

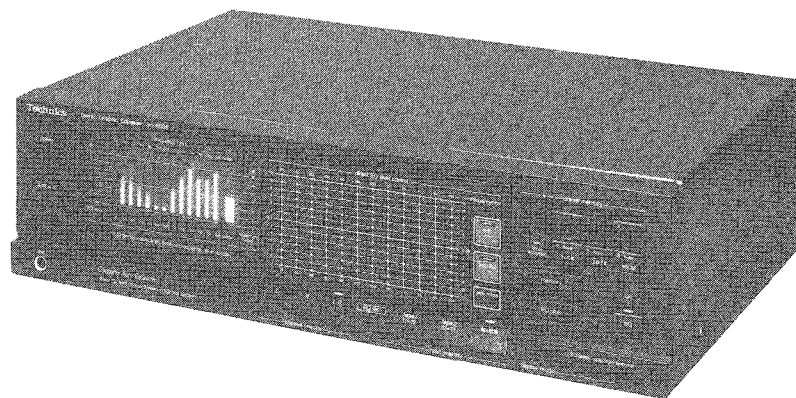
Service Manual

Stereo Graphic Equalizer

(with spectrum analyzer)

Equalizer

SH-8066



Color

(K) Black Type

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

SPECIFICATIONS

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) 1V output
Input sensitivity : 150 mV
Signal-to-noise ratio : [IHF '78]
 above 113 dB/2V (IHF' A)
 107 dB/1V (IHF' A)
 : [DIN 45 500]
 107 dB/2V
 101 dB/1V
Channel balance [DIN 45 500]
 250Hz ~ 6300Hz : ± 0.5 dB
Channel separation [DIN 45 500]
 1kHz : 70dB
Maximum input voltage
 : 8 V (1 kHz)
Input impedance : 22 k Ω
Gain : 0 $\pm$ 1 dB

Band level controls : +12 dB~-12 dB (2 dB step)
Center frequency : 25 Hz, 40 Hz, 63 Hz, 100 Hz,
 160 Hz, 250 Hz, 500 Hz, 1 kHz,
 2kHz, 4 kHz, 8 kHz, 16 kHz
Compatible microphone sensitivity
 : above -74 dBV/ μ bar (1 kHz)

GENERAL

Power supply : AC 60Hz, 120V
 (For U.S.A. and Canada)
 AC 50Hz/60Hz,
 110V/127V/220V/240V
 (For other areas)
Power consumption : 17W (For U.S.A. and Canada)
 (With power switch OFF : 3 W)
 : 15W (For other areas)
 (With power switch OFF : 3W)
Dimensions
 (H $\times$ W $\times$ D) : 119 $\times$ 430 $\times$ 272 mm
 (4 $\frac{11}{16}$ " $\times$ 16 $\frac{15}{16}$ " $\times$ 10 $\frac{23}{32}$ ")
Weight : 3.8 kg (8.4 lb)

Specifications are subject to change without notice for further improvement.

Technics

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■ MICROPHONE FOR FIELD MEASUREMENT

SH-8066 for [M], [MC], [PA] and [PE] areas includes a microphone for field measurement. (Specification of the microphone is described under.)

As SH-8066 for other areas does not include the microphone, use a sold separately microphone for field measurement.

Recommended microphone : RP-3800E (sold separately)

● **Specifications of the microphone included in SH-8066 for [M], [MC] [PA] and [PE] areas:**

●Type:	Electret condenser type	●Equivalent noise:	Less than 34 dB SPL
●Frequency response:	16 Hz~20,000 Hz 20 Hz~16,000 Hz $+3$ -2 dB	●Power supply:	1.5 V (Battery UM-3 or R6×1)
●Directivity:	Omni-directional	●Battery life:	Approx. 2,000 hours (continuous)
●Sensitivity:	-72 dB (0 dB=1 V/ μ bar, 1,000 Hz)	●Weight:	Approx. 125 g (without battery)
●Output impedance:	600 Ω (1,000 Hz, unbalanced)	●Output cord:	4 m of single-core shielded 4 mm O.D. wire with phone-type plug
●Maximum input sound pressure:	More than 110 dB SPL (0 dB= 2×10^{-4} μ bar, 1,000 Hz)	●Stand screw:	PF 1/2"

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■ SAFETY PRECAUTION

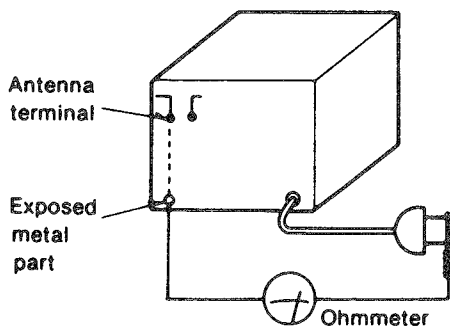
(This "safety precaution" is applied only in U.S.A.)

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**

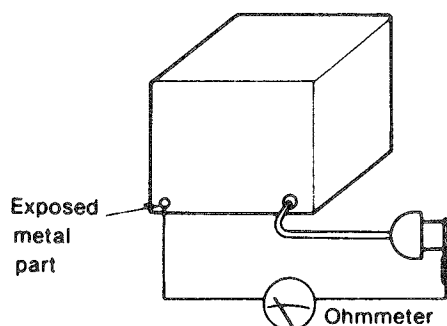
1. Unplug the power cord and short the two prongs of the plug with a jumper wire.
2. Turn on the power switch.
3. Measure the resistance value with ohmmeter between the jumpered AC plug and each exposed metal cabinet part, such as screwheads antenna, control shafts, handle brackets, etc. Equipment with antenna terminals should read between 3M Ω and 5.2M Ω 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 Ω —5.2M Ω

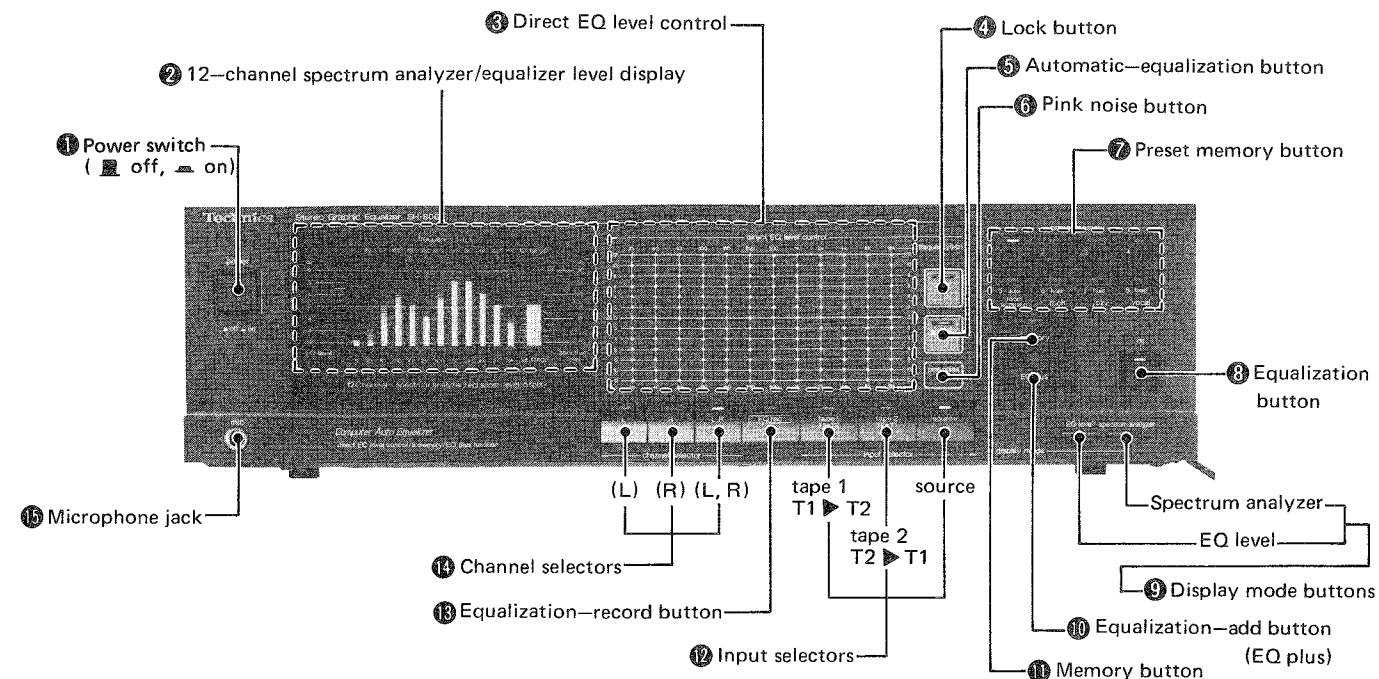


(Fig. B)

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



1 Power "stand by" switch

This switch turns on and off the secondary circuit power only.

Note:

• With the power switch in the OFF position, there is still a slight power consumption (about 3 watts). This is in order to assure the retention of the "most recent" memory and the preset-memory functions.

2 12-channel spectrum analyzer/equalization level display

This display shows the spectrum or equalization level. For the spectrum, a bar-type of display is used; for the equalization level, a dot-type of display is used.

3 Direct-equalization-level controls

These controls are used for adjustment of the equalization level.

The adjustment can be made (in 2-dB steps) to ± 12 dB.

Note:

Do not use a sharp edged surface to trace the curve.

4 Lock button

This button is used to lock the direct-equalization level-control function. When this button is pressed, the indicator will illuminate; when it is pressed once again, the lock is released.

5 Automatic-equalization button

Press this button for automatic correction of the sound-field. When this button is pressed, the indicator will illuminate; when the function is completed, illumination will stop. If a microphone is not connected, this button will not function.

6 Pink-noise button

This button can be used to switch ON and OFF the "pink" noise used when measuring the sound-field frequency response or correcting the sound-field. If a microphone is not connected, this button will not function.

7 Preset-memory buttons

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. There are eight memory areas: three are for fixed-equalization-level memory, and five are for use by the user.

8 Equalization button

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.

9 Display mode buttons

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 spectrum is shown on the display.

10 Equalization-add button (EQ plus)

Press this button to combine two or more equalization curves.

11 Memory button

To enter an equalization curve into the 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.

12 Input selectors

These buttons are used to select the desired sound source. When pressed, the corresponding indicator illuminates.

source: To listen to a phone disc or radio broadcast.

tape 1: To listen to tape deck 1 connected to this unit, or for tape editing from tape deck 1 to tape deck 2.

tape 2: To listen to tape deck 2 connected to this unit, or for tape editing from tape deck 2 to tape deck 1.

13 Equalization-record button (EQ rec)

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.

14 Channel selectors

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.

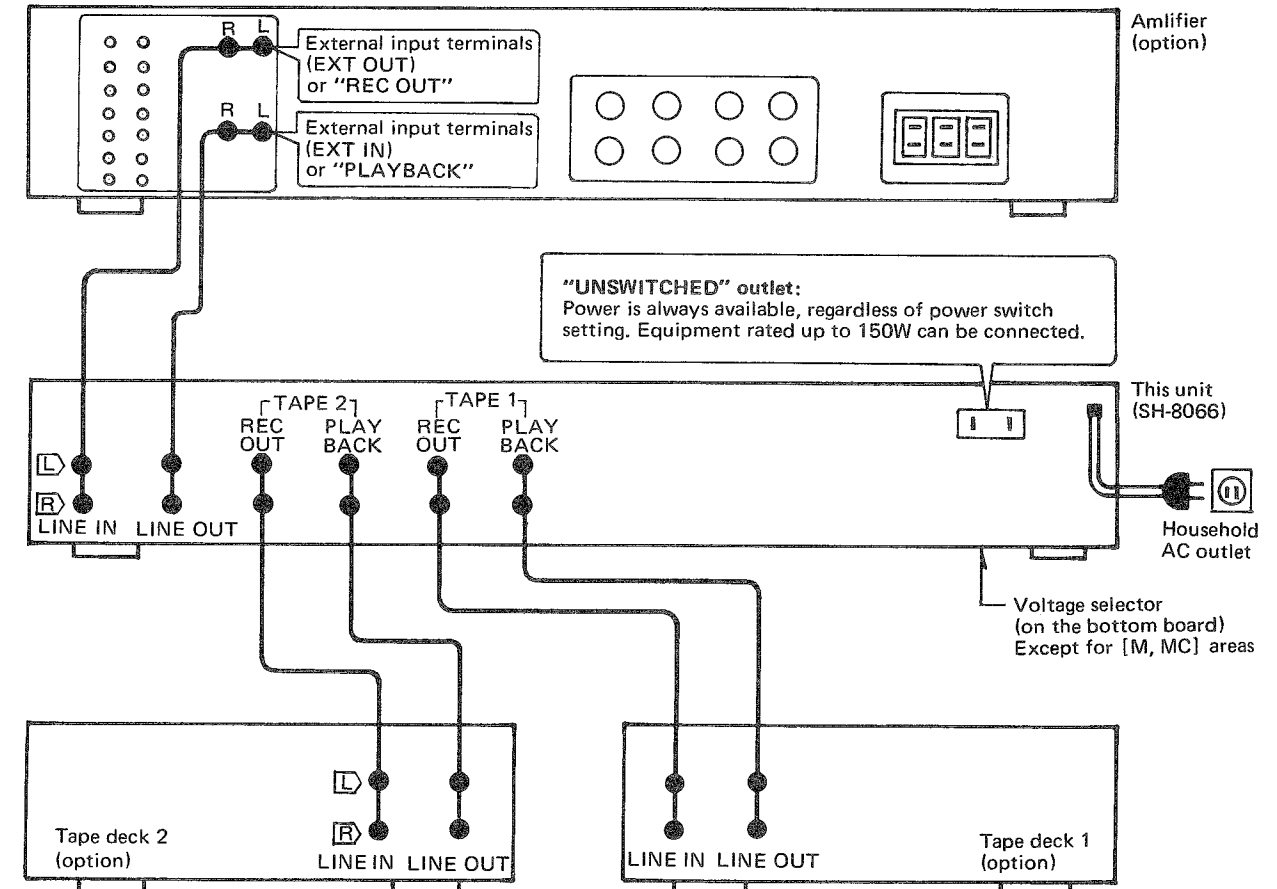
15 Microphone jack

This terminal is for connection of the microphone to be used for measurement. Connect the microphone to this jack for automatic sound-field correction and measurement of sound-field frequency characteristics.

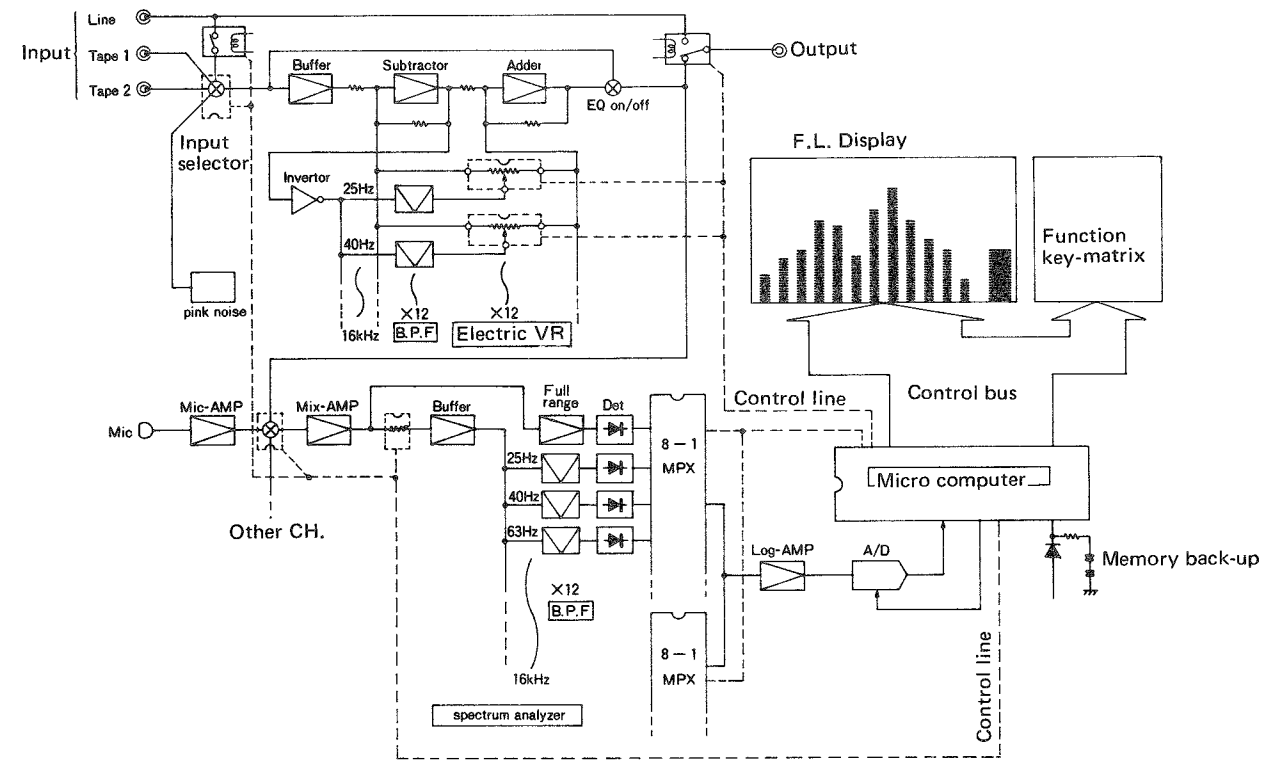
(Note)

This microphone jack cannot be used for mixing.

REAR PANEL AND CONNECTION



BLOCK DIAGRAM OF FUNCTION



“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.

PINK NOISE

Pink noise is used for measurement and correction of the sound field frequency response because it is mostly within the audible range, its energy distribution is uniform, and it has a wide frequency band.

MEMORY RETRIEVAL-OUT

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

The indicator for that button will illuminate, and the display will instantly change to the retrieved equalization curve. When a retrieval is made from the memory, if the equalization button is OFF, the indicator for the preset-memory button will illuminate, and the equalization curve will appear on the display, but the equalization effect will not be applied.

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. Note that there is no erasure (loss) of equalization curves in the fixed equalization-level memories.

Because pink noise has large instantaneous level fluctuations, the display may fluctuate.

TO CANCEL A MEMORY RETRIEVAL-OUT

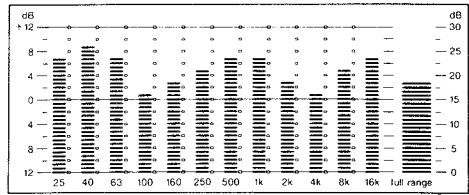
Press either a direct-equalization control or a preset-memory button.

The indicator for the preset-memory button used to make the retrieval will stop illumination.

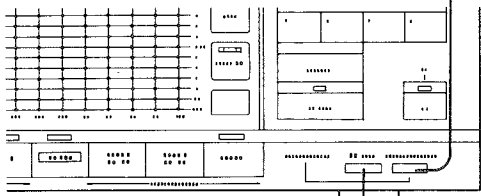
DISPLAY

The display can be used to display the spectrum or the equalization level.

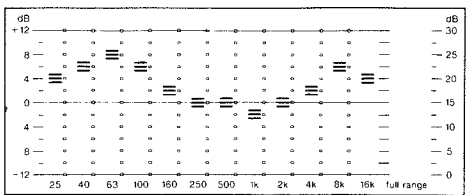
For spectrum display (L), (R) or (L.R)



※ 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.

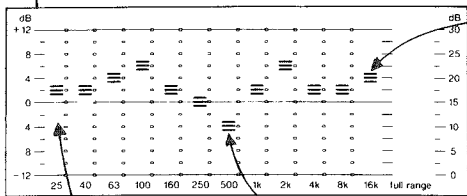


For equalization-level display (L) or (R)



EQ level

For equalization-level display (L.R)

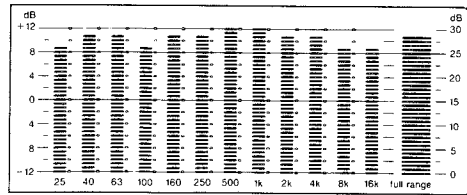


Left and right channels displayed brightly at the same position.
Right channel (dim) Left channel (bright)

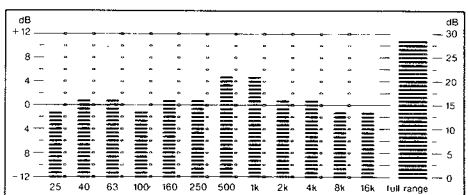
AUTOMATIC LEVEL FUNCTION

This unit incorporates a function for automatic adjustment of over-indication or under-indication of the spectrum (caused by high or low input signal levels), so that the displayed spectrum is always at the central part of the display for easy visibility.

