

KENWOOD

KAC-X1R KAC-PS1D

MONO DIGITAL POWER AMPLIFIER ▶ page 2-8

INSTRUCTION MANUAL

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MODE D'EMPLOI

AMPLIFICADOR DE POTENCIA DIGITAL MONOFÓNICO ▶ página 18-24

MANUAL DE INSTRUCCIONES

Kenwood Corporation



Take the time to read through this instruction manual. Familiarity with installation and operation procedures will help you obtain the best performance from your new power amplifier.

For your records

Record the serial number, found on the back of the unit, in the spaces designated on the warranty card, and in the space provided below. Refer to the model and serial numbers whenever you call upon your Kenwood dealer for information or service on the product.

Model KAC-X1R/ KAC-PS1D Serial number _____

US Residence Only

Register Online

Register your Kenwood product at
www.kenwoodusa.com

Safety precautions

▲WARNING

To prevent injury or fire, take the following precautions:

- Mounting and wiring this product requires skills and experience. For safety's sake, leave the mounting and wiring work to professionals.
- When extending the battery, or ground wires, make sure to use automotive-grade wires or other wires with the range of 10 mm² (AWG 8) to 25 mm² (AWG 4) to prevent wire deterioration and damage to the wire coating.
- To prevent a short circuit, never put or leave any metallic objects (such as coins or metal tools) inside the unit.
- If the unit starts to emit smoke or strange smells, turn off the power immediately and consult your Kenwood dealer.
- Do not touch the unit during use because the surface of the unit becomes hot and may cause burns if touched.

▲CAUTION

To prevent damage to the machine, take the following precautions:

- Be sure the unit is connected to a 12V DC power supply with a negative ground connection.
- Do not open the top or bottom covers of the unit.
- Do not install the unit in a spot exposed to direct sunlight or excessive heat or humidity. Also avoid places with too much dust or the possibility of water splashing.
- When replacing a fuse, only use a new one with the prescribed rating. Using a fuse with the wrong rating may cause your unit to malfunction.
- To prevent a short circuit when replacing a fuse, first disconnect the wiring harness.

NOTE

- If you experience problems during installation, consult your Kenwood dealer.
- If the unit does not seem to be working right, consult your Kenwood dealer.

FCC WARNING

This equipment may generate or use radio frequency energy. Changes or modifications to this equipment may cause harmful interference unless the modifications are expressly approved in the instruction manual. The user could lose the authority to operate this equipment if an unauthorized change or modification is made.

FCC NOTE

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment may cause harmful interference to radio communications, if it is not installed and used in accordance with the instructions. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

NOTE

This Class B digital apparatus complies with Canadian ICES-003.

Information on Disposal of Old Electrical and Electronic Equipment (applicable for EU countries that have adopted separate waste collection systems)



Products with the symbol (crossed-out wheeled bin) cannot be disposed as household waste. Old electrical and electronic equipment should be recycled at a facility capable of handling these items and their waste byproducts. Contact your local authority for details in locating a recycle facility nearest to you. Proper recycling and waste disposal will help conserve resources whilst preventing detrimental effects on our health and the environment.

This Product is not installed by the manufacturer of a vehicle on the production line, nor by the professional importer of a vehicle into an EU Member State.

Cleaning the unit

If the front panel gets dirty, turn off the power and wipe the panel with a dry silicon cloth or soft cloth.

▲CAUTION

Do not wipe the panel with a hard cloth or a cloth dampened by volatile solvents such as paint thinner and alcohol. They can scratch the surface of the panel and/or cause the indicator letters to peel off.

To prevent battery rise

When the unit is used in the ACC ON position without turning the engine ON, it depletes the battery. Use it after starting the engine.

Protection function

There is a Protection function installed in the unit to protect the unit and speakers from various problems. When Protection operates, the display informs you of the condition.

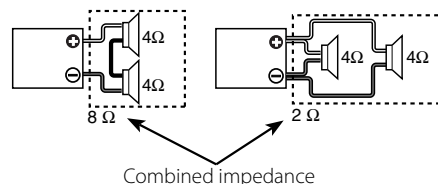
Display	Informations
"E-01"	When the inside of the unit is overheating. When the unit has failed and direct current voltage is generated to the speaker's output.
"E-02"	NOTE Turn the power OFF and release the protection. If the "E-02" code does not disappear, contact your Kenwood dealer.
"E-03"	When the speaker cord is shorted. When the speaker output is in contact with the vehicle ground.
"E-99"	When a system error occurs. Press the Reset button. If the "E-99" code does not disappear, contact your Kenwood dealer.
"VOLT" display is blinked.	When voltage gets out of operation range.

