

Mirror Station Adjustment Manual

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.

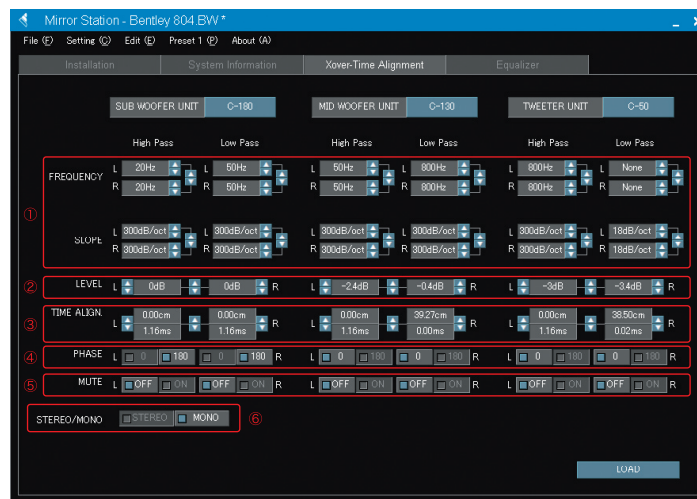
BEWITH's SIEG - Car Audio Analyzer measures the impedance characteristic and in-vehicle transmission frequency characteristic of the speakers easily and accurately. This is indispensable for the dealers to bring out the potential of the speaker units.

Also, referring the measurement result of SIEG results in an appropriate adjustment of BEWITH's DA converter with digital processor AZ-1 and AZ-2 in a short time.

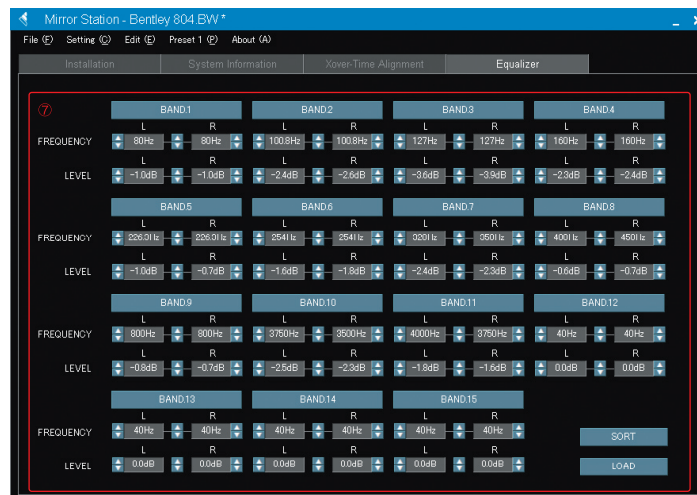
Adjustment items of Mirror Station

Settings of Mirror Station are as follows.

- ① **Crossover setting between the units** : capable of adjusting L and R individually
Cut-off frequency : choose 53 points from 10 to 20 kHz or none
Slope : choose from 6 of -12 to -300 dB/oct.
- ② **Level adjustment** : adjusted at every 0.1 dB step from 0 to -24 dB
- ③ **Time alignment** : 0 to about 5m (0 to 14.70msec), at 0.77cm step (0.22msec step)
- ④ **Phase setting** : 0° or 180°...change the phase in each unit
- ⑤ **Mute** : set in each unit
- ⑥ **STEREO/MONO setting of Subwoofer**



- ⑦ **Equalizer** : choose 15 from 59 bands in 40 to 20 kHz
 At every 0.1 dB step from 0 to -12 dB capable of adjusting L and R individually



The adjustment of Mirror Station

1. Preparation of Mirror Station

[Necessary equipments]

- PC for adjustment
- 2 USB cables (for the connection to SIEG and to Mirror Station)
- Audio source (a standard signal: 1 kHz 0 dB, Pink noise)
- Voltmeter
- Oscilloscope

