Nakamichi

EC-204

Mobile 2-Way Electronic Crossover

EC-302

Mobile 3-Way Electronic Crossover

Owner's Manual *English from page 2*

Bedienungsanleitung *Deutsch von Seite 12*

Mode d'emploi *Français voir page 22*

English

Congratulations!
You have chosen superior components for true high-fidelity in the car. The EC-204 is a 2-way, 4-channel active crossover network which permits the addition of sub-woofers to a multi-amp system. The EC-302 is a 3-way, 2-channel active crossover network designed for systems which have separate amplification for the low, mid and high frequency range.
Both the EC-204 and the EC-302 are equipped to supply a "constant bass" signal which is unaffected by the head unit's fader and balance controls settings. Other valuable features of these sophisticated units include versatile crossover frequency selection, output level controls, and switches for phase and output mode. The EC-204 and EC-302 are perfect for a wide variety of high-end system configurations. A DC-to-DC converter power supply, floating ground and Nakamichi's original Isolated Ground topology ensure minimum distortion and high S/N ratio. The low impedance of the outputs increases resistance against noise pickup and helps to ensure pure signal transmission.
In order to take full advantage of these units' superior performance, please read this manual in its entirety and retain it for future reference.

Thank you.
Nakamichi Corporation

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 bottom panel of the unit.
Model Number: EC-204/EC-302
Serial Number: _____

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

Caution
- **Prolonged exposure to sound at excessive levels has been proven to cause temporary and, in some instances, permanent hearing loss. In order to protect your hearing and your future enjoyment of music, it is strongly recommended that you avoid exposure to excessive listening levels.**
- **For reasons of traffic safety, you should keep the listening volume to a level which will not mask outside noises while driving.**

CONTENTS

Precautions

1. This unit is designed for use in cars with 12 V negative ground systems only.

2. Do not use the system while the car's engine is turned off, to prevent excessive drain of the car battery.

3. When a closed car is parked in the sun, the temperature inside the car will reach very high levels. If a car is parked outdoors in winter, it may cool down considerably. In such cases, use the unit only after the interior temperature of the car has returned to normal.

4. To install the unit, choose a location
   - which is protected from direct sunlight or direct exposure to a hot air flow, and
   - which is protected from exposure to water or high humidity levels, and
   - which is not subject to vibrations or high levels of dust.

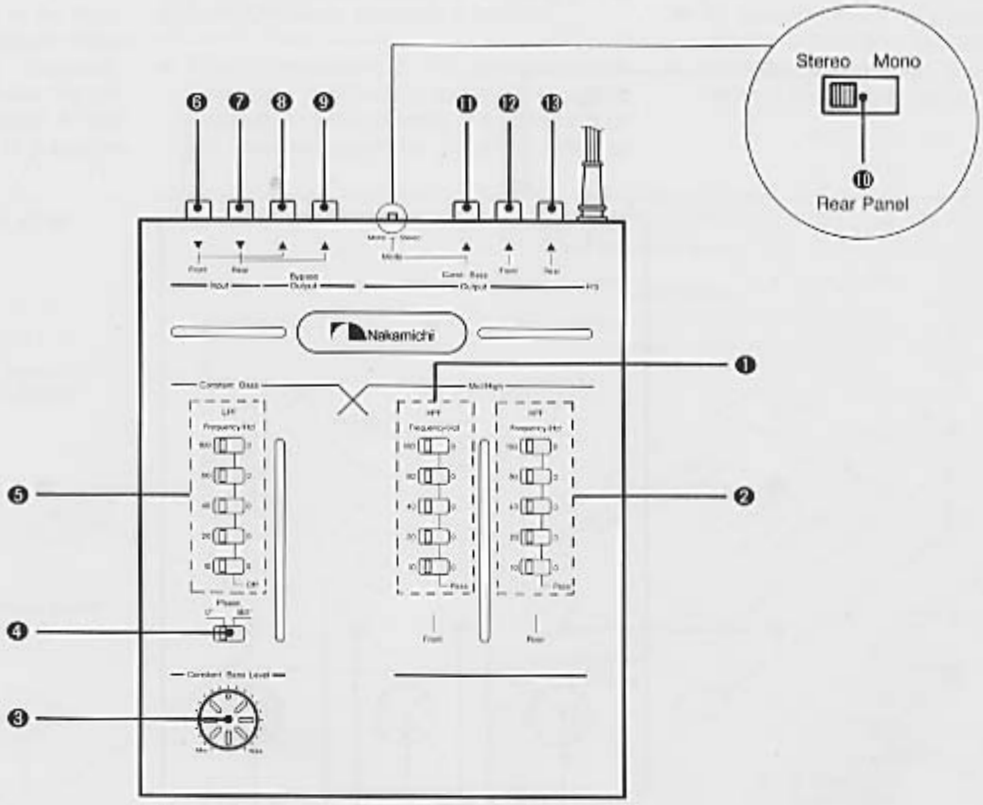
5. Do not open the unit or attempt any internal alterations, as this may degrade performance and will void the warranty.

6. Clean the unit only by wiping it with a soft, dry cloth. Avoid using solvents or alcohol-based cleaners.

7. To protect the speakers from possible damage, **do not set the filter switches to "Off" or "Pass"** before installation.

Controls and Functions

[EC-204]



❶ **Front mid/high HPF selector [Mid/High HPF Front]**
This row of switches serves to set the high-pass filter frequency for the front-channel output.

❷ **Rear mid/high HPF selector [Mid/High HPF Rear]**
This row of switches serves to set the high-pass filter frequency for the rear-channel output.

❸ **Constant bass level control [Constant Bass]**
Adjusts the level of the constant bass output.

❹ **Constant bass phase switch [Phase]**
Allows inverting the phase of the constant bass speakers without the need for rewiring.

❺ **Constant bass LPF selector [Constant Bass LPF]**
This row of switches serves to set the low-pass filter frequency for the constant bass output.

