



i-SERIES

DSPControl SOFTWARE

CAMCO

The screenshot displays the CAMCO i4 DSP control software interface. The main window is titled "i4" and "CAMCO". It features a multi-channel mixer with the following sections:

- Main:** A central section with a "Currently Loaded Preset" dropdown set to "DEFAULT PRESET". Below it are "Amplifier Presets" (Save, Load), "Save to File", "Load from File", "Link" (checked), and "Amplifier Name" (CAMCO ID4). At the bottom, there are "Mute" buttons and output format selectors (Analog 1, Analog 2, AES Stereo).
- In 1, In 2, In 3, In 4:** Four input channels, each with a gain knob (ranging from -38 to +24 dBu) and a "Link" button.
- X-Over:** A section with a "Link" button and a "Mute" button.
- Out 1, Out 2:** Two output channels, each with a gain knob (ranging from -48 to +150 dB) and a "Mute" button.

On the left side, a "D4 8-B COMPRESSOR" panel is partially visible, showing settings for Filter, Frequency, Q, Threshold, Attack, Release, and Ratio. On the right side, another CAMCO interface window is partially visible, showing a frequency spectrum analyzer.

MADE IN GERMANY

User manual for the DSPControl software

TDA30XDSPCENE

Revision E, 2017-05-19

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Please visit our website www.camcoaudio.com for the latest version of this user manual. Please note that the leading version of **CAMCO** manuals is always the English one.

Welcome to the DSPControl software for your iD4 / iD7 amplifier!	3	4.1.1 Caption of the icons states	14	7. Managing the access rights and passwords	26
1. DSPControl software installation	4	4.2 The Main control panel	15	8. The access rights hierarchy	27
1.1 Installation requirements	4	4.3 The Input 1 to 4 control panels	16	9. Unit and Preset level access right options	28
1.1.1 Windows	4	4.4 The Crossover control panel	17	10. The settings which are stored at Unit level	29
1.1.2 OS X	4	4.5 The Output 1 and 2 control panels	18	11. The settings which are stored inside each Preset individually	30
1.2 Demonstration mode	5	4.6 The Compressor control panels	19	12. Remote Access (Telnet)	31
1.3 Preset data integrity	5	5. The menu structure	20	12.1 It offers following features	31
1.4 Uninstalling the DSPControl software	5	5.1 The network panel menu bar	20	12.2 Protocol definition	31
1.5 New versions / updates	5	5.1.1 "File"-menu	20	12.3 The available commands	31
1.6 iD4 / iD7 amplifier firmware update	6	5.1.2 "Tools"-menu	20	12.4 Examples	32
1.7 Updating the iD4 / iD7 firmware	6	5.1.3 "Help"-menu	20	12.5 How to install/activate Telnet with Windows	32
1.7.1 Option 0 : Via the main control panel's menu bar	6	5.2 The amplifier panel menu bar	21	12.6 Using Telnet with OS X	32
1.7.2 Option 1 : Via the network panel's update button for a specific amplifier	7	5.2.1 "File"-menu	21	13. How to backup and restore old Presets	33
1.7.3 Option 2 : All at once via the network panel's menu bar	7	5.2.2 "Unit"-menu	21	13.1 How to transfer old Presets to version v3.9.2 (or higher)?	33
1.8 Amplifier backup folder structure	7	5.2.3 "Preset"-menu	23	14. Signal Processing Block Diagram	34
1.8.1 Folder descriptions	7	5.2.4 "Help"-menu	23	15. Unit Conversion Equations and Lookup Table	35
1.8.2 Filename description	8	6. Managing your Presets with the DSPControl software	24	15.1 Unit Conversion Equations	35
1.8.3 Storage folder	8	6.1 "Save" – Save all Preset-related stuff inside the amplifier	24	15.2 Lookup Table	35
1.9 Manually restoring amplifier settings via "Load Flash Image from File"	8	6.2 "Load" – Load a Preset from the amplifier's Preset list	24	Company information	36
2. Release notes	9	6.3 "Save to File" – Save all Preset-related settings to your computer	24		
2.1 Compatibility table of DSPControl software and iD4 / iD7 amplifier firmware	11	6.4 "Load from File" – Load a single Preset from your computer into the amplifier	24		
3. Troubleshooting / Known issues	12	6.5 "Backup all Presets to Folder" (→ "File"-menu)	24		
3.1 How to power cycle your amplifier	13	6.6 "Restore all Presets from Folder" (→ "File"-menu)	24		
4. The GUI elements	14	6.7 "Load Factory File" (→ "File"-menu)	24		
4.1 The network panel	14	6.8 "Load Flash Image" (→ "File"-menu)	25		
		6.9 "Save Flash Image" (→ "File"-menu, in Developer mode only)	25		

WELCOME!

Welcome to the DSPControl software for your **id4/id7** amplifier!

This manual will guide you through the user interface elements and will explain how to organise, backup and restore your Presets and amplifier settings.

Additionally, it will describe the **id4/id7** Preset and amplifier protection concept. This can be used for example to efficiently keep your Preset's EQ and limiting settings safe, or if you simply want to prevent normal User's from changing any important amplifier settings they shouldn't touch.

We assume that you are familiar with basic Pro Audio signal processing options, so the functioning and available parameters of the rich EQing, filtering and limiting settings will not be outlined in detail in this manual. But be assured that you have purchased a product featuring the latest state-of-the-art DSP performance with full 96 kHz/24 Bit resolution. Especially the 6-channel multi-band-compressor in the output section gives you an outstanding tool to control and protect your loudspeakers.

Efficient loudspeaker excursion control and long-term RMS power limiting for low, mid and high frequency are the key benefits of the powerful limiting section, thus allowing you to create tailored Presets with full loudspeaker protection and at the same time maximum output power performance.



1. DSPControl software installation

This chapter describes the installation of the DSPControl software and updating of the amplifier's firmware. For installing the DSPControl software there is no need to have an amplifier connected. But for updating the firmware on your **iD4/iD7** amplifier, the units have to be connected via Ethernet of course.

1.1 Installation requirements

The following operating systems are supported:

- Windows XP with Service Pack 2
- Windows 7 or higher
- Mac OS X 10.5.8 or higher



1.1.1 Windows

Download the installation package for your Windows version from our website and open it. The installer will guide you through the installation procedure. It is not needed to remove any older versions, they will be removed automatically. You will need administrator privileges for installation.

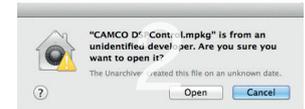
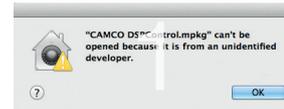
Depending on the user rights within your operating system, you may also need to run the program as administrator for proper operation.



1.1.2 OS X

Download the installation package for OS X from our website, unpack and open it.

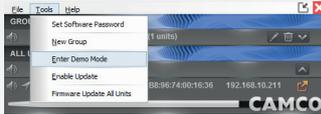
With OS X 10.7 or higher you might get a message (1) that you can't open the installer due to the standard security settings under OS X.



If you get that message, just rightclick the installer icon and select "Open" from the context-menu. Then click the "Open"-button of the verification-dialog (2) and there you go.

The installer will guide you through the installation procedure. During the installation process you will get asked to enter your system password, so it will be handy to have it ready. It is not needed to remove any older versions, they will be removed automatically.

INSTALLATION INSTRUCTIONS



1.2 Demonstration mode

Once installed, the DSPControl software offers a fully functional demonstration mode, which allows you to explore all features without having to connect an amplifier. In this mode it is possible to load and save Presets from and to your computer. The demonstration mode is limited to the User mode access level. It can be activated from the network panel menu bar "Tools → Enter Demo Mode".

1.3 Preset data integrity

Installing a new version of the DSPControl software will *not* touch any Presets stored on your **id4 / id7** or computer. But we recommend to create a backup of all amplifier Presets and settings in case you want to update the amplifier firmware.

1.4 Uninstalling the DSPControl software

› Windows

To uninstall the **CAMCO** DSPControl software from your computer, select "Start → All Programs → CAMCO → Uninstall DSPControl". Alternatively, you can run the installation setup again to repair or remove the application.

