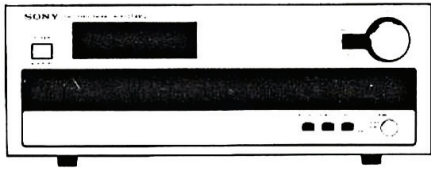


SONY®

FM STEREO/FM-AM TUNER

ST-4950



OWNER'S INSTRUCTION MANUAL

Please read this manual completely to become familiar with all the features and capabilities of your new Sony high-fidelity tuner. Keep this manual handy for future reference.

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FEATURES

The ST-4950 is a highly sophisticated and sensitive fm stereo/a-m tuner, designed with the most advanced Sony techniques for discriminating audiophiles.

In the fm tuner section, a MOS FET front end, solid-state IF filters and an IC IF amplifier assure not only excellent selectivity and high sensitivity without distortion even in a strong signal strength area, but a lower noise level and better interference rejection.

The new Phase Lock Loop (PLL) FM Multiplex demodulator IC stably ensures the greatest stereo separation and lowest possible distortion.

Accurate and stable tuning is facilitated by using the new type CG variable condenser. The Light Emitting Diode (LED) dial indicator marks the desired stations sharply and precisely.

In the a-m tuner section, better interference rejection is obtained by the use of a newly-developed IF filter. Also the improved AGC circuit used in the RF block provides wide input dynamic range and less distortion.

The strength of fm multipath signals, which so significantly affects the quality of fm stereo reception, is visually indicated to assist in adjusting the antenna direction for the clearest signal.

A discriminator output jack is provided for any adaptors that may be required in the future for discrete 4-channel FM transmissions.

WARNING

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

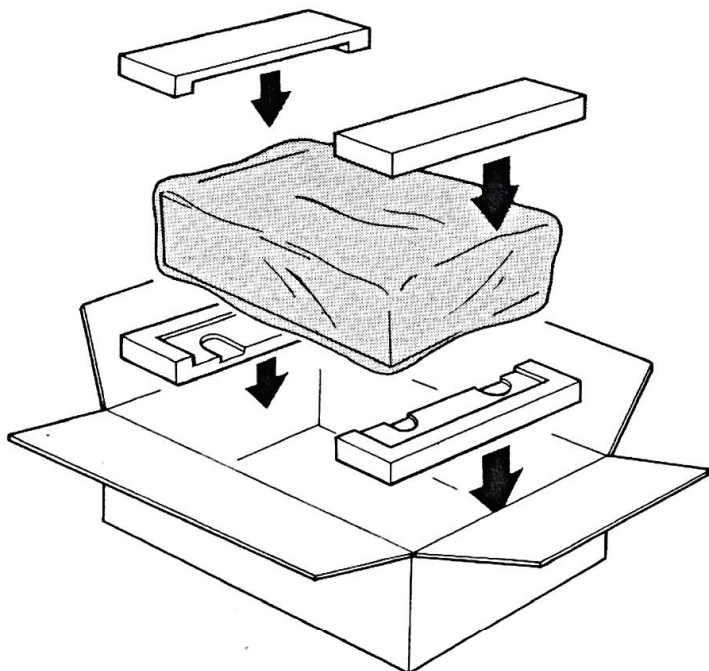
PRECAUTIONS

- Operate the set only on 120 V ac, 60 Hz.
- Should any liquid or solid object fall into the cabinet, unplug the set and have it checked by qualified personnel before operating it any further.
- Good air circulation is essential to prevent internal heat build-up in the set. Place the set in a location with adequate air circulation. Do not place the set on a soft surface such as a rug or in an enclosed cabinet that would block the ventilation holes on the bottom.
- Unplug the set from the wall outlet when it will not be used for an extended period of time.
- To disconnect the cord, pull it out with the plug. Never pull it by the cord.
- Don't install the set 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.
- When the set is not used, turn the power off, to conserve energy and to extend the useful life of the tuner.
- Do allow more than 5 inches of space behind the set so that the direction of the built-in ferrite-bar antenna can be adjusted.

UNPACKING

Do not throw away the ST-4950 carton and the associated material; they will come in handy if you ever have to transport or ship your set. Inspect your ST-4950 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, the unit should be repacked in the original carton and packing material just as before.



