

Nakamichi PA-304

Mobile Power Amplifier

Owner's Manual

Congratulations!

You have chosen a fine component for true mobile high fidelity. The PA-304 is a multi-mode power amplifier which can be switched to 4-channel, 3-channel or 2-channel operation. It possesses a large PWM type power supply with DC-to-DC converter for high efficiency and large output current capacity. To ensure optimum sound quality, the output stage is built with discrete circuit components. The amplifier circuits are divided into the drive stage and output stage, with separate power supplies, circuit boards and chassis. This reliably prevents any possibility of noise interference. The result is high output power combined with minimum distortion, for dynamic, clear and detailed sound reproduction over the entire frequency range.

In order to take full advantage of this unit's excellent performance, please read this manual in its entirety and retain it for future reference.

Thank you.

Nakamichi Corporation

WARNING

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

Please record the Model Number and Serial Number in the space provided below and retain these numbers.

Model Number and Serial Number are located on the rear panel of the unit.

Model Number: PA-304 _____

Serial Number: _____

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Precautions

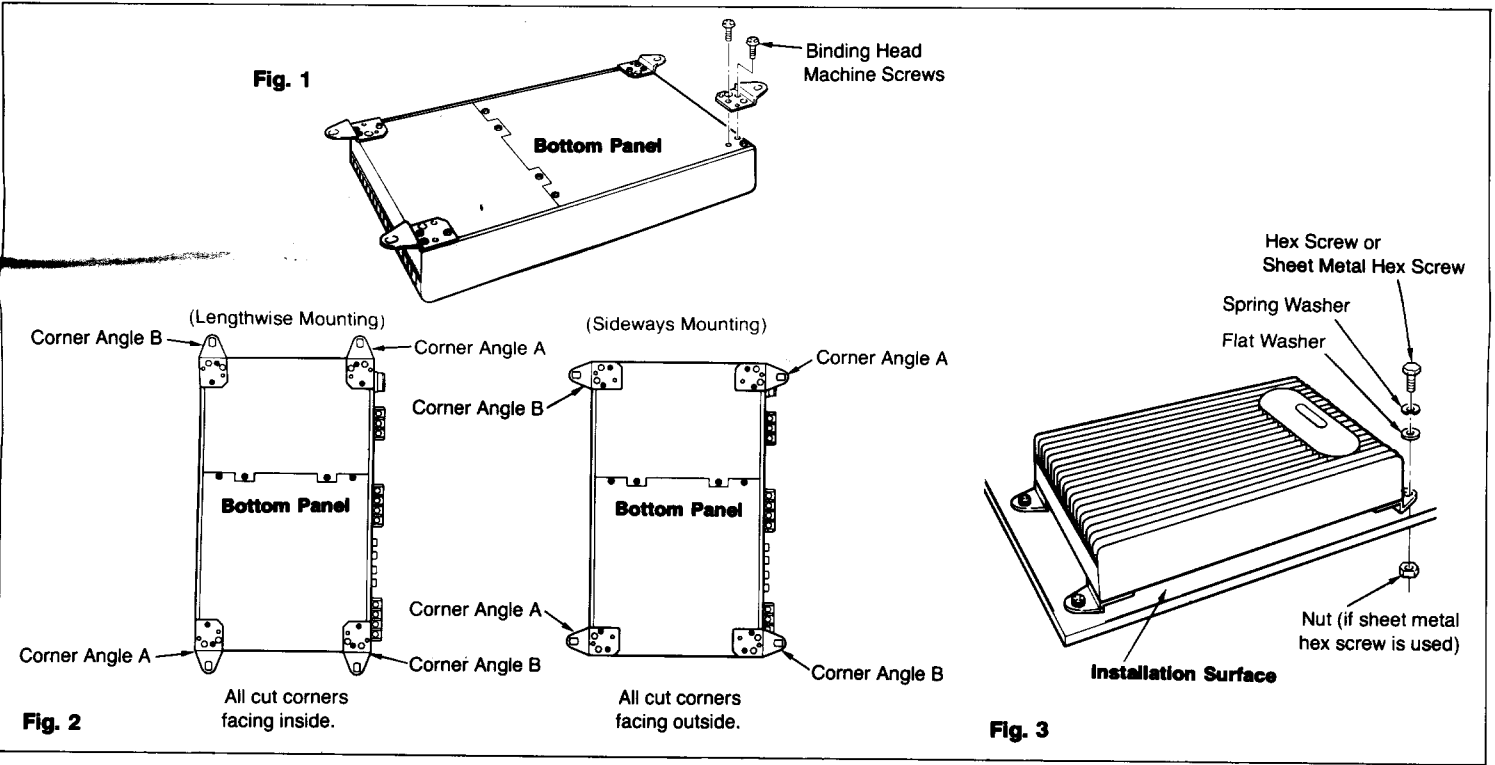
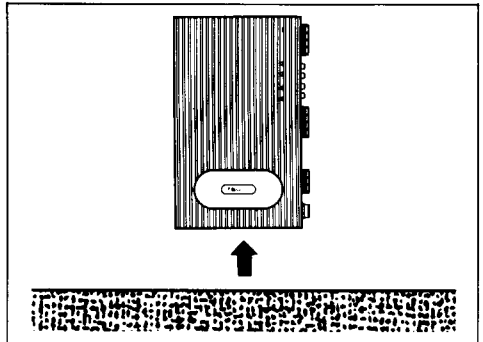
1. This unit is designed for use in cars with 12 V negative ground systems only.
2. As this unit can deliver substantial amounts of power, it is essential that all connections be established properly to prevent damage. Please refer to the paragraph "Connections."
3. This unit can become quite warm during operation. It should therefore only be installed in locations which provide adequate ventilation and are not subject to excessive humidity or splashes of water, etc. Especially when the amplifier was driven to high levels for an extended period, the heatsink will become hot and should not be touched accidentally.
4. Do not use this unit while the car's engine is turned off, to prevent excessive drain of the car battery.
5. If the fuse is blown, check all connections and then replace it with a new fuse of the identical type. If the fuse blows again, contact your dealer for servicing.
6. When a closed car is parked in the sun, the temperature inside the car will reach very high levels. In such a case, use the unit only after the temperature has returned to normal.
7. For reasons of traffic safety, you should keep the listening volume while driving to a level which will not mask outside noises.

