# JVC

# SERVICE MANUAL

## COMPUTER CONTROLLED S.E.A. GRAPHIC EQUALIZER

## MODEL SEA-M9B

# Contents

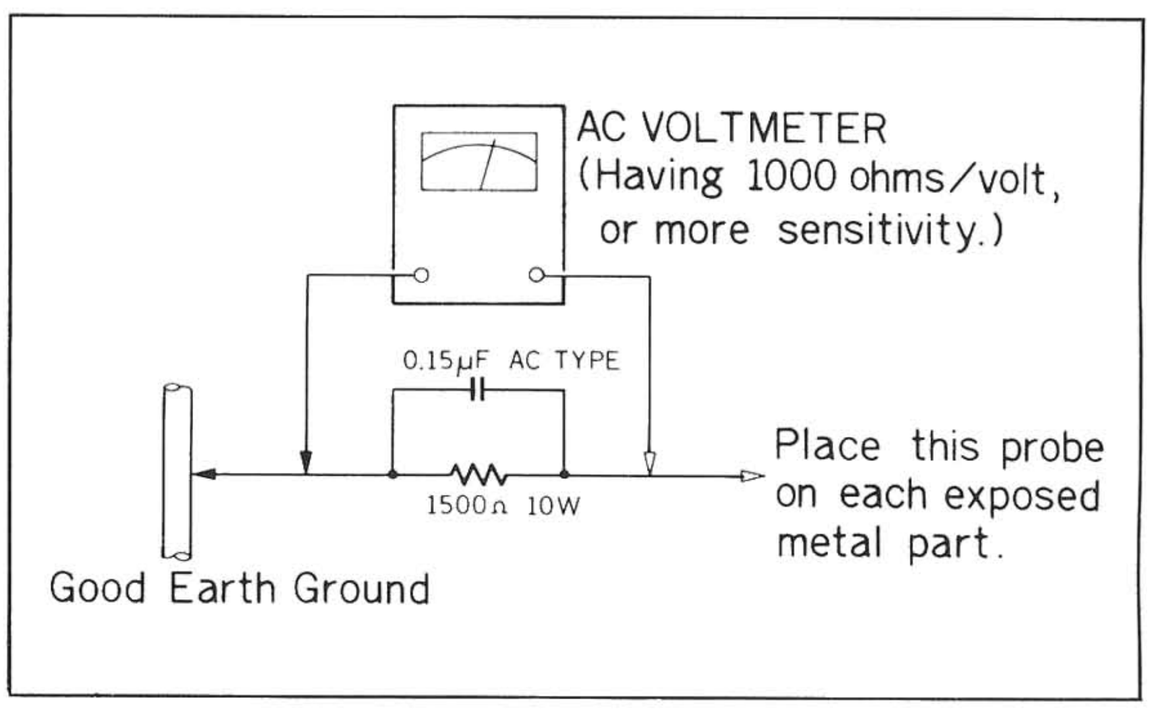



This manual combines two single volumes, Service manual and Parts list.

No.2745
Aug. 1984

# Safety Precautions

1. The design of this product contains special hardware, many circuits and components specially for safety purposes.
   For continued protection, no changes should be made to the original design unless authorized in writing by the manufacturer. Replacement parts must be identical to those used in the original circuits. Service should be performed by qualified personnel only.
2. Alterations of the design or circuitry of the product should not be made. Any design alterations or additions will void the manufacturer's warranty and will further relieve the manufacturer of responsibility for personal injury or property damage resulting therefrom.
3. Many electrical and mechanical parts in the product have special safety-related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in the parts list of Service manual. Electrical components having such features are identified by shading on the schematics and by ( ⚠ ) on the parts list in Service manual. The use of a substitute replacement which does not have the same safety characteristics as the recommended replacement part shown in the parts list in Service manual may create shock, fire, or other hazards.
4. The leads in the products are routed and dressed with ties, clamps, tubings, barriers and/or the like to be separated from live parts, high temperature parts, moving parts and/or sharp edges for the prevention of electric shock and fire hazard.
   When service is required, the original lead routing and dress should be observed, and they should be confirmed to be returned to normal, after re-assembling.
5. Leakage current check
   (Safety for electrical shock hazard)
   After re-assembling the product, always perform an isolation check on the exposed metal parts of the Products (antenna terminals, knobs, metal cabinet, screw heads, earphone jack, control shafts, etc.) to be sure the product is safe to operate without danger of electrical shock.
   Do not use a line isolation transformer during this check.
   - Plug the AC line cord directly into the AC outlet. Using a "Leakage Current Tester", measure the leakage current from each exposed metal part of the cabinet, particularly any exposed metal part having a return path to the chassis, to a known good earth ground (water pipe, etc.). Any leakage current must not exceed 0.5 mA AC (r.m.s.).
   - Alternate check method
     Plug the AC line cord directly into the AC outlet. Use an AC voltmeter having 1,000 ohms per volt or more sensitivity in the following manner. Connect a 1500 Ω 10 W resistor paralleled by a 0.15 μF AC-type capacitor between an exposed metal part and a known good earth ground (water pipe, etc.).
     Measure the AC voltage across the resistor with the AC voltmeter.
     Move the resistor connection to each exposed metal part, particularly any exposed metal part having a return path to the chassis, and measure the AC voltage across the resistor. Now, reverse the plug in the AC outlet and repeat each measurement. Any voltage measured must not exceed 0.75 V AC (r.m.s.). This corresponds to 0.5 mA AC (r.m.s.).




**CHECKING YOUR LINE VOLTAGE (Except for U.S.A., Canada, Australia, U.K. and Continental Europe.)**
Before inserting the power plug, please check this setting to see that it corresponds with the line voltage in your area. If it doesn't, be sure to adjust the voltage selector switch to the proper setting before operating this equipment. The voltage selector switch is located on the rear panel.

**CAUTION** Before selecting the "Voltage selector switch" to proper voltage disconnect the power plug.

# 1. Specifications

**Input section**

| | |
|---|---|
| SEA INPUT | : Input impedance 47 kohms |
| TAPE-1 | : Input impedance 47 kohms |
| TAPE-2 | : Input impedance 47 kohms |

**Output section**

| | |
|---|---|
| SEA OUTPUT | : Output impedance 100 ohms |
| TAPE REC | : Output impedance (SEA REC) 100 ohms |
| Rated output | : 2 V RMS (SEA SYSTEM FLAT) |
| Max. output | : 5 V RMS (SEA SYSTEM FLAT) |
| Total harmonic distortion | : 0.003 % (20 Hz – 20 kHz, rated output) |
| Intermodulation distortion | : 0.003 % (SEA SYSTEM FLAT) |
| Gain | : SEA DEFEAT 0 dB<br>SEA ON 0 dB<br>ATTENUATOR ON -6 dB |
| Frequency response | : 10 Hz – 100 kHz (+0, -2 dB) |
| S/N ratio | : 118 dB (at rated output, IHF A-network short-circuited) |

**Control section**

| | |
|---|---|
| SEA center frequency | : 16 Hz, 31.5 Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz, 8 kHz, 16 kHz, 32 kHz |

**Pink noise section**

| | |
|---|---|
| Output | : 35 mV |

**Microphone amplifier section**

| | |
|---|---|
| Matching microphone sensitivity | : More than –72 dB |

**Matching microphone**

| | |
|---|---|
| Output impedance | : Less than 1 kohm |

**General**

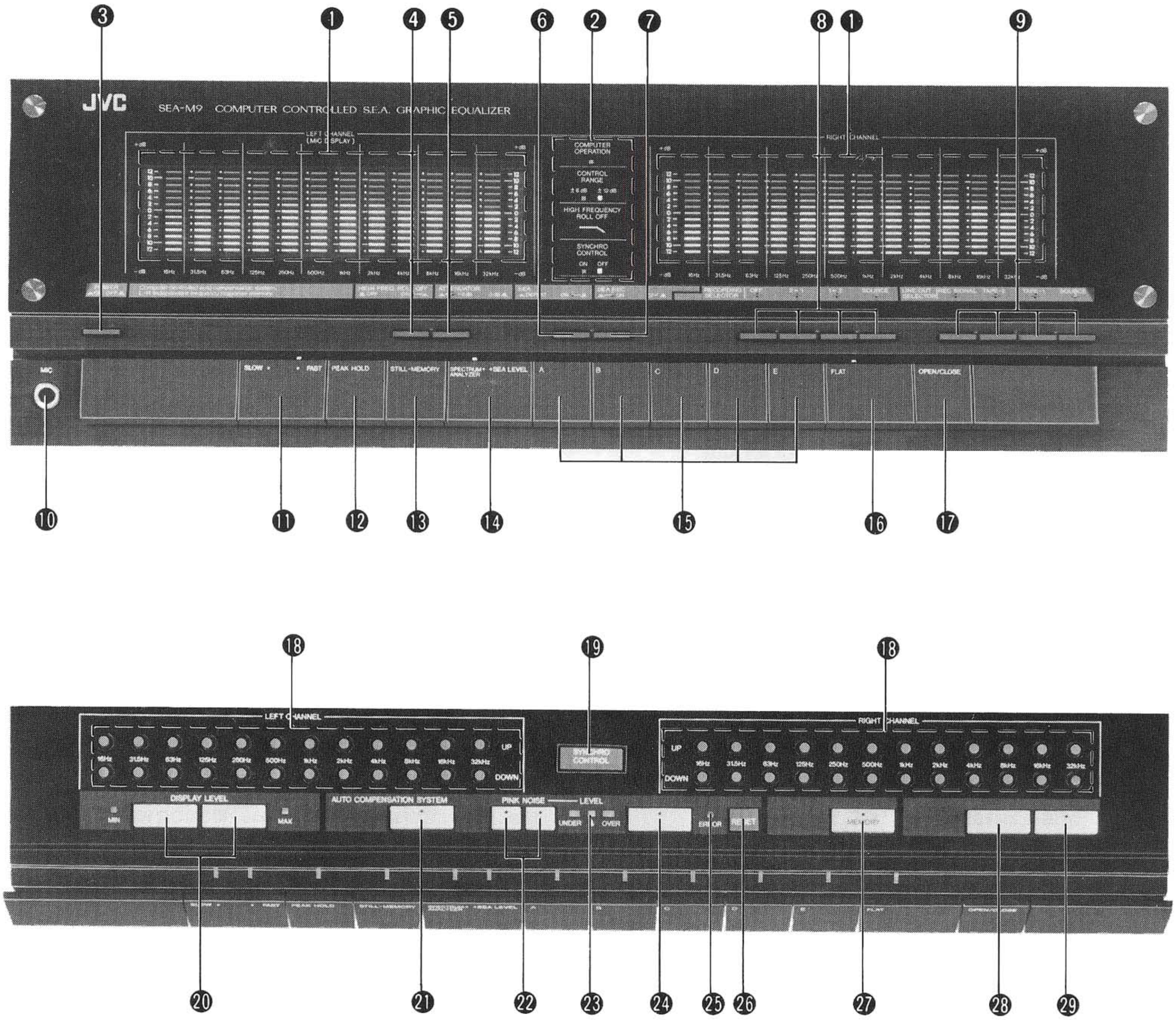
| | |
|---|---|
| Dimensions (W x H x D) | : 435 x 149 x 377 mm |
| Weight | : 10 kg net (excluding carton) |
| Accessories | : Connection cord (1.2 m) . . . . . 2<br>Condenser microphone MU-M9 . . . . . 1<br>Microphone holder . . . . . 1<br>Battery R-6/AA/UM-3 . . . 1 |

Design and specifications subject to change without notice.

**POWER SPECIFICATIONS**

| | U.S.A. & Canada | Europe, U.K. & Australia | Other area |
|---|---|---|---|
| Power Supply | AC 120 V ∿, 60 Hz | AC 110/120/220/240 V∿ selectable, 50 Hz | AC 110/120/220/240 V∿ selectable, 50/60 Hz |
| Power Consumption | 35 watts | 40 watts | 40 watts |
| Power Outlets | Fitted | Not fitted | Fitted |
| Line Voltage Selector | Not fitted | Fitted | Fitted |

# 2. Names of Parts and Their Functions




## ❶ DISPLAY

Shows the audio spectrum, SEA level and SEA compensation level (for compensation of room acoustic, etc.).

**SPECTRUM ANALYZER display:** The output signals are analyzed for 12 frequency bands whose center frequencies are identical to those of the 12 S.E.A. controls. This indicator shows the output signal level for each frequency band. When connecting a microphone to the MIC jack, the sound picked up by the microphone is shown by the SPECTRUM ANALYZER display.

**SEA LEVEL display:** Shows the SEA level when the SPECTRUM ANALYZER/SEA LEVEL button ⓮ is pressed. Either of the two LEDs above this button lights to show which display is being shown.

**SEA compensated level display:** The SEA compensated level is shown after automatic room acoustic analysis and compensation.

## ❷ INDICATOR

**COMPUTER OPERATION:** Flashes during automatic room acoustic analysis and compensation.

**HIGH FREQUENCY ROLL OFF:** Lights when the HIGH FREQUENCY ROLL OFF button is pressed to ON.

**CONTROL RANGE & SYNCHRO CONTROL:** CONTROL RANGE ±6 dB or ±12 dB and SYNCHRO CONTROL ON or OFF are shown.

## ❸ POWER button

**ON ( ▬ ):** Press to turn the power on. After about 5 seconds this unit starts to operate.

**STAND BY ( ■ ):** Set to this position to turn the power off.

**Note:**

- Even when the POWER button is off, this unit consumes a small amount of electricity (0.1 watt) to maintain the memory data.

## ❹ HIGH FREQUENCY ROLL OFF button

**ON ( ▬ ):** Press to this position to attenuate the frequency response from 4 kHz and over smoothly (-3 dB/oct).

**OFF ( ■ ):** Normally set to this position.

**❺ ATTENUATOR button**

**-6 dB ( ▂ ):** Press this button to this position to attenuate the input level when performing live recording of a performance with a wide dynamic range or playing a tape with a high recording/playback level.

**0 dB ( ■ ):** Normally set to this position.

**❻ SEA button**

**DEFEAT ( ▂ ):** To bypass the SEA circuit.

**ON ( ■ ):** Set to this position to listen to SEA-compensated signals.

**❼ SEA REC button**

**ON ( ▂ ):** Set to this position to record SEA-compensated signals.

**OFF ( ■ ):** Set to this position to record tapes bypassing the SEA circuit.

**❽ RECORDING SELECTOR**

**SOURCE:** Press this to record the source connected to the LINE IN terminals.

**1 ► 2:** Press this to dub from TAPE-1 to TAPE-2.

**2 ► 1:** Press this to dub from TAPE-2 to TAPE-1.

**OFF:** Press this when not recording.

**❾ LINE OUT SELECTOR**

**SOURCE:** Press this to play the source connected to the LINE IN terminals.

**TAPE-1:** Press this to play TAPE-1 deck.

**TAPE-2:** Press this to play TAPE-2 deck.

**REC SIGNAL:** Press this to monitor the recording of the source selected with the RECORDING SELECTOR.

**❿ MIC jack**

**⓫ SLOW/FAST button**

Use to select the fast or slow response time of the SPECTRUM ANALYZER indicator.

**⓬ PEAK HOLD button**

When the SPECTRUM ANALYZER indicator is shown and this button is pressed, peak values are shown and held. When a signal higher than the one shown is input, the indication changes to the higher level.

**⓭ STILL-MEMORY button**

Press to set to on to hold the SPECTRUM ANALYZER display; the LED above this button lights.

**⓮ SPECTRUM ANALYZER/SEA LEVEL button**

Press to select the SPECTRUM ANALYZER display or SEA LEVEL display.