› OS X

Just go to your applications folder (standard) or the folder in which you have the software installed and remove the DSPControl application by moving it to the trash.

1.5 New versions / updates

Please visit the downloads section of our website to check for new versions of the DSPControl software.

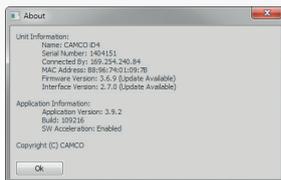
→ <http://www.camcoaudio.com/download.html>

INSTALLATION INSTRUCTIONS

1.6 iD4/iD7 amplifier firmware update

For smooth remote control of your **iD4/iD7** amplifier it is important to match the amplifier's firmware to the current version of the DSPControl application. If not, incompatibilities can cause problems while performing actions on your connected amplifier.

So please check if there might be a firmware update available by opening the "Help → About" menu window in the main amplifier panel.



Alternatively, you can also check in the release notes compatibility table on page 11.

Following are some important points to know and to respect when performing a firmware update:

- If the current access level doesn't have the access right to update the amplifier's firmware, you will not be able to perform firmware updates.
 - See also chapter "Access Right Options" for details.
- Updating the firmware will usually reset all settings (i.e. access rights, passwords, Unit name, network settings, power-on Preset, read-only Preset range, auto-standby and display setting) to factory defaults and all Presets will be erased.
- To avoid losing your settings and Presets you can either do a manual backup before the update or use the automatic backup and restore function offered during the update procedure (when started from the main control panel's menu bar).

→ During the update process, ticks and pops may occur, depending on the hardware. So please disconnect your loudspeakers to avoid discomfort or even damage. Make sure that no other units are power cycled during the update process, this may disturb the process.

→ If the update process is interrupted or fails for any reason (even in case your unit would not start up anymore) you can repeat the process at any time. Switch off your hardware and close the software, restart your unit and repeat the process.

→ To avoid network problems during firmware update, we recommend to use an automatic (DHCP or link local) configured network without static IP address and subnet. Firmware update with static IP address is basically possible, but can cause network problems during update depending on network topology.

→ The update of your **iD4/iD7**'s firmware without the automatic backup and restoring should be finished in about 1 to 2 minutes (depending on your hardware and connection speed).

Using the feature to automatically backup and restore the amplifier's Presets should take about 2.5 to 4 minutes, also depending on hardware and connection speed.

1.7 Updating the iD4/iD7 firmware

There are three ways to start the firmware update procedure:

1.7.1 Option ①: Via the main control panel's menu bar

→ Preferred update option

Open the amplifier's main control panel and select the menu "Unit → Firmware Update" to start the update.

Starting the firmware update from the amplifier's panel will always carry out an update, even if the firmware is already up-to-date.

If you perform a firmware-update on your **iD4/iD7** amplifier from the main control panel, the update process has the option to backup and restore the amplifier's Presets and settings automatically in a fast way (available since version v3.9.2 for updates from version v3.7.0. If you were running a version lower than v3.7.0, fast backup and restore will not be supported. In this case please refer to the chapter "Preset Notice").

INSTALLATION INSTRUCTIONS

1.7.2 Option ②: Via the network panel's update button for a specific amplifier

→ Recommended if you want to reanimate the amplifier in case it is not properly recognised in the network panel and you're not able to open the amplifier's main control panel

From the network panel's menu bar you can select "Tools → Enable Update" to display the update buttons. If the update button is shown orange, the unit's firmware can be updated, otherwise the button is greyed out (which means the firmware is already up-to-date or that you don't have the right to do the update). Simply click on the update button (orange) to start the update on the unit.

1.7.3 Option ③: All at once via the network panel's menu bar

→ Not recommended

By selecting "Tools → Firmware Update All Units" from the network panel's menu bar, you have the possibility to update the firmware of all connected **iD4/iD7** amplifiers with just one click.

The update will only be carried out in case there is a newer version available. This method of updating the firmware is still available but not recommended anymore, because network problems might easily disturb or even interrupt this procedure. We recommend to use the firmware update option 1 or 2 instead.

⚠ Attention

By updating the firmware from the network panel with options ② or ③, the amplifiers will be reset to factory settings and all Presets will be erased. We recommend to use option ① (if available) for a secure update procedure. Because only this option offers error handling (in case of network problems or unusual network topology) and automatic Preset backup and restore options.

1.8 Amplifier backup folder structure

Since **CAMCO** DSPControl software version 3.9.2 the amplifier backup data will be saved automatically to your computer for optional data recovery in case it might be needed. To organize the automatic and manually created binary files the following folder structure is used:

- [Storage folder]
 - ↳ ■ backup
 - ↳ ■ [Amplifier MAC address]
 - ↳ ■ Auto_Backups
 - ↳ ■ *_Auto_Backup_V3_6_9.ffi
 - ↳ ■ Auto_Uploads
 - ↳ ■ *_Auto_Upload_V3_11_2.ffi
 - ↳ ■ Manual_Backups
 - ↳ ■ *_Manual_Backup_V3_11_2.ffi

1.8.1 Folder descriptions

Auto_Backups will store the original amplifier configuration before the update has actually been carried out. But note that the binary file will only be created and stored if you explicitly choose to create a backup when starting the update procedure. If you don't, there will be no backup created in this folder either.

Auto_Uploads will store the converted and updated amplifier configuration which is uploaded back to the amplifier during the update process.

Manual_Backups will store the user created binary backup files. This is only the recommended default directory. You are of course free to store your manual backups to any other location on your computer of course.

1.8.2 Filename description

The file names will be structured based on the following scheme:

B8_96_74_01_06_16_2016_01_13_1159_Auto_Backup_V3_6_9.ff

-  Amplifier MAC address
-  Backup date
-  Backup time (at file creation, can differ from the system file creation time)
-  Backup type (see folder names description)
-  Firmware version included in this binary backup

1.8.3 Storage folder

The product application folder (storage directory) will be different depending on the operating system you use.

› Windows

[SystemDrive] → Users → [Username] → AppData → Roaming → CAMCO → backup

› OS X

[SystemDir] → User → [Username] → Library → Preferences → CAMCO → backup

1.9 Manually restoring amplifier settings via “Load Flash Image from File”

Since DSPControl version 3.9.2 and higher, all automatic and manual flash image backups can also be restored manually with the “Load Flash Image from File” option in the “File” menu.

But please note that loading a flash image will also “update” the amplifier firmware to the version originally included in the flash image at the time it was originally created. So you might encounter firmware incompatibilities with the latest DSPControl application after having loaded a flash image. But still all Presets and amplifier settings are kept and transferred, so there is no risk of losing data. With this feature you could easily downgrade any amplifier to an older configuration if needed or necessary, or recover a previous setup in case there were problems during the update procedure.

RELEASE NOTES

2. Release notes

This is a list of changes, bugfixes, and known issues since version v3.1.9 related to your DSPControl software and the firmware for your **id4 / id7**.

DSPControl v3.9.2 (amplifier firmware v3.11.2)**Changes**

- › Possibility of full audio routing
- › New designed and more detailed update/download progress window
- › Create binary amplifier configuration backup images which replaces the Factory Presets and allows to backup the whole amplifier configuration
- › Corrected the PEQ window curve mathematics
- › Redesigned firmware up- and download communication for faster configuration data and Preset import/export
- › Harmonized the Unit menu list entries between the different access levels
- › Added official support for Windows 8 and Windows 10
- › Removed fullscreen functionality from amplifier view
- › New EULA

Fixed issues

- › Text input boxes had undefined behavior in case of non defined input values
- › Standard update mechanism showed user message "Please power cycle" before the data upload was finished
- › Manual IP address configuration accepted invalid IP ranges
- › Erase fail during ethernet firmware upload if an arbitrary network device answered the broadcast progress message generated by DSPControl

DSPControl v3.8.0 (amplifier firmware v3.8.1)**Changes**

- › Enhanced and optimised input source selection
- › Harmonised Unit menu entries through all access levels
- › Improved GUI window handling for better response
- › Improved Windows 8 installation procedure (no driver installation work-around needed anymore)
- › Added amplifier Telnet remote control option

Fixed issues

- › Input source selection now stored inside Presets
- › No losing of focus anymore when moving the main amplifier panel window quickly

DSPControl v3.7.0 (amplifier firmware v3.6.9)**Changes**

- › Support for **id7** amplifiers
- › Encryption of Presets, backups and Factory Files when storing to computer's hard drive for enhanced security
- › Option to clear all user or factory Presets in Developer mode

⚠ Important

Presets, backups and Factory Files once stored with v3.7.0 (or higher) will not be readable with any previous versions. But stored files from previous software versions are fully compatible of course.