Wiring

- Take the battery wire for this unit directly from the battery. If it's connected to the vehicle's wiring harness, it can cause blown fuses etc.
- If a buzzing noise is heard from the speakers when the engine is running, connect a line noise filter (optional) to each of the battery wire.
- Do not allow the wire to directly contact the edge of the iron plate by using Grommets.
- Connect the ground wire to a metal part of the car chassis that acts as an electrical ground passing electricity to the battery's negative ⊖ terminal. Do not turn the power on if the ground wire is not connected.
- Be sure to install a protective fuse in the power cord near the battery. The protective fuse should be the same capacity as the unit's fuse capacity or somewhat larger.
- For the power cord and ground, use a vehicle type (fireproof) power wiring cord with a current capacity greater than the unit's fuse capacity. (Use a power wiring cord with a diameter between 10 mm² (AWG 8) to 25 mm² (AWG 4).)
- When more than one power amplifier are going to be used, use a power supply wiring wire and protective fuse of greater current-handling capacity than the total maximum current drawn by each amplifier.




Speaker Selection

- The rated input power of the speakers that are going to be connected should be greater than the maximum output power (in Watts) of the amplifier. Use of speakers having input power ratings that are less than the output power of the amplifier will cause smoke to be emitted as well as damage.
- Use speakers that have an impedance of 1Ω or greater. When more than one set of speakers are going to be used, calculate the combined impedance of the speakers and then connect suitable speakers to the amplifier.



Installation

Accessories

Part name	External View	Number of Items
Self-tapping screws (ø5 × 18 mm)		4
Hexagon Wrench (Large)		1
Hexagon Wrench (Small)		1

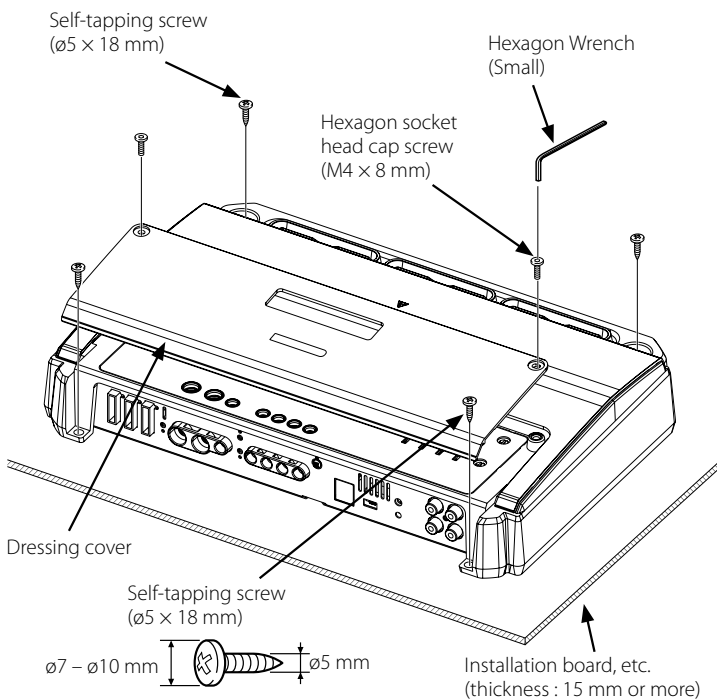
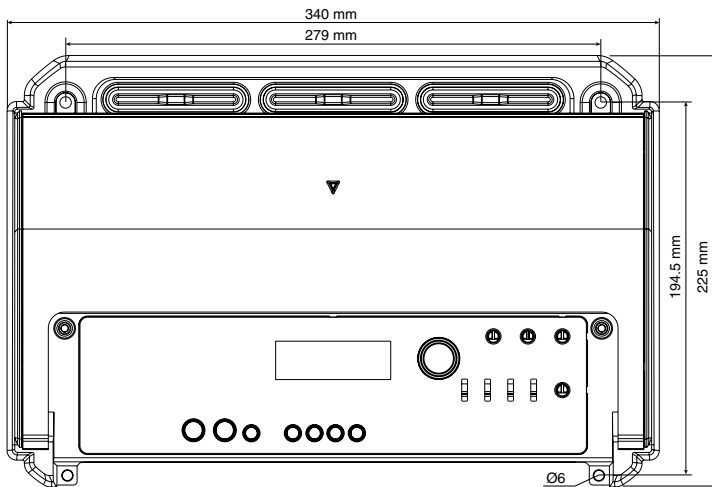
Installation procedure

Since there are large variety of settings and connections possible according to applications, read the instruction manual well to select the proper setting and connection.