**⓯ A.B.C.D.E. buttons (5-preset memory system)**

5 SEA frequency patterns adjusted separately for left and right channels can be stored in memory.

To store an SEA pattern, first press the MEMORY button ㉗ then one of these buttons A – E.

To recall the pattern stored in memory, press one of the buttons A – E as required.

**⓰ FLAT button**

Press this button to make the SEA frequency response flat. The indicator above this button lights.

**⓱ OPEN/CLOSE button**

Press to move the drawer in and out.

**⓲ SEA UP/DOWN buttons**

The SEA-M9B graphic equalizer divides the audio spectrum from 16 Hz to 32 kHz into 12 frequency bands having center frequencies at intervals of one octave.

The response in each band can be varied by ±12/±6 dB (selected by CONTROL RANGE button), by scanning using the UP and DOWN buttons.

**16 Hz:** This frequency range is felt rather than heard. Effective in reducing very low frequency noise and intermodulation distortion caused by record surface warps. Lowering this band obtains the same effect as a sub-sonic filter.

**31.5 Hz:** Reproduce the very low bass sound by raising the band obtaining that solid and substantial "being-there" feeling. When lowered, it functions as low-cut filter and eliminates hum and rumble.

**63 Hz:** Raise to emphasize the very low bass response of organs, drums, and contrabass. It produces stable and solid sound by raising the band and eliminates the unclear sound response of low frequencies by lowering the band.

**125 Hz:** Raise the band to obtain a more expanded low sound. Lower the band to eliminate unclear sound caused by large spaces in listening rooms.

**250 Hz:** Lower the band to reduce the reflected sound in a live listening room or to eliminate unclear sound caused in small listening rooms.

**500 Hz:** This frequency range is the base on which music is constructed. Raise this band to really put a punch in your music.

**1 kHz:** Most effective in emphasizing or de-emphasizing the human voice. Raise the band to cause the vocalist to be brought to the foreground, or lower for causing it to recede into the background.

**2 kHz:** This frequency stimulates the human ear. If the music sounds hard or metallic, lower the band.

**4 kHz:** Raise this band slightly so that the tension of strings can be sensed and a vigorous sound reproduction can be obtained. Lower the band to obtain more fatigue-free listening.

**8 kHz:** Boost to add clarity to winds and strings. This band varies the tonal expression, influencing the subtleties of the music.

**16 kHz:** Boosting this frequency range properly adds to the delicacy of highs, with cymbals and triangles resounding in a more ear-pleasing manner, and provides a feeling of extension. This band can also be used to compensate for cartridge response since most moving magnet cartridges have their resonance peaks in the frequency range from 10 kHz to 20 kHz.

**32 kHz:** High frequencies exceeding audible frequency range. Use this band to control extremely delicate sound or to cut unnecessary super-high sound.

⑲ **SYNCHRO CONTROL button**
Press this button to ON so that the SEA levels of both channels can be controlled by pressing the SEA UP/DOWN buttons of either channel; the LED indicater lights.

⑳ **DISPLAY LEVEL UP/DOWN buttons**

㉑ **MIC button**
Press this button to ON to check the room acoustic with a microphone or to observe the spectrum of an instrumental, vocal, etc.; the LED indicater lights. The spectrum indication is shown for the left channel and an arrow ( ⇦ ) for the right channel. (Mic mixing is impossible because the sound from the microphone does not come out from the speakers.)

㉒ **PINK NOISE buttons**
**L:** To output the pink noise from the left speaker.
**R:** To output the pink noise from the right speaker.

㉓ **PINK NOISE LEVEL indicator**

㉔ **START button**
Press to start the analysis for automatic compensation.

㉕ **ERROR indicator**

㉖ **RESET button**
To stop the automatic compensation in the middle of processing.

㉗ **MEMORY button**
Press to store the SEA frequency response pattern in memory before pressing one of the 5-preset memory system buttons; the indicator LED in the button lights.

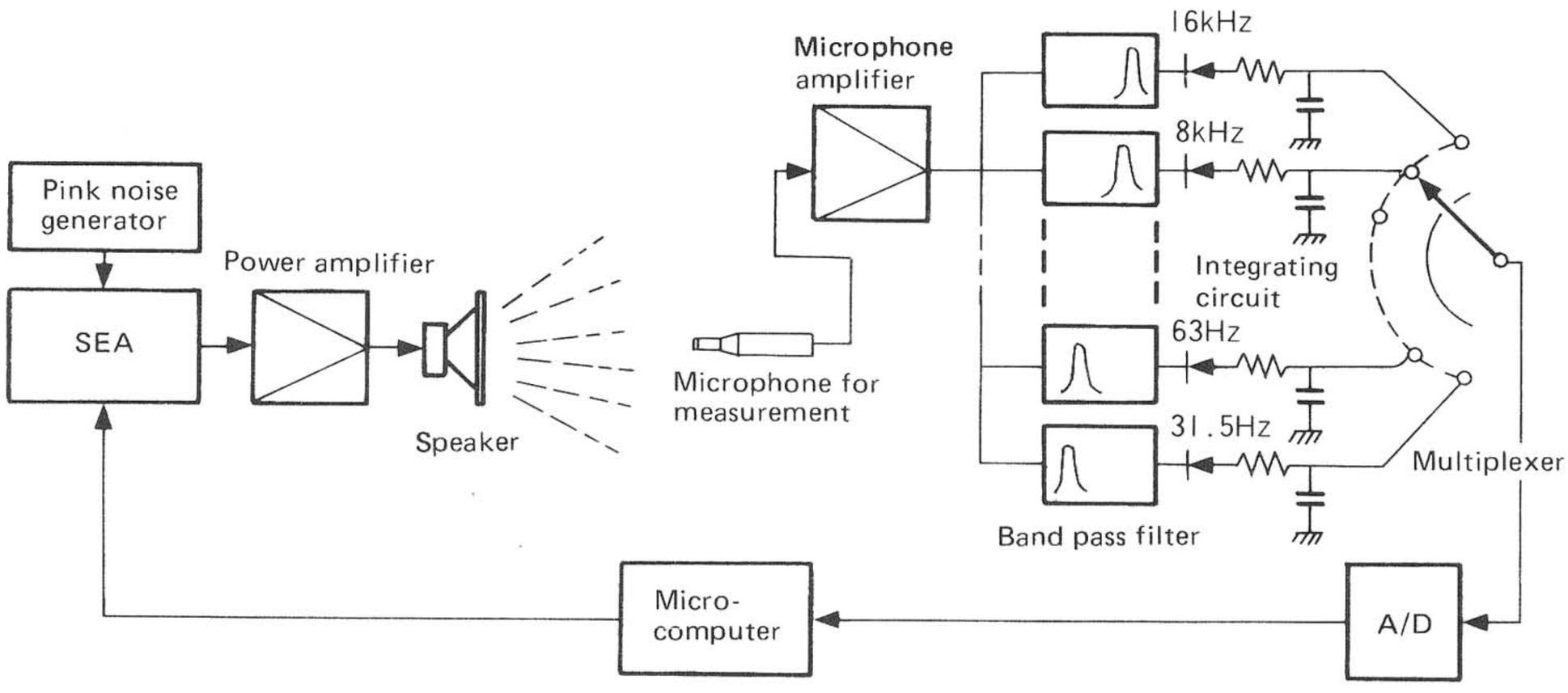
㉘ **CONTROL RANGE button**
Press to select the SEA range (±6 or ±12 dB).

㉙ **REVERSE button**
Press to reverse the SEA frequency response by a single operation; the indicator LED in the button lights momentarilly.

# 3. Explanation of Technology

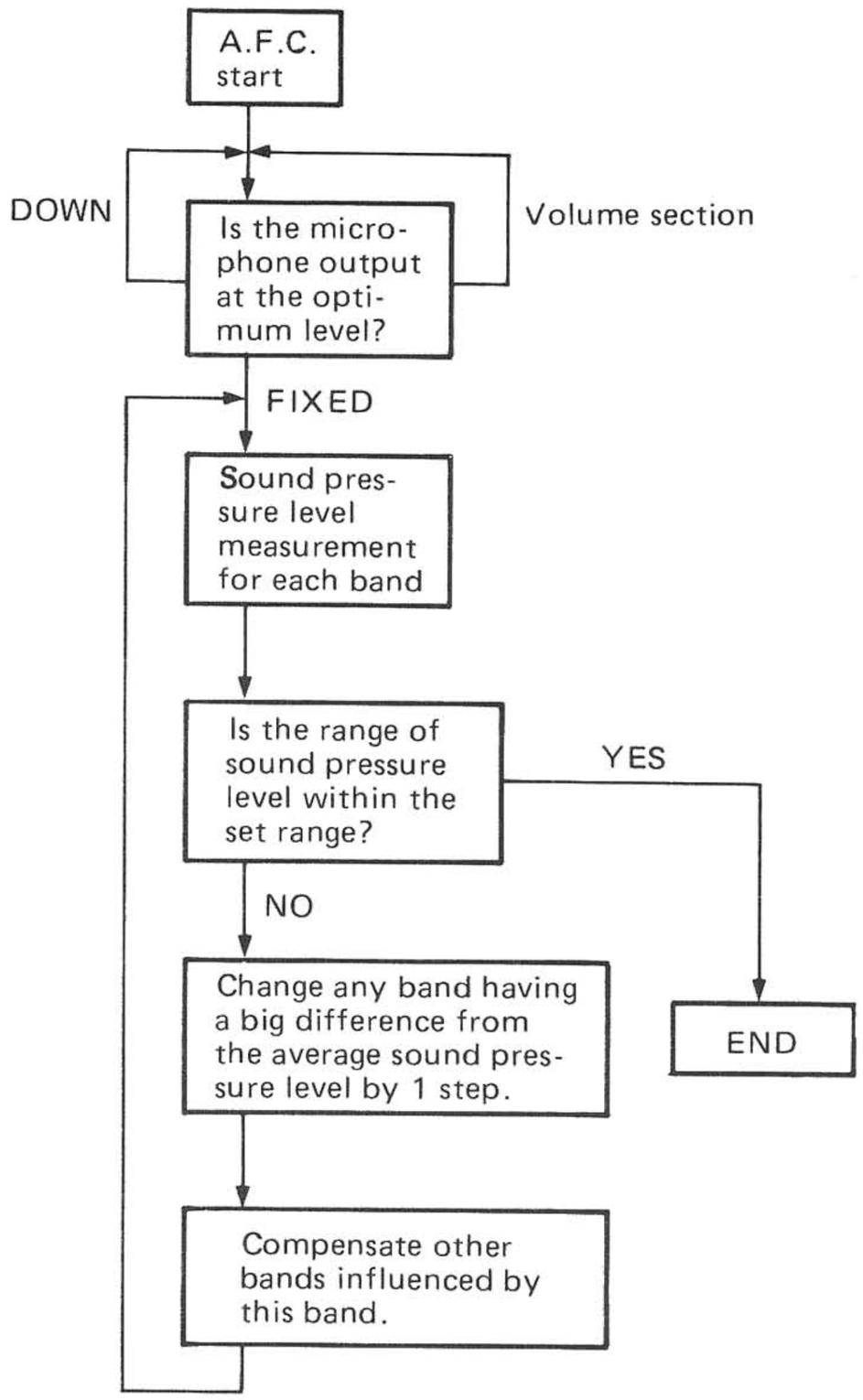
## 3-(1) Automatic Compensation for Room Acoustics

Automatic compensation means to compensate the sound field, especially the transmission frequency characteristics, automatically according to the acoustic characteristics of the listening room.

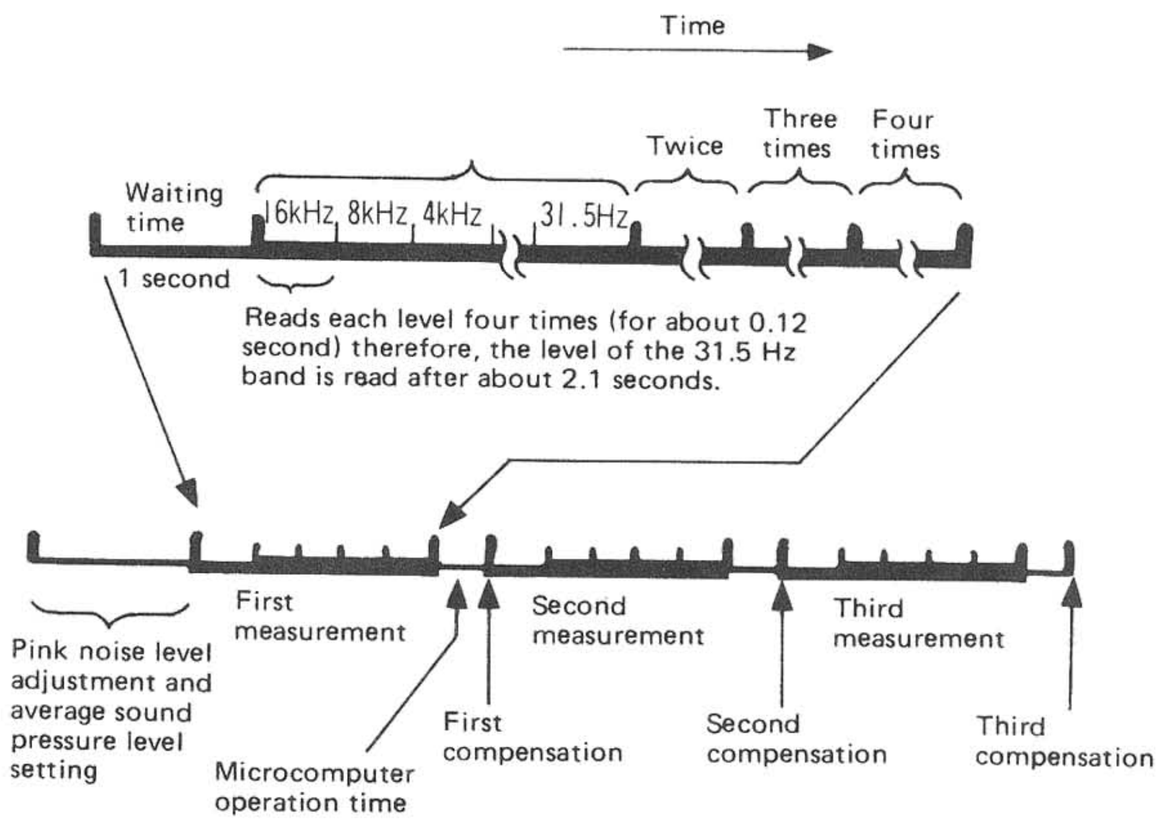



**(Construction of automatic compensation system for room acoustics)**

First, output pink noise and pick it up by the microphone used for measurement to measure the average sound pressure level at all frequencies. During this time, connect the SEA unit with a flat setting between the pink noise generator and the power amplifier.
Next, measure the sound pressure level of each frequency band and compensate the frequency characteristic by raising the level for frequencies with a lower than average sound pressure level and lowering for frequencies with a higher level. Perform compensation to make the frequency characteristic flat by repeating the operation and performing fine correction.
This is an outline, more detail will be given in the operation section. Press the START button to set the automatic room acoustic compensation mode. In this case, output the pink noise from this unit through the speakers and measure the average sound pressure level at all frequency ranges (each frequency band) by picking up the pink noise by the microphone used for measurement (provided).
By this, the optimum level is shown by adjusting the microphone input level. If it is UNDER, raise the volume of the amplifier and if it is OVER, lower it. When the microphone input level is at optimum level, compensation for room acoustic has been completed.