When input level is high

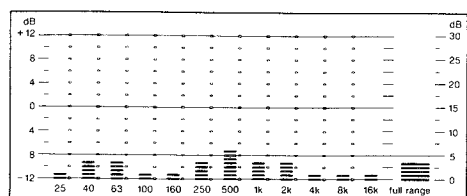


When the average value of the spectrum exceeds this level, the overall spectrum is suppressed by 10 dB.

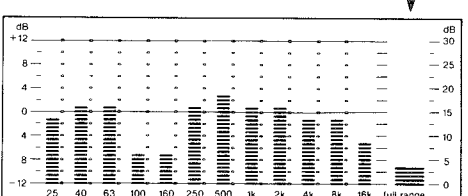


※ The actual input level is shown by the “full range” display at the far right.

When input level is low

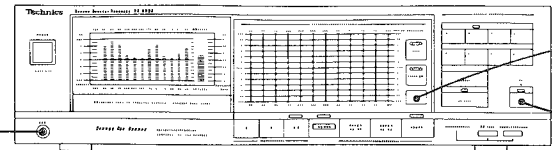


When the average value of the spectrum is less than this level, the overall spectrum is raised by 10 dB.



■ OPERATION

● MEASUREMENT OF SOUND-FIELD FREQUENCY RESPONSE



1. Connect the microphone (included).
Position the microphone at the place and height at which you usually listen to your audio equipment.

2. Pink noise to "on"
The stroke of this button has been increased in order to prevent mis-operation, so they must be pressed firmly.

3. EQ to "off"

4. Adjust the volume control (of the amplifier) so that the "full range" spectrum is illuminated more than center position (15 dB).
The spectrum shown on the display is the sound-field frequency response.

Do not exceed watt of output power.
The speakers (tweeters) may be damaged.

※ When the measurement is finished, press the pink-noise button (to "off") or press one of the input selectors.

● BEFORE MEMORIZATION OF EQUALIZATION CURVES

This unit has eight memory areas; five of these are available to the user, and can be changed; the other three are preset (fixed) music curves and cannot be changed.

★ Memory areas for the user

- As many as five pairs (left/right channels) of equalization curves can be entered into memory areas 1 through 5.
- When an automatic sound-field correction is made, the equalization curve is automatically entered in memory area 5.

★ Fixed-equalization-level memory areas

Equalization curves which are appropriate to the following three types of music have already been preset to memory areas 6 through 8, thus making it possible to enjoy music listening at a touch of a button. (Other equalization curves cannot be entered into these memory areas.)

Memory area 6 (rock):

The level for 63 Hz and 100 Hz is increased in order to emphasize the power of the bass fiddle and bass drum; in addition, the level for the range from 4 kHz through 16 kHz has been increased in order to obtain a characteristic in which there is a tauter high range and low-range build-up.

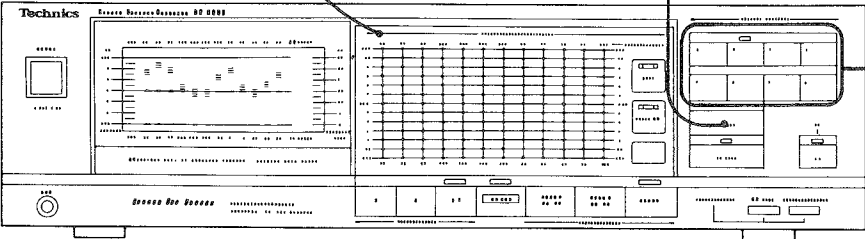
Memory area 7 (jazz):

The level for 63 Hz and 100 Hz is increased, and moreover the level for 4 kHz and 8 kHz is moderately increased, in order to provide a modulated, soft sound.

Memory area 8 (vocal):

The 2-kHz range is increased by 4 dB and the 4-kHz range is increased by 2 dB; in addition, the 500-Hz range is reduced by -4 dB, thus providing a clear characteristic with excellent vocal emphasis.

● MEMORIZATION OF EQUALIZATION CURVES



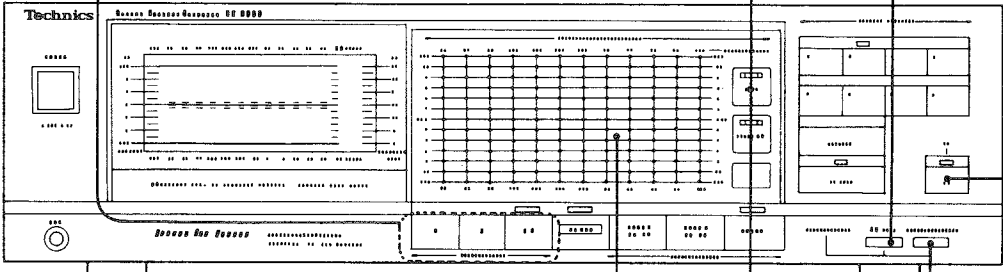
1. Set the equalization level.
(See page 8.)

2. Memory to "on"
(The indicator will flash for about 4 seconds.)

3. Press one of the preset-memory buttons (1 to 5) while the indicator is flashing (in step 2).

- ※ If two or more entries are made into one memory area, only the last one will be memorized.
- ※ The memory-add "EQ plus" button will not function, even if it is pressed, while the indicator of the memory button is flashing.

● MANUAL CONTROL OF THE EQUALIZATION LEVEL



1. Select the channel(s) to be adjusted.
L: To adjust the left channel
R: To adjust the right channel
L.R: To adjust the left and right channels

2. Lock to "off"
The stroke of this button has been increased in order to prevent mis-operation, so they must be pressed firmly.

3. "EQ level"

4. EQ to "on"
Press the "spectrum analyzer" button to aurally adjust while watching the spectrum display.

5. For adjustment of the equalization level.
Adjustment to ± 12 dB (in 2-dB steps) is possible by pressing the point of intersection of the level and the frequency where adjustment is desired or by tracing with a finger.
(If a finger is used, move it slowly, allow for proper operation.)

● Convenient Functions

● (Lock button)

"on" Equalization curves can be protected.

When this button is pressed to ("on"), the direct-equalization-level controls will not function, thus protecting an equalization curve(s) which has been set. The pressed position will be illuminated on the display, and the desired frequency and level value can be easily found.

"off" Frequencies can be easily detected and changed.

When the lock button is pressed to "off" while the direct-equalization-level control is being pressed, the level of a frequency can be easily changed.

Note:

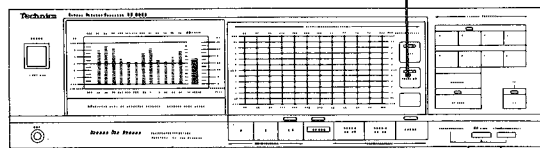
If the direct equalization level controls are used while the equalization button is set to "off", the equalization level before the "off" setting will be retained, so the controls have no effect at that time.

• AUTOMATIC SOUND-FIELD CORRECTION

1. Follow steps 1 to 4 of "MEASUREMENT OF SOUND-FIELD FREQUENCY RESPONSE".

2. Auto EQ to "on"

The stroke of this button has been increased in order to prevent mis-operation, so they must be pressed firmly.



When the automatic-equalization button is switched ON:

- The indicator of the automatic-equalization button will illuminate, and automatic sound-field correction will begin, first of the left channel and then of the right channel. The signal is sampled and corrected a maximum of 16 times for each (left and right) channel; the corrections will be completed in a total of about 50 seconds.
- Even if the equalization button is switched OFF, it will be switched ON automatically.
- None of the buttons, except the power switch and the automatic-equalization button will function during automatic sound-field correction.

3. After the automatic sound-field correction is completed the equalization level (after the correction) is automatically memorized to preset-memory button 5. The equalization button is then switched ON and the "spectrum analyzer" display-mode button is switched ON. Other buttons return to the condition before the automatic sound-field correction was made, and the indicator of the automatic-equalization button stops illuminating.

※The frequency range of the automatic sound-field correction is from 40 Hz to 16 kHz. (25 Hz is set to the 0-dB position.)

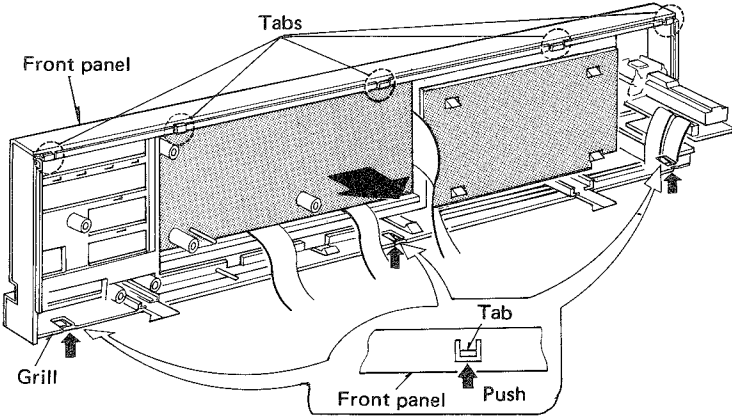
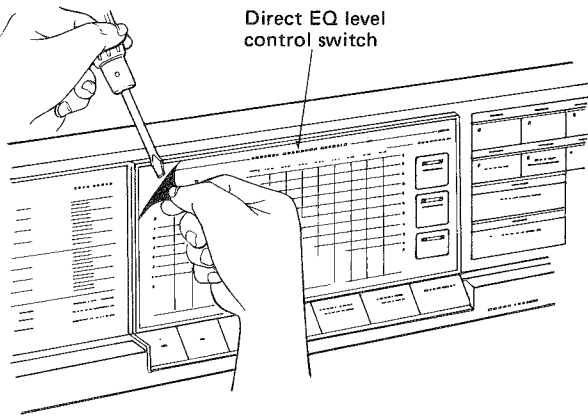
※To discontinue the automatic sound-field correction before it has finished, press the automatic-equalization button (to "off").

If, at that time, a memory call-out is made, the equalization curve may become flat. If this happens, press one of the other preset-memory buttons, and then once again press the preset-memory button pressed first.

■ DISASSEMBLY INSTRUCTIONS

Ref. No. 1	How to remove the cabinet	Ref. No. 2	How to remove the "main" P.C.B.
Procedure 1	1. Remove the 5 screws. (① ~ ⑤)	Procedure 1 → 2	1. Remove the 4 screws (① ~ ④) and 2 screws (⑤ , ⑥) raise the main P.C.B. as shown by curved arrow.

Ref. No. 3	How to remove the front panel	Ref. No. 5	How to remove the "function key" P.C.B.
Procedure 1 → 3	1. Pull off lead wire at 8 connectors (J1, 2, 4, 6, 8, 9, 10 & 16).	Procedure 1 → 3 → 5	1. Remove the 11 screws. (① ~ ⑪) 2. Push the 3 tabs. 3. Remove the P.C.B.
Ref. No. 4	How to remove the "FL" P.C.B. and power switch P.C.B.	Note: When fixing function key board, take care of the direction of the three transparent flat cables (J13, 14 & 15) and not to bend cable sharply. When taking selector buttons out of function key board, holding the portion in the broken line enclosure is feared to break selector buttons.	
Procedure 1 → 3 → 4	1. Remove the 2 screws. (① , ②) 2. Push the 4 tabs. 3. Remove the FL P.C.B. 4. Remove the 2 screws. (③ , ④) 5. Remove the power switch P.C.B.		

Ref. No. 6	How to remove the grill
Procedure 1 → 3 → 6	1. Separate front panel from grill by pushing 5 tabs at the upper part and 3 tabs at the lower part of the front panel. (Exploded view shows the state after separation.) 
Ref. No. 7	Exchange of direct EQ level and control switch
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. * The switch is supplied stuck on the "grill" of repair parts.	

*** 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 C17 and C18 (2.3V, 3.3F)

■ TECHNICAL INFORMATION

Band level control volume and band pass filter of the device are electronically controlled with IC's.

Their fundamental performances:

● Band Pass Filter

There are many types of band pass filter (BPF) of graphic equalizer. Introduced here are a circuit using semi-conductive inductor.

● BPF using semi-conductive inductor

BPF requires L, and a large core is required if coil is used, and the performance is relatively low. So, the semi-conductive inductor circuit is designed so that the characteristics equivalent to coil can be obtained.

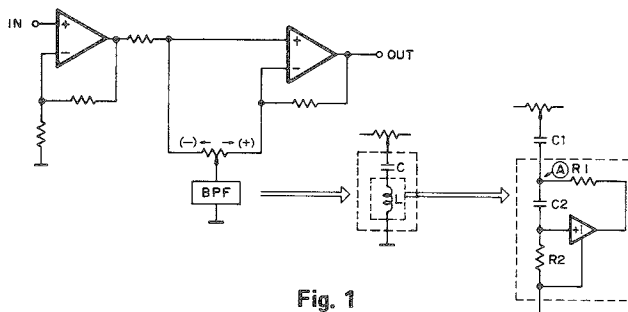


Fig. 1

— Inductor changes in impedance in proportion to the frequency —

1. As the input frequency from **C1** increases, the impedance of **C2** decreases and the input level to the amplifier becomes higher.
2. Output level of amplifier becomes higher.
3. Voltage of point (A) via feed-back impedance **R1** increases.
4. That is, the impedance ground to point (A) increases in proportion to frequency (showing the same characteristic as **L**).
5. The circuit has **C1** and **L** forming a series resonant circuit, and the frequency characteristic obtained has center frequency (f_0).

— Calculation of center frequency —

$$(L = R1 \cdot R2 \cdot C2) \quad (C = C1)$$

$$f_0 \text{ (Hz)} = \frac{1}{2\pi \sqrt{LC}} = \frac{1}{2\pi \sqrt{R1 (\Omega) \cdot R2 (\Omega) \cdot C2 (F) \cdot C1 (F)}}$$

● Band level control circuit

(for varying the center frequency by $\pm 12\text{dB}$)

The equalizer circuit of this unit is shown in Fig. 2. When the control volume (VR) is turned in the direction of $\rightarrow (+)$, NF level lowers with the connection shown in Fig. 3, causing the gain of operation amplifier to increase, then the "peak" appears. Contrarily, when VR is turned in the direction of $\leftarrow (-)$, the input impedance of operation amplifier becomes lowered with the connection shown in Fig. 4. Then the frequency level is "dip".

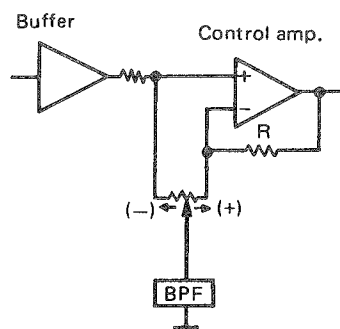


Fig. 2

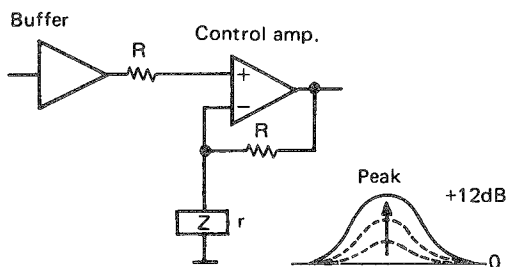


Fig. 3

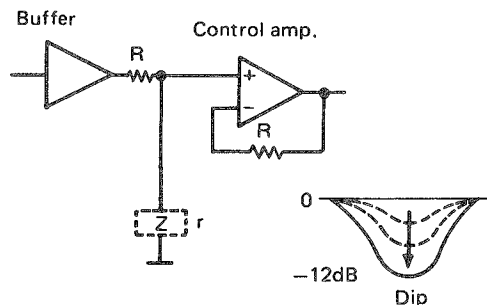


Fig. 4

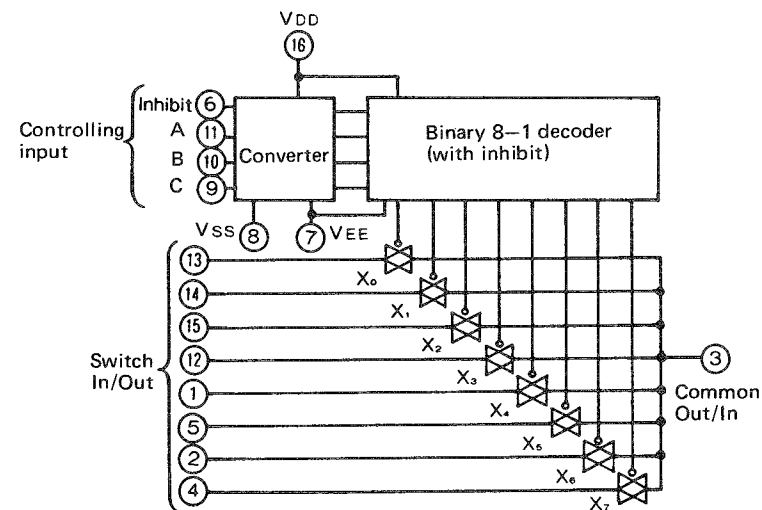
FUNCTION OF IC'S

• Micro-computer (IC60) HD614042SB22

Pin No.	Notation	Object of Function	
		Input	Output
1	D ₁₁	−12dB line & AEQ key input to key scan	−12dB segment output to FL meter
2	D ₁₂	−10dB line & LOCK key input to key scan	−10dB segment output to FL meter
3	D ₁₃	−8dB line & Pink noise on/off key input to key scan	−8dB segment output to FL meter
4	D ₁₄	−6dB line & Lch, Rch key input to key scan	−6dB segment output to FL meter and lock of LED & lighting of AEQ, LED (cathode side) output
5	D ₁₅	−4dB line & L, Rch, EQ rec key input to key scan	−4dB segment output to FL meter and memory 4, 8 of LED and lighting of LED (cathode side) output
6	R ₀₀	—	Grid output of 25Hz to FL meter & line output for 25Hz of key scan
7	R ₀₁	—	Grid output of 40Hz to FL meter & line output for 40Hz of key scan
8	R ₀₂	—	Grid output of 63Hz to FL meter & line output for 63Hz of key scan
9	R ₀₃	—	Grid output of 100Hz to FL meter & line output for 100Hz of key scan
10	R ₁₀	Key scan −2dB line & TAPE 1, 2 key input	−2dB segment output to FL meter and lighting LED (cathode side) of memory 3, 7 output
11	R ₁₁	Key scan 0dB line Source, EQ Level key input	0dB segment output to FL meter and lighting LED (cathode side) of memory 2, 6 output
12	R ₁₂	Key scan +2dB line & Spectrum Analyzer, EQ plus key input	+2dB segment output to FL meter and lighting LED (cathode side) of memory 1, 5 output
13	R ₁₃	Key scan +4dB line & EQ on/off, memory key input	+4dB segment output to FL meter and lighting LED (cathode side) of memory & EQ on/off output
14	R ₂₀	Key scan +6dB line & memory 4, 5 key input	+6dB segment output to FL meter and lighting LED (cathode side) of EQ plus, Source output
15	R ₂₁	Key scan +8dB line & memory 3, 8 key input	+8dB segment output to FL meter and lighting LED (cathode side) of TAPE 1, 2 output
16	R ₂₂	Key scan +10dB line & memory 2, 7 key input	+10dB segment output to FL meter and lighting LED (cathode side) of EQ rec, L, R output
17	R ₂₃	Key scan +12dB line & memory 1, 6 key input	+12dB segment output to FL meter and lighting LED (cathode side) of Rch, Lch output
18	R ₀	Check terminal for microphone insert H on L off	—
19	R ₁ /Vdisp	Output power source terminal (−32V) of high voltage withstanding terminals (D4~D15, R ₀₀ ~R ₁₃ , R ₂₀ ~R ₂₃)	—
20	R ₃₀	—	Output for lighting LED (cathode side) for Lch/L, R/TAPE 1/Source/EQ on-off/memory 5, 6, 7, 8/Auto EQ
21	R ₃₁	—	Output for lighting LED (cathode side) for Rch/EQ rec/TAPE 2/EQ plus/Memory/memory 1, 2, 3, 4/Lock
22	R ₃₂ /INT0	Input terminal for external interruption to MCU H active mode L stop mode	—
23	R ₃₃ /INT1	—	—
24	R ₅₀	—	Grid output for 16kHz of FL meter, & line output for 16kHz of key scan
25	R ₅₁	—	All grid output for FL meter
26	R ₅₂	—	Key output for key scan memory 1, 2, 3, 4/EQ on-off/Spectrum Analyzer/source/TAPE 1/L, R/Lch/Pink Noise/Lock/Auto
27	R ₅₃	—	Key output for key scan memory 5, 6, 7, 8/Memory/EQ/plus/EQ level/TAPE 2/EQ rec/Rch
28	R ₆₀	—	FL desponse (response) control
29	R ₆₁	—	For muting music sound H on L off
30	R ₆₂	—	Output for driving RLY2
31	R ₆₃	—	Output for driving RLY1
32	V _{CC}	5V source	—
33	R ₄₀ /SCK	—	Output for controlling Strobe of IC44 (TC9163N)
34	R ₄₁ /SI	—	Output for controlling Strobe of IC45 (TC9163N)

