



SetPre for NMR

Gradient Amplifier Software User Manual

Version 001



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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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Preemphasis tool for the gradient amplifiers

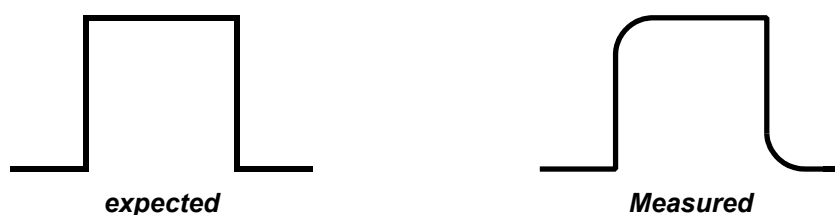
1

What is SetPre used for ?

1.1

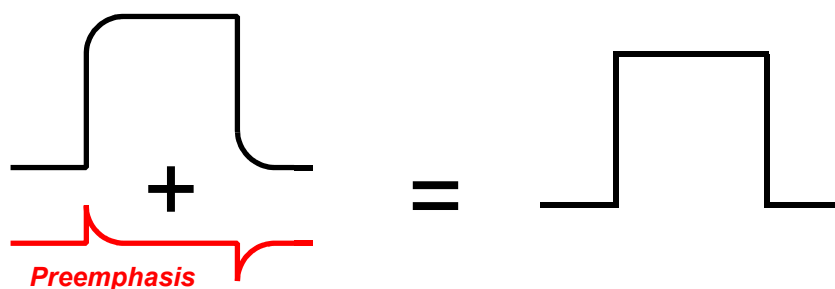
For electronic reasons, the gradient signal generated by the GCU/GCON is never exactly as expected (see Figure 1.1).

Figure 1.1. GCU/GCON signal



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

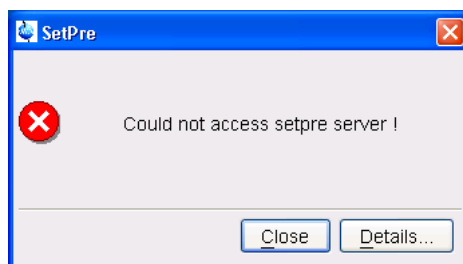
Figure 1.2. Preemphasis correction



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

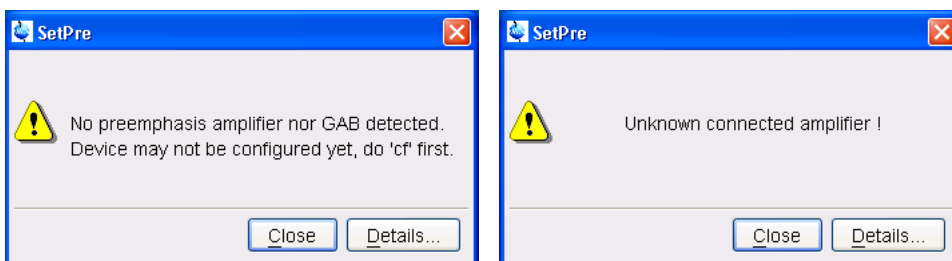
To start SetPre, type "**setpre**" in the TOPSPIN command line. The GUI communicates with a server-program which controls the hardware (the gradient amplifier) and handles the parameters files. If the GUI does not manage to connect to this server (for example because of network troubles), the message 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



You may start SetPre with the following options (the keyword must be preceded by the "-" character) :

-ii

This option forces the hardware detection (recommended if the connected amplifier has been changed).

-debug

In any case, while SetPre is running, it writes some "log" messages in a logfile, "setpre.log" (in <TOPSPINHOME>/prog/logfiles), like error messages and other main events.

The "debug" option simply makes SetPre more "talkative" : it will write more information in the logfile.

-probe

This informs SetPre that it must read the "default" parameters file associated to the current probehead (identified by its PROBEID), and then upload the parameters to the hardware. *No GUI is started.*

All the parameters files are stored on the disk in the directory :
<TOPSPINHOME>/exp/stan/nmr/parx/preemp/<PROBEID>

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 :

- AVANCE amplifiers :
"GAB", "BGU2", "GREAT 1/10", "GREAT 3/10" or "Master Unit".
- IPSO amplifiers :
"GREAT 3/10-E"

On the lower right corner of the window, the current probehead ID is indicated (you must define/create it with the command [edhead] before using setpre).



