

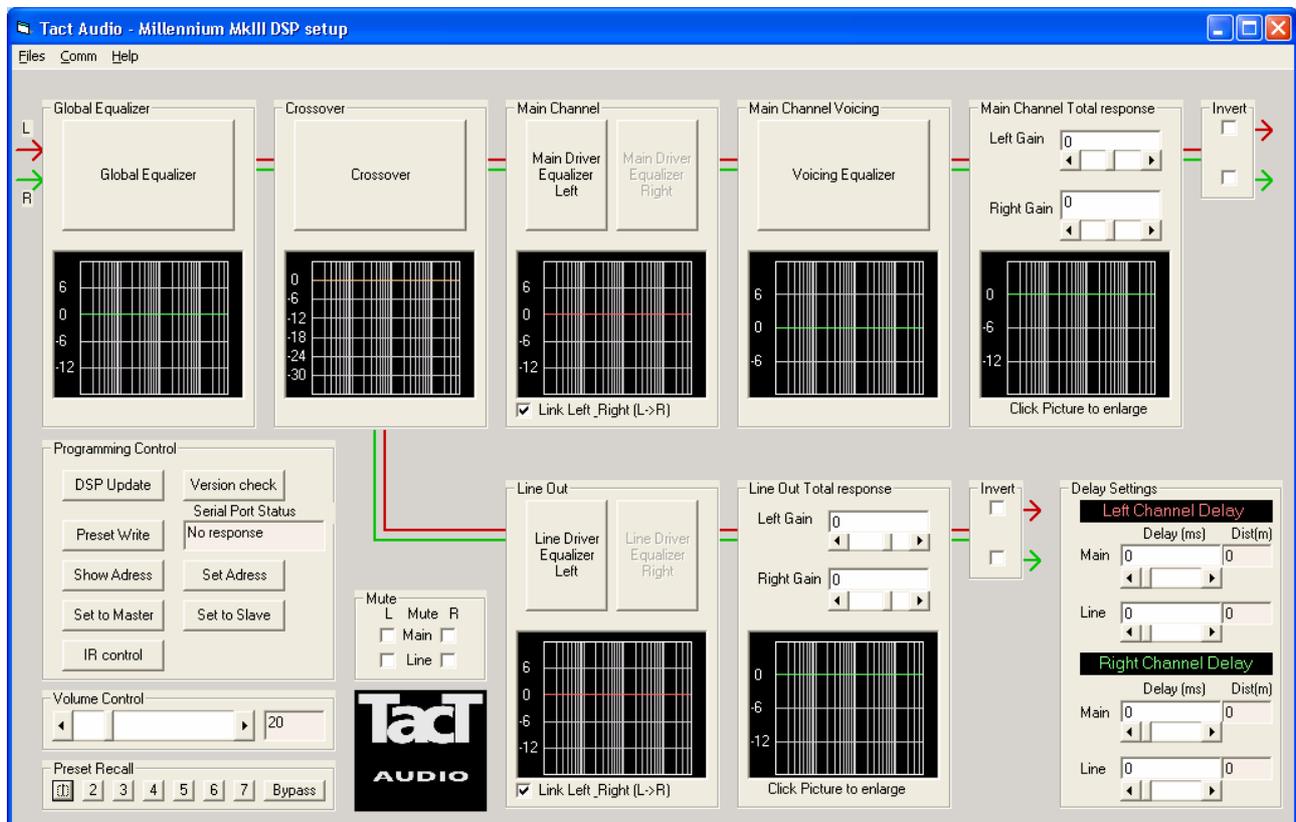
DSP Software Manual for Tact Millennium MkIII

Manual Rev. 1.1 based on DSP software v1.21 and MkIII firmware release 30.

Introduction:

The DSP software suite is the key to programming the presets of the Millennium MkIII thus taking advantage of the new DSP functionality embedded in the upgrade. The powerful DSP functionality of the Millennium can be used for both fitting main speakers to subwoofers or making active speaker systems with more processing power than most loudspeaker manufactures have present.

As a basic overview the GUI reflects the block diagram of the internal algorithm where the signal enters from the left side of the diagram and exits on the right. The “Main” channel is the main speaker outputs of the Millennium MkIII, and the “Line” channel is the Analog output from the DA Converter



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The Program is online connected to the Millennium with the supplied RS232 cable, so all changes can be tested immediately. If more than the simple functions are used it is highly recommended that an external measuring system is used for checking the loudspeaker response while equalising.

