GROUND ZERO

GERMAN ENGINEERING

DSP SERIES
Digital Signal Processor

Owner´s manual

GZDSP 6-8X PRO

Feature list

- 8-channel digital signal processor (DSP) - Cirrus Logic 32-bit/192 kHz single core chipset
- 6-channel line input (RCA)
- 6-channel high-level input (with auto-on function and audio summing)
- AUX input (3.5 mm socket)
- Optical and coaxial digital input (sampling rate up to 24-bit/192 kHz)
- 8-channel line output (RCA)
- Simple handling user interface (Windows ® compatible)
- Realtime setup of all functions (via PC)
- Channel separated parametric equalizer (6x 31 band / 2x 11band)
- Channel separated time alignment (0-15 ms / 0-510 cm)
- Adjustable crossover (HPF / LPF / BPF) in the range of 20 Hz to 20 kHz
- Selectable crossover slope (6 to 48 dB/Oct)
- Selectable phase shift for each channel (0° or 180°)
- Adjustable filters (Butterworth) HPF / LPF / BPF with a slope of 6 – 48 dB/Oct.
- Selectable phase shift on each channel (0° or 180°)
- Memory for 10 user presets

Product description

The GZDSP 6-8X PRO is a digital signal processor increasing the sound quality of the vehicle´s audio equipment. Based on the 32-bit DSP processor in combination with a 24-bit AD and DA converter. Due to its audio summing function combining 6 high-level channels and 31-band equalizing on each channel (11-bands on the subwoofer channels), the GZDSP 6-8X PRO can be integrated into almost every OEM sound system even with OEM DSP.
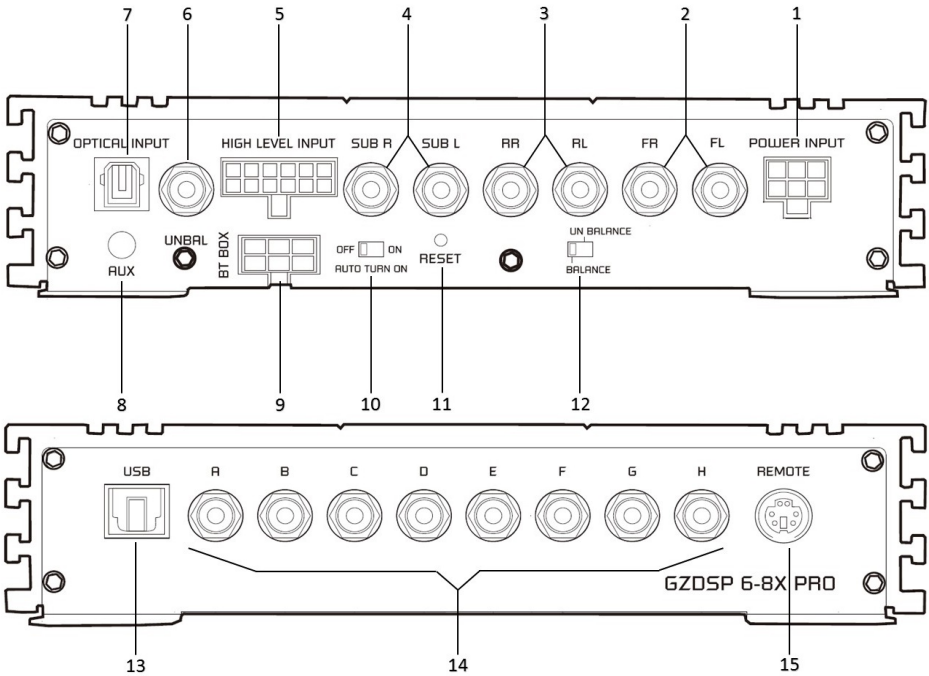
Table of contents

Package contents

- 1 x GZDSP 6-8X PRO unit
- 1 x USB cable (A to B connector / 5.0 m)
- 1 x 6-channel high-level input harness
- 1 x Power supply harness
- 1 x CD-ROM incl. PC software and driver package
  compatible to Microsoft Windows® XP SP3, Vista, 7, 8, 8.1 und 10
- 1 x Owner´s manual (German/English)
- 1 x Fastening kit

