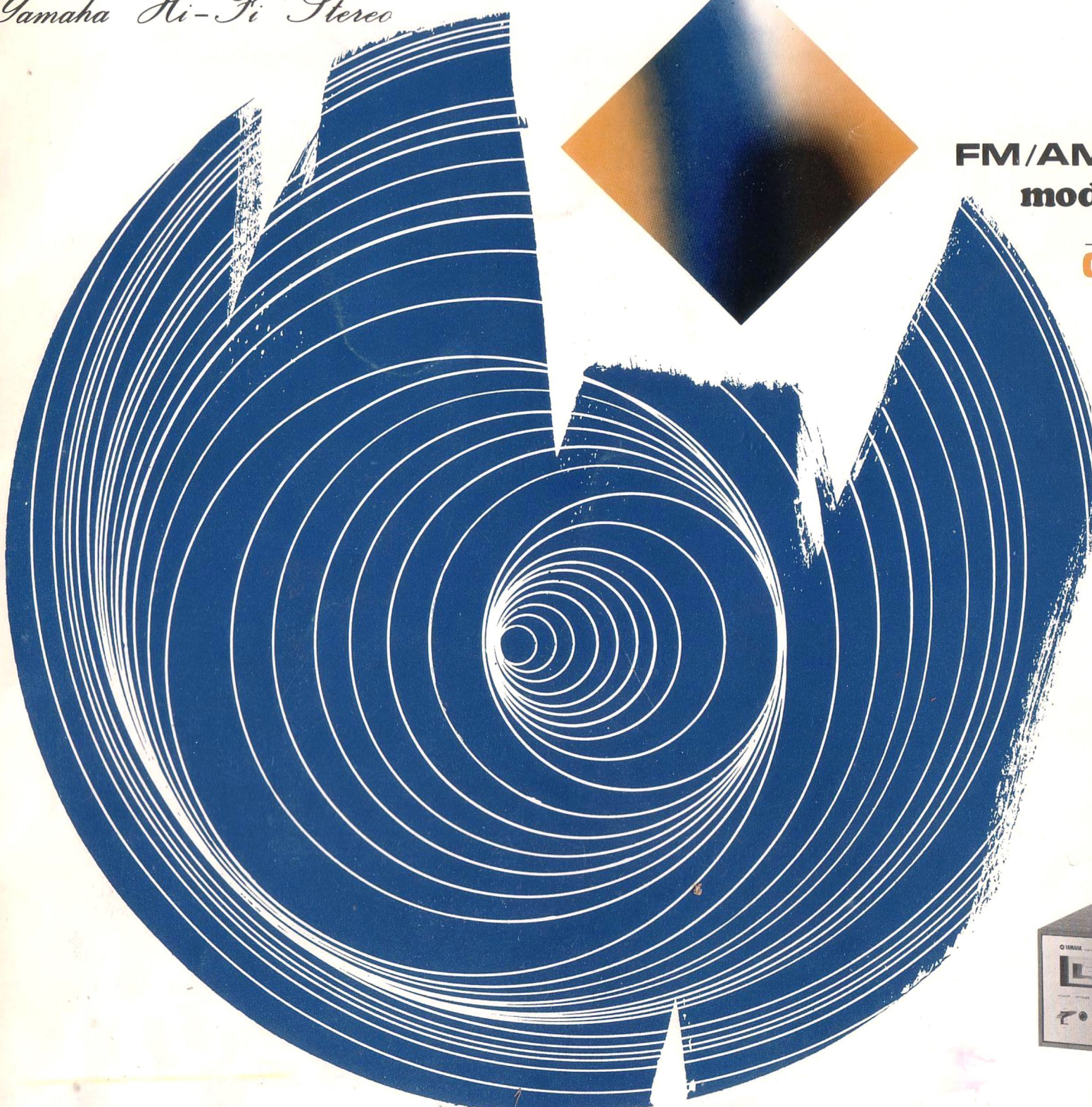
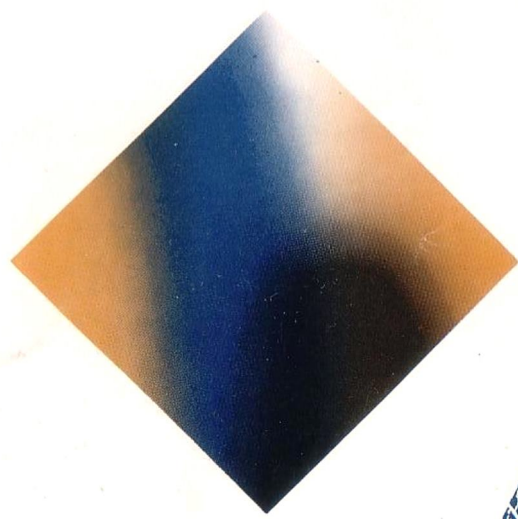


*Yamaha Hi-Fi Stereo*



**FM/AM RECEIVER**  
**model CR-400**  
**Owner's Manual**



# CONTENTS

## PLEASE READ THIS FIRST!

You may seriously damage any transistorized audio unit by being careless when you first operate it. Carelessness is the major cause of audio repairs. Avoid disappointment by following the precautions listed below BEFORE you attempt to plug in or operate your CR-400.

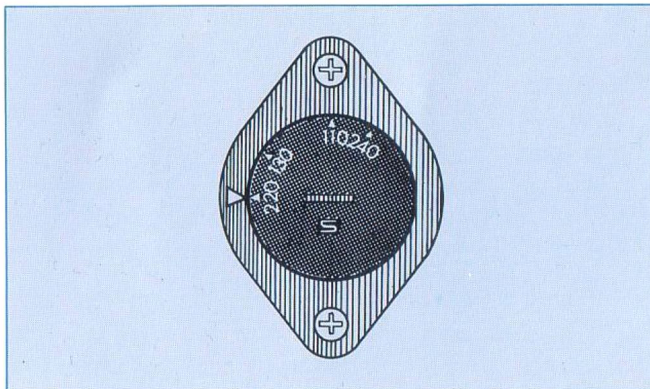
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## PRECAUTIONS

- Don't place your unit in direct sunlight or near a source of heat. Heat can damage transistors.
- Don't force the knobs or switches, especially those for the digital clock.
- Don't place your CR-400 close to the right side of your turntable. This can cause hum.
- Don't use speakers of impedance rating lower than 8 ohms.
- Don't plug this unit into the wall AC outlet unless the power switch is off.
- Don't connect any other equipment (speakers, turntables, tape recorders, etc.) unless the power switch is off.
- Don't turn on the power switch unless speakers are properly connected and the volume control is set at minimum.
- Don't locate your turntable close to, or immediately in front of your speakers.
- Do make sure there is clearance above, below and behind your unit for air circulation.
- Do protect the set from dampness, dust and shocks.

If your stereo has a Voltage Selector, before you plug in the AC supply, please check that it is set to your local current.

If not properly set, turn the knob to the correct position. Voltage settings: 110, 130, 220, 240V (150, 260V are not used).



## CHECKING THE SOUND

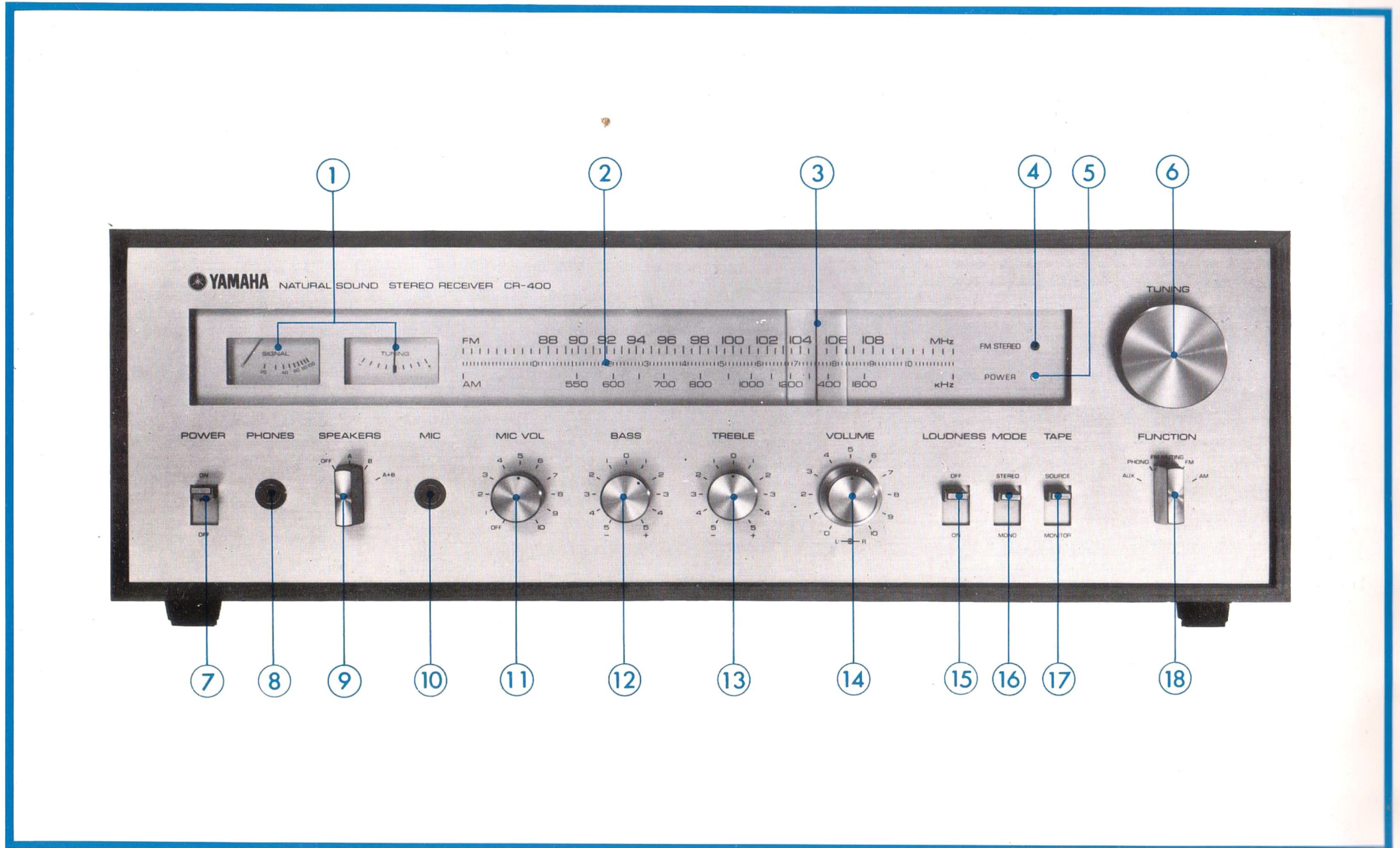
First connect a pair of 8 ohm speaker systems to the SPEAKERS A jacks on the rear panel. Be careful to connect (+) and (-) speaker terminals to the proper jacks. If not, the speakers will be "out of phase" and an apparent loss of bass and channel separation will ensue.

