

YAMAHA TX-470

*Natural Sound AM/FM Stereo Tuner
40 Station Random Access Preset Tuning
Automatic Preset Tuning for FM Stations
Multi-Status Station Memory
Rotary Encoder Tuning
Direct PLL Synthesizer Tuning*

Thank you for selecting this YAMAHA stereo tuner.



OWNER'S MANUAL

CONTENTS

Safety Instructions	2
Supplied Accessories	3
Connections.....	4
Tuning Operations	7
Preset Tuning.....	9
Troubleshooting	11
Specifications	12

IMPORTANT!

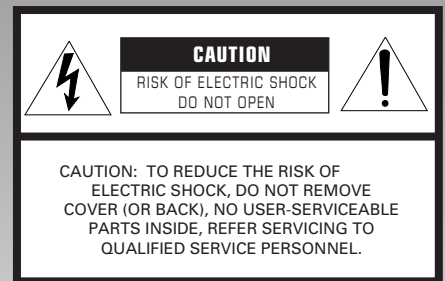
Please record the serial number of this unit in the space below.

Model:
Serial No.:

The serial number is located on the rear of the unit.
Retain this Owner's Manual in a safe place for future reference.

WARNING

TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE.



• Explanation of Graphical Symbols




The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert you to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



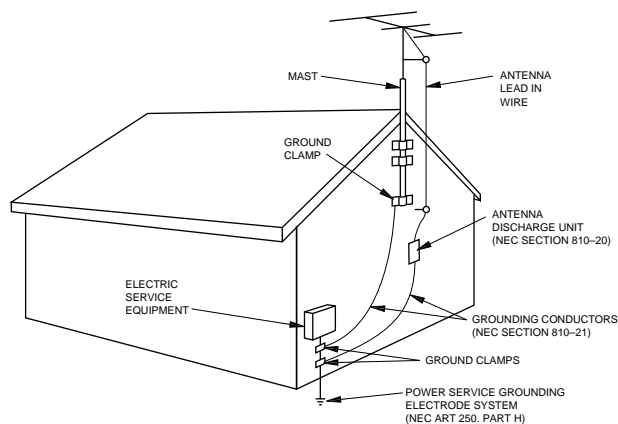
The exclamation point within an equilateral triangle is intended to alert you to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

SAFETY INSTRUCTIONS

- 1 Read Instructions – All the safety and operating instructions should be read before the unit is operated.
- 2 Retain Instructions – The safety and operating instructions should be retained for future reference.
- 3 Heed Warnings – All warnings on the unit and in the operating instructions should be adhered to.
- 4 Follow Instructions – All operating and other instructions should be followed.
- 5 Water and Moisture – The unit should not be used near water – for example, near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool, etc.
- 6 Carts and Stands – The unit should be used only with a cart or stand that is recommended by the manufacturer.
- 6A A unit and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the unit and cart combination to overturn. 
- 7 Wall or Ceiling Mounting – The unit should be mounted to a wall or ceiling only as recommended by the manufacturer.
- 8 Ventilation – The unit should be situated so that its location or position does not interfere with its proper ventilation. For example, the unit should not be situated on a bed, sofa, rug, or similar surface, that may block the ventilation openings; or placed in a built-in installation, such as a bookcase or cabinet that may impede the flow of air through the ventilation openings.
- 9 Heat – The unit should be situated away from heat sources such as radiators, stoves, or other appliances that produce heat.
- 10 Power Sources – The unit should be connected to a power supply only of the type described in the operating instructions or as marked on the unit.
- 11 Power-Cord Protection – Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the unit.
- 12 Cleaning – The unit should be cleaned only as recommended by the manufacturer.
- 13 Nonuse Periods – The power cord of the unit should be unplugged from the outlet when left unused for a long period of time.
- 14 Object and Liquid Entry – Care should be taken so that objects do not fall into and liquids are not spilled into the inside of the unit.
- 15 Damage Requiring Service – The unit should be serviced by qualified service personnel when:
 - A. The power-supply cord or the plug has been damaged; or
 - B. Objects have fallen, or liquid has been spilled into the unit; or
 - C. The unit has been exposed to rain; or
 - D. The unit does not appear to operate normally or exhibits a marked change in performance; or
 - E. The unit has been dropped, or the cabinet damaged.
- 16 Servicing – The user should not attempt to service the unit beyond those means described in the operating instructions. All other servicing should be referred to qualified service personnel.
- 17 Power Lines – An outdoor antenna should be located away from power lines.