Pin No.	Natation	Object of Function	
		Input	Output
35	R ₄₂ /SO	—	Output for controlling Strobe of Rch electronic volume/IC4, 6, 8, 10, 12, 14 (TC9170P)
36	R ₄₃	—	Output for controlling Strobe of Lch electronic volume/IC5, 7, 9, 11, 13, 15 (TC9170P)
37	R ₇₀	—	Data A output of IC55, 56 (HD14051)
38	R ₇₁	—	Data B output of IC55, 56 (HD14051)
39	R ₇₂	—	Data C output of IC55, 56 (HD14051)
40	R ₇₃	—	—
41	R ₈₀	—	A/D conversion data bit 0 output
42	R ₈₁	—	A/D conversion data bit 1 output
43	R ₈₂	—	A/D conversion data bit 2 output
44	R ₈₃	—	A/D conversion data bit 3 output
45	R ₉₀	—	—
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	—	Inhibit output of IC55, 56 (HD14051)
55	D ₁	Input terminal of A/D	—
56	D ₂	CLK controlling input for IC55, 56 (TC9163N), IC4~15 (TC9170)	—
57	D ₃	DATA controlling input for IC55, 56 (TC9163), IC4~15 (TC9170)	—
58	D ₄	—	Grid output for 160Hz of FL meter & line output for 160Hz of key scan
59	D ₅	—	Grid output for 250Hz of FL meter & line output for 250Hz of key scan
60	D ₆	—	Grid output for 500Hz of FL meter & line output for 500Hz of key scan
61	D ₇	—	Grid output for 1kHz of FL meter & line output for 1kHz of key scan
62	D ₈	—	Grid output for 2kHz of FL meter & line output for 2kHz of key scan
63	D ₉	—	Grid output for 4kHz of FL meter & line output for 4kHz of key scan
64	D ₁₀	—	Grid output for 8kHz of FL meter & line output for 8kHz of key scan

• 13 channel multi-plexer (IC55, IC56) HD14051BP



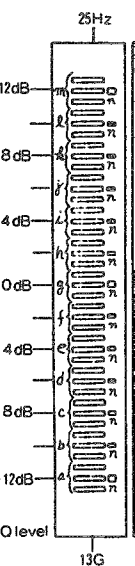
Truth value table

Controlling input				ON Switch
Inhibit	C	B	A	
0	0	0	0	X ₀
0	0	0	1	X ₁
0	0	1	0	X ₂
0	0	1	1	X ₃
0	1	0	0	X ₄
0	1	0	1	X ₅
0	1	1	0	X ₆
0	1	1	1	X ₇
1	x	x	x	Output open

Note) X : either one of 1 or 0

Pin No.
2
15
3
14
4
13
10
9
11
5
6
7

• Grid and Seg



F : filament

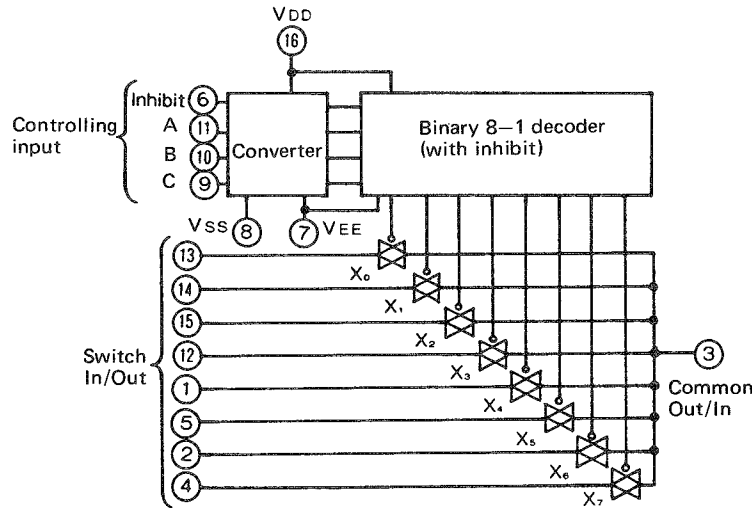
Segment termin

Name of terminal

Pin No.	Notation	Object of Function
35	R ₄₂ /SO	Output for controlling Strobe of Rch electronic volume/IC4, 6, 8, 10, 12, 14 (TC9170P)
36	R ₄₃	Output for controlling Strobe of Lch electronic volume/IC5, 7, 9, 11, 13, 15 (TC9170P)
37	R ₇₀	Data A output of IC55, 56 (HD14051)
38	R ₇₁	Data B output of IC55, 56 (HD14051)
39	R ₇₂	Data C output of IC55, 56 (HD14051)
40	R ₇₃	—
41	R ₈₀	A/D conversion data bit 0 output
42	R ₈₁	A/D conversion data bit 1 output
43	R ₈₂	A/D conversion data bit 2 output
44	R ₈₃	A/D conversion data bit 3 output
45	R ₉₀	—
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	Inhibit output of IC55, 56 (HD14051)
55	D ₁	Input terminal of A/D
56	D ₂	CLK controlling input for IC55, 56 (TC9163N), IC4~15 (TC9170)
57	D ₃	DATA controlling input for IC55, 56 (TC9163), IC4~15 (TC9170)
58	D ₄	Grid output for 160Hz of FL meter & line output for 160Hz of key scan
59	D ₅	Grid output for 250Hz of FL meter & line output for 250Hz of key scan
60	D ₆	Grid output for 500Hz of FL meter & line output for 500Hz of key scan
61	D ₇	Grid output for 1kHz of FL meter & line output for 1kHz of key scan
62	D ₈	Grid output for 2kHz of FL meter & line output for 2kHz of key scan
63	D ₉	Grid output for 4kHz of FL meter & line output for 4kHz of key scan
64	D ₁₀	Grid output for 8kHz of FL meter & line output for 8kHz of key scan

Pin No.	Notation	Object of Function	
		Input	Output
35	R ₄₂ /SO	—	Output for controlling Strobe of Rch electronic volume/IC4, 6, 8, 10, 12, 14 (TC9170P)
36	R ₄₃	—	Output for controlling Strobe of Lch electronic volume/IC5, 7, 9, 11, 13, 15 (TC9170P)
37	R ₇₀	—	Data A output of IC55, 56 (HD14051)
38	R ₇₁	—	Data B output of IC55, 56 (HD14051)
39	R ₇₂	—	Data C output of IC55, 56 (HD14051)
40	R ₇₃	—	—
41	R ₈₀	—	A/D conversion data bit 0 output
42	R ₈₁	—	A/D conversion data bit 1 output
43	R ₈₂	—	A/D conversion data bit 2 output
44	R ₈₃	—	A/D conversion data bit 3 output
45	R ₉₀	—	—
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	—	Inhibit output of IC55, 56 (HD14051)
55	D ₁	Input terminal of A/D	—
56	D ₂	CLK controlling input for IC55, 56 (TC9163N), IC4~15 (TC9170)	—
57	D ₃	DATA controlling input for IC55, 56 (TC9163), IC4~15 (TC9170)	—
58	D ₄	—	Grid output for 160Hz of FL meter & line output for 160Hz of key scan
59	D ₅	—	Grid output for 250Hz of FL meter & line output for 250Hz of key scan
60	D ₆	—	Grid output for 500Hz of FL meter & line output for 500Hz of key scan
61	D ₇	—	Grid output for 1kHz of FL meter & line output for 1kHz of key scan
62	D ₈	—	Grid output for 2kHz of FL meter & line output for 2kHz of key scan
63	D ₉	—	Grid output for 4kHz of FL meter & line output for 4kHz of key scan
64	D ₁₀	—	Grid output for 8kHz of FL meter & line output for 8kHz of key scan

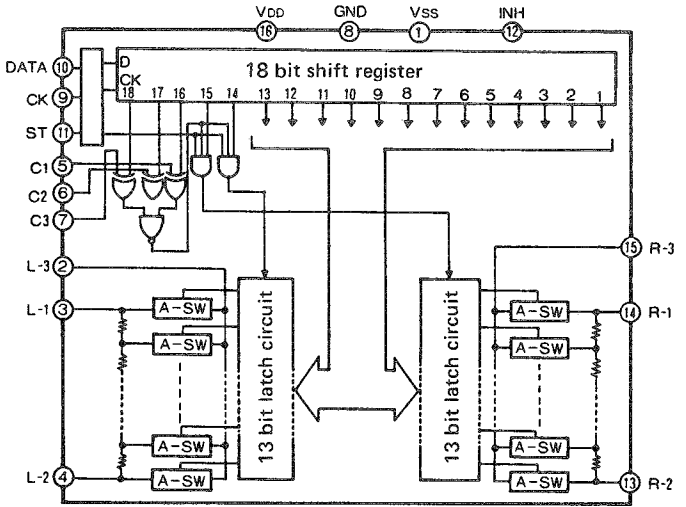
● 13 channel multi-plexer (IC55, IC56) HD14051BP

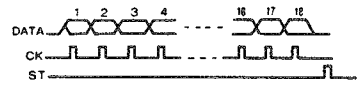


Truth value table				
Controlling input				ON Switch
Inhibit	C	B	A	
0	0	0	0	X ₀
0	0	0	1	X ₁
0	0	1	0	X ₂
0	0	1	1	X ₃
0	1	0	0	X ₄
0	1	0	1	X ₅
0	1	1	0	X ₆
0	1	1	1	X ₇
1	×	×	×	Output _{open}

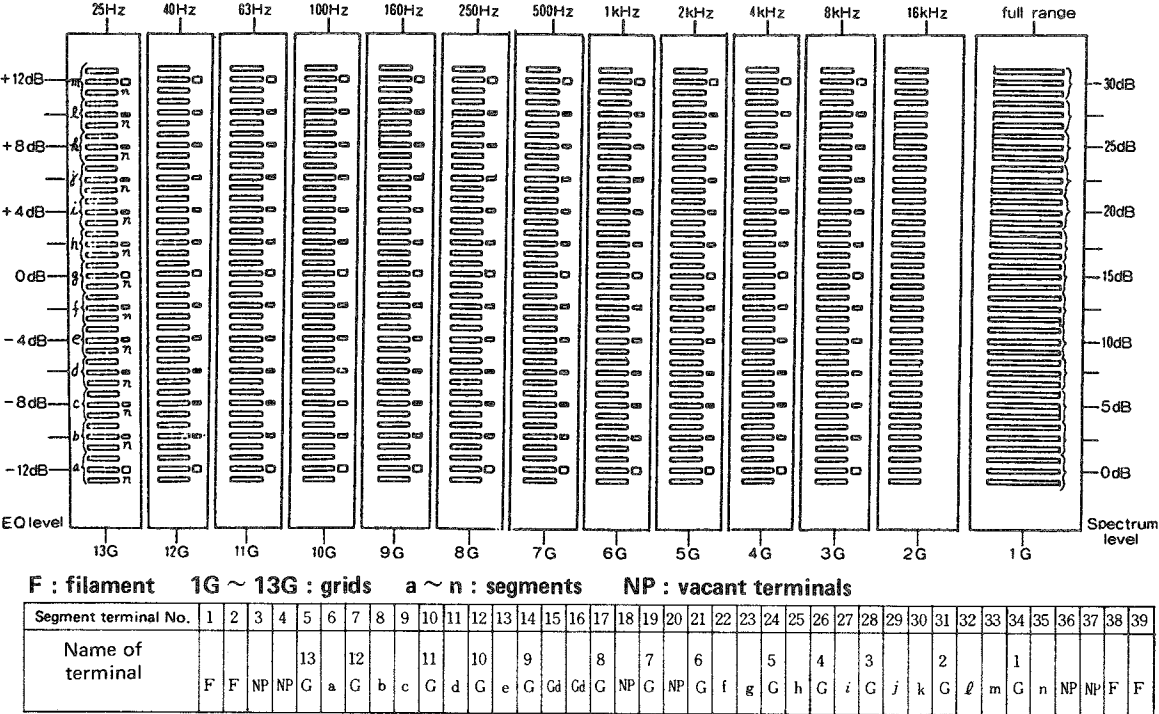
Note) X : either one of 1 or 0

● Band level control (IC4 ~ IC15) TC9170P



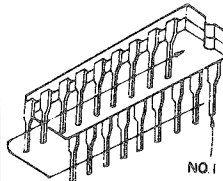
Pin No.	Notation	Description of Function
2	L - 3	 Input terminal for control resistance. L & R: symmetric
15	R - 3	
3	L - 1	
14	R - 1	
4	L - 2	
13	R - 2	 Strobe input terminal. Signal to select attenuation channel taken via DATA & CK terminals are latched by putting this terminal at "H" level. When this terminal is not at "H" level, data remain as before.
10	DATA	
9	CK	
11	ST	Code bit input terminal. Functions only when the terminal's state ("H" or "L") coincides with tone controlling 16 to 18 bit data (C1 = 16 bits, C2 = 17, C3 = 18) received.
5	C1	
6	C2	
7	C3	

● Grid and Segment of FL display tabe

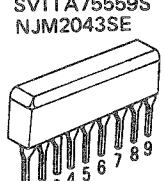


CIRCUIT BOARDS AND WIRING CONNECTION DIAGRAM

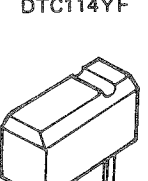
• Terminal guide of IC's, transistors and diodes



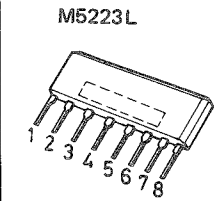
HD614042SB22	64pins
TC9163N	28pins
TC9170P	
HD14050B	16pins
HD14051BP	



SVITA75559S
NJM2043SE

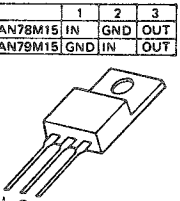


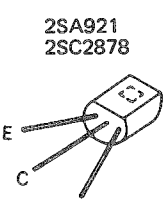
DTC114YF



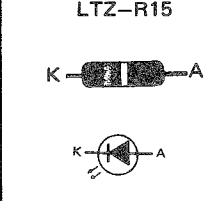
M5223L

1	2	3
AN78M15	IN	GND
AN78M15	GND	OUT



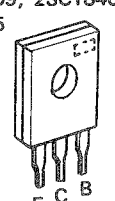


2SA921
2SC2878

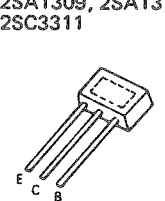


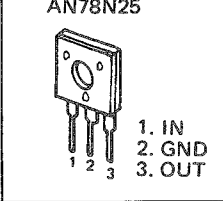
LTZ-R15

2SA1309, 2SC1846
2SA885



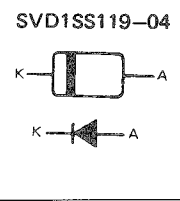
2SA1309, 2SA1310
2SC3311



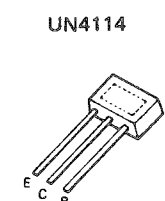


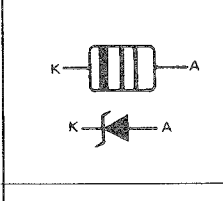
AN78N25

SVD1SS119-04



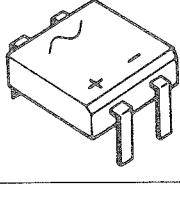
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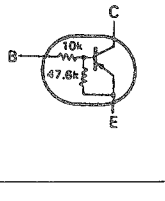




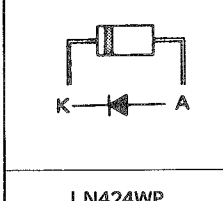
MA4068

SVD1B4B42



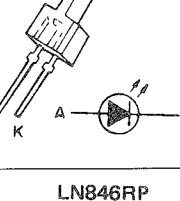


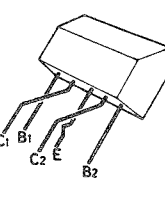
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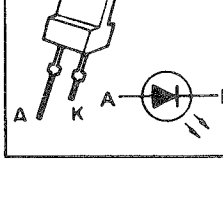
SVD1SR35200

LN824WP

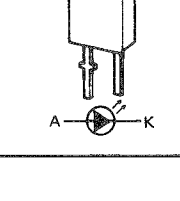




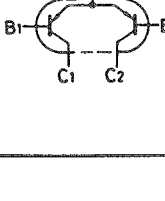
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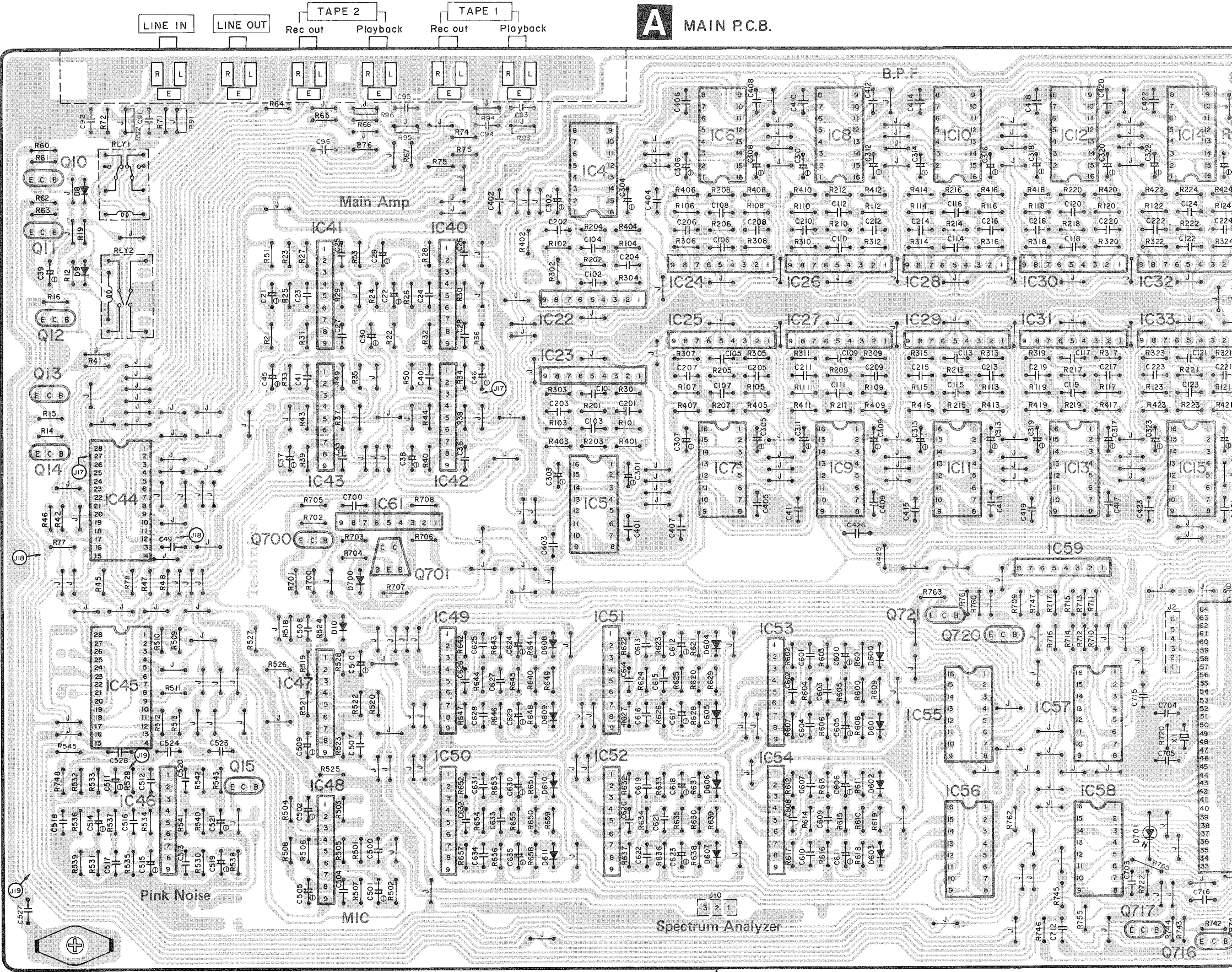
LN424WP



