ORDER NO. SD83072588C8

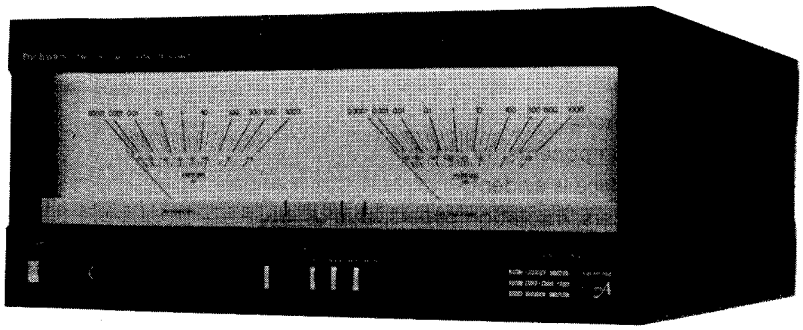
# Service Manual

ComputerDrive new class A

## Stereo DC Power Amplifier

# SE-A3MK2

[D], [EW], [EK], [EF], [EH], [EB], [Ei], [XA]



**Areas**

* [D] is available in Scandinavia and European except Switzerland.
* [EW] is available in Switzerland.
* [EK] is available in United Kingdom.
* [EF] is available in France.
* [EH] is available in Holland.
* [EB] is available in Belgium.
* [Ei] is available in Italy.
* [XA] is available in Southeast Asia, Oceania, Africa, Middle Near East and Central South America.

## Specifications (Specifications are subject to change without notice for further improvement.)

### (DIN 45 500)

### ■ AMPLIFIER SECTION

| | |
|---|---|
| **20 Hz~20 kHz continuous power output** | |
| **both channels driven** | 2 × 300W (4Ω) |
| | 2 × 300W (8Ω) |
| **40 Hz~16 kHz continuous power output** | |
| **both channels driven** | 2 × 300W (4Ω) |
| | 2 × 300W (8Ω) |
| **1 kHz continuous power output** | |
| **both channels driven** | 2 × 320W (4Ω) |
| | 2 × 320W (8Ω) |
| **Total harmonic distortion** | |
| **rated power at 20 Hz~20 kHz** | 0.003% (4Ω) |
| | 0.002% (8Ω) |
| **rated power at 40 Hz~16 kHz** | 0.003% (4Ω) |
| | 0.002% (8Ω) |
| **rated power at 1 kHz** | 0.0005% (4Ω) |
| | 0.0003% (8Ω) |
| **−26 dB power at 1 kHz** | 0.0003% (4Ω) |
| **50 mW power at 1 kHz** | 0.0003% (4Ω) |
| **Intermodulation distortion** | |
| **rated power at 250 Hz: 8 kHz=4:1, 4Ω** | 0.001% |
| **rated power at 60 Hz: 7 kHz=4:1, SMPTE, 8Ω** | 0.001% |
| **TIM (Transient Intermodulation Distortion)** | unmeasurably small |
| **Power bandwidth** | |
| **both channels driven, −3 dB (T.H.D. 0.01%)** | |
| | 5 Hz~70 kHz (4Ω) |
| | 5 Hz~90 kHz (8Ω) |
| **Residual hum and noise** | 0.15 mV |
| **Damping factor** | 100 (4Ω), 200 (8Ω) |
| **Input sensitivity and impedance** | 1 V/47kΩ |
| **S/N rated power (4Ω)** | 120 dB (IHF, A: 125 dB) |
| **Frequency response** | 20 Hz~20 kHz, +0 dB, −0.1 dB |
| | DC~200 kHz, −3 dB |
| **Headphones output level and impedance** | 1.1V/330Ω |
| **Load impedance** | |
| **MAIN or REMOTE** | 4Ω~16Ω |
| **MAIN and REMOTE** | 8Ω~16Ω |
| **Meter** | |
| **reading range** | 0.0001 W~1000 W (8Ω) |
| | −60 dB~+5 dB |
| | (logarithmic compression) |
| **frequency response (reading accuracy)** | |
| | 10 Hz~20 kHz ±1 dB (more than −40 dB) |
| | 10 Hz~10 kHz ±1 dB (less than −40 dB) |
| **attack time** | 50 μsec. |
| **recovery time** | 750 msec. (0 dB~−20 dB) |

### ■ GENERAL

| | |
|---|---|
| **Power consumption** | 1700W |
| **Power supply** | AC 50 Hz/60 Hz, 110V/120V/220V/240V |
| **Dimensions (W×H×D)** | 430 × 208 × 507 mm |
| | (16-15/16" × 8-3/16" × 19-31/32") |
| **Weight** | 39 kg |
| | (86 lb.) |

**Note:**
Total harmonic distortion is measured by the digital spectrum analyzer (H.P. 3045 system).

Technics

**Matsushita Electric Trading Co., Ltd.**
P.O. Box 288, Central Osaka Japan

# SE-A3MK2

## ■ CONTENTS



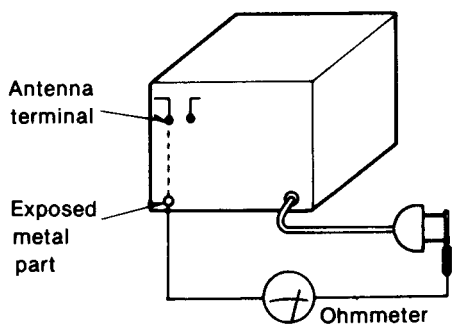
## ■ SAFETY PRECAUTION

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

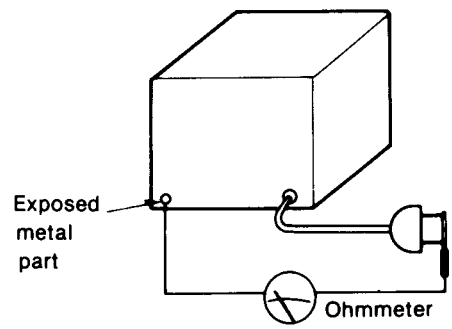
1. Unplug the power cord and short the two prongs of the plug with a jumper wire.
2. Turn on the power switch.
3. Measure the resistance value with ohmmeter between the jumpered AC plug and each exposed metal cabinet part, such as screwheads antenna, control shafts, handle brackets, etc. Equipment with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




(Fig. B)

Resistance = Approx ∞

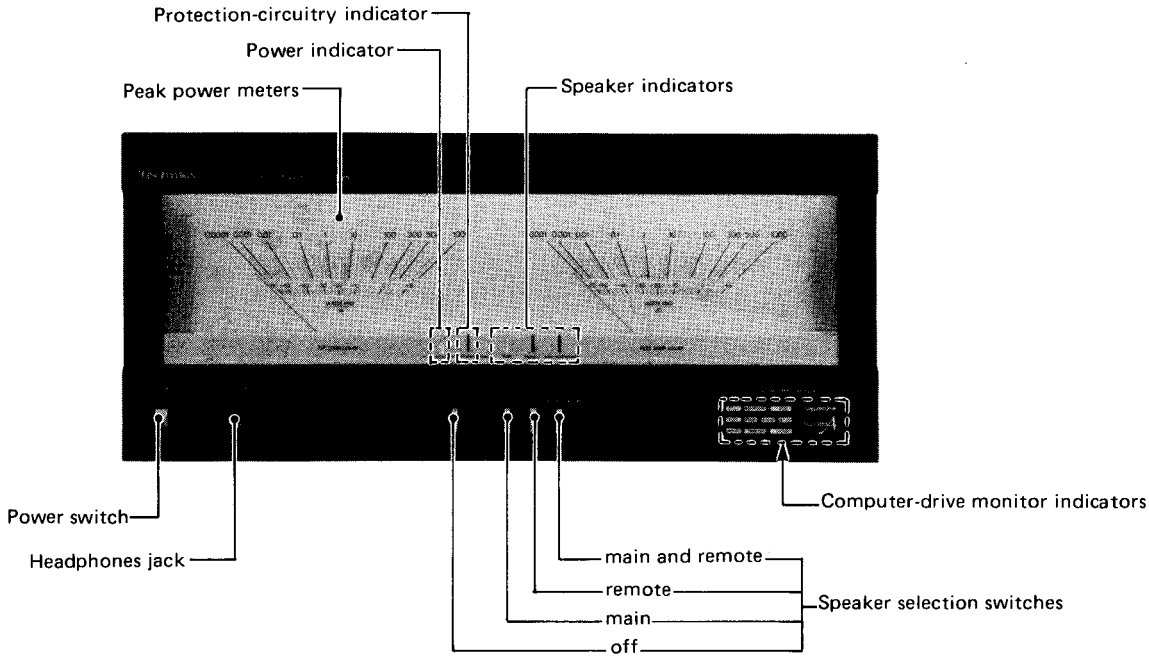
4. If the measurement is outside the specified limits, there is a possibility of a shock hazard. The equipment should be repaired and rechecked before it is returned to the customer.

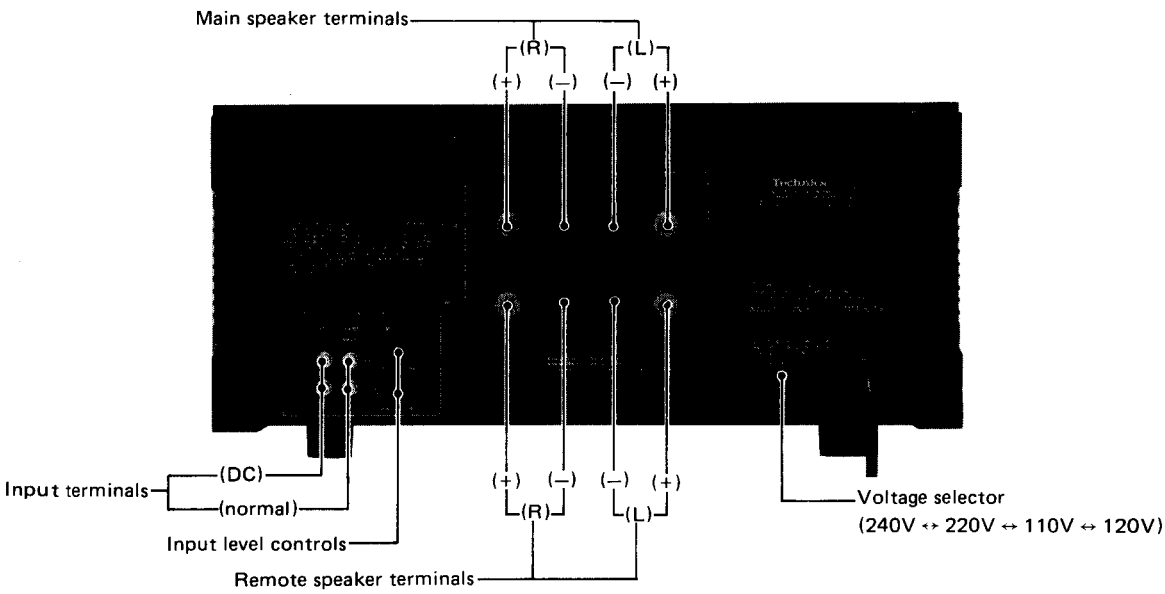
## ■ BEFORE REPAIR AND ADJUSTMENT

1. Turn off the power supply and short-circuit of power supply capacitors (C1 ~ C4, 105V, 22000μF) at resistance (about 100Ω, 10W) in order to discharge the charged voltage. Do not short between C1 ~ C4 by screwdriver. It may damage the componet.
2. Before turning on the power supply after completion of repair, slowly apply the primary voltage by using a power supply voltage controller to make sure that the consumed current is free of abnormality. The consumed current at 50Hz/60Hz in no signal mode is shown below with respect to supply voltage 110V/120V/220V/240V.

| Power supply voltage | | AC 110V | AC 120V | AC 220V | AC 240V |
|---|---|---|---|---|---|
| Consumed current | 50Hz | 0.6A ~ 1.8A | 0.5A ~ 1.7A | 0.3A ~ 0.9A | 0.3A ~ 0.9A |
| | 60Hz | 0.5A ~ 1.7A | 0.4A ~ 1.6A | 0.2A ~ 0.8A | 0.2A ~ 0.8A |

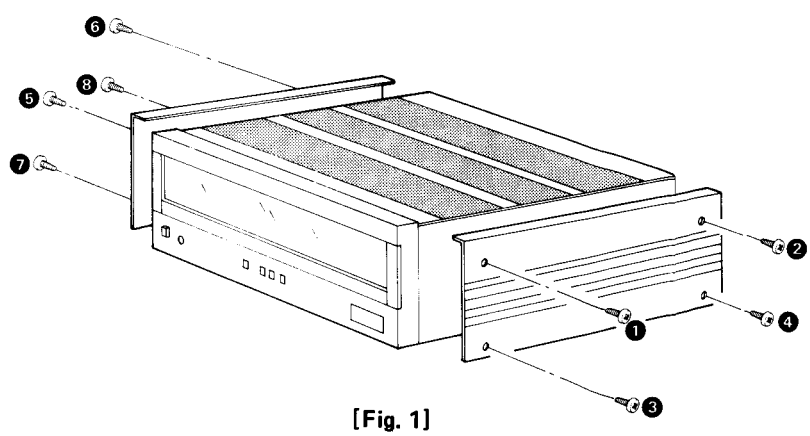
## ■ LOCATION OF CONTROLS



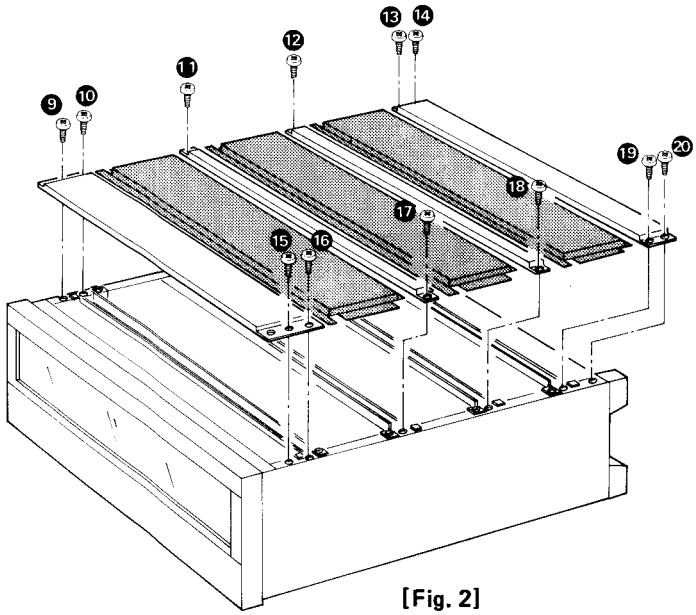




## ■ DISASSEMBLY INSTRUCTIONS

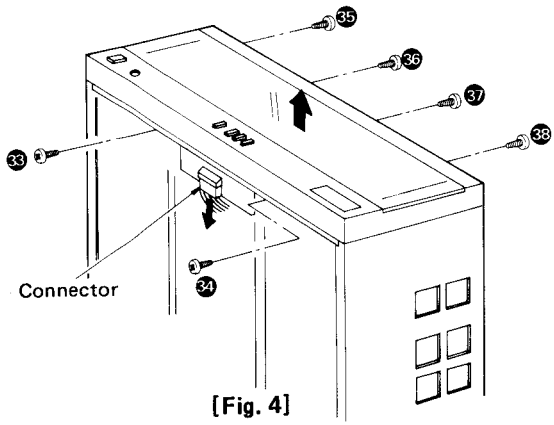
- **How to Remove the Side and Top Boards [Fig. 1, 2]**
  1. Remove the 8 setscrews [Fig. 1: ❶ ~ ❽] of the side board.
  2. Remove the 12 setscrews [Fig. 2: ❾ ~ ⓴] of the top board. Then the top board and punching metal can be removed.




**[Fig. 1]**

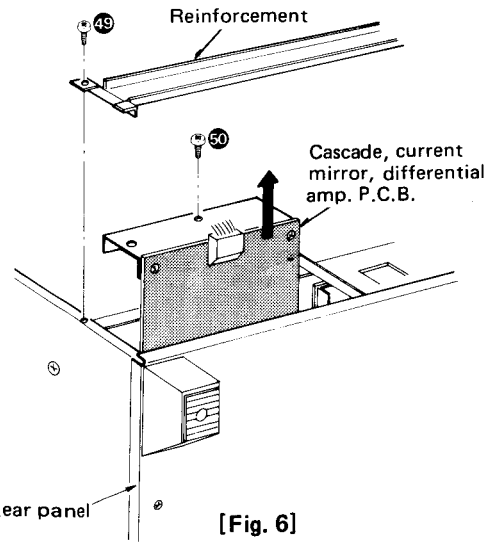


[Fig. 2]



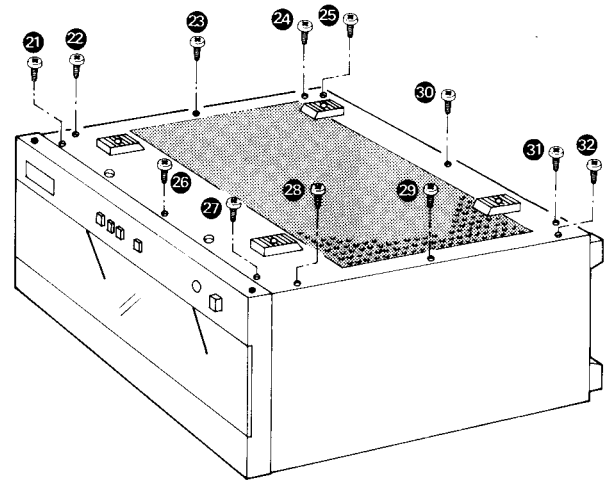

[Fig. 4]

- **How to Remove the Peak Power Meter [Fig. 5]**
  1. Remove the front panel. (Refer to "**How to remove the front panel**".)
  2. Remove the 4 setscrews [Fig. 5: ㊴ ~ ㊷] of the front chassis, and then remove the front chassis as shown in Fig. 5.
  3. Remove the 6 nuts [Fig. 5: ㊸ ~ ㊽] of the peak power meter. Then the peak power meter can be removed.



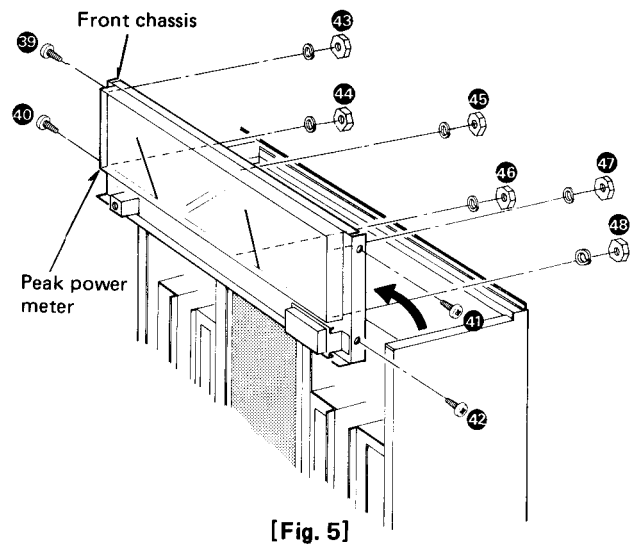

[Fig. 6]

- **How to Remove the Bottom Board [Fig. 3]**
  1. Remove the 12 setscrews [Fig. 3: ㉑ ~ ㉜] of the bottom board. Then the bottom board can be removed.



[Fig. 3]

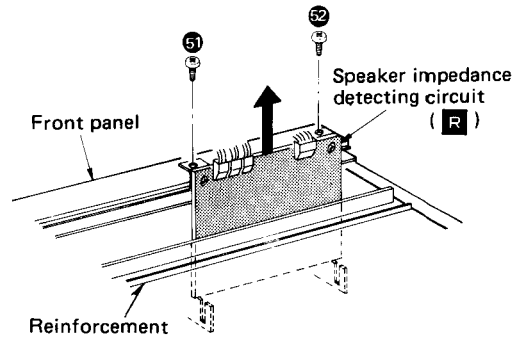
- **How to Remove the Front Panel [Fig. 4]**
  1. Remove the top and bottom boards. (Refer to "**How to remove the side and top boards**" and "**How to remove the bottom board**".)
  2. Remove the 6 setscrews [Fig. 4: ㉝ ~ ㊳] of the front panel and the connector, and then remove the front panel.




[Fig. 5]

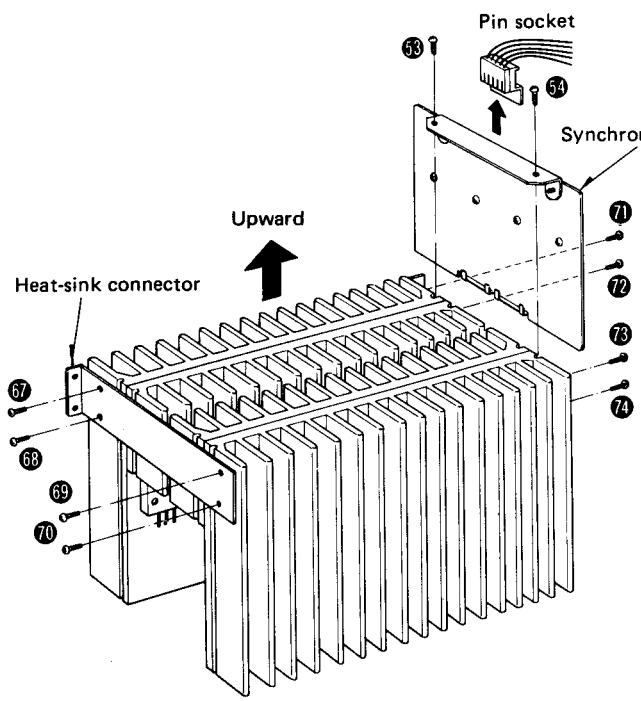
- **How to Remove the Cascade, Current Mirror, Differential Amplifier P.C.B. ( C ) [Fig. 6]**
  1. Remove the side and top boards. (Refer to "**How to remove the side and top boards**".)
  2. Remove the 2 setscrews [Fig. 6: ㊾ x 2] which fasten the reinforcement.
  3. Remove the setscrew [Fig. 6: ㊿] which secures the cascade, current mirror and differntial amplifier P.C.B., and then pull out the P.C.B.

