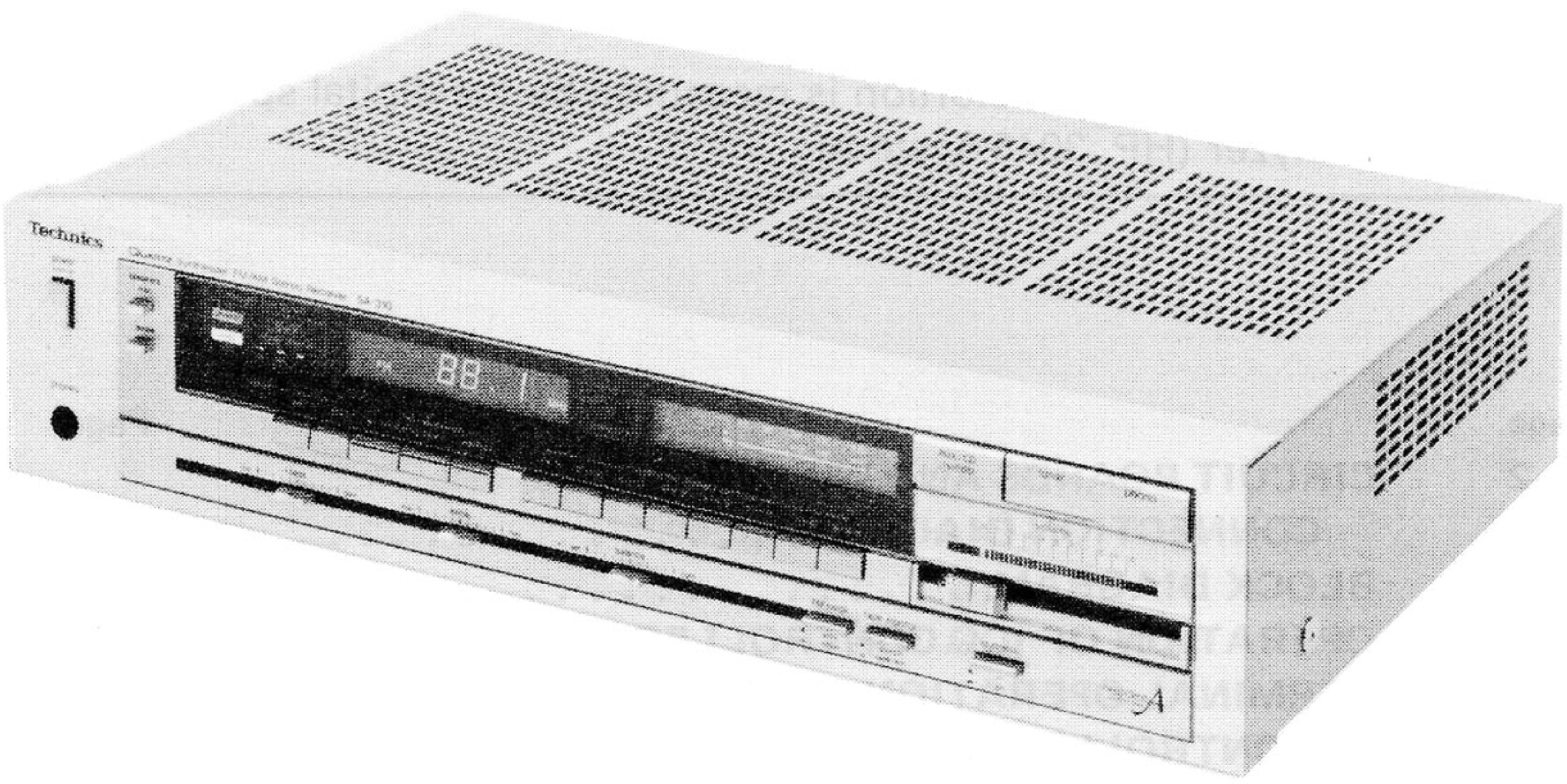
ORDER NO. SD82112339C1

Service Manual

QUARTZ Synthesizer FM/AM Stereo Receiver

SA-310

[M], [MC]



Areas

* [M] is available in U.S.A.
* [MC] is available in Canada.

Specifications

(Specifications are subject to change without notice for further improvement.)
(Weights and dimensions shown are approximate.)

(IHF '78)

■ AMPLIFIER SECTION

Rated minimum sine wave RMS power output
20 Hz~20 kHz both channels driven
0.02% total harmonic distortion
35W per channel (8 ohms)

1 kHz continuous power output both channels driven 0.02% total harmonic distortion	37W per channel (8 ohms)
Dynamic headroom	1.2 dB (8 ohms)
Total harmonic distortion	
rated power at 20 Hz~20 kHz	0.02% (8 ohms)
half power at 20 Hz~20 kHz	0.009% (8 ohms)
half power at 1 kHz	0.005% (8 ohms)
SMPTE intermodulation distortion	0.02% (8 ohms)
Frequency response	
PHONO	RIAA standard curve ±0.8 dB
AUX/CD/VIDEO, TAPE/EXT	5 Hz~70 kHz, −3 dB
Input sensitivity	
PHONO	0.45 mV (2.5 mV, IHF '66)
AUX/CD/VIDEO, TAPE/EXT	25 mV (150 mV, IHF '66)
S/N (IHF, A)	
PHONO	77 dB (80 dB, IHF '66)
AUX/CD/VIDEO, TAPE/EXT	82 dB (95 dB, IHF '66)
Maximum input voltage	
PHONO	150 mV (160 mV, 1 kHz)
Input impedance	
PHONO	47 kilohms
AUX/CD/VIDEO, TAPE/EXT	22 kilohms
Tone controls	
BASS	50 Hz, +10 dB~ −10 dB
TREBLE	20 kHz, +10 dB~ −10 dB
Loudness control (volume at −30 dB)	50 Hz, +9 dB
Low frequency damping factor	40 (8 ohms)
Load impedance	
MAIN or REMOTE	4~16 ohms
MAIN and REMOTE	8~16 ohms

■ FM TUNER SECTION

Frequency range	87.9~107.9 MHz
Sensitivity	10.8 dBf (1.9 μV, IHF '58)
50 dB quieting sensitivity	
MONO	16.1 dBf (3.5 μV IHF '58)
STEREO	38.3 dBf (45 μV IHF '58)
Total harmonic distortion	
100 Hz	0.15% (MONO), 0.3% (STEREO)
1 kHz	0.15% (MONO), 0.3% (STEREO)
6 kHz	0.3% (MONO), 0.3% (STEREO)
S/N	
MONO	77 dB
STEREO	71 dB
Frequency response	20 Hz~15 kHz, +1 dB, −2 dB
Alternate channel selectivity	70 dB
Capture ratio	1 dB
Image rejection at 98 MHz	55 dB
IF rejection at 98 MHz	75 dB
Spurious response rejection at 98 MHz	82 dB
AM suppression	50 dB
Stereo separation	
1 kHz	40 dB
10 kHz	30 dB
Carrier leak	
19 kHz	−35 dB
38 kHz	−50 dB
Antenna terminals	300 ohms (balanced)
	75 ohms (unbalanced)

Technics

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■ AM TUNER SECTION	
Frequency range	530~1620 kHz
Sensitivity	20 μV, 300 μV/m
Selectivity	55 dB
Image rejection at 1000 kHz	40 dB
IF rejection at 1000 kHz	60 dB

■ GENERAL	
Power consumption	215W, 265 VA
Power supply	AC 120V, 60 Hz
Dimensions (W×H×D)	430 × 97 × 283 mm (16-15/16" × 3-13/16" × 11-5/32")
Weight	5.9 kg (13 lb.)

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

■ CONTENTS

	Page
SAFETY PRECAUTION	2
LOCATION OF CONTROLS	3
AM LOOP ANTENNA	4
HOW TO PRESET RADIO BROADCAST FREQUENCIES	4
TECHNICAL INFORMATION	5, 6
PROTECTION CIRCUITRY	7
BEFORE REPAIR AND ADJUSTMENT	7
DISASSEMBLY INSTRUCTIONS	7 ~ 9
HOW TO REPLACE CHIPS (RESISTORS)	10
MEASUREMENTS AND ADJUSTMENTS	10 ~ 12
PRINTED CIRCUIT BOARDS	13 ~ 16
CIRCUIT BOARDS AND WIRING CONNECTION DIAGRAM	17, 18
BLOCK DIAGRAM	19 ~ 22
OPERATION OF ICQ CONTROLLER	23, 24
TERMINAL OPERATION OF ICQ CONTROLLER (IC701)	25
TERMINAL OPERATION OF PLL CONTROLLER (IC901)	25, 26
RESISTORS & CAPACITORS	26, 27
SCHEMATIC DIAGRAM	28 ~ 33
REPLACEMENT PARTS LIST	34
EXPLODED VIEWS	35, 36

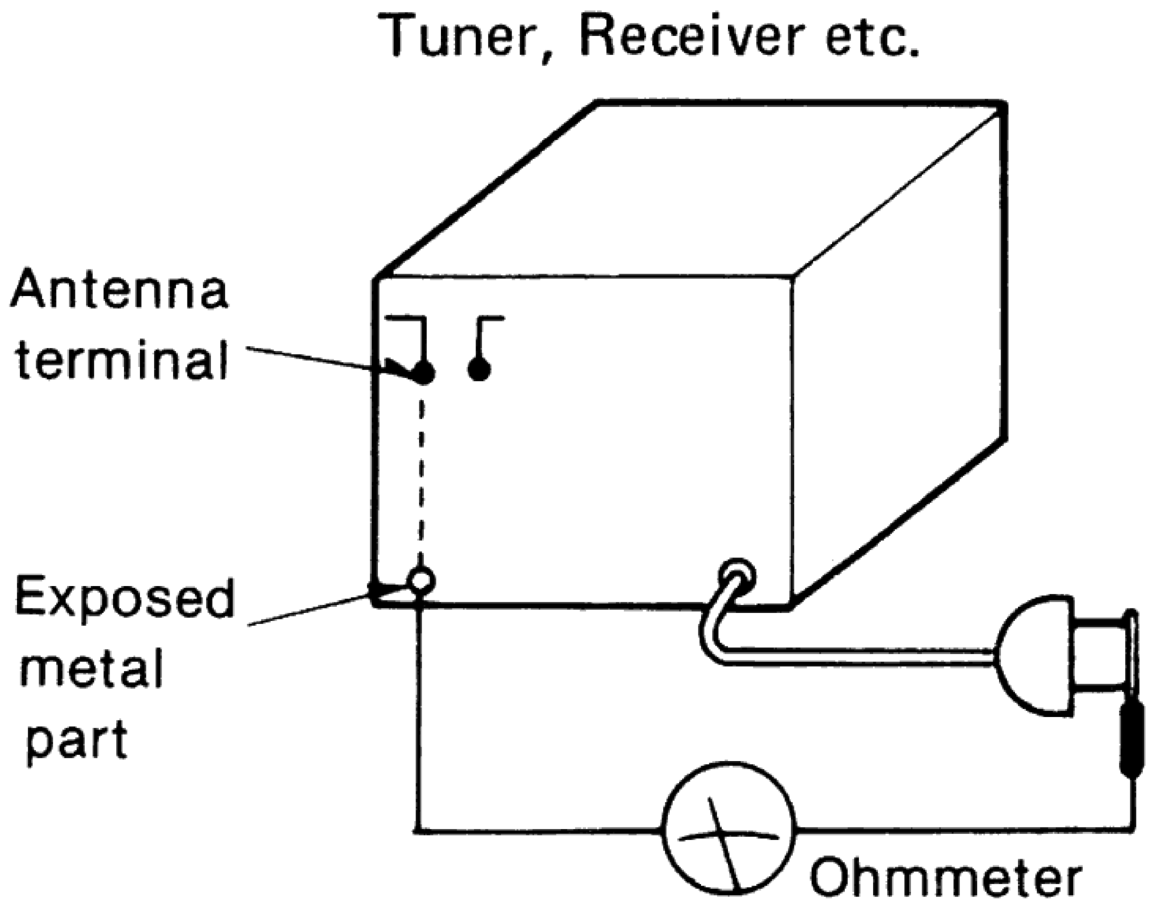
■ SAFETY PRECAUTION

1. Before servicing (such as replacement of components), unplug the power supply cord to prevent an electric shock.
2. Use only manufacturer's recommended components for safety. Check condition of power cord and replace if wear or damage is evident.
3. After servicing, be sure to restore the following to the condition in which they were originally installed.
   (1) the lead dress and
   (2) insulation barriers, insulation papers, shields and the like.
4. Before returning a serviced apparatus to a customer, make the following insulation resistance test to prevent a customer from being exposed to a shock hazard.

• Insulation resistance test (See Figure below.)

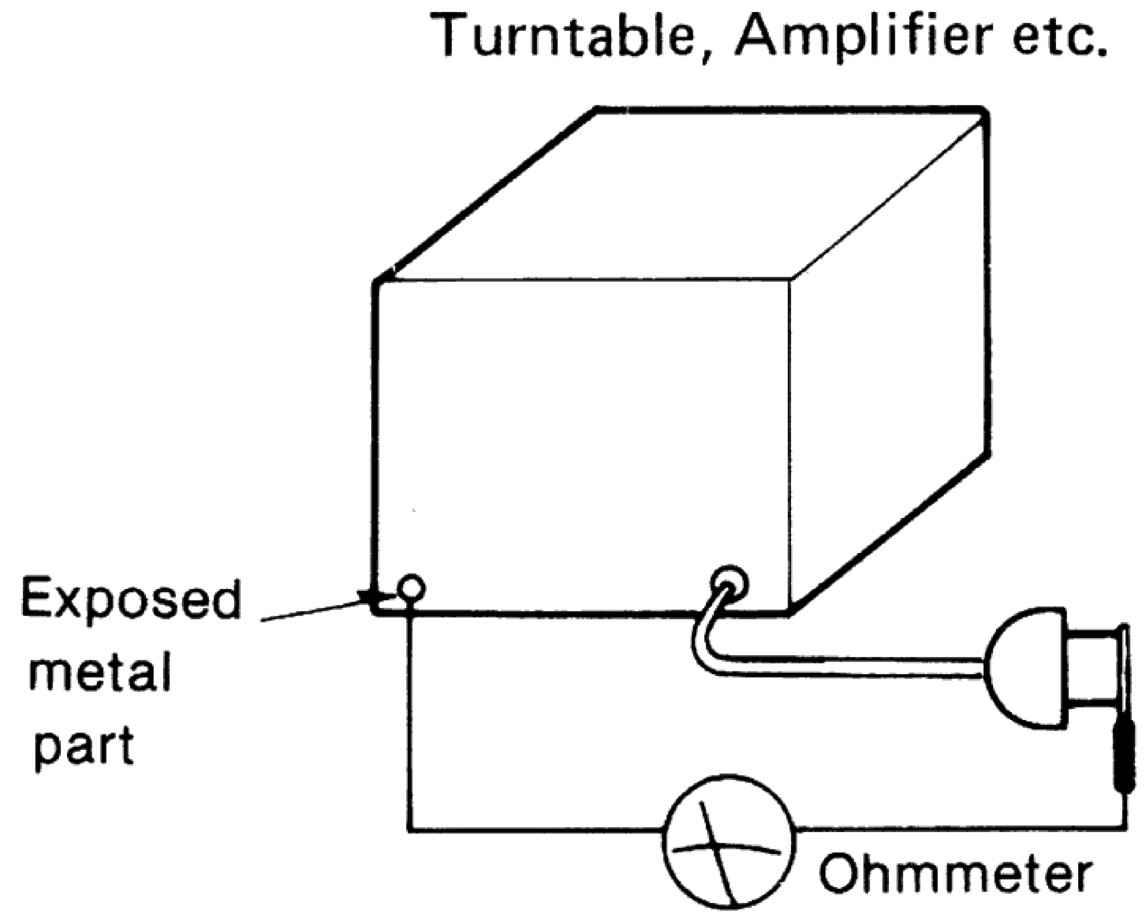
1. Unplug the power supply cord and connect a jumper wire between the two prongs on the plug.
2. Turn on the power switch of the apparatus.
3. Measure the resistance value (with an ohmmeter) between the jumpered AC plug and each exposed metalic cabinet part on the apparatus, such as screwheads, antenna, control shafts, handle brackets, etc.
   The reading should be as shown in figure below. In case a measurement is outside of the limits specified, there is a possibility of a shock hazard, and the apparatus should be repaired and rechecked before it is returned to a customer.

Tuner, Receiver etc.



3MΩ<R<5.2MΩ

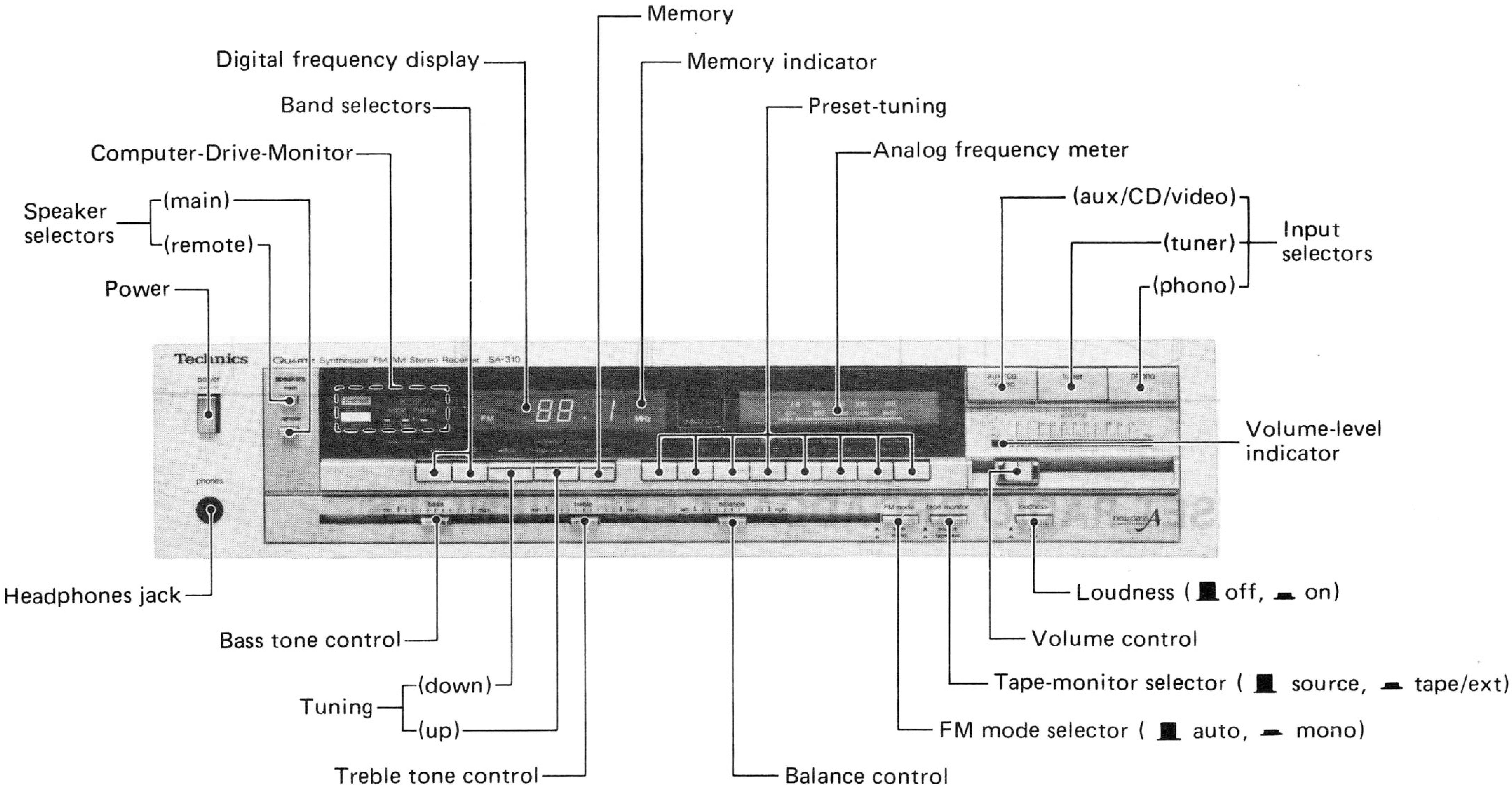
Turntable, Amplifier etc.

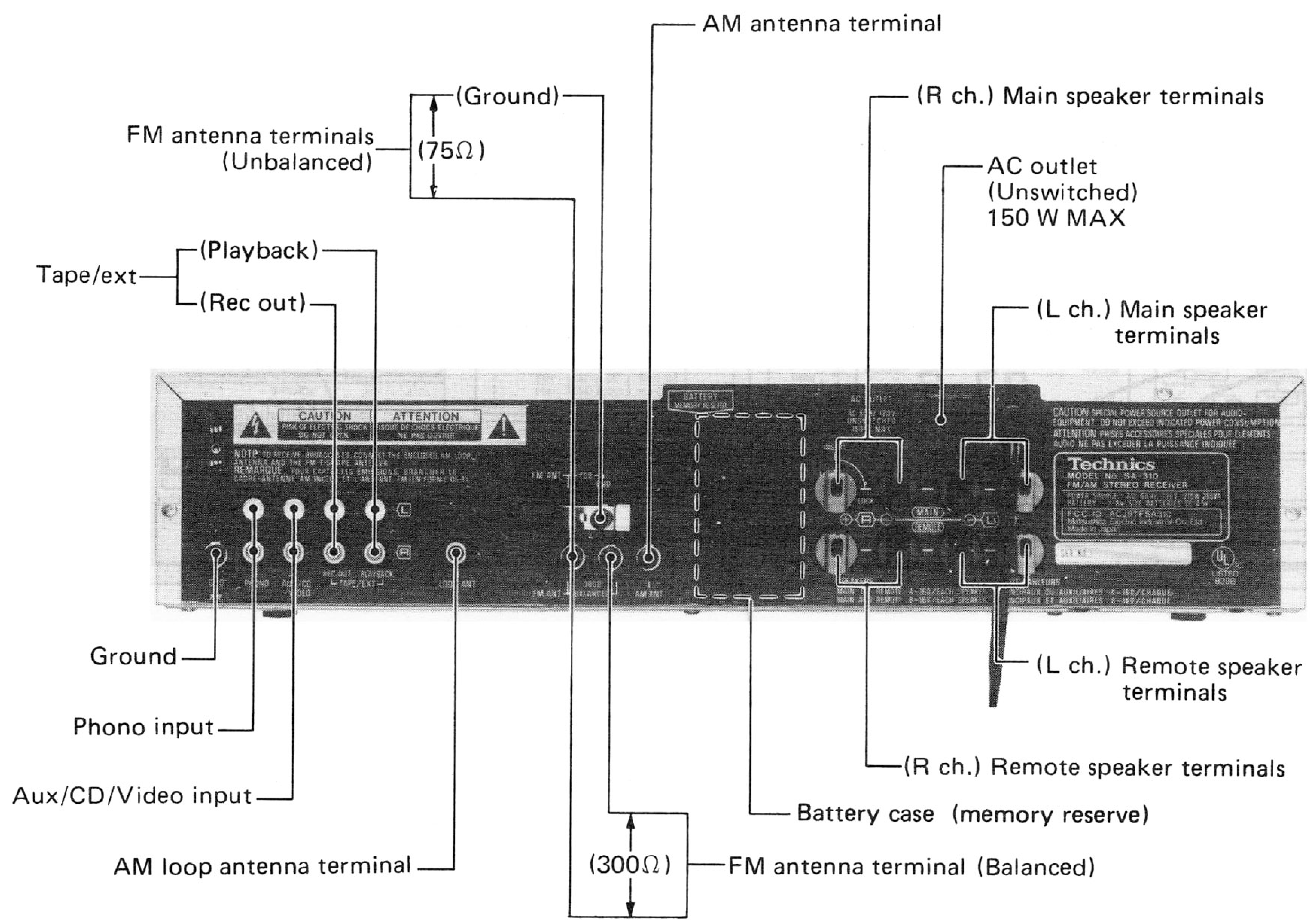


R = nearly ∞

where, R: resistance value

■ LOCATION OF CONTROLS

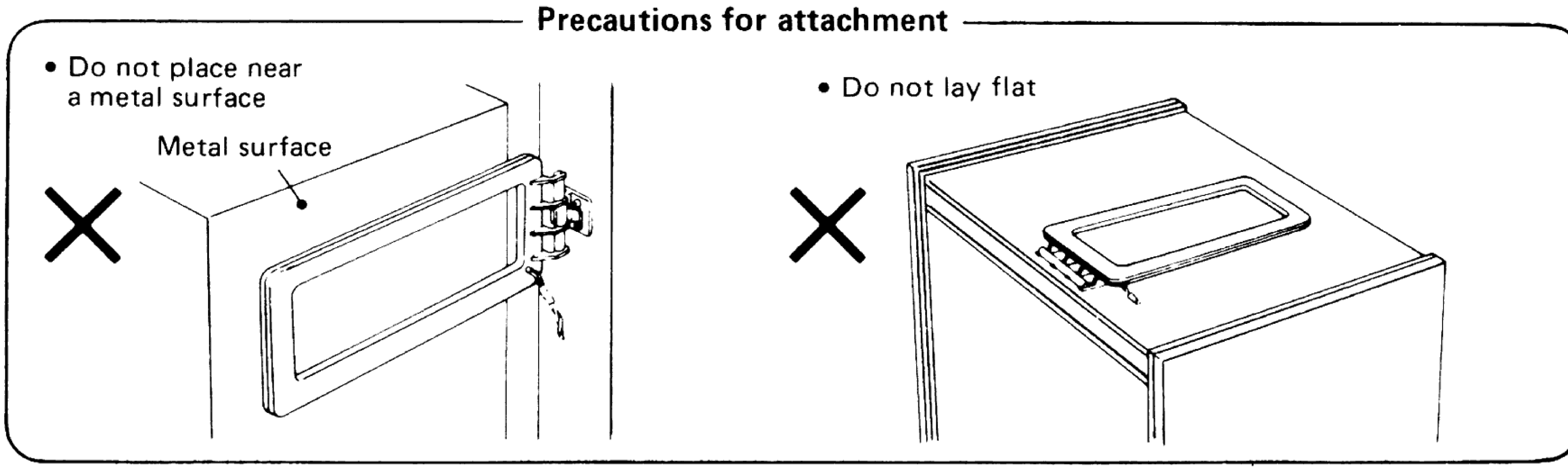




*** Phono input capacitance is about 150pF.**

■ AM LOOP ANTENNA

When the AM loop antenna is connected to the rear panel, place it as far away from the set as possible to improve the sensitivity.