❻ **Front input connectors L/R [Input Front]**

❼ **Rear input connectors L/R [Input Rear]**

❽ **Front bypass output connectors L/R [Bypass Output Front]**
The signal from the front input ❻ is supplied at this output without passing the internal circuits of the EC-204.

❾ **Rear bypass output connectors L/R [Bypass Output Rear]**
The signal from the rear input ❼ is supplied at this output without passing the internal circuits of the EC-204.

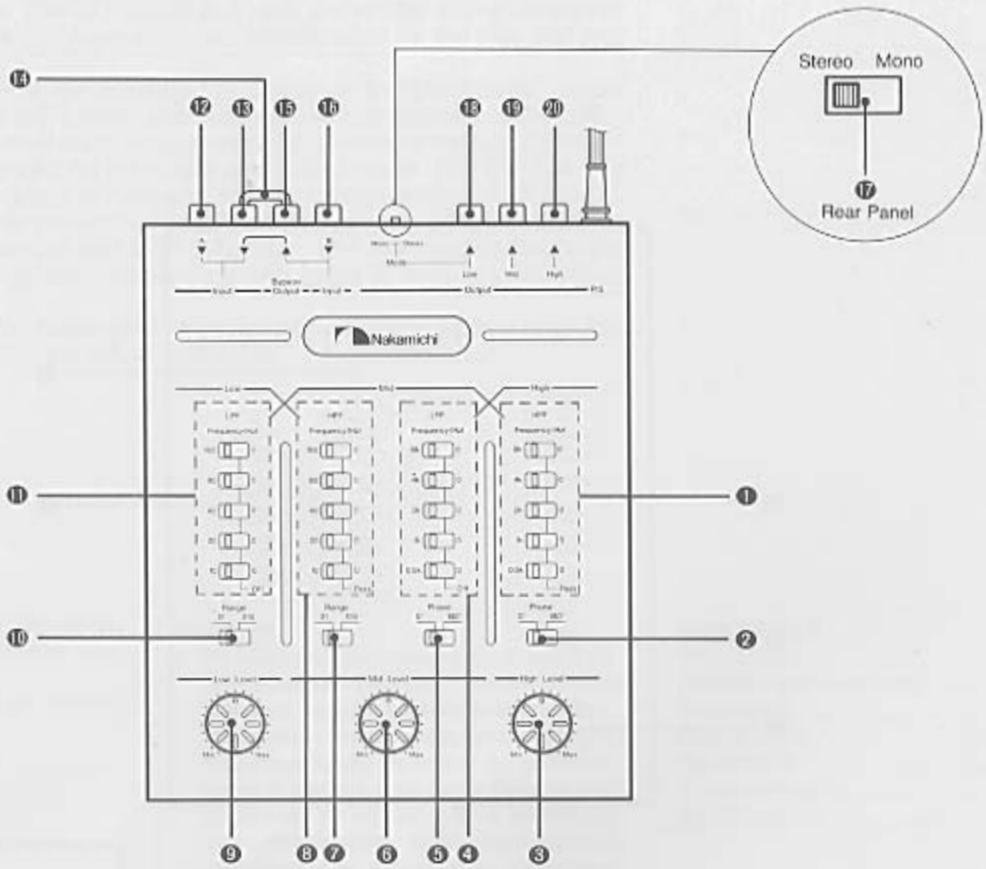
❿ **Constant bass output mode selector [Mode]**
Switches the signal supplied at the constant bass output ⓫ to stereo or mono.

⓫ **Constant bass output connectors L/R [Output Const. Bass]**

⓬ **Front output connectors L/R [Output Front]**

⓭ **Rear output connectors L/R [Output Rear]**

[EC-302]



❶ **High-range HPF selector [High HPF]**
This row of switches serves to set the high-pass filter frequency for the high-range output.

❷ **High-range phase switch [Phase]**
Allows inverting the phase of the high-range speakers without the need for rewiring.

❸ **High-range level control [High Level]**
Adjusts the level of the high-range output.

❹ **Mid-range LPF selector [Mid LPF]**
This row of switches serves to set the low-pass filter frequency for the mid-range output.

❺ **Mid-range phase switch [Phase]**
Allows inverting the phase of the mid-range speakers without the need for rewiring.

❻ **Mid-range level control [Mid Level]**
Adjusts the level of the mid-range output.

❼ **Mid-range multiplier switch [Range]**
Allows changing the setting range and frequency steps for the mid-range high-pass filter.
×1 : 10 to 310 Hz (10-Hz steps)
×10: 100 to 3,100 Hz (100-Hz steps)

❽ **Mid-range HPF selector [Mid HPF]**
This row of switches serves to set the high-pass filter frequency for the mid-range output.

❾ **Low-range level control [Low Level]**
Adjusts the level of the low-range output.

❿ **Low-range multiplier switch [Range]**
Allows changing the setting range and frequency steps for the low-range low-pass filter.
×1 : 10 to 310 Hz (10-Hz steps)
×10: 100 to 3,100 Hz (100-Hz steps)

⓫ **Low-range LPF selector [Low LPF]**
This row of switches serves to set the low-pass filter frequency for the low-range output.

⓬ **Input connectors A L/R [Input A]**
The signal from this input is always routed through the low-pass filter for the low range.

⓭ **Mix input connectors L/R**
The signal from this input is mixed with the signal from input A ⓬ and always routed through the low-pass filter for the low range.

⓮ **Jumper plugs L/R**
Serve to route the signal from input B ⓰ also to the mix input ⓭. When the plugs are removed, the mix input ⓭ and the bypass output ⓯ can be used separately.

⓯ **Bypass output connectors L/R [Bypass Output]**
The signal from input B ⓰ is supplied at this output without passing the internal circuits of the EC-302.

⓰ **Input connectors B L/R [Input B]**
The signal from this input is always routed through the high-pass filter and low-pass filter for the mid-range and the high-pass filter for the high range.