Next, connect the FM ribbon antenna to the "300" FM antenna terminals. Then set the controls as follows:

Speakers: A; Mic, Volume: Off; Bass, Treble & Volume: 0; Loudness: Off; Mode: Stereo; Tape: Source; Function: FM.

Now switch on the power and tune across the dial for the strongest FM station (indicated by the swing of the Signal meter needle to the right) which is broadcasting in stereo (indicated by the FM Stereo lamp). Center in on the station watching the Tuning meter. Then turn up the volume and adjust the balance with its inner and outer sections if necessary.

# FRONT PANEL CONTROLS & FUNCTIONS



**① Signal and Tuning Meters**

These meters let you tune in a station with perfect precision. Both are used for FM broadcasts, while only the signal meter is needed for AM. If the signal meter does not indicate more than 20 when a strong station is tuned in it means that the signal from the antenna is too weak. Refer to the section on Antenna Connection (p. 10) and correct.

**② Dial**

Indicates the station frequency. The top figures are for FM, the bottom for AM.

**③ Dial Indicator**

Moves as the tuning knob is turned. The red line shows the exact frequency of the signal being received.

**④ FM Stereo Indicator**

This lamp automatically lights when an FM stereo signal is being received. If the FM signal is monophonic, the lamp will go out.

**⑤ Power Lamp**

Reminds you that the power switch is on.

**⑥ Tuning Knob**

Select a station by turning this knob slowly to the left or right while watching the appropriate meter(s) for perfect alignment.

**⑦ Power Switch**

Turn the CR-400 power on when switched.

**⑧ Headphone Jack**

Use this terminal when listening via a set of stereo headphones (see p. 14).

**⑨ Speaker Selector Switch**

This selector lets you choose either one or both of the sets of speakers connected to the terminals on the rear panel (see p. 9).

**⑩ Mic Jack**

If you use a microphone, plug it into this jack.

**⑪ Mic Volume Control**

Controls the input volume from a microphone connected to the jack. Turning to the right increases the volume. When no microphone is used the control should be turned all the way to the left to OFF (see p. 13).

**⑫ Bass Control**

Turn this knob to the right to accentuate bass tones, to the left to weaken them. The "O" or central setting is the normal position (see p. 6).

**⑬ Treble Control**

Works just like the Bass control, but affects treble tones.

**⑭ Volume Control**

Turn to the right to increase the overall volume. Whenever the power is turned on, or when the function switch is used to change from one mode to another, this control should be turned all the way down (to the left). (See p. 6).

**⑮ Loudness Switch**

At low volume levels the ear's sensitivity to extreme high and low tones diminishes. This switch accentuates both ends of the frequency scale for full-fidelity late-night listening.

**⑯ Mode Switch**

Use this switch to choose between stereo and mono reproduction of stereo signals; also use it to play the right or left channel of a stereo signal through both speakers.

**⑰ Tape Monitor Switch**

Use this switch to monitor the sound from a tape deck connected to the recording/playback terminals (or plug) on the rear panel. Set this switch to TAPE for tape playback, or, with a three-head deck, use it to monitor the just-recorded signal during recording (see p. 12).

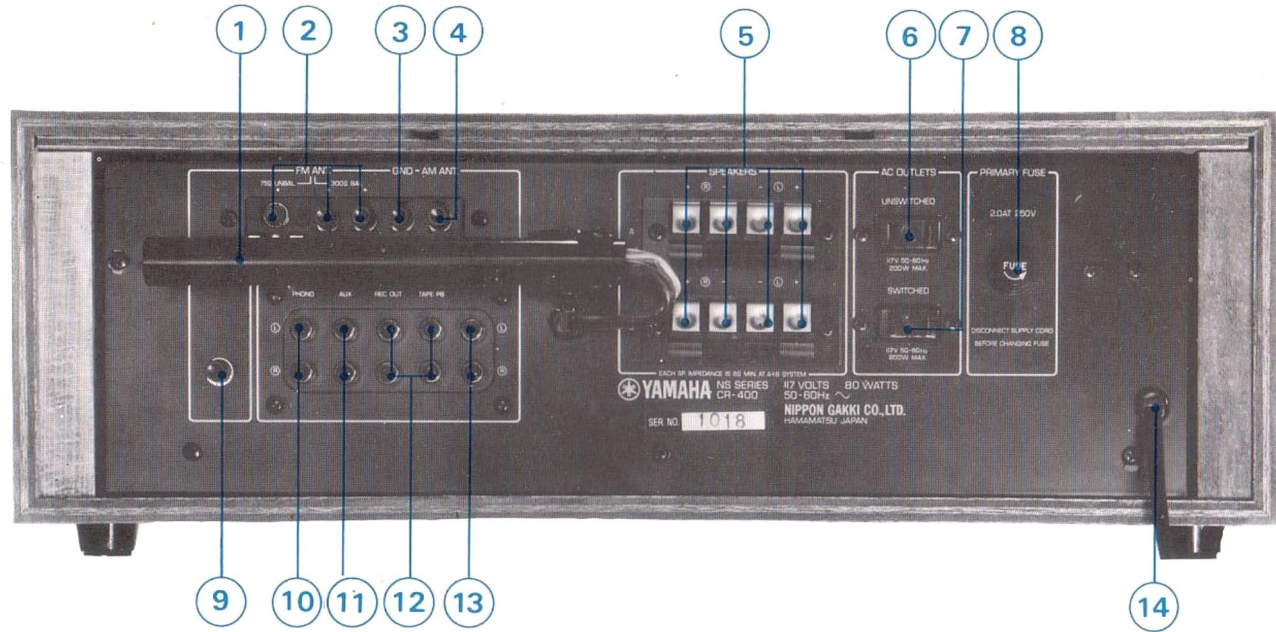
**⑱ Function Switch**

Selects the following programs:

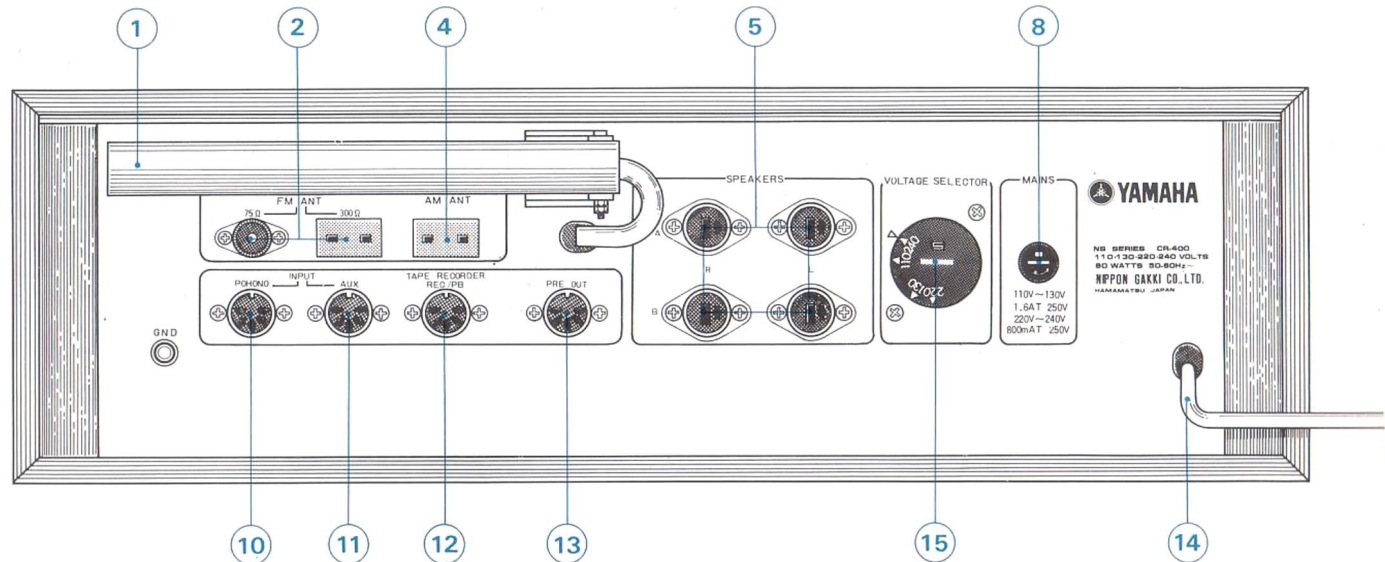
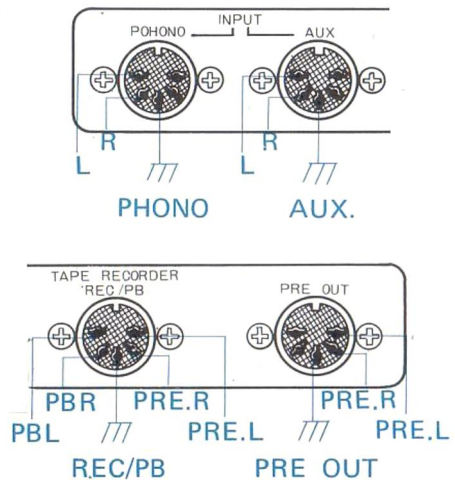
Aux:	(See p. 12)
Phono:	(See p. 11)
FM Muting:	(See p. 11)
FM:	(See p. 11)
AM:	(See p. 10)