- 18 Grounding or Polarization – Precautions should be taken so that the grounding or polarization is not defeated.
- 19 Outdoor Antenna Grounding – If an outside antenna is connected to this unit, be sure the antenna system is grounded so as to provide some protection against voltage surges and built-up static charges. Article 810 of the National Electrical Code, ANSI/NFPA 70, provides information with regard to proper grounding of the mast and supporting structure, grounding of the lead-in wire to an antenna discharge unit, size of grounding conductors, location of antenna discharge unit, connection to grounding electrodes, and requirements for the grounding electrode.

EXAMPLE OF ANTENNA GROUNDING



NEC – NATIONAL ELECTRICAL CODE

Note to CATV system installer:

This reminder is provided to call the CATV system installer's attention to Article 820-40 of the NEC that provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building, as close to the point of cable entry as practical.

CAUTION: READ THIS BEFORE OPERATING YOUR UNIT

- 1 To ensure the finest performance, please read this manual carefully. Keep it in a safe place for future reference.
- 2 Install your unit in a cool, dry, clean place – away from windows, heat sources, and too much vibration, dust, moisture or cold. Avoid sources of hum (transformers, motors). To prevent fire or electrical shock, do not expose to rain and water.
- 3 Do not operate the unit upside-down. It may overheat, possibly causing damage.
- 4 Never open the cabinet. If a foreign object drops into the set, contact your dealer.
- 5 Do not use force on switches, knobs or cords. When moving the set, first turn the unit off. Then gently disconnect the power plug and the cords connecting to other equipment. Never pull the cord itself.
- 6 Do not attempt to clean the unit with chemical solvents; this might damage the finish. Use a clean, dry cloth.

7 To prevent lightning damage, pull out the power cord and remove the antenna cable during an electrical storm.

8 Be sure to read the "TROUBLESHOOTING" section on common operating errors before concluding that your unit is faulty.

FCC INFORMATION

1. IMPORTANT NOTICE : DO NOT MODIFY THIS UNIT!

This product, when installed as indicated in the instructions contained in this manual, meets FCC requirements. Modifications not expressly approved by Yamaha may void your authority, granted by the FCC, to use the product.

2. IMPORTANT : When connecting this product to accessories and/or another product use only high quality shielded cables. Cable/s supplied with this product MUST be used. Follow all installation instructions. Failure to follow instructions could void your FCC authorization to use this product in the USA.

3. NOTE : This product has been tested and found to comply with the requirements listed in FCC Regulations, Part 15 for Class "B" digital devices. Compliance with these requirements provides a reasonable level of assurance that your use of this product in a residential environment will not result in harmful interference with other electronic devices.

This equipment generates/uses radio frequencies and, if not installed and used according to the instructions found in the users manual, may cause interference harmful to the operation of other electronic devices.

Compliance with FCC regulations does not guarantee that interference will not occur in all installations. If this product is found to be the source of interference, which can be determined by turning the unit "OFF" and "ON", please try to eliminate the problem by using one of the following measures:

Relocate either this product or the device that is being affected by the interference.

Utilize power outlets that are on different branch (circuit breaker or fuse) circuits or install AC line filter/s.

In the case of radio or TV interference, relocate/reorient the antenna. If the antenna lead-in is 300 ohm ribbon lead, change the lead-in to coaxial type cable.

If these corrective measures do not produce satisfactory results, please contact the local retailer authorized to distribute this type of product. If you can not locate the appropriate retailer, please contact Yamaha Electronics Corp., U.S.A. 6660 Orangethorpe Ave, Buena Park, CA 90620.

The above statements apply ONLY to those products distributed by Yamaha Corporation of America or its subsidiaries.

We Want You Listening For A Lifetime

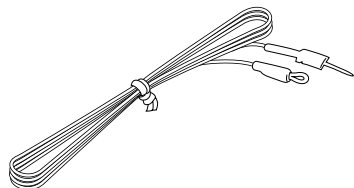
YAMAHA and the Electronic Industries Association's Consumer Electronics Group want you to get the most out of your equipment by playing it at a safe level. One that lets the sound come through loud and clear without annoying blaring or distortion – and, most importantly, without affecting your sensitive hearing. Since hearing damage from loud sounds is

often undetectable until it is too late, YAMAHA and the Electronic Industries Association's Consumer Electronics Group recommend you to avoid prolonged exposure from excessive volume levels.

