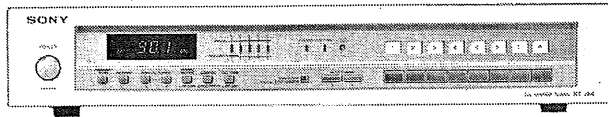


FM STEREO TUNER

# ST-J60



## OPERATING INSTRUCTIONS

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

## OWNER'S RECORD

The model and serial numbers are located at the rear. Record these numbers in the space provided below. Refer to them whenever you call upon your Sony dealer regarding this product.

Model No. ST-J60

Serial No. \_\_\_\_\_

## TABLE OF CONTENTS

Features . . . . .	2
Unpacking . . . . .	3
Precautions . . . . .	3
System connections . . . . .	4
Connection notes . . . . .	4
Connection diagram . . . . .	4
Antenna connection . . . . .	5
Function of controls . . . . .	6
FM reception . . . . .	7
Automatic tuning . . . . .	7
Manual tuning . . . . .	8
Memory tuning . . . . .	8
Station labels . . . . .	9
Antennas . . . . .	10
Multipath reception . . . . .	10
Antenna orientation . . . . .	10
Specifications . . . . .	11
Trouble checks . . . . .	11
Block diagram . . . . .	back cover

## FEATURES

- Accurate tuning can be easily made with the crystal locked digital synthesizer system.
- Quick and accurate station selection with an electronic digital readout on the frequency counter.
- Three methods of tuning are available:
  - Automatic tuning:** The FM band is scanned automatically until a signal is received.
  - Manual tuning:** Tuning can be made either by changing the frequency counter reading rapidly or step by step.
  - Memory tuning:** The desired pre-memorized station can be quickly received by pressing the station button.
- The memory contents are retained by the nonvolatile IC used for the memory circuit during the time the tuner power is off. The memory circuit also features a last station memory and memory scanning.
- Excellent reception characteristics are assured by employing carefully selected parts; a MOS FET in the front-end block for high sensitivity, a uni-phase filter and an IC in the IF amplifier for high selectivity, and a phase-locked loop IC in the multiplex decoder for excellent separation and distortion characteristics.
- The 5-step LED signal strength indicator provides an easy readout of the received signal strength.
- A CAL TONE switch is provided for producing a 400 Hz signal which is useful for calibrating the recording level on the deck.
- A lighting sensor automatically adjusts the brightness of the frequency display in accordance with the lighting in the room.

## WARNING

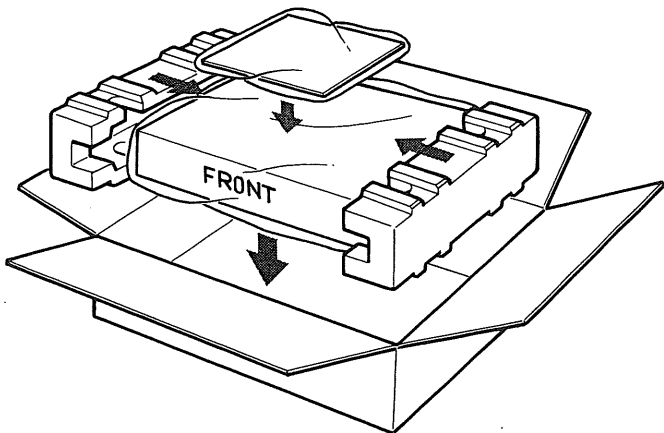
To prevent fire or shock hazard, do not expose the unit to rain or moisture.

To avoid electrical shock, do not open the cabinet. Refer servicing to qualified personnel only.

## 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

- Before operating the unit, be sure that the operating voltage of your unit is identical with that 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 out 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.
- Good air circulation is essential to prevent internal heat build-up in the unit. Place the unit in a location with adequate air circulation. Do not place the unit on a soft surface, such as a rug.

### 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.

### On cleaning

Clean the cabinet, panel and knobs periodically with a soft cloth. If finger prints, 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.