DSPControl v3.6.6 (amplifier firmware v3.6.5)**Fixed issues**

- › Compatibility issue with OS X 10.9 Mavericks: When restarting the application, previous versions would not reconnect without a restart of the system

* unpublished version

DSPControl v3.6.5 (amplifier firmware v3.6.5)**Changes**

- › Simplified Unit and Preset access rights options
- › Automatic backup and restore of all amplifier settings when doing a firmware update (optional)
- › Reorganised menu structure and renamed menu entries
- › Possibility to erase all Presets in Developer mode

Fixed issues

- › Improved Preset backup and restore functions; now more robust even with bad network connection
- › Several bugfixes and improvements

⚠ Important

Due to some changes in the Preset structure it is necessary to follow a certain procedure to transfer your old Presets to the latest version.

→ Please see chapter "Preset Notice" for a detailed description.

DSPControl v3.5.6***Changes**

- › GUI (Graphical User Interface) facelift
- › Dual bargraph scaling in dBu and dBFS for all input bargraphs
- › All parameters can be accessed and changed again from the amplifier display (Filters, PEQ's, Limiters ect.)
- › BLC limiter improvement
- › Threshold settings of output BLC now done in Vpeak

Fixed issues

- › Auto Standby function now working correctly
- › "Popping sound" at powerup removed

DSPControl v3.5.4***Changes**

- › Factory files and backups now support locked Presets
- › Added trim gain for selected models

Fixed issues

- › Setting Bridge Mode from the DSPControl software

DSPControl v3.4.7***Changes**

- › Unit panels are restored and brought to front when trying to launch them while they already exist
- › Demo password does not need to be entered anymore after entering Demo mode from the network panel
- › When creating Factory Files, the supported units can be selected

Fixed issues

- › Creating Factory Files did not work in version v3.3.X to v3.4.0
- › Added "0" to choices of read-only Preset range
- › Restored "Invalid Password" error dialog when entering an invalid password (this includes the Preset passwords)
- › Removed low-level compressor distortion (audible in LF channels)

* unpublished version

RELEASE NOTES

DSPControl v3.3.8***Changes**

- › Major performance improvements on all operating systems, especially when using more than 10 connected units with a Windows PC
- › Major sound quality performance improvement on AES input
- › Added "Firmware Update All Units" under "Tools". This process simultaneously updates all connected units and can take several minutes.
- › Mutes can be controlled even if a channel is locked
- › In Developer mode, the number of factory Presets (write-protected Presets) can be set
- › Units can be renamed in the network panel
- › Groups and units are alphabetically ordered in the network panel
- › When loading a Preset from computer, the progress dialog closes automatically
- › Units are no longer indicated to be muted while they are in standby
- › Clicking the icon of the minimized program in the dock in OS X restores the windows

Fixed issues

- › Group power button
- › Group mute
- › Slope indication in PEQ Q text box corrected when changing between Bell and Shelf filters
- › Group rename
- › Many smaller bug fixes

DSPControl v3.2.1***Changes**

- › Faster update of PC interface when changing values via front panel
- › Possibility to set end user access rights per Preset

DSPControl v3.2.0***Fixed issues**

- › Log in via amplifier display
- › Preset save/reload issue

2.1 Compatibility table of DSPControl software and iD4/iD7 amplifier firmware

As you might have noticed the version numbering of the DSPControl application is similar to the amplifier firmware, but not identical. This table gives an overview on which firmware belongs to which released software version.

DSPControl software version	Amplifier firmware version	Ethernet firmware version
v3.1.9 / v3.1.9.1	v3.1.9	v2.7.0
v3.6.5	v3.6.5	v2.7.0
v3.6.6	v3.6.5	v2.7.0
v3.7.0	v3.6.9	v2.7.0
v3.8.0	v3.8.1	v3.8.1
v3.9.2	v3.11.2	v3.9.0

* unpublished version

3. Troubleshooting / Known issues

Issue	Possible solution/reason
<ul style="list-style-type: none"> → Amplifier sometimes loses network connection without apparent reason. → Intermittent problems when accessing the amplifier. → Ethernet or DSP firmware cannot or just partially be uploaded. → Intermittent problems while updating. 	<p>Please check that only one instance of the DSPControl application is running on the network. More than one DSPControl application running in the network will cause unpredictable behaviour.</p>
<ul style="list-style-type: none"> → The amplifier is only shown as "No Name" in the Network Panel 	<p>IP address conflict.</p> <ul style="list-style-type: none"> → Check if the amplifier or your network card is set to a static (fixed) IP address. If yes, please set both to automatic (DHCP) configuration and try again.
<ul style="list-style-type: none"> → Ethernet or DSP firmware update cannot be started, does not work or fails. 	<p>Network configuration error or more than one network card active.</p> <ul style="list-style-type: none"> → Try to deactivate all network devices within your computer which are not used to connect to the amplifier. Usually wireless network devices (including Bluetooth devices) may cause connection problems. → Try to connect a standard (for example 5 or 8-port) network hub / switch between the computer and the amplifier. Some business network switches and cards are known to sense 10 Mbit connections very slowly or deny delivering UDP broadcasts. → Deactivate all VPN related network connections. → Check if the amplifier or your network card is set to a static (fixed) IP address. If yes, please set both to automatic (DHCP) configuration and try again.
<ul style="list-style-type: none"> → The amplifier is only shown as "Startup..." in the Network Panel. 	<p>The amplifier's Ethernet firmware is damaged and the amplifier is in boot-loader mode.</p> <ul style="list-style-type: none"> → Use the "Network Panel" update routine (update option  on page 7) to repair the amplifier's Ethernet firmware. <p>All previous amplifier settings and Presets should be accessible again after the ethernet firmware update. You can start a DSP firmware update from the "Main Control Panel" (including configuration backup) after having repaired the Ethernet interface.</p>