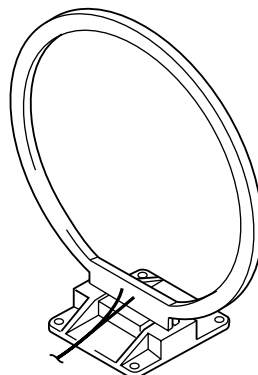


SUPPLIED ACCESSORIES

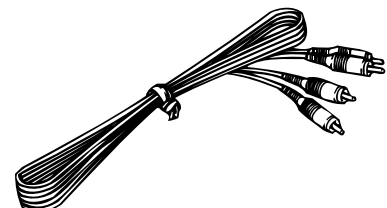
After unpacking, check that the following parts are contained.



Indoor FM Antenna



AM Loop Antenna



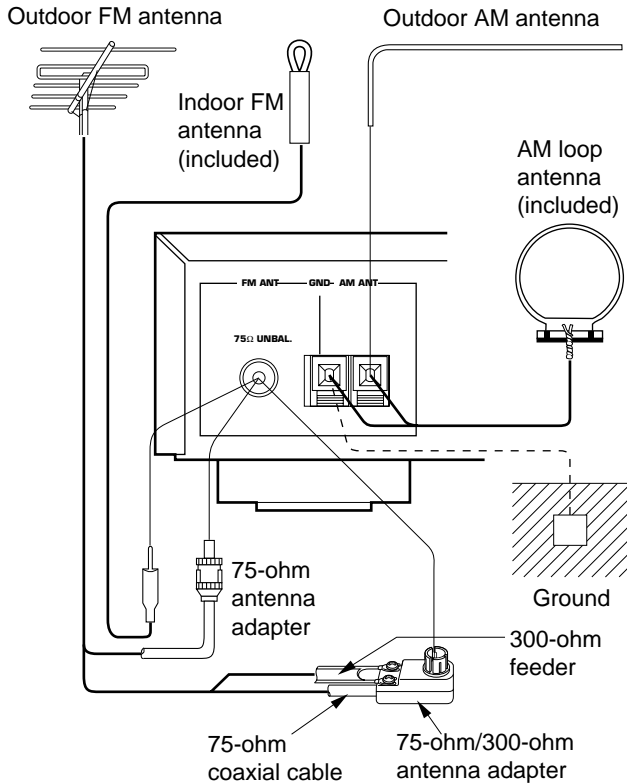
Audio connection cord

CONNECTIONS

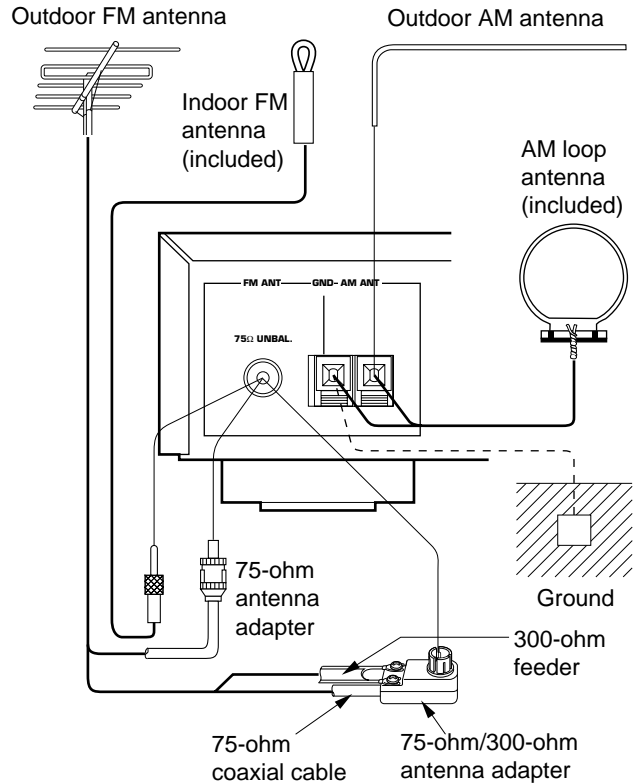
ANTENNA CONNECTIONS

- Each antenna should be connected to the designated terminals correctly, referring to the following figure.
- Both AM and FM indoor antennas are included with this unit. In general, these antennas will probably provide sufficient signal strength. Nevertheless, a properly installed outdoor antenna will give clearer reception than an indoor one. If you experience poor reception quality, an outdoor antenna may result in improvement.