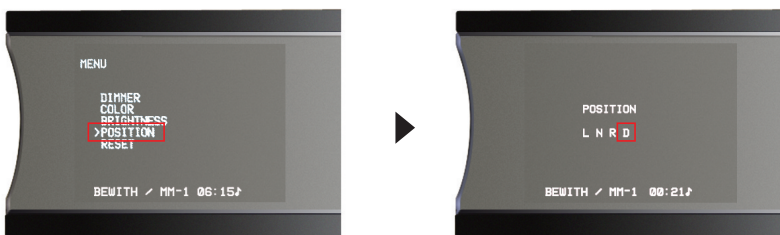
[Preparation]

- Adjust the seat and set the listening position.
- Pull the USB cable connected to the Mirror Station up to the front seat.
- The audio source should be stopped or pull the CF out from MM-1 (for protection of the speakers).
- Check the display of the MM-1 for preset number, input source, and volume.

The display of the preset number and the input source will disappear after a while.

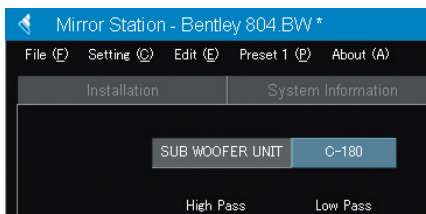


- Set the MM-1 to “D” (digital output) at [POSITION] setting in [MENU].



- Load “Mirror Station” program on your PC and connect the USB cable. Refer to the manual for the installation of the software and drive, or connection method. Choose a Serial port at [Port] setting of [Setting] menu. When it is connected properly, 2 COM cables are displayed. Choose one that has larger number. Now it is ready to use.

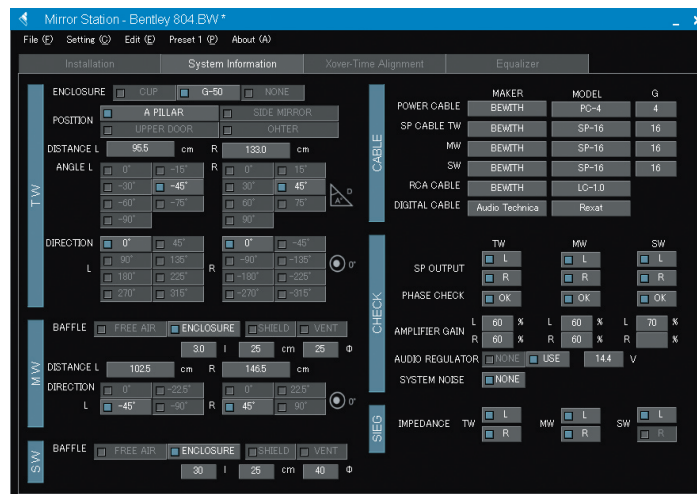
※Please refer to the manual for operating the equipment and software.



2. Input of installation information

Click [Installation] and [System Information] to input each item. You can also input data before or after the adjustment because it does not affect directly to the adjustment.

Because the customer data is very important for the communication between the customers and the dealers, and also between the dealers and us, we recommend that you input and save specific data of the customers.