- **How to Remove the Speaker Impedance Detection Circuit ( R ) and Icq Control Circuit ( O ) P.C.B. [Fig. 7]**
  1. Remove the side and top boards. (Refer to "**How to remove the side and top boards**".)
  2. Remove the 2 setscrews [Fig. 7: ㊶ , ㊷ ] of speaker impedance detecting circuit board ( R ), and then pull out the P.C.B. in the direction of the arrow.
  3. Icq control circuit can be removed in the same way.

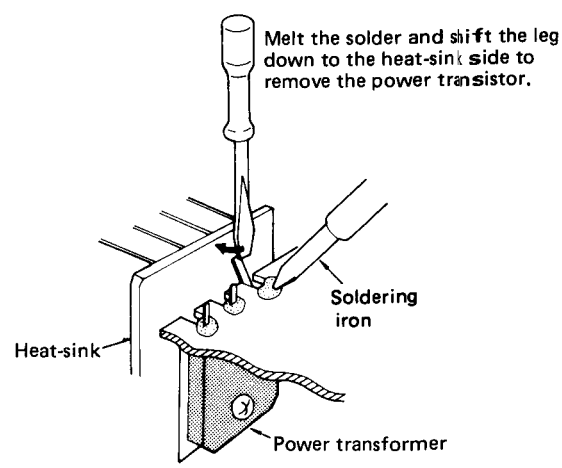



[Fig. 7]

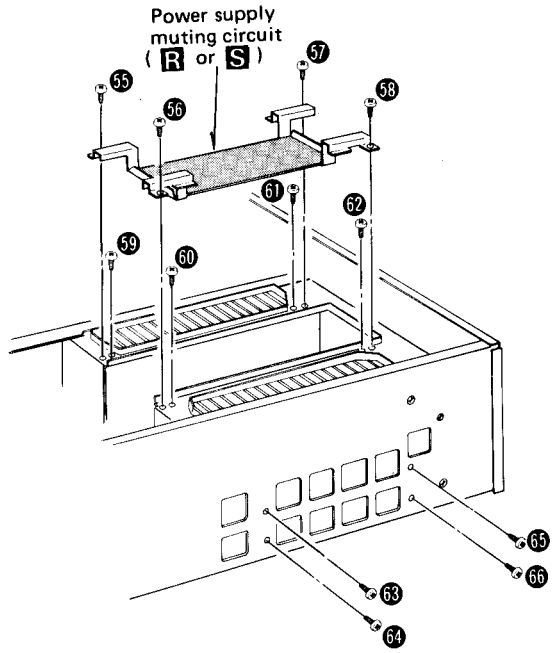
- **How to Remove the Power Transistors [Fig. 8, 9, 10, 11]**
  1. Remove the top and bottom boards. (Refer to "**How to remove the side and top boards**" and "**How to remove the bottom board**".)
  2. Remove the 3 reinforcements at top of the set.
  3. Pull out the pin socket of synchronous bias circuit board ( D ). Next, remove the 2 setscrews [Fig. 8: ㊸ , ㊹ ] of the P.C.B. ( D ), and then remove the P.C.B. ( D ) upward.
  4. Unsolder the 8 power transistors (Q125 ~ Q128, Q135 ~ Q138) as in Fig. 9.
  5. Remove the 4 setscrews [Fig. 10: ㊺ ~ ㊽ ] of the power supply muting circuit board ( R or S ), and then remove the P.C.B. ( R or S )
  6. Remove the 4 setscrews [Fig. 10: ㊾ ~ ㊿ ] which secure the heat-sink from underneath the power block chassis.
  7. Remove the 4 setscrews [Fig. 10: ㊸ ~ ㊻ ] which secure the heat-sink from side of the set.
  8. Lift the heat-sink to remove it from the chassis.
  9. Remove the 8 setscrews [Fig. 8: ㊼ ~ ㊿] which fasten the heat-sink connector.
  10. Remove the power transistor by removing the 2 setscrews [Fig. 11: ㊺ , ㊻ ].
  11. When fitting the power transistor, apply silicone compound (or equivalent heat diffusing agent) to the back of power transistor and the mica plate (heat-sink side), and then reversely follow the procedures 1 ~ 10.



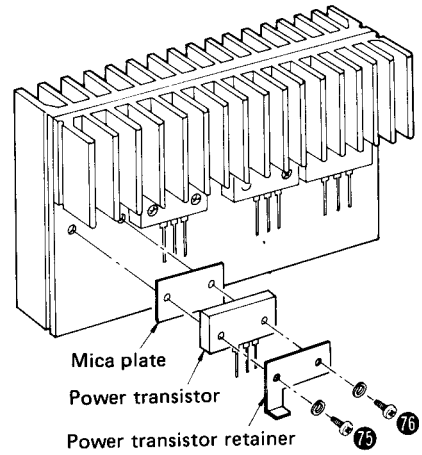

[Fig. 8]



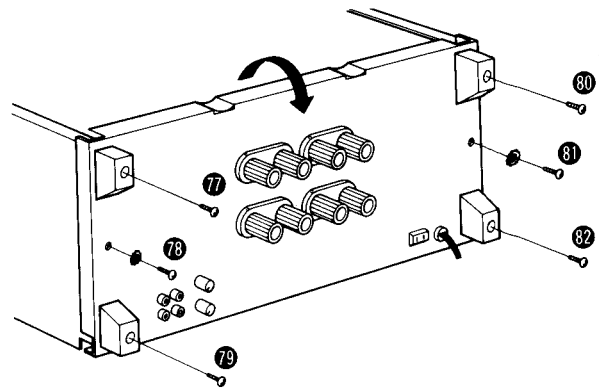

[Fig. 9]




[Fig. 10]



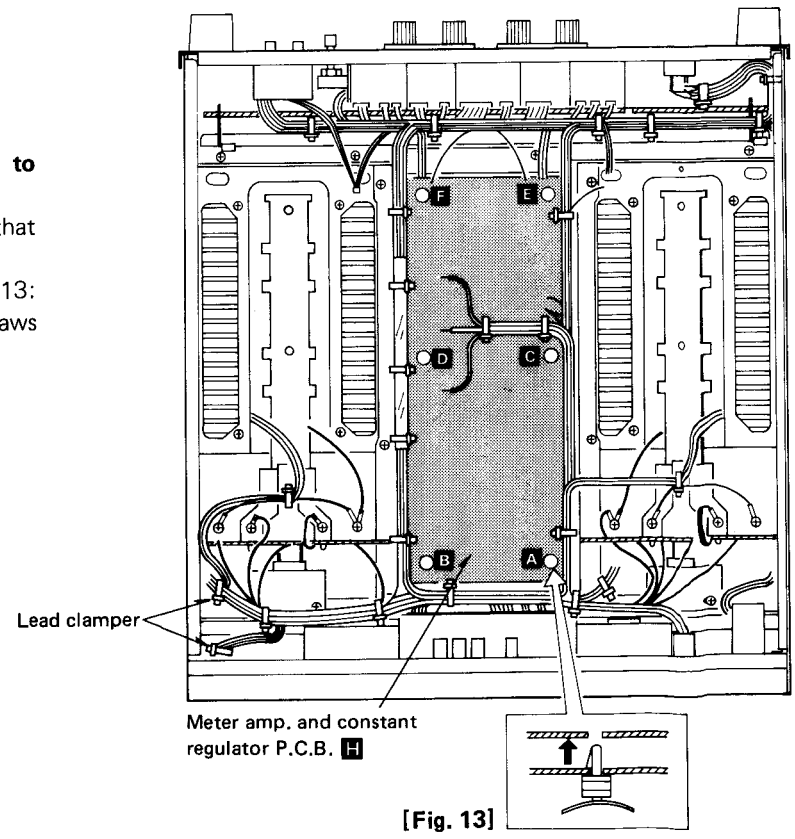

[Fig. 11]




[Fig. 12]

- **How to Remove the Speaker Selector and Protection Circuit P.C.B. ( L ) [Fig. 12]**
  1. Remove the top and bottom boards. (Refer to "**How to remove the side and top boards**" and "**How to remove the bottom board**".)
  2. Remove the 6 setscrews [Fig. 12: 77 ~ 82 ] of the rear panel, and then shift the rear panel.
  3. Unsolder the speaker terminals. (8 portions)
  4. Remove the 4 setscrews of the P.C.B. ( L ) and remove the P.C.B. ( L )

- **How to Remove the Meter Amplifier and Regulator P.C.B. ( H ) [Fig. 13]**
  1. Remove the bottom board. (Refer to "**How to remove the bottom board**".)
  2. Cut off the lead clamper of the lead wire so that the P.C.B. ( H ) can be easily removed.
  3. P.C.B. ( H ) is secured with 6 spacers [Fig. 13: A ~ F ] as in Fig. 13. Release the spacer claws and then lift the P.C.B.
  4. For the lead wire, refer to Fig. 13.




[Fig. 13]

## ■ CHECK POINTS FOR REPAIR

- **When protection circuit indicator is lighted:**
  The indicator lights up if the unit is abnormal. It lights up with power supply turned ON, and goes out when the unit is in operation (about 5 sec. later). In case of abnormality during operation, the indicator lights up and then no sound is made. In that case, set the power switch to "off" and check the cause according to the following procedure.

① Set the power switch of this unit to "off", and change the input terminal on the back from "DC" to "NORMAL". Next, set the power switch to "on", and check if the protection circuit indicator lights up.

NO → As the equipment (pre-amp side) other than this unit is out of order, DC power is applied to the input, causing the protection circuit to operate. So, it is not a sign of trouble of this unit.

↓ YES

② Check if computer drive monitor indicator "auto" is lighted.

NO → **Overcurrent and overload detection circuits are operated.**
Check if the line is short-circuited between speaker terminal and speaker side terminal.
NO → Check transistors Q114, Q119, Q120 of temperature protection circuit.
NO → Check power transistors Q125~Q138.
NO → Check transistor Q130 and diode D311 of over-current detection circuit.

NO → **Temperature detection circuit is operated.**
Check if the radiating hole is blocked with a book or audio equipment, worsening the radiating effect.

↓ YES

- **DC detection circuit is operated.**

③ Check if DC voltage is present at terminal (133) of power amplifier P.C.B. E .

NO → Check muting/relay drive IC (IC301) and its adjacent circuits.

↓ YES

④ Check the positive (+B) and negative (−B) voltage of power amplifier P.C.B. E , synchronous bias P.C.B. D , and previous stage differential amplifier P.C.B. C .

ABNOMAL → Regulator circuit is defective or fuse is blown. So, check the regulator circuit.

↓ NORMAL

⑤ Remove the synchronous bias P.C.B. D , then connect terminal ⑧ led to Q125 and Q126 base of power amplifier P.C.B. E , terminal ⑦ led to Q135 and Q136 base, and terminal ③ led to Q137 and Q138 base to the earth line, and then check if DC voltage is present at terminal (133) of power amplifier P.C.B. E .

YES → Power amplifier P.C.B. is defective. So, check power transistors Q125 ~ Q138.

↓ NO

⑥ Connect synchronous bias P.C.B. D to power amplifier P.C.B. E , and remove front stage differential amplifier P.C.B. C . Connect terminal ③ of lead wire (121) to the earth line, and check if DC voltage is present at terminal (133) of power amplifier P.C.B. E .

YES → Synchronous bias P.C.B. D is detective. So, check Q115 ~ Q124.

↓ NO

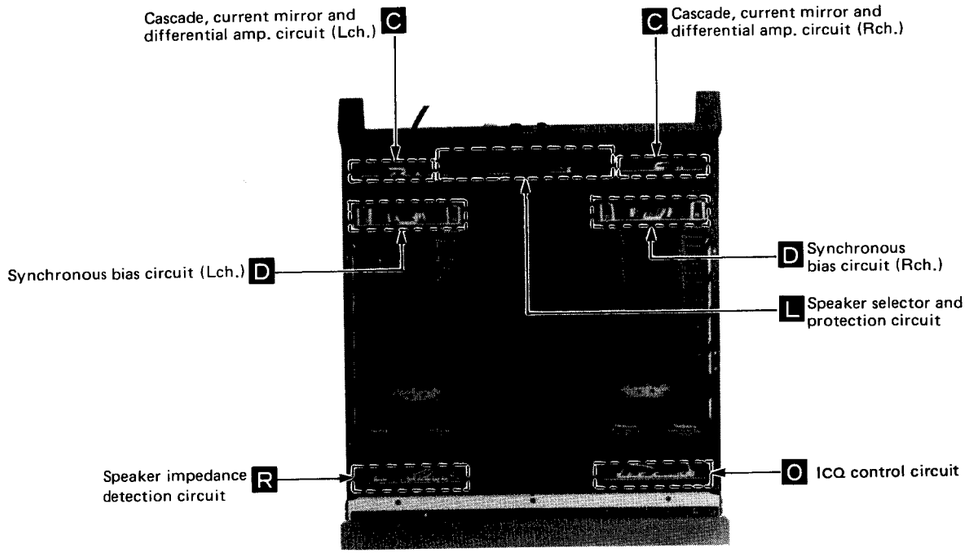
Previous stage differential amplifier P.C.B. C is defective. So, check each transistor.

**NOTE**

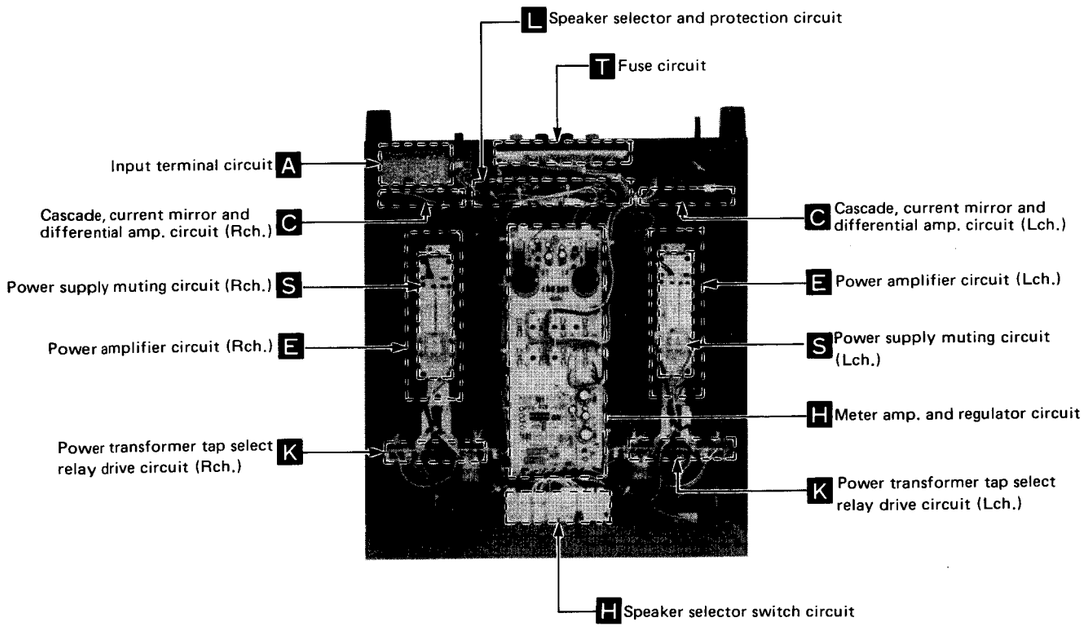
**When measuring the circuits in the voltage amplification stage, there is a fear of abnormal oscillation due to input impedance of the tester. So, when a tester whose input impedance is below or over 1 MΩ is used, respectively connect a 10 kΩ or 47 kΩ resistor in series to the tester.**

## ■ LOCATION OF P.C.B.

- **Top view**



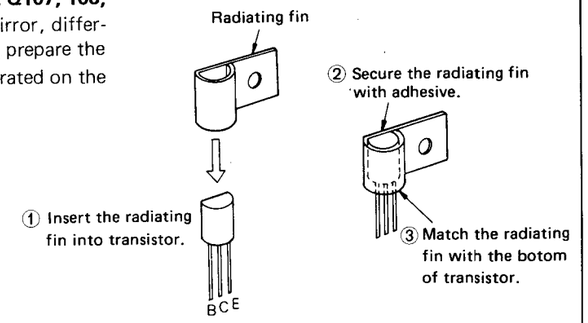

- **Bottom view**




**NOTE**

To repair or replace transistors **Q110, 115, 118 (2SC1573NC), Q107, 108, 109, 116, 117 (2SA879NC)** used on the cascade, current mirror, differential amplifier P.C.B. (C) and synchronous bias P.C.B. (D), prepare the radiating fin packed along with transistor repair parts as illustrated on the right.

| Circuit diagram No. | Transistor | Repair part No. |
|---|---|---|
| Q110, 115, 118 | 2SC1573NC | SWV61 |
| Q107, 108, 109 116, 117 | 2SA879NC | SWV59 |




## ■ MEASUREMENTS AND ADJUSTMENTS

- **Voltage regulator adjustment (after repair of voltage regulator circuit).**
  - ① After the repair, turn the voltage regulator adjusting **VR201** to minimum position before turning power supply ON, and connect nothing to the speaker terminals.
  - ② Connect a DC voltmeter between TP5 (+) and TP4 (earth), and adjust **VR201** so that the voltage is **+90**V.
  - ③ Next, connect a DC voltmeter between TP3 (+) and TP4 (earth), then make sure the value is within **–89** to **–92**V.

- **DC balance adjustment (after repair of power and drive amplifier circuit)**
  - ① After the repair, turn the sound volume and **VR103** to the minimum positions before turning power supply ON, and connect nothing to the speaker terminals.
  - ② Connect a DC voltmeter between TP2 (+) and TP4 (earth), and adjust **VR103** to 0mV in 30mV range.
  - ③ If it is not adjustable, pull out J101 and make the above-mentioned adjustment.

- **Clock adjustment (after replacement of microcomputer)**
  - ① Connect an oscilloscope to TP701, and adjust **VR701** so that the period of waveform is 3.3$\mu$-sec. (Refer to Fig. 14.)

- **Idling current ($I_{CQ}$) and clamp voltage adjustment (after repair of power and drive amplifier)**
  - ① After the repair, maximize the sound volume before turning power supply ON, and connect nothing to the speaker terminals.
  - ② Turn $I_{CQ}$ adjusting **VR104** (both L ch and R ch) and **VR105** (both L ch R ch) to the minimum positions.
  - ③ Connect a DC voltmeter between TP1 and TP2.

**Note**

*** During idling current and clamp voltage adjustment, if the DC voltmeter is metallic case or earth line comes in touch with other equipment, the transistors, etc. of this unit may be damaged. So, be sure to keep the DC voltmeter away from other equipment.**

  - ④ Connect a low frequency oscillator to the input terminal and apply 400Hz, 300mV signal to the circuit.
  - ⑤ With power turned ON, adjust **VR104** so that the voltage is approx. 19mV, about 10 minutes after computer drive monitor "auto" is lighted.
  - ⑥ Next, adjust **VR105** so that the voltage between TP1 and TP2 is approx. 20mV.

**Note**

**In this set, $I_{CQ}$ is controlled by microcomputer. $I_{CQ}$ is a little more than usual due to "PREHEAT" for 20 sec. after power ON. After that, the output level and transistor temperature are detected in "AUTO" mode, thereby automatically controlling $I_{CQ}$.**

## ■ OPERATION OF Icq CONTROLLER

### 1) Operation of PREHEAT

This circuit is intended that a great idling current is forcibly applied to the power transistor by the microcomputer for a specific length of time so that the power transistor condition becomes optimum as soon as possible after power supply ON. With power turned ON, "H" output is delivered to terminal ⑰ of IC701 as in Table 1, causing Q752 to turn ON. And then preheat LED lights up, and a voltage is also applied to the LED's of D755, D756 and D757. Each of these diodes is controlled by terminals ②, ③ and ④ of IC701. After power ON, "high" LED lights up first, followed by "mid" and "low" in order. Also, during preheat, "L" output is delivered to terminal ㉓ of IC701, then Q705 and 706 turn ON through IC703. As Q705 and 706 turn ON, the base voltage of Q106 (driver stage transistor) is lowered, and a current more than usual flows in Q106, thus preheating the power stage.

### 2) Signal detection and temperature detection

Music signal from power amplifier is applied to IC701 terminals ⑪ and ⑫ [terminals ⑬, ⑭] through D703 (D704) and IC702. When the signal rectified by D703 (D704) and C703 (C704) becomes 3V or over, then "L" input is applied to IC701 terminal ⑫ [terminal ⑭] and when the signal becomes 9V or over, then "L" input is applied to IC701 terminal ⑪ [terminal ⑬]. Z761 (Z762) is a thermistor (posistor) for radiator temperature detection, and serves to detect the temperatures of heat-sink such as 60°C, 100°C and 130°C. When the heat-sink temperature is 60°C, the 60°C sensor of Z761 (Z762) increases in resistance, then the level of IC702 terminal ② becomes "H". Also, IC702 terminal ⑮ is inverted to "L" and it is applied to terminal ⑩ of IC701.

Similarly, heat-sink temperatures are detected at 100°C and 130°C, and the inputs are applied to IC701 terminals ⑨ and ⑧. When music signal and temperature detection signal are applied to IC701 terminals ⑧ ~ ⑭, the outputs are delivered to IC701 terminals ② ~ ⑥, thereby controlling $I_{CQ}$ through R721 ~ 726, Q705 and Q706.