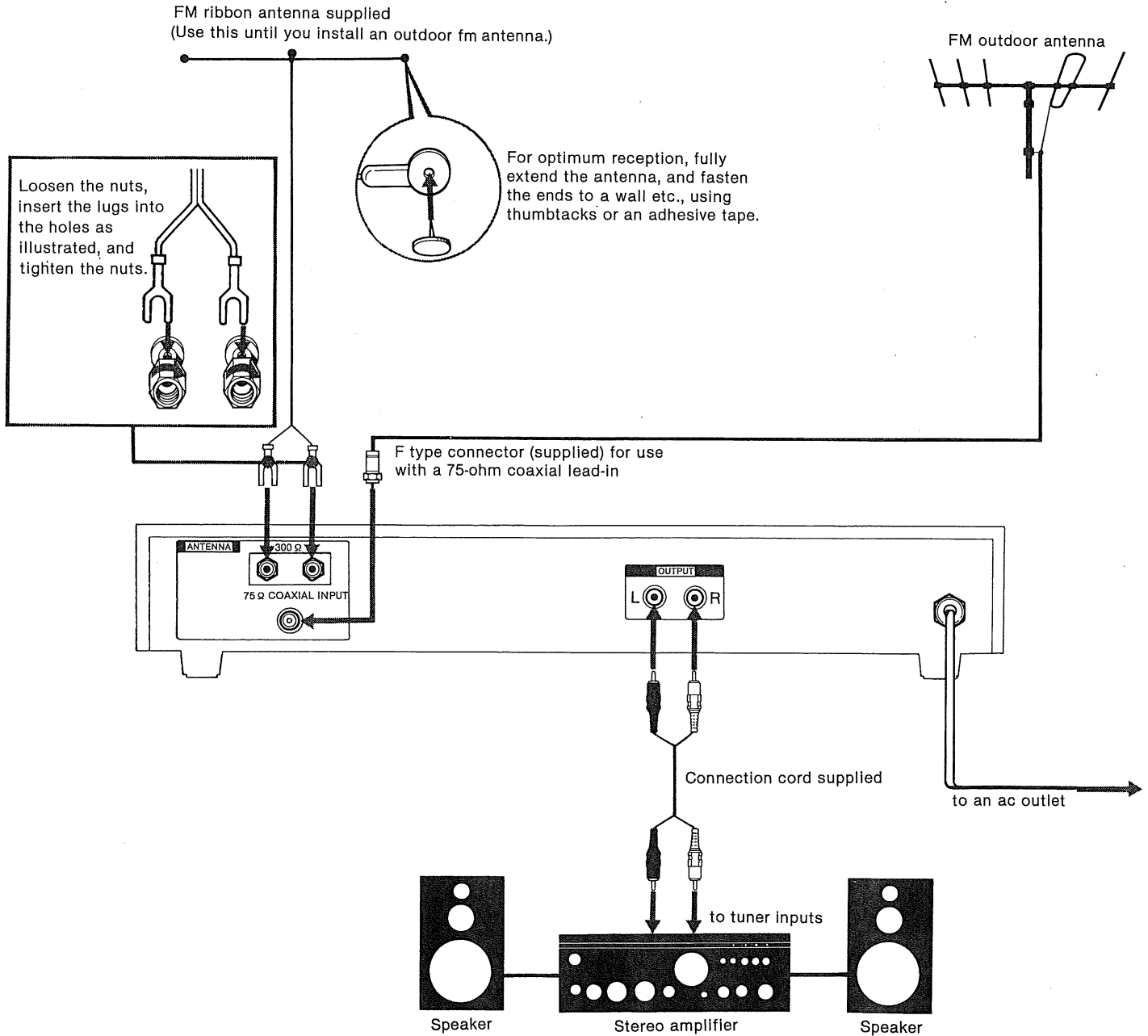
## SYSTEM CONNECTIONS

### CONNECTION NOTES

- The power cord should be connected last of all, first making sure that the POWER switch is turned off.
- To assure correct matching at the input and output terminals of your audio system, refer to the "SPECIFICATIONS" on page 11, 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.

- For all connections use low-capacitance type shielded cables like the one supplied. Keep the cables as short as practicable, avoiding horizontal runs. Excessively long runs, over 2 meters (6 feet), tend to reduce the high-frequency response, while horizontal runs are susceptible to power line hum pickup.
- Be sure to connect the red plug to the right [R] jack and the remaining one to the left [L]. The cable connectors should be fully inserted into the jacks. A loose connection may cause hum and noise.

### CONNECTION DIAGRAM



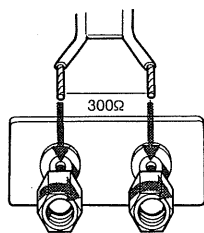
## ANTENNA CONNECTION

This tuner accepts either 300-ohm twin lead or 75-ohm coaxial cable. The 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 75-ohm coaxial cable 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.

See page 10 for detailed information about FM antennas and multipath reception.

### 300-ohm twin lead connection

Loosen the nuts on the 300-ohm terminals, insert the firmly twisted wires into the holes, and tighten the nuts.

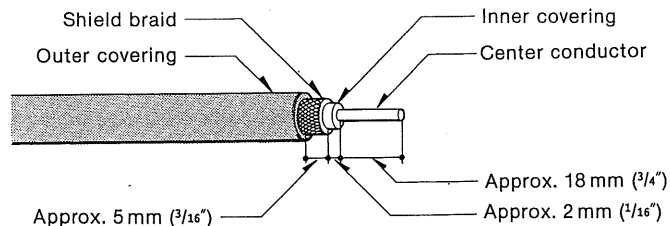


### 75-ohm coaxial cable connection

If 75-ohm coaxial cable is used, attach the supplied connector as described below, and connect the cable to the 75Ω COAXIAL INPUT.

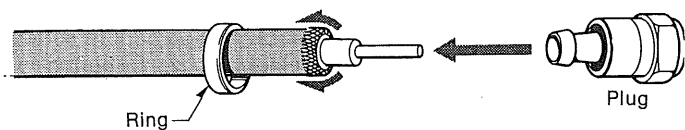
① Cut and remove the outer covering, shield braid and inner covering with knife or razor blade as shown.

Be careful not to damage the center conductor.