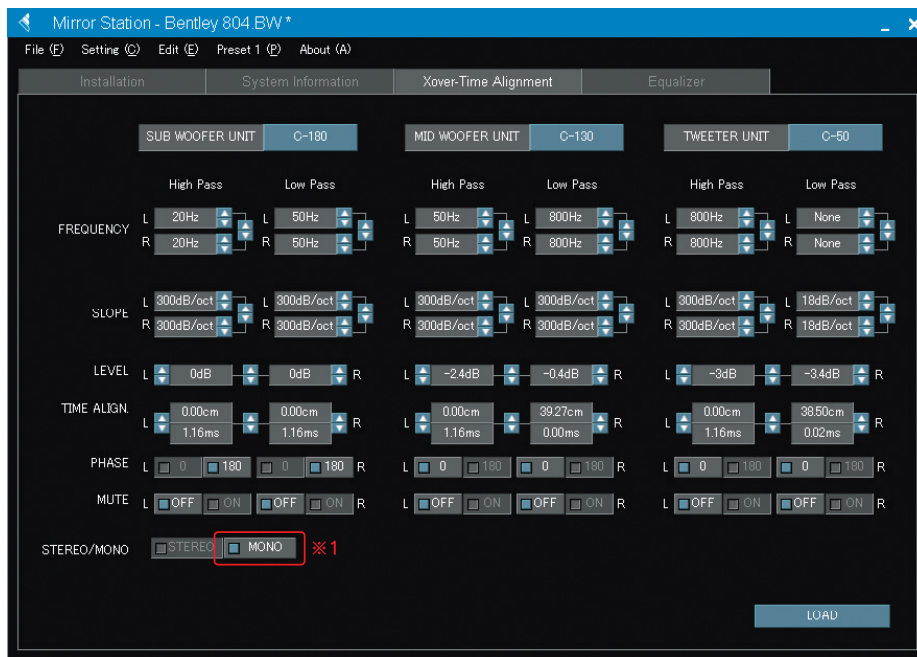
※1. Click yes at [MM-1] in [Installation] menu for synchronizing the power on to both MM-1 and Mirror Station. In this case, click [Load System Settings] for loading data to Mirror Station. Otherwise, the setting would not be changed. Also, wiring the [Remote Out] of the MM-1 Smart Interface to the [Remote In] of the Mirror Station is necessary.

※2. If an error comes up when clicking [Load System Settings] or [LOAD], the right [Port] has not been selected. Please make sure the wiring is correct and Mirror Station is powered on and select the right port.

3. Xover Frequency Setting

After making sure the CF is pulled out, turn on everything again and click [Xover-Time Alignment]. Choose appropriate slope value that is close to frequency slope value recommended for the speaker unit. Left and Right channels usually have the same value.

At STEREO/MONO setting, click [STEREO] for 1 SW, and click [MONO] for 2 SWs. After inputting the information, click [LOAD] to load data to the Mirror Station.



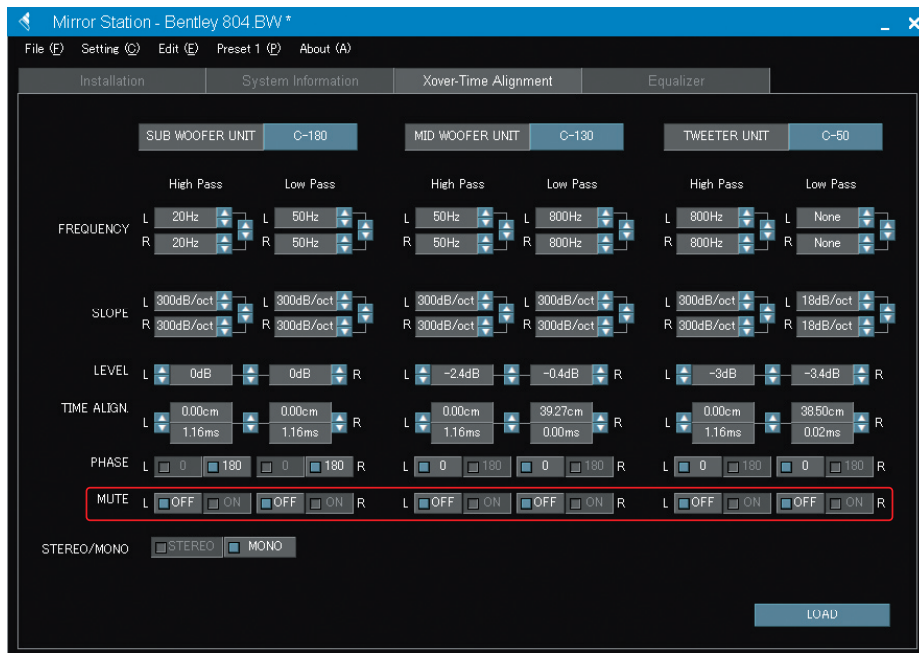
*Caution! Please make sure of High Pass frequency setting for TW. Inputting too low frequency sound to TW may cause damage of the speaker unit depending on the volume.