Installation

Use the supplied mounting hardware and install the PA-304 as shown in the illustrations, making sure that the unit cannot in any way interfere with driving safety. Especially when mounted under the driver's seat, the unit must be securely fastened to prevent it from jamming under the pedals in case of a sudden stop. You should also take the following points into account when choosing a location.

- This unit employs a DC-DC converter which may cause interference during AM reception if placed in close proximity to an AM tuner or AM antenna. Install the unit as far away as possible

- from such equipment.
- To prevent power loss and noise pickup, choose a mounting location which permits short connecting leads to the other components of the system and to the car battery.
- Install the unit with the heatsink pointing upwards. Do not cover the heatsink with floor mats, carpeting, etc.
- If the unit has to be mounted upright, the heatsink fins should be oriented vertically (perpendicular to the car floor).



Before starting the installation, check whether the supplied auxiliary parts are complete.

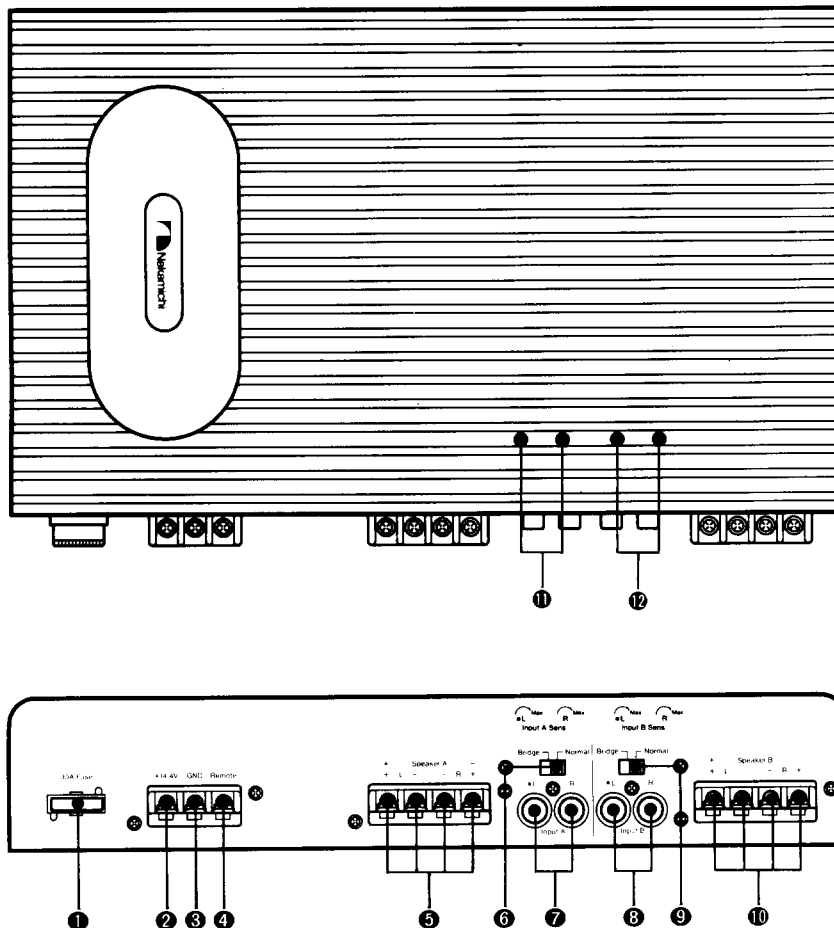
	Qty
Mounting Corner Angle (A/B, 2 each).....	4
Binding Head Machine Screw (BT3 X 6).....	8
Hex screw (M4 X 15).....	4
Nut.....	4
Sheet Metal Hex Screw (4 X 16).....	4
Spring Washer.....	4
Flat Washer.....	4
Screwdriver for Sensitivity Adjustment.....	1

- (1) Attach the supplied corner angles to the unit (Fig. 1).
- (2) Depending on the installation requirements, the angles may be mounted either lengthwise or sideways. Refer to Fig. 2 to determine the correct positioning and orientation of the corner angles A and B.

- (3) Fasten the corner angles to the installation surface (Fig. 3). The required hole diameter is 5 mm when using the hex screws and 3.4 mm when using the sheet metal screws.

- Use the supplied binding head machine screws to fasten the corner angles to the unit. If other screws are used, their length must not exceed 6 mm.

Controls and Features



❶ Fuse Holder

Contains a 30-ampere fuse. If blown, replace only with a fuse of identical type and rating. (Using a different fuse may result in severe overheating and loss of output power.)

❷ +14.4 V Terminal

This terminal should be connected to the car battery's positive (+) terminal. To prevent danger in case of a short-circuit, install a 30-ampere fuse in this line close to the battery.

❸ Ground Terminal

This terminal should be connected directly to the car's chassis.

❹ Remote Control Terminal

When this terminal is connected to the Remote Power Amplifier On/Off Control output of the jointly used tuner/cassette deck, the amplifier will be switched on and off together with the tuner/cassette deck.