SYSTEM CONNECTIONS

CONNECTION NOTES

To assure correct matching at the input and output terminals of your audio system, refer to the table of "SPECIFICATIONS" on page 10, and to the specifications given in the instruction manuals provided with your amplifier. Generally the output level of the ST-4950 should be equal to or slightly greater than the sensitivity of the corresponding input. Also the output impedance of the ST-4950 should be considerably lower than the impedance of the corresponding input.

For all input and output connections use a low-capacitance type shielded cable like the ones supplied. Keep the cables as short as practicable, avoiding horizontal runs. Excessively-long runs (over 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. The power cord should be connected last of all, first making sure that the POWER switch is released.

Ground Connection

When an outdoor antenna is installed, a direct ground is recommended for lightning protection. For indoor antennas, a connection to an ac outlet plate screw is satisfactory. Never connect to a gas pipe.

FM ANTENNA CONNECTION

The tuner accepts 300-ohm twin lead and 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.

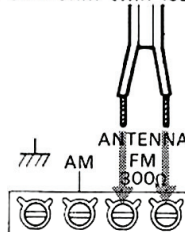
To avoid excessive loss of signal strength and to minimize undesired pickup on the line, observe the following precautions.

- 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.

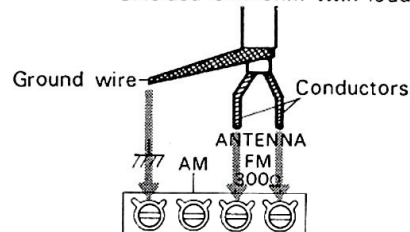
300-ohm Twin Lead Connection

For the use of 300-ohm twin lead, connect it to the FM 300Ω terminal as follows.

Standard 300-ohm twin lead



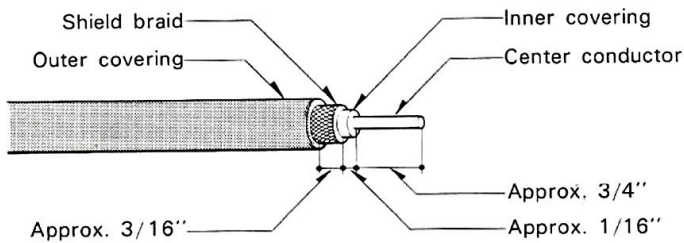
Shielded 300-ohm twin lead



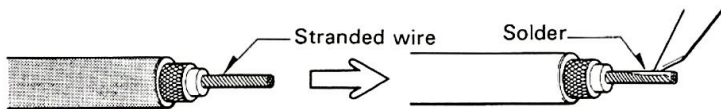
75-ohm Coaxial Cable Connection

For the use of 75-ohm coaxial cable, attach the supplied connector as described below, and connect the cable to the FM 75 Ω COAXIAL INPUT. Type RG-59U cable is ideal for this use.

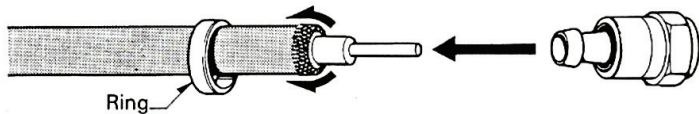
❶ Cut and remove the outer covering, shield braid and inner covering with knife or razor blade as shown. Be careful not to damage the center conductor.



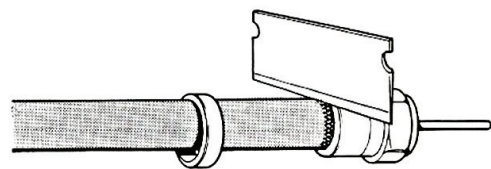
If the center conductor is a stranded type, twist the strands tightly and solder them.



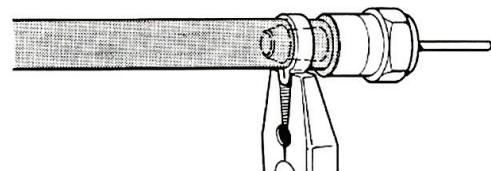
❷ Pass the ring over the cable, and spread the braid. Then push the connector into the cable between the braid and the inner covering.



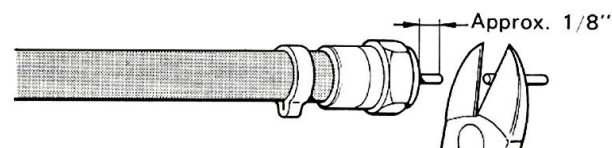
❸ Cut the excess braid.



