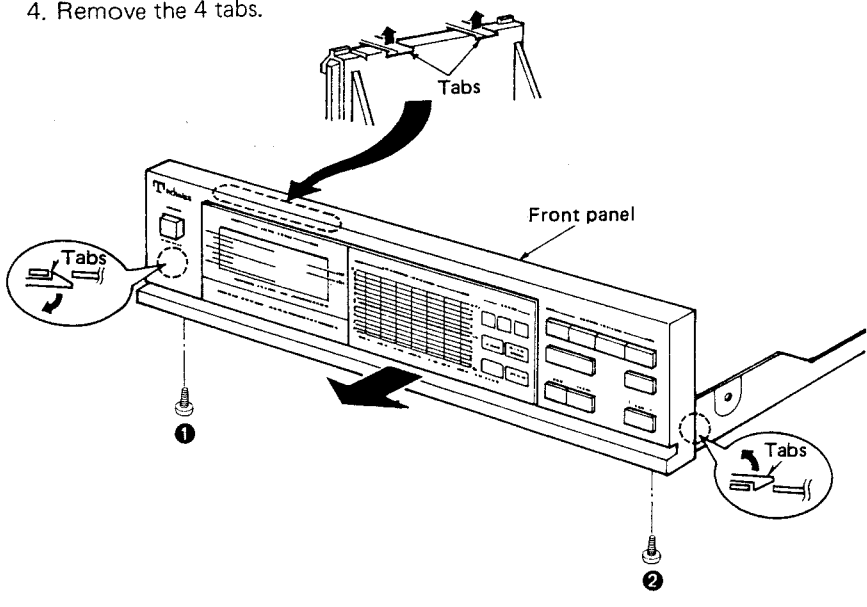
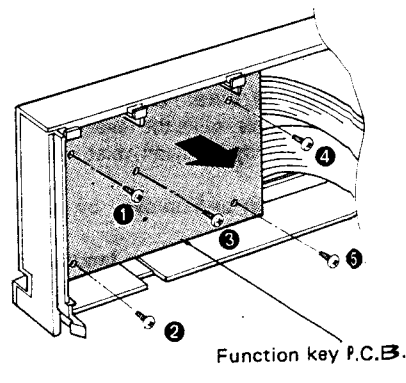
Tape hiss can be effectively reduced by slightly raising the level of high frequency (above 2.5 kHz) sounds during tape deck recording, and then lowering them during playback.

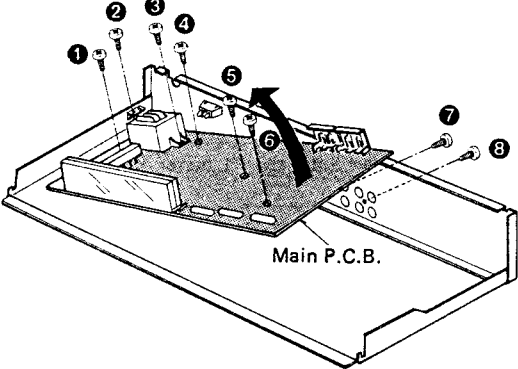
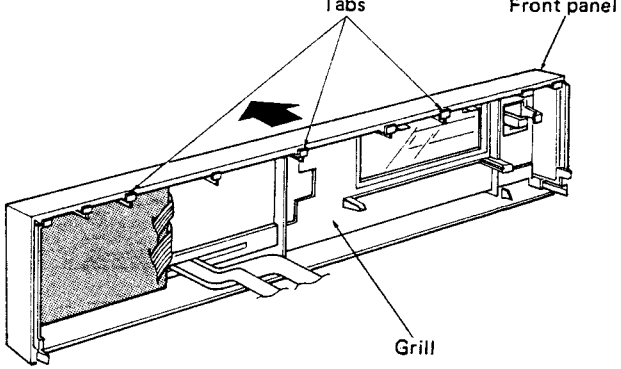
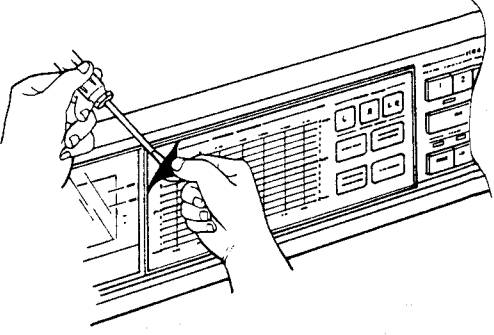
Note:

If sounds above 6.3 kHz are raised too much, distortion may result in the tape deck. Prevent this by watching the level meters of the tape deck and setting the recording levels appropriately.



DISASSEMBLY INSTRUCTIONS

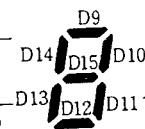
<p>Ref. No. 1</p>	<p>Ref. No. 2</p>
<p>How to remove the cabinet</p>	<p>How to remove the front panel</p>
<p>Procedure 1</p> <p>1. Remove the 5 screws (❶ ~ ❺).</p> 	<p>Procedure 1 → 2</p> <p>1. Pull off lead wire at 4 connectors (J1, 2, 3, 4).</p> 
<p>2. Remove the push a power button by screw-driver.</p> 	<p>Note:</p> <p>How to remove the connectors (J3, 4)</p> <ol style="list-style-type: none"> 1. Draw up a connector as direction of arrow ❶ . 2. Pull off lead wire as direction of arrow ❷ . 3. When fixing connector in lead wire, fit in order of inversion. 
<p>3. Remove the 2 screws (❶ , ❷).</p> <p>4. Remove the 4 tabs.</p> 	<p>Ref. No. 3</p> <p>How to remove the function key P.C.B.</p> <p>Procedure 1 → 3</p> <p>1. Remove the 5 screws (❶ ~ ❺).</p> 

Ref. No. 4	How to remove the main P.C.B.	Ref. No. 5	How to remove the grill
Procedure 1 → 2 → 4	1. Remove the 8 screws (❶ ~ ❸) raise the main P.C.B. as shown by curved arrow.	Procedure 1 → 2 → 5	1. Push down the 3 tabs. 2. Remove the front panel from chassis as direction of arrow.
			
Ref. No. 6	Exchange of direct EQ level and control switch		
Procedure 6			
<p>When exchanging switch only from the reason of injury or dirt on its surface, peel it off by raising it at the four corners with a screw-driver as shown in the right figure. Switch peeled off shall not be used again.</p> <p>* The switch is supplied stuck on the "grill" of repair parts.</p>			

