

## 4 – The Dashboard

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The NTNMR Dashboard displays the parameter values stored in the data file, and allows the user to modify them for a new experiment.

### 4.1 Displaying the Dashboard

Acquisition	Frequency	Multi Rec.	Processing	Grad. Preemph.	Misc.	Sequence	
Nucleus	H1	Scans 1D	16	Points 2D	1	SW 2D	5000.0 Hz
Observe Freq.	270 MHz	Actual Scans 1D	16	Actual Points 2D	1	SW 3D	5000.0 Hz
Acq. Points	1024	Scan Start 1D	1	Points Start 2D	1	SW 4D	5000.0 Hz
Points 1D	1024	Repeat Times	1	Points 3D	1	Dwell_2D	100u
SW +/-	5000.0 Hz	S.A. Dimension	1	Actual Points 3D	1	Dwell_3D	100u
Filter	5000.0	Dummy Scans	0	Points Start 3D	1	Dwell_4D	100u
Dwell Time	100u	Receiver Gain	0	Points 4D	1	Grd. Theta	0.00
Acq. Time	102.4m	Receiver Phase	0	Actual Points 4D	1	Grd. Phi	0.00
Last Delay	1s	Grd. Orientation	XYZ	Points Start 4D	1		

When the Dashboard button is activated and the Dashboard window is opened, parameters from the data file will appear. This window displays a categorized list of parameters for acquisition and processing.

*The Dashboard window displays the parameters that are read from the data file. Changing the values for parameters displayed in the Dashboard window does not affect the parameters stored with the data file, unless the data is written to a file by using the **Save** command.*

### 4.2 Working with the Dashboard

The dashboard contains several tools that facilitate quick access to information available as well as manipulation of the appearance of the Dashboard.

#### Re-sizing the Dashboard

The Dashboard is a “dockable” window. In the “docked” state, you can resize it vertically by dragging the sash-bar. In the “undocked” state, the mouse pointer changes while hovering over the Dashboard window edges indicating that it can be resized by dragging the mouse pointer while holding the left mouse button down. It can also be resized by dragging the gripper-control.

If there are too many parameters to display, a scroll bar will be activated at the bottom of the window to allow scrolling to the parameters out of the current view.

## Tabs

The parameters in the dashboard are organized under several categories that appear as a row of tabs along the top of the dashboard. Left-clicking on any tab will update the display to show all of the parameters in that category. Note that not all parameters are editable. Some parameters such as "Actual Scans 1D" are provided for informational purposes and are not editable.

**The Tab Button:** 

Clicking on the Tab button will hide the category tabs along the top of the Dashboard.

**Real Time Adjustment Mode Button:** 

This button activates the Real Time Adjustment Mode for interactively adjusting experimental parameters. See the Chapter on Pulse Sequences for more information.

**The Scroll Button:** 

The Scroll button can be used to page through the various Dashboard parameter display categories. Each left-click will cause the display to jump to the next tab and update the display. This button is functional regardless of whether the tabs are currently visible.

**The Text Size Buttons:** 

The up and down size buttons allow the size of the Dashboard text to be increased and decreased. Left-clicking either size button will cause the display to be refreshed with an increase or decrease of 1 point in the font size.

**The Customize Button:** 

Clicking on this button (Dashboard Customize) in the Dashboard toolbar allows the user to customize the dashboard display. See the section below for more details.

**Variable Editor Button:** 

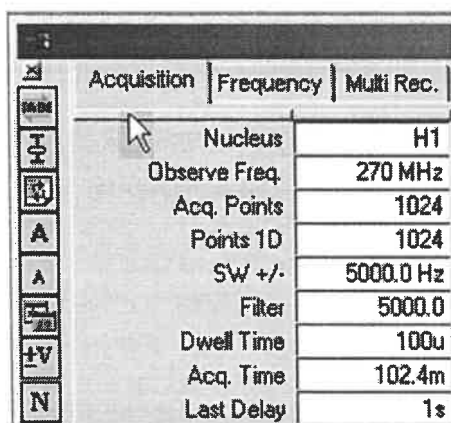
Clicking on this button on the dashboard opens the Variable Editor window, discussed below in more detail in the section on sequence variables.