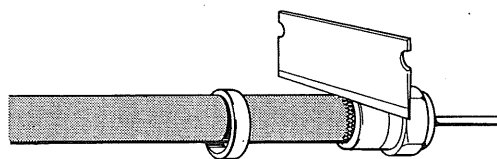


If the center conductor is a stranded type, twist the strands tightly and solder them. Do not use too much solder.

② Pass the ring over the cable, and spread the braid. Then push the connector into the cable between the braid and the inner covering.

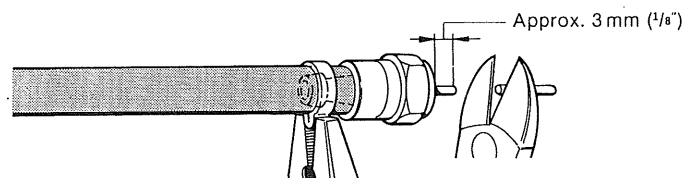


③ Cut the excess braid.



④ Crimp the ring with a lineman's plier to secure the connector.

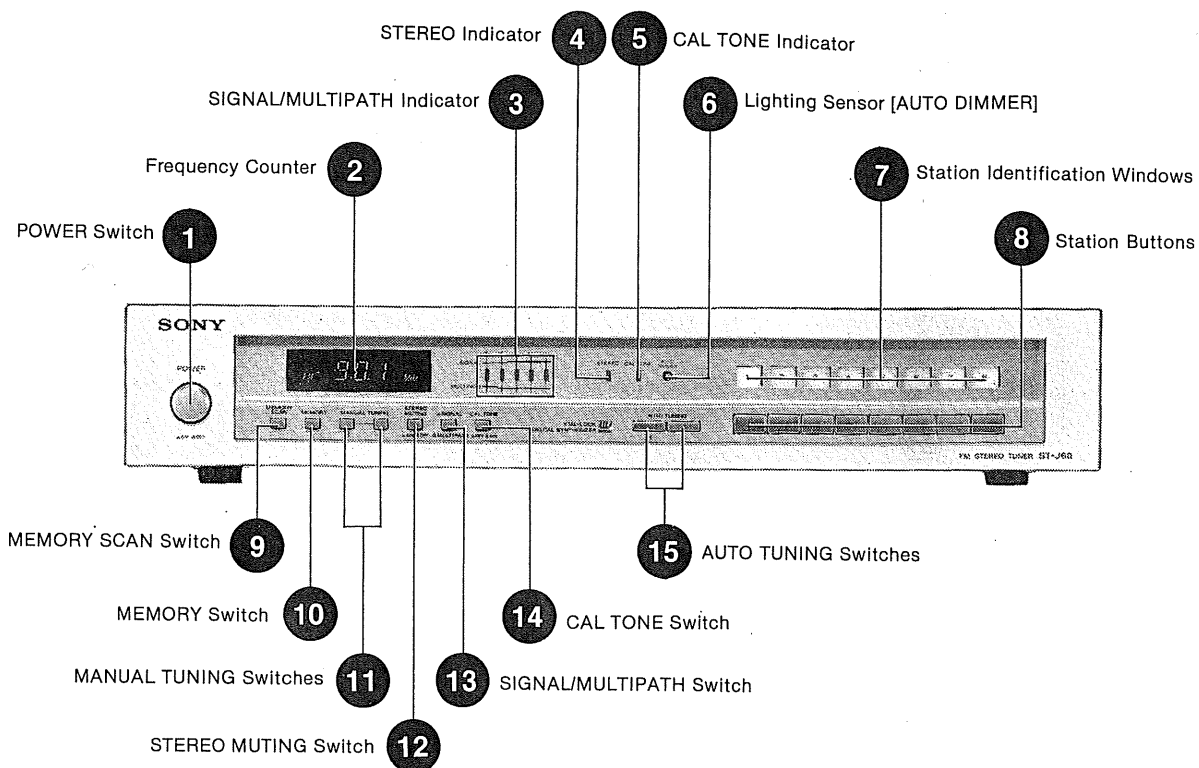
⑤ Let the center conductor protrude about 3 mm (1/8 inch): cut off the excess conductor.



## FUNCTION OF CONTROLS

Before plugging in or attempting to operate this tuner, it is suggested that you familiarize yourself with all its switches and controls and the purpose of each.

Each number in the photo is keyed to the descriptive text.



### ① POWER Switch

Turns the operating power on or off. When the power is turned on, the frequency which had been received before is turned in automatically.

### ② Frequency Counter

Permits reading the received frequency at a glance from the figures.

### ③ SIGNAL/MULTIPATH Indicator

This is a dual-function indicator which normally shows the signal strength of FM broadcast stations. A station is optimally tuned when the highest possible numbered LEDs are illuminated. By setting the SIGNAL/MULTIPATH switch to  MULTIPATH, the indicator shows the magnitude of the multipath component of the signal. For details refer to page 10.

### ④ STEREO Indicator

Lights up when an FM stereo program of sufficient signal strength is tuned in while the STEREO MUTING switch is set to  ON.