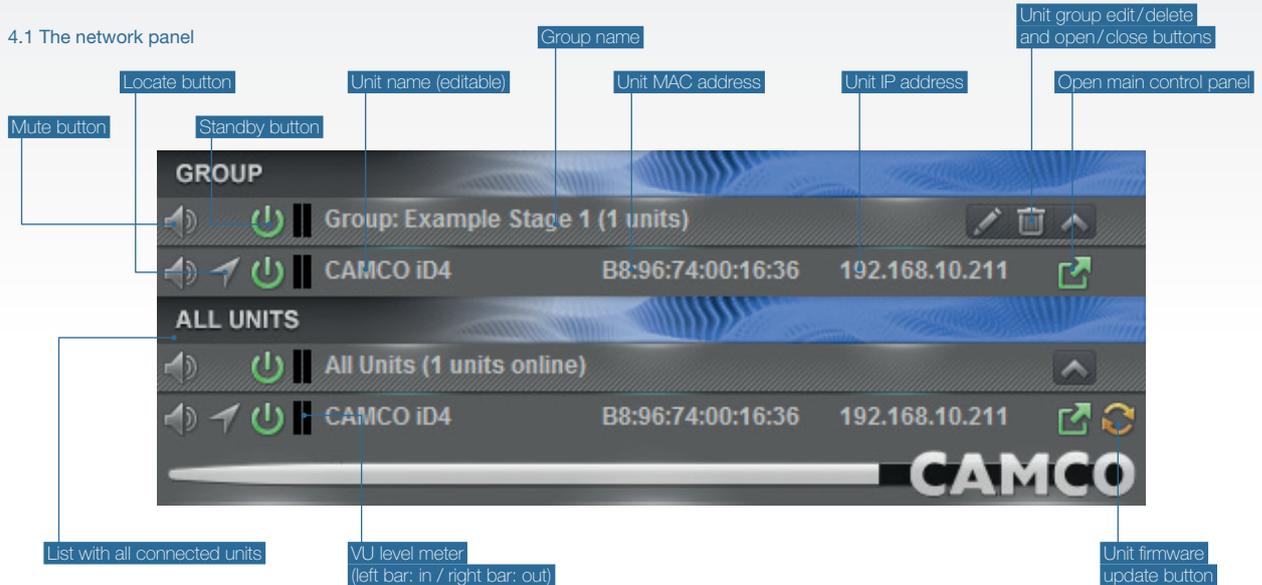
Issue	Possible solution/reason
<ul style="list-style-type: none"> → The amplifier is only shown as "No Name" in the Network Panel AND the amplifier is not booting anymore (the display backlight remains off and the display just shows a row of squares). 	<p>The amplifier's DSP firmware is damaged.</p> <ul style="list-style-type: none"> → Please power cycle the amplifier and then use the "Network Panel" update routine (update option 2 on page 7) to repair the amplifier's DSP firmware. <p>All amplifier settings and Presets will be lost after this update. But possibly there exists an an automatic or manual backup of your previous settings. Please refer to chapter "Amplifier backup folder structure" for recovery options.</p>
<ul style="list-style-type: none"> → Amplifier remains in Mute mode after DSP firmware update → Amplifier not listed anymore within the DSPControl Network Panel after firmware update (not even as "Startup..." or "No Name") → The network connection LEDs on the amplifiers rear panel are not blinking on powerup. 	<p>Power cycle the amplifier.</p> <p>The amplifier's Ethernet firmware is not responding.</p> <ul style="list-style-type: none"> → Take the amplifier from the mains for minimum 4 minutes and restart the amplifier again.

3.1 How to power cycle your amplifier

Power cycling means switching the unit off via the power switch on the front panel and then wait until the display backlight switches off. On the **id4** amplifier this takes less than 1 second, on the **id7** amplifier this takes approx. 15 seconds. Then switch the amplifier back on again.

4. The GUI elements

4.1 The network panel



4.1.1 Caption of the icons states

Sound is not muted	Display in normal state	Unit is offline	Open panel disabled (because unit is offline)	Update not available
Sound is muted	Display is blinking	Unit is off	Open panel enabled	Update available
		Unit is on	Open panel locked (panel already open)	
		Unit is starting up		

THE GUI ELEMENTS

4.2 The Main control panel

Load and save buttons

Amplifier Preset list

Preset name (editable)

Main navigation buttons

Input 1 to 4 fader

Output 1 and 2 fader

Link buttons for Input 1/2, 3/4 and Output 1/2



Current access level indicator

Amplifier name (editable)

Network link status with amplifier selection dropdown list

Input selection dropdown lists

Numerical gain inputs for Input 1 to 4 and Output 1 and 2

Mute buttons for all Input and Output channels

4.3 The Input 1 to 4 control panels

The screenshot shows the CAMCO i4 DSP control software interface. The main window is titled 'i4' and has tabs for 'Main', 'In 1', 'In 2', 'In 3', 'In 4', 'X-Over', 'Out 1', and 'Out 2'. The 'In 1' tab is selected. The interface is divided into several sections:

- Left Panel:** Contains 'Currently Loaded Preset' (DEFAULT PRESET), 'Amplifier Presets' (a dropdown menu), 'Save' and 'Load' buttons, 'Save to File' and 'Load from File' buttons, a 'Link' indicator (green), a dropdown menu for 'CAMCO iD4 (B8:96:74:00)', and 'Amplifier Name' (CAMCO iD4). At the bottom, there is a 'DEVELOPER MODE' button with a gear icon.
- Center Panel:** Features a 'Graphical realtime settings screen' showing a frequency response graph with 10 numbered points (1-10) and a table of parameters below it.

	1	2	3	4	5	6	7	8	9	10
Type	Low Sh	Bell	High Shr							
Freq	750Hz	60 Hz	39 Hz	160 Hz	320 Hz	790 Hz	1.28 kHz	2.00 kHz	3.00 kHz	7.60 kHz
Q	8.9	2.2	7.0	1.0	1.0	2.1	5.0	2.0	1.3	8.9
Gain	-2.00	0.00	0.00	0.00	0.00	-0.25	0.00	0.00	0.00	1.00
On	<input checked="" type="checkbox"/>									
HPF	<input checked="" type="checkbox"/>	Off	Linkwitz-Riley 24dB	Off	Off	Off	Off	Off	Off	Linkwitz-Riley 24dB
LPF	<input checked="" type="checkbox"/>	Off								
- Right Panel:** Includes a 'Compressor' section with a gear icon, a 'Mute' button, a 'Delay' knob, and a 'Limiter' section with two knobs. Below these are 'Input channel limiter control' and 'Input delay control' labels.

Callouts point to the following elements:

- PEQ-Filter type selection
- Main navigation buttons
- Graphical realtime settings screen with full window and full screen mode
- Mute button (also accessible from the Main panel)
- Compressor button
- Input channel fader and numerical gain input (also accessible from the Main panel)
- PEQ numerical gain inputs
- PEQ Q/BW-switch and numerical inputs
- PEQ numerical inputs for frequency
- HPF and LPF On/Off-switches with filter type selection
- On/Off-switches for each PEQ
- Input channel limiter control
- Input delay control

THE GUI ELEMENTS

4.4 The Crossover control panel

The screenshot shows the CAMCO iD4 DSP control software interface. The main window is titled 'iD4' and has tabs for 'Main', 'In 1', 'In 2', 'In 3', 'In 4', 'X-Over', 'Out 1', and 'Out 2'. The 'X-Over' tab is active, displaying a crossover filter graph with a red curve and a blue line. The graph has a logarithmic frequency axis from 10 to 20k Hz and a linear gain axis from -50 to 10 dB. Below the graph are two columns of controls for two channels (1 and 2). Channel 1 has a HPF of 30 Hz, a But 18dB filter, an LPF of 75 Hz, a Gain of -3.50 dB, and a Delay of 5.391 ms. Channel 2 has a HPF of 50 Hz, a But 24dB filter, an LPF of Off, a Gain of -8.00 dB, and a Delay of 0.0 ms. On the left side, there are buttons for 'Main navigation buttons', 'Numerical gain inputs', and 'LPF and HPF numerical inputs and filter selection'. On the right side, there is an 'Output VU level meter' and 'Mute buttons (also accessible from the Main and Output panel)'. At the bottom right, there are 'Phase invert buttons (also accessible from the Output panel)'. The interface also includes a 'Developer Mode' button and a 'Link' section with 'L' and 'R' buttons.