❺ Speaker Output Terminals A Left/Right

❻ Bridge switch A

❼ Line Input Jacks A Left/Right

❽ Line Input Jacks B Left/Right

❾ Bridge switch B

❿ Speaker Output Terminals B Left/Right

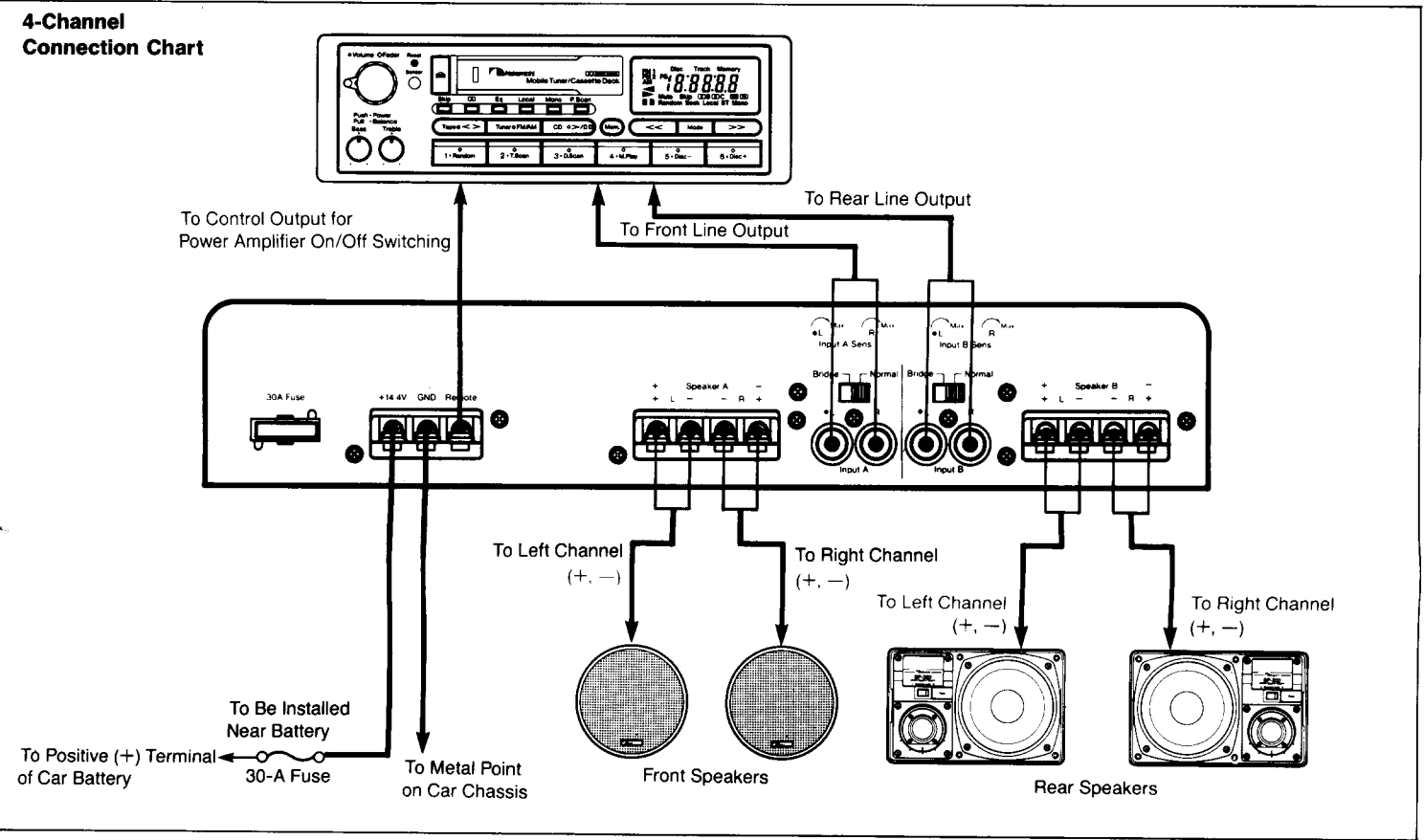
⓫ Input Sensitivity Controls A Left/Right

⓬ Input Sensitivity Controls B Left/Right

These controls serve to adjust the amplifier's input sensitivity to match the output level of the tuner/cassette deck.

Connections

Establish secure connections as shown in the chart.



- Be sure to remove the negative (-) terminal from your car battery before making any connections, as an accidental short-circuit could have catastrophic results.
- The explanation of how to establish connections is based on the assumption that the jointly used tuner/cassette deck has a control output for remote switching of the power amplifier.
- Take special care when routing the power supply cable and make sure that it cannot get caught in the car seat sliding rails or rub against sharp edges, etc., as a short-circuit could have very dangerous consequences.

Line Output Connections

Connect the front line output of the tuner/cassette deck to the line input A (or B) of the amplifier and the rear line output to the line input B (or A) jacks.

- The PA-304 cannot be used as a booster amplifier. Do not connect speaker-level outputs to the unit.

Speaker Connections

Connect the front speakers to the Speaker Output Terminals A (or B) and the rear speakers to the Speaker Output Terminals B (or A) of the amplifier. Take care not to mix up left and right channels and observe correct positive (+) and negative (-) polarity.

Use only speakers with an impedance of 4 ohms or more, as the use of lower-impedance speakers may lead to overheating and damage.