When the music signal is in a range of 0 ~ 1.3V or so, the level of IC702 terminal ⑦ becomes "L", while IC702 terminal ⑩ goes "H". It is applied to IC702 terminals ① and ② as "H" input, then IC701 operates as if the 60°C and 100°C temperature sensors were operating.

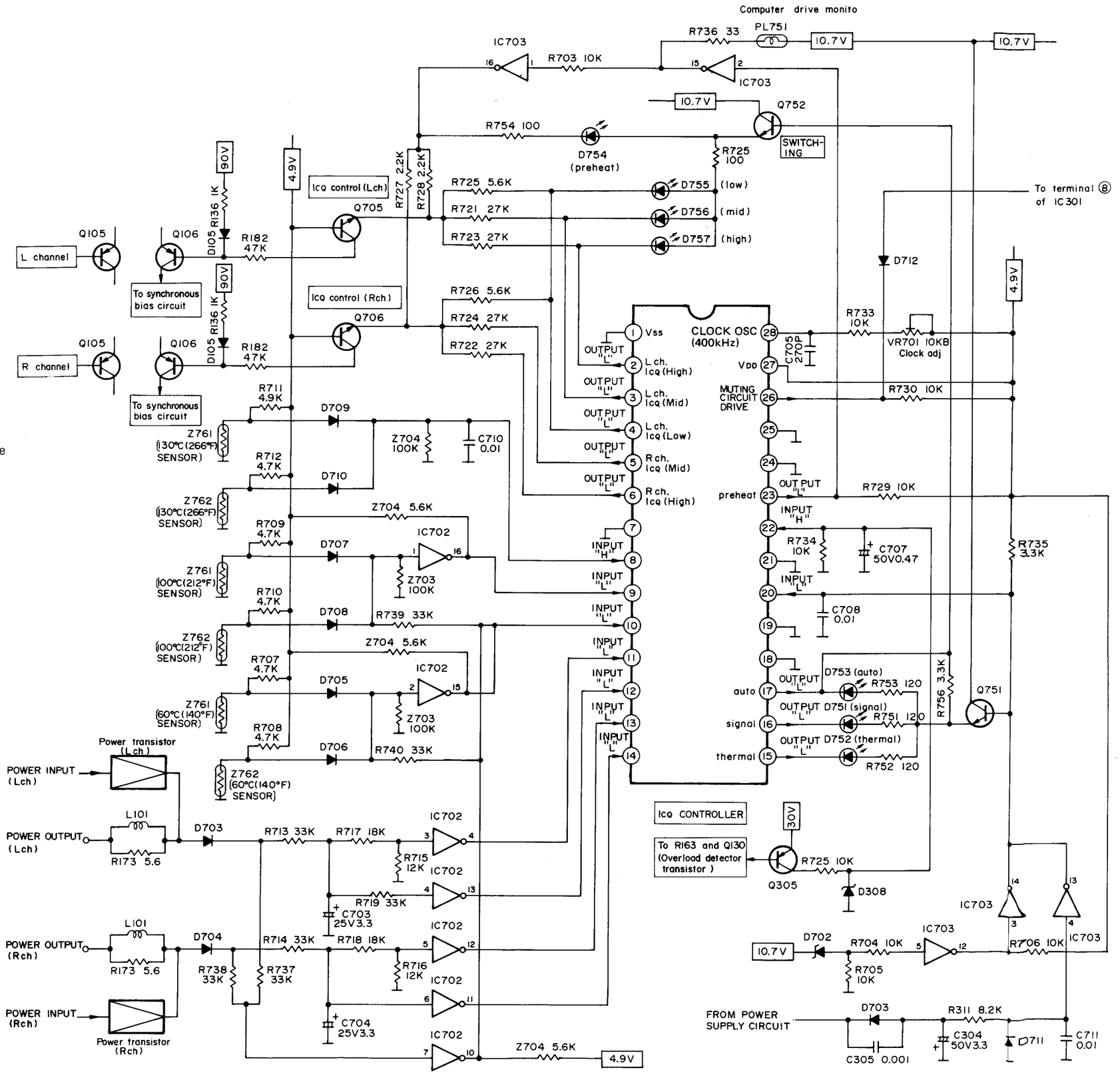
### 3) Power ON/OFF muting

With power turned ON, the output of IC701 terminal ㉖ is at "L" for about 5 sec., and "L" input is applied to terminal ⑧ of IC301 (muting and speaker relay drive IC), causing speaker relay RLY301 ~ 303 to turn OFF. With power turned OFF, "H" input is applied to IC703 terminal ④, and "L" input is applied to IC701 terminal ⑳ because the time constant of C304 (3.3μF) and R311 (8.2 kΩ) is smaller than that of block electrolytic condenser of power supply circuit. As terminal ⑳ goes "H", then "L" output is delivered to terminal ㉖. It is applied to IC301 terminal ⑧, causing speaker relay RLY 301 ~ 303 to turn OFF.

### 4) Overload detection circuit

When speaker terminals are shortcircuited, a great current flows in R163, then the base potential of Q130 (overload detection circuit) increases causing Q130 to turn ON. Then Q305 also turns ON, and "H" input is applied to IC701 terminal ㉒. And "L" output is delivered to IC701 terminal ㉖. As IC701 terminal ㉖ goes "L", speaker relay RLY301 ~ 303 turn OFF the same as for power OFF muting.

When "H" input is applied to IC701 terminal ㉒, then the output of IC701 terminal ㉖ is held causing power switch to turn OFF, therefore the speaker relay will not turn ON unless the set is checked beforehand.



- **Load impedance detection circuit adjustment (after repair of load impedance detection circuit)**
  1. Set the speaker select switch to "main" position, and the sound volume to minimum.
  2. Connect a 6.5 Ω (1W) or 2 series-connected resistors of 6.5 Ω to "main" speaker terminals.
  3. Connect TP601 and TP602 with lead wire.
  4. Turn power supply ON and turn **VR602** counterclockwise. (Then, the sound of tap relay operation can be heard.)
  5. Connect a DC voltmeter between TP601 and TP605, and then adjust **VR601** so that the voltage is **−200mV** (−80mV to −400mV).
  6. Connect a DC voltmeter between TP601 and TP604, and then adjust **VR602** so that the voltage is **−200**mV (−80mV to −400mV).
  7. Disconnect the lead wire that connects TP601 and TP602, then make sure the tap relay is switched.

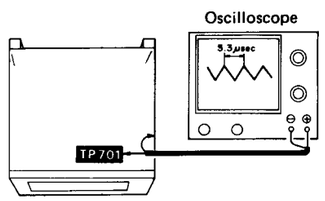
- **Peak power meter adjustment (after replacement of meter amplifier circuit and peak power meter)**
  1. Before power ON, completely turn **VR403** and **VR404** clockwise.
  2. Connect a low frequency oscillator to "Input DC" terminal, and AC voltmeter to speaker terminals.
  3. Apply 1kHz signal from the low frequency oscillator, and adjust the output volume of oscillator so that the AC voltmter reads **0.894**V.
  4. Adjust the meter adjusting **VR401** (L ch) and **VR402** (R ch) so that the meter reads 0.1W.
  5. Adjust the output volume of low frequency oscillator so that the AC electronic voltmeter connected to speaker terminals reads **48.99**V.
  6. Adjust the meter adjusting **VR403** (L ch) and **VR404** (R ch) so that the meter reads **300**W.

- **Overload detecting protection circuit check**
  1. Set the speaker select switch to "main" position.
  2. Connect a 0.33 Ω (30W) resistor to remote speaker terminal.
  3. Connect a low frequency oscillator to "INPUT" terminal, and AC voltmeter to main speaker terminal.
  4. Apply 1kHz signal from the low frequency oscillator, and adjust the output volume of oscillator so that the AC voltmeter reads **5V**.
  5. With the speaker select switch shifted to "remote" position, if the relay turns off, then the protection circuit is in normal operation.

**Note**

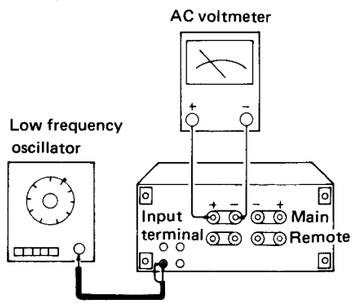
* **Check the protection circuit individually on each channel.**

* **If the protective relay is operated, it will not be reset even when abnormality has been eliminated. So, once turn power supply OFF and again turn it ON.**




**[Fig. 14]**

**Clock adjustment**



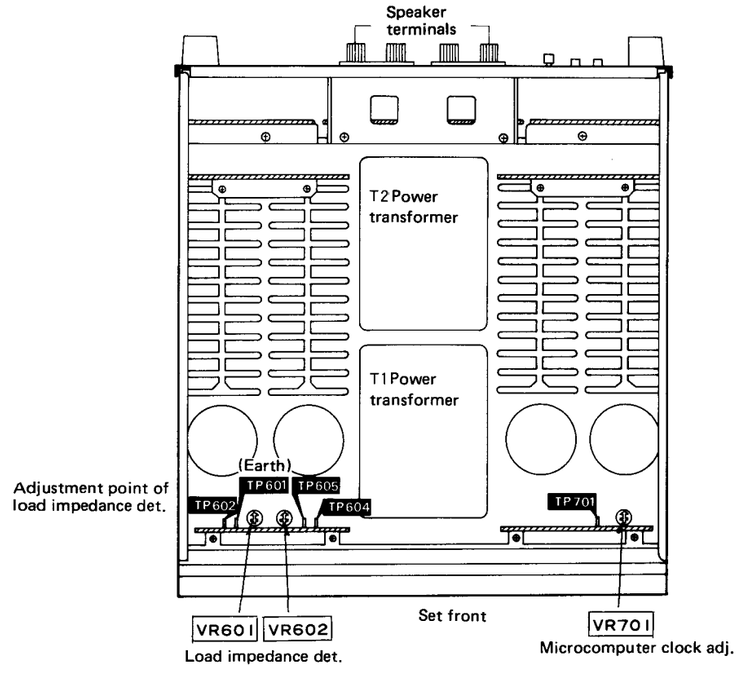

**[Fig. 15]**

**Peak power meter adjustment**

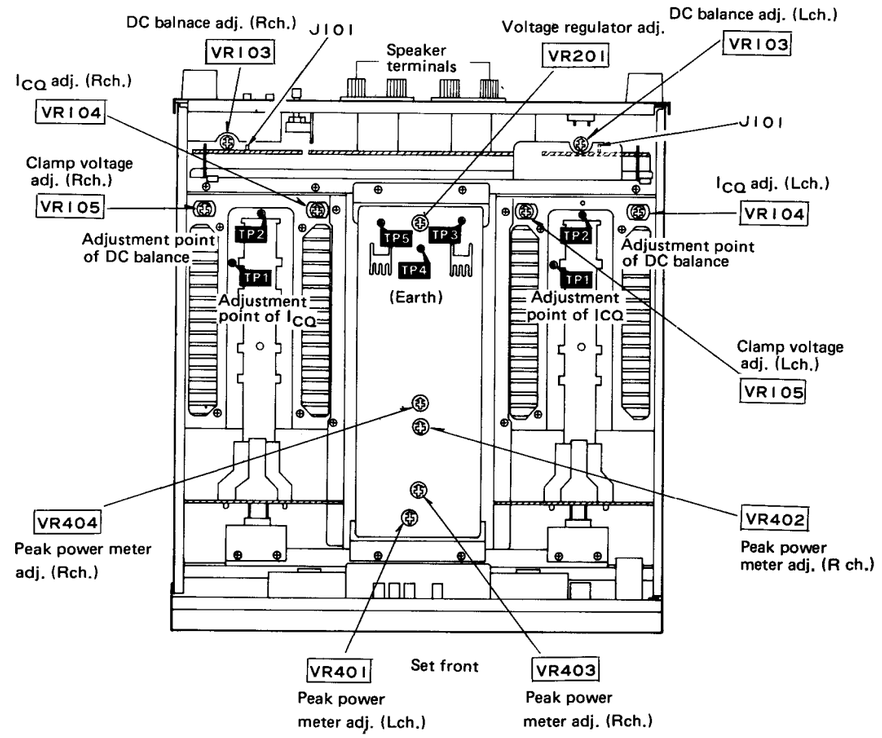


- **Adjustment points**

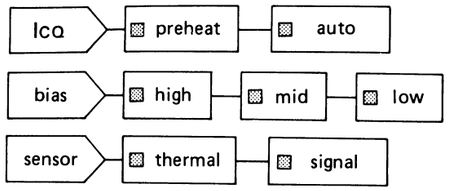
**Top view**




**Bottom view**



- **Computer drive monitor indicators**
  These indicators are used to check that stable idling current flows from the bias circuit in order to prevent transient crossover distortion.




**Icq:**
When the power is switched on, the heat-sink is preheated so that the bias circuit can immediately operate. The "preheat" indicator will illuminate at this time, and then, when the circuit is fully stabilized, the "auto" indicator will illuminate.

**bias:**
When the power is switched on, the bias changes from high, mid and low during the time until the idling current becomes stabilized, and the respective indicators illuminate.
Note that the display will no longer illuminate when the idling current has reached a condition of stability.

**sensor:**
The "thermal" sensor detects the temperature of the output transistor(s) and heat-sink, and the "signal" sensor detects the music signal level. Both indicators will illuminate when the sound can be heard.

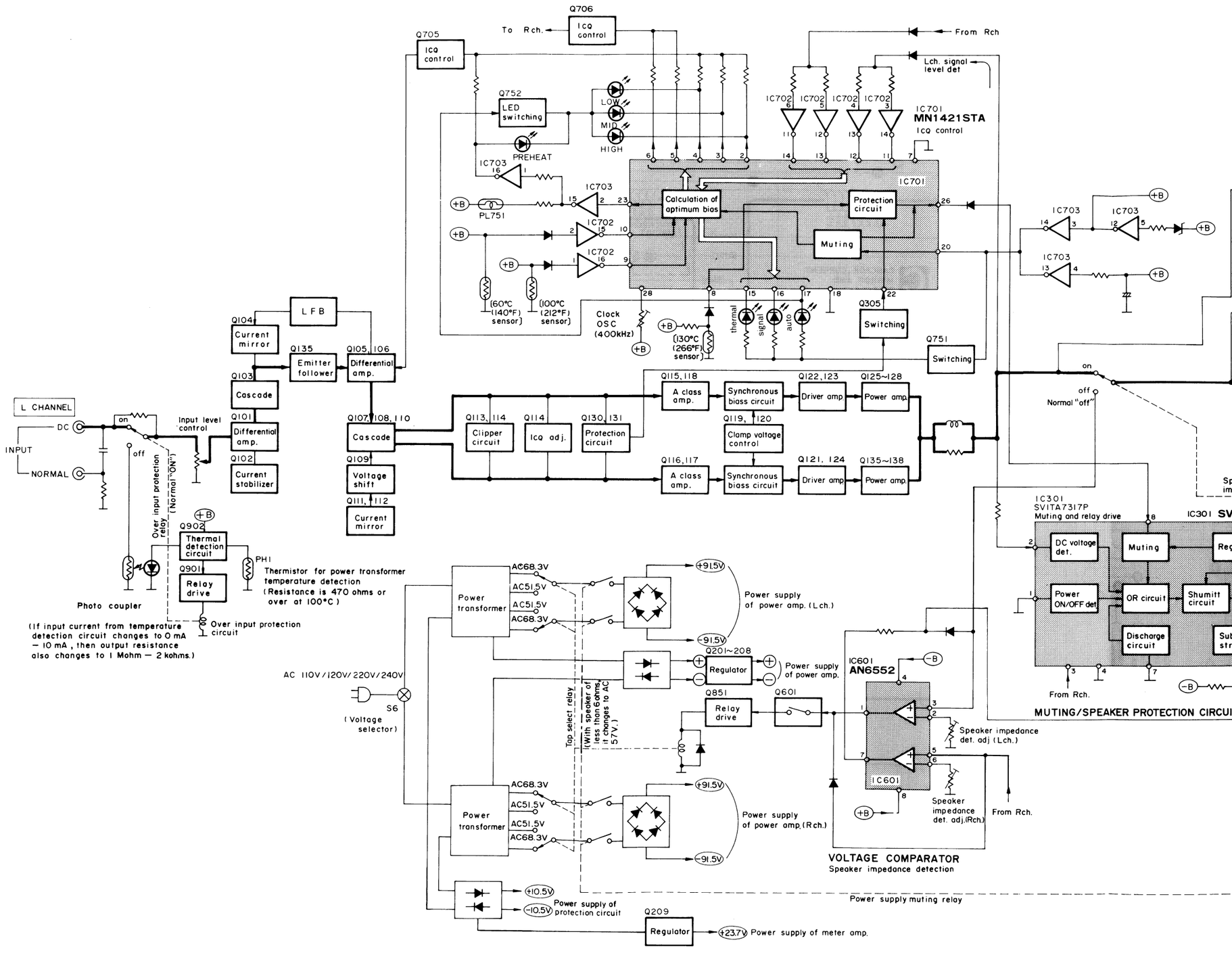
▒ "ON" (light up) time

| Output port | ④ pin $CO_7$ | ③ pin $CO_8$ | ② pin $CO_9$ | ⑮ pin $EO_0$ | ⑯ pin $EO_1$ | ⑰ pin $EO_2$ | ㉓ pin $DO_0$ |
|---|---|---|---|---|---|---|---|
| Ind. / sec. | bias low | bias mid | bias high | sensor thermal | sensor signal | ICQ auto | ICQ preheat |
| Power "ON" | Ⓗ | Ⓗ | Ⓛ | Ⓛ | Ⓛ | Ⓗ | Ⓛ |
| 0.4 sec. | | | | | | | |
| 0.4 sec. | | | | | | | |
| 0.4 sec. | | | | | | | |
| 0.4 sec. | | Ⓛ | Ⓗ | | Ⓗ | | |
| 0.4 sec. | | | | | | | |
| 0.4 sec. | | | | | | | |
| 0.4 sec. | | | | | | | |
| 0.4 sec. | | | | Ⓗ | Ⓛ | | |
| 0.4 sec. | | | | | | | |
| 0.4 sec. | | | | | | | |
| 0.4 sec. | Ⓛ | Ⓗ | | | Ⓗ | | |
| 0.4 sec. | | | | | | | |
| 0.4 sec. | | | | | | | |
| 14 sec. | Ⓗ | | Ⓛ | Ⓛ | Ⓛ | | |
| ∫ | | | Ⓗ | | | Ⓛ | Ⓗ |

About 6 sec.

[Table 1]

