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**YAMAHA Hi-Fi STEREO**

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**SERVICE MANUAL**

MODEL **CR-1000**

 **YAMAHA**

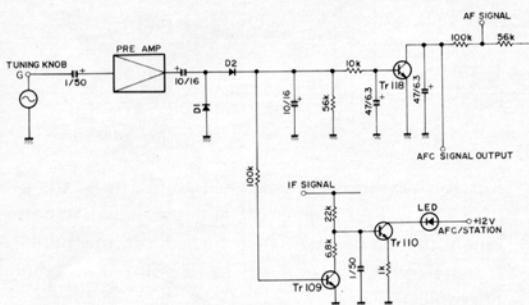
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## CIRCUIT DESCRIPTION

### • AUTO-TOUCH AFC OFF CIRCUIT



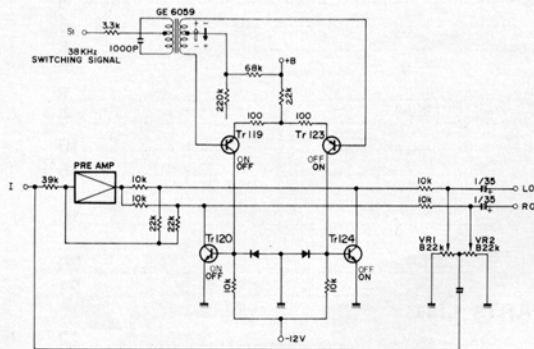
The human body's electric current (G) is detected by the tuning knob and amplified by the pre-amplifier, which then feeds it to D1 and D2.

This current is then supplied to the base of the Tr118, switching it and the AFC signal on, while the AFC circuit goes off.

When the station is tuned in and the tuning knob released, the current going to the base of the Tr118 goes off and the AFC circuit switches on for steady FM listening.

At the same time, the LED illuminated by the IF signal goes off to signal that the AFC circuit is off. This happens because D1 and D2 (mentioned above) feed current to the base of Tr109, lowering the Tr109 C-E impedance and thus reducing the Tr110 base collector current.

● MULTIPLEX DEMODULATOR WITH TRANSISTOR SWITCHING CIRCUIT EMPLOYING NEGATIVE FEEDBACK



The composite signal entering through terminal I<sub>1</sub> is divided into L and R stereo signals through the on/off operation of Tr119 and Tr123, which are switched by the 38kHz switching signal.

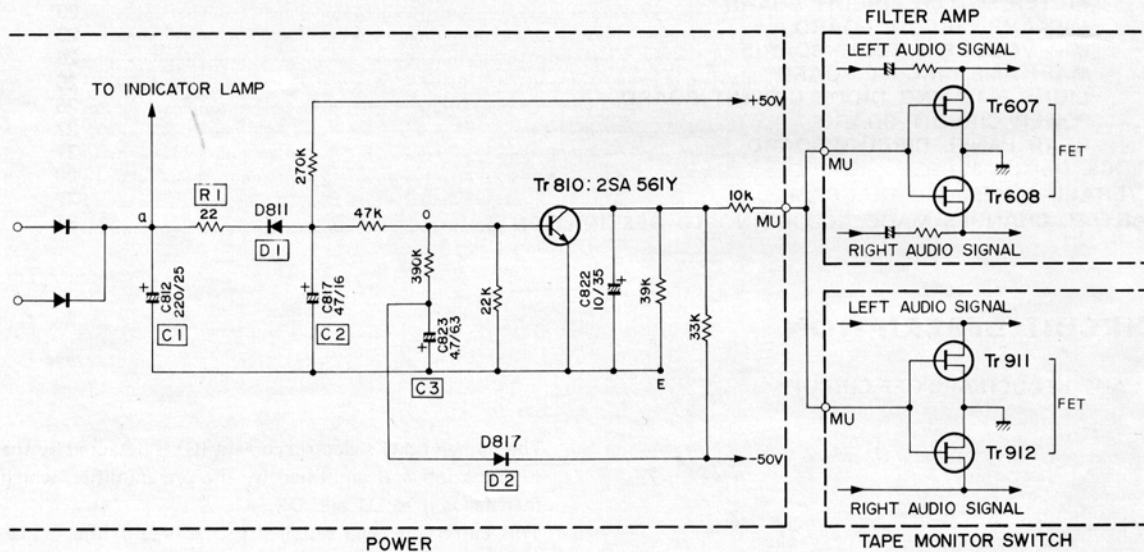
These in tune switch Tr120 and Tr124 on and off to the divided signal.

The stereo signal entering via terminal I<sub>1</sub> is separated into L and R.

At this time, crosstalk elements are removed from the L and R signals by VR1 and VR2 and negative feedback is fed to terminal I<sub>1</sub>.

Thus the circuit assures excellent separation and ultra-low distortions.

● TRANSIENT NOISE CANCELLATION CIRCUIT

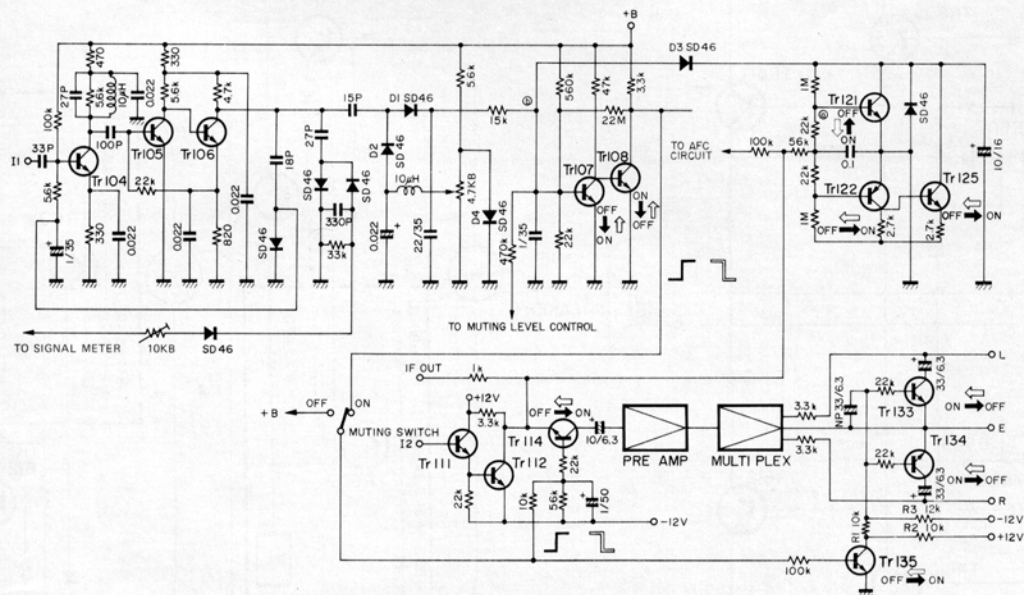


1. When the Power switch is off FETs are on, so the signal is grounded.
2. When the Power switch is on -50V current immediately flows to C3, but it takes some time for the 0 point potential to reach C2. Thus for a short time after the Power switch is turned on Tr810 is on, but FETs is also on, thus cutting initial switching noise.
3. During listening Tr810 has zero potential and is thus off due to the bias.

4. For this reason potential is fed to MU (i.e., the gate of FETs), FETs goes off and the signal is passed.
4. When the Power switch is turned off the potential for the indicator lamp passes to point O, creating E potential there.

In this case the load at C2 discharges through R1 and D1, the base of Tr810 receives current from C3 and is switched on by the load. FETs also goes on and the signal is grounded, thus eliminating noise when the set is switched off.

● MUTING CIRCUIT



1. When Signal is Received

The IF signal received via  $I_1$  is amplified by Tr 104 – Tr 106. This signal is rectified by D1 and D2, becoming positive DC potential before being fed to the base of Tr 107. This switches Tr 107 on and Tr 108 off, so that the Tr 108 collector switches to positive potential. This raises the Tr 114 base potential, switching Tr 114 on, and the FM detection signal entering via  $I_2$  is passed to the pre-amp. At the same time, Tr 135 base potential is raised, switching Tr 135 on. In order to create E potential in Tr 135 collector –12V is fed to the bases of Tr 133 and Tr 134, switching them off. In this way output signal is created at the L and R terminals.

2. When No Signal is Received

In this condition, since no IF signal is entering via  $I_1$ , Tr 107 is off and Tr 108 is on. This causes the Tr 108 potential to equal E potential more or less. Tr 114 is off. At the same time Tr 135 is off, and because of the connection with R1, R2 and R3 positive potential is fed to the bases of Tr 133 and Tr 134. Tr

133 and Tr 134 are switched on, and a complete muting action is achieved thanks to Tr 114, Tr 133 and Tr 134.

3. Signal Received, But Tuning Not Centered

In the best signal detection conditions (center of S curve) the detected output signal does not include DC components. However, if the tuning is off this point even slightly, the signal will include such DC components (+ or –). Using these DC components it is possible to determine whether the receiving conditions are good or bad. The CR-1000 muting circuit utilizes this phenomenon. The AC component is achieved using a 0.1 $\mu$ F capacitor taking the output of Tr 111 and Tr 112 and amplifying the detection signal, feeding only the DC component to point (a). If the +DC component generates Tr 122 goes on; if the –DC component generates, TR 122 goes on and thus switches on Tr 125. That is to say, if the signal fed to point (a) is different than the E potential, point (b) is grounded; thus it receives no signal. In this way all noise which occurs during tuning is canceled.

● PROTECTION CIRCUITS

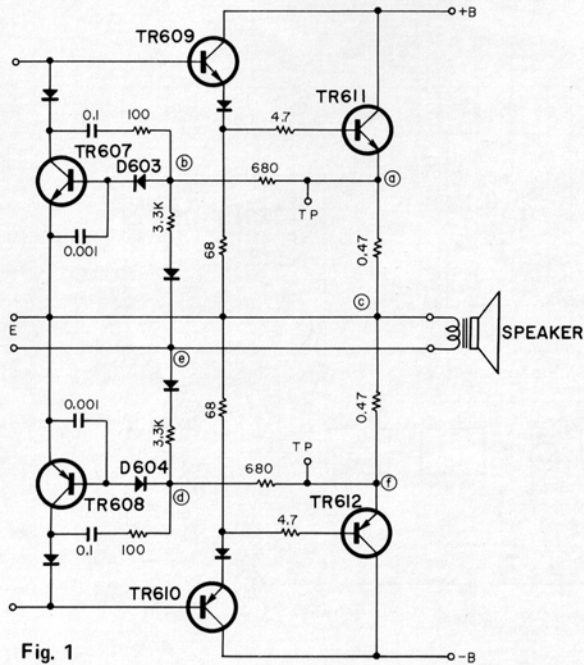


Fig. 1

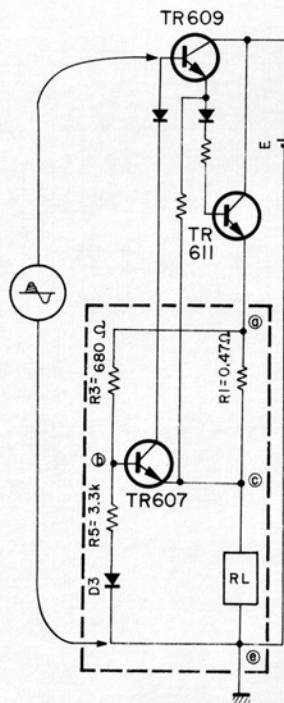


Fig. 2

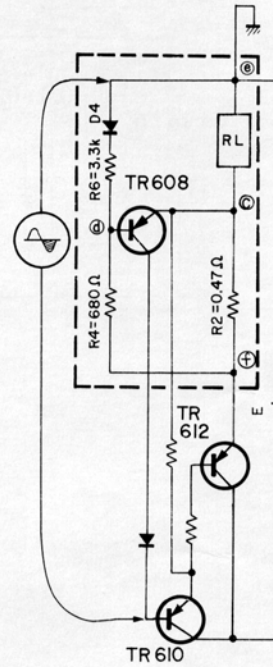


Fig. 3

The circuits indicated by the dotted lines in Figs. 2 and 3 are equivalent to the a, b, c, e and d, f, c, e bridge circuits in Fig. 1.

These bridge circuits detect both the voltage indicated by a drop in collector voltage, and that which shows power transistor current.

With these voltages damage to the set, caused by power transistor operation exceeding the area of safe operation, is avoided; Tr607~610 are suppressed and the signal driving the power transistors is controlled.

In reality, when the amp is operating the bridge, R1-R3-R5-RL and R2-R4-R6-RL bridge circuits maintain the balance.

If load resistance is shorted or too low, the bridge circuits go out of balance.

First, as shown in Fig. 2, if we examine the bridge circuit for the plus half cycle we see that when it is unbalanced the potential at point (b) rises above that of point c. Tr607 goes on and the voltage at the base of Tr609 drops.

To avoid damage, power transistor (Tr611) current decreases in a few seconds.

In the same way, as Fig. 3 shows, if there is a short or drop in the minus half cycle bridge circuit load resistance Tr608 goes on and Tr610 impedance rises, causing the power transistor (Tr612) current to drop in a few seconds to avoid damage.

Because of D3 and D4, however, even if the load resistance of these circuits is shorted, power transistor current does not disappear. Approximately 1.3A remains, so the output signal is not completely cancelled.

# SPECIFICATIONS

## ■ AUDIO SECTION

### POWER OUTPUT

Dynamic Power (IHF)	200 watts (4Ω) 200 watts (8Ω)
Continuous RMS Power (each channel driven)	100/100 watts (4Ω) at 1,000Hz 80/80 watts (8Ω) at 1,000Hz
Continuous RMS Power (both channels driven)	100/100 watts (4Ω) at 1,000Hz 75/75 watts (8Ω) at 1,000Hz
Continuous RMS Power (both channels driven)	85/85 watts (4Ω) at 20 to 20,000Hz 70/70 watts (8Ω) at 20 to 20,000Hz

### TOTAL HARMONIC DISTORTION

Power Amplifier Only	less than 0.1% at rated power less than 0.04% at 1 watt
Preamplifier Only (PHONO to PRE OUT)	less than 0.1% at rated power (AUX to PRE OUT) less than 0.02% at rated power
Overall (AUX to Power Output)	less than 0.1% at rated power

### INTERMODULATION DISTORTION

	(70Hz:7,000Hz=4:1 SMPTE method)
Power Amplifier Only	less than 0.1% (8Ω) at rated power less than 0.05% (8Ω) at 1 watt
Overall (AUX to Power Output)	less than 0.1% (8Ω) at rated output

### POWER BANDWIDTH

	(IHF, distortion 0.5% const.) 5 to 50,000Hz
FREQUENCY RESPONSE (at 1 watt)	Overall (AUX, TAPE PB to Power Output) 10 to 50,000Hz +0.5dB, -1dB
Overall (MIC to Power Output)	100 to 10,000Hz +0.5dB, -6dB
Power Amplifier Only	10 to 100,000Hz +0dB, -1dB
Deviation from RIAA (30 to 15,000Hz)	+0.2dB, -0.2dB

### LOAD IMPEDANCE

4 to 16Ω

### DAMPING FACTOR (8Ω)

70 at 1,000Hz

### CHANNEL SEPARATION (at rated power, 1,000Hz)

Power Amplifier Only

60dB

Overall from PHONO 1, 2

50dB

Overall from AUX, TAPE PB

50dB

Overall from MIC

50dB

### HUM AND NOISE (IHF, Closed circuit A Network)

Overall from PHONO 1, 2

better than 80dB

Overall from MIC

better than 70dB

Overall from AUX, TAPE PB

better than 90dB

Power Amplifier Only

better than 100dB

### Volume at Minimum

better than 90dB

### INPUT SENSITIVITY AND IMPEDANCE

	(at rated power, 1,000Hz)
PHONO 1	3mV (30kΩ, 50kΩ, 100kΩ)
PHONO 2	3mV (50kΩ)
PHONO 1, 2 Max. Input Capability	280mV (T.H.D. 0.1%)
MIC	3mV (50kΩ)
MIC Max. Input Capability	450mV (T.H.D. 0.3%)
AUX 1, 2	150mV (40kΩ)
TAPE PB A, B	150mV (40kΩ)
Power Amplifier Input	775mV (40kΩ)

### OUTPUT LEVEL AND IMPEDANCE

	(at rated power, 1,000Hz)
TAPE REC OUT A, B	150mV (2kΩ)
PRE OUT	775mV (2kΩ)
	3,000mV (Max. Output T.H.D. 0.1%)

### tone controls

BASS	+15dB, -15dB at 50Hz
TREBLE	+10dB, -10dB at 10,000Hz

### FILTERS

LOW	-3dB at 20Hz (12dB/oct.)
HIGH	-3dB at 6,000Hz (6dB/oct.)

