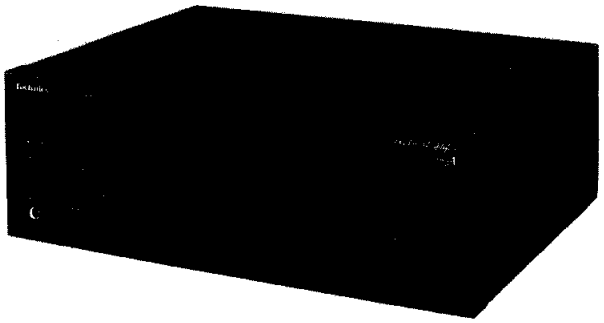
ORDER NO. AD9103052C2

# Service Manual

Amplifier

Stereo Integrated Amplifier

# SU-X902



**Color**

(K) ..... Black Type

**Areas**

| Country Code | Area | Color |
|---|---|---|
| (E) | Continental Europe | (K) |
| (EB) | Great Britain | |
| (EG) | F.R. Germany & Italy | |

## SPECIFICATIONS

**(DIN 45 500)**

### ■ AMPLIFIER SECTION

| | |
|---|---|
| **DIN power output** | |
| **1 kHz THD: 1 %** | 2 × 100 W (8 Ω) |
| **Total harmonic distortion** | |
| **rated power at 1 kHz** | 1 % (8 Ω) |
| **Harmonic distortion** | |
| **half power at 1 kHz (analog section)** | 0.009 % (8 Ω) |
| **Residual hum and noise** | 0.3 mV |
| **Damping factor** | 30 (8 Ω) |
| **Input sensitivity and impedance** | |
| **PHONO** | 3 mV/47 kΩ |
| **TUNER, TAPE** | 150 mV/22 kΩ |
| **CD, VDP, VCR** | 200 mV/22 kΩ |
| **Maximum input voltage (1 kHz, RMS)** | |
| **PHONO** | 100 mV |
| **S/N (rated power 8 Ω)** | |
| **PHONO** | 75 dB (IHF, A: 79 dB) |
| **TUNER, CD, TAPE, VDP, VCR** | 82 dB (IHF, A: 83 dB) |
| **Frequency response** | |
| **PHONO** | RIAA standard curve ±0.8 dB (30 Hz~15 kHz) |
| **TUNER, CD, TAPE, VDP, VCR** | 15 Hz~60 kHz (−3 dB) |
| **CD, DAT, AUX (digital section)** | 15 Hz~20 kHz (−0.5 dB) |
| **Tone controls** | |
| **BASS** | 50 Hz, +10 dB~−10 dB |
| **TREBLE** | 20 kHz, +10 dB~−10 dB |
| **Muting** | −20 dB |
| **Super bass** | 60 Hz, +8 dB |
| **Output voltage** | |
| **TAPE, VCR REC OUT** | 150 mV |
| **Channel balance, TUNER, 250 Hz~6,300 Hz** | ±1.0 dB |
| **Channel separation, (TUNER, 1 kHz) (A SPEAKER)** | 55 dB |
| **Headphones output level and impedance** | 660 mV/330 Ω |
| **Load impedance** | |
| **A or B, A and B** | 8 Ω~16 Ω |
| **SURROUND** | 8 Ω~16 Ω |

### ■ VIDEO SECTION

| | |
|---|---|
| **VIDEO OUTPUT** | 1 Vpp/75 Ω |
| **VCR MONITOR** | 1 Vpp/75 Ω |

### ■ GENERAL

| | |
|---|---|
| **Power consumption** | 450 W |
| **Power supply** | |
| **For Great Britain** | AC 50 Hz/60 Hz, 230~240 V |
| **For others** | AC 50 Hz/60 Hz, 220 V |
| **Dimensions (W × H × D)** | 360 × 129 × 305 mm (14-3/16" × 5-3/32" × 12") |
| **Weight** | 7.5 kg (16.5 lb.) |

**Notes:**

1. Specifications are subject to change without notice. Weight and dimensions are approximate.
2. Total harmonic distortion is measured by the digital spectrum analyzer.

Technics

# ■ CONTENTS



# ■ BEFORE REPAIR

(1) Turn off the power supply. Using a 10Ω, 5 W resistor connect both ends of power supply capacitors (C711, C712, 3300 μF) in order to discharge the voltage.
(2) Before turning the power supply on, after completion of repair, slowly apply the primary voltage by using a power supply voltage controller to make sure that the consumed current at 50 Hz/60 Hz in NO SIGNAL mode should be shown below with respect to supply voltage 220 V/240 V.

| Power supply voltage | AC 230 V | AC 240 V |
|---|---|---|
| Consumed current 50 Hz | 198~463 mA | 186~434 mA |
| Consumed current 60 Hz | 192~448 mA | 181~422 mA |

# ■ PROTECTION CIRCUITRY

The protection circuitry may have operated if either of the following conditions is noticed:
*No sound is heard when the power is switched ON.
*Sound stops during a performance.
The function of this circuitry is to prevent circuitry damage if, for example, the postive and negative speaker connection wires are "shorted", or if speaker systems with an impedance less than the indicated rated impedance of this unit are used.
If this occurs, follow the procedure outlined below:

1. Switch OFF the power.
2. Determine the cause of the problem and correct it.
3. Switch ON the power once again.

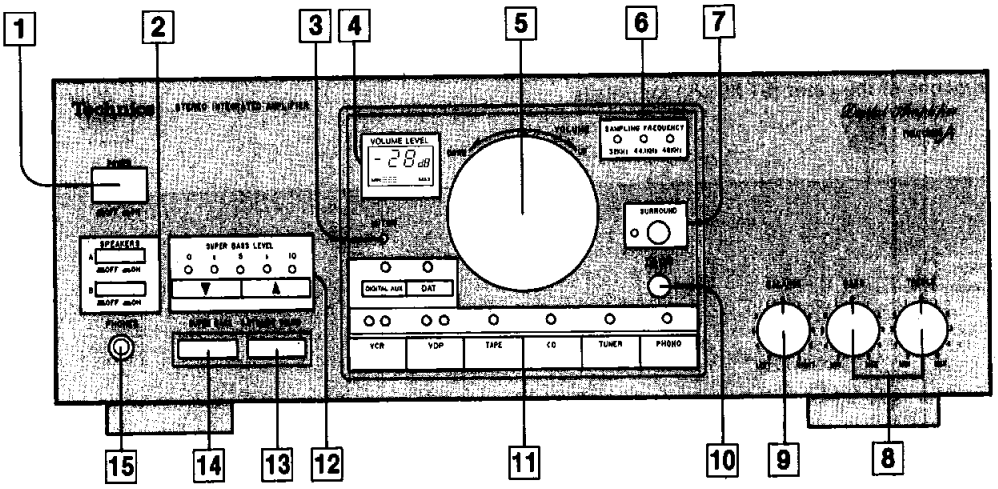
**Note:**
When the protection circuitry functions, the unit will not operate unless the power is first switched OFF and then ON AGAIN.

# ■ ACCESSORIES

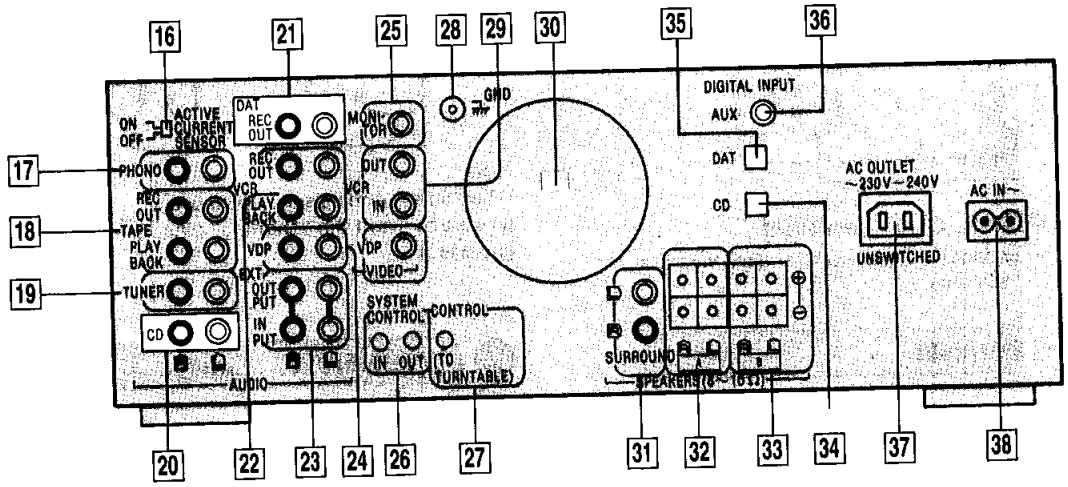
●AC power supply cord ..... 1
Configuration of AC power supply cord differs according to area.

SJA187 .....For (E) (EG) area only
SJA188..... For (EB) area only.

# ■ LOCATION OF CONTROLS




1. Power switch (POWER)
2. Speaker selectors (SPEAKERS)
3. Muting indicator (MUTING)
4. Volume-level indicator (VOLUME LEVEL)
5. Volume control (VOLUME)
6. Sampling frequency indicators (SAMPLING FREQUENCY)
7. Surround-sound button/indicator (SURROUND)
8. Tone controls (BASS/TREBLE)
9. Balance control (BALANCE)
10. Volume preset button (VOLUME PRESET)
11. Input selectors/indicators
12. Super bass level control buttons/indicators (SUPER BASS LEVEL)
13. Super dynamic sound button/indicator (S. DYNAMIC SOUND)
14. Super bass button/indicator (SUPER BASS)
15. Headphones jack (PHONES)



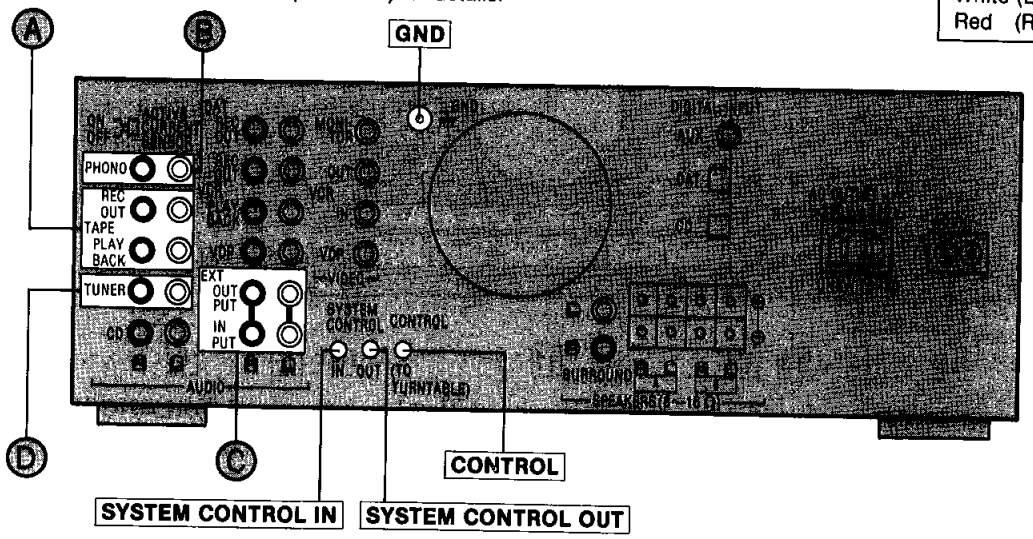

16. Active current sensor switch
17. Phono input terminal
18. Tape rec out/playback terminal
19. Tuner input terminal
20. CD input terminal
21. DAT recout terminal
22. VCR recout/playback terminal
23. EXT output/input terminal
24. VDP input terminal
25. MONITOR terminal
26. System control IN/OUT terminal
27. Control terminal (to turntable)
28. GND terminal
29. VCR out/in terminal
30. Cooling fan
31. Surround-sound speaker terminal
32. Main speaker A terminal
33. Main speaker B terminal
34. CD digital input terminal
35. DAT digital input terminal
36. AUX digital input terminal
37. AC outlet
38. AC inlet

# ■ CONNECTIONS

**Make connections to each component in the system by using stereo connection cables (not included).**

See the operating instructions of the tuner (ST-X902L) for details.