Measure the average sound pressure value and find a band having a big absolute difference from the average value then compensate it by 1 step so that the absolute value of this band becomes smaller.
In this case, since other bands are influenced by compensating this band, make corresponding compensations for other bands. After this, repeat compensation until the sound pressure level in each frequency range is within the set range.
Sound pressure level compensation has three ranges; rough compensation (within ±3 dB), medium compensation (within ±1.5 dB) and fine compensation.
Since pink noise has a greater amplitude at lower frequencies, the Q of the band pass filter is set to be lower and the detection output voltage is stabilized by increasing the time constant.




**(How to measure the sound pressure level at each frequency)**

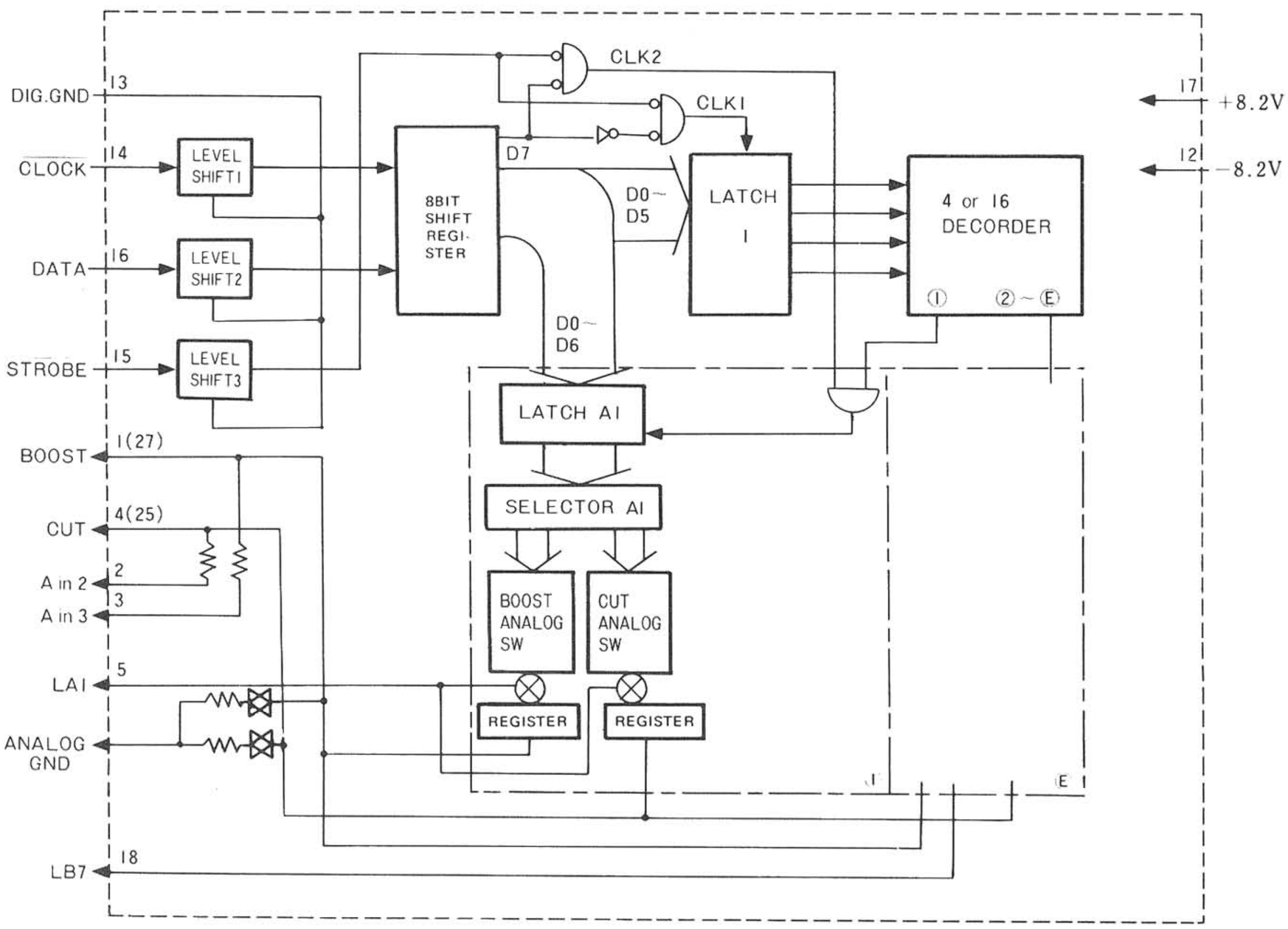
## 3-(2) ICs developed for SEA (LM835)

LM835 is a high-precision SEA LSI IC developed exclusively for this unit. 24-step graphic equalization is possible by dividing the frequency range into 14 bands (12 bands are used for this unit) which each have a ±12 dB/±6 dB gain range.

This is composed of the logic input section from the control CPU (data, strobe, clock) and signal path section consisting of high-precision SiCr (silicon chrome) resistors and low distortion analog switches.

Its function is the selection of gain by sending 8-bit serial data II after sending 8-bit serial data I and selecting the frequency.

| Pin. No. | Mnemonic | Operation |
|---|---|---|
| ①, ㉗ | BOOST | SEA volume boost output terminal |
| ②, ③ | A in 2<br>A in 3 | Distortion cancel terminals |
| ④, ㉕ | CUT | SEA volume cut output terminals |
| ⑤–⑪ | LA1 – LA7 | SEA volume 16 Hz (LA1) – 500 Hz (LA7) terminals |
| ⑫ | Vss | -8.2 V |
| ⑬ | DIG.GND | DIGITAL Ground |
| ⑭ | CLOCK | Clock input terminal for data input |
| ⑮ | STROBE | Strobe input terminal |
| ⑯ | DATA | Data input terminal |
| ⑰ | $V_{DD}$ | +8.2 V |
| ⑱ – ㉔ | LB7 – LB1 | SEA IC/of 1 kHz (LB1) – 32 kHz (LB5) terminal |
| ㉖ | A in 6 | Input terminal of SEA amplifier output |
| ㉘ | ANALOG GND | ANALOG.GND |




## 3-(3) Pink Noise

This unit has a built-in pink noise generator which generates pink noise by passing white noise generated from the 23-bit digital noise generator (MM5437) through a 3 dB/oct L.P.F. (Low Pass Filter).

This generator prevents unnecessary noise from being generated by sending the control signal to MM5437 and stopping its operation.

## 3-(4) Membrane Switch PCB (ENC-006; Drawer section switch PCB)

This is click membrane switch PCB with 70 spacers and 70 metal diaphragms and patterns on both sides.

As this PCB has a delicate structure, take care the following points when handling it.

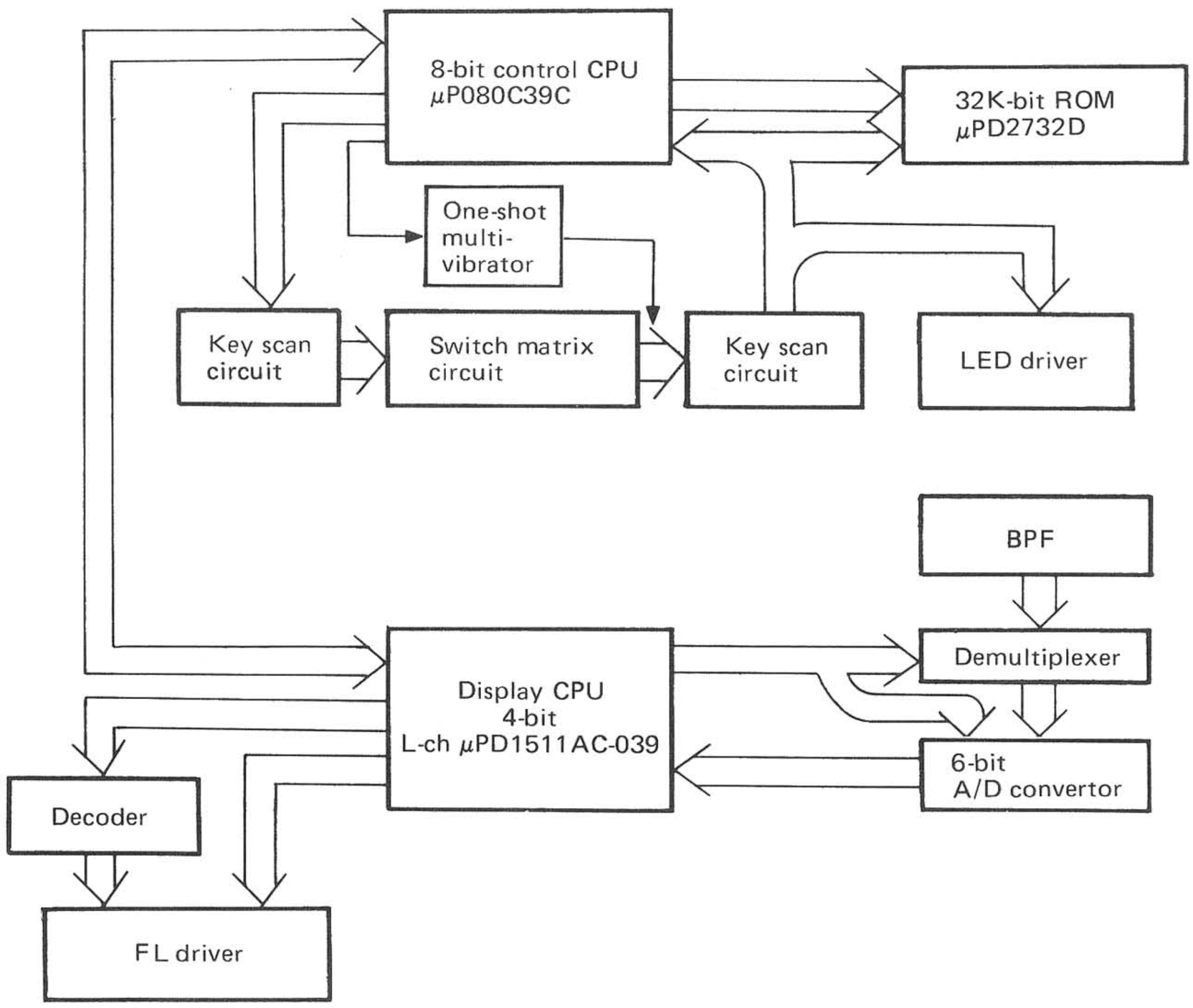
(1) Do not push the diaphragms (6 mm dia. phosphor-bronze discs) with your fingers. (If it is pressed too far, its elasticity cannot be restored. If it is necessary to push them, push with a device with a sharp edge such as a ball pen).

(2) Do not damage or tear off the film sheet. (It may become impossible to deplace.)
(3) When replacing the IC or other parts, use one with the same size. (Since this unit is thin, it is impossible to install large replacement chips.)
(4) Concerning switch contact defects on their own (when deformation of diaphragm cannot be restored, etc.), the replacement of only the switch is impossible. In this case, as replacing the PCB is needed, consult a JVC dealer.

## 3-(5) FL Circuit

This circuit uses a 4-bit microcomputer to show the spectrum analysis and SEA curve using a fluorescent display (FL). The data from the 8-bit control CPU is sent to the 4-bit microcomputer which sends the data of 12 bands/13 steps to the FL driver then the SEA curve is shown by the FL.

On the other hand, concerning the spectrum analysis, the signal having passed through the B.P.F. is passed through the demultiplexer then the 6-bit microcomputer acting as an A/D convertor. Then this data is input to the 4-bit microcomputer. After this, the spectrum analysis is shown by the FL like the SEA curve.
The arrow indication of the R-ch in the MIC mode is controlled by a 4-bit microcomputer. The level detection circuit of 10 frequency bands from 31.5 Hz to 16 kHz is in the L-ch FL circuit and the data is sent to the control CPU.




