Walkup NMR

Varian NMR Spectrometer Systems
With VNMR 6.1C Software
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Technical contributors: Bruce Adams, Krish Krishnamurthy, Frits Vosman, Everett Schreiber
Technical writer: Everett Schreiber
Technical editor: Dan Steele

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Chapter 1. Introduction to Walkup NMR User Interfaces

Sections in this chapter:
- 1.1 “GLIDE User Interface,” this page
- 1.2 “Tcl/dg User Interface,” page 8

VNMR provides two walkup NMR user interfaces: GLIDE and Tcl/dg. Both interfaces are designed for efficient operation of the spectrometer in open access environments or where only a predefined set of experiments are required and minimal system administrator involvement is needed. Both interfaces are customizable to meet specific needs. As supplied, both interfaces make a wide variety of powerful 1D and 2D NMR experiments available through a graphical user interface. The NMR experiments provided are well suited for analysis and study of small to medium sized molecules typically, but not exclusively, in deuterated organic solvents.

1.1 GLIDE User Interface

The GLIDE user interface (Figure 1) is designed to make setting up, acquiring, processing, and plotting tasks easy. GLIDE provides drop down menus for selection of experiments and pop up dialog panels for routine acquisition or for customization of acquisition. For routine use, you do not have to adjust parameters, which optimizes throughput. The GLIDE user interface guides you step-by-step with appropriate menus and choices. An online help button is provides access to online instructions.

Figure 1. GLIDE User Interface

GLIDE has the following features:
- Customizable icons, buttons, and values.
- Unavailable options are clearly indicated.
- Administrator control of autocalibration access.
- Autocalibration of key probe parameters such as $\text{dm}$, $\text{pw90}$, gradients, lock, and $\text{tpwr}$.
- Administration tools to predefine available experiments for different groups of users.
Chapter 1. Introduction to Walkup NMR User Interfaces

The GLIDE user interface provides access to most aspects of an experiment. If you need access to parameters and functionality not presented in the GLIDE interface, the VNMR menu system, located just below the GLIDE window is accessible to the user. If this is still not enough, the GLIDE window can be hidden and any VNMR command can be entered in the VNMR input window.

GLIDE provides the guidance and opportunity for exploration while always supplying a secure path back through the default buttons in each phase. If the default GLIDE buttons do not provide enough adjustment, you can program the buttons for different actions.

The GLIDE interface, operations, calibrations, and customization are covered in the following chapters:

- Chapter 2 “GLIDE Walkup User Interface,” page 11
- Chapter 3 “GLIDE Step-by-Step,” page 17
- Chapter 4 “GLIDE Calibration,” page 47
- Chapter 5 “GLIDE Administrating and Customizing,” page 59

1.2 Tcl/dg User Interface

VNMR provides three push-button interfaces for selecting and running experiments within the Tcl/dg interface.

CustomQ interface, Figure 2, accesses the same experiments available through the GLIDE interface and provides access to most aspects of an experiment. Parameters and functionality not presented in the CustomQ interface are accessed through either the VNMR menu system or other Tcl/dg panels.

Walkup, Figure 3, provides one button access to a preset group of experiments which makes set up and acquisition easy. All parameters and plotting options are preset. The experiments are a subset of the experiments available through the CustomQ interface.

Setup EXP, Figure 4, accesses all the experiments available through the CustomQ interface as well as several N15 experiments. Setup EXP is designed for the more advanced user and the system administrator. Setup EXP provides access to locally stored probe calibrations.
1.2 Tcl/dg User Interface

Each of these interfaces is designed to simplify setting up, acquiring, processing, and plotting tasks easy. Programming and customization of the Tcl/dg window is covered in the User Programming manual.

The Tcl/dg interfaces, operations, calibrations, and administration are covered in the following chapters:

- Chapter 6 “Tcl/Tk User Interfaces,” page 85
- Chapter 7 “Tcl/Ttk NMR Interfaces Step-by-Step,” page 91
- Chapter 8 “Tcl/Tk NMR Administration and Calibration,” page 121
Chapter 1. Introduction to Walkup NMR User Interfaces
Chapter 2. **GLIDE Walkup User Interface**

Sections in this chapter:

- 2.1 “Standard GLIDE Experiments,” this page
- 2.2 “GLIDE Buttons,” page 12

This chapter provides a general overview of the GLIDE user interface and features of the GLIDE buttons.

Step-by-step operation, administration, and customization of the GLIDE interface are covered in separate chapters (or other manuals), listed below:

- Chapter 3, “GLIDE Step-by-Step,” for instructions on how to run experiments using GLIDE.
- Chapter 4, “GLIDE Calibration,” for instructions on calibration.
- Chapter 5, “GLIDE Administrating and Customizing,” for instructions on how to administrate and customize GLIDE for local use.
- Chapter 9, “Processing and Plotting Saved Data,” for instructions on how to retrieve, process and plot saved data.
- *Getting Started* for detailed information on spectrometer operations.
- *User Guide: Liquids NMR* for additional information about various experiments.

### 2.1 Standard GLIDE Experiments

The GLIDE interface provides a large number of powerful 1D and 2D experiments. The experiments and groups of experiments are the following:

- Standard Proton 1D, Carbon 1D, Fluorine 1D, and Phosphorus 1D
- Chained Proton, Carbon, Fluorine, and Phosphorus 1D
- Chained Proton 1D and COSY
- Chained Carbon 1D and DEPT
- Proton 1D with options for chained 2D experiments:
  - COSY
  - gCOSY
  - gDQ COSY
  - TOCSY
  - NOESY
  - ROESY
  - HMQC
  - gHMQC
Chapter 2. GLIDE Walkup User Interface

- HSQC
- gHSQC
- gHMBC or HMBC if gradients are not present
- HMQCTOXY
- HSQCTOXY
- gHMQCTOXY
- gHSQCTOXY
- CARBON 1D
  - Carbon 1D with options for chained 1D and 2D experiments:
    - APT
    - DEPT
    - HETCOR
    - gHETCOR
    - PROTON 1D
    - COSY
    - gCOSY
  - Proton 1D with options for chained selective experiments:
    - TOCSY1D
    - NOESY1D
    - ROESY1D
    - HOMODEC

2.2 GLIDE Buttons

The GLIDE interface contains an icon box (labeled Glide) and five buttons: Setup, Custom, Go, Exit, and Help. When GLIDE is first activated, the Custom and Go buttons appear shaded to indicate that they are not yet active. Each button is described below.

Setup Icon

Click the Setup icon on the GLIDE interface window to display the Experiment Setup window, shown in Figure 5.
2.2 GLIDE Buttons

The Experiment Setup window provides two drop-down menus, one for selecting the experiment and another for selecting the solvent. If a sample changer is configured for the instrument, a sample location field is active. Sample Insert and Eject buttons are active for instruments with automated insert/eject/spin. AutoLOCK and AutoSHIM options are selected in this window. The spectrum or spectra will be saved using the file name entered in the Save As field. Additional sample information can be entered in the Text box.

