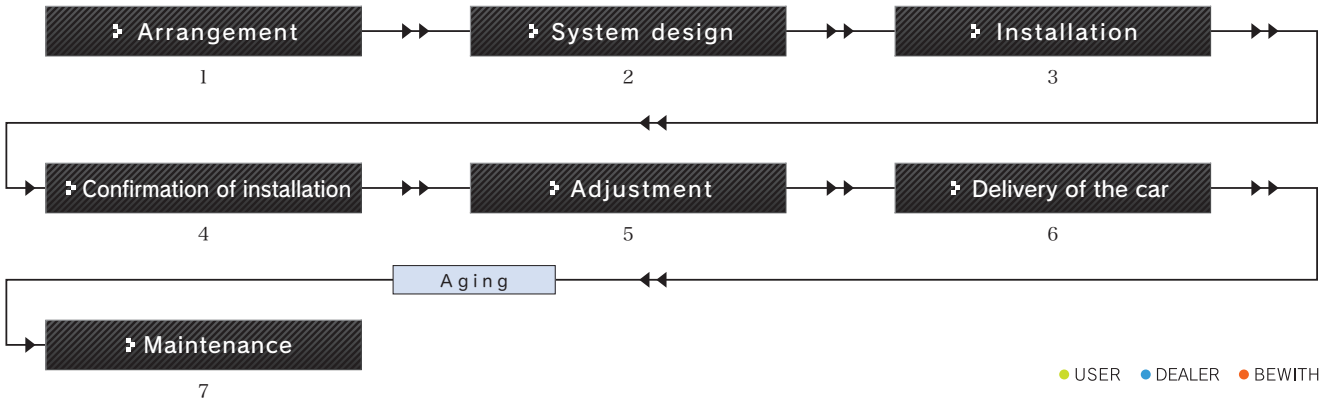
BEWITH

BEWITH Quality Sound Guarantee Program

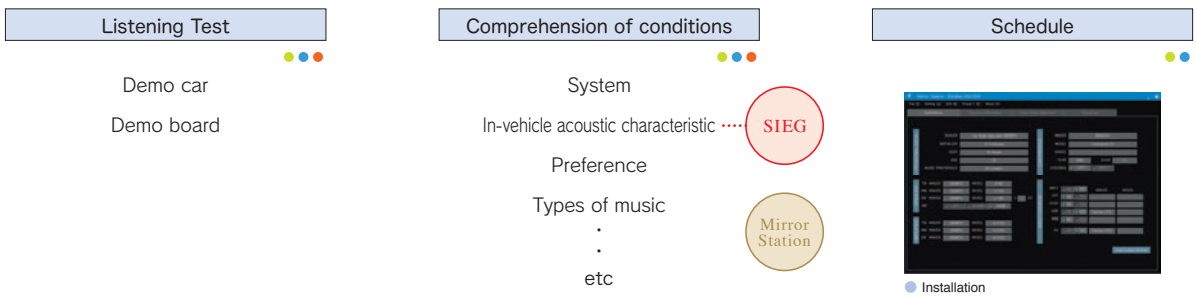
BEWITH not only develops products but also guarantees the sound quality after the installation. For this, BEWITH developed the advanced car audio analyzer “SIEG”. Choose BEWITH for gaining real and the best sound.

At the car audio dealer, by utilizing SIEG at every scene and understanding the acoustic characteristic, an effective installation which makes the best of the audio equipment delivers the quality sound. SIEG is the communication tool to give 100% satisfaction to the customers at car audio dealers.



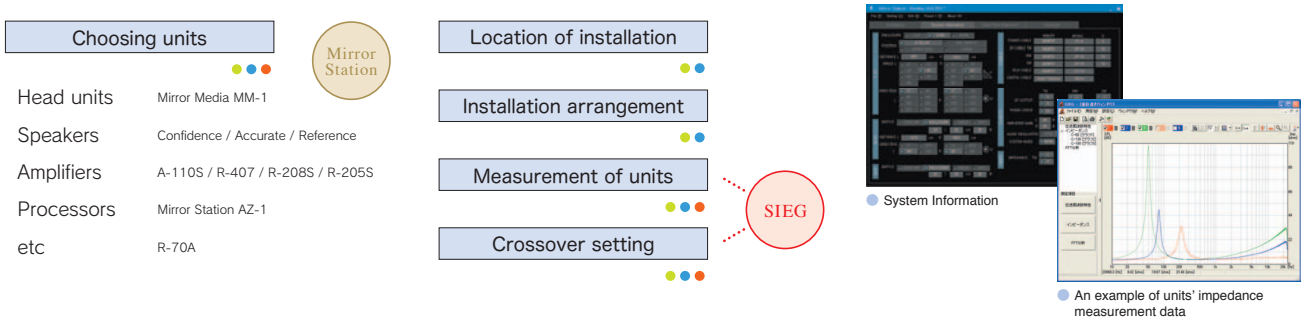
1. Arrangement

Measures the acoustic characteristic of the customer’s car, shows and explains analyzed result to the customer.



2. System design

Based on the measurement result of the speakers, proposes appropriate system composition and crossover frequency setting to the customer.

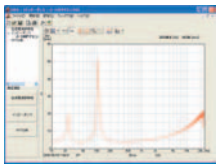


3. Installation

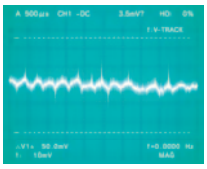
Confirms the condition of the enclosure and baffle board, and proceeds to the installation.

Vibration isolation / Damping
Enclosures
Noise reduction
Wiring
Adjustment
SIEG
R-70A

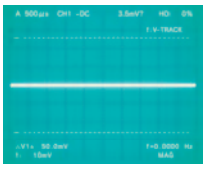
● Enclosure



● An example of enclosure impedance measurement data



● Oscilloscope data of electric current from a battery

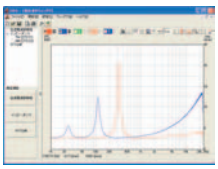


● Oscilloscope data of electric current went through R-70A

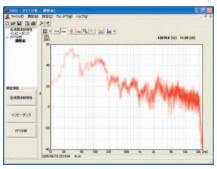
4. Confirmation of the installation

Improves the system if any problems would be verified after confirming overall acoustic characteristics inside the vehicle, and the installation condition including the vibration absorption and deadening.

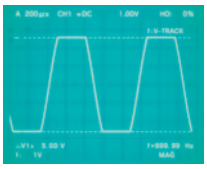
Data measurement
Impedance
FFT
Transmission frequency characteristics
AMP/Gain adjustment
Noise measurement
SIEG
オシロスコープ



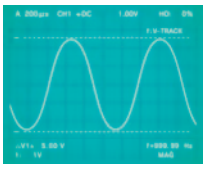
● An example of impedance measurement data



● An example of frequency response measurement data



● Before gain adjustment

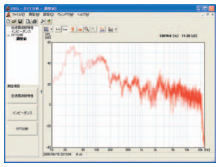


● After gain adjustment

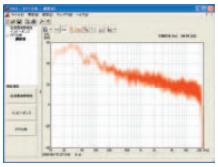
5. Adjustment

Adjust volume, crossover frequency, time alignment, frequency response of each speaker unit, based on the result of SIEG measurement.

Equalizer
X-over
Time Alignment
FFT
Transmission frequency characteristics
Mirror Station
SIEG

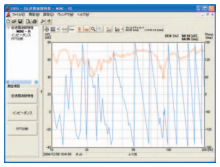


● An example of frequency response measurement data

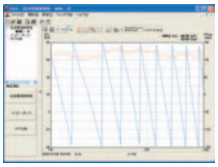


● An example of frequency response measurement data after adjustment

● X-over/Time Alignment



● An example of in-vehicle phase frequency characteristics and transmission time measurement data

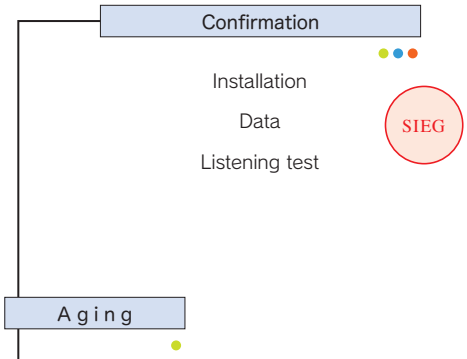


● An example of transmission frequency characteristics measurement data after adjustment

● USER ● DEALER ● BEWITH

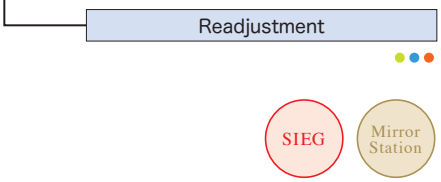
6. Delivery of the car

After the final adjustment, show the result of the measurement and have the customer listen to the complete sound system.

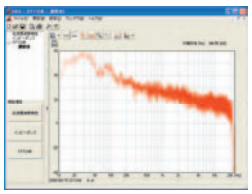


7. Maintenance

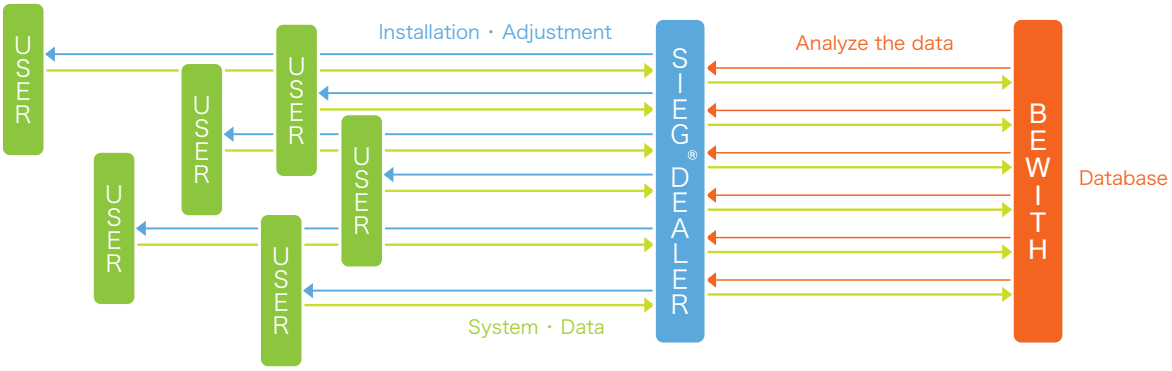
Along with the measurement results of SIEG, readjust the change in tone quality caused by the long term use of the audio system and the vehicle, and according to the customers' preference.



● Equalizer



● An example of frequency response measurement data after adjustment



Speaker

Basic installation of BEWITH speakers

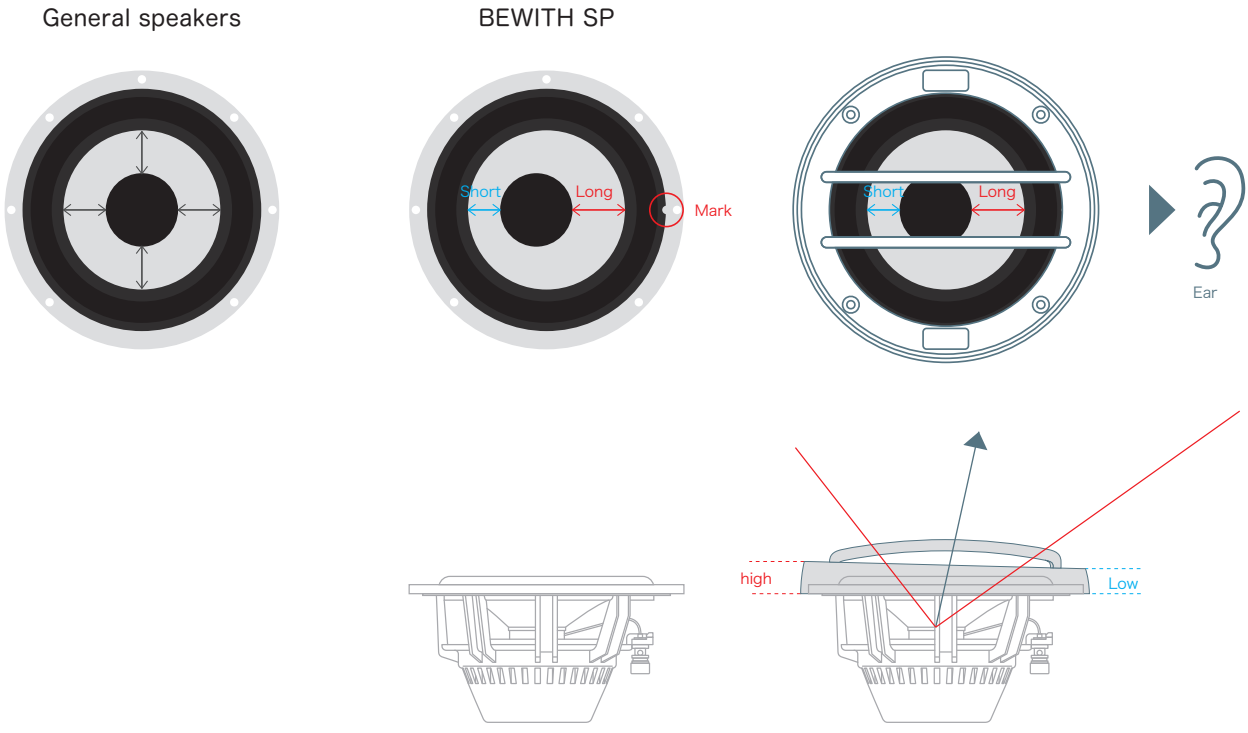
Features of BEWITH speakers (Confidence, Accurate, and Reference) are that tweeters, middle range woofers, and subwoofers have the same cone structure, and the voice coils are off-set. Because of the remarkable structures, the installation needs exceptional methods.

1. Installation angles

In a general cone speaker, the sound pressure level on the speaker axis is the highest. And the farther from the axis it gets, the more sound pressure level decreases. Also, in the high frequency range, the level decreases obviously and it shows on every angle in concentric cone speaker.
In BEWITH speaker, because the voice coil is off-set structure, the way the sound pressure level decrease is different depending on the direction of off axis.

●Long side : There is a chipped part as a mark on the side of the cone which has longer distance from the center cap to the edge. An angle of this side is gradual than the side of shorter distance of the cone. The sound radiated from the speaker spreads to a long side by centering on a speaker axis. Therefore, it is necessary to direct the long distance side of the cone to the listening point. As to the grille, the part placed on to the long distance side of the cone is thinner than the other side.

●Short side : On the other hand, an angle of the short distance side is steep, and the sound pressure level is decreased more than the long distance side when distanced from the speaker axis. As to the tweeter installation, the reflected sound is suppressed by directing the short distance side to the side window.