⓱ **Low-range output mode selector [Mode]**
Switches the signal supplied at the low-range output ⓲ to stereo or mono.

⓲ **Low-range output connectors L/R [Output Low]**
When the low-range output mode selector is set to "Mono", either of the two connectors can be used.

⓳ **Mid-range output connectors L/R [Output Mid]**

⓴ **High-range output connectors L/R [Output High]**

Installation

Use the supplied mounting hardware and install the EC-204/EC-302 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.

The illustrations show installation of the EC-204.
Installation of the EC-302 is identical.

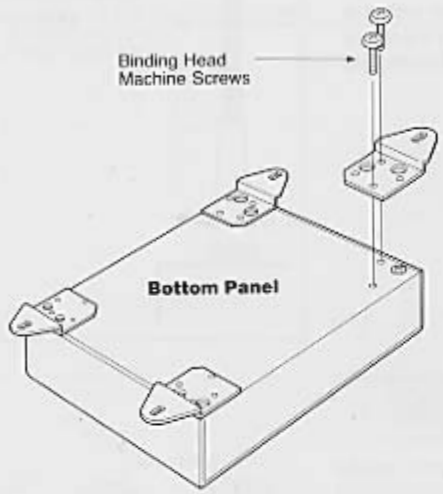


Fig. 1

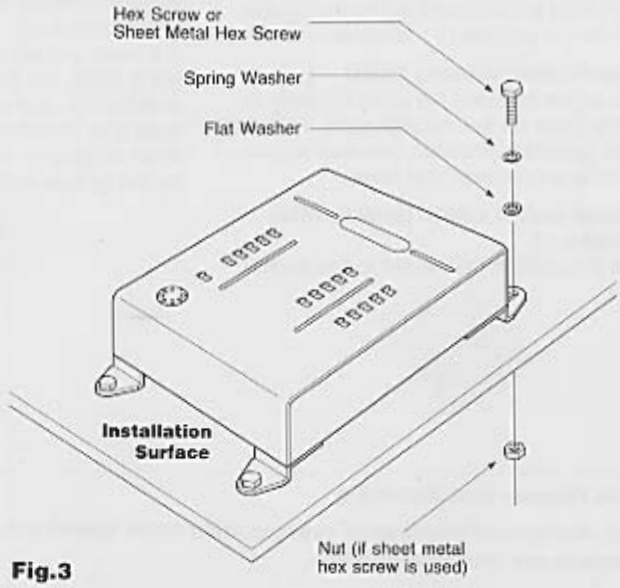


Fig.3

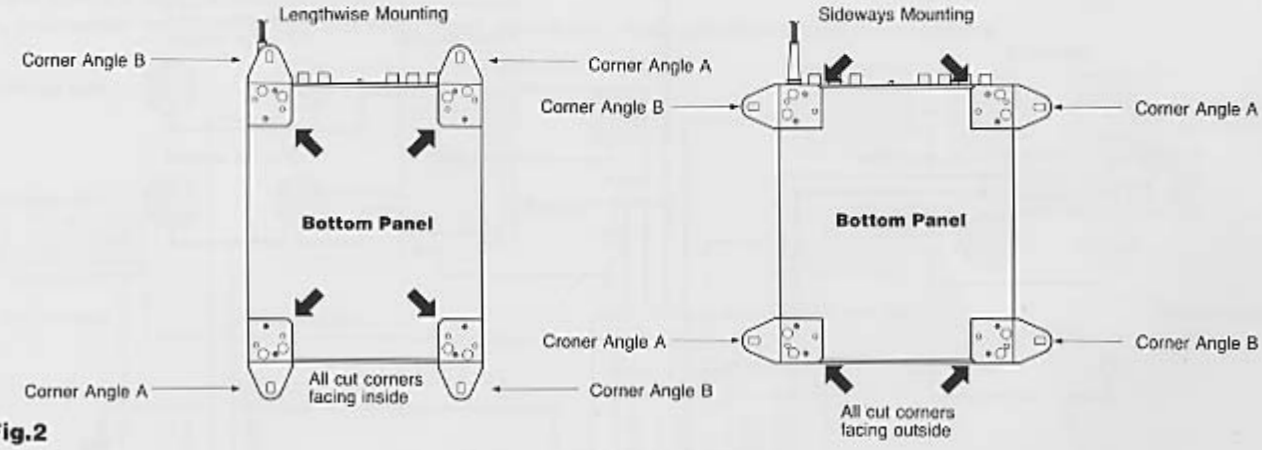


Fig.2

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 (M3 × 6)	8
Hex Screw (M4 × 15)	4
Nut	4
Sheet Metal Hex Screw (4 × 16)	4
Spring Washer	4
Flat Washer	4

① Attach the supplied corner angles to the unit **(**see **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 installtion surface **(**see **Fig. 3)**. The required hole diameter is 5 mm when using the hex screws and 3.4 mm when using the sheet metal hex 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.

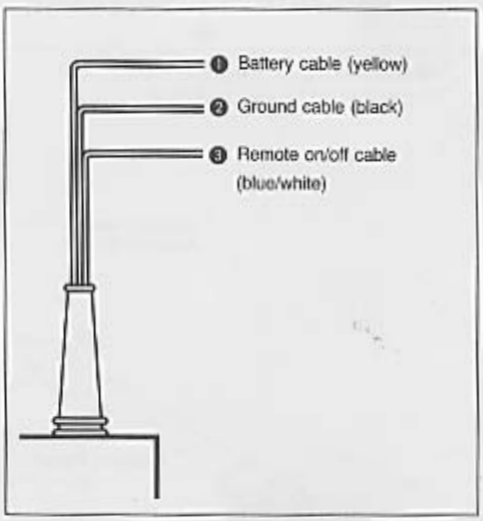
Connections

- **Be sure to remove the negative (−) terminal from your car battery before making any connections, as an accidental short-circuit could have catastrophic results.**
- Take special care when routing the battery cable and make sure that it cannot get caught in the car seat sliding rails or rub against sharp edges, as a short-circuit could have very dangerous consequences.
- Pop noise can occur when the jumper plugs are inserted or removed. To protect the speakers from damage, always turn the entire system OFF before inserting or removing the jumpers (EC-302).