**(Block diagram of microcomputer peripheral circuits)**

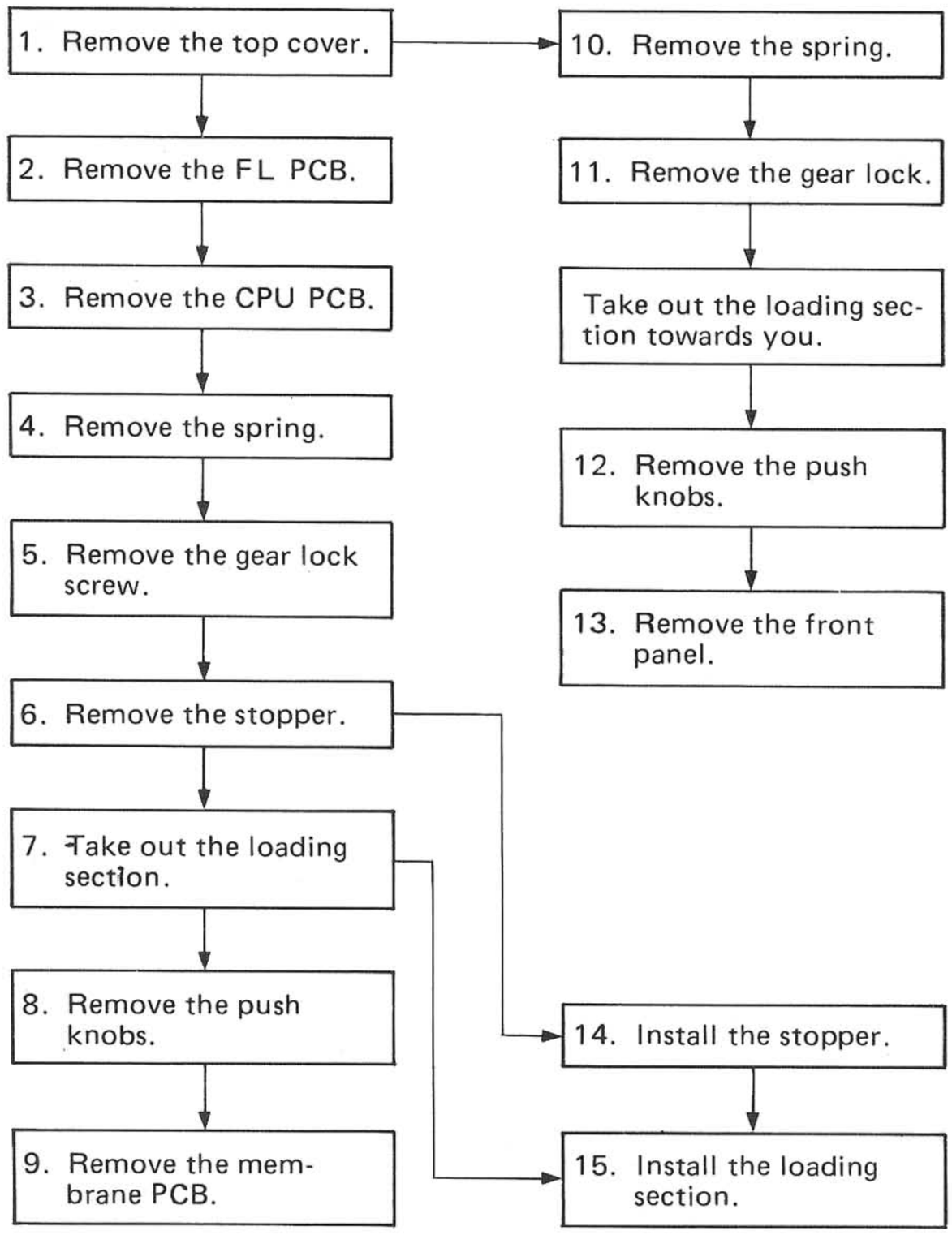
## 3-(6) Drawer Motor Drive Circuit

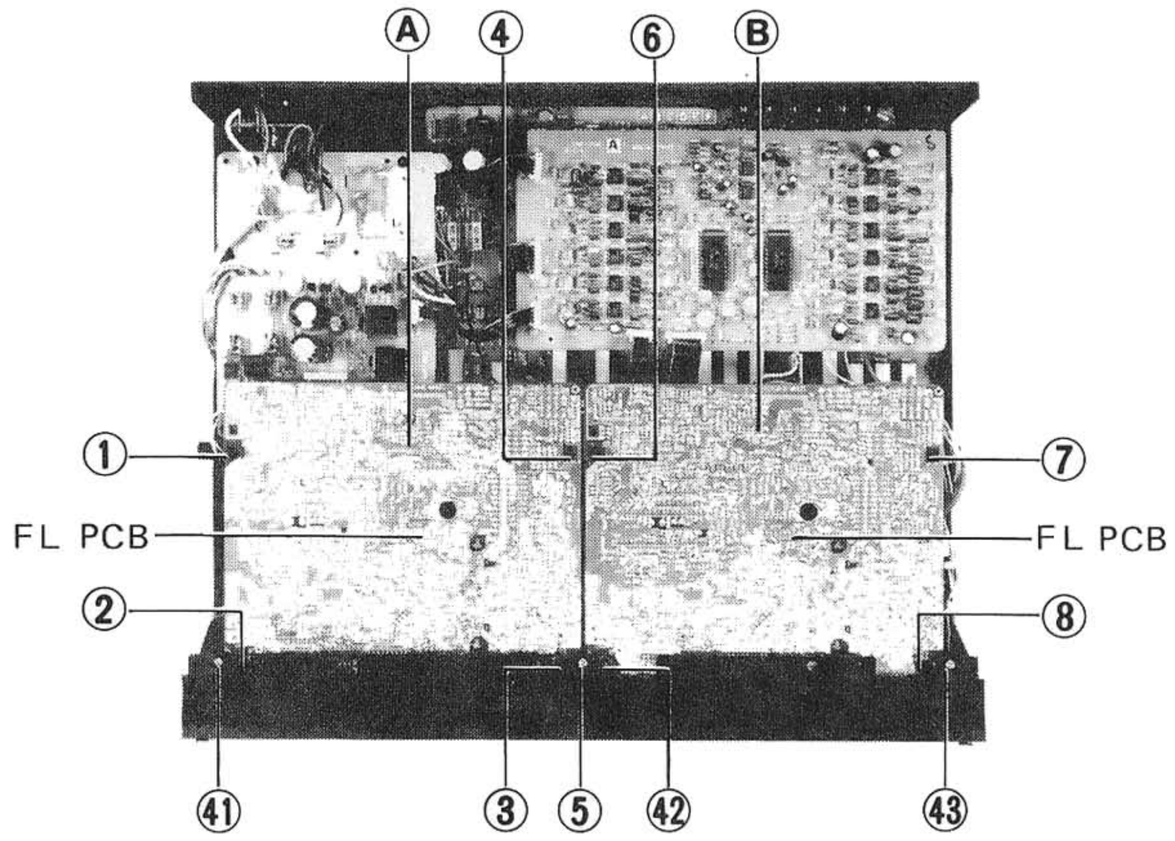
The motor drive IC (IC007: BA6208) has the input/output characteristic shown in the table on the right.
The normal or reverse rotation of the motor is performed by the D flip-flop in IC004 (1/2 TC4013BP).
When the drawer is moved in or out, the excess current of the motor is detected at Q001 and when inputs to pins 2 and 3 of IC006 (μPD4081BC) from IC005 (1/2TC4013BP) are both 0, the motor is stopped. IC006 functions so that the motor does not operate even if the power switch is set to ON and S181 and IC005 detect if the drawer is in or out when the power switch is set to ON to set the direction the motor should move in next.

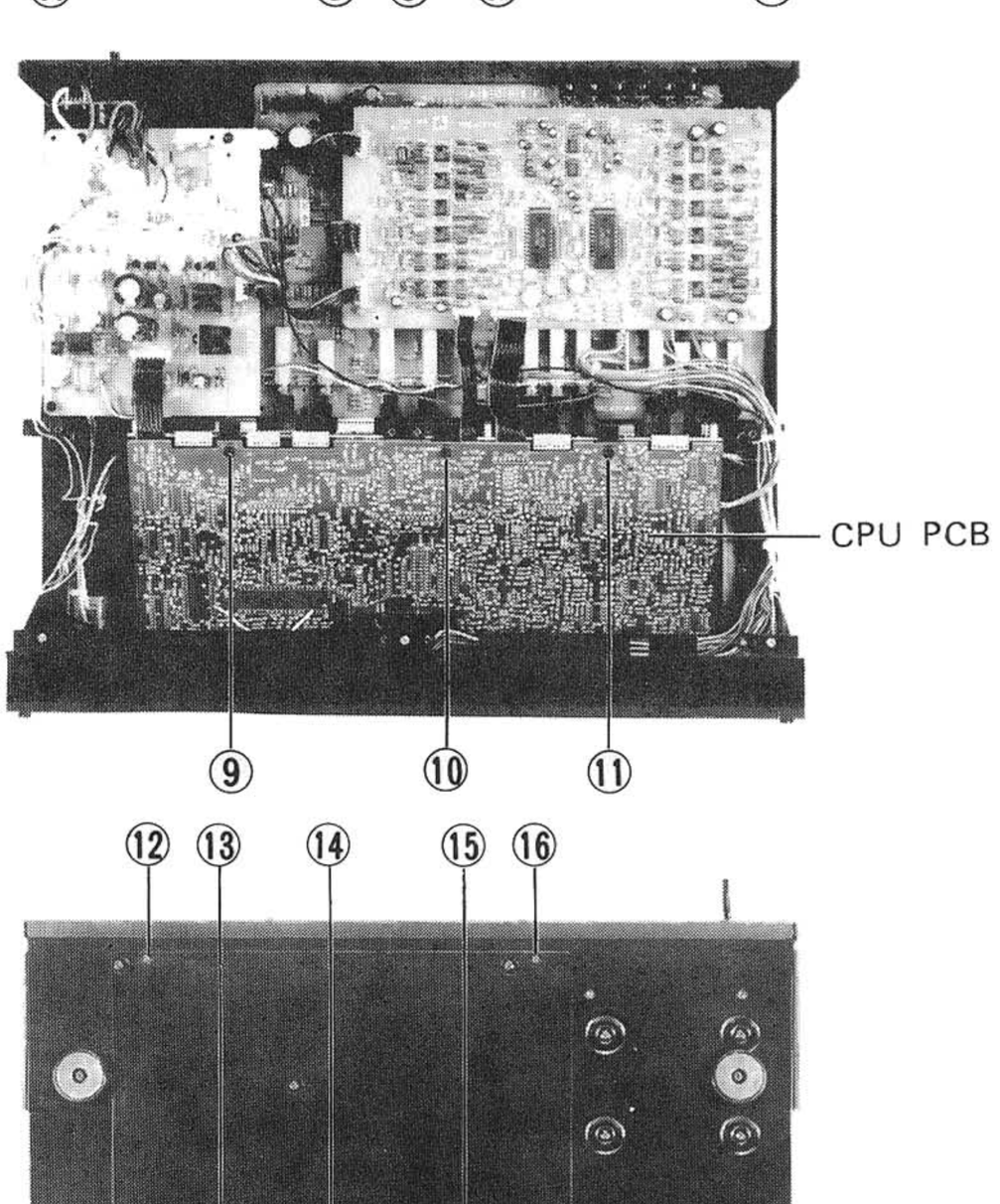
| Pin 3 input | Pin 2 input | Pin 8 input | Pin 7 input | Motor |
|---|---|---|---|---|
| 1 | 1 | L | L | Stop |
| 1 | 0 | H | L | Normal rotation |
| 0 | 1 | L | H | Reverse rotation |
| 0 | 0 | — | — | Stop |

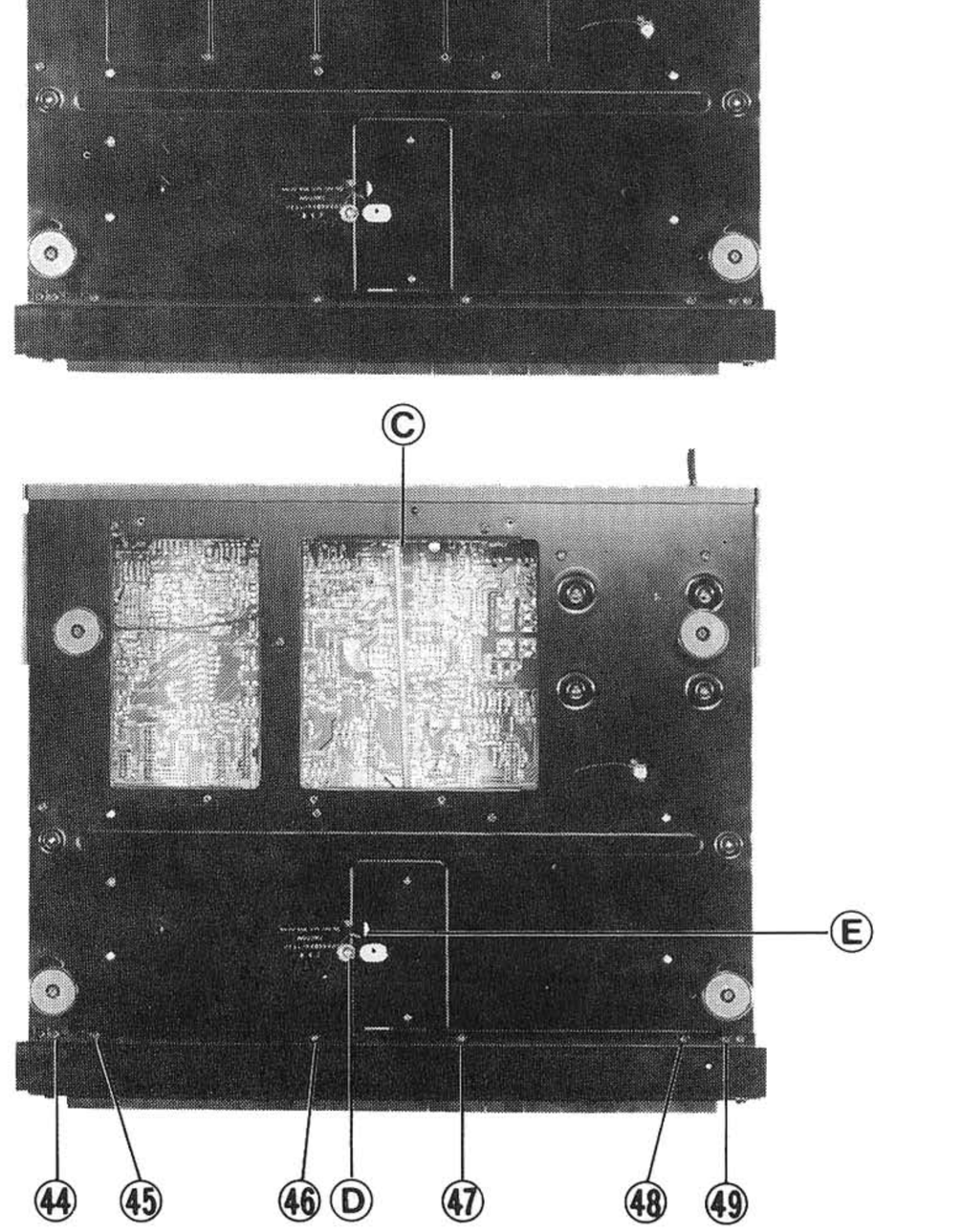
# 4. Removal Procedures

Since this unit is assembled in a specified order, disassemble or reassemble it referring to the flow chart below. Concerning disassembling of other parts, refer to "Exploded View".




**1. How to remove the top cover**

Remove the screws (two screws of left and right side panels) on both sides and three screws on the rear panel of this unit.

**2. How to remove the FL PCB**

(1) Remove eight screws ① – ⑧ holding the PCB.
(2) Take out the FL PCB from the connector by lifting the back portions Ⓐ and Ⓑ of the PCB.

**3. How to remove the CPU PCB**

(1) Take out three plastic rivets ⑨ – ⑪ holding the PCB.
(2) Take out 3-pin connector and three flat cards.

**4. How to remove the spring**

(1) Remove five screws ⑫ – ⑯ holding the bottom board.

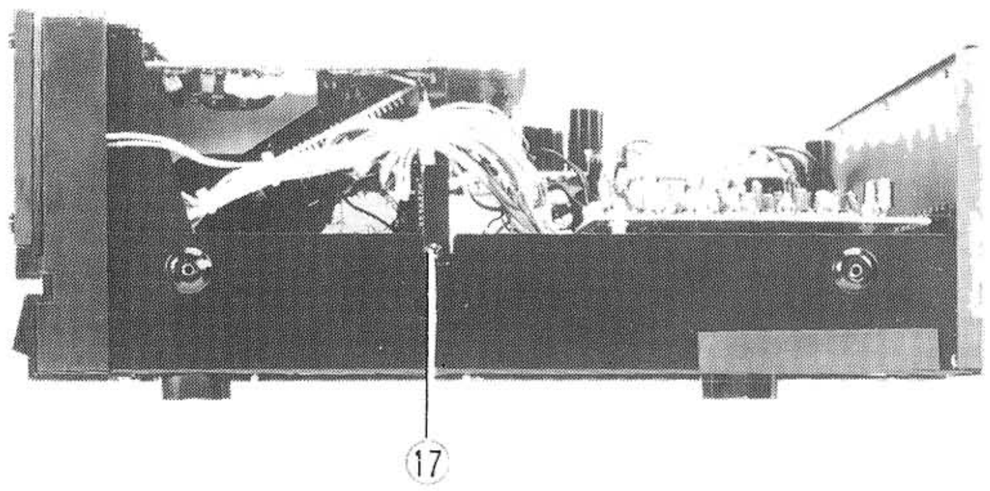
(2) Remove part Ⓒ (bonded) to which the spring is hooked.

**5. How to remove the gear lock screw**

(1) Turn the ⊖minus screw of part Ⓓ fully clockwise.

(2) Draw the rack (rack & pinion) visible on part Ⓔ towards you using a screwdriver.

(3) The engagement of the rack and pinion will separate and the loading section will move freely.




**6. How to remove the stopper**

(1) Remove the screws (each one on left and right) ⑰ from holes on both sides by holding the loading section pressed in.

(2) Take out the stopper ( ⊐ bracket).

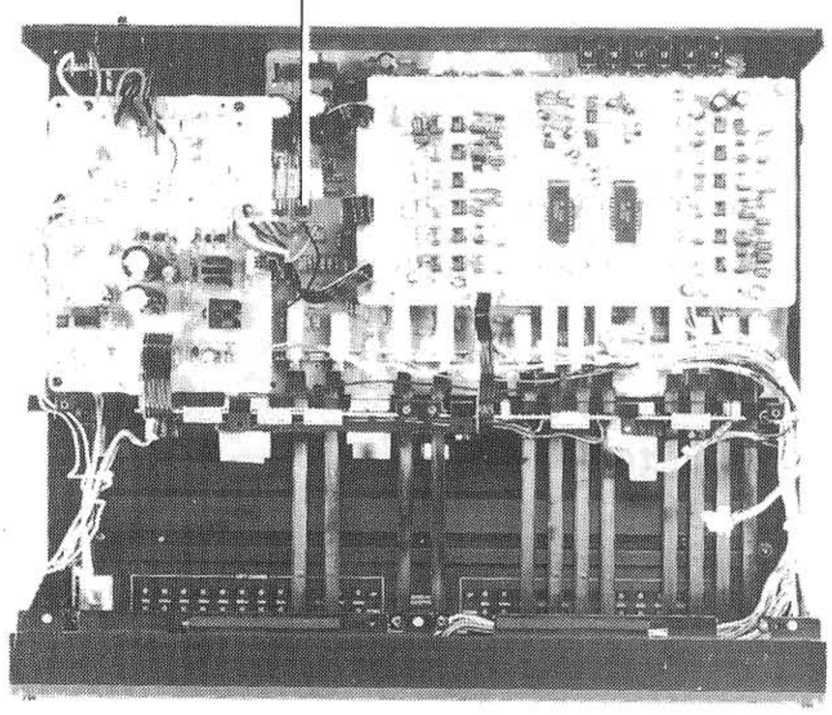
**7. How to remove the loading section**

(1) Unsolder the ground wire (black) of the motor (Unsolder section Ⓕ)

(2) Take out three flat cards.