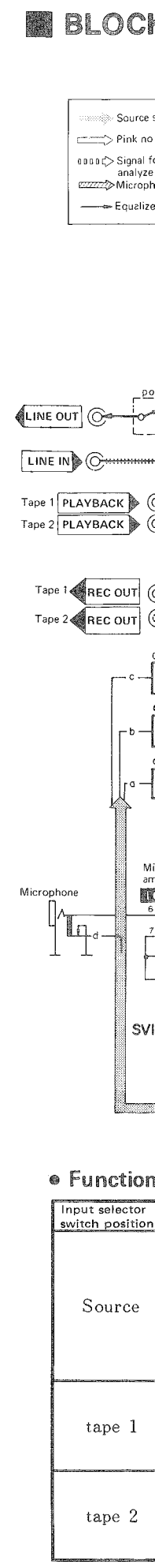
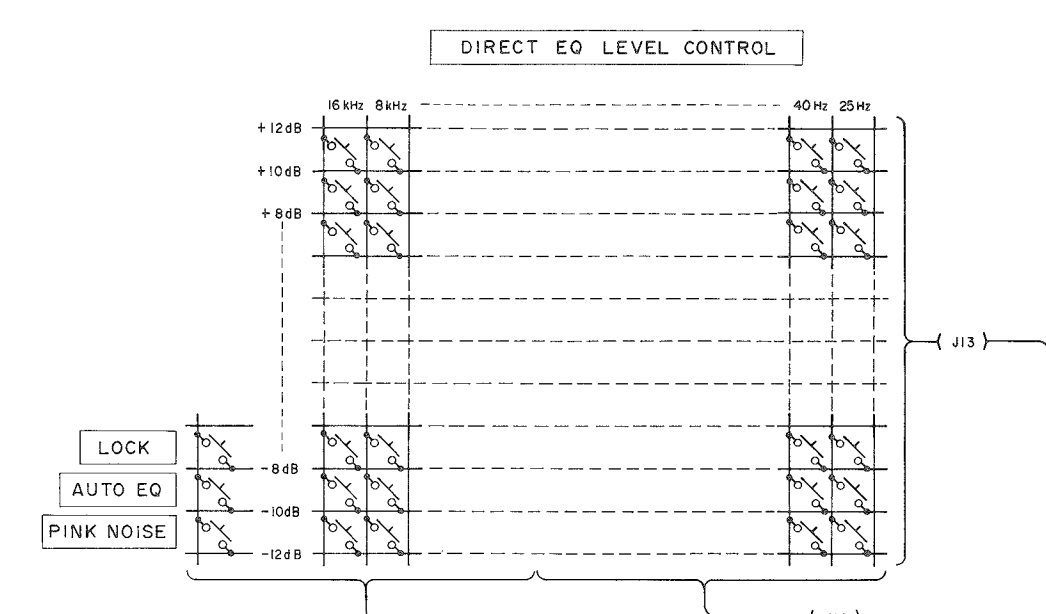
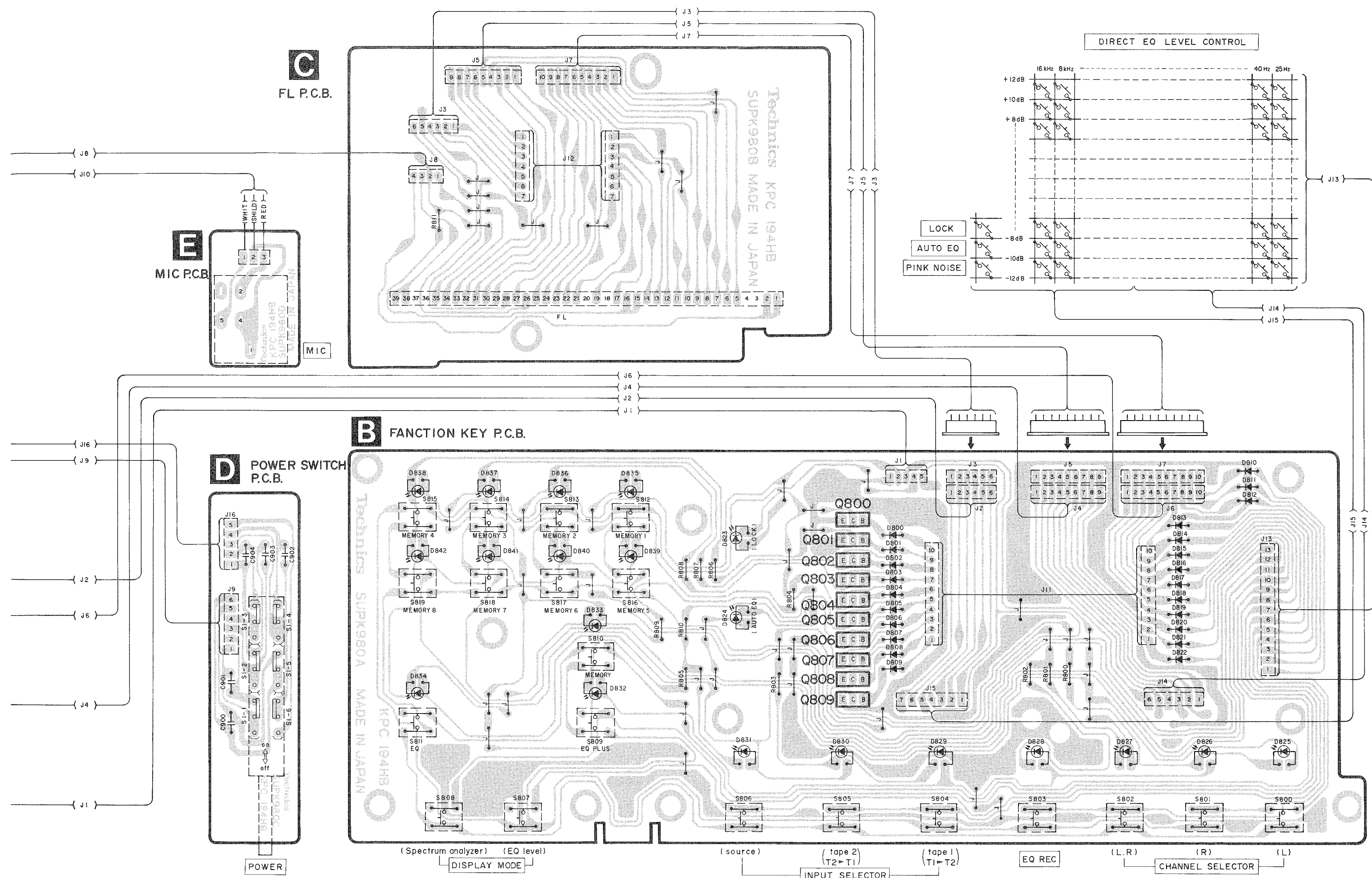
LN846RP



2SC1583

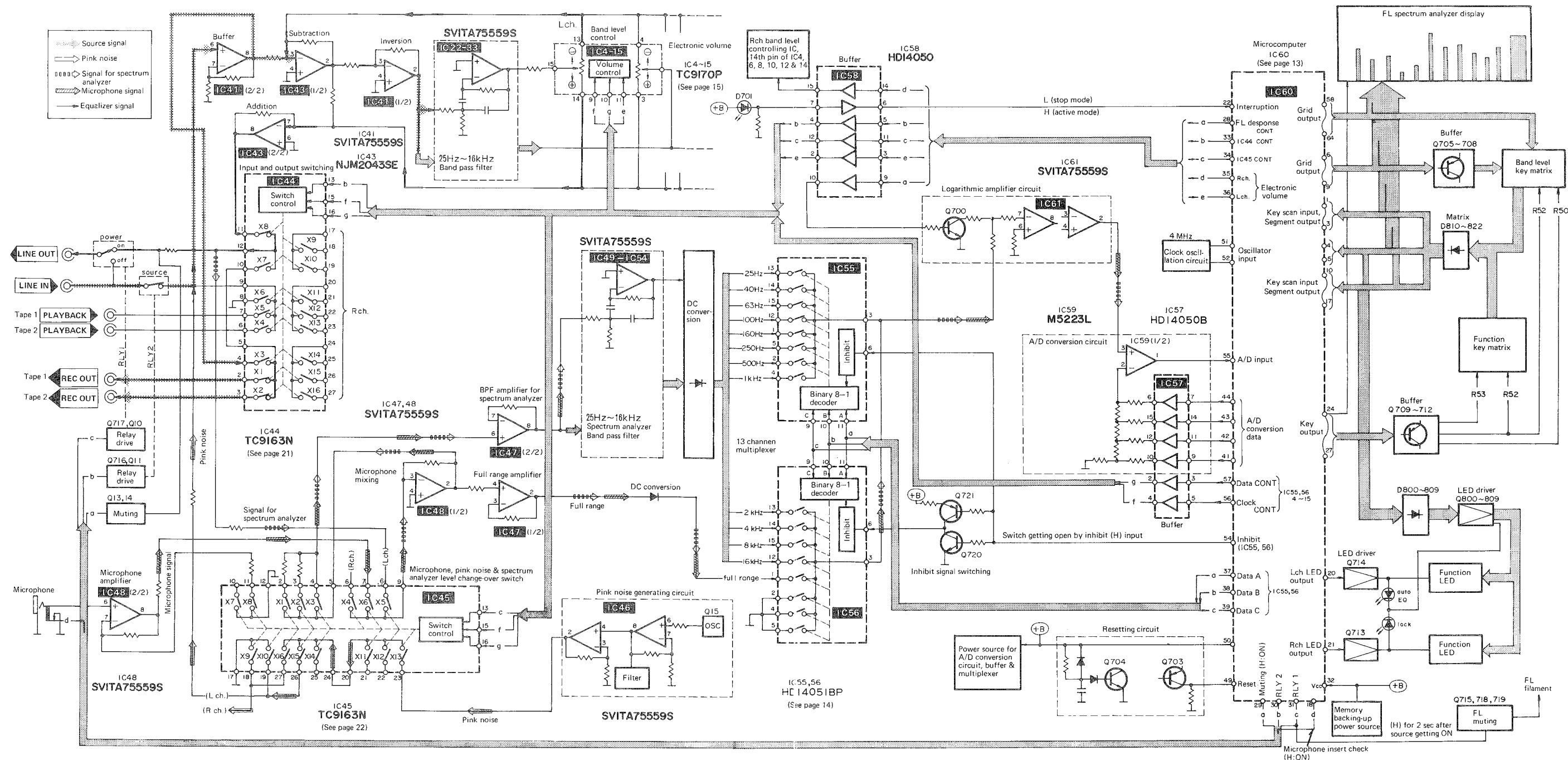
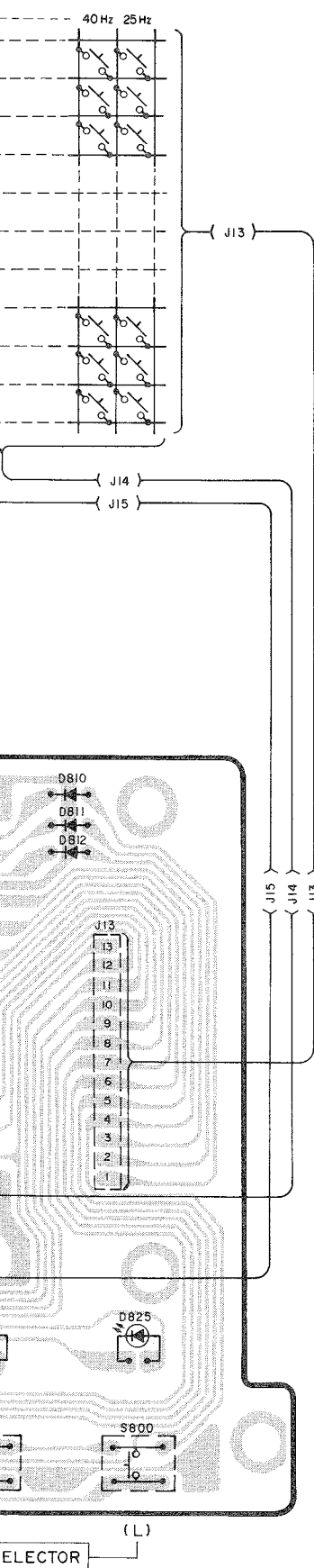






BLOCK DIAGRAM

CONTROL



● Function of IC44 (TC9163N)

Input selector switch position		IC's switch No.		X1	X2	X3	X4	X5	X6	X7	X8	RLY 2	RLY 1
Source	EQ switch	off	on	on	on	—	—	—	—	on	—	on	on
	EQ rec switch	off	on	on	on	—	—	—	—	—	on	on	on
	EQ switch	on	on	on	—	—	—	—	—	—	on	on	on
	EQ rec switch	off	on	on	—	—	—	—	—	—	on	on	on
	EQ switch	on	on	—	—	—	—	—	—	—	on	on	on
	EQ rec switch	on	on	on	—	—	—	—	—	—	on	on	on
tape 1	Pink noise switch	off	on	on	on	—	—	—	—	—	on	on	on
	Switch control	on	—	—	—	—	—	—	—	—	on	—	—
	EQ switch	off	—	on	on	—	on	—	—	—	—	—	on
	EQ rec switch	off	—	on	on	—	on	—	—	—	—	—	on
	EQ switch	on	—	on	—	—	—	—	—	—	—	—	on
	EQ rec switch	on	—	on	—	—	—	—	—	—	—	—	on
tape 2	EQ switch	off	on	—	on	on	—	—	—	—	on	—	on
	EQ rec switch	off	on	—	on	on	—	—	—	—	on	—	on
	EQ switch	on	on	—	on	on	—	—	—	—	—	—	on
	EQ rec switch	on	on	—	on	on	—	—	—	—	—	—	on
	EQ switch	off	on	—	—	—	—	—	—	—	on	—	on
	EQ rec switch	on	on	—	—	—	—	—	—	—	on	—	on

● Function of IC45 (TC9163N)

X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16
—	—	—	—	—	—	—	—	on	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	on	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	on	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	on	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	on	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	on	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	on	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	on	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	on	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	on	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	on	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	on	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	on	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	on	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	on	—	—	—	—	—	—	—

(—) indicators are "OFF" state.

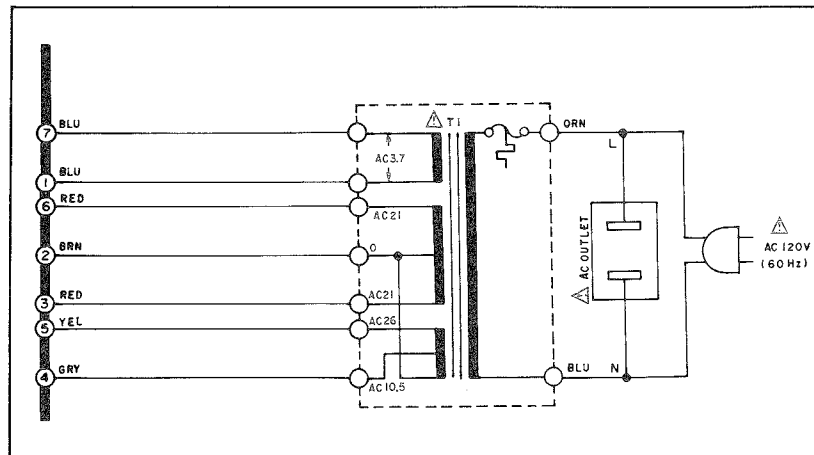
SCHEMATIC DIAGRAM

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

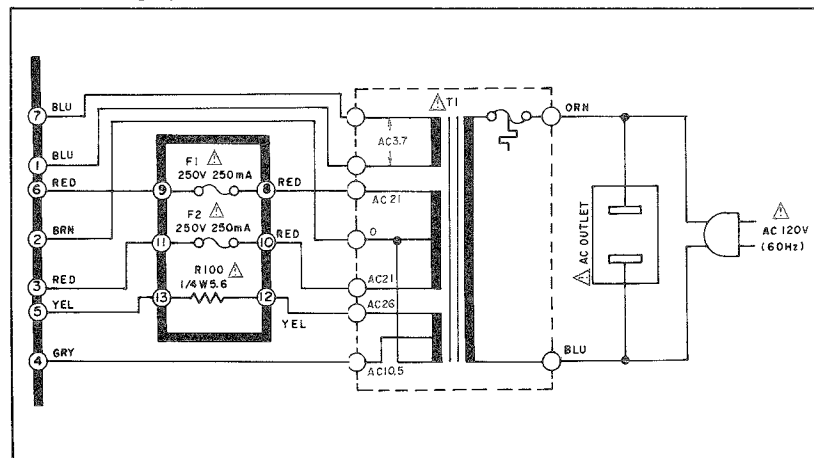
- Power source circuit shown at the bottom of 29 page is for [E, EH, EB, EF, EK, EGA, Ei, XL, XA, PA and PE] areas, different from those for [MC] (Canada) and [M] (U.S.A.) is some portions.
 - Resistors and capacitors with red reference numbers in schematic diagram and printed circuit board are parts used in [E, EH, EB, EF, EK, EGA, Ei, XL, XA, PA and PE] areas.
- For [M] and [MC] areas, those parts are not used or short circuited.

Power source

For Canada [MC] area



For U.S.A. [M] area



Note 1:

- RLY 1:** Relay that switches circuit responding to ON and OFF of power source. Position shown in the diagram corresponds to "SOURCE ON." In "SOURCE OFF," input terminal and output is connected directly.
- RLY 2:** Relay that gets ON when input changing switch is at "source." The position illustrated in the diagram is ON.
- 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, Settings of the device in measuring voltage . . . Channel selection switch to "L,R" Equalizer ON—OFF Switch to "ON" Display mode switch to "Spectrum analyzer"

4. Signal line

- Source signal
- Pink-noise signal
- Microphone signal
- Spectrum analyzer signal
- Positive and Negative voltage supply line

5. Important safety notice:

Components identified by Δ mark safety. When replacing any of the specified parts.

