
# SetPre for MRI

## Gradient Amplifier Software
## User Manual

**Version 001**

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This manual describes the units as they are at the date of printing. On request, the manufacturer shall supply circuit diagrams, lists of components, descriptions, calibrating instructions and any other information for use by qualified personnel of the user, in charge of repairing the parts of the unit which have been stated by the manufacturer to be "repairable". Such supply shall in no event constitute permission to modify or repair the units or approval of the same.



This unit is not designed for any type of use which is not specifically described in this manual. Such use may be hazardous.

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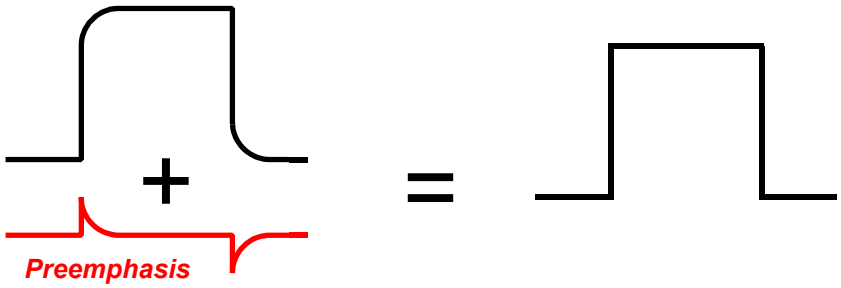
## What is SetPre used for ? 1.1

For electronic reasons, the gradient signal generated by the GCU is never exactly as expected (see Figure 1.1).

*Figure 1.1. GCU signal*


That's why it's necessary to create another signal which can be added with the GCU signal, in order to correct the distortion. This additional signal is the *preemphasis signal* (see Figure 1.2).

*Figure 1.2. Preemphasis correction*

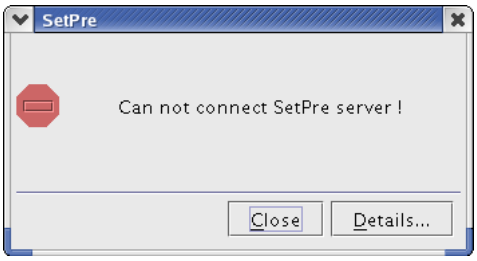



The SetPre program is the tool that must be used to set this preemphasis signal (the red curve on Figure 1.2).

## Starting SetPre 1.2

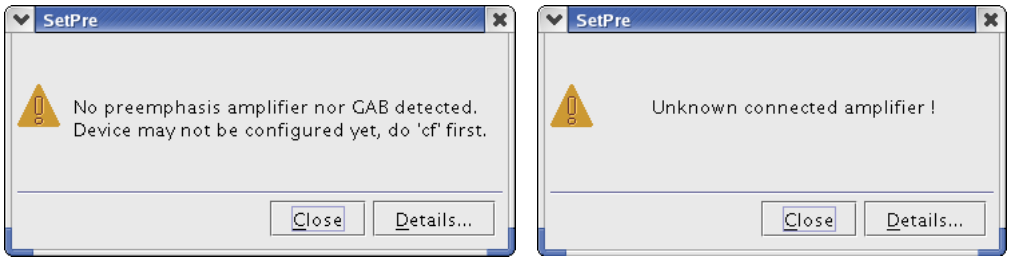
To start SetPre, use the item menu "**Tools**" ➪ "**Adjust Preemphasis Values**", in the ParaVision "**Spectrometer Control Tool**" window.
The GUI communicates with a server-program which controls the hardware (the gradient amplifier) and handles the parameters files. If the GUI does not manage to connect to this server (for example because of network troubles), the message shown on Figure 1.3 may be displayed.

*Figure 1.3. Server connection error*




If the server connection succeeds, then the server gets the current hardware configuration. If a suitable device is detected (a GAB, or a Master Unit, or any preemphasis amplifier), its associated graphical user interface is displayed (see ***"The Graphical User Interface" on page 9***). In the other case, one of the messages shown on Figure 1.4 may be displayed.

*Figure 1.4. Amplifier detection error*



## *How SetPre works* *1.3*

Even if it's started from ParaVision, SetPre runs in the TOPSPIN program. The first time you start SetPre, the connected device (GAB, BGU2, GREAT or Master Unit) is identified and the hardware parameters values are loaded. If you close SetPre *without closing TOPSPIN*, and then you start it again, this identification & loading step is not done again : it's assumed that the hardware configuration has not changed.

