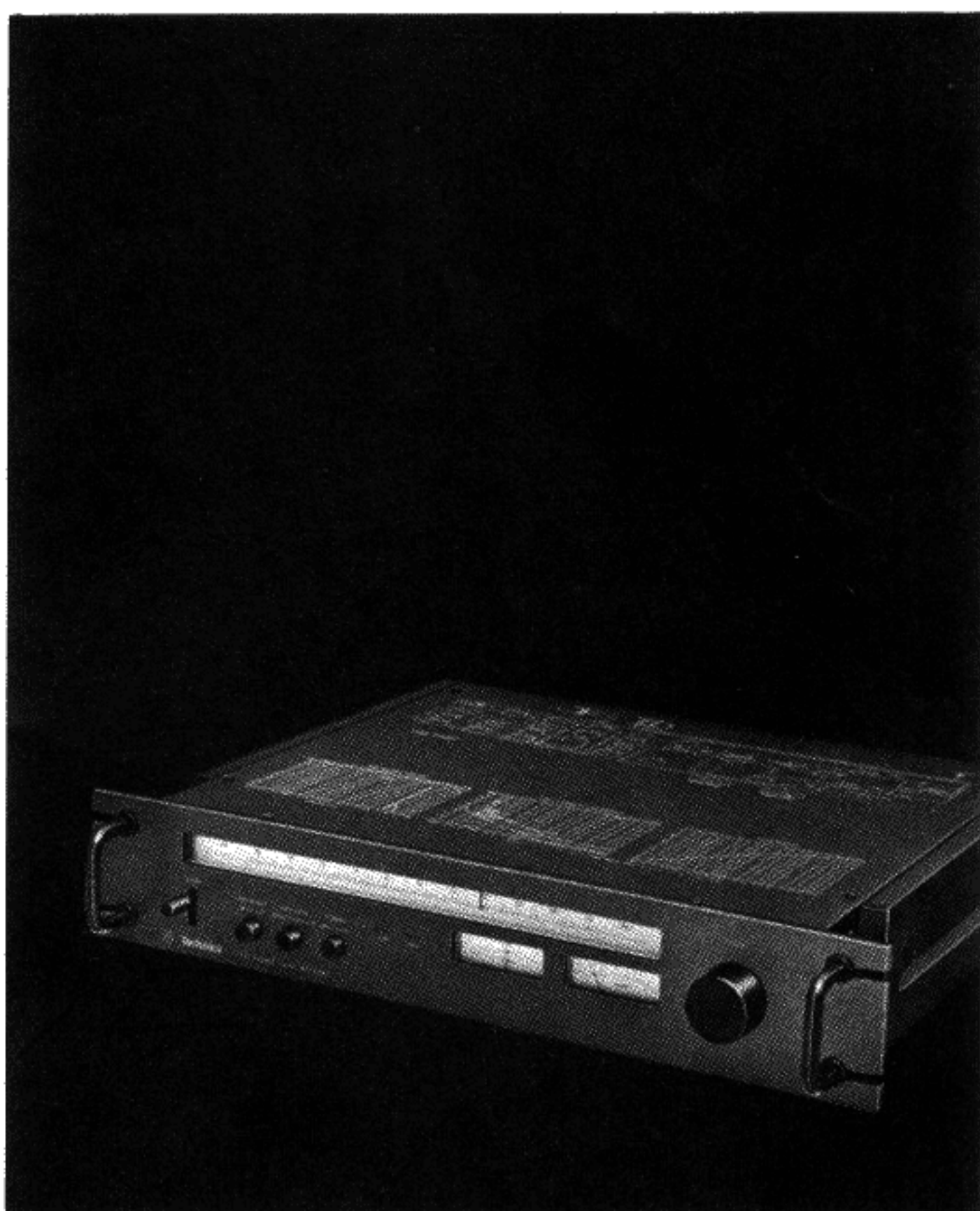




FM Stereo Tuner

ST-9030

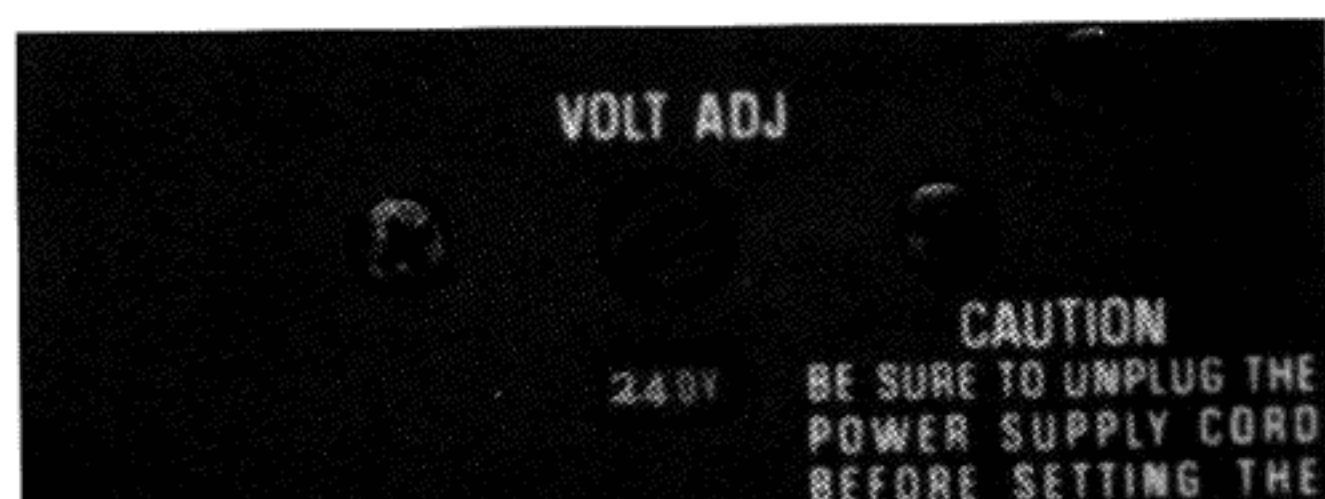
OPERATING INSTRUCTIONS



Before operating this unit, please read these instructions completely.

BEFORE USING THIS UNIT

Be sure to set the voltage selector to agree with the voltage used in the region where the unit is used. The desired voltage can be easily selected by using an ordinary screw-driver. Never forget to always have the voltage selector set to the correct setting because, if the setting is incorrect, this unit could be ruined by using it on incorrect voltage.



FOR UNITED KINGDOM

WARNING

THIS APPARATUS MUST BE EARTHED.

IMPORTANT

THE WIRES IN THIS MAINS LEAD ARE COLOURED IN ACCORDANCE WITH THE FOLLOWING CODE.

GREEN AND YELLOW	EARTH
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 GREEN-and-YELLOW must be connected to the terminal in the plug which is marked with the letter E or by the safety earth symbol $\equiv$ or coloured GREEN or GREEN-and-YELLOW.

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.

STAR FEATURES

• Pilot-signal cancel circuitry with frequency response from 20 Hz~18 kHz, +0.1~ -0.5 dB

For faithful waveform transmission, frequency response and phase are important points for tuners as well as for amplifiers and speakers.

In this unit, the 19-kHz pilot signal used for stereo demodulation in the MPX circuitry is cancelled by electronic circuitry rather than a low-pass filter system. There is, moreover, pilot-signal cancel circuitry to suppress the 38-kHz subcarrier before it becomes a problem.

In addition, because the electronic circuitry uses no filters, there is almost no phase inversion, thus making great contributions to the improvement of waveform transmission as well as the IF circuitry which emphasizes the group-delay characteristic.

• IF band-selection circuitry detects interference signals below the level of human perception

The group-delay characteristics of the IC circuitry-a very crucial factor in the determination of the sound quality of a tuner and the selectivity characteristic-a very decisive factor for the elimination of interference from broadcasts on adjacent frequencies-are, in principle, always opposite to each other in character.

This unit incorporates wide-band IF circuitry (consisting of an IF filter block which has superb group-delay characteristics, and 6-stage differential amplification) which is designed to give priority to sound quality, and narrow-band IF circuitry (consisting of a 4-resonance-element-type filter system which emphasizes selectivity, and 6-stage differential amplification) which is designed to give priority to selectivity, as well as automatic band-selection circuitry which automatically selects the type of IF circuitry depending upon the presence or absence of interference. The IF band-selection circuitry is automatically switched at a level lower than human perception-an audio output of -50 dB (absolute level 0.3%) thus assuring broadcast reception which is best matched to reception conditions at all times.

• Highly sensitive front end, with precision frequency-linear 8-gang variable-capacitor design

The front end-a very important factor in the determination of tuner performance-has a newly developed frequency-linear 8-gang variable-capacitor design, together with local-oscillation circuitry which employs a tuned buffer, an FET-type balanced mixer, etc., thus resulting in a design which has the fundamental characteristics such as spurious characteristics, powerful input resistance characteristics, etc.-suitable for a tuner of such high quality as this unit.

• Servo-tuning circuitry which always maintains the precise tuning point

This circuitry functions to assure optimum performance including low distortion, perfect separation, etc. regardless of frequency deviation caused by temperature change or of incomplete tuning, constantly maintaining all systems of the IF stage and the detection stage at the most precisely tuned point.

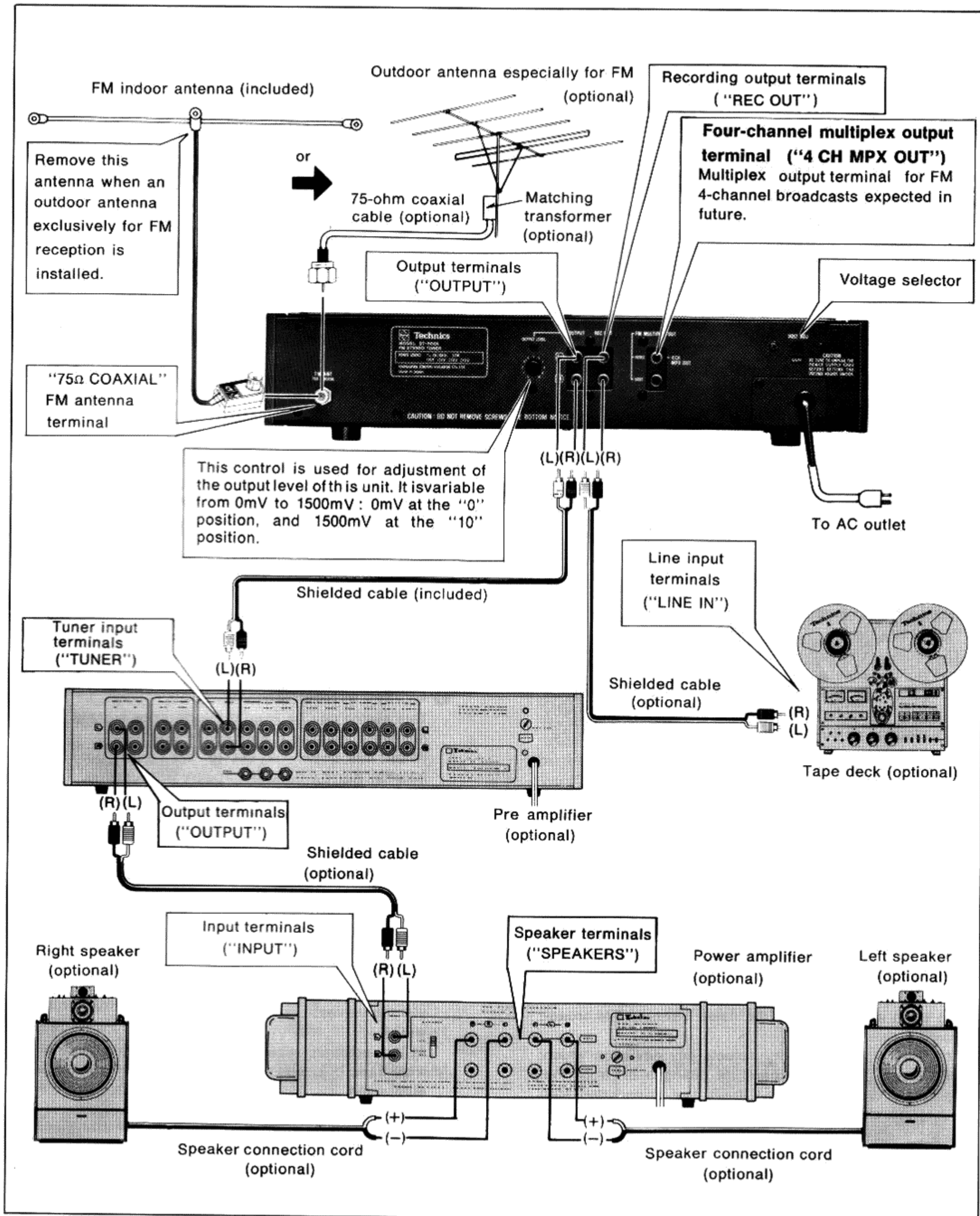
• Automatic high-blend circuitry

When signal strength becomes weak, resulting in effects by noise upon the stereo reception, the high-blend circuitry automatically functions to provide reception which is always at the optimum level.