  Optionally available:
- Remote control unit GZDSP REMOTE PRO
- Remote control unit GZDSP TOUCH REMOTE
- Streaming interface GZDSP BT-BOX

- As a precaution, it is recommended to disconnect the vehicles battery before mounting the amplifier. (Note: For new vehicles, disconnecting the battery might cause various errors in your vehicle´s electric system that can be cleared only by authorized service partners of your vehicle´s manufacturer! Please ask your service partner first before disconnecting the battery!)

- The power supply wire (+12 V) has to be protected within max. 20 cm / 8" by a main fuse holder with a fuse value matching the recommendation for your amplifier
  (Note: If there is more than one amplifier connected using this power wire, the main fuse value must be equal to the sum of the recommended fuses of all connected devices. However, make sure the diameter of your power wire will be enough for the required current!)

- If necessary, replace a defective fuse by a fuse with identical quality and value

- Never drill a hole to the vehicle´s gas tank or brake lines, to wirings or any other important vehicle parts!

- Never pass wires over sharp edges or vehicle parts due avoid any kind of damage

- Keep the wiring away from the antenna and electronic devices contributing to radio reception

- Lay the power supply wiring always separated from speaker wiring to avoid disturbance

- The amplifier contains a temperature protection circuit that turns the device off in case of overheating. After a certain cooling time, it will turn on automatically. To avoid heat build-up, sufficient air supply for cooling must be provided. Never cover the surface of the amplifier´s heatsink entirely

- The DSP unit should **NEVER** be mounted onto a vibrating part or surface such as a subwoofer enclosure. This might lead to malfunction due to loosened electrical parts inside the amplifier.

- Some amplifiers offer a high-level input option, however if a pre-amplified output (RCA) is available (at the head unit), it is strongly recommended to make use of them.

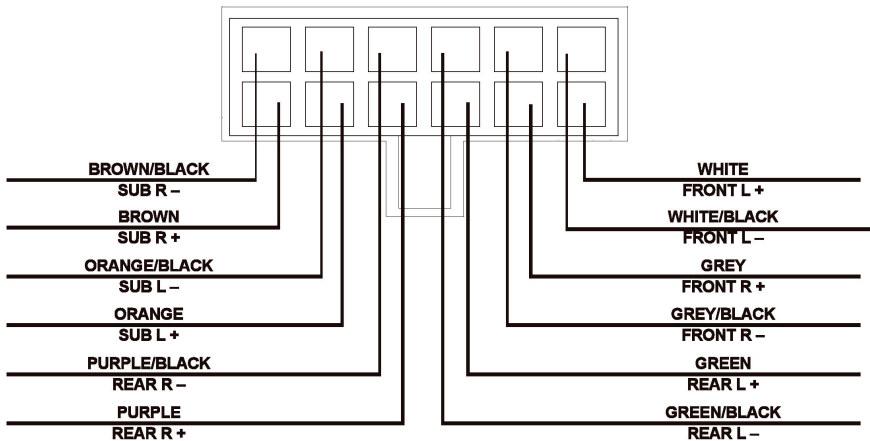| 1	Power input	To connect the power wire and remote input and output cable. Check the pinout below
2	Front input	To connect the pre-amplified head-unit front output (RCA) audio signal
3	Rear input	To connect the pre-amplified head-unit rear output (RCA) audio signal (if available)
4	Subwoofer input	To connect the pre-amplified head-unit subwoofer output (RCA) audio signal (if available)
5	High-Level input	The high-level input can be used if there´s no pre-amplified output available. To connect the head-unit´s speaker output wires directly. The high-level input offers auto-on function recognizing the DC level. No remote input wire required. Set the auto-on switch to "ON" **Caution: The high-level input and the line input cannot be used simultaneously. This may lead to malfunction and cause serious damage to the DSP unit**
6	Coaxial input* (DSD input)	To connect audio sources offering a coaxial digital signal (Stereo PCM). Select DSD as audio source at the Windows software or using GZDSP Touch Remote to use the coaxial input. (The coaxial digital input cannot be selected using GZDSP Remote Pro)
7	Optical input* (SP/DIF input)	To connect audio sources offering an optical signal (Stereo PCM) Select SP/DIF as audio source at the Windows software or select OPT input using GZDSP Touch Remote or GZDSP Remote Pro to use the optical input
8	Auxiliary input	To connect an additional source unit (source can be selected using one of the optionally available remote-control units GZDSP REMOTE PRO or GZDSP TOUCH REMOTE
9	BT-BOX connector	To connect the optionally available music streaming interface GZDSP BT-BOX
10	Auto-On switch	To select the auto-on mode if no remote input wire is required or available
11	Reset function	To reset the unit to factory setting in case of any malfunction or misbehavior
12	Input mode switch	To select between balanced or un-balanced input signal
13	USB connector	To connect the included USB wire to the Windows PC´s USB port
14	RCA output	Line output for amplifier(s) providing an adjustable audio signal using the PC software
15	Remote connector	To connect one of the optionally available remote control units