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

Channel control

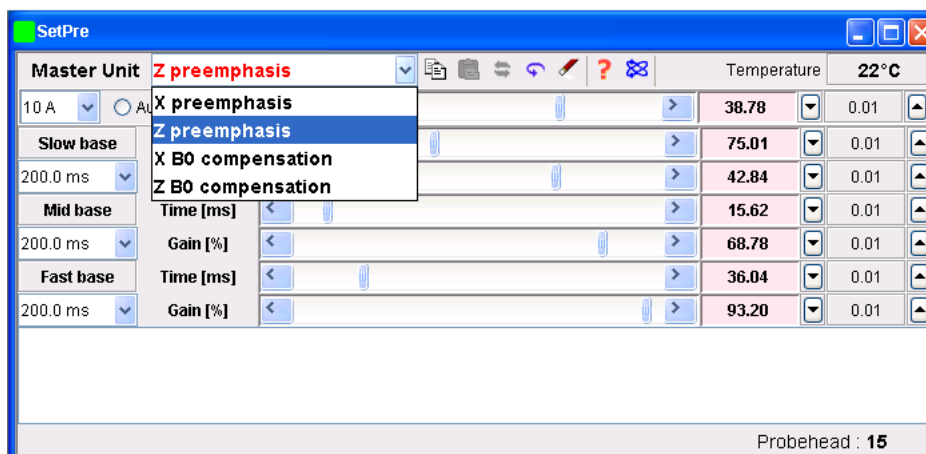
2.1.2

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).

The Graphical User Interface

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 (*)
GREAT 3/10-E	X,Y,Z,YX,XY,XZ,ZX,ZY,YZ

(*) 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

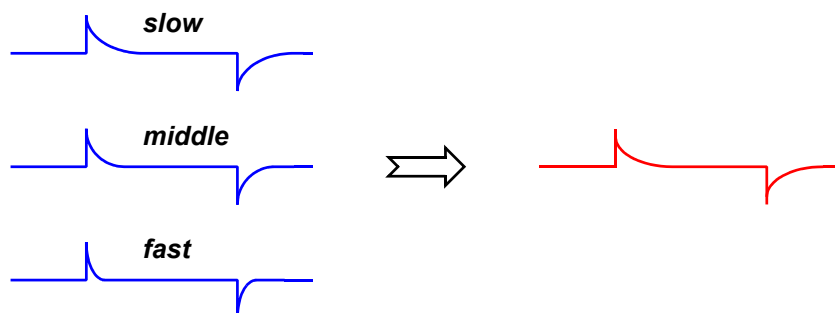
2.1.3

AVANCE amplifiers (BGU2, GREATs, Master Unit)

Preemphasis are generated by the amplifier controller itself.

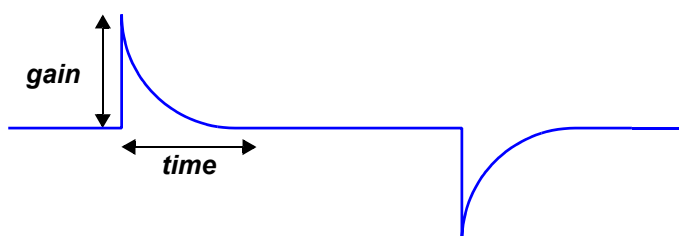
The preemphasis signal results from the addition of **3 preemphasis curves** (see Figure 2.2).

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



Slow base	Time [ms]	<	>	75.01	0.01
200.0 ms	Gain [%]	<	>	42.84	0.01

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%

IPSO amplifiers (GREAT 3/10-E)

Preemphasis are generated by the DPP board, plugged in the IPSO computer.

The preemphasis signal results from the addition of **6 preemphasis curves**.

Time base : "0.2 ms", "2.0 ms", "20 ms", "200 ms", "2 s" or "20 s"

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).