■ Example of tweeter installation

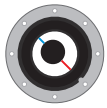
a. Installation on the dashboard

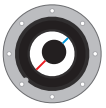
Because a speaker axis is facing up, direct the long distance side to the listening point.

Left

Right

Dashboard

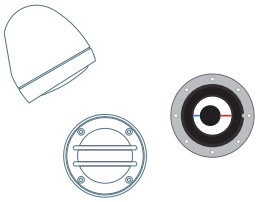


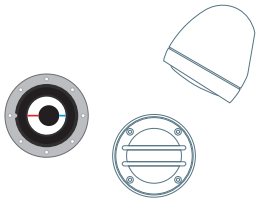


b. Installation on the A-pillar

It is possible to install the tweeter toward the listener. Install the short distance side toward the side window and the long distance side toward the center of the car. Please note not to make the reflected sound from the side window.

A-Pillar





c. Installation the door

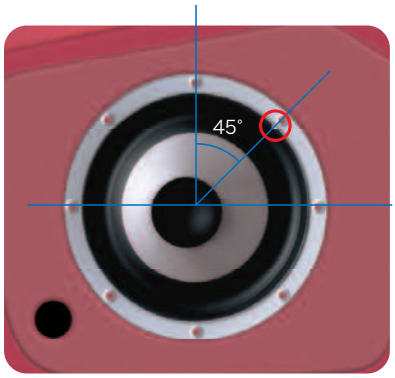
Because a speaker axis faces toward the center of the car, direct the long distance side to the listening point.

Door Upper

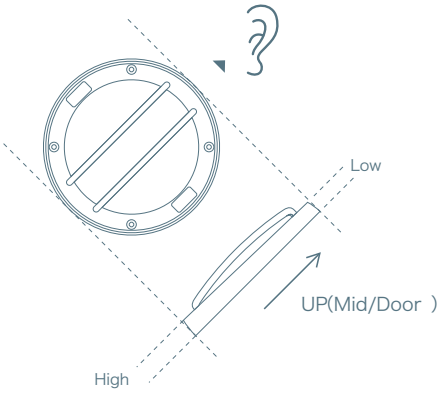
■ Example of middle woofer installation

Because the middle woofer is installed on the lower area of the door in general, install the long distance side upward.

Ex) Sample of C-130 installation angle



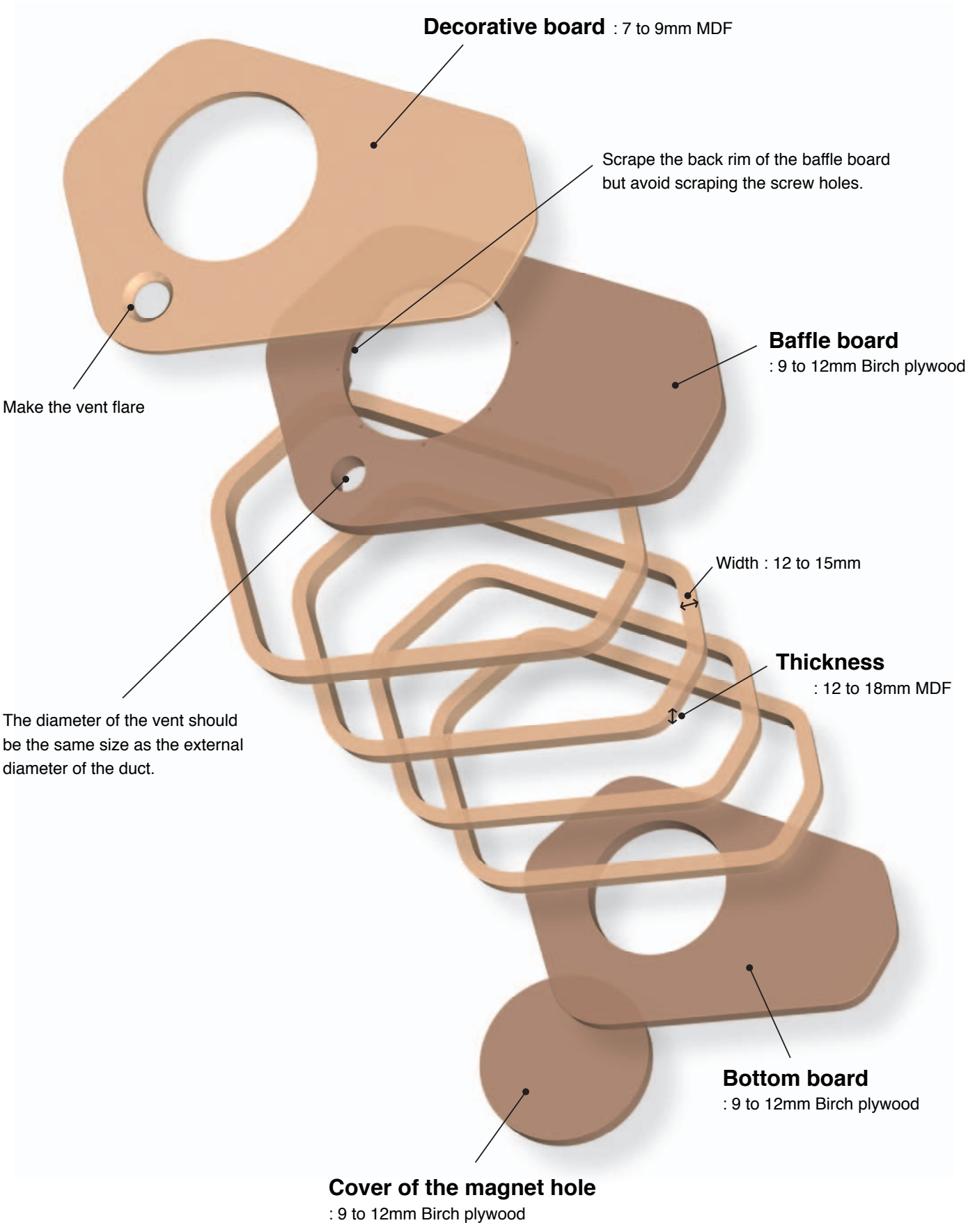
Ex) Sample of G-130 installation



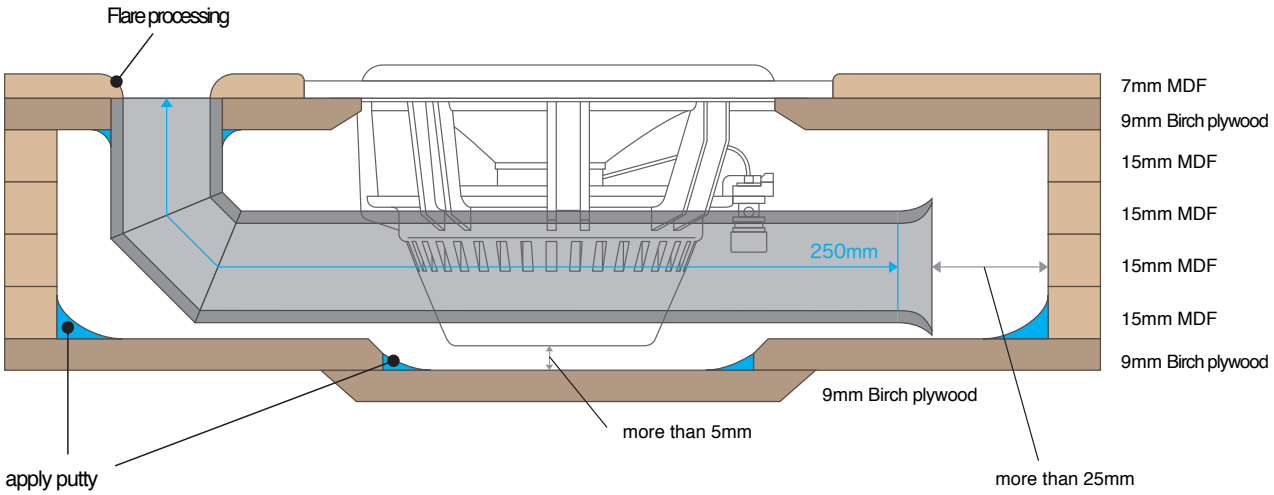
By installing according to those basics, it is possible to deliver the sound from the speaker directly to the ear and enjoy better sound.

Enclosure

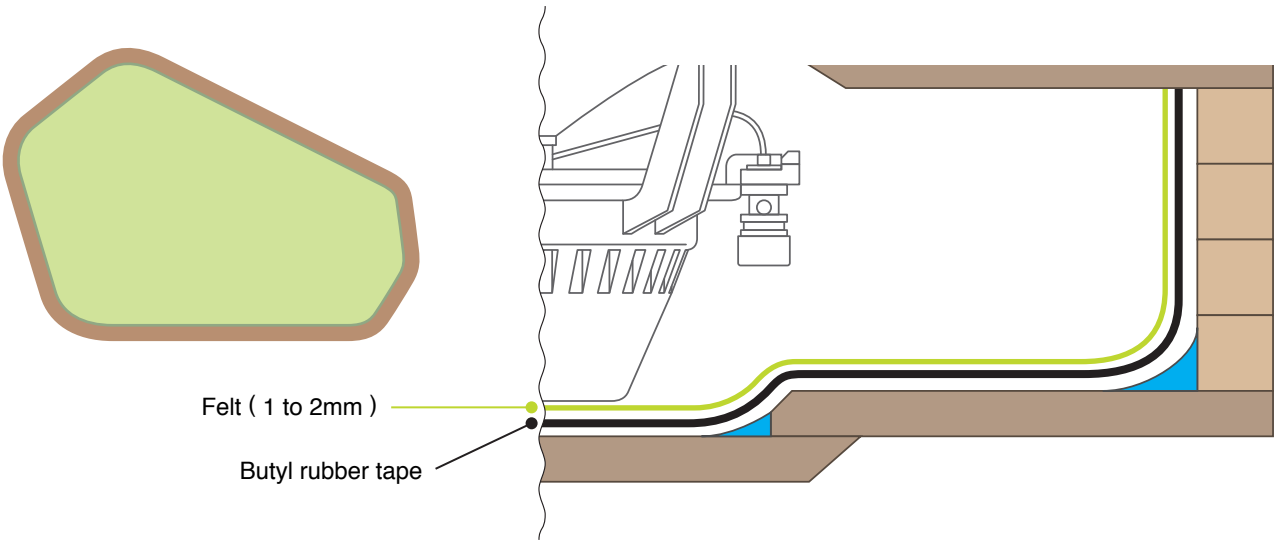
Making enclosure (door) 1



Making enclosure (door) 2

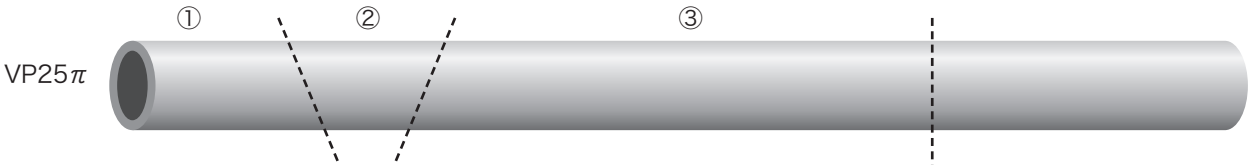


The mounting depth of the speaker unit shown above is 72mm.
When the thickness of the baffle board is 9 to 12mm and 4 layers of MDF is 15mm each, the total height is about 72mm. Therefore, the enclosure does not have enough clearance in order for the speaker unit to fit properly. As a solution for this case, cut a large hole (about the same size of the mounting diameter) in the bottom board where the magnet touches, and obtain more depth by covering the hole with 9 to 12mm birch plywood from outside. It is useful when the enclosure should be made thin as much as possible. (Use 1 board maximum for the cover.) If it is possible, employ 5 MDF boards of 15mm thickness each to make the enclosure. The air flow inside the enclosure is a very important factor in making the enclosure. The air tends to stay in the corners. Therefore, to make smooth air flow, make the corners round by applying putty or a wooden triangular piece.



Making duct

Employ a PVC pipe which you can get in hardware stores. As shown below, cut 2 places at an angle of 22.5°(sand the edges down). A duct of 90° corner is made by turning the part ② over(shown in the picture) and connecting it with super glue. The general elbow cannot be used because the internal diameter would be changed. Also, when cutting only 1 place at an angle of 45° and making a duct of 90° corner, the air flow inside would not be smooth enough to work properly. The vent inside the enclosure should be ground thinly and flared with a heat gun(just like a trumpet's bell). The ideal flare size is 1.75 times larger than the internal diameter. Paint the inside of the duct black to look good.



【Reference data】 Examples of enclosure capacity, duct length, andcrossover frequency setup

Speaker *	Capacities (ℓ)	duct length (cm)		The inside diameter of the duct (mm)	X-over frequency (Hz)	
		Compact cars	Middle to large cars		High pass	Low pass
C-130BF A-130II	2.8	24	23	25mmϕ	50	800 Hz (Tweeter's high pass)
	3.0	24	23		50	
	3.2	25	24		40	
	3.4	25	24		40	
	3.6	25	24		40	
	4.0	25	24		40	

Speaker *	Capacities (ℓ)	duct length (cm)		The inside diameter of the duct (mm)	X-over frequency (Hz)	
		Compact cars	Middle to large cars		High pass	Low pass
C-180BF A-180II	20.0	22	23	40mmϕ	30	MW high pass
	25.0	22	23		30	
	30.0	22	23		25	
	35.0	23	24		20	

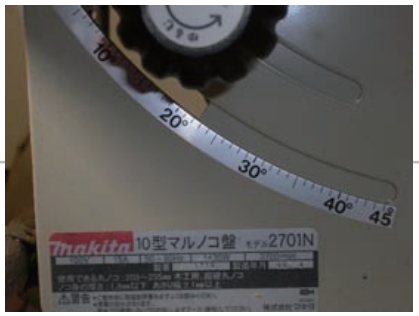
**High pass frequency is a standard frequency band of reproduction

"Compact car" refers to the car size of up to 1300cc; "Middle to large

How to make an enclosure duct

Use a PVC pipe. The inside diameter for front speaker: 25 mm, for subwoofer: 40 mm.

When you cut the pipe, apply wood piece to it for assistance.



Adjust the degree of table saw at 22.5°.

Cut the edge of the pipe at 22.5°.

File down the cut section.

Make the inside of the pipe flared. Refer to the attached paper.

Using the super glue is desirable.