■ HOW TO PRESET RADIO BROADCAST FREQUENCIES

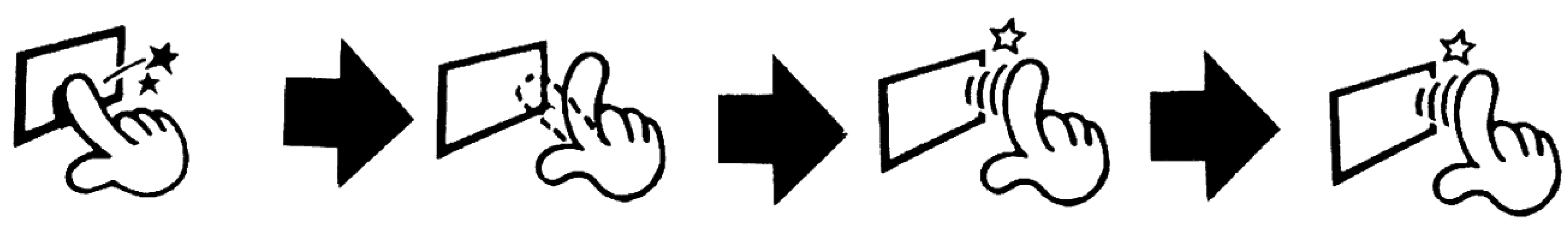
• **Automatic memory presetting**

3 Power: "on" (▟ – ▟)

4 • To preset an FM station: press the "FM" button.
• To preset an AM station: press the "AM" button.

5 • To preset FM broadcasting stations: Set to 87.9 MHz.
• To preset AM broadcasting stations: Set to 530 kHz.

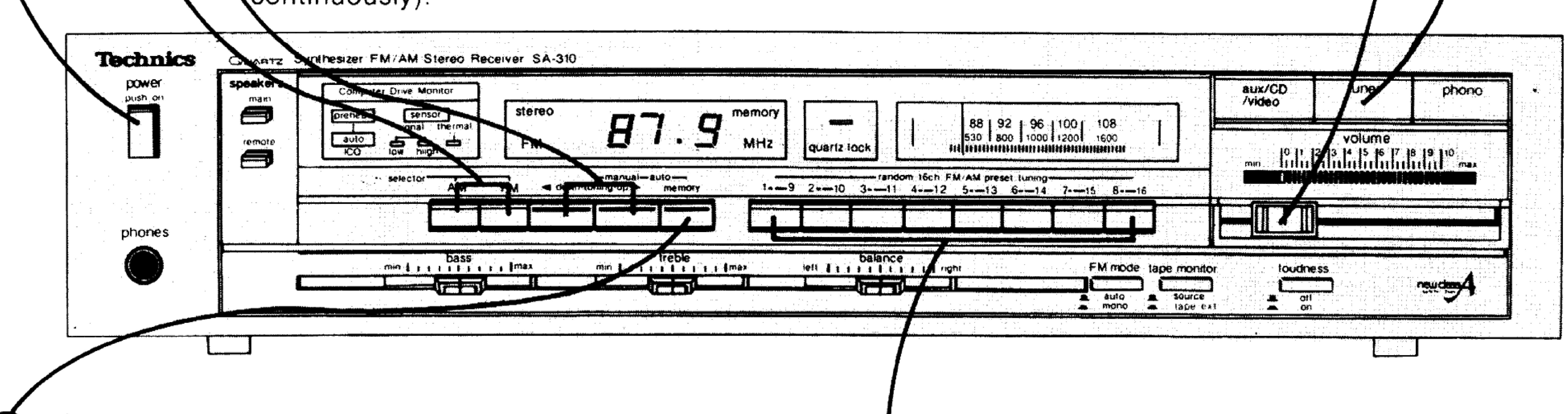
① Press the button and hold slightly
② Release it at 87.9 MHz for FM or 530 kHz for AM, and then press the button again momentarily.
③ Press the button momentarily (frequency will change each time the button is pressed), and tune to one of the above frequencies.



(frequency will change continuously).
(frequency change will stop).

1 "0 → 1"
Set volume control to low position for easier tuning.

2 "tuner"



6 Press. When the frequency indication begins to change, release.

(The frequency will change upward, and the automatic presetting will begin with the broadcasting station of the lowest frequency and will continue in order.)

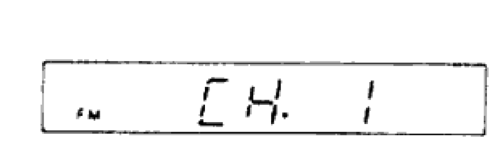
Notes:

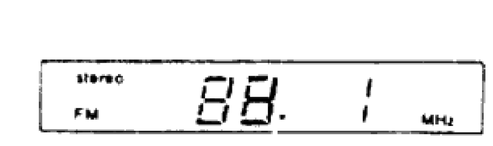
1. In areas where there are less than 8 FM stations, the remaining channels (through channel 8) will be left empty. The empty channels can be filled by using manual memory presetting.
2. If a new broadcasting station is preset into a channel, the broadcasting station which was previously entered in that channel will be automatically erased.

7 Confirm the names (call signs, etc.) of the broadcasting stations which are preset to each channel, and enter them on the file sheet

To check the front channels (CH1~8):

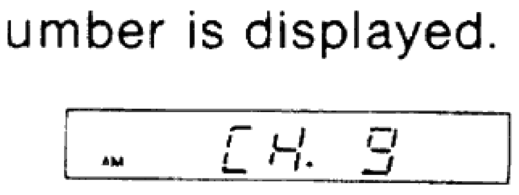
Press momentarily. → Channel number is displayed. → Frequency stored in the memory is displayed.

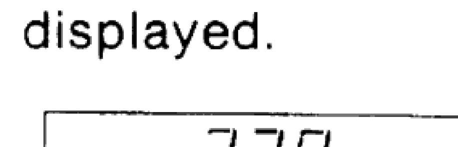




To check the back channels (CH 9~16):

Press slightly longer. → Release the button when the channel number is displayed. → Frequency stored in the memory is displayed.



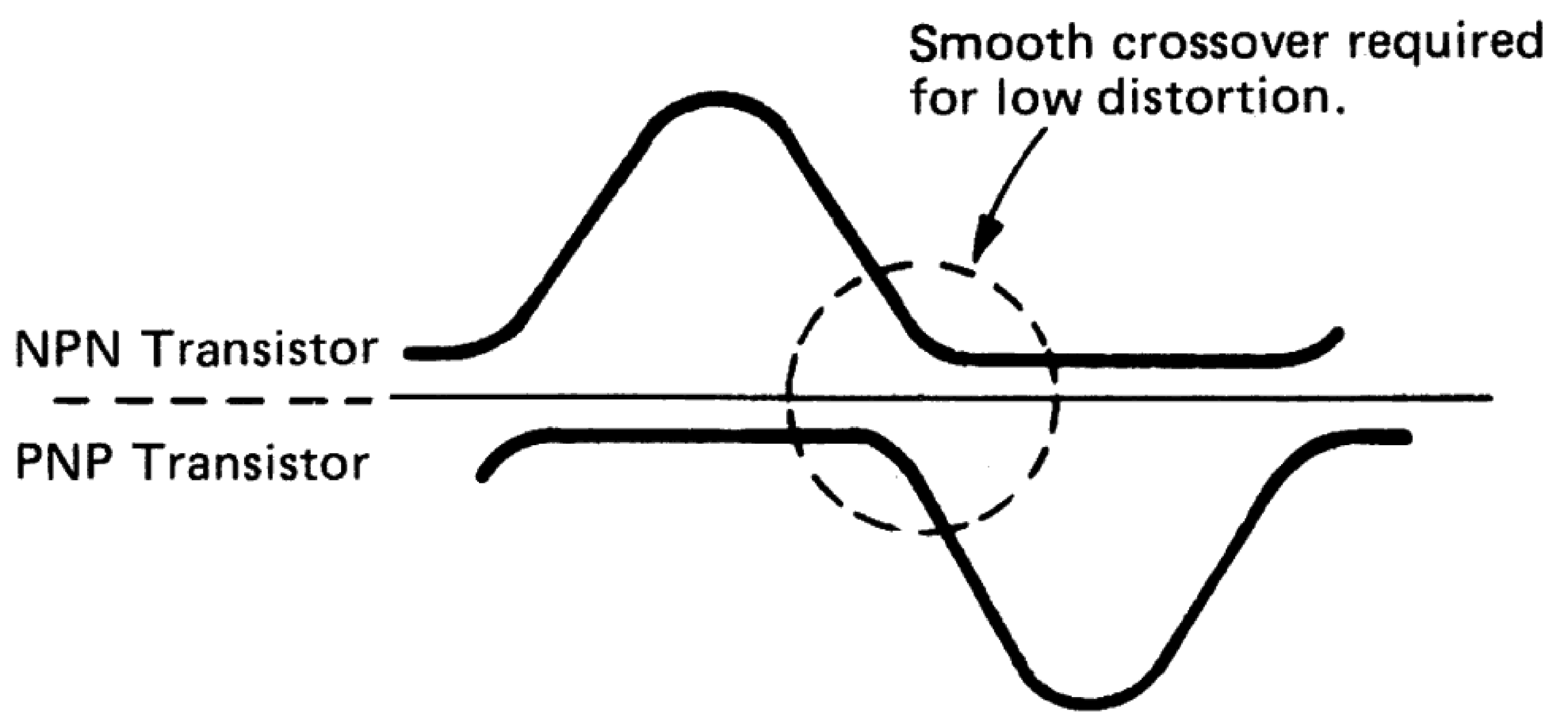


■ TECHNICAL INFORMATION

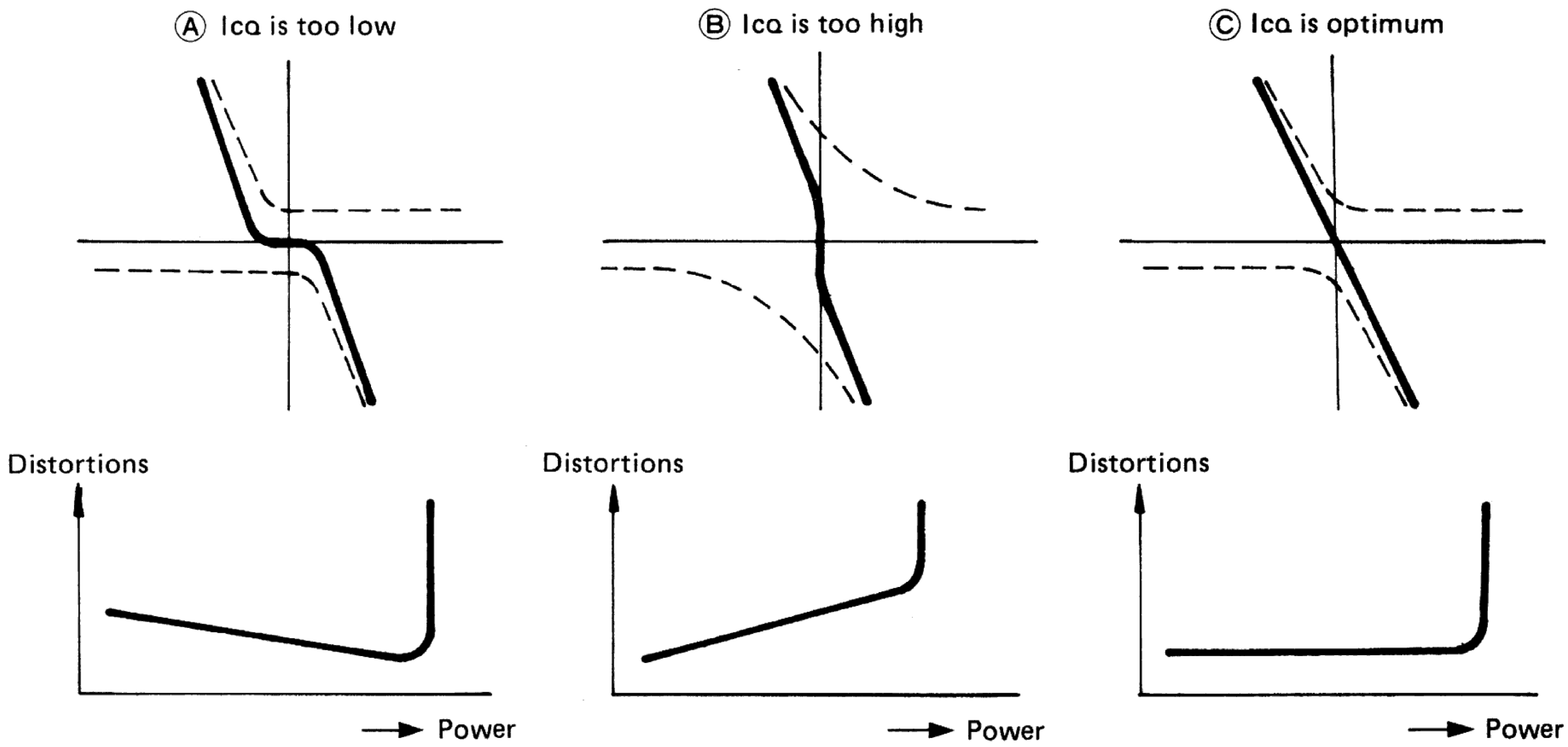
Technics New Class A amplifier circuitry eliminates switching and crossover distortion. To further improve fidelity a "computer drive" circuit has been incorporated to eliminate transient distortion in music signal reproduction.

• Power transistor idling current (Icq)

The idling current through the power transistors is adjusted so that crossover distortion is minimized when switching from the NPN transistor to the PNP transistor in a complimentary design (Fig. 1).
If Icq is not adjusted properly, distortion will result as in Fig. 2.



[Fig. 1]

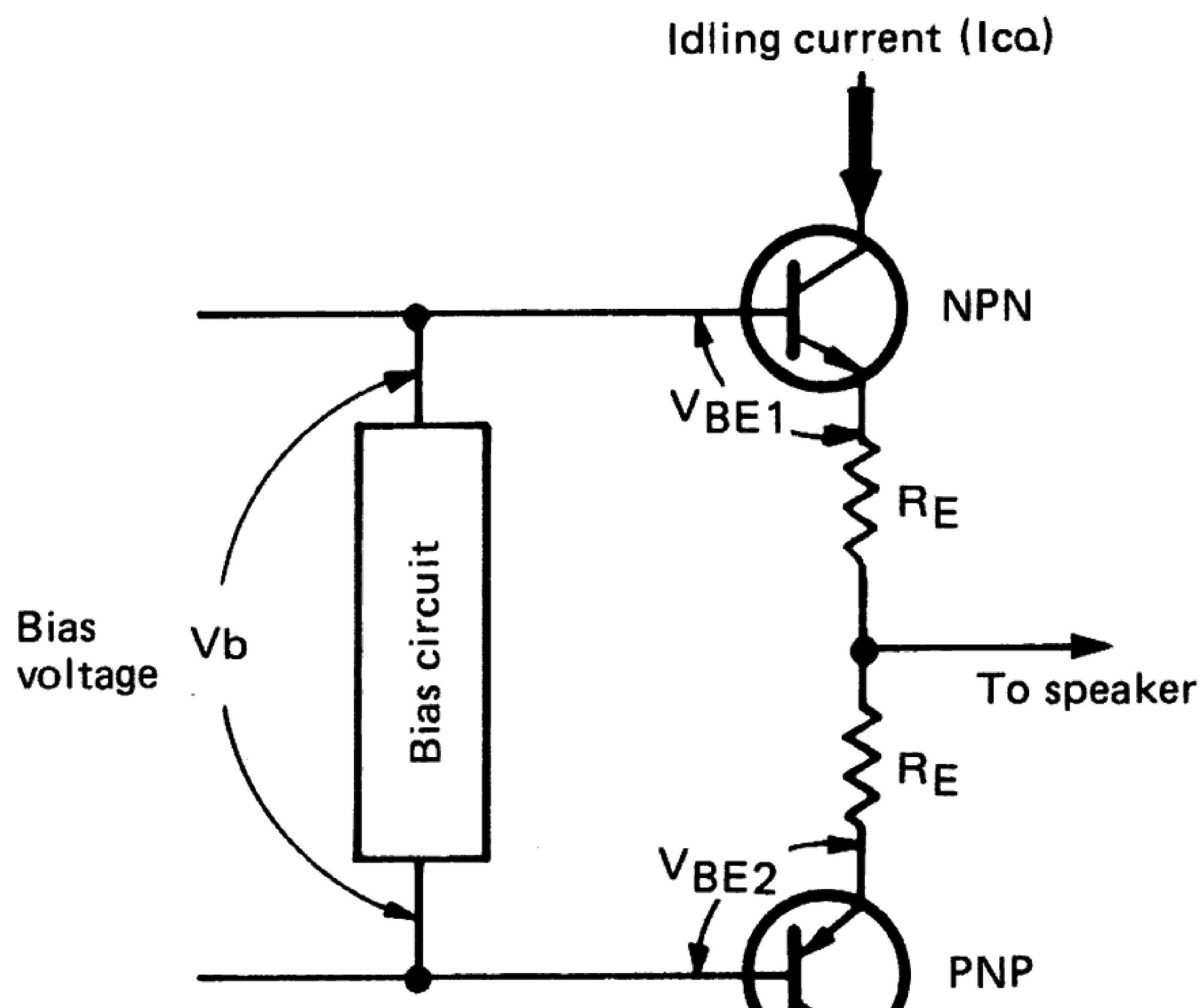


Relationship between idling current level and cross-over distortion.

[Fig. 2]

• Idling current and bias current

Idling current is determined by the bias voltage (Vb) of the bias circuit and the V_{BE} of each power transistor (Fig. 3). The V_{BE} varies according to the temperature of the transistor. This temperature varies instantaneously with the music signal. Unfortunately, with current designs, these instantaneous fluctuations cannot be detected due to the placement of the thermal sensor and the slow temperature change of the heat sink. Attempts have been made to include a thermal sensor as part of the output power pack. However, most power packs do not include a thermal sensor. Also, this method does not work if discrete components are used. We are still faced with the problem of stable bias operation and fast response to abrupt changes in temperature.



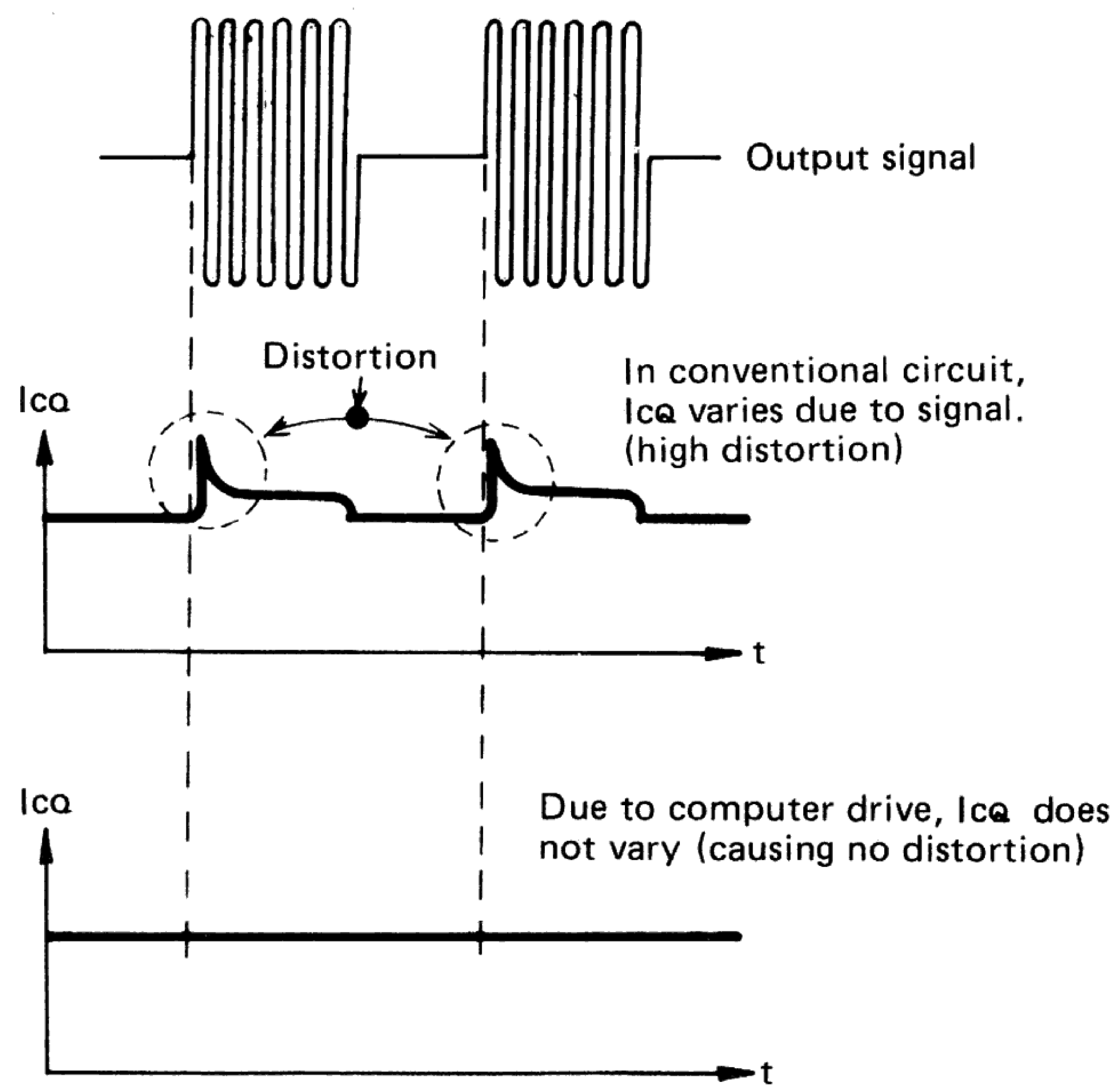
$$Icq = \frac{Vb - (V_{BE1} + V_{BE2})}{2R_E}$$

[Fig. 3]

• Computer drive system

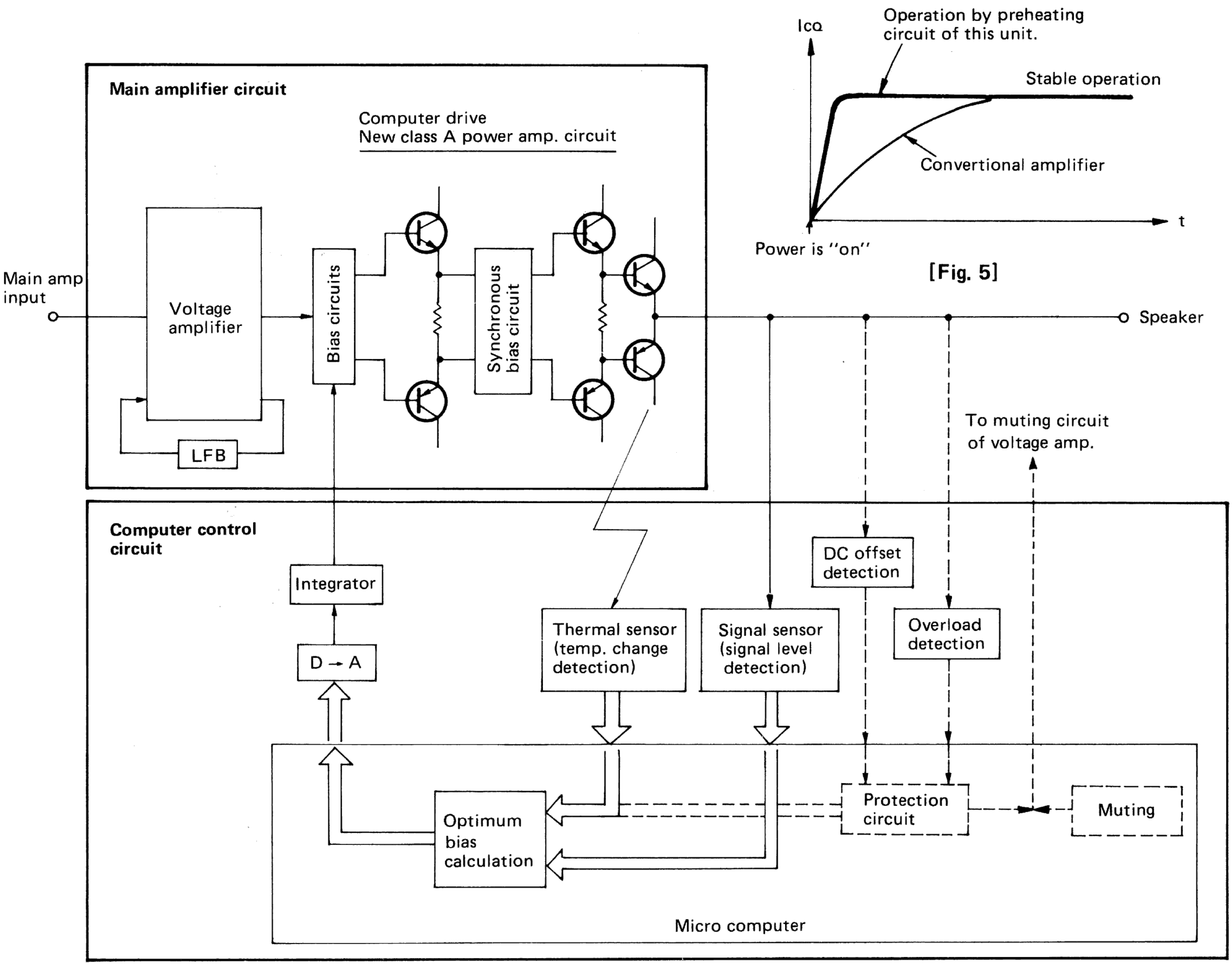
Knowing the thermal and signal characteristics of the power transistors, a system can be designed to calculater the instantaneous temperature changes and adjust for the optimum idling current. Information regarding the transistor ambient temperature and the input music signal is obtained through sensors and fed to a computer. The computer calculates the optimum idle current and maintains it at a constant level by varying the bias voltage. Figure 4 illustrates the relationship of the output signal and the idling current. Figure 6 is a block diagram of the "computer drive" system.