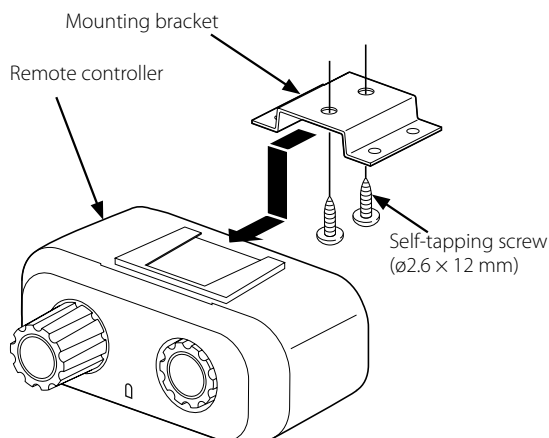
1. Remove the ignition key and disconnect the negative ⊖ terminal of the battery to prevent short circuits.
2. Set the unit according to the intended usage.
3. Connect the input and output wires of the units.
4. Connect the speaker wires.
5. Connect the power wire, power control wire and grounding wire following this order.
6. Install the installation fittings in the unit.
7. Attach the unit.
8. Install the remote controller.
9. Connect the negative ⊖ terminal of the battery.

CAUTION





- Do not install in the below locations; (Unstable location, In a location that interferes with driving, In a location that gets wet, In a dusty location, In a place that gets hot, In a place that gets direct sunlight, In a location that gets hit by hot air)
- Do not install the unit under the carpet. Otherwise heat build-up occurs and the unit may be damaged.
- Install this unit in a location which allows heat to easily dissipate. Once installed, do not place any object on top of the unit.
- The surface temperature of the amplifier will become hot during use. Install the amplifier in a place where people, resins, and other substances that are sensitive to heat will not come into contact with it.
- This unit has cooling fan to decrease the internal temperature. Do not mount the unit in a place where the cooling fan and ducts of the unit are blocked. Blocking these openings will inhibit the cooling of the internal temperature and result in malfunction.
- When making a hole under a seat, inside the trunk, or somewhere else in the vehicle, check that there is nothing hazardous on the opposite side such as a gasoline tank, brake pipe, or wiring harness, and be careful not to cause scratches or other damage.
- Do not install near the dashboard, rear tray, or air bag safety parts.
- The installation to the vehicle should securely fasten the unit to a place in which it will not obstruct driving. If the unit comes off due to a shock and hits a person or safety part, it may cause injury or an accident.
- After installing the unit, check to make sure that electrical equipment such as the brake lamps, turn signal lamps and windshield wipers operate normally.



Remote controller (Accessory of KAC-PS1D. Optional accessory for KAC-X1R.)



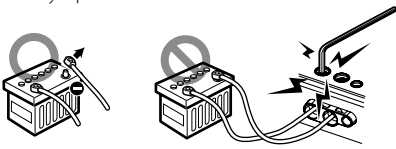
Accessories

Part name	External View	Number of Items
Remote cable (6.0 m : 19.7 ft)		1
Remote controller		1
Mounting bracket		1
Self-tapping screws (ø2.6 × 12 mm)		2

