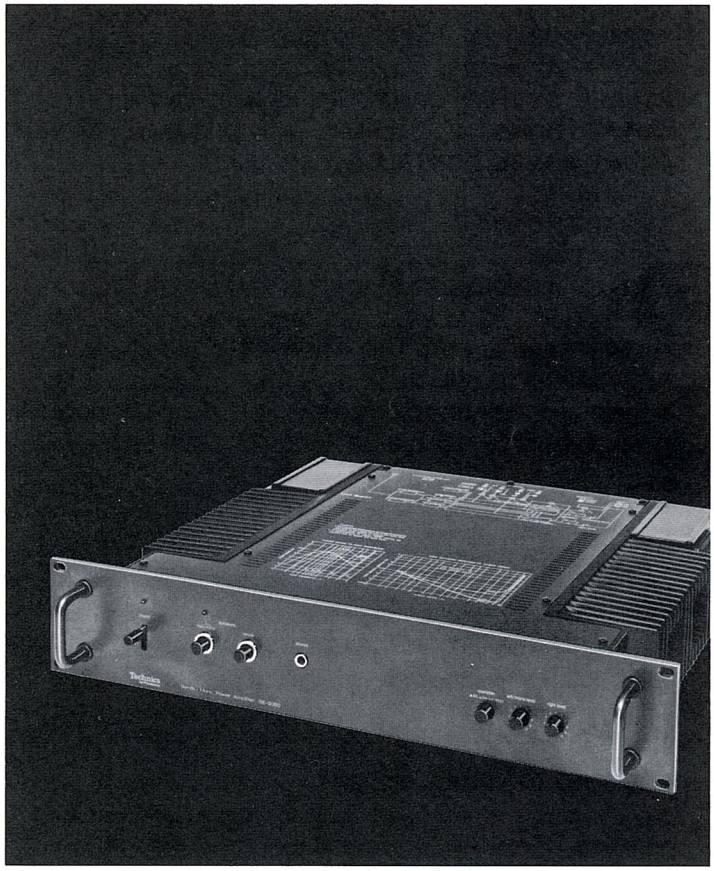
Technics
by Panasonic

Stereo/Mono Power Amplifier

SE-9060

OPERATING INSTRUCTIONS



Before operating this set, please read these instructions completely.

Your new "Technics by Panasonic" stereo/mono power amplifier was manufactured and assembled under exacting quality control standards.
The incorporation of the latest advances in design and the use of the most modern components assure outstanding performance with superb sensitivity and tonal quality.
A few minutes of your time, wisely spent reading carefully through this instruction booklet, will assure you of getting the maximum benefit of this fine component's potential.

CONTENTS

MAINTENANCE

WARNING CONCERNING REMOVAL OF COVERS

NOTE: This set should be serviced by qualified technicians only.
No service information is provided for customers.

PRODUCT SERVICE

Should your "Technics by Panasonic" product ever require servicing, refer to the Directory of Authorized Service Centers or your franchised "Technics by Panasonic" dealer for detailed instructions.

LOCATION OF SERIAL NUMBER

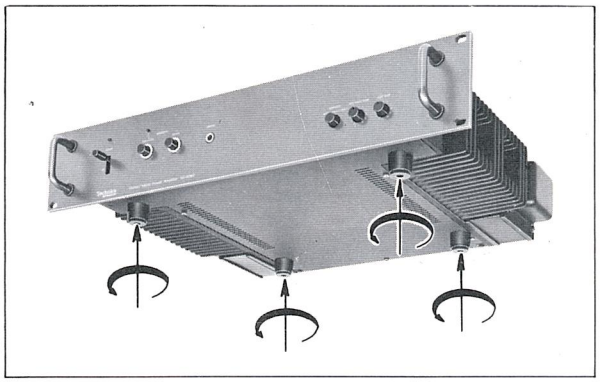
You will find the serial number located on the bottom of the unit.

ATTACHMENT OF FEET (INCLUDED)

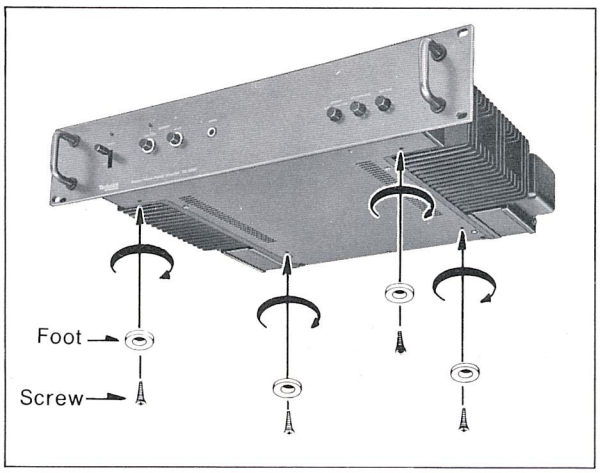
This unit has an extra set of 4 feet which, if installed, lower the height by 5 mm, to 96 mm. These feet are especially useful if other audio components in this series (models SU-9070, ST-9030, SH-9020 and SH-9010) are stacked one on top of another.

■ Attachment

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



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



The model number of this product may be found on the bottom of the unit; and the serial number on the label affixed to the bottom of the unit.
You should note the model and serial numbers of this unit in the space provided, and retain this insertion as a permanent record of your purchase to aid in identification in the event of theft.

MODEL NUMBER _____, SERIAL NUMBER _____

WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

STAR FEATURES

■ DC Power Amplifier with Superb Waveform Fidelity and Total Harmonic Distortion of Only 0.02%

Differential amplifiers in the first stage incorporate dual FET's with identical characteristics, and operation is at a high gain and a low-distortion ratio current-mirror load... thus assuring an extremely high degree of DC stability.
The next stage—voltage amplification—is designed with low-distortion circuitry which employs a constant-current load in order to obtain high gain.
The output stage consists of perfectly complementary circuitry, with a 3-stage Darlington connection—an improvement over the 2-stage Darlington connection—to make surplus power-amplification capacity possible.
Moreover, very careful study of the operation points and gain distribution of each stage has made possible great improvements in naked characteristics, such as the suppression of naked distortion to a very low level.
In addition, in order to make waveform fidelity a reality, this unit has a special DC amplifier: with no input/output coupling capacitors, no capacitors between stages, and no capacitors in the negative-feedback loop ... thus assuring gain all the way to the DC range.
In the above ways, then, superb circuitry design together with highly sophisticated circuit technology permit this model to effectively display its fullest performance capabilities under conditions of either low or high output, and throughout a very wide frequency range from low to high frequencies.
The result are impressive: total harmonic distortion—from 20 Hz to 20 kHz—of only 0.02% at rated output, and a miniscule 0.0015%—a figure so low as to be almost immeasurable by measuring equipment—at 1 kHz, −3 dB output.