A

B

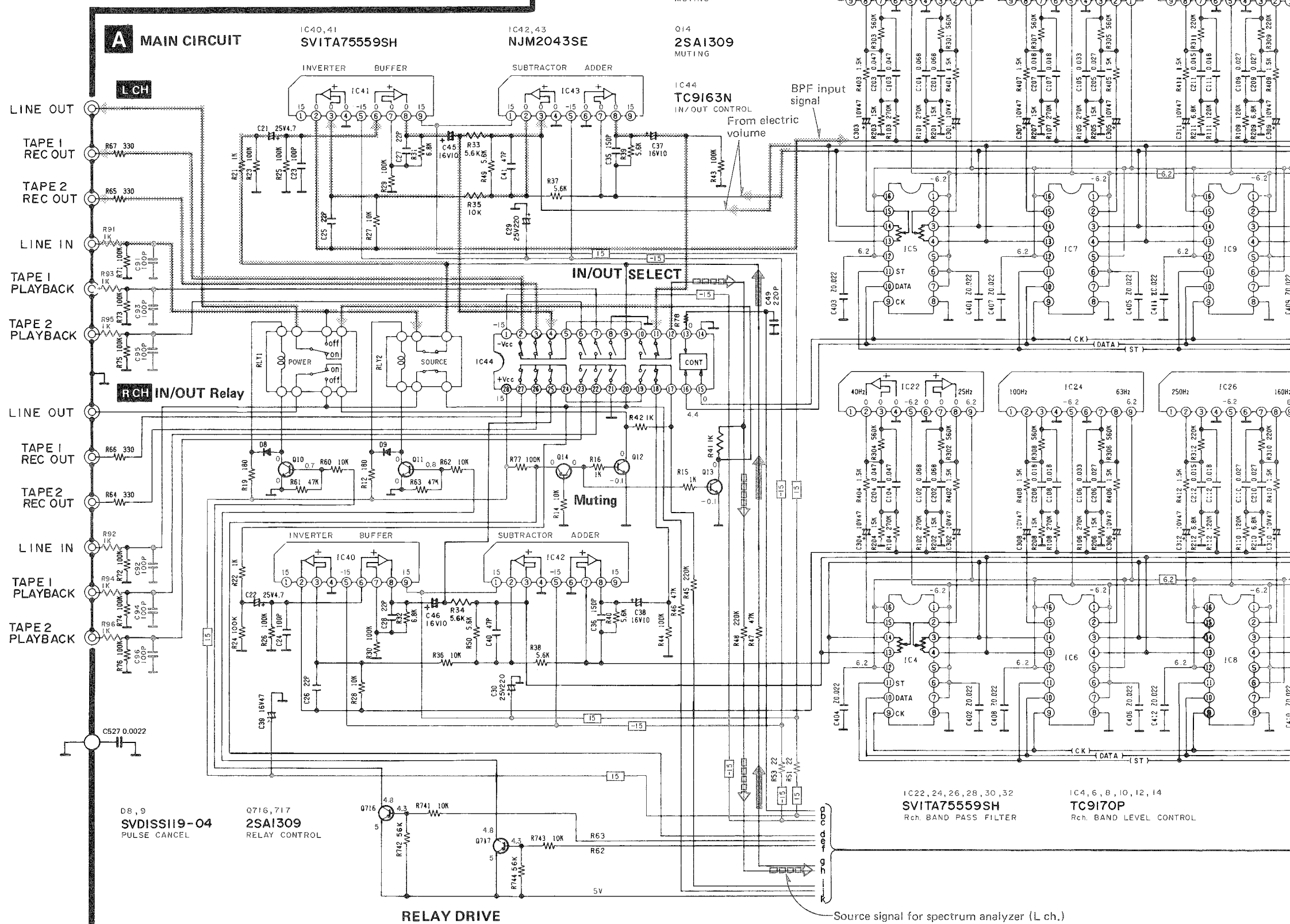
C

D

E

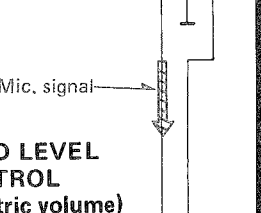
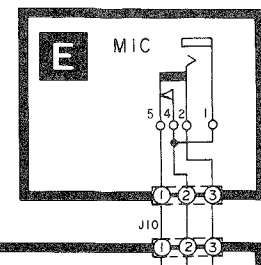
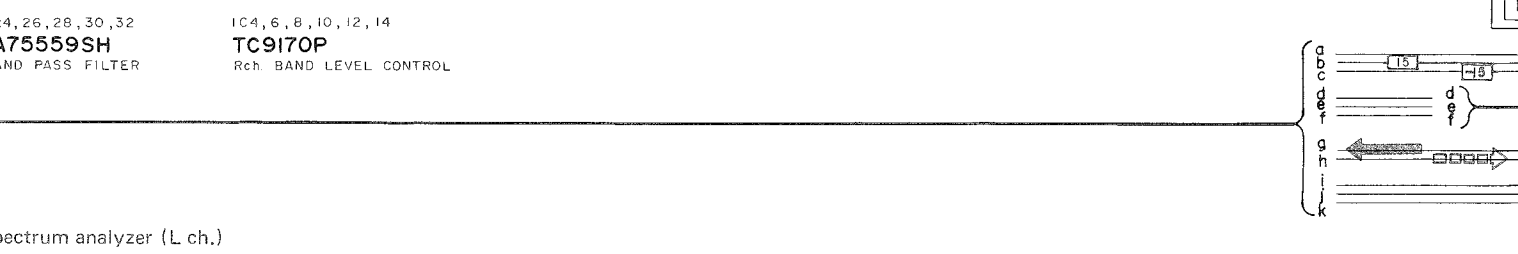
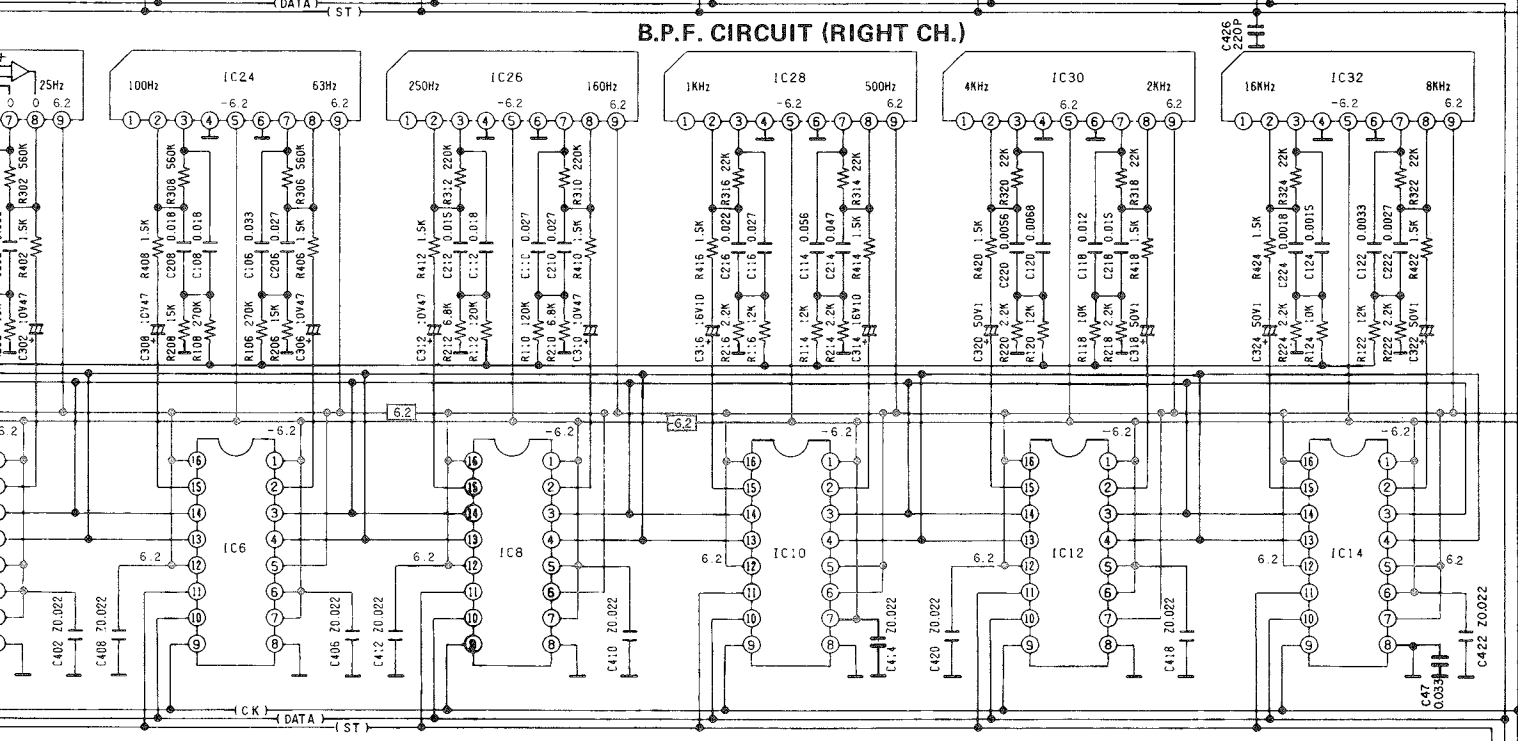
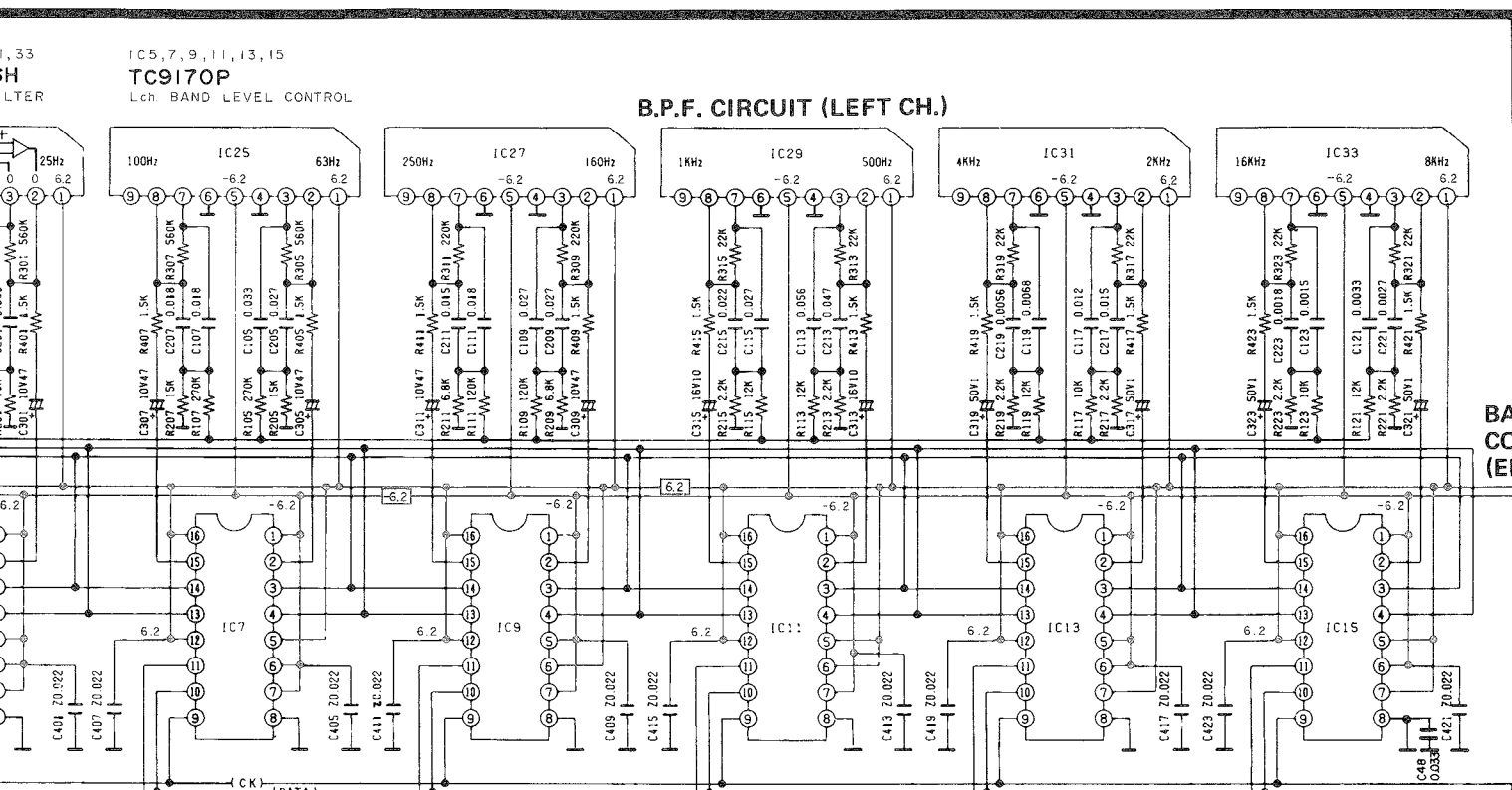
F

G



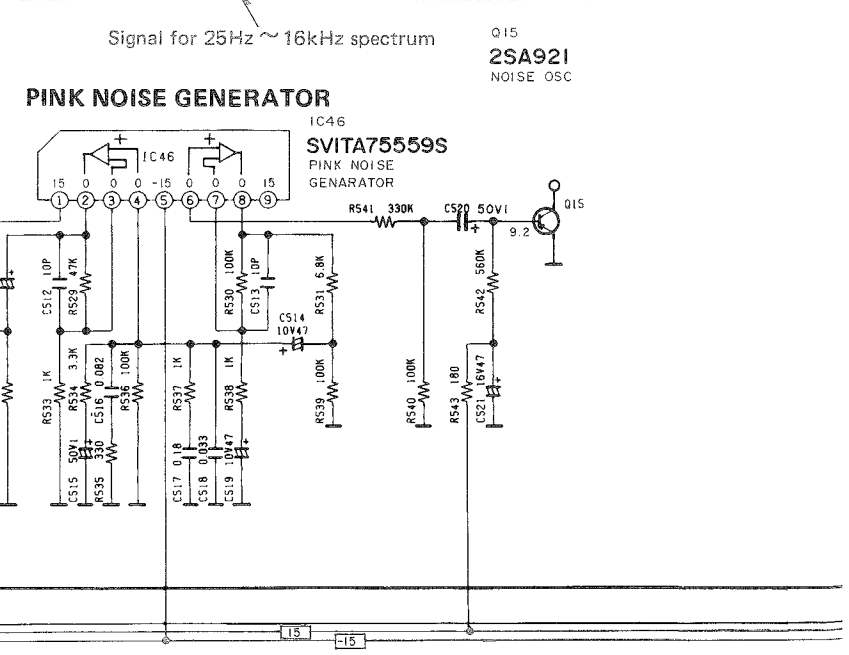
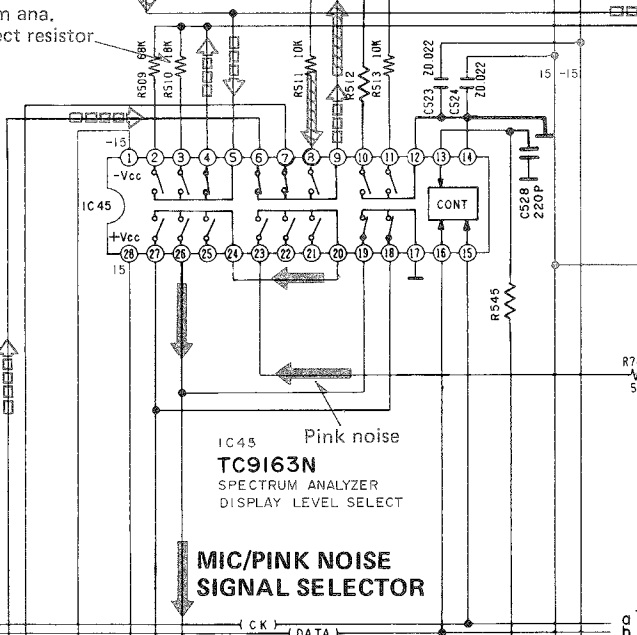
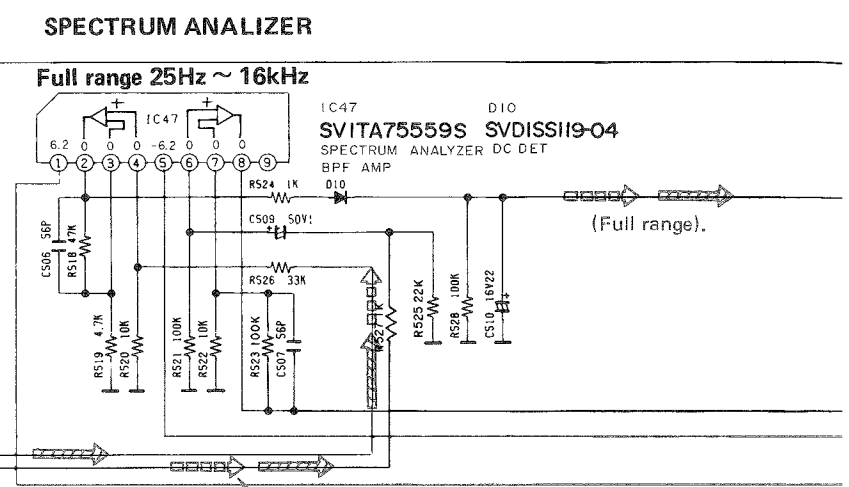
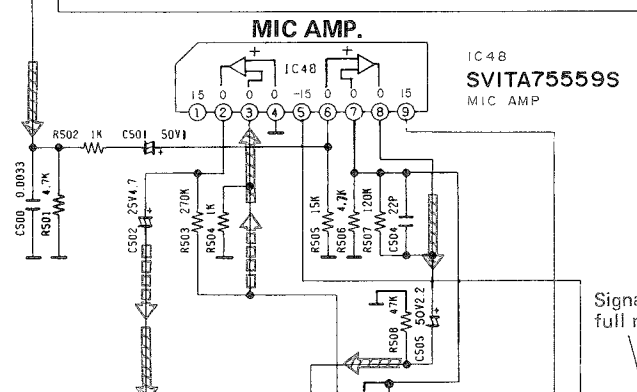
Microphone signal

5. 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.



BAND LEVEL CONTROL
(Electric volume)

- Notes 2 :**
- 1. **S1-1 ~ S1-6 :** Power switch in "on" position.
(S1-6 is 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. **S800 ~ S802:** Channel selection switch. [L/R/L+R]
 - 3. **S803:** Equalization-record switch.
 - 4. **S804 ~ S806:** Input selection switch. (tape 1/tape 2/source)
 - 5. **S807 ~ S808:** Display mode selection switch. (EQ level/spectrum analyzer)
 - 6. **S809:** Equalizer-add (EQ plus) switch.
 - 7. **S810:** Memory switch.
 - 8. **S811:** Equalization ON/OFF (EQ) switch.
 - 9. **S812 ~ S819:** Preset-memory switch. (memory 1 ~ memory 8)
 - 10. Direct equalizer level control key matrix circuit includes switches that "vary all frequencies in the range of $\pm 12\text{dB}$ ", "LOCK" switch, "Auto-EQ" switch and "Pink-noise" switch.
"Auto-EQ" switch and "Pink-noise" switch do not function unless insertion of microphone into MIC jack.
 - 11. **S2:** Voltage selection switch in "110V" position. (Except for [M] and [MC] areas.)
(110V $\leftrightarrow$ 127V $\leftrightarrow$ 220V $\leftrightarrow$ 240V)



spectrum analyzer (L ch.)

B.P.F. FOR SPECTRUM ANALYZER

LOG. AMP.

A/D CONV.

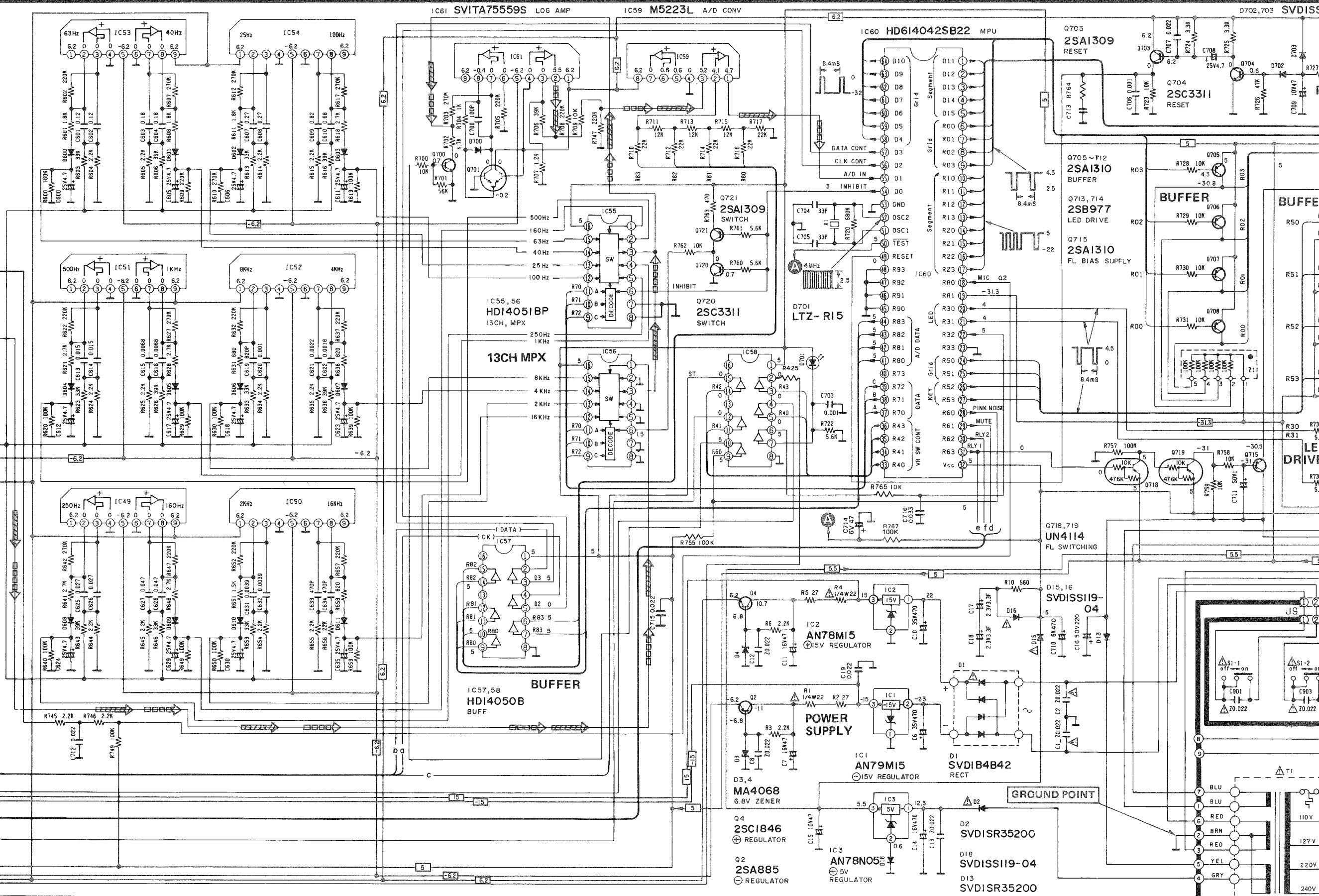
MICRO COMPUTER

D600~611
SVDISS119-04
DC DET

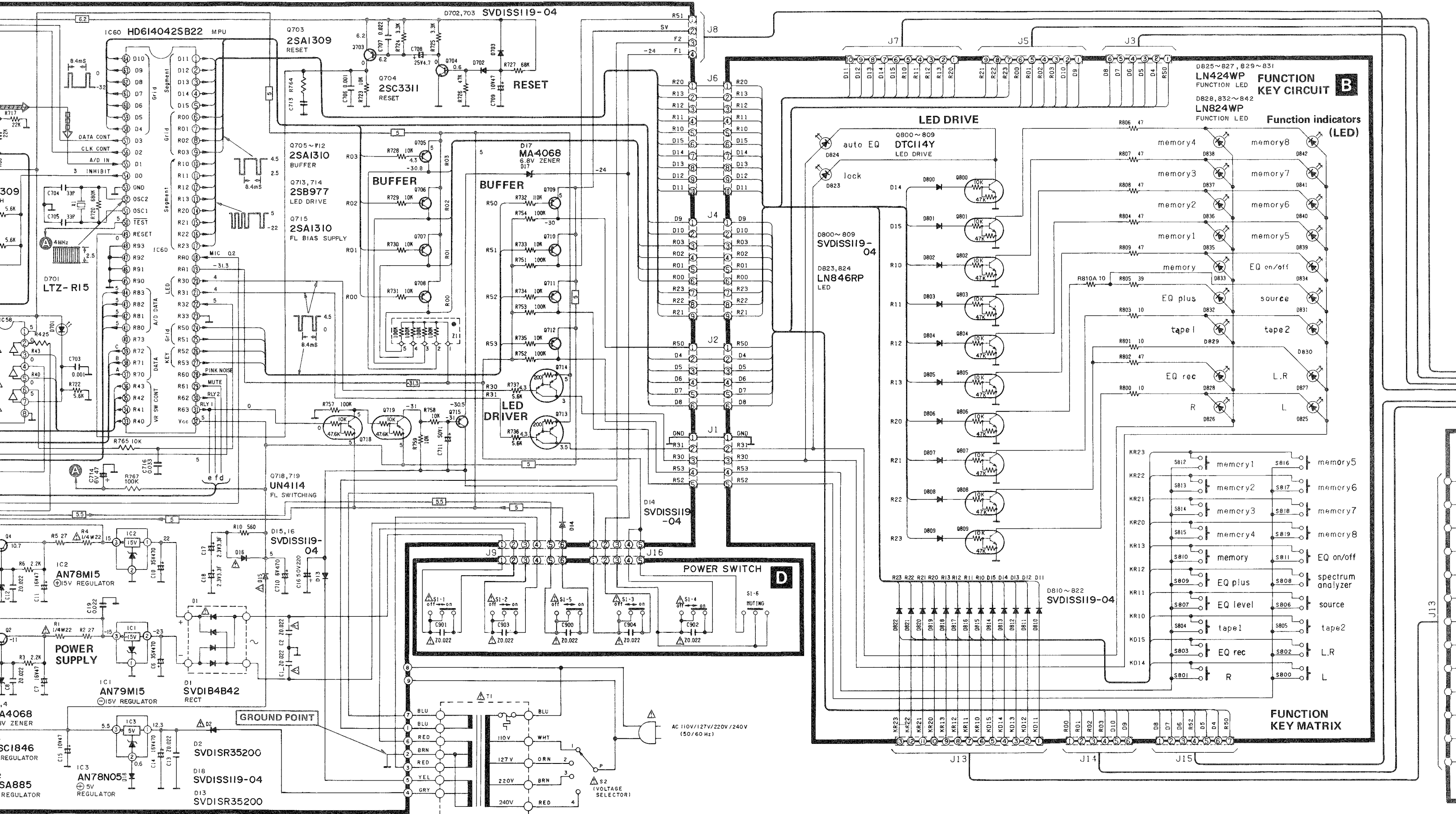
IC49~54
SVITA75559S
SPECTRUM ANALYZER
BAND PASS FILTER