FUNCTION OF IC'S

• Micro-computer (IC13) HD614042SD15

Pin No.	Notation	Object of Function	
		Input	Output
1	D ₁₁	+2dB line & Lch, memory 4 key input to key scan	+2dB segment output to FL meter β segment output
2	D ₁₂	+4dB line & lock, EQ on/off key input to key scan	+4dB segment output to FL meter β segment output
3	D ₁₃	+6dB line & spectrum analyzer key input to key scan	+6dB segment output to FL meter β segment output
4	D ₁₄	+8dB line & Rch key input to key scan	+8dB segment output to FL meter β segment output
5	D ₁₅	+10dB line & Reverse key input to key scan	+10dB segment output to FL meter β segment output
6	R ₀₀	—	Grid output of 63Hz to FL meter & line output for 63Hz of key scan
7	R ₀₁	—	Grid output of 160Hz to FL meter & line output for 160Hz of key scan
8	R ₀₂	—	Grid output of 400Hz to FL meter & line output for 400Hz of key scan
9	R ₀₃	—	Grid output of 1kHz to FL meter & line output for 1kHz of key scan
10	R ₁₀	—	Grid output of 2.5kHz to FL meter & line output for 2.5kHz of key scan
11	R ₁₁	—	Grid output of 6.3kHz to FL meter & line output for 6.3kHz of key scan
12	R ₁₂	—	Grid output of 16kHz to FL meter & line output for 16kHz of key scan
13	R ₁₃	—	All band grid output for FL meter
14	R ₂₀	—	Lch, Rch, EQ, lock, reverse, β grid output for FL meter
15	R ₂₁	—	Spectrum analyzer scale segment output to FL meter
16	R ₂₂	—	EQ level scale segment output to FL meter
17	R ₂₃	+12dB line & Lch, Rch key input to key scan	+12dB segment output to FL meter
18	R _{AO}	Input terminal of A/D	—
19	R _{A1/V}	Output power source terminal (-32V) of high voltage withstanding terminal (D4~D15, R ₀₀ ~R ₁₃ , R ₂₀ ~R ₂₃)	—
20	R ₃₀	—	—
21	R ₃₁	—	—
22	R ₃₂ /INTO	Input terminal for external interruption to MCU H..... active mode L..... stop mode	—
23	R ₃₃ /INTI	—	—
24	R ₅₀	—	Output for controlling data of IC2 (TC9164N)
25	R ₅₁	—	Output for controlling data of IC6 (LC7522)
26	R ₅₂	—	Output for controlling data of IC5 (LC7522)
27	R ₅₃	—	Output for controlling strobe of IC 2 (TC9164N)
28	R ₆₀	—	Output for lighting LED for tape
29	R ₆₁	—	Output for lighting LED for source
30	R ₆₂	—	Output for lighting LED for rec
31	R ₆₃	—	Output for lighting LED for memory
32	V _{CC}	5V source	—



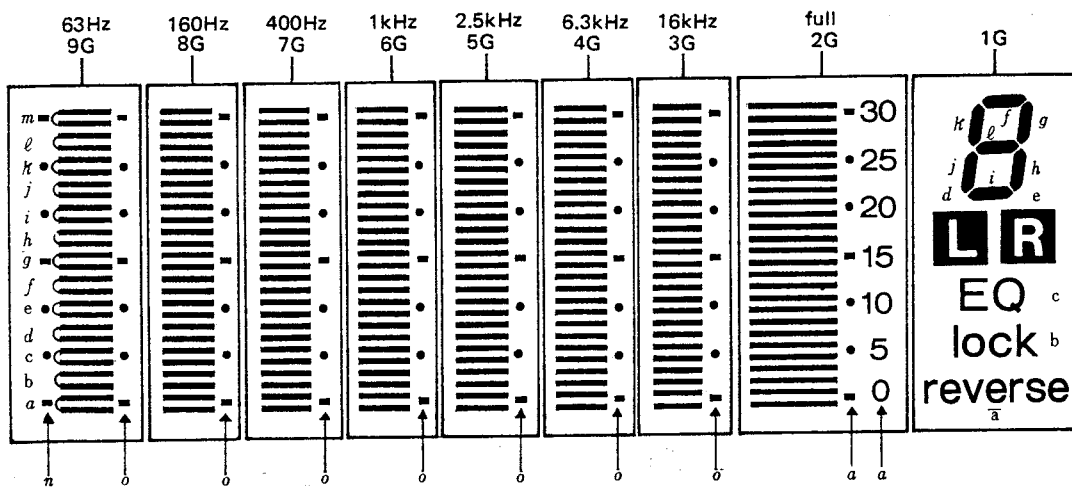
Pin No.	Notation	Object of Function	
		Input	Output
33	R ₄₀ /SCK	—	Data A output of IC12 (HD14051)
34	R ₄₁ /SI	—	Data B output of IC12 (HD14051)
35	R ₄₂ /SO	—	Data C output of IC12 (HD14051)
36	R ₄₃	—	Output for controlling lock of IC2 (TC9164N)
37	R ₇₀	—	A/D conversion data bit 0 output
38	R ₇₁	—	A/D conversion data bit 1 output
39	R ₇₂	—	A/D conversion data bit 2 output
40	R ₇₃	—	A/D conversion data bit 3 output
41	R ₈₀	—	A/D conversion data bit 4 output
42	R ₈₁	—	A/D conversion data bit 5 output
43	R ₈₂	—	A/D conversion data bit 6 output
44	R ₈₃	—	A/D conversion data bit 7 output
45	R ₉₀	Selection for indication of spectrum analyzer H bar indication only L bar/dot indication select	—
46	R ₉₁	—	—
47	R ₉₂	—	—
48	R ₉₃	—	—
49	RESET	Terminal for resetting MCU	—
50	TEST	—	—
51	OSC1	Input terminal for internal oscillator	—
52	OSC2	Input terminal for internal oscillator	—
53	GND	—	Ground
54	D ₀	—	Output for controlling clock of IC5, 6 (LC7522)
55	D ₁	—	For muting music sound H on L off
56	D ₂	—	Key output for key scan Lch, Rch, reverse, Rci, spectrum Analyzer, lock, EQ
57	D ₃	—	Key output for key scan EQ on/off, memory, memory 1, 2, 3, 4, rec, tape, source
58	D ₄	-12dB line & tape key input to key scan	-12dB segment output to FL meter reverse segment output
59	D ₅	-10dB line & source key input to key scan	-10dB segment output to FL meter lock segment output
60	D ₆	-8dB line & rec key input to key scan	-8dB segment output to FL meter EQ segment output
61	D ₇	-6dB line & memory key input to key scan	-6dB segment output to FL meter <input type="checkbox"/> segment output
62	D ₈	-4dB line & memory 1 key input to key scan	-4dB segment output to FL meter <input type="checkbox"/> segment output
63	D ₉	-2dB line & memory 2 key input to key scan	-2dB segment output to FL meter 8 segment output
64	D ₁₀	0dB line & memory 3 key input to key scan	0dB segment output to FL meter 8 segment output

● Electronic volume (IC5, 6) LC7522

Pin No.	Notation	Object of Function
1	V _{DD}	Power supply terminal (for sound signal)
2 (27)	IN1	Sound signal input terminal. Pin 2 is not connection

Pin No.	Notation	Object of Function
3 (26)	IN2	Sound signal input terminal. Pin 3 is not connection
4 (25) 10 (19)	f_7 f_1	Band filter connection terminal. Pin 4—10 are not connection
11 (12)	TEST 2 TEST 1	Non connection
13	S	—
14	V _{EE}	Power supply terminal (for sound signal)
15	V _{CC}	Power supply terminal
16	D1	Terminal for data signal input from micro-computer (IC13)
17	CLK	Terminal for clock signal input from micro-computer (IC13)
18	V _{SS}	Ground