Click on the Experiment button with the right mouse button to display the GLIDE experiment menu. The choices are:

- Proton 1D
- Carbon 1D
- Phosphorus 1D
- Fluorine 1D
- User selected HCPF 1Ds
- H1 and COSY only
- C13 and DEPT only
- H1 and H1 detected Experiments
- C13 and C13 detected Expt
- H1 and selective 1D Exp

Make a choice by clicking the appropriate item with the left mouse button, see Figure 6A. Similarly, to choose a solvent, click on the Solvent button with the right mouse button, see Figure 6A. A list of solvents appears with choices such as CDCl3, Acetone, Benzene, and DMSO. Click on the solvent you are using.

Figure 5. GLIDE Experiment Setup Window

Figure 6. GLIDE Experiment List (A) and Solvent List (B)
If optional automation hardware is installed, this window also shows Insert and Eject buttons, and if a sample changer is enabled (traymax parameter not set to 0), a location for a sample can be entered.

Below these buttons, you can enter a file name and text for the sample. For routine 1D experiments, saving data is optional and will not occur if this field is left blank. For all combination experiments, saving data is required. A default name is generated for the data directory if none is entered in the Save As field. Data is saved in ~vnmrsys/data.

To close the Experiment Setup window and activate the choices shown, click on the Setup button at the bottom of the window. To leave the values unaltered and close the window, click instead on Close. Click on Close only if you decide not to run any experiment.

When setup is complete, the shading disappears from the Custom and Go buttons.

Custom Icon

The Custom drop-down menu appears, as in Figure 7, following the initial Experiment Setup and contains three buttons labeled Acquire, Process, and Plot. Each button opens a window with a number of fields and buttons. The choices available in these individual windows is determined by the experiment and nucleus selected during the Setup step.

The select button next to each button in the Custom menu can be changed from selected to not selected. If selected, that phase of the experiment is executed when the Go button is clicked. If the button is not selected, that phase is not automatically executed, but can be executed after the acquisition is complete. The ability to postpone experiment execution is most often useful for the Plot option, because you have the opportunity to interactively define plot-related values (e.g., integral normalization) before making a plot.

Acquire Button

After setting up an experiment using the Experiment setup window the Custom menu automatically appears below the Custom icon when the basic Experiment Setup process is completed, see Figure 7. The Proton 1D, Carbon 1D, Phosphorus 1D, or Fluorine 1D experiments can be performed immediately, without changing any parameters, because the parameters have default values. Combination experiments, User selected HCPF 1Ds, H1 and COSY only, C13 and DEPT only, H1 and H1 detected Experiments, C13 and C13 detected Expt, or H1 and selective 1D Exp provide additional choices of experiments and
2.2 GLIDE Buttons

experimental conditions. Each choice is presented with a default setting and a selection of optional acquisition parameters. Clicking the Acquire icon presents the user with various acquisition options for customizing the individual 1D experiments or defining options for the combination experiments. Chapter 3, “GLIDE Step-by-Step,” provides details for customizing and defining acquisition options.

**Process Button**

The Process button brings up the process options popup menu. The popup window allows the user to enter values for two key processing parameters, the fourier number and line broadening. The current values of these processing parameters are displayed in the popup window. Either or both values can be changed. To change a value, highlight the current value, type in a new value and press the SET button. Pressing the Reset button returns the parameters to their original values. Pressing the Close button saves the new values and exits the window without processing the data. Pressing the Process button exits the window and processes the current data set using the currently displayed values.

**Plot Button**

The Plot button brings up the plot options popup menu. The popup window allows the user to enter values for plotting the spectrum, spectral width, integral (partial, full, or none), parameters (various options as displayed in the drop down menu), and plotting of peaks (No peak plot and various peak plot options are displayed in the drop down menu). Pressing the Reset Plot button returns the settings to their original values. Pressing the Close Plot button saves the new values and exits the window without plotting the data. Pressing the Do Plot button exits the window and plots the current data set using the currently displayed values.

**Go Icon**

The Go button is shaded and inactive until at least the Experiment Setup has been completed. Once the experiment setup and (optional) customization are complete, clicking on the Go button causes GLIDE to acquire, process, plot, and save the selected experiment(s). Calibrations stored in the probe file are automatically used by the appropriate macros.

**Exit Icon**

Clicking on the Exit button closes the GLIDE user interface.
Help Button and One Line Help

Clicking on the Help button displays a help window with buttons for each of the experiments in the Setup window experiment list. Pressing a button displays a help file in the text window.

Each window contains a help line just above the window control buttons. As you move the cursor across the window, a context sensitive description is displayed in this box.

An example of this one line help is shown here. Although the mouse cursor is not shown in the graphic, it is over the title “Directory”. In the help window the message “Default directory is userdir+’/data’” is displayed indicating that the data will be saved in the directory “data” in the current user directory.

Popup Window Buttons

The final action in using each window is to click on one of the buttons (Do, Reset, or Close) at the bottom of the window:

- **Do** does acquisition, processing, or plotting, corresponding to the choices made in the current window. This choice is most often useful for reprocessing or replotting data that has already been acquired.

- **Reset** changes all the values back to the defaults. Defaults are always the first choices in a list.

- **Close** saves any changes made and closes the window. Choices made in all selected windows will be automatically used after the Go button is clicked to start an acquisition.
Chapter 3. **GLIDE Step-by-Step**

Sections in this chapter:
- 3.1 “Opening and Closing GLIDE,” page 17
- 3.2 “Proton 1D Spectrum,” page 18
- 3.3 “Carbon 1D Spectrum,” page 20
- 3.4 “Fluorine 1D Spectrum,” page 23
- 3.5 “Phosphorus 1D Spectrum,” page 25
- 3.6 “User-Selected HCPF 1D Spectra,” page 27
- 3.7 “H1 and COSY Experiments,” page 31
- 3.8 “C13 and DEPT Experiments,” page 33
- 3.9 “H1 and H1 Detected Experiments,” page 35
- 3.10 “C13 and C13 Detected Experiments,” page 39
- 3.11 “H1 and Selective 1D Experiments,” page 43

### 3.1 Opening and Closing GLIDE

When you open the GLIDE user interface the menu overlays the top of the VNMR window.

To Open GLIDE

To open the GLIDE user interface window, take one of the following actions:
- Click on the GLIDE button on the Main Menu
- OR–
- Enter the command `glide` in the VNMR input window

To Hide / Show GLIDE

The GLIDE button in the Permanent Main Menu acts as a toggle, allowing the GLIDE window to be moved into view or hidden behind other windows.
Chapter 3. GLIDE Step-by-Step

- To hide the GLIDE user interface window from the display but keep the program running, click on the GLIDE button in the VNMR Permanent menu. To show the GLIDE window, click again on the GLIDE button or enter the command `glide`

To Close GLIDE

To close the GLIDE program so it no longer is running, take one of the following actions:
- Click on the Exit button, or
- Enter the command `glide('exit')`.

You might be asked to confirm that you want to exit GLIDE. Customizing the file `glide_defaults` (described in Chapter 5 “GLIDE Administrating and Customizing,” page 59) determines whether or not you see the confirmation window.

3.2 Proton 1D Spectrum

This section describes how to setup, customize, and acquire a proton 1D spectrum.

