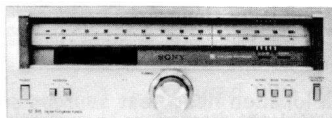


FM-AM PROGRAM TUNER

ST-515



OPERATING INSTRUCTIONS page 2

- Before operating the unit, please read this manual thoroughly.
- This manual should be retained for future reference.

MODE D'EMPLOI page 9

- Avant toute opération, lire attentivement ce mode d'emploi.
- Conserver ce manuel pour toute référence ultérieure.

BEDIENUNGSANLEITUNG Seite 17

- Vor Inbetriebnahme lesen Sie bitte diese Bedienungsanleitung sorgfältig durch.
- Bewahren Sie diese Anleitung zum späteren Nachschlagen gut auf.

MANUAL DE INSTRUCCIONES Página 25

- Antes de manipular el aparato, lea usted este manual detenidamente.
- Conserve este manual para futuras referencias.

This instruction manual covers the four models: Canadian model, European model, the United Kingdom model and Other country model. Their performance and characteristics are identical except for the difference in operating voltage.

WARNING

- To prevent fire or shock hazard, do not expose the unit to rain or moisture.
- To avoid electrical shock, do not open the cabinet. Refer servicing to qualified personnel only.

TABLE OF CONTENTS

Features	2
Unpacking	2
Precautions	2
Operating voltage	2
Notice for the customers in the United Kingdom	3
System connections	3
Location and function of controls	5
FM and AM reception with the program sensor system	6
FM and AM reception without the program sensor system	7
Maintenance	7
FM antennas	7
Specifications	8
Trouble checks	8

FEATURES

- Quartz-lock system provides low distortion reception by precisely tuning to center of FM broadcast station carrier.
 - Fast and simple station selection with simultaneous electronic digital readout and illumination of signal indicator (in FM and AM), and with illumination of locked lamp (in FM).
 - Program Sensor System for quick and accurate tuning.
- In the Program Sensor mode:
- Program tuning is done by simply setting the Dial Pointer to a Station Marker that has been preset.
 - Switching between FM and AM stations is done automatically.
 - Muting function for FM and AM reception to eliminate interstation noise while tuning from station to station.
 - A uni-phase filter in the IF block and a PLL MPX IC assure excellent stereo separation and lower distortion.
 - Long Dial Scale and dial mechanism using large flywheel for accurate tuning.

UNPACKING

Do not throw away the carton and the associated material; they will come in handy if you ever have to transport or ship the unit. Inspect your unit immediately after unpacking. If any sign of damage is found, consult your local Sony dealer. When shipping the unit for repair work or to another location, it should be repacked in the original carton and packing material just as it was originally.

PRECAUTIONS

On safety

- Check that the operating voltage of your unit is identical with the voltage of your local power supply.
- Should any liquid or solid object fall into the cabinet, unplug the unit and have it checked by qualified personnel before operating it any further.
- Unplug the unit from the wall outlet if it is not to be used for an extended period of time. To disconnect the cord, pull it out by grasping the plug. Never pull it by the cord.

On installation

- Do not install the unit in a location near heat sources such as radiators or air ducts, or in a place subject to direct sunlight, excessive dust, mechanical vibration or shock.

On operation

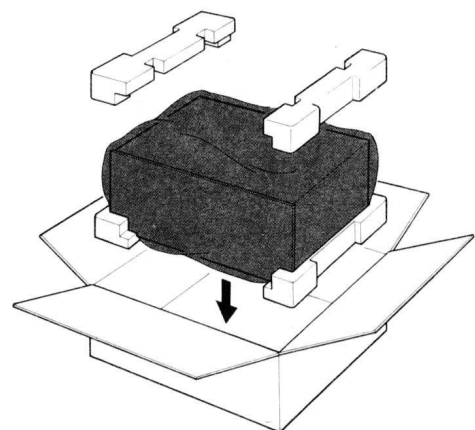
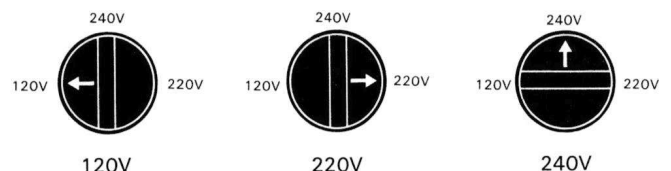
- When the unit is not in use, turn the power off to conserve energy and to extend the useful life of your unit.
- If any problem arises in the operation of this unit, first follow the procedures suggested in "TROUBLE CHECKS" on page 8. If difficulty persists, contact your nearest Sony dealer.