# REAR PANEL PARTS & FUNCTIONS

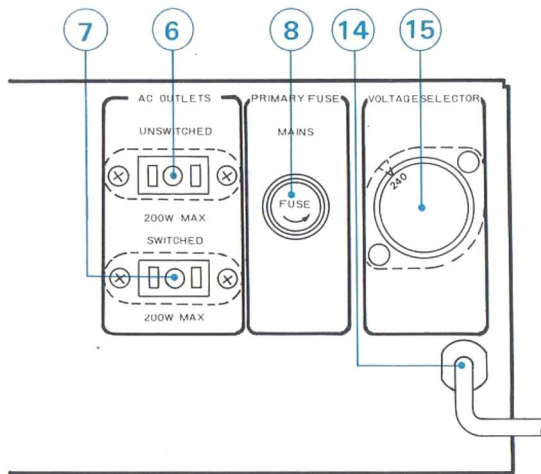
## TYPE A MODEL



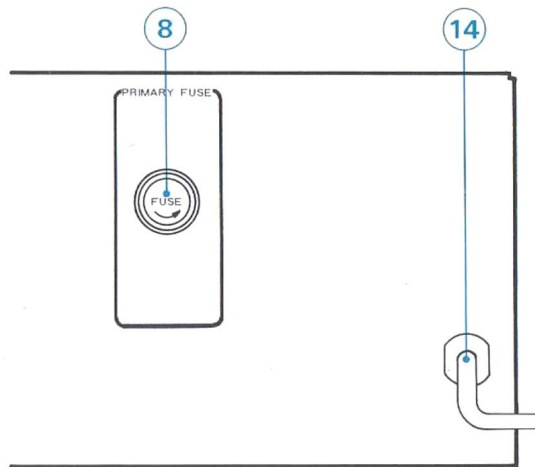
## TYPE E MODEL



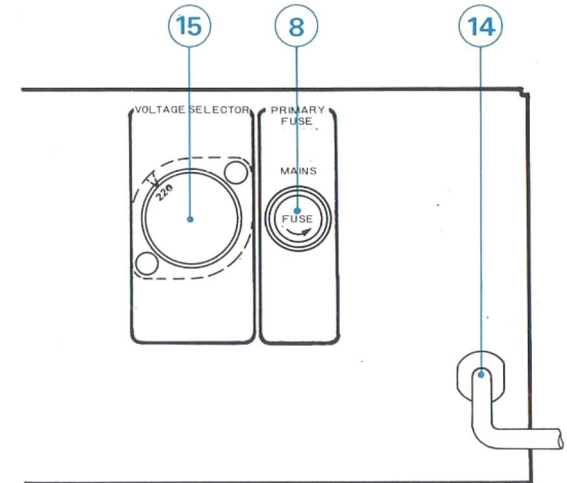
TYPE B MODEL



TYPE C MODEL



TYPE D MODEL



- ① AM Ferrite Bar Antenna (see p. 9 for connection).
  - ② FM Antenna (75Ω, 300Ω FM antenna terminals). See p. 10 for connection.
  - ③ Ground Terminal (see p. 9 for connection).
  - ④ AM Antenna Terminal (see p. 9 for connection).
  - ⑤ Speaker Terminals (see p. 9 for connection).
  - ⑥ Unswitched (AC Power Supply)  
Provides AC supply when the CR-400 is plugged in, regardless of whether the power switch is on or off (maximum allowable power consumption: 200W).
  - ⑦ Switched AC Power Supply  
Provides AC supply only when the CR-400 is both plugged in and the power switch is on (maximum allowable power consumption: 200W).
- Note); The model made to the European specification is partially different in design from that described herein.

- ⑧ Primary Fuse  
Part of the amplifier protection system. If the fuse blows, replace with only a 2.0A fuse (European Model – 1.6A).
- ⑨ Ground Terminal  
Connect the record player ground wire here (see p. 11).
- ⑩ Phono Jacks (see p. 11).
- ⑪ Auxiliary Input Jacks (see p. 12).
- ⑫ Tape Recording/Playback Jacks (see p. 12).
- ⑬ Pre Out Terminals (see p. 13).
- ⑭ AC Cord
- ⑮ Voltage Selector

# VOLUME & TONE CONTROLS

## VOLUME CONTROL

This is a double knob. The inner part is for the left channel, the outer for the right. While they can be turned independently, they are intended to be turned together unless one is purposely held in place. If the red marks on both are lined up, the volume levels for left and right channels are equal. To check that this matches your room, set the mode switch to Mono and then make sure the sound seems to be coming from a point midway between the speakers. If it is not, adjust the volume knob sections until this is achieved. This adjustment is made by turning down the channel that seems to sound the strongest until an apparent balance is reached. See Fig. 1.

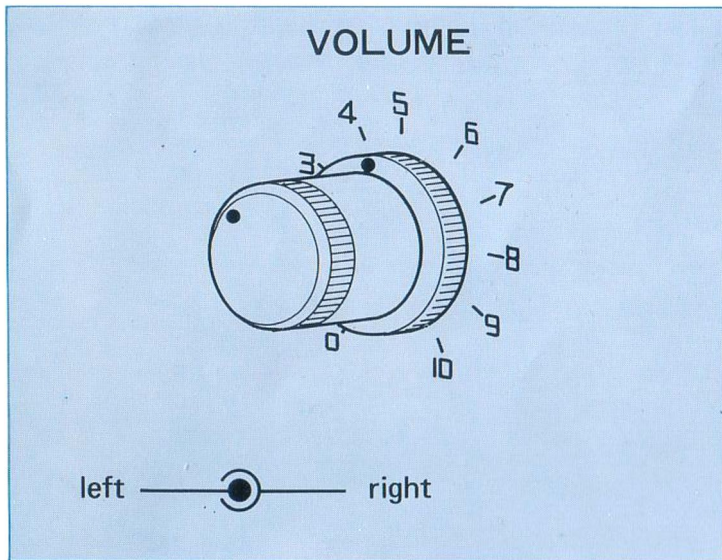


Fig. 1

## TONE CONTROLS

The main purpose of the tone controls is to adjust the sound for the type of tone that suits your listening tastes and the music. This will have to be done by experimenting; there are no rules. But there are other uses for the controls. If you have a great deal of noise or hiss in the background, turn the Treble control farther left than "0" (ie., turn it down). On the other hand, if you are troubled by booming interference or turntable rumble, this can be somewhat corrected by turning the Bass down. These controls can also be used to compensate for tonal characteristics of your room. Some rooms make the high tones too loud, others accentuate the bass. See Fig. 2.