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

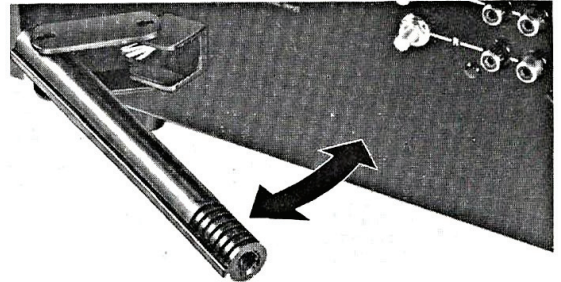


❺ Let the center conductor protrude about 1/8 inch; cut off the excess conductor.



AM ANTENNA CONNECTION

In most areas, the built-in ferrite-bar antenna will provide satisfactory a-m reception. Move the antenna on the rear panel as shown for best reception.



In difficult reception areas, it may be necessary to connect a length of insulated wire 20–50 feet long to the AM ANTENNA terminal. Extend this out of doors if possible, keeping the greater portion horizontal. A-m signal strength is indicated on the SIGNAL MULTIPATH meter; the stronger the signal, the greater the deflection to the right.

OUTPUT CONNECTIONS

FIXED OUTPUT jacks

These connect the fm signals at a 750 millivolt output level (at 100% modulation) to the TUNER input jacks of the amplifier.

VARIABLE OUTPUT jacks

The output levels at these jacks can be varied continuously from 0 to 2 volts by turning the associated LEVEL ADJUST screws. These are useful in equalizing the volume produced by the tuner with that provided by other signal sources such as tape recorders, record players, etc.

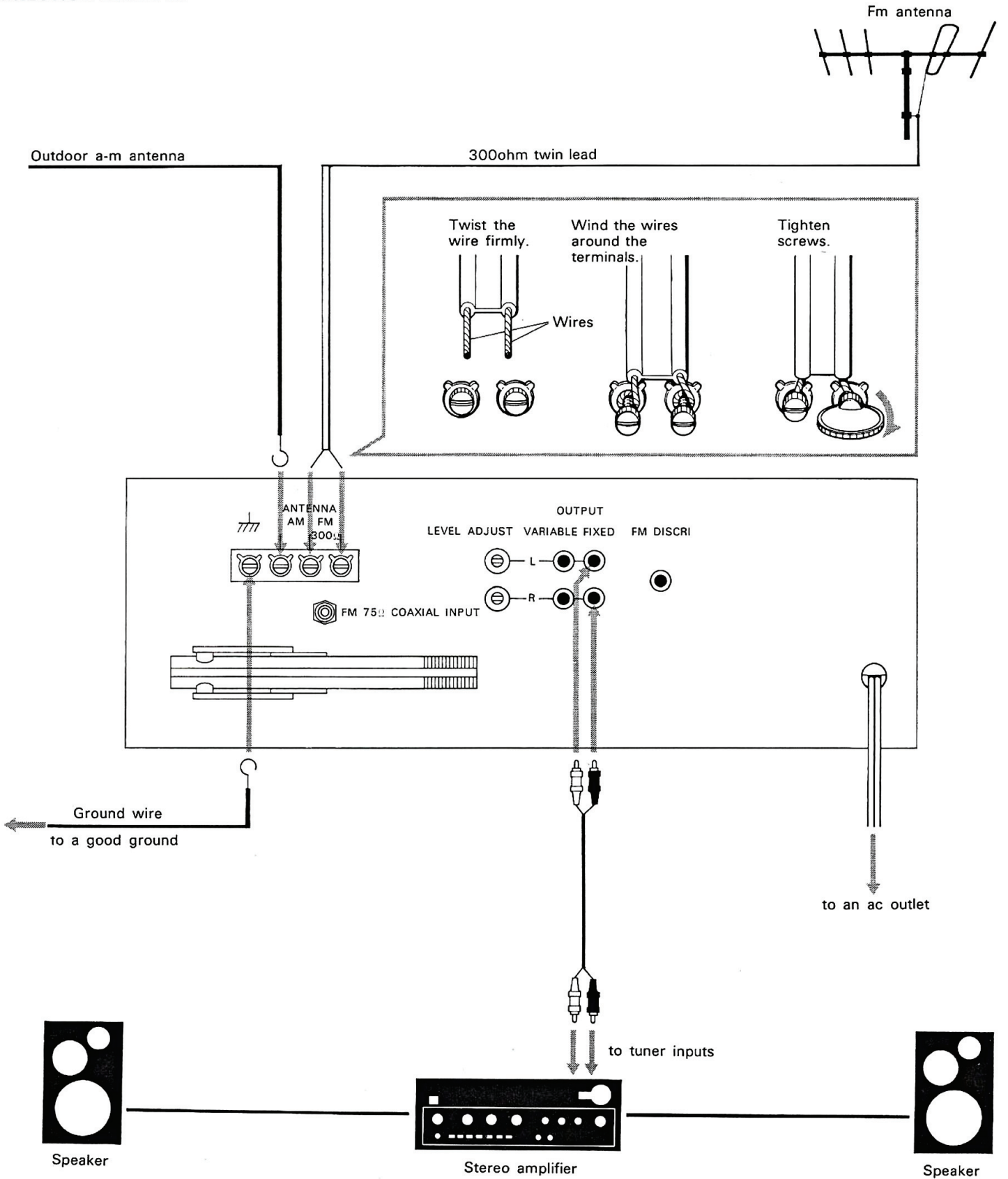
Note 1: Be sure to connect the L jack of the tuner to the left input jack of the amplifier and the R to the right.