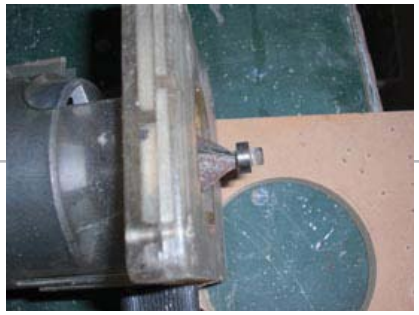
Spread the super glue equally.

Glue both cut sections together.

Finished.

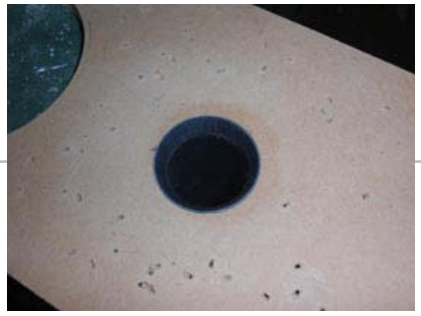
How to make flared pipe.

Get a PVC pipe.



Use trimmer to slant the cut section.

Stabilize the pipe.



Slant the cut section by the trimmer.

Use belt sander to make the slant part smooth.

Sand it down.

The pipe with slant edge.

Prepare something conic.

Heat the slant edge with heat gun or burner.

Stretch the heated edge.

Stretch the heated edge.

File it smooth.

Finished pipe 1.

Finished pipe 2.

Fabrication example. 1

1. The original interior

2. Determine the shape of the enclosure

3. Cut out the trim

4. Stack the cut-out boards to make the side panel

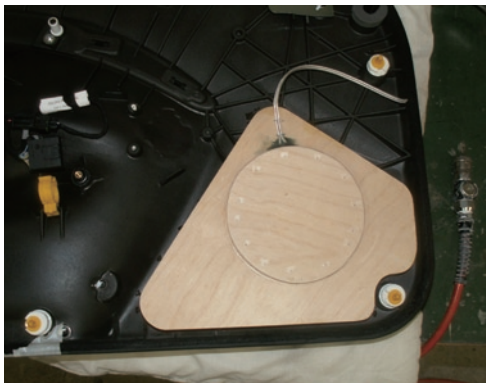
5. Apply putty to the corner of the back panel and the side panel and make it round and smooth

6. Make a port

Fabrication example. 2

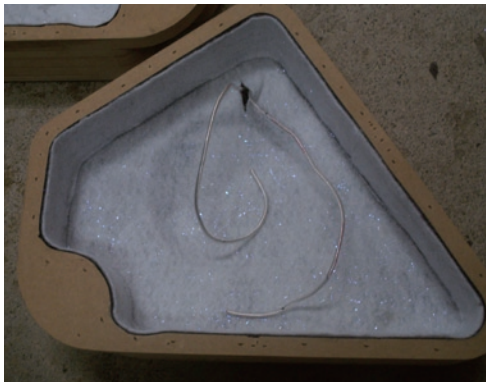
7. Fix the port onto the baffle board

8. Make sure that the enclosure fits on the trim

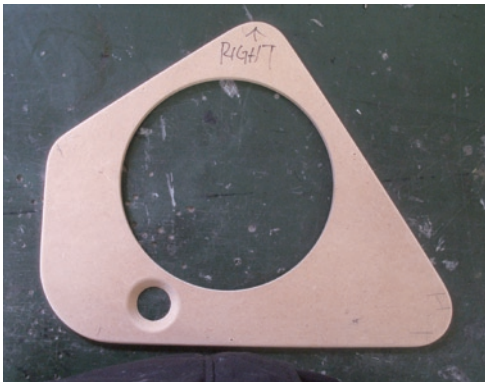


9. The back of the enclosure

10. Apply butyl tape to the inside wall of the enclosure

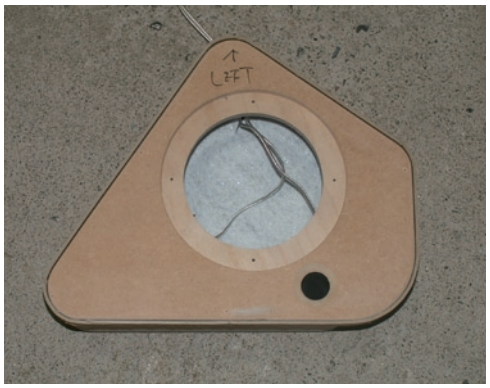


11. Apply felt to the inside wall of the enclosure



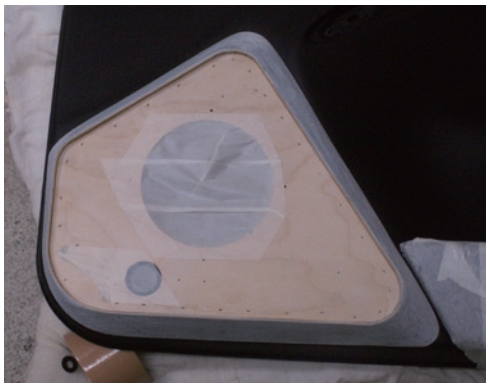
12. Cut out the surface panel

Fabrication example. 3



13. Place the surface panel onto the enclosure and make sure it fits

14. Place the enclosure into the trim, and form the side panel and the trim together



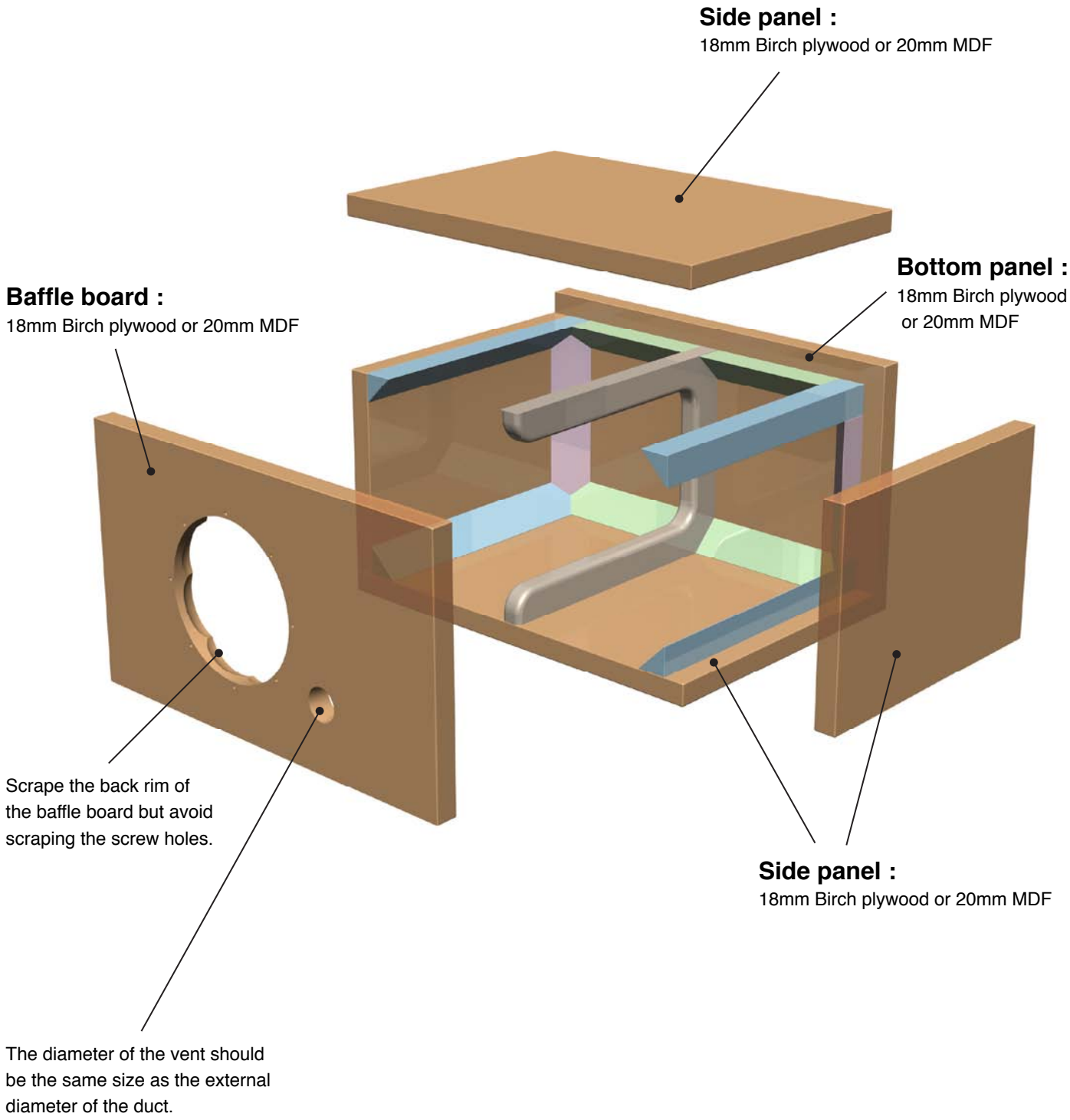
15. Smooth the edges

16. Glue a leather onto the surface panel and the side panel

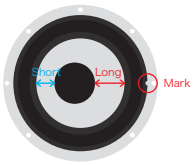
17. Completed 1

18. Completed 2

How to make a bass-reflex enclosure for subwoofer.

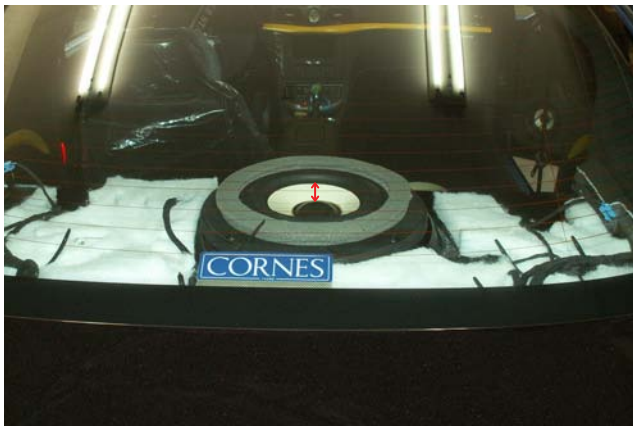


The directions of off-center subwoofer in various installation places.



Trunk pass-through

The upper part of trunk



Rear tray

The side of trunk

Trunk floor

Trunk floor

SIEG®

SIEG Outline

Introduction

Most speakers in the field of car audio are usually sold as a single item, and function as "Speakers" only after they are installed by the specialty store. It is greatly different from the speaker for home audio which is installed in the enclosure from the beginning.

A speaker unit before the installation has its own unique characteristic of material and shape. Therefore, the design of enclosure and the capacity that are able to make the best use of it are necessary. An appropriate installation with understanding the feature of the speaker unit accurately and considering the in-vehicle acoustic characteristic and the back ground noise is the fastest way to bring out the best out of the speaker.

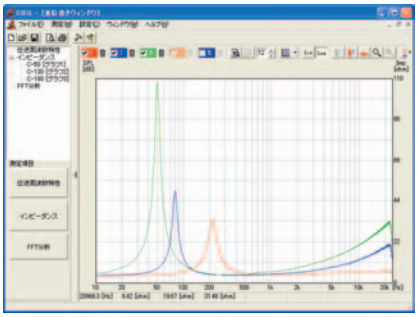
Because there are various restrictions inside the car compared with the listening room, the adjustment in accordance with the in-vehicle acoustic characteristic by the processor is indispensable to create the best sound field.

BEWITH's SIEG - Car Audio Analyzer measures the impedance characteristic and in-vehicle transmission frequency characteristic of the speakers easily and accurately. This is indispensable for the dealers to bring out the potential of the speaker units.

Measurement features of SIEG

1. Measurement of impedance frequency characteristic of the speaker unit

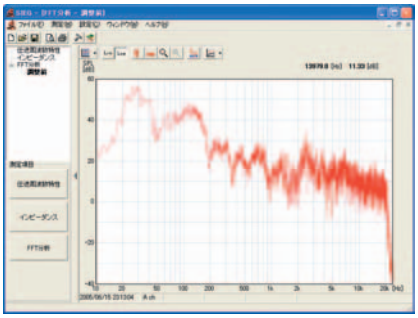
The impedance frequency characteristic shows the resistance of the speakers in frequencies. Low range resonance frequency, nominal impedance, and other conditions can be confirmed in this graph. First, measure the fundamental response of a speaker unit and confirm its capacity and characteristic. Second, analyze the performance of the speaker unit by comparing the response before and after the installation. Understand the necessity of adjustment such as reproduction frequency band, strength of the enclosure, effect of the port, problems of the back pressure, and network adjustment, and take necessary measure efficiently.



2. Measurement of the in-vehicle sound field by FFT (Fast Fourier Transform) analysis

By the FFT analysis, an element of each frequency is displayed as the sound pressure level. Use the following signals for the measurement; Pink noise which has an equal amount of energy per octave; a band noise from only specific band; or standing wave of a specific frequency.

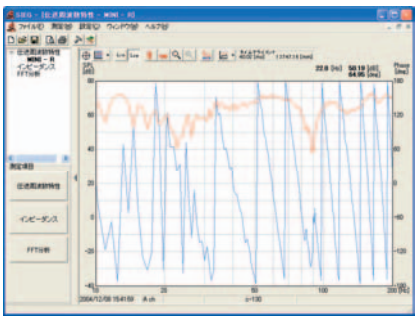
At the final adjustment of the sound after the installation of the speakers, measure the in-vehicle characteristic. Specify the peaks and dips caused by the specific frequency, confirm the cause, and adjust each frequency band after taking measures. Finally, measure the result of the adjustment and again take measures and adjust.



3. Measurement of Transmission frequency characteristic

Transmission frequency characteristic shows the change of the sound pressure level caused by the difference in the frequencies of the vehicle. The pink noise that has an equal amount of energy per octave is also used as a signal for the measurement. SIEG generates the pink noise and then the audio system reproduces it. And SIEG analyzes the frequency and phase of the sound reached to the measuring point. The phase is the time gap of the sound radiated from several sound sources. Even though the frequency and amplitude of the sound is the same, the sound is not the same when there are phase lags.

This measurement provides you the data which the electric characteristic of each equipments and wirings, individual difference of the speaker unit, and all the acoustic characteristics in the vehicle were added to.



By SIEG, because an appropriate installation which matches to the characteristic of the speaker unit is possible, adjustment time will be reduced. Also, it is easy to bring out the best of the speaker unit by appropriate adjustment based on the measurement result. A hearing adjustment will be necessary in the end. However, much time and effort will be reduced.