### ⑤ CAL TONE Indicator

Lights up when a 400 Hz calibrating tone signal is provided by setting the CAL TONE switch to  ON.

### ⑥ Lighting Sensor [AUTO DIMMER]

This senses the lighting of the room and selects the brightness of the frequency display automatically. If the room is dark, the display is dimmed, and if the room becomes lighter, the display is brightened automatically.

### ⑦ Station Identification Windows

Station labels (supplied) identifying pre-memorized stations are placed in these windows.

### ⑧ Station Buttons

To tune to a pre-memorized station, press the appropriate button. The lamp in the station identification window above the button will light up when the button is pressed.

### ⑨ MEMORY SCAN Switch

Press for automatic scanning of the preset stations on the station buttons. For details, refer to page 9.

### ⑩ MEMORY Switch

Press to operate the memory circuit. The MEMORY indicator will appear on the frequency counter for a few seconds indicating that the memory circuit is standing by.

## FM RECEPTION

### ⑪ MANUAL TUNING Switches

For manual tuning, press either of these two buttons to change the frequency.

Press the left switch [<] to go to a lower frequency, and the right switch [>] to go to a higher. Momentarily pressing the switch changes the frequency one channel (0.2 MHz) at a time. If you keep the switch depressed, the frequencies will change rapidly.

### ⑫ STEREO MUTING Switch

Normally keep this switch depressed (ON) to eliminate FM interstation noise while tuning from station to station.

When a stereo signal of sufficient strength is received, the tuner operates in stereo mode and the STEREO indicator lights up.

When you want to tune in a very weak station, or when an FM program is too noisy, depress again to release this switch (OFF). This will enable the tuner to receive weak stations, although the stereo feature is sacrificed. When setting the STEREO MUTING switch to OFF, keep the amplifier volume down to avoid speaker damage caused by the interstation noise.

### ⑬ SIGNAL/MULTIPATH Switch

Normally keep this switch depressed (SIGNAL). The SIGNAL/MULTIPATH indicator shows the strength of the received signals. To check the multipath reception, set this switch to the released position (MULTIPATH).

### ⑭ CAL TONE Switch

Normally keep this switch depressed (OFF).

Press and release this switch (ON) to obtain a 400 Hz, 50% modulated signal for calibrating the recording level. When recording broadcasts, first adjust the recording level by using this signal. Generally, on ordinary cassette decks, adjust the recording level so that the pointers of the VU meters deflect as close to -3 dB as possible, and on Elcaset decks or reel-to-reel tape decks, as close to 0 dB as possible. However, depending on the broadcast programs or the tapes you use, some further adjustments may be necessary. You can determine the most appropriate recording level for your deck after several trials, using the suggested levels as a starting point.

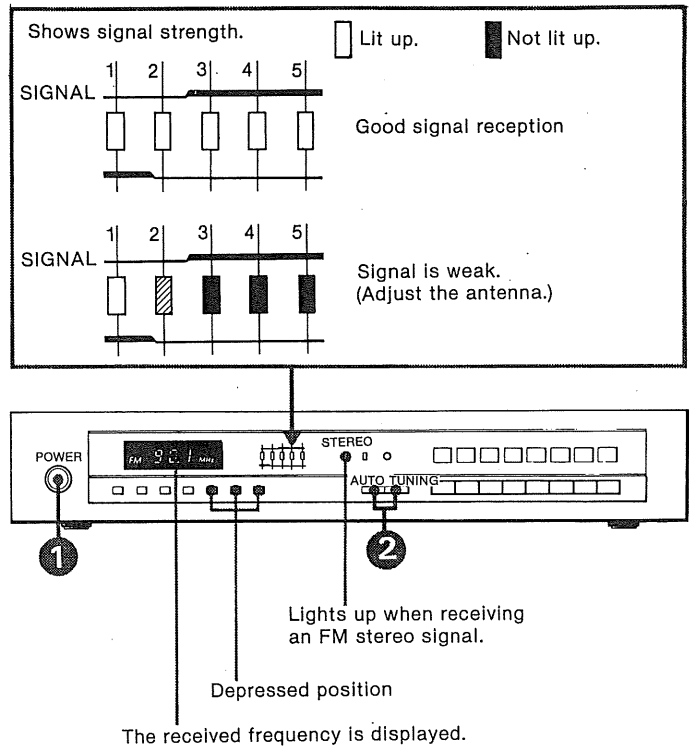
### ⑮ AUTO TUNING Switches

For automatic tuning, press either of these two switches; the left switch [<] to go to a lower frequency, and the right switch [>] to go to a higher. When the switch is pressed, the frequencies below (or above) that shown on the counter will be scanned automatically until a signal is received. To continue scanning, press it again.

### AUTOMATIC TUNING

By simply pressing the AUTO TUNING button [<] or [>] once, the frequency counter figures change rapidly and stop automatically when a radio broadcasting signal of a sufficient strength is received.

This tuning system is convenient for receiving those stations whose frequency has not been memorized, or to see what kind of programs are on the air.



① Depress the POWER switch to ON.

② Press either the left [<] (for lower frequencies) or the right [>] (for higher) AUTO TUNING switch to start automatic frequency scanning.