Power supply harness

Black	GND	Connect the unit to a suitable ground terminal. The ground wire should be as short as possible and be mounted to an unvarnished metal part
Red	+ 12 V	Connect the unit to the positive pole (+) of the vehicle´s battery. Use adequate wiring gauge (not less than 1.0 mm² / 17 AWG) with an additional fuse holder (2 A fuse) not further than 30 cm / 12" away from the terminal of the battery
Blue wire	Remote input	Connect the head-unit´s remote out wire (REM) if available and set the auto-on switch to "OFF". Using the high-level input, the DSP unit turns on automatically when DC-On voltage is recognized and there´s no remote wire required – switch set to "ON". Some head-units however, may not be capable to send the DC signal. This requires a remote wire connection and the switch must be set to "OFF"
Blue/ White	Remote output	To be used with additional system equipment like amplifiers. If connected to the amplifier´s remote input terminal, the amplifier turns on or off together with the DSP unit. The current is limited to 500 mA

High-level connector pinout

BROWN/BLACK — SUB R –	WHITE — FRONT L +
BROWN — SUB R +	WHITE/BLACK — FRONT L –
ORANGE/BLACK — SUB L –	GREY — FRONT R +
ORANGE — SUB L +	GREY/BLACK — FRONT R –
PURPLE/BLACK — REAR R –	GREEN — REAR L +
PURPLE — REAR R +	GREEN/BLACK — REAR L –

PC software installation

The PC software is compatible* to Windows™ XP (SP3) operating systems (or later). One USB port and 25 MB free memory space is required for the installation. The files are located on the included CD-ROM. If there is no CD drive available, the software can be downloaded from the Ground Zero web page:

www.ground-zero-audio.com

* compatible operating systems: Microsoft Windows® XP SP3 / Vista / 7 / 8 / 8.1 / 10
  PC requirements: min. 1.5 GHz processor with 1 GB main memory (RAM) and graphic cards
       with a resolution of 1024x600 pixels or more

Run the **setup.exe** file. The installation wizard will install the GUI software for the DSP on the PC system. The driver will be installed by clicking INSTALL at the appearing window. Restart the PC after the installation has been finished.

Important note:
We strictly recommend using the latest DSP software available from the web page for GZDSP 6-8X PRO