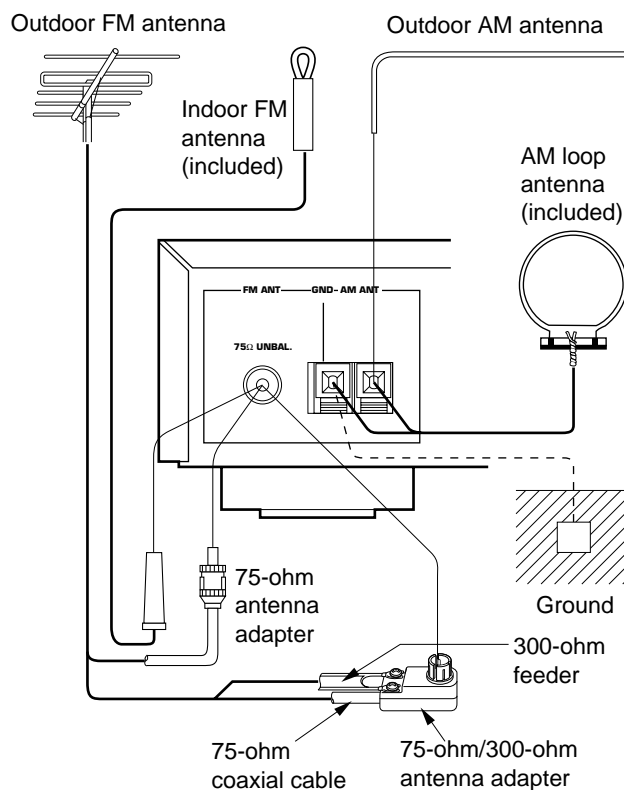
U.S.A., CANADA AND GENERAL MODELS



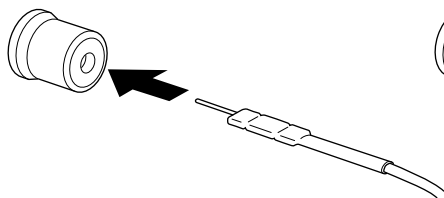
U.K. MODEL



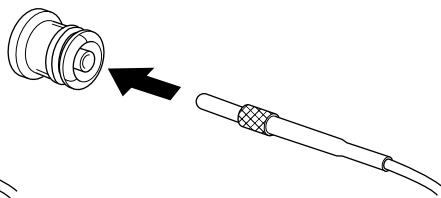
AUSTRALIA AND EUROPE MODELS



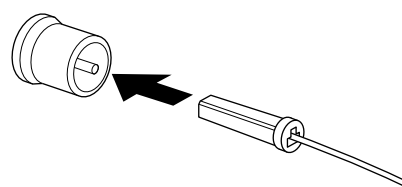
Connecting the indoor FM antenna
(U.S.A., Canada and General models)



(U.K. model)

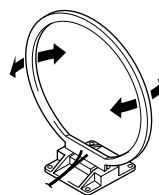
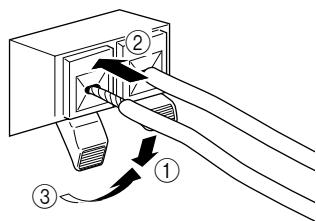


(Australia and Europe models)



*If you connect an outdoor FM antenna to this unit, do not connect the indoor FM antenna to this unit.

Connecting the AM loop antenna



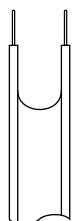
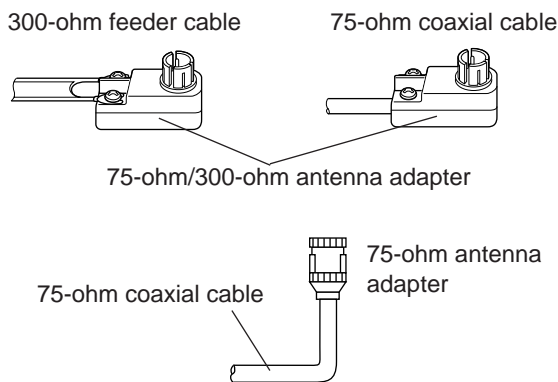
Orient so that the best reception is obtained.

- * The AM loop antenna should be placed apart from the main unit. The antenna may be hung on a wall.
- * The AM loop antenna should be kept connected, even if an outdoor AM antenna is connected to this unit.