GRID AND SEGMENT OF FL DISPLAY TUBE



F : filament, 1G ~ 9G : grids, a ~ n : segments, NP : vacant terminals

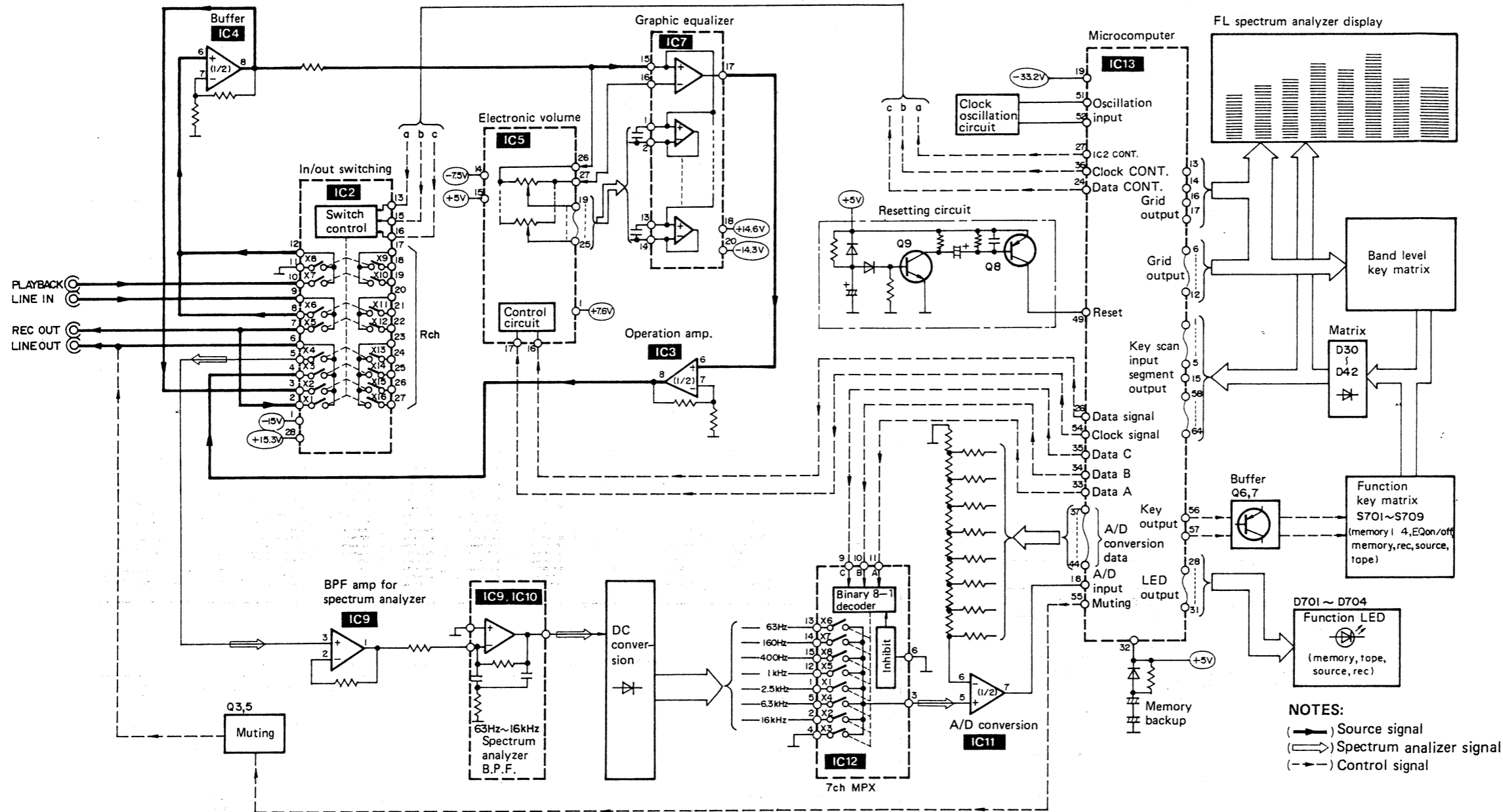
Segment terminal No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42							
Name of terminal	F	F	NP	9	9	NP	NP	NP	8	NP	NP	NP	7	NP	NP	6	NP	O	5	G	n	m	l	4	G	k	j	3	G	i	h	2	G	f	2	G	e	d	1	G	c	b	a	1	G	NP	F	2	F

TERMINAL GUIDE OF IC'S, TRANSISTORS AND DIODES

	<table border="1"> <tr><td>LA6324</td><td>14 Pin</td></tr> <tr><td>HD14051BP</td><td>16 Pin</td></tr> <tr><td>M5229P</td><td>20 Pin</td></tr> <tr><td>TC9164N</td><td>28 Pin</td></tr> <tr><td>LC7522</td><td>28 Pin</td></tr> <tr><td>HD614042SD15</td><td>64 Pin</td></tr> </table>	LA6324	14 Pin	HD14051BP	16 Pin	M5229P	20 Pin	TC9164N	28 Pin	LC7522	28 Pin	HD614042SD15	64 Pin	<p>2SA1015-Y 2SC1815L-G 2SC2878A-T</p>	<p>2SA1309Q 2SC3311-Q</p>	<p>SVD1B4B42</p>
	LA6324	14 Pin														
HD14051BP	16 Pin															
M5229P	20 Pin															
TC9164N	28 Pin															
LC7522	28 Pin															
HD614042SD15	64 Pin															
<table border="1"> <tr><td>M5223L</td><td>8 Pin</td></tr> <tr><td>SVITA75559S</td><td>9 Pin</td></tr> </table>	M5223L	8 Pin	SVITA75559S	9 Pin	<p>L78N05</p> <p>1. Input 2. Output 3. Common</p>	<p>MA2150B MA4068M MA4075M</p> <p>Anode Cathode</p> <p>Ca — >— A</p>	<p>SVD1SS119-04 SVD1SR35200A</p> <p>Anode Cathode</p> <p>Ca — >— A</p>	<p>LN224WP</p> <p>Anode Cathode</p> <p>Ca — >— A</p>								
M5223L	8 Pin															
SVITA75559S	9 Pin															

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■ BLOCK DIAGRAM



■ SCHEMATIC DIAGRAM

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

Note 1:

1. **S1-1~S1-4:** Power switch in "on" position.
S1-6: Muting switch that prevent flickering of FL and/or LED as a result of malfunction of microcomputer and change of equalizer level when power is put ON/OFF.)
2. **S2:** Voltage selection switch in "240 V" position.
[XA, PA, PE areas.]
(110V ↔ 127V ↔ 220V ↔ 240V)
3. **S701~S704:** Preset-memory switch. (memory 1 ~ memory 4)
4. **S705:** Equalization ON/OFF (EQ) switch in "off" position
5. **S706:** Memory switch in "off" position.
6. **S707:** Equalization-record switch in "off" position.
7. **S708, S709:** Input selection switch. (source, tape)
8. Direct equalizer level control key matrix circuit includes switches that "vary all frequencies in the range of ±12dB", "LOCK" switch, "Reverse" switch, "Display mode" switch and channel select "switch".
9. All voltage values shown in circuitry are the standard values for the DC electronic circuit tester (high-impedance) with the ground point taken as standard.
Therefore, there may exist some errors in the voltage values, depending on the internal impedance of the DC circuit tester.