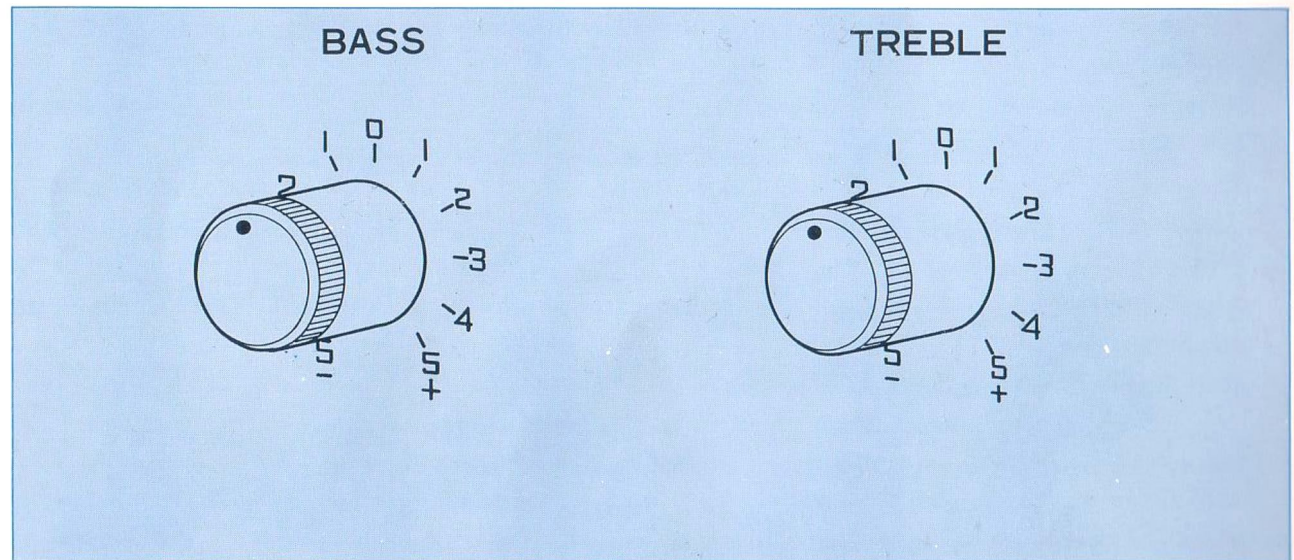
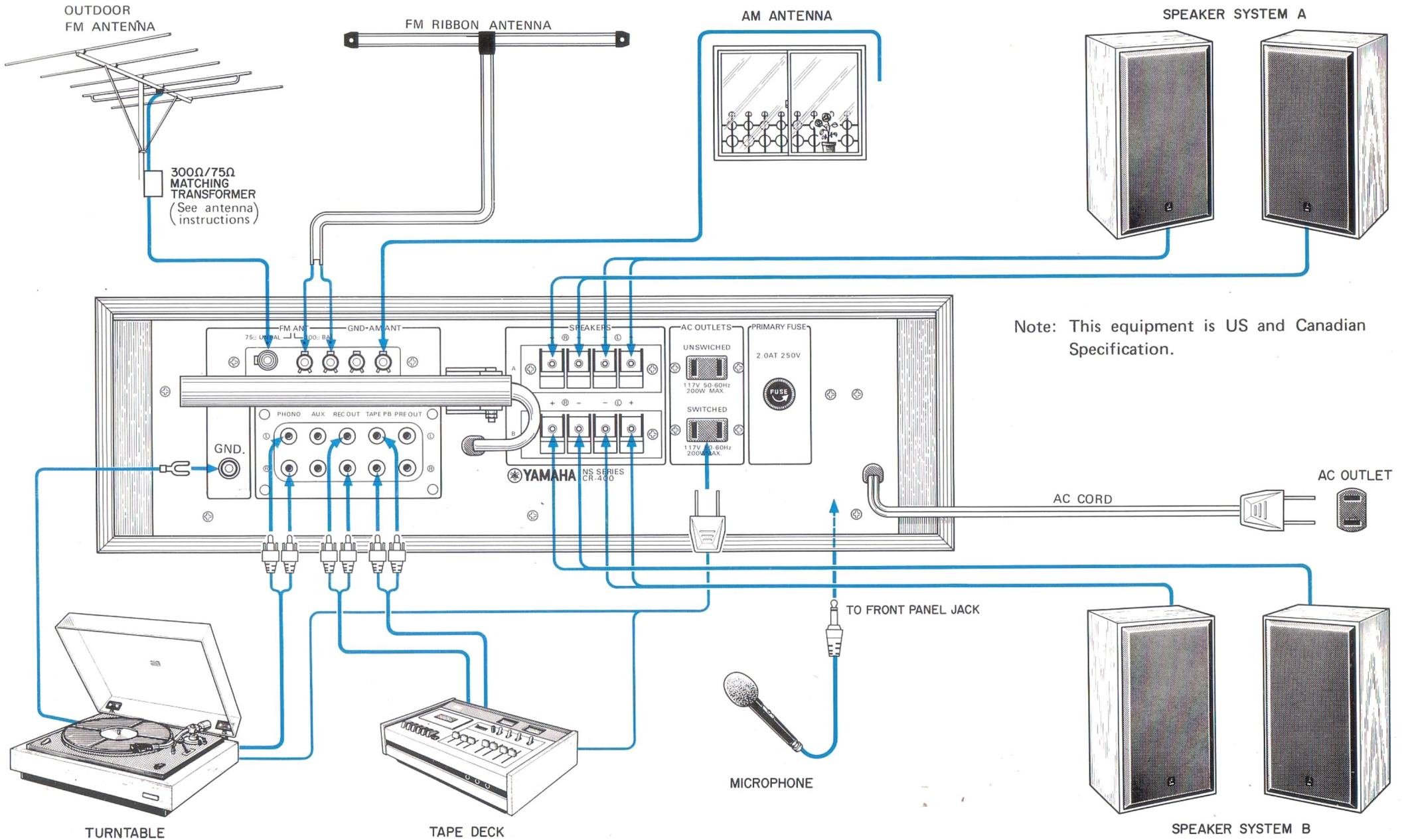
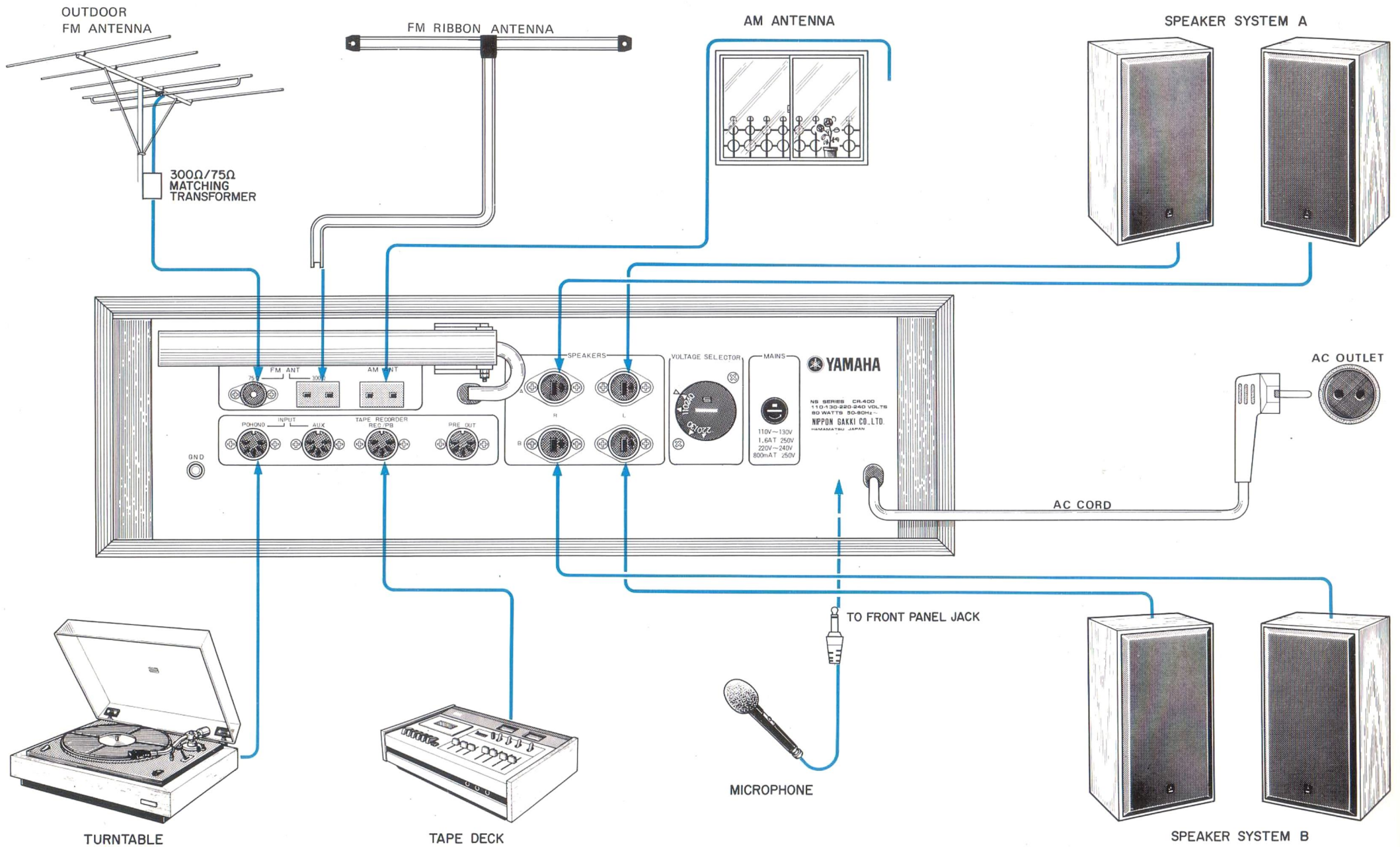