■ Highly Stabilized Power-Supply Circuitry...with Constant-Voltage Power Supply and Completely Independent Left and Right Power Supplies

An extremely important and necessary factor in determining whether an amplifier of high output power can effectively display its finest performance capabilities is the completeness of the power-supply circuitry.
The power-supply circuitry in the output stage of this unit is designed for perfectly independent left and right operation by using 4 power supplies (2 positive and 2 negative), and completely separating the power transformers, rectifying diodes and smoothing capacitors for the left and right channels. In addition, a total of four electrolytic smoothing capacitors—with a tremendous capacity of 18,000 μF—are used, two for each channel.
Special emphasis was, moreover, placed on the design of the power-supply circuitry. Two true constant-voltage power supplies (one each positive and negative) are used as the power-supply circuitry of the differential-amplification stage and the voltage-amplification stage. As a result, the degree of DC stability is very high and transient non-linear distortion is minimized under conditions of high output, so that power-supply voltage fluctuations are extremely rare even when signals which have a widely fluctuating level, such as music signals, are received.
In addition, there is almost no transient crosstalk due to interference between channels caused by changes in the power-supply voltage when transitional signals are received.

■ Protection Circuitry

Although this unit uses circuitry of extremely high stability as well as highly reliable components throughout, it also has—to meet any unexpected emergency—two types of protection circuitry to protect the amplifier and speakers.

- Circuitry for protection against output "short-circuiting"
  This is special protection circuitry, incorporating a current limiter which functions to reduce output to zero if the speaker terminals become "shorted," thus preventing damage to the amplifier.
- Electronic protection circuitry to protect speakers from DC voltage.
  This protection circuitry detects abnormal DC voltage and functions to protect the speakers by disconnecting the speakers from the amplifier (by using a relay). This circuitry also functions as muting circuitry, eliminating the "shock" sound when the power is turned on or off.

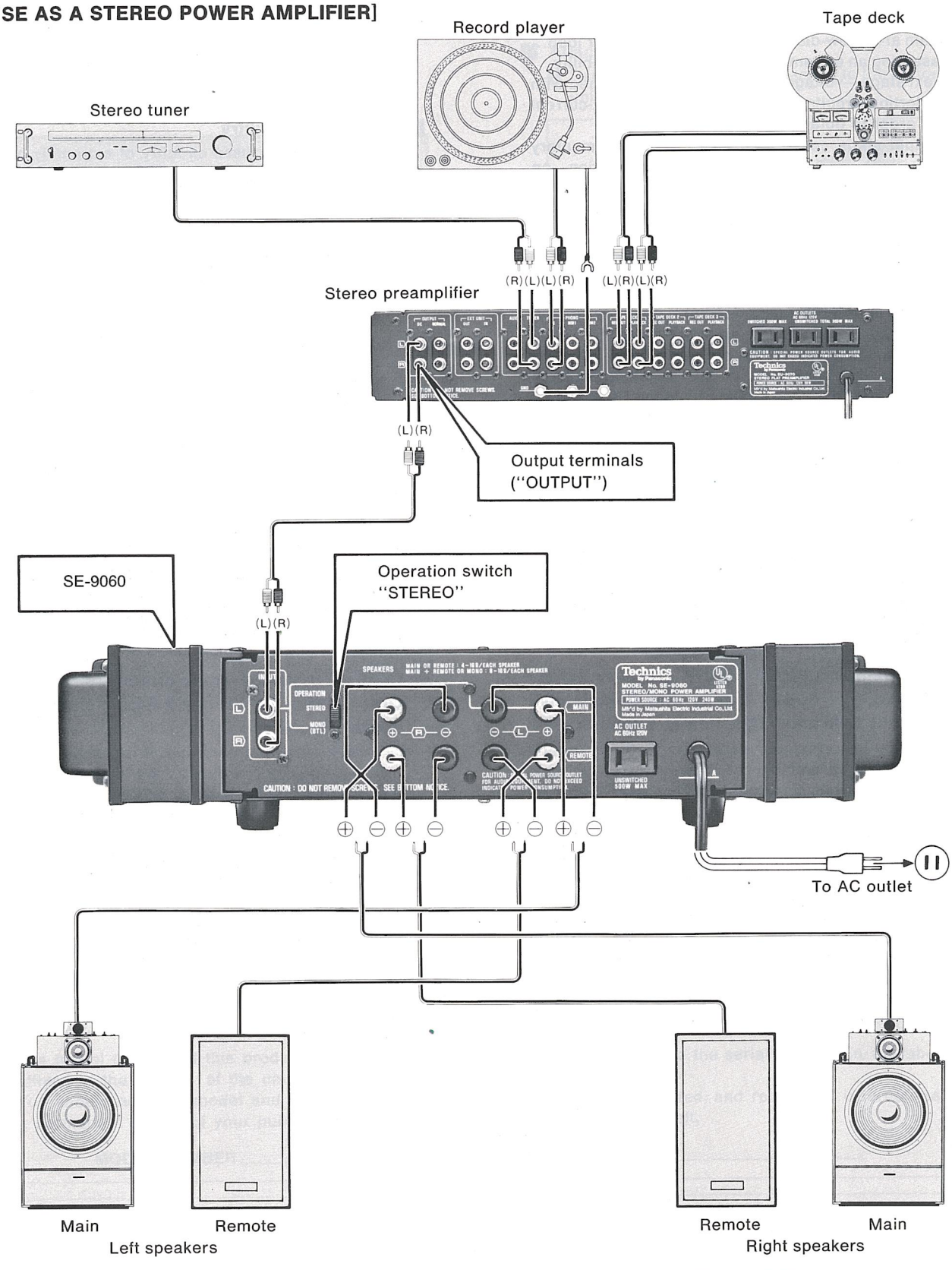
Although this unit employs an exposed radiator for dissipation of heat, careful consideration was made for safety by using a special "thermo label" which changes color when the temperature of the label exceeds 50°C (after continuous use at high output) thus serving as a warning not to touch the radiator.