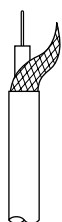
■ **Optional outdoor FM antenna**

Consult with your dealer or authorized service center about the best method of selecting and erecting an outdoor FM antenna. The choice of the feeder cable is also important. Flat ribbon-shaped twin-lead cable performs well electrically, and is cheaper and somewhat easier to handle when routing it through windows and around rooms. Coaxial cable is more expensive, does a much better job of minimizing interference, is less prone to the effects of weather and close-by metal objects, and is nearly as good a signal conductor as feeder cable, particularly for foam-type coaxial cables. Coaxial cable is somewhat more difficult to install at the point where the cable enters the building. If coaxial cable is selected, make sure the antenna is designed to be used with that type of cable.

* Use a 75-ohm/300-ohm antenna adapter (not included) or a 75-ohm antenna adapter (not included) for connections.



300-ohm feeder cable



75-ohm coaxial cable

Notes for FM antenna installation

- To minimize automobile ignition noise, locate the antenna as far from heavy traffic as possible.
- Keep the feeder cable or coaxial cable as short as possible. Do not bundle or roll up excess cable.
- The antenna should be at least two meters (6.6 feet) from reinforced concrete walls or metal structures.

■ Optional outdoor AM antenna

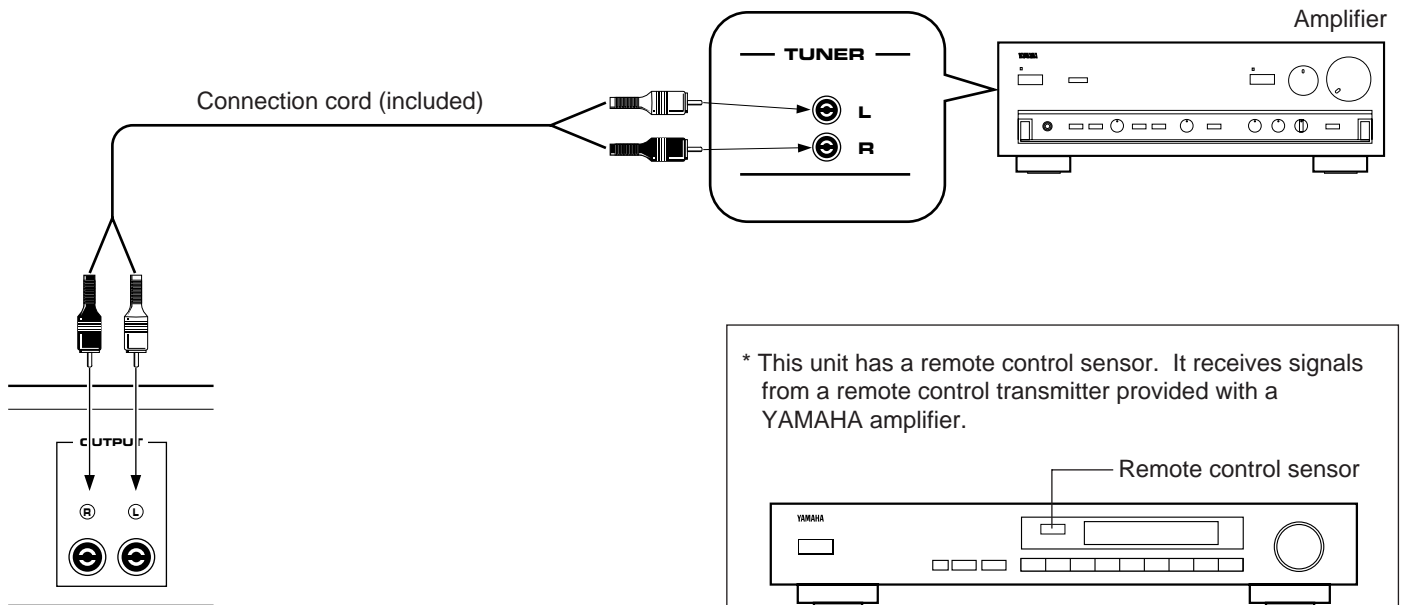
In steel buildings or at a great distance from the transmitter, it may be necessary to install an outside long wire antenna.

GND terminal

For maximum safety and minimum interference, connect the **GND** terminal to a good earth ground. A good earth ground is a metal stake driven into moist earth.