### LOUDNESS CONTROL

	(Continuous Loudness Volume at Minimum)
	+10dB at 100Hz, +5dB at 10,000Hz

## ■ TUNER SECTION

### FM:

Tuning Range	88MHz to 108MHz
Usable Sensitivity (IHF)	1.7μV
Quieting Slope	55dB at 5μV 60dB at 10μV
Image Frequency Rejection	110dB
IF Rejection	110dB
Spurious Response Rejection	110dB
AM Rejection	55dB

Capture Ratio	1.0dB
Alternate Channel Selectivity (IHF)	80dB
Signal-to-Noise Ratio	75dB
Total Harmonic Distortion	MONO 0.15% at 400Hz 0.3% at 50 to 10,000Hz STEREO 0.3% at 400Hz 1.0% at 50 to 10,000Hz
Stereo Separation	45dB at 400Hz 35dB at 50 to 10,000Hz

### Frequency Response

	+0.5dB, -0.5dB at 50Hz to 10,000Hz +1.5dB, -1.5dB at 20Hz to 15,000Hz
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### Sub-Carrier Suppression

60dB

### Muting Override Signal Level

10μV to 30μV variable

### Antenna Impedance

300Ω balanced  
75Ω unbalanced

### IF Out Level and Impedance

400mV/1kΩ

## ■ GENERAL

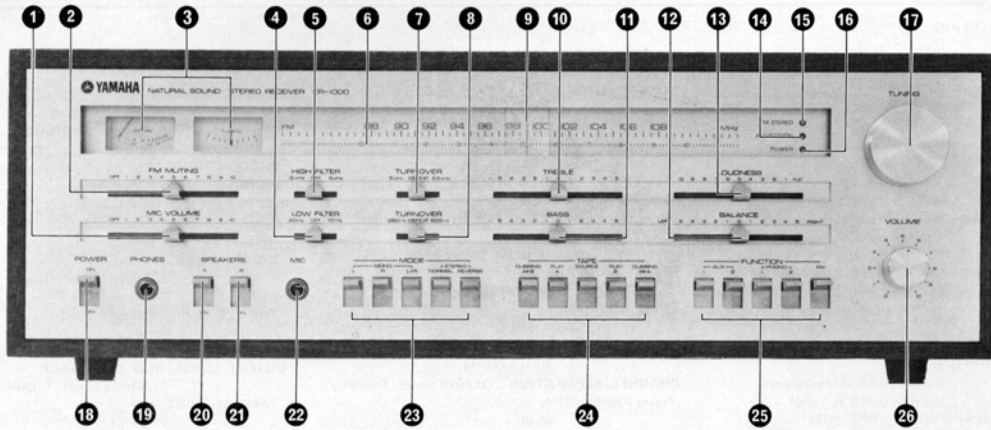
Semiconductors	2 IC's; 2 MOS FET's; 98 Transistors; 10 FET's; 3LD's; 56 Diodes; 6 Zener Diodes
Power Source	AC110,117,130,220,240V, 50/60Hz

Power Consumption	
Rated	
Canadian Model	320W 400VA
Except Canadian Model	250W
Max.	430W

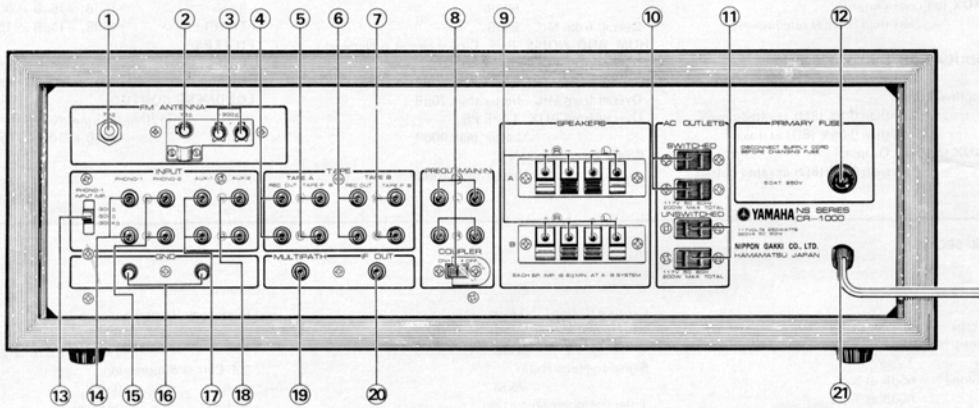
AC outlets	
Switched	2 (total 200 watts)
Unswitched	2 (total 200 watts)
Dimensions	510mm (20" W x 174mm (6 7/8") (H x 335mm (13 1/4") D
Weight	19 kg (41.9 lbs.)

# EXTERNAL VIEW

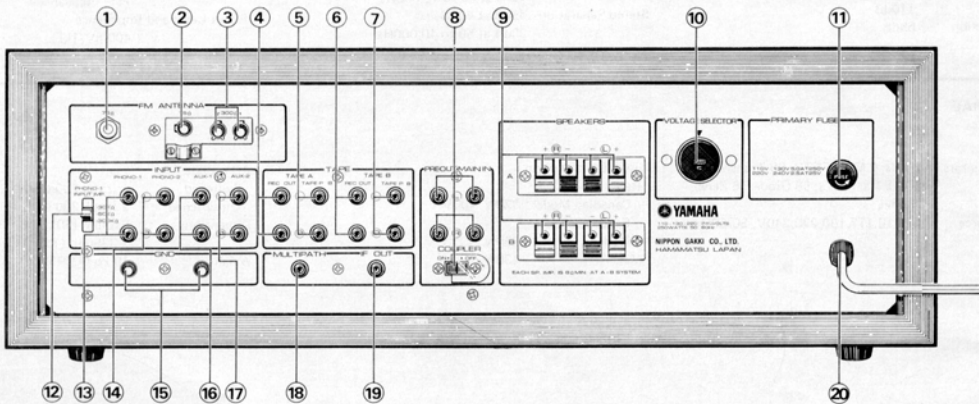
## FRONT PANEL



## REAR PANEL (U.S. & CANADIAN MODELS)



## REAR PANEL (EUROPEAN MODEL)



## FRONT PANEL

- |   |                         |   |                          |
|---|-------------------------|---|--------------------------|
| ① | MIC VOLUME CONTROL      | ⑭ | AFC/STATION INDICATOR    |
| ② | FM MUTING LEVEL CONTROL | ⑮ | FM STEREO INDICATOR      |
| ③ | SIGNAL & TUNING METER   | ⑯ | POWER INDICATOR          |
| ④ | LOW FILTER SWITCH       | ⑰ | TUNING KNOB              |
| ⑤ | HIGH FILTER SWITCH      | ⑱ | POWER SWITCH             |
| ⑥ | DIAL SCALE              | ⑲ | PHONES JACK              |
| ⑦ | TREBLE TURNOVER SWITCH  | ⑳ | SPEAKER SWITCH A         |
| ⑧ | BASS TURNOVER SWITCH    | ㉑ | SPEAKER SWITCH B         |
| ⑨ | DIAL POINTER            | ㉒ | MIC JACK                 |
| ⑩ | TREBLE TONE CONTROL     | ㉓ | MODE SELECTOR SWITCH     |
| ⑪ | BASS TONE CONTROL       | ㉔ | TAPE MONITOR SWITCH      |
| ⑫ | BALANCE CONTROL         | ㉕ | FUNCTION SELECTOR SWITCH |
| ⑬ | LOUDNESS CONTROL        | ㉖ | VOLUME CONTROL           |

## REAR PANEL (U.S. & CANADIAN MODELS)

- |   |  |   |   |
|---|--|---|---|
| ① | FM ANTENNA CONNECTOR (75Ω UNBALANCED)  | ⑩ | AC OUTLETS (SWITCHED)                   |
| ② | FM ANTENNA TERMINAL (75Ω UNBALANCED)   | ⑪ | AC OUTLETS (UNSWITCHED)                 |
| ③ | FM ANTENNA TERMINAL (300Ω BALANCED)    | ⑫ | PRIMARY FUSE HOLDER                     |
| ④ | TAPE A REC OUT JACKS                   | ⑬ | PHONO 1 INPUT IMPEDANCE SELECTOR SWITCH |
| ⑤ | TAPE A P/B JACKS                       | ⑭ | PHONO 1 INPUT JACKS                     |
| ⑥ | TAPE B REC OUT JACKS                   | ⑮ | PHONO 2 INPUT JACKS                     |
| ⑦ | TAPE B P/B JACKS                       | ⑯ | GROUND TERMINALS                        |
| ⑧ | PRE OUT/MAIN IN JACKS & COUPLER SWITCH | ⑰ | AUX 1 INPUT JACKS                       |
| ⑨ | SPEAKER TERMINALS                      | ⑱ | AUX 2 INPUT JACKS                       |
|   |  | ⑲ | MULTIPATH JACK                          |
|   |  | ⑳ | IF OUT JACK                             |
|   |  | ㉑ | AC CORD                                 |

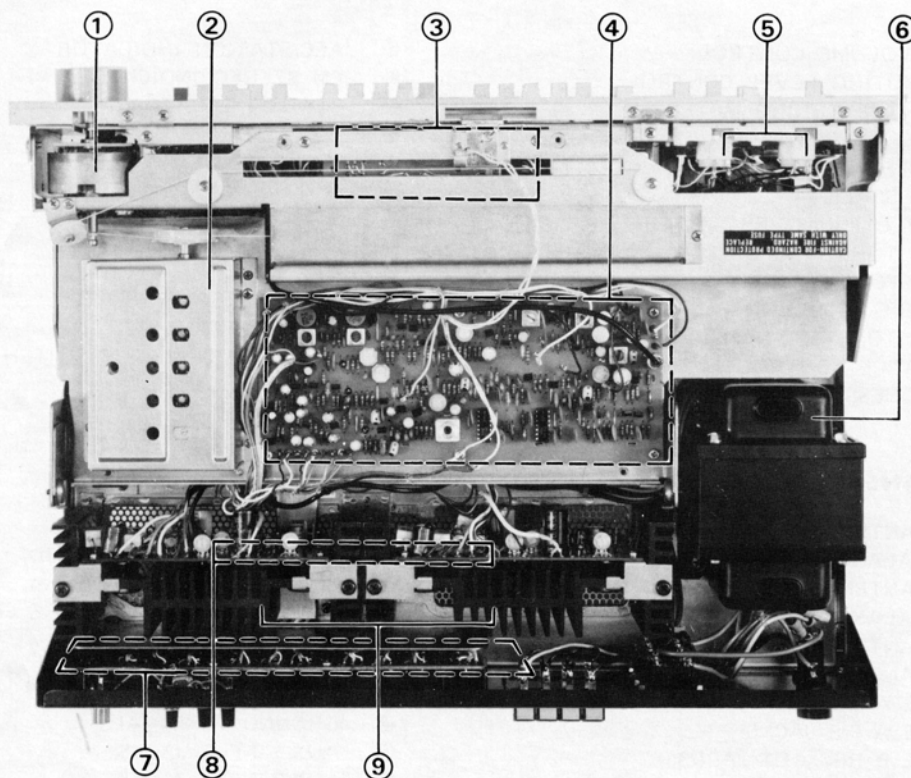
## REAR PANEL (EUROPEAN MODLE)

- |   |  |   |                                  |
|---|--|---|----------------------------------|
| ① | FM ANTENNA CONNECTOR (75Ω UNBALANCED)  | ⑨ | SPEAKER TERMINALS                |
| ② | FM ANTENNA TERMINAL (75Ω UNBALANCED)   | ⑩ | VOLTAGE SELECTOR                 |
| ③ | FM ANTENNA TERMINAL (300Ω BALANCED)    | ⑪ | PRIMARY FUSE HOLDER              |
| ④ | TAPE A REC OUT JACKS                   | ⑫ | PHONO 1 INPUT IMPEDANCE SELECTOR |
| ⑤ | TAPE A P/B JACKS                       | ⑬ | PHONO 1 INPUT JACKS              |
| ⑥ | TAPE B REC OUT JACKS                   | ⑭ | PHONO 2 INPUT JACKS              |
| ⑦ | TAPE B P/B JACKS                       | ⑮ | GROUND TERMINALS                 |
| ⑧ | PRE OUT MAIN IN JACKS & COUPLER SWITCH | ⑯ | AUX 1 INPUT JACKS                |
|   |  | ⑰ | AUX 2 INPUT JACKS                |
|   |  | ⑱ | MULTIPATH JACK                   |
|   |  | ⑲ | IF OUT JACK                      |
|   |  | ⑳ | AC CORD                          |



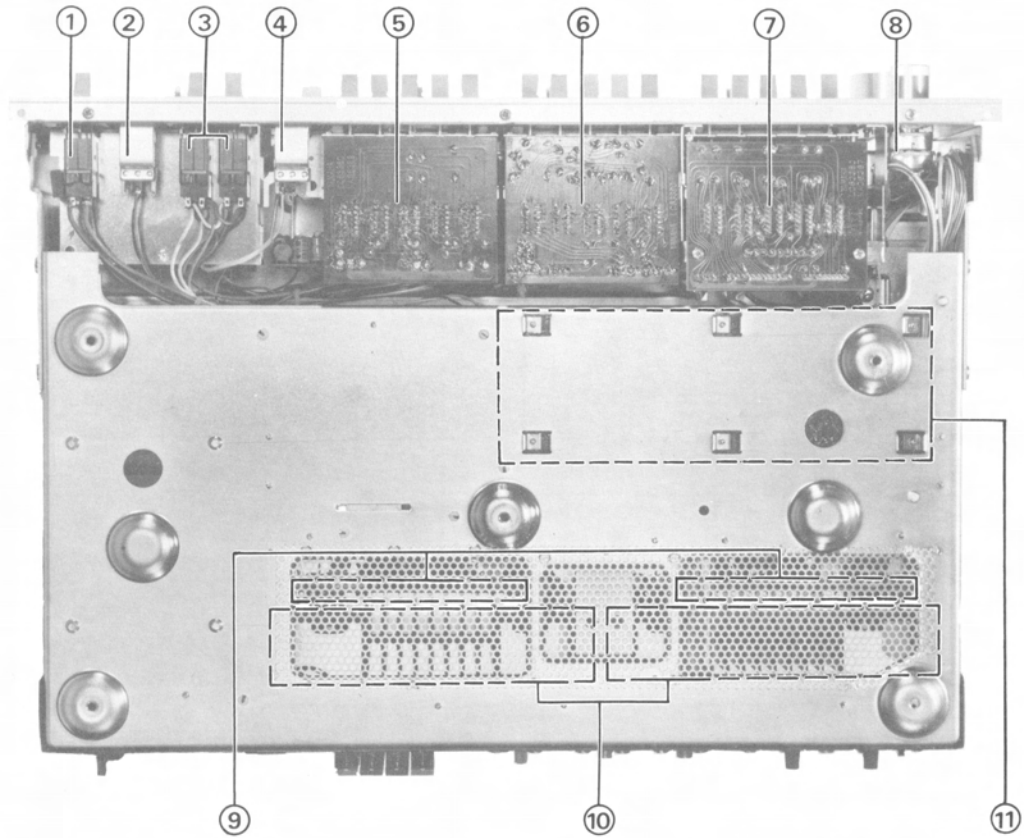
## INTERNAL VIEW

### TOP VIEW



- |  |  |
|--|--|
| ① FLY WHEEL  | ⑤ SIGNAL & TUNING METER  |
| ② RF FRONT END PACK<br>FS-112U<br>GENERAL, U.S. & CANADIAN,<br>AUSTRALIAN, EUROPEAN MODELS   | ⑥ POWER TRANSFORMER<br>GA60580   |
| ③ TONE CONTROL AMP CIRCUIT BOARD<br>NA06365  | ⑦ REAR PANEL CIRCUIT BOARD<br>NA06358  |
| ④ TUNER CIRCUIT BOARD<br>NA06372<br>SOUTH AFRICAN MODEL<br>NA06405<br>U.S. & CANADIAN MODELS<br>NA06406<br>GENERAL, AUSTRALIAN,<br>EUROPEAN MODELS | ⑧ MAIN AMP CIRCUIT BOARD<br>NA06401<br>:EXCEPT EUROPEAN MODELS<br>NA06402<br>:EUROPEAN MODELS ONLY |
|  | ⑨ HEAT SINK  |

**BOTTOM VIEW**



- |   |   |   |  |
|---|---|---|--|
| ① | POWER SWITCH                                | ⑦ | FUNCTION CIRCUIT BOARD<br>NA06367              |
| ② | PHONES JACK                                 | ⑧ | VARIABLE RESISTOR<br>(VOLUME CONTROL : A100kΩ) |
| ③ | SPEAKER SWITCH                              | ⑨ | MAIN AMP CIRCUIT BOARD                         |
| ④ | MIC JACK                                    | ⑩ | HEAT SINK                                      |
| ⑤ | MODE SWITCH CIRCUIT BOARD<br>NA06369        | ⑪ | POWER CIRCUIT BOARD<br>NA06357                 |
| ⑥ | TAPE MONITOR SWITCH CIRCUIT BOARD<br>NA0370 |   |  |

## PARTIAL DISASSEMBLY

### BEFORE DISASSEMBLY

- The screwdriver for each screw should match the screw size. If you use a smaller or larger size it will damage the groove.
- If you use excessive force on the printed circuit board it will crack or cut the print wiring, so be careful.
- When using a soldering iron finish all work as quickly as possible.

Be careful not to install levers and knobs in the wrong place or upside-down. See Fig. 1.

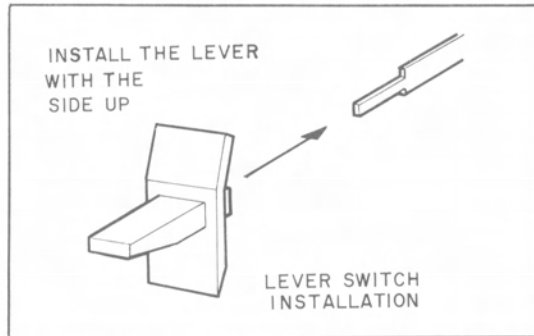


Fig. 1

### CABINET REMOVAL

- Remove screws 1~7 as shown in Fig. 2.
- Set the dial pointer at 92MHz, then remove the cabinet.

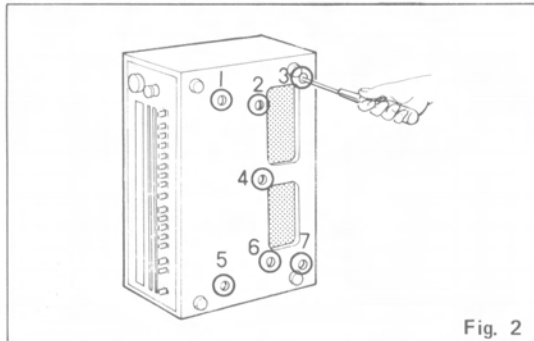


Fig. 2

### MAIN AMP UNIT REMOVAL

- Remove screws of the both side of heat sink (1 & 2 or 1' & 2') shown in Photo 1.
- Then lift up to remove the heat sink and main amp circuit board.
- Remove screws (1~4) shown in Photo 2, and then pull up to remove the power transistors.
- Remove screws 1, 2 shown in Photo 3, then separate the main amp circuit board from the heat sink.

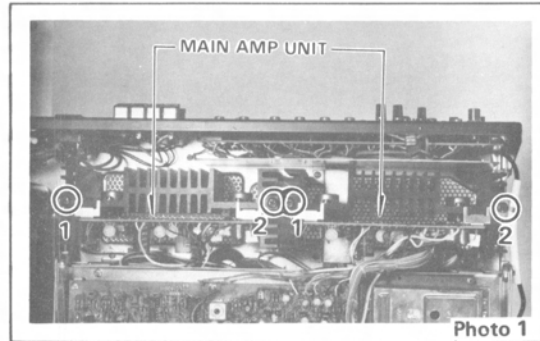


Photo 1

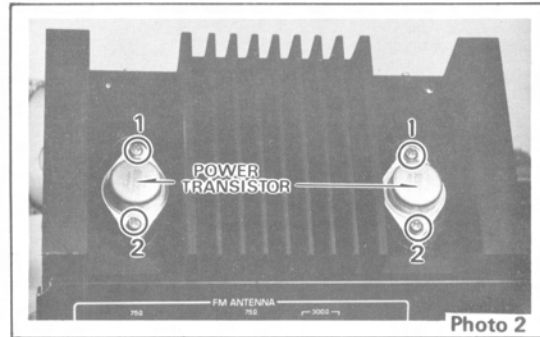


Photo 2

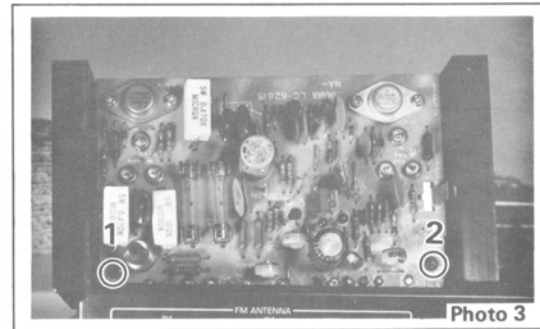


Photo 3

Note: When reinstalling the power transistor to the heat sink, be sure to fully lubricate with silicon grease. Do not tighten the fixing screws with excessive force. Attach as shown in Fig. 3.