OPERATING VOLTAGE

Canadian model: The unit operates only on 120 V ac, 60 Hz.

United Kingdom model: The unit operates only on 240 V ac, 50 Hz.

European and other country models: The unit operates on 120, 220, or 240 V ac, 50/60 Hz. It is factory set to 220 or 120 V ac. Before connecting the unit to the power source, check that the voltage selector setting of your unit is identical with the voltage of your local power supply. To operate on other voltage supply, turn the voltage selector located at the rear with a coin so that the arrow mark of the selector points to the proper voltage figure.



NOTICE FOR THE CUSTOMERS IN THE UNITED KINGDOM

IMPORTANT

The wires in this mains lead are coloured in accordance with the following code :

- Blue : Neutral
- Brown : Live

As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug proceed as follows :

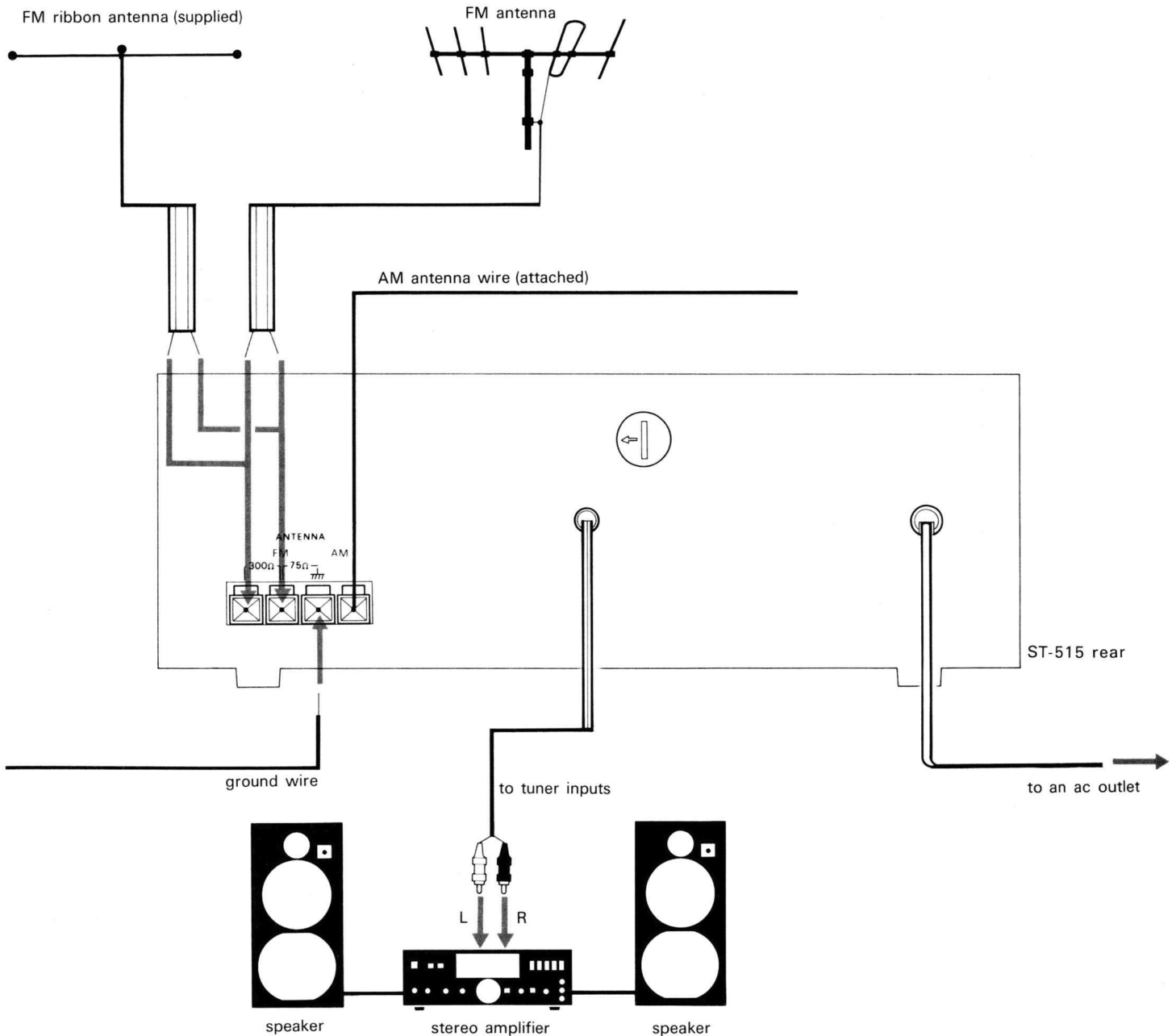
The wire which is coloured blue must be connected to the terminal which is marked with the letter N or coloured black.
The wire which is coloured brown must be connected to the terminal which is marked with the letter L or coloured red.