## ■ BLOCK DIAGRAM

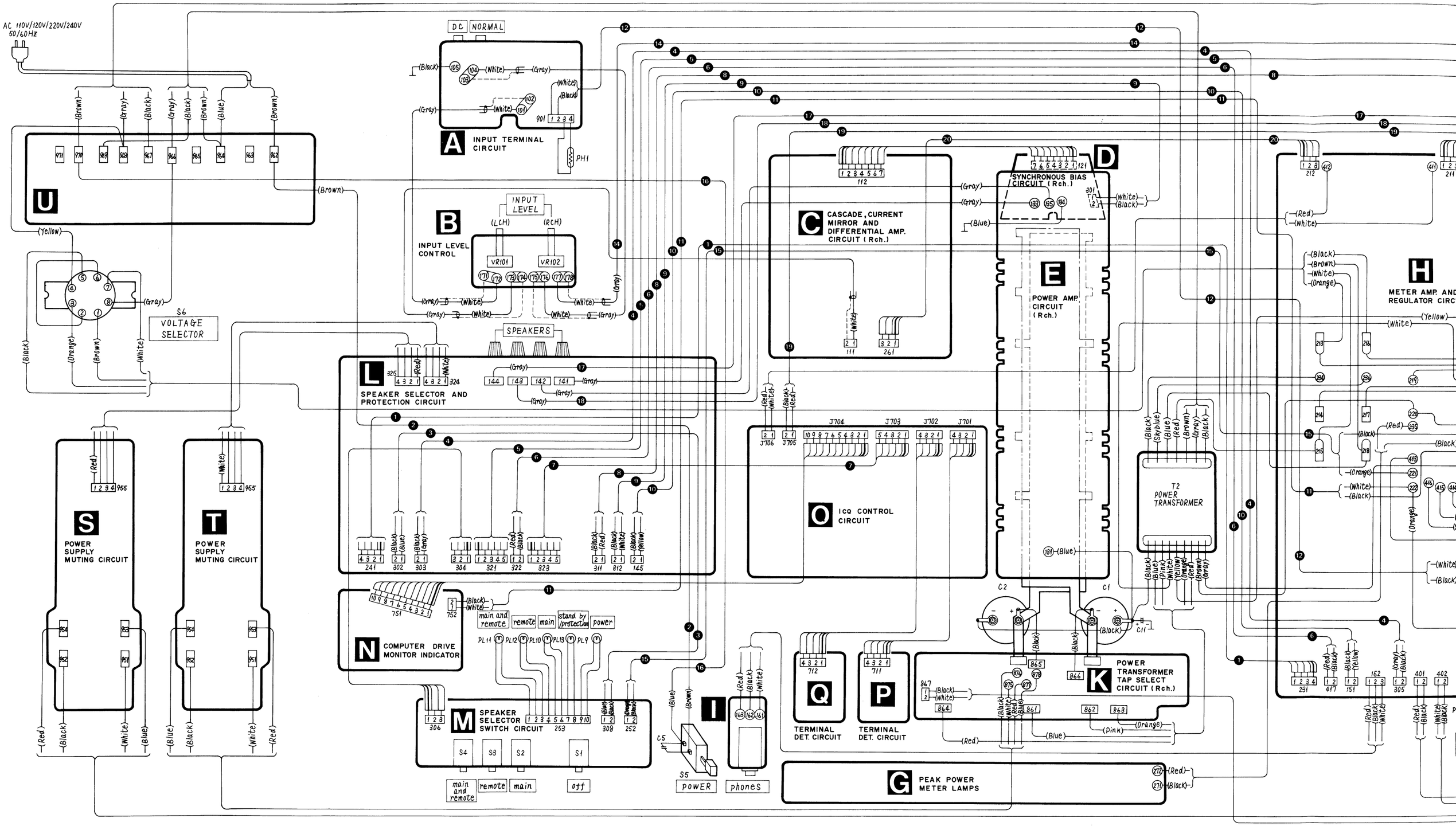


SE-A3MK2

AM

Q706 ICQ control
To Rch.
Q705 ICQ control
From Rch
Lch. signal level det
Q752 LED switching
LOW
MID
HIGH
PREHEAT
IC702 IC702 IC702 IC702
IC701 MN1421STA ICQ control
IC703
IC703
PL751
IC702
IC702
(60°C (140°F) sensor)
(100°C (212°F) sensor)
Clock OSC (400kHz)
(130°C (266°F) sensor)
thermal
signal
auto
Calculation of optimum bias
Protection circuit
Muting
IC701
Q305 Switching
Q751 Switching
IC703 IC703
IC703
IC401 SVITA7318P Detector circuit and power compressor
GND
Detector
Detector
VCC
IC402 AN6552 Meter drive
Peak power meter ( Lch.)
Peak power meter ( Rch.)
Rch.
on
off
on
off
Meter relay (normal "ON")
Headphones jack
To Rch.
Main speaker
Remote speaker
on
off
Normal "off"
Speaker protection and speaker impedance det. relay
LFB
Q104 Current mirror
Q135 Emitter follower
Q105, 106 Differential amp.
Q103 Cascade
Q101 Differential amp.
Q102 Current stabilizer
Input level control
Q107, 108, 110 Cascade
Q109 Voltage shift
Q111, 112 Current mirror
Q113, 114 Clipper circuit
Q114 ICQ adj.
Q130, 131 Protection circuit
Q115, 118 A class amp.
Q116, 117 A class amp.
Synchronous biass circuit
Synchronous biass circuit
Q119, 120 Clamp voltage control
Q122, 123 Driver amp
Q121, 124 Driver amp
Q125~128 Power amp
Q135~138 Power amp
IC301 SVITA7317P Muting and relay drive
IC301 SVITA7317P
DC voltage det.
Muting
Regulator
Power ON/OFF det
OR circuit
Shumitt circuit
Relay drive
Discharge circuit
Sub straight
Output becomes "H" in muting mode
From Rch.
MUTING/SPEAKER PROTECTION CIRCUIT
Q902 Thermal detection circuit
Q901 Relay drive
PH1 Thermistor for power transformer temperature detection (Resistance is 470 ohms or over at 100°C)
Over input protection circuit
rature to 0 mA tance 2 kohms.)
Power transformer
AC68.3V
AC51.5V
AC51.5V
AC68.3V
+91.5V
-91.5V
Power supply of power amp. (Lch.)
Q201~208 Regulator
Power supply of power amp.
AC 110V/120V/220V/240V
S6 (Voltage selector)
Tap select relay
(With speaker of less than 6ohms, it changes to AC 57V.)
Q851 Relay drive
Q601
IC601 AN6552
Speaker impedance det. adj (Lch.)
Speaker impedance det. adj.(Rch.)
From Rch.
Power transformer
AC68.3V
AC51.5V
AC51.5V
AC68.3V
+91.5V
-91.5V
Power supply of power amp.(Rch.)
VOLTAGE COMPARATOR
Speaker impedance detection
+10.5V
-10.5V
Power supply of protection circuit
Q209 Regulator
+23.7V Power supply of meter amp.
Power supply muting relay
Q603 Latch released
Q604
Q351
Q302 Relay drive
Q306, 602
Integration circuit
Integration circuit
A pulse as shown is made when speaker switch is operated.
Remote speaker select relay
Remote speaker select relay
Q301
Q303, 304
Peak power meter protection relay
PL13 Protection circuit ind.
Power supply of AC
Power ind. PL9
S1 (OFF)
on
off
S2 (MAIN)
Main speaker ind. PL10
ON
OFF
Power supply of AC
S3 (REMOTE)
Remote speaker ind. PL12
S4 (MAIN + REMOTE)
Main + remote speaker ind. PL11

## ■ CIRCUIT BOARDS AND WIRING CONNECTION DIAGRAM (Top View)



C CASCADE, CURRENT MIRROR AND DIFFERENTIAL AMP. CIRCUIT ( Rch.)

D SYNCHRONOUS BIAS CIRCUIT ( Rch.)

E POWER AMP. CIRCUIT ( Rch.)

H METER AMP. AND REGULATOR CIRCUIT

D SYNCHRONOUS BIAS CIRCUIT ( Lch.)

E POWER AMP. CIRCUIT (Lch.)

C CASCADE, CURRENT MIRROR AND DIFFERENTIAL AMP. CIRCUIT ( Lch.)

Q ICQ CONTROL CIRCUIT

T2 POWER TRANSFORMER

T1 POWER TRANSFORMER

R SPEAKER & IMPEDANCE DETECTION CIRCUIT

I

Q TERMINAL DET. CIRCUIT

P TERMINAL DET. CIRCUIT

K POWER TRANSFORMER TAP SELECT CIRCUIT ( Rch.)

J POWER TRANSFORMER TAP SELECT CIRCUIT ( Lch.)

PEAK POWER METER (R) (L)

G PEAK POWER METER LAMPS

F PEAK POWER METER LAMPS

PH1

S1 off

S5 POWER

phones

C5

C1 C2 C3 C4 C11 C12

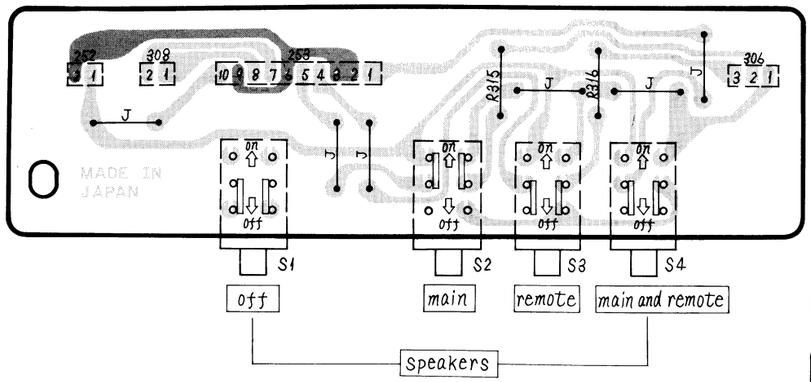
Stand by /protection power

PL18 PL9

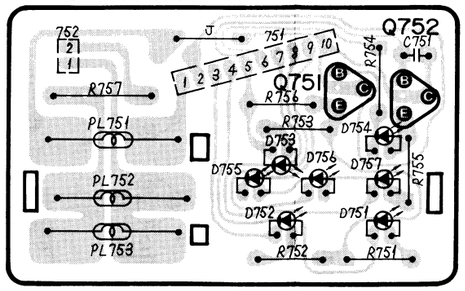
## ■ PRINTED CIRCUIT BOARDS

Ground (Earth) line

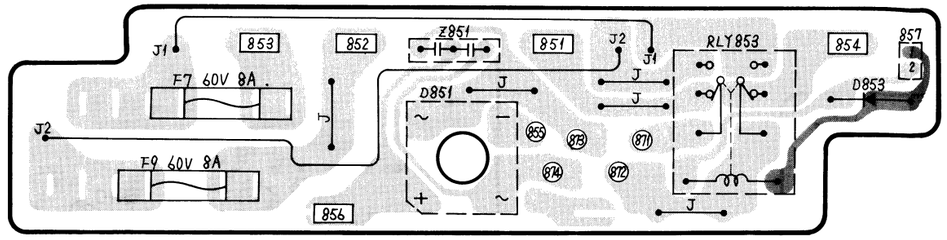
### M SPEAKER SELECTOR SWITCH CIRCUIT



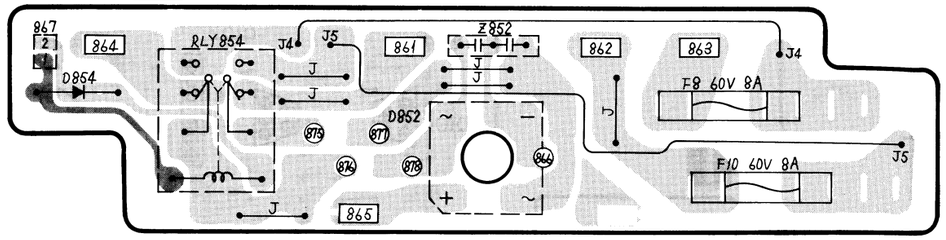

### N COMPUTER DRIVE MONITOR INDICATOR



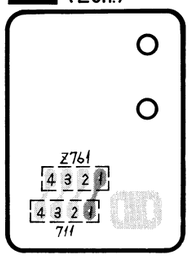

### J POWER TRANSFORMER TAP SELECT CIRCUIT (Lch.)



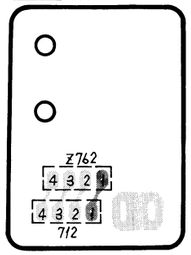

### K POWER TRANSFORMER TAP SELECT CIRCUIT (Rch.)




### P THERMAL DET. CIRCUIT (Lch.)

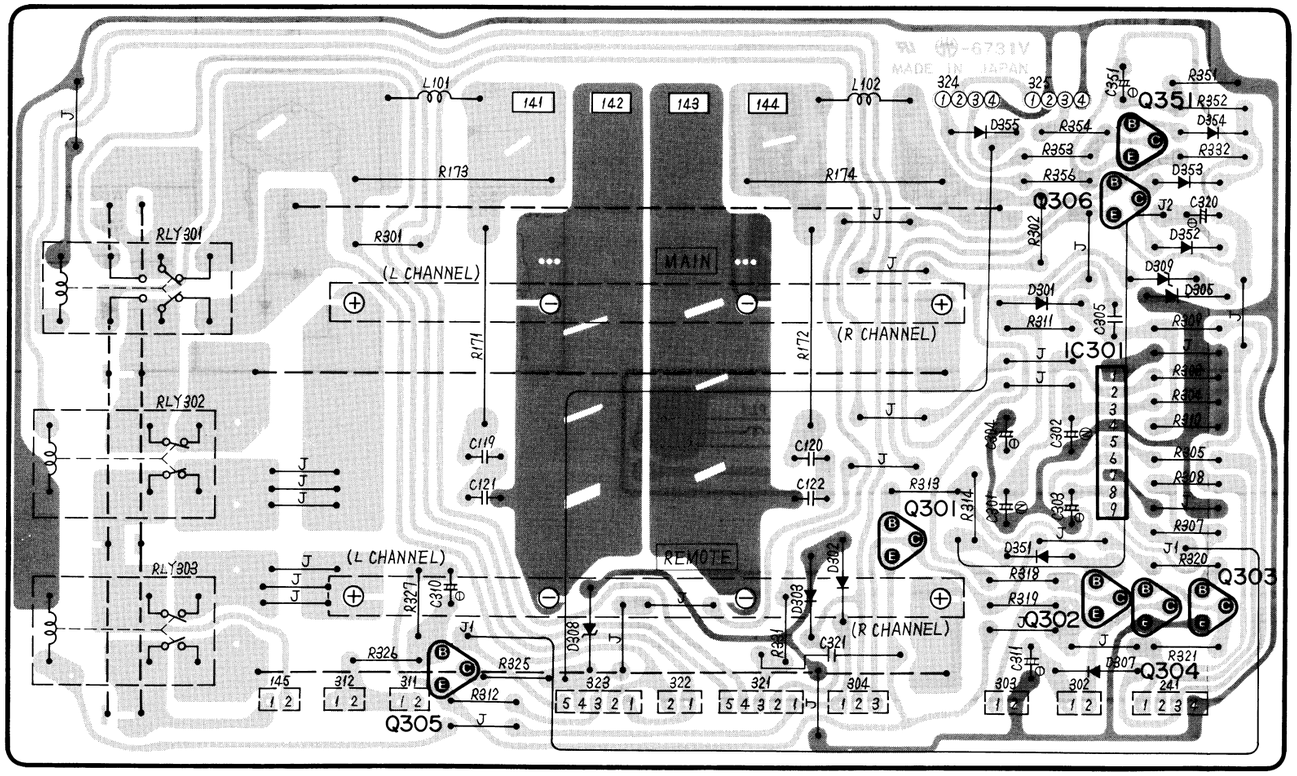



### Q THERMAL DET. CIRCUIT (Rch.)



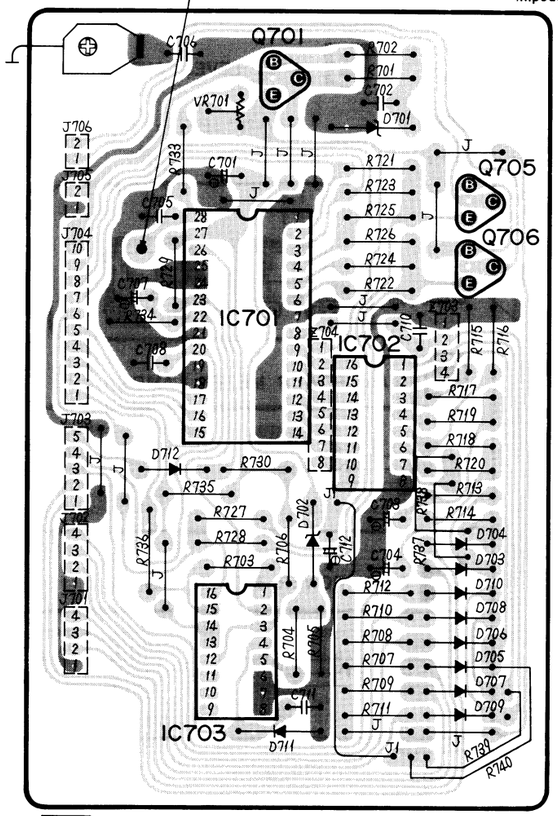

D751: SIGNAL IND.
D752: THERMAL IND.
D753: AUTO IND.
D754: PREHEAT IND.
D755: LOW IND.
D756: MID IND.
D757: HIGH IND.

### L SPEAKER SELECTOR AND PROTECTION CIRCUIT




### O Icq CONTROL CIRCUIT

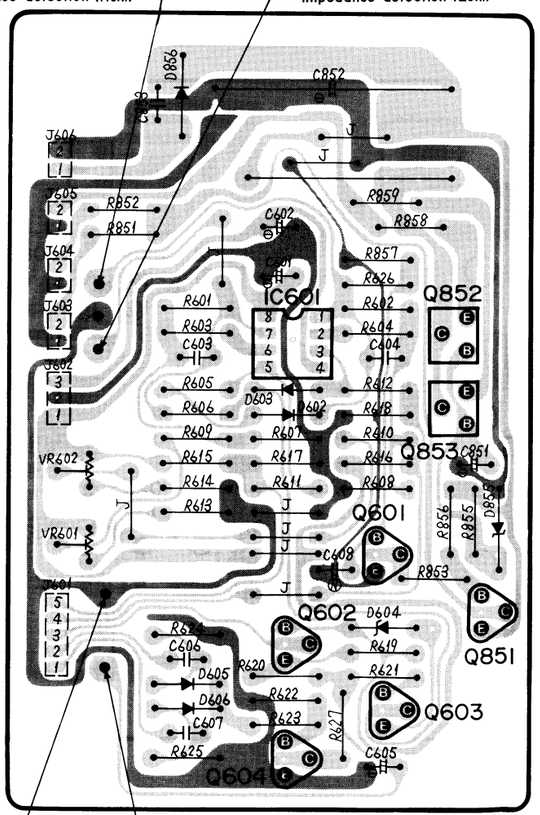
Adjustment point of clock (400kHz) TP701




### R SPEAKER & IMPEDANCE DETECTION CIRCUIT

Adjustment point of load impedance detection (Rch.) TP604

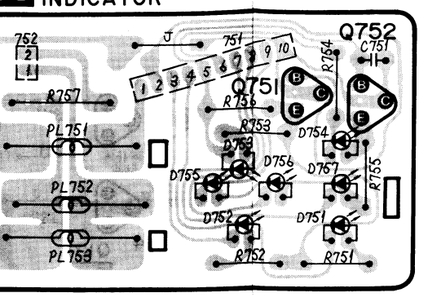
Adjustment point of load impedance detection (Lch.) TP605




TP601 Ground point

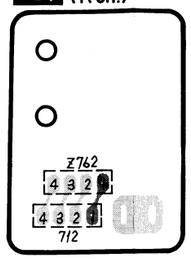
TP602 Ground point

## N COMPUTER DRIVE MONITOR INDICATOR

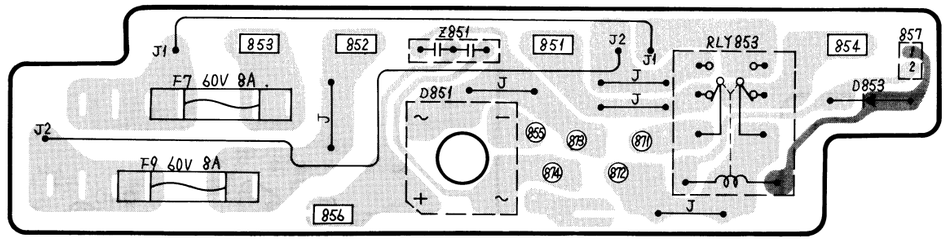



D751: SIGNAL IND.
D752: THERMAL IND.
D753: AUTO IND.
D754: PREHEAT IND.
D755: LOW IND.
D756: MID IND.
D757: HIGH IND.

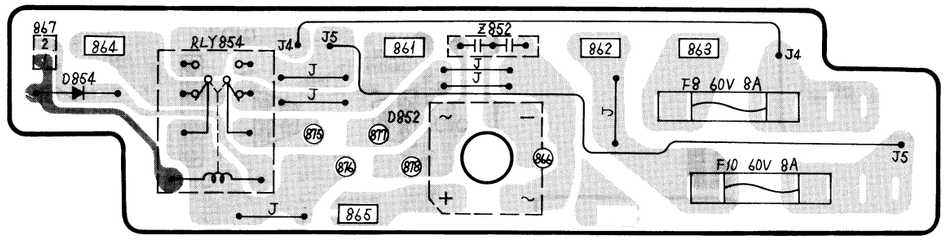
## Q THERMAL DET. CIRCUIT (Rch.)



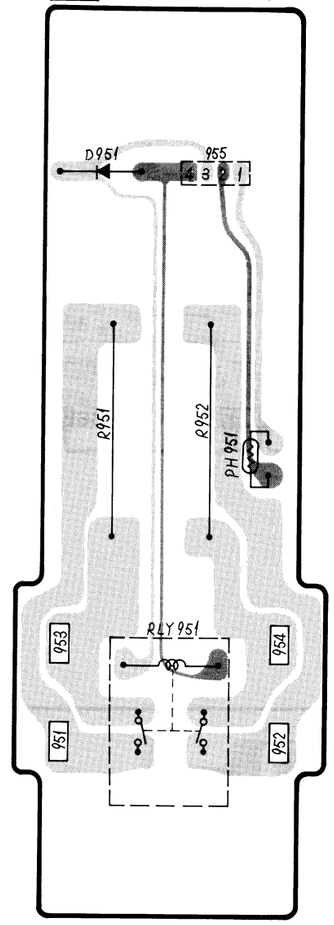

## J POWER TRANSFORMER TAP SELECT CIRCUIT (Lch.)



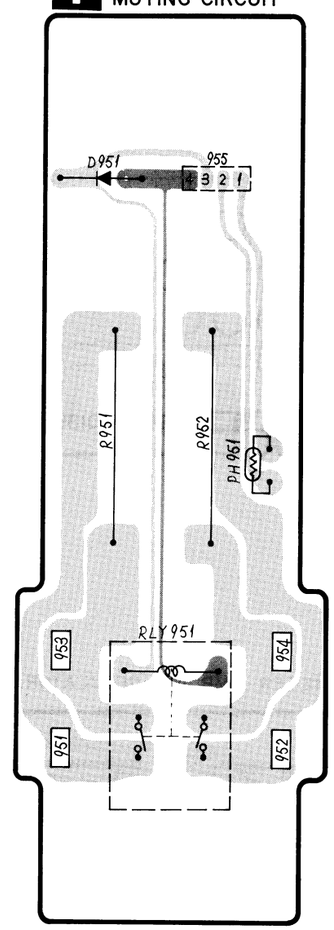

## K POWER TRANSFORMER TAP SELECT CIRCUIT (Rch.)



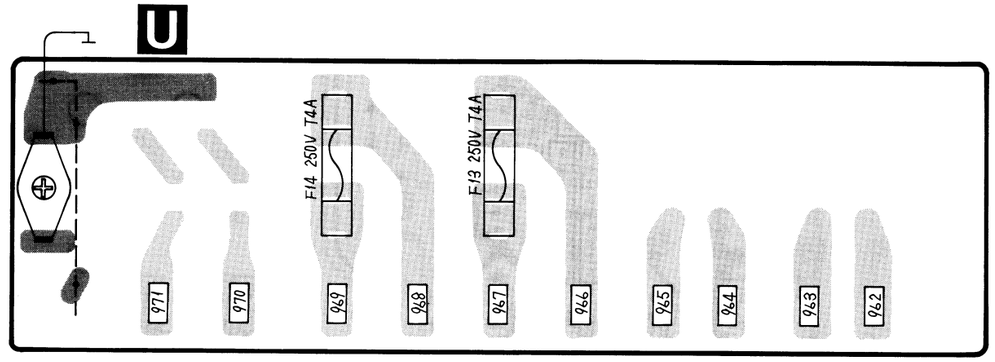

## S POWER SUPPLY MUTING CIRCUIT




## T POWER SUPPLY MUTING CIRCUIT




## U




Adjustment point of clock (400kHz) TP701

Adjustment point of load impedance detection (Rch.) TP604

TP605 Adjustment point of load impedance detection (Lch.)