Connection

⚠ WARNING

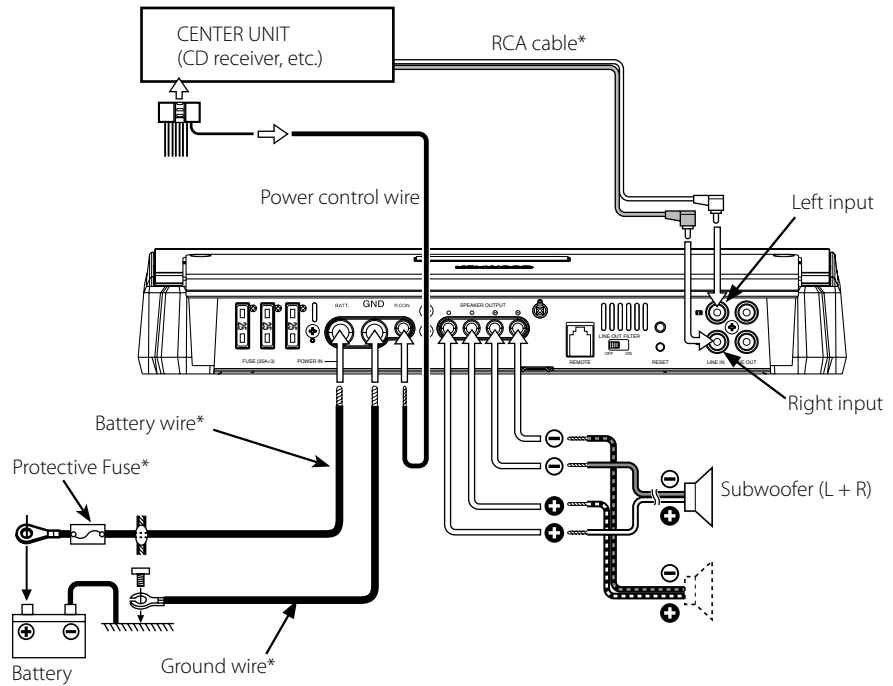
To prevent fire caused by a short in the wiring, connect a fusible link or breaker nearby the battery's positive terminal.



⚠ CAUTION

- If sound is not output normally, immediately turn power off and check connections.
- Be sure to turn the power off before changing the setting of any switch.
- If the fuse blows, check wires for shorts, then replace the fuse with one of the same rating.
- Check that no unconnected wires or connectors are touching the car body. Do not remove caps from unconnected wires or connectors to prevent short circuits.
- Connect the speaker wires to appropriate speaker connectors separately. Sharing the negative wire of the speaker or grounding speaker wires to the metal body of the car can cause this unit to fail.
- After installation, check that the brake lamps, wipers, and wipers work properly.

* Commercially available parts



About the Lead Terminals

1 Wire Thicknesses

You can use wires with the following thicknesses:

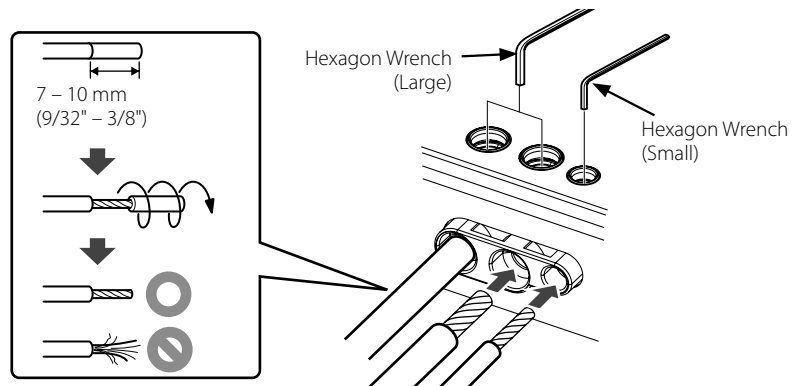
Battery wire and ground wire	AWG 4 – AWG 8
Power control wire and speaker wire	AWG 6 – AWG 18

2 Strip the wire

Make a cut in the wire sheath (insulator made from vinyl, etc.) at the position 7-10 mm away from the end of the wire, and then remove the unnecessary portion of the sheath by twisting it.

3 Install the wire

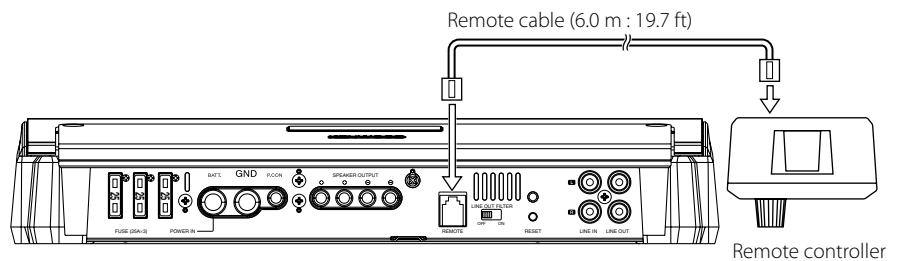
Loosen the screw using the supplied hexagon wrench. Insert the conductor of the wire in the terminal hole, and then tighten the screw.