(3) Take out the loading section towards you (until it stops).

(4) Take it out by lifting it up slightly.



**8. How to remove the push knobs**

(1) Remove four screws ⑱ – ㉑.

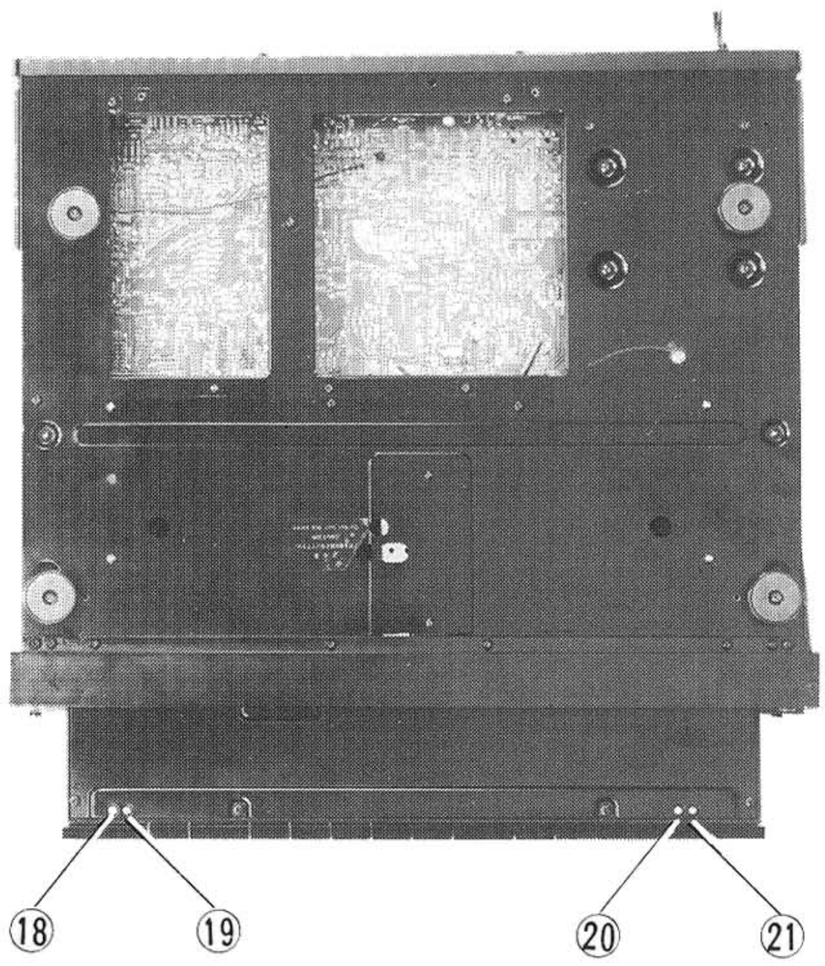
(2) Slide the escutcheons Ⓖ and Ⓗ on both edges outwards.

(3) The push knobs are separated into 2 blocks at center part Ⓙ.

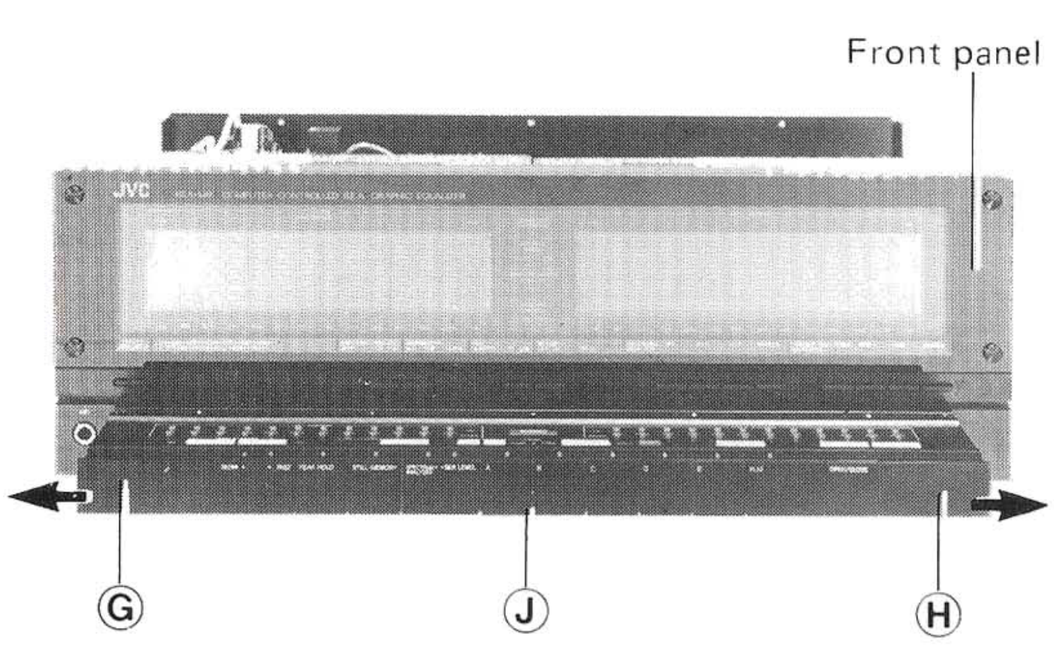
(4) Push up the lower edge of each knob and pull it towards you.

(5) Take out the right block (or left block) by pulling towards you.

**Note:** Take care to lose the flat washer provided with each knob because they come off easily.



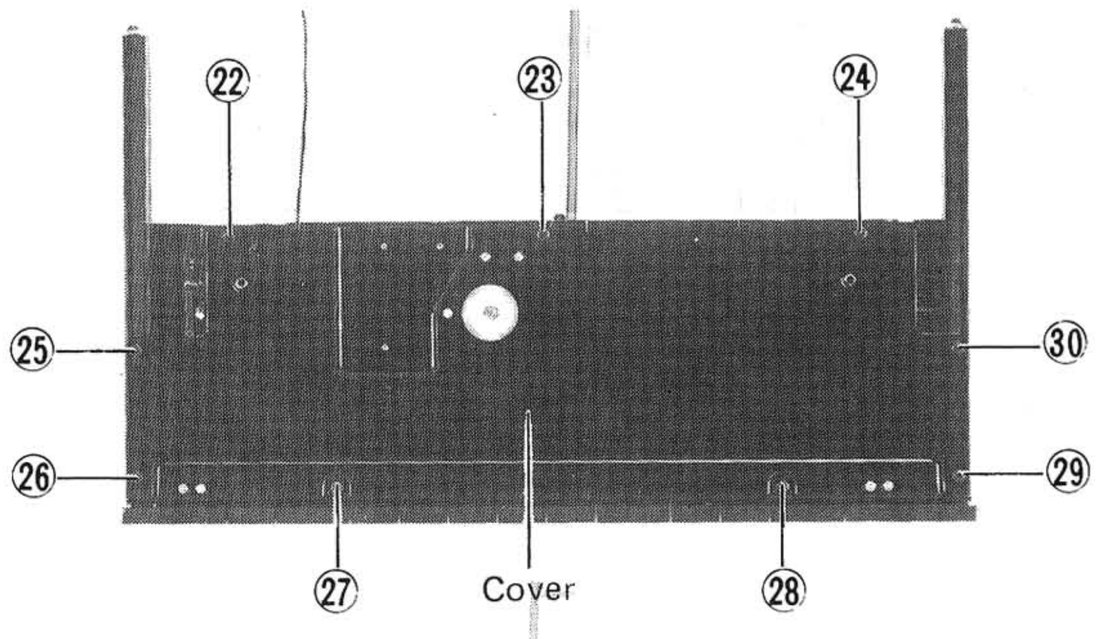

Front panel



## 9. How to remove the membrane PCB

(1) Remove nine screws ㉒ – ㉚ holding the cover.
(2) Take out 3-pin connector.
(3) Remove ten screws ㉛ – ㊵ holding the PCB.
Screws ㉛ – ㉟ are special screws, ㊱ is a plastic rivet, screw ㊵ is provided with a flat washer and screw ㊳ is a flat head screw.

**Note:** When installing the PCB, insert the LED into the felt spacer (to prevent leakage of light).




## 10. How to remove the spring

Refer to item 4.

## 11. How to remove the gear lock screw

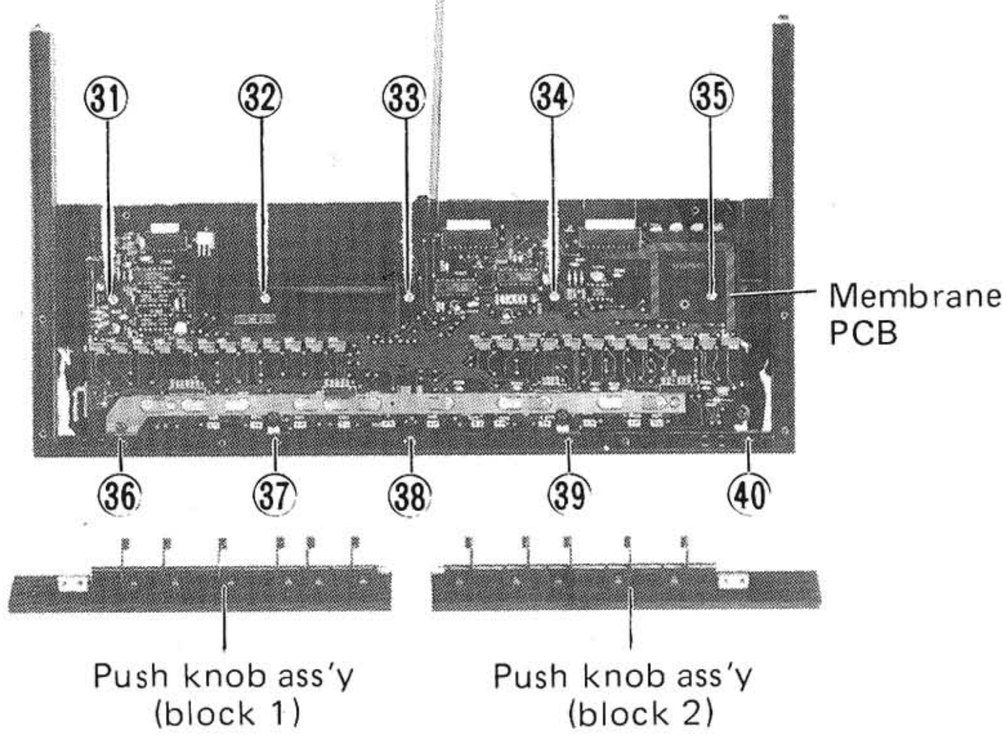
Refer to item 5.

## 12. How to remove the push knobs

Refer to item 8.

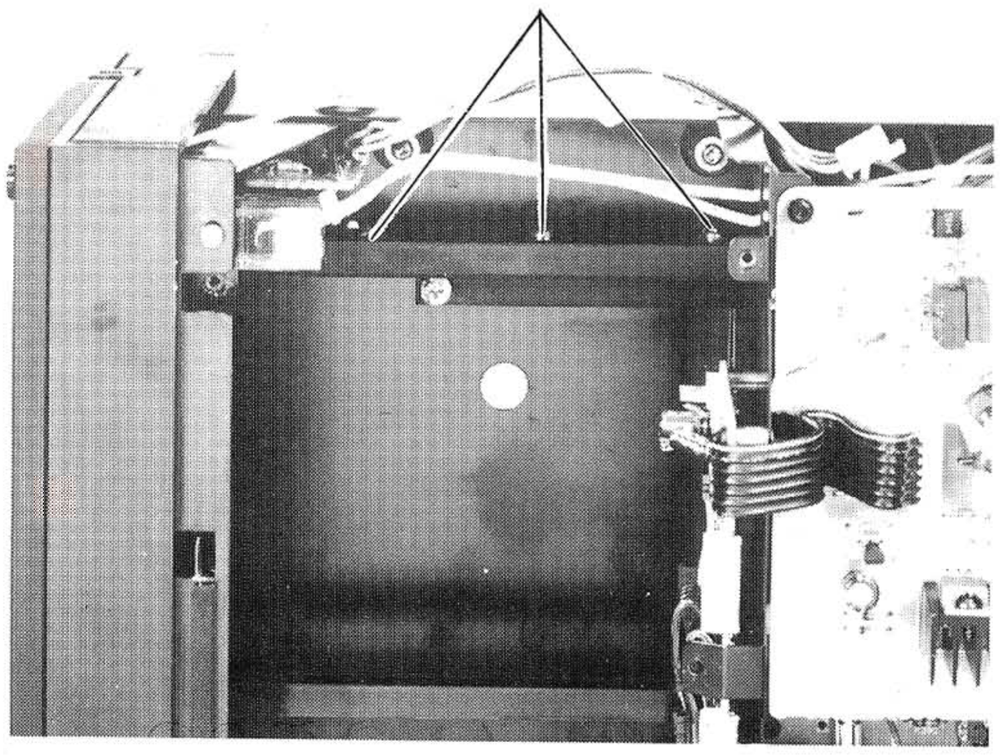
## 13. How to remove the front panel

(1) Remove three screws ㊶ – ㊸ holding the upper portion of the panel.
(2) Remove six screws ㊹ – ㊾ holding the lower portion of the panel.
(3) Take out the whole panel towards you.




## 14. How to install the stopper

(1) Hook the spring. (By this, the tension is always applied but it is possible to take it out freely by hand.)
(2) Insert the stopper into the hole in the side rail and fix the screw (refer to item 6).
(3) When fixing the stopper, there is a slight play (for installation position). After installation, operate the loading section and make sure that there is no movement to the left and right just before it stops.

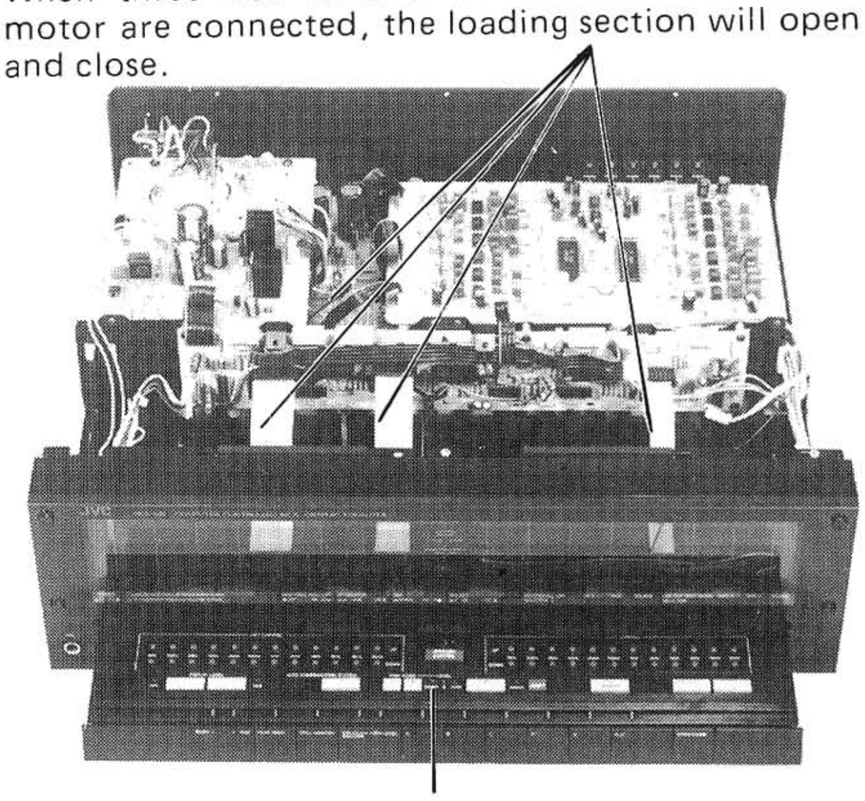


## 15. How to install the loading section

(1) Draw ball bearing sections Ⓚ (three on both left and right) fully towards you.
(2) Insert the loading section about 5 cm by putting both ends in the bearing section.
(3) Push the loading section in by pulling the left and right bearing sections towards you using both hands.