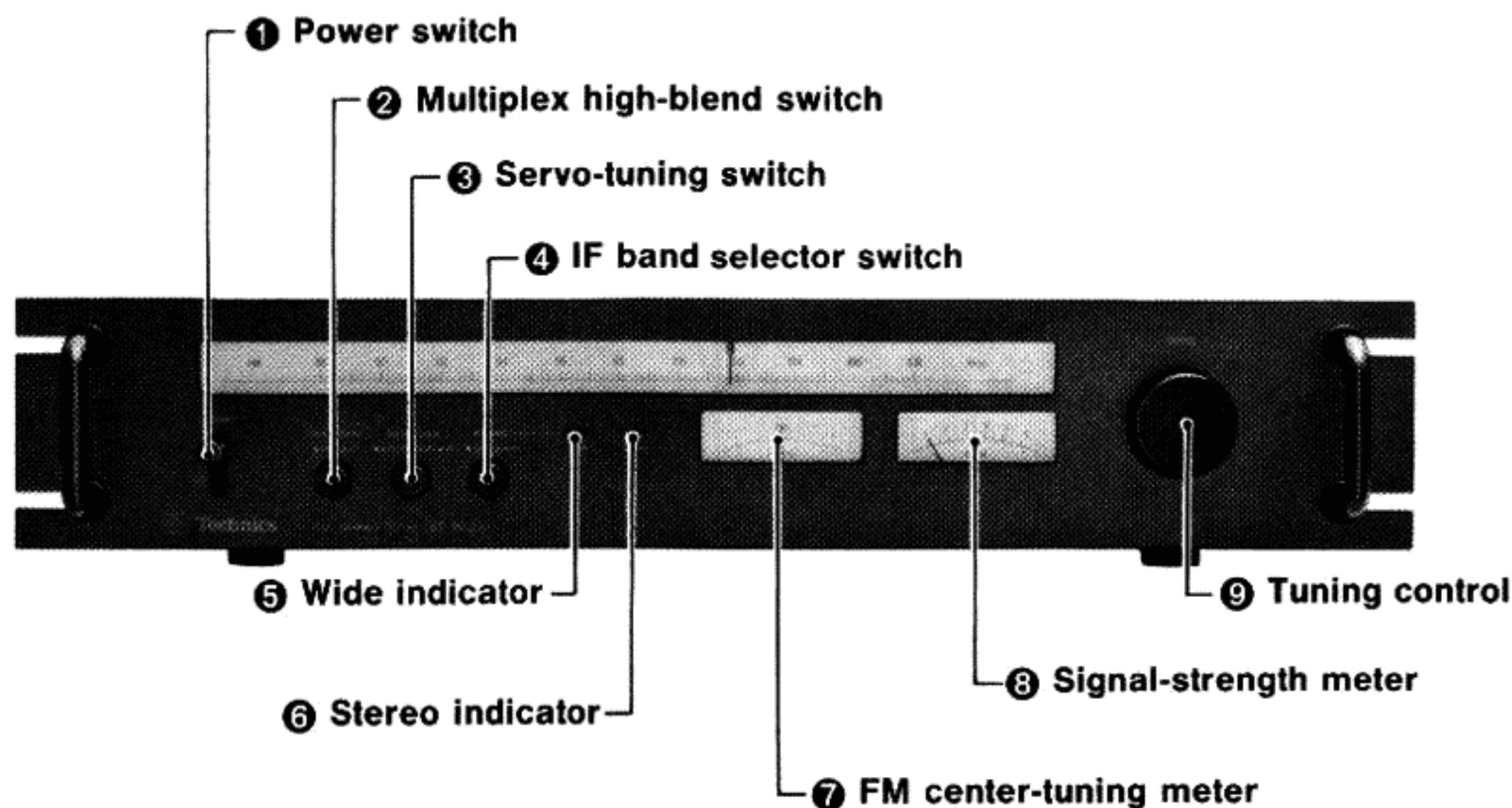
• AND muting switching system for narrow-band muting

An AND muting switching system which uses the level signal from the narrow-band IF circuitry and the low-frequency DC signal (S characteristic) from the narrow-band detection stage is used to form the narrow-band muting circuitry.

STEREO SYSTEM COMPONENTS AND THEIR CONNECTIONS



FRONT PANEL CONTROLS AND THEIR FUNCTIONS



① Power switch

This switch is used to turn the power on and off. Upon turning on, the power is applied, and faces of the dial and meter are illuminated.

② Multiplex high-blend switch

This switch is to be used if there is a great deal of interference in an FM stereo broadcast, making it difficult to listen to comfortably.

Under normal conditions, this switch should be set to the "auto" position.

The multiplex circuitry mixes the treble range of the left and right channels—because noise in the high range is comparatively the most offensive to the ear—thus mutually cancelling the noise components, thereby reducing the noise without spoiling the stereo "feeling" acoustically.

auto:

When this switch is set to the "auto" position, the high-blend circuitry is automatically turned on or off depending upon the strength or weakness of the input signal. When a weak broadcast signal is received, the high-blend circuit operates, and noise in the treble range is reduced.

off:

When this switch is set to the "off" position, the high blend circuit does not function.

③ Servo-tuning switch

This switch is used both to maintain the optimum tuning point and to remove the noise between FM broadcasts.

The servo-tuning circuitry detects any deviation which might result from temperature changes or from the reception position differing from the transmitted frequency, and operates to constantly hold the reception to the precise frequency.

auto/muting on:

When this switch is set to this position, the servo-tuning circuitry automatically operates about 5 seconds after the broadcast station is tuned, and the tuning

point is held until the tuning control is turned and the broadcast is thus detuned. In addition, this position can be used to remove the between-station noise particular to the FM band (noise which is heard between FM broadcast frequencies).

off:

Set to this position to receive weak FM broadcasts. Note that, because between-station noise is not removed, the volume control should be set to the minimum position when the broadcast is being tuned.

In addition, the servo-tuning circuitry does not function when the switch is set to this position.

④ IF band selector switch

This switch can be used if interference signals make it difficult to receive the reception precisely.

When this switch is set to the "auto" position, the internal narrow-band IF circuitry will function. If after a broadcast is tuned, interference signals are detected, the reception will automatically continue through the narrow-band IF circuitry, thus eliminating the interference signals.

If, on the other hand, reception is good from nearby or middle-distant stations, the circuitry is automatically changed to the wide-band IF circuitry for clearest reproduction of sound.

auto:

At this position, broadcasts are always received in the optimum condition depending on the propagation of electric waves.

wide:

At this position, reception is always made through the wide-band IF circuit with interference signals not being eliminated.

Note:

Wide-band IF circuit: IF circuit in which preference is given to distortion and S/N characteristics.

Narrow-band IF circuit: IF circuit in which preference is given to selectivity for preventing interference signals from mixing.

⑤ Wide indicator

This indicator is illuminated during reception through the wide-band IF circuit.

⑥ Stereo indicator

This indication lamp for FM broadcasts will illuminate when an FM stereo broadcast is received.

⑦ FM center-tuning meter

For FM broadcasts, tune approximately by referring to the signal-strength meter⑧. Pinpoint the best, least distorted position with the FM center-tuning meter.

The needle of the meter is in the center if no broadcast is being received. During tuning, the needle fluctuates to the left and right. When the station is locked in, the needle returns to the center. If the tuning control⑨ is re-adjusted, the needle will fluctuate again to the left and right, and when the broadcast is completely detuned, the needle returns to the center.

⑧ Signal-strength meter

Turn the tuning control⑨ to adjust the dial pointer near the frequency of the desired station. Look at the signal-strength meter⑧ and tune until the needle moves to the maximum position.

In addition, the FM center-tuning meter⑦ assures the precisely accurate tuning point.

⑨ Tuning control

This control is used for selection of the desired broadcast. To select the desired broadcast, turn this control while watching the signal-strength meter⑧ and the FM center-tuning meter⑦.

FOR FM BROADCASTS

<Operation of the pre-main amplifier section>

- ① Set the input selector to "tuner".
- ② Set the tape monitor selector to "source".
- ③ Turn the volume control counterclockwise to a minimum volume level. Keeping it turned slightly clockwise will facilitate later broadcast selection.
- ④ Set the power switch to turn on power.

<Operation of this unit>

- ① Set the level control knob on the rear panel to "10" of the graduations, and turn the power switch① "on".
- ② Turn the tuning control⑨ for selection of the desired broadcast while watching the signal-strength-meter⑧ and the FM center-tuning meter⑦.

<Volume control>

- ① After selecting the station, the volume of the amplifier may be increased gradually.
- ② Adjust the volume, tone quality etc. at the integrated amplifier section.