■ Remote cable connection (Accessory of KAC-PS1D. Optional accessory for KAC-X1R.)

⚠ CAUTION

- Before connecting the remote controller cables, always turn the Bass boost level knob all the way to the left.



■ **Multi Amplifier with Remote cable connection (Accessory of KAC-PS1D. Optional accessory for KAC-X1R.)**

You can control the Bass boost level of the second and subsequent Slave amplifiers simultaneously from the Master amplifier.

The volume level of each amplifier is determined by the setting of the Master amplifier (INPUT SENSITIVITY, boost level of the remote controller).

Setting the Master amplifier

1. Adjust the "INPUT SENSITIVITY" to the output of the center unit to be connected.
2. Set the LPF frequency and Bass boost level.
3. Turn the "LINE OUT FILTER" switch "ON".

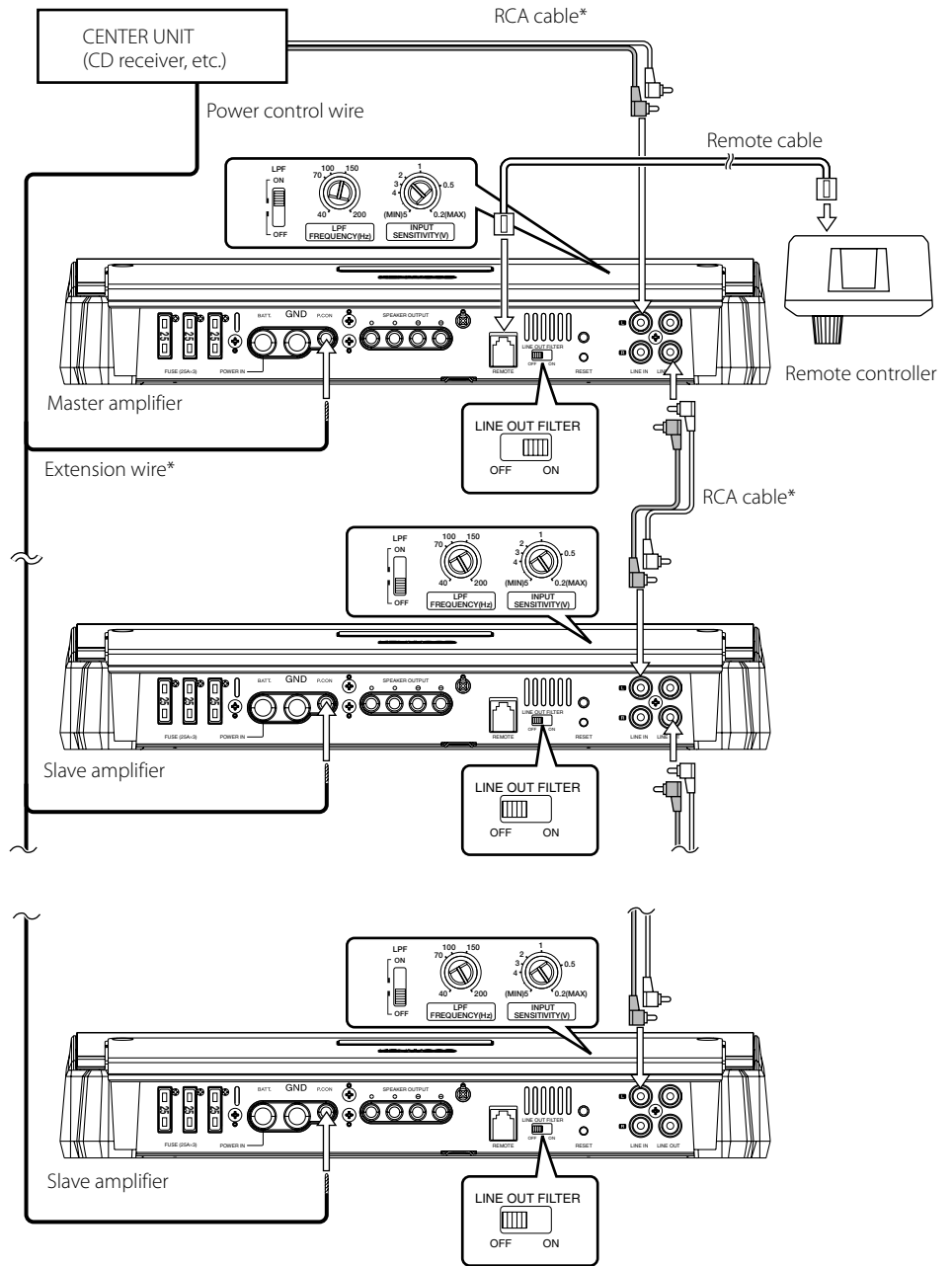
Setting the Slave amplifier

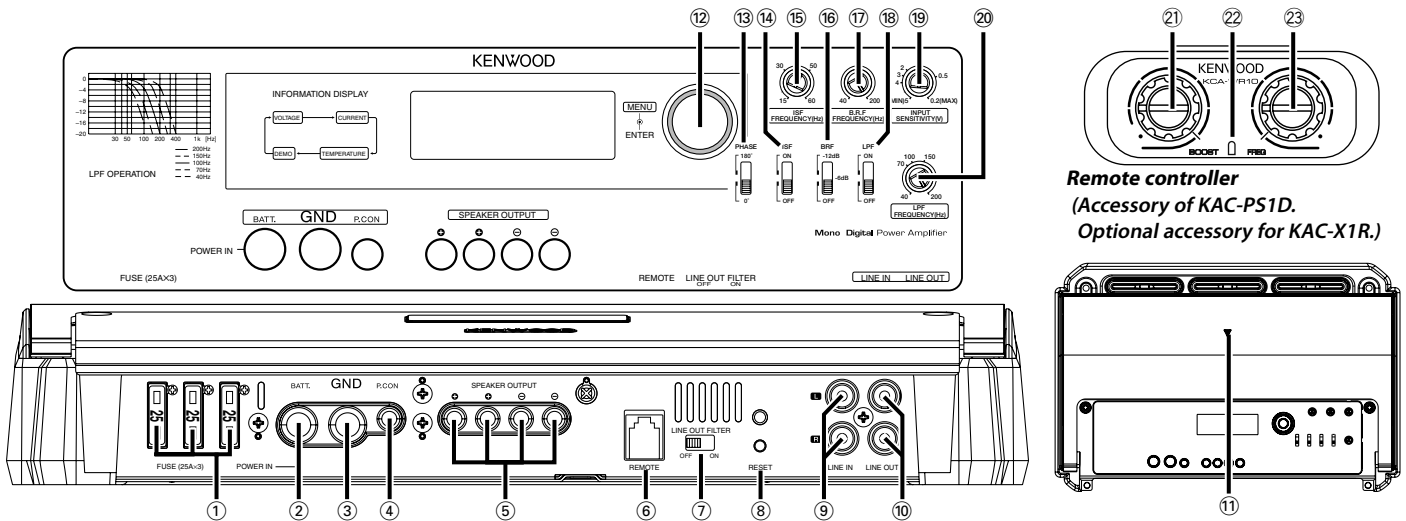
1. Turn the "LINE OUT FILTER" switch "OFF".
 2. Adjust the "INPUT SENSITIVITY".
- To adjust the Slave amplifier to the same volume as the Master amplifier, adjust the "INPUT SENSITIVITY" to "0.2 V (max.)".

CAUTION

- Before connecting the remote controller cables, always turn the Bass boost level knob all the way to the left.

* Commercially available parts





NOTE

The control panel locates under the dressing cover. Remove the cover to access to its controls for adjustment. (See page 3)

- ① **Fuse (25 A × 3)**
- ② **Battery terminal**
- ③ **Ground terminal**
- ④ **Power control terminal**

NOTE

Controls the unit power. Be sure to connect it with all the systems.

- ⑤ **Speaker output terminals**
As this unit accepts speakers with a minimum impedance of 1 ohm, connect speakers with 1-ohm or higher impedance to these terminals.

CAUTION

The rated input of the speakers should be no less than the maximum output of the amplifier. Otherwise malfunction may result.

- ⑥ **REMOTE terminal**
Connects the Remote cable.

NOTE

Use the Remote cable of the accessory.

- ⑦ **LINE OUT FILTER switch**
Changing over the audio signal output to the "LINE OUT" terminal.

ON position:
The audio signal adjusted when setting "LPF", "INPUT SENSIVITY" control and Bass boost is output to the "LINE OUT" terminal.