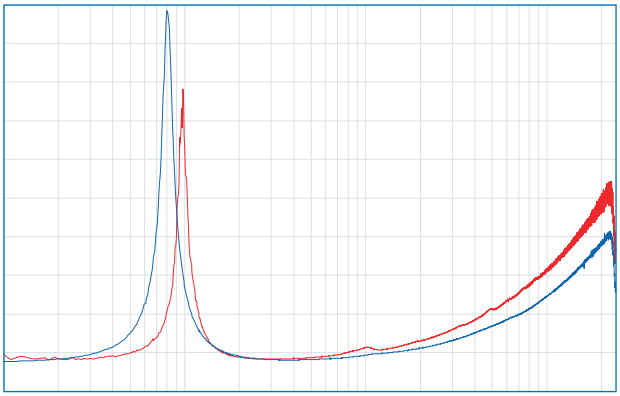
Effective use of SIEG

Please refer to the owner's manual for the operation of this equipment and software.

1. Measurement of the impedance frequency characteristic of the speaker

Measures the impedance frequency characteristic of the speaker and checks the lowest resonance frequency (f0), the nominal impedance (Z0), and Q factor.

- Check the difference of the left and right. If needed, match both.
- Understand the interference of the edge and the resonance at high frequency range.
- Set the frequency band according to the characteristics.
- Consider the level adjustment according to the impedance frequency characteristic at high frequency range.



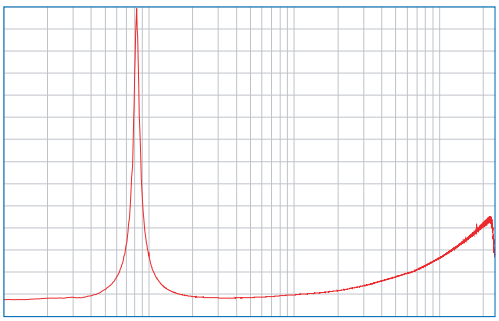
2. Consideration of the installation, the design of the enclosure

Consider the installation, the design and capacity of the enclosure, according to the characteristic of the speaker unit.

2-1. Example of the characteristic with sealed enclosure

When installing the speaker unit to the sealed enclosure which is airtight, the characteristic of the speaker becomes similar characteristic to the fundamental response. Though it depends on the size and sound absorption material inside the enclosure, the lowest resonance frequency shifts to high range a little and the Q factor becomes large. When the enclosure is not rigid enough, the enclosure itself expands by the sound pressure and appropriate Q factor would not be obtained.

①Examples of the characteristic measurement with sealed enclosure

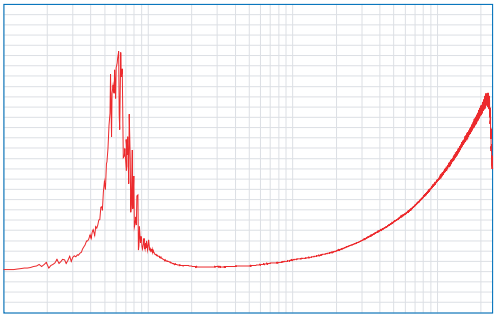


Using an appropriate enclosure

②Examples of the characteristic measurement with sealed enclosure

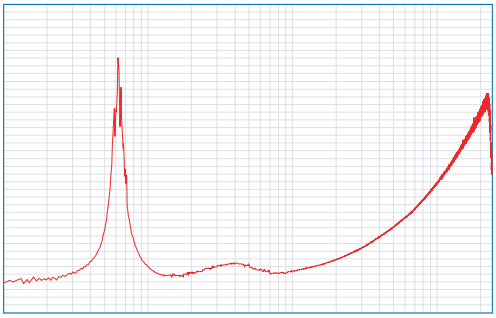
Resonance of the back of the enclosure

③Examples of the characteristic measurement with sealed enclosure



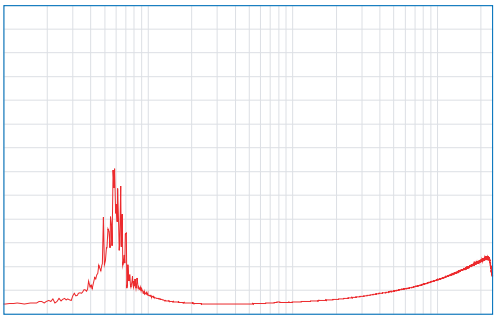
Resonance of the back of the enclosure, machinery resonance, and a resonance caused by the first backpressure radiation

④Examples of the characteristic measurement with sealed enclosure



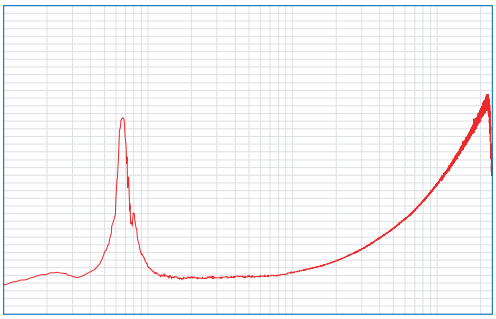
Resonance of the back of the enclosure, machinery resonance, and a resonance caused by the first backpressure radiation and a standing wave

⑤Examples of the characteristic measurement with sealed enclosure



The back of the enclosure is narrow and also other resonances occur

⑥Examples of the characteristic measurement with sealed enclosure



Inappropriate shield and the air leak

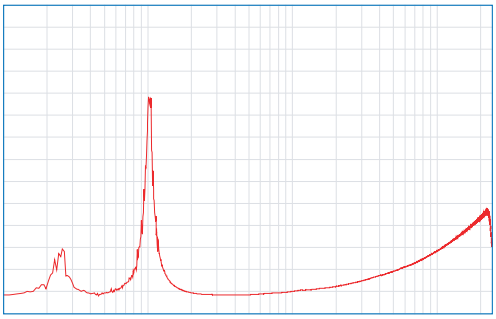
2-2. Example of the characteristic with bass-reflex enclosure

The bass-reflex enclosure is a speaker cabinet enclosure in which a portion of the radiation from the rear of the cone is channeled to reinforce the bass tones. With this enclosure, 2 peaks arise at the lowest resonance frequency (f0) and anti-resonance frequency (fr) on the impedance characteristic. As well as the sealed enclosure, the air leakage from the places except the duct causes inappropriate characteristic. Conversely, the airtightness can be confirmed on the impedance characteristic.

①Example of the characteristic with bass-reflex enclosure

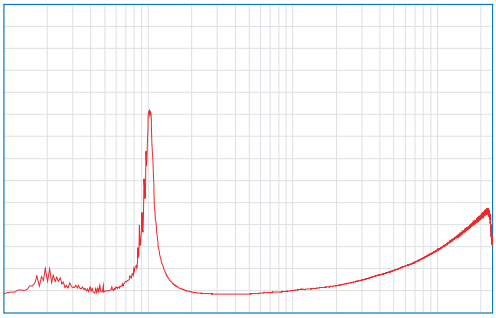
An appropriate duct and a speaker unit's movement

②Example of the characteristic with bass-reflex enclosure



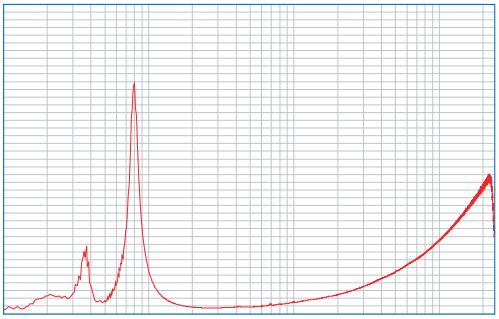
A diffraction and resonance occurred inside the duct and a resonance caused by the speaker unit's backpressure

③Example of the characteristic with bass-reflex enclosure



A narrow (long) duct and a resonance of the back of the enclosure

④Example of the characteristic with bass-reflex enclosure



Short duct, duct leak, enclosure leak, or a resonance of the back of the enclosure

2-3. Notes to the bass-reflex enclosure

In home audio, the bass-reflex enclosure is designed to divide the work load equally between the speaker unit and the port to reproduce lower frequency band well. In this case, 2 same height peaks arise on the impedance characteristic. Inside a vehicle, because the capacity of the space is small, a peak arises at around 100 to 125 Hz. Therefore, if the design of the enclosure is the same as the home-use, low frequency sound becomes too loud.

In car audio bass-reflex enclosure, an anti-resonance frequency of the port is set in low frequency band for wider reproduction band. Also, the sound radiated out of the port is reduced intentionally for flat frequency response.

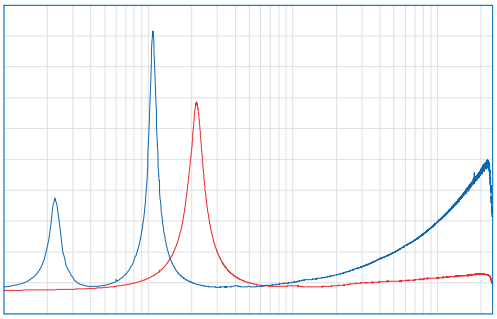
In the frequency band below the anti-resonance frequency of the port, control of speaker cone becomes inappropriate and it causes malfunction of the speaker. It is important to design the port and the enclosure for appropriate speaker operation.

3. Confirmation of the installation

3-1. Impedance measurement

Measures the final impedance of the speakers which have been installed to the vehicle.Å@Å@Take off the speaker cables from the network (when using multi-system, take them off from the amplifier), connect them to SIEG and measure.
Check the result of the measurement and improve the installation if needed.

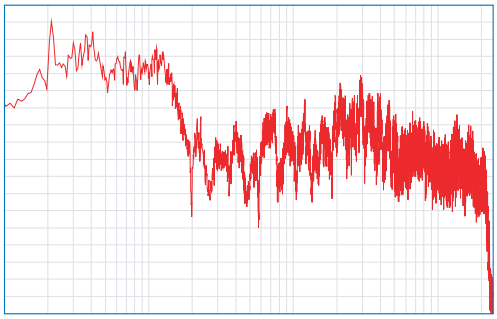
- Condition of the speaker installation.
- Condition of the enclosure and the baffle board.
- Condition of the backpressure treatment of the speaker unit.
- Condition of the vibration absorption and deadening.



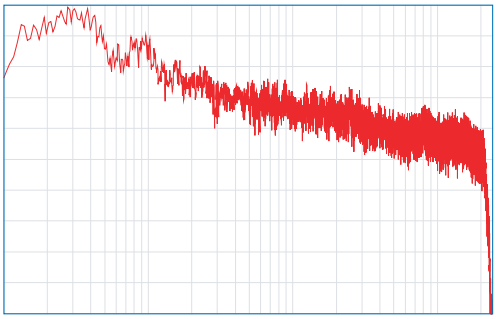
Example of measurement when using an enclosure

3-2. FFT measurement

Check the characteristics of the audio equipment and condition of the speaker installation, in addition to the in-vehicle acoustic characteristics. FFT analysis measures the frequency characteristics by reproducing the pink noise and taking the sound reached to the listening point with microphone.
It also shows the condition of the installation such as the frequency band that resonates with the capacity in vehicle and the resonance of the door trim in high frequency band. This data is useful not only for the level adjustment between the speakers and the adjustment with equalizer, but also for many other adjustment and cuts down the workload.



Example of FFT measurement



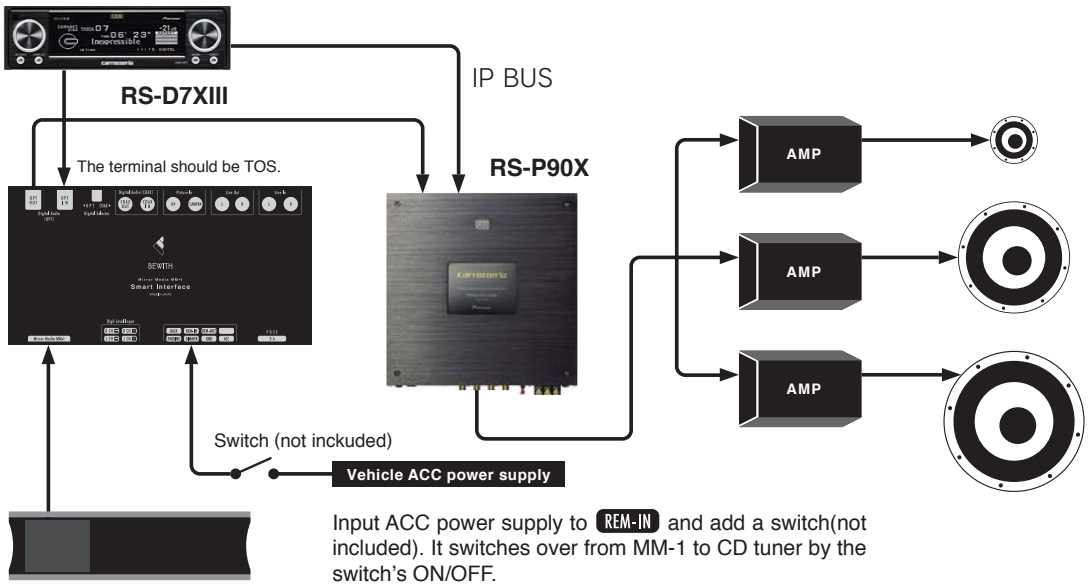
Example of FFT measurement after the adjustment

Mirror Media® MM-1

Examples of MM-1 installation

■ Connection to after market audio system (carrozzeria X)

MM-1 + after market system / Digital

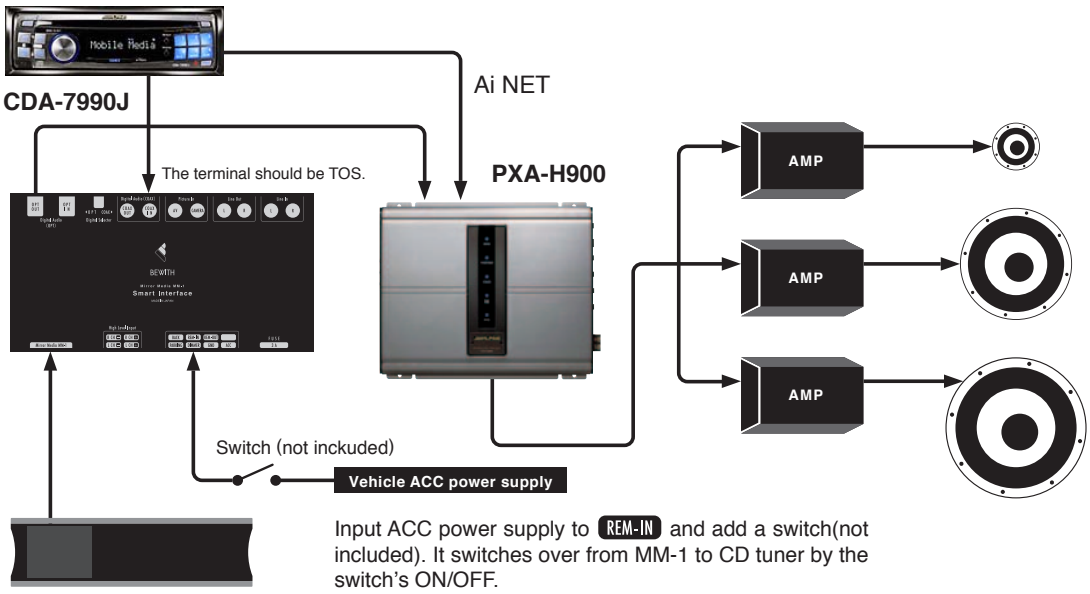


Input ACC power supply to REM-IN and add a switch(not included). It switches over from MM-1 to CD tuner by the switch's ON/OFF.