Afterwards, each parameter modification (via the GUI) is never sent to the hardware (this is the "cache mode"), unless you activate the "upload" button in the SetPre toolbar. Offset auto-adjustment and option items (in the "Options" menu) are exceptions : in these cases, the hardware is directly updated.

But in the other cases, the hardware updating is controlled by the acquisition module.

# Preemphasis tool for the gradient amplifiers

# The Graphical User Interface 2

## The common controls 2.1

### Device identification 2.1.1

On the upper left corner of the window, you can see which device is connected. The possible names are : "GAB", "BGU2", "GREAT 1/10", "GREAT 3/10" or "Master Unit".

On the lower right corner of the window, the current system status is indicated.

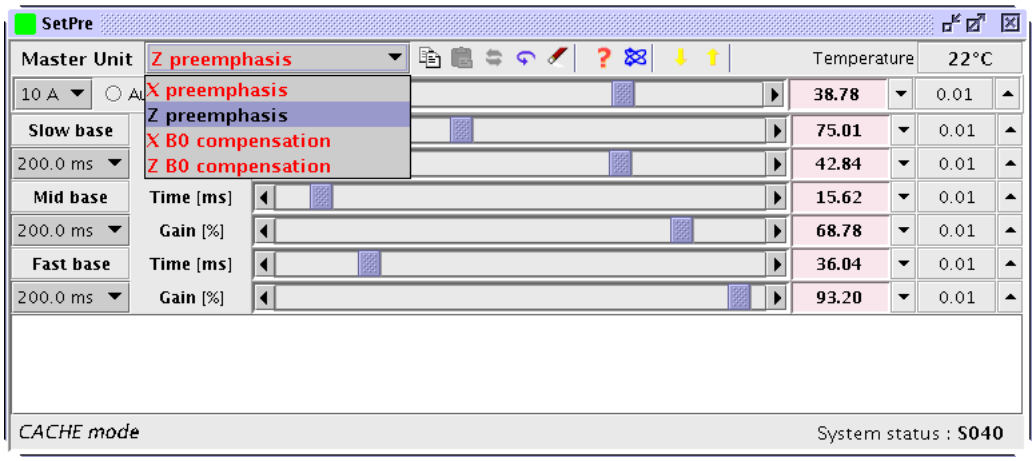
*Note : the GAB has no GUI, but the SetPre menu ("File" and "Edit") is available.*

### Channel control 2.1.2

The default selected channel is always **Z** (if it's available). But you can select any other channel in the pull-down list at the top of the window.

The content of this list depends on the current hardware configuration (see the example of the Master Unit, on Figure 2.1).

*Figure 2.1. Channel control*




| Device | Available channels |
|---|---|
| GAB | *none* |
| BGU2 | X,Y,Z,XB0,YB0,ZB0,YX,XY,XZ,ZX,ZY,YZ |
| GREAT 1/10 | Z |
| GREAT 3/10 | X,Y,Z |
| Master Unit | X,Y,Z,XB0,YB0,ZB0 (*) |

(*) Master Unit constraints :

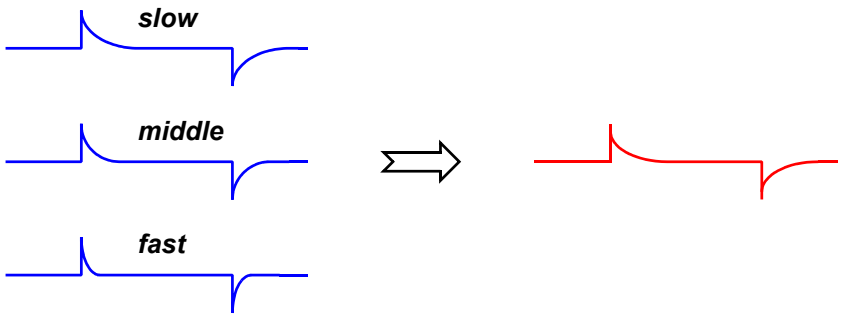
- X, Y and Z are available only if amplifier X, Y and Z resp. are connected
- XB0 available only if amplifier X *and* amplifier B0 are connected
- YB0 available only if amplifier Y *and* amplifier B0 are connected
- ZB0 available only if amplifier Z *and* amplifier B0 are connected

### *Preemphasis sliders* *2.1.3*

Preemphasis are generated by the amplifier controller itself.