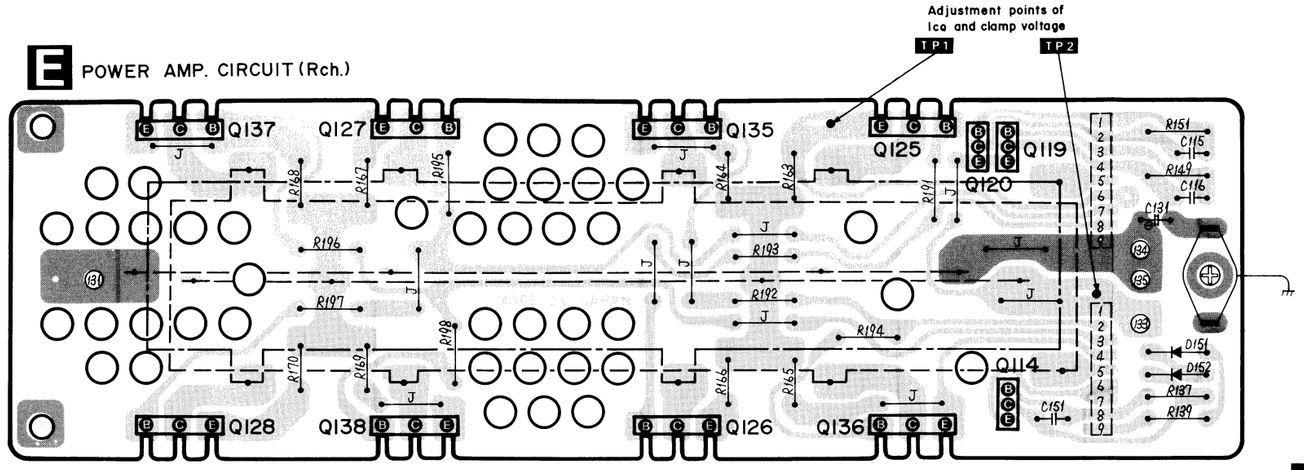
TP601 Ground point

TP602 Ground point

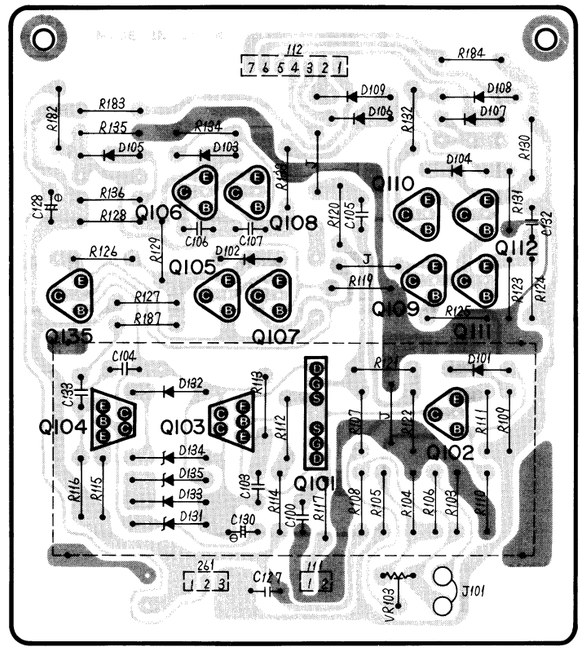
## O ICQ CONTROL CIRCUIT

## R SPEAKER & IMPEDANCE DETECTION CIRCUIT

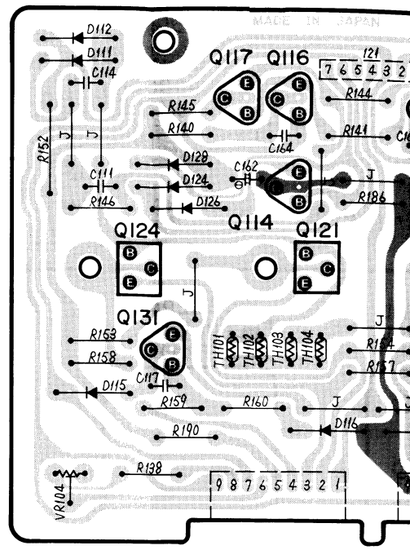
## E POWER AMP. CIRCUIT (Rch.)



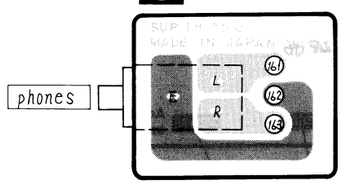

## C CASCADE, CURRENT MIRROR AND DIFFERENTIAL AMP. CIRCUIT (Lch.)



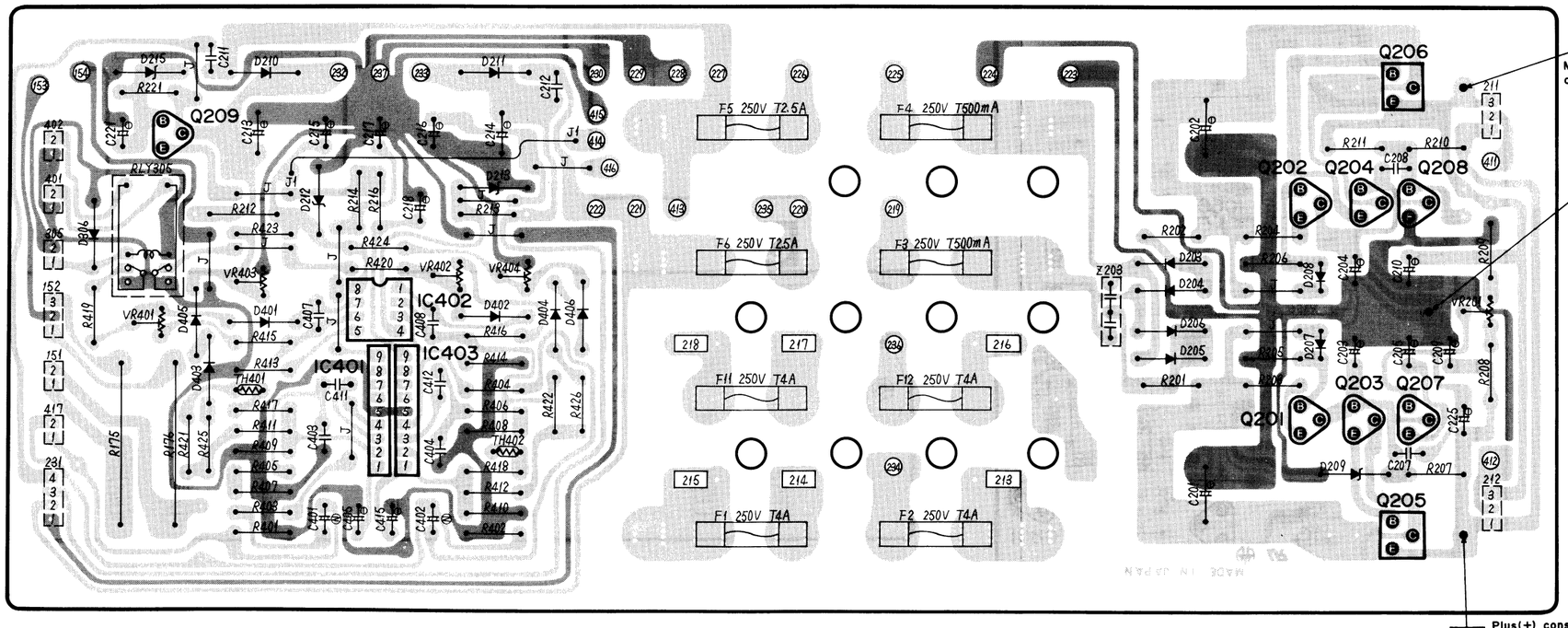

## D SYNCHRONOUS BIAS CIRCUIT (Lch.)



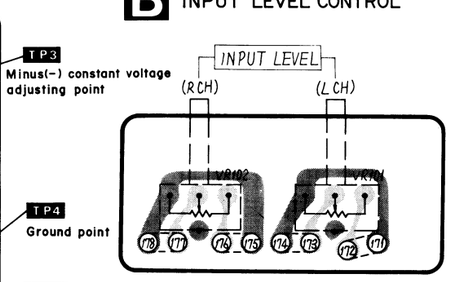

## I



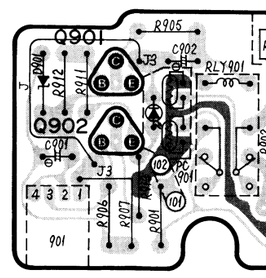

## H METER AMP. AND REGULATOR CIRCUIT



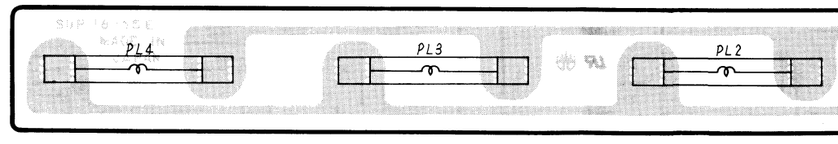

## B INPUT LEVEL CONTROL



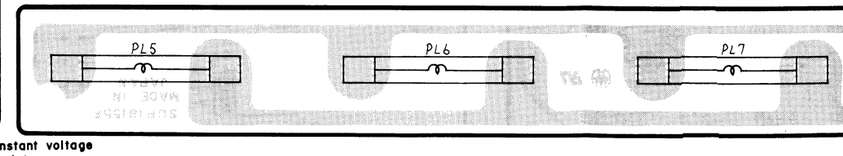

## A INPUT TERMINAL CIRCUIT



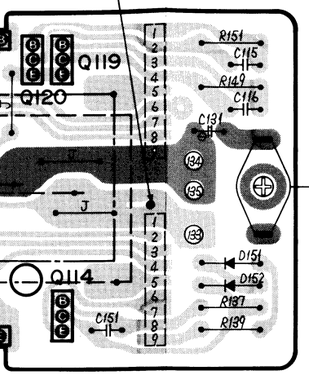

## G PEAK POWER METER LAMPS

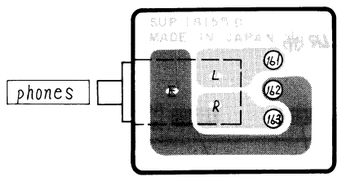



## F PEAK POWER METER LAMPS

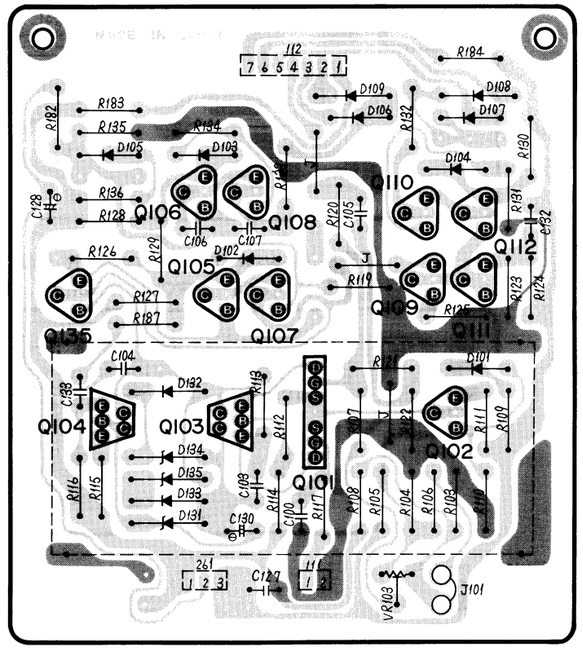


justment points of
and clamp voltage

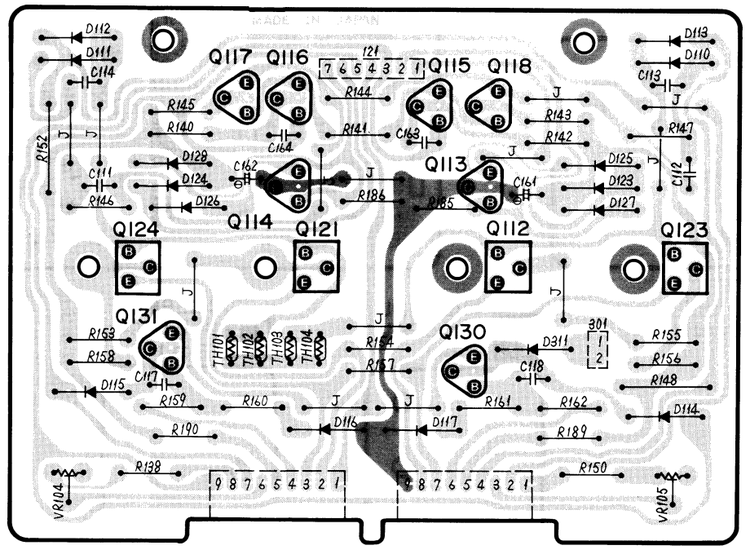


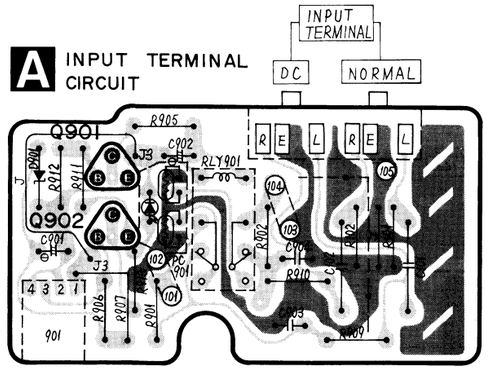

C CASCADE, CURRENT MIRROR AND DIFFERENTIAL AMP. CIRCUIT (Lch.)



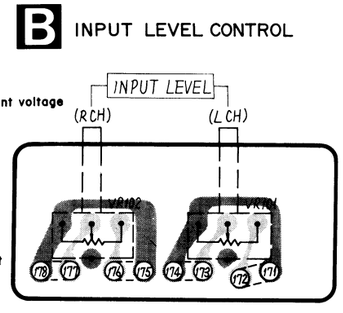

D SYNCHRONOUS BIAS CIRCUIT (Lch.)

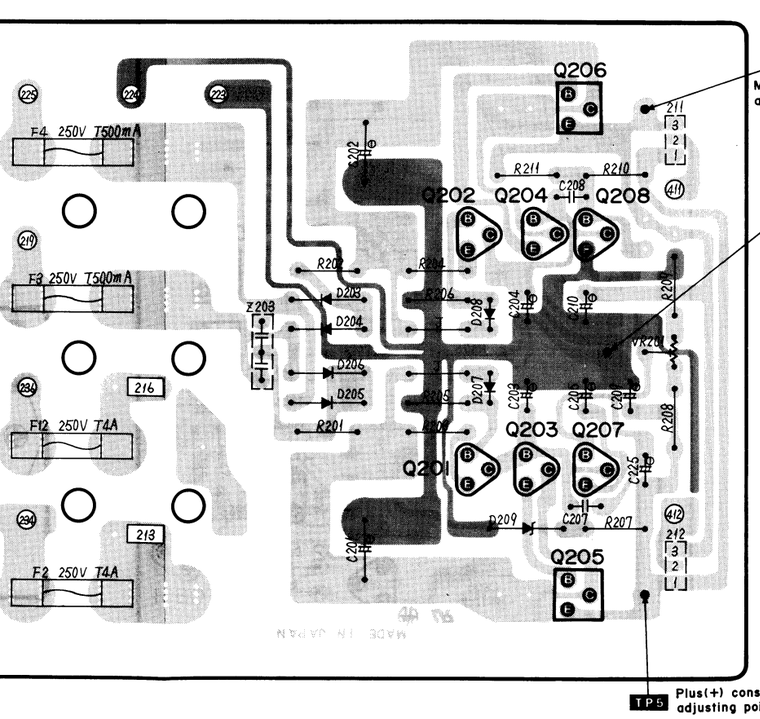



A INPUT TERMINAL CIRCUIT

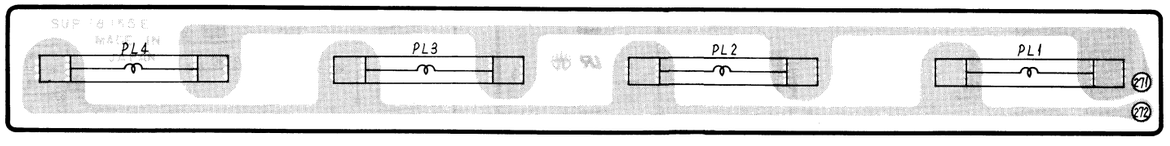



B INPUT LEVEL CONTROL

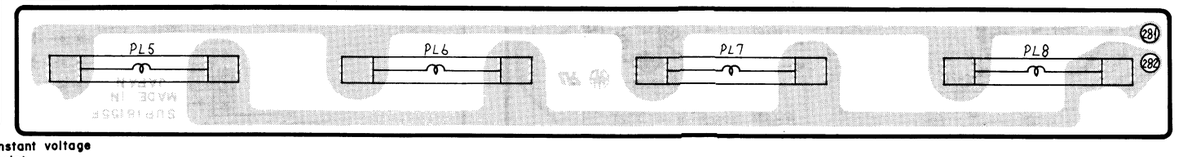



G PEAK POWER METER LAMPS

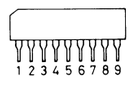


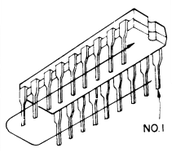

F PEAK POWER METER LAMPS




## • Terminal guide of transistors, diodes and IC's

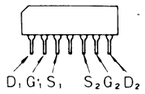
SVITA7317P
SVITA7318P



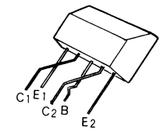

| | |
|---|---|
| AN6552F | 8pin |
| AN6552 | 8pin |
| MN1421STA | 28pin |
| SVITD6250IP | 16pin |

SVIμPA68H



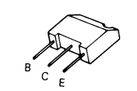

D1: Drain 1
G1: Gate 1
S1: Source 1
D2: Drain 2
G1: Gate 2
S2: Source 2

2SC2291 , 2SA995

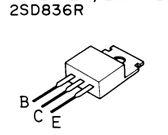


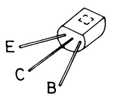

2SC1980S , 2SA722
2SA879NC , 2SC1573NC
2SC1328T , 2SA1123
2SC2631 , 2SC1885
2SA1015 , 2SA912
2SC1509 , 2SA777
2SA921 , 2SA564
2SC1685NC , 2SD788
2SC3112 , 2SC1815

2SD661 , 2SB745

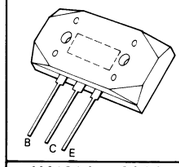



2SA913B , 2SC1913B
2SC2592R, 2SA1112R
2SD836R

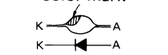


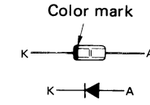

2SC3264 , 2SA1295



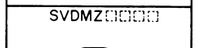

SVDMA26-1
SVDMA26-2
Color mark



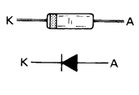

MA27WA
Color mark



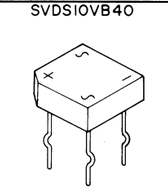

SVDMZ



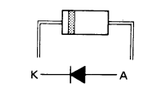

MA162A , 0A90
MA150



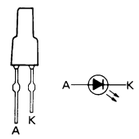

SVDS10VB40



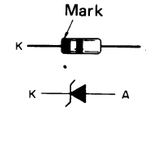
SVDSRIK2
SVDSRIK8




SVDAY5533K1M
SVDBG5533K-1




MA1120M
Mark



# ■ REPLACEMENT PARTS LIST (Cabinet and chassis parts)

**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 ⚠ 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 "**S**" 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.