Fig. 2

# CONNECTION DIAGRAM



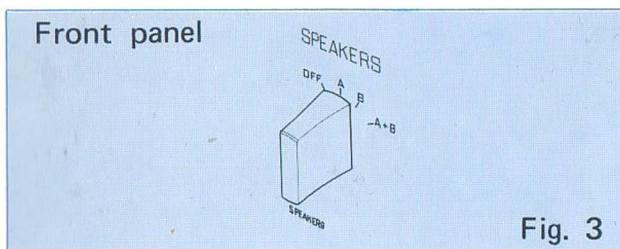
# TYPE E MODEL



# CONNECTION & OPERATION

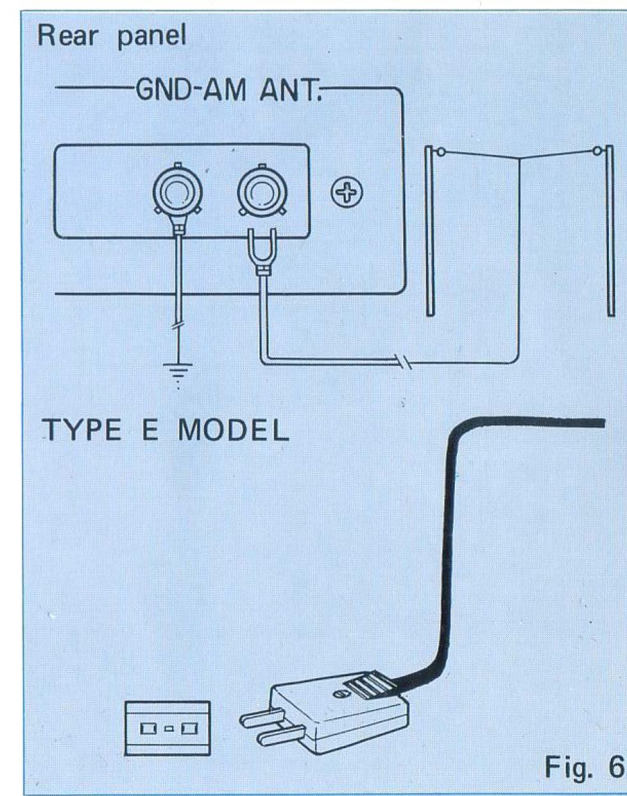
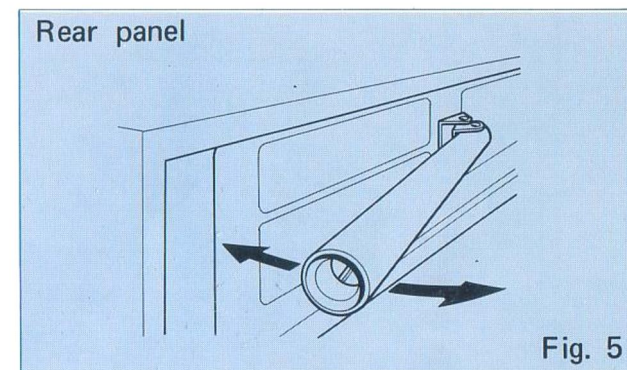
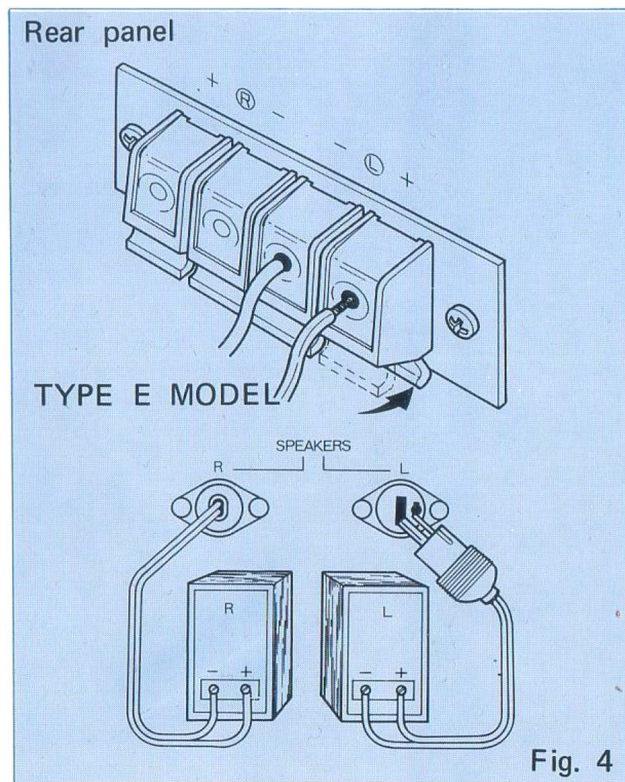
## SPEAKER CONNECTIONS

- There are two sets of speaker terminals on the rear panel for speaker sets A and B.
- Select either system by setting the front panel selector to A or B. In addition, you can listen to both at once by setting to A+B. Do not use speakers with less than  $8\Omega$  impedance. When the selector is set to OFF no sound will come from the speakers. This is the position to use when listening through the headphones only. See Fig. 3.
- When connecting the speakers make sure the speaker to your left as you face them in the listening position is connected to the L terminals. Also make sure the (+) and (-) connections are the same for both speakers or the signals will be out of phase, and you will lose much of the stereo depth.
- As Fig. 4 shows, the speaker terminals are push types. Simply push the lever at the bottom of the terminal, then insert the end of the lead in the hole and hold it there while you release the lever. The lead will be firmly held in place. Use the red lead for the (+) terminal.



## AM ANTENNA CONNECTION

A high-performance ferrite bar antenna is built into the rear panel. For optimum reception tune in a strong AM station, then adjust the angle of this antenna while watching for maximum deflection of the signal meter. See Fig. 5. Inside a ferro-concrete structure, or in a weak signal area, however, this antenna may not be enough. In that case install an AM lead antenna as shown in Fig. 6. The use of an AM lead antenna also requires a ground connection.



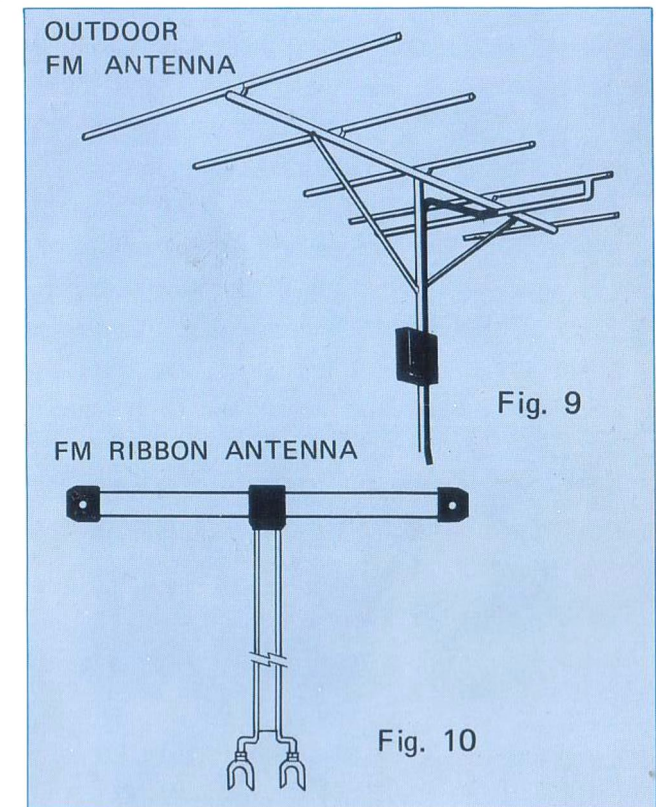
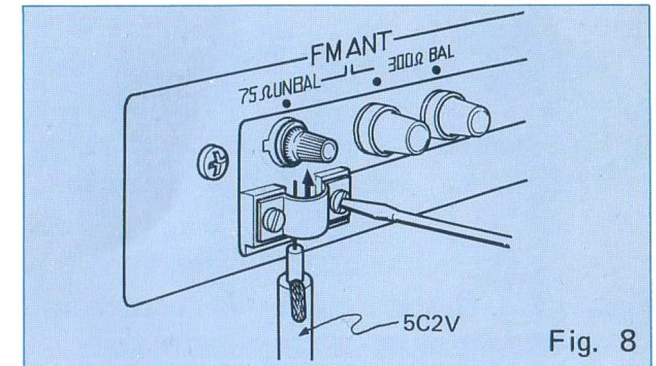
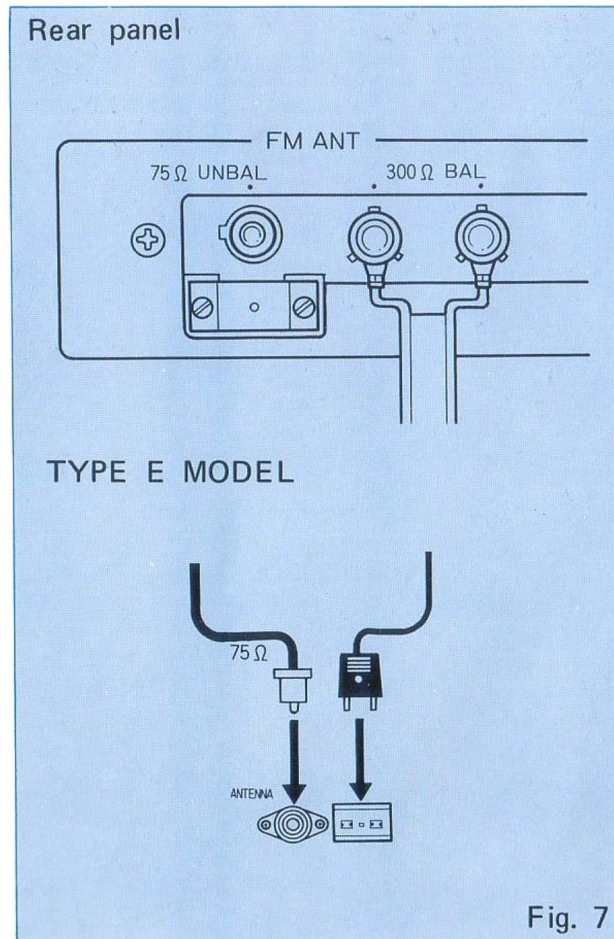
## FM ANTENNA CONNECTION

The T-shape ribbon antenna included among the accessories is for FM reception. It is usually sufficient for strong signal areas, but in a weak signal area an outdoor FM antenna will improve reception.

This set has two FM antenna terminals, for  $300\Omega$  and  $75\Omega$  input. The ribbon antenna should be connected to the  $300\Omega$  terminals as shown in Fig. 7. Then extend it and fix its location by tacking to a wall, etc. while you have a strong station tuned in and you are watching the tuning meter for maximum signal strength. See Fig. 10. If you use an outdoor antenna, try to find a spot least affected by interference such as that from automobile or motorcycle ignition systems, etc. Connect via a coaxial cable. The cable should be trimmed so that it can be slipped under the clamp (Fig. 8) with the shield wire touching the clamp and the center wire connected to the terminal. Remember that some outdoor FM antennas require matching transformers and some do not; read the antenna owner's manual before connecting. If you use a regular feeder line (TV antenna cord) from the antenna, connect to the  $300\Omega$  terminals. See Fig. 9. It is best, though, to use a coaxial cable no thicker than size 5C2V.

## AM RECEPTION

Turn function selector to AM. Tune in the desired AM station by ear. Maximum deflection of SIGNAL meter (to the right) will indicate most precise tuning of that AM station.