Generally, it takes several minutes for the power transistors to reach the temperature of stable operation after the power is turned on. To ensure stable and optimum performance quickly, the microcomputer forces a large amount of idling current through the power transistors for a short time. This rapidly "preheats" the transistors and the heat sink. Figure 6 illustrates the stable operation level for the convertional and new computer drive system.



Output vs idling current

[Fig. 4]



[Fig. 6]

■ PROTECTION CIRCUITRY

The protection circuitry may have operated if either of the following conditions is noticed:

- No sound is heard when the power is turned on.
- Sound stops during a performance.

The function of this circuitry is to prevent circuitry damage if, for example, the positive 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 outlines below:

1. Turn off the power.
2. Determine the cause of the problem and correct it.
3. Turn on the power once again after one minute.

Note

When the protection circuitry functions, the unit will not operate unless the power is first turned off and then on again.

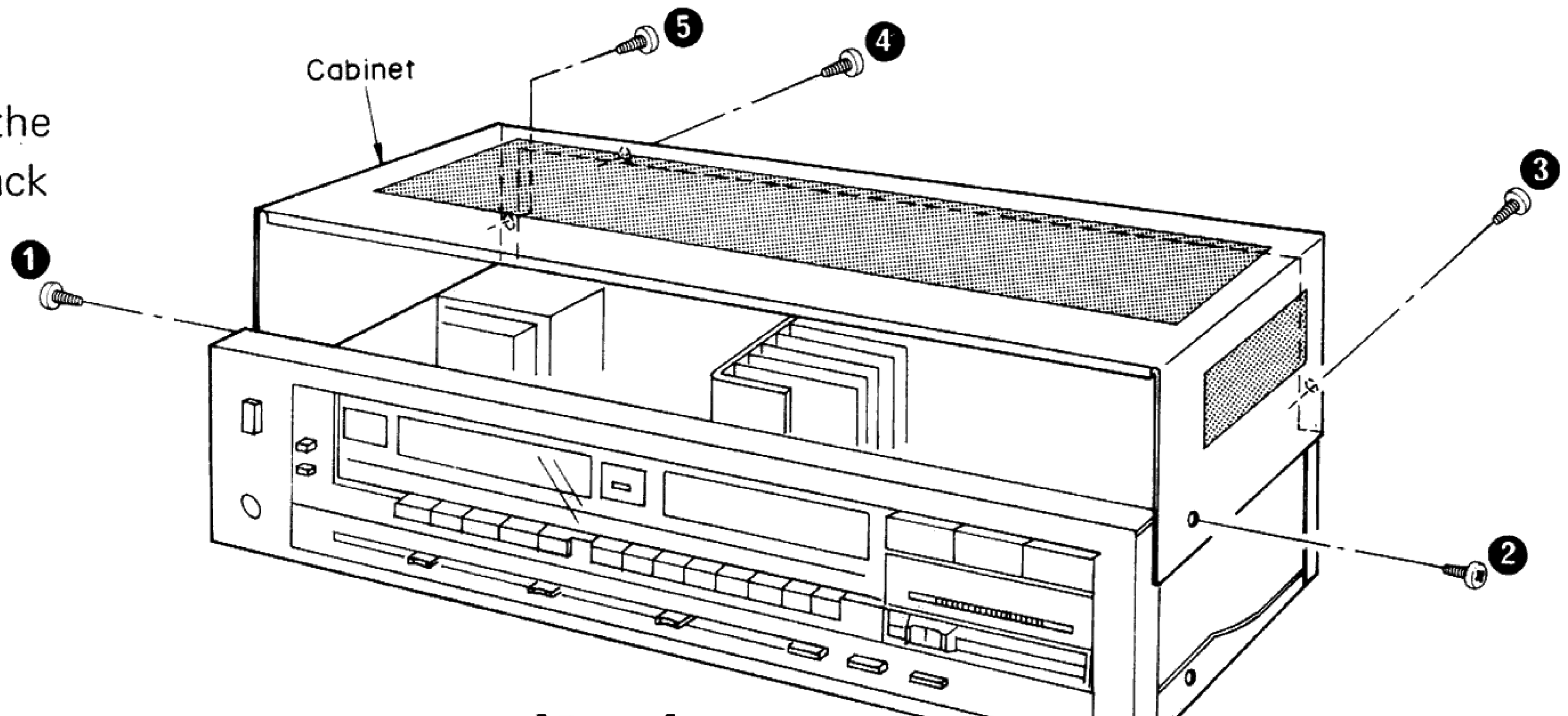
■ BEFORE REPAIR AND ADJUSTMENT

1. Turn off the power supply and short-circuit both ends of power supply condensers (C703, C704, 6800μF) at resistance (about 10Ω, 5W) in order to discharge the charged voltage.
   Both ends of do not short between C703/C704 by screwdriver. It may damage the component.
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 at 120V, 60 Hz in no-signal mode is 300 ~ 700 mA.

■ DISASSEMBLY INSTRUCTIONS

● How to remove the cabinet

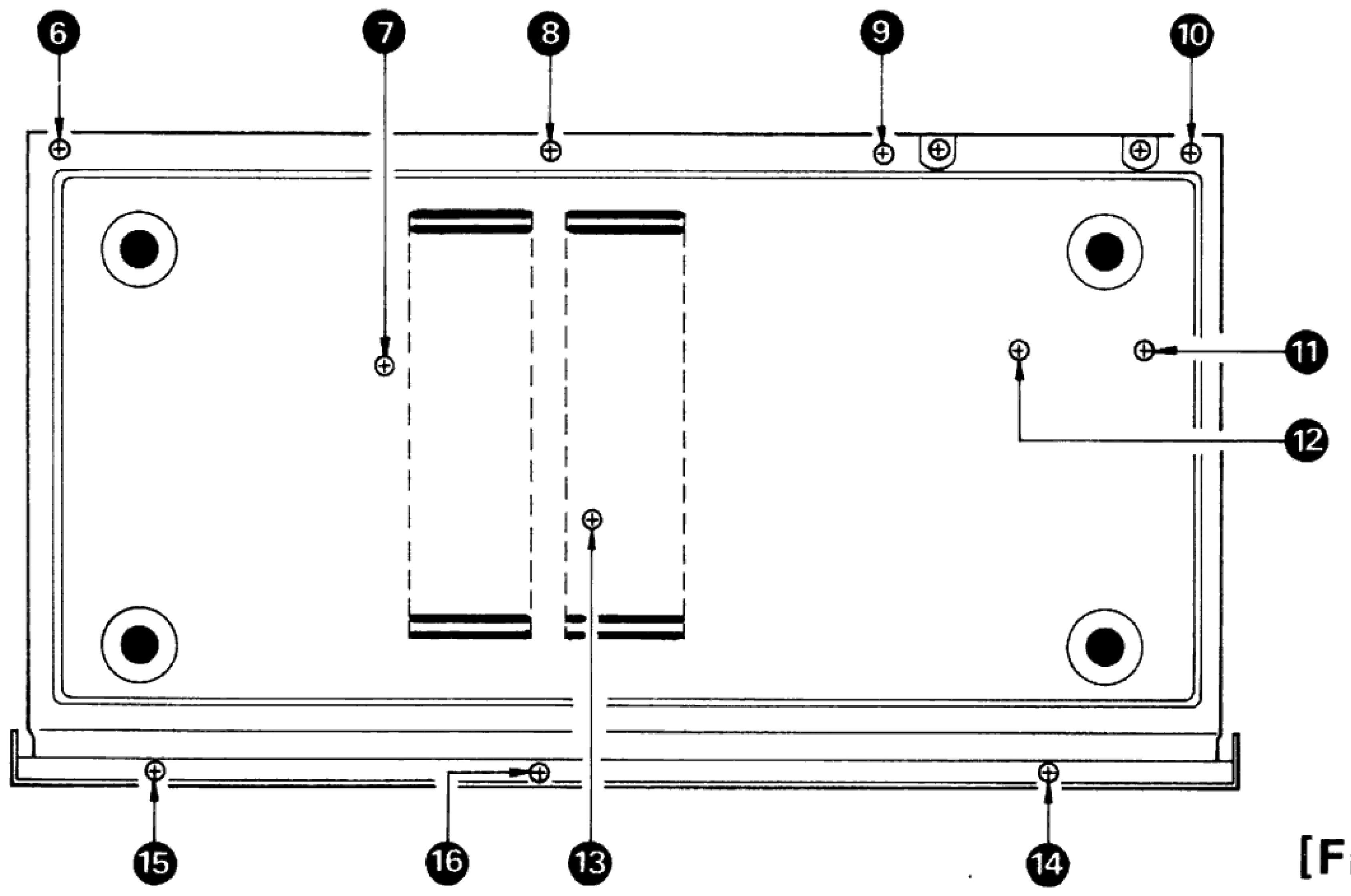
1. Remove the 2 setscrews (Fig. 7 : ❶,❷) on the side and 3 setscrews (Fig. 7 : ❸~❺) on the back of the cabinet.
2. Remove the cabinet upward.



[Fig. 7]

● How to remove the bottom board

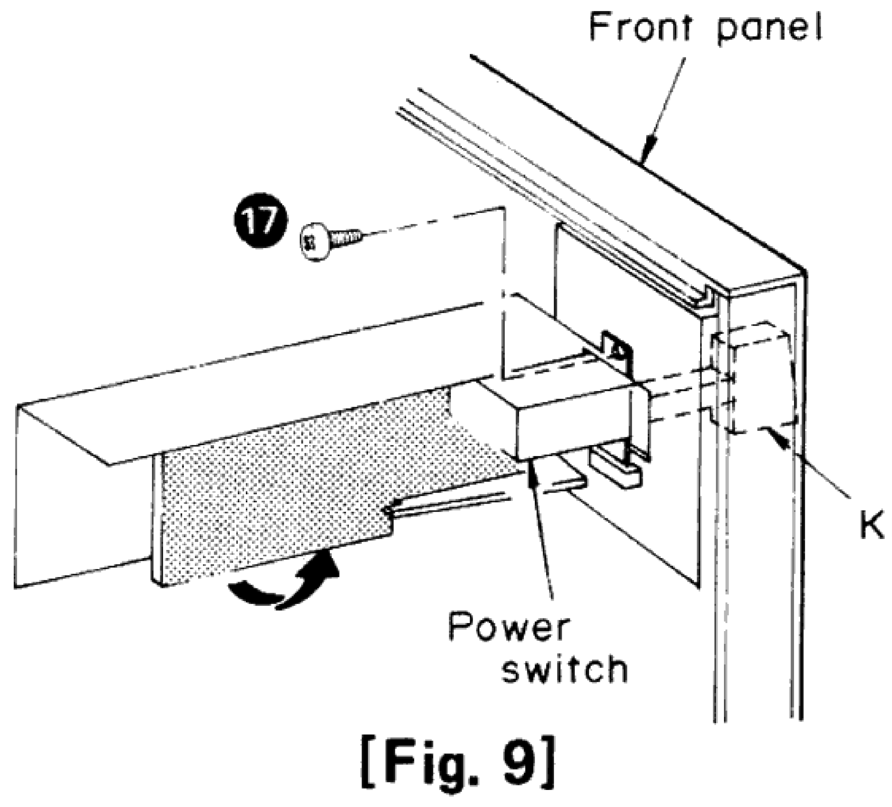
1. Remove the 10 setscrews (Fig. 8 : ❻ ~ ⓯) of the bottom board.
2. Remove the bottom board.



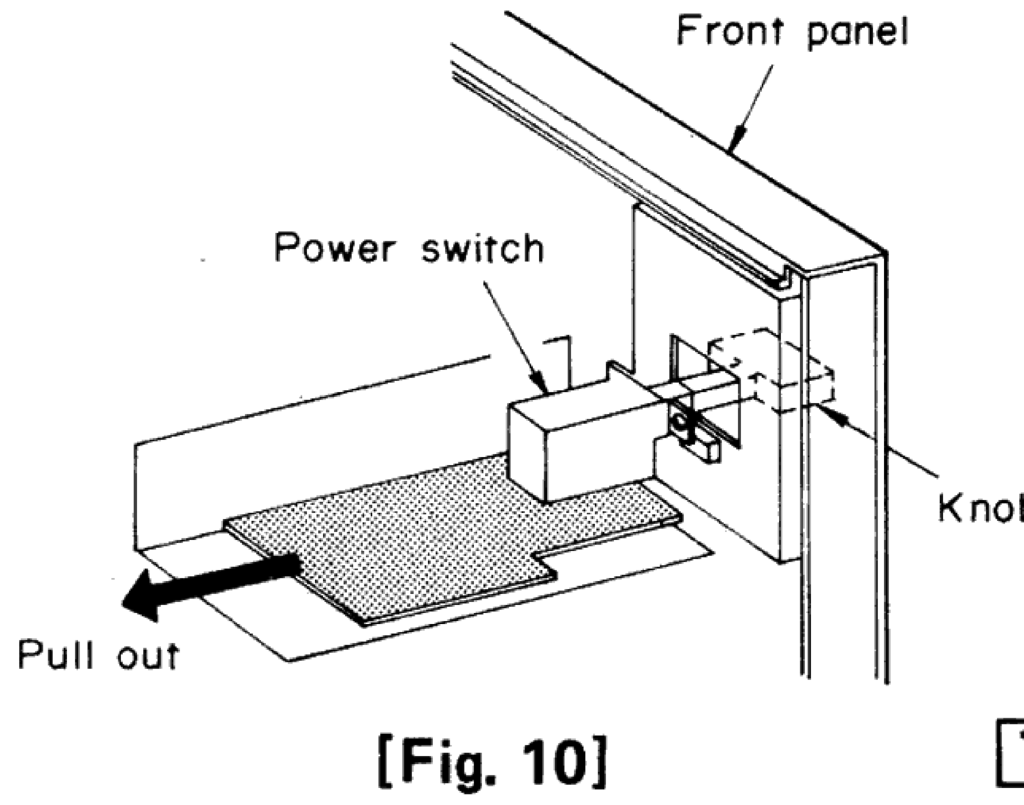
[Fig. 8]

● How to remove the power switch

1. Remove the setscrew (Fig. 9 : ⓱) of the power switch.
2. Next, lay down the power switch P.C.B. as shown in Fig. 10, and remove the power switch from the front panel.



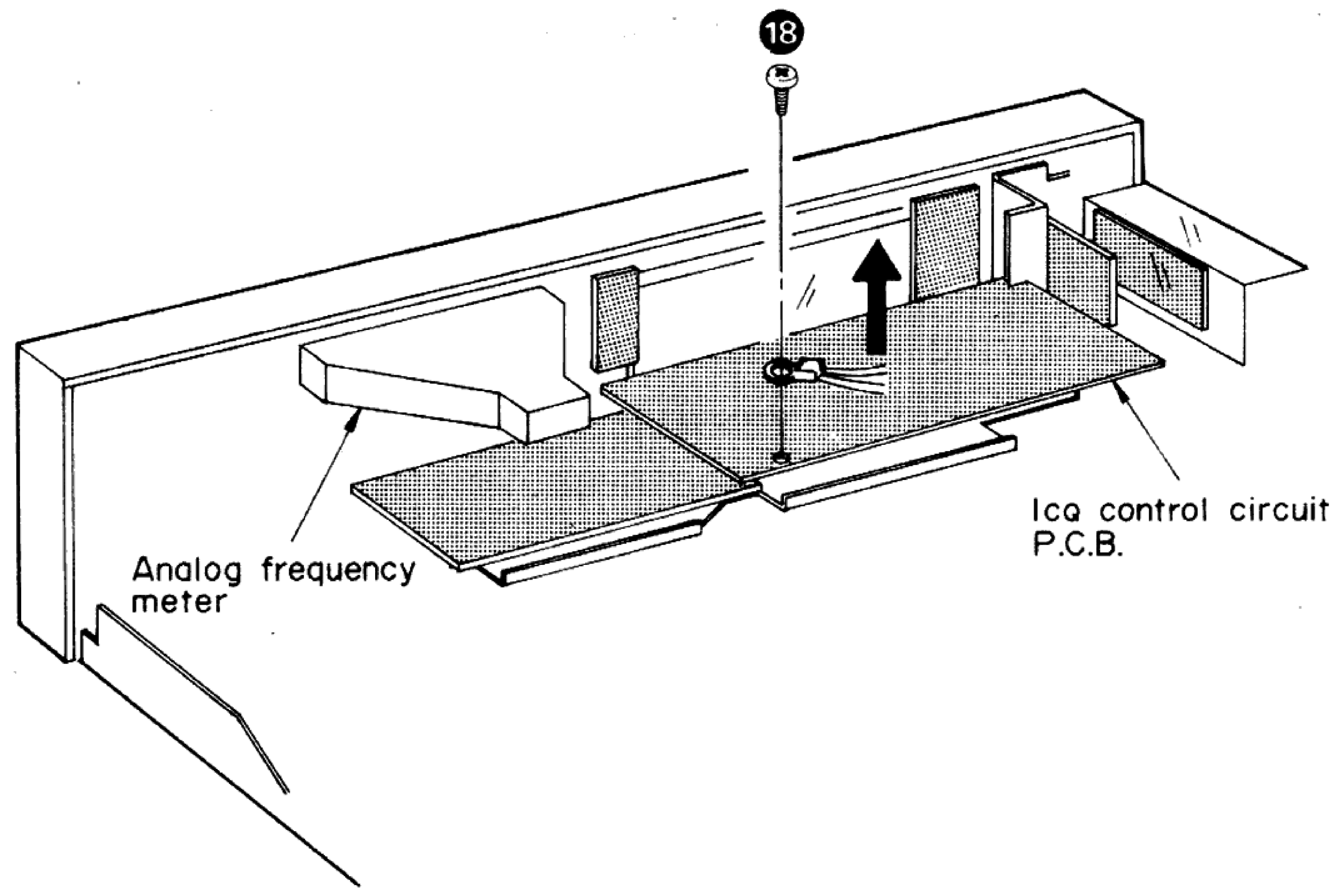
[Fig. 9]



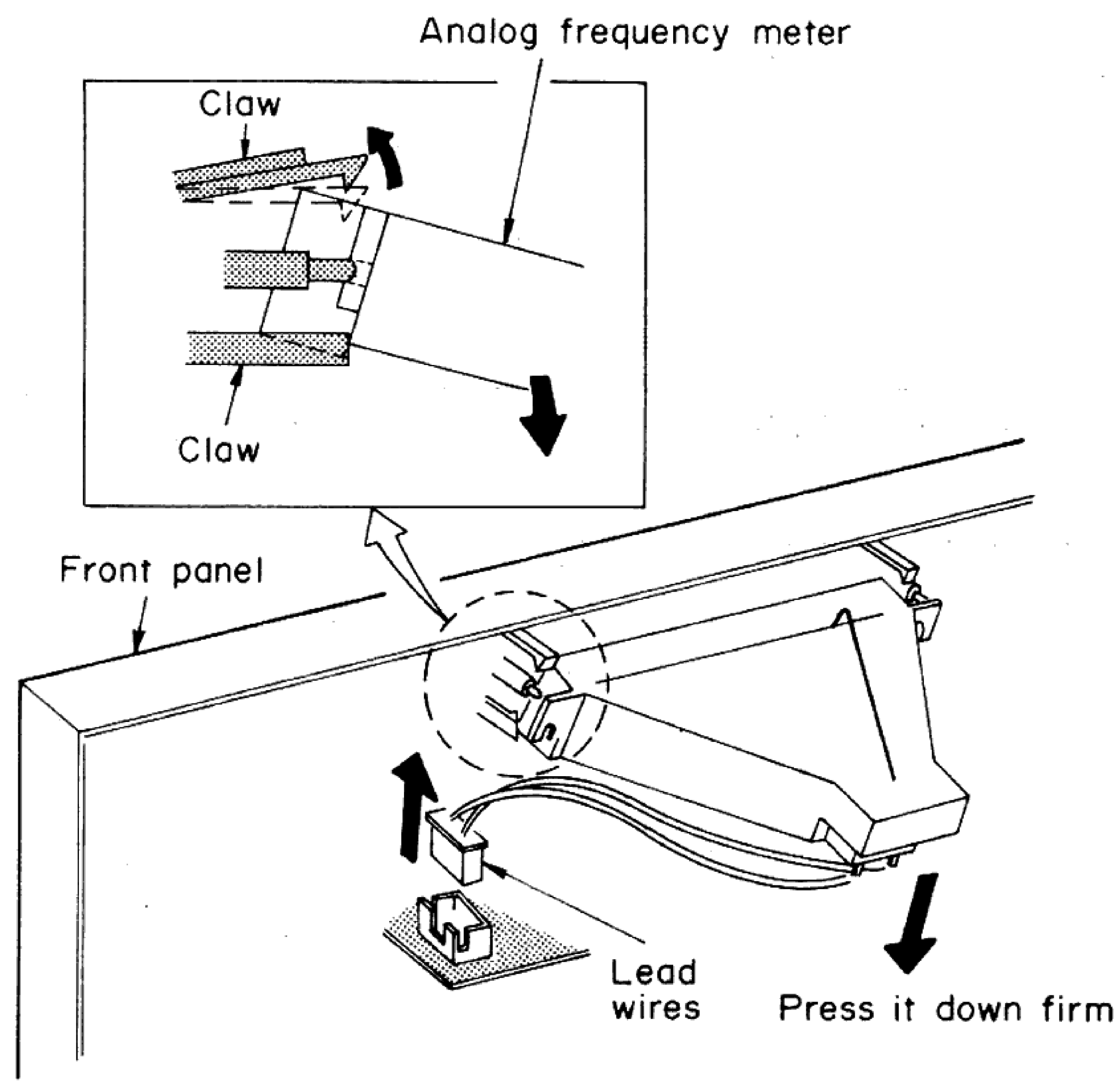
[Fig. 10]

• How to remove the front panel

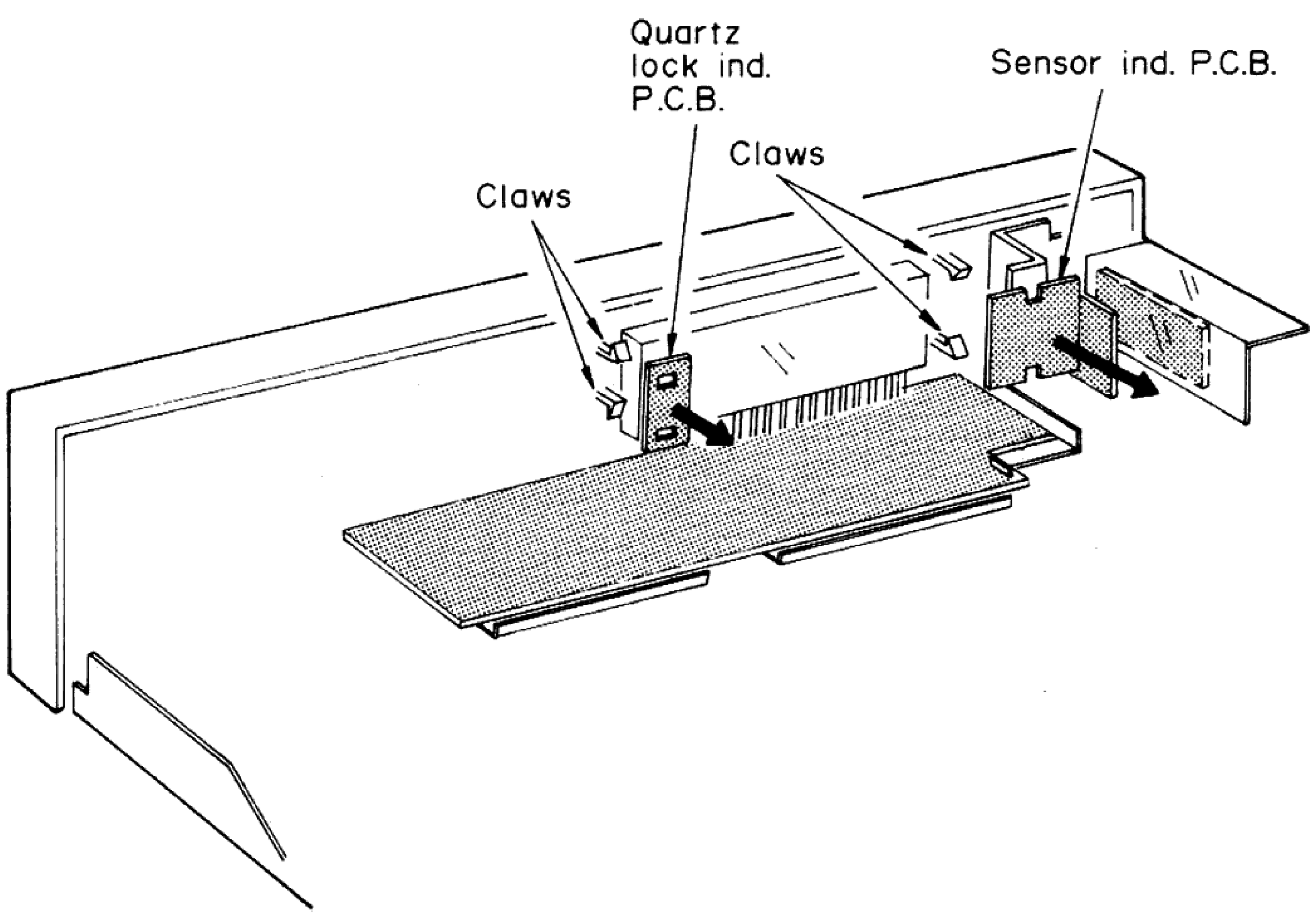
1. Remove the cabinet.
2. Remove the setscrew (Fig. 11 : ⓲), and then remove the IcQ control circuit P.C.B.
3. Disconnect the lead wire of analog frequency meter and press down the meter as shown in Fig. 12 to remove it from the front panel assembly.
4. Release the 2 claws which fasten the quartz lock indicator P.C.B. and sensor indicator P.C.B., and then remove the printed circuit board from the front panel. (See Fig. 13)
5. Remove the setscrew (Fig. 14 : ⓳) of the FM/AM preset-tuning P.C.B. and then detach the FM/AM preset-tuning P.C.B.
6. Remove the 2 setscrews (Fig. 15 : ⓴ , ㉑) of the shield plate, and then detach the shield plate.
7. Remove the 3 input selector knobs by pushing them from inside the front panel by use of a screwdriver or the like. (Refer to Fig. 16)
8. Remove the 3 setscrews (Fig. 8 : ⓮ ~ ⓰) which secure the front panel from the bottom.
9. Next, pull out the front panel toward you as shown in Fig. 17.
10. Release the 5 claws at the top of the front panel grille, and then remove the front panel aslant as in Fig. 18.