Note 2: You can use both FIXED and VARIABLE jacks simultaneously.

FM Discriminator Output jack [FM DISCRI]

This jack accepts an adaptor for fm discrete four-channel broadcasts. An output of 150 millivolts is supplied to this jack when receiving a 100% modulated signal.

CONNECTION DIAGRAM

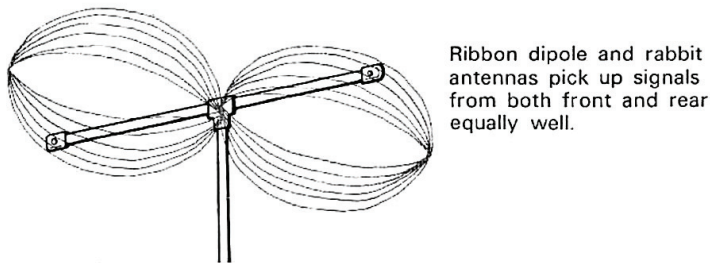


FM ANTENNAS

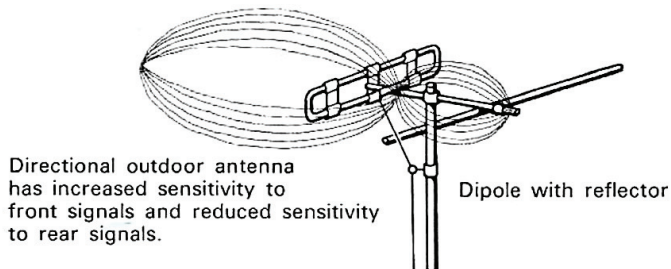
Good fm reception depends not only on the tuner sensitivity but on the quality of the received signals. This is determined by the signal strength, the presence of multipath signal and the geographic location of the desired fm stations. To get the best from your tuner, use an antenna suited to your location.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

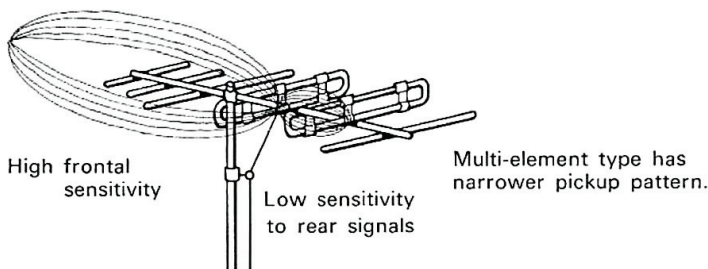


Ribbon dipole and rabbit antennas pick up signals from both front and rear equally well.



Directional outdoor antenna has increased sensitivity to front signals and reduced sensitivity to rear signals.