CONNECTIONS TO THE AMPLIFIER

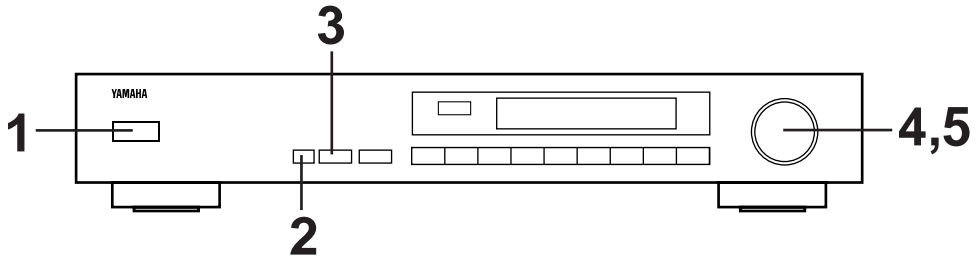
- Before making any connections, switch OFF the power to this unit and the amplifier or other component.
- Be sure that the connections from the left (“L”) and right (“R”) OUTPUT terminals are connected to the corresponding (left and right) input terminals of the amplifier or other component.



TUNING OPERATIONS

Normally, if station signals are strong and there is no interference, quick automatic-search tuning (AUTOMATIC TUNING) is possible. However, if signals of the station you want to select are weak, you must tune to it manually (MANUAL TUNING).

AUTOMATIC TUNING



1 POWER

2 Select the reception band (FM or AM) while watching the display.

FM/AM

3

TUNING MODE

AUTO/MA MONO

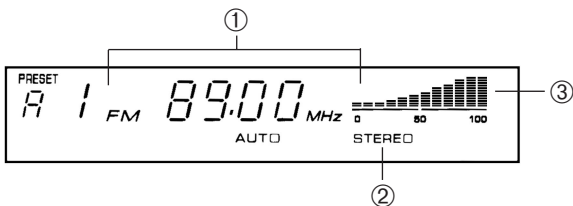
4 Tune to a desired station.

To tune to a higher frequency, slightly turn the control to the right. To tune to a lower frequency, slightly turn the control to the left.

5 If the station where tuning search stopped is not the desired one, follow step 4 again.

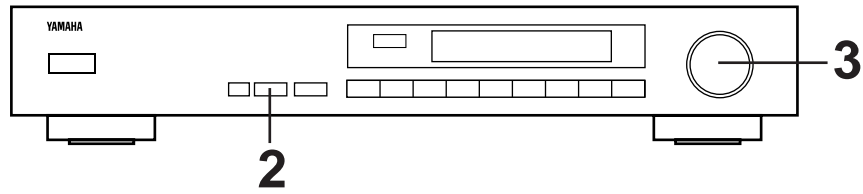
* If the tuning search does not stop at the desired station, change to the MANUAL TUNING method as described on the following page.

Display information



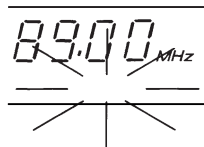
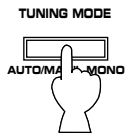
- ① Displays the band and frequency of the received station.
- ② Illuminates when an FM stereo broadcast with sufficient signal strength is received.
- ③ Indicates the signal level of the received station.

MANUAL TUNING



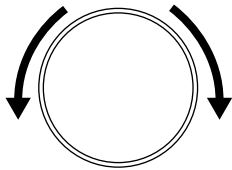
1 Follow step 1 and 2 on the previous page.

2



"AUTO" goes off.

3 Tune to a desired station manually.

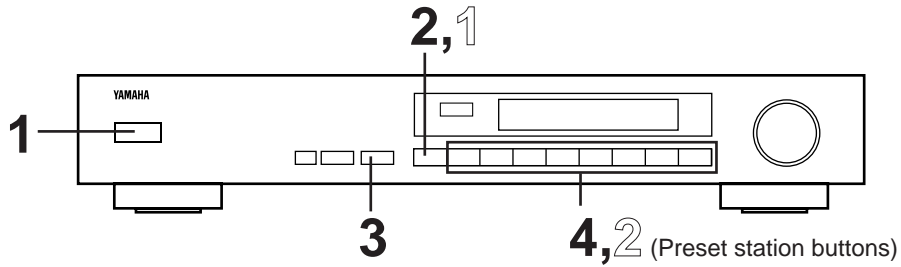


Note

If you tune to an FM station manually, it is received in monaural mode automatically to increase the signal quality.