Setup

1. Click on the GLIDE Setup button to display the Experiment Setup window.
2. Eject the sample from the magnet and insert your sample.
3. Right click the Experiment drop-down menu and select Proton 1D, as shown in Figure 8.
4. Right click the Solvent drop-down menu and select the appropriate lock solvent, as shown in Figure 8.
5. Set Autoshim and Autolock. Click the NO button if your sample is already locked and shimmed or if you would prefer to lock and shim manually.
6. Enter a name for the directory, in the Save As field, to save the FID after the experiment is completed. If no file name is entered, the login name is used.
7. Enter appropriate text in the Text box for your sample.
8. Click on Setup.

Standard proton parameters are recalled. Relevant parameters and text are reset according to your choices.

If you set Autoshim and Autolock to NO, manually lock and shim now.
If you prefer to use default settings and not customize, you should skip now to “Acquire,” page 20.

**Customize**

At the end of the setup operation, the Custom button in the GLIDE user interface is no longer shaded and the Acquire, Process, and Plot buttons are displayed.

1. Click the **Acquire** button to open the Acquisition Options window.

2. Select the spectral window in the **PROTON Spectral Width (ppm)** field.

3. Select the number of proton scans to acquire in the **PROTON scans** field.

4. Select a relaxation delay in the **Relaxation Delay (sec)** field.

5. Enter a value for the pulse angle (observe pulse) in the **PROTON Pulse Angle** field and click on **Set**. If you make no change or click on **Default**, a 45-degree pulse angle is selected.

6. Click on **Close** to save the values you selected and continue on with customizing processing, and plotting options.

   Click on **Do** if you want to save the values you selected, skip the customizing processing, and plotting options, and immediately start acquisition.

7. Click the **Process** button to open the Process Setup window.

8. Enter a Fourier number in the **Fourier Number** field and click on **Set**, or click on **NO** to use default Fourier number.

9. Enter a line broadening factor in the **Line Broadening** field and click on **Set** or click on **NO** to turn off line broadening.

10. Click on **Close** to save the values you selected.

    Do not click on Process unless you clicked on the Do button in step 6 and acquisition has been completed.

11. Click the **Plot** button to open the Plot Setup window.

12. Select Default, Displayed Spectrum, or Full Spectrum in the **Spectral Width** field.

13. Select Partial, Full, or Off in the **Plot Integral** field.
14. Select how to plot the parameters from the **Plot Parameters** menu.
15. Select a peak-picking option from the **Plot Peaks** menu.
16. Click on **Close Plot** to save the values you selected.
   Do not click on **Do Plot** unless acquisition and processing have been completed.

**Acquire**

Click the Go button on the **GLIDE** user interface to start acquisition.

The proton spectrum is acquired, processed, plotted, and saved according to the choices you made. The FID is saved with the name PROTON.fid in the directory ~/vnmrsys/data/filename-date. If this directory already exists, the FID is saved in the directory ~/vnmrsys/data/filename-date-time.

### 3.3 Carbon 1D Spectrum

This section describes how to setup, customize, and acquire a carbon 1D spectrum.

**Setup**

1. Click on the **GLIDE Setup** button to display the Experiment Setup window.
2. Eject the sample from the magnet and insert your sample.
3. Right click the **Experiment** drop-down menu and select **Carbon 1D**, as shown in Figure 9.
4. From the **Solvent** menu, select the appropriate lock solvent, as shown in Figure 9.
5. Set **Autoshim** and **Autolock**. Click the NO button if your sample is already locked and shimmed or if you would prefer to lock and shim manually.
6. Enter a name for the directory, in the **Save As** field, to save the FID after the experiment is completed. If no file name is entered, the login name is used as the name.
7. Enter appropriate text in the **Text** box for your sample.
8. Click on **Setup**.
   Standard carbon parameters are recalled. Relevant parameters and text are reset according to your choices.
   If you set Autoshim and Autolock to NO, manually lock and shim now.

![Figure 9. GLIDE Setup for Carbon 1D Spectrum](image-url)
If you prefer to use default settings, and not customize, you should skip now to “Acquire,” page 22.

**Customize**

At the end of the setup operation, the Custom button in the GLIDE user interface is no longer shaded and the Acquire, Process, and Plot buttons are displayed.

1. Click the **Acquire** button to open the Acquisition Setup window.

2. Select the spectral window in the **CARBON Spectral Width (ppm)** field and the number of scans to acquire or enter a value in the **CARBON scans** field.

3. Select a relaxation delay in the **Relaxation Delay (sec)** field and enter a value for the pulse angle (observe pulse) in the **CARBON Pulse Angle** field and click on **Set**. If you make no change or click on **Default**, a 45-degree pulse angle is selected.

4. Select a decoupler mode. Click on the **H1 dec mode** menu button and left click on the decoupler mode. The choices are: Decoupled+NOE (normal decoupled spectrum with NOE), Decoupled-NOE (decoupled spectrum with no NOE - used for integration), Coupled+NOE (coupled spectrum with NOE), and Coupled-NOE (coupled spectrum with no NOE).

5. Select CARBON S/N TEST option: **Default** (S/N=100), **Set** (user entered value in test field), or **DO NOT TEST**. If either the Default or Set option is selected, the acquisition continues until the signal to noise tests matches the value in the test field or the number of carbon scans are reached, which ever comes first. The signal to noise is measured on the tallest peak in the spectrum which is often the solvent peak. If the DO NOT TEST options is selected, acquisition continues until the number of carbon scans set in the CARBON scans field are acquired.

6. Click on **Close** to save the values you selected and continue on with customizing processing, and plotting options.

7. Click on **Do** if you want to save the values you selected, skip the customizing processing, and plotting options, and immediately start acquisition.

8. Click the **Process** button to open the Process Setup window.

9. Enter a Fourier number in the **Fourier Number** field and click on **Set**, or click on **NO** to use default Fourier number.

10. Enter a line broadening factor in the **Line Broadening** field and click on **Set**, or click on **NO** to turn off line broadening.

11. Click on **Close** to save the values you selected.
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Do not click on Process unless you clicked on the Do button in step 6 and acquisition has been completed.

11. Click the Plot button to open the Plot Setup window.
12. Select Default, Displayed Spectrum, or Full Spectrum in the Spectral Width field.
13. Select how to plot the parameters from the Plot Parameters menu.
14. Select a peak-picking option from the Plot Peaks menu.
15. Click on Close Plot to save the values you selected.

Do not click on Do Plot unless acquisition and processing have been completed.

Acquire

If you did not start the acquisition in step 6, click the Go button in the GLIDE user interface to start acquisition.

The carbon spectrum is acquired, processed, plotted, and saved according to the choices you made.

The FID is saved with the name CARBON.fid in the directory ~/vnmrsys/data/ filename-date. If this directory already exists, the FID is saved in the directory ~/vnmrsys/data/filename-date-time.
3.4 Fluorine 1D Spectrum

This section describes how to setup, customize and acquire a fluorine 1D spectrum.

**Setup**

1. Click on the **GLIDE Setup** button to display the Experiment Setup window.
2. Eject the sample from the magnet and insert your sample.
3. Right click the **Experiment** drop-down menu and select **Fluorine 1D**, as shown in Figure 10.
4. Right click the **Solvent** drop-down menu and select the appropriate lock solvent, as shown in Figure 10.
5. Set **Autoshim** and **Autolock**. Click the **NO** button if your sample is already locked and shimmed or if you would prefer to lock and shim manually.
6. Enter a name for the directory, in the **Save As** field, to save the FID after the experiment is completed. If no file name is entered, the login name is used.
7. Enter appropriate text in the **Text** box for your sample.
8. Click on **Setup**.