USB connection (cable included)
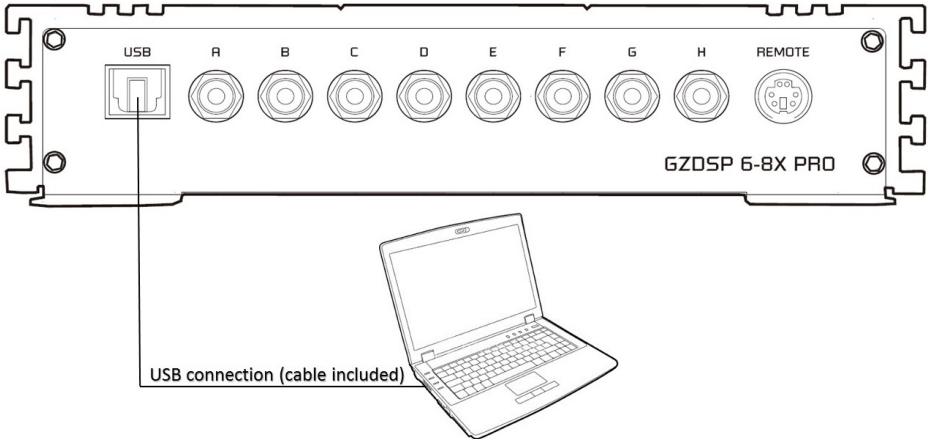
USB connection: We don´t recommend using any passive extension cable together with the included USB wire, as the proper function can´t be ensured.

DSP setting: The GZDSP 6-8X PRO must be connected to a PC with the DSP software installed using the included USB wire. To adjust any setting the amplifier must be in operation mode. Double click on the software icon or select from the software list to start. The program starting window appears.

Windows® user account control (UAC): In case the PC operating system is set to restricted security clearance regarding software with unknown source or without digital signature a window will appear each time at the program is starting. Please confirm with >Yes< (language depends on your local setting) to run the program.

Setup note: The first time the GZDSP 6-8X PRO is turned on <u>and</u> the software is started there is no audio signal on the output channels (RCA) available unless each channel has been adjusted.
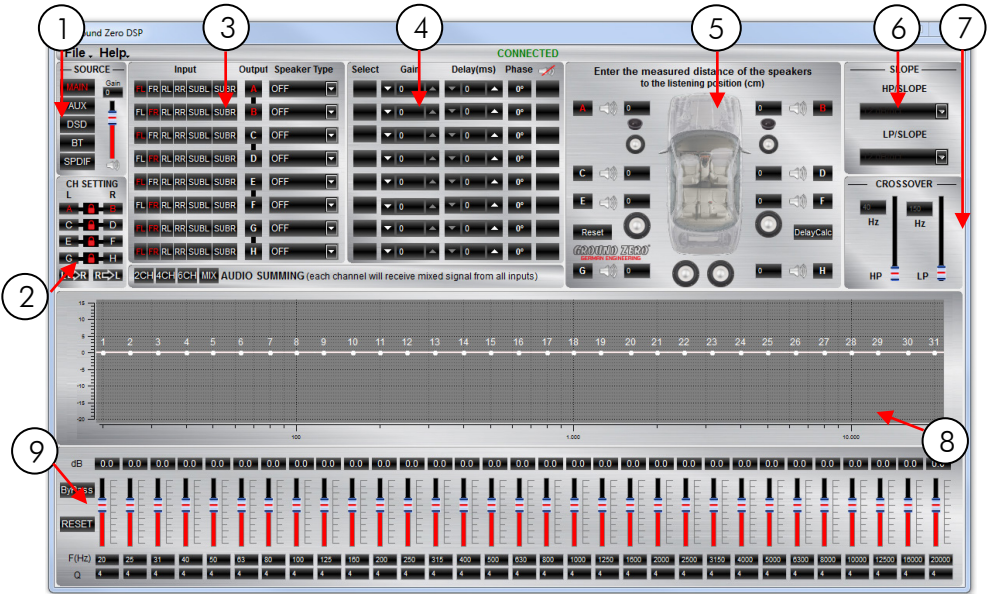
Demo Mode (offline mode): The software can be used in offline mode without having the GZDSP 6-8X PRO connected to the PC to become familiar with most of the features and to create sample setups. Select >Yes< when the start window appears.
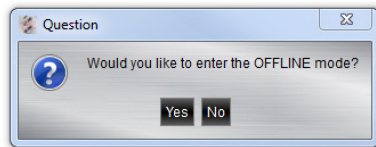
USB connection and COM port / Windows device manager

In order to use the software, the GZDSP 6-8X PRO must establish a communication to the PC. Therefore, an unused USB port is required. During the connection of the USB cable the system will assign automatically a USB port. To avoid misbehavior during the communication, it´s recommended to select a COM port number between 1 and 9. The assigned COM port number can be checked at the system´s device manager. The GZDSP unit will appear as "USB-SERIAL CH 340" device (at the COM&LPT list). The COM port can be changed at the properties manually if necessary.