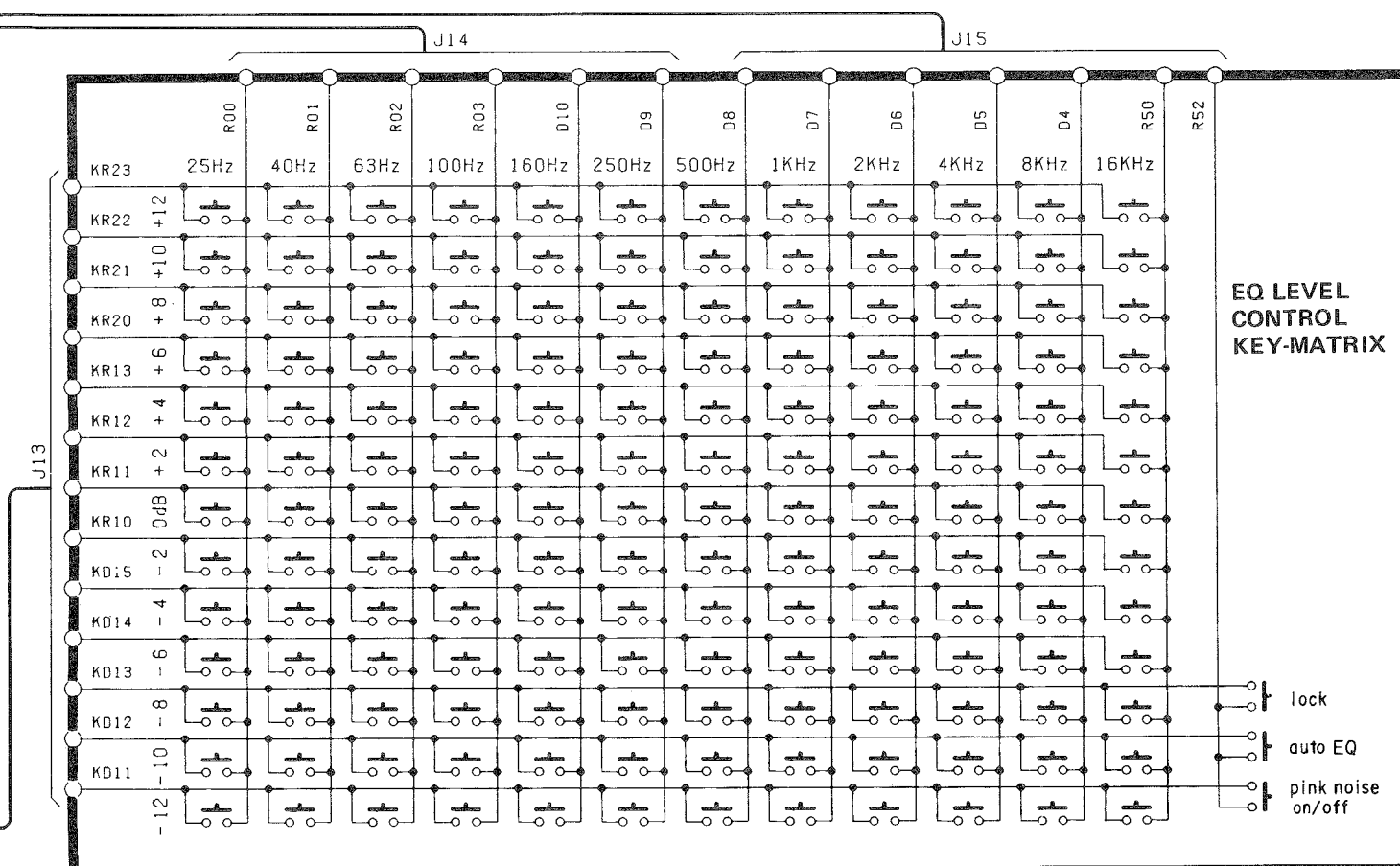
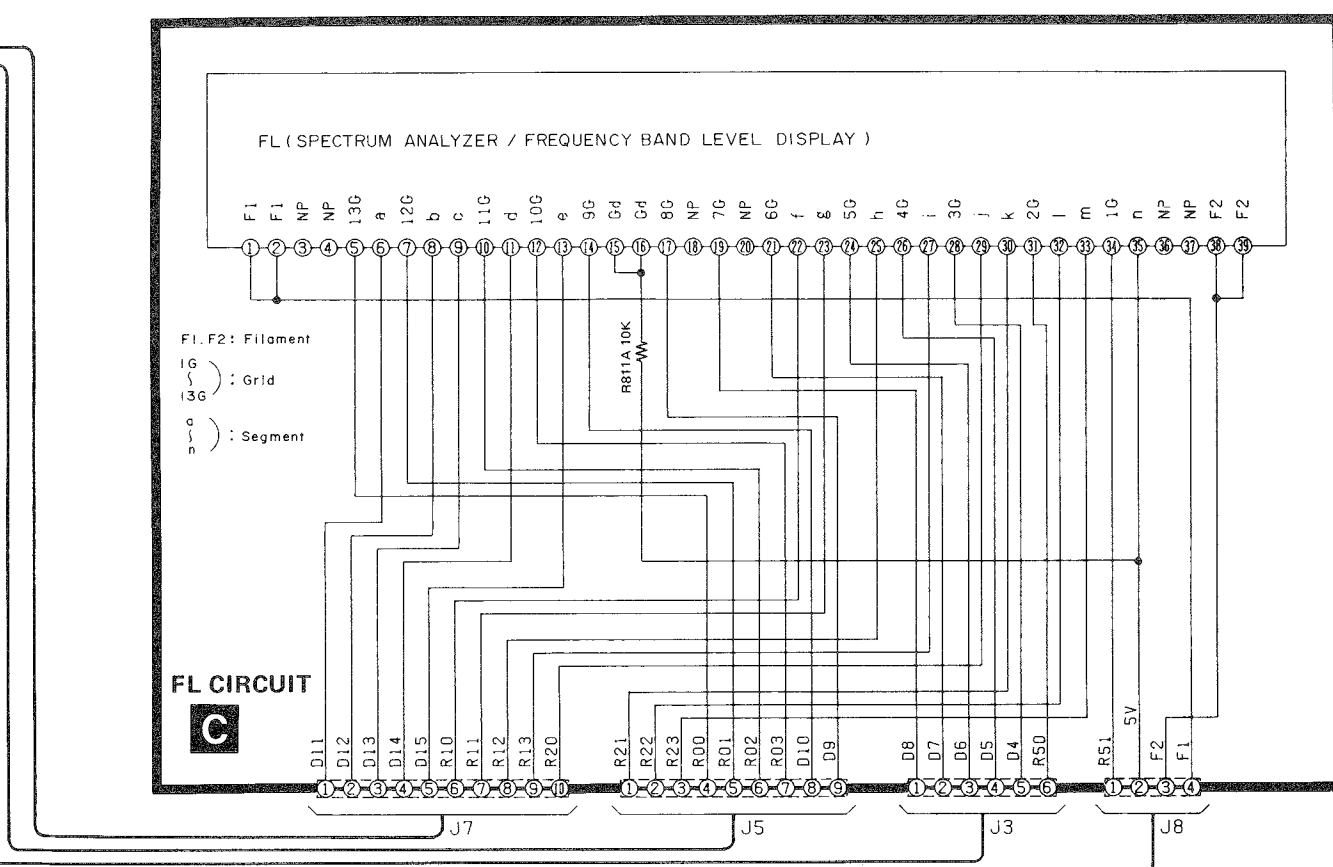
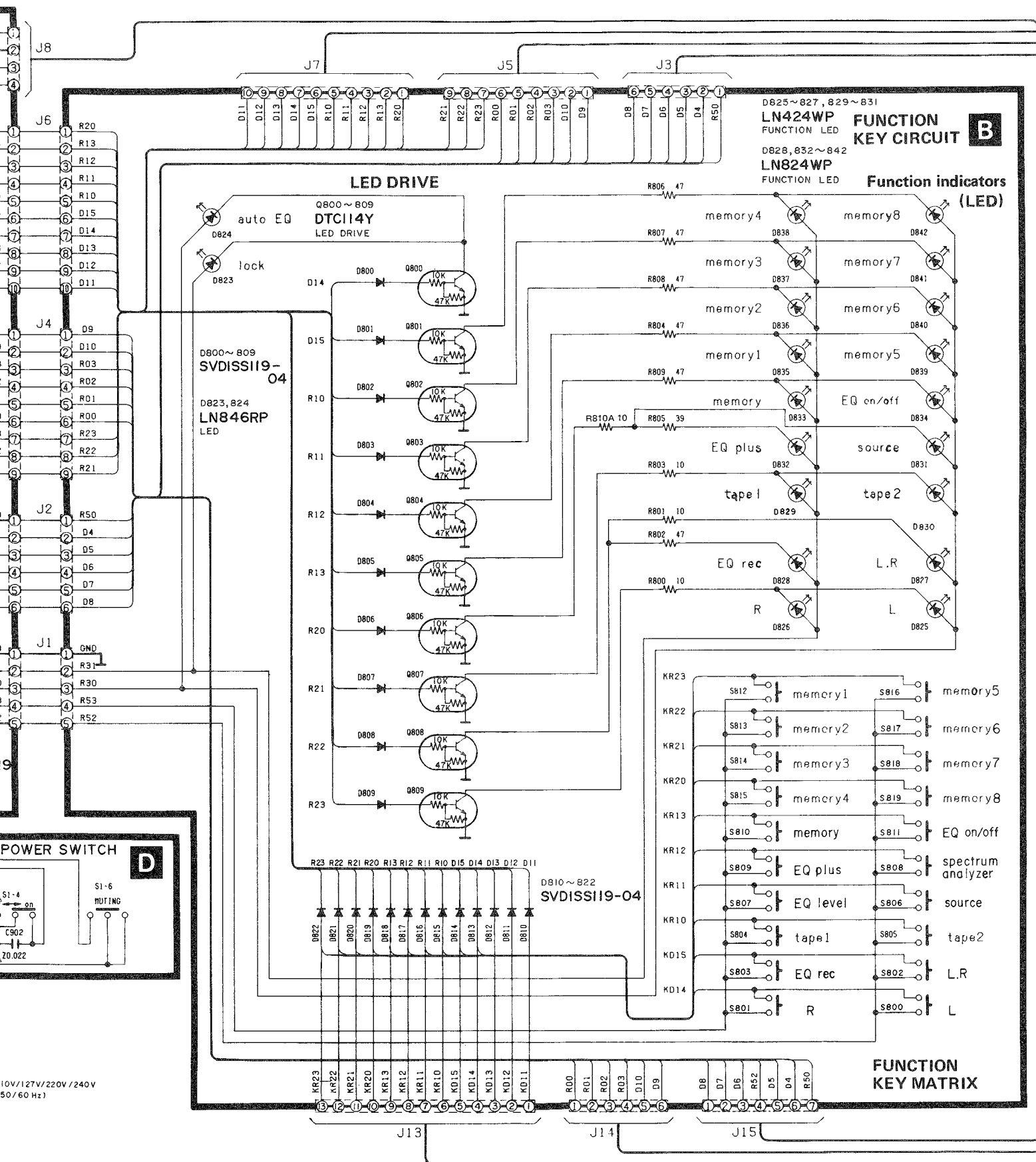
Q700
2SC3311
LOG AMP

Q701
2SC1583
LOG AMP



MICRO COMPUTER





RESISTORS & 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 Δ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
3. The "S" mark is service standard parts and may differ from production parts.
4. The unit of resistance is Ω (ohm), K = 1000 Ω , M = 1000k Ω .
5. The unit of capacitance is μ F (microfarad). P = 10⁻⁶ μ F

CAPACITORS

Ref. No.	Part No.	Value	Ref. No.	Part No.	Value
C1, 2	Ⓢ ECKD1H223ZF	0.022	C417, 418	Ⓢ ECKD1H223ZF	0.022
C6	ECEA1VU471	470	C419, 420	Ⓢ ECKD1H223ZF	0.022
C7	ECEA1CU470	47	C421, 422	Ⓢ ECKD1H223ZF	0.022
C8	Ⓢ ECKD1H223ZF	0.022	C423	Ⓢ ECKD1H223ZF	0.022
C10	ECEA1VU471	470	C426	Ⓢ ECKD1H221KB	220P
C11	ECEA1CU470	47	C500	Ⓢ ECQM1H332JZ	0.0033
C12, 13	Ⓢ ECKD1H223ZF	0.022	C501	ECEA1HU010	1
C14	ECEA1CU471	470	C502	ECEA1EU4R7	4.7
C15	ECEA1AU470	47	C504	Ⓢ ECCD1H220K	22P
C16	ECEA1HU221	220	C505	ECEA1HU2R2	2.2
C17, 18	EECW2R3A3R3E	3.3F	C506, 507	Ⓢ ECCD1H560K	56P
C19	Ⓢ ECKD1H223ZF	0.022	C509	ERD10TJ102	1K
C21, 22	ECEA1EU4R7	4.7	C510	ECEA1CU220	22
C23, 24	Ⓢ ECKD1H101KB	100P	C511	ECEA1EU4R7	4.7
C25, 26	Ⓢ ECCD1H220K	22P	C512, 513	Ⓢ ECCD1H100K	10P
C27, 28	Ⓢ ECCD1H220K	22P	C514	ECEA1AU470	47
C29, 30	ECEA1EU221	220	C515	ECEA1HU010	1
C35, 36	Ⓢ ECKD1H151KB	150P	C516	Ⓢ ECQM1H823JZ	0.082
C37, 38	ECEA1CU100	10	C517	ECQM1H184JZ	0.18
C39	ECEA1CU470	47	C518	Ⓢ ECQM1H333JZ	0.033
C40, 41	ECCD1H470K	47P	C519	ECEA1AU470	47
C45, 46	ECEA1CU100	10	C520	ECEA1HU010	1
C47, 48	Ⓢ ECKD1H333ZF	0.033	C521	ECEA1CU470	47
C49	Ⓢ ECKD1H221KB	220P	C523, 524	Ⓢ ECKD1H223ZF	0.022
C91, 92	ECKD1H101KB	100P	C527	Ⓢ ECKD1H223ZF	0.022
C93, 94	ECKD1H101KB	100P	C528	Ⓢ ECKD1H221KB	220P
C95, 96	ECKD1H101KB	100P	C600	ECEA1EU4R7	4.7
C101, 102	ECQV05683JZ	0.068	C601, 602	ECQM1H124JZ	0.12
C103, 104	ECQV05473JZ	0.047	C603, 604	ECQM1H184JZ	0.18
C105, 106	Ⓢ ECQM1H333JZ	0.033	C605, 606	ECEA1EU4R7	4.7
C107, 108	ECQM1H183JZ	0.018	C607, 608	ECQM1H274JZ	0.27
C109, 110	Ⓢ ECQM1H273JZ	0.027	C609	ECQM1H823JZ	0.082
C111, 112	Ⓢ ECQM1H183JZ	0.018	C610	ECQM1H683JZ	0.068
C113, 114	Ⓢ ECQM1H563JZ	0.056	C611, 612	ECEA1EU4R7	4.7
C115, 116	Ⓢ ECQM1H273JZ	0.027	C613, 614	ECFTD153KXL	0.015
C117, 118	Ⓢ ECQM1H123JZ	0.012	C615, 616	ECFTD682KXL	0.0068
C119, 120	Ⓢ ECQM1H682JZ	0.0068	C617, 618	ECEA1EU4R7	4.7
C121, 122	Ⓢ ECQM1H332JZ	0.0033	C619	Ⓢ ECKD1H821KB	820P
C123, 124	Ⓢ ECQM1H152JZ	0.0015	C620	ECFTD102KXL	0.001
C201, 202	ECFTD683KXL	0.068	C621	Ⓢ ECQM1H222JZ	0.0022
C203, 204	ECFTD473KXL	0.047	C622	ECFTD182KXL	0.0018
C205, 206	ECFTD273KXL	0.027	C623, 624	ECEA1EU4R7	4.7
C207, 208	ECFTD183KXL	0.018	C625, 626	ECFTD273KXL	0.027
C209, 210	ECFTD273KXL	0.027	C627, 628	ECFTD473KXL	0.047
C211, 212	ECFTD153KXL	0.015	C629, 630	ECEA1EU4R7	4.7
C213, 214	ECFTD473KXL	0.047	C631, 632	ECFTD392KXL	0.0039
C215, 216	ECFTD223KXL	0.022	C633, 634	ECKD1H471KB	470P
C217, 218	ECFTD153KXL	0.015	C635	ECEA1EU4R7	4.7
C219, 220	ECFTD562KXL	0.0056	C700	Ⓢ ECKD1H101KB	100P
C221, 222	ECFTD272KXL	0.0027	C703	ECFTD102KXL	0.001
C223, 224	ECFTD182KXL	0.0018	C704, 705	Ⓢ ECCD1H330K	33P
C301, 302	ECEA1AU470	47	C706	ECFTD102KXL	0.001
C303, 304	ECEA1AU470	47	C707	Ⓢ ECKD1H223ZF	0.022
C305, 306	ECEA1AU470	47	C708	ECEA1EU4R7	4.7
C307, 308	ECEA1AU470	47	C709	ECEA1AU470	47
C309, 310	ECEA1AU470	47	C710	ECEA0JU471	470
C311, 312	ECEA1AU470	47	C711	ECEA1HU010	1
C313, 314	ECEA1CU100	10	C712	Ⓢ ECKD1H223ZF	0.022
C315, 316	ECEA1CU100	10	C713	ECKD1H102ZF	0.001
C317, 318	ECEA1HU010	1	C714	ECEA0JU470	47
C319, 320	ECEA1HU010	1	C715	Ⓢ ECKD1H223ZF	0.022
C321, 322	ECEA1HU010	1	C716	ECKD1H333ZF	0.033
C323, 324	ECEA1HU010	1	C720	Ⓢ ECKD1H223ZF	0.022
C401, 402	Ⓢ ECKD1H223ZF	0.022	C900, 901	ECKD1H223ZF	0.022
C403, 404	Ⓢ ECKD1H223ZF	0.022	Ⓢ Δ	Ⓢ ECKD1H223ZF	0.022
C405, 406	Ⓢ ECKD1H223ZF	0.022	C902, 903	ECKD1H223ZF	0.022
C407, 408	Ⓢ ECKD1H223ZF	0.022	Ⓢ Δ Ⓢ	Ⓢ ECKD1H223ZF	0.022
C409, 410	Ⓢ ECKD1H223ZF	0.022	C904	Ⓢ Δ Ⓢ ECKD1H223ZF	0.022
C411, 412	Ⓢ ECKD1H223ZF	0.022			
C413, 414	Ⓢ ECKD1H223ZF	0.022			
C415	Ⓢ ECKD1H223ZF	0.022			