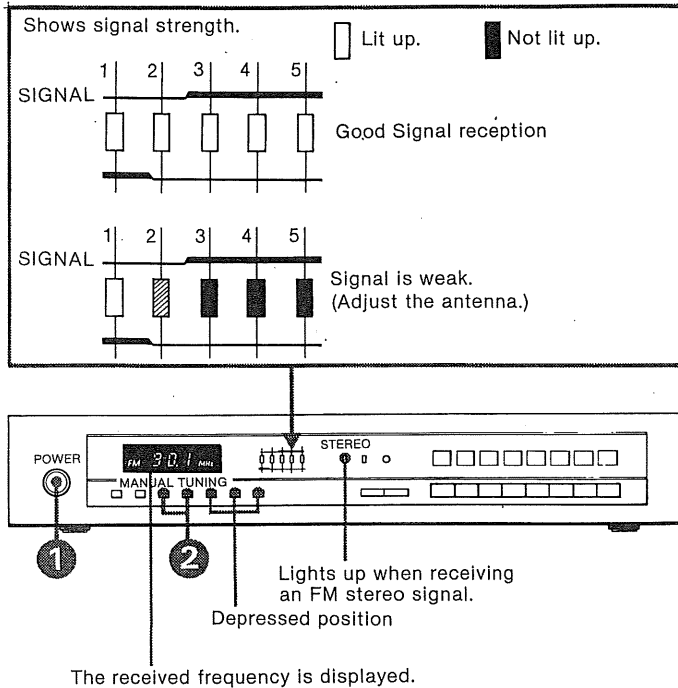
The frequency counter figures change rapidly and stop when a signal is received. If the received signal is not a desired one, press the button again. Repeat this step until a desired station is tuned in.

### Notes

● When the frequency counter figures reach the edge of the tuning range, 87.5 MHz or 107.9 MHz, the frequency will then be counted from the opposite edge of the tuning range; i.e., when the frequency is counted down to 87.5 MHz, the figures 107.9 will then appear on the counter and continue counting down.

● If the counter does not stop at the desired frequency, adjust the antenna for optimum reception. If the signal strength is still too weak for automatic tuning, tune in the station according to "MANUAL TUNING" on the next page.

## MANUAL TUNING



- ① Depress the POWER switch to ON.
- ② Select the frequency of the desired station with the MANUAL TUNING switches.

Press either the left [ $<$ ] (for lower frequencies) or the right [ $>$ ] (for higher) switch and keep the switch depressed until the counter figures approach the desired frequency. Then keep pressing the switch momentarily to change the frequency 0.2 MHz steps until the desired frequency appears on the counter.

### Notes

- When FM stereo signals are noisy, or to tune in a very weak station, lower the volume and release the STEREO MUTING switch by pressing it again. This will result in better reception.
- When the frequency counter figures reach the edge of the tuning range, 87.5 MHz or 107.9 MHz, the frequency will then be counted from the opposite edge of the tuning range; i.e., when the frequency is counted down to 87.5 MHz, the figures 107.9 will then appear on the counter and continue counting down.

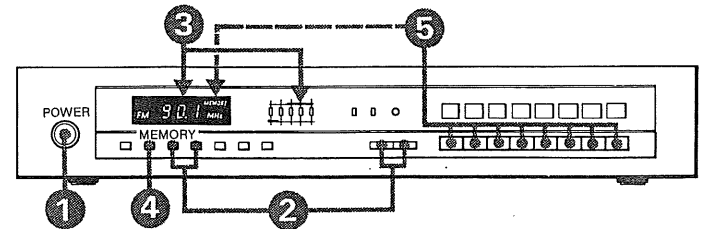
## MEMORY TUNING

With a conventional tuner, it is necessary to turn the tuning knob and search for the desired station each time you wish to tune in a station.

With this tuner, owing to an electronic tuning system using a PLL (Phase Locked Loop) synthesizer and a memory circuit, the tuning procedure is much simplified. Once you commit the frequencies to memory, pushing a button is enough to tune in a desired station.

### To memorize the station frequencies

The numbers in the illustration refer to the sequence of operations.



- ① Depress the POWER switch to ON.
- ② Tune in the station you wish to memorize with either the AUTO TUNING switch or the MANUAL TUNING switch.
- ③ Make sure that the desired station frequency is indicated on the frequency counter, and check the receiving condition. Adjust the antenna, if necessary, so that the SIGNAL/MULTIPATH indicator lights up as fully as possible.
- ④ Press the MEMORY switch. The MEMORY indicator will appear on the frequency counter indicating that the memory circuit is ready for storing the data.
- ⑤ While the MEMORY indicator is illuminated, press the desired station button to memorize the frequency. The lamp in the identification window above the button lights up and the frequency is then committed to memory.

**Note:** The MEMORY indicator will go off automatically after a few seconds. When the indicator is out, the memory circuit does not operate to memorize the station.

Repeat the steps ② to ⑤ for each station button. A total of 8 buttons can be preset in any desired sequence. The previous memory will be erased when a new frequency is committed to the memory of the same button. An erasure cannot be made without a new input.