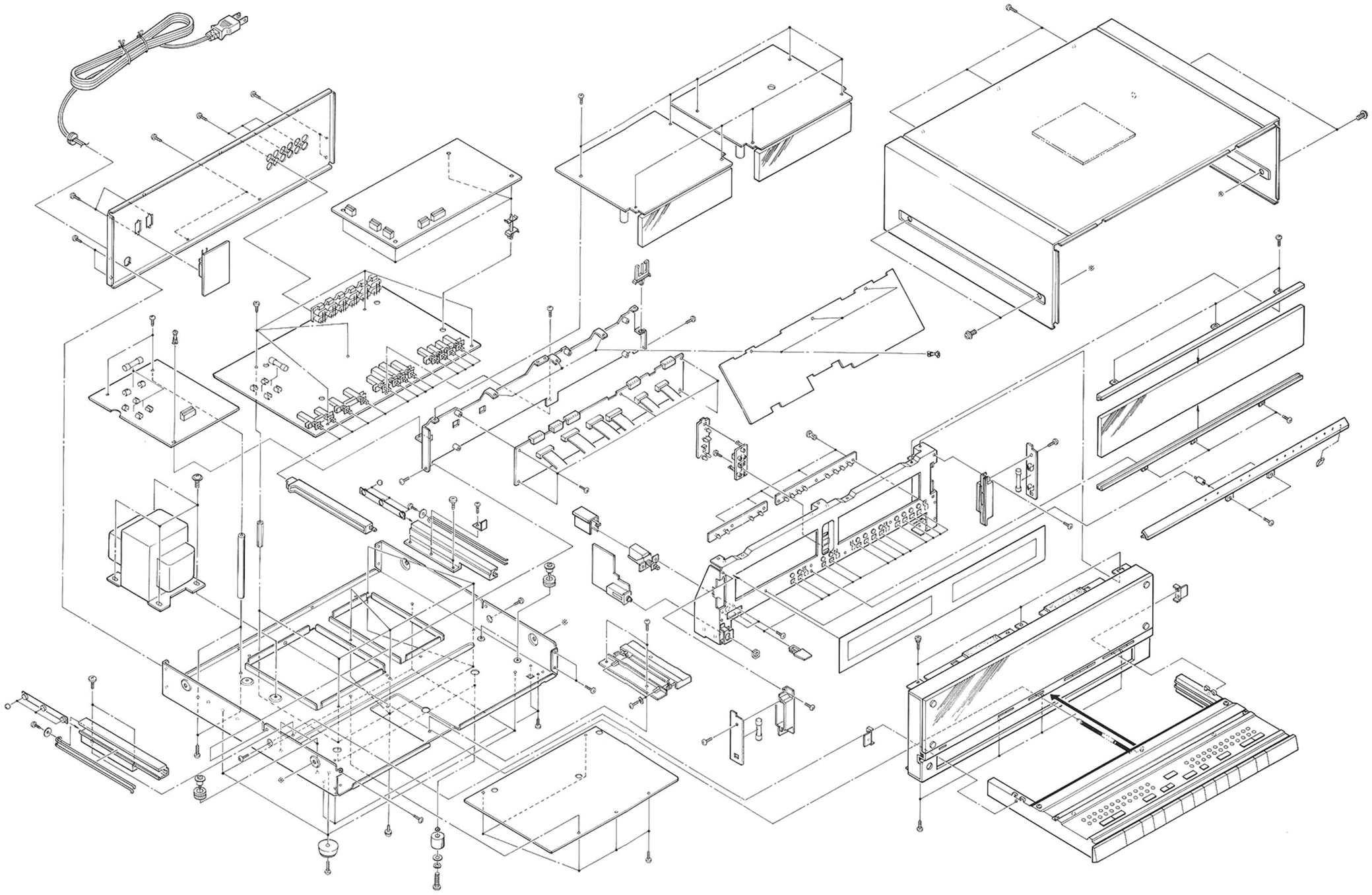
**Note:** If it is forced in without pressing the bearing section down, the inner most ball will fall out. Make sure to push in the loading section drawing the bearing section towards you.

When three flat cards and the black wire of the motor are connected, the loading section will open and close.

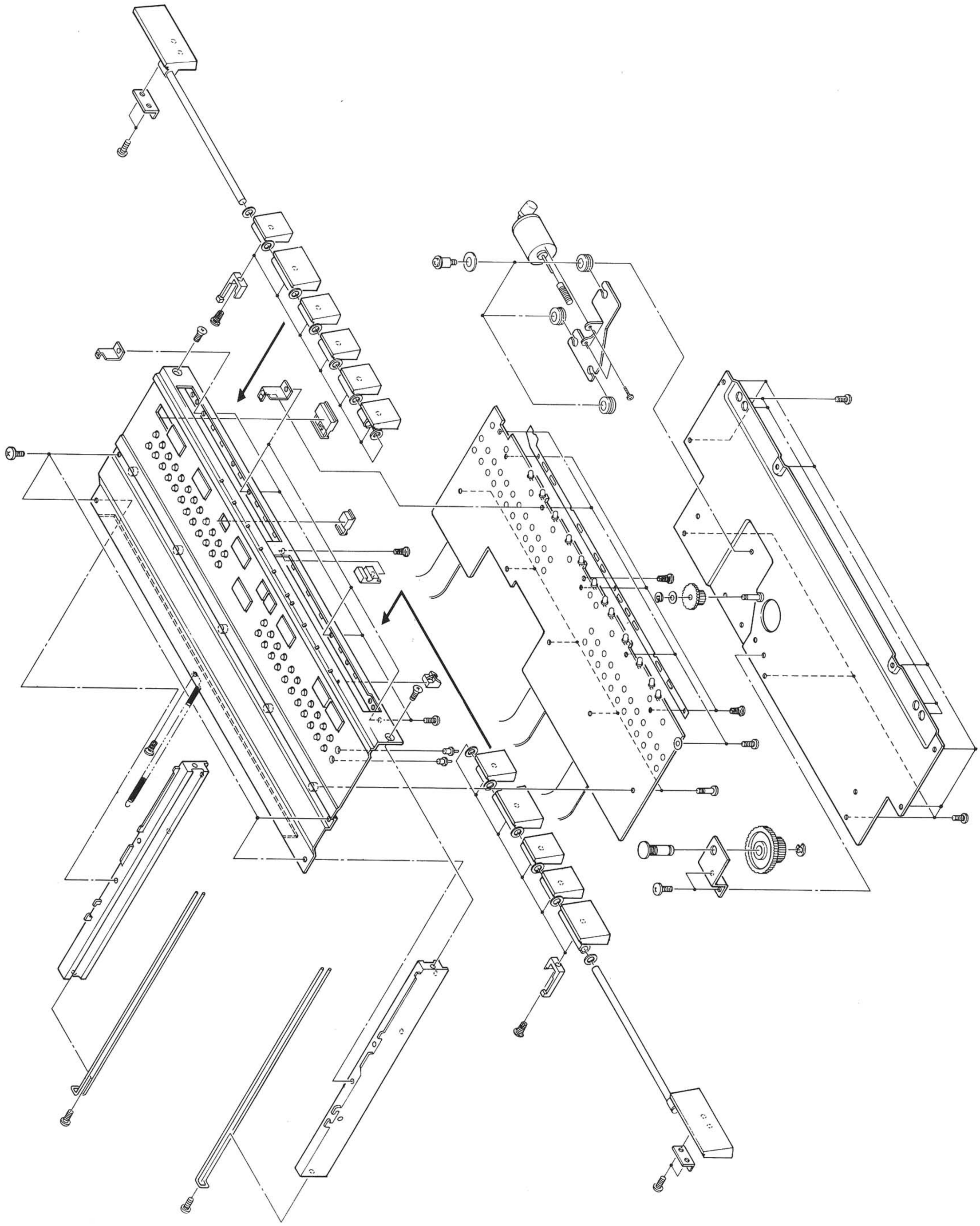


Loading section (when it is taken out to the stopper position).

# 5. Exploded View



## ■ Loading Section

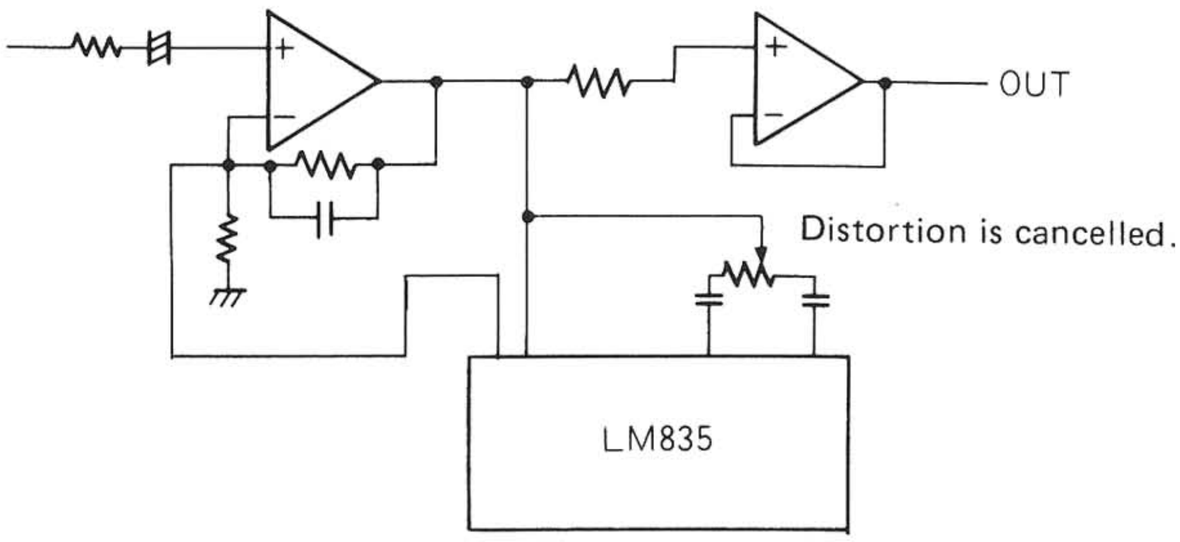


# 6. Adjustment Procedures

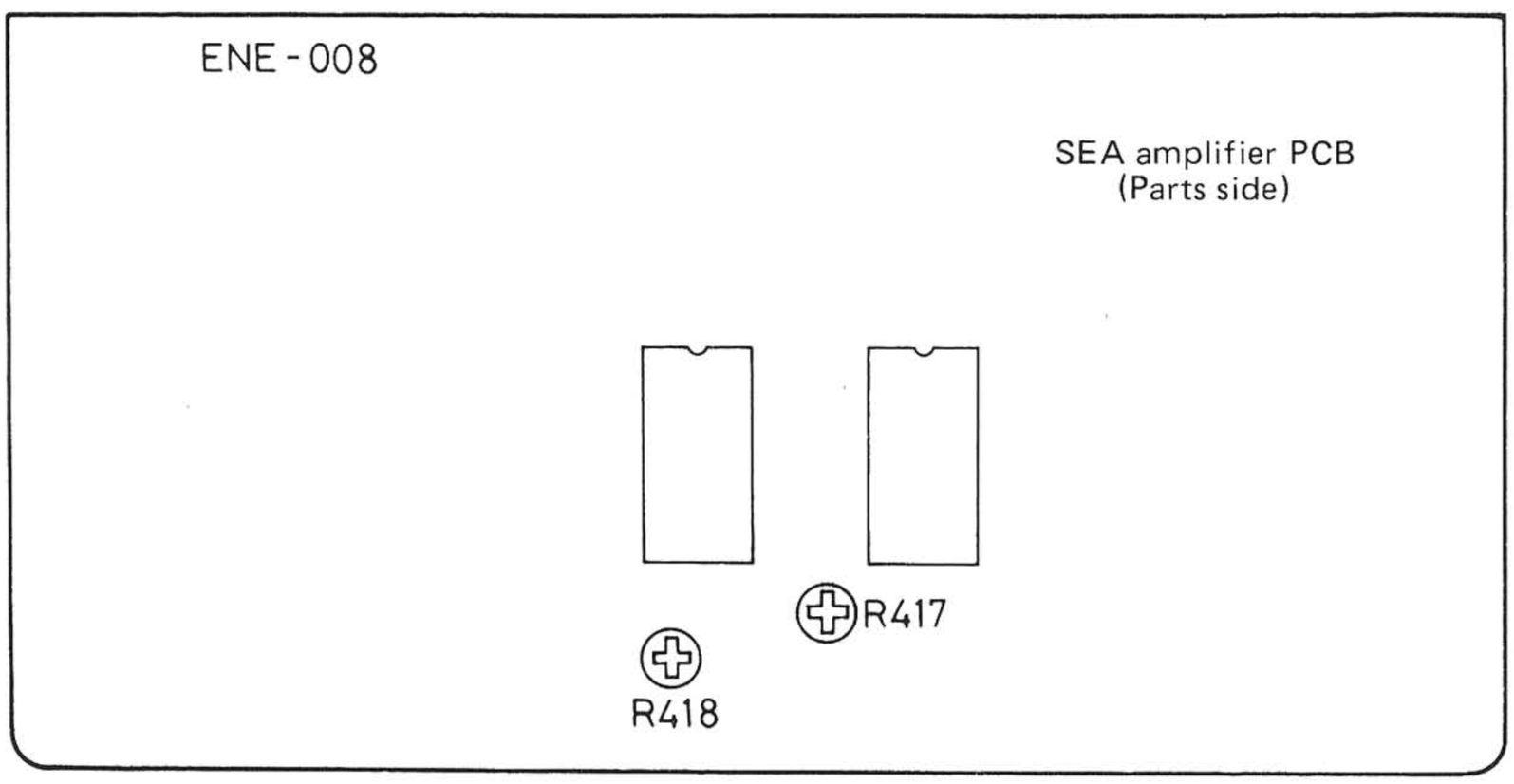
## 6-(1) Distortion Adjustment (20 kHz)

- **Adjustment instrument**
  Philips screwdriver
- **Adjustment**
  Adjust R417 (Lch) and R418 (Rch) so that the distortion at LINE OUT is minimum by inputting a 20 kHz, Vin2V signal to LINE IN.
  The distortion should be less than 0.003 % (typ. approx. 0.002 %).