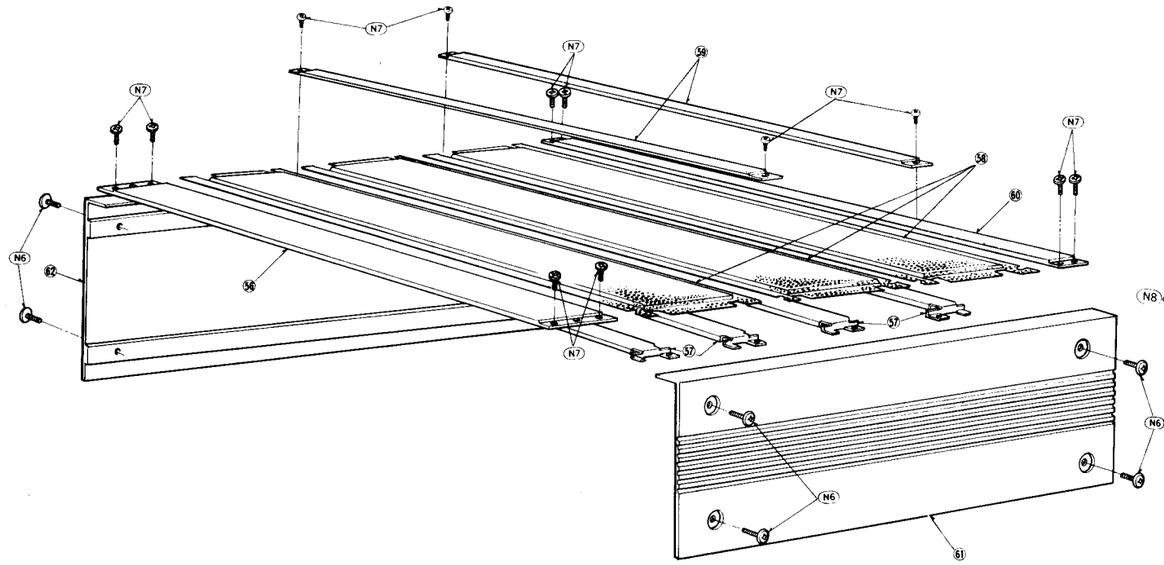
| Ref. No. | Part No. | Description & Pcs |
|---|---|---|
| **CABINET and CHASSISES** | | |
| 1 | SGWEA3MK2N | Panel, Front Ass'y (1) |
| 2 | SDU159–4 | Sheet (Orange) (1) |
| 3 | SDU159–3 | Sheet (White) (2) |
| 4 | SDU159–5 | Sheet (Green) (2) |
| 5 | SGU145 | Glass, Front (1) |
| 6 | SHGA971 | Spacer, Front Glass (5) |
| 7 | SBC261–1 | Button, Power Source (1) |
| 8 | SUS193 | Spring, Power Source (1) |
| 9 | SBC219–2 | Button, Speaker (4) |
| 10 | SUS159 | Spring, Speaker (8) |
| 11 | SHS6121 | Spacer, Push Switch (3) |
| 12 | SHG6123 | Spacer, Front Glass (1) |
| 13 | SGEEA3MK2N | Bracket Ass'y (with Filter) (1) |
| 14 | SDU31 | Filter (Yellow) (1) |
| 15 | SDU33 | Filter (Red) (4) |
| 16 | SDU41 | Filter (Yellow) (4) |
| 17 | SDU39 | Filter (Red) (1) |
| 18 | SHG1555–1 | Holder, Lamp (5) |
| 19 | SUW1645 | Holder, Lamp (1) |
| 20 | SGW2310BD | Panel, Front Bottom (1) |
| 21 | SUWEA3MK2N–1 | Bracket Ass'y, Meter (1) |
| 22 | SGW2350B | Bracket (Right) (1) |
| 23 | SHGA629 | Spacer, Panel (2) |
| 24 | SUW1651 | Bracket (1) |
| 25 | SGW2351B | Bracket (Left) (1) |
| 26 | SUW2039 | Holder, LED (1) |
| 27 | SDH545 | Reflector Plate (1) |
| 28 | SMP335–1 | Holder, LED (1) |
| 29 | SSM153–1 | Meter (1) |
| 30 | SUW1603 | Bracket, Headphone (1) |
| 31 | XCJ6P21B–A | Jack, Headphone (1) |
| 32 | SUWEA3MK2N–2 | Bracket, Lamp (1) |
| 33 | SMP275 | Bracket, Lamp (1) |
| 34 | SJT347 | Crip, Fuse (12) |
| 35 | SUW1961–1 | Bracket (4) |
| 36 | SDU35 | Filter, Meter (1) |
| 37 | SKU8270 | Bottom Board (1) |
| 38 | SKL239 | Foot (4) |
| 39 | SUH461–1 | Bracket (2) |
| 40 | SML95–1 | Bracket, Power Trans. (1) |
| 41 | SUW1601 | Bracket, Heat Sinker (4) |
| 42 | SUW1607 | Bracket, Heat Sinker (2) |

| Ref. No. | Part No. | Description & Pcs |
|---|---|---|
| 43 | SUW1617 | Bracket, Heat Sinker (2) |
| 44 | RHR110 | Bushing (2) |
| 45 | SJF4811 | Terminal Board, Output (1) |
| 46 | SJF3431A | Terminal Board, Input (1) |
| 47 | SUW1613 | Bracket (1) |
| **48**[EW,XA] | SHR127 | Bushing (1) |
| **48**[EK] | SHR129 | Bushing (1) |
| **48**[other] | SHR131 | Bushing (1) |
| **49**[EW] ⚠ | SJA111 | Cord, Power Source (1) |
| **49**[EK]**S** ⚠ | QFC1205M | Cord, Power Source (1) |
| **49**[XA] ⚠ | SJA121 | Cord, Power Source (1) |
| **49**[other] ⚠ | SJA123 | Cord, Power Source (1) |
| 50 | SUV453 | Cover, Voltage Selector (1) |
| **51**[EW,EK, XA] | SGP2151–3A | Rear Panel (1) |
| **51**[other] | SGP2151–2A | Rear Panel (1) |
| 52 | SKL241 | Foot (4) |
| 53 | SBN613 | Knob (2) |
| 54 | SUW1615 | Bracket (1) |
| 55 | SUW1611 | Bracket (2) |
| 56 | SKP75 | Cabinet, Front Upper (1) |
| 57 | SUH597 | Bracket (4) |
| 58 | SGM89 | Bracket (3) |
| 59 | SKP81 | Cabinet, Upper, Center (2) |
| 60 | SKP79 | Cabinet, Upper, Rear (1) |
| 61 | SKS29 | Cabinet, Right (1) |
| 62 | SKS29–1 | Cabinet, Left (1) |
| 63 | SUW1619 | Bracket (1) |
| 64 | SHR301 | Clamper, Read Wire (5) |
| 65[XA] only | SMX685 | Cover, Capacitor (1) |
| **SCREWS** | | |
| N1 **S** | XTB3+8BFZ | Tapping, ⊕3x8 (4) |
| N2 **S** | XTB3+8BFZ | Tapping, ⊕3x8 (1) |
| N3 **S** | XTB3+8BFZ | Tapping, ⊕3x8 (6) |
| N4 **S** | XTB3+8BFZ | Tapping, ⊕3x8 (2) |
| N5 **S** | XTB3+8BFZ | Tapping, ⊕3x8 (3) |
| N6 | XSSS5+12F1S | (8) |
| N7 **S** | XTB3+8BFZ | Tapping, ⊕3x8 (28) |
| N8 **S** | XSN3+6FZS | ⊕3x6 (2) |

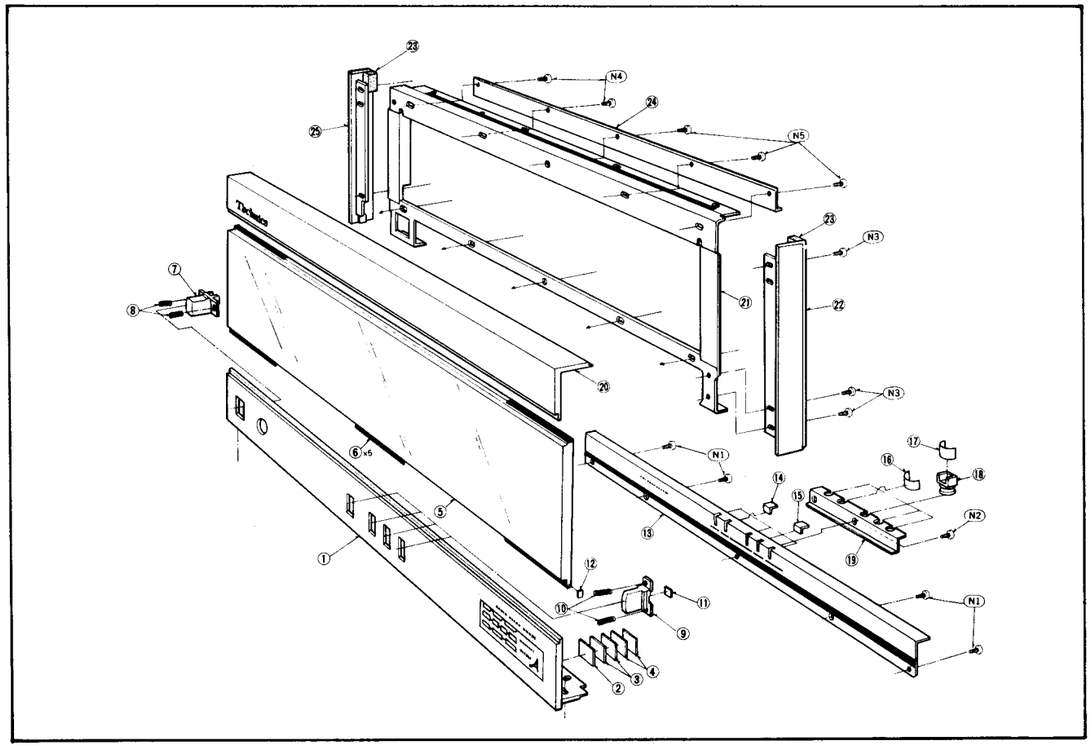
| Ref. No. | Part No. | Description & Pcs |
|---|---|---|
| N12 **S** | XTB3+8BFZ | Tapping, ⊕3x8 (2) |
| N13 **S** | XTB3+8BFZ | Tapping, ⊕3x8 (6) |
| N14 **S** | XTB3+8BFZ | Tapping, ⊕3x8 (4) |
| N15 **S** | XTB3+8BFZ | Tapping, ⊕3x8 (2) |
| N18 **S** | XTB3+8BFZ | Tapping, ⊕3x8 (4) |
| N19 **S** | XSN5+12S | ⊕5x12 (4) |
| N22 **S** | XSN4+10FZS | ⊕4x10 (4) |
| N24 **S** | XTB3+8BFZ | Tapping, ⊕3x8 (8) |
| N25 **S** | XTB3+8BFZ | Tapping, ⊕3x8 (5) |
| N26 **S** | XTB3+8BFZ | Tapping, ⊕3x8 (4) |
| N27 **S** | XTB4+8BFZ | Tapping, ⊕4x8 (30) |
| N28 **S** | XTB4+12BFZ | Tapping, ⊕4x12 (12) |
| N29 **S** | XTB4+12BFZ | Tapping, ⊕4x12 (4) |
| **WASHERS** | | |
| N9 **S** | XWA3B | Spring, $\phi$3 (2) |
| N16 **S** | XWA3B | Spring, $\phi$3 (6) |
| N20 **S** | XWA5B | Spring, $\phi$5 (4) |
| N23 **S** | XWA4B | Spring, $\phi$4 (4) |
| N30 **S** | XWG5 | Plain, $\phi$5 (6) |
| N31 **S** | XWC8B | Spring with Detent, $\phi$8 (2) |
| **NUTS** | | |
| N10 **S** | XNS12 | $\phi$12 (1) |
| N11 | SNE59–1 | (1) |
| N17 **S** | XNG3BS | $\phi$3 (6) |
| N30 **S** | XNS8 | $\phi$8 (2) |
| **ACCESSORIES** | | |
| A1 [other] | SQF11773 | Instruction Book (1) |
| A2 [XA] only | SJP9215 | Cord (1) |
| A3 | SJP2237–2 | Plug (1) |
| **PACKING PARTS** | | |
| **P1** [EF] | SPG4481–1 | Carton Box (1) |
| **P1** [other] | SPG4477–1 | Carton Box (1) |
| P2 | SPS2605–2 | Pad, Bottom (1) |
| P3 | SPS2607 | Pad, Upper (1) |
| P4 | SPS2789 | Pad, Rear (1) |
| P5 | SPE349 | Pad, Panel (1) |
| P6 | SPH6279 | Polyethylene Sheet (1) |
| P7 | SPH6281 | Polyethylene Sheet (1) |



# ■ EXPLODED VIEWS




● **Front panel**



[XA] only

Power Switch (S5)

Capacitor

PL1 ~8

S5

S6

VR101

VR102

Speaker terminal P.C.B.

## ■ SCHEMATIC DIAGRAM

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

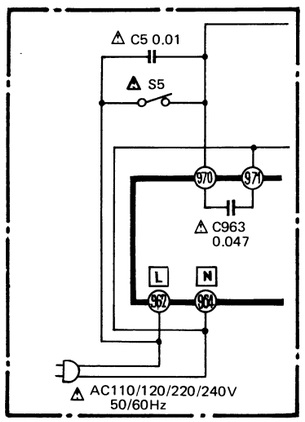
- **The part No. of transistors, IC and diodes mentioned in the schematic diagram stand for production part No. Regarding the part No. with ⓞ mark, the production part No. are different from the replacement part No. Therefore, when placing an order for replacement parts, pleases use the part No. in the replacement parts list.**

**Notes**

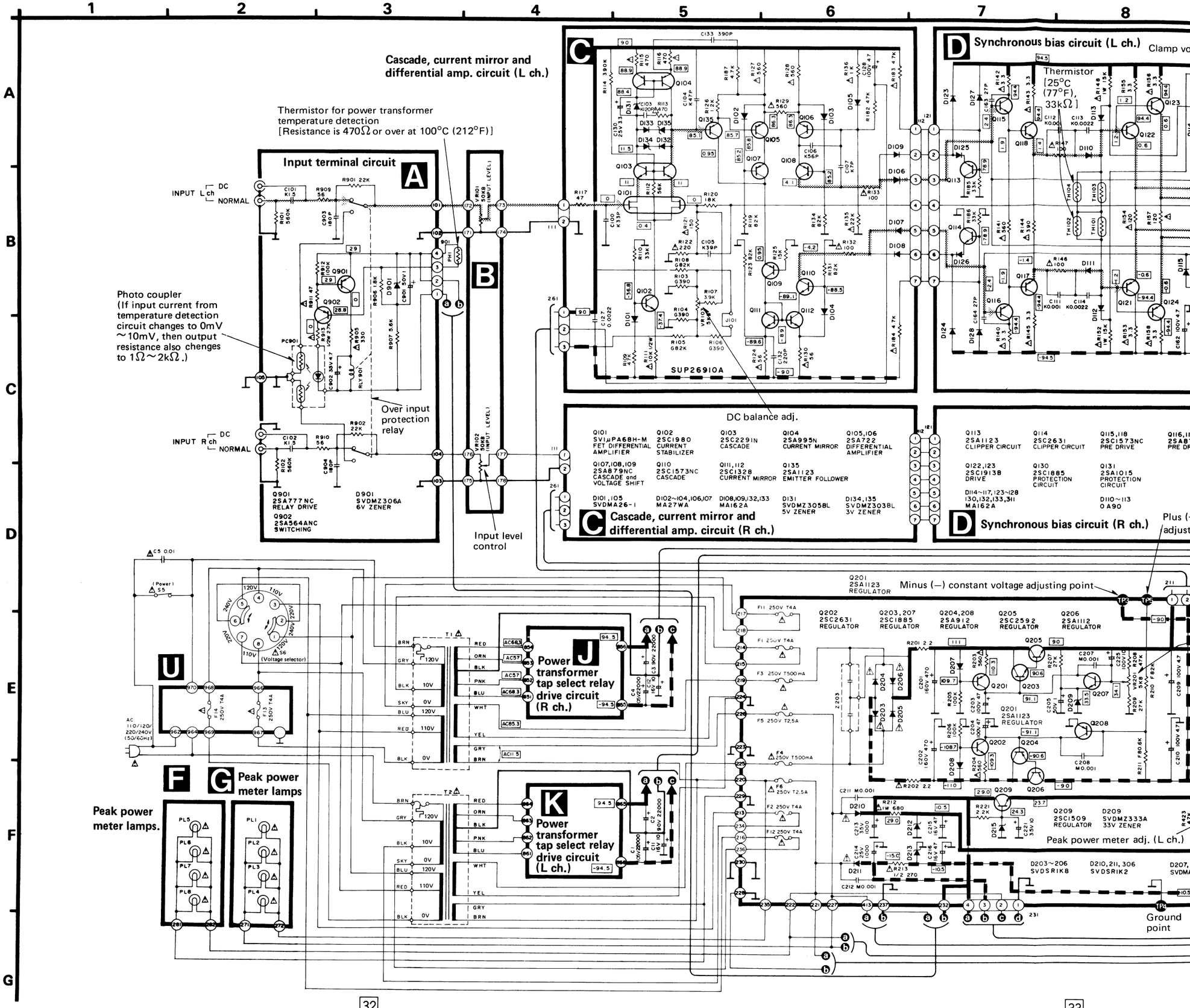
1. **S1 ~ S4:** Speaker selection switches in **"main"** position.
   S1: off, S2: main, S3: remote, S4: main and remote
2. **S5:** Power switch in **"on"** position.
3. **S6:** Voltage selector switch in **"240V"** position.
   120V ↔ 110V ↔ 220V ↔ 240V
4. Important safety notice:
   Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.
5. ▭ indicated voltage values 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. (high tap)
6. ▒▒▒ Phono signal lines
7. ▬▬ Positive (+B) voltage lines
8. ▬▬▶ Negative (—B) voltage lines

- **Circuit to be changed**

**For [EF] area**





## D Synchronous bias circuit (L ch.)

Clamp voltage adj.

Thermistor [25°C (77°F), 33kΩ]

ICQ adj.

## E Power amplifier circuit (L ch.)

Adjustment points of ICQ and clamp voltage

SUP26930A

## L Speaker selector and protection circuit

D301, 307, 351~355 MA150

D302, 303, 305 SVDSRIK2

Q301, 302, 351 2SA777 SWITCHING

Q305 2SA921 SWITCHING

Q303, 304 2SC1815 SWITCHING

Q306 2SA564 SWITCHING

D308 SVDMZ305 5V ZENER

D309 SVDMZ324 24V ZENER

L ch MAIN R ch

SPEAKERS

L ch REMOTE R ch

IC301 SVITA7317P MUTING and RELAY DRIVE

Q113 2SA1123 CLIPPER CIRCUIT

Q114 2SC2631 CLIPPER CIRCUIT

Q115,118 2SC1573NC PRE DRIVE

Q116,117 2SA879NC PRE DRIVE

Q121,124 2SA913B DRIVE

Q122,123 2SC1913B DRIVE

Q130 2SC1885 PROTECTION CIRCUIT

Q131 2SA1015 PROTECTION CIRCUIT

D110~113 0A90

D114~117, 123~128 130, 132, 133, 341 MA162A

Q120 2SB745 CLAMP VOLTAGE CONTROL

Q114, 119 2SD661 Icq adj. and CLAMP VOLTAGE CONTROL

Q125~128 2SC3264 POWER AMPLIFIER

Q135~138 2SA1295 POWER AMPLIFIER

D151, 152 MA27WA

## E Power amplifier circuit (R ch.)

## D Synchronous bias circuit (R ch.)

Plus (+) constant voltage adjusting poin

(+) constant voltage adjusting point

Q204, 208 2SA912 REGULATOR

Q205 2SC2592 REGULATOR

Q206 2SA1112 REGULATOR

Voltage regulator adj.

IC401, 403 SVITA7318P POWER COMPRESSOR

IC401

IC403

Thermistor [25°C (77°F), 10kΩ]

Peak power meter adj. (L ch.)

Q201 2SA1123 REGULATOR

Q209 2SC1509 REGULATOR

D209 SVDMZ333A 33V ZENER

IC402 AN6552F METER DRIVE

Peak power meter protection relay

D203~206 SVDSRIK8

D210, 211, 306 SVDSRIK2

D207, 208 SVDMA26-2

D212, 213 SVDMZ310B 10V ZENER

D215 SVDMZ324A 24V ZENER

D401~404 MA150

Ground point

Peak power meter adj. (R ch.)

Peak power meter adj. (R ch.)

## H Meter amp. and regulator circuit

## I

HEADPHONES

PEAK POWER METER

## M Speaker selector switch circuit

(MAIN and REMOTE) S4

(REMOTE) S3

(MAIN) S2

S1 (OFF)

PL9 power

PL13 stand by /protection

PL10 main

PL12 remote

PL11 main and remote

**Computer drive monitor indicators** **N**

Q751, 752 2SC3112 SWITCHING

D751, 752, 754~757 SVDAY5533KIM

D753 SVDBG5533K-1

D751 : SIGNAL
D752 : THERMAL
D753 : AUTO
D754 : PREHEAT
D755 : LOW
D756 : MID
D757 : HIGH

60°C (140°F) sensor [Resistance is 770Ω or over at 60°C]

100°C (212°F) sensor [Resistance is 770Ω or over at 100°C]

130°C (266°F) sensor [Resistance is 770Ω or over at 130°C]

**Temperature detection circuit (L ch.)** **P**

**Temperature detection circuit (R ch.)** **Q**

Clock adj. (400kHz)

Clock (400kHz) adjusting point

TP701

IC701 MN1421STA ICQ CONTROLLER

IC703

IC702

Z704 (5.6K x 7)

Z703 (100K x 3)

Q705 2SC2631 SWITCHING (Icq CONTROL)

Q706

IC702,703 SVTTD6250IP INVERTER

D711 0A90

D702 SVDMZ308B 8V ZENER

Q701 2SD788 REGULATOR

D701 SVDMZ306A 6V ZENER

D703~709, 710, 712 MA150

**ICQ control circuit** **O**

**S**

D951 SVDSRIK2

**T**

D951 SVDSRIK2

Normal ON

D851 SVDS10VB40

D853 SVDSRIK2

**J**

D852 SVDS10VB40

D854 SVDSRIK2

**K**

**Power transformer tap select relay drive circuit (R ch.)**

**Power transformer tap select relay drive circuit (L ch.)**

Q851 2SA777NC TAP SELECT RELAY DRIVE

D855 MA1120M 12V ZENER

D856 SVDSRIK2

Q852,853 2SD836 REGULATOR

Load impedance detection (L ch.) adjusting point

Load impedance detection adj. (L ch.)