SYSTEM CONNECTIONS

CONNECTION NOTES

- The power cord should be connected last of all, first making sure that the POWER switch is in the OFF position.
- To assure correct matching at the input and output terminals of your audio system, refer to the table of "SPECIFICATIONS" on page 8, and to the specifications given in the instruction manual provided with your amplifier. Generally the output level of the tuner should be equal to or slightly greater than the sensitivity of the corresponding input. Also the output impedance of the tuner should be considerably lower than the impedance of the corresponding input.
- The cable connectors should be fully inserted into the jacks. A loose connection may cause hum and noise.
- Be sure to connect the red plug to the right [R] jack, and the remaining one to the left [L].

CONNECTION DIAGRAM



FM ANTENNA CONNECTION

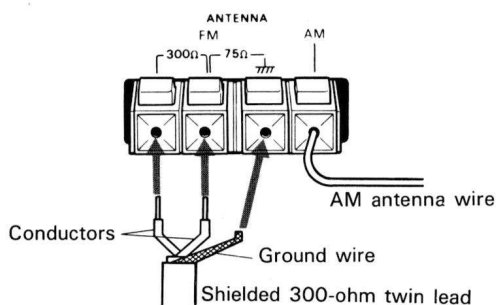
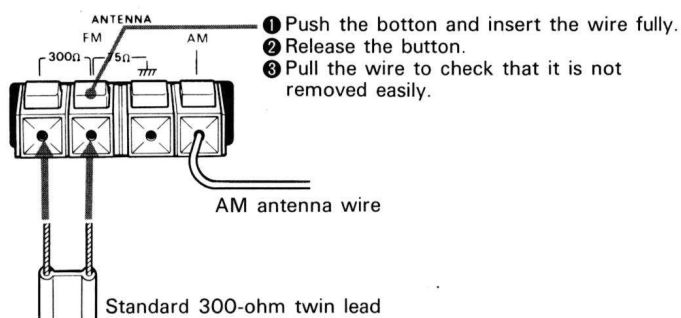
The tuner accepts 300-ohm twin lead or 75-ohm coaxial cable. The 300-ohm twin lead may be either the standard or shielded type. Standard 300-ohm twin lead is inexpensive and will be adequate for most installations. However, in cases where local noise or multipath pickup on the transmission line causes interference, a shielded transmission line must be used. In locations where ignition noise is severe, the antenna should be located as far away from the highway as possible, and the lead-in should preferably be of the coaxial type.

To avoid excessive loss of signal strength and to minimize undesired pickup on standard twin lead line, observe the following precautions:

- Use commercially-available stand-off insulators to route the lead over the roof, outer wall, etc.
- Keep the lead as short as possible and avoid long horizontal runs.
- Cut off the unused portion of the lead at the tuner input, rather than folding or bunching it together.