Note : The switch (not included) is necessary for switching over from MM-1 to another system (factory standard or after market system). Volume is controled by CD tuner(RS-D7X). Terminal of the digital cable needs processing to fit on.

■ Connection to after market audio system (Alpine former F1)

MM-1 + after market system / Digital

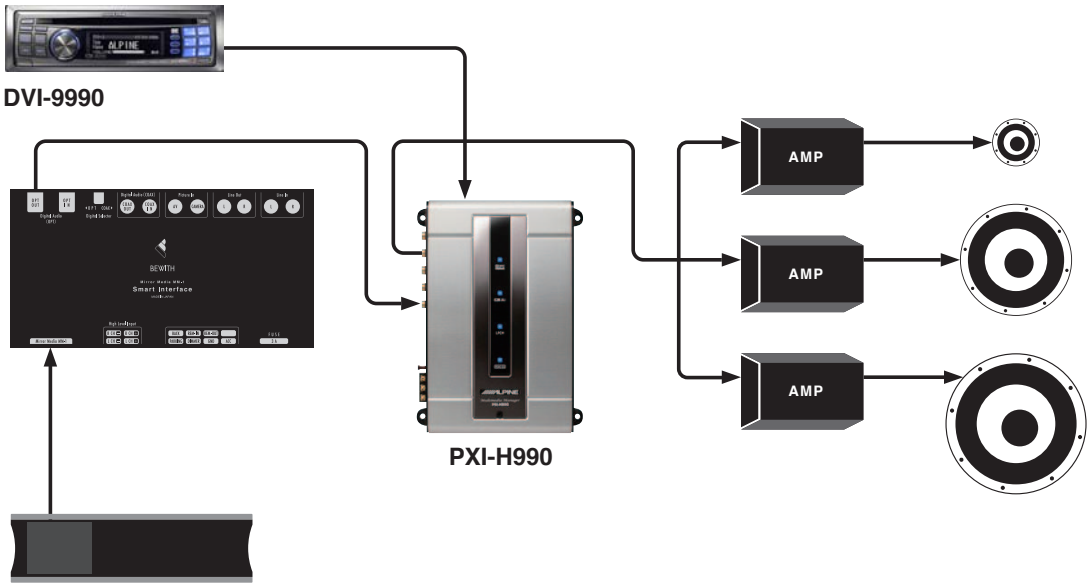


Input ACC power supply to REM-IN and add a switch(not included). It switches over from MM-1 to CD tuner by the switch's ON/OFF.

Note : The switch (not included) is necessary for switching over from MM-1 to another system (factory standard or after market system). Volume is controled by CD tuner(7990J). Terminal of the digital cable(COAX) needs processing to fit on.

■ Connection to after market audio system (Alpine new F1)

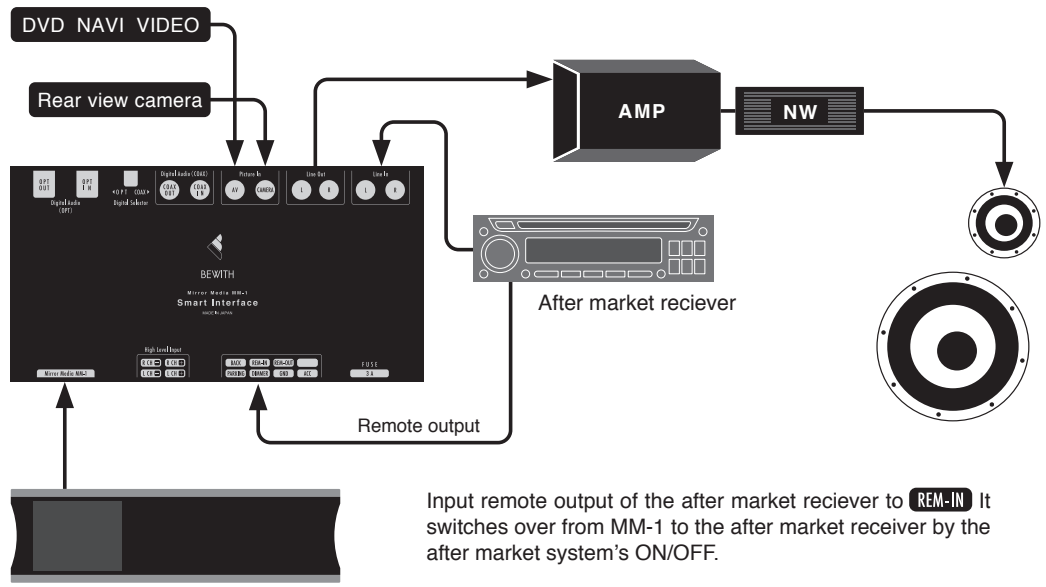
MM-1 + after market system / Analog



Note : It switches over from MM-1 to another system by the source changeover of DVI-9990.

■ Connection to after market audio system

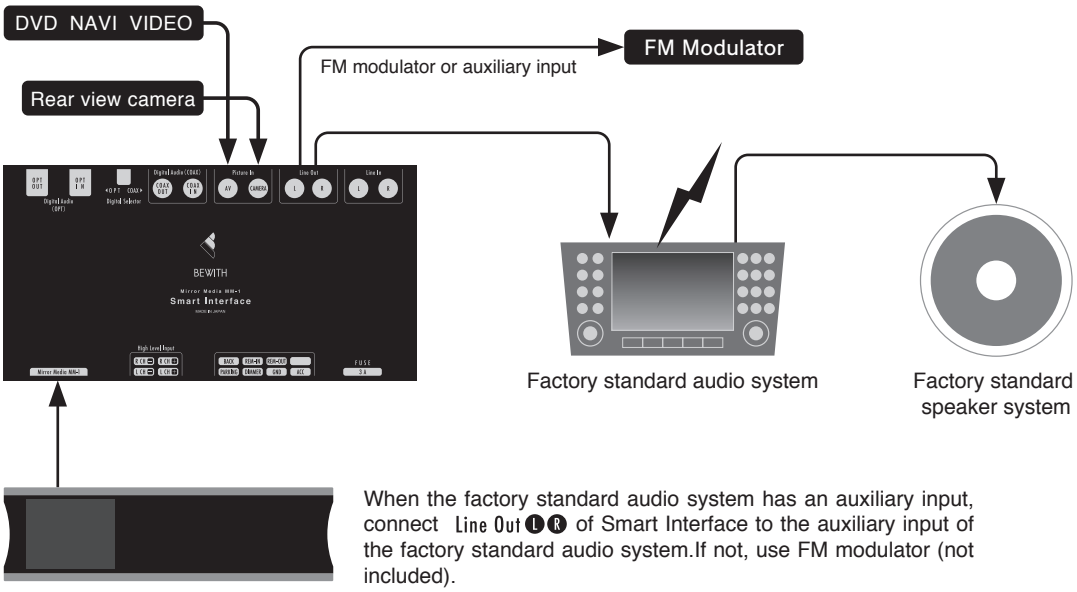
MM-1 + after market system / Analog



Input remote output of the after market reciever to REM-IN It switches over from MM-1 to the after market receiver by the after market system's ON/OFF.

■ Connection to factory standard audio system (1)

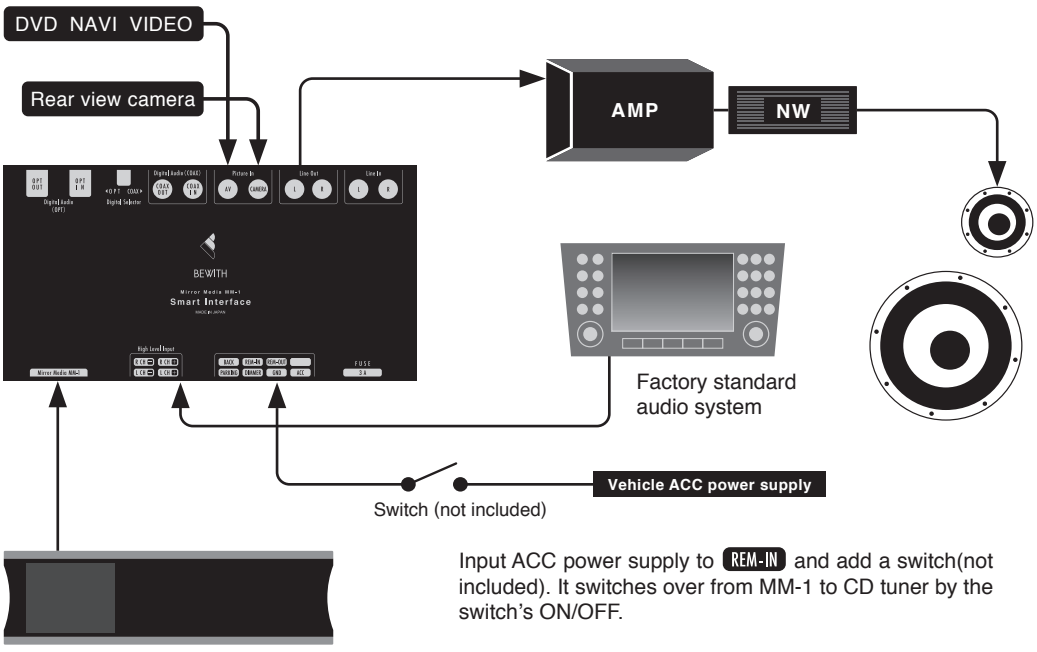
MM-1 + factory standard system



When the factory standard audio system has an auxiliary input, connect Line Out (L)(R) of Smart Interface to the auxiliary input of the factory standard audio system.If not, use FM modulator (not included).

■ Connection to factory standard audio system (2)

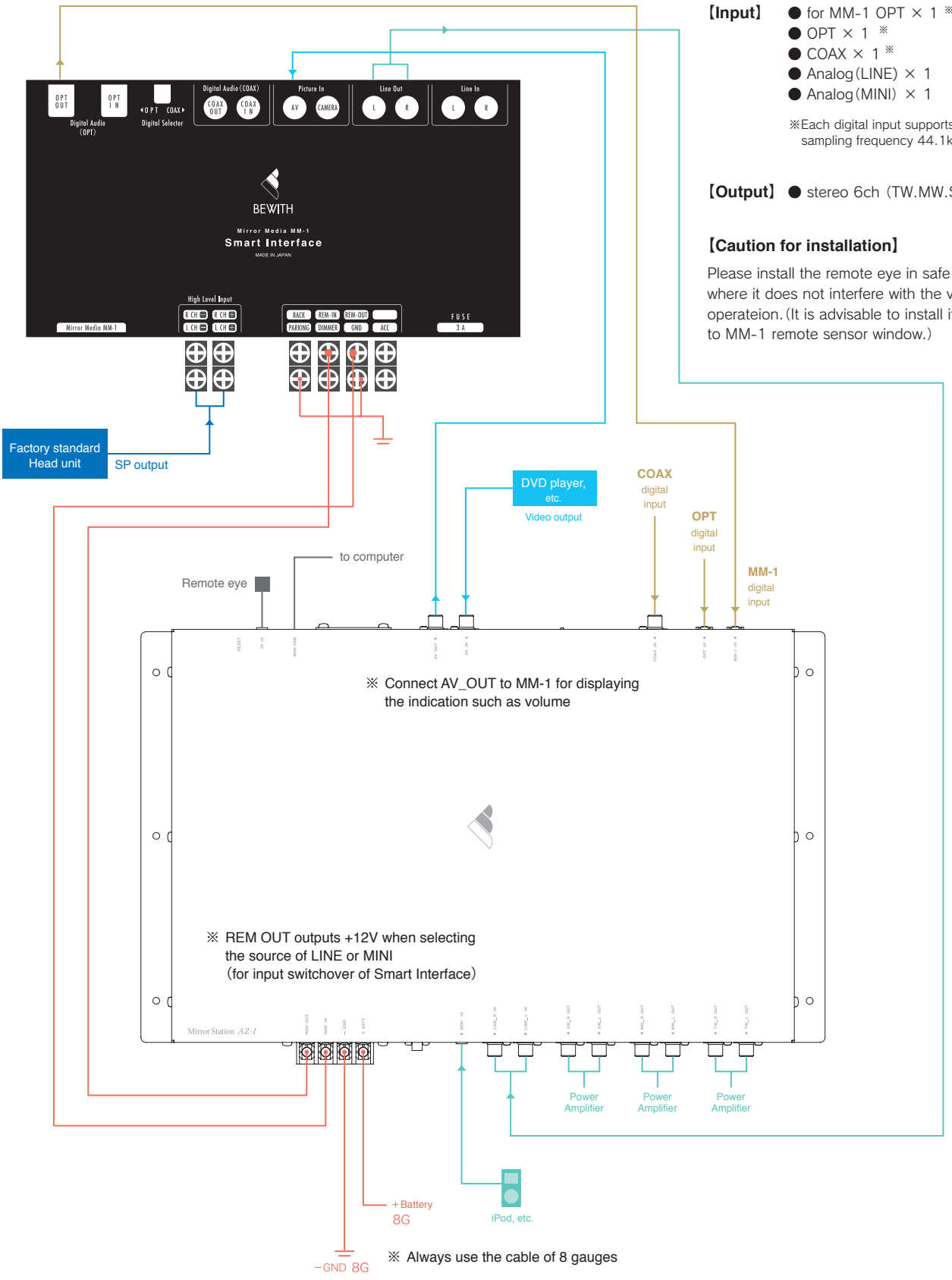
MM-1 + factory standard system + after market amplifier system



Input ACC power supply to REM-IN and add a switch(not included). It switches over from MM-1 to CD tuner by the switch's ON/OFF.