D604 SVDMZ306A 6V ZENER

Q602 2SC1685NC SWITCHING

Q603 2SA564 SWITCHING

Q604 2SD788 SWITCHING

IC601 AN6552 VOLTAGE COMPARATOR

Q601 2SC1685NC TAP SELECT RELAY DRIVE

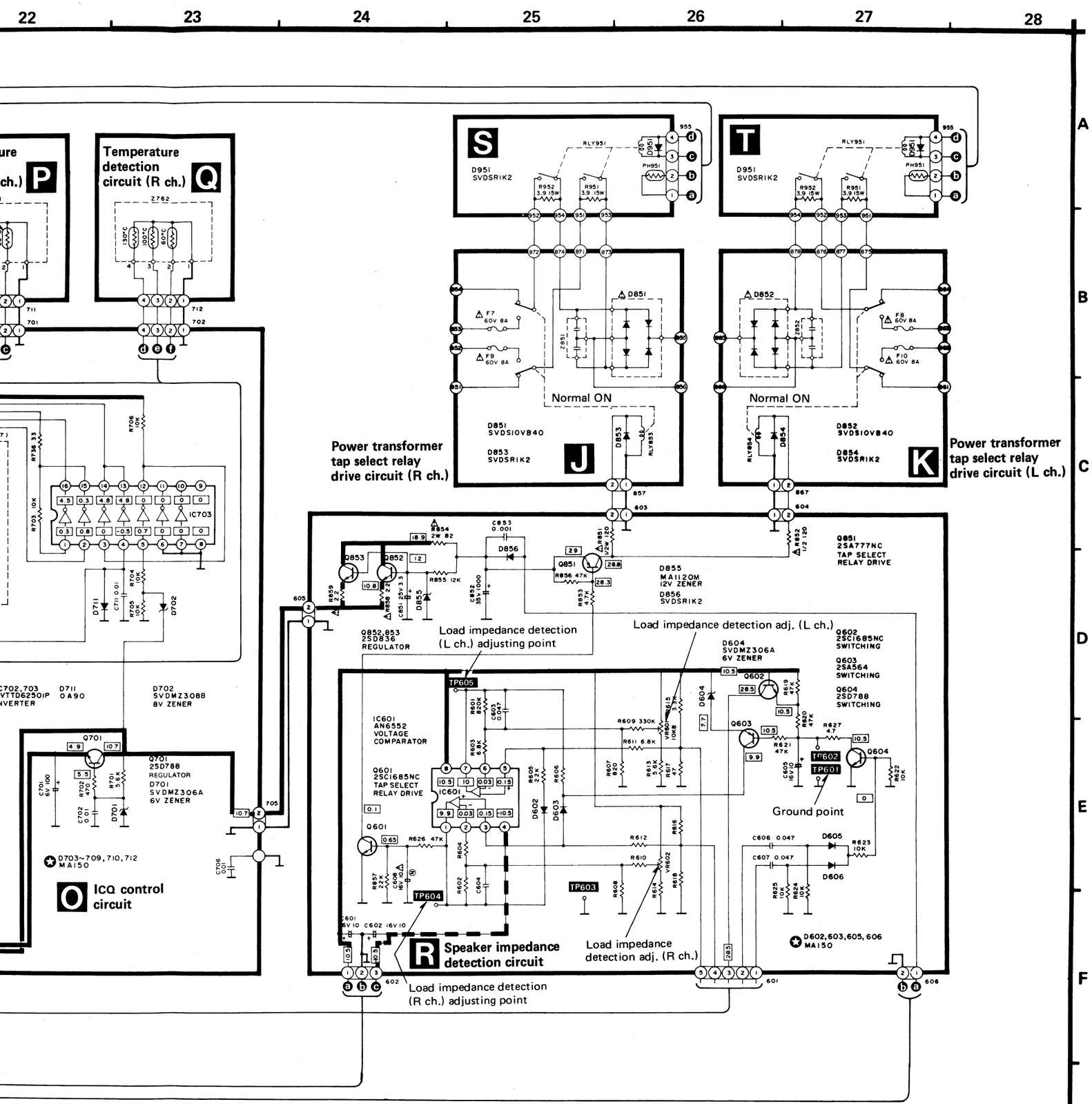
Ground point

**Speaker impedance detection circuit** **R**

Load impedance detection adj. (R ch.)

Load impedance detection (R ch.) adjusting point

D602, 603, 605, 606 MA150




**Note**

1. Transistor No. of Q135 (2SA1123) used in cascode, current mirror and differential amplifier circuit (C) and that of Q135 (2SA1295) used in power amplifier circuit (E) are overlapping. So, be careful of this point when replacing the part.
2. Transistor No. of Q114 (2SC2631) used in New Class A drive amplifier and synchronous bias circuit (D) and that of Q114 (2SD661) used in power amplifier circuit (E) are overlapping. So, be careful of this point when replacing the parts.

# ■ REPLACEMENT PARTS LIST (Electric parts)

**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 ⚠ 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 "**S**" 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.

| Ref. No. | | Part No. | Description |
|---|---|---|---|
| **INTEGRATED CIRCUITS** | | | |
| IC301 | | SVITA7317P | Speaker Protection |
| IC401,403 | | SVITA7318P | Log. Amp. |
| IC402 | | AN6552F | Meter Amp. |
| IC601 | | AN6552F | Voltage Comparator |
| IC701 | | MN1421STA | Micro Com. |
| IC702,703 | | SVITD62501P | Inverter |
| **TRANSISTORS** | | | |
| (Q101)x2 | | SVIUPA68H–LM | FET Differential Amp. |
| (Q102)x2 | S | 2SC1980–T | Constant Current |
| (Q103)x2 | S | 2SC2291–G | Cascade |
| (Q104)x2 | S | 2SA995N–G | Current Mirror |
| (Q105,106)x2 | S | 2SA722–S | Differential Amp. |
| (Q107~109)x2 | | SWV59 | Cascade & Voltage Shift |
| (Q110)x2 | | SWV61 | Driver |
| (Q111,112)x2 | S | 2SC1328–T | Current Mirror |
| (Q113,135)x2 | S | 2SA1123–R | Clipper Circuit & Emitter Follower |
| (Q114)x2 | S | 2SC2631–R | Clipper Circuit |
| (Q115,118)x2 | | SWV61 | Pre Driver |
| (Q116,117)x2 | | SWV59 | Pre Driver |
| (Use pair ranks as same as Q115~Q118) | | | |
| (Q114,119)x2 | S | 2SD661–S | ICQ Adj. |
| (Q120)x2 | S | 2SB745–S | Clamp Voltage Control |
| (Q121,124)x2 | | 2SA913B–Q | Driver |
| (Q122,123)x2 | | 2SC1913B–Q | Driver |
| (Use pair ranks as same as Q121~124) | | | |
| (Q125~128)x2 | | 2SC3264–Y | Power |
| (Q135~138)x2 | | 2SA1295–Y | Power |
| (Use pair ranks as same as Q125~128, Q135~138) | | | |
| (Q130)x2 | S | 2SC1885–R | DC Detector |
| (Q131)x2 | S | 2SA1015–Y | DC Detector |
| Q201 | S | 2SA1123–R | Regulator |
| Q202 | S | 2SC2631–R | Regulator |
| Q203,207 | S | 2SC1885–R | Regulator |
| Q204,208 | S | 2SA912–R | Regulator |
| Q205 | S | 2SC2592–R | Regulator |
| Q206 | S | 2SA1112–R | Regulator |
| Q209 | S | 2SC1509F–R | Regulator |
| Q301,302,351 | S | 2SA777NC–R | Relay Drive |
| Q303,304 | S | 2SC1815–Y | Relay Drive |
| Q305 | S | 2SA921–T | Switching |
| Q306 | S | 2SA722–S | Switching |
| Q601,602 | S | 2SC1685–Q | Tap Selector |
| Q603 | S | 2SA722–S | Switching |
| Q604,701 | | 2SD788–D | Switching |
| Q705,706 | S | 2SC2631–R | ICQ Control |
| Q751,752 | | 2SC3112 | Switching |
| Q851 | S | 2SA777NC–R | Tap Selector |
| Q852,853 | S | 2SD836–Q | Regulator |
| Q901 | S | 2SA777NC–R | Relay Drive |
| Q902 | S | 2SA722–S | Switching |

| Ref. No. | | Part No. | Description |
|---|---|---|---|
| **DIODES** | | | |
| (D101,105)x2 | S | MA27A1 | Bias |
| (D102~104)x2 | | MA27W–A | Bias |
| (D106,107)x2 | | MA27W–A | Bias |
| (D108,109)x2 | S | MA162A | Detector |
| (D110~113)x2 | S | 20A90 | Switching |
| (D114~117)x2 | S | MA162A | Switching |
| (D123~128)x2 | S | MA162A | Switching |
| (D131)x2 | | SVDMZ305BL | 5V Zener |
| (D132,133)x2 | S | MA162A | Switching |
| (D134,135)x2 | | SVDMZ303BL | 3V Zener |
| (D151,152)x2 | | MA27W–A | Bias |
| D203~206 | ⚠ | SVDSR1K8 | Rectifier |
| D207,208 | | MA27W–A | Bias |
| D209 | | SVDMZ333A | 33V Zener |
| D210,211,306 | ⚠ | SVDSR1K2 | Rectifier |
| D212,213 | | SVDMZ310B | 10V Zener |
| D215 | | SVDMZ324A | 24V Zener |
| D301,307, 351~355 | S | MA162A | Switching |
| D302,303,305 | ⚠ | SVDSR1K2 | Rectifier |
| D308 | | SVDMZ305BL | 5V Zener |
| D309 | | SVDMZ324 | 24V Zener |
| D311 (x2) | S | MA162A | Switching |
| D401~404 | S | MA162A | Rectifier |
| D405,406 | S | 20A90 | Switching |
| D602,603 | S | MA162A | Switching |
| D604,701 | | SVDMZ306A | 6V Zener |
| D605,606 | S | MA162A | Rectifier |
| D702 | | SVDMZ308B | 8V Zener |
| D703~710 | S | MA162A | Detector |
| D711 | S | 20A90 | Switching |
| D712 | S | MA162A | Detector |
| D751,752 | | SVDAY5533K1M | LED, Signal, Thermal |
| D753 | | SVDBG5533K-1 | LED, Auto |
| D754~757 | | SVDAY5533KIM | LED, Preheat, Low, Mid, High |
| D851,852 | ⚠ | SVDS10VB40 | Rectifier |
| D853,854 | | SVDSR1K2 | Switching |
| D855 | | MA1120H | 12V Zener |
| (D856,951)x2 | ⚠ | SVDSR1K2 | Rectifeir |
| D901 | | SVDMZ306A | 6V Zener |
| **THERMISTORS** | | | |
| (TH101~104)x2 | | ERTD2ZHL333S | 33kΩ |
| (PH1,951)x2 | | SRPBD47101 | 100°C |
| TH401,402 | | ERTD2ZHL103S | 10kΩ |
| **PHOTO INTERRUPTOR** | | | |
| PC901 | | SVEMCD7214F | Thermal Det. |

| Ref. No. | | Part No. | Description |
|---|---|---|---|
| **FUSES** | | | |
| F1,2,11,14 | ⚠ | XBA2C40TR0 | 250V, T4A |
| F3,4 | ⚠ | XBA2C05TR0 | 250V, T500mA |
| F5,6 | | XBA2C25TR0 | 250V, T2.5A |
| F7~10 | ⚠ | XBAS4A8001 | 60V, 8A |
| **COILS** | | | |
| L101,102 | | SLQY07G–10 | Choke |
| L955,956 | | ELQ050D15 | Choke |
| **TRANSFORMERS** | | | |
| T1 | ⚠ | SLT5S65–2 | Power Source |
| T2 | ⚠ | SLT5S65–1 | Power Source |
| **LAMPS** | | | |
| PL1~PL8 | | XAM43P | Meter |
| PL9~PL13 | S | XAMR48T250 | Speaker Ind. |
| PL751~753 | | XAMR74S17 | New Class A |
| **VARIABLE RESISTORS** | | | |
| VR101,102 | | EVH6UA524B54 | Input Level Adj, 50kΩ (B) |
| VR103(x2) | | EVMH8GA00B53 | DC Off-set Adj, 5kΩ (B) |
| (VR104, 105)x2 | | EVMH8GA00B13 | ICQ Adj, 1kΩ (B) |
| VR201 | | EVMH9GA00B53 | Meter Adj, 3kΩ (B) |
| VR601,602 | | EVMH8GA00B14 | Impedance Detector, 10kΩ (B) |
| VR701 | | EVMH8GA00B14 | Micom VCO Adj, 10kΩ (B) |
| **RELAYS** | | | |
| RLY301 | | SSY109–1 | Muting |
| RLY302,303 | ⚠ | SSY113 | Speaker Selector |
| RLY305 | | SSY83 | Meter Protector |
| RLY853,854 | ⚠ | SSY103–1 | Tap Select |
| RLY901 | | SSY115 | Input Level Select |
| RLY951(x2) | ⚠ | SSY103–1 | Tap Select |
| **SWITCHES** | | | |
| S1~4 | | SSH457 | Speaker Selector |
| S5 [XA]. | ⚠ | ESB9997S | Power Source |
| S5 [other] | ⚠ | ESB99399S | Power Source |
| S6 | ⚠ | ESE37200 | Voltage Selector |
| **COMPONENT COMBINATIONS** | | | |
| Z203 | | SXRFS203ZSM | 0.01μFx2 |
| Z703 | | EXBP83104M | 100kΩx4 |
| Z704 | | EXBP87562K | 5.6kΩx7 |
| Z761,762 | | SXRPTH517F03 | 60°C, 100°C, 130°C Sensor |
| Z851,852 | | SXRFS203ZSM | 0.01μFx2 |

**NOTE**

- Transistors (Q107~110, Q115~118) are provided with radiating fins when supplied.

| Circuit diagram No. | Transistor | Repair part No. |
|---|---|---|
| Q110, 115, 118 (Same on both Rch. and Lch.) | 2SC1573NC | SWV61 |
| Q107,108,109, 116, 117 (Same on both Rch. and Lch.) | 2SA879NC | SWV59 |





# ■ 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 ⚠ 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 = 1000Ω, M = 1000kΩ.
5. The unit of capacitance is μF (microfarad). P = $10^{-6}$ μF
6. Bracketed indications in Ref. No. columns spedify the area. Parts without these indications can be used for all areas.

| Resistor Type | Wattage | Tolerance |
|---|---|---|
| ERD : Carbon | 14 : 1/4W | J : ±5% |
| ERG : Metal Oxide | 25 : 1/4W | G : ±2% |
| ERO : Metal Film | 26 : 1/4W | K : ±10% |
| ERX : Metal Film | 1 : 1W | |
| ERC : Solid | 1A : 1W | |
| ERF : Non-flammable | 2A : 2W | |
| | 3A : 3W | |

| Capacitor Type | Voltage: ECEA Type | Voltage: Other | Tolerance |
|---|---|---|---|
| ECEA : Electrolytic | 1A : 10V | 1H : 50V | C : ±0.25pF |
| ECCD : Ceramic | 1C : 16V | KC : 400V AC | D : ±0.5pF |
| ECKD : Ceramic | 1E : 25V | 2H : 500V DC | M : ±20% |
| ECQM : Polyester | 1H : 50V | 2A : 250V AC | J : ±5% |
| ECET : Electrolytic | 1J : 63V | 2C : 160V DC | K : ±10% |
| ECEA..... N: Non Polar Electrolytic | 1V : 35V | | Z : +80%, −20% |
| ECQE : Polyester | 50 : 50V | | P : +100%, −0% |
| | 25 : 25V | | |
| | 2A : 100V | | |

| Ref. No. | | Part No. | Value |
|---|---|---|---|
| **RESISTORS** | | | |
| R101,102 | | ERO25CKF5603 | 560K |
| R103,104 (x2) | S | ERO25CKF3900 | 390 |
| R105 (x2) | S | ERO25CKF8202 | 82K |
| R106 (x2) | S | ERO25CKF3900 | 390 |
| R107 (x2) | S | ERO25CKF3900 | 390 |
| R108 (x2) | S | ERO25CKF8202 | 82K |
| R109 (x2) | S | ERO25CKF4702 | 47K |
| R110 (x2) | S | ERO25CKF3302 | 33K |
| R111 (x2)⚠S | | ERDS1FJ103 | 10K |
| R112 (x2) | S | ERO25CKF5602 | 56K |
| R113 | ⚠S | ERD25FJ471 | 470 |
| R114 | | ERO25CKF3903 | 390K |
| R115,116 ⚠S (x2) | | ERD25FJ471 | 470 |
| R117 (x2) | | ERO25CKF47R0 | 47 |
| R119 (x2) | S | ERO25CKF8202 | 82K |
| R120 (x2) | S | ERO25CKF1802 | 18K |
| R121 (x2)⚠S | | ERD25FJ151 | 150 |
| R122 (x2)⚠S | | ERD25FJ221 | 220 |
| R123 (x2) | S | ERO25CKF8202 | 82K |
| R124 (x2)⚠S | | ERD25FJ560 | 56 |
| R125 (x2) | S | ERO25CKF1502 | 15K |
| R126 (x2) | | ERO25CKF1201 | 1.2K |
| R127,128 ⚠S (x2) | | ERD25FJ561 | 560 |
| R129 (x2)⚠S | | ERD25FJ561 | 560 |
| R130 (x2)⚠S | | ERD25FJ560 | 56 |
| R131 (x2) | S | ERO25CKF8202 | 82K |
| R132,133 ⚠S (x2) | | ERD25FJ101 | 100 |
| R134 (x2) | S | ERO25CKF8202 | 82K |
| R135 (x2)⚠S | | ERD25FJ223 | 22K |
| R136 (x2)⚠S | | ERD25FJ102 | 1K |
| R137 (x2)⚠S | | ERD25FJ272 | 2.7K |
| R138 (x2)⚠S | | ERD25FJ821 | 820 |
| R139 (x2)⚠S | | ERD25FJ100 | 10 |
| R140 (x2)⚠S | | ERD25FJ3R3 | 3.3 |
| R141 (x2)⚠ | | ERD2FCG561 | 560 |
| R142,143 ⚠S (x2) | | ERD25FJ3R3 | 3.3 |
| R144 (x2)⚠ | | ERD2FCG391 | 390 |
| R145 (x2)⚠S | | ERD25FJ3R3 | 3.3 |
| R146,147 ⚠ (x2) | | ERD2FCG101 | 100 |
| R148 (x2) | S | ERG1ANJ153 | 15K |
| R149 (x2) | S | ERO25CKF1741 | 1.74K |
| R150 (x2)⚠S | | ERD25FJ392 | 3.9 |
| R151 (x2) | S | ERO25CKF1741 | 1.74K |
| R152 (x2) | S | ERG1ANJ153 | 15K |
| R153 (x2)⚠S | | ERD25FJ3R3 | 3.3 |
| R154 (x2)⚠ | | ERD2FCG121 | 120 |
| R155,156 ⚠S (x2) | | ERD25FJ3R3 | 3.3 |
| R157 (x2)⚠ | | ERD2FCG121 | 120 |
| R158 (x2)⚠S | | ERD25FJ3R3 | 3.3 |
| R159 (x2)⚠S | | ERD25FJ222 | 2.2K |
| R160,161 (x2) | S | ERO25CKF2202 | 22K |
| R162 (x2)⚠S | | ERD25FJ222 | 22K |
| R163,164 (x2) | | ERF5RKR33 | 0.33 |
| R165,166 (x2) | | ERF5RKR33 | 0.33 |
| R167,168 (x2) | | ERF5RKR33 | 0.33 |
| R169,170 (x2) | | ERF5RKR33 | 0.33 |
| R171,172 | S | ERG3ANJ100 | 10 |
| R173,174 | S | ERX3ANJ5R6 | 5.6 |
| R175,176 | S | ERG3ANJ331 | 330 |
| R182 (x2) | S | ERO25CKF4702 | 47K |
| R183,184 ⚠S (x2) | | ERD25FJ472 | 4.7K |
| R185,186 (x2) | S | ERO25CKF3302 | 33K |
| R187 (x2)⚠S | | ERD25FJ472 | 4.7K |
| R189,190 ⚠ (x2) | | ERD25FJ2R2 | |
| R191,192 ⚠ (x2) | | ERD25FJ2R2 | 2.2 |
| R193,194 ⚠S (x2) | | ERD25FJ2R2 | 2.2 |
| R195,196 ⚠S (x2) | | ERD25FJ2R2 | 2.2 |
| R197,198 ⚠S (x2) | | ERD25FJ2R2 | 2.2 |
| R201,202 ⚠S | | ERD25FAJ2R2 | 2.2 |
| R203,204 ⚠S | | ERD25FJ561 | 560 |
| R205,206 | S | ERO25CKF1003 | 100K |
| R207 | S | ERO25CKF2702 | 27K |
| R208 | S | ERO25CKF4702 | 47K |
| R209 | | ERO25CKF2702 | 27K |
| R210 | S | ERO25CKF8202 | 82K |
| R211 | | ERO25CKF8062 | 80.6K |
| R212 | S | ERG1ANJ681 | 680 |
| R213 | ⚠ | ERDS1FJ271 | 270 |
| R214 | ⚠S | ERD25FJ471 | 470 |
| R216 | ⚠S | ERD25FJ471 | 470 |
| R221 | | ERO25CKF2201 | 2.2K |
| R301,302 | S | ERO25CKF6802 | 68K |
| R303,304 | | ERO25CKF2202 | 22K |
| R305 | | ERO25CKF3901 | 3.9K |
| R307 | S | ERO25CKF5602 | 56K |
| R308 | S | ERO25CKF1202 | 12K |
| R309 | | ERO25CKF3901 | 3.9K |
| R310 | S | ERO25CKF5601 | 5.6K |
| R311 | S | ERO25CKF8201 | 8.2K |
| R312 | | ERO25CKF8202 | 82K |
| R313 | S | ERO25CKF5601 | 5.6K |
| R314 | S | ERO25CKF1802 | 18K |
| R315,316 ⚠S | | ERDS1FJ121 | 120 |
| R318 | ⚠S | ERDS1FJ121 | 120 |
| R319 | ⚠S | ERDS1FJ271 | 270 |
| R320 | S | ERO25CKF5601 | 5.6K |
| R321 | S | ERO25CKF1002 | 10K |
| R325 | S | ERO25CKF1002 | 10K |
| R326 | S | ERO25CKF1003 | 100K |
| R327 | S | ERO25CKF4702 | 47K |
| R331,332 | S | ERO25CKF1003 | 100K |
| R351 | | ERO25CKF8201 | 8.2K |
| R352 | | ERO25CKF1001 | 1K |
| R353,354 ⚠ | | ERDS1FJ121 | 120 |
| R356 | ⚠ | ERDS1FJ392 | 3.9K |
| R401,402 | S | ERO25CKF1003 | 100K |
| R403,404 | S | ERO25CKF2702 | 27K |
| R405,406 ⚠S | | ERC14GK165 | 1.6M |
| R407,408 ⚠S | | ERC14GK165 | 1.6M |
| R409,410 | S | ERO25CKF1001 | 1K |
| R411,412 | S | ERO25CKF4701 | 4.7K |
| R413,414 | S | ERO25CKF1002 | 10K |
| R415,416 | S | ERO25CKF3901 | 3.9K |
| R417,418 | S | ERO25CKF1003 | 100K |
| R419,420 | S | ERO25CKF4700 | 470 |
| R421,422 | | ERO25CKF4701 | 4.7K |
| R423,424 | | ERO26CKF4701 | 4.7K |
| R425,426 | S | ERO25CKF6801 | 6.8K |
| R601,602 | S | ERD25TJ824 | 820K |
| R603,604 | S | ERD25FJ682 | 6.8K |
| R605,606 | S | ERD25TJ223 | 22K |
| R607,608 | S | ERD25FJ821 | 820 |
| R609,610 | S | ERD25TJ334 | 330K |
| R611,612 | S | ERD25FJ682 | 6.8K |
| R613,614 | S | ERD25FJ562 | 5.6K |
| R615,616 | S | ERD25FJ332 | 3.3K |
| R617,618 | S | ERD25FJ470 | 47 |
| R619,620 | S | ERD25TJ473 | 47K |
| R621 | S | ERD25TJ473 | 47K |
| R622,623 | S | ERD25FJ103 | 10K |
| R624,625 | S | ERD25FJ103 | 10K |
| R626 | S | ERD25TJ473 | 47K |
| R627 | S | ERD25FJ4R7 | 4.7 |
| R701 | S | ERD25FJ562 | 5.6K |
| R702 | S | ERD25FJ471 | 470 |
| R703,704 | S | ERD25FJ103 | 10K |
| R705,706 | S | ERD25FJ103 | 10K |
| R707,708 | S | ERD25FJ472 | 4.7K |
| R709,710 | S | ERD25FJ472 | 4.7K |
| R711,712 | S | ERD25FJ472 | 4.7K |
| R713,714 | S | ERD25TJ333 | 33K |
| R715,716 | S | ERD25TJ123 | 12K |
| R717,718 | S | ERD25TJ183 | 18K |
| R719,720 | S | ERD25TJ333 | 33K |
| R721,722 | S | ERD25TJ273 | 27K |
| R723,724 | S | ERD25TJ273 | 27K |
| R725,726 | S | ERD25FJ562 | 5.6K |
| R727,728 | S | ERD25FJ222 | 2.2K |
| R729,730 | S | ERD25FJ103 | 10K |
| R733,734 | S | ERD25FJ103 | 10K |
| R735 | S | ERD25FJ332 | 3.3K |
| R736 | S | ERD25FJ330 | 33 |
| R737,738 | S | ERD25TJ333 | 33K |
| R739,740 | S | ERD25TJ333 | 33K |
| R751,752 | S | ERD25FJ121 | 120 |
| R753 | S | ERD25FJ121 | 120 |
| R754,755 | S | ERD25FJ101 | 100 |
| R756 | S | ERD25FJ332 | 3.3K |
| R757 | S | ERD25FJ150 | 15 |
| R851,852 ⚠S | | ERDS1FJ121 | 120 |
| R853 | S | ERD25FJ472 | 4.7K |
| R854 | S | ERG2ANJ820 | 82 |
| R855 | S | ERD25TJ123 | 12K |
| R856 | S | ERD25TJ473 | 47K |
| R857 | S | ERD25TJ223 | 22K |
| R858,859 ⚠S | | ERD25FJ2R2 | 2.2 |
| R901,902 | S | ERD25TJ223 | 22K |
| R905 ⚠S | | ERD25FJ331 | 330 |
| R906 | S | ERD25FJ182 | 1.8K |
| R907 | S | ERD25FJ562 | 5.6K |
| R909,910 | S | ERD25FJ560 | 56 |
| R911 ⚠S | | ERD25FJ470 | 47 |
| R912 | S | ERD25TJ104 | 100K |
| R913 ⚠S | | ERDS1FJ272 | 2.7K |
| R951,952 (x2) | | ERF15ZXK 3R9B | |