Dipole with reflector



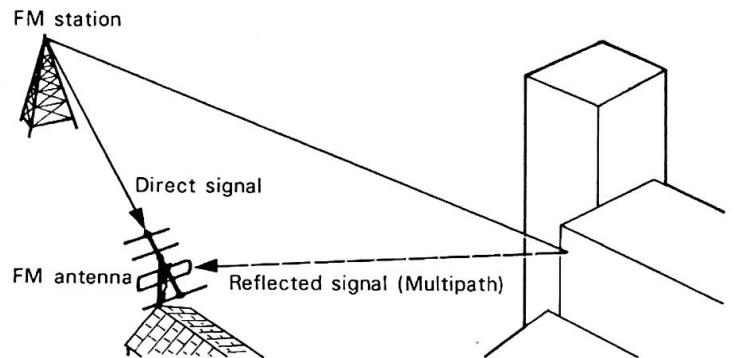
High frontal sensitivity

Low sensitivity to rear signals

Multi-element type has narrower pickup pattern.

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 shielded twin lead, and a good directional antenna that is correctly oriented. To help eliminate the effects of multipath by antenna readjustment, the ST-4950 employs a visual readout of the received strength of the multipath signal.



FM 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 meter which is part of the Sony ST-4950. Normally this meter gives a visual indication of the station signal strength. However, when the MULTIPATH switch is pressed, 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 adjusting first for maximum signal strength. Then depress the MULTIPATH switch and rotate the antenna (by hand or motor, as the case may be) for a minimum multipath indication on the meter. Now recheck to see if the signal strength is sufficient for lowest noise reception. In most cases, this procedure for finding the optimum signal/multipath ratio should only take a few seconds.

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.

LOCATION AND 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.

❶ POWER switch

Depress it to apply power to the tuner. The dial will light.

❷ MULTIPATH switch

Check the multipath reception on fm by pushing this switch. If the SIGNAL MULTIPATH meter reads "0", no multipath is being received. If there is a substantial deflection, readjust the antenna. (See "FM ANTENNA ORIENTATION" on page 6)

❸ HI-BLEND switch

Normally keep this switch released. If a stereo signal contains background hiss or static, depress this switch to obtain satisfactory listening. This activates the high-blend circuit to mix the high-frequency components of the left and right channels, thereby cancelling noise without affecting frequency response, although there is a reduction in stereo channel separation at the higher-frequencies. If the signal strength is not adequate and background noise is noticeable, use of this switch will effectively improve reception.

❹ AFC switch (Automatic Frequency Control)

This switch locks the tuner on an fm station to prevent drifting or fading, and to keep out noise and sideband hiss. When tuning fm stations, be sure to release this switch and tune in your desired station precisely. After correct tuning, depress this switch.

❺ FUNCTION selector

FM STEREO for fm station, usually 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.

FM MONO locks the tuner to monophonic operation, which is helpful when the broadcast is weak and noisy.

AM for a-m reception.

❻ TUNING knob

Selects the desired fm or a-m station.

When the desired station is tuned in, the SIGNAL MULTIPATH meter swings to the right; the maximum deflection to the right means correct tuning.