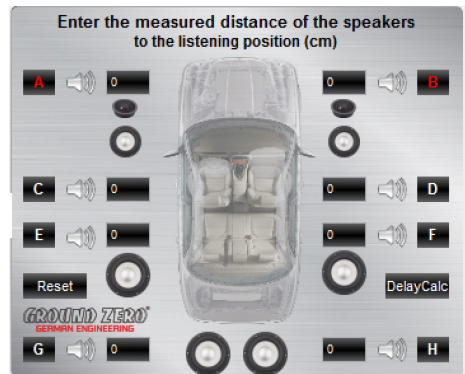|		
1	**Source selection**	**MAIN** - RCA input or high-level input **AUX** - 3.5 mm socket **DSD** - Coaxial input **BT** - Optionally available interface for wireless music streaming **SPDIF** - Optical input Level adjustment (-40 dB up to +12 dB) **Attention!** Set up the level carefully to avoid any kind of damage to the loudspeakers. Recommended value = 0 dB
2	**Channel setting**	At factory setting (two channels linked = lock is closed) the adjustments will affect both channels (crossover and equalizer). By clicking the locking symbol, the channels can be split to do adjustments for each channel separately. Using the copy buttons positioned below adjustments can be copied according the arrow symbols shown from one channel to the other.
3	**Input routing Channel selection Speaker setting**	**Input:** Select the input signal source by clicking the according channel. Red highlighted channels show the selected channels. At the factory setting the inputs 1 and 2 are used for each output channel. **Output:** Click on the channel (or pair of channels) to select for adjustments. **Predefined input:** Clicking one of the input buttons below selects a predefined input setting, automatically. The **MIX** function enables the audio summing of the 6 input channels. **Speaker Type**: Predefined output settings for connected loudspeakers There are several settings available: OFF – channel deactivated Fullrange – HP/LP/BP filters available - select the required filter (point 6) Tweeter – high pass filter 3000 Hz (12 dB/oct.) Midrange – bandpass filter 250 / 3000 Hz (12 dB/oct.) Kickwoofer – bandpass filter 80 / 250 Hz (12 dB/oct.) Subwoofer – bandpass filter 20 / 80 Hz (12 dB/oct.)

4	Gain setting Time alignment Phase control	**Select:** Click to highlight the channels creating a group for common adjustments. **Gain:** Level adjustment using the arrows up to required value (max=0) **Delay(ms):** Time alignment for each channel using the arrows. The value can be edited directly, as well. It´s recommended editing the real distance from the listening point to the according speaker prior to the adjustment of the **Delay(ms)** in detail **Phase:** Clicking the phase buttons inverts the channel´s phase **Mute:** Highlighting the function button mutes the channel
5	Speaker distance	**Editing the speaker distance for the time alignment:** Prior to the detailed setting of the time alignment (point 4), all measured distances of the connected speakers should be edited. Measure the exact distance between the listening position (head) to the center of the speaker. The according time alignment is continuously calculated automatically. The calculated alignment values can be adjusted in detail (check example below). The >Reset< function deletes the time alignment setting. Further adjustments remain unchanged.
6	Crossover slope	Prior to the filter selection it´s required to set a speaker type (point 3). In order to use both, the high pass and the low pass filter (bandpass configuration) select **Fullrange.** The according slope of the crossover can be set at the dropdown menu between 6 and 48 dB/oct. **Note:** The higher the value of the slope, the steeper the roll-off of the signal (reduction of the level)
7	Crossover setting	Use the sliders to adjust the crossover point between 20 and 20000 Hz. activate the crossover filter, first (point 6). The value can be edited directly, as well or be changed at the frequency chart by keeping the yellow or turquoise button clicked and moved to the desired frequency point at the chart
8	Frequency chart	The frequency chart shows the estimated response of the 31-band equalizer (point 9) and the crossover adjustments (point 7) of the selected channel (or pair of channels)
9	Equalizer	The level of each equalizer band can be adjusted to the desired dB value using the slider. Additionally, the Q of the filter can be selected. Use the arrow buttons or edit the value directly. By clicking >Bypass< the equalizer will be deactivated without deleting the setting. >Restore< activates the equalizer again. >Reset< deletes the equalizer setting