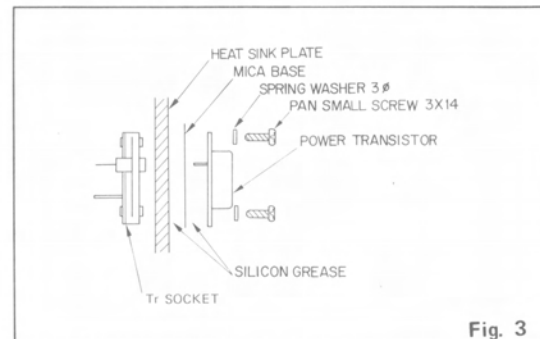
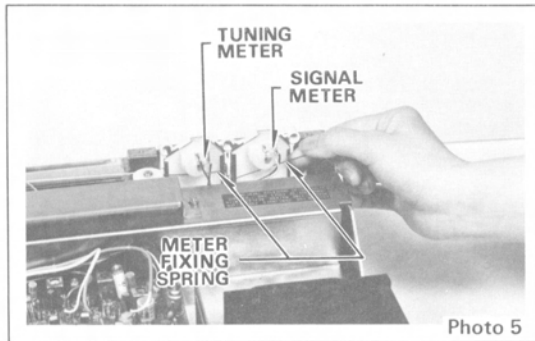
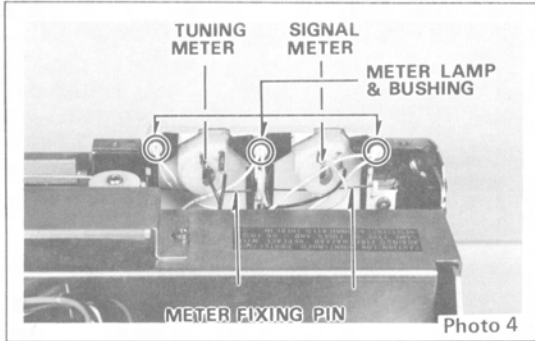


Fig. 3

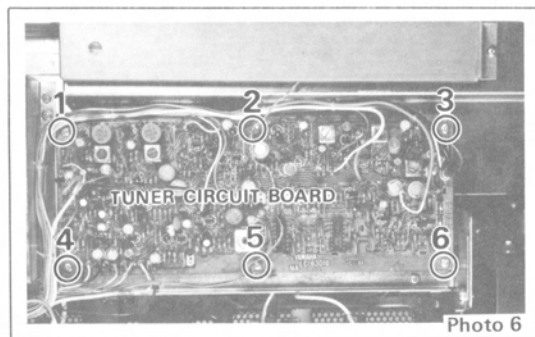
### SIGNAL, TUNING METER REMOVAL

- Pull off the meter lamps with their bushings.
- Remove the meter fixing springs (Photo 4) shown in Photo 5. Then remove the meters.



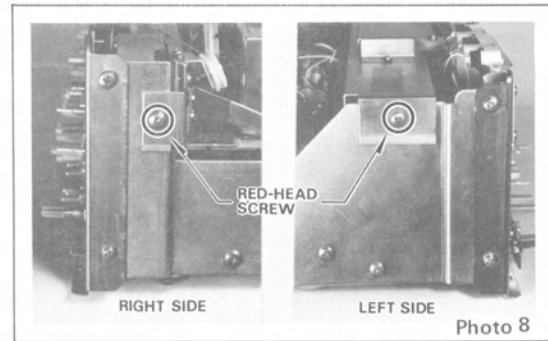
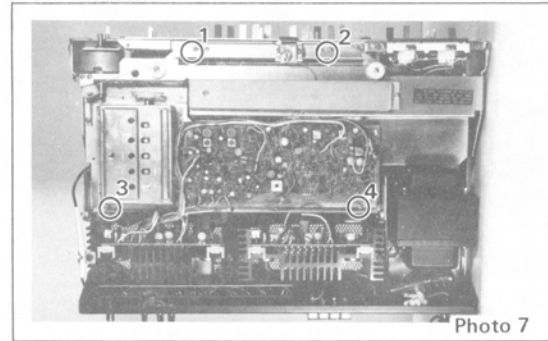
### TUNER CIRCUIT BOARD REMOVAL

Remove screws 1~6 shown in Photo 6. Then lift the tuner circuit board up to remove it.

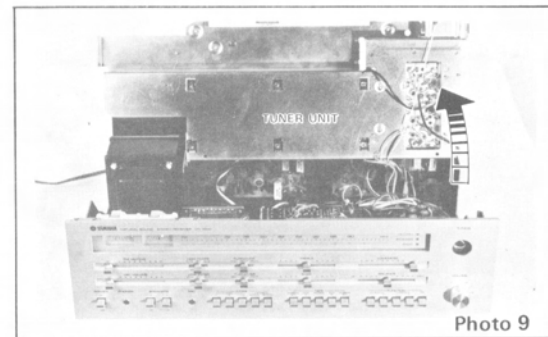


### TUNER UNIT REMOVAL

- Remove red-headed screws 1~4 shown in Photo 7.
- Remove red-headed screws shown in Photo 8.
- Set the dial pointer at 92MHz.

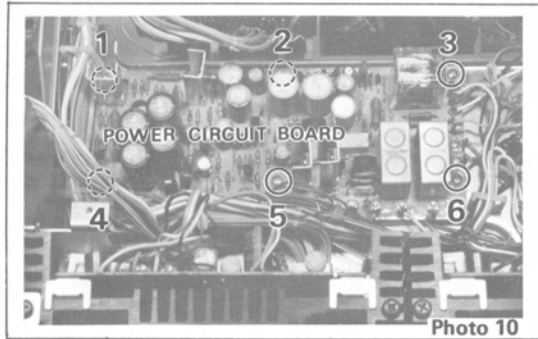


- Pull the TUNING knob to remove it with hexagonal wrench.
- Lift up to set the tuner unit as shown in Photo 9.



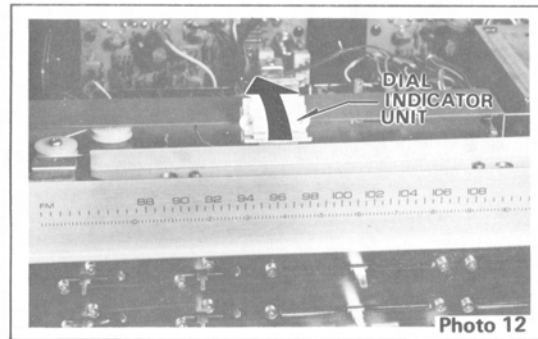
**POWER CIRCUIT BOARD REMOVAL**

- a. First remove the tuner unit.
- b. Remove screws 1~6 shown in Photo 10, then lift up the power circuit board to remove it.



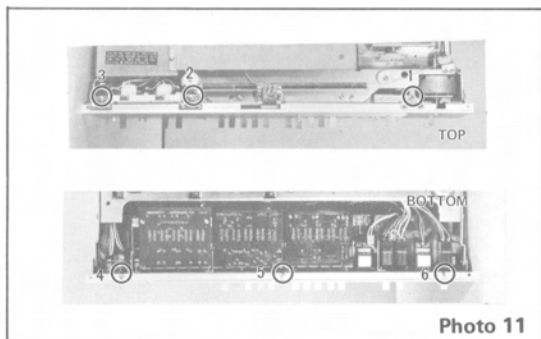
**SUB CHASSIS UNIT REMOVAL**

- a. Remove the dial pointer unit from the rail as shown in Photo 12.

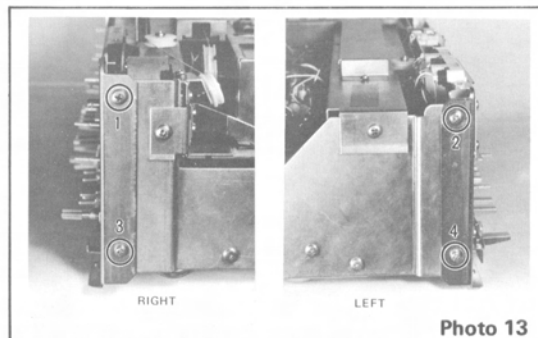


**FRONT PANEL REMOVAL**

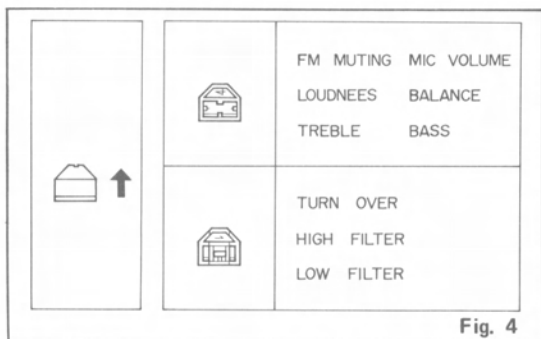
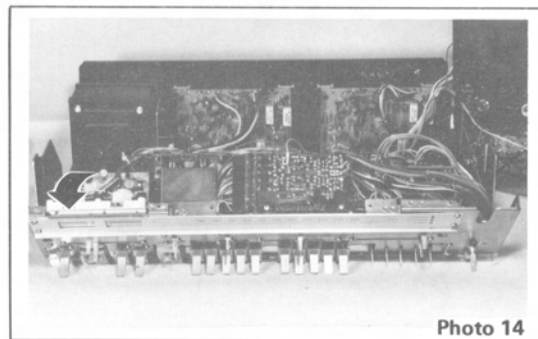
- a. Remove the TUNING knob by using the hexagonal wrench provided.
  - b. Pull off the VOLUME, FM MUTING, MIC VOLUME, HIGH FILTER, LOW FILTER, TURNOVER, BASS, TREBLE, LOUDNESS and BALANCE knobs.
  - c. Remove screws 1~6 shown in Photo 11. Then pull the front panel forward to remove it.
- Note: Refer to Fig. 4 when reattaching the knobs.



- b. Remove screws 1, 2 and loosen screws 3, 4 shown in Photo 13.

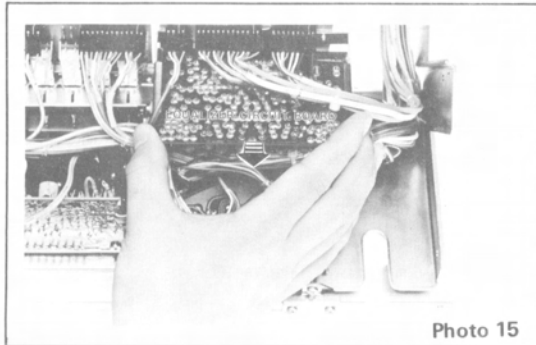


- c. Pull the sub chassis unit forward to tilt it as shown in Photo 14.



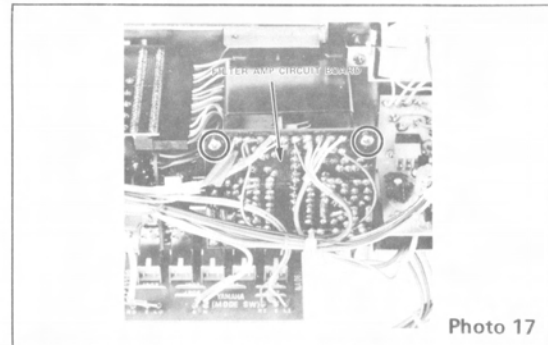
#### EQUALIZER AMP CIRCUIT BOARD REMOVAL

Pull off the board in the direction shown by the arrow to remove it as shown in Photo 15.



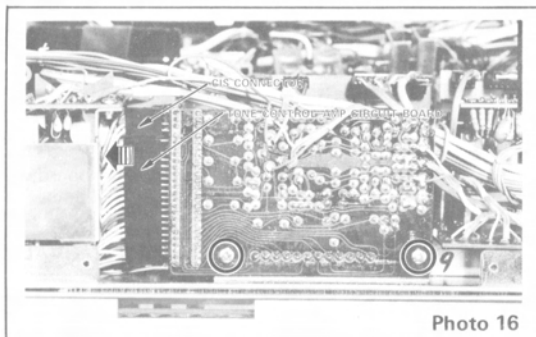
#### FILTER AMP CIRCUIT BOARD REMOVAL

Remove screws 1, 2, then pull off the board in the direction of the arrow to remove it as shown in Photo 17.



#### TONE CONTROL AMP CIRCUIT BOARD REMOVAL

Remove screws 1, 2, then pull off the CIS connector in the direction of the arrow as shown in Photo 16. Then pull up the tone control amp circuit board to remove it.



#### MIC AMP CIRCUIT BOARD REMOVAL

Pull out the sheet holder shown in Photo 18, then pull off the board in the direction of the arrow to remove it.



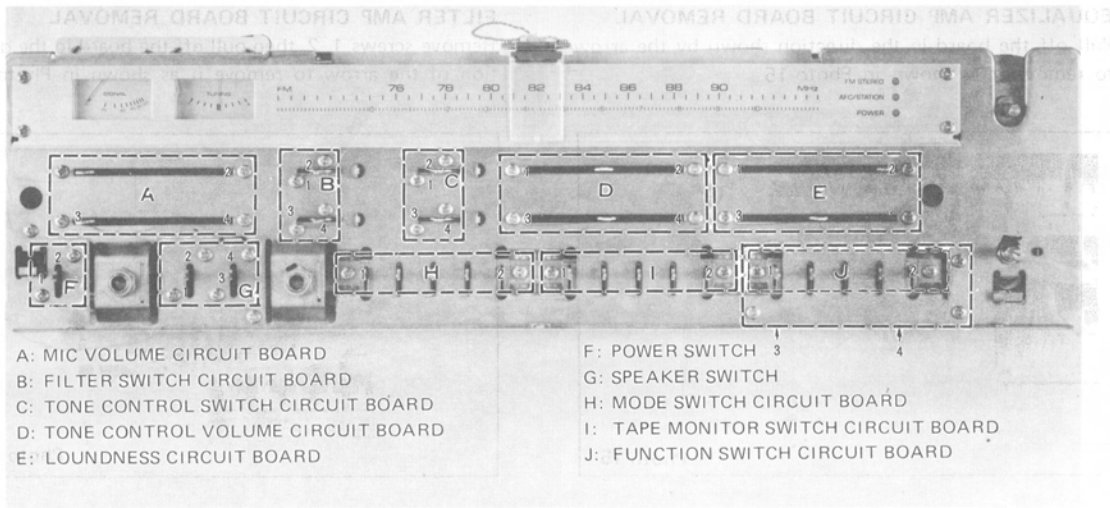


Photo 19

**MIC VOLUME CIRCUIT BOARD REMOVAL**  
 a. Remove the mic amp circuit board (refer to Photo 19).  
 b. Remove screws A-(1~4), then remove the board.

**FILTER SWITCH CIRCUIT BOARD REMOVAL**  
 Remove screws B-(1~4), then remove the board.

**TONE CONTROL SWITCH CIRCUIT BOARD REMOVAL**  
 a. Pull off the CIS connector shown in Photo 20.  
 b. Remove screws C-(1~4), then remove the board.

**TONE CONTROL VOLUME CIRCUIT BOARD REMOVAL**  
 a. Remove the tone control amp circuit board.  
 b. Remove screws D-(1~4), then remove the board.

**LOUDNESS CIRCUIT BOARD REMOVAL**  
 Remove screws E-(1~4), then remove the board.

**POWER SWITCH REMOVAL**  
 Remove screws F-(1, 2).

**SPEAKER SWITCH REMOVAL**  
 Remove screws G-(1~4).

**MODE SWITCH CIRCUIT BOARD REMOVAL**  
 Remove screws H-(1, 2), then remove the board.

**TAPE MONITOR SWITCH CIRCUIT BOARD REMOVAL**  
 a. Pull off the CIS connector shown in Photo 21.  
 b. Remove screws I-(1, 2), then remove the board.

**FUNCTION SWITCH CIRCUIT BOARD REMOVAL**  
 a. Remove the equalizer amp circuit board.  
 b. Remove screws J-(1, 2) and (3, 4), then remove the board.

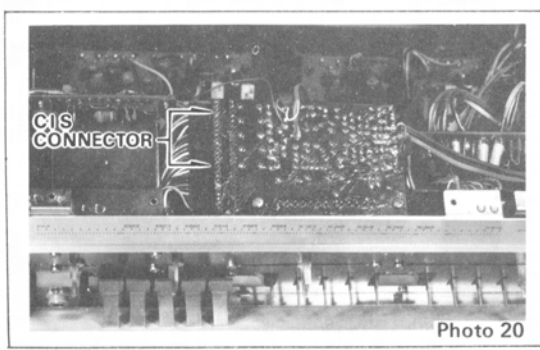


Photo 20

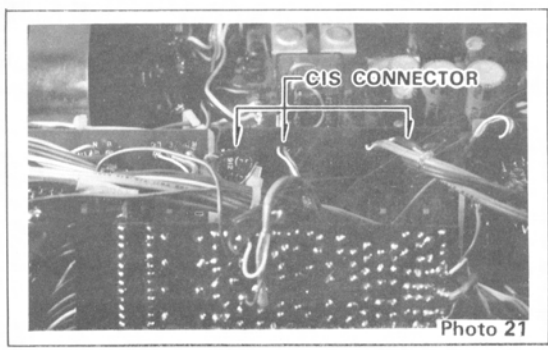
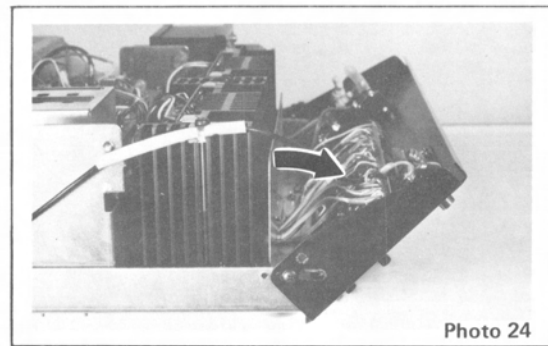
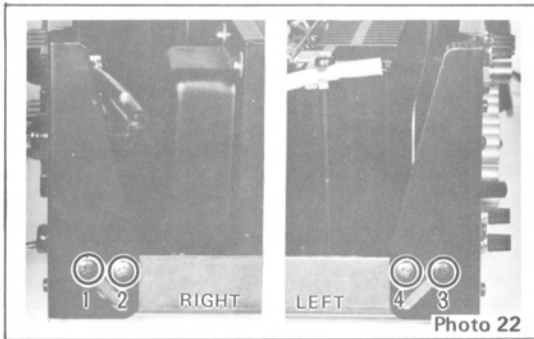


Photo 21

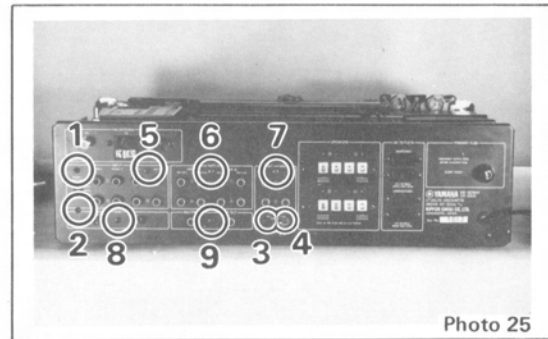
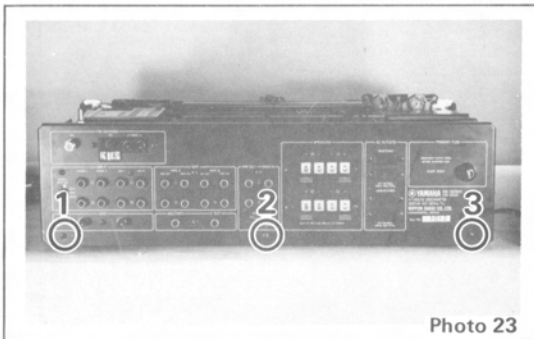
### DROPPING THE REAR PANEL

- a. Remove screws 2, 4 and loosen screws 1, 3 shown in Photo 22.
- b. Remove screws 1~3 shown in Photo 23, then drop the rear panel as shown in Photo 24.