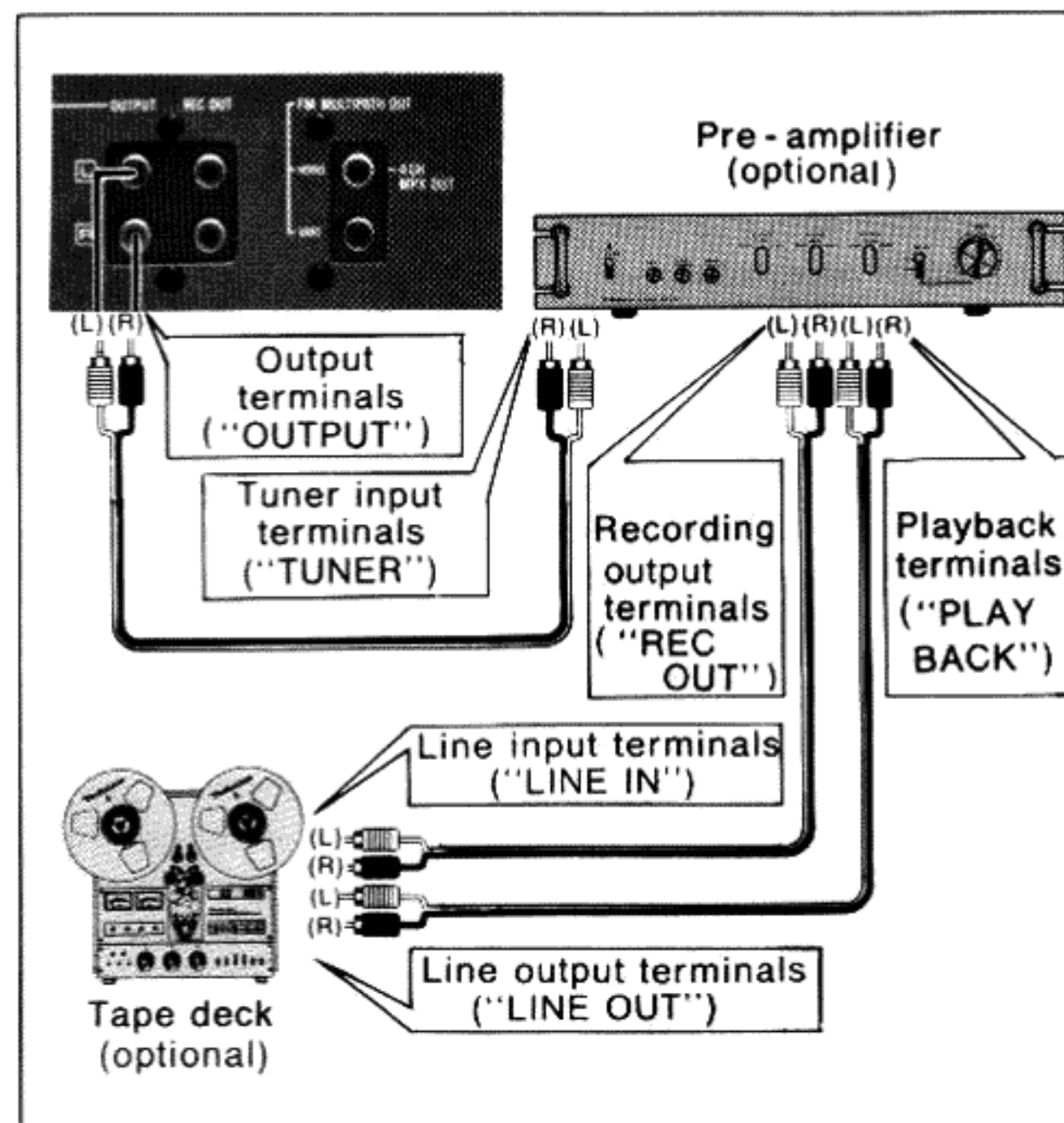
For operation of the integrated amplifier for FM broadcast, read the operating instructions for the amplifier carefully.

TAPE RECORDING AND PLAYBACK

For ordinary recording

Normally, recording is made at the amplifier side in the same procedures as in recording from other program sources such as records, etc.

For the adjustment of recording level, turn the input level control knob of the tape deck while watching the meter of the tape deck, after having adjusted this unit to the same level as other program source.

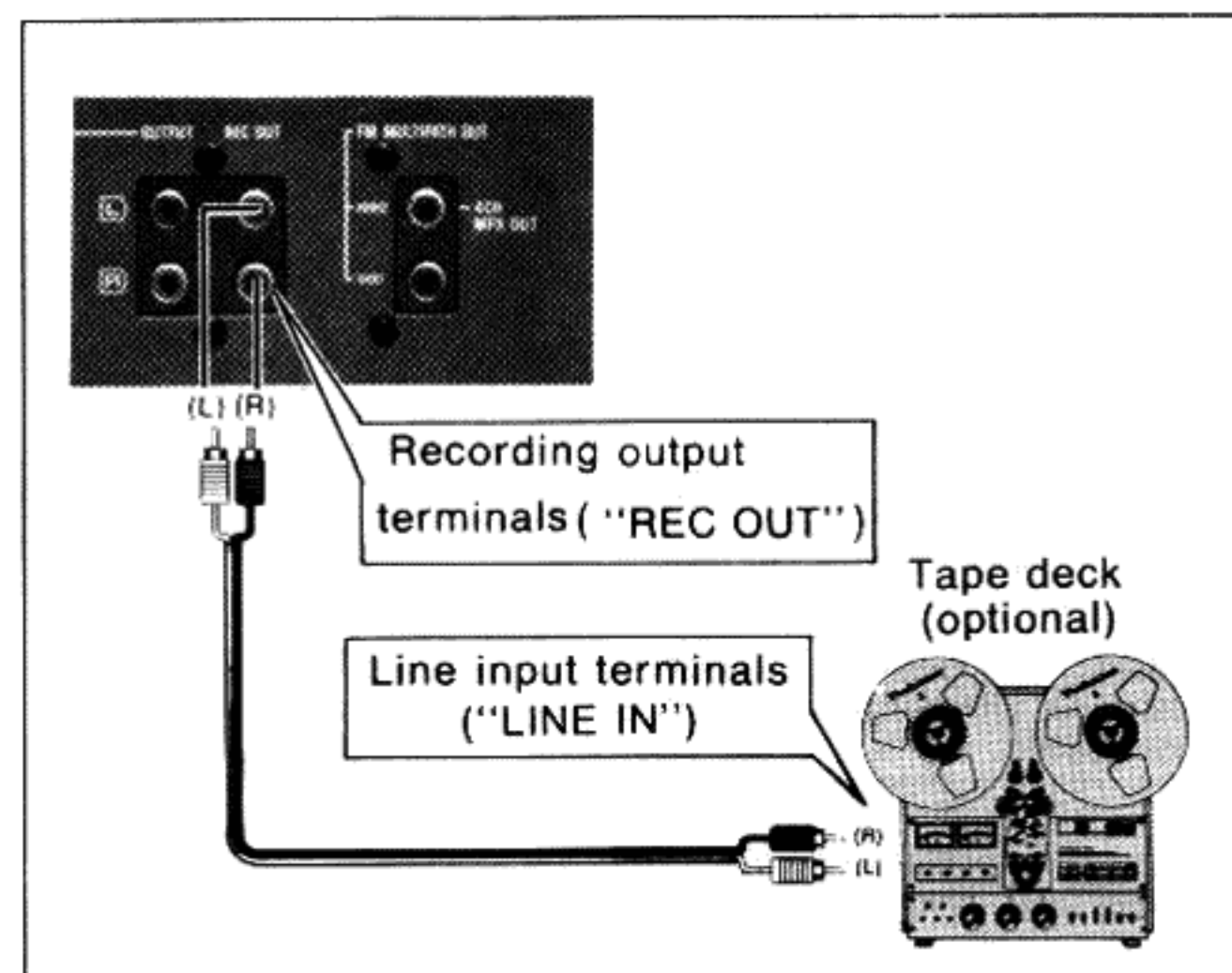


For recording directly from this unit

Connect the recording terminal with the input terminal of the tape deck for recording.

For the adjustment of the recording level, turn the input level control knob of the tape deck while watching the meter of the tape deck.

At the recording terminal of this unit, the selected FM broadcast is supplied at all times as recording signal regardless of the level control knob.



CONNECTION AND USE OF AN FM ANTENNA

In order to obtain the finest tone quality when listening to FM broadcasts, an antenna which is most suitable for the broadcast signals in your area is necessary.

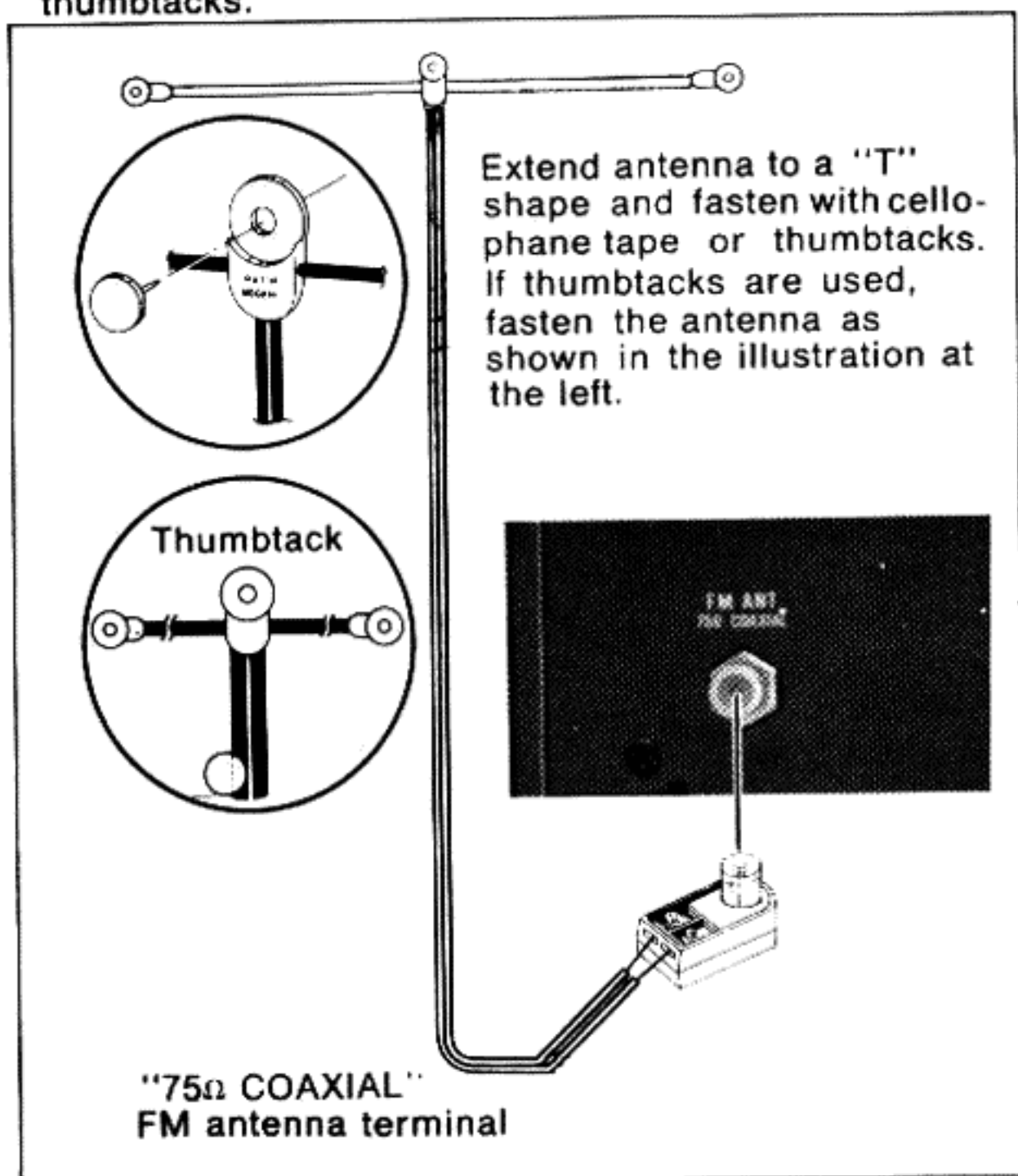
To obtain the best possible performance from this unit, select the best antenna for your reception conditions after studying the following information.

■ ABOUT THE FM ANTENNA WHICH IS INCLUDED:

If this unit is used in a place which is near the broadcasting station and the signals are powerful enough, or in a place such as the outskirts of a city, where interference noise is comparatively slight, the antenna which is included with this unit may be used to obtain a certain degree of reception.