## FM RECEPTION

Turn FUNCTION selector to FM or to FM Muting. First tune in the desired station by ear. For precise tuning, SIGNAL meter will show maximum deflection (to the right), and TUNING meter indicator will be centered. The FM Muting position will cut out unpleasant hiss between FM station, but once you find the station you want, switch to the normal FM position for precise tuning and listening, because the muting circuit also weakens the station signal. The FM Muting position will cut out unpleasant hiss between FM station, but once you find the station you want, switch to the normal FM position for precise tuning and listening, because the muting circuit also weakens the station signal. Do not use the muting position when tuning in weak stations. When the signal received is in stereo the set will automatically play it in stereo and the lamp will light. The lamp will not light for a monaural signal. If you are in a weak signal area and a stereo broadcast just cannot be picked up without a great deal of noise, set the mode switch to Mono. The stereo effect will be lost but the signal will come in stronger. See Fig. 11. If the tuning meter needle position changes while you are listening to a tuned station this is normal. Just retune.

## RECORD PLAYER CONNECTION & OPERATION

Connect the pin plugs from the turntable to the Phono jacks on the rear panel (see Fig. 12). Use the red cord for R, the other for L. Then connect the turntable ground wire to the ground terminal on the panel. Now when the function selector is set to Phono a record can be broadcast through the CR-400.

**Note:** The Phono jacks are for Induced Magnet cartridges only. If your turntable has a crystal or ceramic cartridge, connect it to the Aux jacks instead of the Phono jacks.

- If hum is heard during phono play, check the following:
  - \* Is the player ground wire fully connected to the rear panel terminal? If so, try disconnecting it to see if that makes a difference.
  - \* Is the player signal cord touching or near an AC power cord? They should be separated.

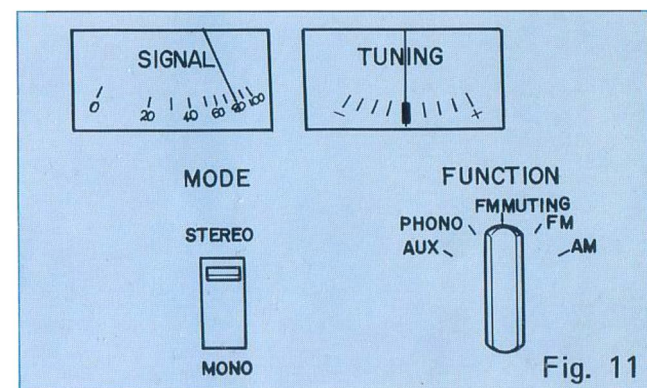


Fig. 11

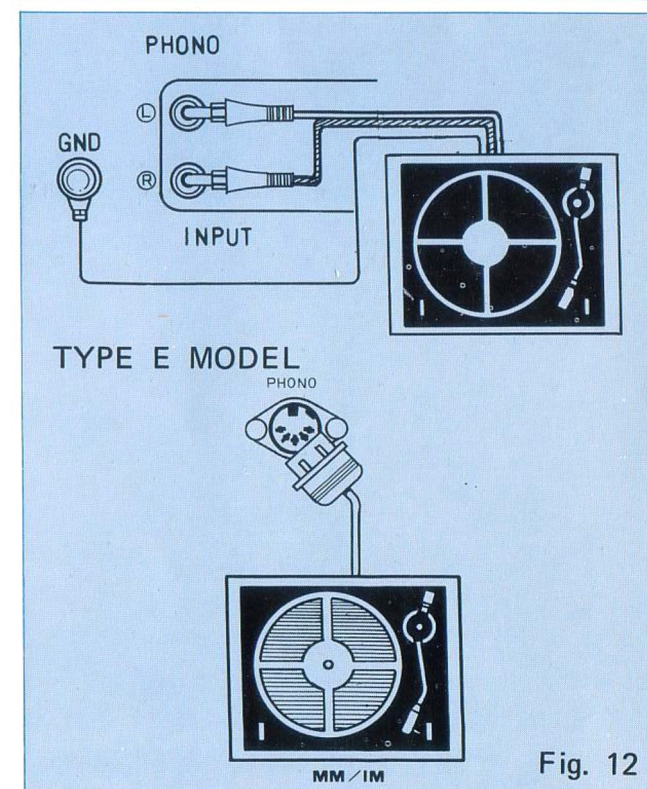


Fig. 12

## TAPE DECK CONNECTION & OPERATION

Connect the tape deck Line Out terminals to the CR-400 rear panel Tape PB terminals, then connect the deck Line In terminals to the rear panel Rec Out. See Fig. 13. If your deck has facilities for a DIN connector, use its plug instead of these terminals.

### ● Playback

Set the Tape Monitor switch to Monitor and then begin tape play. You can now listen via the CR-400. See Fig. 14.

### ● Recording

You can record any signal source coming into the CR-400 amp except microphone sound. If the connected tape deck is a three-head type, you can also monitor the results while recording. See Fig. 14. Remember that the volume and tone settings on the amplifier affect the sound from the speakers and headphones only; they do not affect the signal being recorded. This lets you set for the best listening conditions without spoiling your recording.

## AUX INPUT CONNECTIONS

These jacks are for connecting an 8-track tape player, TV audio signal, etc. They are pin jack types. If the unit is a monophonic type, connect to the left channel jack only. Then when the mode switch is set to Mono the signal will be heard through both speakers. See Fig. 15.

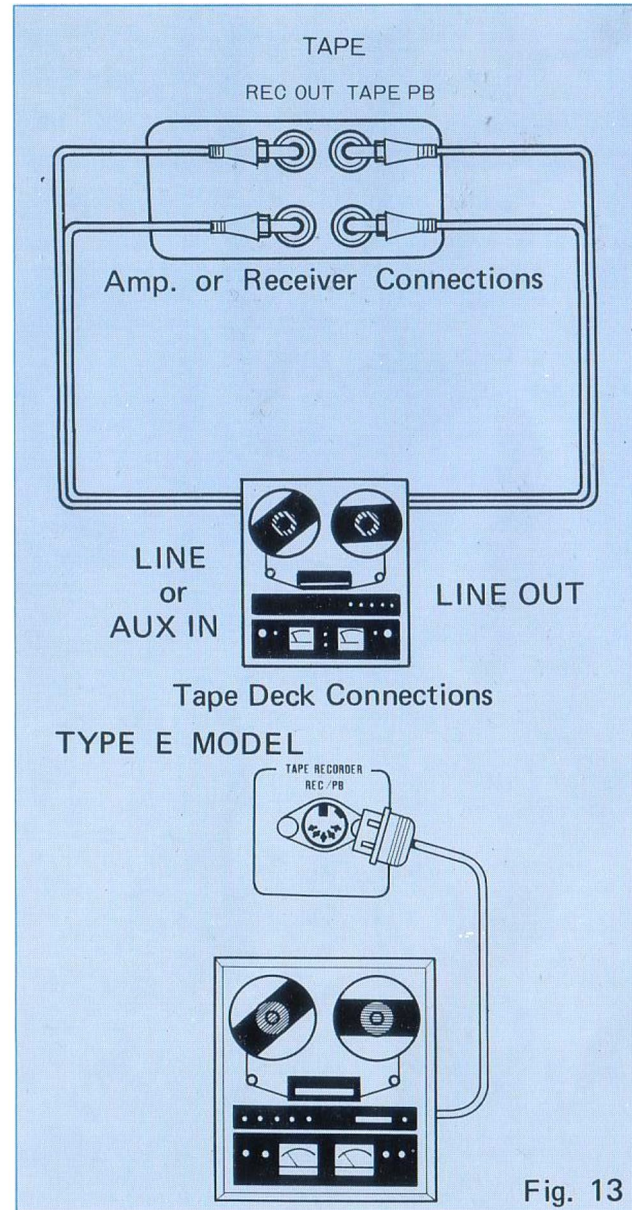


Fig. 13

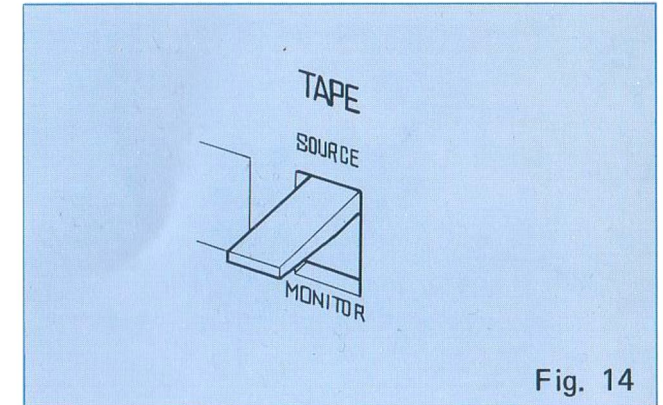


Fig. 14

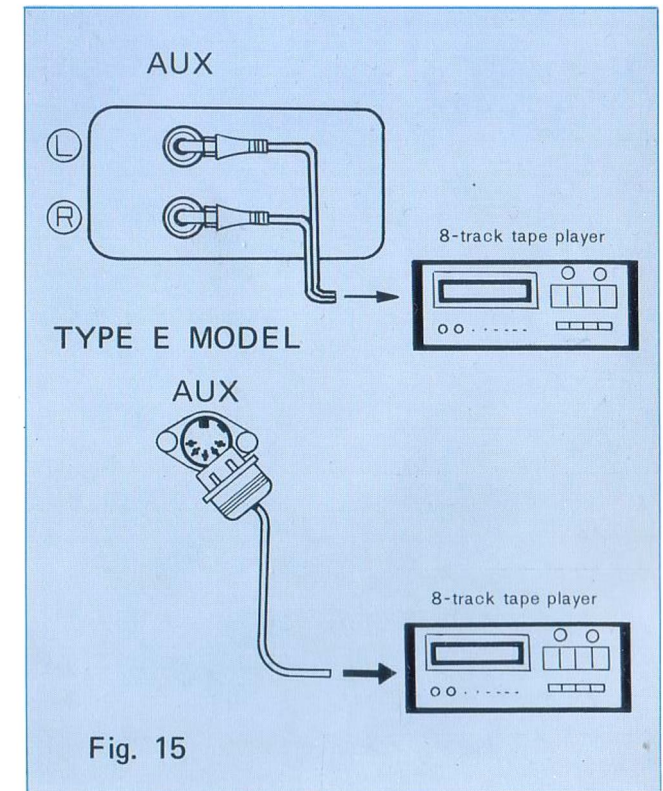


Fig. 15

## MICROPHONE CONNECTION & USE

The CR-400 permits microphone mixing, which lets you play any signal source, then blend in your voice — and even record the results.