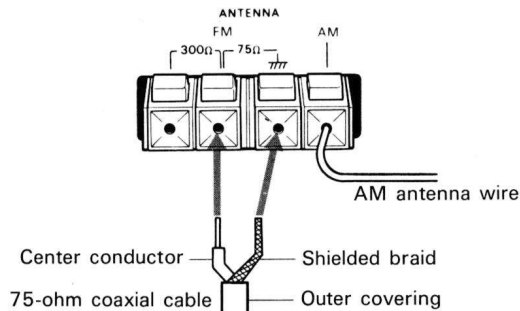
300-ohm twin lead connection

When using 300-ohm twin lead, connect it to the FM 300 Ω terminals as shown.



75-ohm coaxial cable connection

If 75-ohm coaxial cable is used, connect the center conductor to the FM 75 Ω terminal, and the braid to the ground terminal [17]. Cut and remove the outer covering, and separate the shielded braid and center conductor as shown below. Be careful not to damage the center conductor. If the center conductor is a stranded type, twist the strands tightly together.



AM ANTENNA CONNECTION

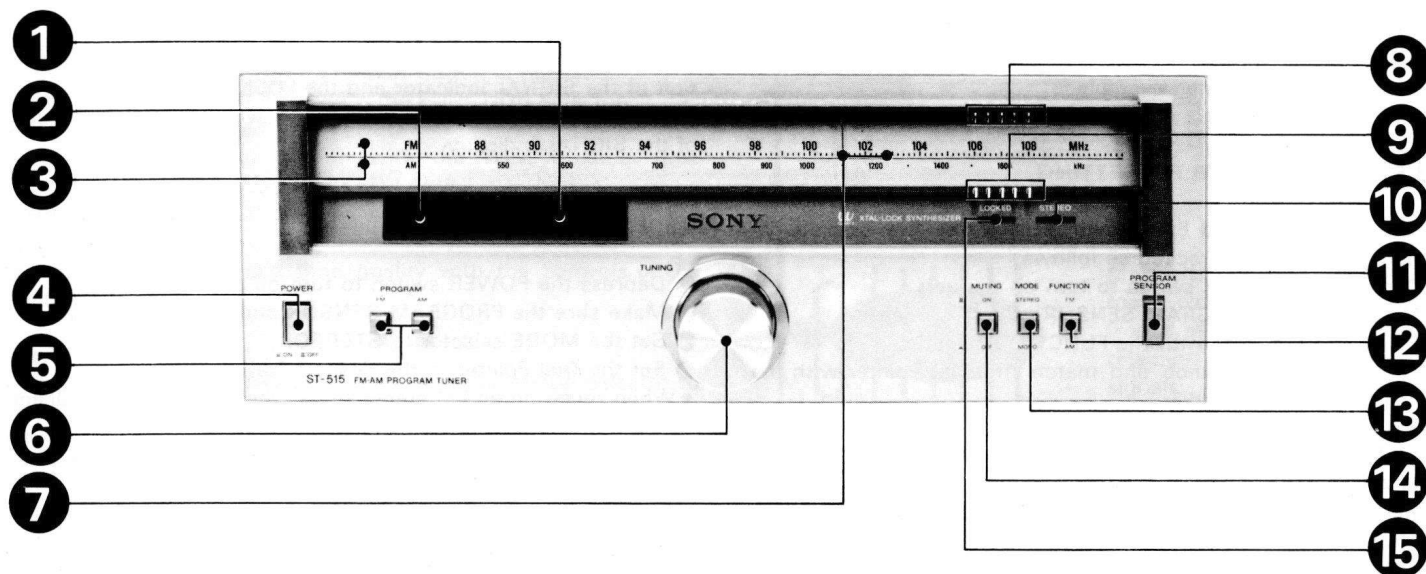
In most areas, the attached AM antenna wire will provide satisfactory AM reception. Extend the antenna wire for best reception. In difficult reception areas, it may be necessary to connect a length of insulated wire 5-15 meters (20-50 feet) long to the AM antenna terminal, instead of the attached AM antenna wire. Extend this out of doors if possible, keeping the greater portion horizontal.

- Extend the antenna wire as high as possible and keep it from touching other material or trees. Keep the antenna wire far away from high voltage power transmission lines and noisy electrical machinery.

GROUND CONNECTION

When an outdoor antenna is connected, the ground terminal [17] of the tuner should be connected directly to earth by means of a grounding rod. The use of a lightning arrester is also recommended with any outdoor antenna.