   Standard fluorine parameters are recalled. Relevant parameters and text are reset according to your choices.

   If you set Autoshim and Autolock to NO, manually lock and shim now.

If you prefer to use default settings and not customize, you should skip now to “Acquire,” page 24.

**Customize**

At the end of the setup operation, the Custom button in the **GLIDE** user interface is no longer shaded and the Acquire, Process, and Plot buttons are displayed.

1. Click the **Acquire** button to open the Acquisition Setup window.
2. Enter a start of spectrum value in the **Start of Spectrum** field and an end of spectrum in the **End of Spectrum** field to set the spectral window. Enter all values in ppm.
3. Enter a value for the **pulse angle** or make no entry and accept the default value.

4. Enter a value for the **recovery delay** or make no entry and accept the default value shown.

5. Enter the number of **scans to acquire** or make no entry and accept the default value.

6. Click on **Close** to save the values you selected and continue on with customizing processing, and plotting options.

   Click on **Do** if you want to save the values you selected, skip the customizing processing, and plotting options, and immediately start acquisition.

7. Click the **Process** button to open the Process Setup window.

8. Enter a Fourier number in the **Fourier Number** field and click on **Set**, or click on **NO** to use default Fourier number.

9. Enter a line broadening factor in the **Line Broadening** field and click on **Set**, or click on **NO** to turn off line broadening.

10. Click on **Close** to save the values you selected.

    Do not click on Process unless you clicked on the Do button in step 6 and acquisition has been completed.

11. Click the **Plot** button to open the Plot Setup window.

12. Select Displayed Spectrum or Full Spectrum in the **Spectral Width** field.

13. Select Partial, Full, or Off in the **Plot Integral** field.

14. Select how to plot the parameters from the **Plot Parameters** menu.

15. Select a peak-picking option from the **Plot Peaks** menu.

16. Click on **Close Plot** to save the values you selected.

    Do not click on **Do Plot** unless acquisition and processing have been completed.

**Acquire**

If you did not start the acquisition in step 6, click the Go button in the **GLIDE** user interface to start acquisition. The fluorine spectrum is acquired, processed, plotted, and saved according to the choices you made.

The FID is saved with the name **FLUORINE.fid** in the directory `~/vnmrsys/data/ filename-date`. If this directory already exists, the FID is saved in the directory `~/vnmrsys/data//filename-date-time`. 

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3.5 Phosphorus 1D Spectrum

This section describes how to setup, customize, and acquire a phosphorus 1D spectrum.

**Setup**

1. Click on the *GLIDE Setup* button to display the Experiment Setup window.
2. Eject the sample from the magnet and insert your sample.
3. Right click the *Experiment* drop-down menu and select *Phosphorus 1D*, as shown in Figure 11.
4. Right click the *Solvent* drop-down menu and select an appropriate lock solvent, as shown in Figure 11.
5. Set *Autoshim* and *Autolock*. Click the NO button if your sample is already locked and shimmed or if you would prefer to lock and shim manually.
6. Enter a name for the directory, in the *Save As* field, to save the FID after the experiment is completed. If no file name is entered, the login name is used.
7. Enter appropriate text in the *Text* box for your sample.
8. Click on *Setup*.

Standard phosphorus parameters are recalled. Relevant parameters and text are reset according to your choices.

If you set Autoshim and Autolock to NO, manually lock and shim now.

If you prefer to use default settings and not customize, you should skip now to “Acquire,” page 26.

**Customize**

At the end of the setup operation, the Custom button in the *GLIDE* user interface is no longer shaded and the Acquire, Process, and Plot buttons are displayed.

1. Click the *Acquire* button to open the Acquisition Setup window (Figure 12).
2. Enter a start of spectrum value in the *Start of Spectrum* field and an end of spectrum in the *End of Spectrum* field to set the spectral window. Enter all values in ppm.
3. Enter a value for the *pulse angle* and the *recovery delay*.
4. Enter a value for the number of *scans to acquire*. 
5. If you make no change a 35-degree pulse angle is selected.

6. Select a decoupler mode. Click on the **H1 dec mode** menu button and left click on the decoupler mode. The choices are: Decoupled+NOE (normal decoupled spectrum with NOE), Decoupled-NOE (decoupled spectrum with no NOE - used for integration), Coupled+NOE (coupled spectrum with NOE), and Coupled-NOE (coupled spectrum with no NOE).

7. Click on **Close** to save the values you selected and continue on with customizing processing, and plotting options.

   Click on **Do** if you want to save the values you selected, skip the customizing processing, and plotting options, and immediately start acquisition.

8. Click the **Process** button to open the Process Setup window.

9. Enter a Fourier number in the **Fourier Number** field and click on **Set**, or click on **NO** to use default Fourier number.

10. Enter a line broadening factor in the **Line Broadening** field and click on **Set**, or click on **NO** to turn off line broadening.

11. Click on **Close** to save the values you selected.

   Do not click on Process unless you clicked the Do button in step 7 and acquisition has finished.

12. Click the **Plot** button to open the Plot Setup window.

13. Select Displayed Spectrum or Full Spectrum in the **Spectral Width** field.

14. Select Partial, Full, or Off in the **Plot Integral** field.

15. Select how to plot the parameters from the **Plot Parameters** menu.

16. Select a peak-picking option from the **Plot Peaks** menu.

17. Click on **Close Plot** to save the values you selected.

   Do not click on **Do Plot** unless acquisition and processing have been completed.

**Acquire**

If you did not start the acquisition in step 7, click the Go button in the **GLIDE** user interface to start acquisition.
The phosphorus spectrum is acquired, processed, plotted, and saved according to the choices you made.

The FID is saved with the name `PHOSPHORUS.fid` in the directory `~/vnmrsys/data/filename-date`. If this directory already exists, the FID is saved in the directory `~/vnmrsys/data/filename-date-time`.

# 3.6 User-Selected HCPF 1D Spectra

This section describes how to setup, customize, and acquire a selected HCPF 1D spectra.

## Setup

1. Click on the **GLIDE Setup** button to display the Experiment Setup window.
2. Eject the sample from the magnet and insert your sample.
3. Right click the **Experiment** drop-down menu and select **User selected HCPF 1D**, as shown in Figure 13.
4. Right click the **Solvent** drop-down menu and select an appropriate lock solvent, as shown in Figure 13.
5. Set **Autoshim** and **Autolock**. Click the **NO** button if your sample is already locked and shimmed or if you would prefer to lock and shim manually.
6. **Enter** a name for the directory, in the **Save As** field, to save the FID after the experiment is completed. If no file name is entered, the login name is used.
7. Enter appropriate text in the **Text** box for your sample.
8. Click on **Setup**.

Standard proton parameters are recalled. Relevant parameters and text are reset according to your choices.

If you set Autoshim and Autolock to NO, manually lock and shim now.

If you prefer to use default settings and not setup to observe a nucleus other than proton or customize the acquisition parameters, click on close and then the GO icon.

---

**Figure 13. GLIDE Setup for HCPF 1D**
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Customize and Acquire

At the end of the setup operation, the Custom button in the GLIDE user interface is no longer shaded and the Acquire, Process, and Plot buttons are displayed.