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 : $\pm$ 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 : $\pm$ 10%		
ECCD : Ceramic	1A : 10V	Z : +80%, -20%		
ECKD : Ceramic	1C : 16V	M : $\pm$ 20%		
ECF : Semi-conductor	1E : 25V			
ECQV : Polyester	D : 25V			
ECQM : Polyester	1H : 50V			
EECW : Liquid electrolyte dubble layer	1V : 35V 2R3 : 2.3V			

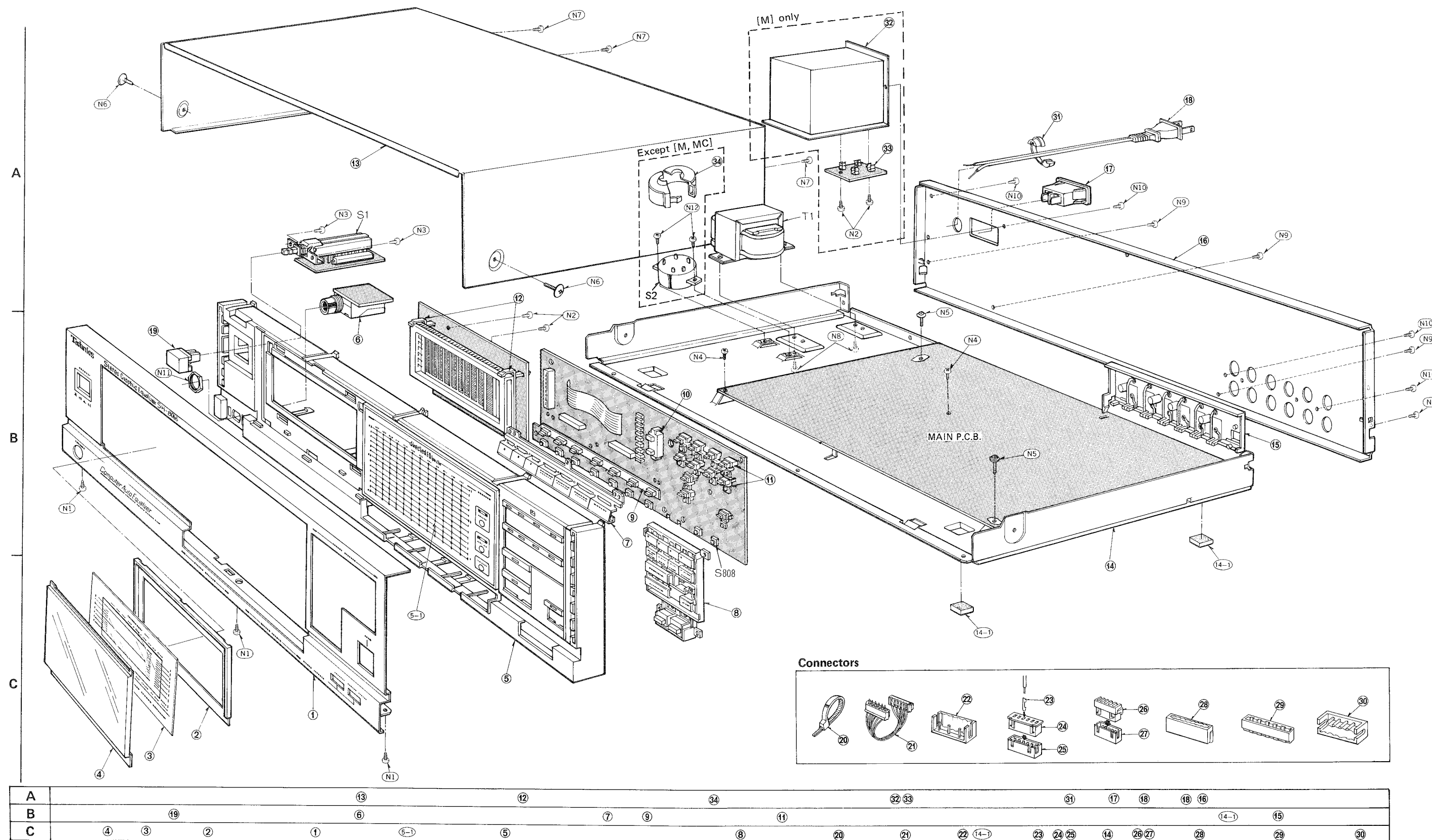
RESISTORS

Ref. No.	Part No.	Value	Ref. No.	Part No.	Value	Ref. No.	Part No.	Value	Ref. No.	Part No.	Value
R1	△ ERD2FCG220	22	R309, 310	ERD10TJ224	220K	R616	ERD10TJ393	39K	R751, 752	ERD10TJ104	100K
R2	ERDS2TJ270	27	R311, 312	ERD10TJ224	220K	R617	ERD10TJ274	270K	R753, 754	ERD10TJ104	100K
R3	ERD10TJ222	2.2K	R313, 314	ERD10TJ223	22K	R618	ERD10TJ272	2.7K	R755	ERD10TJ104	100K
R4	△ ERD2FCG220	22	R315, 316	ERD10TJ223	22K	R619, 620	ERD10TJ104	100K			
R5	ERDS2TJ270	27	R317, 318	ERD10TJ223	22K	R621	ERD10TJ272	2.7K	R757	ERD10TJ104	100K
R6	ERD10TJ222	2.2K	R319, 320	ERD10TJ223	22K	R622	ERD10TJ224	220K	R758, 759	ERD10TJ103	10K
R10	ERD10TJ561	560	R321, 322	ERD10TJ223	22K				R760, 761	ERD10TJ562	5.6K
R12	ERD10TJ181	180	R323, 324	ERD10TJ223	22K	R623	ERD10TJ333	33K	R762	ERD10TJ103	10K
R14	ERD10TJ103	10K	R401, 402	ERD10TJ152	1.5K	R624, 625	ERD10TJ222	2.2K	R763	ERD10TJ471	470
R15, 16	ERD10TJ102	1K	R403, 404	ERD10TJ152	1.5K	R626	ERD10TJ393	39K	R764	ERD10TJ103	10K
			R405, 406	ERD10TJ152	1.5K	R627	ERD10TJ274	270K	R765	ERD25FJ103	10K
R19	ERD10TJ181	180	R407, 408	ERD10TJ152	1.5K	R628	ERD10TJ272	2.7K	R767	ERD10TJ104	100K
R21, 22	ERD10TJ102	1K	R409, 410	ERD10TJ152	1.5K	R629, 630	ERD10TJ104	100K	R800, 801	ERD10TJ100	10
R23, 24	ERD10TJ104	100K	R411, 412	ERD10TJ152	1.5K	R631	ERD10TJ681	680	R802	ERD10TJ470	47
R25, 26	ERD10TJ104	100K	R413, 414	ERD10TJ152	1.5K	R632	ERD10TJ224	220K			
R27, 28	ERD10TJ103	10K	R415, 416	ERD10TJ152	1.5K	R633	ERD10TJ333	33K	R803	ERD10TJ100	10
R29, 30	ERD10TJ104	100K	R417, 418	ERD10TJ152	1.5K	R634, 635	ERD10TJ222	2.2K	R804	ERD10TJ470	47
R31, 32	ERD10TJ682	6.8K	R419, 420	ERD10TJ152	1.5K	R636	ERD10TJ393	39K	R805	ERD10TJ390	39
R33, 34	ERD10TJ562	5.6K				R637	ERD10TJ224	220K	R806, 807	ERD10TJ470	47
R35, 36	ERD10TJ103	10K	R421, 422	ERD10TJ152	1.5K	R638	ERD10TJ821	820	R808, 809	ERD10TJ470	47
R37, 38	ERD10TJ562	5.6K	R423, 424	ERD10TJ152	1.5K	R639, 640	ERD10TJ104	100K	R810A	ERD10TJ100	10
			R425	ERD10TJ103	10K	R641	ERD10TJ272	2.7K	R811A	ERD10TJ103	10K
R39, 40	ERD10TJ562	5.6K	R501	ERD10TJ472	4.7K	R642	ERD10TJ274	270K			
R41, 42	ERD10TJ102	1K	R502	ERD10TJ102	1K	R643	ERD10TJ393	39K			
R43, 44	ERD10TJ104	100K	R503	ERD10TJ274	270K	R644, 645	ERD10TJ222	2.2K			
R45	ERD10TJ224	220K	R504	ERD10TJ102	1K	R646	ERD10TJ333	33K			
R46, 47	ERD10TJ473	47K	R505	ERD10TJ153	15K						
R48	ERD10TJ224	220K	R506	ERD10TJ472	4.7K	R647	ERD10TJ224	220K			
R49, 50	ERD10TJ562	5.6K	R507	ERD10TJ124	120K	R648	ERD10TJ272	2.7K			
R51, 53	△ ERD2FCG220	22				R649, 650	ERD10TJ104	100K			
R60	ERD10TJ103	10K	R508	ERD10TJ473	47K	R651	ERD10TJ152	1.5K			
			R509	ERD10TJ683	68K	R652	ERD10TJ224	220K			
R61	ERD10TJ473	47K	R510	ERD10TJ183	18K	R653	ERD10TJ333	33K			
R62	ERD10TJ103	10K	R511	ERD10TJ103	10K	R654, 655	ERD10TJ222	2.2K			
R63	ERD10TJ473	47K	R513	ERD10TJ103	10K	R656	ERD10TJ223	22K			
R64, 65	ERD10TJ331	330	R518	ERD10TJ473	47K	R657	ERD10TJ224	220K			
R66, 67	ERD10TJ331	330	R519	ERD10TJ472	4.7K	R658	ERD10TJ821	820			
R71, 72	ERD10TJ104	100K	R520	ERD10TJ103	10K						
R73, 74	ERD10TJ104	100K	R521	ERD10TJ104	100K	R659	ERD10TJ104	100K			
R75, 76	ERD10TJ104	100K	R522	ERD10TJ103	10K	R700	ERD10TJ103	10K			
R77	ERD10TJ104	100K				R701	ERD10TJ563	56K			
R78	ERD10TJ103	10K	R523	ERD10TJ104	100K	R702	ERD10TJ472	4.7K			
			R524	ERD10TJ102	1K	R703	ERD10TJ274	270K			
R91, 92	ERD10TJ102	1K	R525	ERD10TJ223	22K	R704	ERD10TJ102	1K			
R93, 94	ERD10TJ102	1K	R526	ERD10TJ333	33K	R705	ERD10TJ154	150K			
R100	△ ERD2FCG5F6	5.6	R527	ERD10TJ102	1K	R706	ERD10TJ393	39K			
R101, 102	ERD10TJ274	270K	R528	ERD10TJ104	100K	R707	ERD10TJ122	1.2K			
R103, 104	ERD10TJ274	270K	R529	ERD10TJ473	47K	R708	ERD10TJ224	220K			
R105, 106	ERD10TJ274	270K	R530	ERD10TJ104	100K						
R107, 108	ERD10TJ274	270K	R531	ERD10TJ682	6.8K	R709	ERD10TJ103	10K			
R109, 110	ERD10TJ124	120K	R532	ERD10TJ104	100K	R710	ERD10TJ223	22K			
R111, 112	ERD10TJ124	120K				R711	ERD10TJ123	12K			
R113, 114	ERD10TJ123	12K	R533	ERD10TJ102	1K	R712	ERD10TJ223	22K			
			R534	ERD10TJ332	3.3K	R713	ERD10TJ123	12K			
R115, 116	ERD10TJ123	12K	R535	ERD10TJ331	330	R714	ERD10TJ223	22K			
R117, 118	ERD10TJ103	10K	R536	ERD10TJ104	100K	R715	ERD10TJ123	12K			
R119, 120	ERD10TJ123	12K	R537, 538	ERD10TJ102	1K	R716, 717	ERDS2TJ223	22K			
R121, 122	ERD10TJ123	12K	R539, 540	ERD10TJ104	100K	R720	ERD10TJ684	680K			
R123, 124	ERD10TJ103	10K	R541	ERD10TJ334	330K	R722	ERD10TJ562	5.6K			
R201, 202	ERD10TJ153	15K	R542	ERD10TJ564	560K						
R203, 204	ERD10TJ153	15K	R543	ERD10TJ181	180	R723	ERD10TJ103	10K			
R205, 206	ERD10TJ153	15K	R545	ERD10TJ103	10K	R724, 725	ERD10TJ332	3.3K			
R207, 208	ERD10TJ153	15K				R726	ERD10TJ473	47K			
R209, 210	ERD10TJ682	6.8K	R600	ERD10TJ184	180K	R727	ERD10TJ683	68K			
			R601	ERD10TJ182	1.8K	R728, 729	ERD10TJ103	10K			
R211, 212	ERD10TJ682	6.8K	R602	ERD10TJ224	220K	R730, 731	ERD10TJ103	10K			
R213, 214	ERD10TJ222	2.2K	R603	ERD10TJ333	33K	R732, 733	ERD10TJ103	10K			
R215, 216	ERD10TJ222	2.2K	R604, 605	ERD10TJ222	2.2K	R734, 735	ERD10TJ103	10K			
R217, 218	ERD10TJ222	2.2K	R606	ERD10TJ393	39K	R736, 737	ERD10TJ562	5.6K			
R219, 220	ERD10TJ222	2.2K	R607	ERD10TJ274	270K	R741	ERD10TJ103	10K			
R221, 222	ERD10TJ222	2.2K	R608	ERD10TJ182	1.8K						
R223, 224	ERD10TJ222	2.2K	R609	ERD10TJ224	220K	R742	ERD10TJ563	56K			
R301, 302	ERD10TJ564	560K	R610	ERD10TJ274	270K	R743	ERD10TJ103	10K			
R303, 304	ERD10TJ564	560K				R744	ERD10TJ563	56K			
R305, 306	ERD10TJ564	560K	R611	ERD10TJ182	1.8K	R745, 746	ERD10TJ222	2.2K			
			R612	ERD10TJ274	270K	R747	ERD10TJ224	220K			
R307, 308	ERD10TJ564	560K	R613	ERD10TJ333	33K	R748	ERD10TJ561	560			
			R614, 615	ERD10TJ222	2.2K	R749	ERD10TJ104	100K			

■ EXPLODED VIEWS

erance
10%
0%, -20%
20%

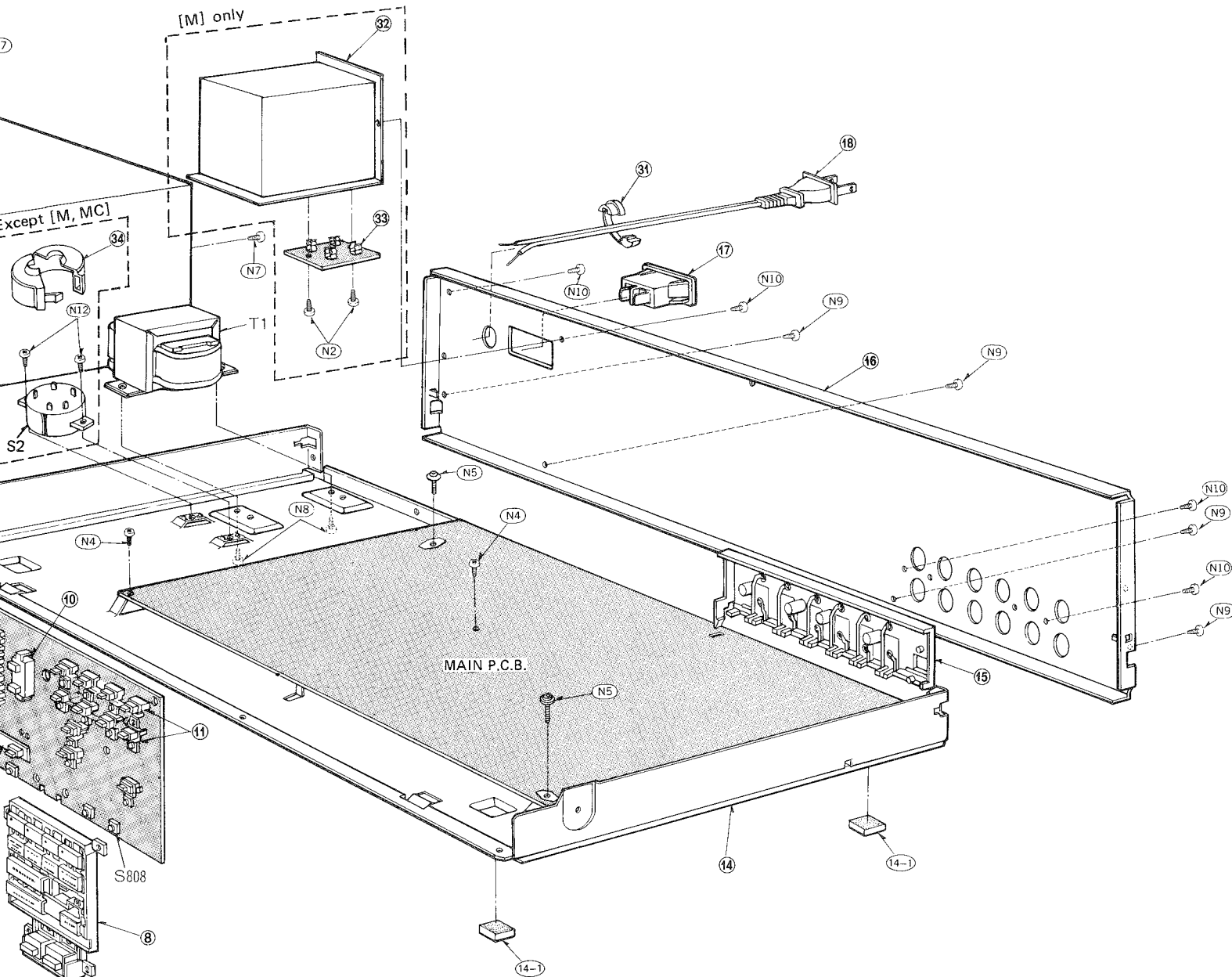
	Part No.	Value
	ERD10TJ104	100K
	ERD10TJ104	100K
	ERD10TJ104	100K
	ERD10TJ104	100K
	ERD10TJ103	10K
	ERD10TJ562	5.6K
	ERD10TJ103	10K
	ERD10TJ471	470
	ERD10TJ103	10K
	ERD25FJ103	10K
	ERD10TJ104	100K
	ERD10TJ100	10
	ERD10TJ470	47
	ERD10TJ100	10
	ERD10TJ470	47
	ERD10TJ390	39
	ERD10TJ470	47
	ERD10TJ470	47
	ERD10TJ100	10
	ERD10TJ103	10K



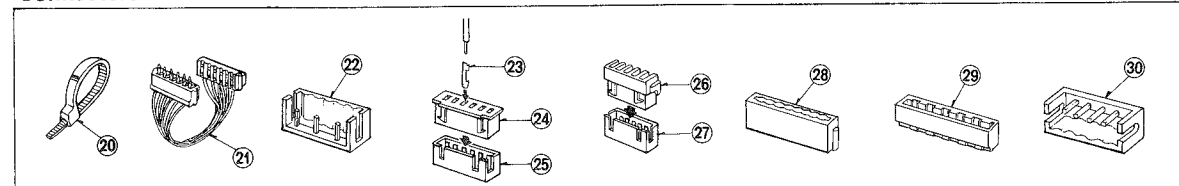
REPLACEMENT PARTS LIST

Notes:

1. Part numbers are indicated on most mechanical parts. Please use this part number for parts order.
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.
4. The "⑤" mark is service standard parts and may differ from production parts.
5. The parenthesized numbers in the column of description stand for the quantity per set.