- **Principle**

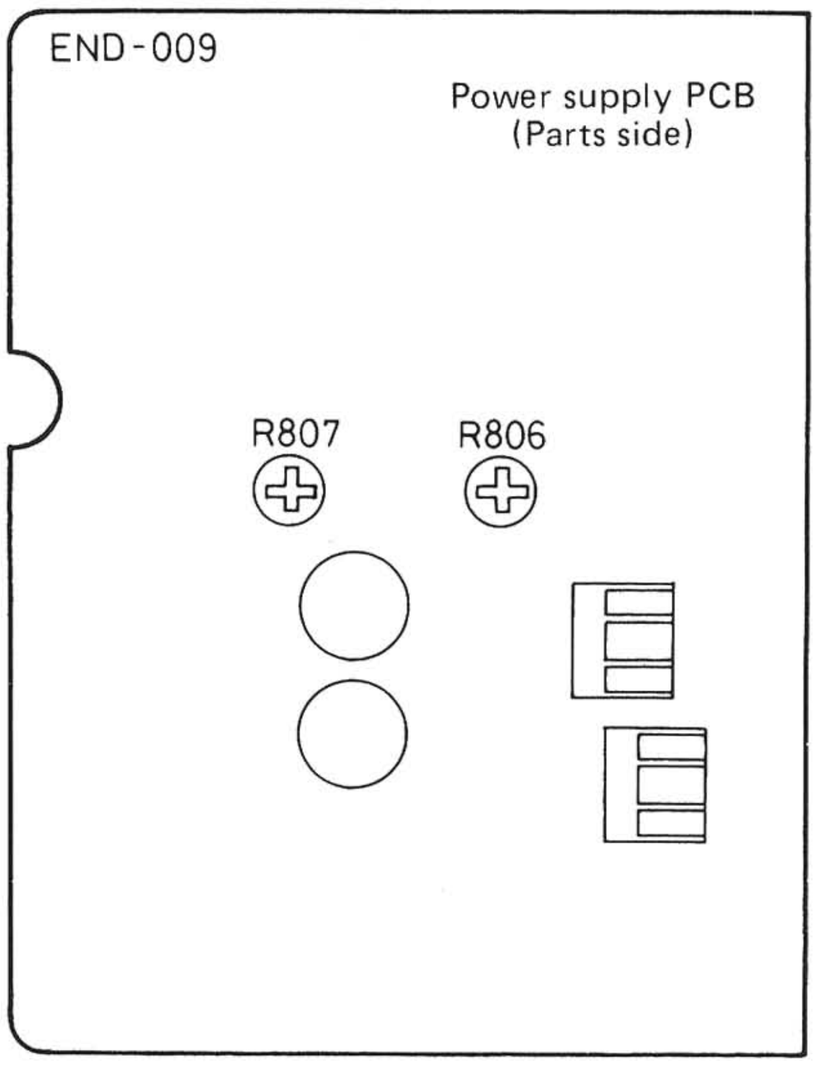



- **Three terminal regulator**
  The stable fixed output voltage can be obtained from the non-stabilized DC input voltage without using externally connected parts. An overcurrent limiting circuit and overheating protection circuit are built in.

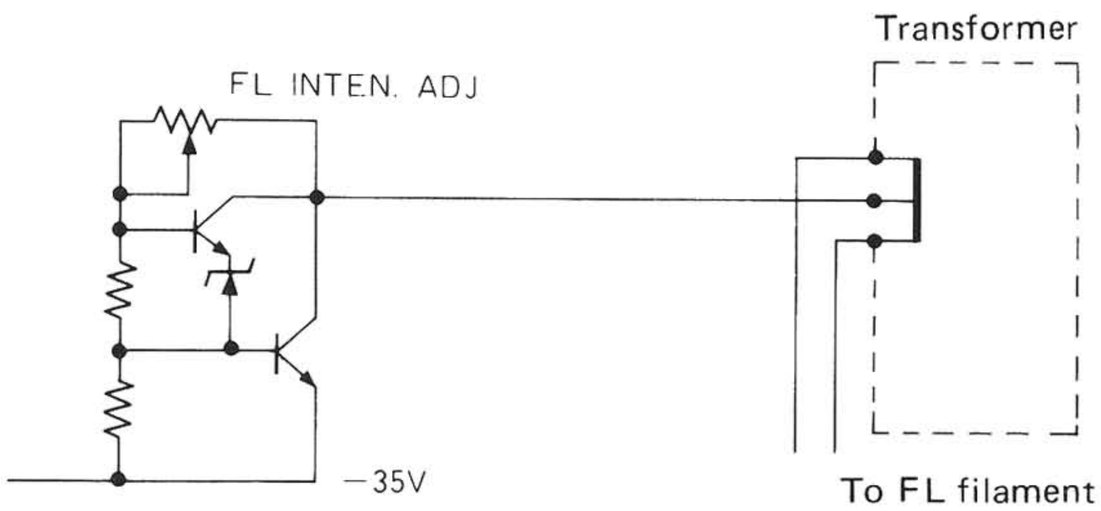



## 6-(2) FL Illumination Adjustment

- **Adjustment instrument**
  Philips screwdriver
- **Adjustment**
  (1) Set the FL indication to the spectrum analysis mode and input pink noise, etc.
  (2) Turn R806 and R807 fully clockwise. (To make the display brightest)
  (3) Check the brightness of L-ch and R-ch FL displays then adjust the brighter ch brightness to be the same as the darker one.



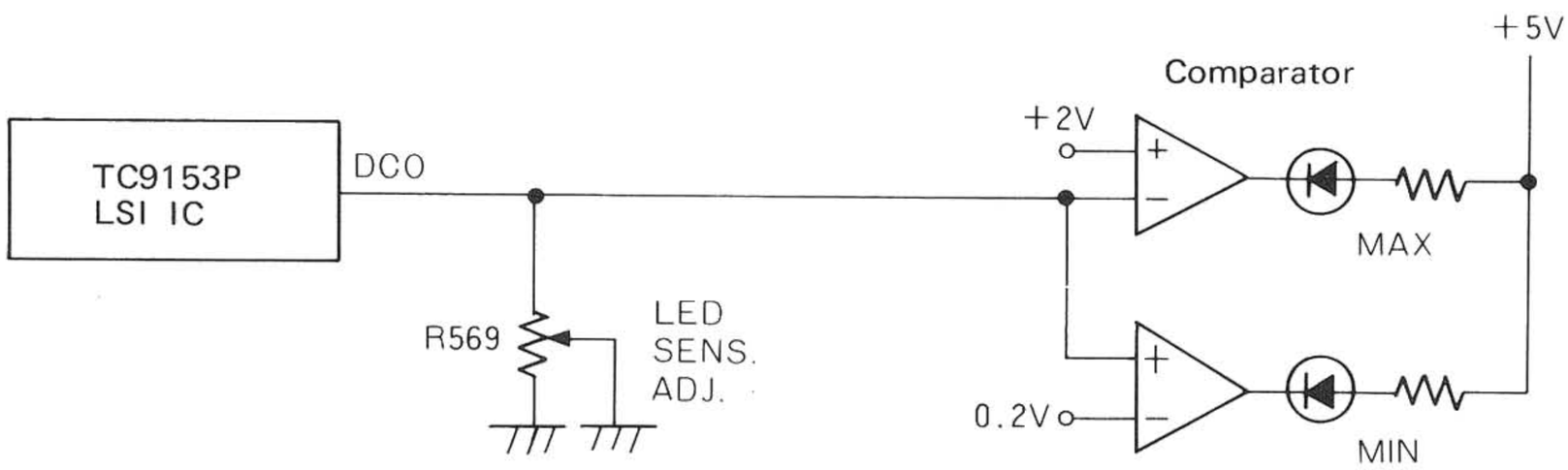

- **Principle**



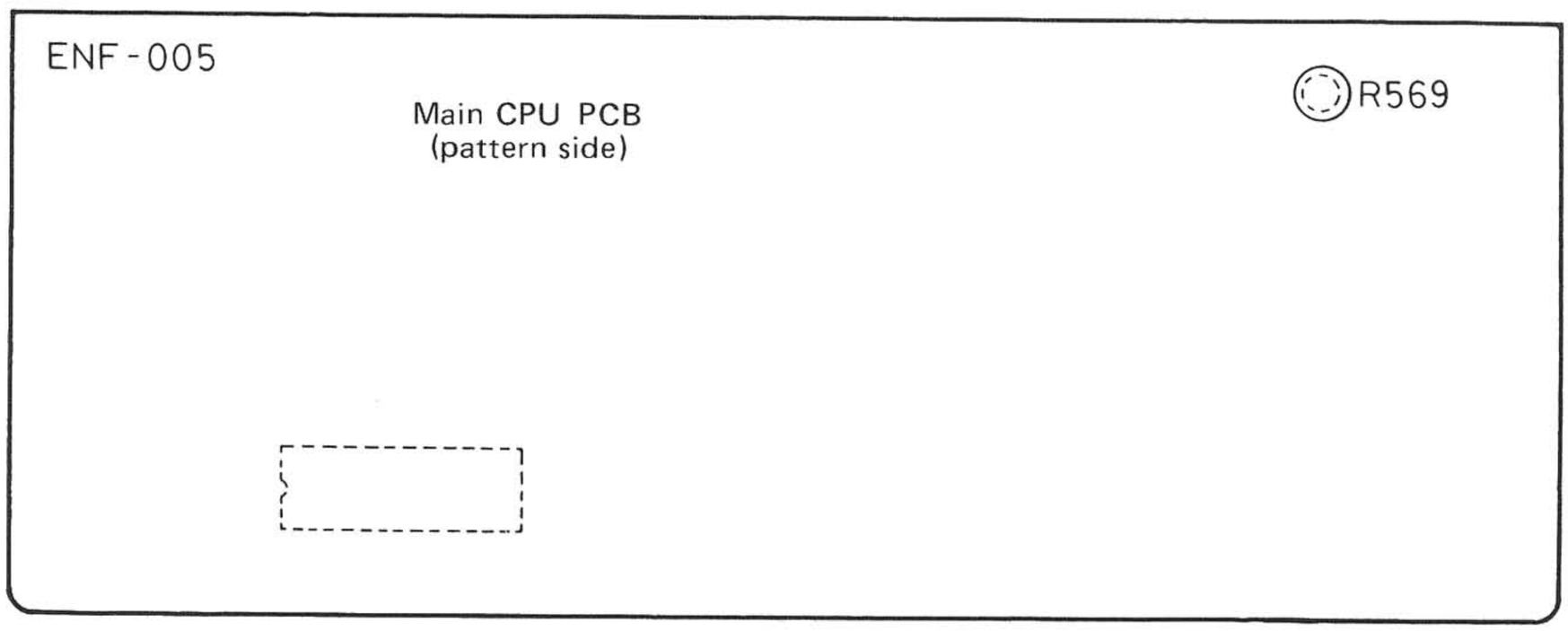
## 6-(3) Display Level Adjustment

- **Adjusting instrument**
  Ordinary screwdriver (small)
- **Adjustment**
  (1) Set the L and R pink noise generators to ON and the SEA to FLAT then adjust the DISPLAY LEVEL UP-DOWN buttons so that the pink noise level is set to about -10 — -6 dB.
  (2) Adjust R569 of ENF-005-1 so that the MAX LED lights at a level higher than this point.
  (3) It is possible to adjust R569 after removing R-ch of FL PCB.
  (4) After adjustment, make sure that the MAX LED goes off by lowering the level by one step by pressing the DOWN button.

- **Principle**

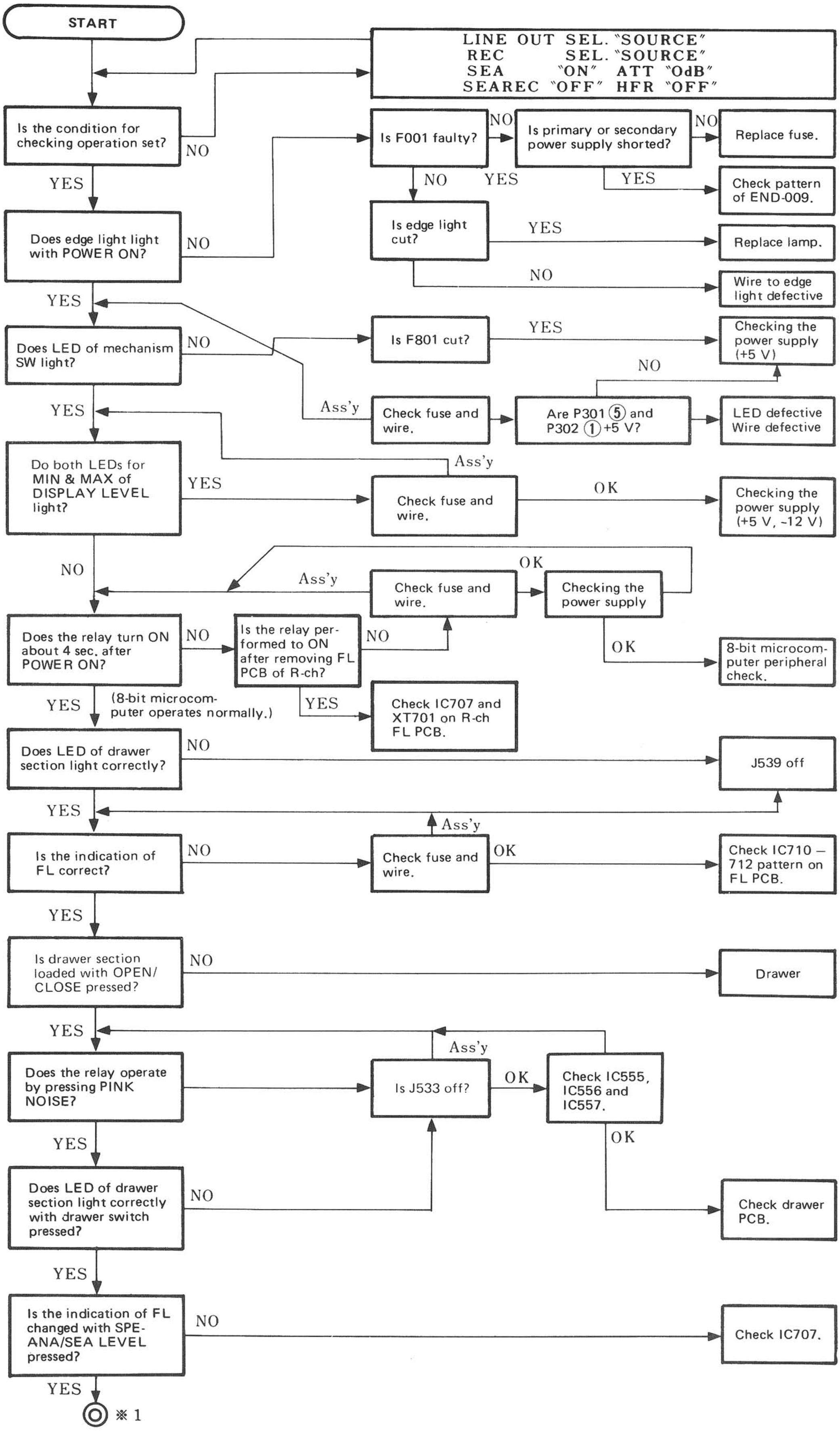



DCO: Changes the 13-step D/A output power to confirm the LSI IC position up to 0 V — 3.5 V max, in stages.



# 7. Troubleshooting

## 7-(1) General Operations



◎ ※1

Is frequency response reversed with REVERSE pressed?
NO → Check IC707.
YES ↓

Does SEA curve move UP and DOWN with SEA UP and DOWN pressed?
NO → Is data sent to IC707 ⑨.
YES ↓

Are center LED and FL switched with CONT-RANGE ±6/±12 dB?
NO → Does Q702 (C) turn to +5 V (6 dB) and -35 V (12 dB)?
YES → Check FL.
NO → Check Q701, Q702 and Q703. Check IC558.
YES ↓

Is curve changed with memory pattern selected?
NO → (back to Is data sent to IC707 ⑨.)
YES ↓ (SEA curve OK)

Is data sent to IC707 ⑨.
YES → Check IC707.
NO → Can data be input to J533?
YES → Check pattern to IC709 ⑨.
NO → Check drawer PCB.