1. Click the Acquire button to open the Acquisition Options window.

2. Customize the proton acquisition:
   a. Select the spectral window in the PROTON Spectral Width (ppm) field.
   b. Select the number of proton scans to acquire in the PROTON scans field.
   c. Select a relaxation delay in the Relaxation Delay (sec) field.
   d. Enter a value for the pulse angle (observe pulse) in the PROTON Pulse Angle field and click on Set. If you make no change or click on Default, a 45-degree pulse angle is selected.
   e. To acquire only a proton spectrum, click on Do or click Close and then click on the Go button.

The remaining three nuclei are presented in this order: carbon, phosphorus, and fluorine. You have the option to acquire the 1D spectrum for each nucleus or a combination of nuclei in any desired order. Acquisition always begins with a proton 1D followed by each selected nucleus.

3. Customize the carbon acquisition:
   a. Select CARBON to open the carbon acquisition options window.

   b. Select the spectral window in the CARBON Spectral Width (ppm) field.
   c. Select the number of carbon scans to acquire or enter a value in the CARBON scans field.
   d. Select a relaxation delay in the Relaxation Delay (sec) field.
   e. Enter a value for the pulse angle (observe pulse) in the CARBON Pulse Angle field and click on Set. If you make no change or click on Default, a 45-degree pulse angle is selected.
3.6 User-Selected HCPF 1D Spectra

f. Select a decoupler mode. Click on the **H1 dec mode** menu button and left click on the decoupler mode. The choices are: Decoupled+NOE (normal decoupled spectrum with NOE), Decoupled-NOE (decoupled spectrum with no NOE - used for integration), Coupled+NOE (coupled spectrum with NOE), and Coupled-NOE (coupled spectrum with no NOE).

g. Select CARBON S/N TEST option: **Default** (S/N=100), **Set** (user entered value in test field), or **DO NOT TEST**. If either the Default or Set option is selected, the acquisition continues until the signal to noise tests matches the value in the test field or the number of carbon scans are reached, which ever comes first. The signal to noise is measured on the tallest peak in the spectrum which is often the solvent peak. If the DO NOT TEST options is selected, acquisition continues until the number of carbon scans set in the CARBON scans field are acquired.

h. **Click OK** to save the values you selected and return to the HCPF acquisition options window or click on **RESET** to return the carbon acquisition options to their default values.

4. Add phosphorus or begin acquisition of proton and carbon:
   - To add phosphorus, go to the next step (step 5).
   - To save the values you selected and begin acquisition, click **Do**.
   - To save acquisition parameters but not begin data acquisition until the **Go** button is pressed, click **Close**.

5. Customize the **phosphorus** acquisition:
   a. Click the **PHOSPHORUS** button in the HCPF acquisition options window.
   b. Enter a start of spectrum value in the **Start of Spectrum** field and an end of spectrum in the **End of Spectrum** field to set the spectral window. Enter all values in ppm.
   c. Enter a value for the pulse angle (observe pulse) in the **PHOSPHORUS Pulse Angle** field.
   d. Enter a relaxation delay in the **Recovery Delay** field.
   e. Enter the number of scans to acquire in the **PHOSPHORUS scans** field.
   f. Select a decoupler mode. Click on the **H1 dec mode** menu button and left click on the decoupler mode. The choices are: Decoupled+NOE (normal decoupled spectrum with NOE), Decoupled-NOE (decoupled spectrum with no NOE - used for integration), Coupled+NOE (coupled spectrum with NOE), and Coupled-NOE (coupled spectrum with no NOE).
   g. **Click OK** to save the values you selected and return to the HCPF acquisition options window or click on **RESET** to return the carbon acquisition options to their default values.

6. Add fluorine or begin acquisition of proton, carbon, and phosphorus:
   - To add phosphorus, go to the next step (step 7).
   - To save the values you selected and begin acquisition, click **Do**.
   - To save acquisition parameters but not begin data acquisition until the **Go** button is pressed, click **Close**.
7. Customize the fluorine acquisition:
   a. Click the FLUORINE button in the HCPF acquisition options window.
   b. Enter a start of spectrum value in the Start of Spectrum field and an end of spectrum in the End of Spectrum field to set the spectral window. Enter all values in ppm.
   c. Enter a value for the pulse angle or make no entry and accept the default value shown.
   d. Enter a value for the recovery delay or make no entry and accept the default value shown.
   e. Enter the number of scans to acquire or make no entry and accept the default value shown.
   f. Click OK to save the values you selected and return to the HCPF acquisition options window or click on RESET to return the carbon acquisition options to their default values.

8. Begin the HCPF acquisition:
   • To save the values you selected and begin acquisition, click Do.
   • To save acquisition parameters but not begin data acquisition until the Go button is pressed, click Close.

A proton and each of the selected experiments spectra are acquired, processed, plotted, and saved according to the choices you made.

The FIDs are saved with the names PROTON.fid, CARBON.fid, PHOSPHORUS.fid, or FLUORINE.fid in the directory ~/vnmrsys/data/ filename-date. If this directory already exists, the FIDs are saved in the directory ~/vnmrsys/data/ filename-date-time.
3.7 H1 and COSY Experiments

Depending on the type of probe (PFG or non-PFG) and the system, this experiment automatically selects the gCOSY (PFG probe) or COSY (non-PFG probe) experiment.

Setup

1. Click on the GLIDE Setup button to display the Experiment Setup window.
2. Eject the sample from the magnet and insert your sample.
3. Right click the Experiment drop-down menu and select H1 and COSY only, as shown in Figure 14.
4. Right click the Solvent drop-down menu and select an appropriate lock solvent, as shown in Figure 14.
5. Set Autoshim and Autolock. Click the NO button if your sample is already locked and shimmed or if you would prefer to lock and shim manually.
   Note that autoshimming and autolocking is done only once prior to the proton 1D acquisition and is turned off before the COSY acquisition.
6. Enter a name for the directory, in the Save As field, to save the FID after the experiment is completed. If no file name is entered, the login name is used.
7. Enter appropriate text in the Text box for your sample.
8. Click on Setup.
   Standard proton parameters are recalled. Relevant parameters and text are reset according to your choices.
   If you set Autoshim and Autolock to NO, manually lock and shim now.

Customize

At the end of the setup operation, the Custom button in the GLIDE user interface is no longer shaded and the Acquire, Process, and Plot buttons are displayed.
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1. Click the **Acquire** button to open the Acquisition Options window.

2. Select the spectral window in the **PROTON Spectral Width (ppm)** field.

3. Select an option for “Minimize SW?” **NO** uses the proton spectral width selected in step 2, **Auto** examines the proton 1D and sets SW, and **Manual** permits the user to set sw after the 1D spectra has been acquired. If you select **Manual**, the proton spectrum is acquired and a **SetSW** button appears on the second row of the VNMR menu bar. Using the mouse, place the cursors on either side of proton spectrum that is displayed and press the **SetSW** button. The COSY experiment executes using this SW.

4. Select the number of proton scans to acquire in the **PROTON scans** field.

5. Select a relaxation delay in the **Relaxation Delay (sec)** field.

6. Enter a value for the pulse angle (observe pulse) in the **PROTON Pulse Angle** field and click on **Set**. If you make no change or click on **Default**, a 45-degree pulse angle is selected.