Connectors



⑨	③④	⑪	③② ③③	③①	①⑦	①⑧	①⑧ ①⑥	①④-①	①⑤
⑧	②①	②② ①④-①	②③ ②④ ②⑤	①④	②⑥ ②⑦	②⑧	②⑨	③①	③②

Ref. No.	Part No.	Description
INTEGRATED CIRCUITS		
IC1	AN79M15	IC
IC2	AN78M15	IC
IC3	AN78N05	IC
IC4~15	TC9170P	IC
IC22~33, 40, 41, 46~54, 61	SVTA75559S	IC
IC42, 43	SVINJM2043SE	IC
IC44, 45	TC9163N	IC
IC55, 56	HD14051BP	IC
IC57, 58	HD14050B	IC
IC59	M5223L	IC
IC60	HD614042SB22	IC
TRANSISTORS		
Q2	2SA885Q	Transistor
Q4	2SC1846-Q	Transistor
Q10, 11, 700, 704, 720	2SC3311-Q	Transistor
Q12, 13	2SC2878A-T	Transistor
Q14, 703, 716, 717, 721	2SA1309Q	Transistor
Q15	2SA921-T	Transistor
Q701	2SC1583-G	Transistor
Q705~712, 715	2SA1310-T	Transistor
Q713, 714	2SB977-Q	Transistor
Q718, 719	UN4114	Transistor
Q800~809	DTC114Y	Transistor
DIODES		
D1	SVD1B4B42	Diode
D2, 13	Δ SVD1SR35200	Diode
D3, 4, 17	MA4068	Diode
D8~10, 14~16, 18, 600~611, 700, 702, 703, 800~822	SVD1SS119-04	Diode
D701	LTZ-R15	Diode
D823, 824	LN846RP	LED
D825~827, 829~831	LN424WP	LED
D828, 832~842	LN824WP	LED
TRANSFORMER		
T1 [M]	Δ SLTK5V5-W	Power Source
T1 [MC]	Δ SLTK5V7-W	Power Source
T1 [other]	Δ SLTK5V6-W	Power Source
CRYSTAL		
X1	SVFCSA400MG	Crystal OSC
FLUORESCENT DISPLAY TUBE		
FL	SADBG284ZK	Spectrum Analyzer
RELAYS		
RLY1	SFDYG5A237P	Relay
RLY2	SSY125	Relay
COMPONENT COMBINATION		
Z1	RGSD4X104K	Component Combination
SWITCHES		
S1	Δ SSHK53	Power Pre-Set
S800~819	SSG13	Pre-Set
S2	Δ ESE37108	Voltage Selector
Except [M, MC]		
FUSES		
F1, 2 [M] only	Δ XBA2F02NU100	250V, 250mA

Ref. No.	Part No.	Description
CABINET and CHASSIS PARTS		
1	SGWKH8066-KM	Front Ass'y (1)
2	SGXK101	Ornament (1)
3	SDUK13	Ornament (1)
4	SGUK13	Transparent Plate (1)
5	SGXH8066-KN	Grille Ass'y (1)
[5-1]	[SSEK15]	[Switch] (1)
6	SJJK22	Mic Jack (1)
7	SBCH8066-KN	Button Ass'y (1)
8	SBCK48-1	Button (1)
9	SUDK14	LED Holder (1)
10	SUDK15	LED Holder (1)
11	SUDK13	LED Holder (1)
12	SHRK928	FL Holder (2)
13	SKCK150K99	Cabinet (1)
14 [M, MC]	SKUKH8066-KM	Chassis Ass'y (1)
14 [other]	SKUKH8066-KE	Chassis Ass'y (1)
[14-1]	[SKL293]	[Foot] (4)
15	SJF3059-2N	Terminal Board (1)
16 [M]	SGPK310-4A	Rear Panel (1)
16 [MC]	SGPK310-1A	Rear Panel (1)
16 [E]	SGPK310-2A	Rear Panel (1)
16 [EK]	SGPK310-2B	Rear Panel (1)
16 [XL]	SGPK310-2C	Rear Panel (1)
16 [XA, PA, PE]	SGPK310-3A	Rear Panel (1)
16 [other]	SGPK310-2D	Rear Panel (1)
17	Δ SJS9221-1	AC Outlet (1)
[M, XA, PA, PE]		
17 [MC]	Δ SJS9223	AC Outlet (1)
18 [M]	Δ RJA9Y	AC Cord (1)
18 [MC]	Δ SJA169	AC Cord (1)
18 [EK]	Δ SFDAB31G01	AC Cord (1)
18 [XL]	Δ SJAG23	AC Cord (1)
18 [PA, PE]	Δ RJA52YA	AC Cord (1)
18 [other]	Δ SFDAB31E01	AC Cord (1)
19	SBC666	Button (1)
20	SHR301	Read Clamper (2)
21	SWKKH8066N1	Connection Cord (J8) (1)
	SWKKH8066N2	Connection Cord (J1) (1)
	SWKKH8066N3	Connection Cord (J3) (1)
	SWKKH8066N4	Connection Cord (J2) (1)
	SWKKH8066N5	Connection Cord (J5) (1)
	SWKKH8066N6	Connection Cord (J4) (1)
	SWKKH8066N7	Connection Cord (J7) (1)
	SWKKH8066N8	Connection Cord (J6) (1)
22	SJTK30401DR	Post (J8) (1)
	SJTK30501DR	Post (J1) (1)
	SJTK30601DR	Post (J2) (1)
	SJTK30901DR	Post (J4) (1)
	SJTK31001DR	Post (J6) (1)
23	SJT783	Terminal (1)
24	SJS5331	Connector (J10) (1)
25	SJT3319	Post (J10) (1)
26	SWKH8066-KN1	Connector (J16) (1)
	SWKH8066-KN2	Connector (J9) (1)
27	SJT3511	Post (J16) (1)
	SJT3611	Post (J9) (1)
28	SJS50571DS	Post (J16) (1)
	SJS50671DS	Post (J9) (1)
	SJS50371DS	Post (J10) (1)
29	SJSK90602HB	Post (J14) (1)
	SJSK90702HB	Post (J15) (1)
	SJSK91302HB	Post (J13) (1)
30	SJTK30602DR	Post (J3) (1)
	SJTK30902DR	Post (J5) (1)
	SJTK31002DR	Post (J7) (1)

Ref. No.	Part No.	Description
CABINET and CHASSIS PARTS		
31 [M, MC]	RHR111	Bushing (1)
31 [EK]	SHR129	Bushing (1)
31 [other]	SHR127	Bushing (1)
32	SUVK14	Cover (1)
[M] only		
33	SJT345	Fuse Crip (4)
[M] only		
34 Except [M, MC]	SUV473	Voltage Selector Cover (1)
SCREWS and NUT		
N1	Δ XTB3+8BFZ	Tapping, $\phi 3 \times 8$ (3)
N2	XTB3+10BFYR	Tapping, $\phi 3 \times 10$ (2)
N3	Δ XTB3+8BFN	Tapping, $\phi 3 \times 8$ (2)
N4	XTW3+8HFFR	Tapping, $\phi 3 \times 8$ (2)
N5	XTBS3+8BFYR1	Tapping, $\phi 3 \times 8$ (2)
N6	SNE2095-5	Cabinet (2)
N7	Δ XTB3+8BFZ	Tapping, $\phi 3 \times 8$ (3)
N8	XYA4+FF10FZ	Tapping, $\phi 4 \times 10$ (2)
N9	Δ XTB3+8BFZ	Tapping, $\phi 3 \times 8$ (4)
N10	Δ XTB3+10BFZ	Tapping, $\phi 3 \times 10$ (4)
N11	Δ XNS12	Nut, $\phi 12$ (1)
N12	XTB3+8B	Tapping, $\phi 3 \times 8$ (2)
Except [M, MC]		
PACKING PARTS		
P1 [M]	SPGK197	Carton Box (1)
P1 [MC]	SPGK198	Carton Box (1)
P1 [PA, PE]	SPGK197	Carton Box (1)
P1 [EF]	SPGK200	Carton Box (1)
P1 [EK]	SPGK201	Carton Box (1)
P1 [XL]	SPGK202	Carton Box (1)
P1 [other]	SPGK199	Carton Box (1)
P2 [XL]	SPSK81-1	Pad, Left Side (1)
P2 [other]	SPSK81	Pad, Left Side (1)
P3 [XL]	SPSK82-1	Pad, Right Side (1)
P3 [other]	SPSK82	Pad, Right Side (1)
P4 [XL]	SPSK85-1	Pad, Center (1)
P4 [other]	SPSK85	Pad, Center (1)
P5 [M]	SQFK10110	Instruction Book (1)
P5 [MC]	SQFK10111	Instruction Book (1)
P5 [PA, PE]	SQFK10114	Instruction Book (1)
P5 [EGA]	SQFK10113	Instruction Book (1)
P5 [other]	SQFK10112	Instruction Book (1)
P6 [M, MC, PA, PE]	SPSK87	Mic Carton Box (Bottom) (1)
P7 [M, MC, PA, PE]	SPSK88	Mic Carton Box (Upper) (1)
P8	SPP649	Polyethylene Sheet (1)
ACCESSORIES		
A1	SJPK2201	Connection Cord (Pin, 0.8m) (2)
A2 [M, MC, PA, PE]	YPMSE050AA	Head Case (1)
A3	YPMMA54AA4	Grip (1)
[M, MC, PA, PE]		
A4	YPMKM302AA4	Holder (1)
[M, MC, PA, PE]		
A5	YPMKM238AB3	Stand (1)
[M, MC, PA, PE]		
A6 [PA, PE]	SJP9215	Plug, AC Adaptor (1)
A6 [XA]	SJP5213-1	Plug, AC Adaptor (1)

■ ADDITION

Though tape monitor circuit is provided in Model No. SH-8066 no description for the circuit is included in the Service Manual.
The description:

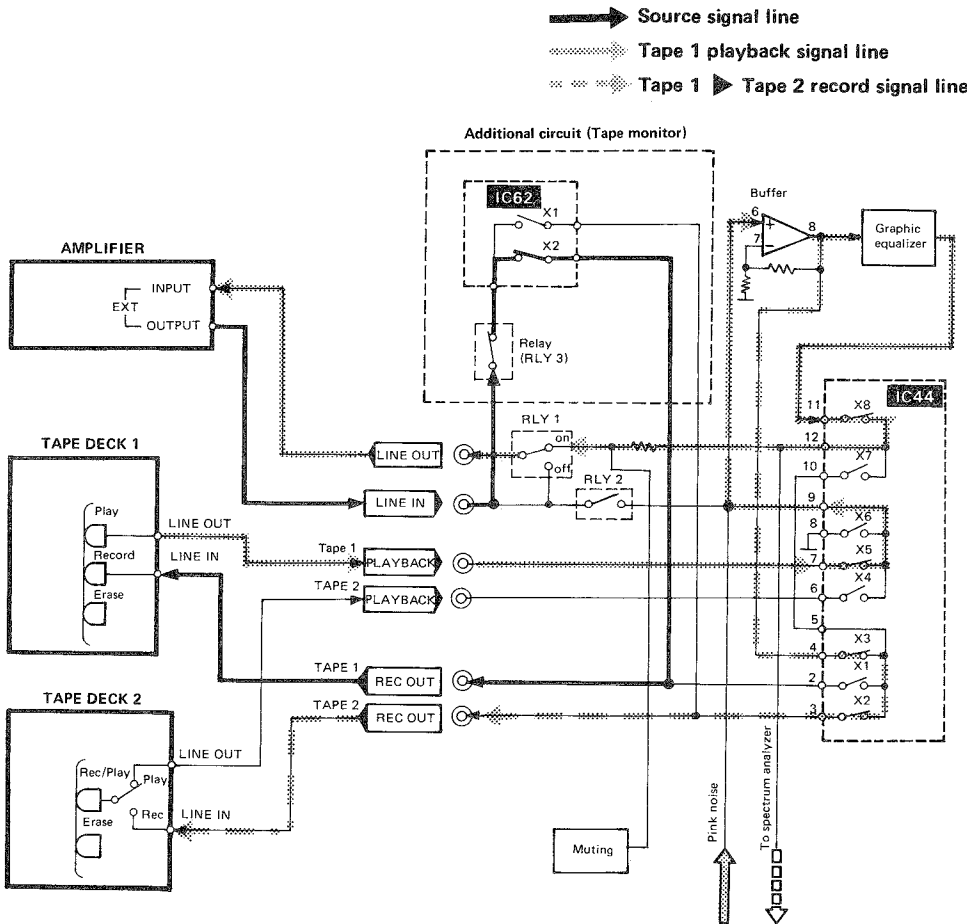
● Function

When "tape 1" or "tape 2" in input selector is pushed, source signal from LINE IN terminal is output to REC OUT terminal in "tape 1" or "tape 2" directly not passing through circuit of graphic equalizer.

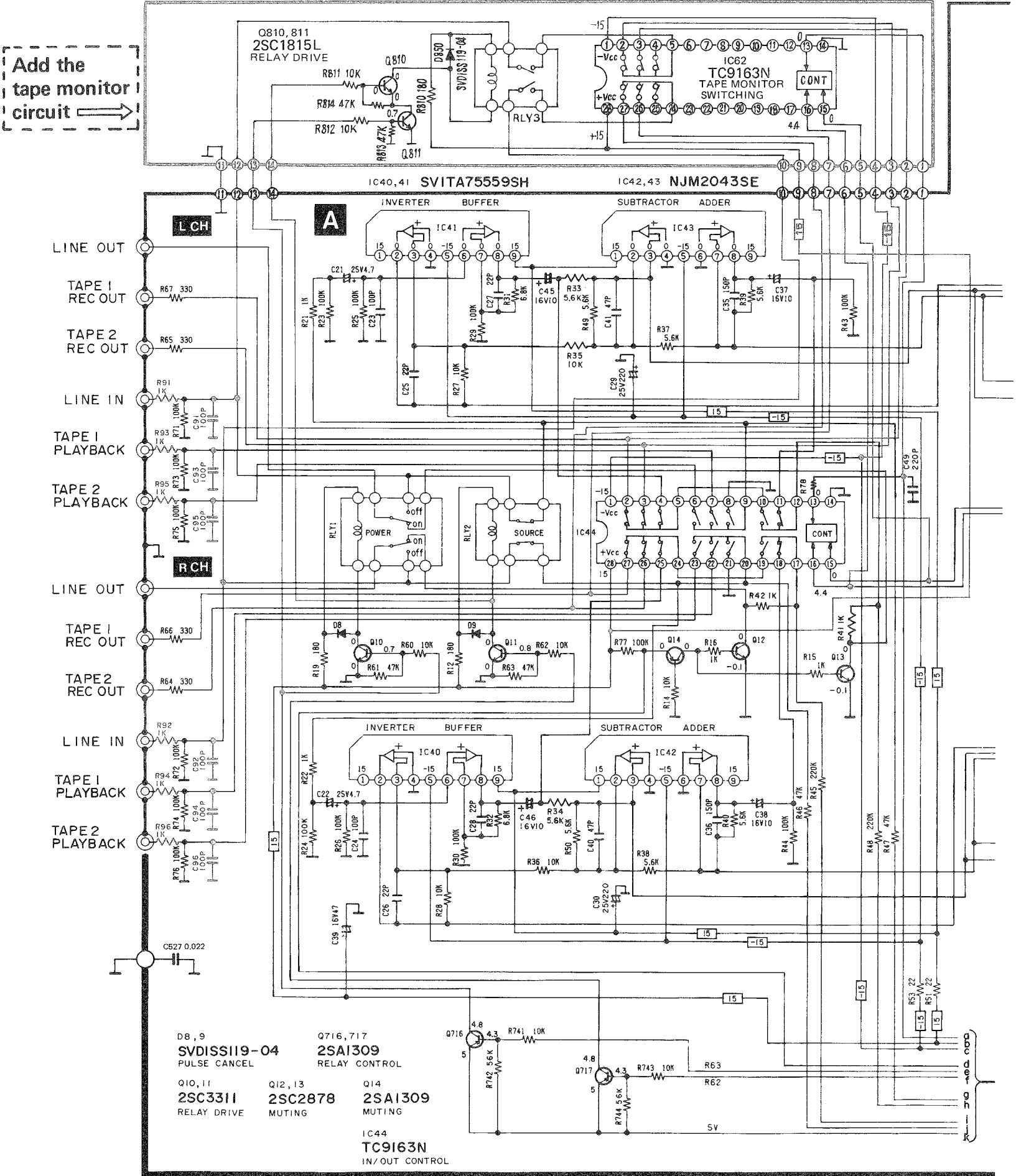
● Block Diagram

1. The diagram shows a case that a 3 head tape deck is connected to "tape 1" and a 2 head deck to "tape 2."
2. Switches (X1 & X2) of IC62 function samely as switches of IC44.
3. RLY 2(a relay that gets ON only when input selector is at "source") and RLY 3 work inversely one the other, the latter being a relay that gets ON only when input selector is at "tape 1" or "tape 2."
4. Switches of IC62 and IC44 in the diagram are in the conditions:
Input selector tape 1
EQ switch ON
EQ rec switch OFF

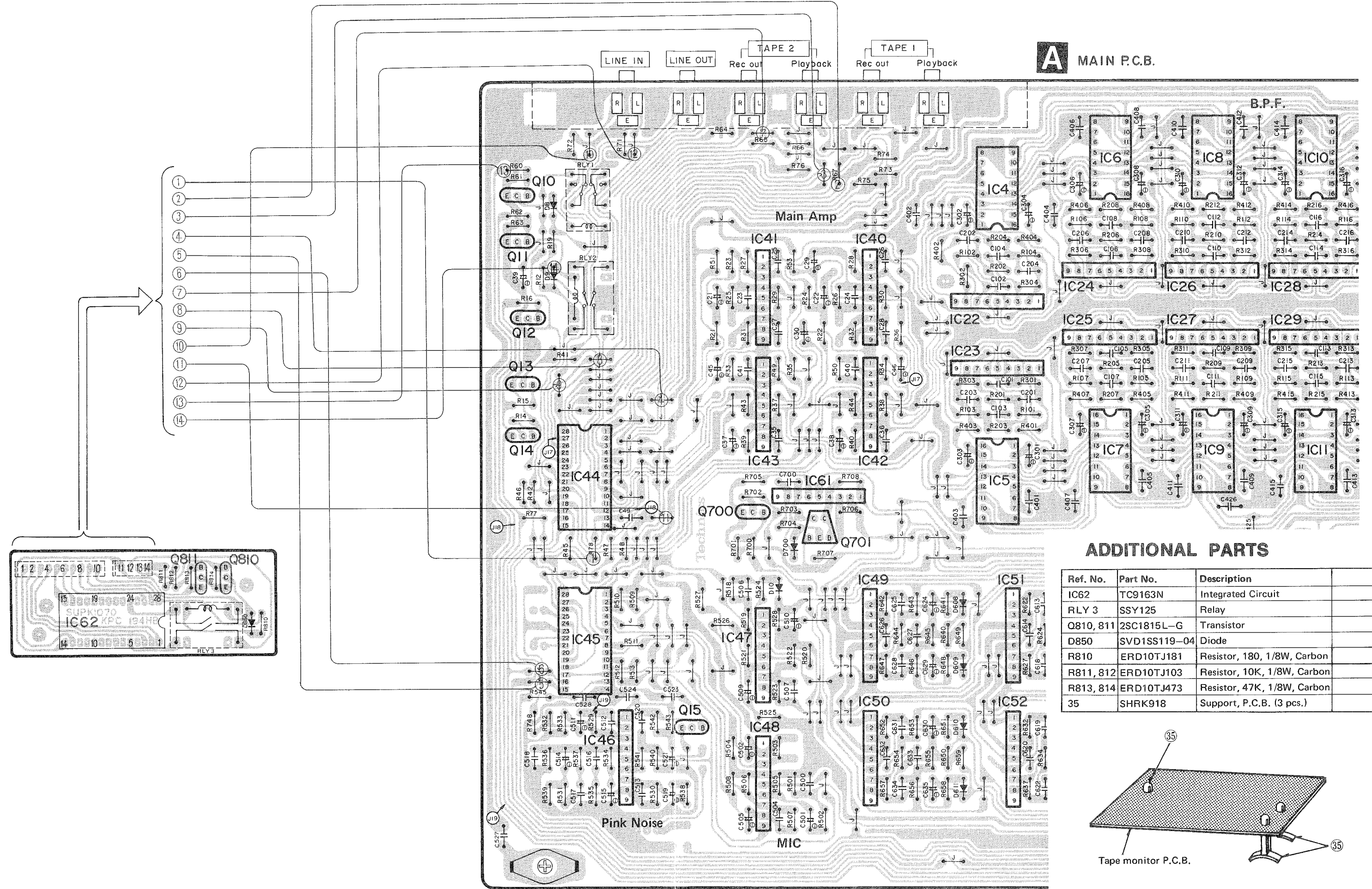
■ BLOCK DIAGRAM



■ SCHEMATIC DIAGRAM



■ CIRCUIT BOARDS AND WIRING CONNECTION DIAGRAM



ADDITIONAL PARTS

Ref. No.	Part No.	Description	
IC62	TC9163N	Integrated Circuit	
RLY 3	SSY125	Relay	
Q810, 811	2SC1815L-G	Transistor	
D850	SVD1SS119-04	Diode	
R810	ERD10TJ181	Resistor, 180, 1/8W, Carbon	
R811, 812	ERD10TJ103	Resistor, 10K, 1/8W, Carbon	
R813, 814	ERD10TJ473	Resistor, 47K, 1/8W, Carbon	
35	SHRK918	Support, P.C.B. (3 pcs.)	