❶ **Battery cable (yellow) [Battery +]**
To be wired to a circuit on the car's fuse block which is constantly connected to the car battery's positive (+) terminal.

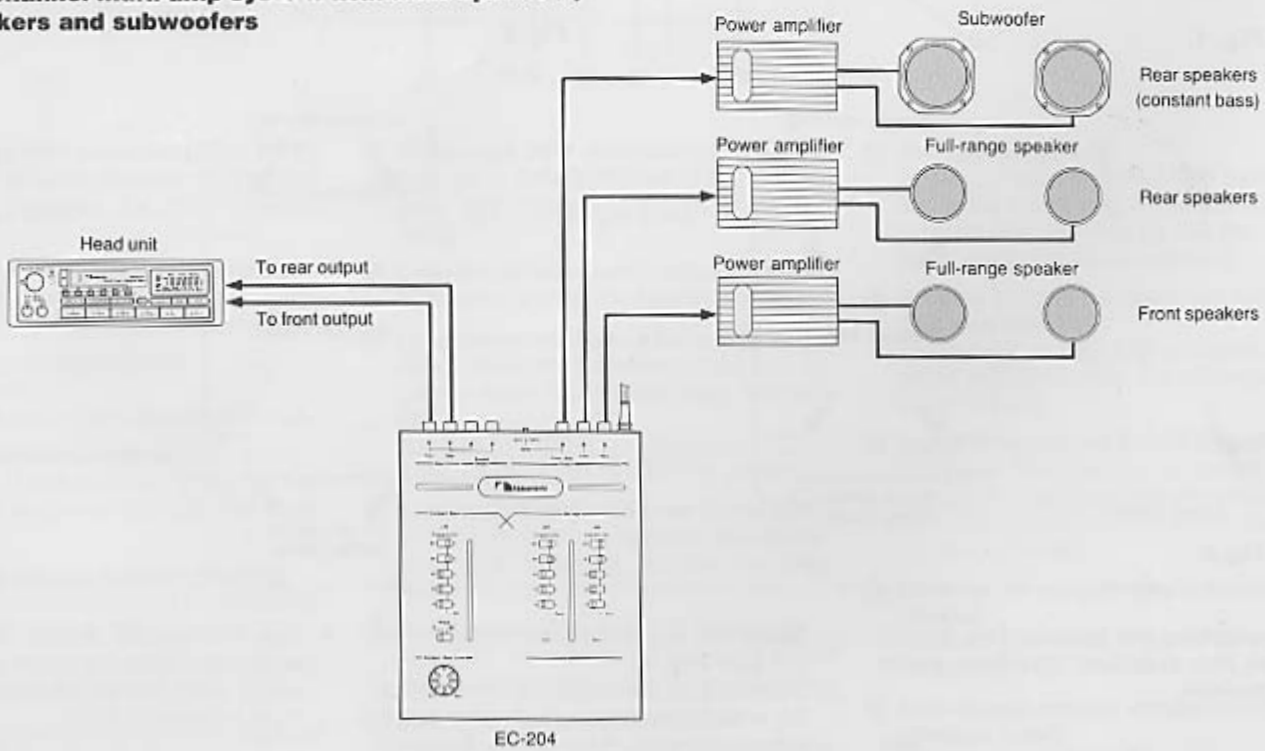
❷ **Ground cable (black) [GND −]**
Use a screw to fasten the cable securely to a metal point on the car's chassis. An improper ground connection can lead to performance degradation and noise.

❸ **Remote on/off cable (blue/white) [Remote +]**
When this cable is connected to the remote control output of the tuner/cassette deck or another head unit, the crossover network will automatically switch on when the head unit is turned on.
If a head unit without a remote control output is used, the EC-204/EC-302 cannot be switched on and off in conjunction with the head unit. In such a case, connect the cable to an accessory circuit of the car (controlled by the ignition key).