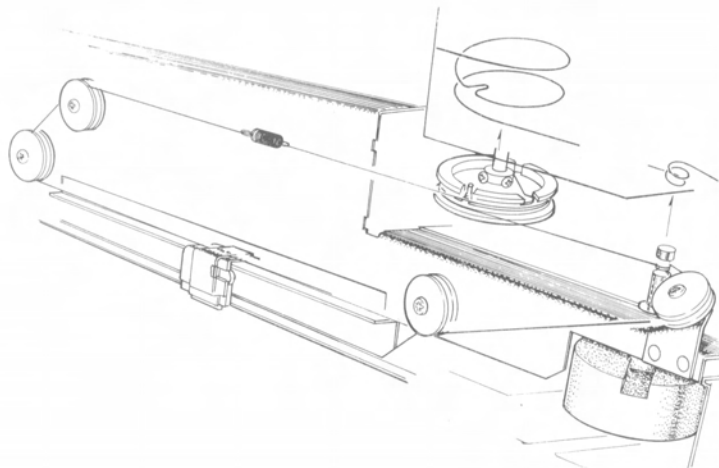


### REAR PANEL CRICUIT BOARD REMOVAL

Remove screws 1~9 shown in Photo 25, then remove the board (drop the rear panel).



### DIAL MECHANISM





# MEASUREMENT AND ADJUSTMENT

## FM SECTION ADJUSTMENT

### FM-IF ADJUSTMENT

STEP	ADJUSTMENT ITEM	TERMINALS TO BE CONNECTED & INSTRUMENTS REQUIRED	ADJUSTMENT	HOW TO ADJUST	RATING OR STANDARD	REMARKS
1	S-Curve	Input jack Sweep Generator Output: 40dB/400 $\pm 100\Omega$ 10-E Oscilloscope (Refer to Fig. 1.)	T101 discrim coil (Upper & - Lower) core, Upper: Second- ary Side  Lower: Primary side	Adjust for symmetrical S-curve with the sec- ondary-side core. Adjust for max. height with the primary-side core.	Output Voltage: more than 400mVp-p Intermediate Frequency: within 10.7- MHz $\pm 200$ - kHz Bandwidth: 300kHz (Refer to Fig. 2.)	

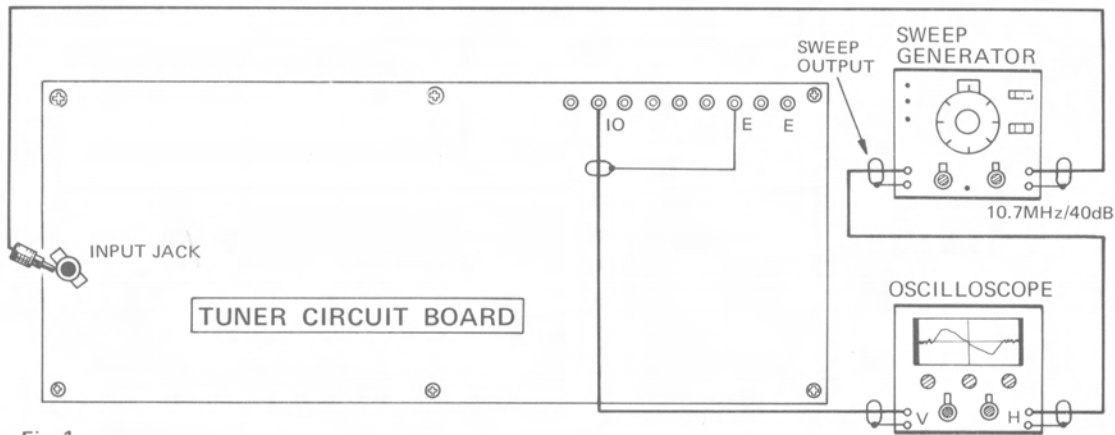


Fig. 1

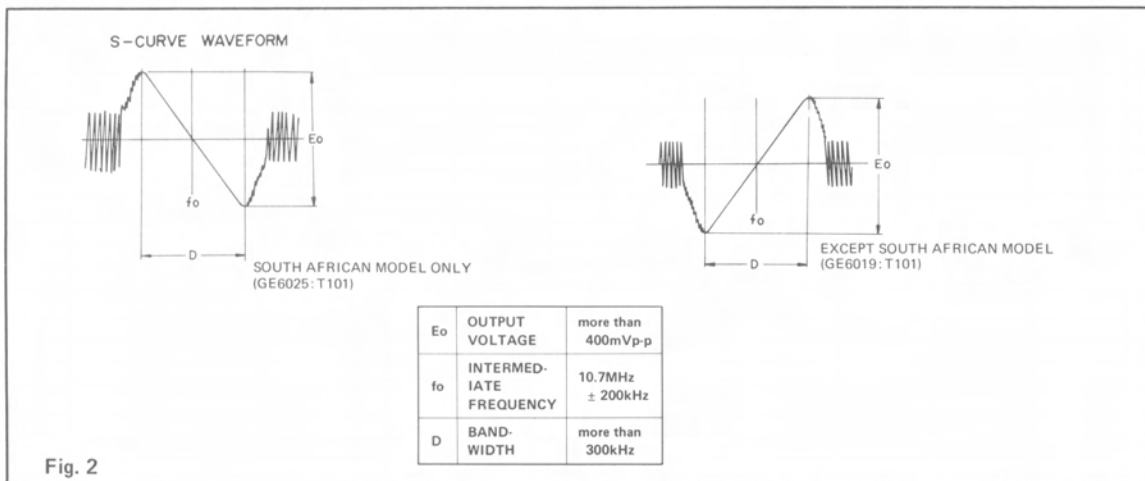
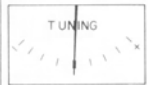
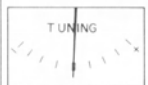




Fig. 2

### FM MPX ADJUSTMENT

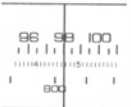
STEP	ADJUSTMENT ITEM	TERMINALS TO BE CONNECTED & INSTRUMENTS REQUIRED	ADJUSTMENT	HOW TO ADJUST	RATING OR STANDARD	REMARKS
1	19kHz Filter adjustment	FM antenna terminal (300Ω) FM signal Generator 98MHz/60dBμ ● Modulate the stereo pilot signal only.	T105 (L) T106 (R) GE605 (Refer to Fig. 3)	Adjust for minimum 19kHz leak element.  factor	Leak level: less than -60dB	Should be set at tuning point of FM TUNER COMPLETE ADJUSTMENT-'2''.
		Rec Out jack Oscilloscope, Distortion ratio meter, Electronic voltmeter				
2	Separation adjustment	FM antenna terminal (300Ω) FM signal Generator 98MHz/60dBμ Modulation Frequency: 400Hz/ 100% stereo (L, R & L-R)	VR103 (L) VR104 (R) B22kΩ (Refer to Fig. 3)	Adjust for maximum separation (obtain this maximum by repeated left and right adjustments).	Separation: more than -2dB Standard Value: -50dB	Should be set at tuning point of FM TUNER COMPLETE ADJUSTMENT-'2''.
		Rec Out jack Oscilloscope, Distortion ratio meter, Electronic voltmeter.				

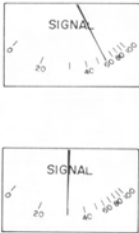
### FM TUNER COMPLETE ADJUSTMENT

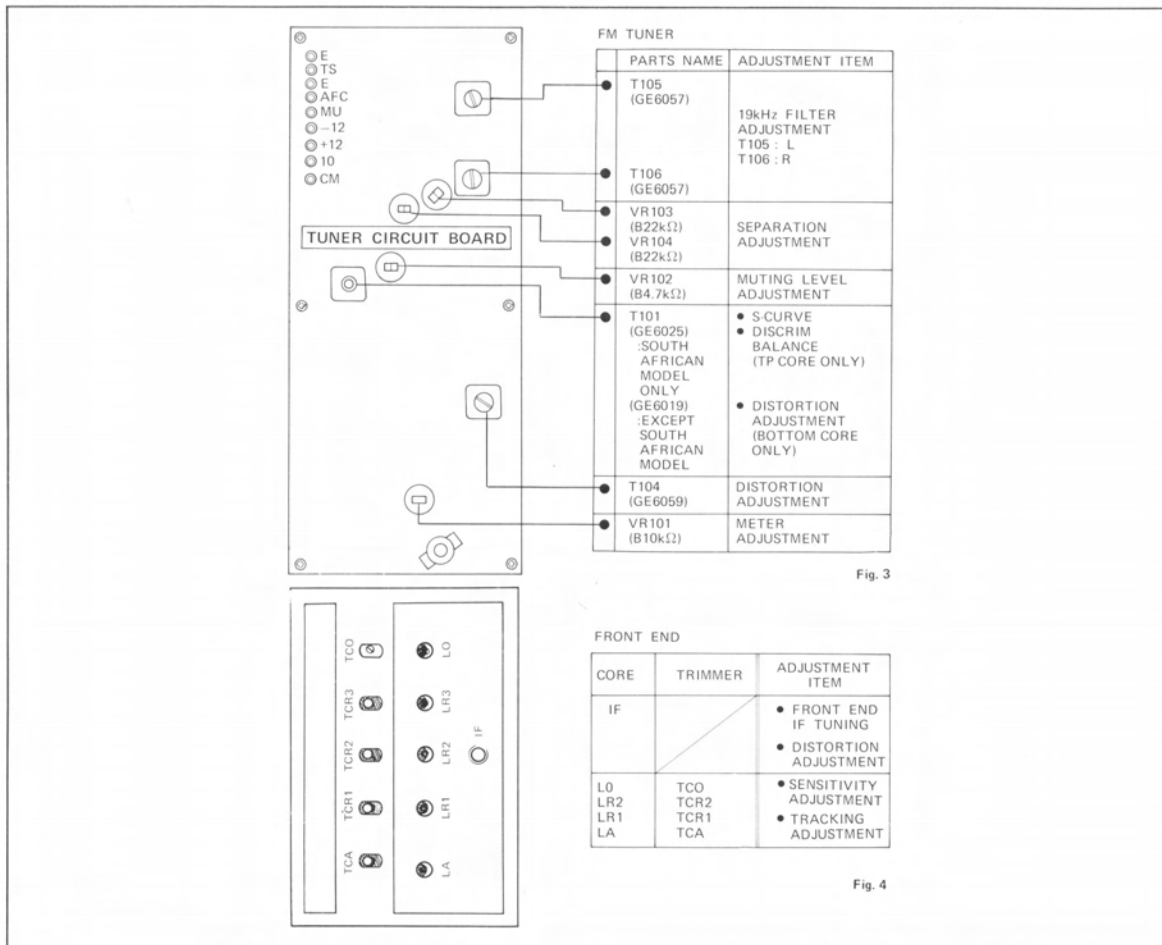
1	Discrim Balance		T101 discrim coil:Secondary Side(upper) Refer to Fig. 3.	Adjust for tuning meter position at 0 with out of tune noise.		Do not connect anything to the FM antenna terminal
2	Tuning Point Set	FM antenna terminal (300Ω) FM signal Generator 98MHz/60dBμ Frequency: 400Hz/100% mono	Tuning knob	Center tuning meter at 0 by tuning.		AFC OFF
3	Front-end IF tuning	FM antenna terminal (300Ω) FM signal Generator 98MHz/30dBμ or so Modulation Frequency: 400Hz/100% mono	Front-end IF core primary and secondary side. (Refer to Fig. 4)	Set for max. signal meter deflection.		Should be set at tuning point 2.
4	Distortion adjustment (Mono)	FM antenna terminal (300Ω) FM signal Generator 98MHz/60dBμ or so Modulation Frequency: 400Hz/100% mono	T101 discrim coil:primary side (bottom) (Refer to Fig. )	Adjust right and left little by little until achieving lowest distortion.	Distortion: less than -50dB (0.25%) Standard Value: less than -58dB (0.12%)	Should be set at tuning point 2.
		Rec Out jack Oscilloscope, Distortion ratio meter, Electronic voltmeter.				

Step	ADJUSTMENT ITEM	TERMINALS TO BE CONNECTED & INSTRUMENTS REQUIRED	ADJUSTMENT	HOW TO ADJUST	RATING OR STANDARD	REMARKS
5	Distortion adjustment (Stereo)	FM antenna terminal (300Ω) FM signal Generator 98MHz/60dBμ Modulation Frequency: 400Hz /100% stereo (L, R & L-R)	T104 (GE-6059), Front-end IF core (upper) & (lower) . (Refer to Fig. 3, 4) .	Adjust T104 for minimum distortion at maximum L-R signal. Adjust front end IF (upper) & (lower) core via L or R for minimum distortion.	Distortion: less than -40dB (0.4%) Standard Value: less than -54dB (0.2%)	Should be set at tuning point 2.
		Rec Out jack Oscilloscope, Distortion ratio meter, Electronic volt meter.				
6	Meter adjustment	FM antenna terminal (300Ω) FM signal Generator 98MHz/100dBμ Modulation Frequency: 400Hz /100% mono	Set VR102 (semi-fixed variable resistor for meter adjustment, B10kΩ) (Refer to Fig. 3)	Set for Maximum ("100") signal meter deflection.	Allowable Error: +0mm, -1mm. 	Should be set at tuning point 2.
7	Muting level adjustment	FM antenna terminal (300Ω) FM signal Generator 98MHz/20dBμ Modulation Frequency: 400Hz /100% mono	Set VR101 (semi-fixed variable resistor for muting level adjustment; B4.7kΩ) (Refer to Fig. 3)	Turn to the right little by little until output power appears.	Level where output appears: 20dBμ ±3dBμ	Should be set at tuning point 2.
		Rec Out jack Oscilloscope, Electronic voltmeter				

### FM TRACKING ADJUSTMENT

STEP	ADJUSTMENT ITEM	TERMINALS TO BE CONNECTED & INSTRUMENTS REQUIRED	ADJUSTMENT	HOW TO ADJUST	RATING OR STANDARD	REMARKS
1	Dial pointer adjustment I Dial pointer adjustment II	FM antenna terminal FM signal Generator 98MHz/60dBμ	Tuning knob Dial pointer	Turn the knob and set the tuning point at TUNER COMPLETE ADJUSTMENT - "2". Set to the middle of the "98" on the gauge board. 	AFC-E	
2	Low-band tracking conformation	FM antenna terminal FM signal Generator 90MHz/60dBμ	Tuning knob	Turn the knob and set the tuning point at 1.	Deviation should be within ±1.0-1 mm of the center of the numbers.	AFC-E, CM-E If the check shows that only one of the standards (2 and 2') are not met, adjust the needle for that measurement to within the standard.
	2'	High-band tracking conformation	FM antenna terminal FM signal Generator 106MHz/60dBμ	Dial pointer		
3	Tracking adjustment I	FM antenna terminal FM signal Generator 90, 98, 106MHz/60dBμ	Tuning knob Dial pointer	Reset the dial pointer so that the greatest deviation is within the standard range.		When both 2 and 2' are out of the standard range.

Step	ADJUSTMENT ITEM	TERMINALS TO BE CONNECTED & INSTRUMENTS REQUIRED	ADJUSTMENT	HOW TO ADJUST	RATING OR STANDARD	REMARKS
4	Tracking adjustment II	FM antenna terminal FM signal Generator 90, 98, 106MHz/60dB $\mu$  FM antenna terminal FM signal Generator 88MHz/ 60dB $\mu$ 88MHz/30dB $\mu$  FM antenna terminal FM signal Generator 106MHz/60dB $\mu$ 106MHz/30dB $\mu$	Tuning knob  Front end L  Front end RF, ANT core. (Refer to Fig. 4.)  Front end LOSC trimmer  Front end RF, ANT trimmer (Refer to Fig. 4.)	Match the needle to the numbers.  Set the tuning point at 1. Set for maximum meter deflection.  Set the tuning point at 1. Set for maximum meter deflection.		When the standard is not met even after adjustments 2, 2' and 3.



## MAIN AMPLIFIER ADJUSTMENT

### BEFORE ADJUSTMENT

- Turn the Pre/Main coupler switch Off.
- After the power switch is turned in, wait 1 minute before adjustment, to be sure of the most stable operation.
- Do not connect speakers or dummy load resistor to the speaker terminals.

STEP	ADJUSTMENT ITEM	TERMINALS TO BE CONNECTED & INSTRUMENT REQUIRED	ADJUSTMENT	HOW TO ADJUST	RATING OR STANDARD	REMARKS
1	Primary stage differential amplification circuit current adjustment	TP1 (-) — TP2 (+) Refer to Fig. 8. Electronic voltmeter	VR602 Refer to Fig. 8.	Set the voltage between TP1 and TP2 to rating value (15V ± 0.15V) with VR602.	15V ± 0.15V	
2	Mid-point voltage adjustment	OUT — E Refer to Fig. 8. Electronic voltmeter.	VR601 Refer to Fig. 8.	Set the voltage between OUT and E to rating value (0V ± 0.01V) with VR601.	0V ± 0.01V	
3	Idling current adjustment	TP3 (+) — TP4 (-) Refer to Fig. 8. Electronic voltmeter.	VR603 Refer to Fig. 8.	Set the voltage between TP3 and TP4 to rating value (0.047V ± 0.01V)	0.047V ± 0.01V	
4		Repeat steps 1 ~ 3 several times.				