OFF position:
The audio signal input from the "LINE IN" terminal is output to the "LINE OUT" terminal (through output).

CAUTION

The volume of the audio output to the "LINE OUT" terminal is different in "ON" and "OFF" position. Remember this when changing the "LINE OUT FILTER" switch from "ON" to "OFF".

- ⑧ **RESET button**
Resets the microprocessor of the unit.
- ⑨ **LINE IN terminal**
- ⑩ **LINE OUT terminal**
The audio signal set with the "LINE OUT FILTER" switch will be output.
- ⑪ **Power indicator**
Lights when the POWER switch is turned On.
The indicator flashes several seconds when the POWER switch is turned On or when the Protection function is activated.

- ⑫ **Control knob**
Allows you to switch between and determine Menu System items.
- ⑬ **PHASE switch**
When this switch is set "180°" (Reverse) the speaker output phase is reversed.
- ⑭ **ISF (infrasonic filter) switch**
When this switch is set to "ON", the inaudible, ultralow frequencies below the frequency set with the "ISF FREQUENCY" control are cut off. This improves the reproduction performance of the speakers by eliminating unnecessary oscillations which will not become sound.
- ⑮ **ISF FREQUENCY control**
Sets the cutoff frequency when the "ISF" switch is set to "ON".
- ⑯ **BRF (band reject filter) switch**
When this switch is set to "-6dB"/"-12dB", frequencies in the band set with the "B.R.F. FREQUENCY" control are rejected and eliminated. The band rejection allows to reduce resonance inside the vehicle compartment and standing waves. (page 7)
- ⑰ **B.R.F. FREQUENCY control**
Sets the rejection frequency when the "BRF" switch is set to "-6dB"/"-12dB". (page 7)
- ⑱ **LPF(Low-Pass Filter) switch**
This switch allows to apply low-pass filtering to the speaker outputs.
 - **OFF position:**
The entire bandwidth is output without filtering.
 - **ON position:**
The filter outputs the band of lower frequencies than the frequency set with the "LPF FREQUENCY" control.
- ⑲ **INPUT SENSITIVITY control**
Set this control according to the pre-output level of the center unit connected with this unit.

NOTE

For the pre-output level, refer to the <Specifications> in the instruction manual of the center unit.
- ⑳ **LPF(Low-Pass Filter) FREQUENCY control**
Sets the cutoff frequency when the "LPF" switch is set to "ON".
- ㉑ **BOOST LEVEL (Bass boost level) control**
Sets the level by which the low frequency range should be boosted.
- ㉒ **Power indicator**
- ㉓ **FREQUENCY (Bass boost frequency) control**
Sets the center frequency around which the low frequency range should be boosted.

Menu System

Display mode

You can set up the display items as follows:

1 Select a display item

Turn the Control knob.

The display items are switched in the following sequence.

Display	Information
"VOLT"	Indicates the source voltage (V).
"CURRT"	Indicates the current consumption (A).
"TEMP"	Indicates the internal temperature (°F/°C).
"DEMO"	Allows you to set up the display demonstration.

NOTE

When the internal temperature is $-22^{\circ}\text{F}/-30^{\circ}\text{C}$ or less, " $-22^{\circ}\text{F}/-30^{\circ}\text{C}$ " is displayed.

Display Item Adjustment

You can adjust the display items as follows.

1 Select a display item

Turn the Control knob.

2 Adjust the display item

Press the Control knob.

The setup items and set values are switched as follows.

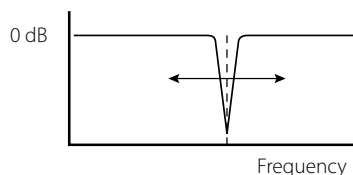
Display	Range	Adjustment Item
"TEMP"	---F (Fahrenheit) / ---C (Centigrade)	The Fahrenheit or Centigrade temperature unit can be selected for the Display mode.
"DEMO"	OFF/ ON	When set to ON, the "VOLT", "CURRT", and "TEMP" items are displayed repeatedly.

NOTE

Normally the setting listed at the top of the chart is the original setting.

Band Reject Filter

The acoustic properties of vehicle compartment tend to cause oscillation due to resonance or unclearness of sound due to standing waves at certain frequencies. The band reject filter can solve the problems of resonance or unclear sound with minimum influence on the sound quality because it eliminates only the frequencies causing resonance or standing waves.