■ Built-in Balanced-Transformerless Circuitry in Order to Use the Unit as a High-Output Monaural Power Amplifier

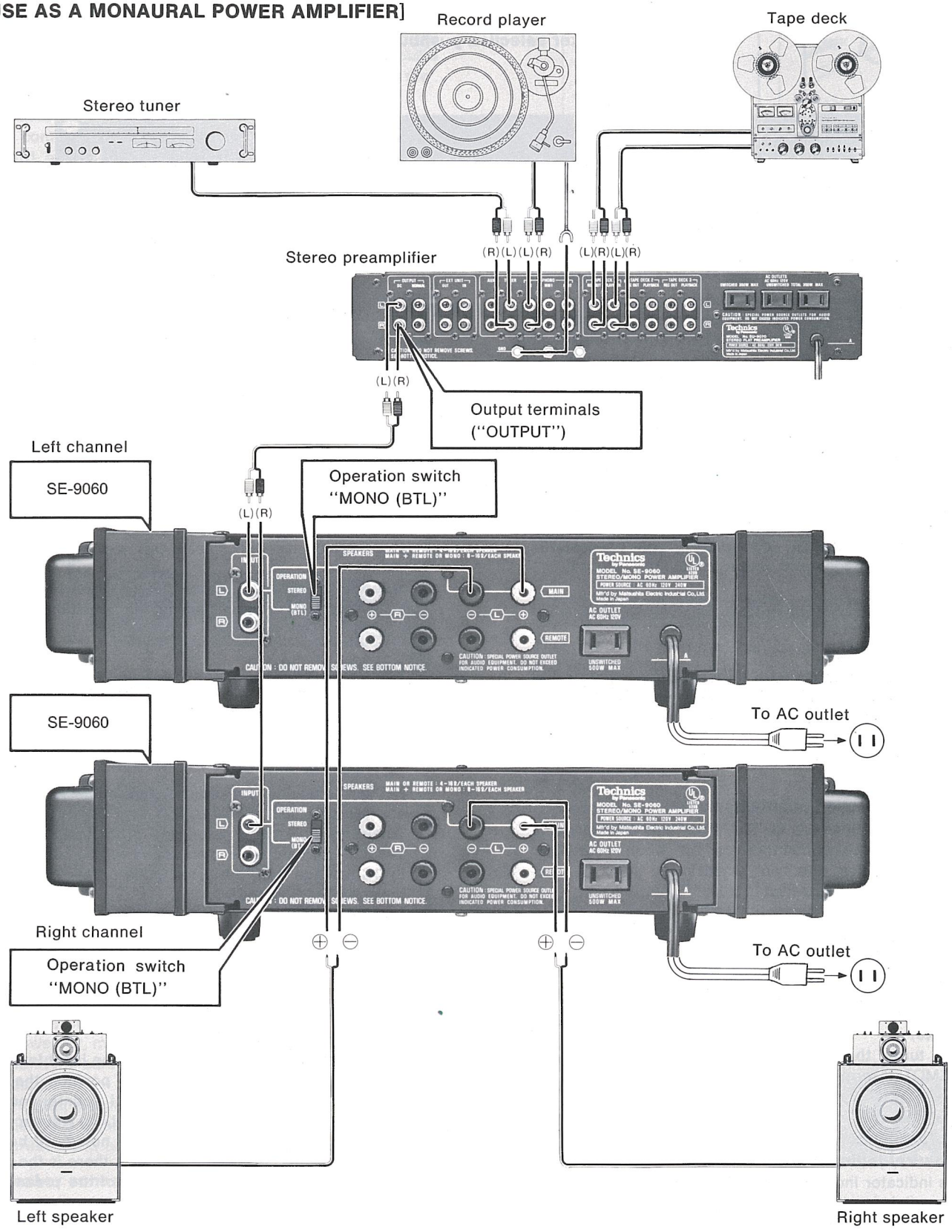
Operation is virtually certain to be satisfactory when ordinary speakers are used for stereo reproduction because the output of 70 W + 70 W (20 Hz ~ 20 kHz) is quite sufficient to drive the speakers. In order, however, to obtain sufficient dynamic range to drive speakers of low efficiency, or for other professional use of this unit for which an even greater output may be desired, the built-in BTL (Balanced-Transformerless) circuitry functions to permit the unit to operate as a high-output monaural power amplifier by effectively utilizing its two power amplifiers.
When the unit is used for Balanced-Transformerless Operation, the output becomes 180 W (20 Hz ~ 20 kHz), with a total harmonic distortion rating of 0.02%.

STEREO SYSTEM COMPONENTS AND THEIR CONNECTIONS

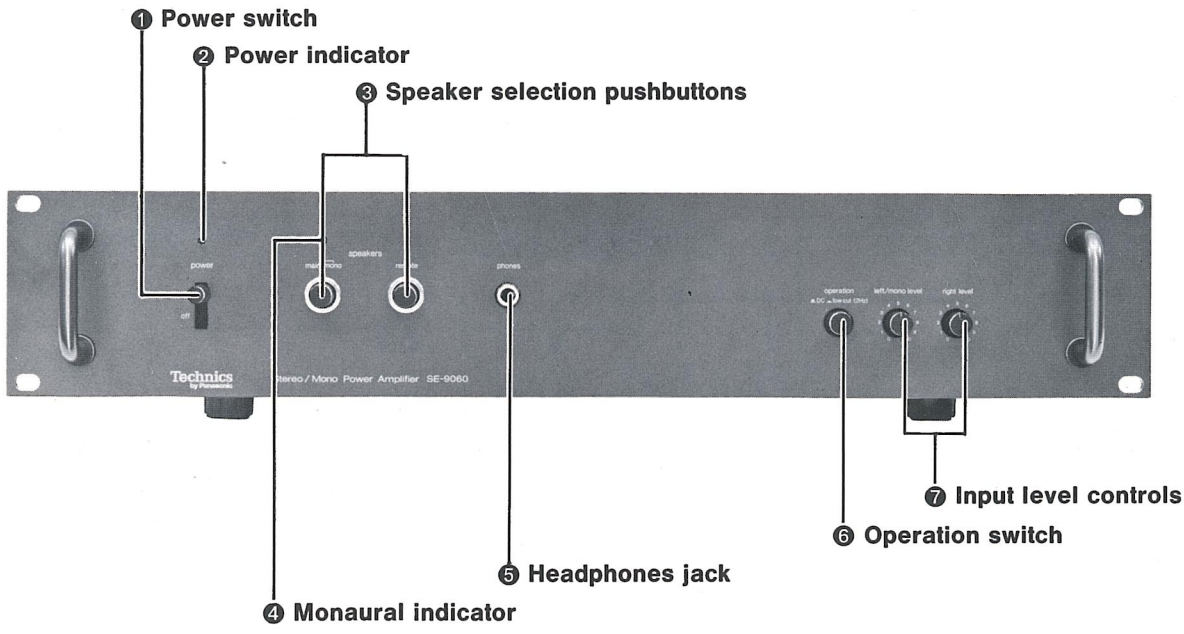
[USE AS A STEREO POWER AMPLIFIER]