Connection and installation:

Connect the ends of the antenna to the "75Ω COAXIAL" FM antenna terminals of this unit. Then, with the other end of the antenna held by both hands in the shape of the letter "T," move the antenna around and up and down, while listening to an FM broadcast, and, when the position is found at which best reception can be obtained, fasten the antenna to a wall by using cellophane tape or thumbtacks.



• How to use the impedance-conversion plug

① The terminal screw can be loosened by turning it 4 or 5 times counterclockwise.	75Ω ↔ 300Ω impedance-conversion plug
② Insert the core wires of the antenna wire into the connection holes.	Terminal screws
③ Turn the terminal screw clockwise until the core wires are tightly secured.	Connection holes
④ Connect to the "75Ω COAXIAL" FM antenna terminal.	

■ USE OF A SPECIAL FM ANTENNA (SOLD SEPARATELY):

Be sure to use an antenna exclusively for FM reception in order to obtain maximum performance from this unit.

① How to select a special FM antenna

(A) A place near the broadcasting station, where signals are strong (within sight of the broadcasting station transmission antenna):

If this unit is used in a place which is near the broadcasting station, the antenna included can be used to obtain a certain degree of reception, although it may easily be affected by automobile ignition noise or "multi-path" reception problems. A special FM antenna consisting of 3, 4 or 5 elements is, therefore, recommended in order to obtain best reception quality.

In general, an antenna which has more elements will have better directional characteristics and signal sensitivity, and "multi-path" reception and other radio interference problems will be reduced.

Note concerning multi-path reception:

Multi-path reception is the reception of two or more signals from the same broadcasting station: one received directly from the station, and the other(s) received indirectly after reflecting off nearby mountains or buildings. This reflected signal causes distortion in the sound by interfering with the direct signal.

Note concerning ignition noise:

Ignition noise is noise in the broadcast which is caused by the electric interference of the motors of nearby automobiles or motorcycles.

(B) A place far from the broadcasting station where signals are weak and reception is difficult (such as near mountains, large buildings, or similar obstacles):

In such a location as described above, an FM antenna consisting of 5 elements or more should be installed.

Note: The actual number of elements required for reception in your area will depend upon the actual surrounding conditions. For expert advice, consult with the store where this unit was purchased.

② Concerning antenna connection wires and impedance matching

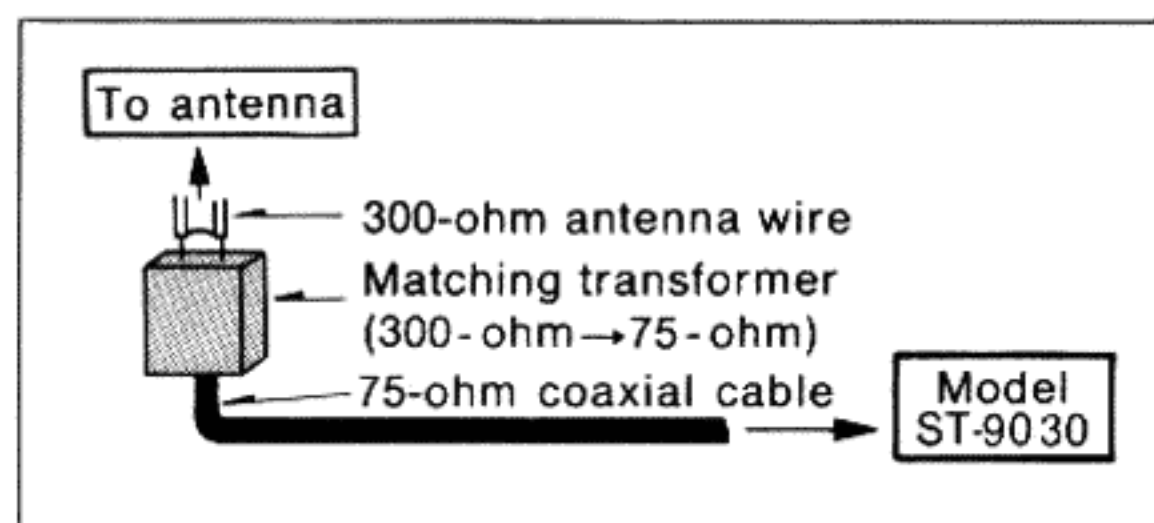
(A) Antenna connection wiring

There are two types of FM antenna connection wire usually used: 300-ohm parallel feeder wire and 75-ohm coaxial cable. To obtain the best performance from this unit, the use of 75-ohm coaxial cable (5C-2V or 3C-2V) is suggested, because this type of cable prevents changes in the signal level from occurring as a result of external interference noise, the weather, and other surrounding conditions.

(B) Impedance matching

If a 75-ohm coaxial cable is used, a matching transformer should be used, between this unit and the antenna, in order to convert the impedance.

Note, however, that some antennas already have a built-in matching transformer, thereby making it unnecessary to use another one.



③ Connection to the "75 Ω COAXIAL" FM antenna terminal:

There is an F-plug for 3C-2V cable and an F-plug for 5C-2V cable included with this unit. Select the correct one to use depending upon the type of coaxial cable used.

1. Prepare the following items: 3C-2V (5C-2V) coaxial cable, radio pliers, nippers (or scissors), and a sharp knife or razor.	6. Attach the F-type plug between the shield wire and the core covering.
2. Using the knife, remove about 20mm ($\frac{4}{5}$") of the covering of the coaxial cable.	As shown in the figure below, select the correct type of F-plug depending upon the type of coaxial cable used.
3. Remove the shield wire so that only about 5mm ($\frac{1}{5}$") remains exposed.	75-ohm coaxial cable (3C-2V) F-type plug for 3C-2V cable
4. Remove the covering of the core so that only about 10mm ($\frac{2}{5}$") of it remains exposed, thus exposing the core wire.	75-ohm coaxial cable (5C-2V) F-type plug for 5C-2V cable
5. Pass the ring (include as an accessory) over the coaxial cable in order to open the shield wire.	7. Tighten the ring by using radio pliers, slightly bending the ring and squeezing tightly in order to completely tighten the ring.

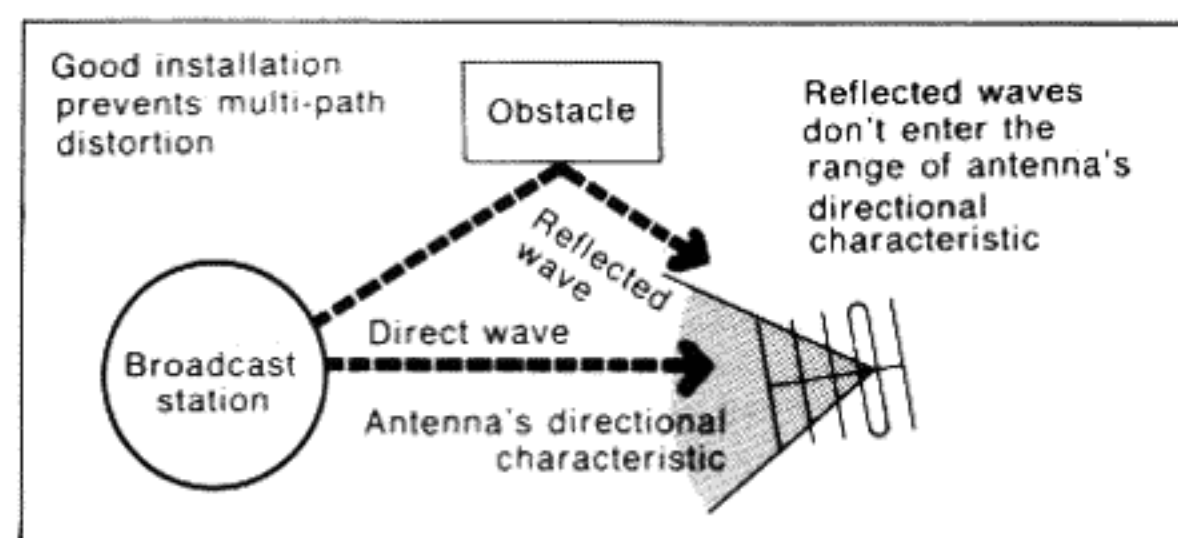
■ INSTALLATION OF AN ANTENNA

EXCLUSIVELY FOR FM BROADCASTS :

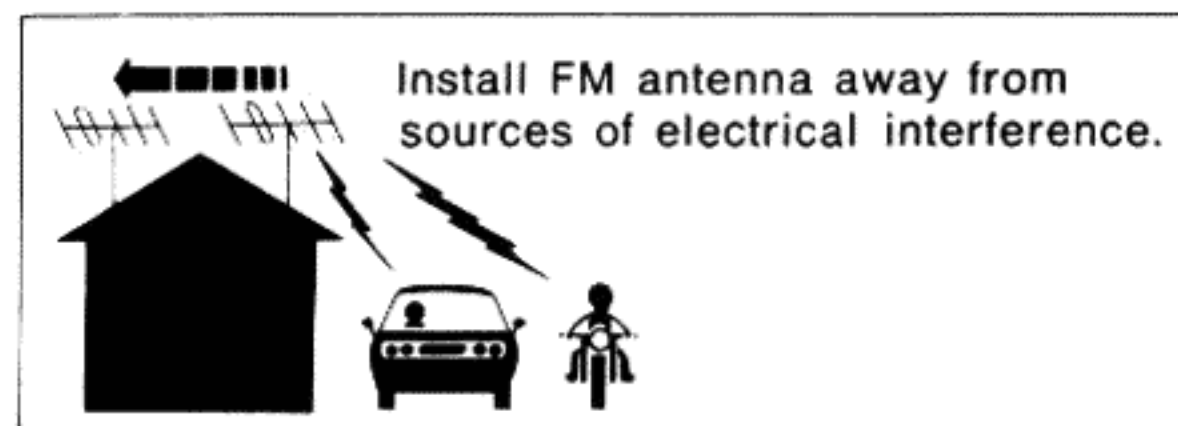
The location of the exclusive antenna for FM broadcasts is a very important factor in the determination of tone quality, and even the best antenna will not function satisfactorily if it is installed in a poor location.

Carefully consider, therefore, the following information before deciding upon the location where the antenna will be installed.

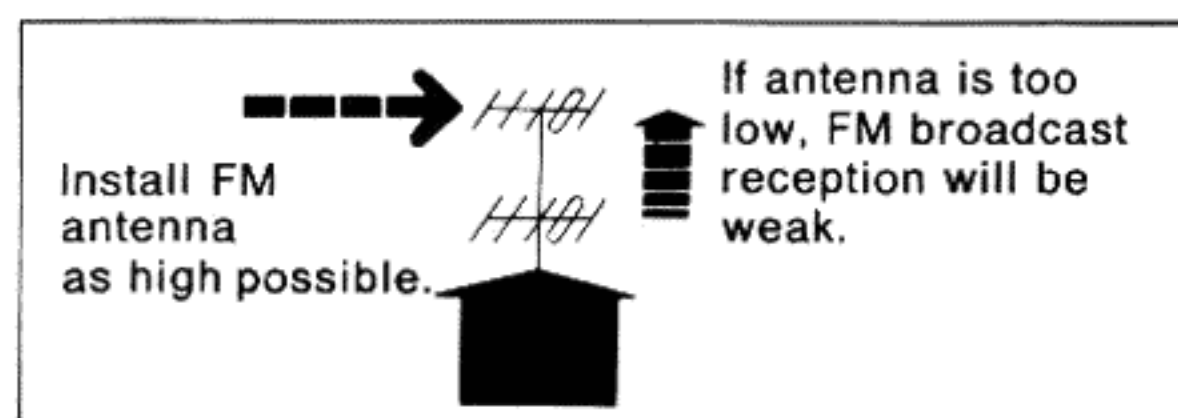
- (1) If such obstacles as mountains or large buildings are nearby, broadcast signals which are reflected from these obstacles (reflected waves) will cause interference in the broadcast signals which are received directly from the broadcast station (direct waves), resulting in multi-path distortion, which will cause distortion in the sound and poor left-right separation of the sound.