7. Select the number of **scans per increment** to acquire for the COSY experiment.

8. Select the number of **increments** to acquire for the COSY experiment.

9. Click the **Do** button to save the values you selected and start acquisition.

**Acquire**

Click the **Go** button in the **GLIDE** user interface to start acquisition.

A proton and COSY (or gCOSY) spectra are acquired, processed, plotted, and saved according to the choices you made.

The FIDs are saved with the names **PROTON.fid** and **COSY.fid** (or **gCOSY.fid** in the directory ~/$vnmrsys/data/filename-date). If this directory already exists, the FIDs are saved in the directory ~/$vnmrsys/data/filename-date-time.
3.8 C13 and DEPT Experiments

This section describes how to setup, customize, and acquire a selected C13 and DEPT spectra.

**Setup**

1. Click on the *GLIDE Setup* button to display the Experiment Setup window (Figure 15A).
2. Eject the sample from the magnet and insert your sample.
3. Right click the *Experiment* drop-down menu and select *C13 and DEPT only*, as shown in Figure 15.
4. Right click the *Solvent* drop-down menu and select an appropriate lock solvent, as shown in Figure 15.
5. Set *Autoshim* and *Autolock*. Click the NO button if your sample is already locked and shinned or if you would prefer to lock and shim manually.
6. Enter a name for the directory, in the *Save As* field, to save the FID after the experiment is completed. If no file name is entered, the login name is used.
7. Enter appropriate text in the *Text* box for your sample.
8. Click on *Setup*. Standard carbon parameters are recalled. Relevant parameters and text are reset according to your choices.
   
   If you set Autoshim and Autolock to NO, manually lock and shim now.

**Customize**

At the end of the setup operation, the Custom button in the *GLIDE* user interface is no longer shaded and the Acquire, Process, and Plot buttons are displayed.

1. Click the *Acquire* button to open the Acquisition Options window (Figure 16).
2. Select the spectral window in the *CARBON Spectral Width (ppm)* field and the number of scans to acquire or enter a value in the *CARBON scans* field.
3. Select a relaxation delay in the *Relaxation Delay (sec)* field and enter a value for the pulse angle (observe pulse) in the *CARBON Pulse Angle* field and click on *Set*. If you make no change or click on *Default*, a 45-degree pulse angle is selected.
4. Select a decoupler mode. Click on the **H1 dec mode** menu button and left click on the decoupler mode. The choices are: Decoupled+NOE (normal decoupled spectrum with NOE), Decoupled-NOE (decoupled spectrum with no NOE - used for integration), Coupled+NOE (coupled spectrum with NOE), and Coupled-NOE (coupled spectrum with no NOE).

5. Select CARBON S/N TEST option: **Default** (S/N=100), **Set** (user entered value in test field), or **DO NOT TEST**. If either the Default or Set option is selected, the acquisition continues until the signal to noise tests matches the value in the test field or the number of carbon scans are reached, which ever comes first. The signal to noise is measured on the tallest peak in the spectrum which is often the solvent peak. If the DO NOT TEST options is selected, acquisition continues until the number of carbon scans set in the CARBON scans field are acquired.

6. Select the number of **DEPT Scans per inc**: to acquire for the DEPT experiment.

7. Select a **DEPT multiplicity**:
   a. **Full Edit** produces 4 edited sub-spectra showing: all protonated carbons, CH carbons only, CH\(_2\) carbons only, and CH\(_3\) carbons only.
   b. **CH and CH\(_3\) up/CH\(_2\) down** produces an unedited dept 135 experiment.
   c. **CH only** produces and unedited dept 90 experiment.
   d. **Protonated Carbons** produces an unedited spectra containing only protonated carbons.

8. Click the **Do** button to save the values you selected and start acquisition and use the default processing and plotting values (recommended) or click Close to customize the processing and plotting.

Do not click on Process unless you clicked on the Do button in step 8 and acquisition has been completed.

9. Click the **Plot** button to open the Plot Setup window. The choices apply to the carbon 1D not the DEPT spectra. DEPT spectra are plotted based on the options selected in step 7.

10. Select Default, Displayed Spectrum, or Full Spectrum in the **Spectral Width** field.

11. Select how to plot the parameters from the **Plot Parameters** menu.

12. Select a peak-picking option from the **Plot Peaks** menu.

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Figure 16. *GLIDE Customize 13C and DEPT Acquisition*
3.9 H1 and H1 Detected Experiments

An experiment chain of H1, gCOSY, HMQC, gHMBC, and gHSQCTOXY representing a portion of the available H1 and H1 detected experiments provided with GLIDE is described below.

**Setup**

1. Click on the **GLIDE Setup** button to display the Experiment Setup window.
2. Eject the sample from the magnet and insert your sample.
3. Right click the **Experiment** drop-down menu and select **H1 and H1 detected Exp**, as shown in Figure 17.
4. Right click the **Solvent** drop-down menu and select an appropriate lock solvent, as shown in Figure 17.
5. Set **Autoshim** and **Autolock**. Click the **NO** button if your sample is already locked and shimmed or if you would prefer to lock and shim manually.
   
   **Note** that autoshimming and autolocking is done only once prior to the proton 1D acquisition and then turned off.
6. Enter a name for the directory, in the **Save As** field, to save the FID after the experiment is completed. If no file name is entered, the login name is used.
7. Enter appropriate text in the **Text** box for your sample.
8. Click on **Setup**.

**Acquire**

Click the Go button in the GLIDE user interface to start acquisition.

Carbon and DEPT spectra is acquired, processed, plotted, and saved according to the choices you made.

The FIDs are saved with the names CARBON.fid and DEPT.fid in the directory ~/vnmrsys/data/filename-date. If this directory already exists, the FIDs are saved in the directory ~/vnmrsys/data/filename-date-time.
Standard proton parameters are recalled. Relevant parameters and text are reset according to your choices.

If you set Autoshim and Autolock to NO, manually lock and shim now.

**Customize**

At the end of the setup operation, the Custom button in the GLIDE user interface is no longer shaded and the Acquire, Process, and Plot buttons are displayed.

- Click the Acquire button to open the Acquisition Options window.

**Proton Acquisition**

1. Select the spectral window in the PROTON Spectral Width (ppm) field.

2. Select an option for “Minimize SW?” NO uses the proton spectral width selected in step 1, Auto examines the proton 1D and sets SW, and Manual permits the user to set sw after the 1D spectra has been acquired. If you select Manual, the proton spectrum is acquired and a SetSW button appears on the second row of the VNMR menu bar. Using the mouse, place the cursors on either side of proton spectrum that is displayed and press the SetSW button. The 2D experiment is executed using this SW.

3. Select the number of proton scans to acquire in the PROTON scans field.

4. Select a relaxation delay in the Relaxation Delay (sec) field.

5. Enter a value for the pulse angle (observe pulse) in the PROTON Pulse Angle field and click on Set. If you make no change or click on Default, a 45-degree pulse angle is selected.