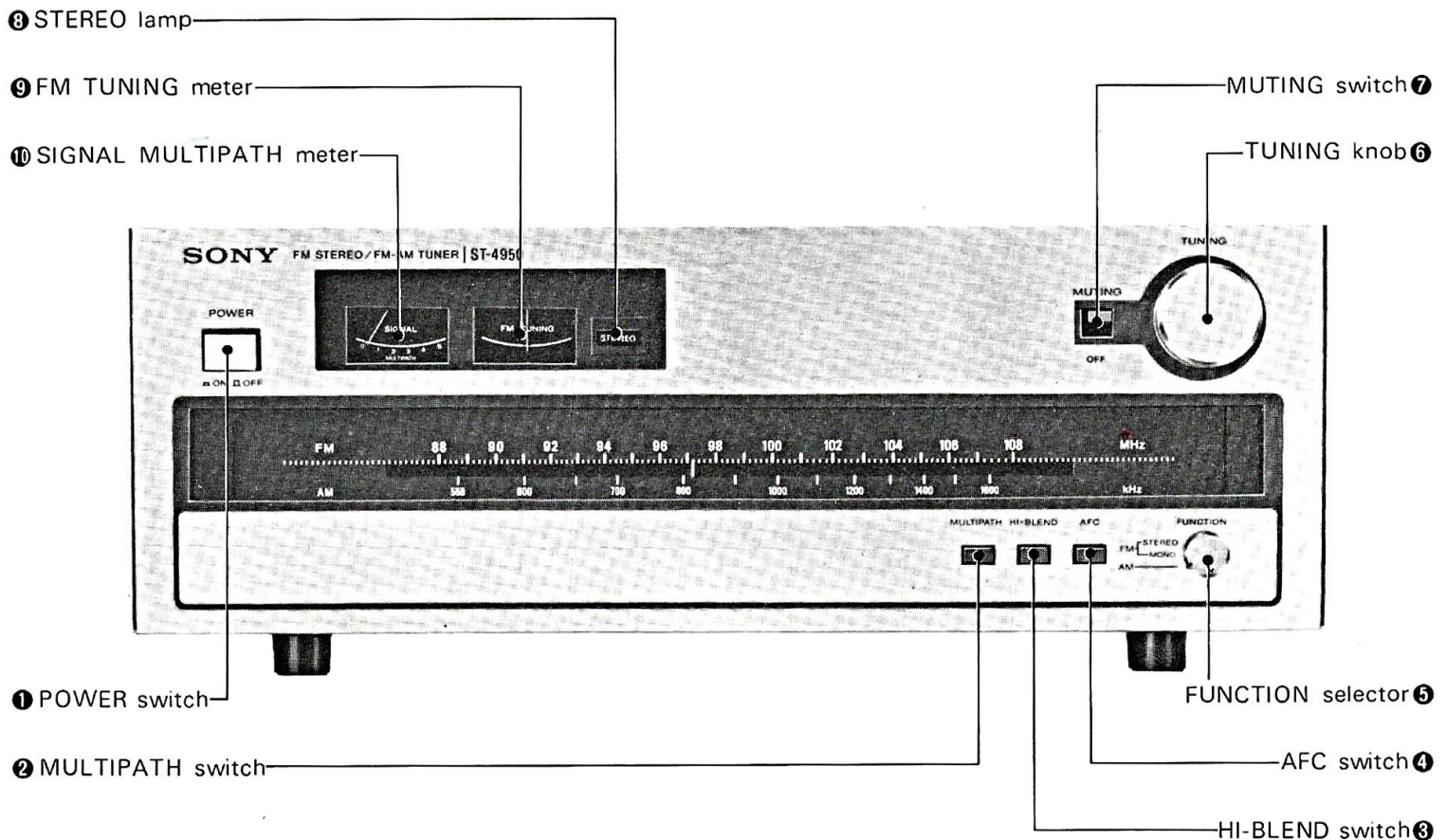
On fm reception, the upper half of the dial indicator will light up when receiving the fm signal, and the center position of the FM TUNING meter shows the best tuning point.

❼ MUTING switch

Normally keep this switch at the upper position to eliminate fm interstation noise while tuning from station to station. Very weak stations are also muted along with the noise, and must be tuned in with the switch set to OFF. In this case, keep the volume down to avoid speaker damage caused by the interstation noise.

❽ STEREO lamp

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



OPERATION

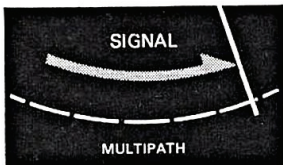
9 FM TUNING meter

While receiving fm programs, this meter acts as a center-of-channel indicator; correct tuning is indicated by a center reading. When the dial indicator comes near the station, the meter pointer will swing either to the left or right, and the pointer will return to the center position at the channel center of the selected station as the correct tuning point is reached. Detuning from the center point will also cause the pointer to move to the right or left, and it will return to the center again when detuned completely.

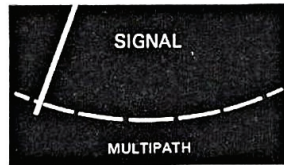


10 SIGNAL MULTIPATH meter

This is a dual-function meter which normally indicates the signal strength of fm and a-m broadcast stations. The maximum pointer deflection to the right means best tuning of the signal. Relative strength of received signals is shown by the amount of pointer deflection. If the pointer always reads 0-1, the signal level is too weak for full performance. In this case, adjust the antenna.

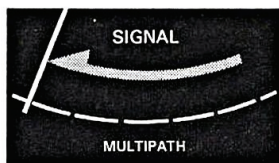


Good antenna input



Weak antenna input

However, on fm stations, by pressing the MULTIPATH switch, the magnitude of the multipath component is indicated by the degree of meter deflection. If this deflection is substantial, perceptible distortion will be present, and should be removed by readjusting the antenna.



Adjust the antenna direction until the meter reads "0".