LOCATION AND FUNCTION OF CONTROLS



1 Digital Display

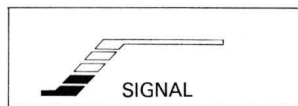
The frequency of the tuned program is displayed in MHz or kHz.

2 SIGNAL Indicator

Indicates the signal strength of broadcast stations. Relative strength of received signals is shown by the amount of indicator illumination. The full illumination of the indicator means the best tuning of the station. When the indicator illuminates only at the low end, it means the weak antenna input. In this case, install a suitable external antenna.



Good antenna input



Weak antenna input

3 Band Indicators [FM] [AM]

The FM or AM indicator lights when the Dial Pointer matches with an FM or AM Station Marker while the Program Sensor System operates, or when the Program Sensor System is cancelled and the FUNCTION selector is set to FM or AM.

4 POWER Switch

Depress this to apply power to the tuner. The dial and meters will light. Depressing it again will shut off the power.

5 PROGRAM Buttons

Used for presetting the desired FM and AM Station Markers on the Dial Scale. See page 6.

6 TUNING Knob

Turn to select the desired station.

7 Dial Scale and Dial Pointer

The frequencies available within each band are marked on the scale.

8 FM Station Markers

Used for quick tuning in of an FM station with the Program Sensor System. See page 6.

9 AM Station Markers

Used for quick tuning in of an AM station with the Program Sensor System. See page 6.

10 STEREO Lamp

This lamp will light when an FM stereo program of sufficient signal strength is tuned in with the MODE selector set to STEREO.

11 PROGRAM SENSOR Button

When this button is depressed, the indicator lamp lights in orange and the Program Sensor System starts to operate. To cancel the Program Sensor System, depress the button again.

12 FUNCTION Selector

Select the desired band, FM or AM, when the Program Sensor System is cancelled.

FM (released): for FM reception.

AM (depressed): for AM reception.

13 MODE Selector

STEREO (released): for FM reception.

Normally use this position. When a stereo signal of sufficient strength is received, the tuner operates in stereo mode, and the STEREO lamp will light. If the signal changes to mono, the tuner will be switched to mono mode automatically.

MONO (depressed): This position locks the tuner to mono mode which is helpful when the broadcast is weak and noisy.

14 MUTING Switch

ON (released): Normally use this position. While tuning from station to station, any interstation noise is eliminated.

OFF (depressed): When very weak stations need to be tuned in, use this position.

- Before setting the switch to OFF position, make sure that the amplifier volume is kept down to avoid speaker damage caused by interstation noise.

- While the Program Sensor System operates, muting is operative regardless of the position of this switch.

15 LOCKED Lamp

This lamp will light when an FM broadcast signal is fully tuned in and the tuner is locked to the signal by the quartz-lock control system incorporated in this tuner.

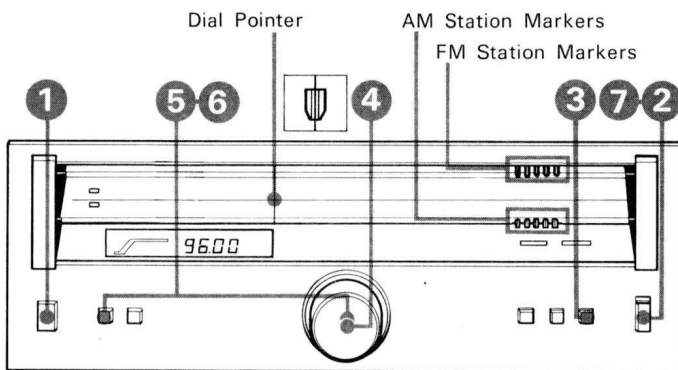
FM AND AM RECEPTION WITH THE PROGRAM SENSOR SYSTEM

Once you preset the Station Markers on the Dial Scale, the program selection is made by simply setting the Dial Pointer to the desired Station Marker. Preset the FM and AM Station Markers according to the following example.