Mirror Station®

Basic installation chart of Mirror Station®



【Input】
- for MM-1 OPT × 1 ※
- OPT × 1 ※
- COAX × 1 ※
- Analog (LINE) × 1
- Analog (MINI) × 1

※Each digital input supports only sampling frequency 44.1kHz

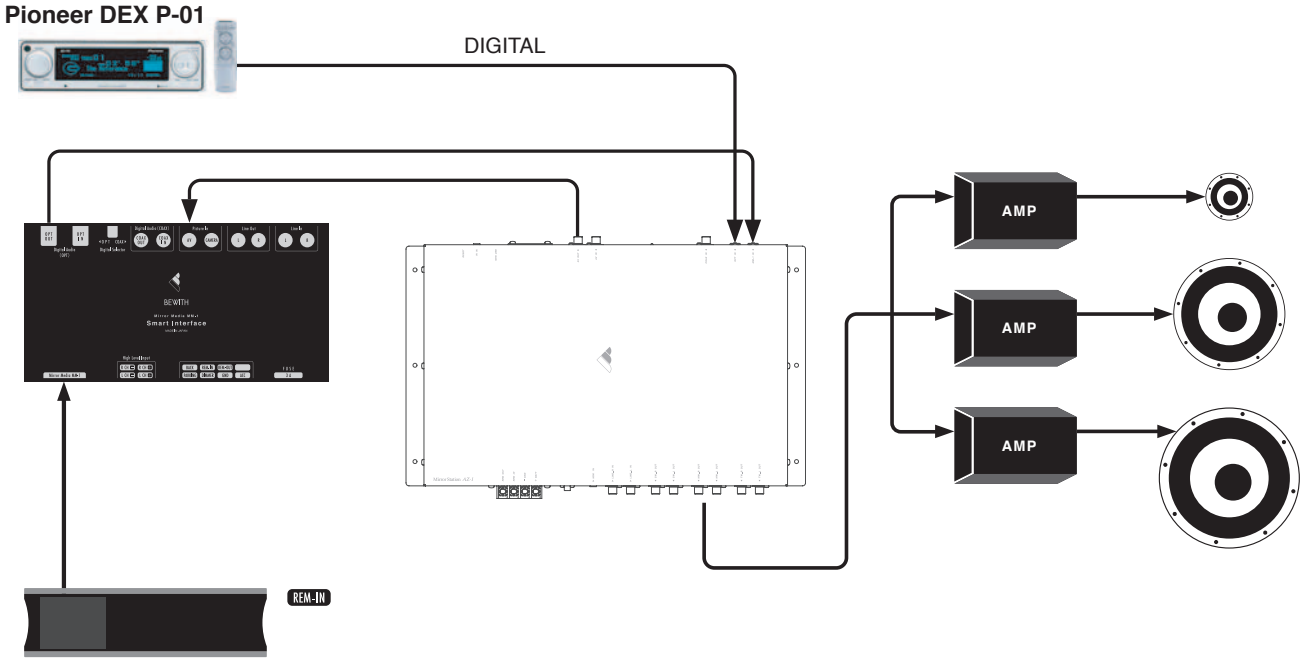
【Output】 ● stereo 6ch (TW.MW.SW)

【Caution for installation】

Please install the remote eye in safe place where it does not interfere with the vehicle operateion. (It is advisable to install it close to MM-1 remote sensor window.)

■ Connection to after market audio system (digital out) .1

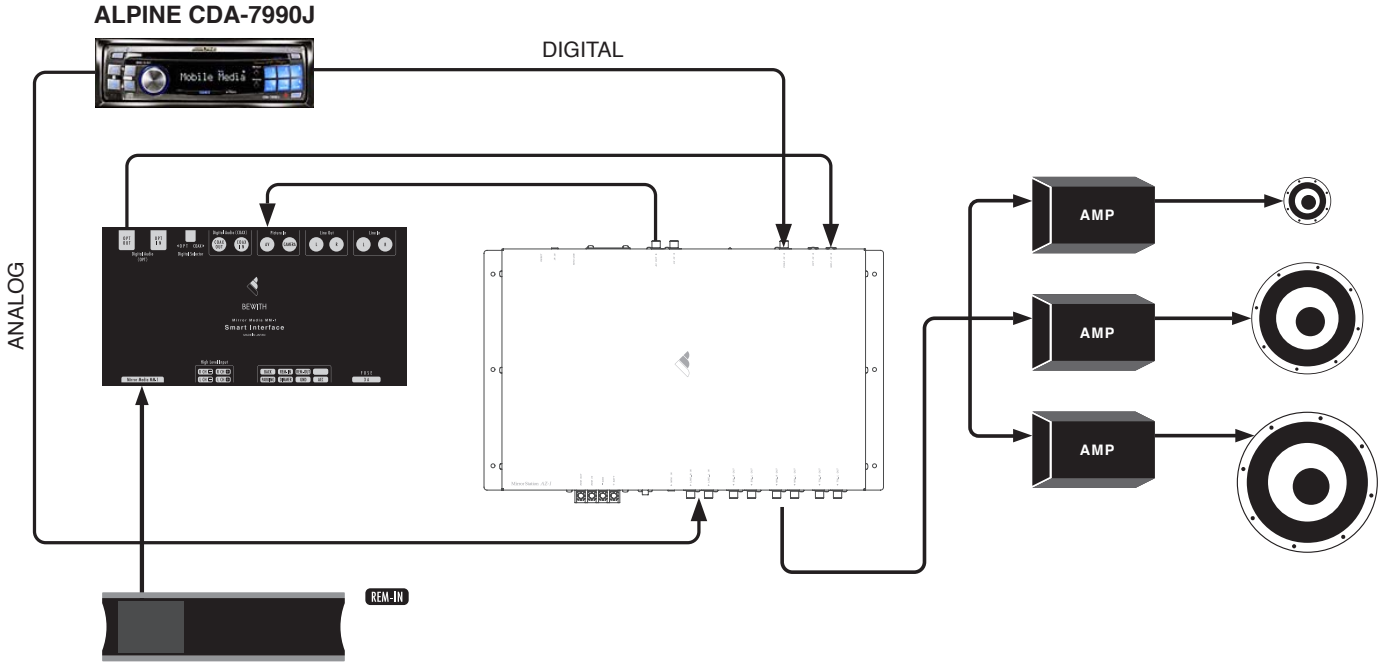
MM-1 + after market system / Digital



※ Terminal of the cable needs processing to fit on (for AZ-1 OPT2 input)
With carrozzeria X serise, digital signal does not output from the head unit unless the processor is connected to IP BUS.

■ Connection to after market audio system（digital out）.2

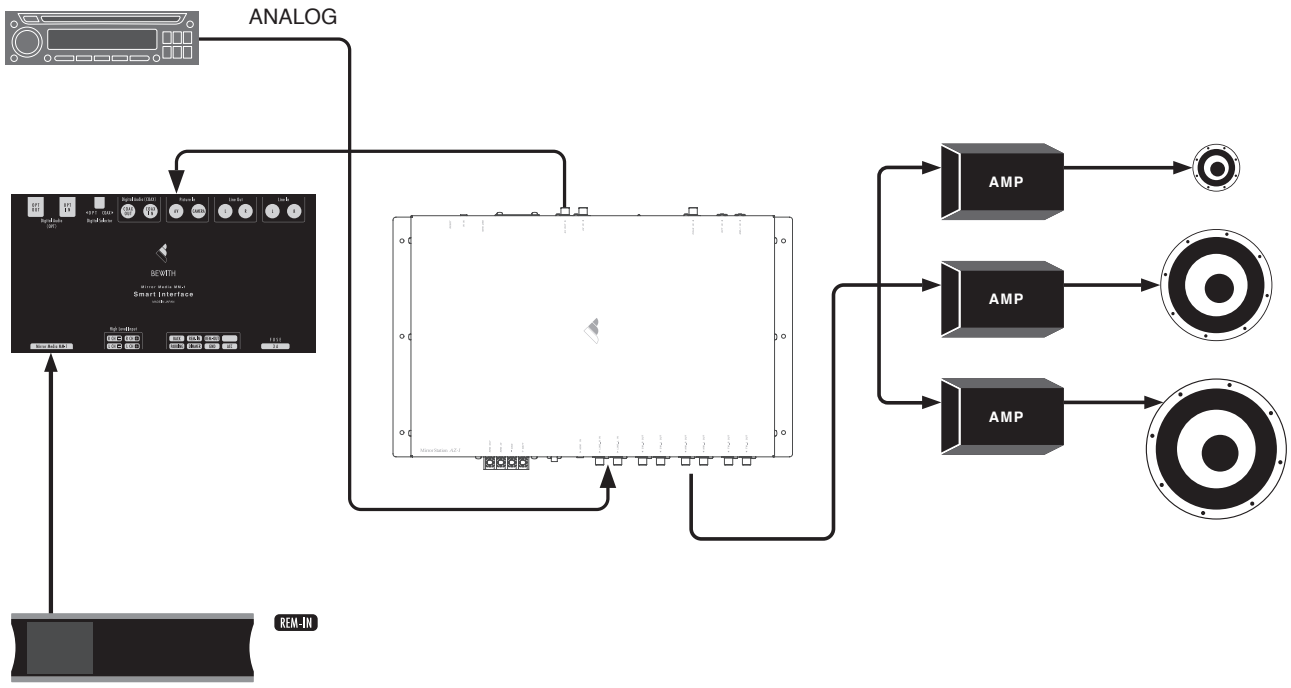
MM-1 + after market system / Digital



※ Digital output of ALPINE CDA-7990J is only for CD audio.
The audio of the tuner should be inputted in ANALOG.
The terminal of COAX input needs processing to fit on.
The ANALOG input needs an adapter cable.

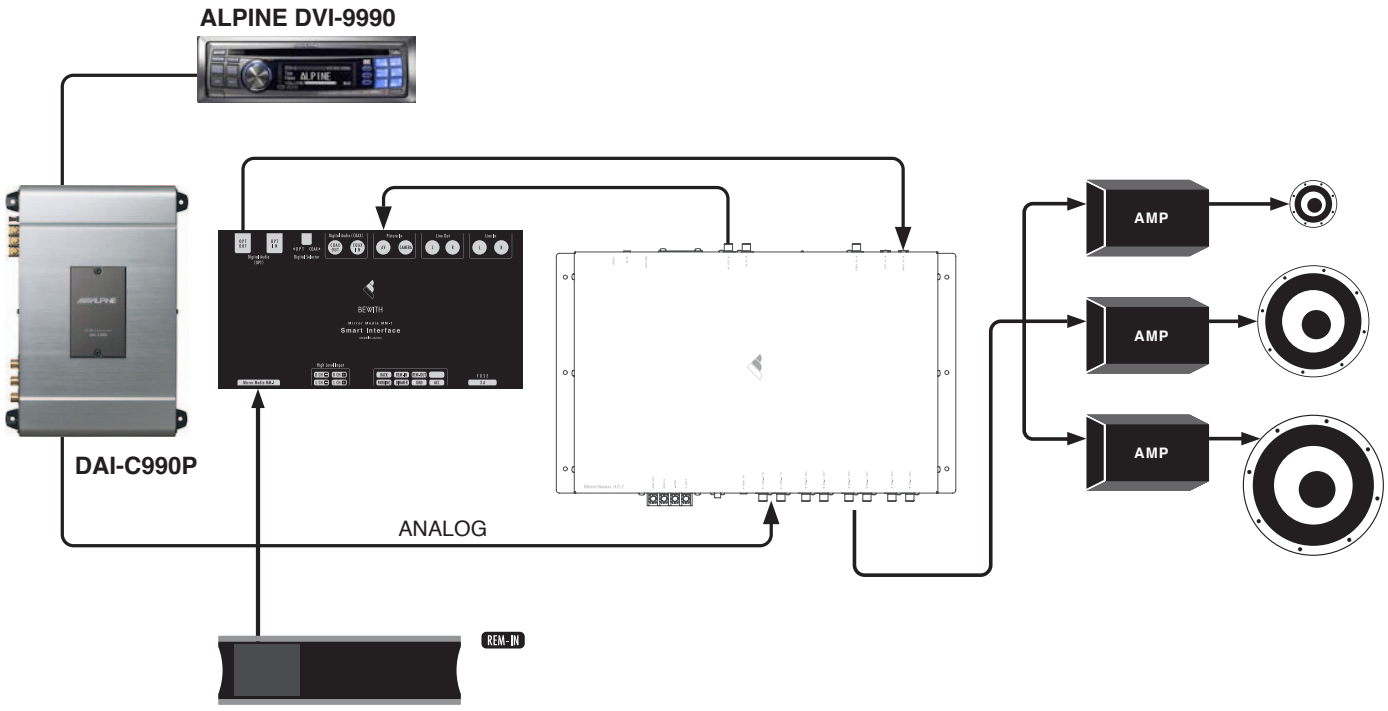
■ Connection to after market audio system (analog out) .1

MM-1 + after market system / Analog



■ Connection to after market audio system (ALPINE F1)

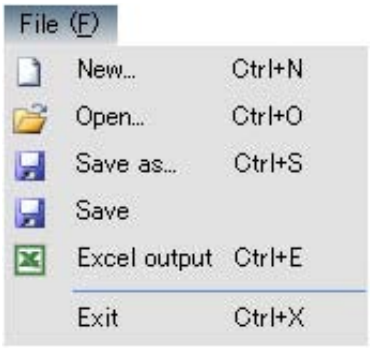
MM-1 + after market system / Analog



Software of Mirror Station®

■ MENU

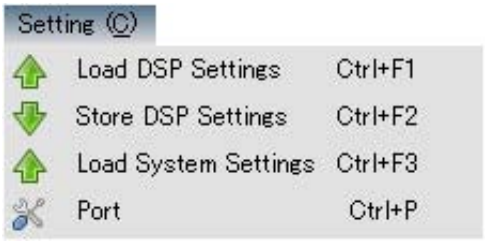
1. File



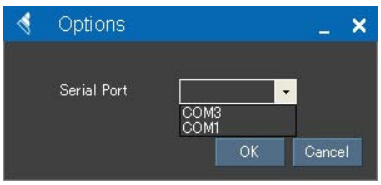
- ●New : New adjustment.
- ●Open : Opens the existing file.
  Displays a dialog box for specifying a data file to read.
- ●Save as : Displays a dialog box for specifying where to save a data file.
- ●Save : Overwrites a data file.
- ●Excel output : Saves a data file as an Excel file.

- ●Exit : Terminates the software.

2. Setting



- ●Load DSP Settings : Loads the Xover-Time Alignment data and Equalizer data which are set up on the computer to the Mirror Station.
- ●Store DSP Settings : Stores the Xover-Time Alignment data and Equalizer data of the Mirror Station to the computer.
- ●Load System Settings : Loads the Installation data and System Information data to the Mirror Station.