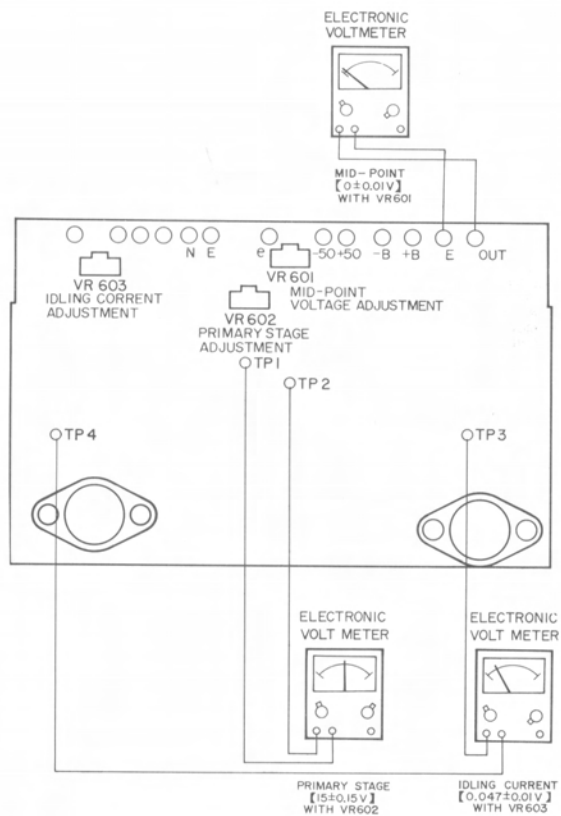


Fig. 8

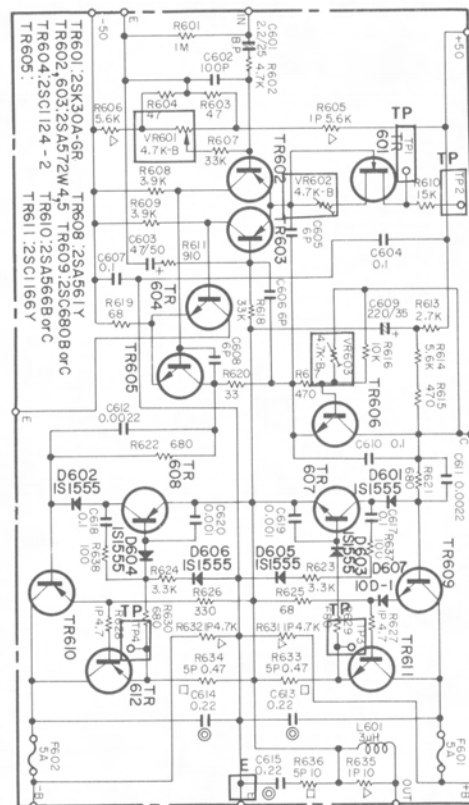


Fig. 9

## AUDIO SECTION

### EQ AMPLIFIER ADJUSTMENT

STEP	ADJUSTMENT ITEM	TERMINALS TO BE CONNECTED & INSTRUMENT REQUIRED	ADJUSTMENT	HOW TO ADJUST	RATING OR STANDARD	REMARKS
1	SEPP Output mid-point voltage adjustment	TP1 — E (L) TP2 — E (R) Refer to Fig.5 Electronic voltmeter	VR401 (L) VR402 (R) Refer to Fig.5	Set the voltage between TP1 and E, TP2 and E to rating value (28.0V $\pm$ 0.5V) with VR401, VR402.	28.0V $\pm$ 0.5V	
2	Bias adjustment	PHONO 1 or 2 jack Oscillator 1kHz/240mV  REC OUT JACK Distortion ratio meter Electronic voltmeter Oscilloscope	VR401 (L) VR402 (R) Refer to Fig.6	Set VR401 and VR402 for lowest possible distortion within the limits set by the Step 1 adjustment of the SEPP output voltage (28.0V $\pm$ 0.5V).		

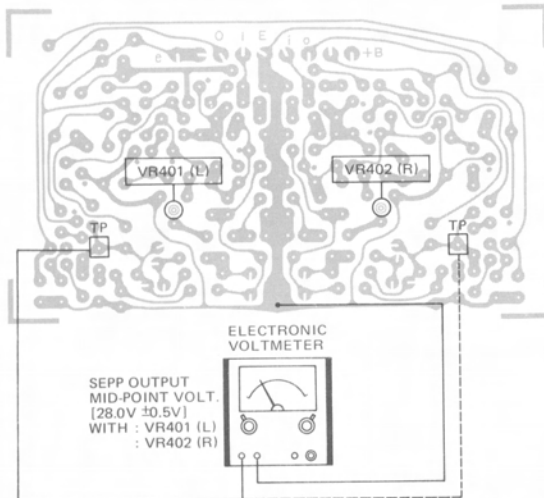


Fig. 5

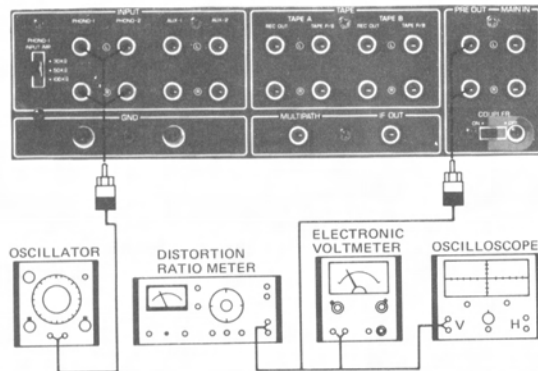


Fig. 6

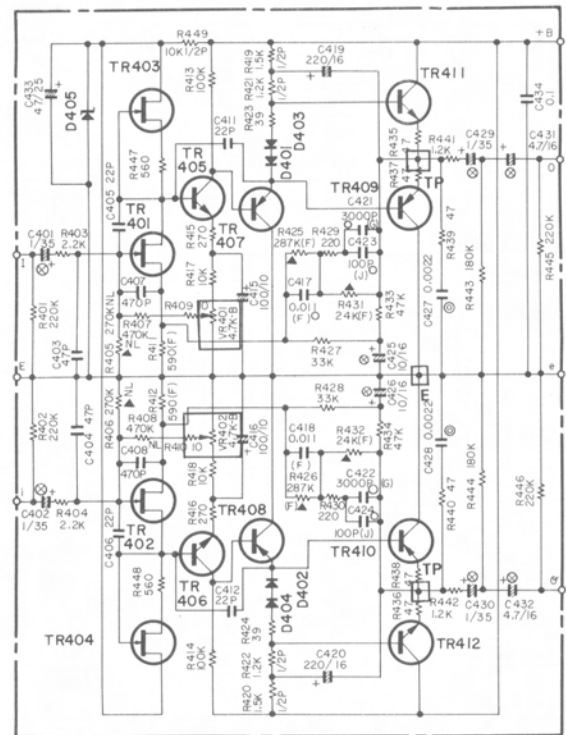
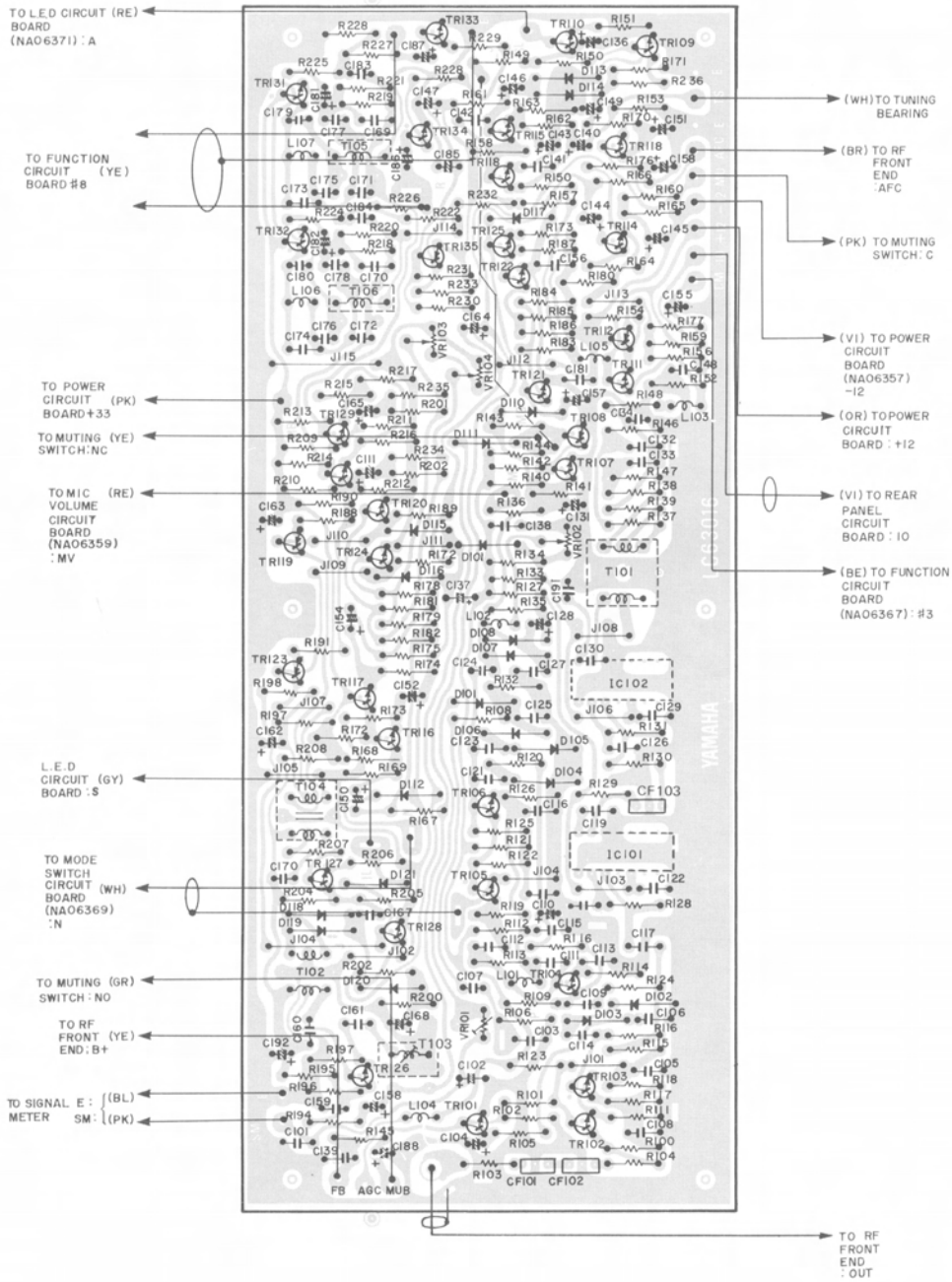


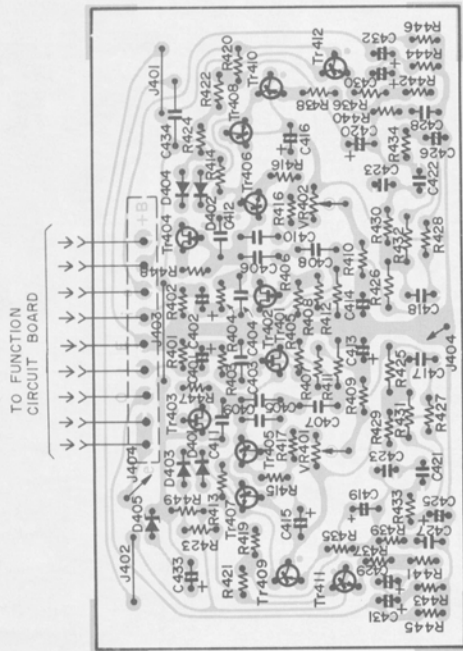
Fig. 7

# PRINTED CIRCUIT BOARD

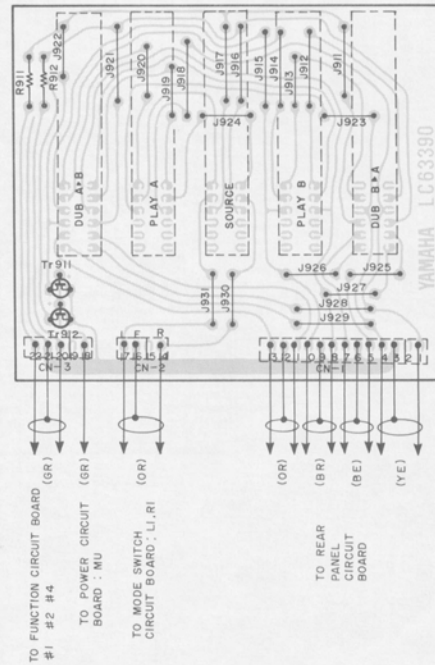
**TUNER CIRCUIT BOARD NAO6372 : SOUTH AFRICAN MODEL**  
**NAO6405 : U.S. & CANADIAN MODELS**  
**NAO6406 : EUROPEAN, AUSTRALIAN & GENERAL MODELS**



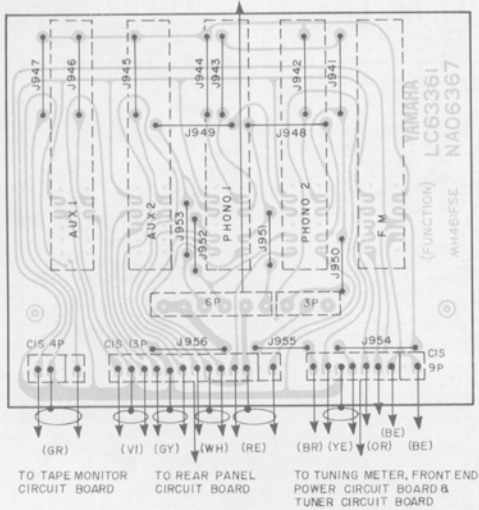
**EQUALIZER AMP CIRCUIT BOARD  
NAO6368**



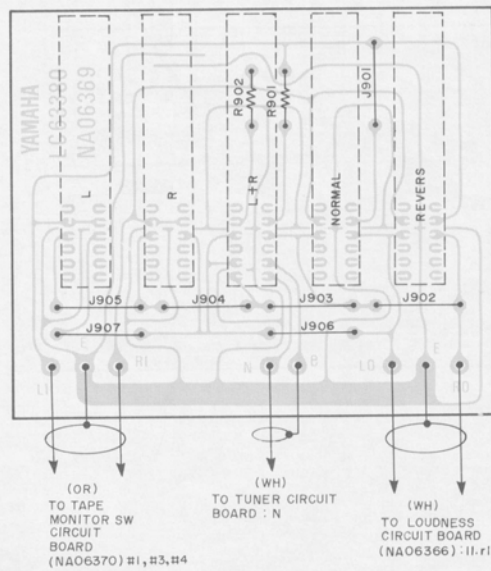
**TAPE MONITOR SWITCH CIRCUIT BOARD  
NAO6370**



**FUNCTION SWITCH CIRCUIT BOARD  
NAO6367**

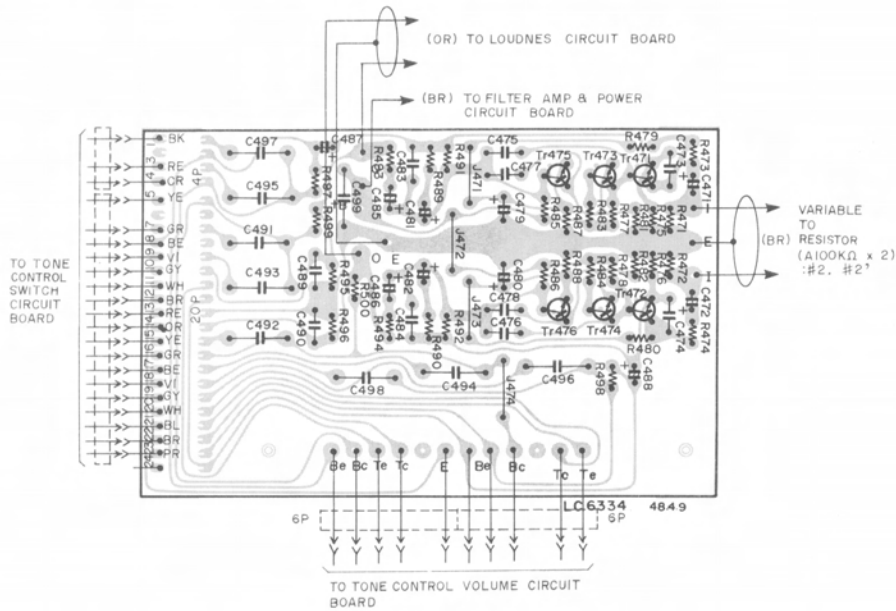


**MODE SWITCH CIRCUIT BOARD  
NAO6369**

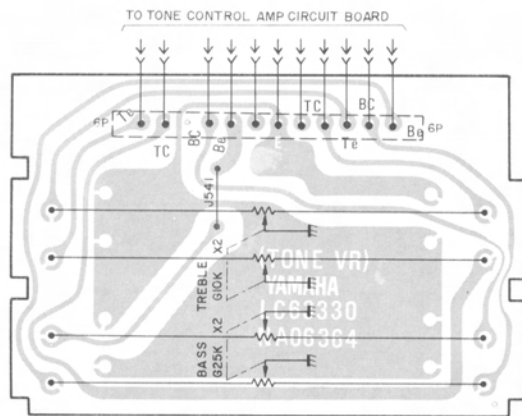




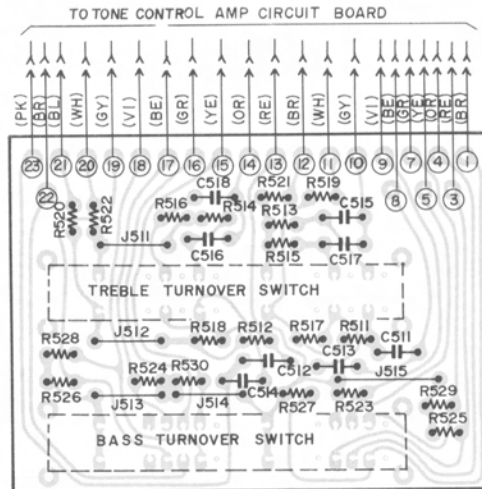
# TONE CONTROL AMP CIRCUIT BOARD NAO6365



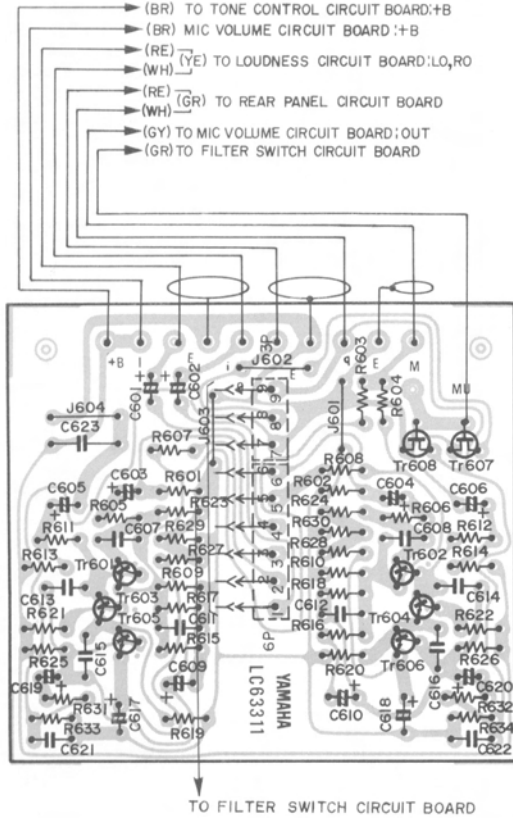
## TONE CONTROL VOLUME CIRCUIT BOARD NAO6364