NOTES:

- (—) Source signal
- (---) Spectrum analyzer signal
- (· · ·) Control signal

● Function of IC2 (TC9164N)

Input select switch position		IC's switch No.							
		X 1	X 2	X 3	X 4	X 5	X 6	X 7	X 8
Source	EQ Switch off	on	on	off	*	off	on	off	off
	REC Switch off	on	on	off	*	off	on	off	off
	EQ Switch on	off	off	on	*	on	on	off	off
	REC Switch off	off	off	on	*	on	on	off	off
	REC Switch on	on	off	on	*	off	on	off	off
	REC Switch on	on	off	on	*	off	on	off	off

Input select switch position		IC's switch No.							
		X 1	X 2	X 3	X 4	X 5	X 6	X 7	X 8
Tape	EQ Switch off	off	on	off	*	on	off	on	off
	EQ Switch on	off	off	on	*	on	off	on	off

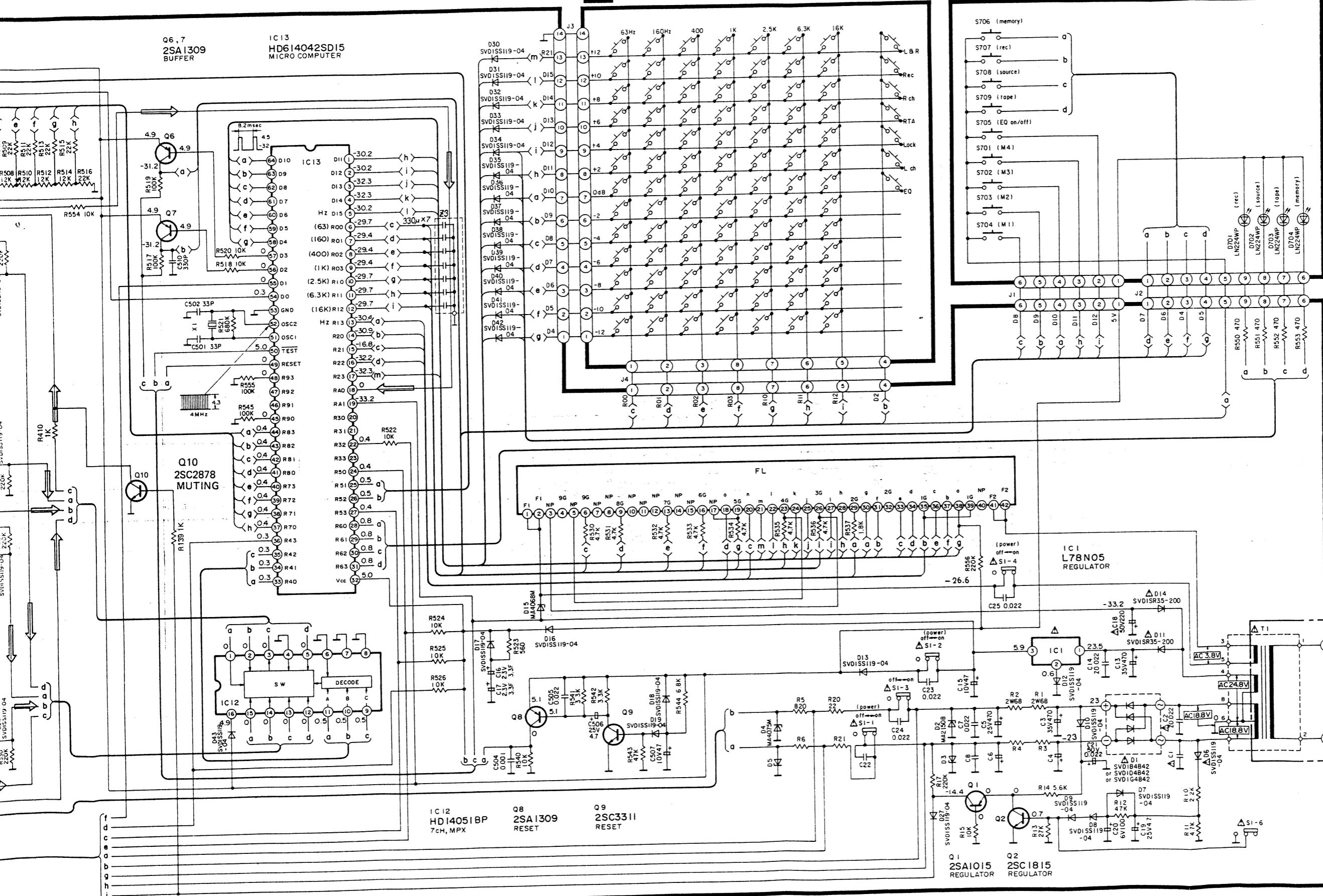
* X4 use for spectrum analyzer, Lch-Rch selection.

* NOTICE: IC & LSI are weak to static charge !!

- In repair work, delicate care prevents secondary fault.
- Stick aluminium foil on the surface of resin-made container for parts.
 - Ground soldering iron.
 - Use conductive mat to work on.
 - Don't hold legs of IC & LSI with fingers directly.
 - Start repair work after discharging memory holding gold capacitors C16 and C17 (2.3V, 3.3 F).

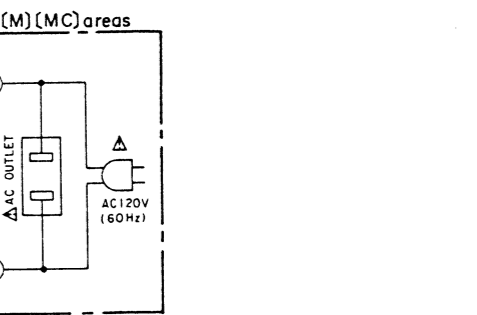
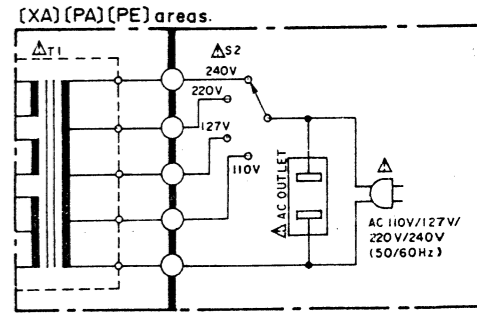
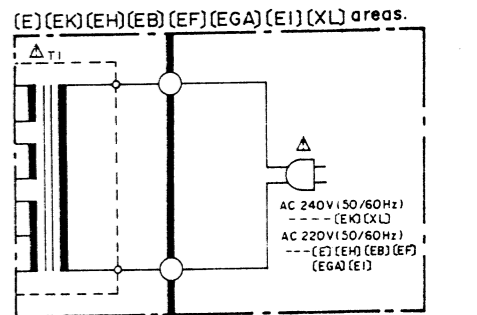
B EQ LEVEL CONTROL KEY CIRCUIT SECTION