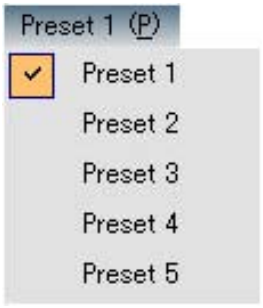
- ●Port : Displays a dialog box for specifying a COM(communication) port. When more than 2 COM ports are displayed, select the port of larger number.(in case of the diagram shown to the right, choose COM3)

3. Edit

- Preset Copy : Copies the selected preset data.
- Preset Paste : Pastes the copied preset data on another preset.

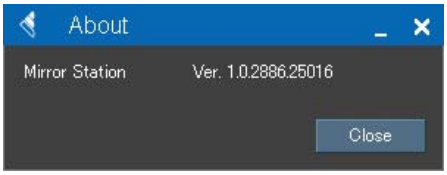
4. Preset 1

Choose one from 5 Preset data.

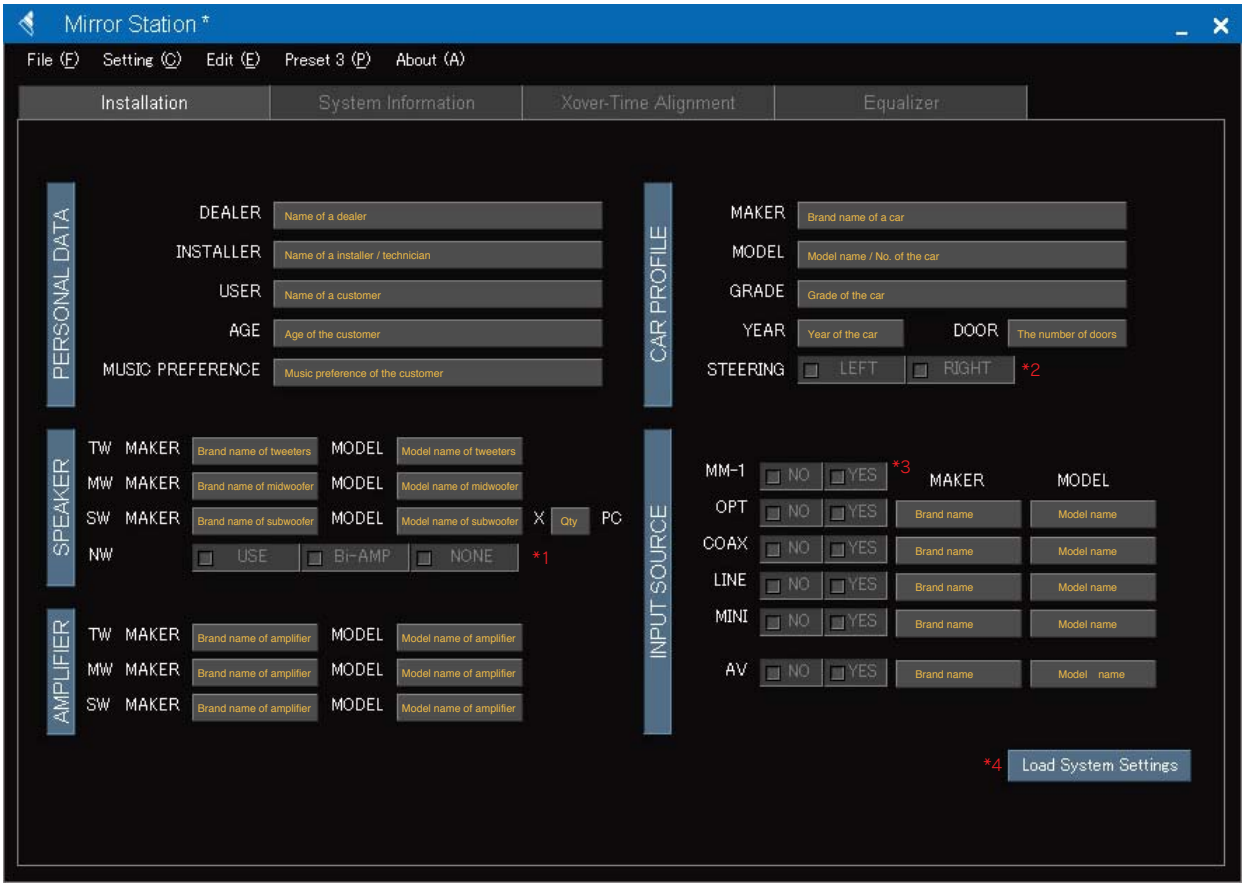


5. About

Displays a version of the software.



Installation



*1

Use a passive network

Use passive networks in bi-amplification

No passive network is used

*2

Car with right-steering

Car with left-steering

*3

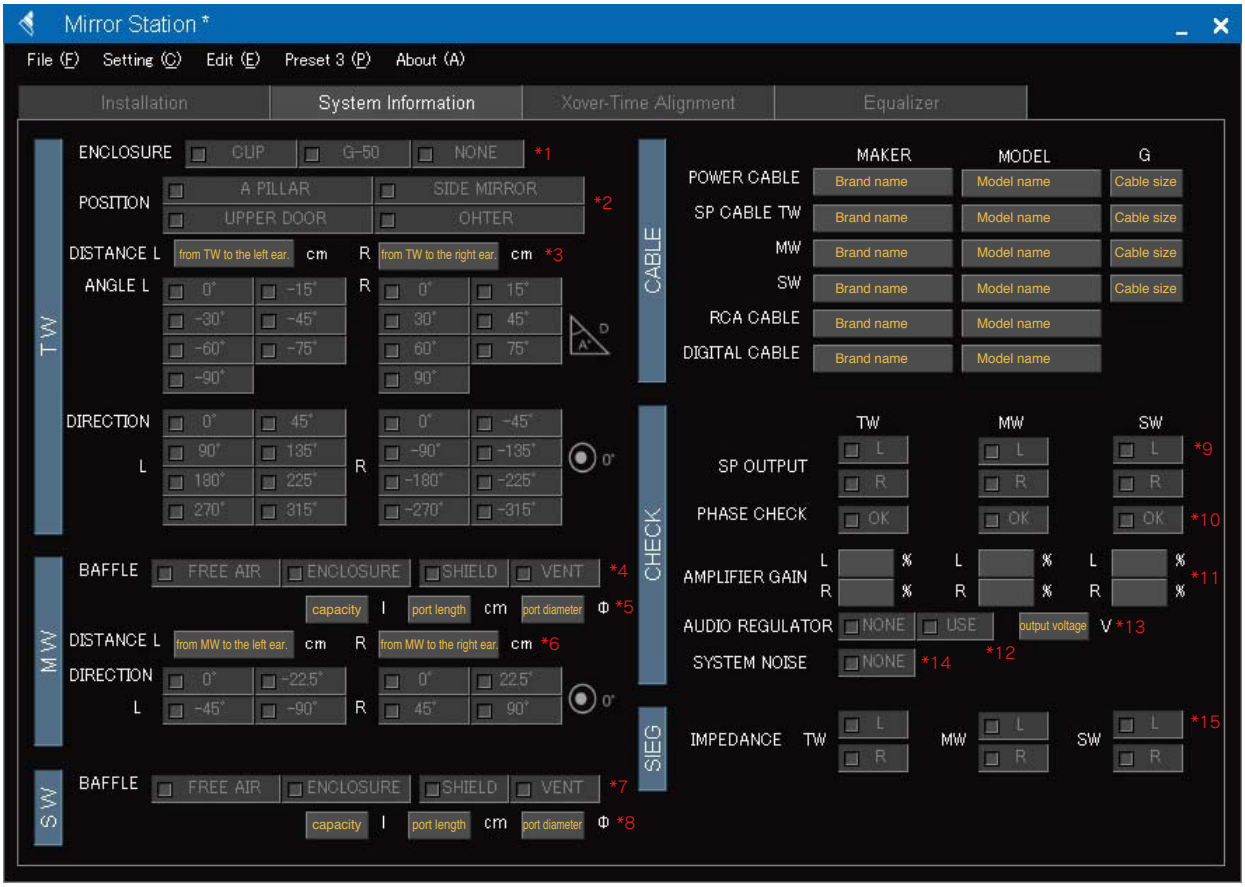
Not using

Using

*4

Load data of the Installationand the System Informationto Mirror Station.

System Information



*1 **TW/ENCLOSURE**：Choose the installation method.

CUP	Attached enclosure
G-50	G-50
NONE	Free air

*2 **TW/POSITION**：Choose the installation location.

*3 **MW/DISTANCE**：Input the distance between the TW and the ears (L: Left, R: Right).

*4 **MW/BAFFLE**：Choose the installation methodfrom Free air or Enclosure.
With the Enclosure, choose Sealed type or Bass-reflex type.

*5 **MW/BAFFLE/ENCLOSURE**
：Input a , port length, and port diameter of the enclosure. (With the sealed enclosure, input only a capacity.)

*6 **MW/DISTANCE**：Input the distance between the MW and the ears (L: Left, R: Right).

*7 **SW/BAFFLE**：Choose the installation method from Free air or Enclosure.
With the Enclosure, choose Sealed type or Bass-reflex type.

*8 **SW/BAFFLE/ENCLOSURE**
：Input a , port length, and port diameter of the enclosure. (With the sealed enclosure, input only a capacity.)

*9 **SP OUTPUT**：With SP OUTPUT, click each unit's box which succeeded in the output test.

*10 **PHASE CHECK**：With PHASE CHECK, click each unit's box which succeeded in the phase test.

*11 **AMPLIFIER GAIN**：Input the gain levels of the amplifier's channels.

*12 **AUDIO REGULATOR**：Click "USE" when using an audio regulator. Click "NONE" when not using an audio regulator.

*13 Input the which is set for the audio regulator.

*14 **SYSTEM NOISE**：Click "NONE" when no noise is detected.

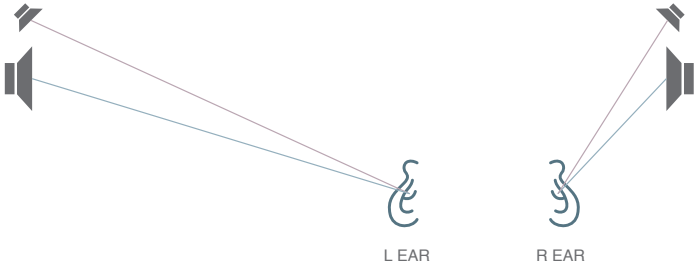
*15 **IMPEDANCE**：Click each unit's box which succeeded in the impedance measurement by SIEG.