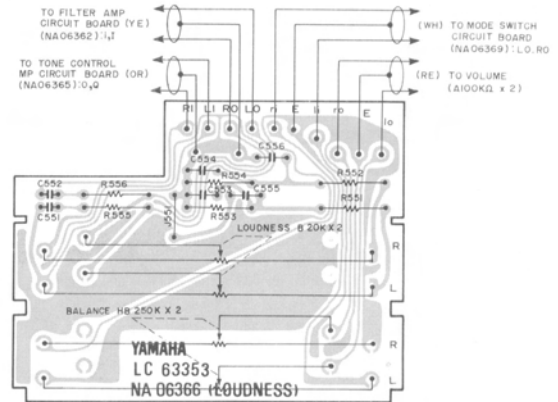
## TONE CONTROL SWITCH CIRCUIT BOARD NAO6363



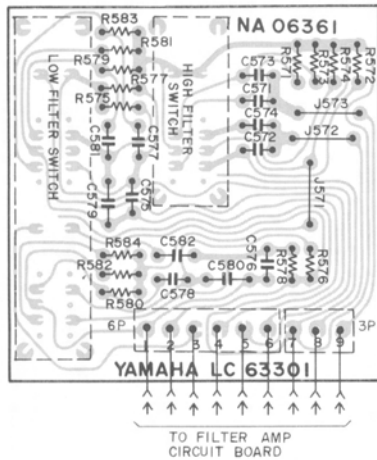
**FILTER AMP CIRCUIT BOARD**  
NAO6362



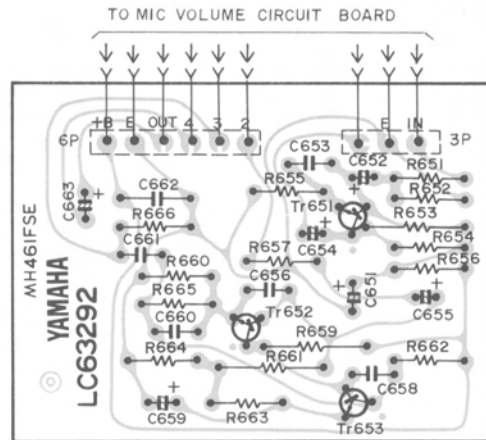
**LOUDNESS CONTROL CIRCUIT BOARD**  
NAO6366



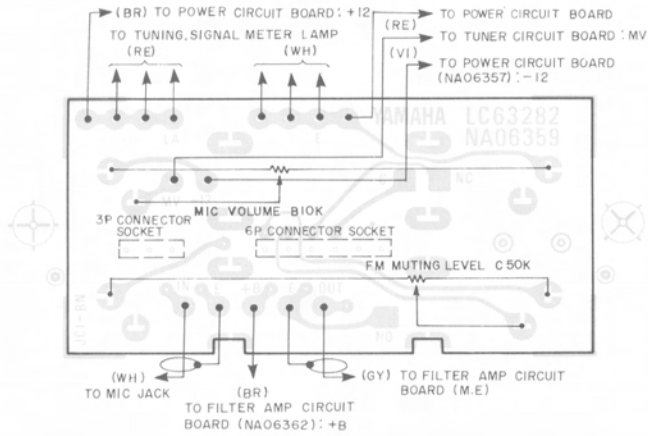
**FILTER SWITCH CIRCUIT BOARD**  
NAO6361



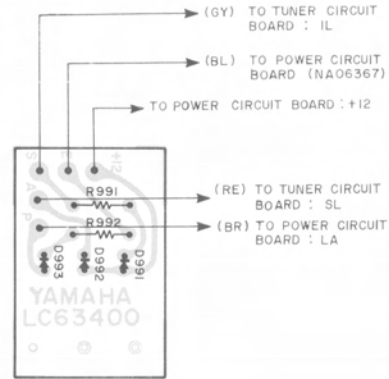
**MIC AMP CIRCUIT BOARD**  
NAO6360



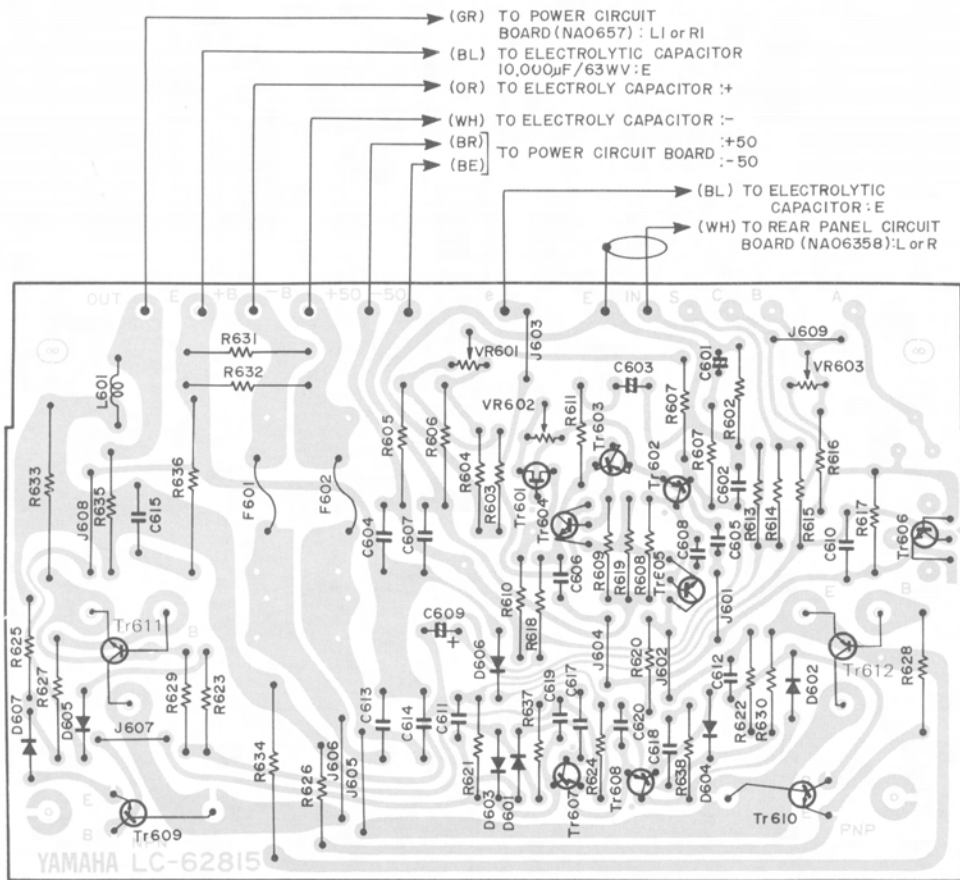
**MIC VOLUME CIRCUIT BOARD  
NAO6359**



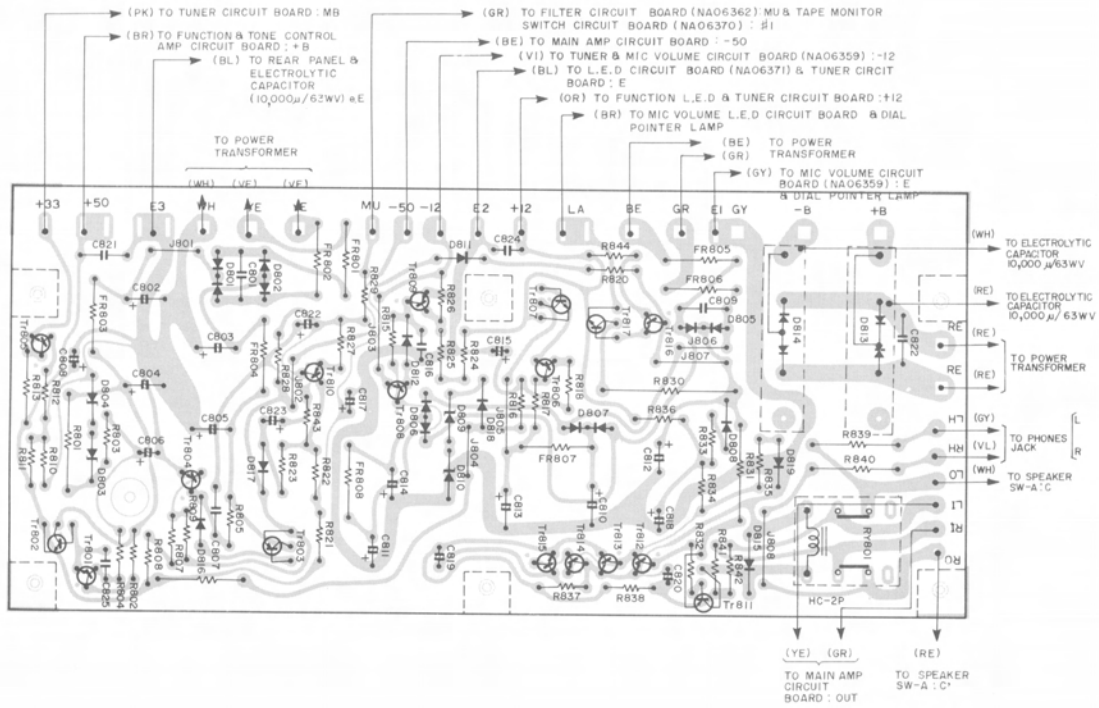
**LIGHT EMITTING DIODE CIRCUIT BOARD  
NAO6371**



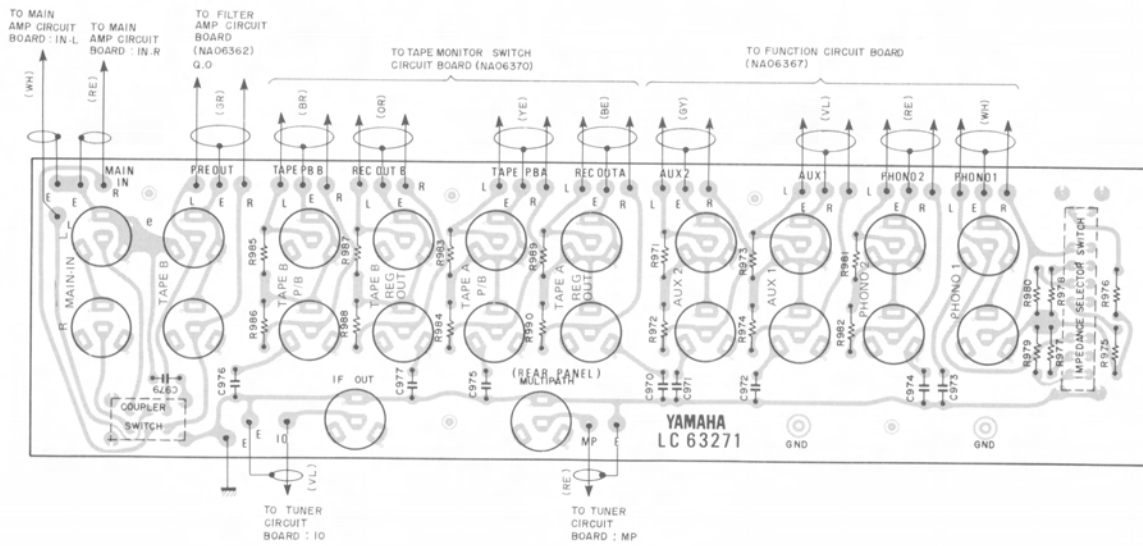
**MAIN AMP CIRCUIT BOARD  
NAO6401 : EXCEPT EUROPEAN MODELS  
NAO6402 : EUROPEAN MODELS ONLY**



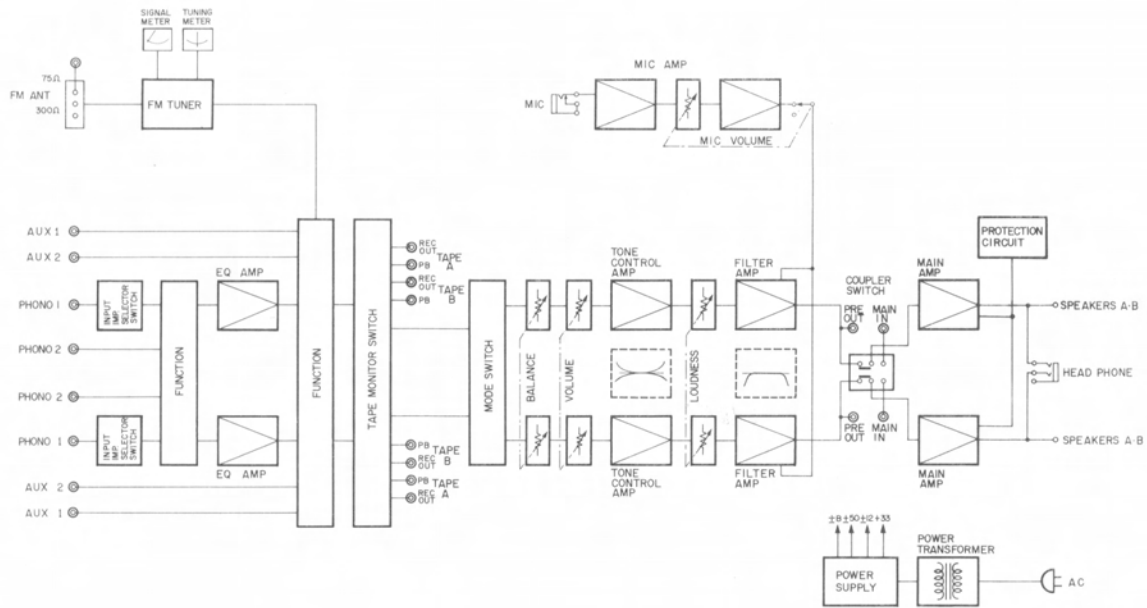
## POWER CIRCUIT BOARD NAO6357



## REAR PANEL CIRCUIT BOARD NAO6358



# BLOCK DIAGRAM



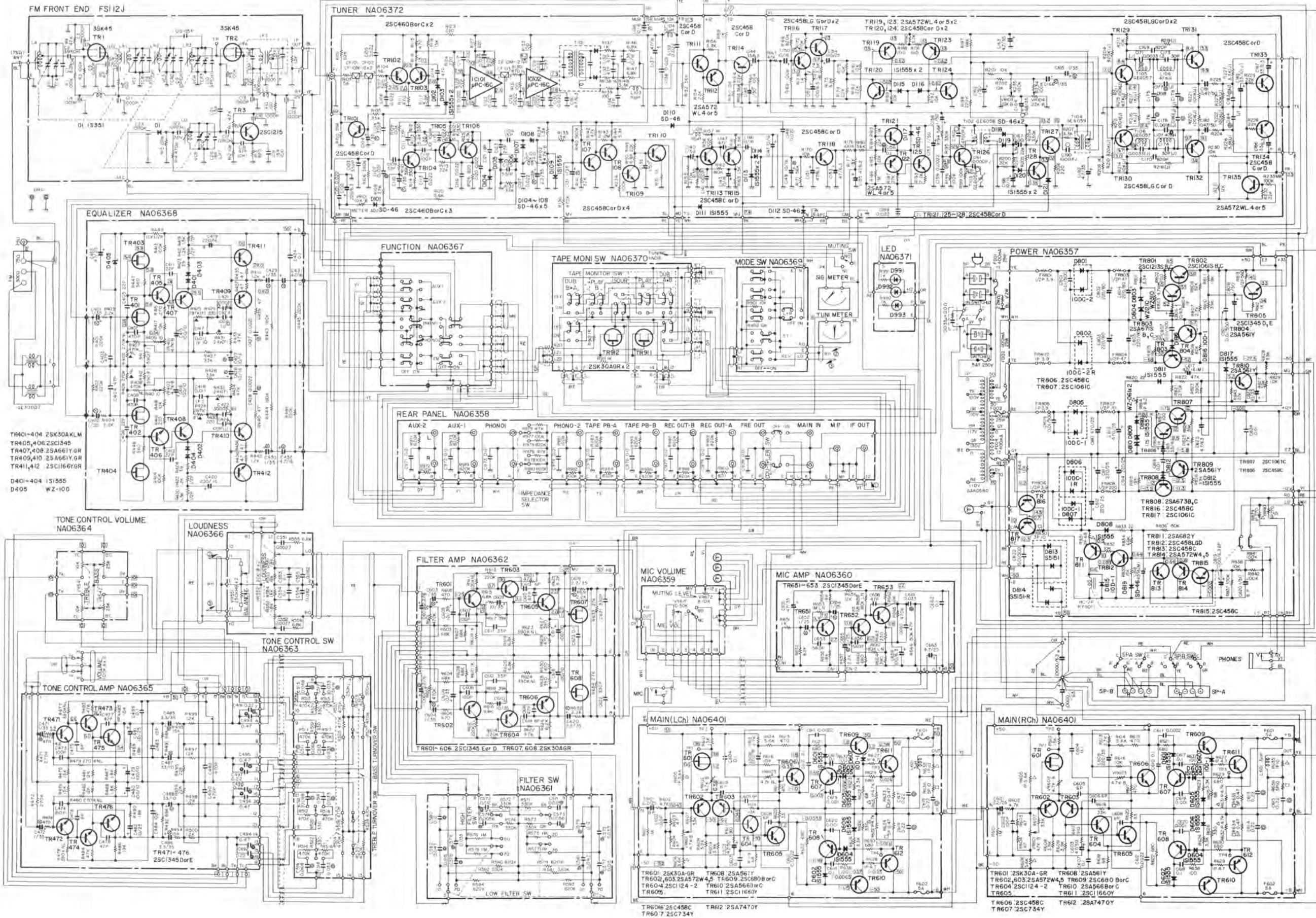
## WIRE COLOR ABBREVIATIONS

BL ▶ Black	VI ▶ Violet
BR ▶ Brown	GY ▶ Gray
RE ▶ Red	WH ▶ White
OR ▶ Orange	GG ▶ Light Green
YE ▶ Yellow	SB ▶ Light Blue
GR ▶ Green	PK ▶ Pink
BE ▶ Blue	

SYMBOL	PARTS NAME
	FUSE RESISTOR
	METAL OXIDE RESISTOR
	CEMENT RESISTOR
NO MARK	CARBON RESISTOR
	CEMENT MOLDED RESISTOR
	METAL OXIDE FILM RESISTOR
	METAL PLATE RESISTOR

SYMBOL	PARTS NAME	REMARKS
	MYLAR CAPACITOR	
NO MARK	CERAMIC CAPACITOR	—  —
	POLYSTYRENE CAPACITOR	
NO MARK	(BI-POLAR) ELECTROLYTIC CAPACITOR	
	LOW-NOISE ELECTROLYTIC CAPACITOR	—  —
	TANTALUM CAPACITOR	

# OVERALL SCHEMATIC DIAGRAM



VOLTAGE TABLE

MUTING CIRCUIT

	OUT OF TUNE [98MHz]		TUNE [103.25MHz]	
	MUTING SW: OFF	MUTING SW: ON	MUTING SW: OFF	MUTING SW: ON
T1104	C	10.5	11.0	0.22
	B	1.16	0.82	0.15
	E	0.5	0.15	
	C	1.7	1.3	
T1105	B	0.68	0.68	
	E	0	0	
	C	4.8	4.2	
	B	1.7	1.3	
T1106	E	1.0	1.05	
	C	0.7	0.69	0.021
	B			0.63
	E	0	0	
T1108	C	0.056	0.048	11.0
	B	0.7	0.69	0.021
	E	0	0	0
	C	-0.52	-0.5	0.056
T1114	B	0.1	-1.65	0.69
	E	-0.5	-0.49	0.05
	C	-0.13	-0.12	0.6
	E	-0.12	-0.12	0.3
T1121	E	0	0	0
	C	-10.5	-10.5	-11.3
	B	-0.58	-0.58	-0.2
	E	0	0	0
T1125	C	-0.13	-0.12	0.6
	B	-10.5	-10.5	-11.3
	E	-11.0	-11.0	-11.3
	C	0	0	0
T1133	B	-1.7	0.67	-1.7
	E	0	0	0
	C	0	0	0
	B	-1.7	0.67	-1.7
T1135	E	0	0	0
	C	-1.7	8.5	-1.7
	B	9.5	8.0	9.4
	E	9.8	8.5	9.8

FUNCTION: FM MONO  
MUTING LEVEL: "0"

FM AGC

	OUT OF TUNE [98MHz]		TUNE [103.25MHz]	
	C	4.2	4.3	
B	0	0.24		
E	0	0		

BUFFER AMP

	AT OUT OF TUNE [98MHz]		AT TONE [103.25MHz]	
	C	11.3	11.3	
B	-0.48	0		
E	-1.1	-0.58		
C	-11.3	-11.3		
B	-1.1	-0.58		
E	-0.5	0.015		

AUTO TOUCH AFC OFF

	AT OUT OF TUNE [98MHz]		AT TUNE [103.25MHz]	
	UN-TOUCHED	*TOUCHED	UN-TOUCHED	*TOUCHED
T1109	C	0.056	0.008	10
	B	0	0.57	0
T1110	C	10.0	10.0	9.5
	B	0.056	0.02	10
T1118	E	0	9.2	1.7
	C	-0.42	0	0.063
T1119	B	0	0.64	0
	E	0	0	0

⊙ UNTOUCHED: When tuning knob is untouched.  
\* TOUCHED : When tuning knob is touched.