- (2) In order to prevent automobile ignition noise from causing interference, the antenna should be installed as far from the road as possible, as shown in figure. In addition, it should be installed as far as possible from neon signs.

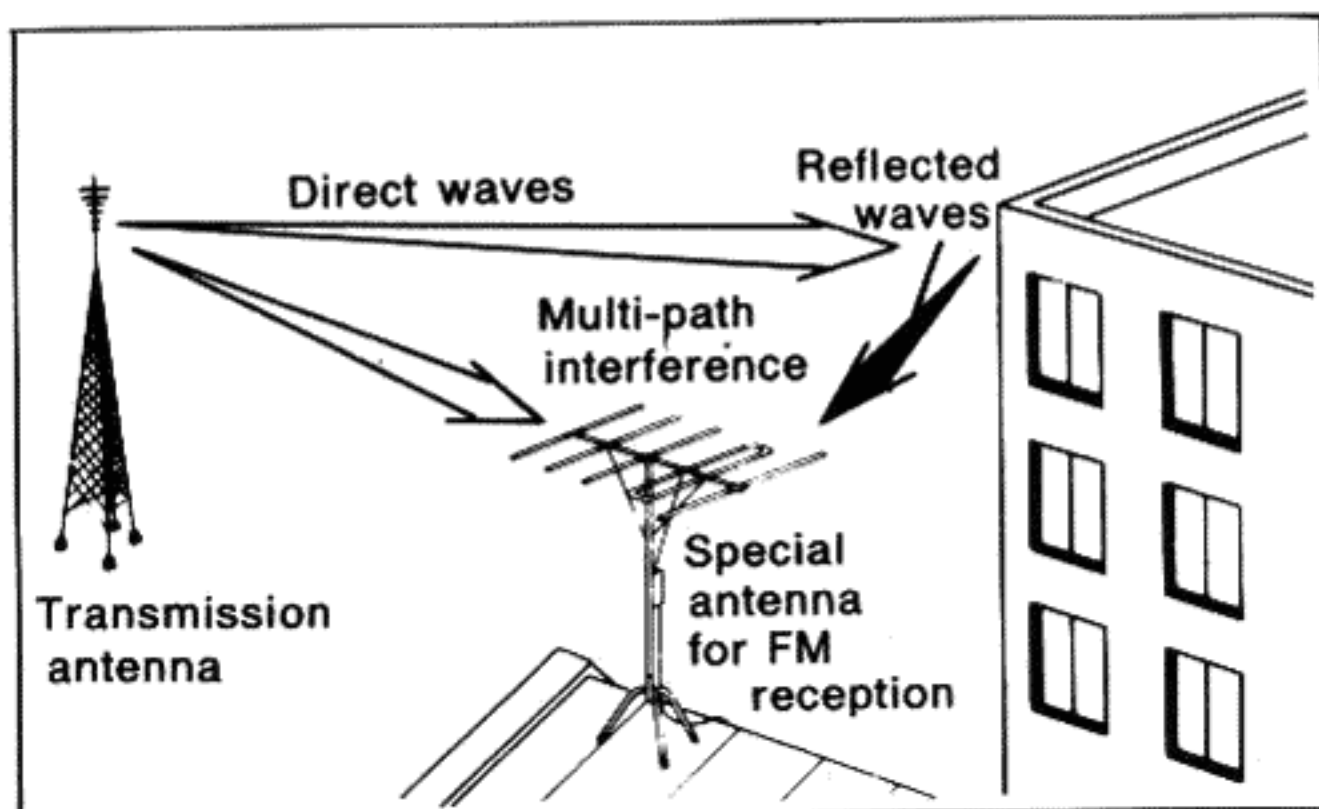


- (3) It should be installed at least 2 meters or more away from a metal roof, a concrete building, or from any other antennas, such as a television antenna.
- (4) FM antennas have a very high "directional" characteristic. In other words, they are much more sensitive to FM signals from one certain direction, more than from any other direction. The antenna should be installed, therefore, so as to face in that direction of best reception.
- (5) Although it is, in general, true that the higher the antenna is installed the better, depending upon the location, it may be that a lesser height would be even more advantageous. However, unless there are some special conditions, a height of 4 meters above the ground is recommended.



- (6) Be sure to install the antenna away from any power lines, because it would be very dangerous if the antenna were to fall and contact the power lines.

HOW TO USE THE MULTI-PATH OUTPUT TERMINALS



ABOUT MULTI-PATH DISTORTION

FM signals, in the same way as light waves, have a tendency to move in a straight line, and, when they encounter an obstruction, are reflected. Because of this characteristic, if there are tall buildings, mountains or other similar obstructions nearby, signals which are received directly from the broadcasting station antenna and signals which are reflected from the obstruction will reach the receiving antenna simultaneously, and the interference which results when the two signals mix is known as multi-path interference and causes distortion.

Such distortion is called "multi-path distortion." This signal distortion passes through the IF stage of the tuner and ultimately appears as distortion in the reproduced sound.

In order to receive FM broadcasts in the optimum condition, therefore, it is necessary to install a special antenna for FM reception, and to face it in the direction in which the reception of such multi-path distortion is minimized. For this reason, this unit includes special multi-path output terminals which are used for the detection of multi-path distortion.

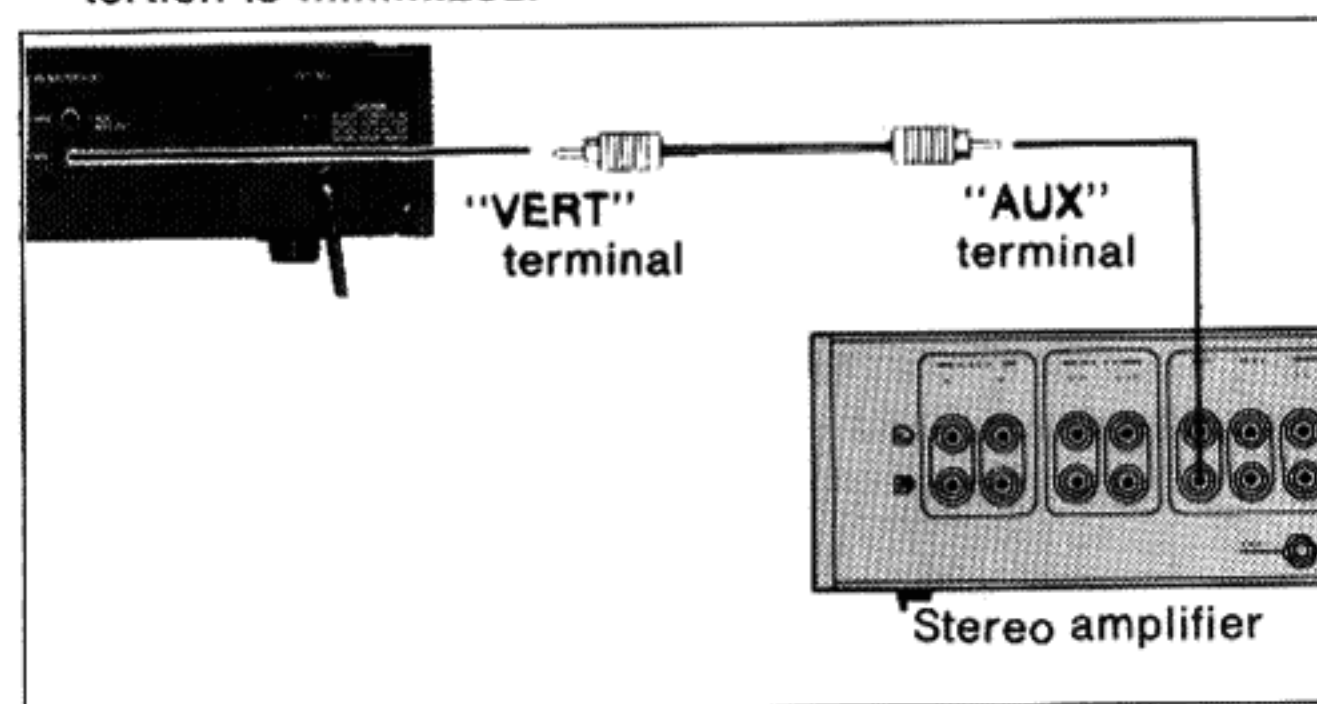
DETECTION OF MULTI-PATH DISTORTION

Simple method, using stereo amplifier

Connect the terminal marked "VERT" (of this unit) with the terminal marked "AUX" (of the Stereo amplifier).

1. Tune to the desired FM broadcast, and, referring to the signal-strength meter and the center-tuning meter, make the tuning as perfect as possible.
2. Adjust the stereo amplifier, and increase the volume level so that the sound signal can be heard.

3. Turning the antenna around horizontally, and moving it up and down, determine the position in which the sound signal is best, and secure the antenna in that position. This, then, will be the position at which multi-path distortion is minimized.