**Dashboard View Toggle button:**  (Value mode)  (Formula mode)

Clicking this button toggles the dashboard display between the default “formula” or mathematical expression display, and the “value” display mode. See the section below on sequence variables and mathematical expressions for more detail.

## The Justification Bars (See diagram below)

Left-clicking on the justification bars above the parameter descriptions and values will alternately change the justification from left to right. The white arrow points to the justification bar on the diagram below.



	Acquisition	Frequency	Multi Rec.
Nucleus			H1
Observe Freq.			270 MHz
Acq. Points			1024
Points 1D			1024
SW +/-			5000.0 Hz
Filter			5000.0
Dwell Time			100u
Acq. Time			102.4m
Last Delay			1s

When the Dashboard window is active, use the [TAB] key to scroll through the list, or select a field by left-clicking and hit [RETURN] or [ENTER] to complete any entry.

## Multiple Files

There is only one Dashboard window. When multiple files are open, the Dashboard displays the parameters for the dataset associated with the “active” (frontmost) window. Clicking on another window will cause the dashboard to update and display the parameters for that window.

*If a field on the Dashboard is highlighted for editing, clicking another Data Window will cause the highlighted parameter value to be transferred*

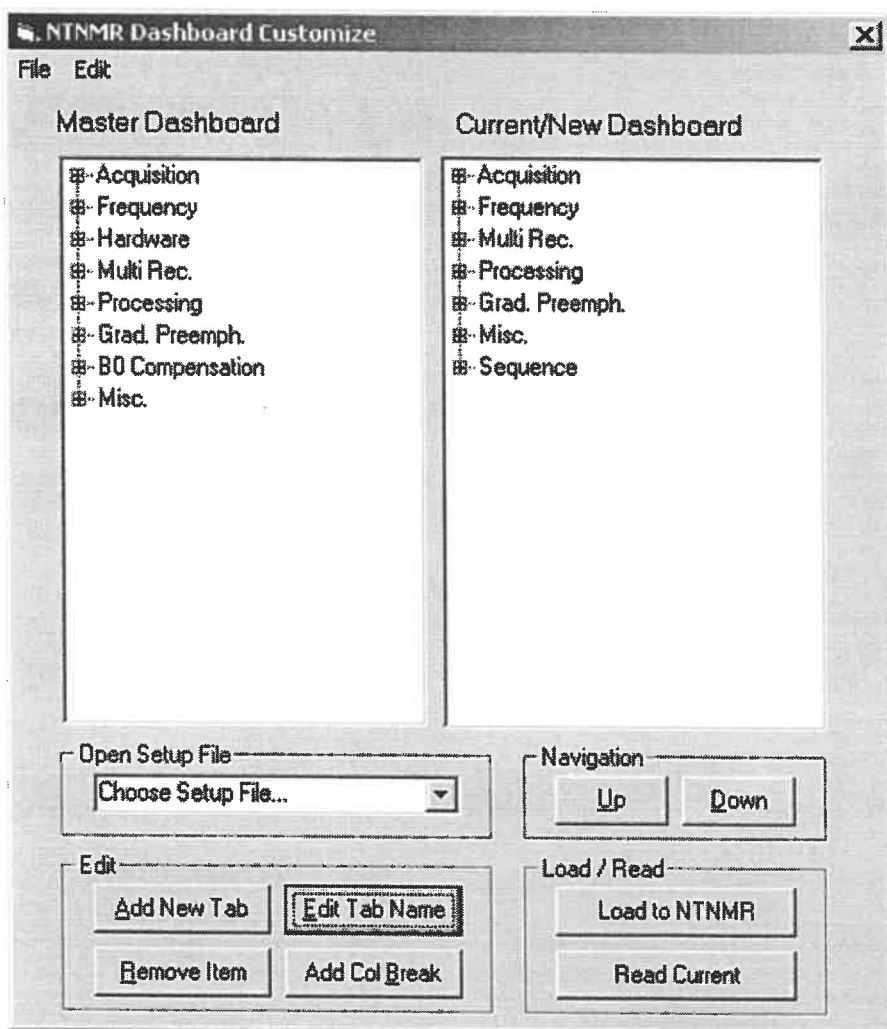
to the new window. This can be useful for updating some parameters such as spectrometer frequency or pulse widths, but must be used with caution.