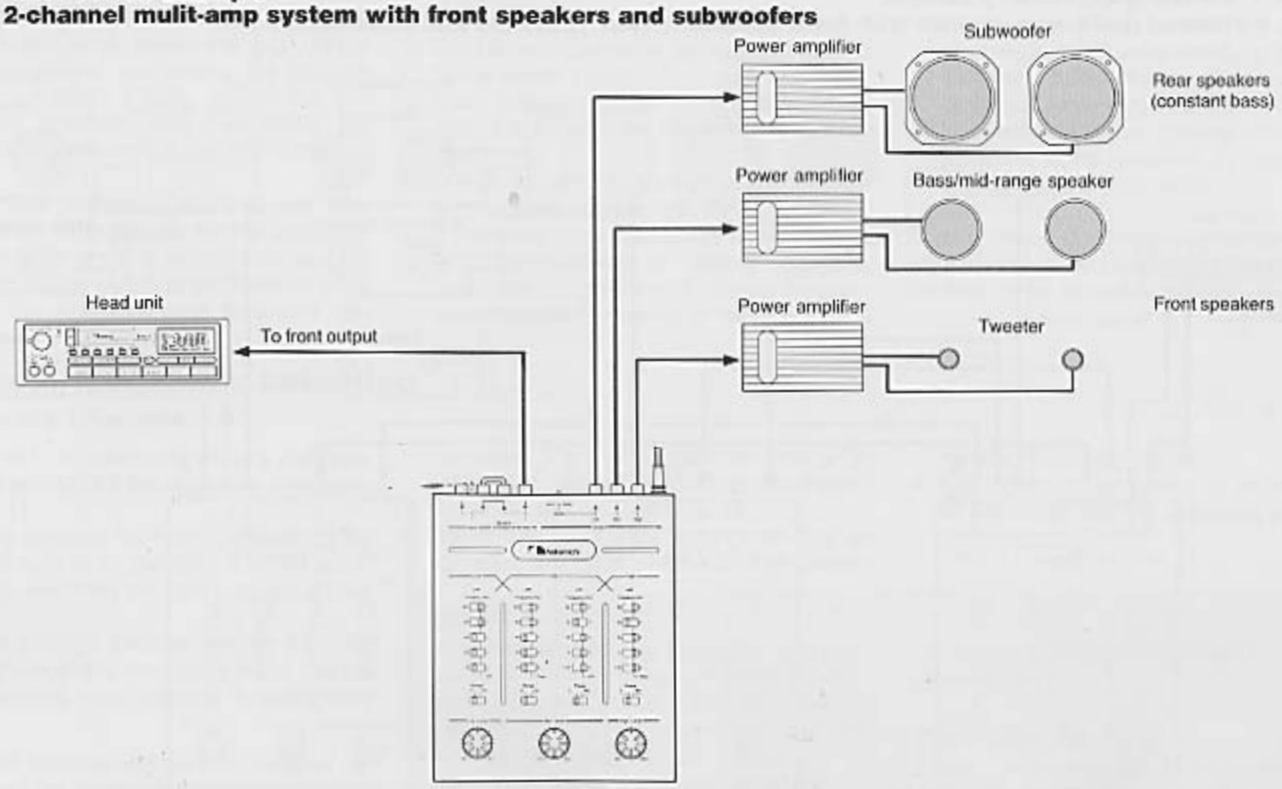


EC-204 Connection Example

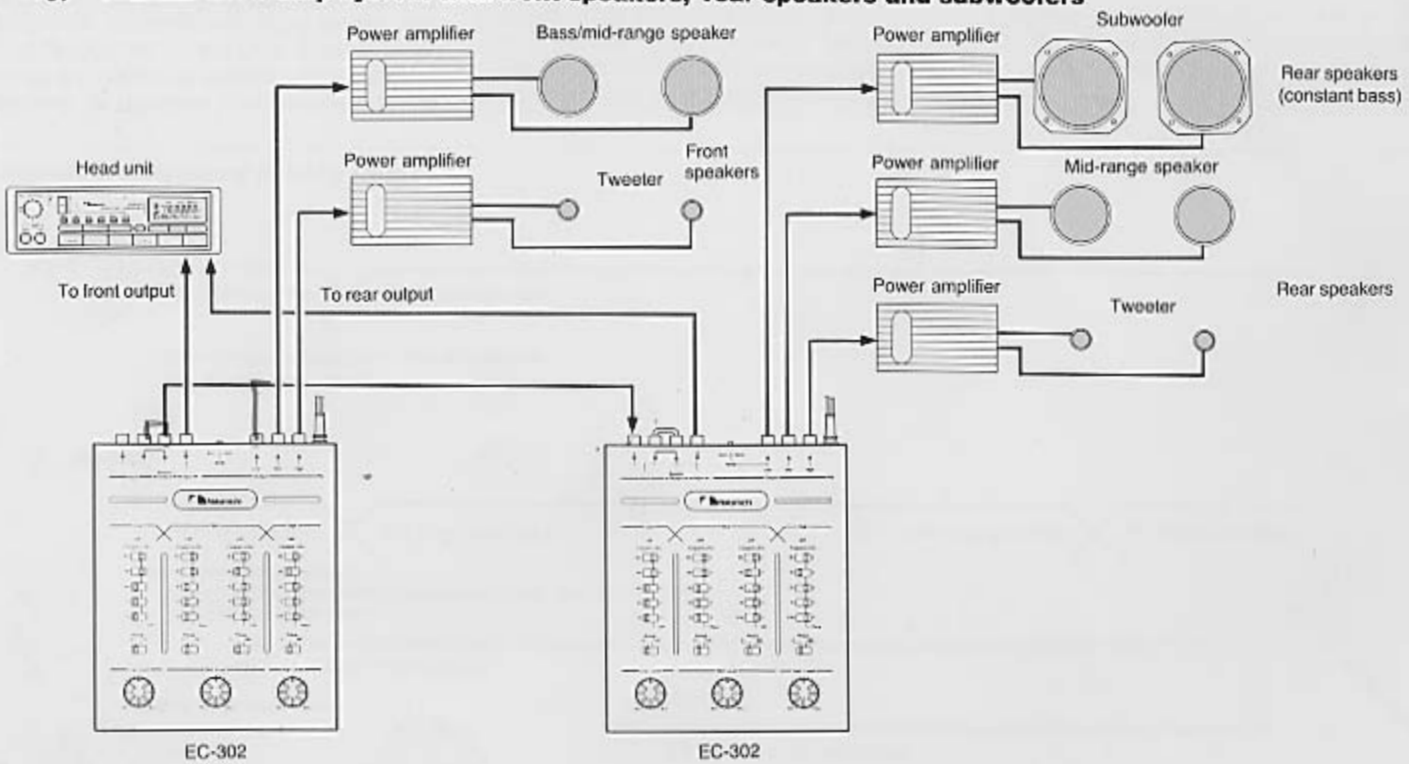
2-way, 4-channel multi-amp system with front speakers, rear speakers and subwoofers