Circuit Diagram Lead Cord Color Code Chart

Code	Color	Code	Color
BL	Black	VI	Violet
BR	Brown	GY	Grey
RE	Red	WH	White
OR	Orange	GG	Light Green
YE	Yellow	SB	Light Blue
GR	Green	PK	Pink
BE	Blue		

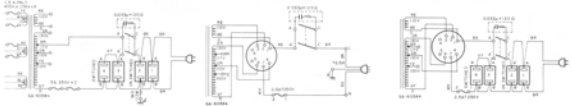
PARTIAL CHANGES MADE ACCORDING TO DESTINATION

POWER CIRCUIT : PRIMARY SIDE

U.S. & CANADIAN MODELS

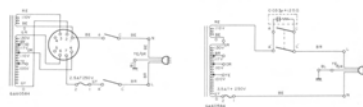
SOUTH AFRICAN MODEL

GENERAL MODEL



EUROPEAN MODEL

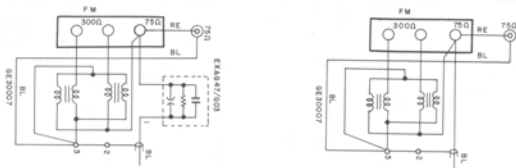
AUSTRALIAN MODEL



ANTENNA

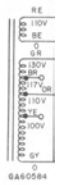
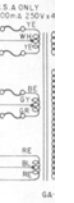
U.S. & CANADIAN MODELS ONLY

EXCEPT U.S. & CANADIAN MODELS



TUNER CIRCUIT BOARD

DESTINATION	SOUTH AFRICAN MODEL	EUROPEAN, AUSTRALIAN & GENERAL MODELS	U.S. & CANADIAN MODELS
NA. NO.	NA66481	NA66483	NA66482
PARTS NO.	NA66481	NA66483	NA66482
C 175	MYLAR CAPACITOR 0.002µF (15%)	SAME AS SOUTH AFRICAN MODEL	MYLAR CAPACITOR 0.004µF (15%)
C 179	MYLAR CAPACITOR 0.002µF (15%)	SAME AS SOUTH AFRICAN MODEL	MYLAR CAPACITOR 0.003µF (15%)
C 180	MYLAR CAPACITOR 0.002µF (15%)	SAME AS SOUTH AFRICAN MODEL	MYLAR CAPACITOR 0.015µF (15%)
C 183	MYLAR CAPACITOR 0.002µF (15%)	SAME AS SOUTH AFRICAN MODEL	MYLAR CAPACITOR 0.015µF (15%)
R 218	CARBON RESISTOR 5.6kΩ 1/8W (15%)	SAME AS SOUTH AFRICAN MODEL	CARBON RESISTOR 5.6kΩ 1/8W (15%)
R 219	CARBON RESISTOR 1kΩ 1/8W (15%)	SAME AS SOUTH AFRICAN MODEL	CARBON RESISTOR 1.2kΩ 1/8W (15%)
R 224	CARBON RESISTOR 1kΩ 1/8W (15%)	SAME AS SOUTH AFRICAN MODEL	CARBON RESISTOR 1.2kΩ 1/8W (15%)
R 225	CARBON RESISTOR 1kΩ 1/8W (15%)	SAME AS SOUTH AFRICAN MODEL	CARBON RESISTOR 1.2kΩ 1/8W (15%)
F 191	GE 6025	GE 6019	GE 6019
DE EMPHASIS	50µsec	50µsec	75µsec



VOLTAGE TABLE

MUTING CIRCUIT

		OUT OF TUNE [98MHz]		TUNE [103.25MHz]	
		MUTING SW: OFF	MUTING SW: ON	MUTING SW: OFF	MUTING SW: ON
		Tr104	C	10.5	
	B	1.16		0.82	
	E	0.5		0.15	
Tr105	C	1.7		1.3	
	B	0.68		0.68	
	E	0		0	
Tr106	C	4.8		4.2	
	B	1.7		1.3	
	E	1.0		1.05	
Tr107	C	0.7	0.69	0.021	
	B	/		0.63	
	E	0	0	0	
Tr108	C	0.056	0.048	11.0	9.0
	B	0.7	0.69	0.021	0.021
	E	0	0	0	0
Tr114	C	-0.52	-0.5	0.056	0.056
	B	0.1	-1.65	0.69	0.7
	E	-0.5	-0.49	0.05	0.055
Tr121	C	-0.13	-0.12	0.6	0.6
	B	-0.12	-0.12	0.3	0.3
	E	0	0	0	0
Tr122	C	-10.5	-10.5	-11.3	-11.3
	B	-0.58	-0.58	-0.2	-0.2
	E	0	0	0	0
Tr125	C	-0.13	-0.12	0.6	0.6
	B	-10.5	-10.5	-11.3	-11.3
	E	-11.0	-11.0	-11.3	-11.3
Tr133	C	0	0	0	0
	B	-1.7	0.67	-1.7	-1.7
	E	0	0	0	0
Tr134	C	0	0	0	0
	B	-1.7	0.67	-1.7	-1.7
	E	0	0	0	0
Tr135	C	-1.7	8.5	-1.7	-1.7
	B	9.5	8.0	9.4	9.8
	E	9.8	8.5	9.8	9.8

FUNCTION: FM MONO  
MUTING LEVEL: "0"

FM AGC

		OUT OF TUNE [98MHz]	TUNE [103.25MHz]
		Tr101	C
	B	0	0.24
	E	0	0

BUFFER AMP

		AT OUT OF TUNE [98MHz]	AT TONE [103.25MHz]
		Tr111	C
	B	-0.48	0
	E	-1.1	-0.58
Tr112	C	-11.3	-11.3
	B	-1.1	-0.58
	E	-0.5	0.015

AUTO TOUCH AFC OFF

		AT OUT OF TUNE [98MHz]		AT TUNE [103.25MHz]	
		☆UN-TOUCH-ED	★TOUCH-ED	☆UN-TOUCH-ED	★TOUCH-ED
Tr109	C	0.056	0.008	10	0.076
	B	0	0.57	0	0.64
	E	0	0	0	0
Tr110	C	10.0	10.0	9.5	9.7
	B	0.056	0.02	10	2.4
	E	0	0	9.2	1.7
Tr118	C	-0.42	0	0.063	0.006
	B	0	0.64	0	0.62
	E	0	0		0

☆UNTOUCHED: When tuning knob is untouched.

★TOUCHED : When tuning knob is touched.

Circuit Diagram Lead Cord Color Code Chart

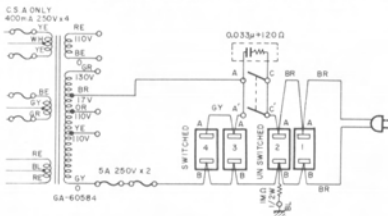
Code	Color	Code	Color
BL	Black	VI	Violet
BR	Brown	GY	Grey
RE	Red	WH	White
OR	Orange	GG	Light Green
YE	Yellow	SB	Light Blue
GR	Green	PK	Pink
BE	Blue		



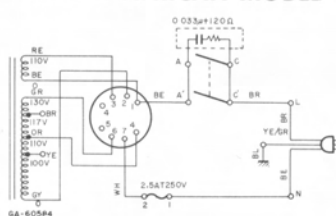
# PARTIAL CHANGES MADE ACCORDING TO DESTINATION

## POWER CIRCUIT : PRIMARY SIDE

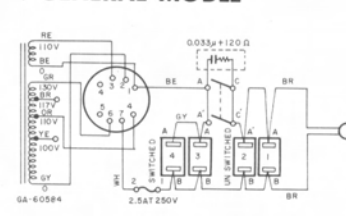
### ▼ U.S. & CANADIAN MODELS



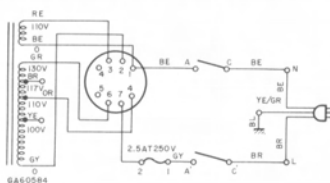
### ▼ SOUTH AFRICAN MODEL



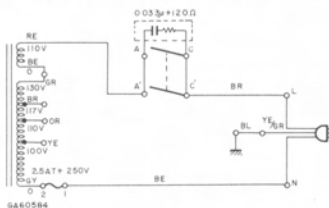
### ▼ GENERAL MODEL



### ▼ EUROPEAN MODEL

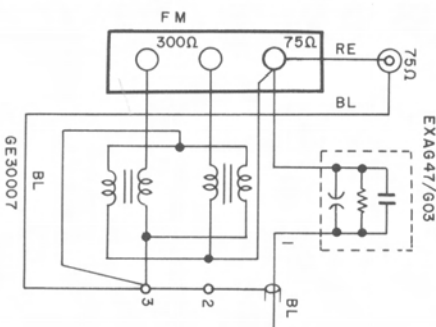


### ▼ AUSTRALIAN MODEL

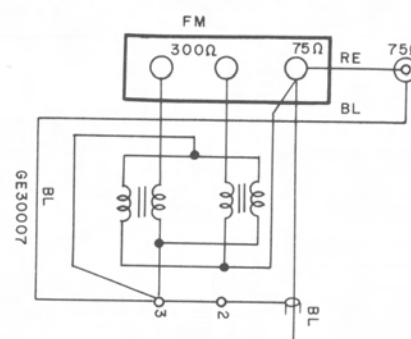


## ANTENNA

### ▼ U.S. & CANADIAN MODELS ONLY



### ▼ EXCEPT U.S. & CANADIAN MODELS

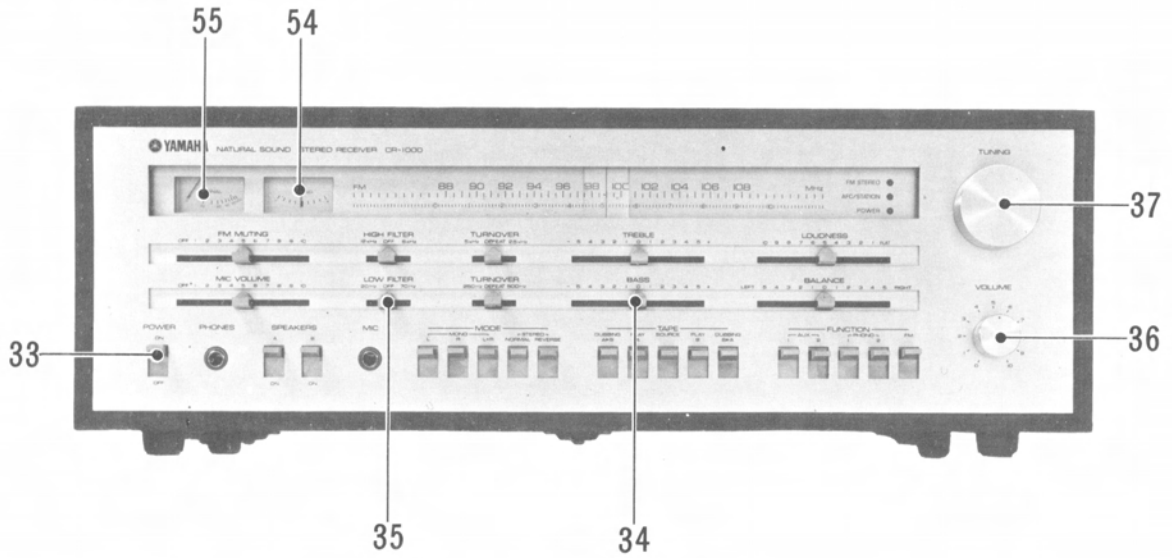


## TUNER CIRCUIT BOARD

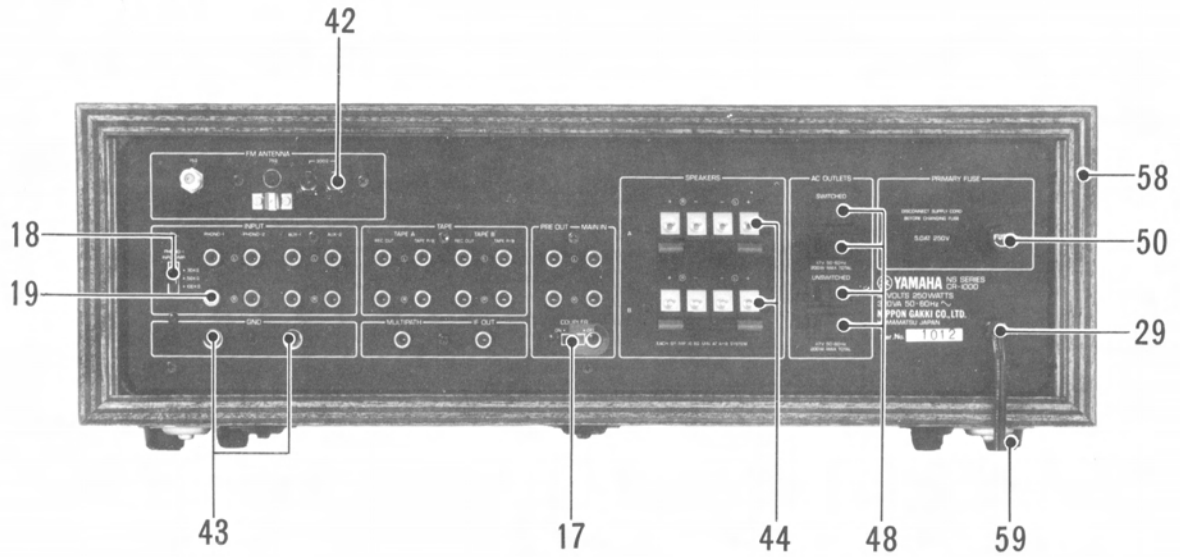
DESTINATION	SOUTH AFRICAN MODEL	EUROPEAN, AUSTRALIAN & GENERAL MODELS	U.S. & CANADIAN MODELS
NA. NO.	NA06461	NA06463	NA06462
PARTS NO.			
C 175	MYLAR CAPACITOR	SAME AS SOUTH AFRICAN MODEL	MYLAR CAPACITOR
C 176	0.0027µF (±5%)		0.0047µF (±5%)
C 179	MYLAR CAPACITOR	SAME AS SOUTH AFRICAN MODEL	MYLAR CAPACITOR
C 180	0.0027µF (±5%)		0.0033µF (±5%)
C 183	MYLAR CAPACITOR	SAME AS SOUTH AFRICAN MODEL	MYLAR CAPACITOR
C 184	0.0022µF (±5%)		0.018µF (±5%)
R 218	CARBON RESISTOR	SAME AS SOUTH AFRICAN MODEL	CARBON RESISTOR
R 219	6.8kΩ ¼W (±5%)		5.6kΩ ¼W (±5%)
R 224	CARBON RESISTOR	SAME AS SOUTH AFRICAN MODEL	CARBON RESISTOR
R 225	1kΩ ¼W (±5%)		1.2kΩ ¼W (±5%)
T 101	GE 6025	GE 6019	GE 6019
DE-EMPHASIS	50µsec	50µsec	75µsec