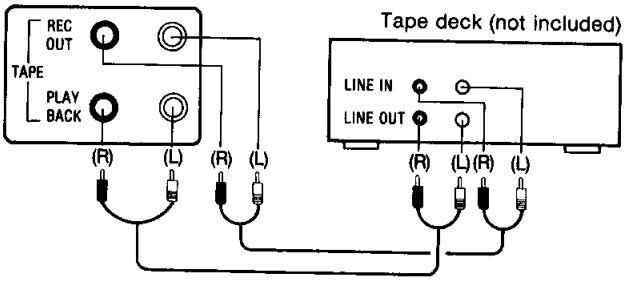
**Stereo connection cable**
White (L)
Red (R)




## Connecting audio components

### Ⓐ "TAPE" terminals

Connect a tape deck.

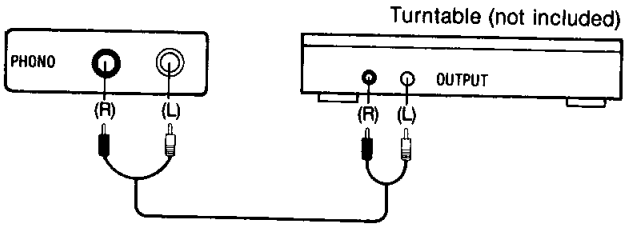



#### ■ "SYSTEM CONTROL OUT" terminal

This terminal is used to connect a Technics tape deck with the "SYSTEM CONTROL IN" terminal.

### Ⓑ "PHONO" terminals

Connect a turntable.




#### ■ "GND" terminal

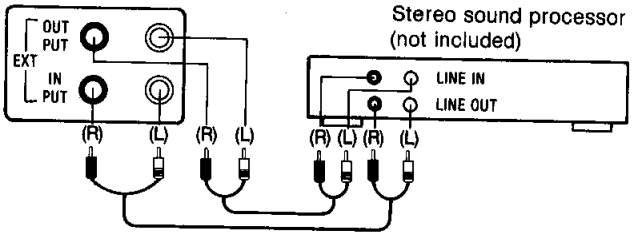
This terminal is for use with a turntable which has a ground wire.

#### ■ "CONTROL" terminal

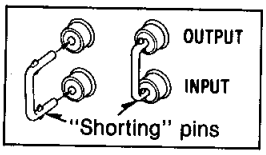
This terminal is used to connect a Technics turntable with the "REMOTE/SYNCHRO REC" terminal.

### Ⓒ "EXT" terminals

Connect a stereo sound processor.

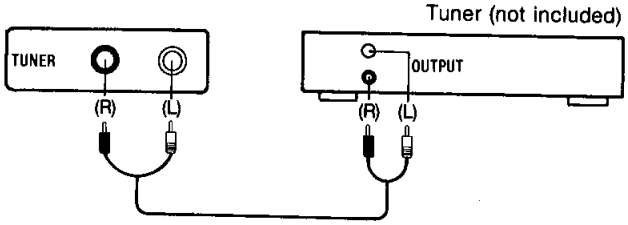



**Note:**
When these terminals are not in use, be sure to insert the "shorting" pins (included).




### Ⓓ "TUNER" terminals

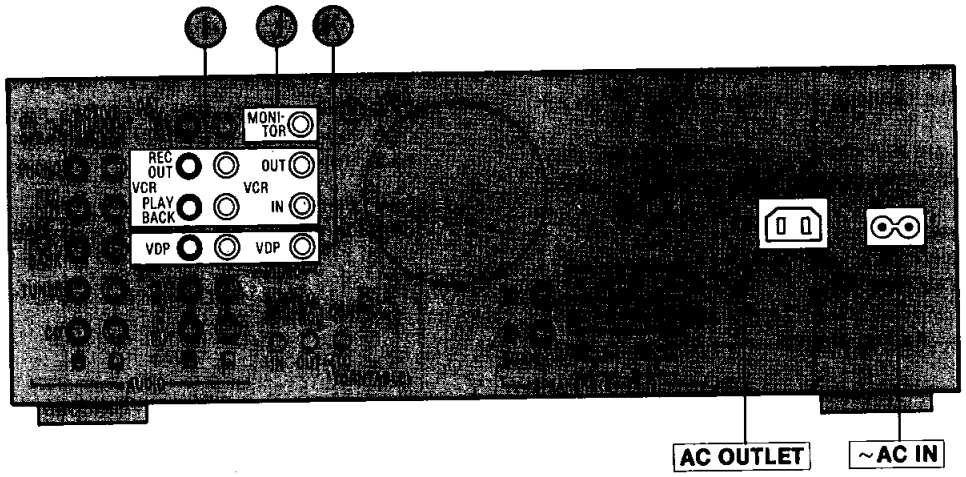
Connect a tuner.




#### ■ "SYSTEM CONTROL IN" terminal

This terminal is used to connect a Technics tuner with the "SYSTEM CONTROL OUT" terminal.

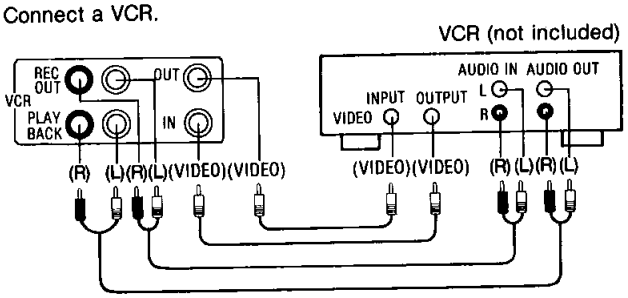
Make connections to each component by using stereo connection cables (not included) and video connection cables (not included).




## Connecting video equipment

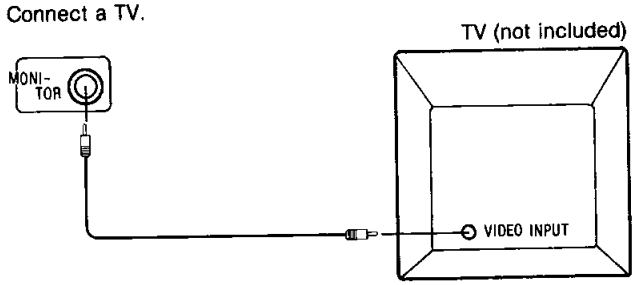
### (I) "VCR" terminals

Connect a VCR.



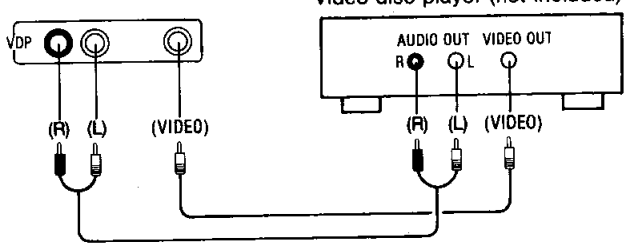

### (J) "MONITOR" terminal

Connect a TV.




### (K) "VDP" terminals

Connect a video disc player.




## AC outlet ("AC OUTLET")

Do not connect video equipment (such as a TV, etc.) to the AC outlet of this unit. (This outlet is intended for audio equipment.) Do not exceed the indicated power ratings when connecting to this outlet.

**"UNSWITCHED" outlet:**

Power is always available, regardless of power switch.
Audio equipment rated up to 60 W can be connected here.

**Note:**

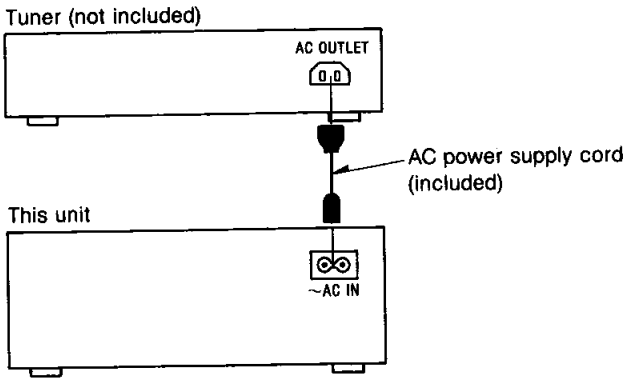
The configuration of the AC outlet differs according to area.

## AC power supply cord

Connect the AC power supply cord (included) after all other cables and cords are connected.

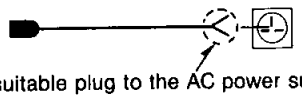
**Notes:**

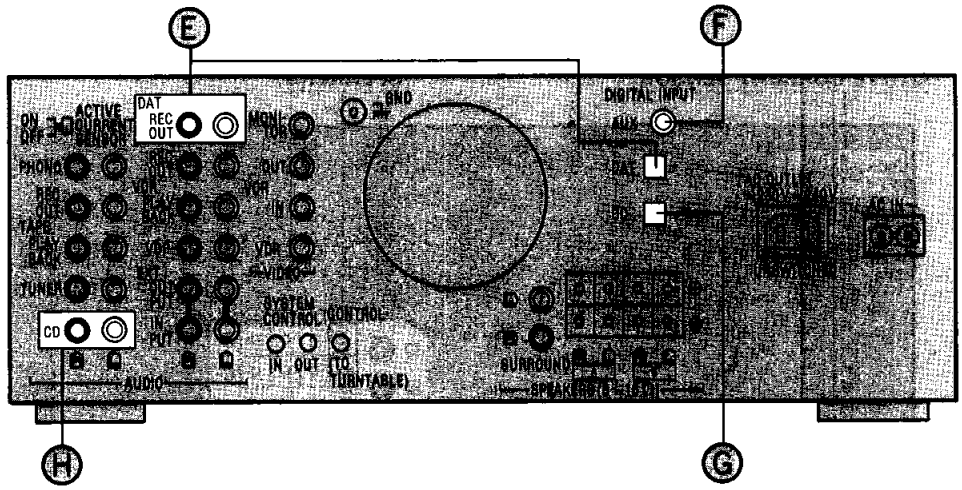
- Configuration of the AC outlet and AC power supply cord differs according to area.
- If this unit is not to be connected with the tuner, the cord is to be connected to the household AC outlet.




**For United Kingdom**

Cut off and dispose of the plug and replace with a suitable plug.

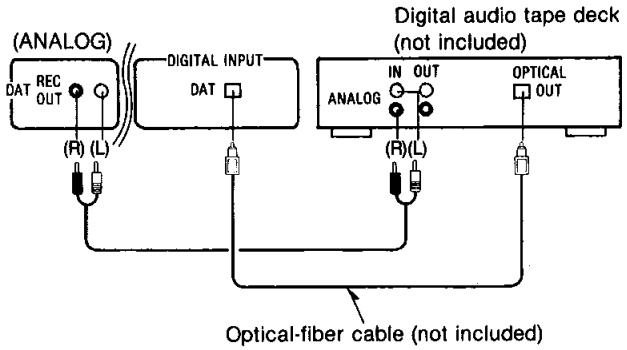





## Connecting audio components

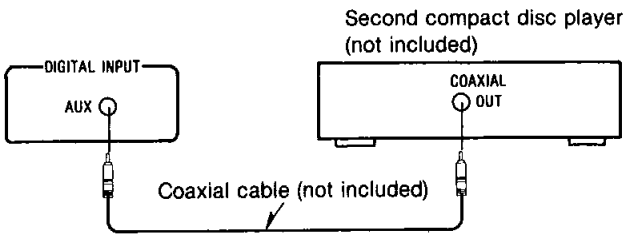
### E "DAT" terminals (ANALOG/DIGITAL)

Connect a digital audio tape deck.
Recordings can be made to the digital audio tape deck.