## 4.3 Customizing the Dashboard

The Customize Button:



Clicking on the button (Dashboard Customize) in the Dashboard toolbar will launch the Dashboard Customize applet that allows the user to choose from a pre-saved list of dashboard configurations, load a pre-saved dashboard configuration from disk, or to customize and save a new dashboard configuration.



Most of the features of this window are self-explanatory. To place a parameter in the Current/New Dashboard, select the tab on the right-hand side where the parameter is to

appear. Then double-click the parameter name in the left-hand column. It will be added at the bottom of the list for the highlighted tab on the right. The position can then be changed with the Up/Down buttons.

The changes do not take affect until "Load to NTNMR" is clicked.

## 4.4 Dashboard Parameters

### Master Parameters

\*The following codes are used to indicate the functionality of dashboard parameters:

- 1 = editable by the user
- 2 = not editable by the user
- 3 = information field only, no hardware significance
- 4 = may not be functional on all hardware types

Dashboard Parameters			
Parameter	Function	Default Tab	Info*
Date	Display the NTNMR file creation date	Misc.	1,3
Magnet Field	Magnetic field in Tesla	Misc.	1,3
F1 Ref. Freq.		Misc.	1
Absolute Freq.		Misc.	2
Exp. Start Time	Time the current experiment was started	Misc.	2
Exp. Finish Time	Estimated time the current experiment will finish	Misc.	2
Exp. Elapsed Time	Estimated time the current experiment has been running	Misc.	2
Trans. Gain	Transmitter power	Hardware	1
Receiver Gain	Receiver gain	Hardware	1
Receiver Gain Ch1	Channel 1 receiver gain	Hardware	1, 4
Receiver Gain Ch2	Channel 2 receiver gain	Hardware	1, 4
DEC Attn	Parameter for the de-coupler power	Hardware	1, 4
DEC BW	Modulation for the de-coupler power	Hardware	1, 4
Set Temp	VT temperature parameter (K)	Hardware	1, 4
Actual Temp		Hardware	2, 4

Set Spin Rate	Sample spinning speed	Hardware	1, 4
Actual Spin Rate		Hardware	2, 4

Dashboard Parameters cont.			
Parameter	Function	Default Tab	Info*
Lock Solvent	Lock Solvent	Hardware	1, 4
Lock Field		Hardware	1, 4
Lock Power	Lock transmitter value, as shown in the Lock Console (see Chapter 2)	Hardware	1, 4
Lock Gain	Lock receiver value, as shown in the Lock Console (see Chapter 2)	Hardware	1, 4
Lock Phase	Lock phase value, as shown in the Lock Console (see Chapter 2)	Hardware	1, 4
Lock PPM		Hardware	1, 4
Shim Units	The sum of the magnitude calculations for all points, used as a shimming rating	Hardware	2
Observe Freq.	Observe frequency in MHz determined by the Observe Ch.	Frequency	1
Observe Ch.	Assigns which transmitter channel is assigned for 'observe' (1-4)	Frequency	1
F1 Freq.	F1 frequency in MHz (F1 base + F1 offset)	Frequency	1
F1 Base	Base observe frequency in MHz	Frequency	1
F1 Offset	Added observe frequency in kHz	Frequency	1
Fn Freq.	Fn frequency in MHz (Fn base + Fn offset)	Frequency	1, 4
Fn Base	Base Fn frequency in MHz	Frequency	1, 4
Fn Offset	Added Fn frequency in kHz	Frequency	1, 4
Nucleus	Display the observation nucleus	Acquisition	3
Points 1D	Number of complex data points (input is adjusted to 2n), any change to this will change Acquisition Points if the Hardware Preference is on for tracking	Acquisition	
Acq. Points	number of complex data points actually sampled (not necessarily 2n, but must be less than or equal to Points 1D), any change will not change Points 1D	Acquisition	1
SW +/-	spectral width in Hz, +/- (editing SW+/- will also change the Dwell Time)	Acquisition	1
Filter	audio filter setting	Acquisition	1, 4
Dwell Time	time per complex point in seconds given by (2*SW+/-)-1 (editing Dwell Time will also change the SW+/-)	Acquisition	1