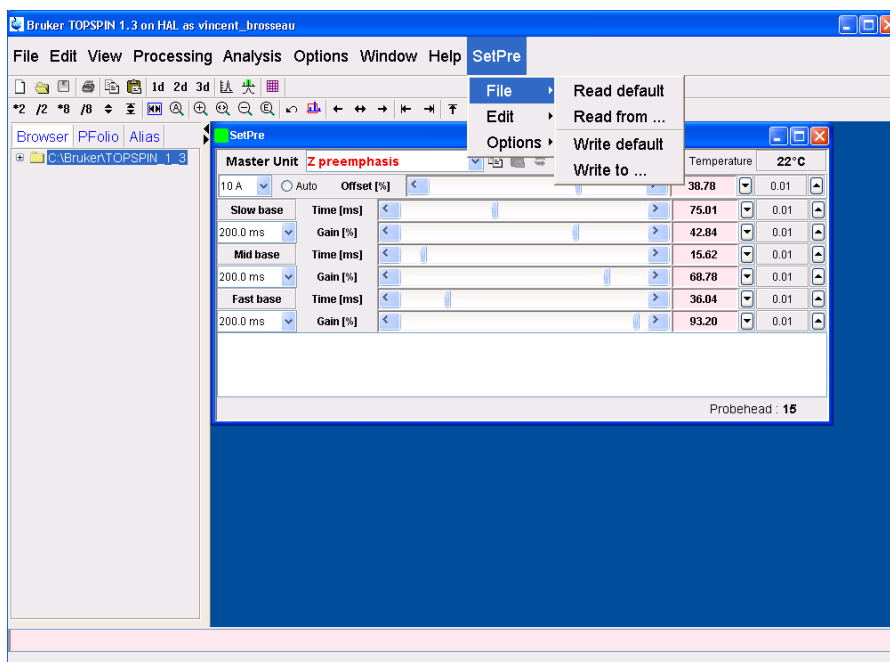
Gain : from -10% to 10%

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 probehead.

They are stored in `<TOPSPINHOME>/exp/stan/nmr/parx/preemp/<PROBEID>`.

Figure 2.4. File menu



Parameters

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

store the current parameters in memory (*NOT* on the disk) :



- Preemphasis
- Impedance (GREATs and Master Unit only)
- offset 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 the preemphasis gain values

Common



help : open this user's guide

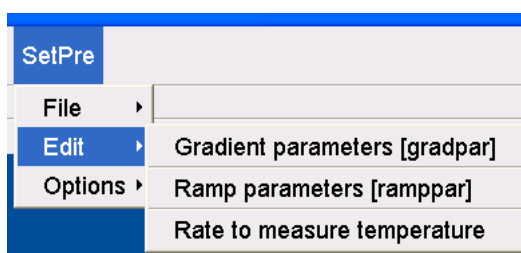
about : open the "about" window (author information)

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



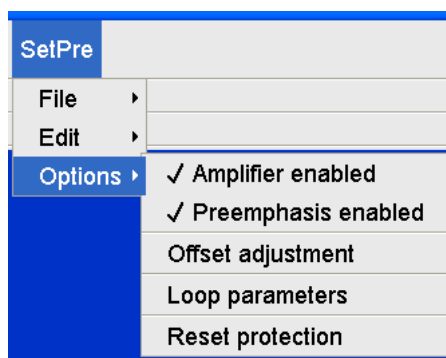
Gradient parameters and ramp parameters are stored where the other parameters (offsets, loop parameters, preemphasis, ...etc) are stored, but the gradient parameters are also stored in the file <TOPSPINHOME>/conf/instr/gradient_calib.

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.

Figure 2.6. Options menu



AVANCE amplifiers (BGU2, GREATs, Master Unit)

- amplifier activation : only for channels X, Y and Z
- preemphasis activation : only for channels X, Y and Z

The Graphical User Interface

IPSO amplifiers (GREAT 3/10-E)

- amplifier activation : only for channels X, Y and Z
- preemphasis activation : for all channels (depending of the connected device)

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.

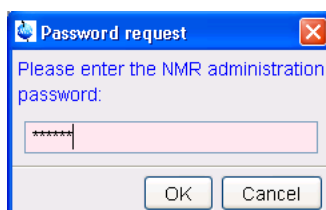
Those features are channel-dependant (each channel - X, Y and Z - has its own offset). It's possible to start the offset auto-adjustment of all the channels simultaneously, thanks to the menu item "Offset adjustment" in the "Options" menu (see Figure 2.6)

Loop parameters (all amplifiers except BGU2)

2.2.2

You can access to the loop parameters from the item menu "Loop parameters", 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

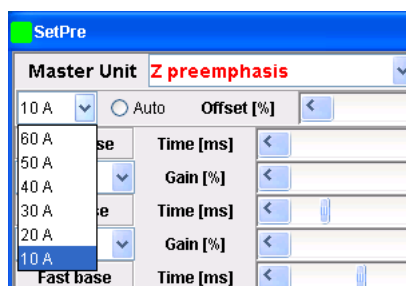
Impedance	Resistors [%]		33.3		0.1	
High	Capacitors [%]		40.7		0.1	

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

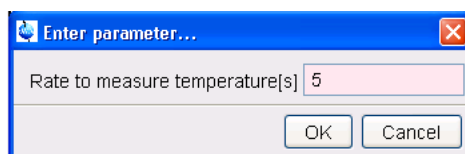


Rate temperature (all amplifiers except GREATs)

2.2.4

The device internal temperature is displayed on the upper right corner of the Set-Pre 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 temperature



Other controls (from the "Options" menu)

2.2.5

- B0 compensation (BGU2 and Master Unit only)
- Gradient generation (BGU2 only)
- Blanking inhibited (IPSO amplifiers only)

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