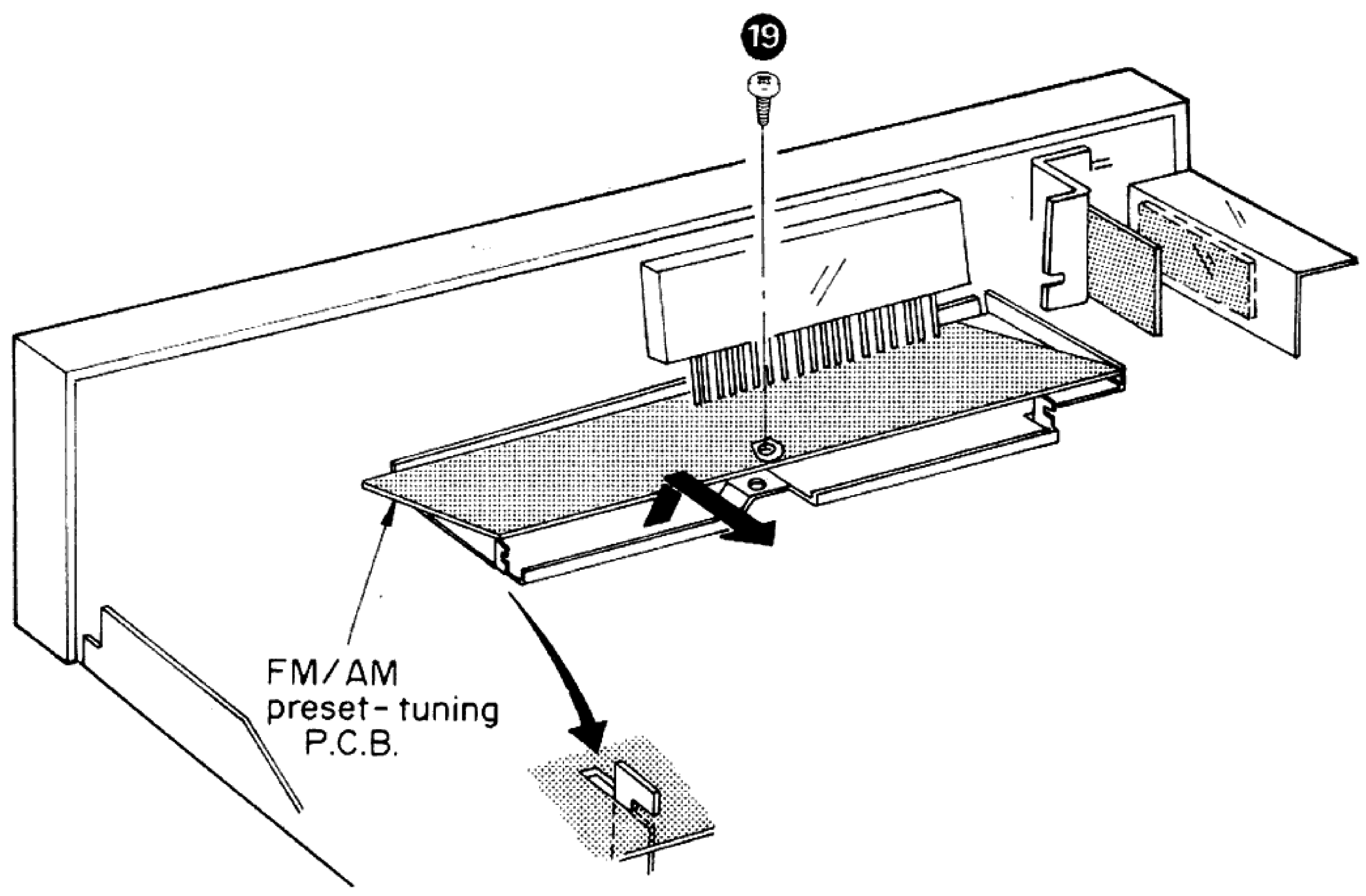
[Fig. 11]



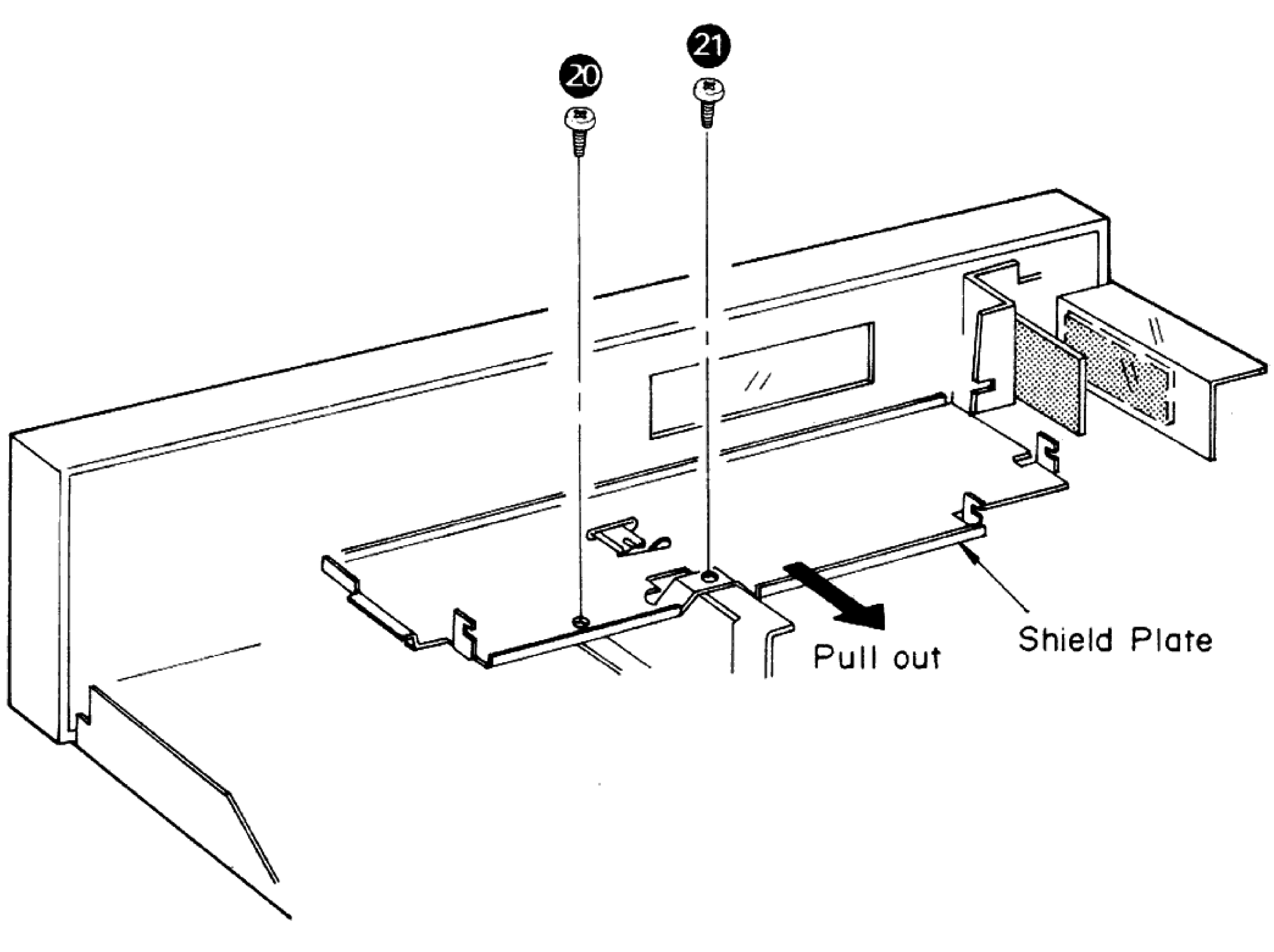
[Fig. 12]



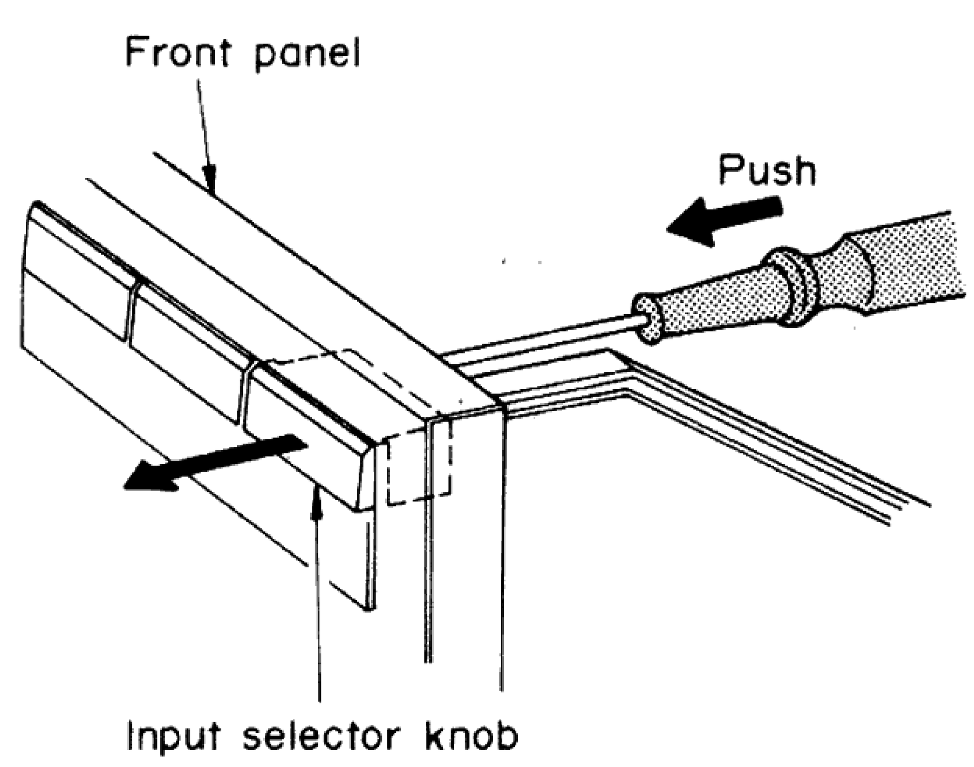
[Fig. 13]



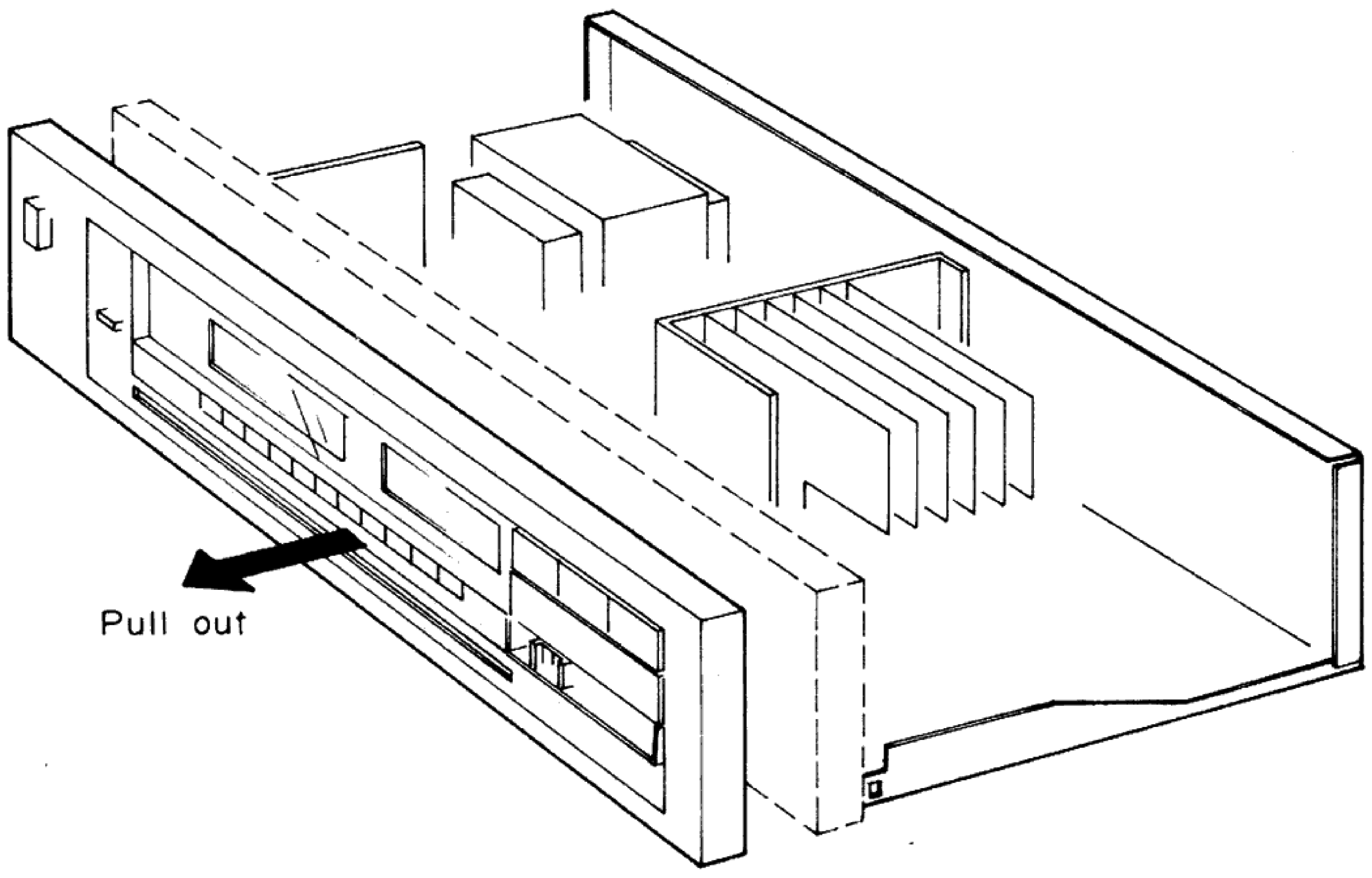
[Fig. 14]



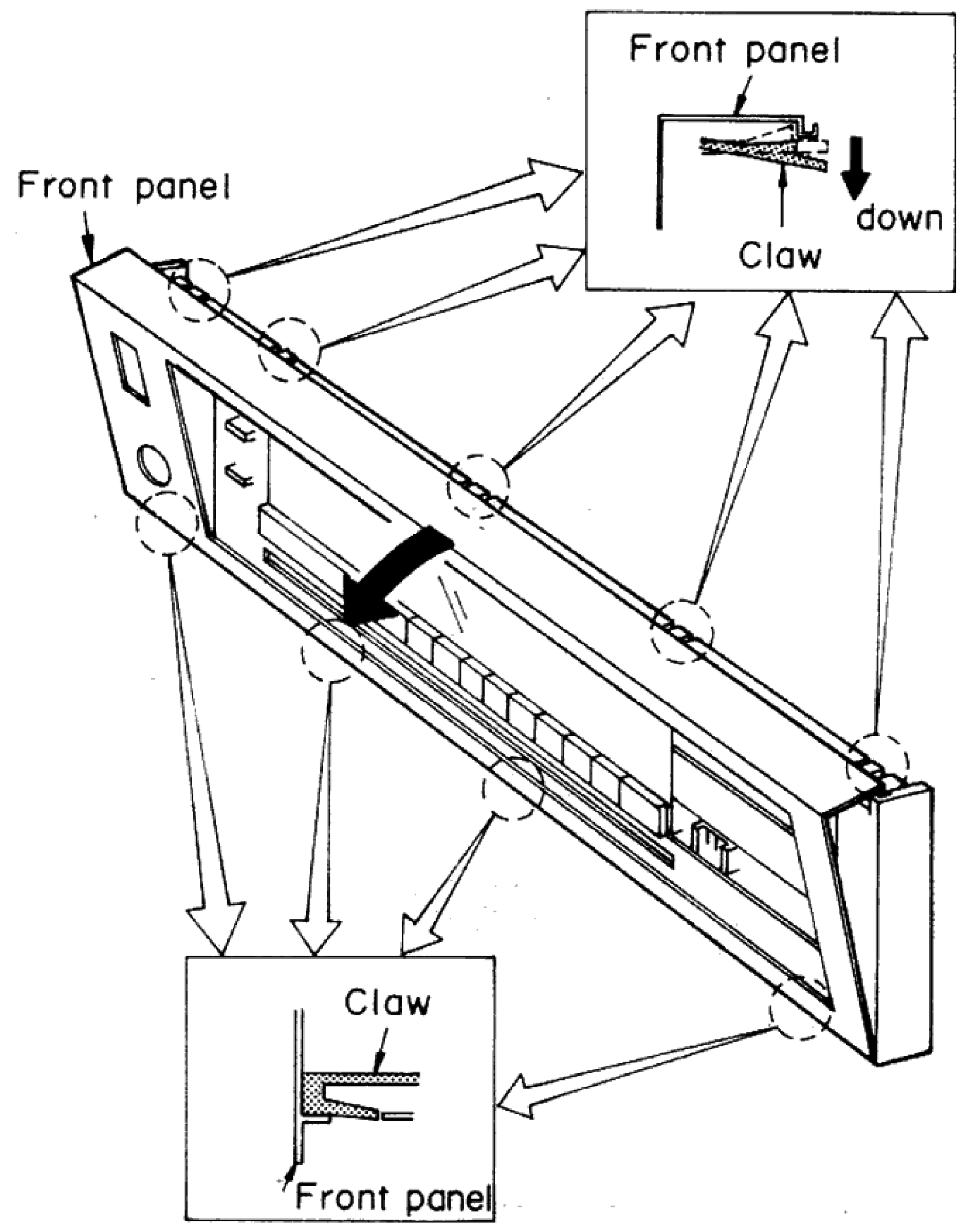
[Fig. 15]



[Fig. 16]



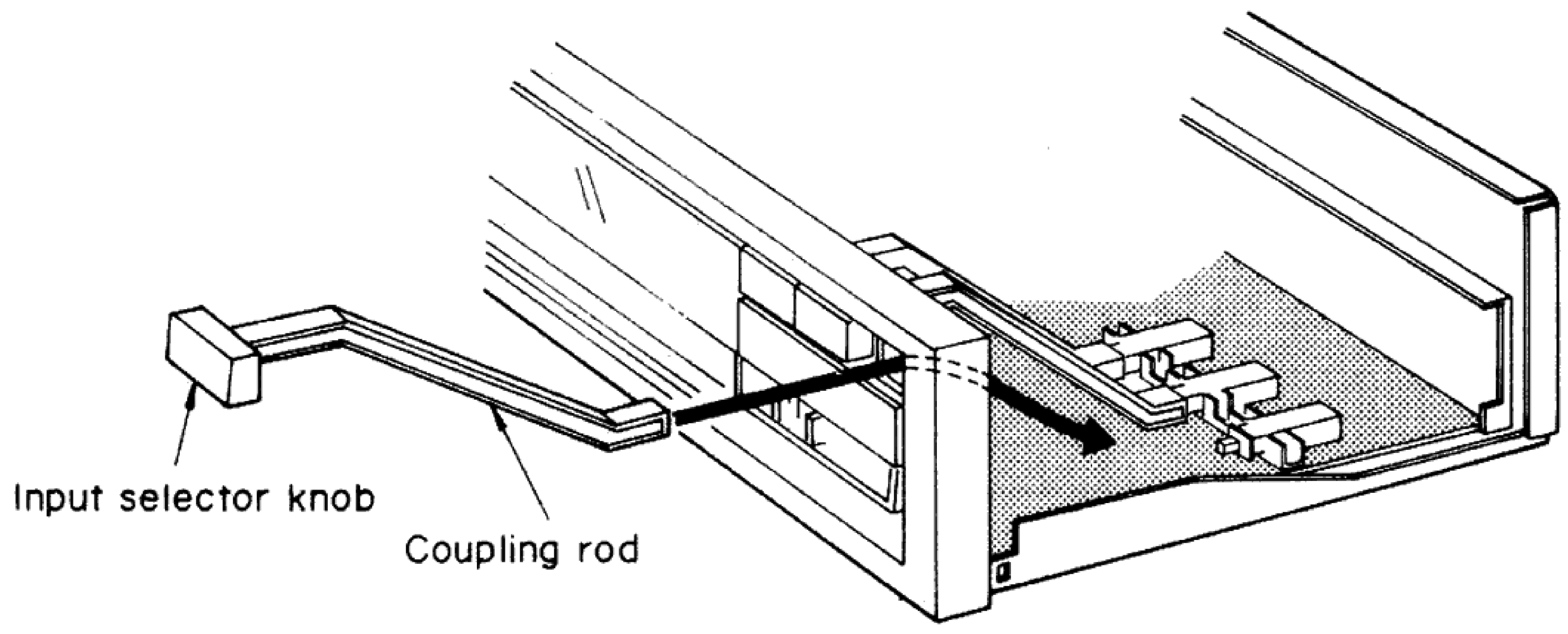
[Fig. 17]



[Fig. 18]

NOTE

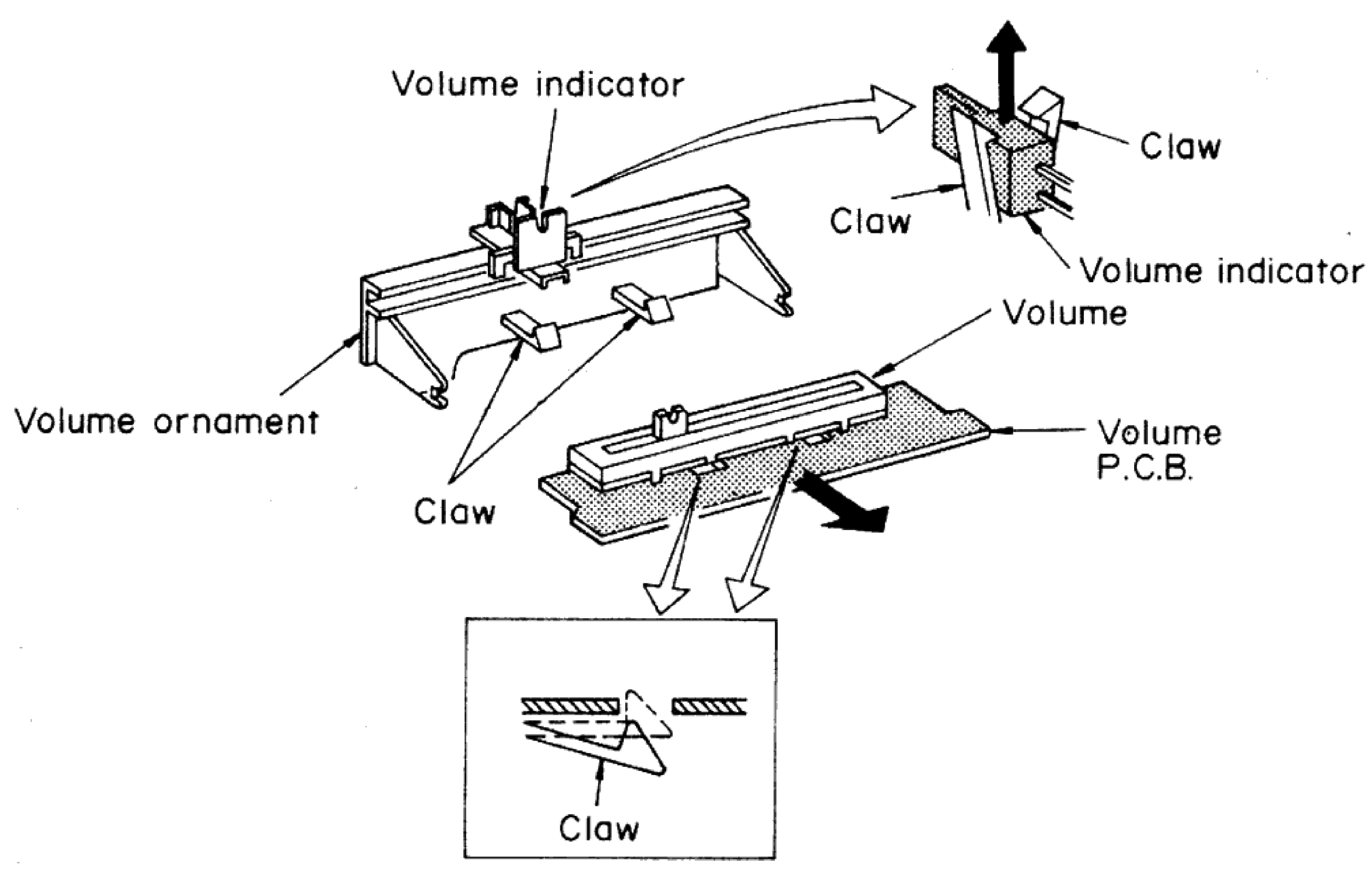
To set the input selector knob, fit the knob to the coupling rod as in Fig. 19, and set it through the front panel before attaching it to the switch.