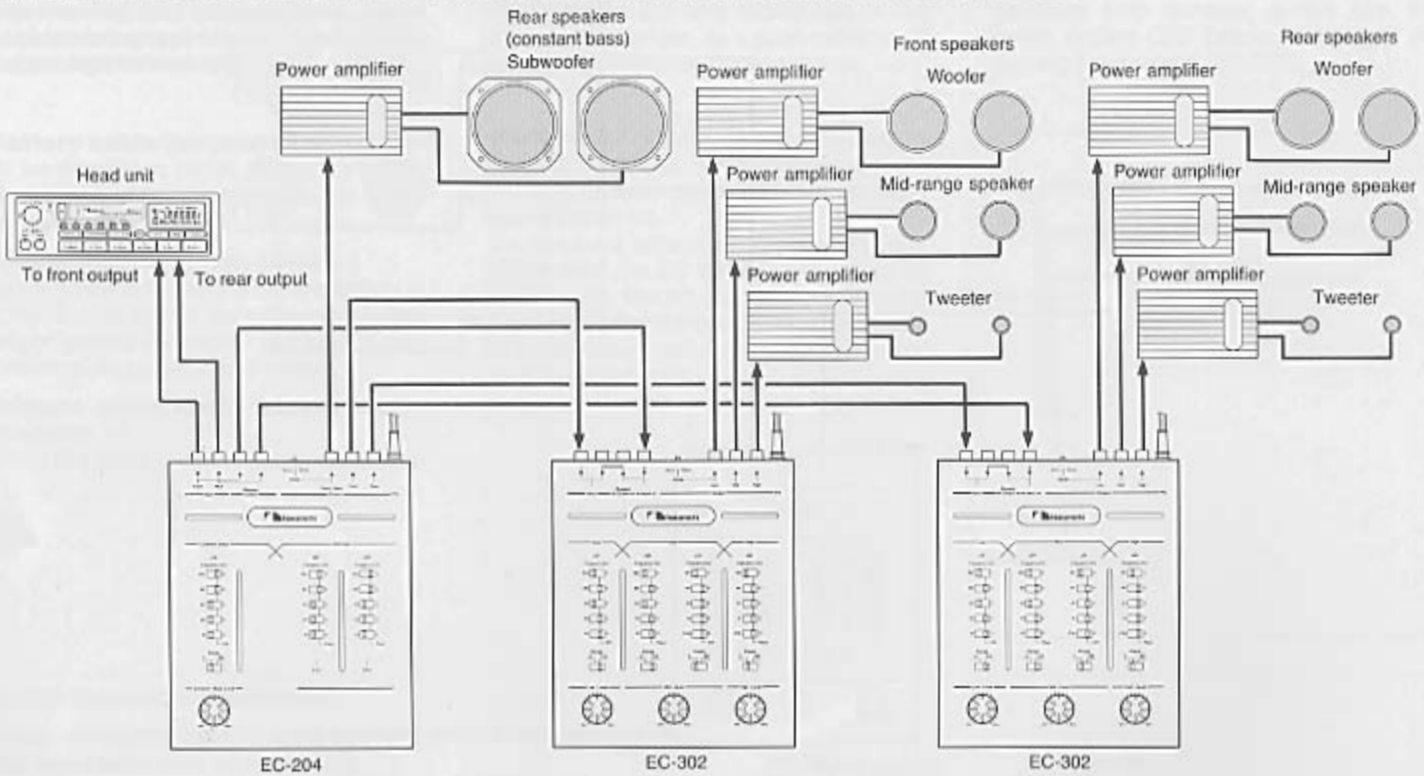
EC-302 Connection Example
3-way, 2-channel mulit-amp system with front speakers and subwoofers



EC-302 + EC-302 Connection Example
3-way, 4-channel multi-amp system with front speakers, rear speakers and subwoofers



EC-204 + EC-302 Connection Example
4-way, 4-channel multi-amp system with front speakers, rear speakers and subwoofers



Adjustment

Start by adjusting the crossover frequencies for the mid-range. Next, adjust the high range while checking and maintaining the balance with the mid-range. Finally, adjust the low range while checking and maintaining the balance with the mid-range and high range.

① **Turn the volume control on the head unit fully down.** Set the crossover frequency to a value which matches the rated frequency range of the speaker units (or to the recommended crossover frequency).
② Set the level control for the frequency range to the center position.
③ Start playback of a good-quality music source and adjust the volume control of the head unit.
④ Check by ear for smooth response, absence of resonances, etc.
⑤ If response is not satisfactory or resonances occur (as indicated by "boomy" sound or unnatural prominence of certain frequencies), change the setting of the output level controls in small increments, or **turn the volume fully down** and change the crossover frequency settings.
⑥ If smooth transition between the speaker units cannot be achieved, try changing the setting of the phase switch.

Repeat steps ① through ⑥, making small adjustments as required until the overall sonic balance of the system is optimal.

Crossover Frequency Selection

■ Setting the filter selectors

The HPF and LPF selectors allow a multitude of different settings for the crossover frequency **(**see **Fig. 1)**.
The setting principle for these selectors is as follows: the sum of all switches in a row set to the left side becomes the filter frequency **(**see **Fig. 2)**.
By using the range switches on the EC-302, the setting range and frequency steps can be altered, allowing even greater flexibility **(**see **Fig. 3)**.

- If the LPF selector and the HPF selector for one particular crossover section are set to the same frequency, the two frequency areas are joined with a 3-dB rolloff on each side, and overall frequency response of the crossover unit will be flat. If different settings are chosen for the two sides, the (measured) frequency response will show peaks and dips. Depending on the car's acoustic properties and particular system characteristics, this may be desirable to achieve aurally flat response. The filter frequencies should be set so as to match the requirements of a particular installation **(**see **Fig. 4)**.
- Select filter frequency settings so that all speakers are used well within their recommended frequency range.
- If a crossover frequency is recommended for a speaker unit, this should be observed if possible.

[High-pass filter]

When all switches are set to the right side, the filter is set to "Pass". For the EC-204, this means that a full-range signal (covering the entire audio frequency band) is output from the front and rear outputs. For the EC-302, a full-range signal is output from the mid-range or high-range output (depending on which HPF selector was set).
During installation and setup, pay close attention to the normal frequency range for the various speaker units and avoid feeding a signal which contains improper frequencies to a speaker. This applies in particular to mid-range drivers and tweeters, as such speakers may be destroyed if the input signal exceeds their recommended crossover frequencies.