PRESET TUNING

This unit can store station frequencies (selected by tuning operation) by using the preset station buttons. With this function, you can select any desired station by only pressing the corresponding preset station button. Up to 40 stations (8 stations x 5 pages) can be stored.



To store stations

- 1** Tune to a desired station.
(Refer to page 7–8 for tuning procedure.)
- 2** Select a desired page (A – E) of preset station buttons while watching the display.
- 3** Press the MEMORY button.

Flashes on and off for about 5 seconds.
- 4** Press a preset station button before “MEMORY” goes off from the display.

Shows the displayed station has been programmed to A1.

* In the same way, program other stations to A2, A3 ... A8.
* You can program more stations to the preset station buttons on other pages in the same way by selecting other pages in step 2.

To recall a preset station

- 1** Select the page of preset station buttons.
- 2**

Select the desired preset station button.

Notes

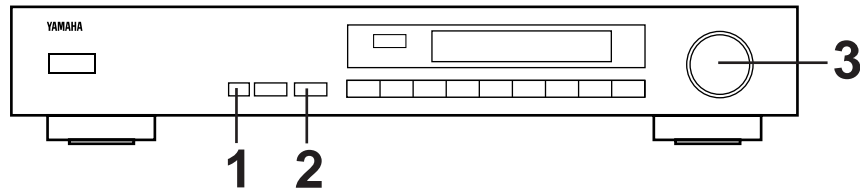
- A new setting can be programmed in place of the former one.
- For presets, the setting of the reception mode (stereo or monaural) is stored along with the station frequency.

Memory back-up

The memory back-up circuit prevents the programmed data from being lost even if the **POWER** switch is set off or the power plug is disconnected from the AC outlet or the power is cut due to temporary power failure. If, however, the power is cut for more than one week, the memory may be erased. If so, it can be re-programmed by simply following the PRESET TUNING steps.

AUTOMATIC PRESET TUNING

You can also make use of an automatic preset tuning function for FM stations only. By this function, this unit performs automatic tuning and stores FM stations with strong signals sequentially. Up to 40 stations are stored automatically to the preset station buttons in the same way as in the manual preset tuning method on the previous page.



To store stations

1

2

Flashes.

3 Slightly turn the TUNING control to the right (or to the left).
 * When turned to the right, automatic tuning is performed toward higher frequencies. When turned to the left, automatic tuning is performed toward lower frequencies.

This unit performs automatic tuning and received FM stations are programmed to A1, A2 ... A8 sequentially.
 * If more than 8 stations are received, they are also programmed to other pages (B, C, D and E) of preset stations buttons in that order.

After the automatic preset tuning is completed

The display shows the frequencies of the first preset station (stored to A1).

Check the contents and the number of preset stations by following the procedure of the section "To recall a preset station" on the previous page.

To recall a preset station

Simply follow the procedure of the section "To recall a preset station" on the previous page.

Notes

- The automatic preset tuning search will be performed through all frequencies until 40 stations are stored. If the number of received stations is less than 40, the search will stop after searching through all frequencies.
- With this function, only FM stations with sufficient signal strength are stored automatically. If the station you want to program is weak in signal strength, tune to it in monaural manually and program it by following the procedure of the section "To store stations" on the previous page.
- You can replace a preset station by another FM or AM station manually by simply following the procedure of the section "To store stations" on the previous page.

TROUBLESHOOTING

If the unit fails to operate normally, check the following points to determine whether the fault can be corrected by the simple measures suggested. If it cannot be corrected, or if the fault is not listed in the SYMPTOM column, disconnect the power cord and contact your authorized YAMAHA dealer or service center for help.