Main navigation buttons

Graphical realtime settings screen with full window and full screen mode

Output VU level meter

Mute buttons (also accessible from the Main and Output panel)

Output link button (also accessible from the Main panel)

Numerical gain inputs

Numerical delay inputs

LPF and HPF numerical inputs and filter selection

Phase invert buttons (also accessible from the Output panel)

4.5 The Output 1 and 2 control panels

The screenshot shows the CAMCO iD4 DSP control software interface. The main window is titled 'iD4' and has tabs for 'Main', 'In 1', 'In 2', 'In 3', 'In 4', 'X-Over', 'Out 1', and 'Out 2'. The 'Main' tab is active, showing a 'Mixer' section with four input channels (In 1, In 2, In 3, In 4) and their respective gain and mute controls. A graphical real-time EQ settings screen is visible in the center, showing a frequency response curve with various filter settings. The right side of the interface features a 'Compressor' section with a gain knob and an 'Invert' button, and a 'Mute' section with a 'Mute' button. The bottom right corner contains 'Delay' and 'Limiter' controls. The interface is annotated with several callouts pointing to specific GUI elements:

- PEQ Filter type selection
- Main navigation buttons
- Input channel mixer/routing section with numerical inputs
- Graphical realtime settings screen with full window and full screen mode
- Mute button (also accessible from the Main panel)
- Compressor button
- Output fader and numerical input (also accessible from the Main panel)
- PEQ numerical gain inputs
- PEQ Q/BW-Switch and numerical gain inputs
- PEQ numerical inputs for frequency
- HPF and LPF On/Off-switches with filter type selection
- On/Off-switches for each PEQ
- Output delay control
- Output channel limiter control

THE GUI ELEMENTS

4.6 The Compressor control panels

Input 1 to 4 compressor navigation buttons

Back to Input panel button

BLC* filter type selection for compressor band 1 to 6

Output 1 and 2 compressor navigation

Back to Output panel button

Input compressor level and gain reduction meter

Output compressor level and gain reduction meter

Compressor controls for threshold, attack, hold, release, ratio and makeup gain with numerical inputs

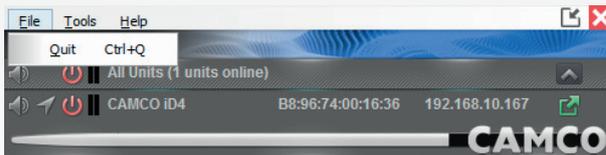
BLC compressor controls for frequency, Q, threshold, attack, release and ratio with numerical inputs

Compressor controls for threshold, attack, hold, release and ratio with numerical inputs

* BLC = Bandwidth Limited Compressor

5. The menu structure

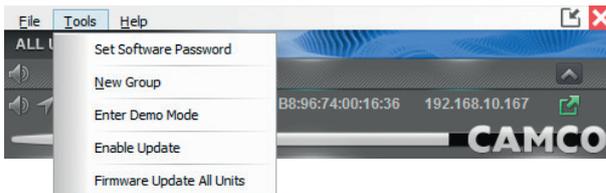
5.1 The network panel menu bar



5.1.1 "File"-menu

> Quit

Closes the application including all amplifier panel windows.



5.1.2 "Tools"-menu

> Set Software Password

Set a password to prevent unauthorized execution of the DSPControl software. To reset the software password just overwrite the old by leaving the input blank.

> New Group

Adds a new amplifier group.

> Enter Demo Mode

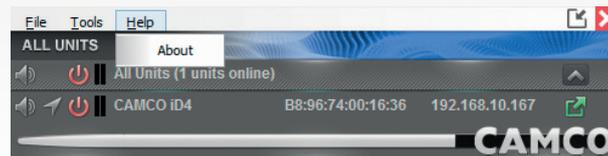
This menu item enables a virtual **iD4** and **iD7** demo-amplifier.

> Enable Update

Activates visibility of the firmware update button for the connected amplifiers.

> Firmware Update All Units

This will update all connected amplifiers to the newest version in case they are still running an older firmware version.



5.1.3 "Help"-menu

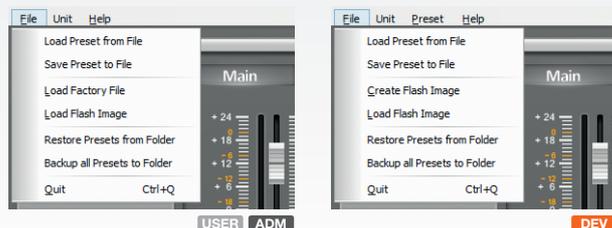
> About:

Shows the application information window with the application version and build number.

USER = User mode **ADM** = Administrator mode **DEV** = Developer mode

THE MENU STRUCTURE

5.2 The amplifier panel menu bar



5.2.1 “File”-menu

› **Load Preset from File**

Load a Preset from your computer into the amplifier.

› **Save Preset to File**

Save the currently loaded Preset from the amplifier to your computer.

› **Load Factory File** **USER** **ADM** / **Create Flash Image** **DEV**

Load a Factory File from your computer into the amplifier in User or Administrator mode or create a flash image with the current configuration of the amplifier and save it to your computer in Developer mode.

› **Load Flash Image**

Load a flash image from your computer into the amplifier.

› **Restore Presets from Folder**

Load a backup-folder with multiple Presets at once into the amplifiers memory.

› **Backup all Presets to Folder**

Save a backup of all Presets from the amplifiers memory to your computer.

› **Quit**

Close the amplifier panel window.



5.2.2 “Unit”-menu

Note

Please note that not all menu entries might be available depending on the current access level and access right settings.

› **Change Access Level**

Change the access level of the Amplifier to User, administrator or Developer mode by using the appropriate passwords.

› **Passwords**

Change the default Unit password of the current access level. In Developer mode it's possible to change the default Unit passwords of all three access levels directly.

› **Access Rights**

Configure the Unit access rights for all lower access levels.

› **Network Settings (Configure →)**

Configure the network IP settings from automatic (DHCP) to manual.

USER = User mode **ADM** = Administrator mode **DEV** = Developer mode

› Telnet Interface (Configure →) **DEV**

Activate/deactivate the Telnet remote access feature.

› Power on Preset (Configure →)

Choose the Preset which will be loaded automatically on startup of the amplifier.

› Read-Only Preset Range (Configure →) **DEV**

Set the range of Presets which are read-only in User and Administrator access level.

› Auto Standby (Configure →)

Set the delay time after which the amplifier will go to standby automatically if no signal is present.

› Output Mode (Configure →)

Set the amplifier stage output mode to "Stereo" or "Bridge Mono".

› Display (Configure →)

Change the state of the display-backlight between "On", "Delayed Off" or "Dimmed".

› Lock Unit

The Unit will be set to the locked-state and can only be unlocked with a correct access level password.

› Go to Standby / Exit Standby

Enters or exits standby mode.

› Firmware Update

Performs a firmware update of the Unit. Updating the firmware will always reset all settings (i.e. access rights, passwords, Unit name, network settings, power-on Preset, read-only Preset range, auto-standby and display setting) to factory defaults and all Presets will be erased.

To avoid losing your settings and Presets you can either do a manual backup before the update or use the automatic backup and restore function offered during the update procedure.

Updating the firmware also can be used to reset the **ID4/ID7** amplifier to a blank state with default passwords and access rights.

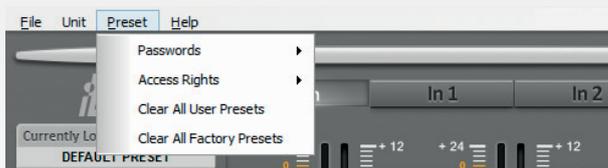
› Status Details

Opens a window with the current amplifier temperature, the load impedance and possible faults.

Please note that the impedance measurement might indicate 3,0 Ω in case no or only very small output signal is present (especially if no loudspeakers are attached). The impedance measurement is designed to work very accurately at mid to high output levels and with actual loudspeakers attached.

USER = User mode **ADM** = Administrator mode **DEV** = Developer mode

THE MENU STRUCTURE

5.2.3 “Preset”-menu **DEV**

› Admin Password

Change the Administrator password of the currently loaded Preset. If set, this Preset password will override the default Unit Administrator password as long as this Preset is active/loaded.

› Developer Password

Change the Developer password of the currently loaded Preset. If set, this Preset password will override the default Unit Developer password as long as this Preset is active/loaded.

⚠ Important

If set, Preset passwords always have a higher priority than the Unit passwords! For details see chapter “Managing the access rights and passwords”.

› User Access Rights

Set the User access rights for input- and output channel.

› Admin Access Rights

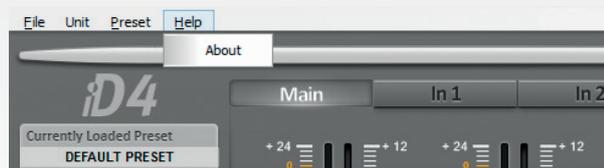
Set the Administrator access rights for input- and output channel.

› Clear All User Presets

Deletes all Presets from the amplifiers memory that are not set as ready-only Presets.