[Low-pass filter]

When all switches are set to the right side, the filter is set to "Off", which means that no signal will be present at the low-range output of the EC-204 or EC-302.

[EC-302]

If the mid-range LPF selector is set to "Off" and the mid-range HPF selector to "Pass", no signal will be present at the mid-range output.

Crossover frequency setting ranges

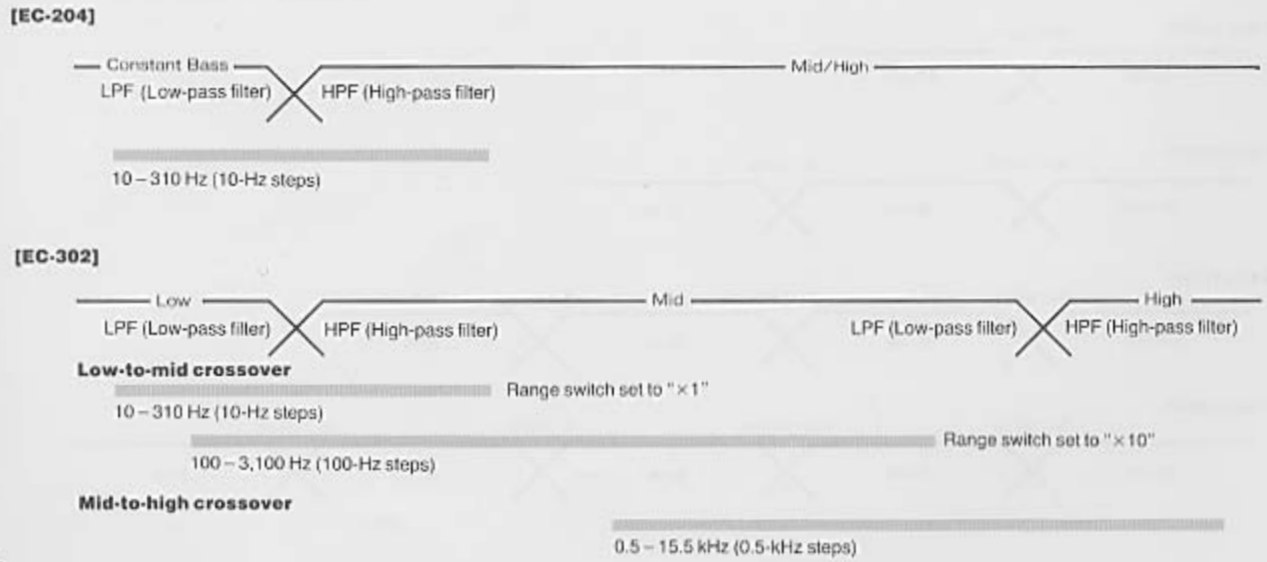


Fig. 1

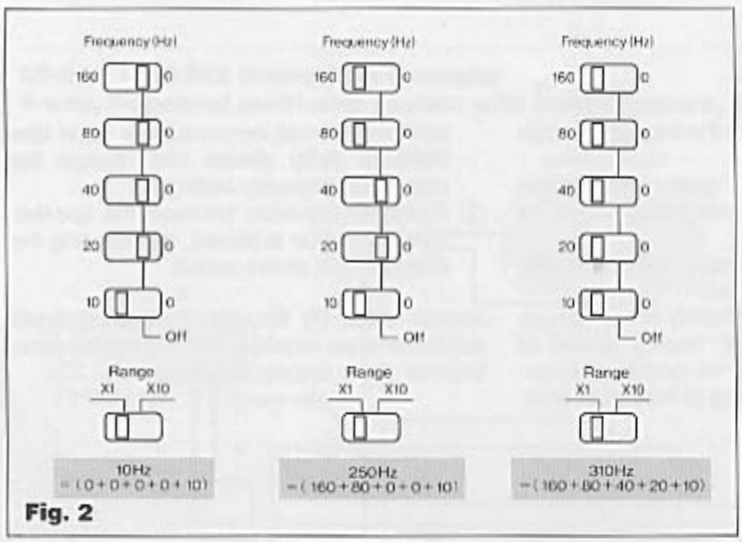


Fig. 2

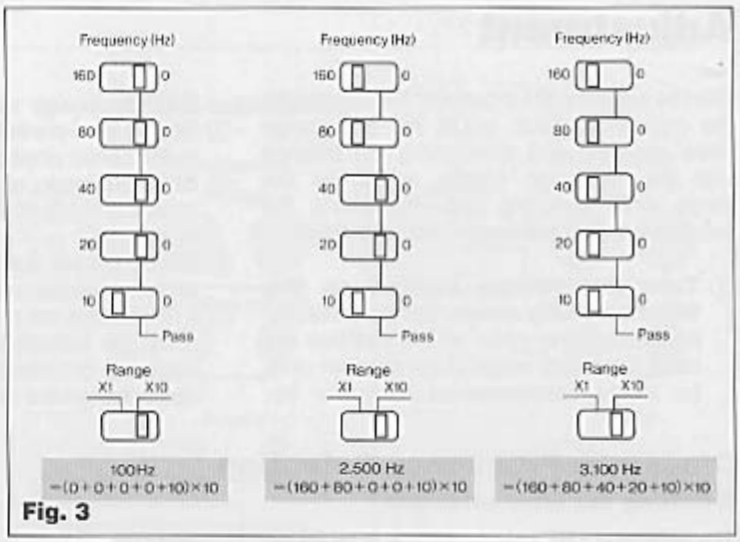


Fig. 3

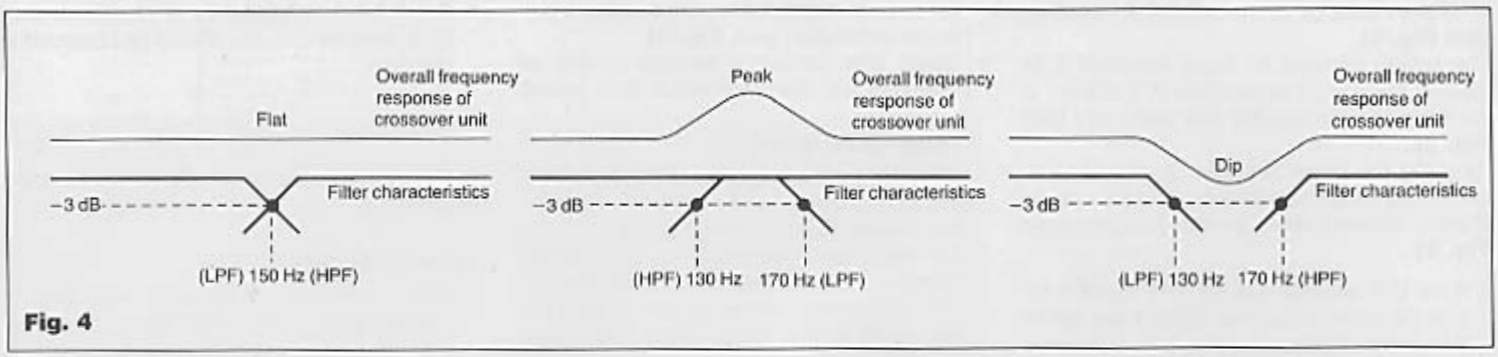


Fig. 4

■ Crossover frequency setting examples

Fig. 5 shows a few setting examples for systems with Nakamichi speaker units. These examples can serve as a general guideline for corssover frequency settings. However, as acoustic characteristics vary considerably depending on the car model and the installation location, final adjustments will have to be made for each individual system.

Crossover frequency setting examples

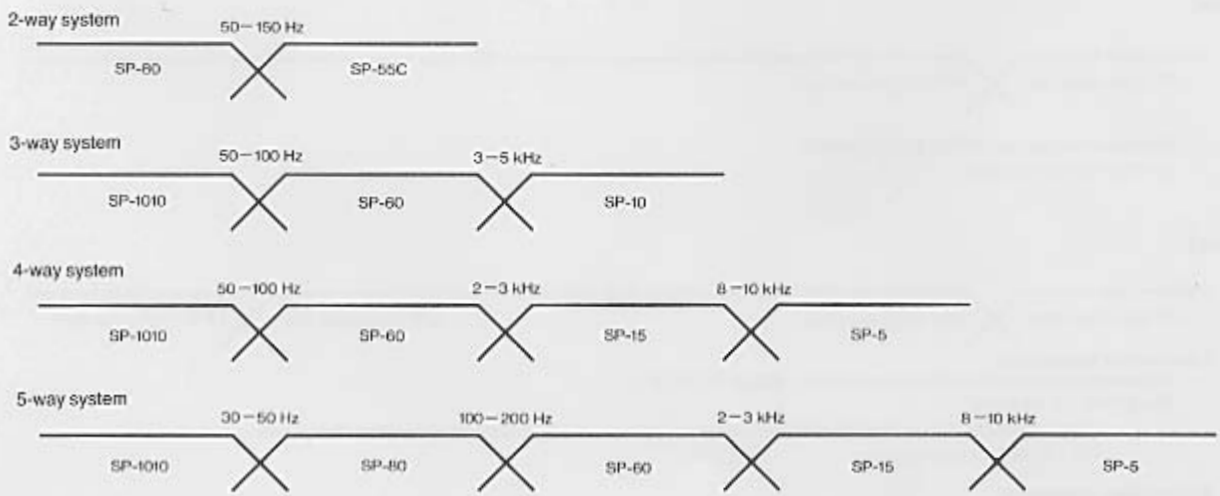


Fig. 5

Troubleshooting

In case of an apparent malfunction, please check whether all connections have been properly made and whether the crossover frequency settings are correct. Sometimes an apparent malfunction may be remedied by a simple check. If the trouble persists, contact an authorized service station.