Dashboard Parameters cont.			
Parameter	Function	Default Tab	Info*
Acq. Time	Displays the Points 1D * Dwell Time	Acquisition	2
Scans 1D	Number of averages/accumulations requested	Acquisition	1
Actual Scans 1D	Number of averages/accumulations actually completed	Acquisition	2
Dummy Scans	Number of scans without data averaging before acquisition starts	Acquisition	1
Scan Start 1D	Sets the starting scan number (1D)	Acquisition	1
Last Delay	The delay of the last event in a pulse sequence (entered in as a number followed by a unit), used to set the delay between scans	Acquisition	1
SW nD	Spectral width for the n dimension (where n can equal 2, 3, or 4).	Acquisition	1
Dwell_nD	Dwell time for the n dimension	Acquisition	1
Points nD	Number of data points in the n dimension	Acquisition	1
Actual Points nD	Number of points actually collected in the n dimension	Acquisition	2
Points Start nD	Starting point for the n dimension	Acquisition	1
Repeat Times	Number of times to repeat the entire experiment. Used for nD experiments only. Data from each dimension will be added Repeat Times value number of times	Acquisition	1
S.A. Dimension	Sets the dimension (1-4) in which the signal averager will accumulate data- see the pulse sequence chapter for more information.	Acquisition	1
S.A. Mode	Sets behavior of the Signal averager for the dimension specified in S.A.Dimension- see the pulse sequence chapter for more information.	Acquisition	1
DC.x	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
DC.y	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
DC.z	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
A0.x	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
A0.y	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
A0.z	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
A1.x	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
A1.y	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
A1.z	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
A2.x	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
A2.y	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
A3.x	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4

Dashboard Parameters cont.			
Parameter	Function	Default Tab	Info*
A3.y	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
A3.z	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
A4.x	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
A4.y	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
A4.z	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
A5.x	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
A5.y	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
A5.z	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
T1.x	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
T1.y	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
T1.z	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
T2.x	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
T2.y	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
T2.z	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
T3.x	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
T3.y	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
T3.z	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
T4.x	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
T4.y	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
T4.z	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
T5.x	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
T5.y	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4

Dashboard Parameters cont.			
Parameter	Function	Default Tab	Info*
T5.z	Gradient pre-emphasis parameter	Grd. Preemph.	1, 4
DC.bx	Gradient pre-emphasis parameter	B0 Compensation	1, 4
DC.by	Gradient pre-emphasis parameter	B0 Compensation	1, 4
DC.bz	Gradient pre-emphasis parameter	B0 Compensation	1, 4
A0.bx	Gradient pre-emphasis parameter	B0 Compensation	1, 4
A0.by	Gradient pre-emphasis parameter	B0 Compensation	1, 4
A0.bz	Gradient pre-emphasis parameter	B0 Compensation	1, 4
A1.bx	Gradient pre-emphasis parameter	B0 Compensation	1, 4
A1.by	Gradient pre-emphasis parameter	B0 Compensation	1, 4
A1.bz	Gradient pre-emphasis parameter	B0 Compensation	1, 4
A2.bx	Gradient pre-emphasis parameter	B0 Compensation	1, 4



A2.by	Gradient pre-emphasis parameter	B0 Compensation	1, 4
A2.bz	Gradient pre-emphasis parameter	B0 Compensation	1, 4
A3.bx	Gradient pre-emphasis parameter	B0 Compensation	1, 4
A3.by	Gradient pre-emphasis parameter	B0 Compensation	1, 4
A3.bz	Gradient pre-emphasis parameter	B0 Compensation	1, 4
A4.bx	Gradient pre-emphasis parameter	B0 Compensation	1, 4
A4.by	Gradient pre-emphasis parameter	B0 Compensation	1, 4
A4.bz	Gradient pre-emphasis parameter	B0 Compensation	1, 4
A5.bx	Gradient pre-emphasis parameter	B0 Compensation	1, 4
A5.by	Gradient pre-emphasis parameter	B0 Compensation	1, 4
A5.bz	Gradient pre-emphasis parameter	B0 Compensation	1, 4
T1.bx	Gradient pre-emphasis parameter	B0 Compensation	1, 4
T1.by	Gradient pre-emphasis parameter	B0 Compensation	1, 4
T1.bz	Gradient pre-emphasis parameter	B0 Compensation	1, 4
T1.bx	Gradient pre-emphasis parameter	B0 Compensation	1, 4
T1.by	Gradient pre-emphasis parameter	B0 Compensation	1, 4
T1.bz	Gradient pre-emphasis parameter	B0 Compensation	1, 4
T2.bx	Gradient pre-emphasis parameter	B0 Compensation	1, 4
T2.by	Gradient pre-emphasis parameter	B0 Compensation	1, 4
T2.bz	Gradient pre-emphasis parameter	B0 Compensation	1, 4
T3.bx	Gradient pre-emphasis parameter	B0 Compensation	1, 4
T4.bx	Gradient pre-emphasis parameter	B0 Compensation	1, 4
T5.bx	Gradient pre-emphasis parameter	B0 Compensation	1, 4
T5.by	Gradient pre-emphasis parameter	B0 Compensation	1, 4
T5.bz	Gradient pre-emphasis parameter	B0 Compensation	1, 4