[USE AS A MONAURAL POWER AMPLIFIER]



FRONT PANEL CONTROLS AND THEIR FUNCTIONS



❶ Power switch

This switch is used to turn the power on and off. The unit will be ready to function a few seconds after the power is turned on.

❷ Power indicator

When the power switch ① is turned on, this indicator illuminates to indicate that the unit is in operation. This indicator remains illuminated during operation.

❸ Speaker selection pushbuttons

These pushbuttons are for turning on and off 2 systems of speakers. The pushbuttons are "off" when in the outer (▬→▮) position, and "on" when in the inner (▮→▬) position.

main/mono:

This pushbutton turns on and off the speaker systems connected to the "MAIN" terminals.

When this unit is used for BTL (Balanced Transformerless) operation, this pushbutton is used to turn the speaker system used on and off.

remote:

This turns the speaker systems connected to the "REMOTE" terminals on and off.

❹ Monaural indicator

This indicator indicates BTL operation. When the operation switch (on the rear panel of this unit) is set to the "MONO (BTL)" position, this indicator illuminates to indicate that the unit is in the BTL operation mode.

❺ Headphones jack

This jack is for connection of headphones.

Use headphones with a voice-coil impedance of 4 to 16 ohms.

When listening only by headphones, set the speaker selection pushbuttons ③ to the "off" position.

❻ Operation switch

This switch is used to obtain the best operating performance from the DC main amplifier.

The released (▬→▮) position is "DC", and the depressed (▮→▬) position is "low cut (2 Hz)."

DC:

Set to this position for ordinary operation. The unit will operate as a DC amplifier.

When this position is used, the protection circuitry of this unit will function and no sound will be heard it there is DC leakage from the preamplifier. This is to protect the speakers from the DC.

low cut (2 Hz):

If there is DC leakage from the preamplifier, this position should be used. The low range of 2 Hz and below will be cut.

❼ Input level controls

These controls are for adjustment of the input level.

The input sensitivity is 1 V at the "10" position, the maximum setting. By turning the control counterclockwise from the "10" position, the input sensitivity will decrease.

If the input level is reduced, residual noise will become lower, although, if reduced too much, there is the possibility that the sound in the final stage of the preamplifier may become distorted.

Operation within a range from "5" to "10" is recommended. The left and right levels can be adjusted individually.

CONNECTIONS

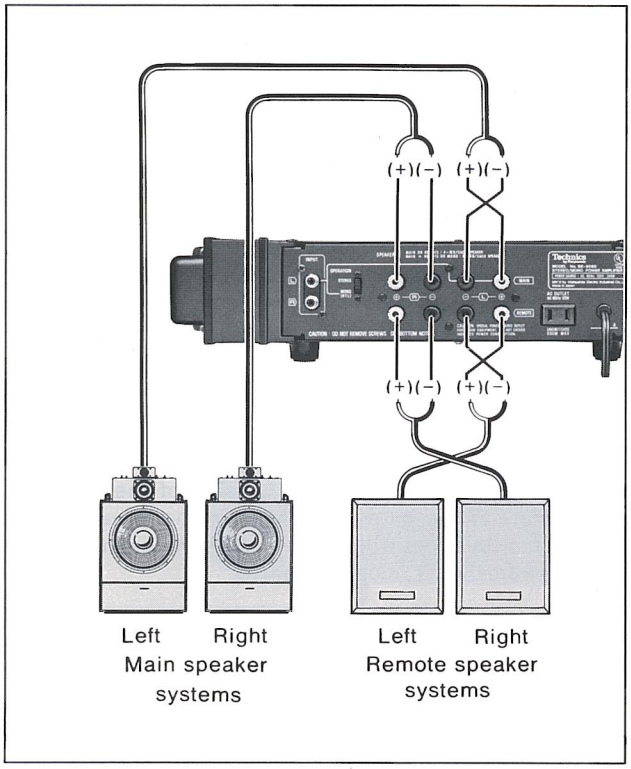
The following is an explanation of connections to be used when this unit is to be used as a stereo power amplifier.

Before making connections

❶ Set the operation switch (on the rear panel) to the "STEREO" position.
❷ Be sure connections are completely made. If plugs are not completely inserted all the way, sound may not be heard, or noise may be caused.
❸ Be sure to carefully read the operation instructions included with each component to be connected.
❹ Do not make any connections to the power supply until all other connections between components have been completed.

Connection of speaker systems

This unit has two pairs of speaker terminals, marked "MAIN" and "REMOTE," making connection of two speaker systems possible.



■ Impedance of speakers

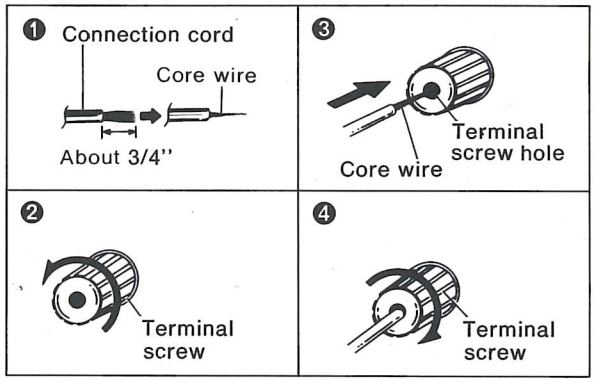
Use speakers with a voice-coil impedance of 4~16 ohms with this unit.
If, howerver, main and remote speaker systems are both used at the same time, use speakers of 8~16 ohms impedance.
Note that, although speaker systems with a low impedance of 4-ohm and 6-ohm can be used, output power will decrease and heat generation will increase.