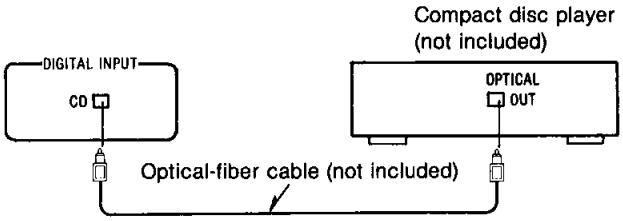

### F "AUX" terminal (DIGITAL)

Connect a second compact disc player, etc.



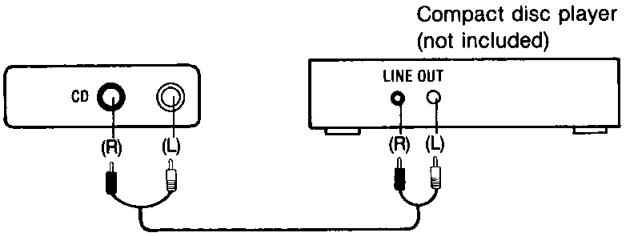

### G "CD" terminal (DIGITAL)

Connect a compact disc player.



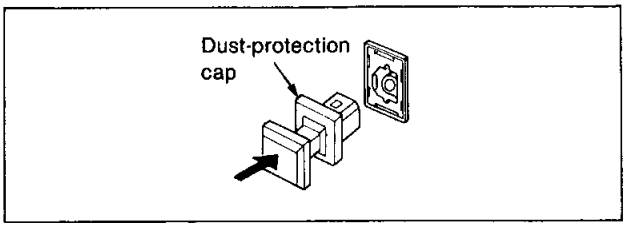

### H "CD" terminals (ANALOG)

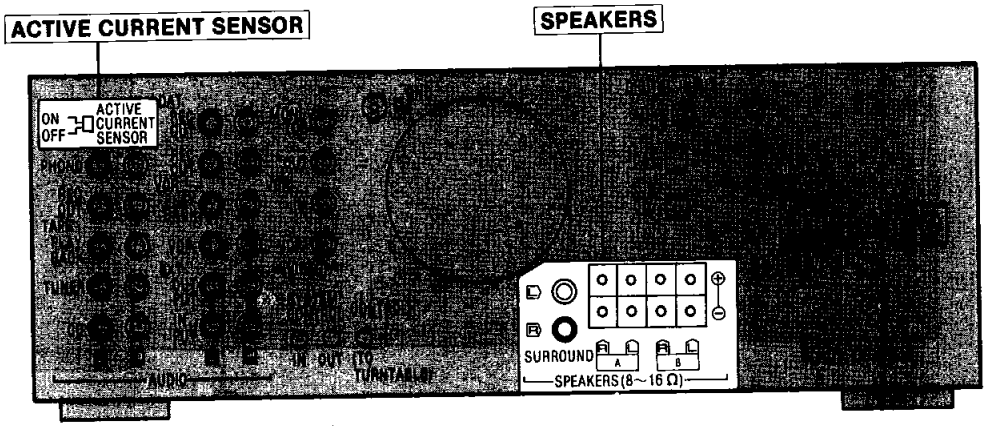
Connect a compact disc player.




### ■ "DIGITAL INPUT" (DAT, CD) terminals of this unit

These terminals are protected by dust-protection caps to avoid damage by dust, etc.
Remove the caps only when the "DIGITAL INPUT" terminals are to be used.
When these terminals are not being used, attach the caps as shown in the illustration at right.



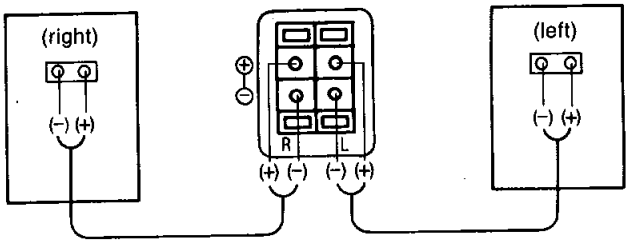



## Connection of speaker systems

Three pairs of speaker systems (main, second, surround-sound) can be connected to this unit.
Speaker systems that can be connected to any of the speaker connection terminals of this unit are speaker systems with an impedance of 8 to 16 ohms.
Make connections to each speaker system by using speaker cords (not included).

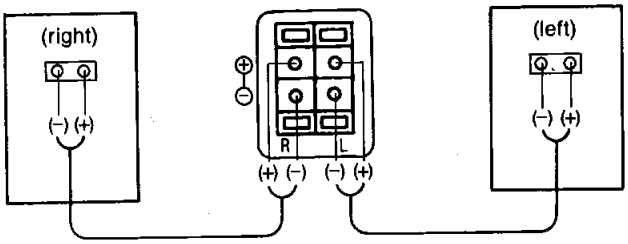
### Main speaker systems (not included)

Connect to the "A" terminals.




### Second speaker systems (not included)

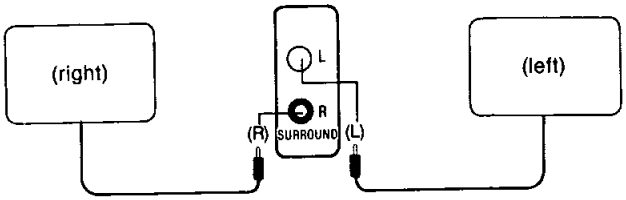
Connect to the "B" terminals.




### Surround-sound speaker systems (not included)

Connect to the "SURROUND" terminals.

- Be sure to connect both speaker systems. If only one side is connected, no sound will be heard.




### How to use the SUPER (super-bass) selector

The selector is used to enjoy powerful super-bass sound.

**ON:** Switch ON when connecting the Technics system speakers (SU-X902: SB-CS90, SU-X502: SB-CS90/CS70).

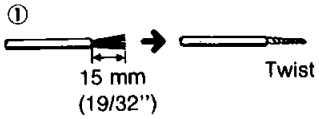
**OFF:** Switch OFF when connecting speakers other than Technics system speakers.

**Notes:**

- When connecting speakers other than system speakers, sound from the speakers may not be heard if the selector is pressed ON, because the protecting circuit on the amplifier becomes active.
- The active current sensor activates only for the speaker systems connected to the "A" terminals.

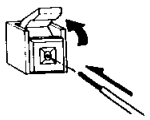
### To connect cords to terminals

① Strip off the outer covering, and twist the center conductor.



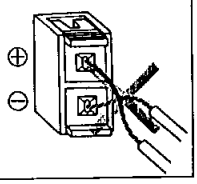

② Tilt the lever back and insert the cord.

③ Close the lever and pull the cord gently to be sure that it is secure.




**Note:**
Be sure to only connect positive (+) cords to positive (+) terminals, and negative (–) cords to negative (–) terminals.

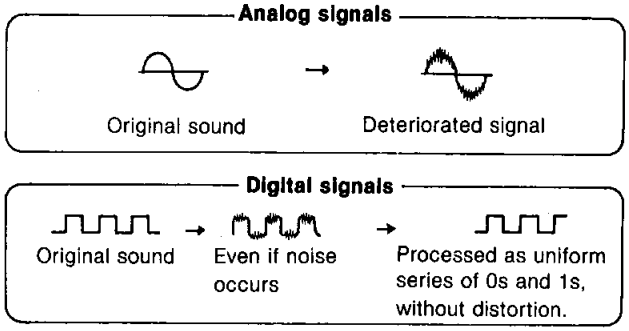
**Note:**
To prevent damage to circuitry, never short-circuit the plus (+) and minus (–) speaker wire.



# ■ DIGITALIZATION OF AUDIO SIGNALS

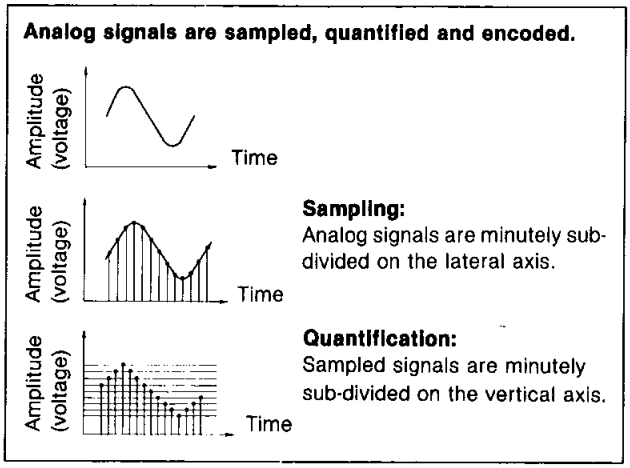
## ■Why digitize?

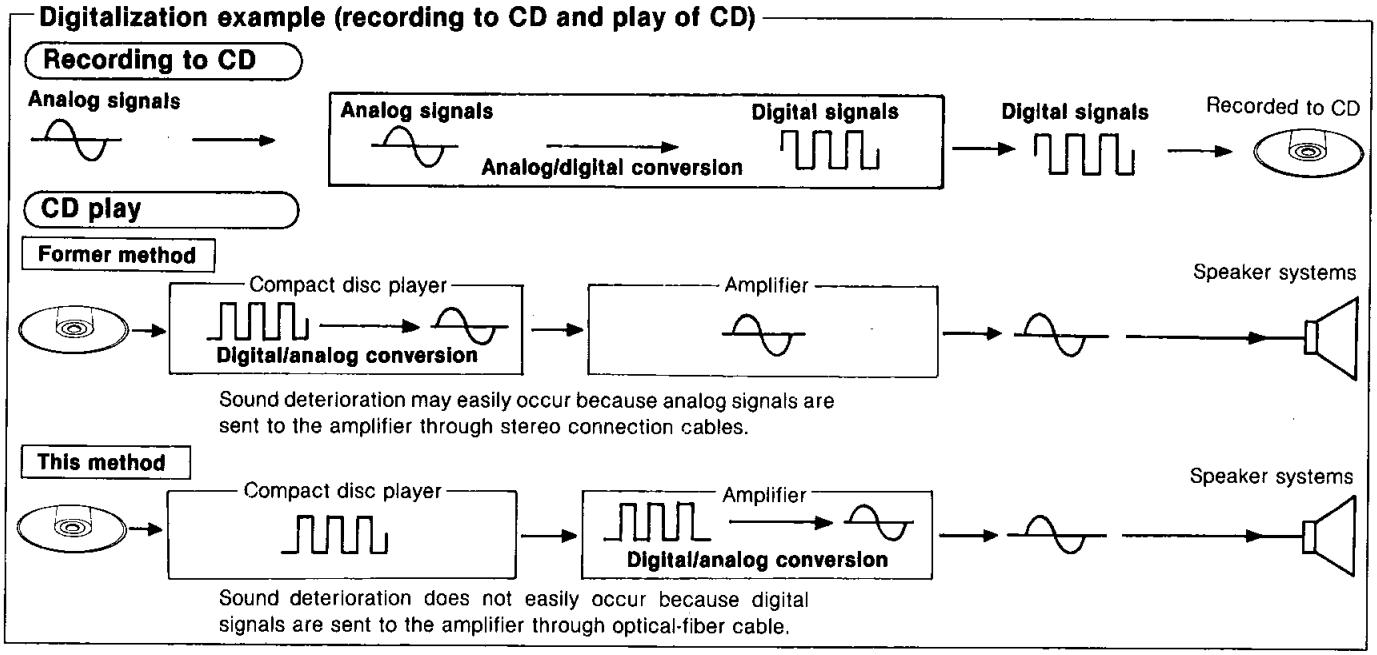
- Audio signals are analog signals with a continuous form.
- When these audio signals are subjected to repeated electronic processing (recording, playback, etc.), they become noisy and distortion occurs, thus resulting in deterioration of the sound quality.
- When these signals are first digitized before processing, they have the following advantages that prevent deterioration of the sound quality:
  ① Resistance to noise
  ② Extremely low distortion
  ③ Flat, even frequency response




## ■How signals are digitized

If it is known to what degree of minuteness the human ear can distinguish sounds, it is then possible, by using that data as the standard reference, to digitize them by dividing analog signals into minute pieces, after which they can be transmitted with a high degree of precision, and thereafter recorded and played back in the digitized format.