C FUNCTION KEY CIRCUIT SECTION



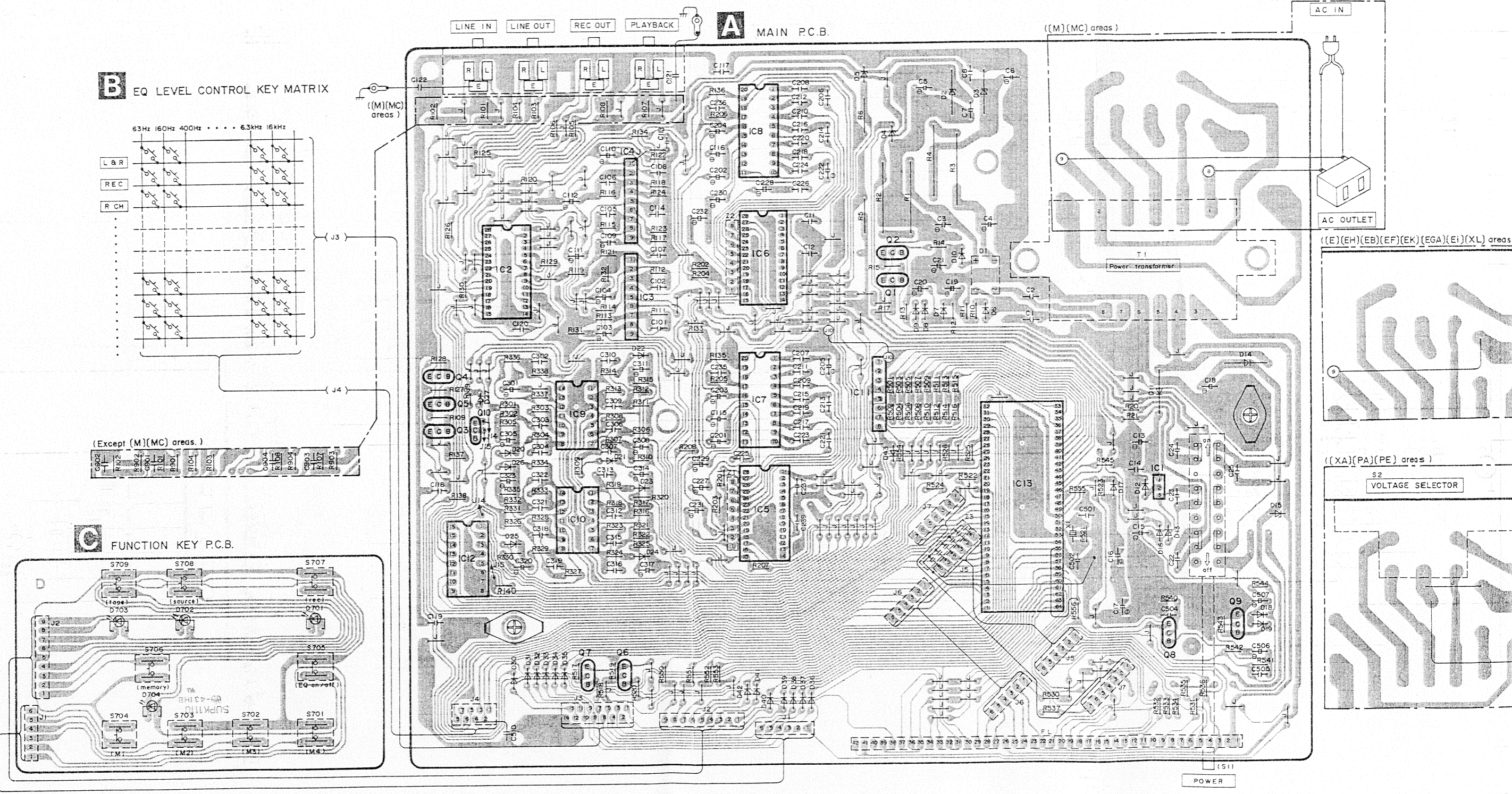
Note 2.

1. 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.
2. Signal line
 - \rightarrow Source signal
 - \Rightarrow Spectrum analyzer signal
 - \rightarrow + B (- B) line.