■ Speaker connection wires

Use medium gauge wire, such as AC power cord, for speaker connections so as not to decrease the damping factor.

■ Connections

❶ Strip off about 3/4" of the connection cord insulation and twist the strands together.
❷ Turn the screw three or four times counterclockwise.
❸ Insert the core wire into the terminal screw hole.
❹ Tighten the screw snugly clockwise. The connection is then finished.



■ Speaker placement

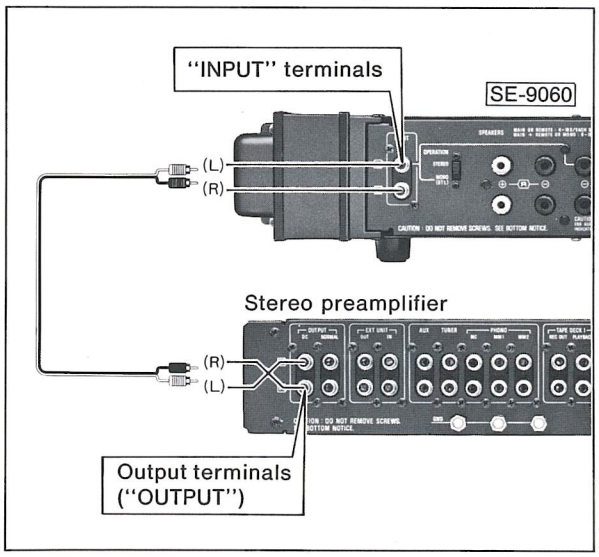
In general, it is advisable to place the speakers on a hard wall surface. Soft surfaces can often ruin the deep tones of the reproduced bass.
Also avoid placing the speakers facing a solid surface because an echo effect may result and distort the quality of the reproduced sound.
In summary, place the speakers on a very hard surface, and, if a hard surface such as window panes or panels happens to face the speakers, cover it with soft material such as curtains.
NOTE:
Be extremely careful that the terminals or speaker wires do not "short" each other out. Never use the minus speaker terminal for ground connections.

Preamplifier connections

This unit is the DC type. The coupling capacitors for input and output, and the capacitors for signal line and NF line are, therefore, omitted. There is amplifying gain to DC. In order to obtain the finest performance of which this unit is capable, it is recommended that the preamplifier used with this unit also be the DC type.

■ Connections

Connect the "INPUT" terminals of this unit with the output terminals ("OUTPUT") of the preamplifier.



OPERATION

Before beginning operation

❶ Check to be sure that the preamplifier, record player and other audio equipment are correctly connected.
❷ Before making connection to the power source, check to be sure that each control and switch is set to the position described below.
- Speaker selection pushbutton ③ .....on (▬→▬)
- Input level controls ⑦ .....5～10

❸ Check to be sure that each control and switch of the preamplifier is set to the position described below.
- Volume control .....∞
- Balance control .....center
- Mode selector.....stereo
- Recording output selector .....off

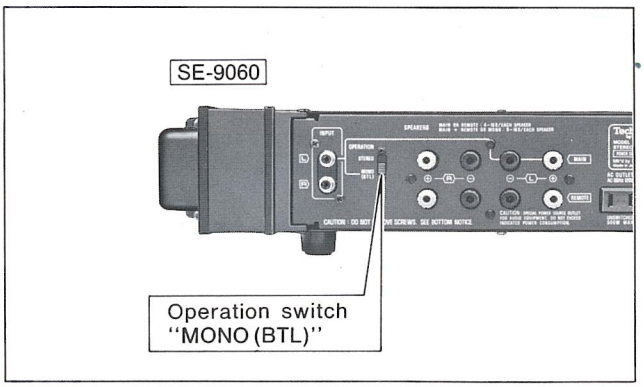
Because the above operations may differ depending upon the preamplifier used, read the operation instructions of the preamplifier carefully for complete details.
❹ Finally, turn on the power to this unit and to the preamplifier.

Operation

❶ Use the input selector of the preamplifier to select the program source.
❷ Begin the operation of the other equipment.
❸ The performance can be heard by turning the volume control of the preamplifier to the right.

USE AS A MONAURAL POWER AMPLIFIER

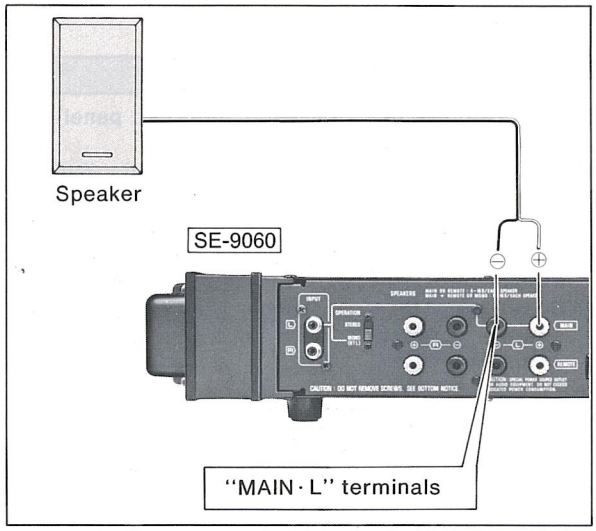
Because this unit includes BTL circuitry, it can be used as a high-power monaural amplifier by setting the operation switch (on the rear panel) to the "MONO (BTL)" position. The right signal is, in this instance, cut off, and only the left signal is reproduced.



Connections and use of the speaker system

■ Connections

Make connections to the "L" side of the "MAIN" terminals. The right terminal is plus (+); and the left terminal, is minus (−).
Signals will not be emitted from other speaker terminals.



■ Speaker system impedance

Speaker systems with a voice-coil impedance of 8～16 ohms can be used with this unit.
Note that, although speaker systems with a low impedance of 4 ohms and 6 ohms can be used, output power will decrease and heat generation will increase.