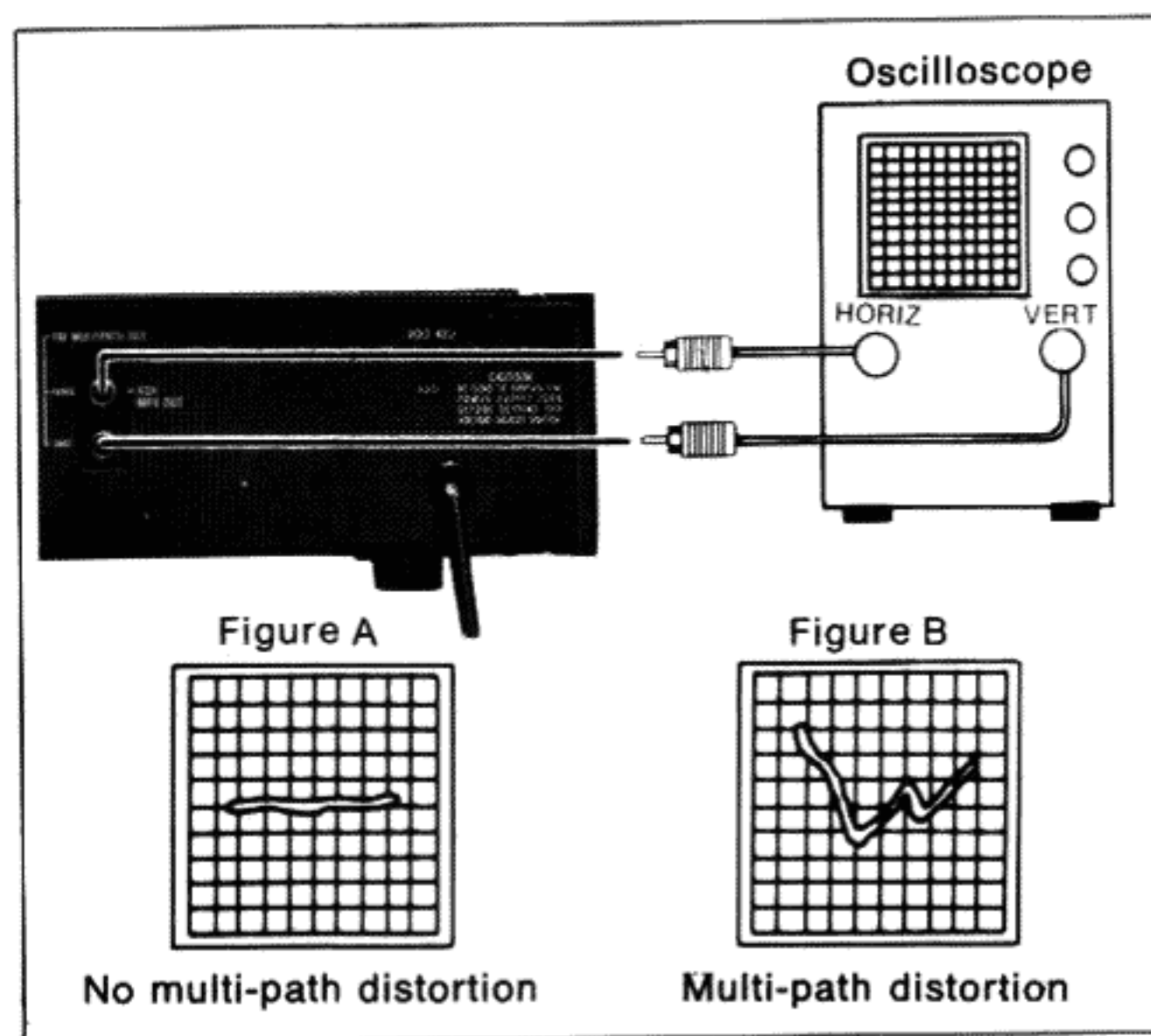
Method using an oscilloscope

Connect the terminal marked "HORIZ" (of this unit) with the horizontal axis terminal (marked "HORIZONTAL") of the oscilloscope, and connect the terminal marked "VERT" (of this unit) with the vertical axis input terminal (marked "VERTICAL") of the oscilloscope.

1. Tune to the desired FM broadcast, and, referring to the signal-strength meter and the center-tuning meter, make the tuning as perfect as possible.
2. Adjust the oscilloscope, and receive the multi-path distortion.
3. If there is multi-path distortion, a pattern such as shown in figure B will be seen on the oscilloscope.

If such a pattern is seen, turn the antenna around horizontally and move it up and down until a pattern such as shown in figure A appears. When this position is determined, secure the antenna in that position.

The pattern shown in figure A is that received at the optimum antenna position, at which there is no multi-path distortion.



HOW TO CARE FOR THE CABINET

- If this unit becomes dirty, it can be cleaned by wiping it with a soft, dry cloth. If it is extremely dirty, dip the soft cloth into a soap-and-water solution, wring the cloth out well and then wipe the unit clean. After cleaning, wipe the unit dry once more with a dry cloth.

- Be careful not to allow alcohol, thinner, benzene, insecticide and other similar chemicals to get on the surface of this unit because they may damage its finish by causing the finish to peel off or lose its luster.
- Never use a wet cloth or a chemically-treated cloth for cleaning.

FOR LONGER AND SAFER USE OF THIS UNIT

In order to receive the best service from this unit, and for safest operation, carefully read the following information.

1. THE POWER SOURCE:

It's very dangerous to use this unit at a voltage which is different from the rated voltage.

- There is the danger of combustion if the unit is connected to a power source which is different from the rated voltage.

Be very careful concerning this point.

Direct current cannot be used.

- There are some places, such as ships, where direct current is used as the power source. Before connecting this unit, confirm the power source.

2. CONNECTION OF THE POWER CORD:

Wet hands are dangerous

- Be sure to never touch the power cord with wet hands because there is the danger of electric shock. This is true, of course, of all electric equipment.

Don't pull the power cord

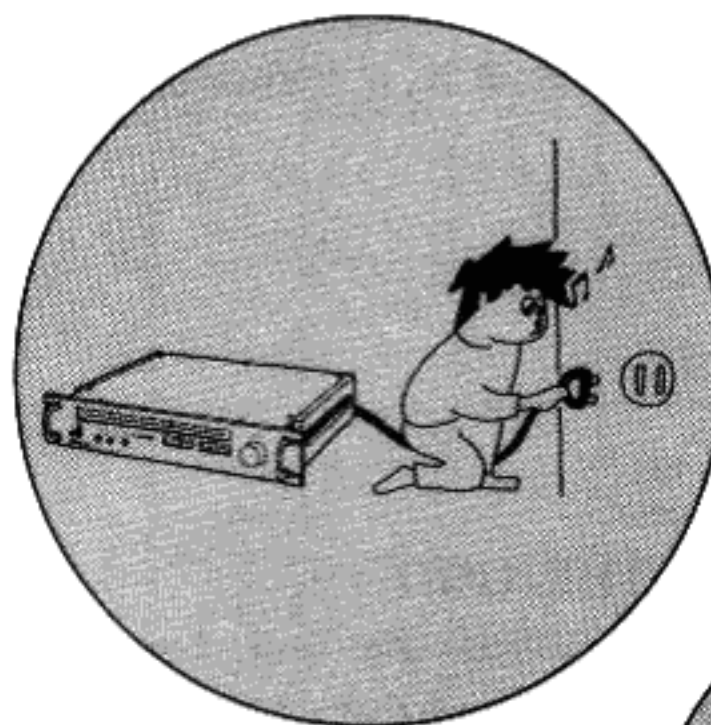
- Never pull the power cord to disconnect it. Always pull the plug of the cord only.

3. LOCATION OF THE UNIT:

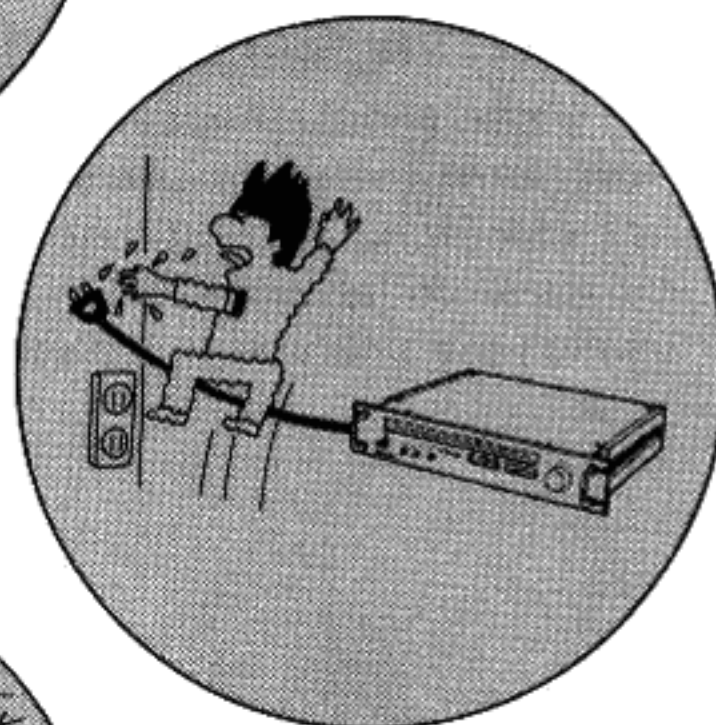
- A place which is not in direct sunlight.

4. NEVER PLACE HEATING EQUIPMENT NEARBY:

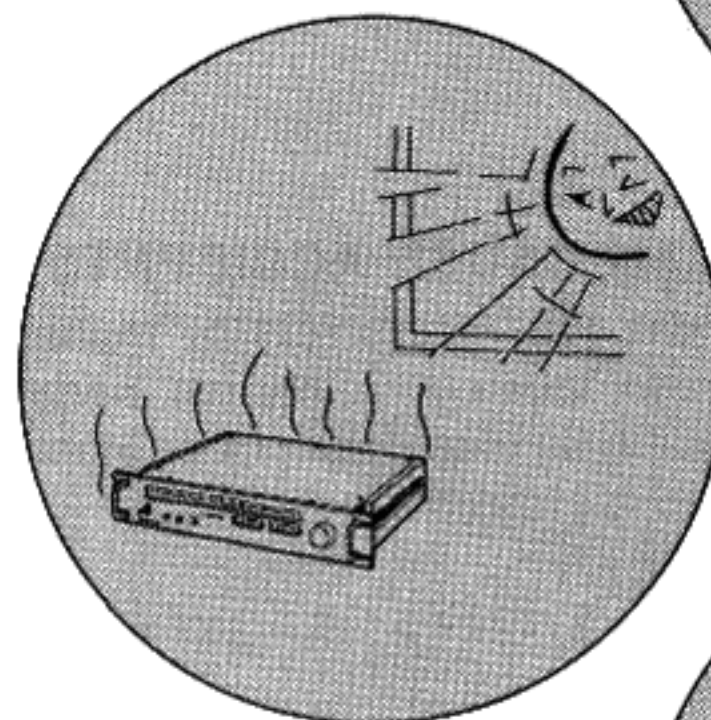
Be sure to keep stoves and other sources of heat away from this unit, because heat radiated by such equipment may cause deformation of plastic parts of this unit or damage its cabinet, or, at worst, might cause a fire.



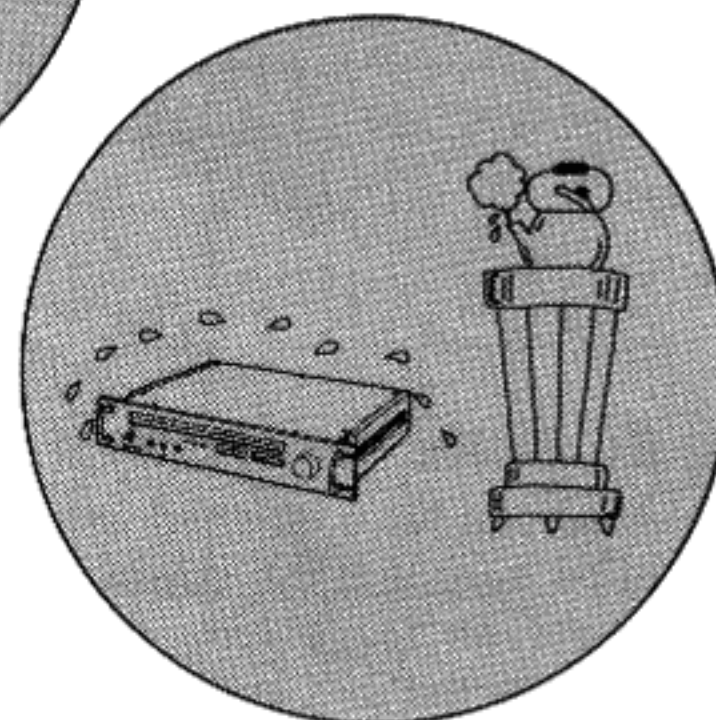
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3



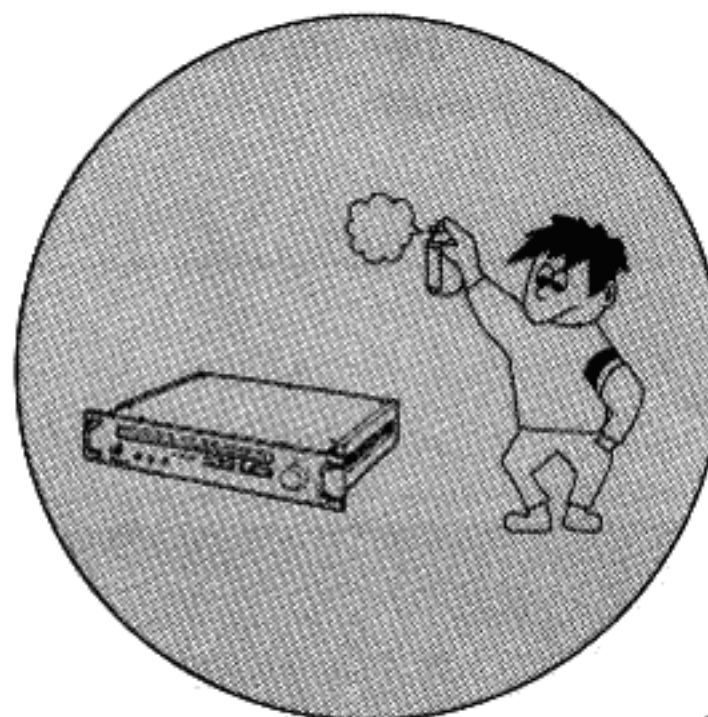
4

FOR LONGER AND SAFER USE OF THIS UNIT

(continued)

5. KEEP INSECTICIDE AWAY :

- If insecticide is sprayed on the cabinet or plastic parts of this unit, "cracks" or "cloudiness" of the material may occur.
- In addition, note that such sprays may be the cause of fire, so great care should be taken.