The manual will only cover the basic usage of the program, further examples on how to tune loudspeaker systems will be addressed in other documents.

Basic Operation:

Before starting the program it is recommended that the Millennium is turned on and connected to the PC's comm. Port 1 to 4. The communication settings can be altered under "Comm" in the top menu bar, where the active port can be chosen and the Comm address of the Millennium can be set, default address is 1. The active comm. Port must be free from other programs usage, e.g. resident programs for Palm cradles or modems, if not the Millennium DSP program can not open the port and an error message will be returned.

To establish contact to the Millennium a few basic settings needs to be synchronized between the PC software and the Millennium. First of all the communication speed needs to be the same from the PC and the Millennium – per default both the Millennium and the software is set to 9600 baud. The settings in the Millennium can be changed with the <VIDEO> button of the black RCS/TCS remote control, and the settings for the software are changed in the "Comm" menu.

Before all commands are active the Comm address – which is the Millenniums network address – must be set correct in the DSP software. If unkown the button "Show Adress" in the programming control panel can be used to show the actual address of the Millennium. The address is shown in the Serial Port Status window and in the display of the Millennium.

The Same address must be entered as network address in the "Comm" menu point "Com address" this will activate all functions in the DSP control software. A brief check can be done by changing the volume control setting which should cause a volume change on the Millennium.

Programming Control:

The programming control panel is already briefly touched in the above paragraph this panel is the most essential communication panel when working with the Millennium.

Besides the Show address button, the Programming control panel can also be used for setting the Network address of the Millennium once the communication is established. The set address button can be used for changing the network address of the Millennium connected. When changing addresses the normal usage is:

Address	Functionality	Comment
0	Reserved	Normally not used
1	Master	Master MkIII, TCS, RCS
2-..	Slave	Slave MkIII

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After changing address with success the Comm address in the DSP software is automatically changed to the new network address so the communication is maintained to the active Millennium.

Further network functionality is the Set to master/slave buttons which is used for changing the status of a Millennium to be either a master amplifier or a slave amplifier. The difference is that when two or more Millenniums are connected together the master amplifier will broadcast information about power status, volume, mute and preset changes to the slave amplifiers which in this way can be relay controlled by the master Millennium.

The latest software revision is checked by the “Version Check” button which displays the active Millenniums firmware revision in the serial port status window.

The DSP update and Preset write buttons are used for writing all current DSP information on filters, delays etc. to the Millennium but in two different ways.

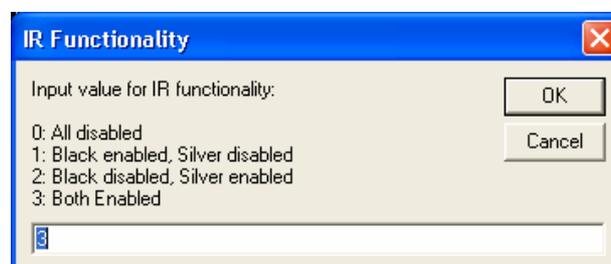
The DSP update writes all changes directly to the DSP’s in the Millennium thus changing the settings fast and efficient on line without storing anything. This feature is used during tuning or development of a setup because it is faster and it does not spoil any current preset settings.

Warning – this feature changes filter coefficients on the fly – so the amplifier can send out clicks and noise during the process, so do not exceed volume settings of 60.

The Preset write feature writes the current setting to the chosen preset thus overwriting the settings in the amplifier without notice, after success full writing of the preset the preset is activated. The preset write is slower than the DSP update because of the dual operation – writing to non-volatile memory and transfer to DSP’s.

The preset setting can be stored or recalled with the file utilities one at a time which is highly recommended as backup of the settings as e.g. a version change in the Millennium firmware will reset all parameters stored.

IR control is used for selecting the remote control functionality. Pressing this button opens a new window:



In the IR functionality window it can be selected which remote controls the Millennium will react to, from none to both the original Millennium “Silver” remote control and the black RCS/TCS remote control. Entering a number from 0 to 3 and pressing OK will activate the chosen remote(s).

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A long-press on the Millenniums (A) button will after this change the IR functionality between inactive and the selection functionality.