› Clear All Factory Presets

Deletes all Presets from the amplifiers memory that are set as read-only Presets (Factory Presets).



5.2.4 “Help”-menu

› About

Shows unit and application information (name, serial number, IP address, MAC address, firmware version, interface version, application version and build number).

6. Managing your Presets with the DSPControl software

6.1 “Save” – Save all Preset-related stuff inside the amplifier

The Preset is then stored to the Preset location currently selected in the Preset list, with the name typed in the “Currently Loaded Preset”-field in the upper left corner. Any previous Preset stored at this location will be lost when overwriting it with a new Preset.

6.2 “Load” – Load a Preset from the amplifier’s Preset list

Loads the selected Preset into the amplifier. Any unsaved changes to the previous Preset will be lost.

6.3 “Save to File” – Save all Preset-related settings to your computer

Pressing this button does *not* automatically store the Preset inside the amplifier. So if you want to store any changes both on your hard drive *and* inside the amplifier don’t forget to press the “**Save**” button as well.

6.4 “Load from File” – Load a single Preset from your computer into the amplifier

Pressing this button will *not* automatically store the Preset inside the amplifier. So if you want to store the freshly loaded Preset permanently inside the amplifier don’t forget to choose a location from the amplifier’s Preset list and to press the “**Save**” button.

6.5 “Backup all Presets to Folder” (→ “File”-menu)

Creates a backup of all Presets stored inside the amplifier to a folder on your computer’s hard drive. This procedure can take some time depending on the amount of Presets to be backed up. Only the Preset-related settings will be stored, not the Unit level settings. See the chapter “Preset Settings” for details.

6.6 “Restore all Presets from Folder” (→ “File”-menu)

Restores a previously created backup from a folder on your computer’s hard drive. This procedure can take some time depending on the amount of Presets to be restored. Only the Preset-related settings will be restored, not the Unit level settings.

Note

In case you want backup or restore a whole set of Presets we recommend to use the “Save Flash Image” and “Load Flash Image” options instead, because they work much faster.

For this you could prepare one dedicated binary backup with all Presets you need, and then simply upload it to another amplifier.

The only drawback is that all amplifier settings (including all passwords and access rights) will be overwritten with the values stored in the binary flash image backup. This might not be adequate for some application scenarios.

6.7 “Load Factory File” (→ “File”-menu)

Loads an old Factory File into your amplifier. Loading a Factory File will automatically change all access rights, passwords and settings to the values stored inside the Factory File.

But be aware that a certain combination of deactivated Unit access rights can effectively lock you out of the unit permanently if you don’t know the new passwords! So please make sure to only load Factory Files from trusted sources, which either:

- will allow at least a firmware update in User mode (which gives you the option to effectively reset the **ID4/ID7** amplifier to a blank state with all access rights granted) or ...
- will have their specific Administrator and Developer passwords published.

The best way to load a Factory File would be to carry out a firmware update first, in order to erase all old Presets. Otherwise all Presets stored to locations not included in the new Factory File will *not* be deleted.

Note that creating Factory Files is no longer supported since version v3.9.2. This feature has been replaced by the “Save Flash Image” and “Load Flash Image” options.

BACKUP & RESTORE PRESETS

6.8 “Load Flash Image” (→ “File”-menu)

v3.9.2 or higher

This will update the amplifier to the selected backup file which includes all amplifier settings, Presets, passwords, access rights and firmware version.

Please be careful to only load flash images from trusted or known sources. It's because you could possibly be locked out of the unit in case you don't know the Unit or Preset passwords inside the binary backup!

The amplifier will be switched into standby mode during the binary upload process.

6.9 “Save Flash Image” (→ “File”-menu, in Developer mode only)

v3.9.2 or higher

Creates a complete backup of all amplifier settings into a single file. This includes all amplifier settings, Presets, passwords, access rights and the firmware version.

The flash image backup should be used if you want to create an image (clone) of all amplifier settings. This gives you the option to easily set up your rolling stock of amplifier's to a defined state, without having to worry about configuring each amplifier individually.

Please do not use the flash image option if you only want to publish a set of Presets to your customers. This should be done with the load/save or backup/restore functions for individual Presets.

Note

It is possible to lock some or all of those load, save, backup and restore options in User and Administrator mode through the Unit Access Rights. For details see the chapter “Unit Settings” below.

7. Managing the access rights and passwords

In order to understand how the access rights are managed in the **ID4/ID7** amplifier, it is important to know that all passwords and access right settings are always stored and checked inside the amplifier.

This means that everytime you will for example switch to Developer mode in the software, the password is transferred to the amplifier and validated there. If the password is correct, the amplifier (and in turn also the DSPControl software) will switch to Developer mode, thus giving full access to all functions and settings. If the password was wrong, the amplifier will deny Developer access and the software will show the message "Invalid Password".

› Example 1

If you are not allowed to access the output settings of the currently loaded Preset, it will not be possible to change any output settings on the amplifier's display either.

Once entered the correct password in the DSPControl software, both the amplifier's display and the software will allow full access to the output settings.

› Example 2

If you enter Developer mode from the amplifier's display (through "►"-MENU → Access Level), the DSPControl software (if connected) will also automatically switch to Developer mode.

Secondly it is important to know that the Administrator and Developer password *can* be different for each Preset individually.

This means for example that if you load a Preset which has custom Admin and/ or Developer passwords you will need those passwords to access Admin or Developer mode. The default password stored at Unit level will *not* work anymore as long as this Preset is loaded and active.

By loading any another Preset without custom passwords (an empty Preset for example) you will again be able to access Admin or Developer Level with your well-known default Unit level passwords.



ACCESS RIGHTS HIERARCHY

8. The access rights hierarchy



DEVELOPER MODE

DEV The Developer mode always gives access to all functions of the **ID4/ID7** amplifier. Especially setting individual Preset access rights and passwords can only be done in Developer mode. The Developer always has the right to change all access rights and passwords for the lower access levels (Admin, User and Locked).

The default Developer mode password is: **CamcoDev**
The default access rights are: **all active** (cannot be restricted)



ADMINISTRATOR MODE

ADM The Administrator mode (abbreviation 'Admin') gives the option to allow a configurable intermediate access level which has less rights than the Developer level but more than the User level. It's up to the system Developer to decide which access rights are granted to system Administrators. Setting Admin access rights can only be done in the higher Developer mode, changing the default Admin password can be done directly in Admin mode (and in Developer mode of course).

The Administrator is normally allowed to change all access rights and passwords for the lower access levels (User and Locked).

The default Admin mode password is: **CamcoAdm**
The default access rights are: **all active**



USER MODE

USER This is the default access level when powering up the **ID4/ID7** amplifiers. So the amplifier will typically be operated in User mode. Setting the User access rights can only be done in the higher Admin or Developer mode, changing the default User password can be done directly in User mode (and in the higher Admin or Developer levels of course).

The User can be allowed to change all access rights for the lower Locked level, provided the User himself has been granted the specific access right.

› Example

If the User has not the right to change the amplifier name, he cannot in turn give the right to change the amplifier name in the locked state. The option will then not be available.

The default User password is: **User**
The default access rights are: **all active**



LOCKED MODE

LOCK This mode is typically used to prevent any intentional or unintentional changes both inside the DSPControl software and the amplifier's display, when for example leaving the DSPControl computer unsupervised. Once entered, a password for any higher access level (User, Admin or Developer) is needed to exit the locked mode.

The default access rights are: **all inactive** (locked)

💡 Note

It is basically possible to restrict the Administrator and User access rights to *less* than the lower Locked access mode. But then the lower access level would have *more* rights than the higher level, which might be confusing. This is up to the Developer or Administrator to decide.