※1 When setting SW to [MONO], left and right channels of SW outputs the same signal. When using both outputs of left and right channels for the bridge wiring of one SW, it is necessary to adjust both channels even if it is set to [MONO].

4. Confirming the connection

Confirm all 6 channels (L and R for each TW, MW, and SW) of amplifier and the speakers are connected properly.

Turn the Mirror Station's volume down enough. Click [OFF] at all the MUTE except one channel. Play pink noise or some music and turn the volume up gradually. Make sure the sound comes out from the corresponded speaker. Next, click [ON] of the MUTE and click [OFF] of one of other channels. Check the sound of the speaker and repeat the check on all other channels. Also, noise check is necessary on each channel.

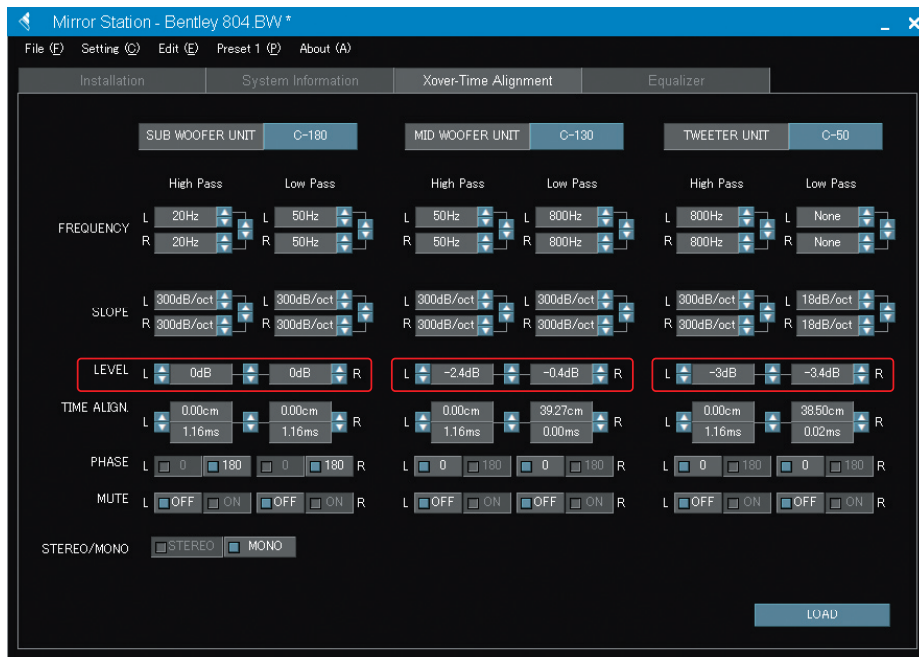


*Please follow the instruction shown below for protecting the speakers when reproducing the sound.

- (1) Pull out the CF before turning on the power.
- (2) Confirm the volume is set low and the MUTE is on before inserting the CF.
- (3) Reproduce the sound source and turn the volume up gradually.