■ Bridged Operation

The PA-304 is designed as a four-channel amplifier, but it provides Bridge switches on the side panel which permit individual use of the A and B amplifier sections in bridged mode. Using a section in bridged mode results in a monaural amplifier which provides twice the output power of stereo operation.

When both switches are set to "Bridge," the PA-304 becomes a two-channel stereo amplifier with 90 watts + 90 watts of output power.

When only one switch is set to "Bridge," the respective section becomes a monaural power amplifier with 90 watts of output power, which is ideal for example to drive a subwoofer. The other section (switch in "Normal" position) operates as a stereo amplifier with 30 watts + 30 watts of output power.

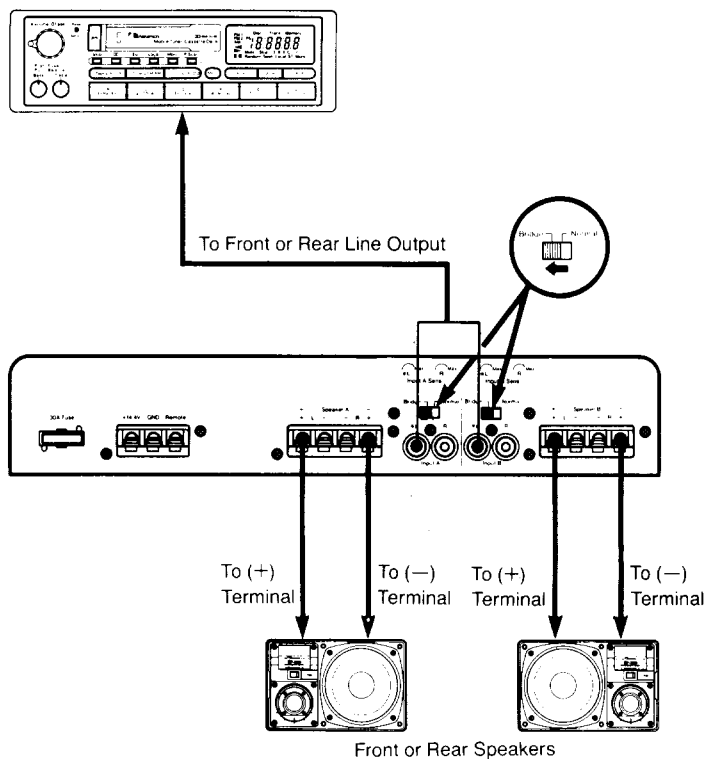
Connections for Bridged Operation

- (1) Set the switch for the amplifier section you wish to operate in bridged mode to "Bridge."
- (2) **When using both amplifier sections in bridged mode,** connect the line output cables to the left-channel jack for section A and B. **When using only one amplifier section in bridged mode,** convert the input signal to mono, using a stereo-to-mono adapter cable or the like, and connect it to the left-channel line input jack of the section.
- (3) Follow the orange markings on the speaker output terminals.

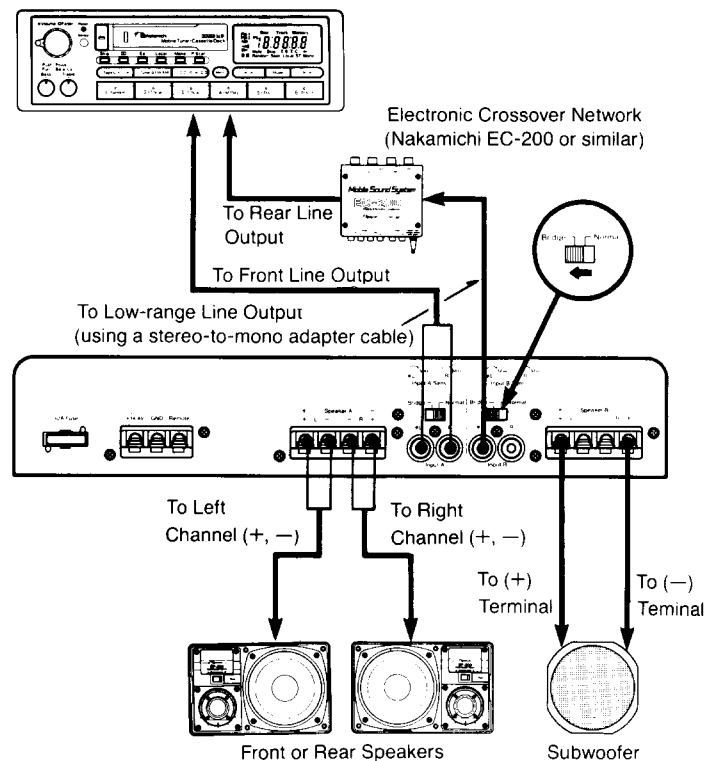
Connect the (-) lead of the loudspeaker to the right-channel (+) terminal on the amplifier and the (+) lead of the loudspeaker to the left-channel (+) terminal on the amplifier.