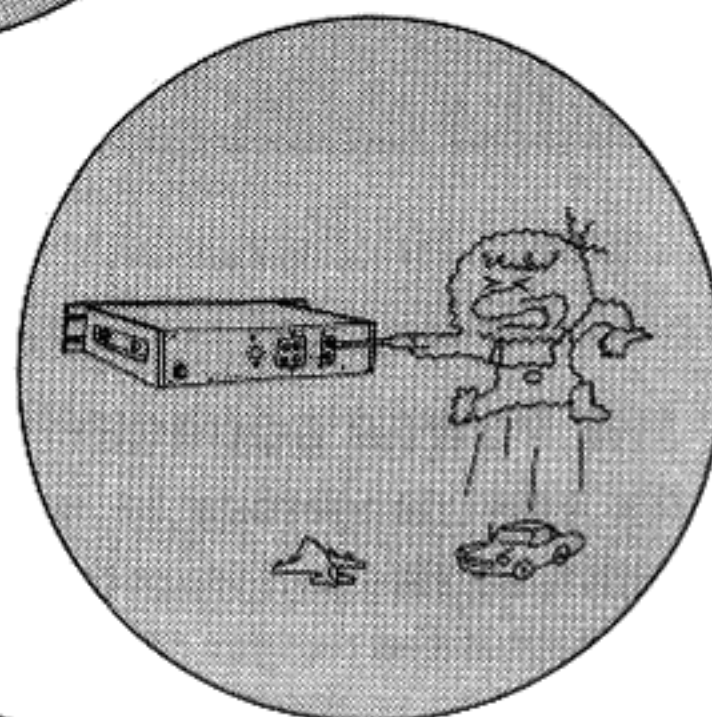
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6. ESPECIALLY FOR FAMILIES WITH CHILDREN

Take care that no small items, such as metal articles, are put inside this unit :

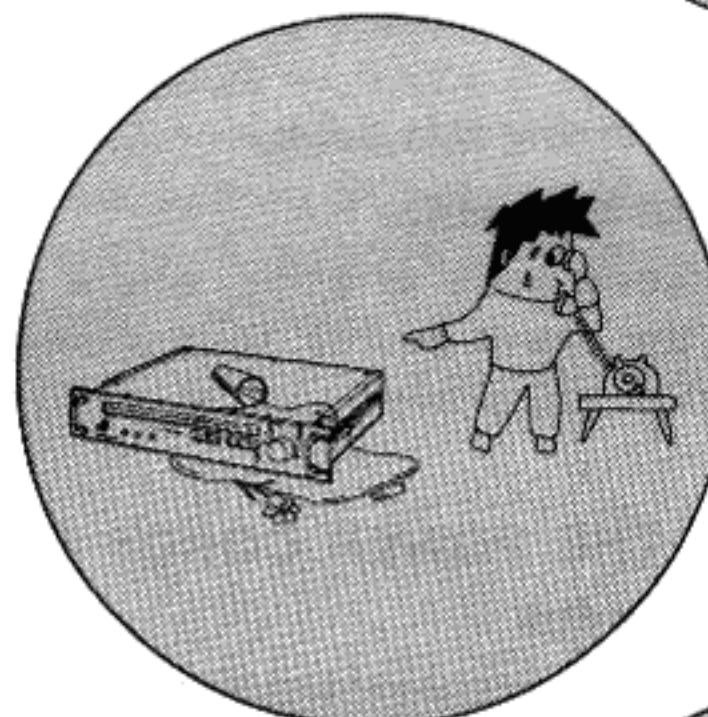
- In addition, children should be especially warned not to put anything into the ventilation holes, such as toys or a screwdriver, because these things may cause an electric shock or result in a malfunction of the unit.

6



7. IF WATER SPILLS ON THE UNIT :

If water should happen to spill on the unit, from an overturned vase for example, there is the danger of fire or electric shock. Disconnect the power cord from the electric outlet immediately, and contact the store from which the unit was purchased.

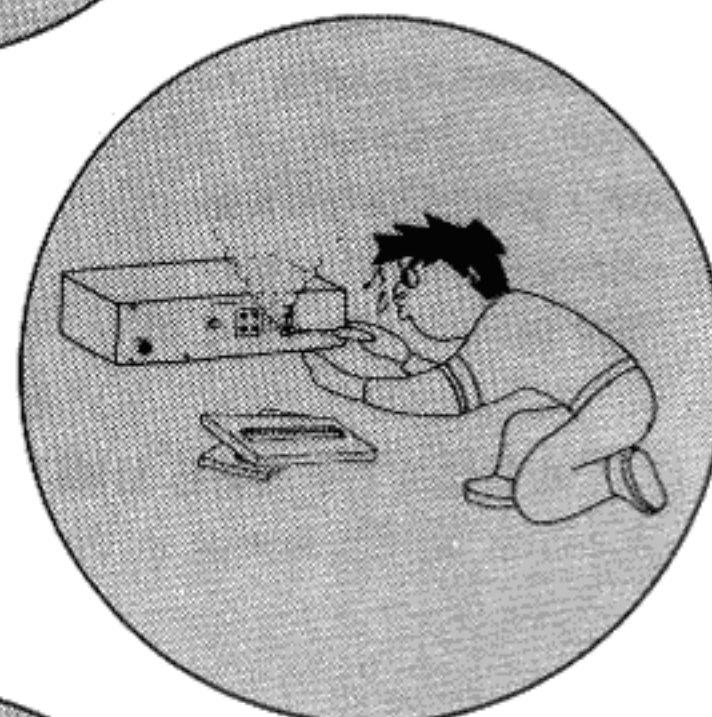


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8. RECONSTRUCTION CAN CAUSE ACCIDENTS :

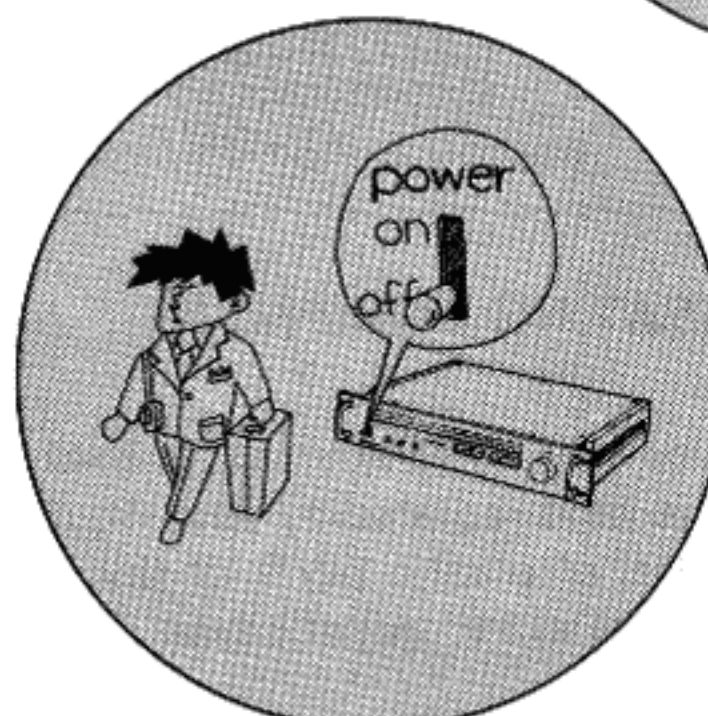
Absolutely never try to remodel, reconstruct or repair this unit. Do not attempt to touch any internal parts because to do so may result in an electric shock or other accident.

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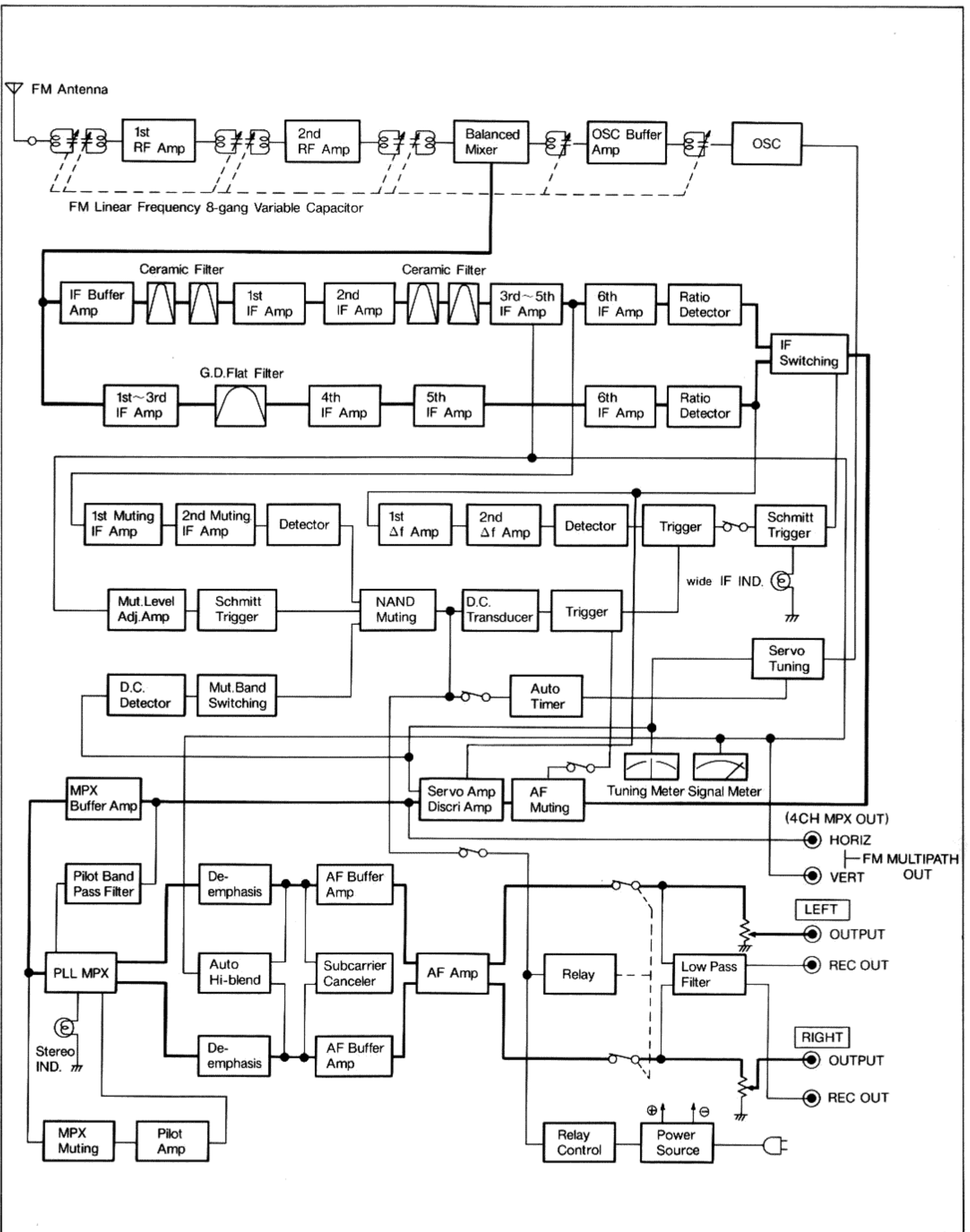
9. BE SURE THE POWER IS OFF :

After you have finished using this unit, check once more to be sure that the power is off. If the unit is left with its power on for a long period of time, it may not only damage the unit and thus shorten its useful life, but may also lead to a dangerous accident.