Time alignment setting (example)
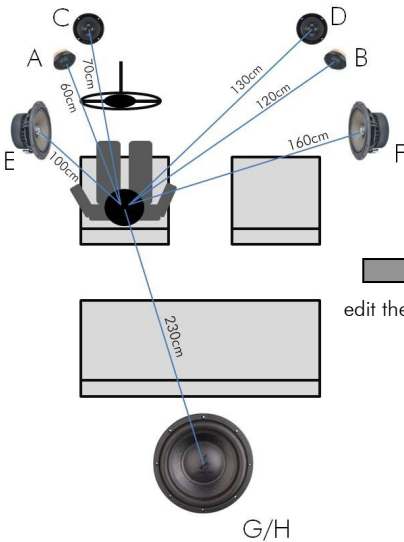
All measured distances (cm) must be added to the graphic. The according alignment values will be continuously calculated and transferred to the **Delay(ms)** list to be adjusted in detail if necessary.

edit the distances

File dropdown menu

|	
Open	To open a setup file that has been saved previously to the PC
Save*	To save the current setup as a file to the PC
Save as*	To save the current setup as a file with a certain file name
Factory Setting	To set the unit to default settings
Remote Setting	To choose the pair of channels effected by the subwoofer level adjustment of the wired remote control
Write to Device*	To write the current setup to the preset memory of the unit. At the following window, the preset number can be selected. The blue frame indicates the currently selected preset number
Read from Device**	To open one of the available presets from the memory of the unit. The preset can be selected from the following window. The blue frame indicates the currently selected preset number
Delete from Device	To delete one of the presets from the memory of the unit. The blue frame indicates the currently selected preset number
Chinese	To switch between Chinese and English language
Exit	Quit the software

*Note: In order to use the memory function, it is necessary to edit a security code and a phone number, first. Check below (Memory access restriction)

** Note: To select one of the memory presets, one of the optionally available remote control units can be used, as well as soon as the USB cable has been disconnected (with GZDSP Remote Pro presets 1 to 9 are available only)

Help dropdown menu

MCU Version	To view the currently installed MCU firmware version
Flash Version	To view the currently installed Flash memory firmware version
Update MCU	To update the MCU. Select the firmware file in the following step
About	To view the current software version

Memory access restriction
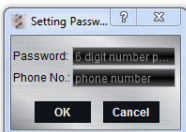
The very first time the memory function is used, it is necessary to set a 6-digit security code to save a preset. Additionally, a phone number* shall be entered
(*Note: Instead of a phone number another numeric code can be entered as alternative)
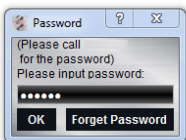
After connecting the PC again later on, the code has to be entered at the software startup enabling to load the preset to the GUI software in order to change the settings.

Connection status

By clicking **Connected** (PC is currently connected) or **Disconnected** (PC is currently disconnected) the connection between the PC and the GZDSP 6-8X PRO will be disconnected or established accordingly. After unintended detaching of the USB wire or turning off the unit you may proceed to change the adjustments this way.