### What the sampling frequency is

The sampling frequency expresses the degree of minuteness to which signals can be cut, relative to a certain specified time interval, during sampling.
For compact disc sound:
Analog signals are cut 44,100 times (i.e., 44.1 kHz) during one second.
This 44.1 kHz is, therefore, the sampling frequency for compact disc sound.

### What analog/digital conversion is

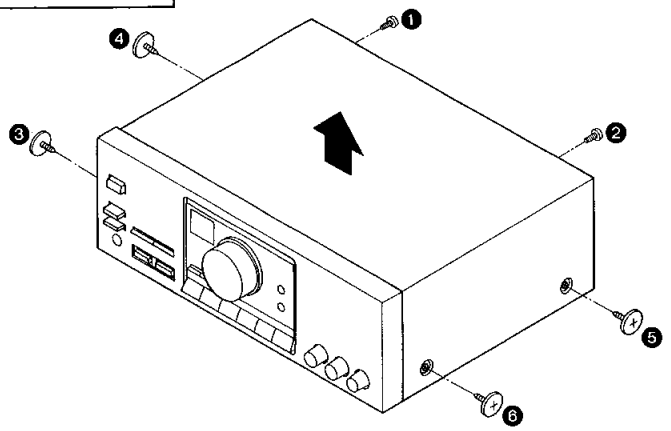
Audio signals (analog signals) are taken out (sampled) at certain fixed time intervals. The points at which this sampling frequency occurs are digitally encoded and converted to digital signals.

### What digital/analog conversion is

Each sampling frequency point is returned (converted) to voltage, thus converting digital signals to the analog signals that we can hear.

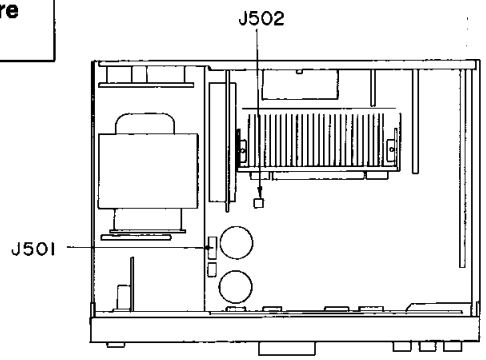
# ■ DISASSEMBLY INSTRUCTIONS

| Ref. No. 1 | Removal of the Cabinet |
|---|---|
| Procedure 1 | |



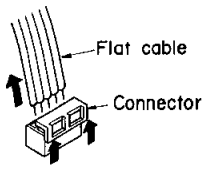
1. Remove the 6 screws (❶~❻).
2. Remove the cabinet in the direction of the arrow.

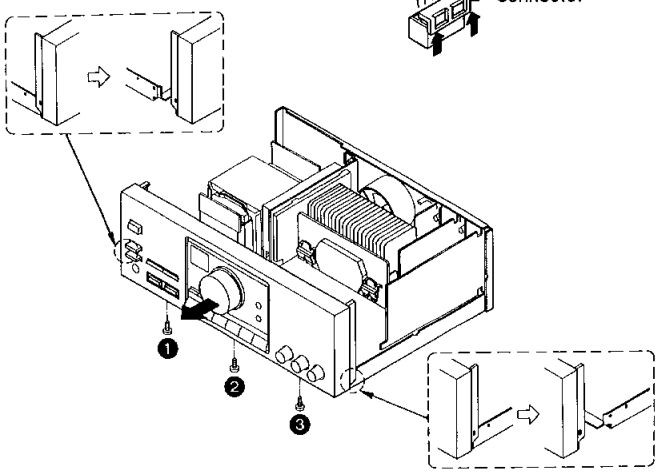
| Ref. No. 2 | Removal of the Front Panel Unit |
|---|---|
| Procedure 1→2 | |




1. Remove the 2 connectors (J501, J502).

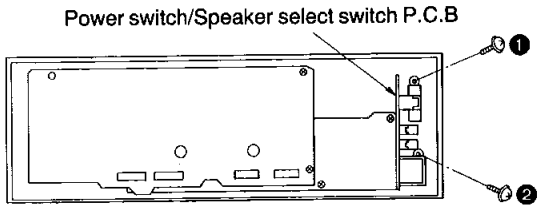
**—Removal of the Connector—**



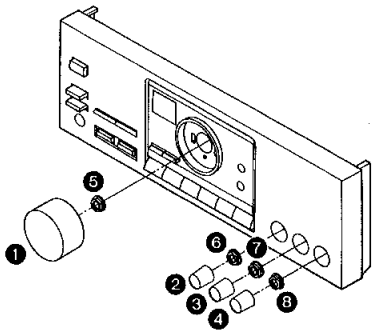
2. Remove the 3 screws (❶~❸).
3. Remove the front panel unit in the direction of the arrow.

| Ref. No. 3 | Removal of the Power Switch/Speaker Select Switch P.C.B. |
|---|---|
| Procedure 1→2→3 | |

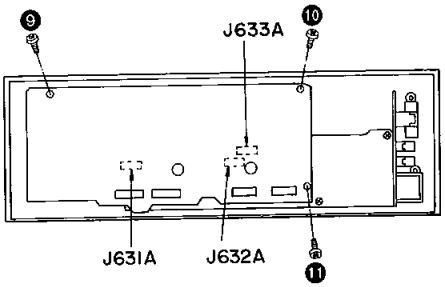



•Remove the 2 screws (❶, ❷).

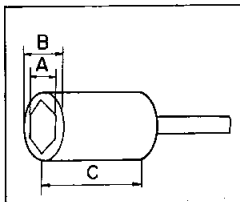
| Ref. No. 4 | Removal of FL Drive P.C.B. |
|---|---|
| Procedure 1→2→4 | |



1. Remove the 4 knobs (❶~❹).
2. Remove the 4 nuts (❺~❽).



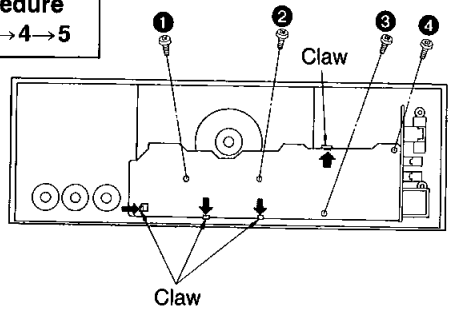

3. Remove the 3 screws (❾~⓫).
4. Remove the 3 connectors (J631A, J632A, J633A).




A=11 mm
B=16 mm
C=longer than 22 mm

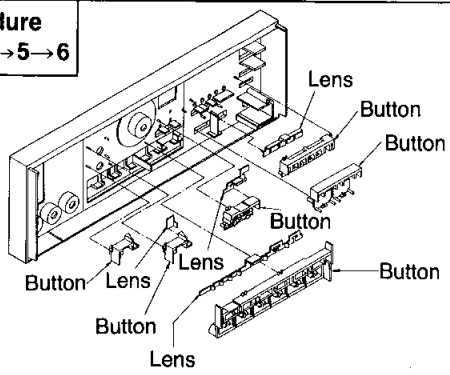
•Use a wrench of the dimensions shown in the illustration above to remove nuts.

| Ref. No. 5 | Removal of the Operation P.C.B. |
|---|---|
| Procedure 1→2→4→5 | |



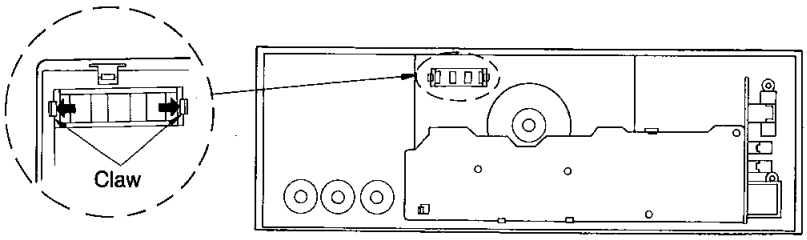

1. Remove the 4 screws (❶~❹).
2. Release the 4 claws in the direction of the arrow.

| Ref. No. 6 | Removal of the Operation Buttons |
|---|---|
| Procedure 1→2→4→5→6 | |



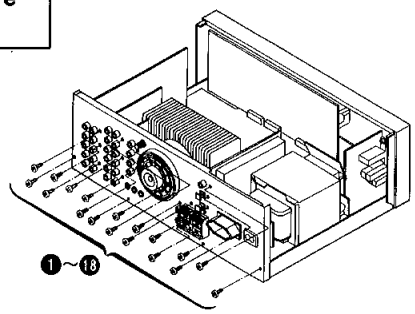

●Pull out the operation buttons and lens.

| Ref. No. 7 | Removal of the Sampling Frequency Indicator Lens |
|---|---|
| Procedure 1→2→4→7 | |

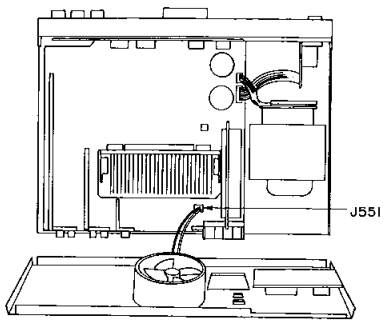



●Release the 2 claws.

| Ref. No. 8 | Removal of the Rear Panel |
|---|---|
| Procedure 1→8 | |

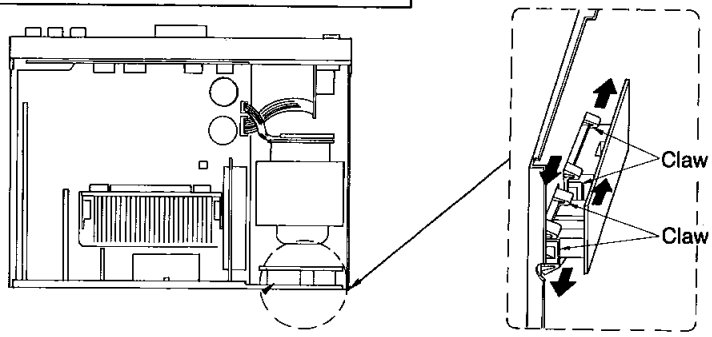



1. Remove the 18 screws (❶~⓲).




2. Release the connector (J551).

| Ref. No. 9 | Removal of the AC OUTLET/AC IN P.C.B. |
|---|---|
| Procedure 1→9 | |

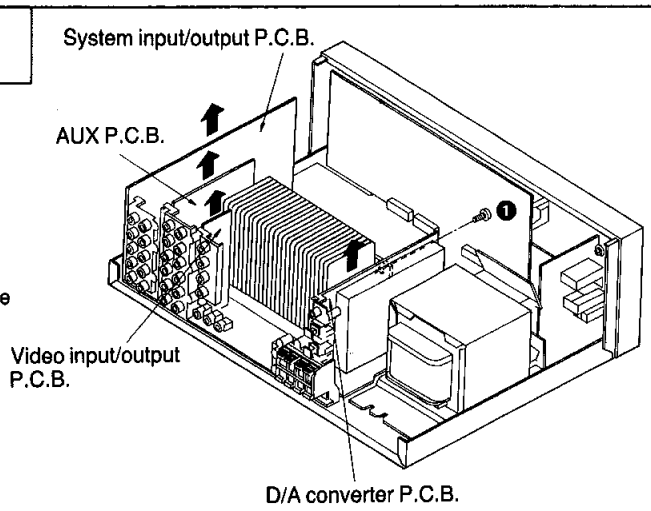



●Release the 4 claws.