■ Adjustment method:

The band reject filter cuts only the limited frequencies to minimize influence on the sound quality. Therefore, its effect cannot be obtained unless the cutoff frequencies are set accurately to the frequencies causing resonance and standing waves. The band reject filter can be adjusted according to what you feel through your ears, but we recommend the use of a signal generator or a spectrum analyzer with a fine frequency measurement capability for the adjustment.

• Adjustment using a signal generator:

Output a sine wave, vary its frequency to find the frequencies at which the vehicle compartment resonates or volume increases (standing waves occur), and set the B.R.F. FREQUENCY control to the position with which the resonance and standing waves disappear.

• Adjustment using a spectrum analyzer:

Output white noise (sound in which all frequencies are at a certain level), find the peak frequency observed on the spectrum analyzer, and set the B.R.F. FREQUENCY control to the position with which the peak observed on the spectrum analyzer disappears.

Troubleshooting Guide

What might appear to be a malfunction in your unit may just be the result of slight misoperation or miswiring. Before calling service, first check the following table for possible problems.

PROBLEM	POSSIBLE CAUSE	SOLUTION
No sound. (Blown fuse.)	<ul style="list-style-type: none"> Input (or output) cables are disconnected. Protection circuit may be activated. Volume is too high. The speaker cord is shorted. 	<ul style="list-style-type: none"> Connect the input (or output) cables. Check connections by referring to <Protection function>. Replace the fuse and use lower volume. After check the speaker cord and fixing the cause of the short, replace the fuse.
The output level is too small (or too large).	<ul style="list-style-type: none"> The input sensitivity adjusting control is not set to the correct position. 	<ul style="list-style-type: none"> Adjust the control correctly referring to <Controls>.
The sound quality is bad. (The sound is distorted.)	<ul style="list-style-type: none"> The speakers wire are connected with wrong \oplus / \ominus polarity. A speaker wire is pinched by a screw in the car body. The switches may be set improperly. 	<ul style="list-style-type: none"> Connect them properly checking the \oplus / \ominus of the terminals and wires well. Connect the speaker wire again so that it is not pinched by anything. Set switches properly by referring to <Controls>.
The Remote Controller does not function.	<ul style="list-style-type: none"> The Remote Cable is disconnected. 	<ul style="list-style-type: none"> Connect the Remote Cable securely and correctly.

Specifications

Specifications subject to change without notice.

CEA-2006

RMS Watts per channel @ 4 ohms, 1 % THD+N	600 W x 1
Signal to Noise Ratio (Reference: 1Watt into 4 ohms)	80 dBA



Audio Section

Max Power Output	2400 W
Rated Power Output (+B = 12.0 V)	
(4 Ω) (20 Hz – 200 Hz, 0.5 % THD)	400 W x 1
(2 Ω) (100 Hz, 0.5 % THD)	800 W x 1
(1 Ω)	\geq 800 W x 1
Rated Power Output (+B = 14.4 V)	
(4 Ω) (20 Hz – 200 Hz, 0.5 % THD)	600 W x 1
(4 Ω) (DIN45324, +B = 14.4 V)	600 W x 1
(2 Ω) (100 Hz, 0.5 % THD)	1200 W x 1
(1 Ω)	\geq 1000 W x 1
Frequency Response (+0, -3 dB)	5 Hz – 400 Hz
Sensitivity (rated output) (MAX.)	0.2 V
(MIN.)	5.0 V
Input Impedance	10 k Ω
Signal to Noise Ratio	105 dB
Low Pass Filter Frequency (-24 dB/oct.)	40 – 200 Hz (variable)
Infrasonic Filter Frequency (-24 dB/oct.)	15 – 60 Hz (variable)
Band Reject Filter	OFF/ -6 dB/ -12 dB
Band Reject Filter Frequency	40 – 200 Hz (variable)
Phase Inverter	0° (Normal) / 180° (Reverse)
Bass Boost Circuit	0 – 18 dB (variable)
Bass Boost Frequency	40 – 100 Hz (variable)

General

Operating Voltage	14.4 V (11 – 16 V allowable)
Current Consumption	75 A
Installation Size (W x H x D)	340 x 60 x 225 mm
.....	13-3/8 x 2-3/8 x 8-7/8 inch
Weight	3.8 kg (8.38 lbs)