Specifications

	EC-204	EC-302
Filter Slope	18 dB/oct.	18 dB/oct.
Crossover Frequencies	10 – 310 Hz (selectable in 10 Hz steps, separate for "Constant Bass", "Front", "Rear")	**Low-Mid** Range switch in X1 position: 10 – 310 Hz (selectable in 10 Hz steps) Range switch in X10 position: 100 Hz – 3.1 kHz (selectable in 100 Hz steps) **Mid-High** 500 Hz – 15.5 kHz (selectable in 500 Hz steps)
Total Harmonic Distortion	Less than 0.003 % (at output level 1 V)	Less than 0.003 % (at output level 1 V)
Signal-to-Noise Ratio	Better than 105 dB (IHF A-WTD)	Better than 105 dB (IHF A-WTD)
Input Level/Impedance	1 V/10 kohms	1 V/10 kohms
Output Level/Impedance	**Constant Bass** 0 – 2 V variable/1 kohm **Front/Rear** 1 V fixed/1 kohm	0 – 2 V variable/1 kohm (separate for "Low", "Mid", "High")
Maximum Input Level	3.5 V	3.5 V
Current Consumption	200 mA Maximum	250 mA Maximum
Power Source	14.4 V DC negative ground (10.8 – 15.6 V allowable)	14.4 V DC negative ground (10.8 – 15.6 V allowable)
Dimensions*	160 (W) × 38 (H) × 190 (D) mm 6-5/16 (W) × 1-1/2 (H) × 7-1/2 (D) inches	160 (W) × 38 (H) × 190 (D) mm 6-5/16 (W) × 1-1/2 (H) × 7-1/2 (D) inches
Approximate Weight	0.9 kg/2 lbs.	1.0 kg/2 lbs. 3 oz.

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

- Specifications and design are subject to change for further improvement without notice.