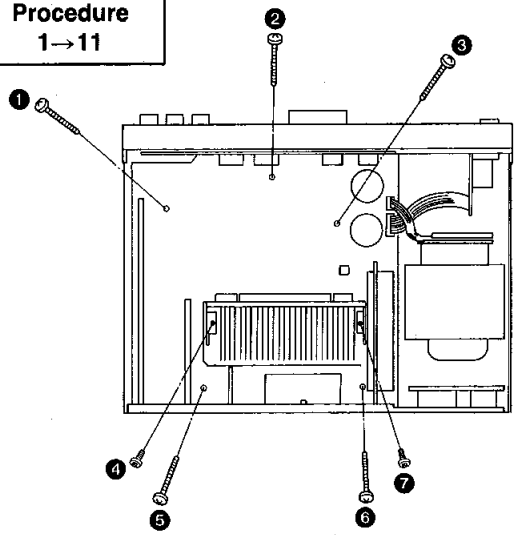
| Ref. No. 10 | Removal of the P.C.B.s |
|---|---|
| Procedure 1→8→10 | |

■ **Removal of the D/A converter P.C.B.**
1. Remove the screw (❶).
2. Remove the D/A converter P.C.B. in the direction of the arrow.

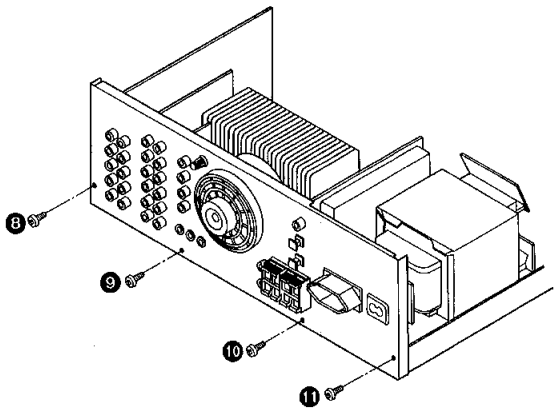
■ Removal of the other P.C.B.
•Remove the P.C.B. in the direction of the arrow.



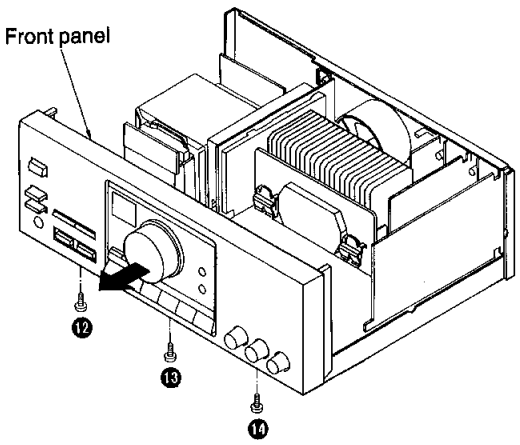

| Ref. No. 11 | Check of the main P.C.B. |
|---|---|
| Procedure 1→11 | |



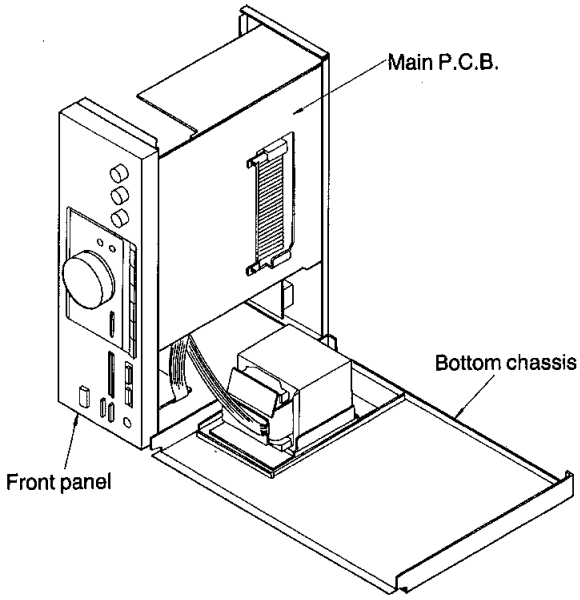
1. Remove the 7 screws (❶~❼).



2. Remove the 4 screws (❽~⓫).

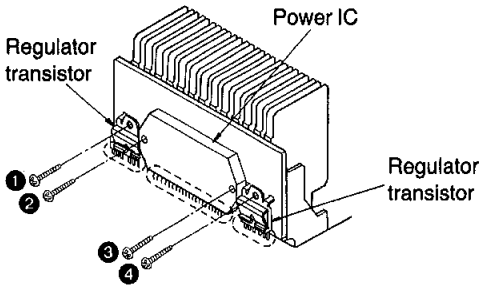



3. Remove the 3 screws (⓬~⓮).
4. Remove the front panel unit in the direction of the arrow.
*Connect 2 flat cables (J501A, J502).



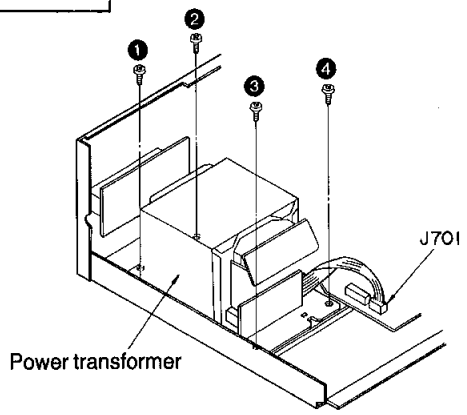

5. Remove the bottom chassis.
6. Reinstall the front panel unit to the main P.C.B.

| Ref. No. 12 | Removal of the Power IC and Regulator Transistor |
|---|---|
| Procedure 1→11→12 | 1. Unsolder the power IC or regulator transistor.<br>2. Remove the 4 screws (❶~❹). |



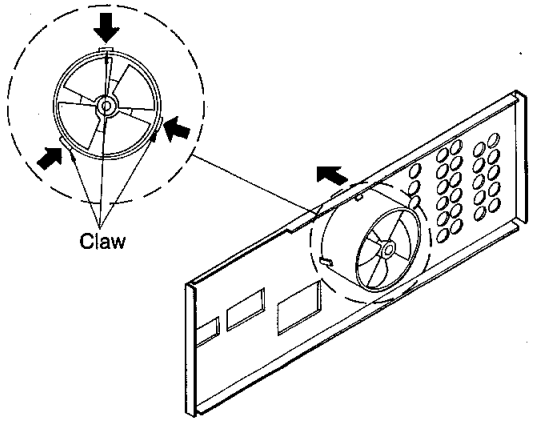

**Note:** When mounting the power IC, or regulator transistor apply silicon terminal compound (SZZ0L15) to the rear of the power IC or regulator transistor.

| Ref. No. 13 | Removal of the Power Transformer |
|---|---|
| Procedure 1→13 | |

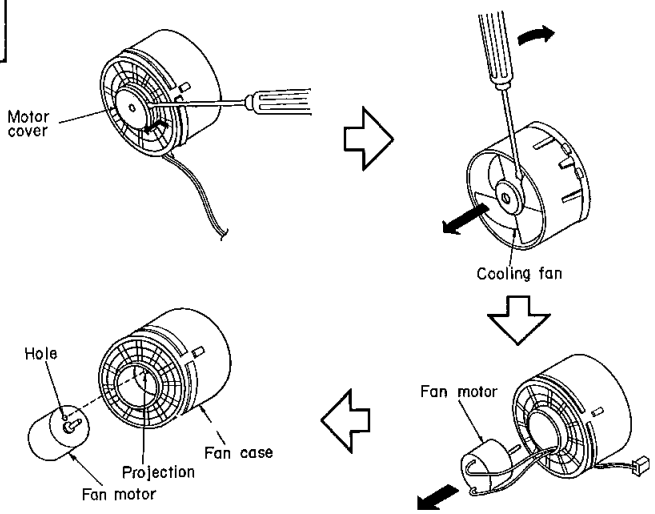



1. Remove the 1 flat cable (J701).
2. Remove the 4 screws (❶~❹).

| Ref. No. 14 | Removal of the Fan Motor |
|---|---|
| Procedure 1→8→14 | |




1. Remove the 1 connector (J209).
2. Release the 3 claws.



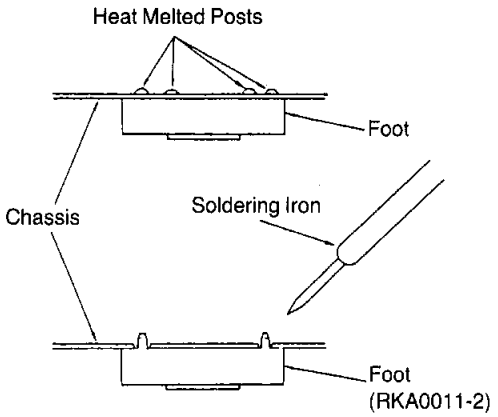

3. Insert a screwdriver at the root of the cooling fan. Force it out of the motor shaft.
4. Remove the motor cover by used ⊖ screwdriver.
5. Remove the motor from the fan casing.
6. When mounting the motor fan, align the fan casing's projection with the hole of the fan motor.

## "ATTENTION SERVICER"

Some chassis components may have sharp edges. Be careful when disassembling and servicing.

## ●Replacement of the Foot.

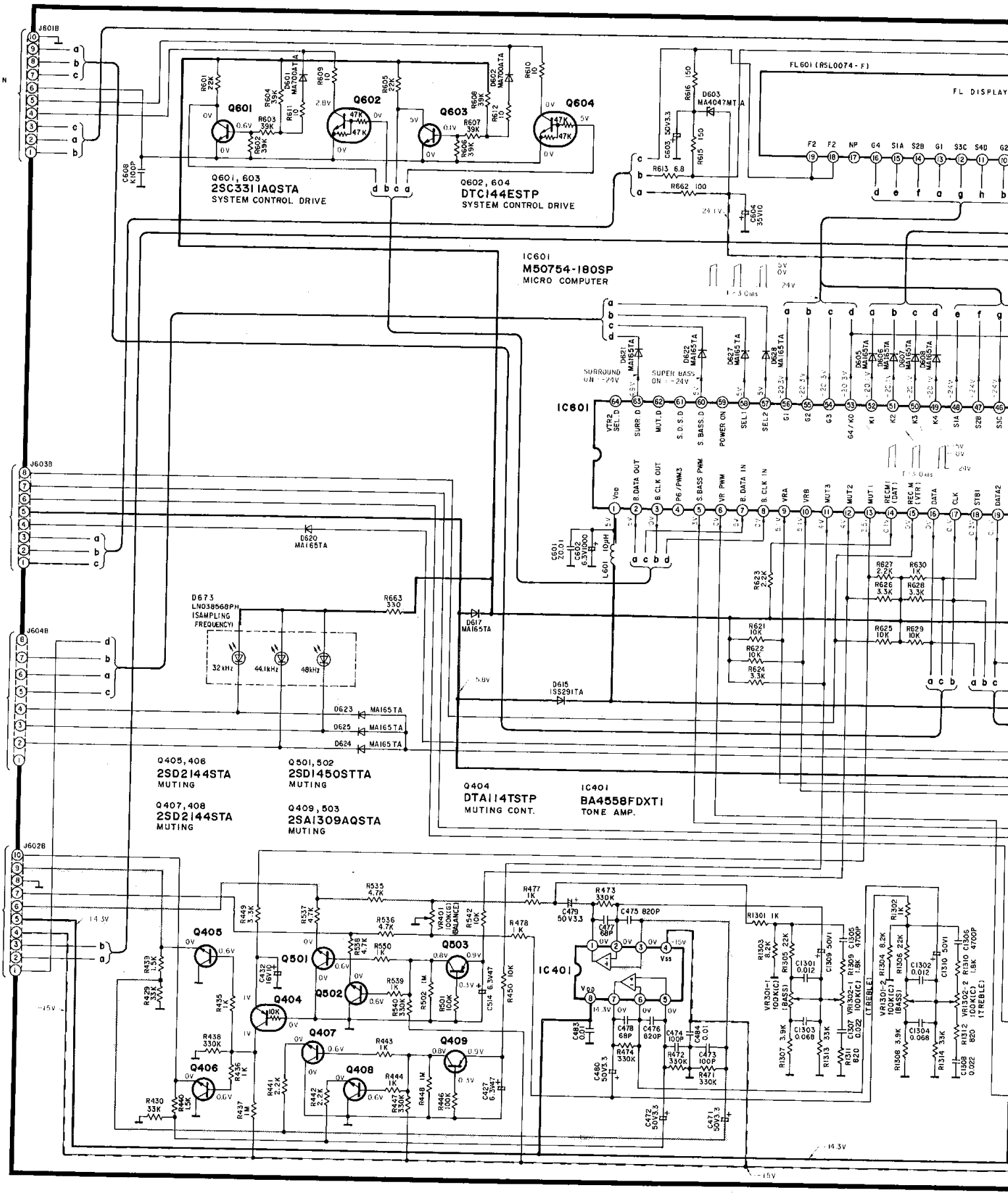
1. Remove the 4 heat melted posts on the chassis with a pair of nippers or similar tool.
2. To replace the foot (RKA0011-2) on the chassis, melt the 4 posts with a soldering iron.