FM STATION MARKER PRESETTING

To preset the left end FM Station Marker for the desired FM station, for example, proceed as follows:

- 1 Depress the POWER switch to turn on the unit.
- 2 Make sure the PROGRAM SENSOR button is released.
- 3 Select the FM band with the FUNCTION selector.
- 4 Turn the TUNING knob and match the Dial Pointer with the left end FM Station Marker.
- 5 While keeping the FM PROGRAM button depressed, turn the TUNING knob to tune in the desired FM station. See "SIGNAL INDICATOR AND LOCKED LAMP".
 - The Dial Pointer and the Station Marker will move together.
- 6 After tuning, release the PROGRAM button and turn the TUNING knob to another Station Marker for the next presetting.
- 7 When all the presetting is finished, depress the PROGRAM SENSOR button. The indicator lamp lights in orange showing that the Program Sensor System is operative.



AM STATION MARKER PRESETTING

AM Station Marker presetting procedures are the same as for "FM STATION MARKER PRESETTING" except for the following points.

- 3 Select the AM band with the FUNCTION selector.
- 5 While keeping the AM PROGRAM button depressed, turn the TUNING knob to tune in the desired AM station. See "SIGNAL INDICATOR AND LOCKED LAMP".

Notes on presetting

- First, decide which Station Marker for which station, because a Station Marker cannot pass another one.
- Placing the unused Station Markers at the left or right end of the Dial Scale is recommended to avoid tuning in an undesired station.
- Do not attempt to move two or more Station Markers simultaneously.
- Up to five stations can be preset for FM and AM reception respectively.

SIGNAL INDICATOR AND LOCKED LAMP

In FM reception, the correct tuning is shown by the full illumination of the SIGNAL indicator and the LOCKED lamp.

In AM reception, the correct tuning is shown by the full illumination of the SIGNAL indicator.

RECEPTION

- 1 Depress the POWER switch to turn on the unit.
- 2 Make sure the PROGRAM SENSOR button is depressed.
- 3 Set the MODE selector to STEREO.
- 4 Set the Dial Pointer to the desired Station Marker.
 - When receiving an FM stereo signal, the STEREO lamp will light up automatically.
- 5 Adjust the volume and tone quality with the controls of the amplifier.
 - A desired station can be tuned in quickly, because the non-preset stations are automatically bypassed.
 - There is no need to set the FUNCTION selector. When the Dial Pointer matches the FM (or AM) Station Marker, the FM (or AM) band operates automatically.
 - When the Dial Pointer matches the FM (or AM) Station Marker, the frequency of that received FM (or AM) station is displayed at the Digital Display. When no Station Marker is matched with the Dial Pointer, the FM frequency is displayed at the Digital Display.
 - If you wish to receive a non-preset station, depress and release the PROGRAM SENSOR button, and tune in the desired station, proceeding as in "FM AND AM RECEPTION WITHOUT THE PROGRAM SENSOR SYSTEM".
 - If an FM Station Marker and an AM Station Marker are preset at the same position, the reception of the FM station is given priority when the Dial Pointer is set to that position. To receive the AM station, in this case, depress and release the PROGRAM SENSOR button, and set the FUNCTION selector to AM.

FM AND AM RECEPTION WITHOUT THE PROGRAM SENSOR SYSTEM

- ❶ Depress the POWER switch to turn on the unit.
- ❷ Make sure the PROGRAM SENSOR button is released.
- ❸ Select the FM or AM band with the FUNCTION selector.
- ❹ Set the MODE selector to STEREO.
- ❺ Tune in the desired station with the TUNING knob. See "SIGNAL INDICATOR AND LOCKED LAMP".
 - When receiving an FM stereo signal, the STEREO lamp will light up automatically.
- ❻ Adjust the volume and tone quality with the controls of the amplifier.

Notes

- When FM stereo signals are noisy, set the MODE selector to MONO for the best possible signal under noise conditions.
- To tune in a very weak station, lower the volume and set the MUTING switch to OFF.

FOR A SIMPLE TUNING IN OF A NON-PRESET STATION

To tune in the desired FM or AM station, turn the TUNING knob so that the frequency of that station appears at the Digital Display.

- When an FM station is tuned in, the LOCKED lamp lights up. While the LOCKED lamp is lit, the quartz-lock system assures a stable tuning condition.