### To receive a preset station

Turn the POWER switch on and simply press the desired station button.

### Memory scan

This system is convenient for seeing what kind of programs are being broadcast by the pre-memorized stations.

When the MEMORY SCAN switch is pressed, the automatic memory scanning system operates and the pre-memorized frequencies will be automatically tuned in one after another, each for 3.5 seconds.

The scanning starts from the pre-memorized station just to the right of the pre-memorized station being received when that station has been tuned by memory tuning, and continues through all the stations. The scanning starts from the pre-memorized station on the far left and continues to the station on the far right when manual or automatic tuning has been used. When it has reached the station on the far right, it begins the sequence again. The lamp in the station identification window above the button of the pre-memorized station tuned in will flicker. If you decide that you would like to listen to any of the stations being scanned, press the button of that station and the scanning will stop.

### Memory of the last received station

This tuner includes a memory circuit to remember the station which had been received just before the power was turned off. This station will be automatically tuned in when the power is turned on again.

This memory system enables you to make a timer-activated recording from the tuner.

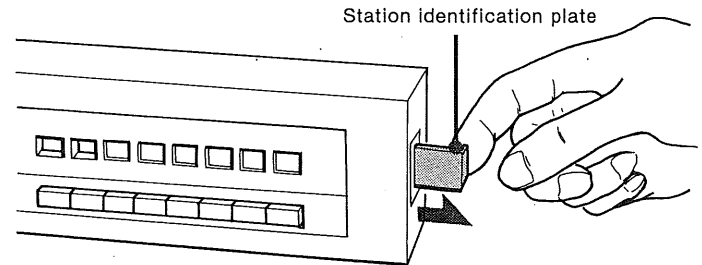
● A station which has been received for less than 1 second cannot be memorized, but the one before that is memorized, if received for over a second.

● If the power is turned off while memory scanning, even if a station has been received for 3.5 seconds, this memory circuit will not operate.

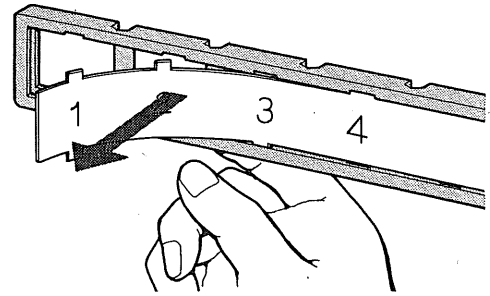
### STATION LABELS

Station labels are supplied for identification of the preset stations. Affix the labels as follows :

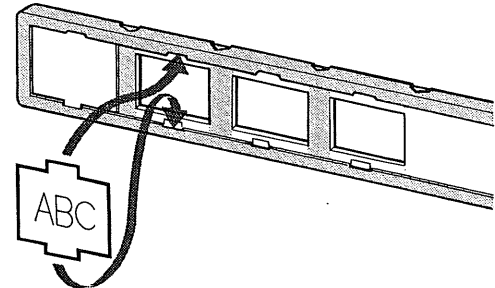
① Pull out the station identification plate from the cutout on the right side.



② Remove the label by pushing out from the back.



③ Pick out the appropriate labels for the pre-memorized stations and put them on the plate as shown in the correct order.



④ Replace the plate.

Check that the station labels match the pre-memorized stations by tuning in to each station.

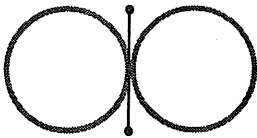
## ANTENNAS

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 one, the supplied ribbon antenna may be useful.

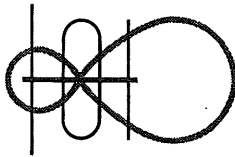
In a strong signal area, the familiar "rabbit-ear" antenna is simple to install and is usually suitable for FM reception, since it can be adjusted easily for best signal pickup. If there are many high structures nearby, and evidence of strong multipath reception is present, use a highly-directional rotatable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

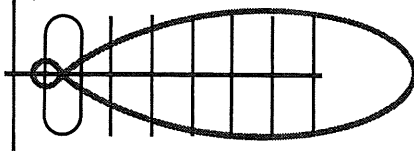
Ribbon dipole and rabbit-ear antennas pick up signals from both front and rear equally well.



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



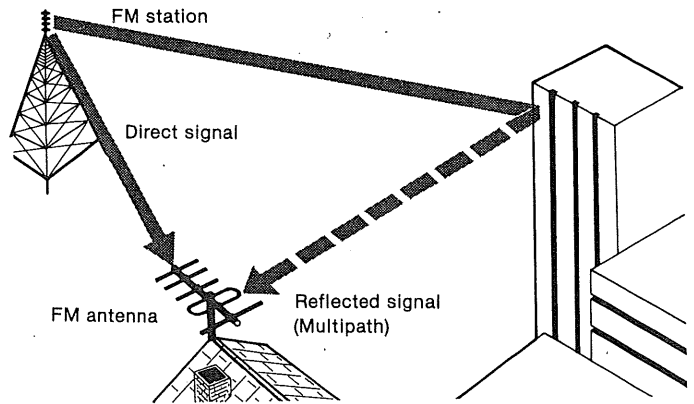
Multi-element type has narrower pickup pattern with high frontal sensitivity and superior rejection of rear signals.