	SYMPTOM	CAUSE	REMEDY
FM	Crackling sounds from time to time (especially in weak signal areas).	Ignition noise from passing vehicles.	The FM antenna should be put up as high as possible, away from the road, and a coaxial cable used.
		Noise from thermostats or other electrical equipment.	Attach a noise suppressor to the equipment causing the noise.
	FM stereo reception is noisy.	Because of the characteristics of FM stereo broadcasts, this is limited to cases where the transmitter is far away or the antenna input is poor.	Check the antenna connections. Try using a multiple element FM antenna. Set the TUNING MODE button to the manual tuning mode.
	The STEREO indicator flickers and reception is noisy.	Insufficient antenna input.	Use an antenna appropriate for the reception condition in your area.
		Not tuned correctly.	Tune again.
	There is distortion and clear reception cannot be obtained even with a good FM antenna.	There is multi path interference.	Adjust antenna placement to eliminate multi-path interference.
	No stereo effect even with a stereo broadcast.	The TUNING MODE button is set to the manual tuning mode.	Set the button properly.
	A desired station cannot be tuned in with Automatic tuning.	The station is too weak.	Use the manual tuning mode. Use a high quality directional FM antenna.
Previously preset stations can no longer be tuned in.	The tuner has been unplugged for a long period.	Repeat the presetting procedure.	
AM	Insufficient sensitivity.	Weak signal or loose antenna connections.	Tighten the AM loop antenna connections and rotate it for best reception.
	A desired station cannot be tuned in with Automatic tuning.		Use the manual tuning mode.
	There are continuous crackling and hissing noises.	These noises result from lightning, fluorescent lamps, motors, thermostats and other electrical equipment.	Use an outdoor antenna and a ground wire. This will help somewhat but it is difficult to eliminate all noise.
	There are buzzing and whining noises (especially in the evening).	Another station is interfering with the received station.	This is impossible to remedy.
A television set is being used nearby.		Move the television away.	

SPECIFICATIONS

FM SECTION

Tuning Range	
[U.S.A. and Canada models]	87.5 to 107.9 MHz
[U.K., Australia, Europe and General models]	87.5 to 108 MHz
50 dB Quieting Sensitivity (IHF) [Except Europe model]	
75 ohms Mono	1.6 μ V (15.3 dBf)
75 ohms Stereo	21 μ V (37.7 dBf)
Usable Sensitivity	
[Except Europe model]	
75 ohms, 1 kHz, 100% mod. (30 dB S/N Quieting)	0.8 μ V (9.3 dBf)
[Europe model] (DIN)	
75 ohms Mono (S/N 26 dB)	0.9 μ V
75 ohms Stereo (S/N 46 dB)	24 μ V
Image Response Ratio	
[Except Europe model]	40 dB
[Europe model]	75 dB
IF Response Ratio	
[Except Europe model]	90 dB
[Europe model]	75 dB
Spurious Response Ratio	70 dB
AM Suppression Ratio	55 dB
Capture Ratio	1.5 dB
Alternate Channel Selectivity	
[Except Europe model]	85 dB
Selectivity (two signals, 40 kHz Dev., \pm 300 kHz)	
[Europe model]	70 dB
Signal-to-Noise Ratio	
[Except Europe model] (IHF)	
Mono	82 dB
Stereo	76 dB
[Europe model] (DIN 40 kHz Dev.)	
Mono	75 dB
Stereo	70 dB
Harmonic Distortion (1 kHz)	
[Except Europe model]	
Mono/Stereo	0.1%/0.2%
[Europe model (40 kHz Dev.)]	
Mono/Stereo	0.1%/0.2%
Stereo Separation	
[Except Europe model]	1 kHz 52 dB
[Europe model]	1 kHz 45 dB

Frequency Response	
[Except Europe model]	
30 Hz to 15 kHz	0 \pm 1.5 dB
[Europe model]	
20 Hz to 15 kHz	0 \pm 0.5 dB
30 Hz to 13 kHz	0 \pm 0.5 dB

AM SECTION

Tuning Range	
[U.S.A., Canada and General models]	530 to 1,710 kHz
[U.K., Australia and Europe models]	531 to 1,611 kHz
Usable Sensitivity	200 μ V/m
Selectivity	32 dB
Signal-to-Noise Ratio	50 dB
Image Response Ratio	40 dB
Spurious Response Ratio	50 dB
Harmonic Distortion; 400 Hz	0.3%

AUDIO SECTION

Output Level/Impedance	
FM (100 % mod. 1 kHz)	
[Except Europe model]	50 mV/2.2 k-ohms
FM (40 kHz Dev.)	
[Europe model]	400 mV/2.2 k-ohms
AM (30% mod. 400 Hz)	150 mV/2.2 k-ohms

GENERAL

Power Supply	
U.S.A. and Canada models	120V, 60 Hz
Europe model	230V, 50 Hz
U.K. and Australia models	240V, 50 Hz
General model	110-120/220-240V, 50/60 Hz
Power Consumption	7W
Dimensions (W x H x D)	435 x 86 x 291 mm (17-1/8" x 3-3/8" x 11-7/16")
Weight	3.2 kg (7 lbs. 1 oz.)
Accessories	Audio connection cord AM loop antenna Indoor FM antenna

* Specifications subject to change without notice.