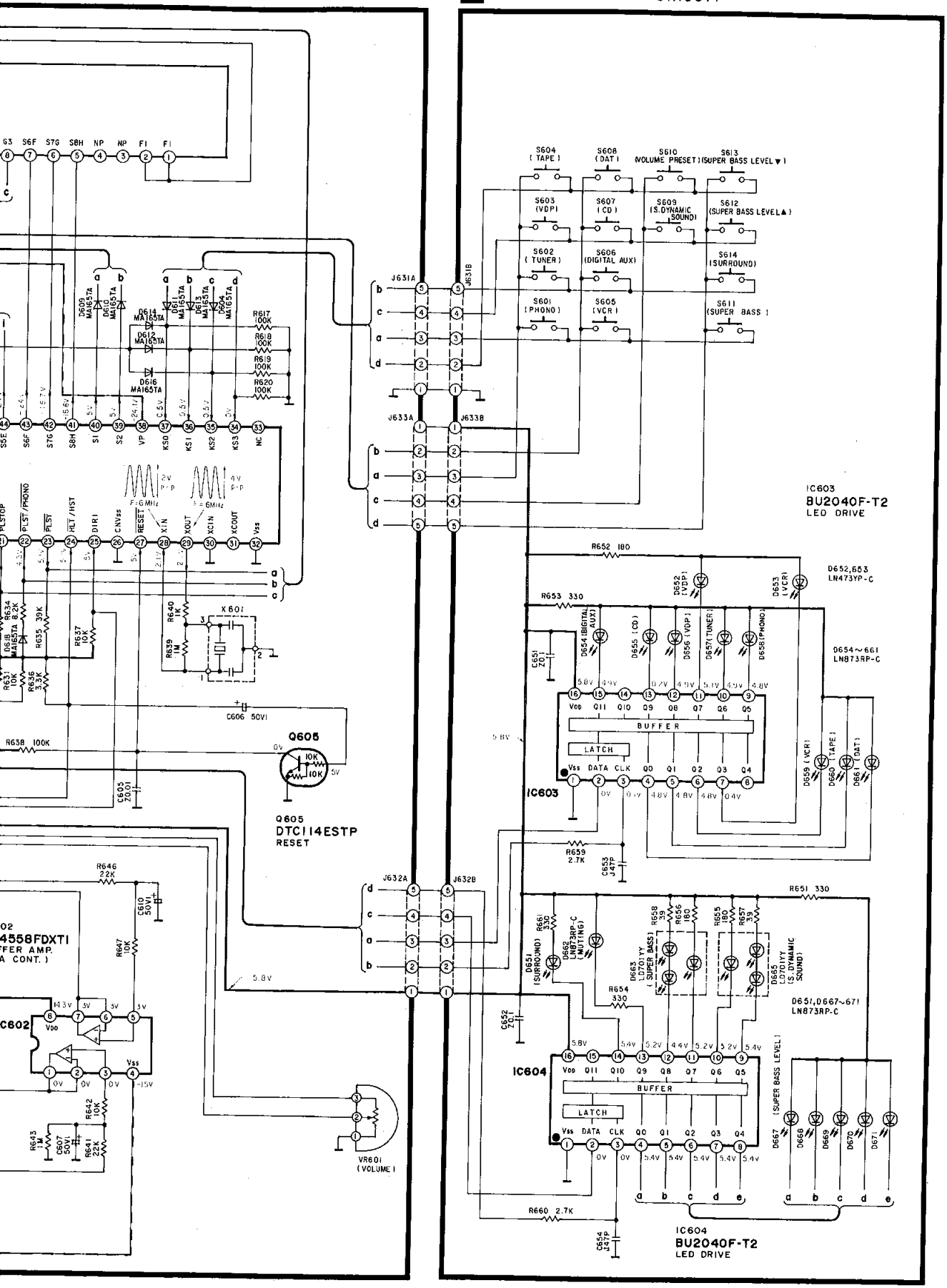
# MATIC DIAGRAM

1 2 3 4 5 6

## A FL DRIVE CIRCUIT

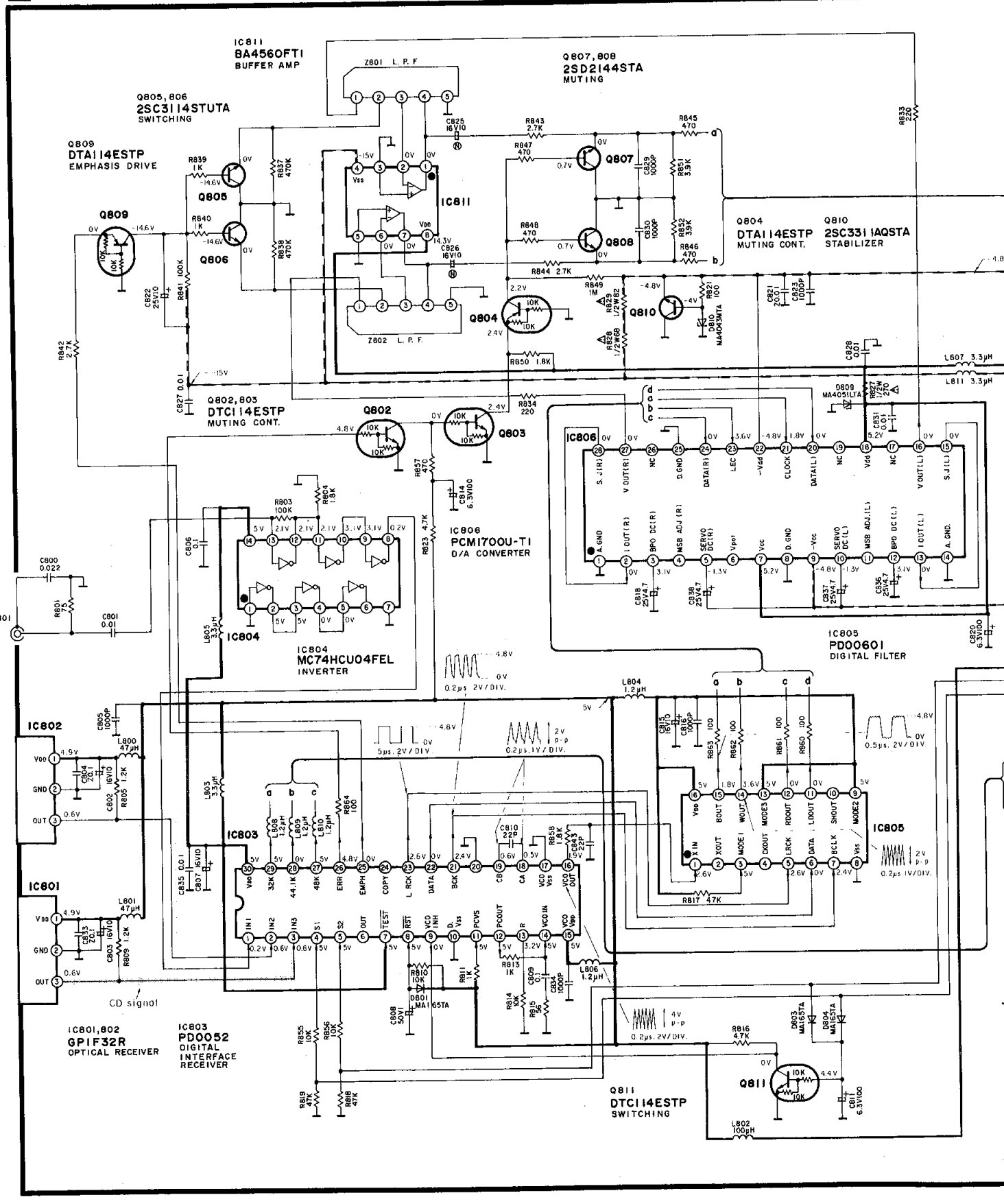


## B OPERATION SWITCH CIRCUIT

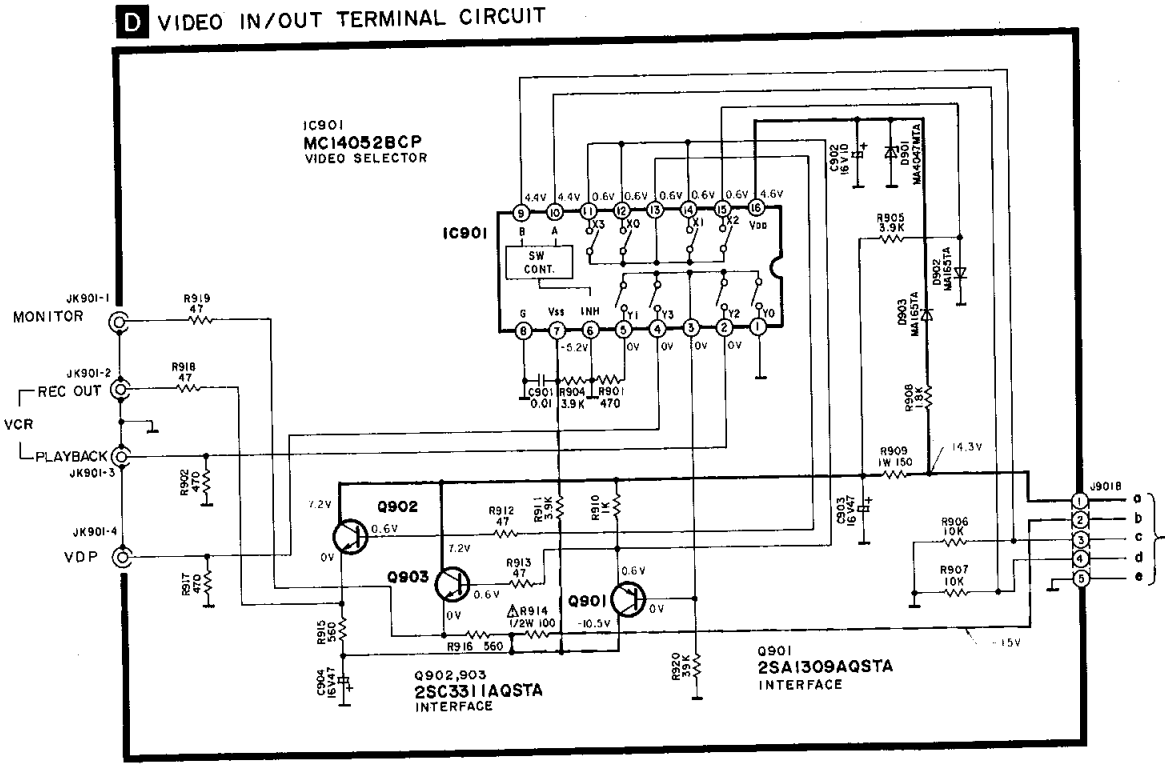


1 2 3 4 5 6

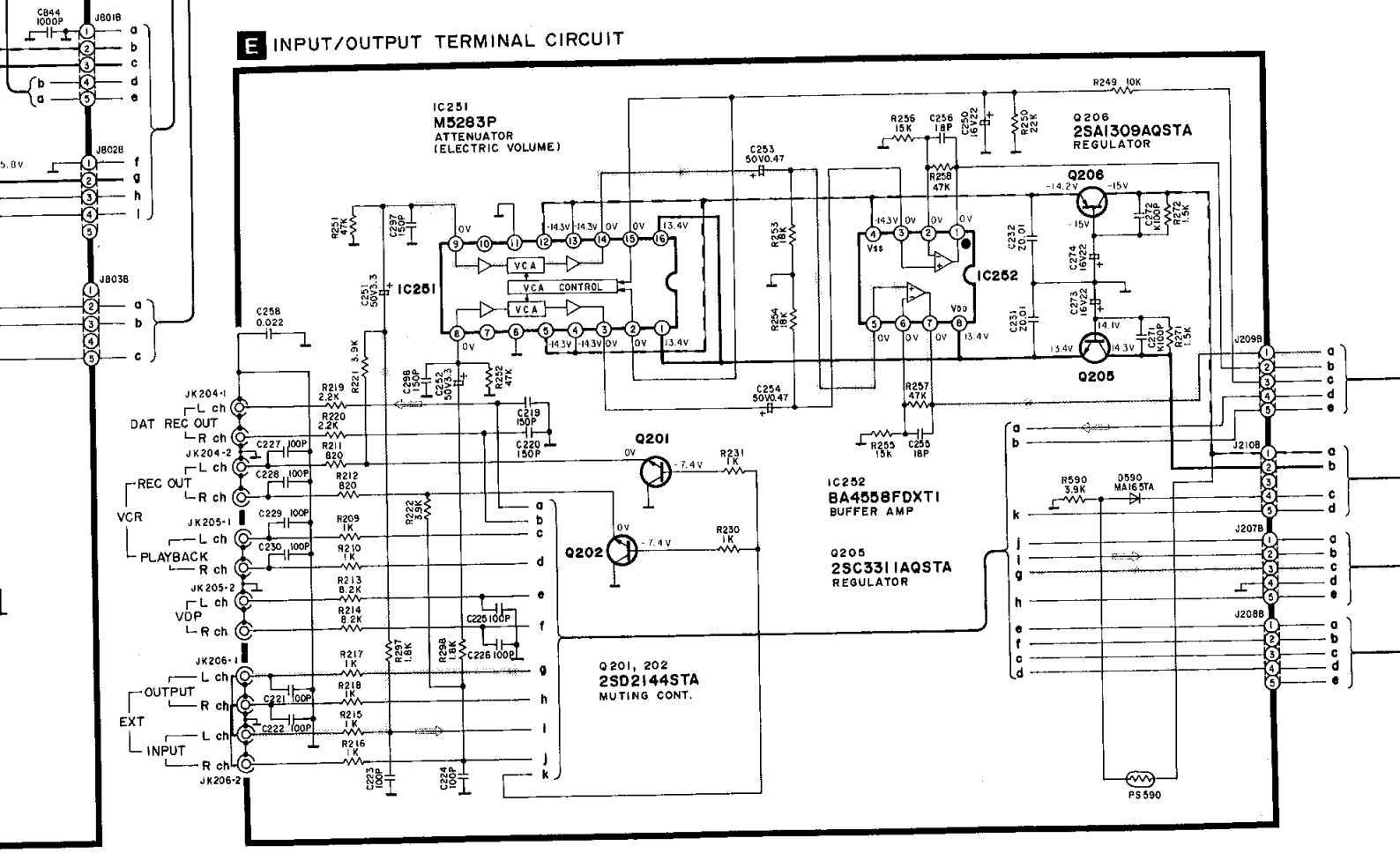
## C D/A CONVERTER CIRCUIT



## D VIDEO IN/OUT TERMINAL CIRCUIT

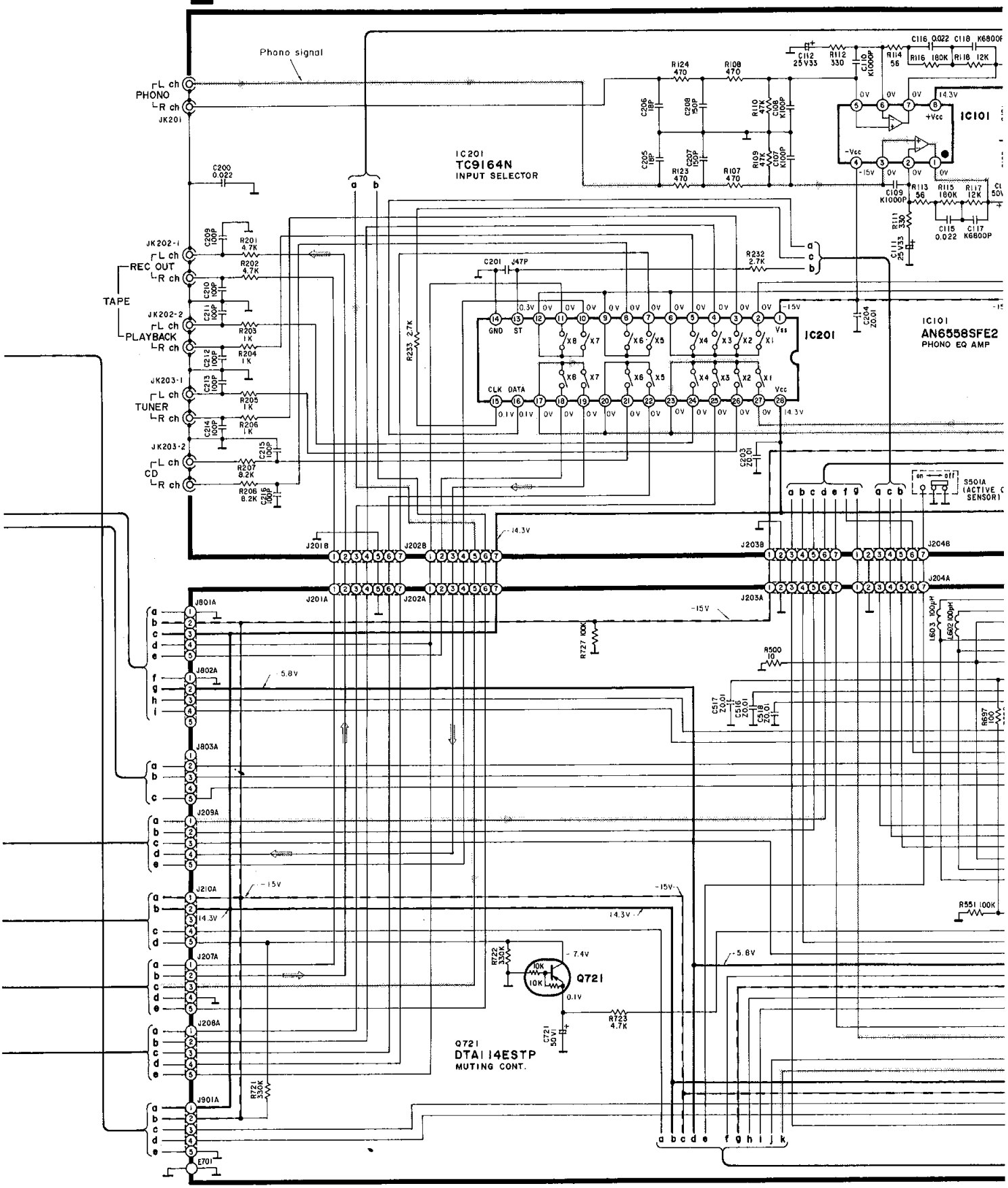



## E INPUT/OUTPUT TERMINAL CIRCUIT



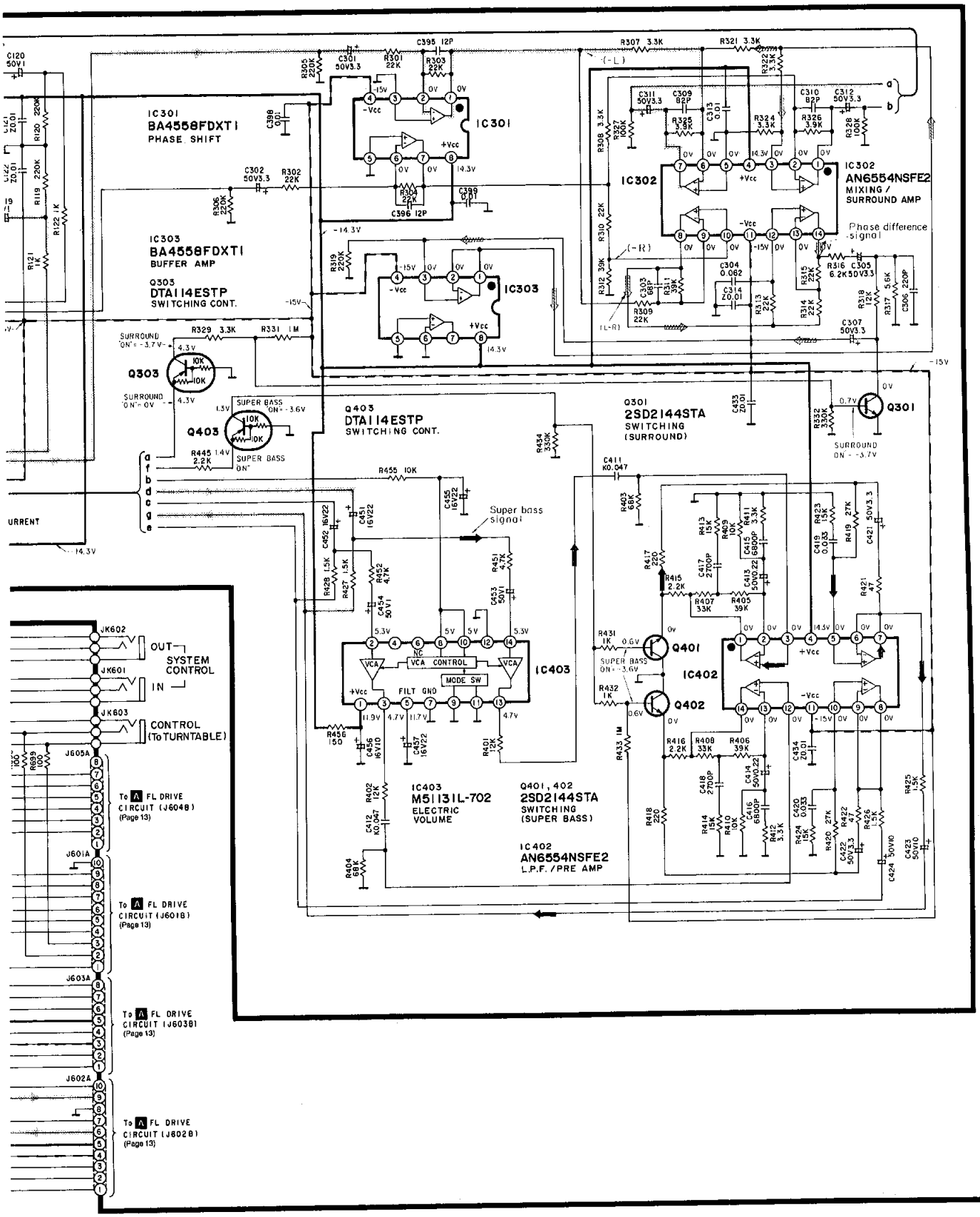
13 14 15 16 17

## F PHONO/TAPE/TUNER/CD TERMINAL CIRCUIT

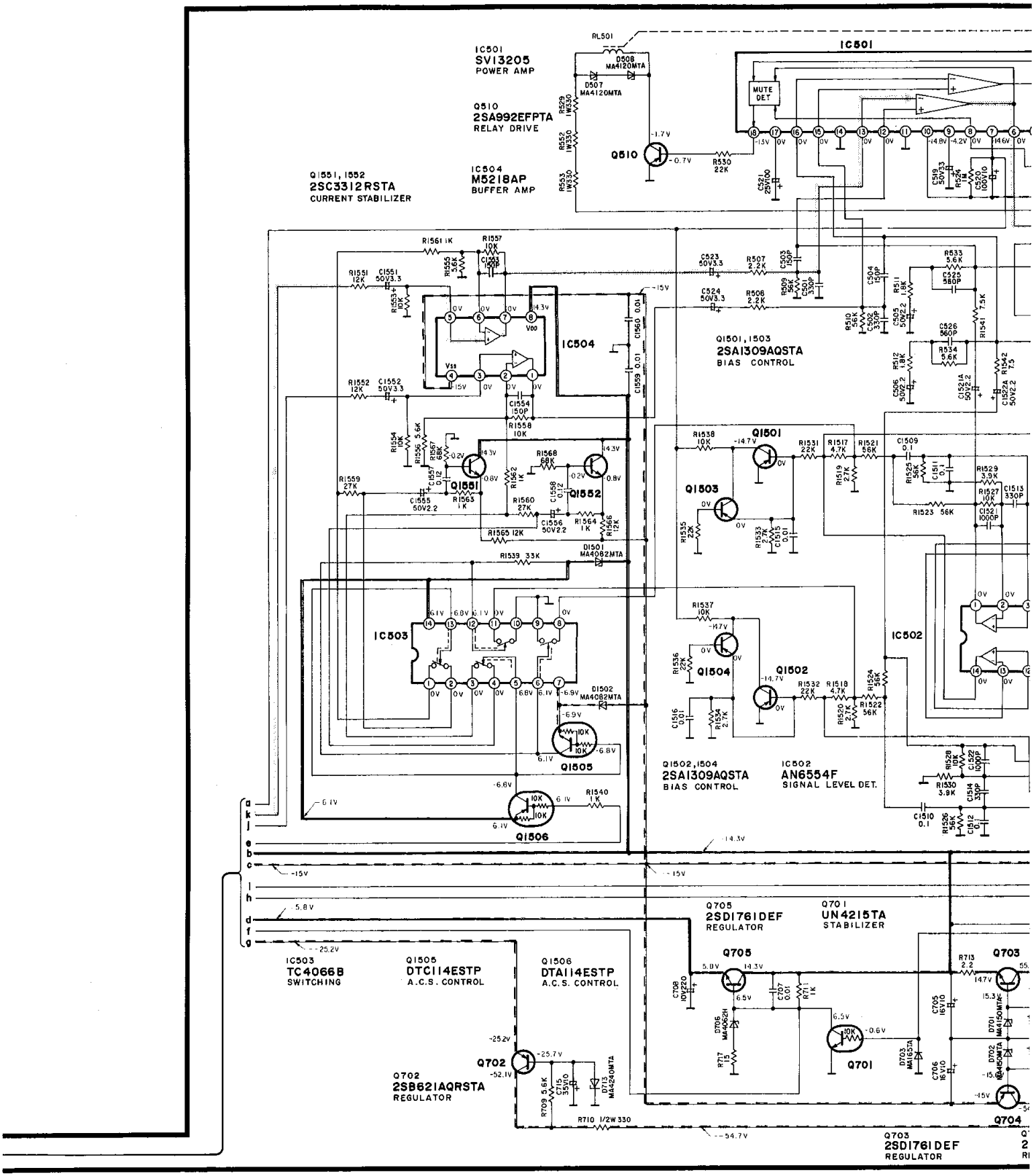



## G MAIN CIRCUIT

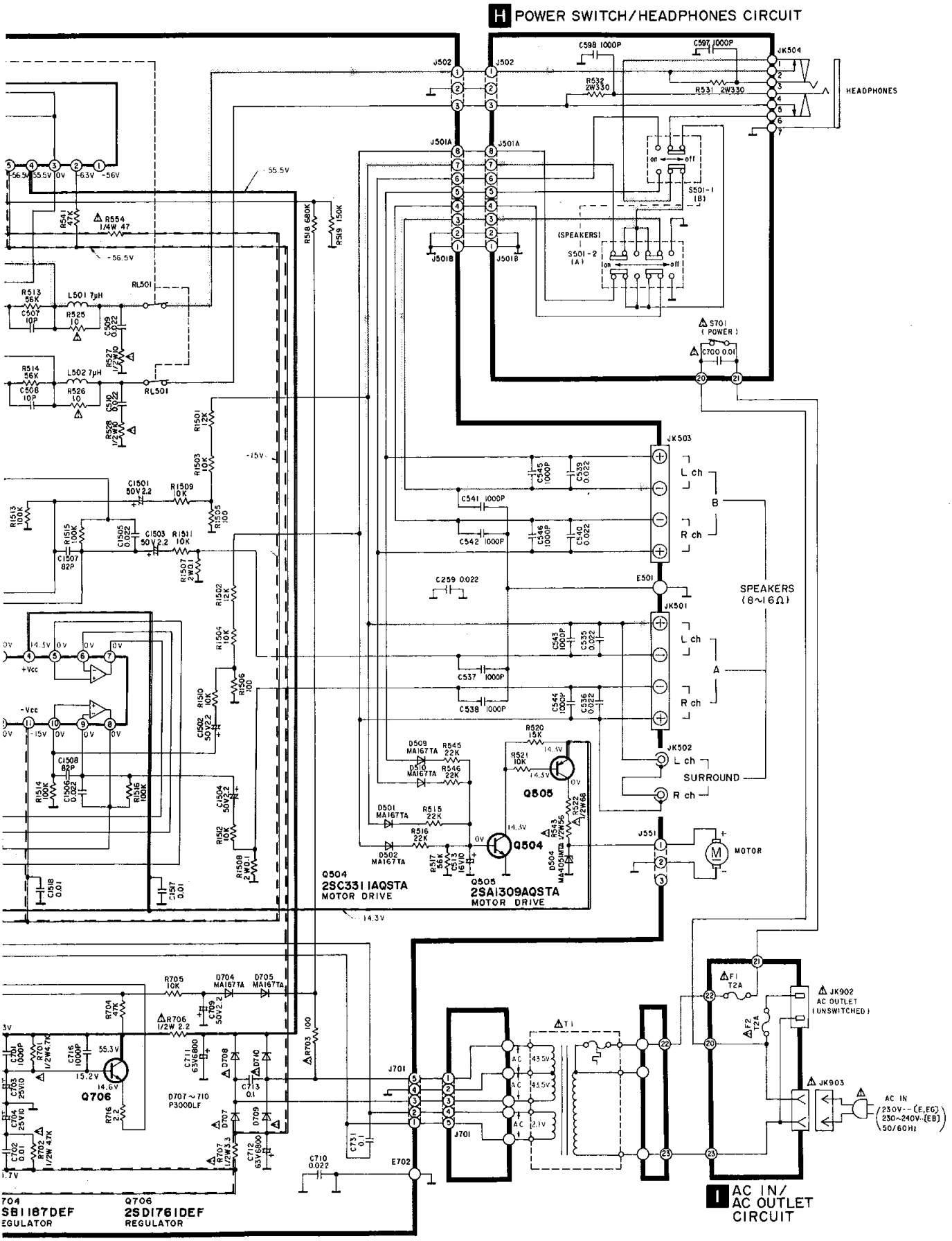
18 19 20 21 22


IC301
BA4558FDXTI
PHASE SHIFT
IC303
BA4558FDXTI
BUFFER AMP
Q303
DTA114ESTP
SWITCHING CONT.
IC302
AN6554NSFE2
MIXING / SURROUND AMP
Phase difference signal
Q403
DTA114ESTP
SWITCHING CONT.
Q301
2SD2144STA
SWITCHING (SURROUND)
SURROUND ON = -3.7V
SURROUND ON = 0V
SUPER BASS ON = -3.6V
SUPER BASS ON
Super bass signal
IC403
M51131L-702
ELECTRIC VOLUME
Q401, 402
2SD2144STA
SWITCHING (SUPER BASS)
IC402
AN6554NSFE2
L.P.F. /PRE AMP
VCA CONTROL
MODE SW
JK602
JK601
JK603
OUT
IN
SYSTEM CONTROL
CONTROL (To TURNTABLE)
J605A
J601A
J603A
J602A
To A FL DRIVE CIRCUIT (J6048) (Page 13)
To A FL DRIVE CIRCUIT (J6018) (Page 13)
To A FL DRIVE CIRCUIT (J6038) (Page 13)
To A FL DRIVE CIRCUIT (J6028) (Page 13)