FM RECEPTION

- 1 Depress the POWER switch to turn on the set.
- 2 Set the FUNCTION selector to FM STEREO.
- 3 Release the HI-BLEND and AFC switches and set the MUTING switch to its upper position.
- 4 Tune in the desired station with the TUNING knob. The correct tuning is shown by the SIGNAL MULTIPATH and FM TUNING meters. When the programs are stereophonic, the STEREO lamp will light.
- 5 Depress the AFC switch.
- 6 Adjust the volume and tone quality with the controls of the amplifier.

Note 1: To tune in very weak stations, lower the volume and set the MUTING switch to OFF.

Note 2: When fm stereo signals are too weak or noisy, the STEREO lamp will flicker. If this happens, adjust the antenna, or depress the HI-BLEND switch, or set the FUNCTION selector to FM MONO.

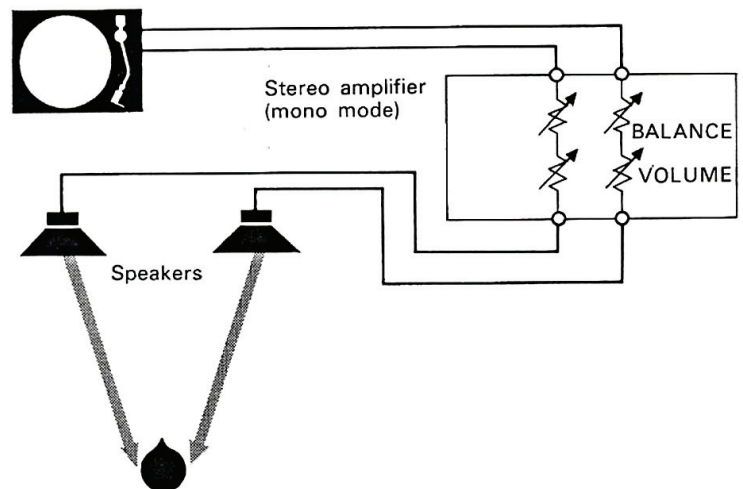
AM RECEPTION

- 1 Depress the POWER switch to turn on the set.
- 2 Set the FUNCTION selector to AM.
- 3 Tune in the desired station with the TUNING knob. The correct tuning is shown by the maximum deflection of the SIGNAL MULTIPATH meter.
- 4 Adjust the volume and tone quality with the controls of the amplifier.

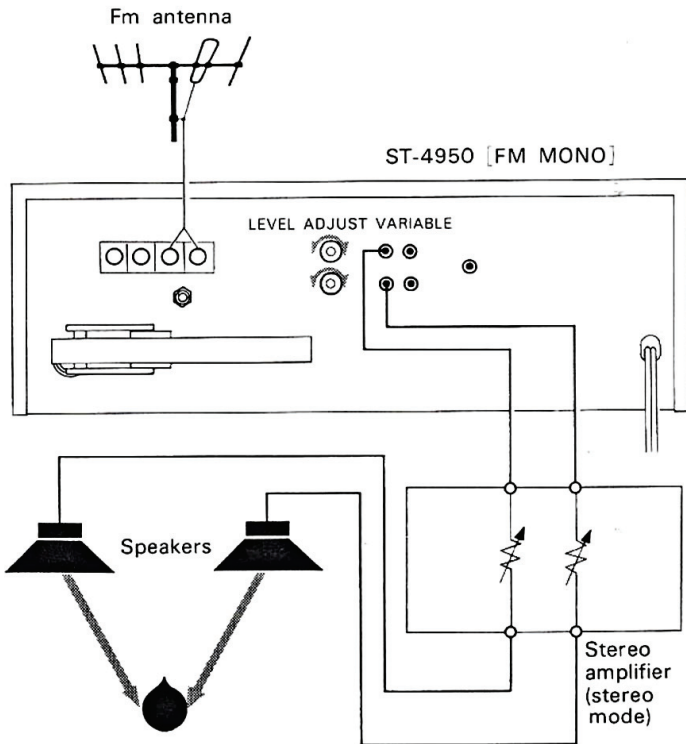
ADJUSTMENT OF THE OUTPUT LEVEL

If the VARIABLE OUTPUT jacks are being used, adjust the output level with the LEVEL ADJUST screws as follows.