[Fig. 19]

• How to remove the volume P.C.B. and volume indicator

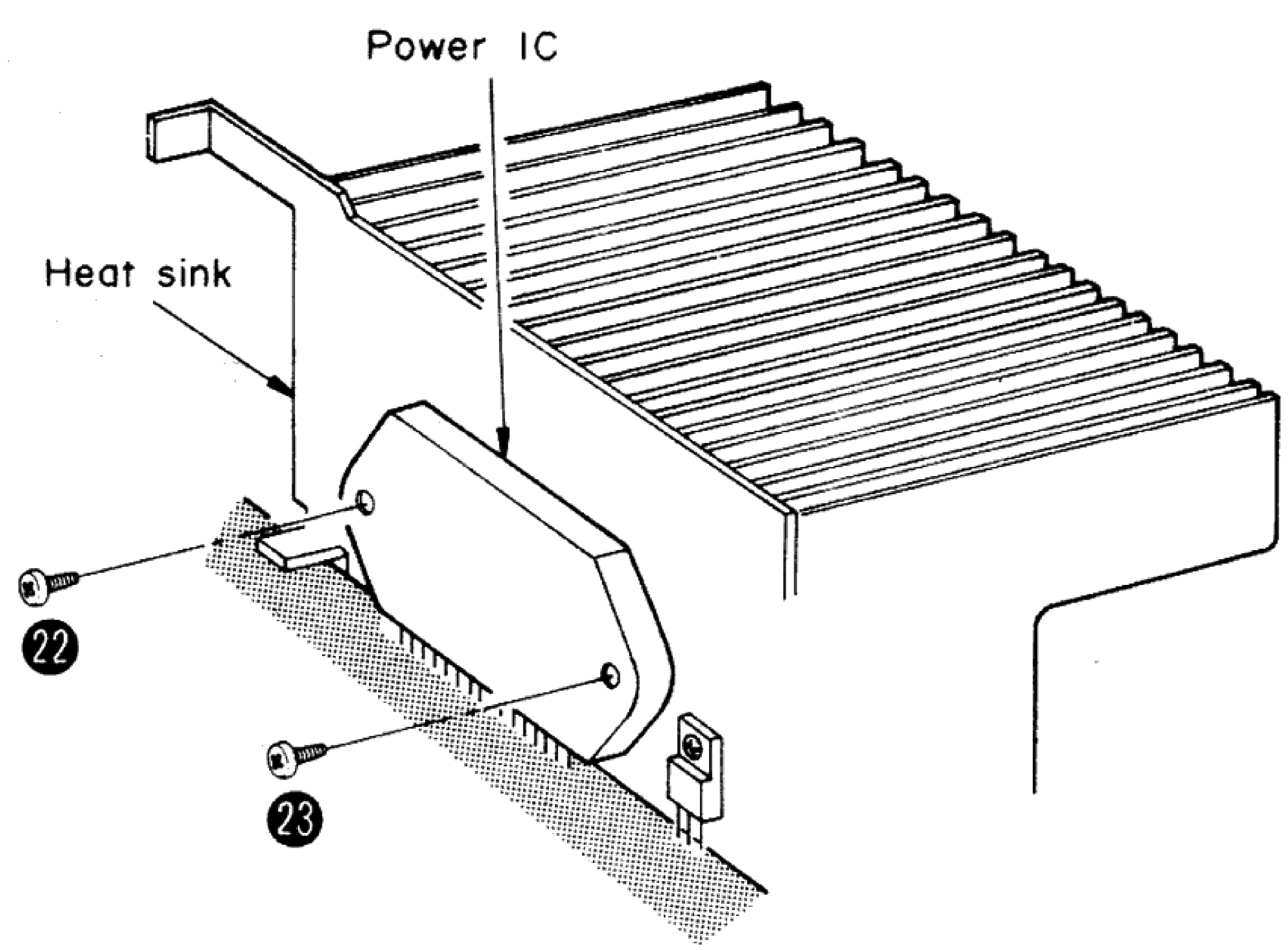
1. The volume P.C.B. is secured with the 2 claws projected from the volume ornament. So release the claws with a screwdriver, and pull out the volume P.C.B. as shown in Fig. 20.
2. When removing the volume indicator, release the 2 claws which secure the volume indicator, and then remove the indicator upward. In this case, do not bend the claws excessively.



[Fig. 20]

• How to remove the power amplifier IC

1. Remove the cabinet and bottom board.
2. Unsolder power IC.
3. Remove the 2 setscrews (Fig. 21 : ㉒ , ㉓) used to secure the power IC on the heat sink, and then pull the power IC.
4. When mounting the power IC, apply silicone compound or equivalent heat diffuser to the rear side of power IC, and then follow the steps 1 ~ 4 reversely.



[Fig. 21]

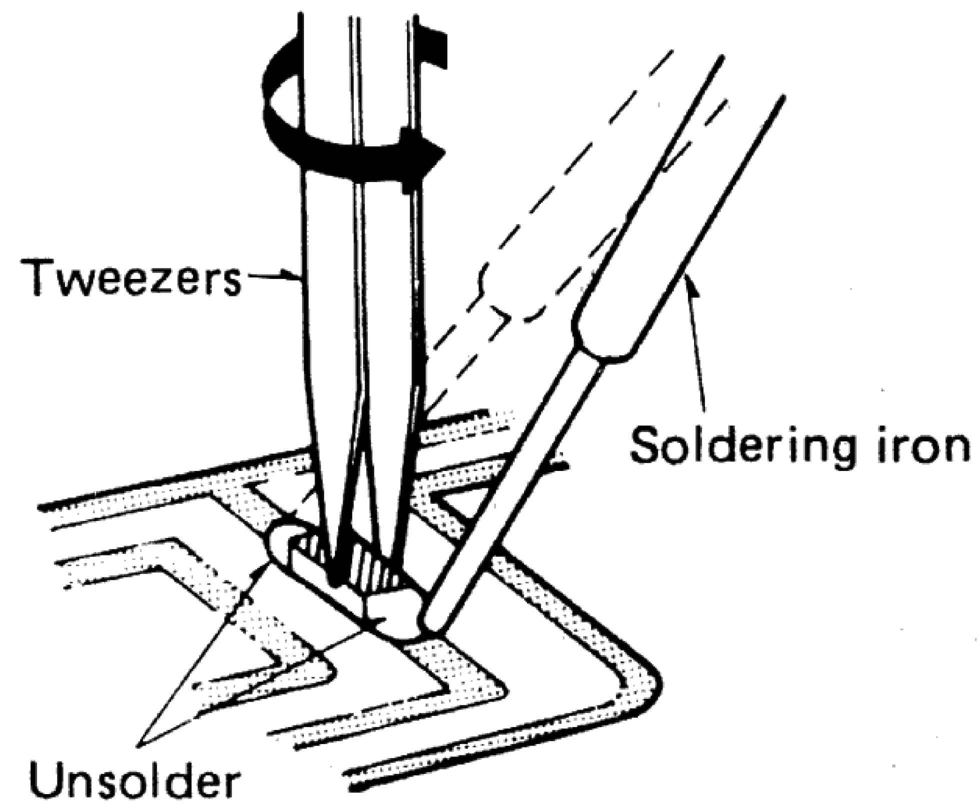
■ HOW TO REPLACE CHIPS (RESISTORS)

• How to replace chips (resistors)

1. Unsolder from chip by using solder sucker.
2. Remove chip with tweezers by rotating it while removing solder as shown in Fig. 22.
3. Solder circuit board first and then solder chip in the direction of the arrow as shown in Fig. 23.

Notes:

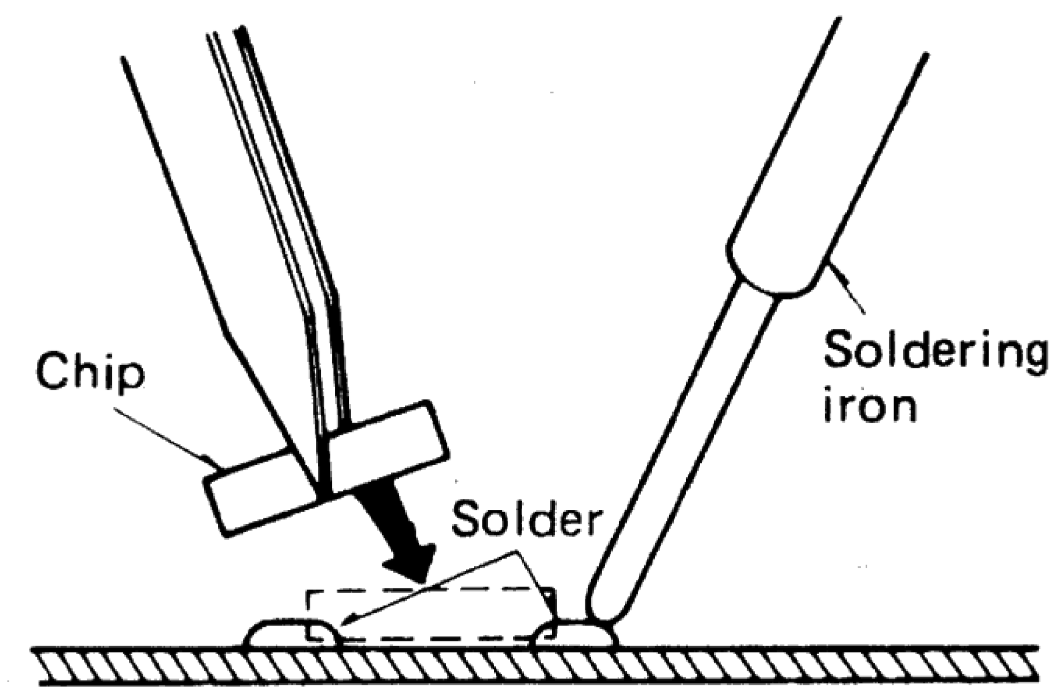
1. Do not use chip again which is removed from printed circuit board.
2. Use lead wire with insulator for replacement instead of chip jumper.



[Fig. 22]

• Note for replacing chips

1. Do not heat chips more than three (3) seconds.
2. Be careful not to damage the electrode of chips.
3. Use soldering iron (less than 60W) and tweezers for replacing chips.



[Fig. 23]

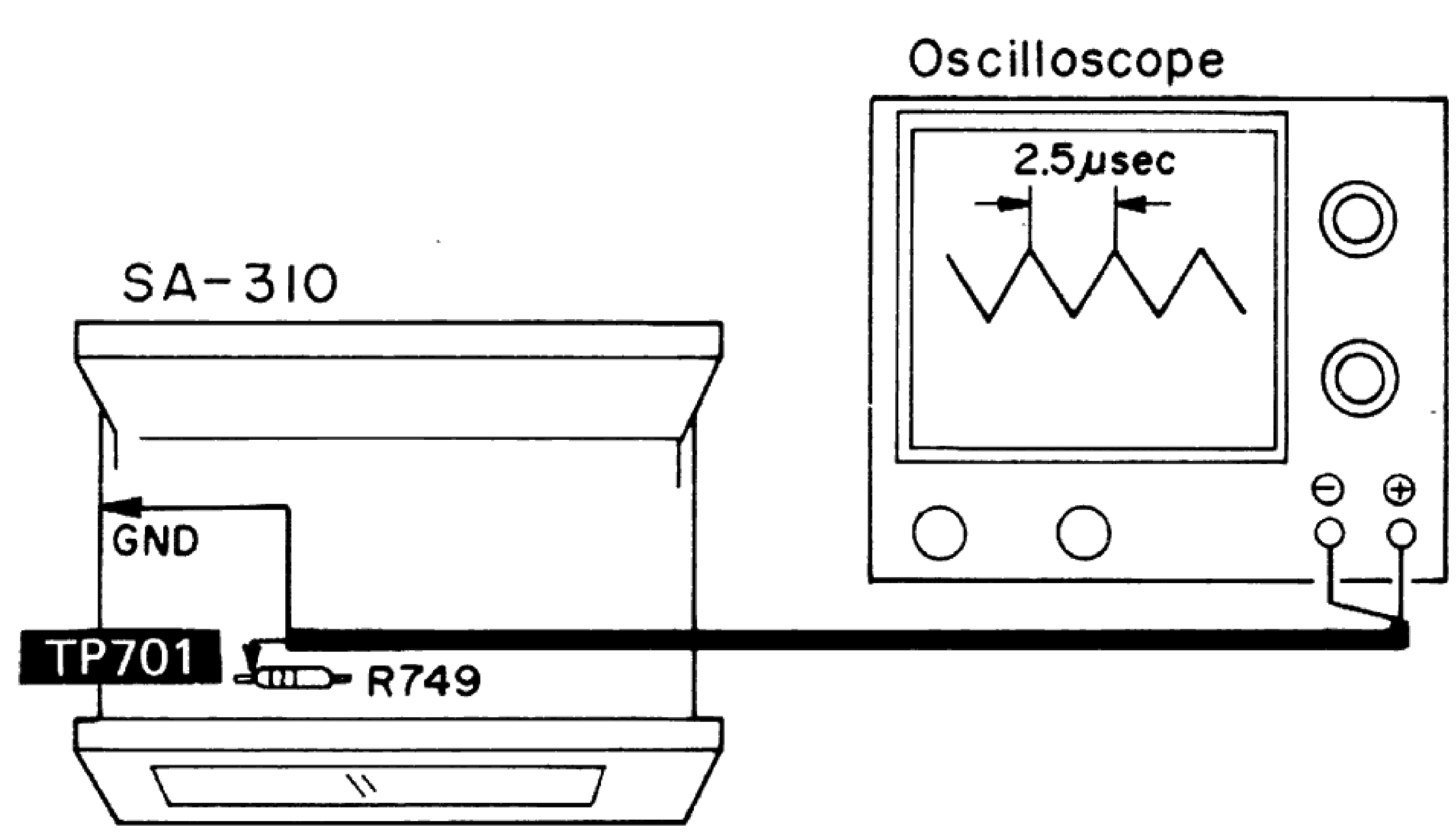
■ MEASUREMENTS AND ADJUSTMENTS

AMPLIFIER ADJUSTMENT

* **Setting of controls and instruments to be used.**

1. Before the adjustment, VR601 and VR602 should be turned in counterclockwise direction.
2. Main speaker switch . . . . on
3. Remote speaker switch. . . . . off
4. Sound volume. . . . . 0 (minimum)
5. DC voltmeter (capable to reasure 5 mV)
6. Oscilloscope

No.	ADJUSTMENTS	DC VOLTMETER CONNECTION	PARTS ADJUSTED	ADJUSTING PROCEDURE
1	Adjustment of Icq	(L channel) Between TP601 (+) and TP603 (–).	VR601 (L channel)	1. Connect 8Ω dummy resistor or speaker of 8Ω inpedance to main speaker terminal. 2. Turn power supply ON and make sure that AUTO LED (green) is lighted. 3. Adjust VR601 (L channel) or VR602 (R channel) so that the voltage at each test point is 15 mV.
		(R channel) Between TP602 (+) and TP604 (–).	VR602 (R channel)	
2	Adjustment of microcomputer Vco	————	VR701 (Adjustment of microcomputer Vco)	1. Connect oscilloscope to TP701. 2. Adjust VR701 so that period of waveform is 2.5μsec. (Refer to Fig. 24).



[Fig. 24]

■ MEASUREMENTS AND ADJUSTMENTS

Note: AM OSC coil (L203) and AM IFT (T203) have been already adjusted, and require no adjustment.

AM ADJUSTMENT

*** Setting and Equipment used**

1. AC electronic voltmeters (VTVM).
2. AM signal generator (AM-SG).
3. Set Band selector to "AM" position.
4. Maintain line voltage at 120 volts.
5. Output of signal generator should be no higher than necessary to obtain an output reading.
6. Use a non-metal screwdriver for the adjustment.

Step No.	AM SIGNAL GENERATOR: CONNECTION	AM SIGNAL GENERATOR: FREQUENCY	DISPLAY FREQUENCY	PREPARATIONS	PARTS ADJUSTED	ADJUSTING PROCEDURE
	AM-RF ADJUSTMENT					
1	Connect AM-SG to AM antenna terminal through 200pF capacitor. Common to chassis. (Weak input) (Refer to Fig. 25)	610 kHz (30% Mod. with 400 Hz)	610 kHz	Connect AC VTVM or scope to "speaker" terminal of the set.	L202 (ANT Coil)	1. Adjust for maximum output. 2. Adjust cord of L202 by screwdriver.
2		1500 kHz (30% Mod. with 400 Hz)	1500 kHz	Connect AC VTVM or scope to "speaker" terminal of the set.	CT201 (ANT Trimmer)	1. Adjust for maximum output. 2. Repeat steps (1) and (2) until the frequency correctly matches the frequency display.

FM ADJUSTMENT

*** Setting and Equipment used**

1. FM signal generator (FM-SG).
2. Oscilloscope.
3. DC electronic voltmeters (VTVM).
4. Frequency counter (19 kHz and 108 MHz measurable).
5. Set band selector to "FM" position.
6. Set FM mode selector to "mono" position.

*** Preparation of FM signal generator (FM-SG)**

1. The standard input set is 60 dB (1 mV), 400 Hz 100% modulation.
(Because of attenuation, using coaxial cables. SG output must be 6 dB plus (IHF). That is, when input 60 dB, SG output is to be 66 dB.)

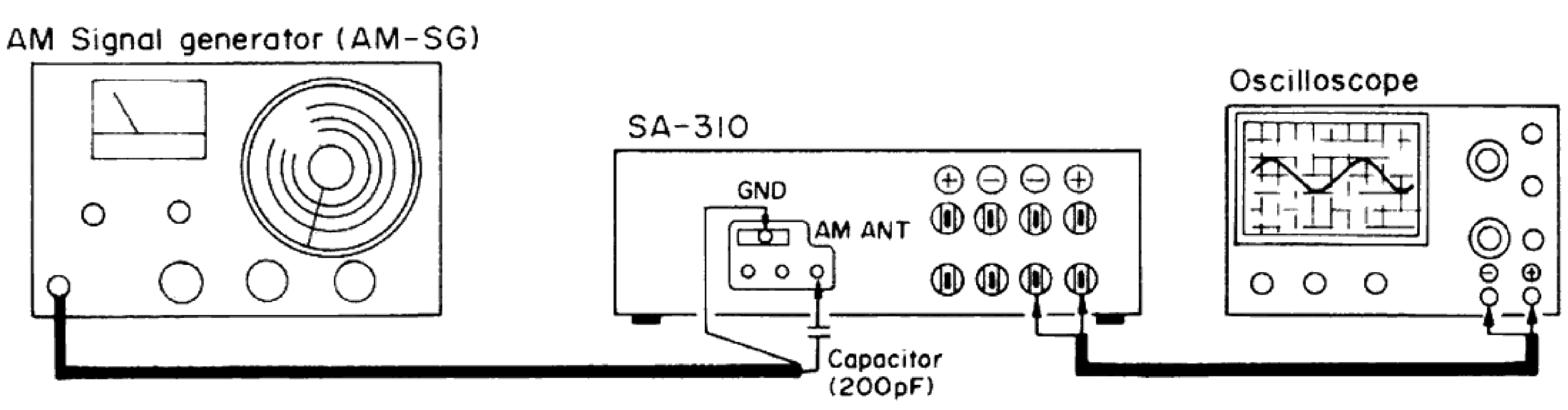
Step No.	AM SIGNAL GENERATOR: CONNECTION	AM SIGNAL GENERATOR: FREQUENCY	DISPLAY FREQUENCY	PREPARATIONS	PARTS ADJUSTED	ADJUSTING PROCEDURE
	FM-IF ADJUSTMENT					
3	Connect FM-SG to FM antenna terminal referring to Fig. 26. (Apply 60 dB to antenna terminal)	100.1 MHz (100% Mod. with 400 Hz)	100.1 MHz	Connect DC VTVM to between TP202 and TP203 through choke coil.	T201 (Discri. IFT)	1. Adjust T201 core so that voltage measured in signal mode is 0 mV in 300 mV range.

FM MPX V.C.O. ADJUSTMENT

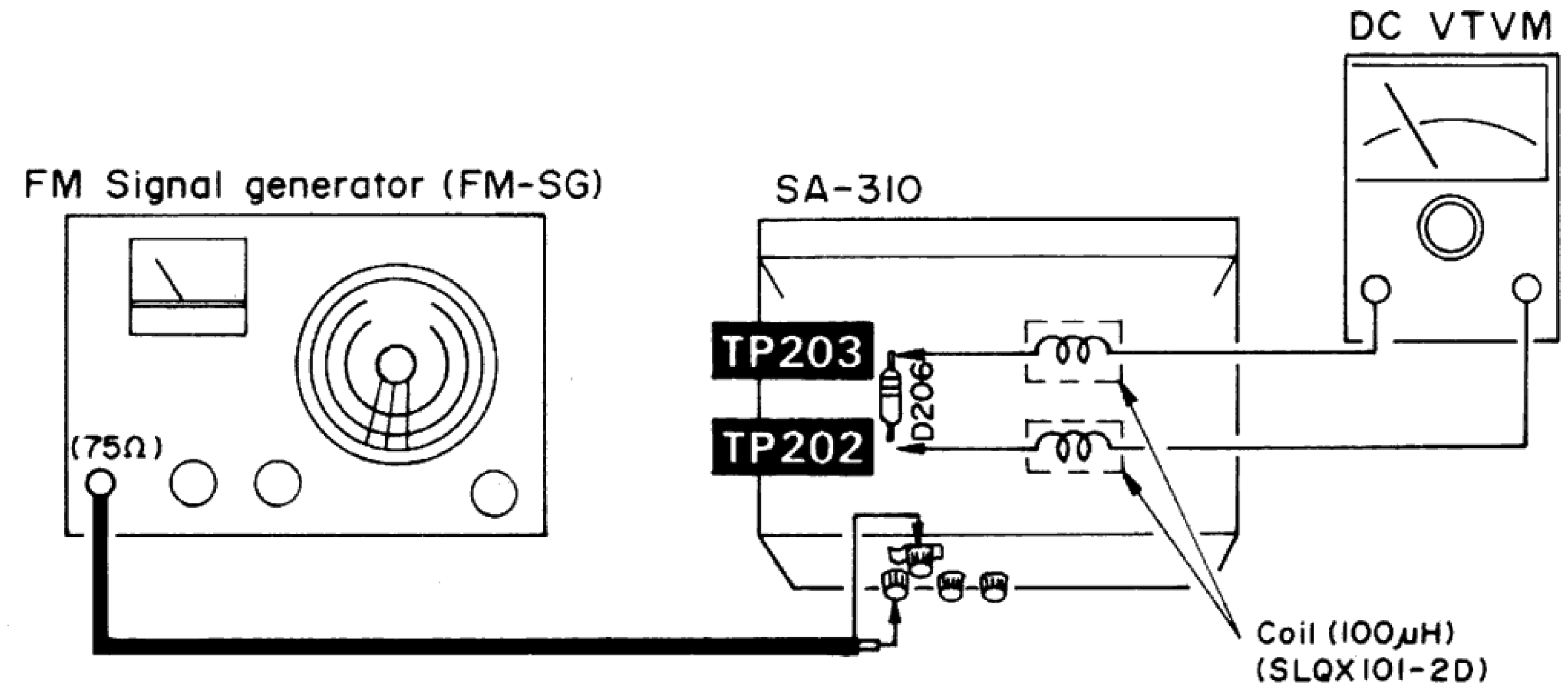
Step No.	USING A FREQUENCY COUNTER	USING ALTERNATE SYSTEM
4	1. 100 MHz, 60 dB Non-modulated mono signal applied to set. 2. FM mode switch to "auto" position. 3. Connect frequency counter to TP301 through resistor (100kΩ) referring to Fig. 27. 4. Adjust **VR301** to 19 kHz ± 30 Hz.	1. Apply stereo signal from generator or stereo station to tuner. 2. Adjust **VR301** until stereo indicator lights up. Cement arm of **VR301** as shown in Fig. 28.