MAINTENANCE

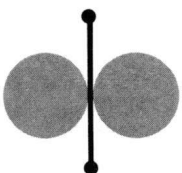
Clean the cabinet, panel and knobs periodically with a soft cloth. If fingerprints, food and beverage stains, etc. are difficult to remove, use a cloth moistened with a mild detergent solution. Do not use any type of scouring powder, abrasive pad or solvent, since these will damage the cabinet.

FM ANTENNAS

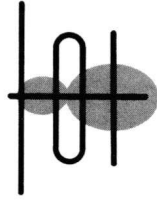
Good FM reception depends not only on the tuner sensitivity but on the quality of the received signals. This is determined by the signal strength, the presence of multipath signal and the geographic location of the desired FM stations. To get the best from your tuner, use an antenna suited to your location. Until you install a suitable antenna, the supplied ribbon antenna may be useful.

In a strong signal area, the familiar "rabbit-ears" antenna is simple to install and is well suited for FM reception, since it can be adjusted easily for best signal pickup. If there are many high structures nearby, and evidence of strong multipath reception is present, use a highly-directional rotatable outdoor antenna.

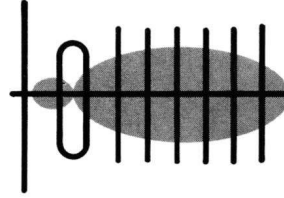
If you wish to receive not only the local stations that an indoor antenna pulls in, but to reach out into areas where there may be programs more to your taste, use a high-gain directional outdoor FM antenna properly installed with a rotator.



Ribbon dipole and rabbit-ears antennas pick up signals from both front and rear equally well.



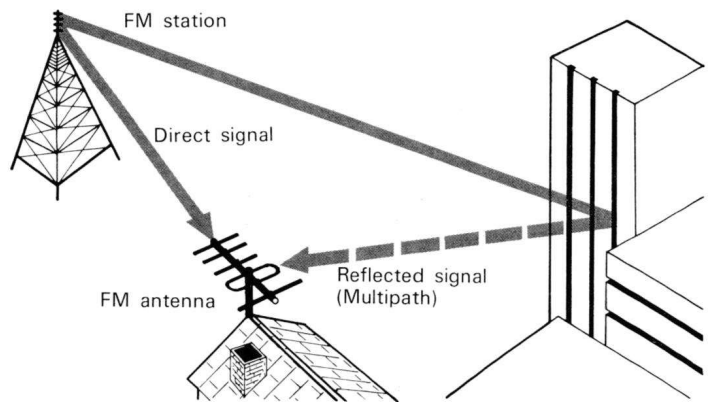
Dipole antenna with reflector has increased sensitivity to front signals and reduced sensitivity to rear signals.



Multi-element type has narrower pickup pattern with high frontal sensitivity and superior rejection of rear and multipath signals.

MULTIPATH RECEPTION

The most important factor affecting FM signal quality is multipath reception. Multipath is caused by signal reflections from hills or structures that reach the receiving antenna perceptibly later in time. Particularly with FM stereo, multipath can cause severe distortion and complete loss of channel separation. The effects of a multipath condition appear as high-frequency noise and distortion, particularly noticeable in music systems with extended response. The effects of multipath reception can be avoided to a great extent by using a coaxial or shielded twin lead lead-in, and a good directional antenna that is correctly oriented.



FM ANTENNA ORIENTATION

While listening to the desired FM station, adjust the antenna direction and height so that the SIGNAL indicator illuminates as fully as possible, and so that the distortion is eliminated.

- In some cases, obtaining good reception from two or more stations may require that the antenna be pointed in different directions. An effective solution to this problem is the use of a remotely-controlled rotatable antenna.

- If an outdoor antenna cannot be erected, use a good indoor antenna ("rabbit-ears" are satisfactory). Adjust the antenna direction for minimum distortion.

- In locations where ignition noise is severe, the antenna should be located as far away from the highway as possible.