9. Unit and Preset level access right options

		Developer mode	Admin mode	User mode	Locked mode
Stored inside UNIT	Load Presets Select if it's allowed to load any Presets from the amplifier's Preset list or from your computer's hard drive	always allowed	configurable in DEV	configurable in DEV & ADM	configurable in DEV , ADM & USER
	Save Presets Select if it's allowed to save any Presets inside the amplifier or to your computer's hard drive	always allowed	configurable in DEV	configurable in DEV & ADM	configurable in DEV , ADM & USER
	Enable Display Lock Control Select if it's allowed to lock the Unit from the amplifier's display	always allowed	configurable in DEV	configurable in DEV & ADM	not available
	Change User Access Rights Select if it's allowed to change the User access rights in Admin mode	available	not available	not available	not available
	Change Locked Access Rights Select if it's allowed to change the Locked access rights in Admin or User mode	always allowed	configurable in DEV	configurable in DEV & ADM	not available
	Change Unit Name Select if it's allowed to change the amplifier's name	always allowed	configurable in DEV	configurable in DEV & ADM	configurable in DEV , ADM & USER
	Change Unit Configuration Select if it's allowed to change the network settings, the auto-standby time and the power-on Preset	always allowed	configurable in DEV	configurable in DEV & ADM	configurable in DEV , ADM & USER
	Load an Empty Preset Select if it's allowed to load an empty Preset from the amplifier	always allowed	configurable in DEV	configurable in DEV & ADM	configurable in DEV , ADM & USER
Stored inside PRESET	Update the Unit firmware* Select if it's allowed to update the Unit firmware	always allowed	configurable in DEV	configurable in DEV & ADM	configurable in DEV , ADM & USER
	Access Input channel (panels)	always allowed	configurable in DEV	configurable in DEV	always locked LOCK
	Access X-Over and Output channels (panels)	always allowed	configurable in DEV	configurable in DEV	always locked LOCK

* Updating the firmware also can be used to reset the **iD4/iD7** amplifier to a blank state with default passwords and access rights. Also all Presets will be erased after firmware update.

USER = User mode **ADM** = Administrator mode **DEV** = Developer mode **LOCK** = Locked mode **LOCK** = Always locked

UNIT SETTINGS

10. The settings which are stored at Unit level

Meaning that those are always the same no matter which Preset currently is loaded, with one exception for the passwords, please see below. Changes to any of these settings will be stored immediately inside the amplifier.

> Default User, Administrator and Developer Passwords

Attention

Password override possible inside each Preset if programmed!

> Locked, User and Administrator Access Rights

Please see dedicated access rights table at chapter "The access rights hierarchy".

> Unit Name

Just type the desired name inside the text box on the left side of the amplifier panel or change it directly in the Network Panel (provided you have the right to change it).

> Network Settings

Either select automatic IP address configuration through your DHCP server or select a fixed IP address and subnet mask.

> Telnet Interface

You can also activate or deactivate the Telnet remote access to the amplifier.

> Power On Preset

Select which Preset shall be loaded automatically after powering up the **ID4 / ID7** amplifier.

> Read-Only Preset Range

Set a range of Presets which cannot be overwritten in Admin, User or Locked mode. Saving to those Preset locations will not be possible.

> Auto-Standby

Set the time after which the amplifier will go to Standby mode if no analogue *and* digital input signal was fed to the amplifier.

If the amplifier has been set into standby through the auto-standby function, automatic wakeup will only work if digital AES input signal is applied again. Applying analogue signal again will *not* wakeup the amplifier.

When using analogue input signal, exiting the automatic standby mode must be done manually through the amplifier's display or the DSPControl application. So please consider this carefully before using this function with analogue input signal.

> Display

Set the amplifier's display backlight status:

- On
- Delayed Off
- Dimmed

 = User mode  = Administrator mode  = Developer mode

11. The settings which are stored inside each Preset individually

Meaning that those settings might change when another Preset is loaded.

Note

Changes to any of these settings are *not* automatically stored inside the currently loaded Preset. So please don't forget to save all changes inside the amplifier by clicking on the "Save" button. If you don't save, all settings and changes will be lost if you switch the unit off or if you load another Preset.

› Custom Administrator and Developer passwords **DEV**

→ Blank/empty = Unit default:

The Admin or Developer level can be accessed through the default Unit passwords.

→ Any custom password:

If this Preset is loaded, then the Admin or Developer level can only be accessed with this custom password.

› User and Administrator Access Rights for accessing the Input or X-Over/Output panels **DEV**

Please see dedicated access rights table at chapter "Access Right Options".

› Amplifier Output Mode (Stereo or Mono Bridged)

Accessible through the menu "Unit → Configure → Output Mode → ..."

› And of course all audio settings configurable in the Main, Input, X-Over and Output panels

(e.g. input selection, volume, mute, EQ, delay, crossover, limiter settings and many more)

USER = User mode **ADM** = Administrator mode **DEV** = Developer mode

REMOTE ACCESS (TELNET)

12. Remote Access (Telnet)

Each Unit (with firmware v3.8.0 and higher) offers the option the access basic functions of the amplifier through a simple Telnet connection protocol, without the need of using the DSPControl application. With this feature the amplifier can be easily controlled over a 3rd party media control device, or even your smartphone for instance.

12.1 It offers following features

- Setting the Gain of each Input and Output channel
- Setting the Mute of each Input and Output channel
- Loading a Preset
- Setting the amplifier to standby
- Locating the amplifier (display blinking) to identify it in a larger system

The Telnet remote access works with the same access rights management than the DSPControl application.

This means that setting the gain and loading a Preset might be blocked if the amplifier's access rights have been restricted by the developer.

If those commands are sent over Telnet to a locked amplifier they will simply be ignored and nothing will happen.

Also please note that the graphical response of the DSPControl application to Telnet commands (if opened at the same time) might be extremely slow. Although the command is executed immediately inside the amplifier's DSP, it might take several seconds for the DSPControl application to display the changes.

Note

By default, Telnet is not installed/activated with Windows, but you can easily install it by a few simple steps. See chapter *"How to install/activate Telnet with Windows"* on page 32.

12.2 Protocol definition

For accessing the amplifier it is first of all needed to know it's the IP address. The access is initiated by following command (without quotation marks):

```
"telnet XXX.XXX.XXX.XXX 23"
```

It is important to add the "23" at the end for proper communication.

After a few seconds, the amplifier will respond with a welcome message and is then ready for receiving commands.

12.3 The available commands

"g": Set Gain (followed by channel index and gain value)

"m[x]": Mute/Unmute channel (followed by channel index) with [x] defined as:
'0'=Unmute, '1'=Mute
Default [x] value if not specified/omitted: '0'

"p[x]": Load Preset where [x] is the desired Preset number
Default [x] value if not specified/omitted: '1'

"s[x]": Set amplifier to standby with [x] defined as:
'0'=Exit Standby, '1'=Go to Standby
Default [x] value if not specified/omitted: '0'

"l": Locate Amplifier. Display is blinking

"e": Execute command (to apply the settings in the amplifier)

The parameters (for Gain and Mute commands)

"c[x]": Channel index with [x] defined as:
'1'=In1, '2'=In2, '3'=In3, '4'=In4, '11'=Out1, '12'=Out2
Default [x] value if not specified/omitted: '11'

"v[x]": Gain value with [x] defined gain value in 1/100 of dB
(e.g. '-100' = -1dB)
Default [x] value if not specified/omitted: '0'

Note

“e” must always be sent at the end of the command sequence in order to apply the changes to the amplifier.

Omitting to send the “e” at the end will simply ignore any previous commands and nothing will happen.

12.4 Examples

For setting the gain of output channel 1 to -3 dB type:
g [Enter] → c11 [Enter] → v-300 [Enter] → e [Enter]

For muting the output channel 2 type:
m1 [Enter] → c12 [Enter] → e [Enter]

For loading Preset no. 15 type:
p15 [Enter] → e [Enter]

For setting the amplifier to standby type:
s1 [Enter] → e [Enter]

For locating the amplifier type:
l [Enter] → e [Enter]

12.5 How to install/activate Telnet with Windows

Follow the steps below to install Telnet Client:

- 1 Go to the *Programs* setup page (usually to be found in the Control Panel) and then select *Turn Windows features on or off*. Then you will be prompted for administrative access rights, which have to be granted.
- 2 In the *Windows Features* dialog box, select the *Telnet Client* check box.
- 3 Click *OK*. The installation might take several minutes.