9

BLOCK DIAGRAM



TECHNICAL SPECIFICATIONS

(DIN 45 500)

FM TUNER SECTION

Frequency range	88~108 MHz	
Antenna impedance	75Ω (unbalanced)	
Sensitivity (± 40 kHz deviation)	1.2μV (IHF, usable, 75Ω)	
	1.2μV (S/N 30dB, 75Ω)	
	1.1μV (S/N 26dB, 75Ω)	
	1.0μV (S/N 20dB, 75Ω)	
Total harmonic distortion (1 kHz)		
wide MONO	0.08%	
STEREO	0.08%	
narrow MONO	0.15%	
STEREO	0.3%	
S/N (± 40 kHz deviation)		
MONO	75 dB (IHF:80 dB)	
Frequency response		
OUTPUT	20 Hz~18 kHz,	+0.1 -0.5 dB
REC OUT	20 Hz~15 kHz,	+0.2 -0.8 dB
Alternate channel selectivity (400 kHz)		
wide	25 dB	
narrow	90 dB	
Capture ratio		
wide	0.8 dB	
narrow	2.0 dB	
Image rejection at 98 MHz	135 dB	
IF rejection at 98 MHz	135 dB	
Spurious response rejection at 98 MHz	135 dB	
AM suppression		
wide	58 dB	
Stereo separation		
wide 1 kHz	50 dB	
10 kHz	40 dB	
narrow 1 kHz	40 dB	
10 kHz	30 dB	
Leak carrier		
OUTPUT 19 kHz	-60 dB (IHF: -65 dB)	
REC OUT 19 kHz	-65 dB (IHF: -70 dB)	
38 kHz	-65 dB (IHF: -70 dB)	
Channel balance (250 Hz~6300 Hz)	0 dB	
Limiting point	1.0μV (75Ω)	
Bandwidth		
wide IF amplifier	300 kHz	
FM demodulator	1.5 MHz	
narrow IF amplifier	200 kHz	
FM demodulator	1.5 MHz	

GENERAL	
1. Name of the person or organization	
2. Address	
3. City	
4. State	
5. Zip	
6. Telephone	
7. Fax	
8. E-mail	
9. Website	
10. Other	

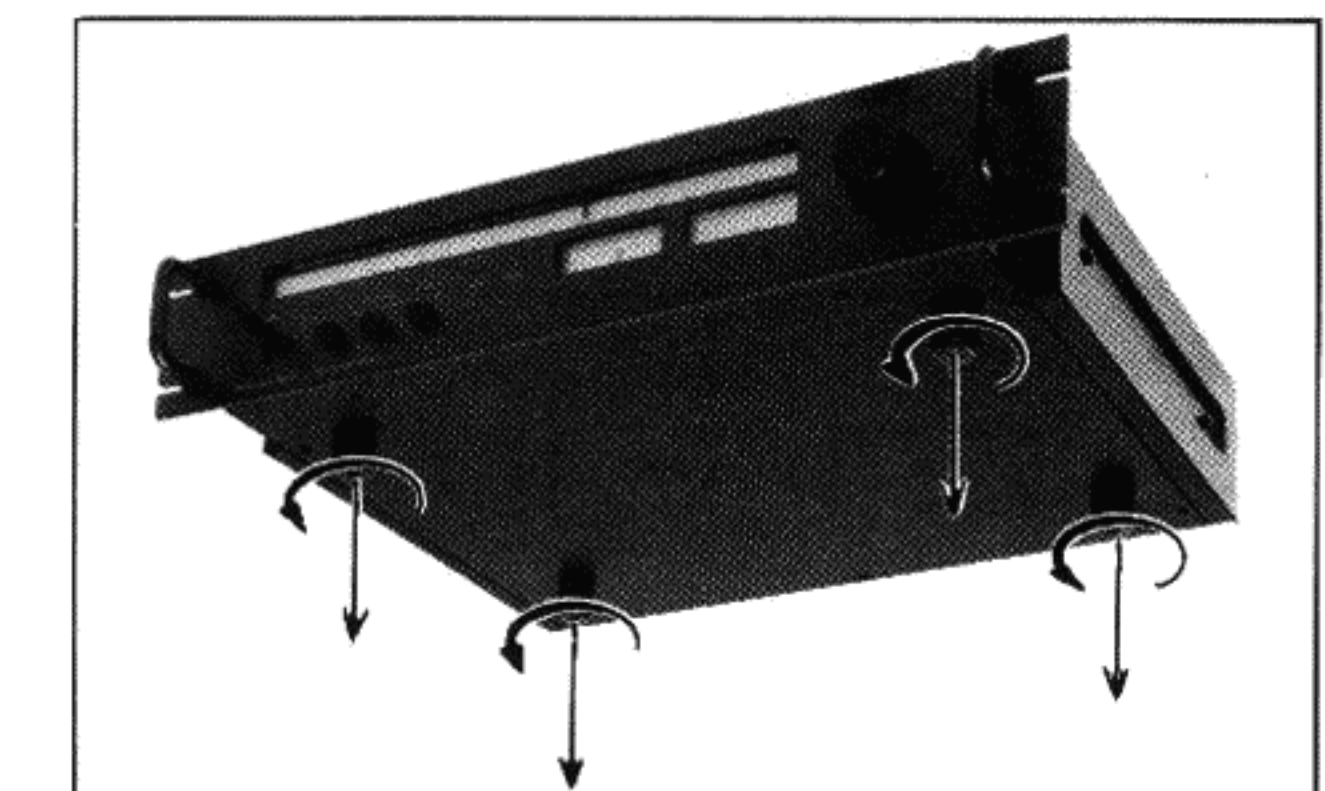
Output voltage	
OUTPUT	0~1.5 V
REC OUT	0.7 V
Power consumption	27 W
Power supply (50/60 Hz)	110V/120V/220V/240V
Dimensions (W × H × D)	450 × 92 × 370 mm 17 ²³ / ₃₂ " × 3 ⁵ / ₈ " × 14 ⁹ / ₁₆ "
Weight	7.4 kg, 16.3 lb.

**ATTACHMENT OF FEET
(INCLUDED)**

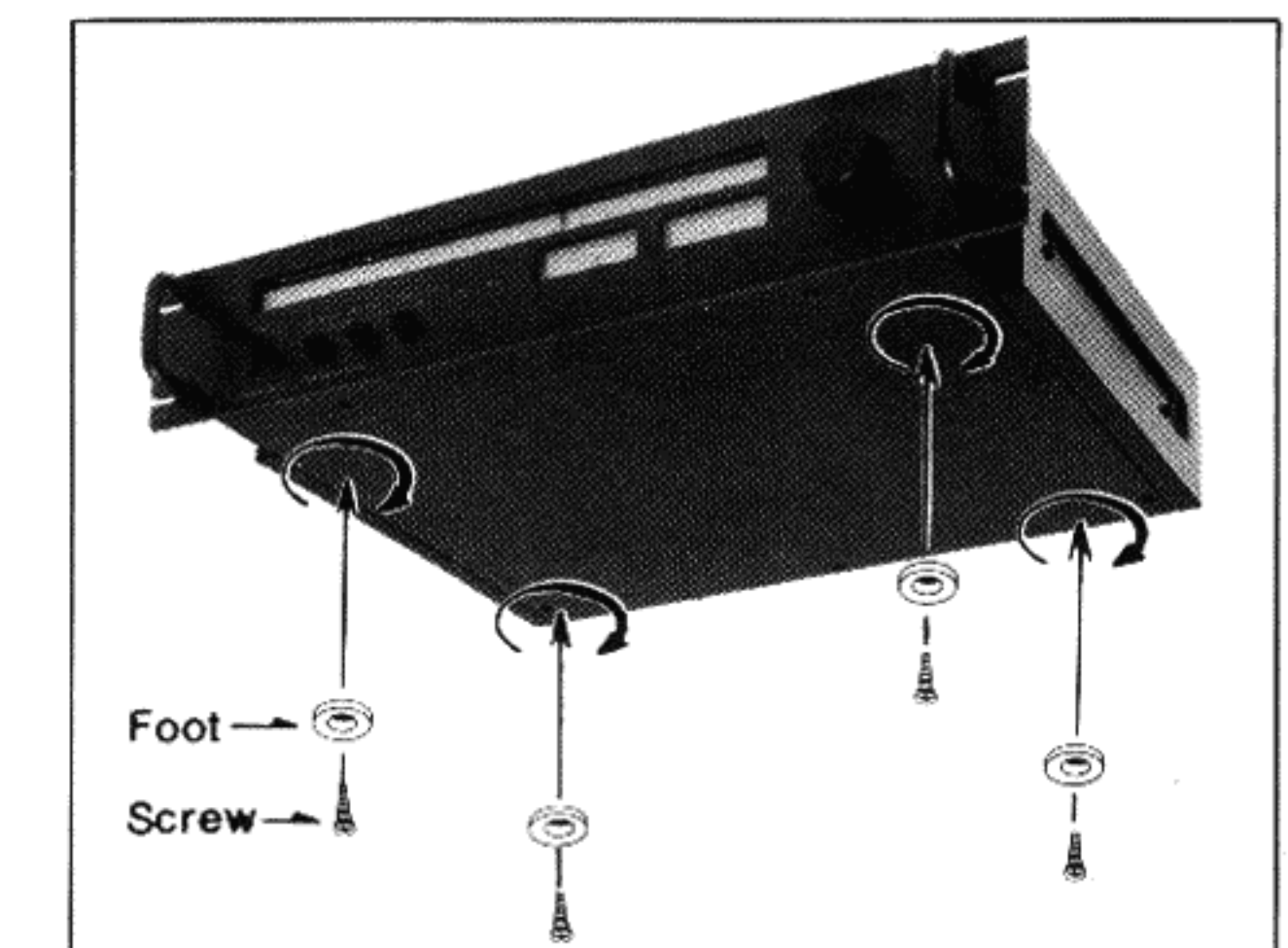
This unit has an extra set of 4 feet which, if installed, lower the height by 8 mm, to 84 mm. These feet are especially useful if other audio components in this series (models SU-9070, SE-9060, SH-9020 and SH-9010) are stacked one on top of another.

■ Attachment

- ❶ Remove the feet already attached to the bottom of the unit.



- ② Attach the other set of feet (included) by using the screws (also included). Use the same holes as for the original feet.



ACCESSORIES

FM feeder antenna	1
Connection wire (Shielded cable)	1
Impedance-conversion plug	1
F type plug ring For 3C-2V	1 set
For 5C-2V	1 set
Feet	4
Screws	4

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