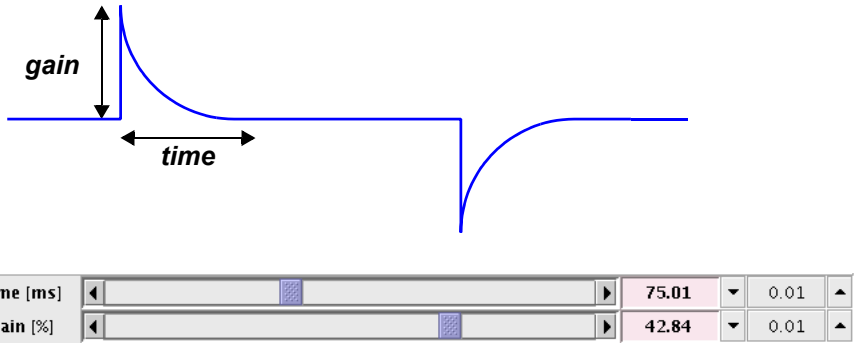
The preemphasis signal results from the addition of ***3 preemphasis curves*** (see Figure 2.2).

*Figure 2.2. Preemphasis signal*




Each curve is an exponential function defined by its gain and its time constant (see Figure 2.3).

*Figure 2.3. Preemphasis control*





**Time base** : "DC", "0.2 ms", "2.0 ms", "20 ms" or "200 ms"

**Time** : its lower limit is 0 ms, and its upper limit value depends of the selected time base (ex. : if time base is "200ms", then time max. is 200 ms).

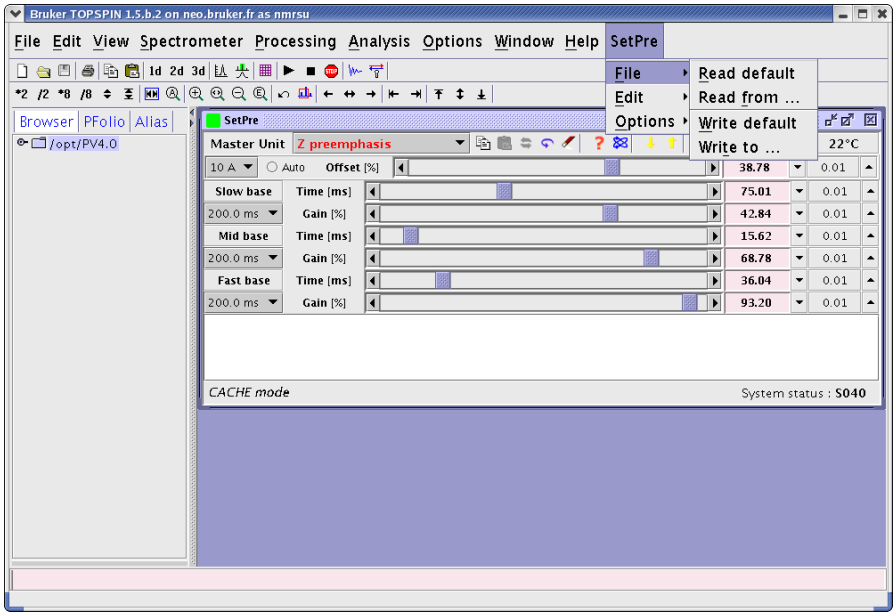
**Gain** : from ***-100% to 100%***

## *Read/Write parameters files* *2.1.4*

In the SetPre "File" menu, you may choose to read or write a parameter file (see Figure 2.4). You may select the file in a dialog box ("Read from…" or "Write to…"), or you may use the "default".

In any case, all the parameters file localisation depends on the current system status : *<PVHOME>/exp/stan/nmr/parx/preemp/<SYSTEMSTATUS>*.

*Figure 2.4. File menu*




## *The Toolbar* *2.1.5*

Parameters

For convenient reason, some parameters may be handled in memory.

**store** the current parameters in memory (*NOT* on the disk) :
- Preemphasis
- offset, impedance and loop parameters (GREATs only)
- amplifier gain (Master Unit only)

**recall** the stored parameters

**exchange** the current parameters with those which are stored

**undo** the modifications (set the initial values)

**clear** (set to null) the preemphasis gain values

Common

**help** : open this user's guide

**about** : open the "about" window (author information)

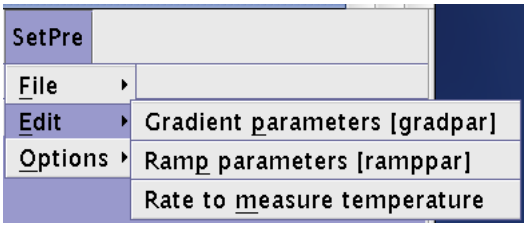
**download** the parameters from the hardware

**upload** the parameters to the hardware

### *GradPar and RampPar tools* *2.1.6*

From the "Edit" menu (see Figure 2.5), you can start the other tools "GradPar" (the gradient parameters GUI) and RampPar (the ramp parameters GUI).