■ Speaker installation chart - System Information -

〈 DISTANCE 〉

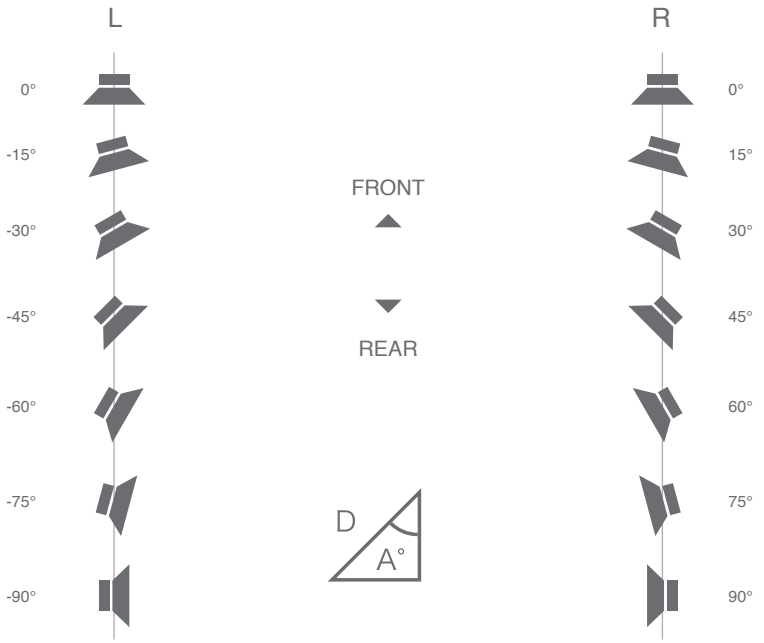
TW

MW



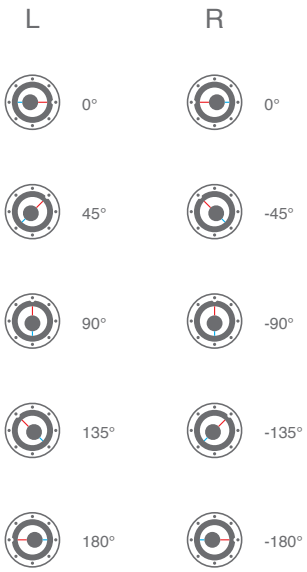
〈 ANGLE 〉

TW



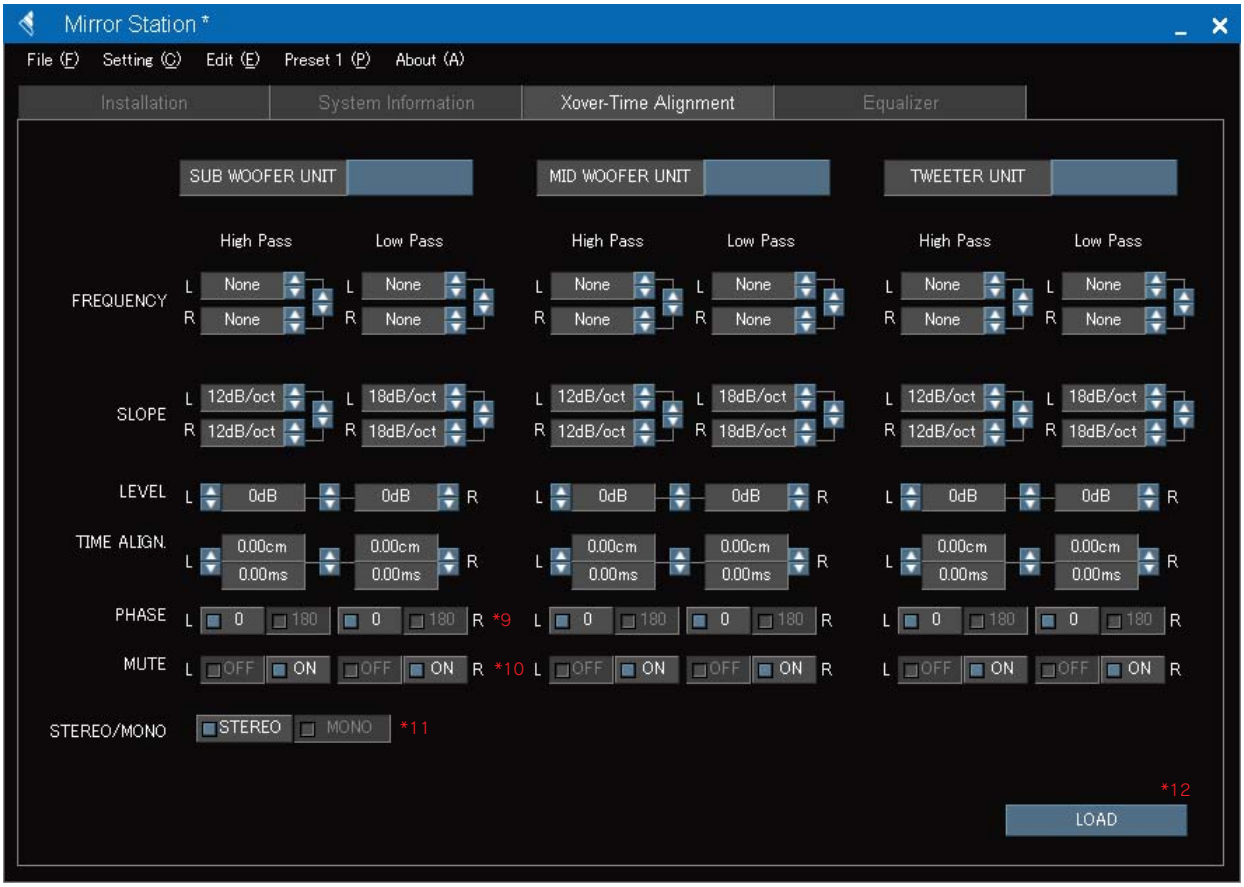
〈 DIRECTION 〉

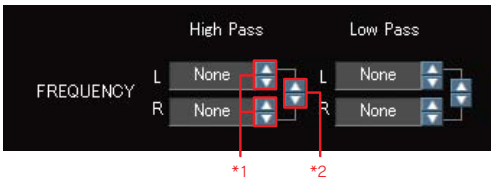
TW



MW

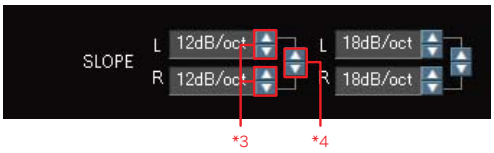
Xover-Time Alignment





*1 Choose the Cut-o? frequency for each L and R of High and Low Pass.

*2 Choose the Cut-o? frequency for High and Low Pass.



*3 Choose the Cut-o? slope for each L and R of High and Low Pass.

*4 Choose the Cut-o? slope for High and Low Pass.

*5 Choose the level for each L and R.

*6 Choose the level.

*7 Choose the distance between the unit and an ear for each L and R.

*8 Choose both L and R distances between the unit and ear.

*9 PHASE : Change over the phase.

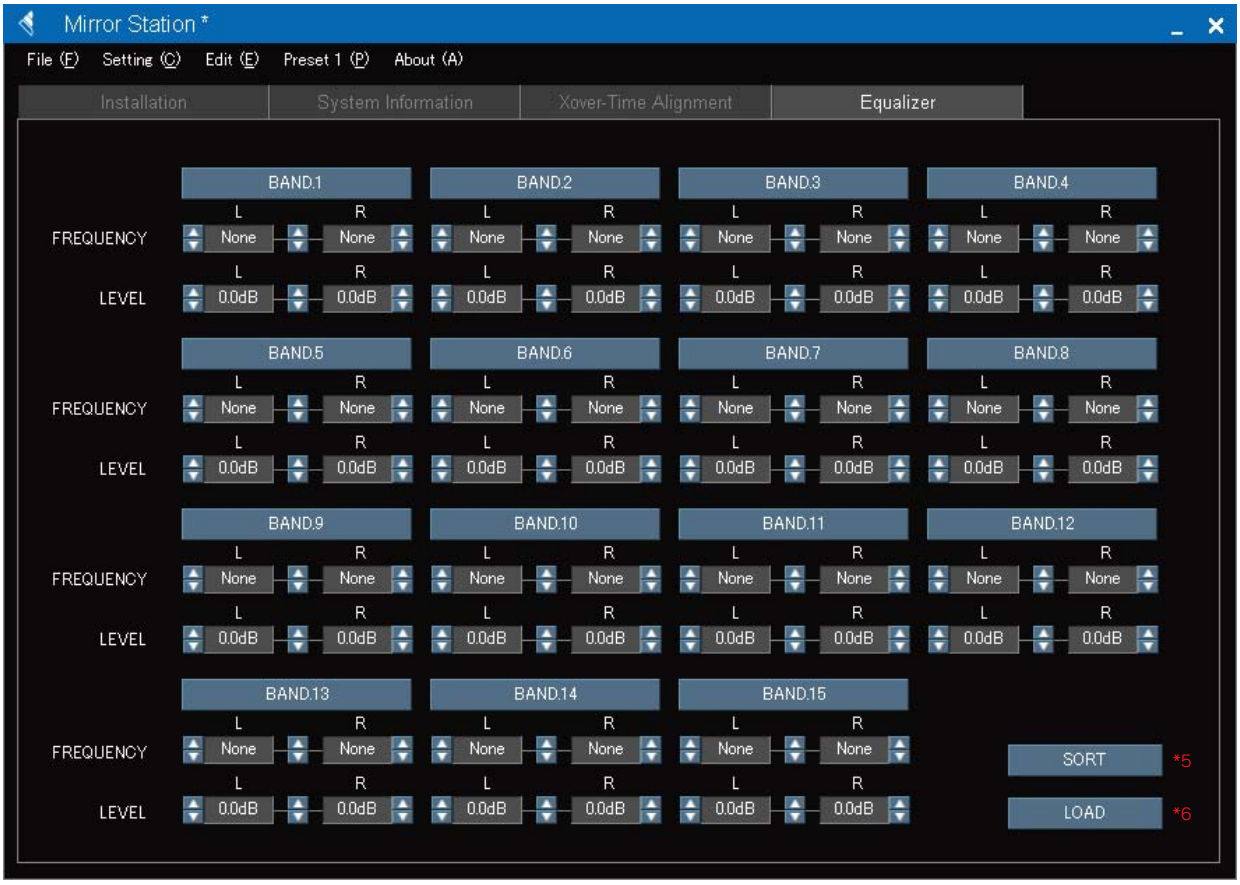
*10 MUTE : Mute on/off

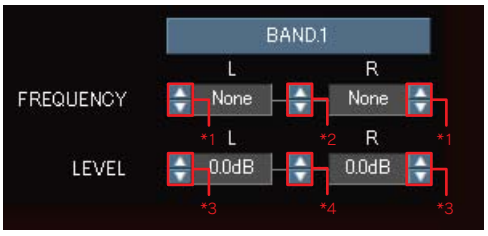
*11 STEREO/MONO : STEREO Stereo output

MONO Monaural output

*12 LOAD : Loads the Xover-Time Alignment data which are set up on the computer to the Mirror Station.

Equalizer





*1 Choose the equalizing frequency for each L and R.

*2 Choose the equalizing frequency.

*3 Choose the equalizing level for each L and R.

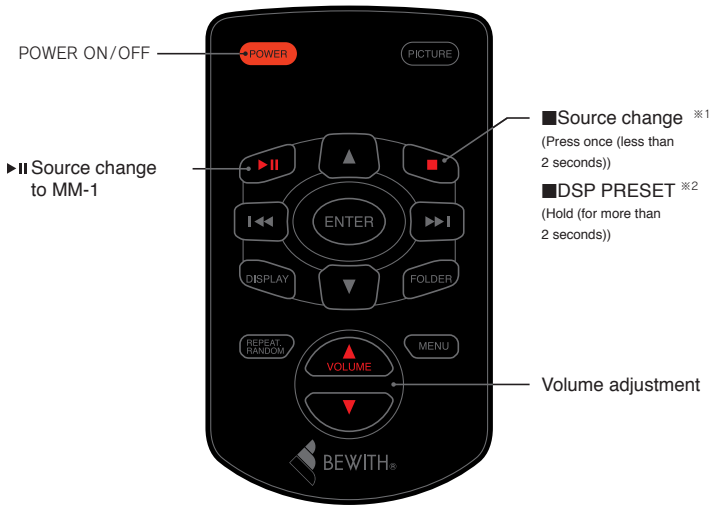
*4 Choose the equalizing level.

*5 **SORT** : Sort the set frequency points into ascending order.

*6 **LOAD** : Loads the Equalizer data which are set up on the computer to the Mirror Station.

Mirror Station® remote control

■ Instruction manual for Remote Control



※1 ●Press STOP botton (less than 2 seconds) for source change mode.

●The order of source change is as follows.

MM1 → OPT → COAX → LINE → MINI → MM1·····

●The change is effective 2 seconds after the selection.

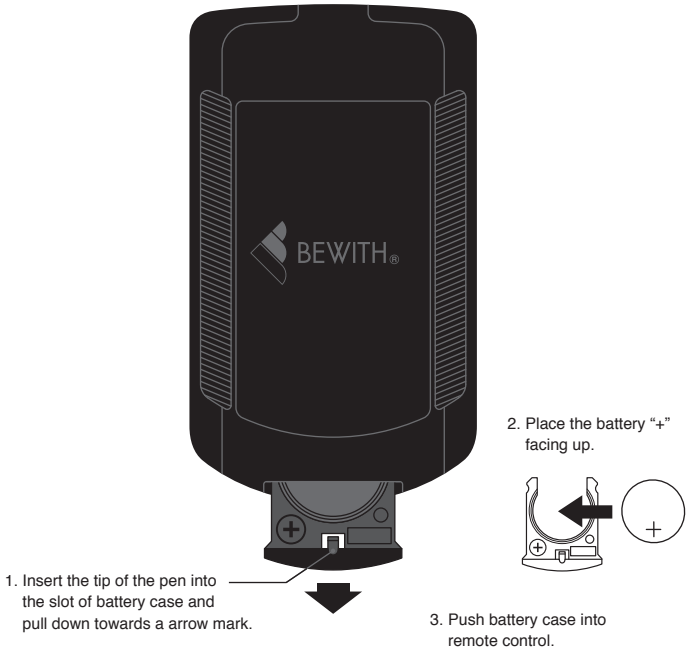
●Hold STOP botton (more than 2 seconds) for DSP PRESET mode.

※2 ●The order of PRESET change is as follows.

PRESET1 → PRESET2 → PRESET3 → PRESET4 → PRESET5 → PRESET1·····

●The change is effective 2 seconds after the selection.

■ Replacement of battery / Handling of Remote Control



●Do not expose remote control to direct sunlight or high temperature.

●Face the remote sensor toward AZ-1's remote sensor window for control.

●Direct sunlight will not enable the remote control to work properly.

●Do not charge remote control battery. It may cause the battery fluid discharge.

●If battery fluid discharges, clean the battery fluid and replace a new battery.

●Replace the battery to a new battery when the remote control is ineffective.

●We are not responsible for any loss of setup data or damages of equipment that may occur from improper use or installation.

※ The battery is not covered by warranty.
Please use a coin cell battery(CR2025) for replacement.

Troubleshooting

Troubleshooting

■MM-1

症　　状	原　　因	処　　置
No sound of OPT Out from MM-1.	POSITION setting is not D.	Select D from the POSTION in the menu.
No picture from AV of the Picture In.	No (-) signal input to the PARKING on the Smart Interface.	Connect (-) signal input cable to the PARKING.
	Input is in CAMERA of the Picture In instead of AV.	Connect the input to AV correctly.
The picture is unclear or distorted.	There is a noise on the AV line.	Make sure the cable is connected correctly.
		Replace with a good quality cable.
Noise in Line output signal (analog)	Noise on the LINE output cable.	Make sure the cable is connected correctly.
No sound of LINE or OPT Out from auxiliary inputs.	POSITION setting is not correct.	Select the position correctly.
	Switch is not connected to REM-IN of Smart Interface.	Connect the switch correctly.
No sound (Power is on).	Proper music files are not downloaded on CF.	Refer to the MM-1 Owner's manual for downloading the music files to the CF.
	POSITION setting is not correct.	Select the position correctly.

■Mirror Station＋MM-1

症　　状	原　　因	処　　置
VOL display of Mirror Station is not shown on MM-1.	No (-) signal is into the PARKING of Smart Interface.	Connect (-) signal cable to the PARKING.
	Power of the AZ is off.	Turn on the power by a remote control.
	The AV Out of AZ and the AV In of Smart Interface are not connected properly.	Make sure the wiring is connected properly.
Audio reproduces later than the picture when connecting DVD.	Because AZ process enormous data, the audio reproduces late. Make the crossover slope of each channel gradual.	Select None for subwoofer's hi-pass, -18dB for subwoofer's low-pass, -12dB for other channels' hi-pass, and -18dB for other channels' low-pass.
No sound from Mirror Station (MM-1 plays but no sound)	POSITION setting of MM-1 is not D.	Select D from the POSTION in the menu.
	OPT In is not connected properly.	Make sure the cable is connected correctly.
	MM-1 is not selected as the input source of AZ.	Select MM-1 for the input source.
	Digital cable is defective.	Unplug the digital cable and make sure of the OPT signal output.
	MUTE is set to each channel.	Cancel the MUTE settings. (All the channels are MUTE at initial setting.)
Power of Mirror Station does not turn on.	Wirings of +B, GND, and Remote In are not connected properly.	Make sure of the wiring.
	Enough power supply is not provided.	Take the +B line from different source.
	Remote Eye is installed to where it cannot detect the signal.	Reconsider the place to install the Remote Eye.
	Remote Eye is not connected properly.	Make sure of the Remote Eye connection.
2 VOL displays show on MM-1.	POSITION setting of MM-1 is not D.	Select D from the POSTION in the menu.
Remote signal of AZ is not output.	Remote Out of AZ outputs only when the input source is LINE or MINI.	This Remote Out of AZ is used only when using High Level Input of Smart Interface.
No picture	AV input and output of AZ are not connected properly.	Make sure the cable is connected correctly.
	No (-) signal is into the PARKING of Smart Interface.	Connect (-) signal cable to the PARKING.
Vol level of Mirror Station does not rise.	Remote Eye is not connected properly.	Make sure of the Remote Eye connection.
	Remote Eye is installed to where it cannot detect the signal.	Reconsider the place to install the Remote Eye.
	The battery of remote control is discharged.	Replace the battery.
Software fails to work.	The software is not installed properly.	Reinstall the software.
	USB cable is not connected properly.	Make sure the cable connection.
	Port is not selected properly.	Select a port at the Setting.