12.6 Using Telnet with OS X

You can use the built-in *Terminal* application found in the *Utilities* folder under *Applications*.

PRESET NOTICE

13. How to backup and restore old Presets

⚠ Important

Due to some changes in the Preset structure it is necessary to follow a certain procedure to transfer your old Presets from version v3.1.9/v3.6.5/v3.6.6 to the the latest version v3.9.2 (or higher).

Simply using the automatic backup and restore function (available when doing a firmware update from the amplifier panel) will not work for transferring Presets from very old firmware versions.

This feature can only be used for updates from v3.7.0 to v3.9.2 or higher versions.

Also old Factory files created in version v3.1.9 (and lower) are not compatible anymore and will fail to load correctly.

⚠ Important

Please note that in case you *don't* need to convert any of your old Presets you can of course skip this procedure and directly carry out an update from v3.1.9 to v3.9.2 (by using the firmware update "Option ②: Via the network panel's update button for a specific amplifier" on page 7).

13.1 How to transfer old Presets to version v3.9.2 (or higher)?

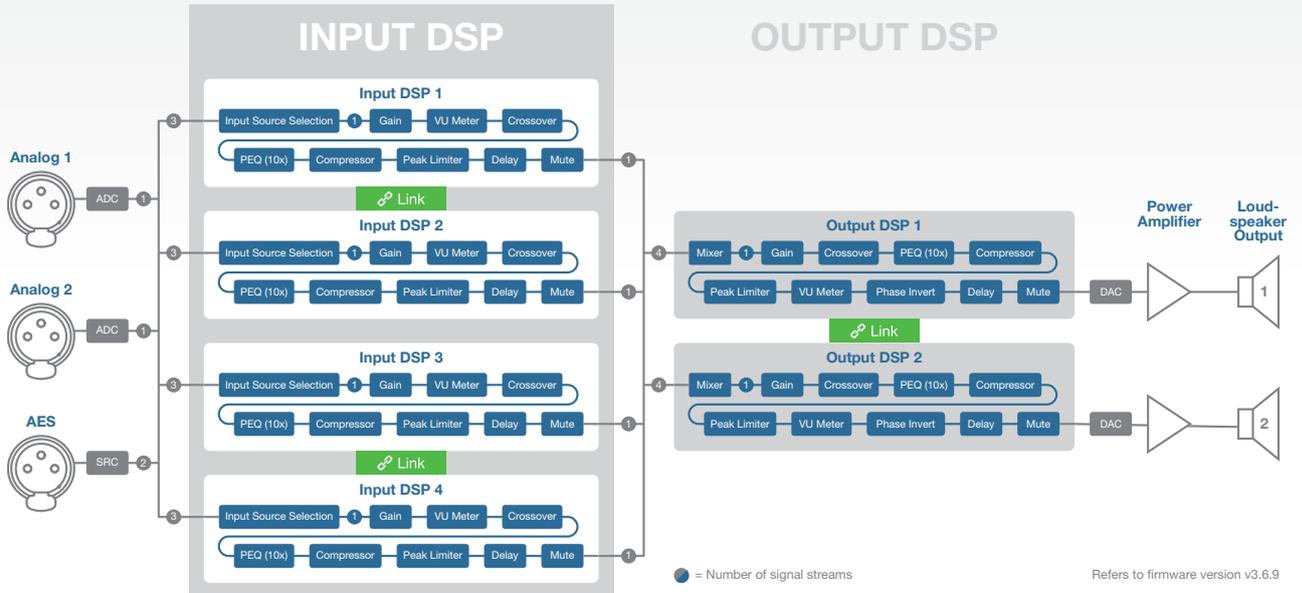
- ❶ Save your Presets with the (old) version you are currently using (v3.1.9, v3.6.5 or v3.6.6). Either one by one or by using the Backup Presets option.
- ❷ Install the version v3.9.2 (or higher) on your computer.
- ❸ Open the software and carry out a firmware update *without* creating an automatic backup of all amplifier settings.
- ❹ Then manually load your Presets back into the amplifier (one by one or with the "Backup all Presets from Folder" option).

Then you can optionally (if you want to protect your Presets now*):

- ❺ Switch to Developer mode.
- ❻ Set the new Preset level access rights (to lock/unlock input and output access) to your needs for *each* Preset individually by:
 - Loading the Preset in the amplifier.
 - Setting the desired User and Admin access rights and Admin and Developer custom passwords (optional).
 - Saving the Preset inside the amplifier.

* Locking Input and Output channel access is stored inside each Preset individually since version v3.6.5, not anymore inside the Unit access rights.

14. Signal Processing Block Diagram



UNIT CONVERSION EQUATIONS

15. Unit Conversion Equations and Lookup Table

15.1 Unit Conversion Equations

Unit conversion	Equation
$V_{RMS} \rightarrow \text{dBu}$	$\text{Level in dBu} = 20 * \log\left(\frac{\text{Value in } V_{RMS}}{0,7746}\right)$
$V_{RMS} \rightarrow \text{dBV}$	$\text{Level in dBV} = 20 * \log\left(\frac{\text{Value in } V_{RMS}}{1,0000}\right)$
$\text{dBu} \rightarrow V_{RMS}$	$\text{Voltage in } V_{RMS} = 0,7746 * 10^{\left(\frac{\text{Level in dBu}}{20}\right)}$
$\text{dBV} \rightarrow V_{RMS}$	$\text{Voltage in } V_{RMS} = 10^{\left(\frac{\text{Level in dBV}}{20}\right)}$
$V_{RMS} \rightarrow V_{Peak}$	$\text{Voltage in } V_{Peak} = 1,414 * (\text{Voltage in } V_{RMS})$
$V_{RMS} \rightarrow \text{Output power}$	8Ω $\text{Output power in } W = \frac{(\text{Voltage in } V_{RMS})^2}{8 \Omega}$
	4Ω $\text{Output power in } W = \frac{(\text{Voltage in } V_{RMS})^2}{4 \Omega}$
	2Ω $\text{Output power in } W = \frac{(\text{Voltage in } V_{RMS})^2}{2 \Omega}$

15.2 Lookup Table

V_{RMS}	V_{Peak}	dBu	dBV	Output power (in W / 8 Ω)	Output power (in W / 4 Ω)	Output power (in W / 2 Ω)
1	1,41	2,22	0,00	0,13	0,25	0,50
2	2,83	8,24	6,02	0,50	1,00	2,00
3	4,24	11,8	9,54	1,13	2,25	4,50
4	5,66	14,3	12,0	2,00	4,00	8,00
5	7,07	16,2	14,0	3,13	6,25	12,5
6	8,49	17,8	15,6	4,50	9,00	18,0
7	9,9	19,1	16,9	6,13	12,3	24,5
8	11,3	20,3	18,1	8,00	16,0	32,0
9	12,7	21,3	19,1	10,1	20,3	40,5
10	14,1	22,2	20,0	12,5	25,0	50,0
12	17,0	23,8	21,6	18,0	36,0	72,0
15	21,2	25,7	23,5	28,1	56,3	113
20	28,3	28,2	26,0	50	100	200
30	42,4	31,8	29,5	113	225	450
40	56,6	34,3	32,0	200	400	800
50	70,7	36,2	34,0	313	625	1250
60	84,9	37,8	35,6	450	900	1800
70	99,0	39,1	36,9	613	1225	2450
80	113	40,3	38,1	800	1600	3200
90	127	41,3	39,1	1013	2025	4050
100	142 ¹	42,2	40,0	1250	2500	5000
117	165 ²	43,6	41,4	1711	3422	6845
125	177	44,2	41,9	1953	3906	7813
141	199	45,2	43,0	2485	4970	9941
150	212	45,7	43,5	2813	5625	11250

¹ Max. peak voltage **id4** / ² Max. peak voltage **id7** / Values in grey are calculated only.
The **id4**/**id7** is not able to deliver these output powers in dual channel operation.

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