FM ANALOG FREQUENCY METER

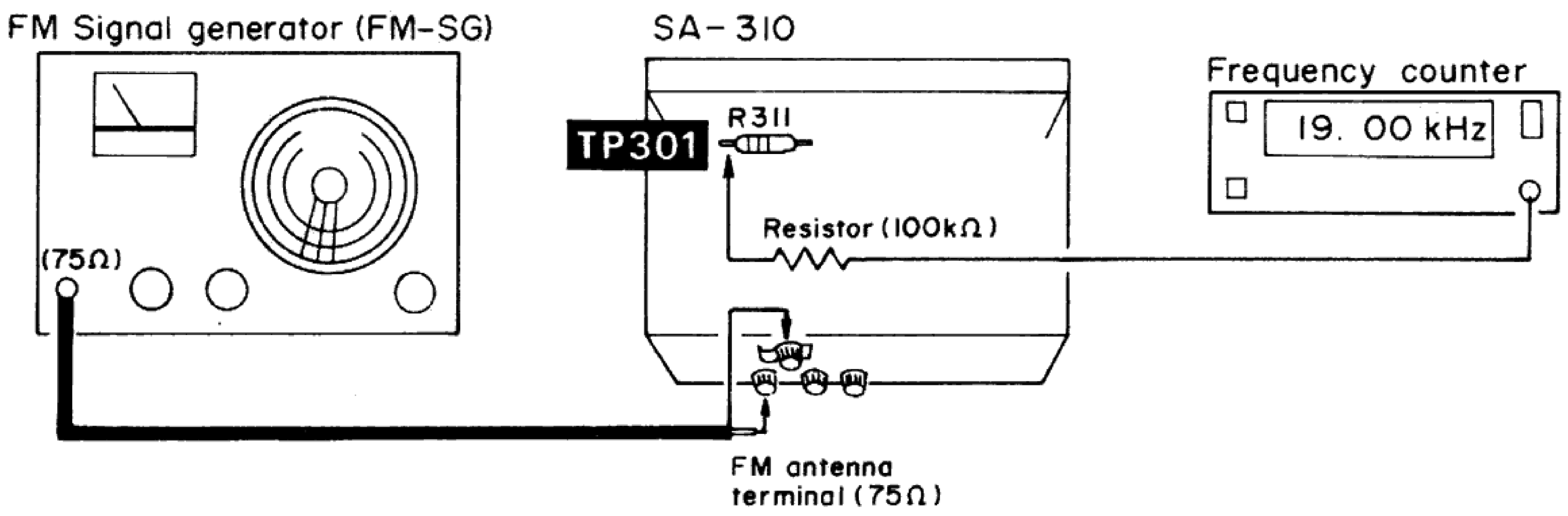
Step No.	CONNECTION	FREQUENCY	DISPLAY FREQUENCY	PREPARATIONS	PARTS ADJUSTED	ADJUSTING PROCEDURE
5	————	No-Signal	96.1 MHz	————	VR901 (Frequency meter)	1. Adjust VR901 so that the analog frequency meter indicates 96.1 MHz. (Refer to Fig. 29) 2. Next operate the tuning button so that 88.1 MHz and 107.9 MHz are indicated in the digital frequency display. Then make sure that the indicator is in contact with each letter. 3. If the requirement in step 2 is not satisfied, go back to step 1 and adjust the indicator within the dotted line of Fig. 29.



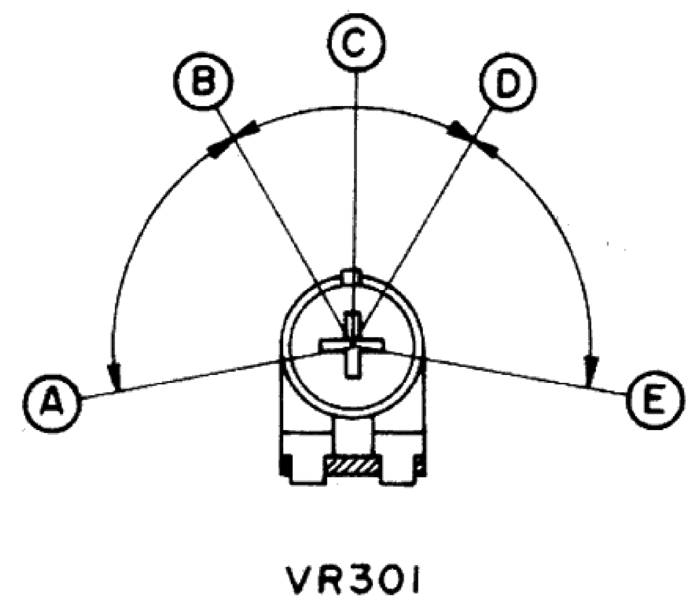
[Fig. 25]
AM-RF adjustment



[Fig. 26]
FM-IF adjustment

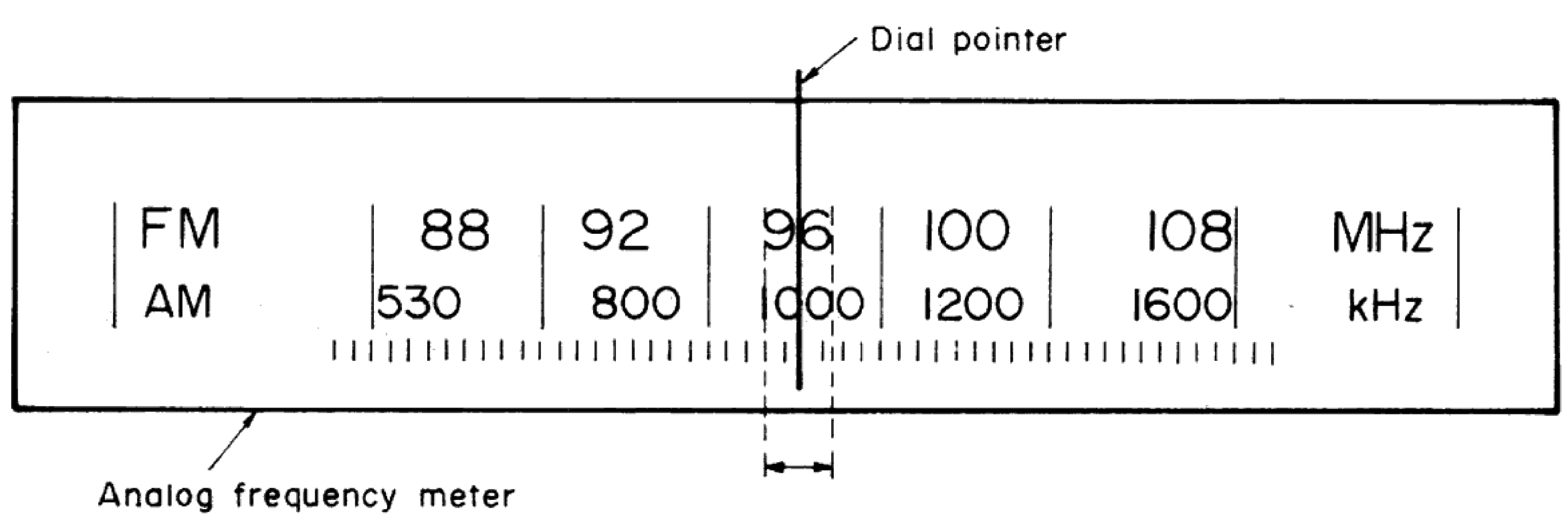


[Fig. 27]
FM MPX PILOT (VCO) adjustment



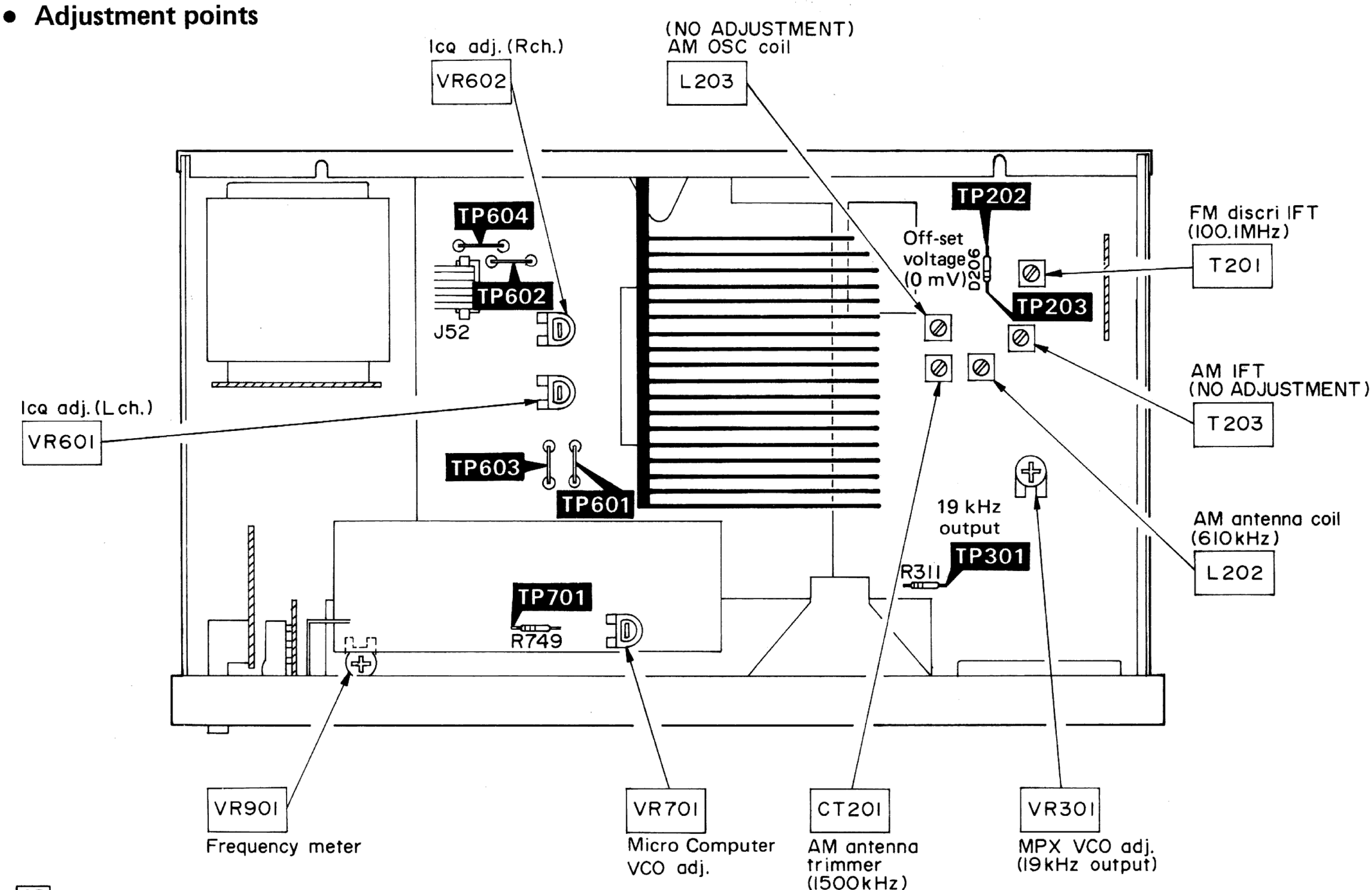
Ⓐ–Ⓑ, Ⓓ–Ⓔ : Stereo OFF position.
Ⓑ–Ⓓ : Stereo ON position.
(indicator lighting)
Ⓒ : Adjust point of pilot circuit

[Fig. 28]



[Fig. 29]
FM analog frequency meter

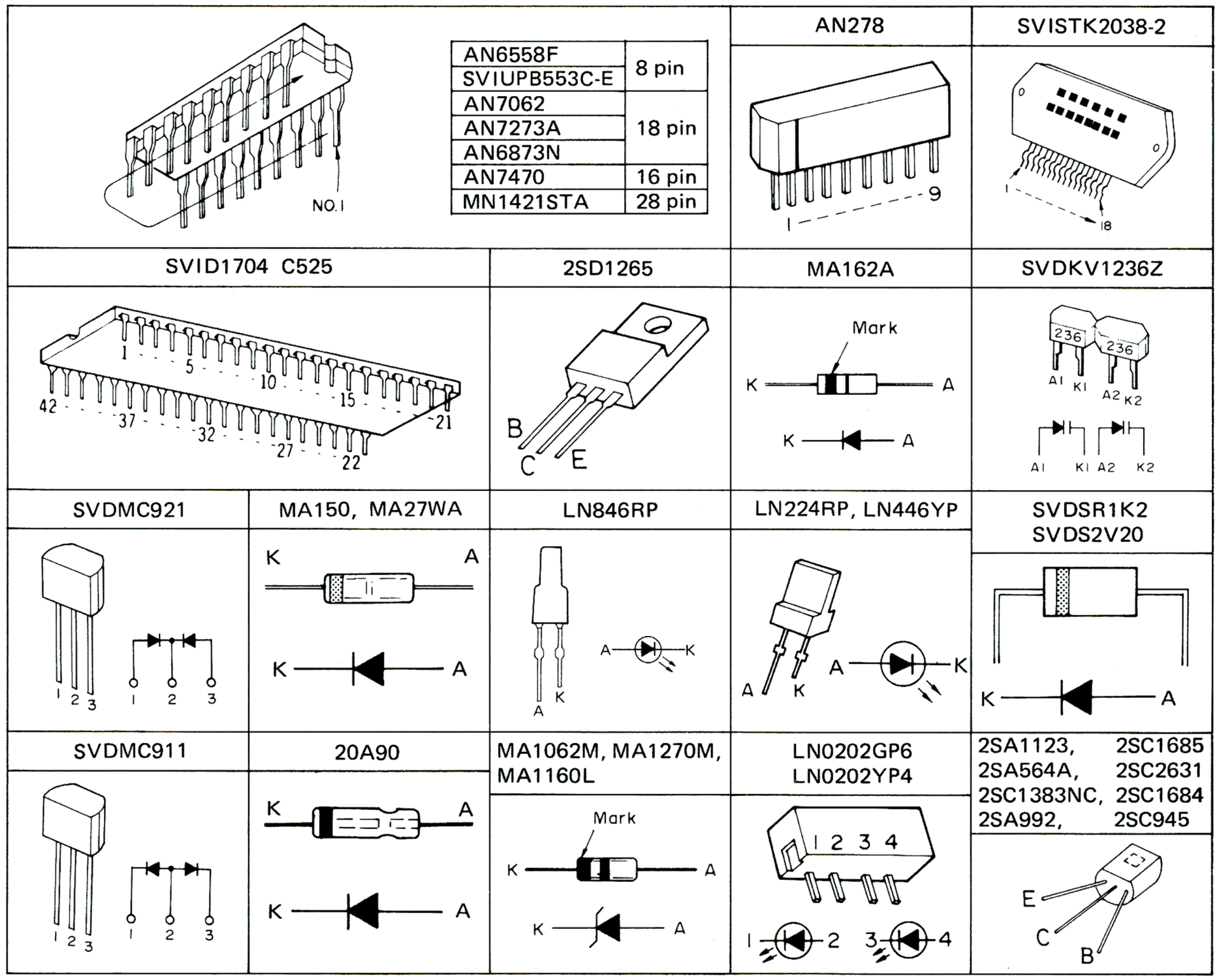
• Adjustment points



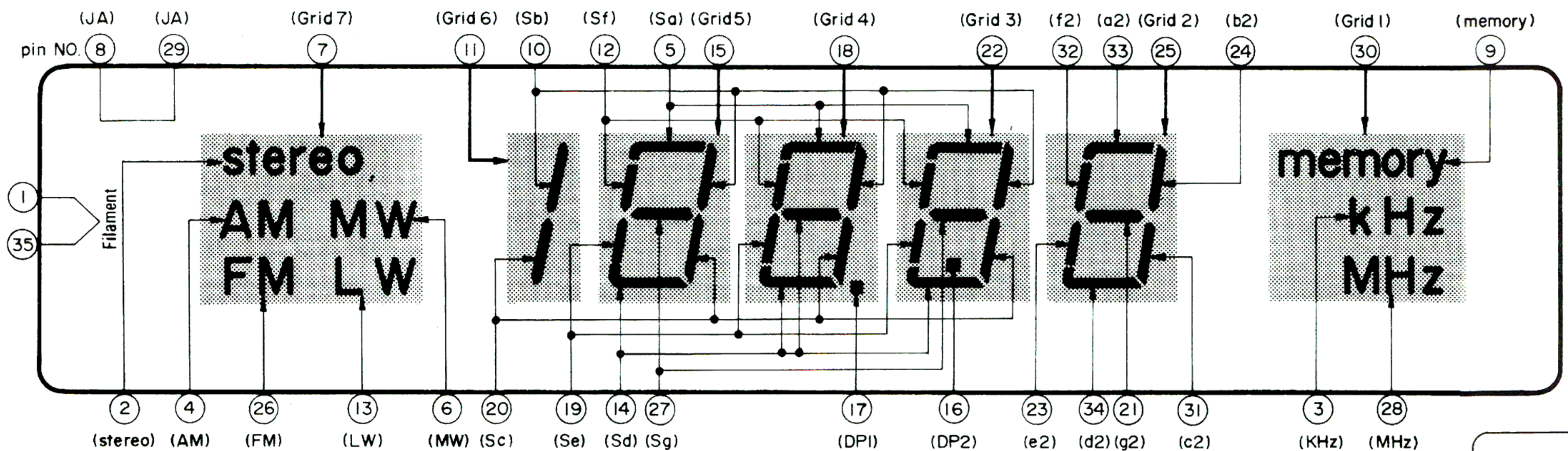
■ PRINTED CIRCUIT BOARDS

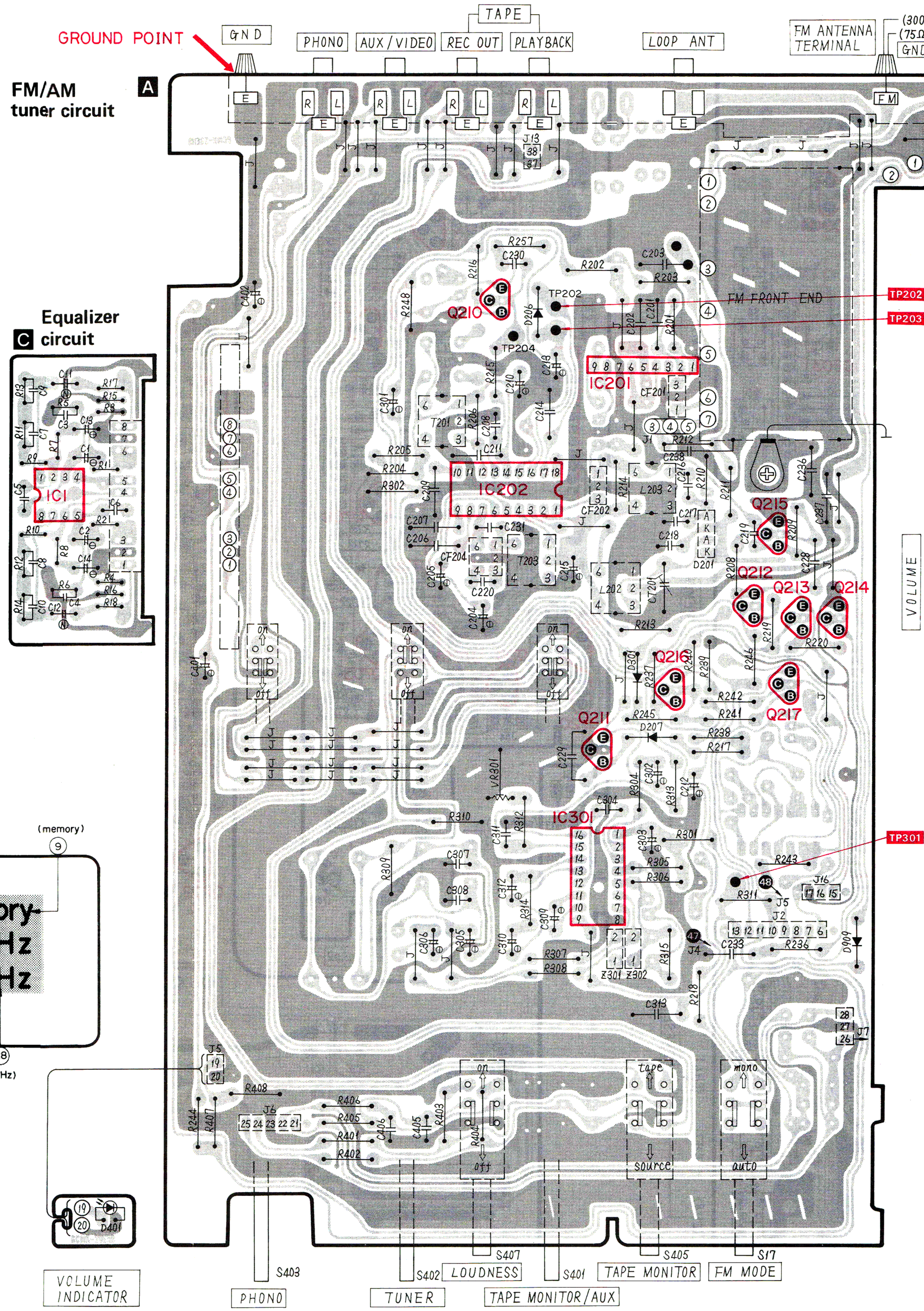
Ground (Earth) lines

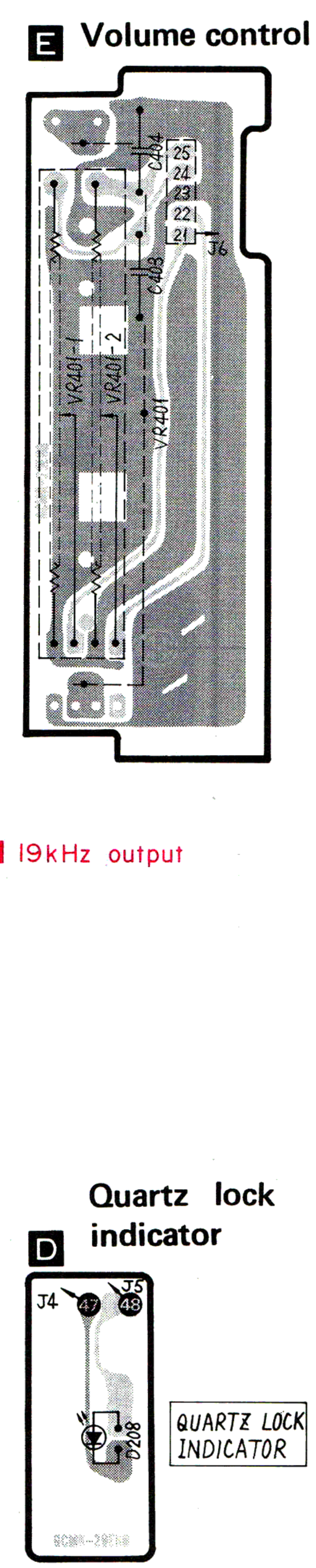
- **Terminal guide of transistors, diodes and IC's**



- **Fluorescent Display Tube (FL)**







■ PRINTED CIRCUIT BOARDS

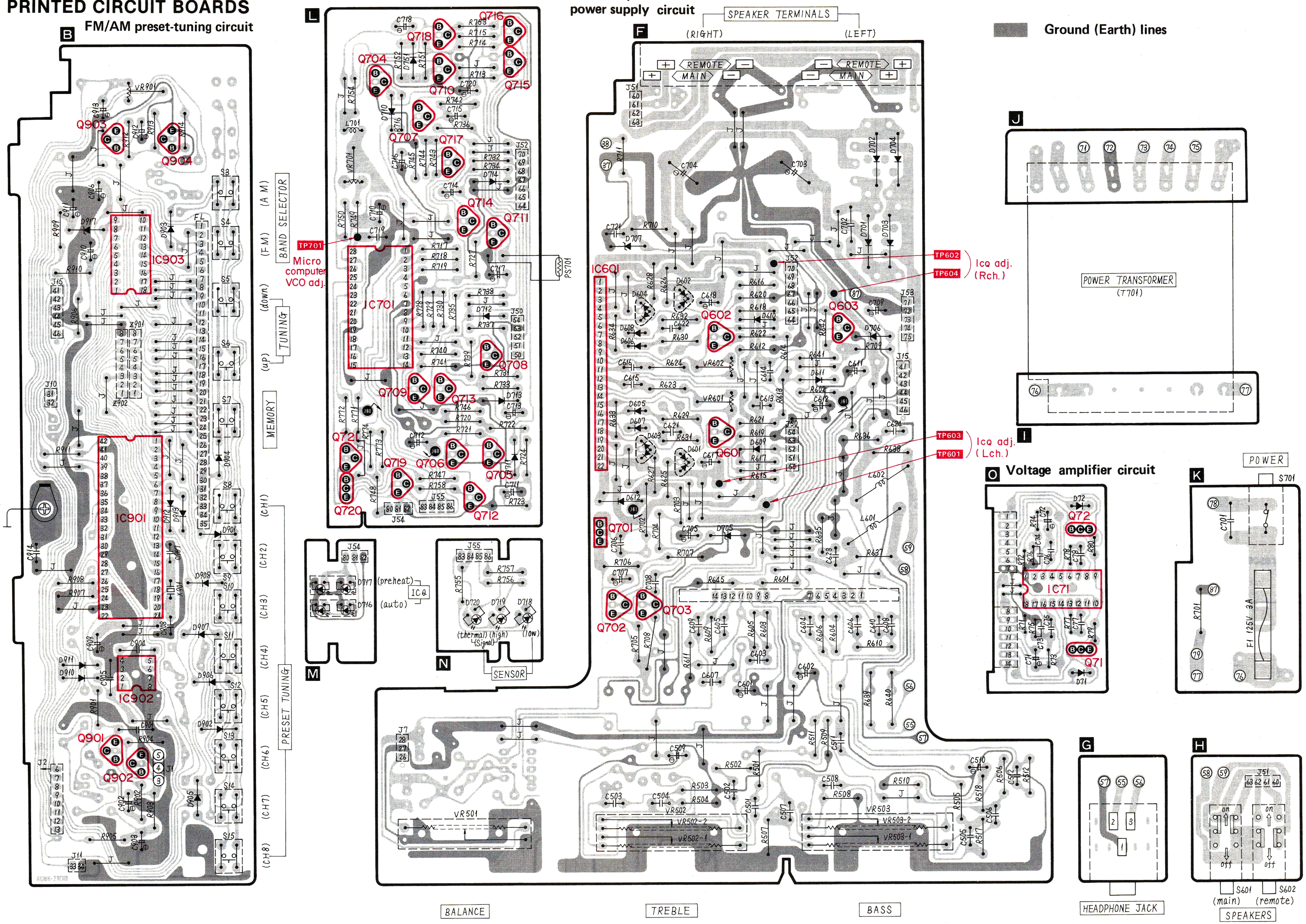
B FM/AM preset-tuning circuit

L Icα control, Muting and protection circuit

F Power amplifier and power supply circuit

Ground (Earth) lines

O Voltage amplifier circuit



■ CIRCUIT BOARDS AND WIRING CONNECTION DIAGRAM (Top View)

■ BLOCK DIAGRAM

■ BLOCK DIAGRAM

Ica: The radiator is preheated in order to assure immediate operation of the bias circuit when the power is switched on.

| preheat | indicator —— During this preheating, the "preheat" indicator illuminates.

| auto | indicator —— When the circuit is stable, the "auto" indicator illuminates.