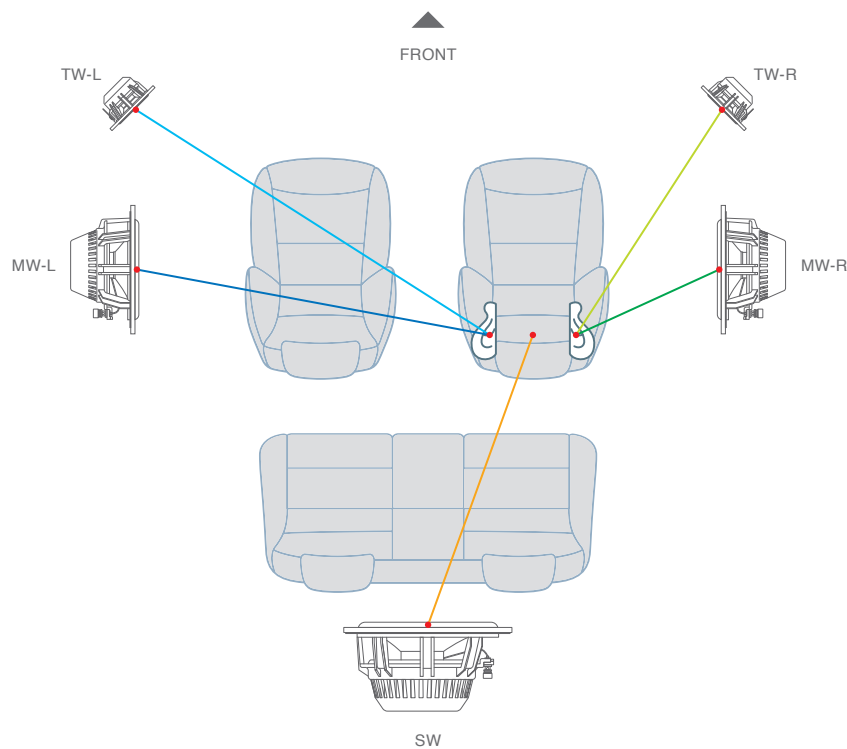
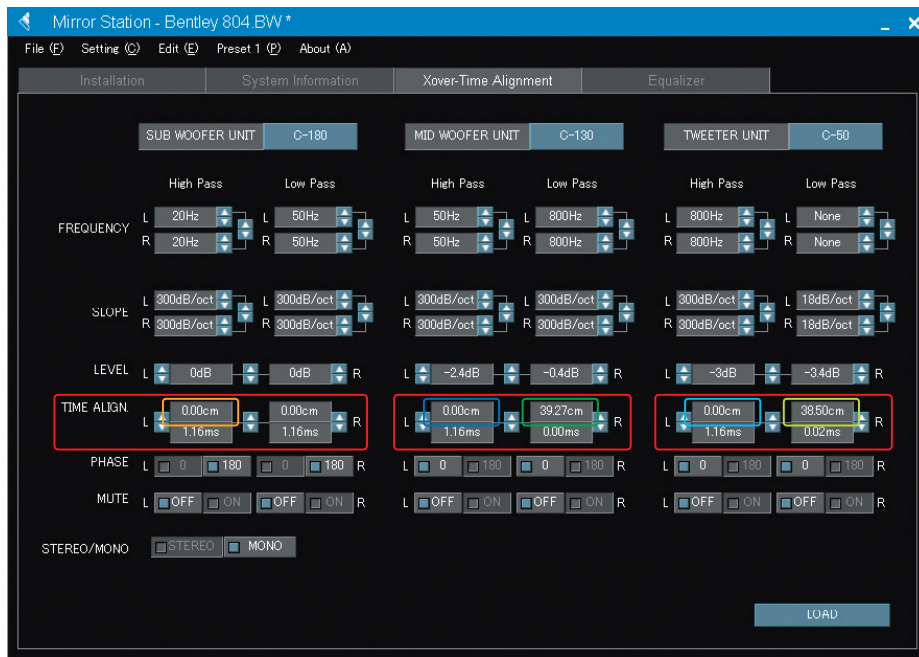
5. Adjustment of Level balance

Click [OFF] of all channels MUTE and play music. Adjust the level balances of the TW, MW, and SW. In this case, set the volumes of left and right channels the same.



6. Adjustment of Time alignment

Measure the distance to each unit. Choose a near numerical value at every 0.77cm steps in [TIME ALIGN.]. The distance should be measured from the left speaker unit to left ear, the right speaker unit to right ear. When using only one SW, measure the distance from SW to the center of your head.