### ● Mixing

1. Plug the microphone into its jack on the front panel (any mike impedance from  $200\ \Omega$  to  $50k\ \Omega$  is acceptable). See Fig. 16.
2. Turn the mike volume control a bit to the right and the mike circuit will be switched on. Turn farther to the right to increase the relative volume of the microphone. In case of howling, either reduce the microphone volume or use it somewhere more distant from the front of the speakers. See Fig. 17.
3. The microphone sound is not affected by the volume or tone controls of the amp, or by position of the function selector switch.

### ● Recording Mixed Signals

1. A mixed signal (microphone sound plus any other signal) can be recorded if the tape recorder Line In jacks are connected to the CR-400 Pre Out jacks. If the Rec Out jacks are used instead, only the sound source indicated by the function selector will be recorded, regardless of whether the mike is used at that time or not. See Fig. 18.

2. Note that the recording level of the tape recorder will be affected by the overall amp and mike volume on the CR-400. The volume should be adjusted so that the level meters on the tape deck and the CR-400 move with the same amplitude during loud signal inputs.

### ● Using the Microphone Only

The mike can be used alone by turning the amplifier volume control to minimum. Recording can be done this way too.

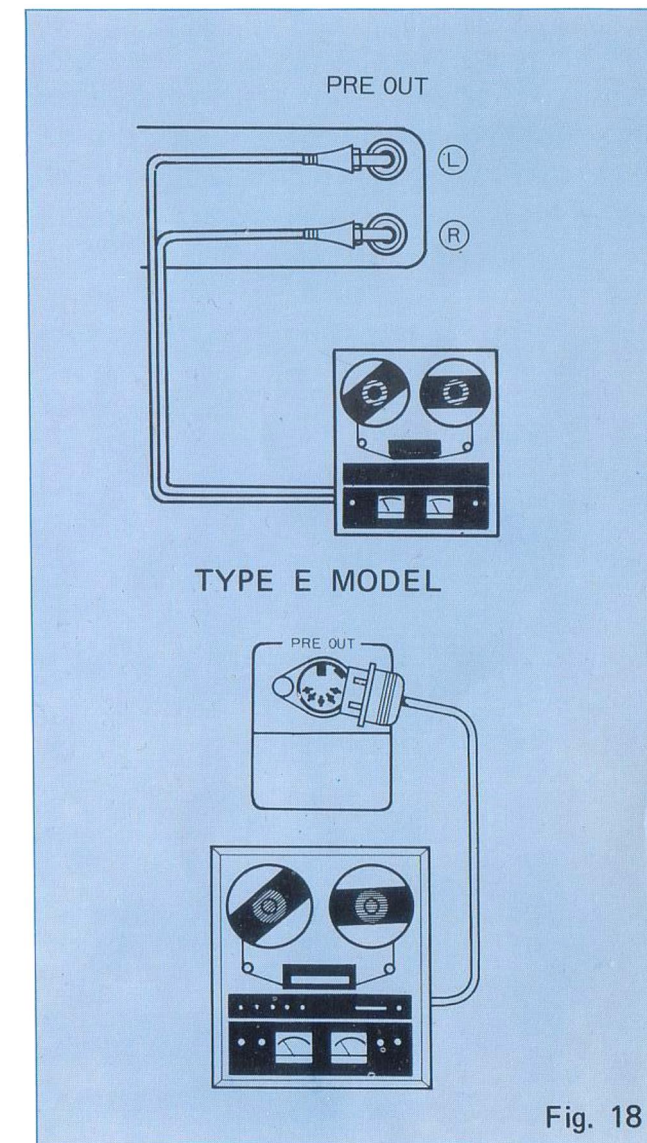
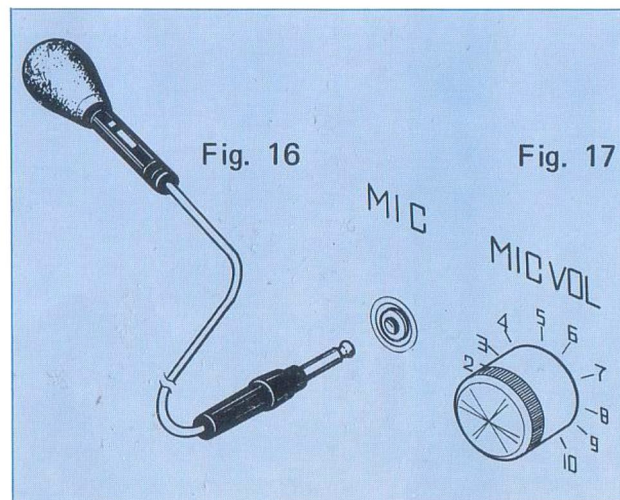


Fig. 18

# HEADPHONE & ACCESSORIES

## HEADPHONE CONNECTION & USE

Plug the headphones into the jack. The speakers will not be shut off. If you want to listen through the headphones only, set the speaker selector switch to OFF. The side of the headphones where the cord is connected produces the left signal. Fig. 19.

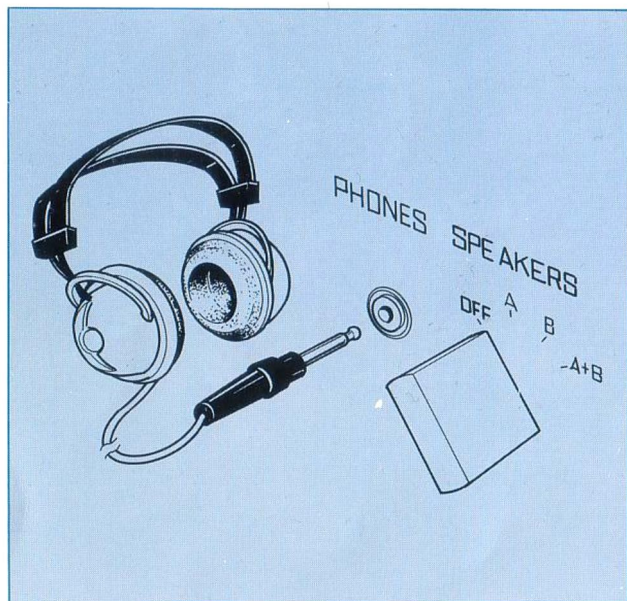


Fig. 19

**CAUTION:** To avoid accidental overload to your headphones, unplug them after each use and return speakers to "ON".

## ACCESSORIES

**Pads:**

Use the pads when another amp, record player, etc. is placed on top of the CR-400. They protect the upper surface from scratches. To use, remove the paper from each pad and stick it to the bottom of the other unit's foot rest (see Fig. 20.)

**Wrench:**

This hexagonal wrench is used to adjust the function and speaker selector settings if they are not lined up with the indications.