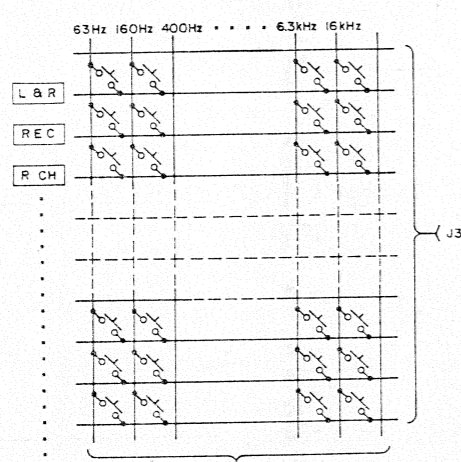


PRINTED CIRCUIT BOARDS AND WIRING CONNECTION DIAGRAM

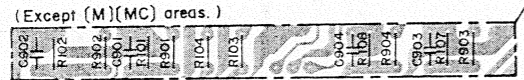
A
B
C
D
M
T



B EQ LEVEL CONTROL KEY MATRIX

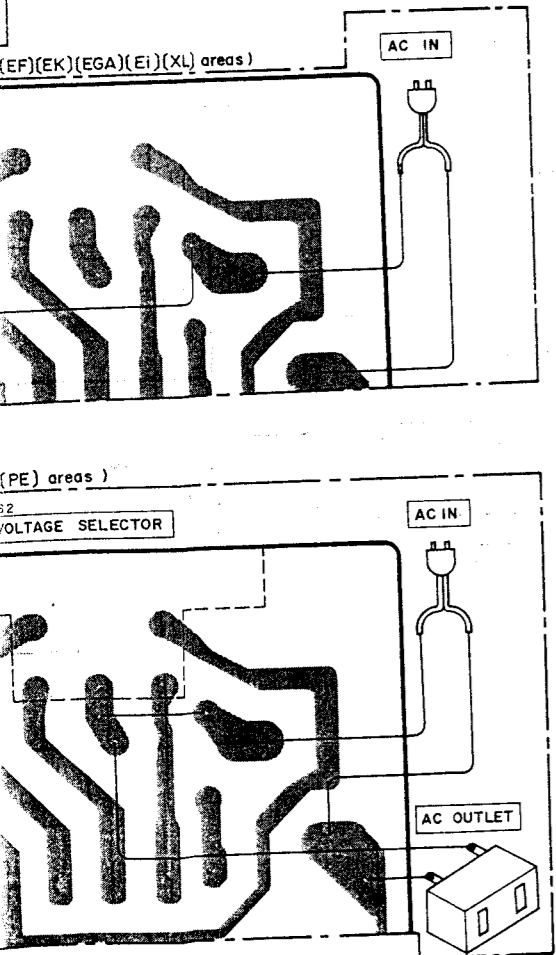
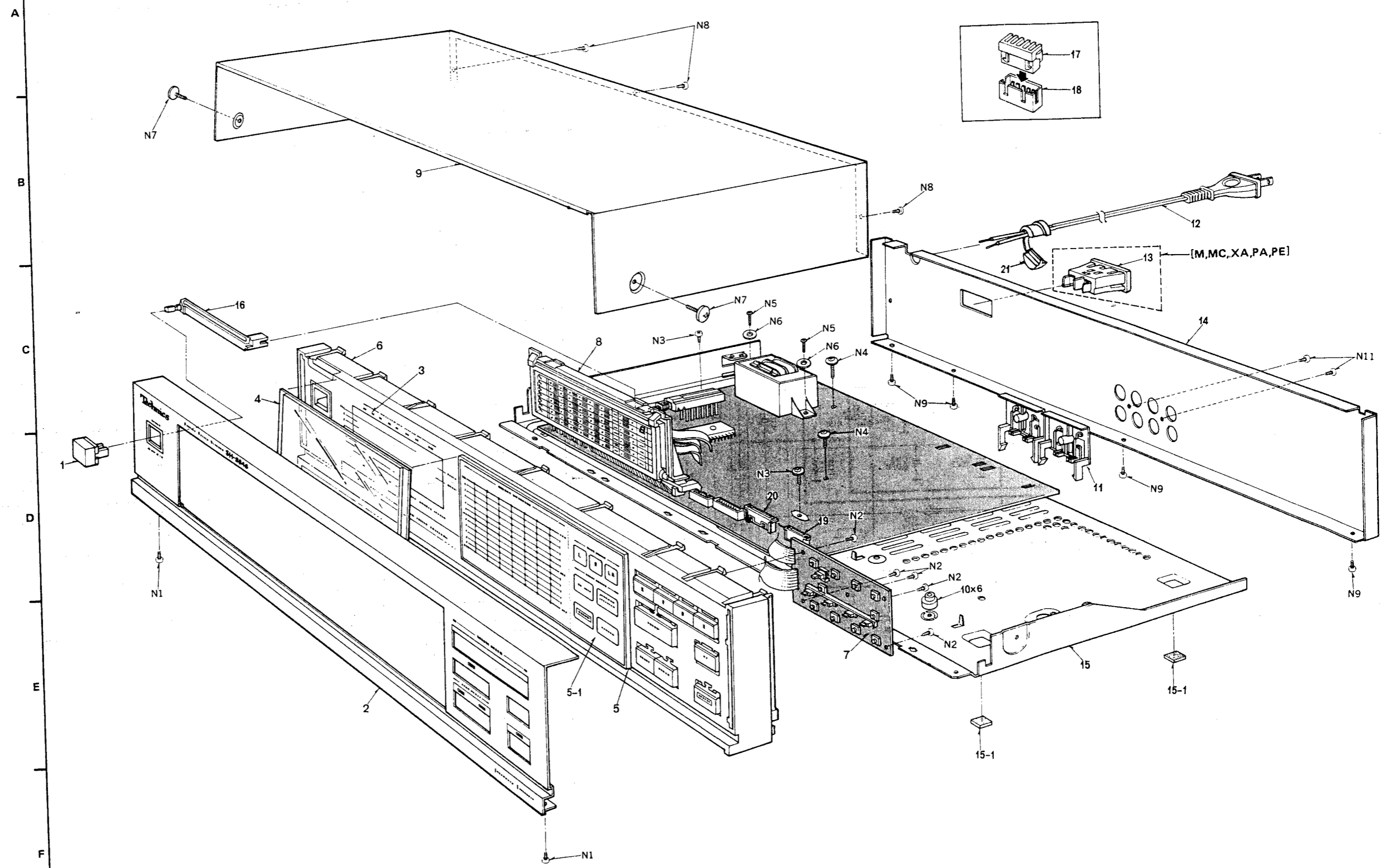


(Except (M)(MC) areas.)



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EXPLODED VIEW



REPLACEMENT PARTS LIST

Notes:

- Part numbers are indicated on most mechanical parts. Please use this part number for parts order.
- 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.
- \otimes - marked parts are used for black only, while \circ - marked parts are for silver type only.
- Part other than \otimes - and \circ - marked are used for both black and silver type.
- Bracketed indications in Ref. No. columns specify the area. Parts without these indications can be used for all areas.
- The "S" mark is service standard parts and may differ from production parts.
- The parenthesized numbers in the column of description stand for the quantity per set.