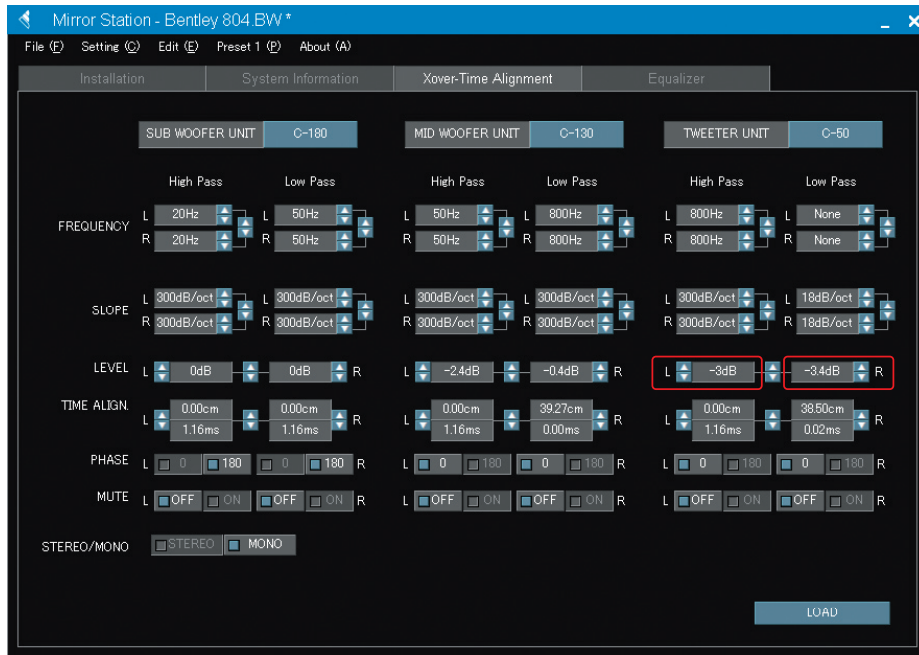


7. Precise adjustment of left and right level

Adjust the level between left and right speaker unit to localize the sound image in front.

First, click [OFF] of both TW's L and R at the MUTE. Play music and cut down the level of the channel which has larger level than the other. Adjust both levels equally by listening and adjust MW and SW as well.

Next, play music with all the channels and adjust whole balance.



8. Adjustment of Equalizer

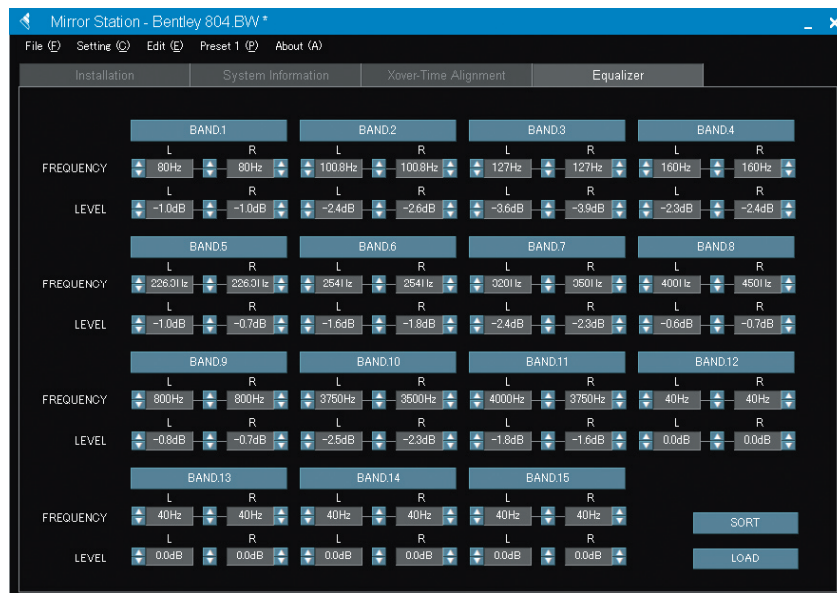
For accurate equalizer adjustment, measure in-vehicle acoustic characteristic by SIEG and refer the result.