- Never connect the negative (-) lead of the loudspeaker used with the bridge section to the car's chassis or use common connections with other speakers' negative leads, as this can destroy the unit!
- When using only one amplifier section in bridged mode, the output power of the other section drops to 30 watts per channel. This is designed to prevent an increase in heat generation associated with bridge operation.
- When using only one amplifier section in bridged mode, there will be a certain difference in output levels between the two sections. Use the input sensitivity controls (→ p. 7) to match the output levels. For the section using bridged mode, only the left-channel sensitivity control is active.

2-Channel Connection Chart



3-Channel Connectin Chart



Power Connections

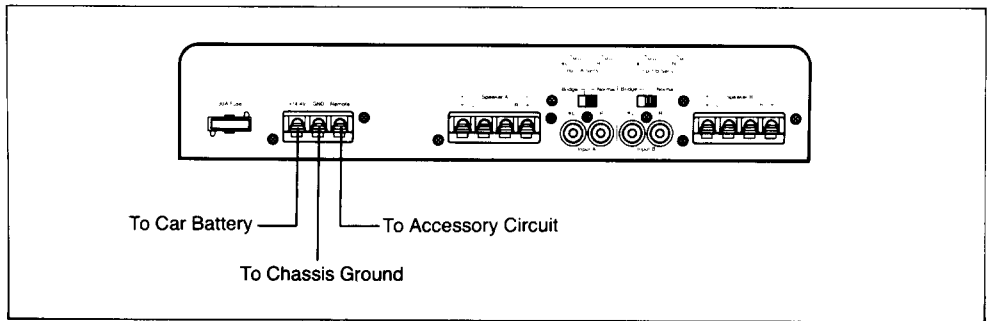
As this unit draws a considerable current during operation, use only A.W.G.—10 (profile surface 5.3 mm²) or heavier wire for the power supply (+14.4 V terminal) and ground connections. The total resistance of the cable should be below 20 milliohms (up to 6 m when using A.W.G.—10 wire). In order to prevent short-circuiting and

overheating, use crimp-on terminals or solder lugs. Connect the amplifier's +14.4 V terminal directly to the car battery's positive (+) terminal, with a 30-ampere fuse installed in the line close to the battery. Do not install any switches etc. in this line. Connect the amplifier's ground terminal (GND)

directly to a metal ground point on the car's chassis, using heavy-gauge wire (A.W.G.—10 or heavier). Connect the power amplifier On/Off control output of the tuner/cassette deck unit to the Remote Control terminal of the PA-304.

■Use of a Tuner/Cassette Deck Without Power Amplifier On/Off Control Output

If a tuner/cassette deck without a remote On/Off control output facility is used, the amplifier cannot be switched in conjunction with the head unit. In such a case, connect a circuit which is switched on and off by the car's ignition key (accessory circuit) to the Remote Control terminal of the PA-304. The maximum current consumption of this terminal is less than 10 mA.