3 | 24 | 25 | 26 | 27 | 28



29 30 31 32


H POWER SWITCH/HEADPHONES CIRCUIT
HEADPHONES
SPEAKERS (8~16Ω)
SURROUND
MOTOR
Q504 2SC3311AQSTA MOTOR DRIVE
Q505 2SA1309AQSTA MOTOR DRIVE
Q706 2SD1761DEF REGULATOR
I AC IN/ AC OUTLET CIRCUIT
AC IN 230V~(E,EG) 240V~(EB) 50/60Hz

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

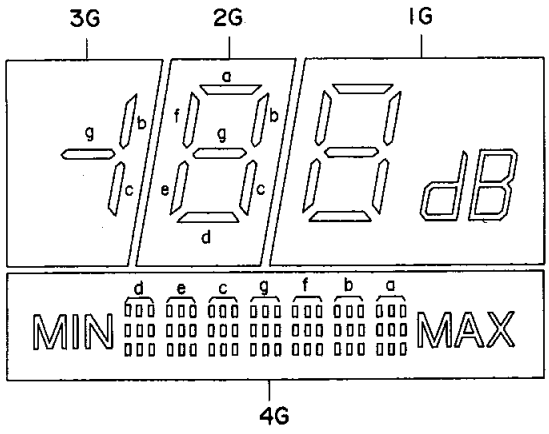
- **•S501A** : Active current sensor switch in "OFF" position.
- **•S501** : Speaker ON/OFF switch.
  (S501-1: SPEAKER A in "ON" position
  S501-2: SPEAKER B in "OFF" position)
- **•S601** : Turntable input switch. (PHONO)
- **•S602** : Tuner input switch. (TUNER)
- **•S603** : Video disc player input switch. (VDP)
- **•S604** : Tape deck input switch. (TAPE)
- **•S605** : Video cassette recorder input switch. (VCR)
- **•S606** : Digital AUX input switch. (DIGITAL AUX)
- **•S607** : CD input switch. (CD)
- **•S608** : Digital audio tape deck input switch. (DAT)
- **•S609** : Super dynamic sound switch. (S. DYNAMIC SOUND)
- **•S610** : Volume preset switch. (VOLUME PRESET)
- **•S611** : Super bass switch. (SUPER BASS)
- **•S612** : Super bass level control switch. (SUPER BASS LEVEL ▲)
- **•S613** : Super bass level control switch. (SUPER BASS LEVEL ▼)
- **•S614** : Surround-sound switch. (SURROUND)
- **•S701** : Power switch. (POWER)

CD signal (Lch), Phono signal (Lch)