**Acquiring Selected 1H Detected Experiments**

All chained experiments begin with a 1D S2PUL experiment. In this case a proton 1D will be the first experiment. Selected experiments are run, following the 1D experiment, in the order in which they are selected. Each experiment has an associated popup window for customizing the acquisition parameters associated with the experiment. In this example the order of the experiments, following the proton 1D is: gCOSY, HMQC, gHMBC, and gHSQCTOXY.
1. Add gCOSY Acquisition to the experiment chain:
   a. Select gCOSY and open the gCOSY Acquisition popup window.
   b. Select a value for gCOSY scans per inc to acquire from the choices in the popup window.
   c. Select a value for gCOSY number of inc to acquire from the choices in the popup window.
   d. Click OK to use the values chosen and return to the Select H1 and H1 Detected Experiments window. Click RESET to return to the default values and either use the default values or enter different parameters. Click OK to close the popup window and return to the Select H1 and H1 Detected Experiments window.

   gCOSY is added to the experiment chain.

2. Add HMQC acquisition to the experiment chain:
   a. Select HMQC and open the HMQC Acquisition popup window.
   b. Select a value for HSQC scans per inc to acquire from the choices in the popup window.
   c. Select a value for HSQC number of inc to acquire from the choices in the popup window.
   d. Select a Carbon Spectra Width (ppm) from the choices presented.
   e. Click OK to use the values chosen and return to the Select H1 and H1 Detected Experiments window. Click RESET to return to the default values and either use the default values or enter different parameters. Click OK to close the popup window and return to the Select H1 and H1 Detected Experiments window.

   HMQC is added to the experiment chain.

3. Add gHMBC acquisition to the experiment chain:
   a. Select gHMBC and open the gHMBC Acquisition popup window.
   b. Select a value for gHMBC scans per inc to acquire from the choices in the popup window.
   c. Select a value for gHMBC number of inc to acquire from the choices in the popup window.
   d. Select a Carbon Spectra Width (ppm) from the choices presented.
e. Select a **gHMBC coupling constant** from the choices presented.

f. Click OK to use the values chosen and return to the Select H1 and H1 Detected Experiments window. Click RESET to return to the default values and either use the default values or enter different parameters. Click OK to close the popup window and return to the Select H1 and H1 Detected Experiments window.

gHMBC is added to the experiment chain.

4. Add **gHSQCTOXY** acquisition to the experiment chain:

a. Select **gHSQCTOXY** and open the gHHSQCTOXY Acquisition popup window.

b. Select a value for **gHSQCTOXY scans per inc** to acquire from the choices in the popup window.

c. Select a value for **gHSQCTOXY number of inc** to acquire from the choices in the popup window.

d. Select a **Carbon Spectra Width (ppm)** from the choices presented or make no choice and accept the default.

e. Select a **gHSQCTOXY mixing time** from the choices presented or make no choice and accept the default.

f. Select a **gHSQCTOXY Direct Corr.** from the choices presented or make no choice and accept the default.

g. Click OK to use the values chosen and return to the Select H1 and H1 Detected Experiments window. Click RESET to return to the default values and either use the default values or enter different parameters. Click OK to close the popup window and return to the Select H1 and H1 Detected Experiments window.

gHSQCTOXY is added to the experiment chain.

The Select H1 and H1 Detected Experiments window shows the selected experiments and proton 1D acquisition parameters.
Verifying the Experiment List

The order that you selected experiments in the Acquisition Setup window is the acquisition order which is displayed in the Text panel of the dg screen. To remove a selection from the experiment chain, deselect it by clicking on the button again. For example, clicking the gHSQCTOXY button a second time deselects it and removes any saved parameter customization for gHSQCTOXY.

Acquire

Click the Do button in the Acquisition Setup window to select you custom options and start acquisition. Spectra is acquired (according to the choices you made and the order of experiment selection), processed, plotted (proton and absolute-value 2Ds only), and saved.

The FIDs are saved with the names PROTON.fid, gCOSY.fid, HMQC.fid, gHMBC.fid, and gHSQCTOXY.fid in the directory ~/vnmrsys/data/filename-date. If this directory already exists, the FIDs are saved in the directory ~/vnmrsys/data/filename-date-time.

3.10 C13 and C13 Detected Experiments

An experiment chain of proton, carbon, APT, DEPT, and gHETCOR representing a portion of the available C13 and C13 detected experiments provided with GLIDE is described below.

Setup

1. Click on the GLIDE Setup button to display the Experiment Setup window.
2. Eject the sample from the magnet and insert your sample.
3. Right click the Experiment drop-down menu and select C13 and C13 detected Expt, as shown in Figure 18.
4. Right click the Solvent drop-down menu and select an appropriate lock solvent, as shown in Figure 18.
5. Set Autoshim and Autolock. Click the NO button if your sample is already locked and shimmed or if you would prefer to lock and shim manually.
6. Enter a name for the directory, in the Save As field, to save the FID after the experiment is completed. If no file name is entered, the login name is used.
7. Enter appropriate text in the Text box for your sample.

Figure 18. GLIDE Setup for C13 and C13 Detected Experiments
8. Click on Setup.

Standard carbon parameters are recalled. Relevant parameters and text are reset according to your choices.

If you set Autoshim and Autolock to NO, manually lock and shim now.

Customize

At the end of the setup operation, the Custom button in the GLIDE user interface is no longer shaded and the Acquire, Process, and Plot buttons are displayed.

- Click the Acquire button to open the Acquisition Options window.

Carbon Acquisition

1. Select the spectral window in the CARBON Spectral Width (ppm) field and the number of scans to acquire or enter a value in the CARBON scans field.

2. Select a relaxation delay in the Relaxation Delay (sec) field and enter a value for the pulse angle (observe pulse) in the CARBON Pulse Angle field and click on Set. If you make no change or click on Default, a 45-degree pulse angle is selected.

3. Select a decoupler mode. Click on the H1 dec mode menu button and left click on the decoupler mode. The choices are: Decoupled+NOE (normal decoupled spectrum with NOE), Decoupled-NOE (decoupled spectrum with no NOE - used for integration), Coupled+NOE (coupled spectrum with NOE), and Coupled-NOE (coupled spectrum with no NOE).

4. Select CARBON S/N TEST option: Default (S/N=100), Set (user entered value in test field), or DO NOT TEST. If either the Default or Set option is selected, the acquisition continues until the signal to noise tests matches the value in the test field or the number of carbon scans are reached, which ever comes first. The signal to noise is measured on the tallest peak in the spectrum which is often the solvent peak. If the DO NOT TEST options is selected, acquisition continues until the number of carbon scans set in the CARBON scans field are acquired.

Acquiring Selected $^{13}$C-Detected Experiments

All chained experiments begin with a 1D S2PUL experiment. If the proton 1D experiment option is selected, it will be the first experiment run regardless of when it is selected. The proton 1D experiment is followed by a carbon S2PUL. Selected experiments are run, following the carbon S2PUL experiment, in the order in which they are selected. Each
experiment has an associated popup window for customizing the acquisition parameters associated with the experiment. In this example the order of the experiments, following the carbon 1D is: APT, DEPT, and gHETCOR.

1. Add **APT** acquisition to the experiment chain:
   a. Select **APT** from the Select C13 and C13 Detected Experiments window and the APT Acquisition popup window opens.
   b. Select the number of **APT Scans per inc**: to acquire for the APT experiment.
   c. Click OK to use the values chosen and return to the Select C13 and C13 Detected Experiments window. Click RESET to return to the default values and either use the default values or enter different parameters. Click OK to close the popup window and return to the Select C13 and C13 Detected Experiments window.