### 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. To help

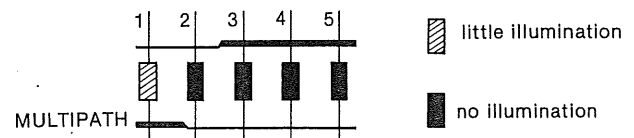
eliminate the effects of multipath by antenna readjustment, this tuner employs a visual readout of the received strength of the multipath signal.



### ANTENNA ORIENTATION

For the highest quality reception, once the antenna has been installed, it should be adjusted to furnish a maximum of signal strength and a minimum multipath component. This can be readily done if either a "rabbit-ear" or motor driven antenna is used. Adjustment is facilitated by the use of the SIGNAL/MULTIPATH indicator. Normally this indicator gives a visual indication of the station signal strength. However, when the SIGNAL/MULTIPATH switch is set to  MULTIPATH, the magnitude of the station multipath component is visually indicated. The desired objective of maximum signal and minimum multipath can be quickly and easily accomplished by following this procedure :

- ① Adjust antenna direction and height so that the SIGNAL/MULTIPATH indicator shows the best possible reception.
- ② Press and release the SIGNAL/MULTIPATH switch ( MULTIPATH).
- ③ Rotate the antenna to find minimum illumination of the SIGNAL/MULTIPATH indicator.



- ④ Depress the SIGNAL/MULTIPATH switch again ( SIGNAL) and recheck to see if the signal strength is sufficient for lowest noise reception.

If your favorite stations lie in different directions, this procedure should be accomplished at each change of station. When a fixed position antenna is used, vary the location and direction until an overall satisfactory position is found before making the installation permanent.

In locations where ignition noise is severe, the antenna should be located as far away from the highway as possible, and used with a shielded or coaxial lead-in.

## SPECIFICATIONS

### Tuner section

Tuning range	87.5 MHz – 107.9 MHz
Antenna terminals	300 ohms, balanced 75 ohms, unbalanced coaxial input
Intermediate frequency	10.7 MHz
Sensitivity at 50 dB quieting	16.1 dBf, 3.5 $\mu$ V (mono) 37.3 dBf, 40 $\mu$ V (stereo)
Usable sensitivity	10.3 dBf, 1.8 $\mu$ V
Signal-to-noise ratio	77 dB (mono) 72 dB (stereo)
Harmonic distortion	at 100 Hz 0.06% (mono), 0.08% (stereo) at 1 kHz 0.06% (mono), 0.08% (stereo) at 10 kHz 0.06% (mono), 0.15% (stereo)
IM distortion	0.06% (mono) 0.08% (stereo)
Separation	at 100 Hz 48 dB at 1 kHz 50 dB at 10 kHz 40 dB
Frequency response	30 Hz – 15 kHz $\pm 0.2$ dB
Selectivity	at 400 kHz 85 dB
Capture ratio	1.0 dB
AM suppression ratio	60 dB
Image response ratio	85 dB
IF response ratio	95 dB
Spurious response ratio	100 dB
RF intermodulation	70 dB
Sub-carrier product ratio	72 dB
Muting and auto-tuning threshold	Approx. 5 $\mu$ V
Output level (75 kHz deviation)	750 mV, 4 k ohms
CAL TONE	50% modulation (37.5 kHz deviation), 400 Hz

### General

System	PLL crystal locked digital synthesizer system
Semiconductors	11 ICs, 3 FETs, 38 transistors, 53 diodes, 15 LEDs
Power requirements	120 V ac, 60 Hz
Power consumption	13 W
Dimensions	Approx. 430 × 80 × 310 mm (w/h/d) (17 × 3 $\frac{1}{4}$ × 12 $\frac{1}{4}$ inches) including projecting parts and controls
Weight	Approx. 4.3 kg (9 lbs 8 oz) net Approx. 5.1 kg (11 lbs 4 oz) in shipping carton
Supplied accessories	FM ribbon antenna (1) 75-ohm antenna cable connector (1) Connecting cord (1) Station label (1 set)

Design and specifications subject to change without notice.

## TROUBLE CHECKS


The following checks will assist in the correction of most problems which you may encounter with your unit. Should any problem persist after you have made these checks, consult your nearest Sony service facility.

Before going through the check list below, first refer back to "CONNECTION DIAGRAM" on page 4 and operating procedures on pages from 7 to 9.

### No audio output

- 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.

### The SIGNAL/MULTIPATH indicator reading is unstable.

- Tune accurately.
- Adjust the antenna orientation.
- Check that the SIGNAL/MULTIPATH switch is depressed ( SIGNAL).

### The STEREO indicator flickers.

- Tune accurately.
- Adjust the antenna.

### Severe hum or noise

- Tune accurately.
- Use shielded antenna leads.
- Avoid long horizontal runs of antenna lead.
- Keep antenna leads away from transformers or motors, and at least 3 meters (10 feet) from TV sets and fluorescent lights.
- Adjust the antenna.
- When listening to FM stereo programs, releasing the STEREO MUTING switch by depressing it will provide less noise in the monaural mode.