Model	GZDSP 6-8X PRO
Type	8-channel signal processor (DSP)
Frequency Response	5 Hz – 20 KHz (-3 dB)
Signal to noise ratio	>115 dB
Channel separation	>70 dB
Harmonic distortion	0.05%
Processor	Cirrus Logic Single Core 32-bit, 8-channel, 192 kHz
Input sensitivity	High-level: 2 – 15 V RMS Line (RCA): 0.6 – 5 V RMS AUX input: 0.6 – 5 V RMS
Input impedance	>47 kΩ
Output	8 x RCA
Input	Main: 6x RCA (line) / 6 x high-level AUX: 3.5 mm / 1/8" stereo jack Optical and coaxial digital input: max. 192 kHz stereo
Remote out	max. 500mA
Recomended fusing	2 A
Dimensions (heatsink) W x H x L mm / inch	185 x 40 x 115 / 7.28" x 1.57" x 4.53"
Software compatibility	Microsoft Windows™ XP SP3, Vista, 7, 8, 8.1,10
Presets	10 individual preset memory - storing/calling a preset by using one of the optionally available remote control units
Gain bandwith	-40 ~ + 12dB
Equalizer	6x 31 bands on each channel (A-F) (20-20000Hz) -18 to +12dB, Q 0.5 - 9 2x11 bands on subwoofer channels (G/H) (20-200Hz), -18 to +12dB, Q 0.5 - 9
Time alignment	0 - 15ms / 0 - 510cm per channel
Crossover	6 / 12 / 18 / 24 / 30 / 36 / 42 / 48 dB/Oct. BPF / LPF / HPF Butterworth 20 - 20000Hz
Phase switch	0° / 180° per channel
Optional remote controls GZDSP REMOTE PRO & GZDSP TOUCH REMOTE	Main level and subwoofer level adjustable, Input mode and preset selectable

Error	Control	Help / Solution
No function	PWR LED on?	-check the fusing -check the remote wire -check the +12 Volt connection and wire -check the ground connection and wire
No sound (PWR LED on)	signal wire no contact or broken	-check the contact or replace the wire
	no audio signal from the head-unit	-check the audio output signal of the head-unit
	amplifier not switched on	-check the remote out of the DSP (page 5) -check the amplifiers power supply
	non operational source selected	-check the setting (page15)
	activated >MUTE< function (User Interface)	-check the setting (page15)
	adjusted level on optional remote control unit too low	-check the setting (page7)
Single channels with no function	signal wire no contact or broken	-check the contact or replace the wire
	no audio signal from the head-unit	-check the audio output signal of the head-unit
	balance or fader control of the head-unit not in center position	-check the setting of the head-unit
	wrong setup of input and output mode	-check the setting (pages 11~14)
	>GAIN< level too low or >Mute< function (user interface) active	-check the setting (page 15)
Impure sound, incorrect stereo reproduction	inverted phase of one or more speakers	-check the polarity of the speaker connection -check the polarity of the high-level input (page 6) -check the >PHASE< setting (page 15) -check the >TIME ALIGNMENT< adjustment (page 16)
Distorted sound quality	speaker overload	-reduce the volume level -check the highpass filter and slope (page 15)
	DSP input override (distortion)	-select the correct input mode -pay attention to the input sensitivity of the DSP unit (page 18)
	head-unit output override (distortion)	-reduce the volume level of the head-unit -set the sound controls of the head-unit to center position -deactivate the >Loudness< function of the head-unit
	amplifier override (clipping)	-check the amplifiers input sensitivity -reduce the level
Increased noise level	>GAIN< level too high	-reduce the >GAIN< level (page 15)
	head-unit creates noise	-select a superior quality head-unit -use the optical output (if available) -let the audio store or manufacturer check the head-unit
Car specific interferences audible through the audio system	diverse power supplies or ground connection	-the head-unit, the DSP and each amplifier should be wired up to a common ground and +12 Volt connection
	signal wire no contact or broken	-check the contact or replace the wire
	head-unit defective	-let the audio store or manufacturer check the head-unit
	amplifier defective	-let the audio store or manufacturer check the amplifier
	DSP unit or amplifier mounted close to an automotive control unit	-choose another mounting position
	analog output of an OEM MOST head-unit connected	-connect the digital MOST audio signal directly to the DSP unit*

*Note: Use an optional car specific interface to connect the digital MOST audio signal directly to the digital input of the GZDSP 6-8X

<u>Terms of warranty</u>

The limited warranty for this product is covered by Ground Zero´s local distribution partners and their terms and conditions. For further information contact your local retailer or distributor.

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