SPECIFICATIONS

FM Tuner Section

Tuning range	87.5 MHz-108 MHz
Antenna	300 ohm balanced 75 ohm unbalanced
Intermediate frequency	10.7 MHz
Sensitivity at 46 dB quieting (40 kHz deviation)	4.0 μ V (MONO) 5.0 μ V (STEREO)
Usable sensitivity	1.7 μ V, S/N=26 dB (40 kHz deviation) 1.9 μ V, 10.7 dBf; IHF
Signal-to-noise ratio	75 dB (MONO) 70 dB (STEREO)
Harmonic distortion	at 100 Hz 0.15% (MONO) 0.25% (STEREO) at 1 kHz 0.15% (MONO) 0.25% (STEREO) at 10 kHz 0.2% (MONO) 0.5% (STEREO)
IM distortion	0.15% (MONO) 0.25% (STEREO)
Separation	35 dB at 100 Hz 45 dB at 1 kHz 40 dB at 10 kHz
Frequency response	30 Hz-15 kHz $+0.5$ dB -2.0 dB 40 Hz-12.5 kHz $+0.5$ dB -1.0 dB
Selectivity	40 dB at 300 kHz 60 dB at 400 kHz
Capture ratio	1.0 dB
AM suppression ratio	54 dB
Image response ratio	80 dB
IF response ratio	100 dB
Spurious response ratio	90 dB
RF intermodulation	60 dB
Output level/impedance	450 mV, 6.8 kilohm at 1 kHz deviation, 100% modulation

AM Tuner Section

Tuning range	530 kHz-1,605 kHz
Antenna	Attached AM antenna wire External antenna terminal
Intermediate frequency	European and UK models: 468 kHz Canadian and other country models: 455 kHz
Usable sensitivity	100 μ V, external antenna at 1,000 kHz
Signal-to-noise ratio	52 dB at 5 mV
Harmonic distortion	0.3% at 5 mV, 400 Hz
Selectivity	28 dB at 9 kHz 30 dB at 10 kHz

General

System	FM stereo, FM/AM superheterodyne tuner
Power requirements	Canadian model: 120 V ac, 60 Hz. UK model: 240 V ac, 50 Hz. European and other country models: 120, 220, or 240 V ac adjustable, 50/60 Hz.
Power consumption	Canadian model: 20 W European, UK and other country models: 24 W

Dimensions	Approx. 410 × 145 × 260 mm (w/h/d) (16 1/4 × 5 3/4 × 10 1/4 inches) incl. projecting parts and controls
Weight	Approx. 5.7 kg (12 lb 9 oz) net 6.7 kg (14 lb 12 oz) in shipping carton
Accessory supplied	FM ribbon antenna

While the information given is true at the time of printing, small production changes in the course of our company's policy of improvement through research, and design might not necessarily be indicated in the specifications. We would ask you to check with your appointed Sony dealer if clarification on any point is required.

TROUBLE CHECKS

The following chart will help correct most problems which may occur with the unit. If the problem persists after you have made these checks, consult your Sony dealer.

Before going through the check list of specified troubles below, first refer back to the connections on page 3 and the operating procedures on page 6.

No audio output

- Depress the POWER switch. Note if the Dial lights.
- Check that the power cord is plugged into a working outlet.
- Check the connections to the amplifier.
- Check the setting of the amplifier's input selector, volume control and power switch.

SIGNAL indicator reading is unstable.

- Adjust the antenna.

STEREO lamp does not light when receiving stereo programs.

- Adjust the antenna.
- Check that the MODE selector is at STEREO.

STEREO lamp flickers.

- Set the MODE selector to MONO.
- If the SIGNAL indicator shows weak antenna input, use an appropriate outdoor antenna. A multi-element type is recommended.
- If the indicator shows sufficient level but an unstable reading, adjust the antenna to eliminate multipath reception.

Severe hum or noise.

- Tune accurately.
- Ground the tuner.
- Avoid long horizontal runs of antenna lead.
- Keep connecting cords (or antenna lead-in) away from transformers or motors, and at least 3 meters (10 feet) from TV sets and fluorescent lights.
- Adjust the antenna.

Ignition noise.

- Tune accurately.
- Install the outdoor antenna away from heavy traffic.
- Use a shielded or coaxial lead-in for the antenna.

Electrostatic charge

- Ground the tuner.

Tuning cannot be made with Program Sensor System.

- Check that the PROGRAM SENSOR button is depressed.
- Check that the Station Marker is preset correctly.
- Adjust the antenna. If the input signal is insufficient, tune in the station without the Program Sensor System.