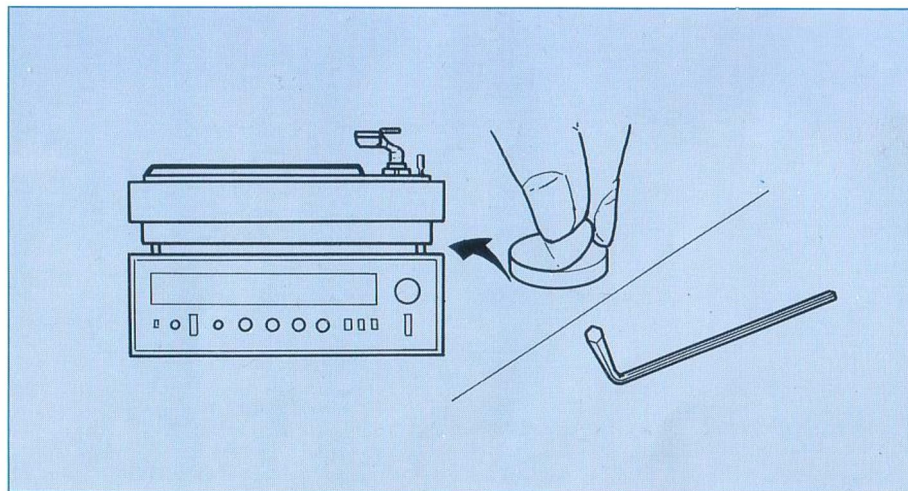


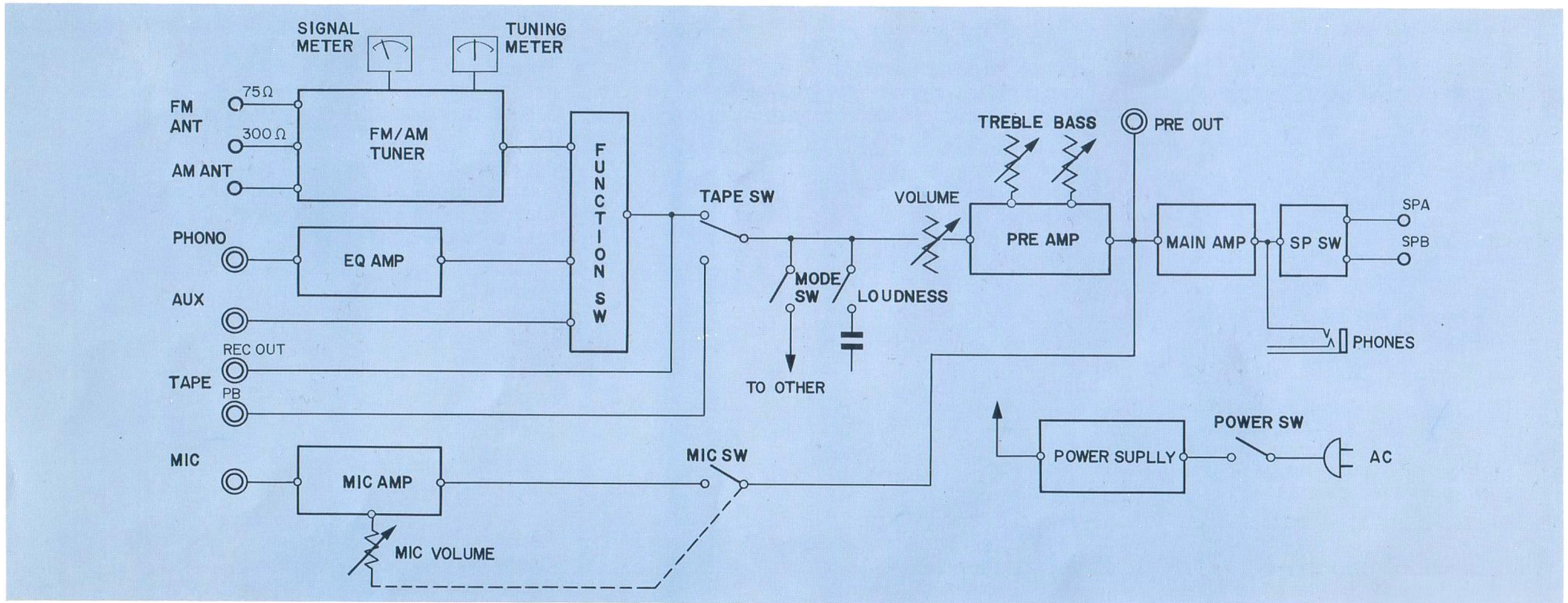
Fig. 20

# TROUBLE SHOOTING

If the unit does not seem to be functioning properly, consult the following chart and make the proper checks. If it still does not work right, contact your Yamaha serviceman.

Problem	Cause	Correction
No power when the switch turned on.	Cord not plugged in. Plug not firmly inserted. Primary fuse blown.	Plug in. Push in firmly. Replace with 2.0A fuse or contact serviceman.
Power is on, but no sound.	Improper speaker connection. Speaker selector switch set to OFF. Tape monitor switch set to Monitor. Improper function selector switch setting. Volume turned too low.	Recheck connections. Turn to A, B or A + B. Set to Source. Set to proper program source. Turn up.
No sound from one channel.	Improper speaker connection. Defective input jack connection. Improper left-right balance setting. Playback from mono tape recorder.	Recheck connections. Recheck connections. Line up red marks on volume knobs. Set mode switch to Mono.
FM Stereo indicator flashes during FM stereo reception.	Improper tuning. Improper antenna or weak signal.	Retune. Check antenna connections. Replace ribbon antenna with more powerful outdoor type.
Noise during FM stereo reception.	A clear FM stereo signal can be received only to within a distance about half that for an FM mono signal.	Install more powerful antenna. Listen in mono mode.
Strange hissing or beeping during FM reception.	Interference from auto or motorcycle ignition.	Make sure to connect with a coaxial cable. Move the antenna farther from the street.
Hum during record play.	Player ground wire disconnected. Improper positioning of player and/or amp. Improper phono connections.	Reconnect firmly. Reposition the units on solid bases. Reconnect firmly.
Sound distortion during record play.	Worn stylus. Improper stylus. Dirty stylus.	Replace. Replace with one that matches the cartridge. Clean.
Howling during record play when volume turned high.	Speakers too close to player.	Separate player and speakers as far as possible. Put a soft, vibration-damping material under the player. Do not place the speaker(s) and player on the same shelf, table-top, etc.

# BLOCK DIAGRAM



NOTE: Diagram shows only one channel. Other channel is similar.

# SPECIFICATIONS

## AUDIO SECTION

### Power Output

Dynamic power (IHF) 76 watts (4 $\Omega$ )  
56 watts (8 $\Omega$ )

### Continuous RMS Power (each channel driven)

24/24 watts (4 $\Omega$ ) at 1,000Hz  
20/20 watts (8 $\Omega$ ) at 1,000Hz

### Continuous RMS Power (both channels driven)

20+20 watts (4 $\Omega$ ) at 1,000Hz  
18+18 watts (8 $\Omega$ ) at 1,000Hz

### Continuous RMS Power (both channels driven)

18+18 watts (4 $\Omega$ ) at 20 to 20,000Hz  
16+16 watts (8 $\Omega$ ) at 20 to 20,000Hz

## TOTAL HARMONIC DISTORTION

### Power Amplifier Only (AUX to Power Amp.)

Less than 0.1% at 1 watt

### Overall (AUX to Power Output)

Less than 0.5% at rated power

## INTERMODULATION DISTORTION

(70Hz : 7,000Hz=4 : 1 SMPTE method)

### Power Amplifier Only (AUX to Power Amp.)

Less than 0.1% (8 $\Omega$ ) at 1 watt

### Overall (AUX to Power Output)

Less than 0.1% (8 $\Omega$ ) at rated output

## POWER BANDWIDTH (IHF, distortion 0.5% const.)

15 to 50,000Hz

## FREQUENCY RESPONSE (at 1 watt)

### Overall (AUX, TAPE PB to Power Output)

20 to 50,000Hz +0.5dB, -3dB

### Overall (MIC to Power Output)

100 to 10,000Hz +0.5dB, -6dB

### Deviation from RIAA (30 to 15,000Hz)

+0.7dB, -0.7dB

## LOAD IMPEDANCE 4 to 16

## DAMPING FACTOR (8 $\Omega$ ) 40 at 1,000Hz

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

Overall from PHONO 50 dB

Overall from AUX, TAPE PB 50 dB

Overall from MIC 50 dB

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

Overall from PHONO better than 72 dB

Overall from MIC better than 65 dB

Overall from AUX, TAPE PB better than 85 dB

Volume at Minimum better than 85 dB

## INPUT SENSITIVITY AND IMPEDANCE

(at rated power, 1,000Hz)

PHONO 3mV (50k $\Omega$ )

### PHONO Max. Input Capability

135mV (T.H.D. 0.5%)

MIC 3mV (50k $\Omega$ )

### MIC Max. Input Capability

450mV (T.H.D. 0.3%)

AUX 150mV (100k $\Omega$ )

TAPE PB 150mV (100k $\Omega$ )

## OUTPUT LEVEL AND IMPEDANCE

(at rated power, 1,000Hz)

TAPE REC OUT 150mV (10k $\Omega$ )

PRE OUT 200mV (3k $\Omega$ )

## TONE CONTROLS

BASS +10dB, -10dB at 50Hz

TREBLE +10dB, -10dB at 10,000Hz

## LOUDNESS CONTROL

+8dB at 100Hz, +4dB at 10,000Hz

## TUNER SECTION

### FM:

Tuning Range 88 to 108MHz

Usable Sensitivity (IHF) 2.5 $\mu$ V

Image Frequency Rejection 55 dB

IF Rejection 75 dB

Spurious Response Rejection 75 dB

AM Rejection 50 dB

Capture Ratio 2.0 dB

Alternate Channel Selectivity (IHF) 65 dB

Signal-to-Noise Ratio 68 dB

### Total Harmonic Distortion

MONO 0.3% at 400Hz

STEREO 0.8% at 400Hz  
Stereo Separation 40dB at 400Hz  
25dB at 50 to 10,000Hz

Frequency Response  
+1.0dB, -1.0dB at 50 to 10,000Hz  
+1.5dB, -3dB at 20 to 15,000Hz

Sub-Carrier Suppression 40 dB

Muting Override Signal level 10 $\mu$ V

Antenna Impedance 300 $\Omega$  balanced  
75 $\Omega$  unbalanced

### AM:

Tuning Range 525 to 1,605kHz

Usable Sensitivity (IHF) 52dB/m

Signal-to-Noise Ratio 43dB at 80dB/m

Image Frequency Rejection 45dB at 1,000kHz

Selectivity 25dB at 1,000kHz

IF Rejection 40dB at 1,000kHz

## GENERAL

### Semiconductors

4 IC's; 3FET's; 38 Transistors;  
2 LED's; 22 Diodes; 1 Zener Diodes

Power Source AC100, 110, 117, 130, 220, 240V,

Power Consumption 50/60HZ

Max. 130 watts

Rated 80 watts

### AC Outlets

Switched 1 (200 watts)

Unswitched 1 (200 watts)

Dimensions 444mm (17 1/2")Wx158mm (6 1/4")H  
x300mm (11 3/4")D

Weight 9.5kg (20.9 lbs)

Design and specifications subject to change without notice for improvements.

SINCE 1887



**YAMAHA**

NIPPON GAKKI CO.,LTD. HAMAMATSU, JAPAN

AOM20

3J30 CR-400 Y.A.



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