## ■ 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 ⚠ 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 = 1000Ω, M = 1000kΩ.
5. The unit of capacitance is μF (microfarad). P = $10^{-6}$ μF
6. Bracketed indications in Ref. No. columns spedify the area. Parts without these indications can be used for all areas.

| Resistor Type | Wattage | Tolerance |
|---|---|---|
| ERD : Carbon | 14 : 1/4W | J : ± 5% |
| ERG : Metal Oxide | 25 : 1/4W | G : ±2% |
| ERO : Metal Film | 26 : 1/4W | K : ±10% |
| ERX : Metal Film | 1 : 1W | |
| ERC : Solid | 1A : 1W | |
| ERF : Non-flammable | 2A : 2W | |
| | 3A : 3W | |

| Capacitor Type | Voltage: ECEA Type | Voltage: Other | Tolerance |
|---|---|---|---|
| ECEA : Electrolytic | 1A : 10V | 1H : 50V | C : ± 0.25pF |
| ECCD : Ceramic | 1C : 16V | KC : 400V AC | D : ±0.5pF |
| ECKD : Ceramic | 1E : 25V | 2H : 500V DC | M : ± 20% |
| ECQM : Polyester | 1H : 50V | 2A : 250V AC | J : ± 5% |
| ECET : Electrolytic | 1J : 63V | 2C : 160V DC | K : ± 10% |
| ECEA..... N: Non Polar Electrolytic | 1V : 35V | | Z : +80%, −20% |
| ECQE : Polyester | 50 : 50V | | P : +100%, −0% |
| | 25 : 25V | | |
| | 2A : 100V | | |

| Ref. No. | | Part No. | Value |
|---|---|---|---|
| **RESISTORS** | | | |
| R101,102 | | ERO25CKF5603 | 560K |
| R103,104 (x2) | S | ERO25CKF3900 | 390 |
| R105 (x2) | S | ERO25CKF8202 | 82K |
| R106 (x2) | S | ERO25CKF3900 | 390 |
| R107 (x2) | S | ERO25CKF3900 | 390 |
| R108 (x2) | S | ERO25CKF8202 | 82K |
| R109 (x2) | S | ERO25CKF4702 | 47K |
| R110 (x2) | S | ERO25CKF3302 | 33K |
| R111 (x2) ⚠S | | ERDS1FJ103 | 10K |
| R112 (x2) | S | ERO25CKF5602 | 56K |
| R113 ⚠S | | ERD25FJ471 | 470 |
| R114 | | ERO25CKF3903 | 390K |
| R115,116 ⚠S (x2) | | ERD25FJ471 | 470 |
| R117 (x2) | | ERO25CKF47R0 | 47 |
| R119 (x2) | S | ERO25CKF8202 | 82K |
| R120 (x2) | S | ERO25CKF1802 | 18K |
| R121 (x2) ⚠S | | ERD25FJ151 | 150 |
| R122 (x2) ⚠S | | ERD25FJ221 | 220 |
| R123 (x2) | S | ERO25CKF8202 | 82K |
| R124 (x2) ⚠S | | ERD25FJ560 | 56 |
| R125 (x2) | S | ERO25CKF1502 | 15K |
| R126 (x2) | | ERO25CKF1201 | 1.2K |
| R127,128 ⚠S (x2) | | ERD25FJ561 | 560 |
| R129 (x2) ⚠S | | ERD25FJ561 | 560 |
| R130 (x2) ⚠S | | ERD25FJ560 | 56 |
| R131 (x2) | S | ERO25CKF8202 | 82K |
| R132,133 ⚠S (x2) | | ERD25FJ101 | 100 |
| R134 (x2) | S | ERO25CKF8202 | 82K |
| R135 (x2) ⚠S | | ERD25FJ223 | 22K |
| R136 (x2) ⚠S | | ERD25FJ102 | 1K |
| R137 (x2) ⚠S | | ERD25FJ272 | 2.7K |
| R138 (x2) ⚠S | | ERD25FJ821 | 820 |
| R139 (x2) ⚠S | | ERD25FJ100 | 10 |
| R140 (x2) ⚠S | | ERD25FJ3R3 | 3.3 |
| R141 (x2) ⚠ | | ERD2FCG561 | 560 |
| R142,143 ⚠S (x2) | | ERD25FJ3R3 | 3.3 |
| R144 (x2) ⚠ | | ERD2FCG391 | 390 |
| R145 (x2) ⚠S | | ERD25FJ3R3 | 3.3 |
| R146,147 ⚠ (x2) | | ERD2FCG101 | 100 |
| R148 (x2) | S | ERG1ANJ153 | 15K |
| R149 (x2) | S | ERO25CKF1741 | 1.74K |
| R150 (x2) ⚠S | | ERD25FJ392 | 3.9 |
| R151 (x2) | S | ERO25CKF1741 | 1.74K |
| R152 (x2) | S | ERG1ANJ153 | 15K |
| R153 (x2) ⚠S | | ERD25FJ3R3 | 3.3 |
| R154 (x2) ⚠ | | ERD2FCG121 | 120 |
| R155,156 ⚠S (x2) | | ERD25FJ3R3 | 3.3 |
| R157 (x2) ⚠ | | ERD2FCG121 | 120 |
| R158 (x2) ⚠S | | ERD25FJ3R3 | 3.3 |
| R159 (x2) ⚠S | | ERD25FJ222 | 2.2K |
| R160,161 (x2) | S | ERO25CKF2202 | 22K |
| R162 (x2) ⚠S | | ERD25FJ222 | 22K |
| R163,164 (x2) | | ERF5RKR33 | 0.33 |
| R165,166 (x2) | | ERF5RKR33 | 0.33 |
| R167,168 (x2) | | ERF5RKR33 | 0.33 |
| R169,170 (x2) | | ERF5RKR33 | 0.33 |
| R171,172 | S | ERG3ANJ100 | 10 |
| R173,174 | S | ERX3ANJ5R6 | 5.6 |
| R175,176 | S | ERG3ANJ331 | 330 |
| R182 (x2) | S | ERO25CKF4702 | 47K |
| R183,184 ⚠S (x2) | | ERD25FJ472 | 4.7K |
| R185,186 (x2) | S | ERO25CKF3302 | 33K |
| R187 (x2) ⚠S | | ERD25FJ472 | 4.7K |
| R189,190 ⚠ (x2) | | ERD25FJ2R2 | |
| R191,192 ⚠ (x2) | | ERD25FJ2R2 | 2.2 |
| R193,194 ⚠S (x2) | | ERD25FJ2R2 | 2.2 |
| R195,196 ⚠S (x2) | | ERD25FJ2R2 | 2.2 |
| R197,198 ⚠S (x2) | | ERD25FJ2R2 | 2.2 |
| R201,202 ⚠S | | ERD25FAJ2R2 | 2.2 |
| R203,204 ⚠S | | ERD25FJ561 | 560 |
| R205,206 | S | ERO25CKF1003 | 100K |
| R207 | S | ERO25CKF2702 | 27K |
| R208 | S | ERO25CKF4702 | 47K |
| R209 | | ERO25CKF2702 | 27K |
| R210 | S | ERO25CKF8202 | 82K |
| R211 | | ERO25CKF8062 | 80.6K |
| R212 | S | ERG1ANJ681 | 680 |
| R213 ⚠ | | ERDS1FJ271 | 270 |
| R214 ⚠S | | ERD25FJ471 | 470 |
| R216 ⚠S | | ERD25FJ471 | 470 |
| R221 | | ERO25CKF2201 | 2.2K |
| R301,302 | S | ERO25CKF6802 | 68K |
| R303,304 | | ERO25CKF2202 | 22K |
| R305 | | ERO25CKF3901 | 3.9K |
| R307 | S | ERO25CKF5602 | 56K |
| R308 | S | ERO25CKF1202 | 12K |
| R309 | | ERO25CKF3901 | 3.9K |
| R310 | S | ERO25CKF5601 | 5.6K |
| R311 | S | ERO25CKF8201 | 8.2K |
| R312 | | ERO25CKF8202 | 82K |
| R313 | S | ERO25CKF5601 | 5.6K |
| R314 | S | ERO25CKF1802 | 18K |
| R315,316 ⚠S | | ERDS1FJ121 | 120 |
| R318 ⚠S | | ERDS1FJ121 | 120 |
| R319 ⚠S | | ERDS1FJ271 | 270 |
| R320 | S | ERO25CKF5601 | 5.6K |
| R321 | S | ERO25CKF1002 | 10K |
| R325 | S | ERO25CKF1002 | 10K |
| R326 | S | ERO25CKF1003 | 100K |
| R327 | S | ERO25CKF4702 | 47K |
| R331,332 | S | ERO25CKF1003 | 100K |
| R351 | | ERO25CKF8201 | 8.2K |
| R352 | | ERO25CKF1001 | 1K |
| R353,354 ⚠ | | ERDS1FJ121 | 120 |
| R356 ⚠ | | ERDS1FJ392 | 3.9K |
| R401,402 | S | ERO25CKF1003 | 100K |
| R403,404 | S | ERO25CKF2702 | 27K |
| R405,406 ⚠S | | ERC14GK165 | 1.6M |
| R407,408 ⚠S | | ERC14GK165 | 1.6M |
| R409,410 | S | ERO25CKF1001 | 1K |
| R411,412 | S | ERO25CKF4701 | 4.7K |
| R413,414 | S | ERO25CKF1002 | 10K |
| R415,416 | S | ERO25CKF3901 | 3.9K |
| R417,418 | S | ERO25CKF1003 | 100K |
| R419,420 | S | ERO25CKF4700 | 470 |
| R421,422 | | ERO25CKF4701 | 4.7K |
| R423,424 | | ERO25CKF4701 | 4.7K |
| R425,426 | S | ERO25CKF6801 | 6.8K |
| R601,602 | S | ERD25TJ824 | 820K |
| R603,604 | S | ERD25FJ682 | 6.8K |
| R605,606 | S | ERD25TJ223 | 22K |
| R607,608 | S | ERD25FJ821 | 820 |
| R609,610 | S | ERD25TJ334 | 330K |
| R611,612 | S | ERD25FJ682 | 6.8K |
| R613,614 | S | ERD25FJ562 | 5.6K |
| R615,616 | S | ERD25FJ332 | 3.3K |
| R617,618 | S | ERD25FJ470 | 47 |
| R619,620 | S | ERD25TJ473 | 47K |
| R621 | S | ERD25TJ473 | 47K |
| R622,623 | S | ERD25FJ103 | 10K |
| R624,625 | S | ERD25FJ103 | 10K |
| R626 | S | ERD25TJ473 | 47K |
| R627 | S | ERD25FJ4R7 | 4.7 |
| R701 | S | ERD25FJ562 | 5.6K |
| R702 | S | ERD25FJ471 | 470 |
| R703,704 | S | ERD25FJ103 | 10K |
| R705,706 | S | ERD25FJ103 | 10K |
| R707,708 | S | ERD25FJ472 | 4.7K |
| R709,710 | S | ERD25FJ472 | 4.7K |
| R711,712 | S | ERD25FJ472 | 4.7K |
| R713,714 | S | ERD25TJ333 | 33K |
| R715,716 | S | ERD25TJ123 | 12K |
| R717,718 | S | ERD25TJ183 | 18K |
| R719,720 | S | ERD25TJ333 | 33K |
| R721,722 | S | ERD25TJ273 | 27K |
| R723,724 | S | ERD25TJ273 | 27K |
| R725,726 | S | ERD25FJ562 | 5.6K |
| R727,728 | S | ERD25FJ222 | 2.2K |
| R729,730 | S | ERD25FJ103 | 10K |
| R733,734 | S | ERD25FJ103 | 10K |
| R735 | S | ERD25FJ332 | 3.3K |
| R736 | S | ERD25FJ330 | 33 |
| R737,738 | S | ERD25TJ333 | 33K |
| R739,740 | S | ERD25TJ333 | 33K |
| R751,752 | S | ERD25FJ121 | 120 |
| R753 | S | ERD25FJ121 | 120 |
| R754,755 | S | ERD25FJ101 | 100 |
| R756 | S | ERD25FJ332 | 3.3K |
| R757 | S | ERD25FJ150 | 15 |
| R851,852 ⚠S | | ERDS1FJ121 | 120 |
| R853 | S | ERD25FJ472 | 4.7K |
| R854 | S | ERG2ANJ820 | 82 |
| R855 | S | ERD25TJ123 | 12K |
| R856 | S | ERD25TJ473 | 47K |
| R857 | S | ERD25TJ223 | 22K |
| R858,859 ⚠S | | ERD25FJ2R2 | 2.2 |
| R901,902 | S | ERD25TJ223 | 22K |
| R905 ⚠S | | ERD25FJ331 | 330 |
| R906 | S | ERD25FJ182 | 1.8K |
| R907 | S | ERD25FJ562 | 5.6K |
| R909,910 | S | ERD25FJ560 | 56 |
| R911 ⚠S | | ERD25FJ470 | 47 |
| R912 | S | ERD25TJ104 | 100K |
| R913 ⚠S | | ERDS1FJ272 | 2.7K |
| R951,952 (x2) | | ERF15ZXK 3R9B | |

| Ref. No. | | Part No. | Value |
|---|---|---|---|
| **CAPACITORS** | | | |
| C1 ~ 4 ⚠ | | ECEGL2AR223X | 22000 |
| C5 ⚠ | | ECKDKC103PF | 0.01 |
| C11, 12 | | ECEAICS100 | 10 |
| C100 (x2) | S | ECCD1H330K | 33P |
| C101,102 | | ECQE1155KZ | 1.5 |
| C103 (x2) | S | ECCD1H121K | 120P |
| C104 (x2) | S | ECCD1H470K | 47P |
| C105 (x2) | S | ECCD1H390K | 39P |
| C106 (x2) | S | ECCD1H560K | 56P |
| C107 (x2) | S | ECCD1H070CC | 7P |
| C111,112 (x2) | S | ECQM1H102JZ | 0.001 |
| C113,114 (x2) | S | ECQM1H222JZ | 0.0022 |
| C115,116 (x2) | S | ECKD1H102MD | 0.001 |
| C117,118 (x2) | S | ECKD1H471KB | 470P |
| C119,120 | S | ECQM1H683JZ | 0.068 |
| C121,122 | S | ECQM1H683JZ | 0.068 |
| C127 (x2) | | ECKD2H222KB | 0.0022 |
| C128 (x2) | S | ECEA2AS4R7 | 4.7 |
| C130 (x2) | S | ECEA50Z3R3 | 3.3 |
| C131 (x2) | S | ECEA50Z1 | 1 |
| C132 (x2) | S | ECKD1H221KB | 220P |
| C133 (x2) | S | ECKD1H391KB | 390P |
| C151 (x2) | S | ECKD1H102MD | 0.001 |
| C161,162 (x2) | S | ECEA2AS4R7 | 4.7 |
| C163,164 (x2) | S | ECCD1H270K | 27P |
| C201,202 | | ECET2CR471SL | 470 |
| C203,204 | S | ECEA2AS470 | 47 |
| C205 | S | ECEA50Z1 | 1 |
| C207,208 | S | ECKD1H102ZF | 0.001 |
| C209,210 | S | ECEA2AS4R7 | 4.7 |
| C211,212 | S | ECKD1H102ZF | 0.001 |
| C213 | S | ECEA1VS102 | 1000 |
| C214 | S | ECEA1VS102 | 1000 |
| C215,216 | S | ECEA1ES470 | 47 |
| C217,218 | S | ECEA1ES221 | 220 |
| C221 | S | ECEA1HS100 | 10 |
| C225 | S | ECEA2AS100 | 10 |
| C301,302 ⚠S | | ECEA1CN101S | 100 |
| C303 | S | ECEA50Z1 | 1 |
| C304 | S | ECEA50Z3R3 | 3.3 |
| C305 | S | ECKD1H102ZF | 0.001 |
| C310 | S | ECEA1VS330 | 33 |
| C311 | S | ECEA1HS470 | 47 |
| C320 | S | ECEA1VS330 | 33 |
| C321 | S | ECKD1H103ZF | 0.01 |
| C351 | S | ECEA1VS100 | 10 |
| C401,402 ⚠S | | ECEA1HN3R3S | 3.3 |
| C403,404 | S | ECQM1H104JZ | 0.1 |
| C405 | S | ECEA50ZR47 | 0.47 |
| C407,408 | S | ECKD1H221KB | 220P |
| C411,412 | | ECQP1822FZ | 0.0082 |
| C415 | S | ECEA50ZR47 | 0.47 |
| C601,602 | S | ECEA1HS100 | 10 |
| C603,604 | S | ECQM1H473JZ | 0.047 |
| C605 | S | ECEA1HS100 | 10 |
| C606,607 | S | ECQM1H473JZ | 0.047 |
| C608 ⚠S | | ECEA1CN100S | 10 |
| C701 | S | ECEA1AS101 | 100 |
| C702 | S | ECKD1H103ZF | 0.01 |
| C703,704 | S | ECEA50Z3R3 | 3.3 |
| C705 | S | ECKD1H271KB | 270P |
| C706 | S | ECKD1H103ZF | 0.01 |
| C707 | S | ECEA50ZR47 | 0.47 |
| C708 | S | ECKD1H103ZF | 0.01 |
| C710,711 | S | ECKD1H103ZF | 0.01 |
| C712 | S | ECEA1AS101 | 100 |
| C751 | S | ECKD1H102ZF | 0.001 |
| C851 | S | ECEA50Z3R3 | 3.3 |
| C852 | S | ECEB1VS102 | 1000 |
| C853 | S | ECKD1H102ZF | 0.001 |
| C901 | S | ECEA50Z1 | 1 |
| C902 | S | ECEA1JS4R7 | 4.7 |
| C903,904 | S | ECCD1H181K | 180P |



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