Dashboard Parameters cont.			
Parameter	Function	Default Tab	Info*
Obs. Freq. Rec1	Observed Frequency for Ch1 Receiver	Multi Rec.	1, 4
Obs. Ch. Rec1	Observed channel for Ch1 Receiver	Multi Rec.	1, 4
Rec. Gain Ch1	Gain of Ch1 Receiver	Multi Rec.	1, 4
Rec. Phase Ch1	Phase of Ch1 Receiver	Multi Rec.	1, 4
Acq. Points Rec1	Acquisition point of Ch1 Receiver	Multi Rec.	1, 4
SW +/- Rec1	Spectral width of Ch1 Receiver	Multi Rec.	1, 4
Filter Rec1	Audio filter setting for Ch1 Receiver	Multi Rec.	1, 4
Dwell Time Rec1	Dwell time for Ch1 Receiver	Multi Rec.	1, 4
Acq. Time Rec1	Acquisition time in Ch1 Receiver	Multi Rec.	1, 4
Obs. Freq. Rec2	Observed Frequency for Ch2 Receiver	Multi Rec.	1, 4
Obs. Ch. Rec2	Observed channel for Ch2 Receiver	Multi Rec.	1, 4
Rec. Gain Ch2	Gain of Ch2 Receiver	Multi Rec.	1, 4

Rec. Phase Ch2	Phase of Ch2 Receiver	Multi Rec.	1, 4
Acq. Points Rec2	Acquisition point of Ch2 Receiver	Multi Rec.	1, 4
SW +/- Rec2	Spectral width of Ch2 Receiver	Multi Rec.	1, 4
Filter Rec2	Audio filter setting for Ch2 Receiver	Multi Rec.	1, 4
Dwell Time Rec2	dwell time for Ch2 Receiver	Multi Rec.	1, 4
Acq. Time Rec2	Observed Frequency for Ch2 Receiver	Multi Rec.	1, 4
Shift # Pts.	Points value used by left/right shift Command	Processing	1
LB nD	Line broadening constant in Hz used during exponential multiplication	Processing	1
GB nD	Line broadening constant in Hz used during Gaussian multiplication	Processing	1
DM nD	Line broadening constant in Hz used for double exponential multiplication	Processing	1
SB Shift nD	Phase shift for sin bell multiplication	Processing	1
SB Width nD	Window points for sin bell multiplication	Processing	1
SB Skew nD	Skew factor for sin bell multiplication	Processing	1
TZ 1-4 nD	Points used for a trapezoidal apodization	Processing	1
Traf nD	Estimated T2 used during Traficante-Ziessow apodization	Processing	1
Sys. Phase 0 nD	Zeroth order phase value stored in the system	Processing	1
Sys. Phase 1 nD	First order phase value stored in the system	Processing	1
Phase 0 nD	Zeroth order phase value	Processing	1
Phase 1 nD	First order phase value	Processing	1
Echo Center nD	Center of echo used in Echo Zero Fill, Echo FFT, and other Echo commands	Processing	1

The above shown table lists all of the available dashboard parameters in NTNMR. Keep in mind that the dashboard that appears in NTNMR will most likely not display all of the parameters listed and that parameters may be stored (and even duplicated) under any tab. Custom tabs with unique names can also be created.

## Sequence Parameters

An additional tab labeled "Sequence" will often be visible. This tab contains user definable Sequence Parameters. If a sequence file is loaded that contains variables, the sequence tab will appear in the dashboard. Consult the chapter on Pulse Sequences for more information.