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
INTEGRATED CIRCUITS			CABINET and CHASSIS			CABINET and CHASSIS		
IC1 [other]	Δ L78N05	IC	1	\circ SBC666	Button, Power (Silver Type) (1)	18	SJT3611	Post, 6P (J1) (1)
IC1 [EK, XL]	Δ AN78N05	IC	1	\otimes SBC666-3	Button, Power (Black Type) (1)	18	SJT3907	Post, 9P (J2) (1)
IC2	TC9164N	IC	2	\circ SGWH8046-SM	Front Panel Ass'y (Silver Type) (1)	19	SJS51473SK	Socket, 14P (J3) (1)
IC3, 4	SVITA75559S	IC	2	\otimes SGWH8046-KM	Front Panel Ass'y (Black Type) (1)	20	SJS50873SK	Socket, 8P (J4) (1)
IC5, 6	LC7522	IC	3	\circ SUDK14-1	FL Filter (Silver Type) (1)	21 [M, MC]	RHR111	Bushing, AC Cord (1)
IC7, 8	M5229P	IC	3	\otimes SUDK14	FL Filter (Black Type) (1)	21 [EK]	SHR129	Bushing, AC Cord (1)
IC9, 10	LA6324	IC	4	SGUK17	FL Tinted Plate (1)	21 [other]	SHR127	Bushing, AC Cord (1)
IC11	M5223L	IC	5	\circ SGXH8046-SM	Membrane Switch Ass'y (Silver Type) (1)	SCREWS AND WASHERS		
IC12	HD14051BP	IC	5	\otimes SGXH8046-KN1	Membrane Switch Ass'y (Black Type) (1)	N1	XTB3+10GFZ	Tapping \otimes 3 x 10 (4)
IC13	HD614042SD15	IC	5-1	\circ SSEK17-1	Membrane Switch (Silver Type) (1)	N2	XTB3+10GFYR	Tapping \otimes 3 x 10 (5)
TRANSISTORS			5-1	\otimes SSEK17	Membrane Switch (Black Type) (1)	N3	XTBS3+20F1	Tapping \otimes 3 x 20 (2)
Q1	2SA1015Y	Transistor	6	\circ SYEK35-1	Front Grille (Silver Type) (1)	N4	XTW3+20T	Tapping \otimes 3 x 20 (2)
Q2	2SC1815L-G	Transistor	6	\otimes SYEK35	Front Grille (Black Type) (1)	N5	XTB3+25J	Tapping \otimes 3 x 25 (2)
Q3, 6, 7, 8	2SA1309Q	Transistor	7	SDUK13	Holder, LED (1/1)	N6	SNW3211	Washer (2)
Q4, 5, 10	2SC2878A-T	Transistor	8	SHRK933	Holder, FL (1)	N7	\circ SNE2095-4	Cabinet (Silver Type) (2)
Q9	2SC3311-Q	Transistor	8	\otimes SKCK170K99	Cabinet (Black Type) (1)	N7	\otimes SNE2095-5	Cabinet (Black Type) (2)
DIODES			9	\circ SKCK170S98	Cabinet (Silver Type) (1)	N8	XTB3+8BFZ	Tapping \otimes 3 x 8 (3)
D1	Δ SVD1B4B42	Diode	9	\otimes SKCK170K99	Cabinet (Black Type) (1)	N9	XTB3+12B	Tapping \otimes 3 x 12 (4)
D2, 3	MA2150B	Diode	10	SHE187	Holder, P.C.B. Terminal (6)	ACCESSORIES		
D4, 5	MA4075M	Diode	11	SJF3057N	Terminal (2)	A1 [M]	SQFK10123	Instruction Book (1)
D6-10, 12, 13, 16-27, 30-43	Δ SVD1SS119-04	Diode	12 [M]	Δ RJA9YA-Y	AC Cord (1)	A1 [MC]	SQFK10124	Instruction Book (1)
D11, 14	Δ SVD1SR35200	Diode	12 [MC]	Δ SJA169	AC Cord (1)	A1 [EGA]	SQFK10126	Instruction Book (1)
D15	MA4068M	Diode	12 [EK]	Δ QFC1205M	AC Cord (1)	A1	SQFK10127	Instruction Book (1)
D701-704	LN224WP	LED	12 [XL]	Δ SJAG23	AC Cord (1)	[PA, PE]		
TRANSFORMER			12 [XL]	Δ RJA52YAK	AC Cord (1)	A1 [other]	SQFK10125	Instruction Book (1)
T1 [M, MC]	Δ SLTK5K6	Power Supply	12 [PA, PE]	Δ SJA138-3	AC Cord (1)	A2	SJPK2201	Connection Cord (Pin, 0.8n) (2)
T1	Δ SLTK5K7	Power Supply	12 [other]	Δ SJS9221-1	AC Outlet (1)	A3	Δ SJP9215	Plug, AC Adaptor (1)
[XA, PA, PE]			13 [M, XA, PA, PE]	Δ SJS9223	AC Outlet (1)	A3 [PA, PE]	Δ SJP5213-1	Plug, AC Adaptor (1)
T1	Δ SLTK5K8	Power Supply	13 [MC]			[XA]		
[E, EH, EGA]			14 [M, MC]	SGPK350-1A	Rear Panel (1)	PACKING		
[EB, EF, EI]			14 [E]	SGPK350-3A	Rear Panel (1)	P1 [M]	\otimes SPGK212	Carton Box (Black Type) (1)
T1 [EK, XL]	Δ SLTK5K9	Power Supply	14 [EGA]	SGPK350-3B	Rear Panel (1)	P1	\circ SPGK231	Carton Box (Silver Type) (1)
CRYSTAL			14 [EH, EB, EF, EI]	SGPH8046-KF	Rear Panel Ass'y (1)	P1 [MC]	\otimes SPGK213	Carton Box (Black Type) (1)
X1	SVFCSA400MG	Crystal OSC	14 [E, EK]	SGPK350-3C	Rear Panel (1)	P1 [MC]	\circ SPGK232	Carton Box (Silver Type) (1)
FLUORESCENT DISPLAY TUBE			14 [XL]	SGPK350-3D	Rear Panel (1)	P1 [EK]	\otimes SPGK216	Carton Box (Black Type) (1)
FL1	SADBG350Z	Spectrum Analyzer	14 [XA, PA, PE]	SGPK350-4A	Rear Panel (1)	P1 [EK]	\circ SPGK233	Carton Box (Silver Type) (1)
COMPONENT COMBINATIONS			15 [M]	SKUH8046-KM	Chassis Ass'y (1)	P1 [EF]	\otimes SPGK215	Carton Box (Black Type) (1)
Z1, 2	RGLD7X224J	Component Combination	15 [MC]	SKUH8046-KN	Chassis Ass'y (1)	P1 [EF]	\circ SPGK234	Carton Box (Silver Type) (1)
Z3	PJB7XC331M	Component Combination	15 [other]	SKUH8046-KE	Chassis Ass'y (1)	P1 [XL]	\otimes SPGK217	Carton Box (Black Type) (1)
SWITCHES			15-1	SKL293	Foot (4)	P1 [XL]	\circ SPGK230	Carton Box (Silver Type) (1)
S1	Δ SSHK60	Power Voltage Selector	16	SUBK17	Connection Rod (1)	P1 [other]	\otimes SPGK214	Carton Box (Black Type) (1)
S2	Δ SSR187-1	Pre-Set	17	SJS50671DS	Connector, 6P (J1) (1)	P1 [other]		
S701-709	SSG13		17	SJS50971DS	Connector, 9P (J2) (1)	P2 [XL]	SPSK91-1	Pad, Left Side (1)
						P2 [other]	SPSK91	Pad, Left Side (1)
						P3 [XL]	SPSK92-1	Pad, Right Side (1)
						P3 [other]	SPSK92	Pad, Right Side (1)
						P4	\circ SPP725	Polyethylene Sheet (Silver Type) (1)
						P4	\otimes SPPK48	Polyethylene Sheet (Black Type) (1)

Numbering System of Resistor

Example

ERD 25 F J 101
Type Wattage Shape Tolerance Value

Resistor Type	Wattage	Tolerance
ERD : Carbon	10 : 1/8W 2F : 1/4W S2 : 1/4W	J : ±5%

Numbering System of Capacitor

Example

ECKD 1H 102 Z F
Type Volgage Value Tolerance Peculiarity

Capacitor Type	Voltage	Tolerance
ECEA : Electrolytic	0J : 6.3V	K : ±10%
ECCD : Ceramic	1A : 10V	Z : +80%, -20%
ECKD : Ceramic	1C : 16V	M : ±20%
ECF : Semi-conductor	1E : 25V	
ECQV : Polyester	D : 25V	
ECQM : Polyester	1H : 50V	
EECW : Liquid electrolyte duble layer	1V : 35V 2R3 : 2.3V	

The unit of resistance is Ω (ohm), K = 1000Ω, M = 1000kΩ.
The unit of capacitance is μF (microfarad). P = 10⁻⁶ μF