- 1 Play a record or a tape at a normal listening level in the monophonic mode, and adjust the balance of the amplifier so that the sound image is centered between the left and right speakers.



- ② Set the amplifier's mode to stereo.
 - ③ Set the FUNCTION selector of the ST-4950 to FM MONO.
 - ④ Compare the volume level of the record (or the tape) with that of the tuner by switching the amplifier's input selector.
 - ⑤ Adjust the LEVEL ADJUST screws of the ST-4950 so that the same volume as the record (or the tape) can be heard from the center between the left and right speakers.
- Clockwise rotation increases the volume.



CARE OF YOUR EQUIPMENT

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 soap solution. Do not use any type of scouring powder, abrasive pad or solvent.

TROUBLE CHECKS

If some trouble should arise with this tuner, first refer back to "SYSTEM CONNECTIONS" on pages 3-5, and "OPERATION" on page 8, then check the following chart. It will help in isolating any trouble which you may have with this tuner. If the trouble persists after you have made these checks, consult your Sony dealer.

SIGNAL MULTIPATH and FM TUNING meters work, but no audio output.

- Check the connections to the amplifier.
- Check the setting of the amplifier's input selector.

SIGNAL MULTIPATH meter is unstable.

- Signals flutter due to aircraft or multipath. Adjust the antenna.

STEREO lamp does not light when receiving stereo programs.

- Keep the FUNCTION selector at FM STEREO.
- Adjust the antenna to yield sufficient antenna input level.

STEREO lamp flickers.

- If the SIGNAL MULTIPATH meter shows weak antenna input, use an appropriate outdoor antenna. A multi-element type is recommended. If the meter shows sufficient level but an unstable reading, adjust the antenna to eliminate multipath reception.
- Set the FUNCTION selector to FM MONO.
- Depress the HI-BLEND switch.

Severe hum or noise

- Use shielded connecting cords.
- Avoid long horizontal runs of antenna lead.
- Keep connecting cords (or antenna lead) away from transformers or motors, and at least 10 feet from TV sets and fluorescent lights.
- Ground the tuner.
- Do not run the antenna lead adjacent an ac power cord.
- Tune accurately.
- Adjust the antenna.

Volume level is too high or too low

- Reconnect the amplifier to the VARIABLE output and adjust the output level of the tuner.

Ignition noise

- Tune accurately.
- Install the outdoor antenna away from heavy traffic.

Electrostatic charge

- Ground the tuner to a good ground.

SPECIFICATIONS

FM Tuner Section

Tuning range	87.5 MHz – 108 MHz
Antenna terminals	300 ohms balanced 75 ohms unbalanced
Intermediate frequency	10.7 MHz
Sensitivity	1.9 μ V, IHF
Image rejection	70 dB
IF rejection	100 dB
Spurious rejection	100 dB
AM suppression	56 dB
Capture ratio	1.0 dB
Selectivity	80 dB
Signal-to-noise ratio	70 dB
Harmonic distortion	Mono 0.15% Stereo 0.3% at 400 Hz, 100% modulation
Stereo separation	40 dB at 400 Hz and 1 kHz
Frequency response	20 Hz – 15 kHz \pm 1 dB
19 kHz, 38 kHz suppression	60 dB
SCA suppression	60 dB
Muting level	Less than 5 μ V

AM Tuner Section

Tuning range	530 kHz – 1,605 kHz
Antenna	Built-in ferrite-bar antenna and external antenna terminal
Intermediate frequency	455 kHz
Sensitivity	48 dB/m, built-in antenna 100 μ V, external antenna
Image rejection	45 dB at 1,000 kHz
Signal-to-noise ratio	50 dB
Harmonic distortion	0.5%

General

Outputs	FIXED 750 mV, 10 kohms VARIABLE 0 – 2 V, 3 kohms FM DISCRI 150 mV, 2.2 kohms
System	Fm stereo, fm/a-m superheterodyne tuner
Power requirements	120 V ac, 60 Hz
Power consumption	22 W
Dimensions	Approx. 16 7/8 (w) \times 6 5/8 (h) \times 13 (d) inches including projecting parts and controls
Weight	Approx. 16 lb 16 oz (net) Approx. 22 lb 1 oz (in shipping carton)
Supplied accessories	FM ribbon antenna 1 Connecting cord 1 75-ohm cable connector 1 Polishing cloth 1

Design and specifications subject to change without notice.

BLOCK DIAGRAM