Preset Recall:

The presets stored in the Millennium can be recalled for AB tests by pressing the 1,2,3.. etc. but only the parameters in the Millennium are changed, the parameters in the DSP program are not altered, the recall panel only affects the settings in the Millennium. Default preset settings are 0 dB bypass through all channels with no delay.

Volume Control & mute:

The volume control slider is used for changing the volume control of the Millennium. The active change in the Millennium is implemented as a running change from the old to the new setting to avoid fast changes that may harm the speakers or the Millennium.

The mute panel is used for muting the channels one by one during development by ticking a channel it will be muted instantly.

Invert Panels:

The invert panels are used to invert the polarity of a channel – this setting is part of the DSP settings in a preset, so the channel is not inverted in the Millennium before the DSP's are updated with the "DSP update" or "Preset write".

Delay settings:

The delay of all 4 channels, 2 main and 2 line channels can be set individually. There is thus a limitation on the settings for left and right channel which will be explained in the following.

The internal memory of the DSP section allow for a total of approx 19.5 ms delay per side – so right side main and line channel share the memory and the total delay of the right side can not exceed this maximum. So if a delay of 15 ms is chosen for the main right channel, and a 10 ms delay is chosen for the right line channel the following error will show:



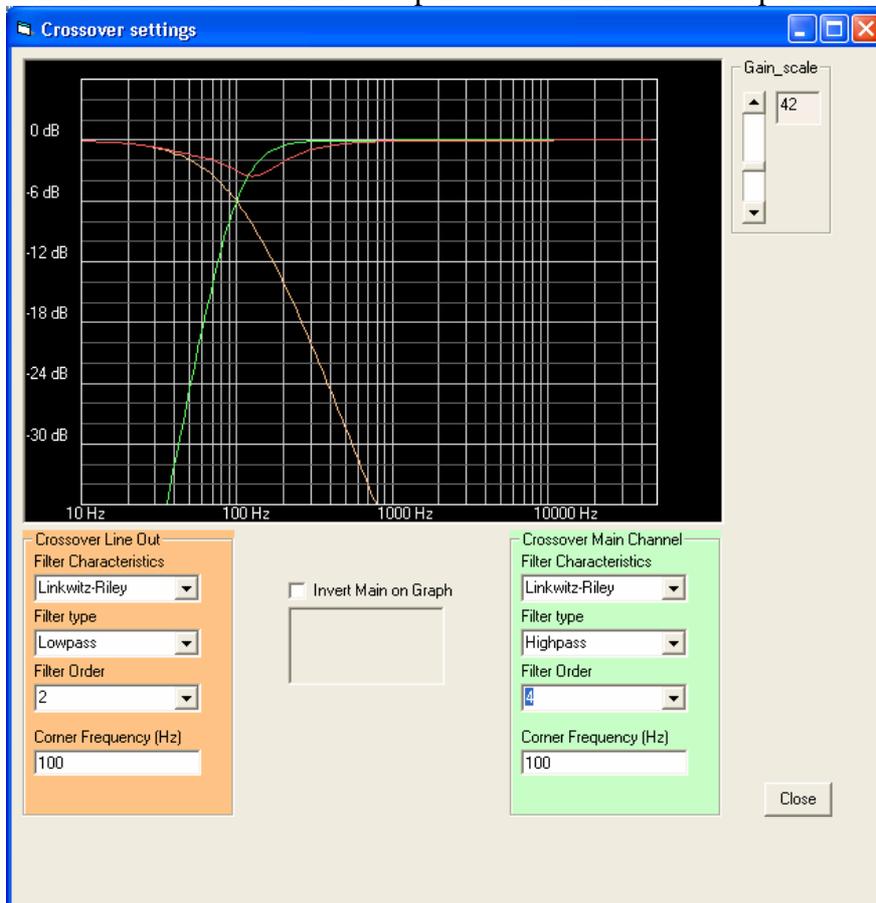
And the main channel will be reduced to the remaining 9.5 ms.

The delay settings are part of the preset settings and are not updated in the Millennium before the DSP's are updated with the "DSP update" or "Preset write".

Crossovers:

Clicking the crossover button or the graph opens the crossover window which sets the crossover between the main and line channels. For each of the channels there is a symmetric left/right side

setting available with either bypass or different filter responses. For a discussion of the different filters and selection of crossovers we refer to separate documents on loudspeaker tuning etc.