● RESISTORS

Ref. No.	Part No.	Value	Ref. No.	Part No.	Value	Ref. No.	Part No.	Value	Ref. No.	Part No.	Value
R1, 2	ERG2ANJ680	68	R139, 140	ERDS2TJ102	1 K	R327	ERDS2TJ333	33K	R521	ERDS2TJ684	680K
R3, 4	ERG2ANJ680	68	R201, 202	ERDS2TJ224	220K	R328	ERDS2TJ154	150K	R522	ERDS2TJ103	10K
R5, 6	ERDS2TJ821	820	R203, 204	ERDS2TJ224	220K	R329	ERDS2TJ272	2.7K	R523	ERDS2TJ561	560
R10	ERDS2TJ222	2.2K	R205, 206	ERDS2TJ682	6.8K	R330	ERDS2TJ224	220K	R524, 525	ERDS2TJ103	10K
R11	ERDS2TJ472	4.7K	R207, 208	ERDS2TJ123	12K	R331	ERDS2TJ223	22K	R526	ERDS2TJ103	10K
R12	ERDS2TJ473	47K	R301	ERDS2TJ822	8.2K	R332	ERDS2TJ103	10K	R530, 531	ERDS2TJ472	4.7K
R13	ERDS2TJ273	27K	R302	ERDS2TJ333	33K	R333	ERDS2TJ474	470K	R532, 533	ERDS2TJ472	4.7K
R14	ERDS2TJ562	5.6K	R303	ERDS2TJ154	150K	R334	ERDS2TJ182	1.8K			
R15	ERDS2TJ103	10K	R304	ERDS2TJ272	2.7K	R335	ERDS2TJ224	220K	R534, 535	ERDS2TJ472	4.7K
R17	ERDS2TJ224	220K	R305	ERDS2TJ224	220K	R336	ERDS2TJ154	150K	R536	ERDS2TJ472	4.7K
									R537	ERDS2TJ182	1.8K
R20, 21	ERDS2TJ220	22	R306	ERDS2TJ822	8.2K	R337	ERDS2TJ104	100K	R540	ERDS2TJ103	10K
R101, 102	ERDS2TJ104	100K	R307	ERDS2TJ273	27K	R338	ERDS2TJ334	330K	R541, 542	ERDS2TJ332	3.3K
R103, 104	ERDS2TJ331	330	R308	ERDS2TJ154	150K	R501	ERDS2TJ223	22K	R543	ERDS2TJ473	4.7K
R105, 106	ERDS2TJ331	330	R309	ERDS2TJ152	1.5K	R502	ERDS2TJ123	12K	R544	ERDS2TJ682	6.8K
R107, 108	ERDS2TJ104	100K	R310	ERDS2TJ224	220K	R503	ERDS2TJ223	22K	R545	ERDS2TJ104	100K
R109	ERDS2TJ103	10K	R311	ERDS2TJ822	8.2K	R504	ERDS2TJ123	12K	R550, 551	ERDS2TJ471	4.70
R111, 112	ERDS2TJ123	12K	R312	ERDS2TJ333	33K	R505	ERDS2TJ223	22K	R552, 553	ERDS2TJ471	4.70
R113, 114	ERDS2TJ183	18K	R313	ERDS2TJ154	150K	R506	ERDS2TJ123	12K			
R115, 116	ERDS2TJ472	4.7K	R314	ERDS2TJ821	820	R507	ERDS2TJ223	22K	R554	ERDS2TJ103	10K
R117, 118	ERDS2TJ473	47K	R315	ERDS2TJ224	220K	R508	ERDS2TJ123	12K	R555	ERDS2TJ104	100K
									R556	ERDS2TJ224	220K
R119, 120	ERDS2TJ102	1K	R316	ERDS2TJ562	5.6K	R509	ERDS2TJ223	22K	R901, 902	ERDS2TJ102	1K
R121, 122	ERDS2TJ154	150K	R317	ERDS2TJ333	33K	R510	ERDS2TJ123	12K	Except		
R123, 124	ERDS2TJ104	100K	R318	ERDS2TJ154	150K	R511	ERDS2TJ223	22K	[M, MC]		
R125, 126	ERDS2TJ222	2.2K	R319	ERDS2TJ681	680	R512	ERDS2TJ123	12K	R903, 904	ERDS2TJ102	1K
R127, 128	ERDS2TJ102	1K	R320	ERDS2TJ274	270K	R513	ERDS2TJ223	22K	Except		
R129, 130	ERDS2TJ224	220K	R321	ERDS2TJ822	8.2K	R514	ERDS2TJ123	12K	[M, MC]		
R131, 132	ERDS2TJ104	100K	R322	ERDS2TJ333	33K	R515, 516	ERDS2TJ223	22K			
R133, 134	ERDS2TJ123	12K	R323	ERDS2TJ154	150K	R517	ERDS2TJ104	100K			
R135, 136	ERDS2TJ273	27K	R324	ERDS2TJ272	2.7K	R518	ERDS2TJ103	10K			
R137	ERDS2TJ104	100K	R325	ERDS2TJ224	220K	R519	ERDS2TJ104	100K			
R138	ERDS2TJ103	10K	R326	ERDS2TJ822	8.2K	R520	ERDS2TJ103	10K			

● CAPACITORS

Ref. No.	Part No.	Value	Ref. No.	Part No.	Value	Ref. No.	Part No.	Value	Ref. No.	Part No.	Value
C1, 2	Δ ECKD1H223ZF	0.022	C113, 114	ECKD1H223ZF	0.022	C221	ECFTD472KXL	0.0047	C317	ECEA1HU010	1
C3, 4	ECEA1VU471	470	C115, 116	ECEA1HU3R3	3.3	C222	ECEA1HUR15	0.15	C318, 319	ECFTD333KXL	0.033
C5, 6	ECEA1EU471	470	C117, 118	ECKD1H223ZF	0.022	C223	ECKD1H681KB	680P	C320	ECEA1HU010	1
C7, 8	ECKD1H223ZF	0.022	C119	ECKD1H223ZF	0.022	C224	ECFTD333KXL	0.033	C321, 322	ECFTD473KXL	0.047
C8, 10	ECEA1EU221	220	C120	ECKD1H181KB	180P	C225, 226	ECFTD823KXL	0.082	C323	ECEA1HU010	1
C11, 12	ECKD1H223ZF	0.022	C121, 122	ECKD1H223ZF	0.022	C227, 228	ECEA1HUR47	0.47	C501, 502	ECCD1H330K	33 P
C13	ECEA1VU471	470	C201, 202	ECEA1HU3R3	3.3	C229, 230	ECEA1HUR22	0.22	C504	ECFTD102KXL	0.021
C14	ECKD1H223ZF	0.022	C203, 204	ECEA1HU3R3	3.3	C231, 232	ECEA1HU010	1	C505	ECKD1H223ZF	0.022
C15	ECEA1AU470	47	C205	ECEA1HUR15	0.15	C235, 238	ECKD1H471KB	470P	C506	ECEA1EU4R7	4.7
C16, 17	EECW2R3A3R3	3.3F	C206	ECFTD472KXL	0.0047	C237	ECKD1H223ZF	0.022	C507	ECEA1AU470	4.7
C18	Δ ECEA1HU221	220	C207	ECFTD333KXL	0.033	C239	ECKD1H223ZF	0.022	C510	ECKD1H331KB	330 P
C19	ECEA1EU4R7	4.7	C208	ECKD1H681KB	680P	C301	ECEA1HU010	1	C901, 902	ECCD1H101K	100 P
C20	ECEA0JU101	100	C209	ECFTD683KXL	0.068	C302	ECCD1H560K	56P	Except		
C21	ECEA1VU101	100	C210	ECFTD103KXL	0.01	C303, 304	ECFTD472KXL	0.0047	[M, MC]		
C22, 23	ECKD1H223ZF	0.022	C211	ECFTD153KXL	0.015	C305	ECEA1HU010	1	C903, 904	ECCD1H101K	100 P
C24, 25	ECKD1H223ZF	0.022	C212	ECFTD222KXL	0.0022	C306, 307	ECFTD222KXL	0.0022	Except		
C101, 102	ECCD1H101K	100P	C213, 214	ECFTD273KXL	0.027	C308	ECEA1HU010	1	[M, MC]		
C103, 104	ECEA1HU3R3	3.3	C215, 216	ECFTD562KXL	0.0056	C309, 310	ECKD1H821KB	820P			
C105, 106	ECCD1H101K	100P	C217	ECFTD103KXL	0.01	C311	ECEA1HU010	1			
C107, 108	ECCD1H101K	100P	C218	ECFTD683KXL	0.068	C312, 313	ECKD1H391KB	390P			
C109, 110	ECEA1EU4R7	4.7	C219	ECFTD222KXL	0.0022	C314	ECEA1HU010	1			
C111, 112	ECEA1EU221	220	C220	ECFTD153KXL	0.015	C315, 316	ECFTD123KXL	0.012			