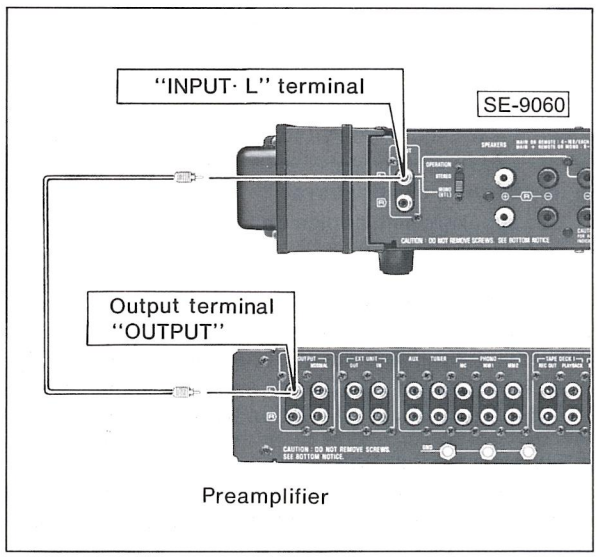
■ On/off control of speaker system

The speaker system connected to the "L" side of the "MAIN" terminals can be turned on and off by using the "main/mono" speaker selection pushbutton ③, on the front panel.

Connections and use with a preamplifier

■ Connections

Make connections from the "L" side of the "INPUT" terminals to the output terminals of the preamplifier. Note that this unit will not operate if the connection is made from the "R" side terminals.



■ Input level adjustment

The input level of this unit can be adjusted by using the "left/mono" input level adjustment control ⑦, on the the front panel.

Concerning use of headphones

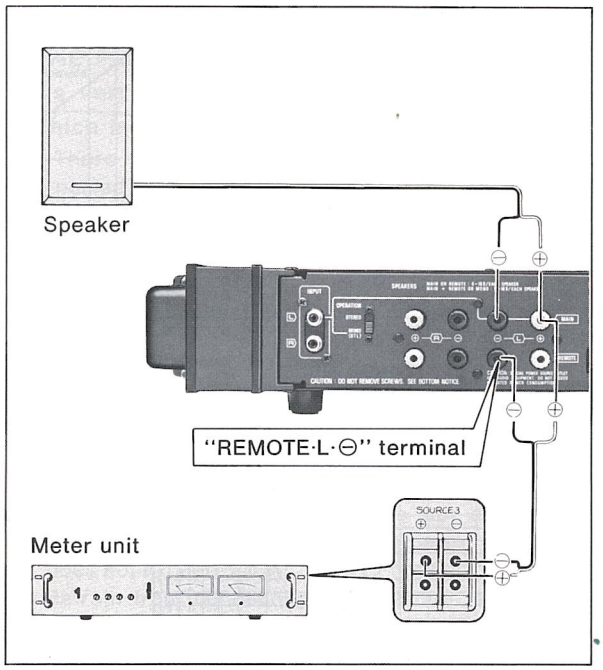
Headphones cannot be used when the operation switch is set to the "MONO (BTL)" position and the unit is being used as a high-power monaural power amplifier.
Although signals will be emitted from the headphones jack, the left signal will be emitted from the right side, resulting in sound which would sound broken and unsatisfactory.

Connections and use with a meter unit

If the model SH-9020 meter unit is connected, the readout of output power should be made as follows for BTL operation.

■ Connections

As shown in the figure below, connections should be made from the "MAIN·L" plus (+) terminal of this unit to the "SOURCE 3" plus (+) terminal of the SH-9020, and from the "REMOTE·L" minus (−) terminal of this unit to the "SOURCE 3" minus (−) terminal of the SH-9020.

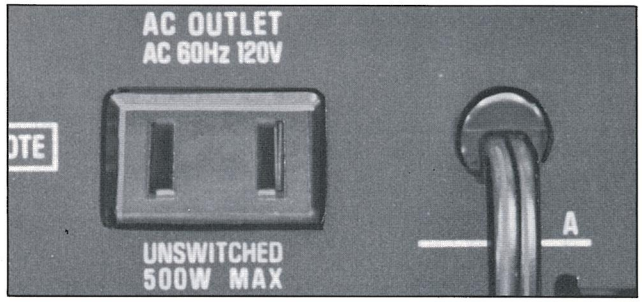


■ Impedance correction

When the SH-9020 is used as a power meter, it is necessary to make an impedance correction.
Usually, the speaker impedance selector of the SH-9020 is set to the position corresponding to the impedance of the speakers. For readout of the output for BTL operation, however, the setting should be made to the numerical value which is 1/2 of the impedance of the speakers. The setting for 8 ohms speakers, for example, should be to the "4 Ω" position.

AC OUTLET

Any equipment connected to this outlet is always on regardless of the position of the power switch on the front panel. Capacity is 500 W.

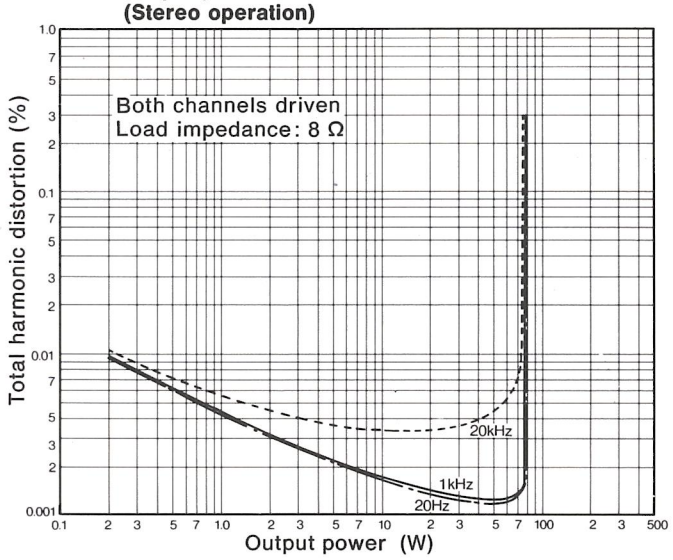


HOW TO CARE FOR THE CABINET

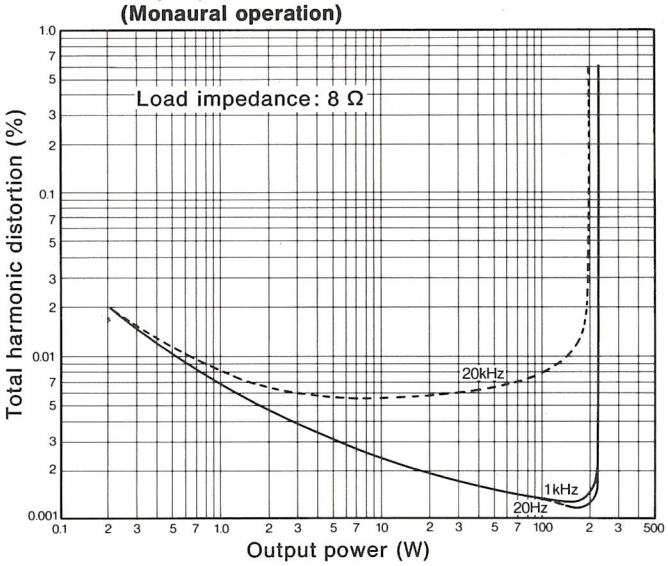
- If this unit becomes dirty, it can be cleaned by wiping it with a soft, dry cloth. If it is extremely dirty, dip the soft cloth into a soap-and-water solution, wring the cloth out well and then wipe the unit clean. After cleaning, wipe the unit dry once more with a dry cloth.
- Be careful not to allow alcohol, thinner, benzine, 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.