Sensor: When the "auto" indicator illuminates, the music signal level and the temperature of the radiator and output transistor are detected.

| low | indicator
| high | indicator

* No signal: both low and high LED's are on.
* Low signal: low LED is off.
* High signal: both high and low LED's are off.

| thermal | indicator — Temperature of the radiator exceeds 60°C, thermal LED turns off.

● LED ON operation with power ON

(When power supply is turned ON, Vcc is applied to pin ⑳ (reset) of IC701 (MN1421STA), causing the program operation to start.

Output port / indicator / sec.	⑰ pin EO2 Ica auto	㉓ pin DO0 Ica preheat	③ pin CO8 bias low	② pin CO9 bias high	④ pin CO7 sensor thermal	㉖ pin DO3 Muting
Power "ON"	Ⓛ	Ⓛ	Ⓛ	Ⓛ	Ⓛ	Muting ON Ⓛ
0.5 sec.						
1 sec.	Ⓗ			Ⓗ	Ⓗ	
1 sec.			Ⓗ			
1 sec.						
1 sec.						Muting off Ⓗ
10 sec.						
↓			LED turns ON/OFF according to the signal level or temperature alteration.			

about 14.5 sec.

This operation is programed

"ON" (light up) time

■ OPERATION OF Icq CONTROLLER

• Icq control circuit

a) Preheat

When the power is turned on pin **23** (DO_0) of IC701 goes low. Q721 turns on, illuminating the preheat LED (D717). Q704 also turns on. Q715 (Q716) conducts heavily and increases the Icq through Q601 (Q602) to pin **14** (9) of IC601. For approximately 15 seconds the the Icq should be 2 times higher than normal.

b) Signal sensor

Q708 is set to turn on when the output from pin **21** (2) of IC601 exceeds 2V. At that time pin **11** (BI_3) of IC701 goes low and pin **2** (CO_9) goes high. The "low" LED turns off. The collector current of Q715 (Q716) reduces and decreases the bias current. Q709 turns on when the output exceeds 4V. Pin **12** (BI_2) goes low and pin **3** (CO_8) goes high. The "high" LED turns off and the current through Q715 (Q716) is further decreased.

c) Thermal sensor

When the thermistor (PS701) temperature reaches 60°C, Q711 turns on. Pin **10** (AI_0) of IC701 goes low and pin **4** (CO_7) goes high. This causes a decrease in the collector current of Q715 (Q716) and the thermal LED (D720) turns off.

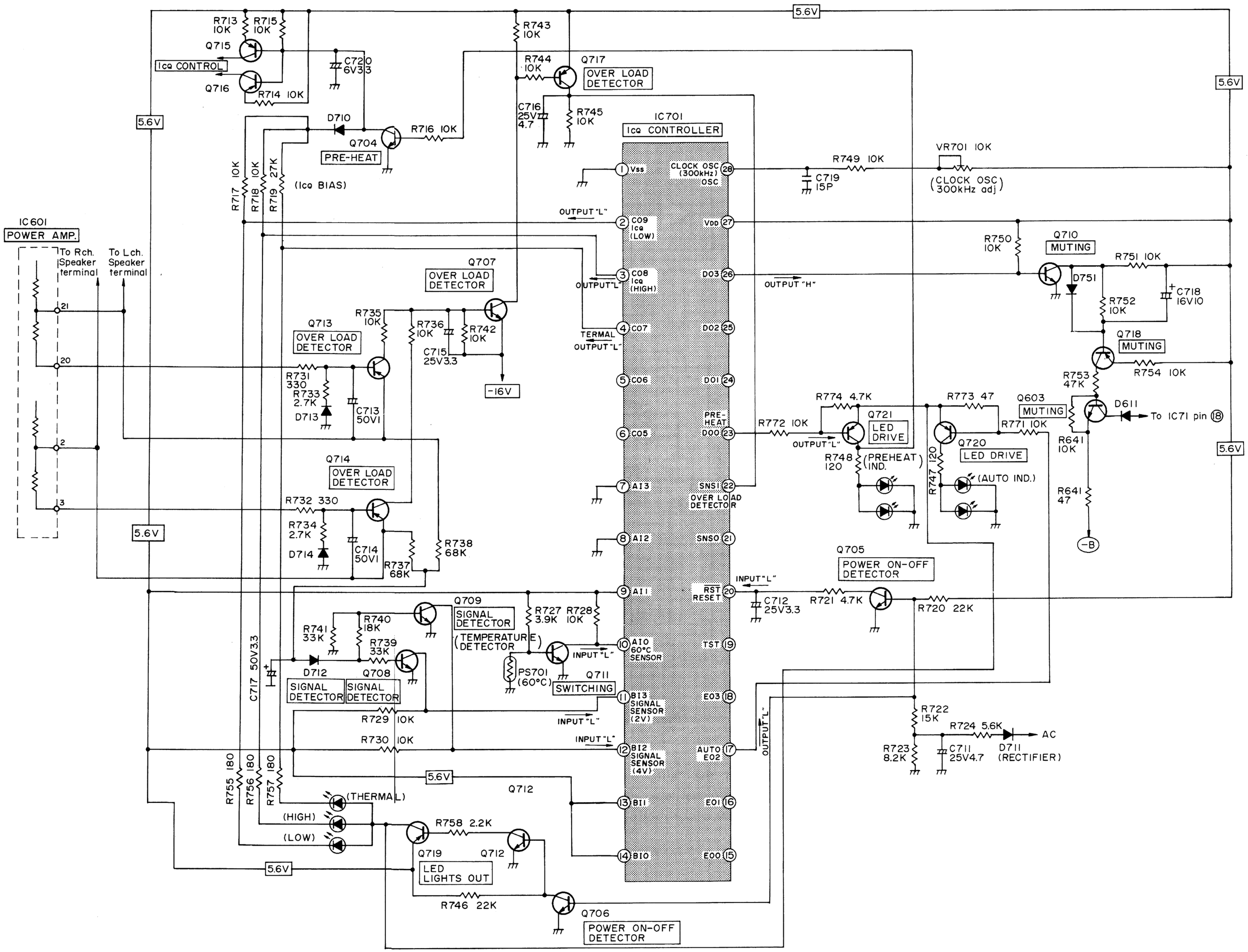
The combination of the signal and thermal sensors serve to change the total impedance of R717 ~ R719 (Bias) to determine the level of Icq applied.

• Muting circuit

When the power is turned on, pin **26** (DO_3) of IC701 goes high for about 4 secones, Q710, Q718 and Q603 turn on to activate IC71 (voltage amplifier).

When the power is turned of, Q705 turns off and pin **20** (RST) of IC701 goes low. Pin **26** (DO_3) also goes low and Q710, Q718 and Q603 turn off to disable IC71 (voltage amplifier).

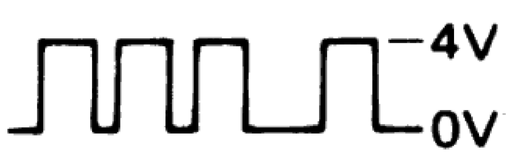
When there is a large amount of signal the voltage across R731 (R732) increases to the point that Q713 (Q714) turns on, pin **22** (SNS_1) of IC701 goes high and pin **26** (DO_3) goes low to disable IC71 (voltage amplifier).

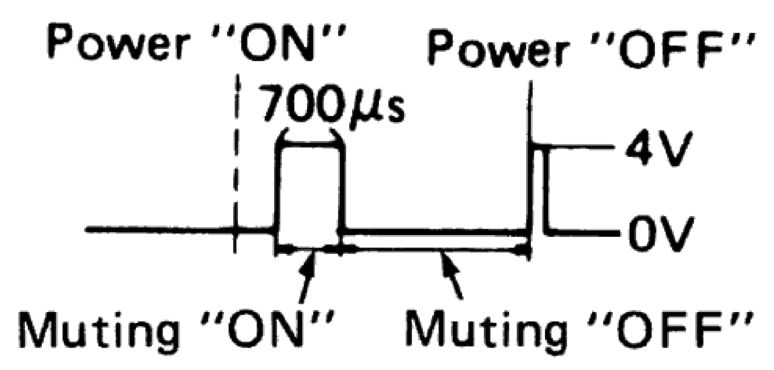


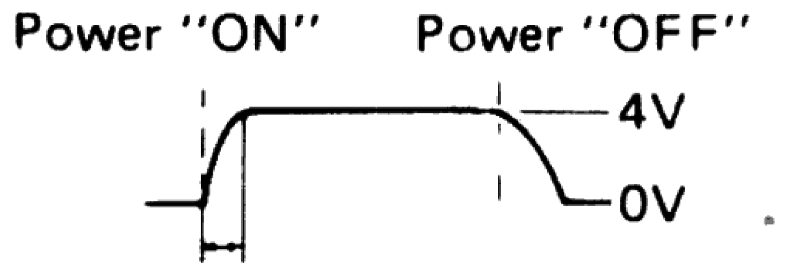
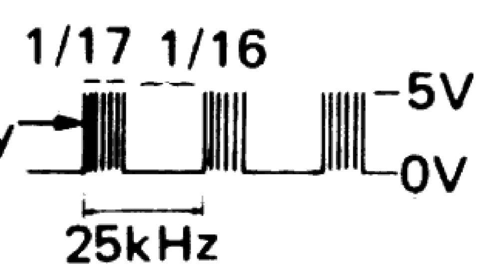
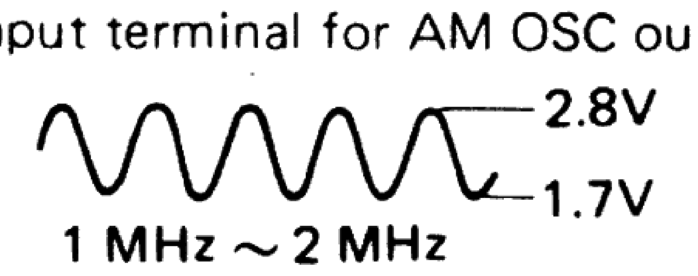
■ TERMINAL OPERATION OF Icq CONTROLLER (IC701)

Pin No.	Mark	Name of block	Description of terminal
1	V_{SS}	Power supply input terminal	Grounded (0V)
2	CO_9	Output port C	It delivers Icq control signal through input port A (thermal sensor) and input port B (signal sensor). [Output "L"]
3	CO_8		
4	CO_7		
5	CO_6		
6	CO_5		
7	AI_3	Input port A	Grounded (0V)
8	AI_2		
9	AI_1		Apply 5V
10	AI_0		Input level changes to "L" at 60°C thermal sensor of power amplifier operates.
11	BI_3	Input port B	Input level changes to "L" as effective output 2V signal sensor of power amplifier operates.
12	BI_2		Input level changes to "L" as effective output 4V signal sensor of power amplifier operates.
13	BI_1		Apply 5V
14	BI_0		
15	EO_0	Output port E	Not used in this unit.
16	EO_1		
17	EO_2		Indicator "auto" lights up at "L" output.
18	EO_3		Not used in this unit.
19	TST	Test input terminal	Terminal for testing LSI (Grounded)
20	RST	Reset input terminal	All outputs are cleared or reset with input at "L" . (It is connected to power supply circuit)
21	SNS_0	Sensor input terminal	Not used in this unit.
22	SNS_1		Input level changes to "H" as power amplifier output short-circuit detector operates.
23	DO_0	Output port D	Output terminal for indicator "preheat" and preheating circuit operation. [Output "L"]
24	DO_1		Not used in this unit.
25	DO_2		
26	DO_3		Output relay turns ON with output at "H".
27	V_{DD}	Power supply input terminal	Apply 5V.
28	OSC	OSC input terminal	Clock signal (about 400 kHz) can be obtained by internal oscillation circuit.

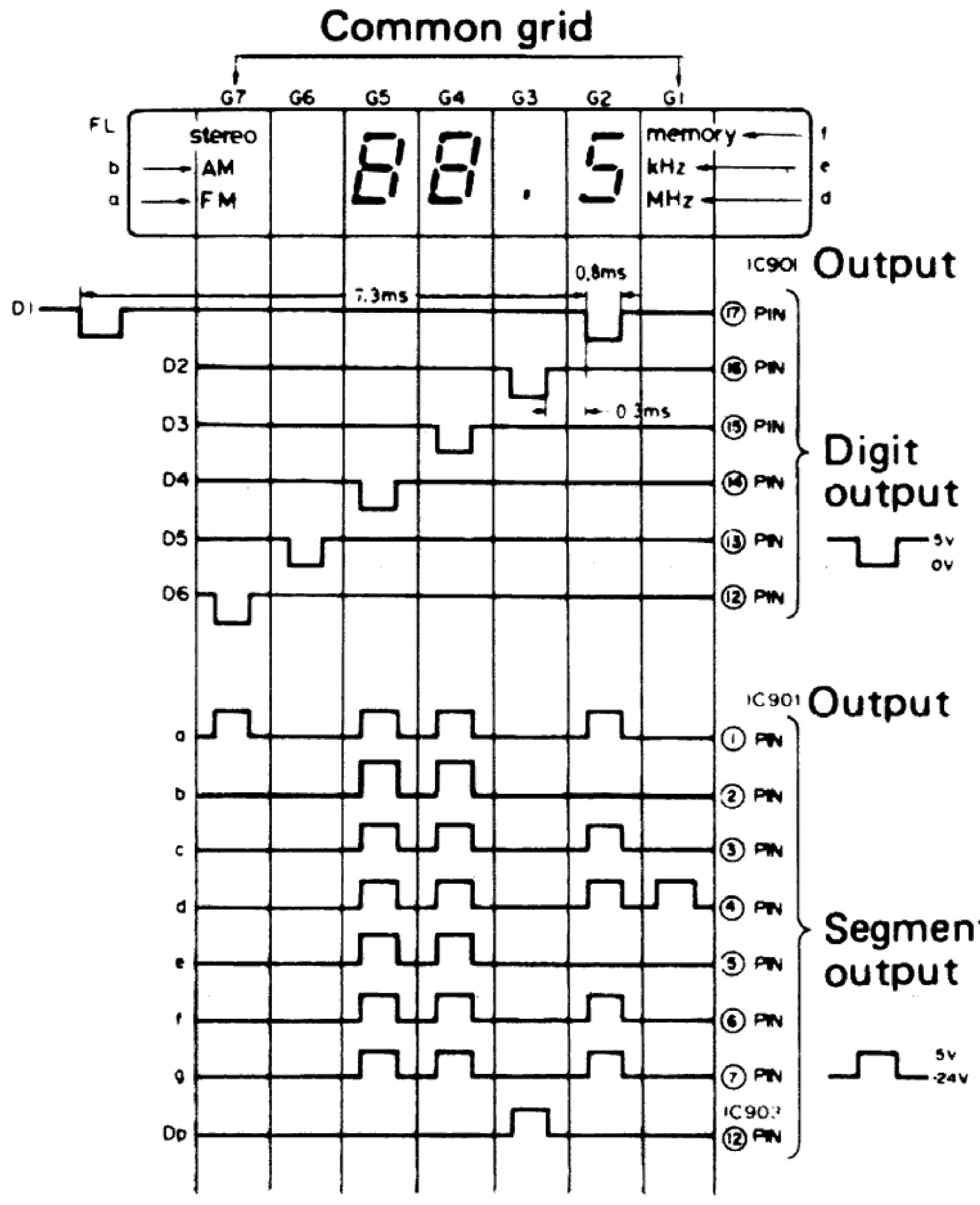
■ TERMINAL OPERATION OF PLL CONTROLLER (IC901)

Pin No.	Mark	Description of terminal
1	Sa	Segment signal output terminal for display. (Refer to Fig. 30)
2	Sb	
3	Sc	
4	Sd	
5	Se	
6	Sf	
7	Sg	
8	K0	Input terminal for key return signal from external key matrix. The output of segment terminals (a ~ g) is used as the key return signal source. 
9	K1	
10	K2	
11	K3	
12	D6	Digit signal output terminal for display. (Refer to Fig. 30)
13	D5	
14	D4	
15	D3	
16	D2	
17	D1	

Pin No.	Mark	Description of terminal
18	MT	This is the output terminal to eliminate shock noise due to unlocking at PLL. When the CE terminal is at low level, the output from this terminal is at high level. 
19	X2	Connecting terminal for crystal oscillator. The crystal connected is at 4.5 MHz.
20	X1	
21	VDD	Power supply terminal of the device.
22	E01	When the divided oscillation frequency is higher than the standard frequency, H-level output is delivered from these terminals. When it is lower, L-level (0V) output is delivered. When they coincide, it results in floating.
23	GND	Ground terminal.
24	E02	Not used in this unit.

Pin No.	Mark	Description of terminal
25	CE	This is the selected signal input terminal of the device. When operating the device, make the level high, and when it is not used, make the level low. When this terminal is at low level, all the segment (a ~ g) and digits (D1 ~ D6) terminals are off, but the memory is held.  The device does not operate during this period.
26	SD	This input terminal detects the reception of a broadcasting station. The voltage is 4.2V during reception, and otherwise 0V.
27	FM	Input terminal for FM OSC output frequency-divided to 1/16 or 1/17 by pre-scaler.
28	PSC	This is the terminal to deliver the frequency dividing ratio changeover output signal to the pre-scaler. The terminal continues to produce pulses at the rise of the signal applied to FM terminal (27) until the content of the inside swallow counter is 0. When the swallow counter comes to 0, the terminal level becomes low, then the frequency dividing ratio of pre-scaler is 1/16. **Pulse two times larger than the value that cannot be divided by VCO/16.** 
29	INT	This is the interrupt demand signal input terminal. The signal from the control input terminal is put into this terminal, demanding for interruption, then the flow of program will be unconditionally shifted to the address No. 1.
30	AM	Input terminal for AM OSC output. 

Pin No.	Mark	Description of terminal
31	PC2	This is 2-bit input/output port. PC2 terminal (31) is the decimal indication output terminal for the digital display.
32	PC3	
33	PB0	This is 4-bit input/output port. PB2 terminal (35), is the FM/AM changeover output terminal, which is 5V in FM, and 0V in AM. Other terminals are not used in this unit.
34	PB1	
35	PB2	
36	PB3	
37	PA0	This is 4-bit input/output port. (Not used in this unit)
38	PA1	
39	PA2	
40	PA3	
41	PD3	One-bit input/output port. (Not used in this unit.)
42	VDP	One-bit output port. Output signal is emitted to operate the analog frequency meter, and the output voltage varies according to the frequency.



[Fig. 30]

■ 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.