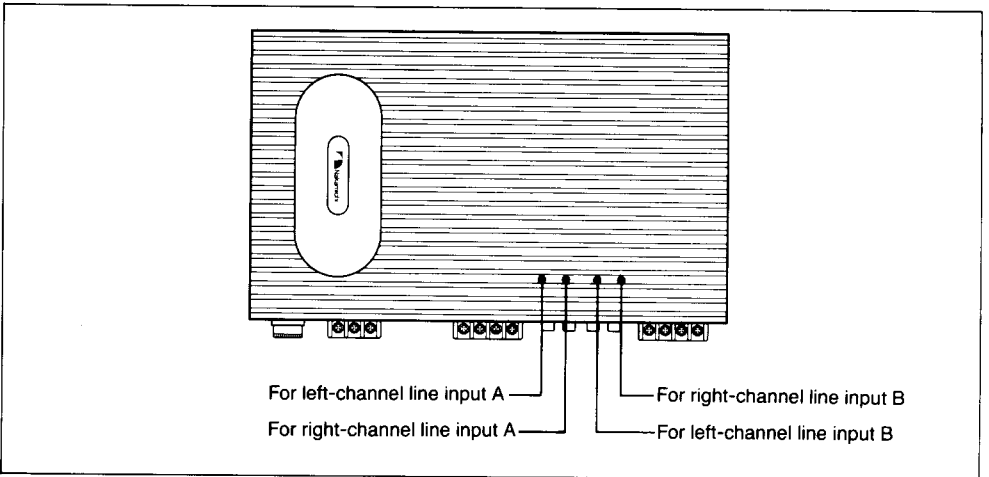


Input Sensitivity Adjustment

The four screwdriver controls on the top panel of this unit permit independent L/R adjustment of input sensitivity in each amplifier section, to match the amplifier to differing output levels of other equipment and to compensate for level differences during bridged operation. Be sure to use only the screwdriver supplied with the PA-304. Perform the adjustment as follows.

- (1) The sensitivity controls are adjusted before shipping for a standard input level (0.8 V). Establish connections in this position and then switch on the amplifier and the tuner/cassette deck.
- (2) Set the volume control of the tuner/cassette deck to an appropriate position and play some music.
- (3) If the listening volume level at this time is sufficient, adjustment of the sensitivity controls is not required. If the volume is too low, slowly turn the respective control clockwise to obtain the optimum aural impression of volume and balance. When the control is turned fully clockwise, the input sensitivity is at maximum.

- Be careful not to exert excessive pressure on the controls while making the adjustment.
- Do not use an ordinary screwdriver for this adjustment, as this could lead to short-circuiting and damage to the unit.



Before Requesting Service

In case of overheating or a short-circuit in the speaker wiring, the protection circuit of this unit will shut the amplifier off. Check whether all connections are established properly as described in this manual and whether the fuse is

not blown, etc. Sometimes an apparent 'malfunction' may be remedied by a simple check. If the trouble persists, contact an authorized service station.

Specifications

Continuous Power Output	45 W × 4 RMS (four channels driven, 4 ohms, 1 kHz, 0.005% THD) 30 W × 2 + 90 W × 1 RMS (three channels driven, 4 ohms, 1 kHz, 0.01% THD) 90 W × 2 RMS (two channels driven, 4 ohms, 1 kHz, 0.01% THD)
Power Bandwidth	10—50,000 Hz (4 ohms, 0.1% THD)
Total Harmonic Distortion	0.005% (4 ohms, 1 kHz, 45W)
Frequency Response	10—50,000 Hz +1, -3 dB (with input sensitivity control at max.) 20—20,000 Hz ±1 dB (with input sensitivity control at max.)
Signal-to-Noise Ratio	Better than 110 dB (IHF A-WTD, at rated power, with input sensitivity control at max.)
Damping Factor	Greater than 1,000 (4 ohms, 1 kHz)
Input Sensitivity/Impedance	0.3—0.8 V variable/10 kohms ("Normal" position) 0.2—0.55 V variable/10 kohms ("Bridge" position)
Channel Separation	Better than 80 dB (4 ohms, 1 kHz)
Power Source	14.4 V DC negative ground (10.8—15.6 V allowable)
Current Consumption	
Max.	29 A (four channels driven, 4 ohms, 45 W × 4) 36 A (two channels driven, 4 ohms, 90 W × 2)
Music	Approx. 10 A (4 ohms)
Min.	Approx. 2 A (idling)
Load Impedance	Above 4 ohms
Dimensions*	320 (W) × 56 (H) × 190 (D) mm 12-5/8 (W) × 2-3/16 (H) × 7-1/2 (D) inches
Approximate Weight	3.8 kg/8 lbs. 6 oz.

*: Dimensions do not include protruding parts. Height is the panel height.

- Unless otherwise noted, all measurements are with four channels driven ("Normal" position).
- Specifications and design are subject to change for further improvement without notice.

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