Dashboard parameters that represent time or frequency must be followed by a unit (such as “n” for nanoseconds, “u” for microseconds, “m” for milliseconds and “s” for seconds). Scientific notation, like 1e-5, is also allowed.

*Sweep width (SW +/-) will be updated after each Dwell Time Character is entered. Acquisition Time will be updated for any change in Acquisition Points, Dwell Time or SW +/-.*

## 4.5 Variables and Mathematical Expressions

### Variable Types

In addition to the dashboard parameters, NTNMR recognizes the following variable types:

**Global variables** are not tied to a particular data file or pulse sequence. Global variables are created at the highest level and can be used in any data or sequence file. A global variable will retain its value across all data or sequence files. Global variables are created with the Variable Editor.

**Local variables** are created on the sequence or data file level. Local variables are created and maintained on the sequence or data file level. The scope of a local variable is restricted to the data file or sequence file where it was created. A local variable appears only in the dashboard, and is not explicitly contained in the pulse sequence timing diagram. Local variables are created with the Variable Editor.

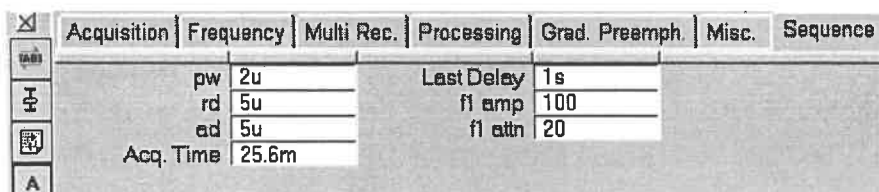
A **sequence variable** is a variable that is assigned in the pulse sequence timing diagram to a particular function in particular event. The most common examples are pulse amplitudes, event times (called ‘delays’ in the pulse sequence timing diagram), and gradient amplitudes. The scope of a sequence variable is restricted to the data file or sequence file where it was created. Refer to chapter 10 for creation of sequence variables.

**Table variables** are used in the definition of specific types of tables for which NTNMR has the capacity to automatically calculate the contents. There are currently three types of table where this can be done – delay, gradient amplitude, and frequency. When activating the ‘auto’ mode for a table, the user has the option to specify values used in the automatic calculation of the table. Values can be hard coded or assigned to a ‘table variable’ that will then appear in the dashboard for more convenient manipulation. See the section on tables for more information. The scope of a sequence variable is restricted to the data file or sequence file where it was created. Table variables are created in the respective Table Editors.

## Sequence Variables

NTNMR allows *unlimited* sequence variables to be defined. See chapter 10 (Pulse Sequences) for a description of adding sequence variables.

The **Sequence** tab in the Dashboard will immediately be updated to include the newly created variable. Clicking on the **Edit variables** button will open the Dashboard and go directly to the **Sequence** tab as shown below.




This allows sequences to be written that can be completely controlled from the dashboard without the user having to edit the sequence directly. Sequence variables and values are saved with the **Data** file or separately in a **Parameter** file. Sequence variables are also saved with **Sequence** files.

Variables can be used multiple times in the sequence. Use the same method to assign a new variable outlined above. When the sequence encounters a variable name that has already been used the sequence assumes that the same value is to be used for multiple events.

## Local and Global Variables

Local and Global variables are created using the Variable Editor. Click the **Variable**

**Editor Button**  on the dashboard to open the **Variable Editor** window. This has the same effect as selecting the **View | Variable Editor** menu item from the main window.


Local variables are displayed on the Sequence tab of the dashboard, using blue text.

Global Variables are displayed on the Global Variable tab of the dashboard.

## Variable Editor

The Variable editor, shown below, allows variables to be defined (Local or Global) or examined (Table and Sequence). In addition, maximum and minimum limits can be set for variables, for example to avoid accidental entry of dangerous or ridiculous values.



The variable set management button  displays an additional menu which allows sets of global variables to be loaded or saved. These sets are saved in the directory `\ntnmr\setup\username` (where username is the Windows user login name). This is useful if the console is used with different probes, magnets, or gradient coils, to load calibration information specific to the experimental setup.