Positive voltage lines (+)
Negative voltage lines (−)
Super bass signal
Phase difference signal
Recording signal

- •Indicated voltage values are the standard values for the unit measured by the DC electronic circuit tester (high-impedance) with the chassis taken as standard. Therefore, there may exist some errors in the voltage values, depending on the internal impedance of the DC circuit tester.
- •Important safety notice:
  Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.

**•Caution!**
IC and LSI are sensitive to static electricity.
Secondary trouble can be prevented by taking care furing repair.
•Cover the parts boxes made of plastics with aluminum foil.
•Ground the soldering iron.
•Put a conductive mat on the work table.
•Do not touch the legs of IC or LSI with the fingers directly.

# ■ DESCRIPTION OF FL PANEL




| | 4G | 3G | 2G | 1G |
|---|---|---|---|---|
| P1 | a | — | a | a |
| P2 | b | b | b | b |
| P3 | c | c | c | c |
| P4 | d | — | d | d |
| P5 | e | — | e | e |
| P6 | f | — | f | f |
| P7 | g | g | g | g |
| P8 | MIN · MAX | — | — | dB |

PIN CONNECTION

| PIN NO. | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONNECTION | F2 | F2 | NP | 4G | P1 | P2 | 3G | P3 | P4 | 2G | P5 | 1G | P6 | P7 | P8 | NP | NP | F1 | F1 |

**Notes:**
F1, F2 ..... Filament
NP ..... No pin
1G~4G ..... Grid