Numbering System of Resistor

Example

ERD	25	F	J	101
Type	Wattage	Shape	Tolerance	Value
ERG	2	AN	J	2R2
Type	Wattage	Shape	Tolerance	Value

Resistor Type	Wattage	Tolerance
ERD : Carbon	10 : 1/8W	J : ± 5%
ERG : Metal Oxide	12 : 1/2W	K : ± 10%
ERQ : Fuse Type Metal	25 : 1/4W	
	1 : 1W	
ERC : Solid	2 : 2W	
	S1 : 1/2W	

ERD10TLJ □□□ → Chip type carbon
ERO10MKG □□□ → Chip type metal film

Numbering System of Capacitor

Example

ECKD	1H	102	Z	F
Type	Volgage	Value	Tolerance	Peculiarity
ECEA	50	M	R47	R
Type	Voltage	Peculiarity	Value	Special use

Capacitor Type	Voltage		Tolerance
	ECEA Type	Order	
ECEA : Electrolytic	OJ : 6.3V	1H : 50V	C : ± 0.25pF
ECCD : Ceramic	1A : 10V	1C : 16V	J : ± 5%
ECKD : Ceramic	1C : 16V	KC : 400V AC	K : ± 10%
ECQM : Polyester	1E : 25V	1 : 100V	Z : +80%, −20%
ECQP : Polypropylene	1H : 50V	45 : 45V DC	N : ± 30%
ECET : Electrolytic	1V : 35V		P : +100%, −0%
ECEA..... N: Non Polar Electrolytic	50 : 50V		
ECBT : Axial Leaded Type Ceramic	25 : 25V		

Ref. No.	Part No.	Value
RESISTORS		
R1,2	ERD10TLJ391U	390
R3,4	ERO10MKG2213	221K
R5,6	ERO10MKG5622	56.2K
R7,8	ERD10TLJ271U	270
R9,10	ERD10TLJ680U	68
R11,12	ERD10TLJ184U	180K
R13,14	ERD10TLJ123U	12K
R15,16	ERD10TLJ563U	56K
R17,18	ERD10TLJ102U	1K
R71,72	ERD10TLJ334U	330K
R73,74	ERD10TLJ102U	1K
R75,76	ERD10TLJ124U	120K
R77,78	ERD10TLJ103U	10K
R79,80	ERD10TLJ220U	22
R201 S	ERD25FJ331	330
R202 S	ERD25FJ272	2.7K
R203 S	ERD25FJ221	220
R204 S	ERD25FJ102	1K
R205 S	ERD25FJ471	470
R206 S	ERD25FJ152	1.5K
R208 S	ERD25FJ103	10K
R209 S	ERD25TJ684	680K
R210 S	ERD25TJ104	100K
R211 S	ERD25FJ102	1K
R212 S	ERD25FJ562	5.6K
R213 S	ERD25FJ152	1.5K
R214 S	ERD25TJ684	680K
R215 S	ERD25FJ103	10K
R216 S	ERD25TJ104	100K
R217 S	ERD25FJ392	3.9K
R218 S	ERD25TJ104	100K
R219 S	ERD25TJ473	47K
R220 S	ERD25FJ103	10K
R236 S	ERD25TJ473	47K
R237,238 S	ERD25FJ103	10K
R239 S	ERD25FJ681	680
R240 S	ERD25TJ104	100K
R241 S	ERD25TJ333	33K
R242 S	ERD25TJ274	270K
R243 S	ERD25FJ271	270
R244 S	ERD25FJ101	100
R245 S	ERD25TJ104	100K
R246 S	ERD25TJ824	820K
R248 S	ERD25FJ682	6.8K
R257 S	ERD25FJ562	5.6K
R301 S	ERD25FJ151	150
R302 S	ERD25TJ104	100K
R304 S	ERD25FJ103	10K
R305,306 S	ERD25TJ223	22K
R307,308 S	ERD25FJ392	3.9K
R309,310 S	ERD25TJ104	100K
R311 S	ERD25FJ392	3.9K
R312 S	ERD25FJ153	15K
R313 S	ERD25FJ103	10K
R314 S	ERD25FJ102	1K
R315 S	ERD25TJ274	270K
R401,402 S	ERD25FJ222	2.2K
R403,404 S	ERD25TJ183	18K
R405,406 S	ERD25TJ393	39K
R407 S	ERD25FJ821	820
R408 S	ERD25FJ271	270
R501,502 S	ERD25FJ392	3.9K
R503,504 S	ERD25FJ561	560
R505,506 S	ERD25TJ183	18K
R507,508 S	ERD25FJ392	3.9K
R509,510 S	ERD25FJ681	680
R511,512 S	ERD25TJ123	12K
R517,518 S	ERD25TJ154	150K
R601 S	ERD25TJ473	47K
R602 △S	ERD25FJ470	47
R603,604 S	ERD25TJ563	56K
R605,606 S	ERD25TJ683	68K
R609,610 S	ERD25FJ331	330
R611,612 S	ERD25TJ154	150K
R613,614 △	ERDS1FJ102	1K
R615,616 S	ERD25FJ222	2.2K
R617,618 △	ERDS1FJ561	560

Ref. No.	Part No.	Value
RESISTORS		
R619,620 S	ERD25TJ393	39K
R621,622 △	ERDS1FJ820	82
R623,624 S	ERD25FJ102	1K
R625,626 S	ERD25TJ824	820K
R627,628 S	ERD25TJ824	820K
R629,630 △S	ERD25FJ561	560
R631,632 △S	ERD25FJ102	1K
R633,634 S	ERD25FJ103	10K
R635,636 △	ERDS1FJ100	10
R637,638 △	ERDS1FJ100	10
R639,640 △	ERDS1FJ331	330
R641 △S	ERD25FJ470	47
R642 S	ERD25FJ103	10K
R645 S	ERD25TJ104	100K
R701 △S	ERC12ZGK335	3.3M
R702(M) S	ERG2ANJ220	22
R702(MC)	ERQ1AJ150	15
R703 △S	ERDS1FJ152	1.5K
R704 S	ERD25FJ821	820
R705 S	ERD25FJ681	680
R706 S	ERD25FJ272	2.7K
R707 S	ERD25FJ222	2.2K
R708 S	ERG1ANJ470	47
R709 △	ERDS1FJ821	820
R710 △	ERDS1FJ152	1.5K
R711 S	ERD25FJ221	220
R713,714 S	ERD25FJ103	10K
R715,716 S	ERD25FJ103	10K
R717,718 S	ERD25FJ103	10K
R719 S	ERD25FJ272	2.7K
R720 S	ERD25TJ223	22K
R721 S	ERD25FJ472	4.7K
R722 S	ERD25TJ153	15K
R723 S	ERD25TJ123	12K
R724 S	ERD25FJ562	5.6K
R727 S	ERD25FJ392	3.9K
R728,729 S	ERD25FJ103	10K
R730 S	ERD25FJ103	10K
R731,732 △	ERDS1FJ331	330
R733,734 S	ERD25FJ272	2.7K
R735,736 S	ERD25TJ563	56K
R737,738 S	ERD25TJ683	68K
R739 S	ERD25TJ333	33K
R740 S	ERD25TJ183	18K
R741 S	ERD25TJ223	22K
R742 S	ERD25TJ563	56K
R743,744 S	ERD25FJ103	10K
R745 S	ERD25FJ103	10K
R746 S	ERD25TJ223	22K
R747,748 S	ERD25FJ121	120
R749,750 S	ERD25FJ103	10K
R751 S	ERD25FJ332	3.3K
R752 S	ERD25TJ224	220K
R753 S	ERD25TJ473	47K
R754 S	ERD25FJ103	10K
R755,756 S	ERD25FJ181	180
R757 S	ERD25FJ181	180
R758 S	ERD25FJ222	2.2K
R771,772 S	ERD25FJ103	10K
R773,774 S	ERD25FJ472	4.7K
R901 S	ERD25FJ102	1K
R902 S	ERD25FJ561	560
R903 S	ERD25FJ682	6.8K
R904 S	ERD25FJ103	10K
R905 S	ERD25FJ101	100
R906 S	ERD25FJ151	150
R907 S	ERD25FJ103	10K
R908 S	ERD25TJ273	27K
R909 △	ERDS1FJ680	68
R910 S	ERD25FJ681	680
R911 S	ERD25FJ103	10K
R912 S	ERD25TJ224	220K
R913 S	ERD25TJ154	150K
R914 S	ERD25TJ104	100K

Ref. No.	Part No.	Value
CAPACITORS		
C1,2 S	ECEA50M3R3R	3.3
C3,4 S	ECCD1H101K	100P
C5,6 S	ECKD1H471KB	470P
C7,8 S	ECQM1H223JZ	0.022
C9,10 S	ECQM1H682JZ	0.0068
C11,12 △S	ECEA1HN010S	1
C13,14 S	ECEA1CS330	33
C71,72 S	ECEA50Z3R3	3.3
C73,74 S	ECCD1H390K	39P
C75,76 S	ECCD1H820K	82P
C77,78 S	ECKD1H391KB	390P
C201,202	ECBT1C103ZYY	0.01
C203	ECBT1C223NYY	0.022
C204 S	ECEA1AS101	100
C205 S	ECEA50Z3R3	3.3
C206	ECBT1C103ZYY	0.01
C207	ECBT1C223NYY	0.022
C208 S	ECCD1H470K	47P
C209	ECBT1C223NYY	0.022
C210 S	ECEA1HS100	10
C211	ECBT1C103ZYY	0.01
C212 S	ECEA50ZR47	0.47
C213 S	ECEA50Z1	1
C214	ECBT1C103ZYY	0.01
C215 S	ECEA1HS100	10
C216	ECQP1471JZ	470P
C217 S	ECCD1H100KC	10P
C218	ECQM1H473KV	0.047
C219 S	ECCD1H180KC	18P
C220 S	ECCD1H470K	47P
C228	ECBT1C103ZYY	0.01
C229	ECBT1C223NYY	0.022
C230 S	ECQM1H183JZ	0.018
C231 S	ECCD1H080CC	8P
C233	ECBT1C103ZYY	0.01
C236	ECBT1C223NYY	0.022
C237	ECBT1C103ZYY	0.01
C301 S	ECEA50Z2R2	2.2
C302 S	ECEA25Z4R7	4.7
C303 S	ECEA1ES101	100
C304	ECQM1H473KV	0.047
C305,306 S	ECEA50ZR47	0.47
C307,308 S	ECQM1H223JZ	0.022
C309 S	ECEA50Z1	1
C310 S	ECEA50Z3R3	3.3
C311	ECQP1471JZ	470P
C312 S	ECEA50Z1	1
C313	ECBT1C103ZYY	0.01
C401,402 S	ECEA1HS100	10
C403,404	ECBT1H331KBY	330P
C405,406	ECQM1H563KV	0.056
C501,502	ECQM1H222KV	0.0022
C503,504 S	ECQM1H223JZ	0.022
C505,506 S	ECQM1H183JZ	0.018
C507,508	ECQM1H104KV	0.1
C509,510 S	ECEA25Z4R7	4.7
C511,512 S	ECCD1H150KC	15P
C601,602 S	ECEA1HS100	10
C603,604 S	ECCD1H050CC	5P
C605,606 S	ECKD1H821KB	820P
C607,608 S	ECCD1H220K	22P
C609,610 S	ECCD1H180KC	18P
C611 S	ECEA1HS101	100
C612 S	ECEA50Z1	1
C613,614 S	ECCD1H330K	33P
C615,616 S	ECKD1H103ZF	0.01
C617,618 S	ECEA50Z3R3	3.3
C621,622 S	ECKD1H681KB	680P
C623,624(M)	ECQM1H273KV	0.027
C623,624(MC)	ECQM1H563KV	0.056
C625,626(MC)	ECQM1H563KV	0.056
C701 △	ECKDKC103PF2	0.01
C702 △S	ECKD2H103PE	0.01
C703,704 △	ECETS45V682U	6800
C705 S	ECEA1ES101	100
C706 S	ECKD1H103ZF	0.01
C707 S	ECEA1HS100	10

Ref. No.	Part No.	Value
CAPACITORS		
C708 S	ECKD1H103ZF	0.01
C709 S	ECEA1VS330	33
C710 S	ECEA0JS471	470
C711 S	ECEA25Z4R7	4.7
C712 S	ECEA50Z3R3	3.3
C713,714 S	ECEA50Z1	1
C715 S	ECEA50Z3R3	3.3
C716 S	ECKD1H223ZF	0.022
C717 S	ECEA50Z3R3	3.3
C718 S	ECEA1HS100	10
C719 S	ECCD1H151K	150P
C720 S	ECEA1CS330	33
C721 S	ECKD1H103ZF	0.01
C901	ECBT1C103ZYY	0.01
C902 S	ECEA50M4R7R	4.7
C903 S	ECEA1HS100	10
C904,905	ECBT1C103ZYY	0.01
C906 S	ECEA0JS471	470
C907 S	ECCD1H080CC	8P
C908 S	ECCD1H180KC	18P
C909 S	ECEA0JS471	470
C910 S	ECEA1HS100	10
C911 S	ECEA1VS330	33
C912 S	ECEA1HS100	10
C913 S	ECEA1AS221	220
C914 S	ECEA25Z4R7	4.7

SCHEMATIC DIAGRAM

NOTE 1

- **Use of ceramic filters in pairs**

The ceramic filters (CF201, CF202) for FM-IF circuit are available in two ranks. For this machine, be sure to use the ceramics of the same rank in a pair.

At repairing and replacement, pay close attention to the diode (D912) for use as different diodes must be used depending on each rank of the ceramic filters.

Color marking (Red or Black)

SFE 10.7 MHz

RANK (Color)	D912	CENTER FREQUENCY
Red	X	10.70 MHz
Black	O	10.65 MHz

Note: O Mark Diode is used.
X Mark Diode is not used.

■ 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 part, please use the part No. in the replacement part list.

NOTE 2

1. **S3, 4** : Band selector switch
   [S3 —— AM]
   [S4 —— FM]
2. **S5, 6** : Tuning switch.
   [S5 —— down (tuning to lower frequency)]
   [S6 —— up (tuning to higher frequency)]
3. **S7** : Memory switch.
4. **S8 ～ 15** : Preset tuning switch.
   [S8 —— CH. 1 S12 —— CH. 5]
   [S9 —— CH. 2 S13 —— CH. 6]
   [S10 —— CH. 3 S14 —— CH. 7]
   [S11 —— CH. 4 S15 —— CH. 8]
5. **S17** : FM mode selector switch. (auto ◄—► mono)
6. **S401 ～403** : Input selector switch in "**tuner**" position.
   [S401 —— phono]
   [S402 —— tuner]
   [S403 —— aux]
7. **S405** : Tape-monitor selector switch in "**source**" position.
8. **S407** : Loudness switch in "**off**" position.
9. **S601** : Main speaker switch in "**off**" position.
10. **S602** : Remote speaker switch in "**on**" position.
11. **S701** : Power source switch in "**on**" position.
12. 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.
   * Figures in ▭ stand for DC voltage in FM signal (no signal) mode.
   * Figures in < > stand for DC voltage in FM stereo signal reception mode.
   * Figures in ( ) stand for DC voltage in AM signal reception mode.
13. Positive voltage lines AF signal lines
   FM signal FM IF
   AM signal AM IF
   Negative voltage lines.

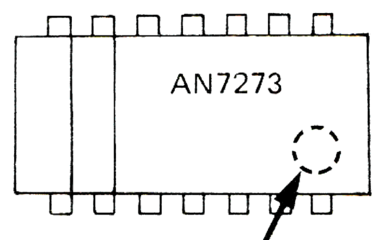
IMPORTANT SAFETY NOTICE

The shaded area on this schematic diagram incorporates special features important for protection from five and electrical shokc hazards.
When servicing it is essential that only manufacturer's specified parts be used for the critical components in the shaded areas of the schematic.

NOTE 3

AN7273 (IC201) is available in A rank (AN7273A) and B rank (AN7273B). Either rank can be used for this unit, but the suitable resistor must be used according to the rank as shown in the table below. So, keep this point in mind when repairing or replacing the unit.

RANK / Ref.No.	A	B
R202	2.7kΩ	1.8kΩ
R239	680Ω	560Ω



"A" painted in this position or red mark on main body stands for A rank, and similarly, "B" or green mark stands for B rank.

■ REPLACEMENT PARTS LIST

Note:
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. Bracketed indications in Ref. No. columns spedify the area.
5. The parenthesized number in the column of description stand for the quantity per set.

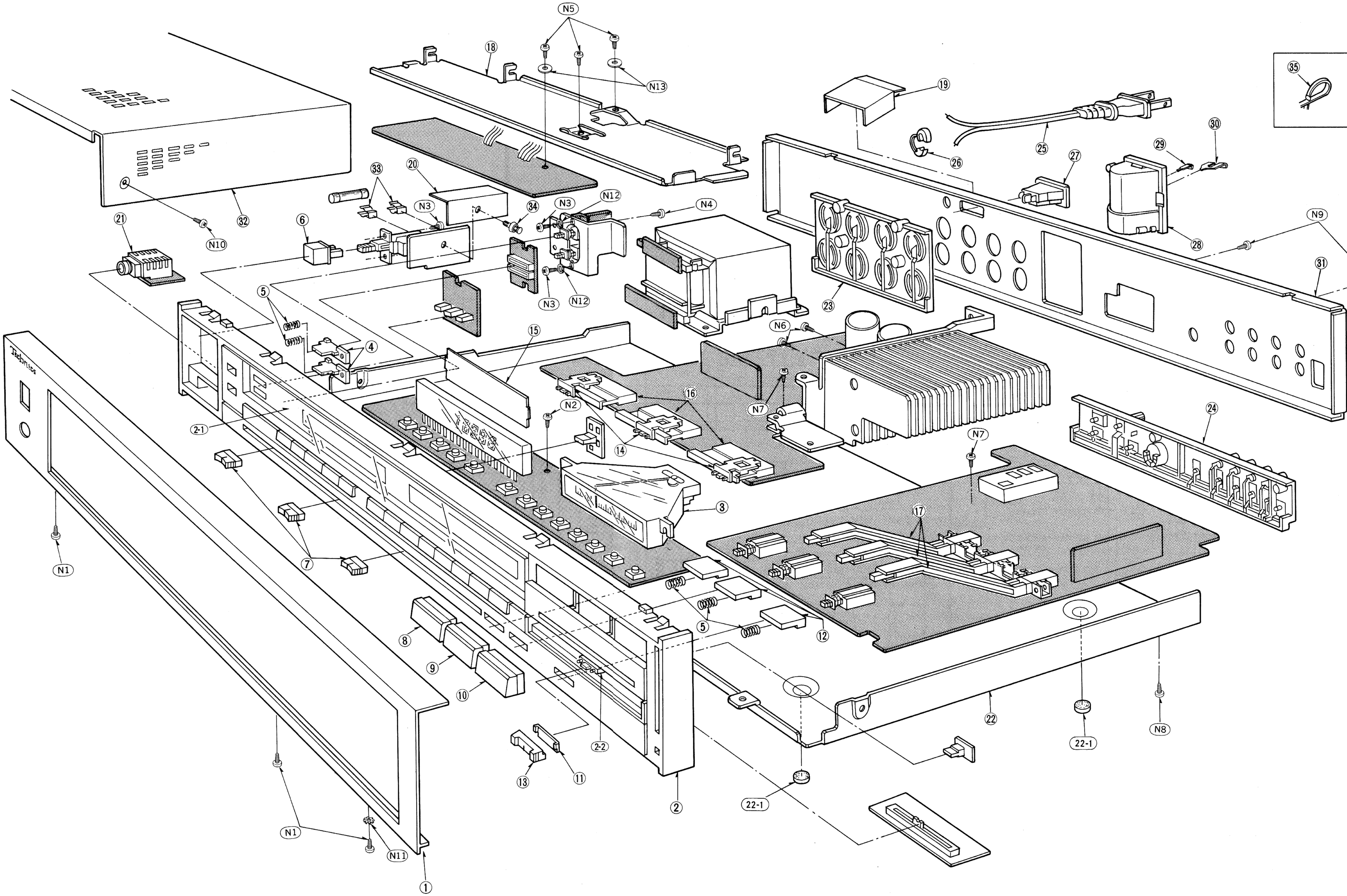
Aeras
* [M] is available in U.S.A.
* [MC] is available in Canada.

Ref. No.		Part No.	Description
INTEGRATED CIRCUITS			
IC1		AN6558F	Voltage Amplifier
IC71		AN7062	Voltage Amplifier
IC201		AN278	FM IF Amplifier
IC202		AN7273A	FM/AM IF Amplifier and FM/AM Det.
IC301		SVIUPC1161C3	Multiplex
IC601	⚠	SVISTK2038-2	2ch Power Amplifier
IC701		MN1421STA	ICQ Controller
IC901		SVID1704C525	PLL Controller
IC902		SVIUPB553AC	Pre Scaler
IC903		AN6873N	FL Driver
TRANSISTOR			
Q71,72		2SA1123-R	Voltage Amplifier
Q210,211	S	2SC1685-Q	Switching
Q212,213	S	2SA564-Q	FM/AM Selector
Q214~216	S	2SC1685-Q	Switching
Q217	S	2SA564-Q	Switching
Q601,602		2SC2631-R	ICQ Controller
Q603		2SC1685-Q	Switching
Q701		2SD1265-0	Regulator
Q702		2SC1685-Q	Regulator
Q703	S	2SC1383Q	Regulator
Q704~712	S	2SC1685-Q	Preheat Det,Power ON/OFF Det. Over Load Det. Signal Det. Power Muting and Switching
Q713,714		2SA992	Over Load Det.
Q715~721	S	2SA564AQ	ICQ Control
Q901,902	S	2SC945-Q	Loop Filter
Q903,904	S	2SC1685-Q	Analog Frequency Meter Control
DIODES			
D71,72	S	MA162A	Derector
D201		SVDKV1236Z	AM Variable Capacitor
D206		MA27W-A	Detector
D207	S	MA162A	Switching
D208		LN846RP	LED.Quartz-Lock Ind (Red)
D301	S	MA162A	Switching
D401		LN224RP	LED.Volume (Red)
D601,602		SVDMC921	Synchronous Bias
D603,604		SVDMC911	Synchronous Bias
D605~608	S	20A90	Switching
D609~611	S	MA162A	Switching
D612	⚠	SVDSR1K2	Rectifier
D701~704	⚠	SVDS2V20	Rectifier
D705		MA1062M	6V,Zener
D706		MA1270M	27V.Zener
D707		MA1160L	16V.Zener
D710~714	S	MA162A	Rectifier
D716		LN0202GP6	LED.Auto Ind.
D717		LN0202YP4	LED.Praheat Ind.
D718~720		LN446YP	LED.High,Low and Thermal Ind.
D751	S	MA162A	Switching
D901~903	S	MA162A	Switching
D917		MA1062M	6V,Zener
COILS			
L202		SLA2C5-P	AM Antenna
L203		SLO2C29R-P	AM OSC
L601,602		SLQY15G-30	Choke
L701		SLQX101-3M	Choke

Ref. No.		Part No.	Description
FUSE			
F1	⚠	XBAIF30NU14	Power Source 125V.3A
TRANSFORMERS			
T201		SLI4C547-P	FM IF Off-Set
T203		SLI2C143-M	AM IF
T701	⚠	SLT5M281-W	Power Source
VARIABLE RESISTORS			
VR301		EVN75AA00B53	VCO Adj 5kΩ(B)
VR402		EWE00105A15S	Volume Control, 100kΩ(A)
VR501		EVD00205G15S	Balance Control, 100kΩ(G)
VR502,503		EWD00105C15S	Tone Control, 100kΩ(C)
VR601,602	S	EVNM4AA00B53	ICQ Adj 5kΩ(B)
VR701	S	EVNM4AA00B14	Micom Vco Adj,10kΩ(B)
VR901		EVN75AA00B53	Meter Adj, 5kΩ(B)
VARIABLE CAPACITORS			
CT201		SVCTY121B269	AM Antenna Trimmer
COMPONENT COMBINATIONS			
Z301,302		EXRP181K473C	180PF,47kΩ
Z901		EXBP87104M	100kΩ(X7)
Z902		EXFP7331MW	330PF(X7)
FLUORESCENT DISPLAY TUBE			
		SAD7MT29ZA	
FM FRONT END			
		SNVFE306E05	Front End
THERMISTOR			
PS701		SRPBH47101	Posistor
CERAMIC FILTERS			
CF201,202		SVFE107MS8A	FM,10.7MHz. (Red)
		SVFE107MS8D	FM,10.65MHz, (Black)
		(Use pair ranks as same as CF201 and CF202)	
CF204		SVFSFZ450F7L	AM,450kHz
SWITCHES			
S3~S15		SSG13	AM/FM Selector, Tuning Memory and Preset Tuning
S401~403		SSH3049	Input Selector
S17,405,407		SSH1031	FM Mode,Tape Monitor and Loudness
S701	⚠	SSH1071	Power Source
S601,602		SSH2047	Speakers
CRYSTAL			
X901		SVQSH452-D	4.5MHz

Ref. No.	Part No.	Description	
CABINET and CHASSIS PARTS			
1	SGWA310M	Front Panel Ass'y	①
2	SGXA310M	Sub Front Panel Ass'y	①
2-1	[SGU319SB	Transparent Plate	①
2-2	[SGX7431	Holder	①
3	SSM175-4	Meter	①
4	SBC483-2	Button Speaker	②
5	SUS257	Spring	⑤
6	SBC337-IM	Button,Power	①
7	SBD69-2M	Button,Bass,Treble Balance	③
8	SBC549-1	Button,Selector (Aux CD.Video)	①
9	SBC547-1	Button,Selector (Tuner)	①
10	SBC551	Button,Selector (Phono)	①
11	SHR9653	Spacer,Main Volume	①
12	SBC565-IM	Button,FM mode,Tape monitor,Loudness	③
13	SBD71	Button,Main Volume	①
14	SBZ663	Connection Rod.	③
15	SDU89-1	Sheet. FL	①
16	SGX7475	Holder	③
17	SUB139	Connection Rod	③
18	SMC1041	Shield Cover	①
19	SMX515	Cover,AC Socket	①
20	SMX711	Cover,Fuse P.C.B	①
21	SJJ71B	Jack,Headphones	①
22	SKUA310M	Bottom Board (W/Feet)	①
22-1	SKL245-2	Foot	④
23	SJF4815-2	Terminal Board,Speaker	①
24	SJF8037-11N	Terminal Board,In Put	①
25 [M] ⚠	RJA9Y	AC Cord	①
25 [MC] ⚠	SJA109	AC Cord	①
26 [M]	RHR111	Bushing	①
26 [MC]	SHR129	Bushing	①
27 [M] ⚠	SJS9221	Socket	①
27 [MC] ⚠	SJS9223	Socket	①
28	SJB3005-1	Battery Case	①
29	SJC7	Terminal,Battery	②
30	SJC9	Terminal,Battery	②
31 [M]	SGP3510A	Rear Panel	①
31 [MC]	SGP3510-1A	Rear Panel	①
32	SKCA410M	Cabinet Ass'y	①
33	SJT345	Crip.Fuse	②
34	SHR401-1	Pin	①
35	SHR301	Cramper	②
SCREW			
N1	XTB3+8BFZ	Tapping.⊕3X8	③
N2	XTB3+8BFN	Tapping.⊕3X8	①
N3	XSN3+6S	Tapping.⊕3X6	②
N4	XTB3+8FN	Tapping.⊕3X8	①
N5	XTB3+8FN	Tapping.⊕3X8	③
N6	XTB3+14BFZ	Tapping.⊕3X14	②
N7	XTB3+8BFZ	Tapping.⊕3X8	①
N8	XTB3+8BFZ	Tapping.⊕3X8	④
N9	XTB3+8BFZ	Tapping.⊕3X8	⑤
N10	SNE2095-2	Tapping.	②
WASHERES			
N11	XWC3B	With Detent.3ϕ	①
N12	XWA3	Spring.3ϕ	②
N13	XWG3	Plain.3ϕ	②
ACCESSORIES			
A1	SSA611-1	Loop Antenna(AM)	①
A2	SMA231	Holder	①
A3	SMA233-1	Holder	①
A4	XTN3+10AFZ	Screw	②
A5	SSA267-1	Cord.Antenna(FM)	①
A6 [M]	SQF11507-2	Instruction Book	①
A6 [MC]	SQF11509-2	Instruction Book	①
PACKING PARTS			
P1 [M]	SPG4221	Carton Box	①
P1 [MC]	SPG4223	Carton Box	①
P2	SPS3519	Pad.Left	①
P3	SPS3521-2	Pad.Right	①
P4	SPS3523	Pad.Upper	①
P5	SPP699	Polythylene Bag	①

■ EXPLODED VIEWS



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