Set up the microphone at the listening point (near the ear) and carry out the FFT analysis of reproduced pink noise. Because the pink noise originally has the characteristic of -3dB/oct. , it is sure to become a straight line that declines to the right in the graph where the frequency was shown with the logarithm scale of a horizontal axis. (It is about -30dB in between 20 Hz to 20 kHz .) However, in fact, it would have many peaks and dips because of the in-vehicle and equipment's acoustic characteristic and the condition of installation.



Therefore, search peaks of the frequency band from the result of the FFT analysis, and control them to obtain flat frequency response.

Click [Equalizer] and display equalizer setting menu. Choose the frequency band with the peak and input the level you wish to lower it. Also, click [LOAD] to load data to the Mirror Station.

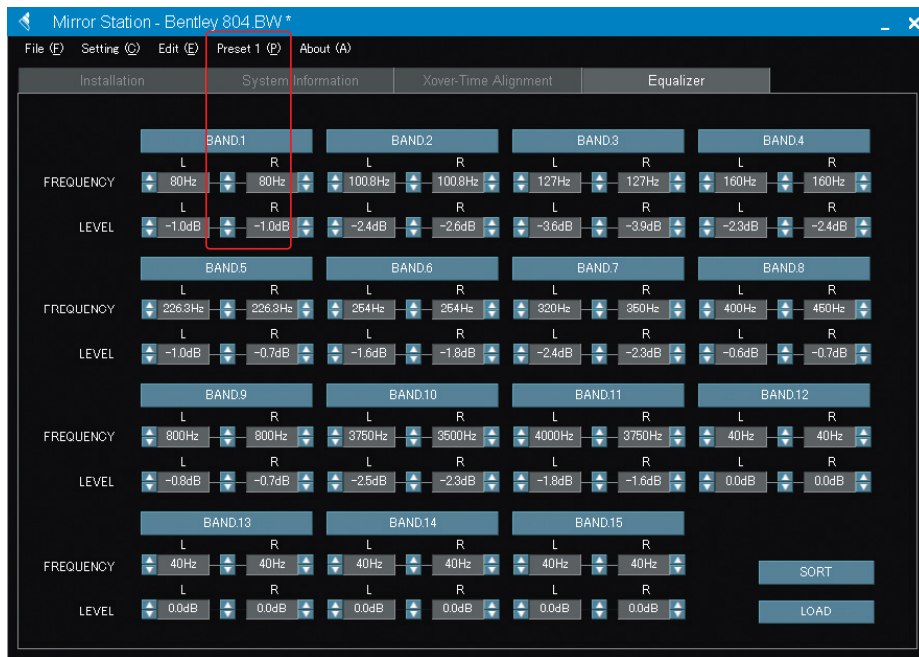


8. Adjustment of Equalizer

Repeat the equalizer setting and the measurement by SIEG. After that, readjust the level balance between TW, MW, and SW by playing music.

The Mirror Station is capable of memorizing 5 settings as preset 1 to 5. Save those results and readjust according to the music the customer prefers. ※1※2

When the adjustment is done, save the data to your computer from the Save menu in the File.



※1. Data of "Xover-Time Alignment" and "Equalizer" can be copied and pasted to other Presets by using "Preset Copy" and "Preset Paste" of "Edit" menu. As a result, the work of the input can be reduced.

※2. As it is mentioned before, the Mirror Station can memorize 5 different data. You also can save as many data as you want by creating new files of software on your PC. The results of the measurement and FFT analysis of SIEG are very important data for more advanced and precise adjustment and save much work hours.