RESPONSE CURVES

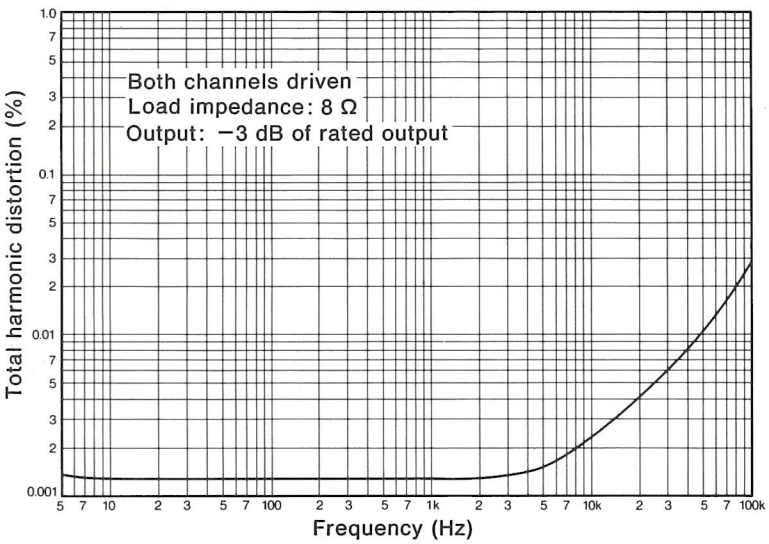
Output power vs. total harmonic distortion (Stereo operation)



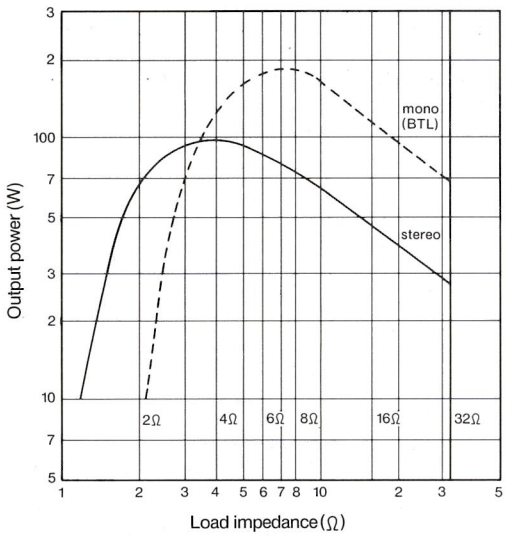
Output power vs. total harmonic distortion (Monaural operation)



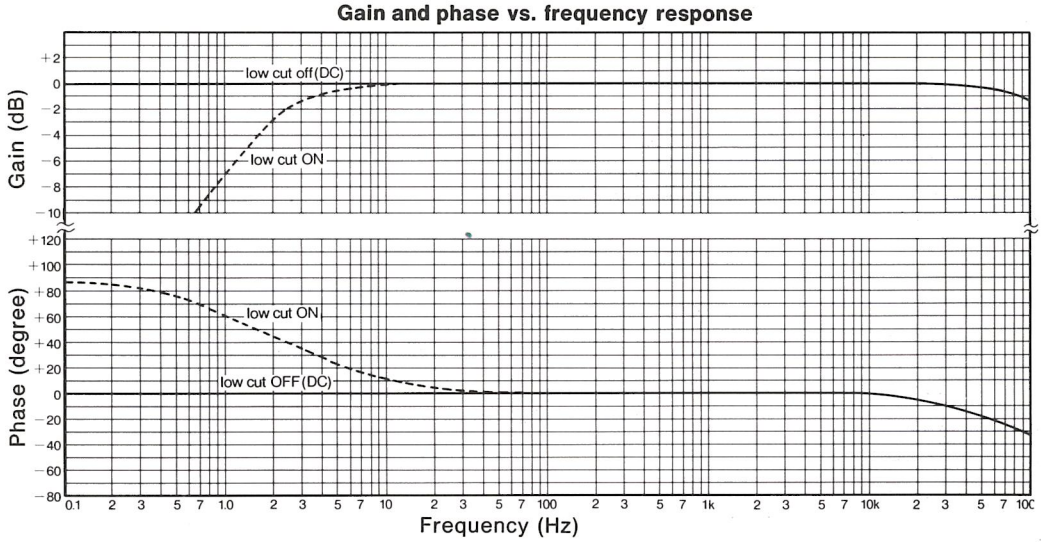
Power bandwidth



Load impedance vs. output power



Gain and phase vs. frequency response



TECHNICAL SPECIFICATIONS

Rated minimum sine wave RMS power output
Stereo operation
20 Hz～20 kHz
both channels driven
0.02% total harmonic distortion
70 W per channel (8 ohms)
90 W per channel (4 ohms)
Monaural operation
20 Hz～20 kHz
0.02% total harmonic distortion 180 W (8 ohms)

1 kHz continuous power output
Stereo operation
both channels driven
0.02% total harmonic distortion
75 W per channel (8 ohms)
100 W per channel (4 ohms)
Monaural operation
0.02% total harmonic distortion 200 W (8 ohms)

Total harmonic distortion	
rated power	0.02% (20 Hz～20 kHz)
half power	0.0015% (1 kHz)
Intermodulation distortion (rated power)	
60 Hz: 7 kHz = 4:1, SMPTE	0.02%
Frequency response	20 Hz～20 kHz, +0, −0.05 dB
	0 Hz～100 kHz, +0, −1.0 dB
S/N (IHF, A)	120 dB
Residual hum & noise	100 μV
	25 μV(IHF, A)
Input sensitivity & impedance	1 V/47 kilohms
Damping factor	
Stereo operation	100 (8 ohms)
	50 (4 ohms)
Monaural operation	50 (8 ohms)
Load impedance	
Stereo operation	
MAIN or REMOTE	4～16 ohms
MAIN＋REMOTE	8～16 ohms
Monaural operation	8～16 ohms
Power consumption	240 W
Power supply	AC 60 Hz, 120 V
Dimensions (W×H×D)	19" ×3-31/32" ×14-13/16" (482×101×376 mm)
Weight	26.5 lb. (12.0 kg)

■ ACCESSORIES

Connection cord	1
Feet	4
Screws	4

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 than the rated voltage

- There is the danger of combustion if the unit is connected to a power source which is different than 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. AC OUTLET

The power consumption of any appliance connected here should not exceed 500W.