*Figure 2.5. Edit menu*

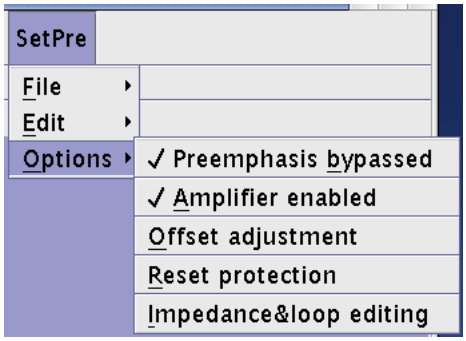



Gradient parameters and ramp parameters are stored where the other parameters (offsets, loop parameters, preemphasis, …etc) are stored, but the gradient parameters are also stored in the file <PVHOME>/conf/instr/gradient_calib.

### *Amplifier and Preemphasis activation* *2.1.7*

From the "Options" menu (see Figure 2.6), you can activate/deactivate each amplifier and each preemphasis correction. These options are available only for channels X, Y and Z.

*Figure 2.6. Options menu*




### *Reset protection* *2.1.8*

From the "Options" menu (see Figure 2.6), you can reset the amplifier protection.

## The amplifier-dependant controls 2.2

### Offset (all amplifiers except BGU2) 2.2.1

The preemphasis offset may be adjusted (from **-100%** to **100%**) thanks to the specific slider control (see Figure 2.7).

*Figure 2.7. Offset adjustment*

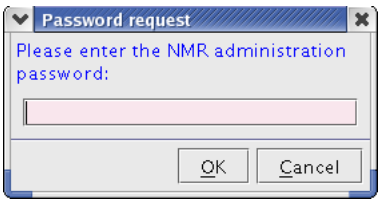

The "Auto" option may be activated to start the offset auto-adjustment. In this case, when the auto-adjustment is finished, the offset value is updated and the slider is adjusted too.

Those features are channel-dependant (each channel - X, Y and Z - has its own offset). It's possible to start the offset auto-adjustment of all the channels simultaneously, thanks to the menu item "Offset adjustment" in the "Options" menu (see Figure 2.6)

### Loop parameters (all amplifiers except BGU2) 2.2.2

You can access to the loop parameters from the item menu "Impedance&loop editing", in the "Options" menu (see Figure 2.6). The NMR administration password is required (see Figure 2.8).

*Figure 2.8. NMR administration password*



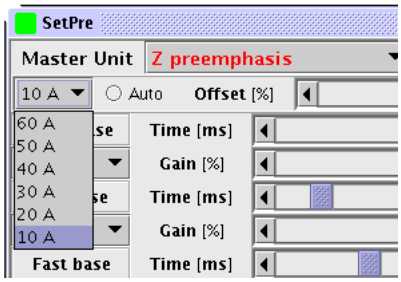

If the access is granted, specific sliders will be displayed. Use them to change the impedance value ("Low" or "High") and the capacitors and resistors values (from **0%** to **100%**, see Figure 2.9).

*Figure 2.9. Loop parameters*

### *Amplifier gain (Master Unit only)* 2.2.3

As you can see on Figure 2.10, you can select from 10A to 40A (or 60A, depending on which type of amplifier is connected).

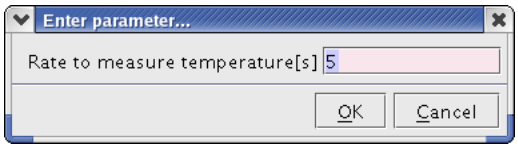
*Figure 2.10. Amplifier gain*




### *Rate temperature (all amplifiers except GREATs)* 2.2.4

The device internal temperature is displayed on the upper right corner of the SetPre window. It's value is refreshed every *X* seconds, where X may be set from the "Rate to measure temperature" item in the "Options" menu (see Figure 2.11).

*Figure 2.11. Rate to measure temperature*




### *Other controls (from the "Options" menu)* 2.2.5

- B0 compensation *(BGU2 and Master Unit only)*
- Gradient generation *(BGU2 only)*

# Figures

# Figures