# PARTS LIST

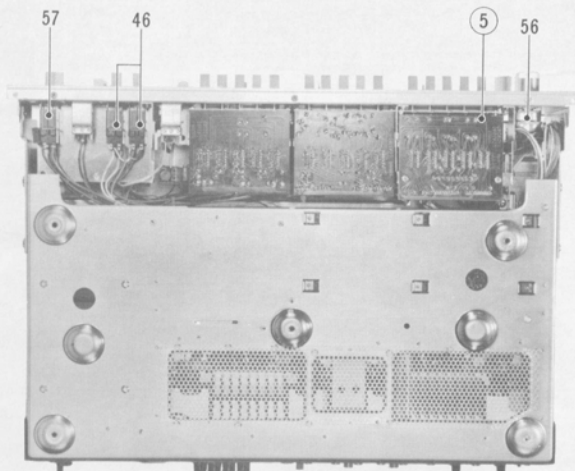
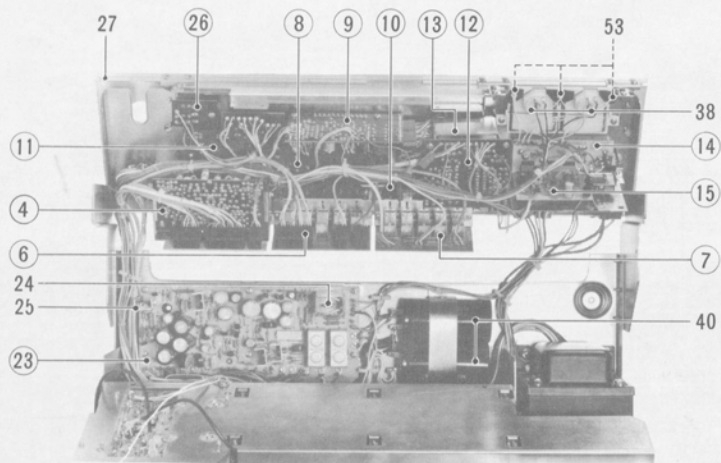
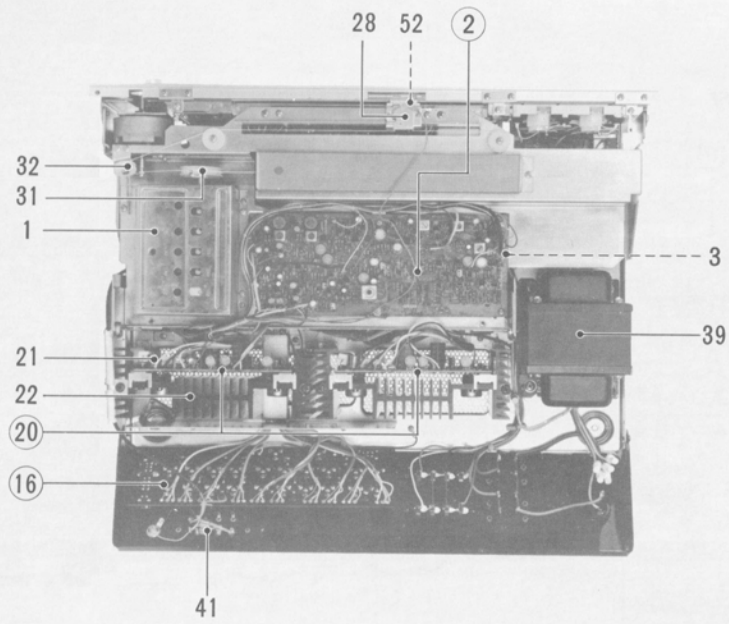
## FRONT VIEW



## BACK VIEW



# INTERNAL VIEW



Ref. No.	Part No.	Description		Remarks	Common Models	
1	PA00016	FM Pack	FS112J	F M バ ッ ク	Domestic model	
	PA00017	"	FS112U	"	U.S., Canadian, Australian & European models	
	PA00018	"	FS112S	"	South African model	
②	NA06372	FM IF circuit board	63012	F M I F シ ー ト	South African model	CR1000 CR800
	NA06405	"	"	"	U.S. & Canadian models	"
	NA06406	"	"	"	General, Australian & European models	"
	FF04310	Polystyrene capacitor (X type)	1000PF	X 型 ス チ ロ ー ル コ ン デ ン サ		
	FF04347	"	4700PF	"		
	FF04410	"	10000PF	"		
	FP13710	Tantalum capacitor	10 $\mu$ F 16WV	タ ン タ ル 固 体 コ ン デ ン サ		
	FP15568	"	0.68 $\mu$ F 35WV	"		
	FP15610	"	1 $\mu$ F "	"		
	FP15622	"	2.2 $\mu$ F "	"		
	FM22633	Bipolar electrolytic capacitor	3.3 $\mu$ F 25WV	バ イ ン ボ ー ラ コ ン デ ン サ		
	HT41004	Variable resistor (SV10KR)	B4.7K $\Omega$	ソ リ ッ ド V R		
	HT41007	" ( " )	B10K $\Omega$	"		
	HY00016	" (TM-10K)	B22K $\Omega$	メ タ ル グ レ ー ス V R		
	GE30001	RF inductor	10 $\mu$ H	R F イ ン ダ ク タ ー		
	GE10005	FM IFT		F M I F T	GE6019	
	GE10006	"		"	GE6025	
	GE20008	MPX coil		M P X コ ー ル	GE6057	
	GE20009	"		"	GE6058	
	GE20010	"		"	GE6059	
	GE20011	"	47mH	"	GE6062	
	GG00002	Ceramic filter	CF-10M-12	セ ラ ミ ッ ク フ ィ ル タ ー		
	iG00003	Integrated circuit	$\mu$ PC-16C	I C		
	iF00004	Diode	1S1555	ダ イ オ ー ド		
	iF00002	"	SD-46	"		
	iA05720	Transistor	2SA572(WL-4.5)	ト ラ ン ジ ス タ		
	iC04583	"	2SC458(C or D)	"		
	iC04585	"	2SC458LG(C or D)	"		
	iC04608	"	2SC460(B or C)	"		
3	LB10020	Pin jack	SQ3056	基 板 型 ピ ン ジ ャ ッ ク		

Ref. No.	Part No.	Description		Remarks	Common Models
④	NA06368	Equalizer circuit board	#63372	イコライザート シ	
	HL40615	Metal oxide film resistor	1.5K $\Omega$ 1/2W	酸化金属抵抗	
	HZ00018	Metalized film resistor	( $\pm$ 1%) 590 $\Omega$	金属被膜抵抗	
	HZ00019	"	( " ) 24K $\Omega$	"	
	HZ00020	"	( " ) 287K $\Omega$	"	
	FP13647	Tantalum capacitor	4.7 $\mu$ F 16WV	デッド型タンタル コンデンサ	
	FP15610	"	1 $\mu$ F 35WV	"	
	FP13710	"	10 $\mu$ F 16WV	"	
	FD15210	Polystyrene capacitor	100PF $\pm$ 5%	スチロール コンデンサ	
	FD19331	"	3000PF $\pm$ 2%	"	
	FD18411	"	0.011 $\mu$ F $\pm$ 1%	"	
	iF00004	Diode	ISI555	ダイオード	
	iF00027	Zener diode	WZ-100	ツェナーダイオード	
	iA06613	Transistor	2SA661 (GR or Y)	トランジスタ	
	iC11663	"	2SC1166 (GR or Y)	"	
	iC13455	"	2SC1345 (E or F)	"	
	iE00004	FET (field effect transistor)	2SK30A (K,L or M)	電界効果 トランジスタ	
	LB30013	Connector socket	3P	3Pコネクタ ソケット	
	LB60028	"	6P	6Pコネクタ ソケット	
	HT41004	Variable resistor (SV10KR)	B4.7K $\Omega$	ソリッドVR	
⑤	NA06367	Function switch circuit board	#63360	ファンクション スイッチシート	
	KA70042	Lever switch (5 interlocking)	SPZ-5202(S)	5連ピアノスイッチ	Function
	LB60027	Connector plug	6P No.2183-6A	コネクタプラグ	
	LB30012	"	3P No.2183-3A	"	
	LB60030	CIS connector socket	13P	CISコネクタ ソケット13P	
	LB60025	"	9P	" 9P	
	LB40008	"	4P	" 4P	
	LB10016	CIS keying pin		CISキーイング ピン	
⑥	NA06370	Tape monitor switch circuit board	#63390	テープモニター スイッチシート	

Ref. No.	Part No.	Description	Remarks	Common Models
	KA70044	Lever switch (5 interlocking)	5連ピアノスイッチ TAPÉ	
	LB40008	CIS connector 4P	CISコネクタ 4P	
	LB50007	" 5P	" 5P	
	LB60030	" 13p	" 13P	
	LB10016	CIS keying pin	CISキーイング ピン	
⑦	NA06369	Mode switch circuit board #63380	モードスイッチ シート	
	KA70042	Lever switch (5 interlocking)	5連ピアノスイッチ MODE	
⑧	NA06364	Tone volume circuit board #63330	トーンボリューム シート	
	HQ20012	Slide variable resistor, with click 60mm 10K $\Omega$ x 2	スライドボリューム 11点クリック付 TREBLE	
	HQ20011	" 25K $\Omega$ x 2	" BASS	
	LB60028	Connector socket 6P No.2145-6A	コネクタ ソケット	
⑨	NA06365	Tone amp. circuit board #63341	トーンアンプシート	
	FP52733	Tantalum capacitor 33 $\mu$ F 10WV	タンタル固体 コンデンサ	
	FP15610	" 1 $\mu$ F 35WV	"	
	FP15633	" 3.3 $\mu$ F 35WV	"	
	iC13454	Transistor 2SC1345(D or E)	トランジスタ	
	LB60027	Connector plug 6P No.2183-6A	コネクタ プラグ	
	LB40011	CIS connector socket 4P	CISコネクタ ソケット 4P	
	LB60036	" 20P	" 20P	
	LB10016	CIS keying pin	CISキーイング ピン	
⑩	NA06363	Tone control switch circuit board #63321	トーンスイッチ シート	
	KA20014	Lever switch SLA-34301	レバースイッチ TURN OVER DEFEAT	
	LB60037	CIS connector housing 20P	CISコネクタ ハウジング	
	LB40009	" 4P	"	
	LB10019	CIS connector pin	CISコネクタ ピン	
⑪	NA06366	Loudness circuit board #63350	ラウドネスシート	

Ref. No.	Part No.	Description		Remarks	Common Models
	HQ20013	Slide variable resistor	B20K $\Omega$ x 2	スライドVR	LOUDNESS
	HQ20014	"	HB250K $\Omega$ x 2	"	BALANCE
⑫	NA06362	Filter amp circuit board #63310		フィルターアンプ シ	
	FP13622	Tantalum capacitor	2.2 $\mu$ F 16WV	タンタル コンデンサ	
	FP15610	"	1 $\mu$ F 35WV	"	
	FP15622	"	2.2 $\mu$ F 35WV	"	
	iC13454	Transistor	2SC1345 (E or D)	トランジスタ	
	iE00002	FET (field effect transistor)	2SK30A (GR)	電界効果 トランジスタ	
	LB60027	Connector plug	6P No.2183-6A	コネクタプラグ	
	LB30012	"	3P No.2183-3A	"	
⑬	NA06361	Filter switch circuit board #63301		フィルタースイッチ シ	
	KA20016	Lever switch	SLA-32301	レバースイッチ	TREBLE
	KA20014	"	SLA-34301	"	BASS
	LB30013	Connector socket	3P No.2145-3A	コネクタ ソケット 3P	
	LB60028	"	6P No.2145-6A	" 6P	
⑭	NA06359	Mic volume circuit board #63281		マイクVRシート	
	HQ20015	Slide variable resistor	60mm C-50K $\Omega$	スライドVR	INPUT GAIN
	HQ20016	"	" B10K $\Omega$	"	OUTPUT GAIN
	KA60011	Micro switch	AM6220-44	マイクロスイッチ	MIC SW.
	AA07533	Micro switch holder		マイクロスイッチ ホルダー	
	AA07534	Micro switch lever		マイクロスイッチ レバ	
	AA07535	"		"	
	LB30012	Connector plug 3P	No.2183-3A	コネクタプラグ 3P	
	LB60027	" 6P	No.2183-6A	" 6P	
⑮	NA06360	Mic amp circuit board #63291		マイクアンプ シ	
	FP14610	Tantalum capacitor	1 $\mu$ F 25WV	タンタル コンデンサ	
	iC13454	Transistor 2SC1345 (C or D)		トランジスタ	

Ref. No.	Part No.	Description			Remarks	Common Models
	LB60028	Connector socket	6P No.2145-6A	コネクターソケット 6P		
	LB30013	"	3P No.2145-3A	" 3P		
⑩	NA06358	Rear panel circuit board	#63271	リアパネル シ		
17	KA40021	Slide switch	SL222B4	スライドスイッチ	COUPLER	
18	KA40020	"	SL243B4BM	"	PHONO IMP	
19	LB10014	Pin jack	S-Q3061	ピンジャック		
⑳	NA06401	Main amp circuit board	#62815	メインシート	except European model	
	NA06402	"	"	"	European model	
	HZ00021	Cement molded resistor (fireproof)	4.7Ω 1W	不燃性抵抗		
	HL31410	Metal oxide resistor	10Ω 1W	酸化金属抵抗		
	HL31647	"	4.7KΩ	"		
	HL31656	"	5.6KΩ	"		
	HM55247	Cement resistor	0.47Ω 5W	セメント抵抗		
	HM55410	"	10Ω 5W	"		
	FM22622	Bipolar electrolytic capacitor	2.2μF 25WV	バイポーラ コンデンサ		
	FM11747	"	47μF 50WV	"		
	HT41015	Variable resistor (SR29R)	B4.7KΩ	可変抵抗器		
21	GD90005	Coil	3μH	空芯コイル		
	iA05612	Transistor	2SA561(Y)	トランジスタ		
	iA05662	"	2SA566(B or C)	"		
	iA05720	"	2SA572(W-4.5)	"		
	iC04583	"	2SC458(C)	"		
	iC06802	"	2SC680(B or C)	"		
	iC07342	"	2SC734(Y)	"		
	iC11242	"	2SC1124(-2)	"		
	iA07471	"	2SA747 (O) or (Y)	"		
	iC11161	"	2SC1116 (O) or (Y)	"		
	iE00002	FET (field effect transistor)	2SK30A GR	電界効果 トランジスタ		
	iF00004	Diode	ISI555	ダイオード		
	iF00003	"	10D-1	"		



Ref. No.	Part No.	Description		Remarks	Common Models
	LB30011	Transistor socket	S2-110B-00	トランジスタソケット	
	LB20057	Fuse holder pin		ヒューズホルダーピン	
	BB06308	Transistor pusher		トランジスタえ	
22	BA06487	Heat sink		放熱板	
	KB00110	Fuse (UL listed SS-2)	5.0A 250V	ヒューズ	except European model
	KB00059	Miniature fuse	5.0A 250V	"	European model
	HZ00057	Fuse resistor	68Ω 85mA	ヒューズ抵抗	
	HZ00060	"	680Ω 25mA	"	
23	NA06357	Power supply circuit board	#63263	電源シート	
	HL31527	Metal oxide resistor	270Ω 1W	酸化金属抵抗	
	HL31682	"	8.2KΩ "	"	
	HL32468	"	68Ω 2W	"	
	HL32633	"	3.3KΩ "	"	
	HL33410	"	10Ω 3W	"	
	HZ00030	Fuse resistor	3.9Ω 1W	ヒューズ抵抗	
	HZ00026	"	10Ω ½W	"	
	HZ00015	"	47Ω "	"	
	HZ00014	"	220Ω "	"	
	FM10810	Bipolar electrolytic capacitor	100μF 6.3WV	バイポーラコンデンサ	
	FM11610	"	1μF 50WV	"	
	iF00004	Diode	ISI555	ダイオード	
	iH00003	"	10D-1	"	
	iH00008	"	10DC-1	"	
	iH00009	"	10DC-1R	"	
	iH00005	"	10DC-2	"	
	iH00013	"	10DC-2R	"	
	iF00002	"	SD-46	"	
	iF00032	Zenner diode	WZ-061	ツェナーダイオード	
	iF00028	"	WZ-210	"	
	iF00022	"	WZ-310	"	
	iA05612	Transistor	2SA561(Y)	トランジスタ	
	iA05720	"	2SA572(W-4.5)	"	
	iA06739	"	2SA673(B or C)	"	
	iA06719	"	2SA671(B or C)	"	
	iA06820	"	2SA682(Y)	"	
	iC04583	"	2SC458(C)	"	

Ref. No.	Part No.	Description		Remarks	Common Models
	iC04586	"	2SC458LG(D)	"	
	iC10613	Transistor	2SC1061(C)	トランジスタ	
	iC10618	"	2SC1061(B or C)	"	
	iC12139	"	2SC1213(B or C)	"	
	iC13454	"	2SC1345(D or E)	"	
24	KC00008	Relay	HC-2P	リレー	
	iH00021	Diode	S5151	シリコンダイオード	
	iH00022	"	S5151R	"	
25	BA06161	Heat sink		放熱板	
②⑥	NA06371	L.E.D. circuit board	#63400	L. E. D. シート	
	iF00029	Light emitting diode	TLR-102	発光ダイオード	
	CB06896	Indicator holder		インジケータホルダー	
	CB06944	Plastic rivet		プラスチックリベット	
27	NB06754	Front panel assembly		パネルユニット	
	NB06756	Dial scale panel unit		目盛板ユニット	
28	NB06757	Dial pointer unit		ダイヤル指針ユニット	
29	CB06863	Cord stopper (small)		コードストッパー	
30	CB00441	" (larger)		"	General, U.S. & Canadian models South African, Australian & European models
31	CB06942	Pulley for variable capacitor		バリコンプリー	
32	CB06599	Pulley		滑車	
	CB06829	Meter frame		メーター枠	CR400
33	CB06893	Knob (lever switch)		レバースマミ	
34	CB06930	Knob (slide volume)		スライドVRマミ	
35	CB06931	Knob (change lever)		切換レバマミ	
36	BA06446	Knob (volume)		ツマミ	CA-1000
37	BA06486	Knob (tuning)		チューニングマミ	
	BA06490	Dial scale panel		ダイヤル目盛板	
	AA07038	Dial spring		ダイヤルスプリング	
38	AA07363	Meter holder spring		メーター押えバネ	
39	GA60584	Power transformer		電源トランス	
40	FZ00014	Electrolytic capacitor	10000 $\mu$ F 63WV	電解コンデンサ	
41	GE30007	Balun transformer		バルントランス	
42	LA00110	Antenna terminal	3P	アンテナ端子	
43	LA00107	Ground terminal		アース端子	CA1000
44	LA00111	Push terminal (4PD)		4PD型プッシュターミナル	
45	LA00101	Terminal	3P	中継端子台3P	

Ref. No.	Part No.	Description		Remarks	Common Models
46	LB30007	Phone jack	JH5020K	ホーンジャック	
47	LB20016	F type receptacle	F-61A	F型レセプタクル	except European model
	LB20015	Connector socket for 75Ω coreaxial cable		75 Ω 同軸コネクタースocket	European model
48	LB20030	AC socket		A C コンセント	
49	LB20025	Voltage selector		電圧切換器	
50	LB20048	Fuse holder		ヒューズホルダー	except European model
	LB20047	"		"	Canadian model
51	LB20059	"	FEB031-1401	"	European model
	CG06026	Dial panel		ダイヤルパネル	
52	JB00009	Lead type lamp	12V60mA	リード式パイロットランプ	
53	JB00023	"	"	"	CA1000
54	Ji00019	Tuning meter		チューニングメーター	
55	Ji00020	Signal meter		シグナルメーター	
56	HS12038	Variable resistor	A100KΩ x 2	可変抵抗器	
57	KA20010	Lever switch	JL-04	電源スイッチ	except European model
	KA20011	"	JL-08	"	European model
	KB00042	Fuse	250V 2.5A	ヒューズ	General, South African & Australian models
	KB00110	" (SS-2)	" 5A	"	U.S. & Canadian models
	KB00087	Lead type fuse	" 5A	"	"
	KB00066	Miniature fuse	" 400mAT	"	Canadian model
	KB00069	Miniature fuse	" 2.5AT	"	European model
58	3200127005000	Outside case		外箱	
59	CB06889	Slip fitting		脚	
	NB06678	Service pad		サービスパッド	
	FZ00009	Complex part		複合部品	U.S. & Canadian models

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