- Related audio equipment, such as tape decks, may be connected to the AC outlet if the power consumption does not exceed 500 W.
- Refrain from connecting such electric appliances as irons or toasters, which draw large amounts of current, to avoid damage from overheating.

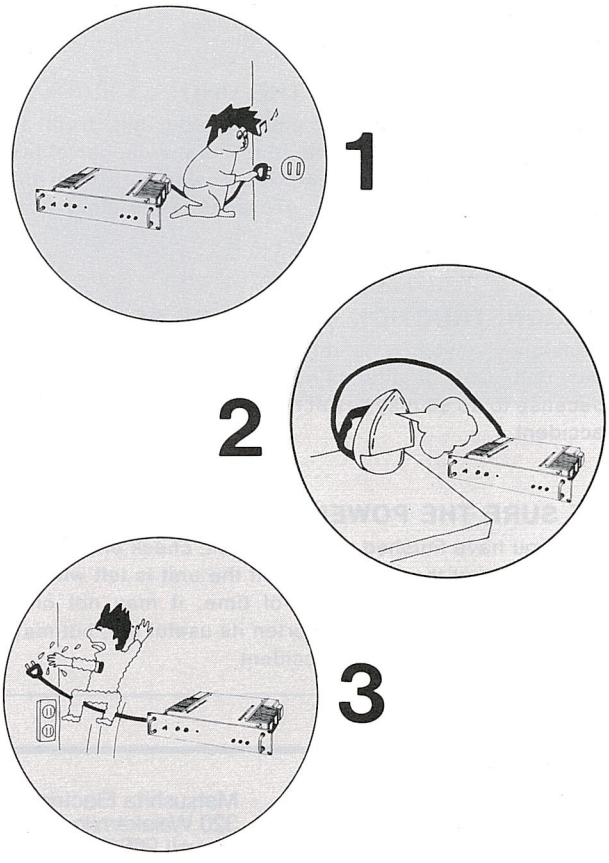
3. CONNECTION OF THE POWER CORD

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.



FOR LONGER AND SAFER USE OF THIS UNIT (continued)

4. LOCATION OF THE UNIT

- A place which is not in direct sunlight.

5. 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.

6. 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.

7. 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 AC outlet, such as toys or a screwdriver, because these things may cause an electric shock or result in a malfunction of the unit.

8. IF WATER SPILLS ON THE UNIT

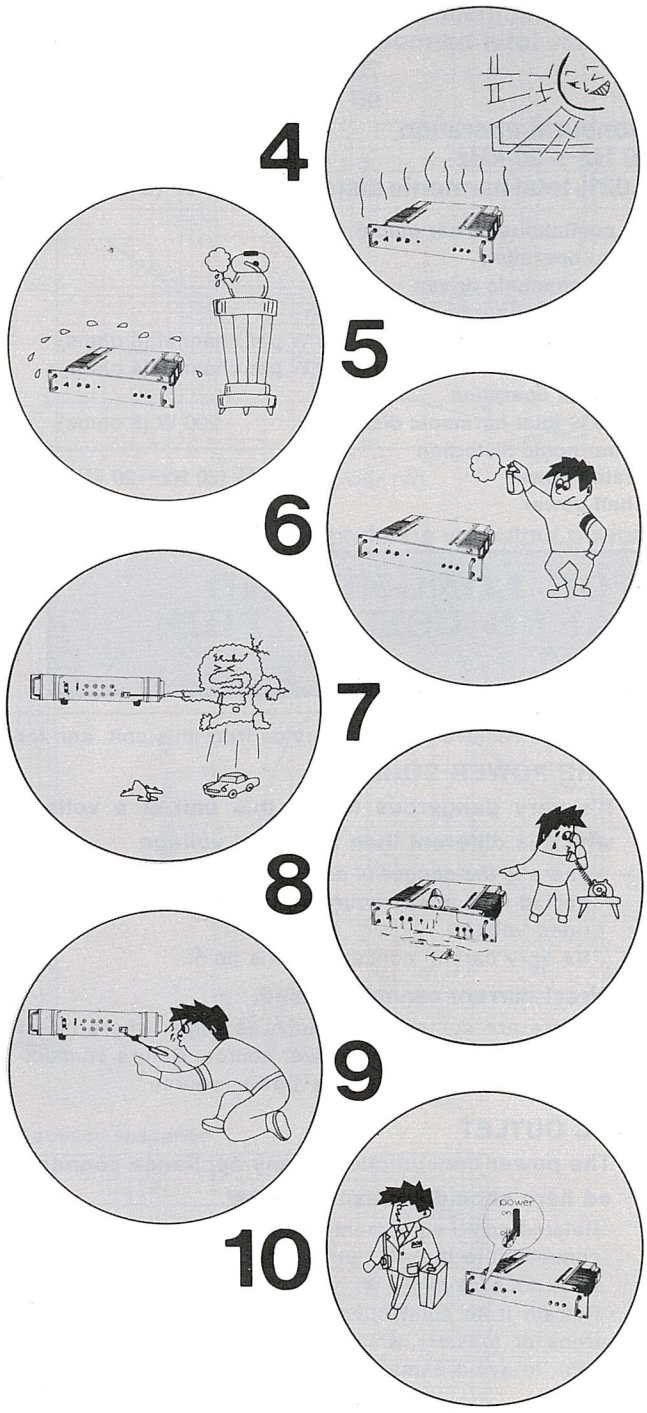
If water should happen to spill on the unit, from an overturned vase for example, there is the danger of fire or electric shock. Disconnect the power cord from the electric outlet immediately, and contact the store from which the unit was purchased.

9. 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.

10. 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.



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