Can pink noise be indicated in FL?
NO → Is the pink noise output level indicated by keeping DISPLAY LEVEL pressed?
YES → (back to Is data sent to IC707 ⑨.)
NO → IC550 faulty
YES ↓

Is indication changed correctly with DISPLAY UP/DOWN pressed?
NO → IC550 faulty
YES ↓

Is speed changed with SLOW/FAST pressed?
NO → Is P701 ③ +5 V with SLOW pressed and 0 V with FAST pressed?
YES → Check Q706, 707, IC724 and IC715.
NO → Pattern to IC555 ⑥ defective
YES ↓

Does PEAK HOLD operate?
NO → (to Does HFR operate?)
YES ↓

Does STILL-MEMORY operate?
NO → (to Does HFR operate?)
YES ↓

Is input level attenuated by -6 dB by pressing ATT?
NO → Is shaft connected correctly?
OK → Check SW PCB pattern.
Ass'y → (back to Is input level attenuated by -6 dB by pressing ATT?)
YES ↓

Does HFR operate?
NO → (back to Is input level attenuated by -6 dB by pressing ATT?)
YES ↓

Does FL turn to microphone mode by pressing MIC SW?
R-ch → arrow
L-ch → spectrum analyzer
NO → (back to Is curve changed with memory pattern selected?)
YES ↓

◎ ※2

※ 2

Is sound picked up by MIC indicated in L-ch when MIC is inserted?

NO

Is P546 off?

Ass'y

OK

Is signal output to MIC PCB ㉘ ?

NO

Check microphone PCB.

YES

Is relay operated by pressing PRESET?

Check Q301 and Q302.

OK

Membrane PCB, IC555, IC557

(Spectrum analyzer OK)

YES

Can LINE OUT be observed with an oscilloscope after inputting LINE IN signal (1 kHz, 0.1 V).

NO

Is the condition for checking operation set?

Setting

OK

YES

Spectrum analyzer is changed with memory pattern.

NO

YES

END

Are IC401 ① and ⑦ outputs correct?

YES

Check SW PCB pattern.

NO

Are waveforms of IC402 ③ and ⑤ output?

NO

YES

IC400 defective

Are waveforms of IC401 ③ and ⑤ output?

YES

SEA PCB pattern defective

NO

Are waveforms of IC403 and 404 ㉕ changed?

YES

NO

Are waveforms of IC403 and 404 ㉖ input?

NO

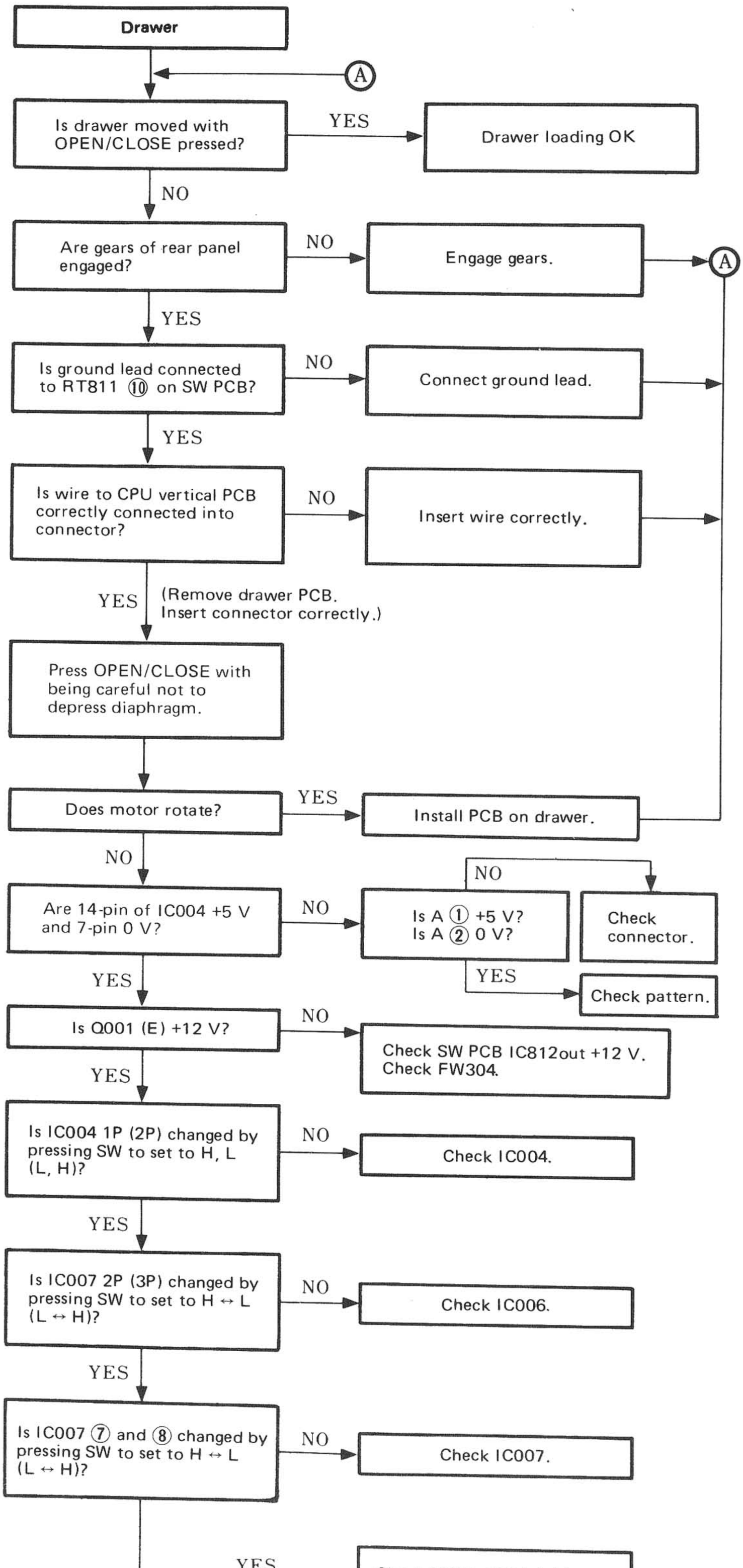
YES

IC403 or IC404 defective

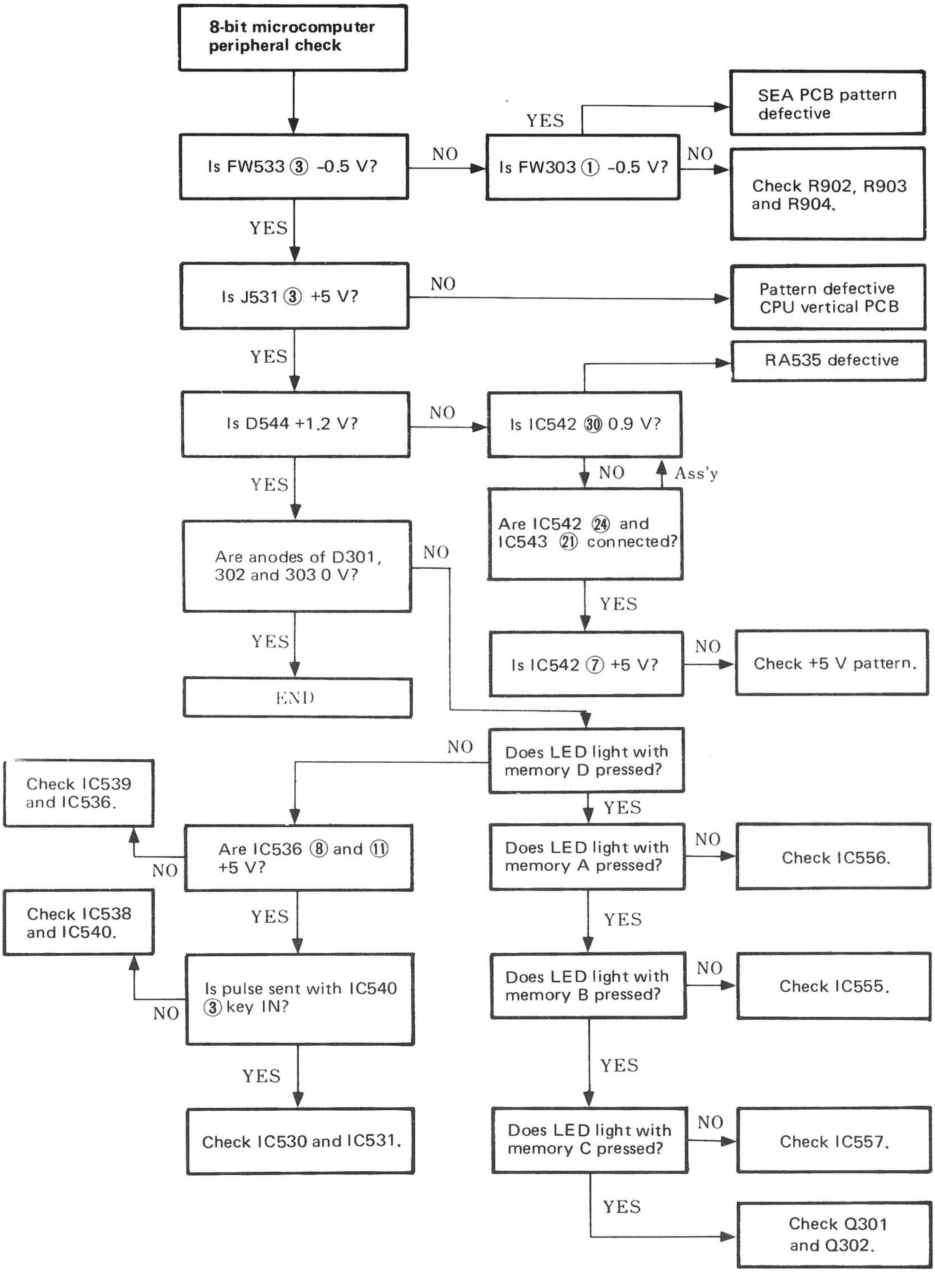
Reference

| | |
|---|---|
| CPU vertical PCB | ENF-005-2 |
| CPU oblique PCB | ENF-005-1 |
| FL PCB | ENB-004 |
| SW PCB | ENC-003 |
| Power supply PCB | END-009 |
| SEA PCB | ENE-008 |

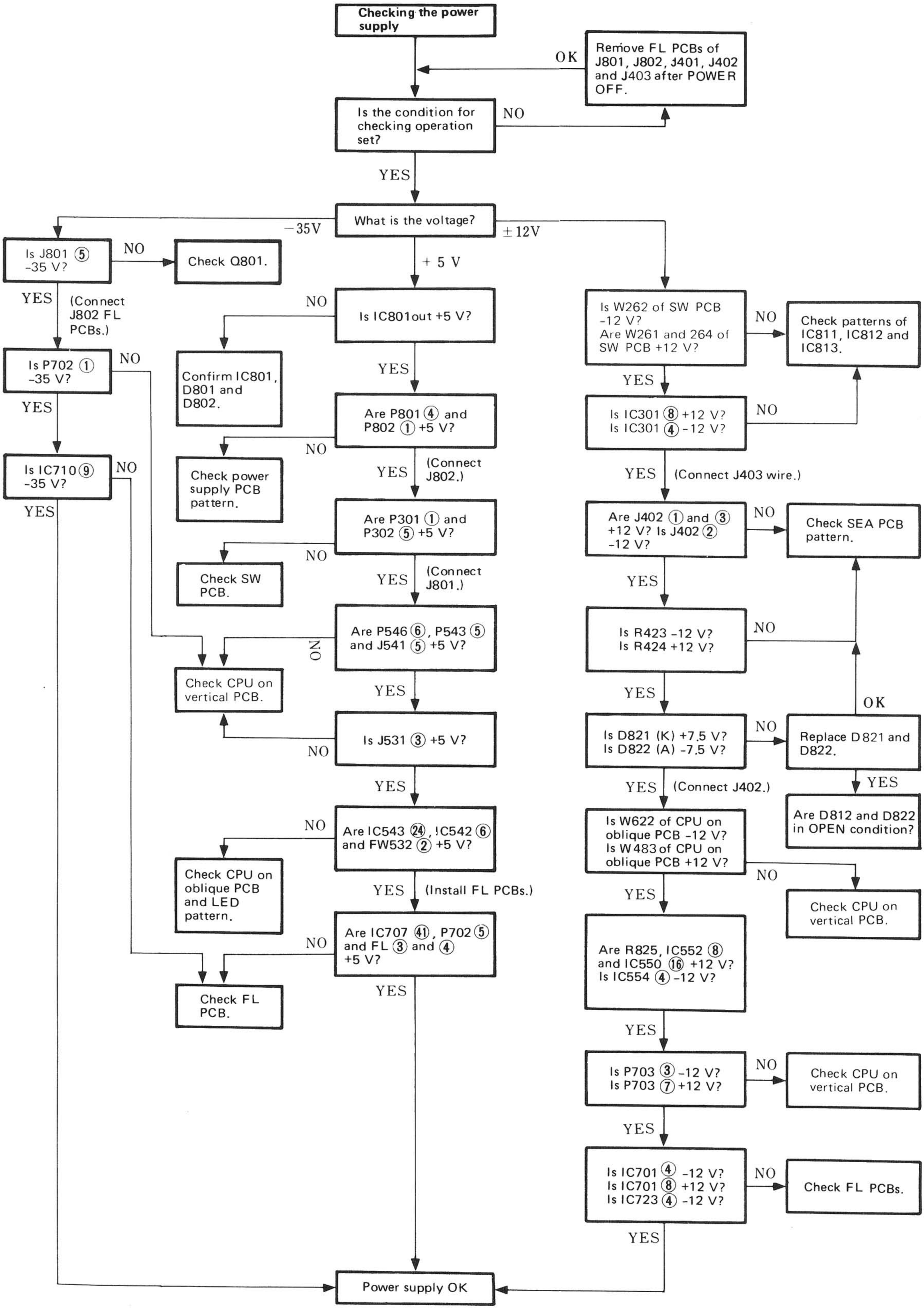
## 7-(2) Drawer


Drawer
A
Is drawer moved with OPEN/CLOSE pressed?
YES
Drawer loading OK
NO
Are gears of rear panel engaged?
NO
Engage gears.
A
YES
Is ground lead connected to RT811 ⑩ on SW PCB?
NO
Connect ground lead.
YES
Is wire to CPU vertical PCB correctly connected into connector?
NO
Insert wire correctly.
YES
(Remove drawer PCB. Insert connector correctly.)
Press OPEN/CLOSE with being careful not to depress diaphragm.
Does motor rotate?
YES
Install PCB on drawer.
NO
Are 14-pin of IC004 +5 V and 7-pin 0 V?
NO
Is A ① +5 V? Is A ② 0 V?
NO
Check connector.
YES
Check pattern.
YES
Is Q001 (E) +12 V?
NO
Check SW PCB IC812out +12 V. Check FW304.
YES
Is IC004 1P (2P) changed by pressing SW to set to H, L (L, H)?
NO
Check IC004.
YES
Is IC007 2P (3P) changed by pressing SW to set to H ↔ L (L ↔ H)?
NO
Check IC006.
YES
Is IC007 ⑦ and ⑧ changed by pressing SW to set to H ↔ L (L ↔ H)?
NO
Check IC007.
YES
Check C023, C024, L001 and L002.

## 7-(3) 8-bit Microcomputer Peripheral Check



## 7-(4) Checking the Power Supply



MEMO

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(No. 2745)

Printed in Japan
5908[V]