## Mathematical expressions

Mathematical expressions can be used in the sequence tab of the dashboard only. They define one parameter as a function of other parameters (including local and global variables). This allows one to assign, for example, a pulse width and then cause other pulse widths to be determined by the value of the first. For example if a sequence has a sequence variable called “p90” and another called “p180”, the user can set  $p90 = 5u$  and set  $p180 = 2 * p90$ . Essentially unlimited flexibility is available for the expressions used and many types of mathematical manipulations are supported. The following section details the syntax and illustrates some examples.

Any variable contained in an expression must be encapsulated in the [ ] characters.

$$p180 = [p90] * 2$$

Calculations are performed in the time base of microseconds (u).

$$5m + 500u \text{ is evaluated as } 5500u$$

Expressions that contain values without units and values with units will result in a value with units of microseconds (u), where the unit-less values are assumed to be in units of microseconds.

$$2 * 5m \text{ is evaluated as } 10000u \text{ (which is equal to } 10m)$$

$$2 * 5u \text{ is evaluated as } 10u$$

$$2 + 5m \text{ is evaluated as } 5002u$$

$$2 + 5u \text{ is evaluated as } 7u$$

Expressions where all values contained are unit-less will return a value with no unit.

$$2 + 5 \text{ is evaluated as } 7$$

$$2 * 5 \text{ is evaluated as } 10$$

### The “val” function

NTNMR provides the special function “val” for returning the value portion of any expression. This function removes the units. Keep in mind that the time base for all calculations is microsecond (u).

$$\text{val}(2 * 5m) \text{ is evaluated as } 10000$$

$$\text{val}(2 * 5u) \text{ is evaluated as } 10$$

$$\text{val}(2 + 5m) \text{ is evaluated as } 5002$$

val(2 + 5u) is evaluated as 7

The val function can also be used as part of a more complicated expression.

2.3 \* val([tramp] + 1/[pw])

**Dashboard View Toggle button:**  (Value mode)  (Formula mode)

Clicking on this button toggles the Dashboard between the “Value” and “Formula” mode. By default, the Dashboard is in the Value mode. In the Value mode the Dashboard parameters will display the contents as entered by the user, regardless of whether they are numerical values, other variables or mathematical expressions. Whereas in the Formula mode, if the value of a parameter is set to another Dashboard parameter or has a mathematical expression, its numerical value is displayed.

## Example

A portion of a dashboard showing some mathematical expressions for calculation of gradient amplitudes (sequence variables Gr, Grr, etc.) from system information (Hz/mm fs) and user entries (Te, offset\_r\_mm, FOVmm\_r, etc.) is shown below in the Formula mode:

Misc.	Sequence	Global Variables
	f_p	=([Gp]*[offset_p_mm]*[Hz/mm fs])/100
	G_gauss_spoil	1.5
	Gbal	1.5
	Gr	=([2500]/([Hz/mm fs]*[FOVmm_r]))*100
	Gtm	9
	Grr	=([Gr]*0.5*val([tset]+[tramp])/([trephase]+[tramp]))
	Gpr	=([Gp]*0.5*val([tset]+[tramp])/([trephase]+[tramp]))
	Gp	=([2500]/([Hz/mm fs]*[FOVmm_p]))*100
	Gs	=([2500]/([Hz/mm fs]*[FOVmm_s]))*100
	Gsr	=([Gs]*0.5*val([tset]+[tramp])/([trephase]+[tramp]))
	Te	40m
	offset_r_mm	5
	offset_p_mm	10
	FOVmm_p	10
	FOVmm_r	5
	Tm	50m
	FOVmm_s	5
	Hz/mm fs	1700
	Tr	1s
	offset_s_mm	5

The same dashboard in Values mode looks like this:

Misc.	Sequence	Global Variables
	f_p	5000.00000000
	G_gauss_spoil	1.5
	Gbal	1.5
	Gr	29.41176414
	Gtm	9
	Grr	27.77777672
	Gpr	27.77777672
	Gp	14.70588207
	Gs	29.41176414
	Gsr	27.77777672
	Te	40m
	offset_r_mm	5
	offset_p_mm	10
	FOVmm_p	10
	FOVmm_r	5
	Tm	50m
	FOVmm_s	5
	Hz/mm fs	1700
	Tr	1s
	offset_s_mm	5

Note that the system information (Hz/mm fs) could have been a global variable, but was not in this case.