In the graph each crossover filter response is shown for the main and line output and as an indication of how the filter responses will add up electrically the sum is shown in red. Please note how e.g. Butterworth filters of odd order adds to perfect reconstruction as with Linkwitz-Riley filters where as even order Butterworth filters do not reconstruct directly to a flat response. Again we refer to a separate document on crossover filter choice.

The filter settings are not implemented in the Millennium before the DSP's are updated with the "DSP update" or "Preset write" when reverted to the main page. Return to the main page can be done with either the Close button or with the normal "X" close page button on the page frame.

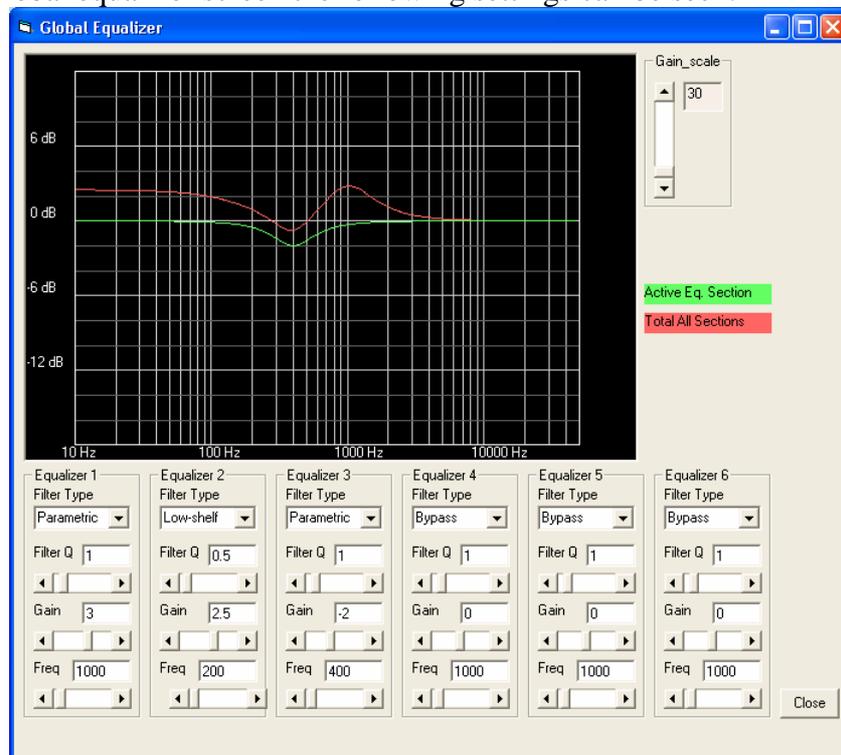
Equalizer sections:

All equalizer sections follow the same scheme so only the global equalizer is used as an example. Looking at the main page the signal flow is indicated with the green and red lines for left and right channel.

Global equalizer is used for global voicing of the signal to both the main speakers and the line outputs – this can e.g. be used for settings in the crossover region where the filter effect is wanted in both signal outputs. The global equalizer is implemented on both the left and right signal.

The Main channel and Line channel equalizers are intended for equalization of each channel independently. The left and right side can be either linked for symmetric speaker setup or adjusted individually by un-checking the link flag in the main window. The voicing equalizer is intended for use on the main speaker output only as a tone control to adjust the personal taste of the main speakers.

Looking at the Global equalizer screen the following settings can be seen:



There are 6 global equalizer sections available, each implemented as a second order section referred to as a Biquad filter. The filter can be bypassed or used as a parametric equalizer section or as a high-shelf or low-shelf section. For each section the Q, gain and center frequency must be given, and the active section response is shown in green in the graph and the total response in red.

The filter settings are not implemented in the Millennium before the DSP's are updated with the "DSP update" or "Preset write" when reverted to the main page. Return to the main page can be done with either the Close button or with the normal "X" close page button on the page frame.

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Total Response:

In the main page the total response frame shows the individual channels relative gain which can be used for fine tuning of sensitivity for each output relative to the volume control setting. A click on the total response shows the total response of the output in a large single screen.

Software updates and problems:

This software is under a running development with new features to be installed in the future, so please check the TacT audio website www.tactaudio.dk for the newest version of this manual and the software related to it.

If you have problems or questions please contact TacT Audio via the web www.tactaudio.dk