### Ignition noise

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

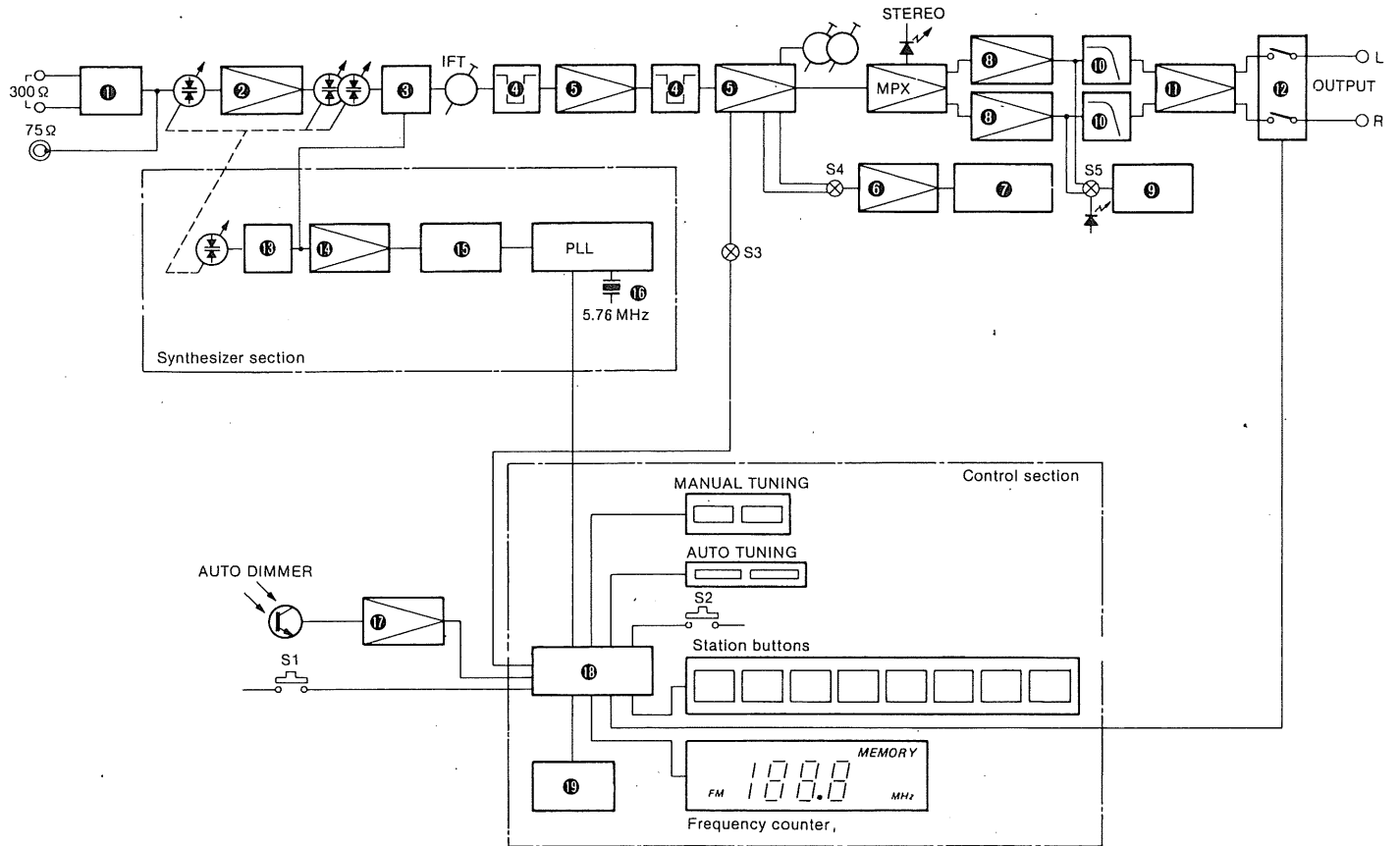
### Tuning cannot be done correctly when the station button is pressed.

- Memorize the frequency correctly.
- Try again after turning off the power once and turning on again.

### The frequency counter does not stop at the desired station during automatic tuning.

- The signal strength is too weak for automatic tuning. Adjust the antenna for optimum reception or tune in the station with manual tuning system.

# BLOCK DIAGRAM



- ① Balun
- ② RF amp
- ③ Mixer
- ④ Uni-phase filter
- ⑤ IF amp
- ⑥ Driver
- ⑦ SIGNAL/MULTIPATH indicator
- ⑧ Buffer amp
- ⑨ CAL TONE osc.
- ⑩ Low-pass filter

- ⑪ Output amp
- ⑫ Relay
- ⑬ Local osc.
- ⑭ Buffer amp
- ⑮ Prescaler
- ⑯ Crystal osc.
- ⑰ Buffer amp
- ⑱ Controller
- ⑲ Memory circuit

- S1 MEMORY SCAN switch
- S2 MEMORY switch
- S3 STEREO MUTING switch
- S4 SIGNAL/MULTIPATH switch
- S5 CAL TONE switch