2. Add **DEPT** acquisition to the experiment chain:
   a. Select **DEPT** from the Select C13 and C13 Detected Experiments window and the DEPT Acquisition popup window opens.
   b. Select the number of **DEPT Scans per inc**: to acquire for the DEPT experiment.
   c. Select a **DEPT multiplicity**.
      - **Full Edit** produces 4 edited sub-spectra showing: all protonated carbons, CH carbons only, CH2 carbons only, and CH3 carbons only.
      - **CH and CH3 up/CH2 down** produces an unedited dept 135 experiment.
      - **CH only** produces and unedited dept 90 experiment.
      - **Protonated Carbons** produces an unedited spectra containing only protonated carbons.
   d. Click OK to use the values chosen and return to the C13 and C13 Detected Experiments window. Click RESET to return to the default values and either use the default values or enter different parameters. Click OK to close the popup window and return to the Select C13 and C13 Detected Experiments window.

3. Add **gHETCOR** acquisition to the experiment chain:
   a. Select **gHETCOR** from the Select C13 and C13 Detected Experiments window and the gHETCOR Acquisition popup window opens.
   b. Select a value for **gHETCOR scans per inc** to acquire from the choices in the popup window.
   c. Select a value for **gHETCOR number of inc** to acquire from the choices in the popup window.
d. Click OK to use the values chosen and return to the C13 and C13 Detected Experiments window. Click RESET to return to the default values and either use the default values or enter different parameters. Click OK to close the popup window and return to the Select C13 and C13 Detected Experiments window.

Proton Acquisition

1. Select PROTON from the Select C13 and C13 Detected Experiments window and the PROTON Acquisition popup window opens.

This will be the first experiment run even though it is your last experiment selection.

2. Select the spectral window in the PROTON Spectral Width (ppm) field.

3. Select an option for “Minimize SW?” NO uses the proton spectral width selected in step 2, Auto examines the proton 1D and sets SW, and Manual prompts the user for input after the 1D spectra has been acquired. If you select Manual, the proton spectrum is acquired and a SetSW button appears on the second row of the VNMR menu bar. Using the mouse, place the cursors on either side of proton spectrum that is displayed and press the SetSW button. The HETCOR experiment executes using this SW.

4. Select the number of proton scans to acquire in the PROTON scans field.

5. Select a relaxation delay in the Relaxation Delay (sec) field.

6. Enter a value for the pulse angle (observe pulse) in the PROTON Pulse Angle field and click on Set. If you make no change or click on Default, a 45-degree pulse angle is selected.

7. Click OK to use the values chosen and return to the Select C13 and C13 Detected Experiments window. Click RESET to return to the default values and either use the default values or enter different parameters. Click OK to close the popup window and return to the Select C13 and C13 Detected Experiments window.

The Select C1 and C13 Detected Experiments window shows the selected experiments and proton 1D acquisition parameters..
3.11 H1 and Selective 1D Experiments

An experiment chain of H1, TOCSY1D, and NOESY1D representing a portion of the available H1 and Selective H1 experiments provided with GLIDE is described below.

Setup

1. Click on the GLIDE Setup button to display the Experiment Setup window.
2. Eject the sample from the magnet and insert your sample.
3. Right click the Experiment drop-down menu and select H1 and Selective 1D Expt, as shown in Figure 17.
4. Right click the Solvent drop-down menu and select an appropriate lock solvent, as shown in Figure 17.
5. Set Autoshim and Autolock. Click the NO button if your sample is already locked and shimmed or if you would prefer to lock and shim manually. Note that autoshimming and autolocking is done only once prior to the proton 1D acquisition and then turned off.

Figure 19. GLIDE Setup for H1 and Selective 1D Experiments
6. Enter a name for the directory, in the **Save As** field, to save the FID after the experiment is completed. If no file name is entered, the login name is used.

7. Enter appropriate text in the **Text** box for your sample.

8. Click on **Setup**.
   Standard proton parameters are recalled. Relevant parameters and text are reset according to your choices.
   If you set Autoshim and Autolock to NO, manually lock and shim now.

**Customize**

At the end of the setup operation, the Custom button in the *GLIDE* user interface is no longer shaded and the Acquire, Process, and Plot buttons are displayed.

- Click the **Acquire** button to open the Acquisition Options window.

**Proton Acquisition**

1. Select the spectral window in the **PROTON Spectral Width (ppm)** field.

2. Select an option for “Minimize SW?” NO uses the proton spectral width selected in step 1, Auto examines the proton 1D and sets SW, and Manual permits the user to set SW after the 1D spectra has been acquired. If you select Manual, the proton spectrum is acquired and a **SetSW** button appears on the second row of the VNMR menu bar. Using the mouse, place the cursors on either side of proton spectrum that is displayed and press the **SetSW** button. The selective 1D experiment executes using this SW.

3. Select the number of proton scans to acquire in the **PROTON scans** field.

4. Select a relaxation delay in the **Relaxation Delay (sec)** field.

5. Enter a value for the pulse angle (observe pulse) in the **PROTON Pulse Angle** field and click on **Set** or click on **Default** to select a 45-degree pulse angle.

**Acquiring Selected 1H Detected Experiments**

All chained experiments begin with a 1D spectrum, in this case a proton 1D. Selected experiments are run, following the 1D experiment, in the order in which they are selected. Each experiment has an associated popup window for customizing the acquisition parameters associated with the experiment. In this example the order of the experiments, is PROTON 1D, TOCSY1D, and NOSY1D.

1. Adding **TOCSY1D** acquisition to the experiment chain:
3.11 H1 and Selective 1D Experiments

- Select TOCSY1D and open the TOCSY1D Acquisition popup window.
- Select a value for **TOCSY1D scans per inc** to acquire from the choices in the popup window.
- Select a value for **TOCSY1D mixing time** from the choices in the popup window. If you select Array a series of experiments will be run with mixing time arrayed from 10 ms to 100 ms.
- Click OK to use the values chosen and return to the Select H1 and Selective 1D Experiments window. Click RESET to return to the default values and either use the default values or enter different parameters. Click OK to close the popup window and return to the Select H1 and H1 Selective Experiments window.

TOCSY1D is added to the experiment chain.

2. Add **NOESY1D** acquisition to the experiment chain:

- Select NOESY1D and open the NOESY1D Acquisition popup window.
- Select a value for **NOESY1D scans per inc** to acquire from the choices in the popup window.
- Select a value for **NOESY1D mixing time** from the choices in the popup window.
- Click OK to use the values chosen and return to the Select H1 and Selective 1D Experiments window. Click RESET to return to the default values and either use the default values or enter different parameters. Click OK to close the popup window and return to the Select H1 and H1 Selective Experiments window.

NOESY1D is added to the experiment chain.

The Select H1 and Selective 1D Experiments window shows the selected experiments and proton 1D acquisition parameters..

**Verifying the Experiment List**

The order that you selected experiments in the Acquisition Setup window is the acquisition order which is displayed in the Text panel of the dQ screen.

To remove a selection from the experiment chain, deselect it by clicking on the button again. For example, clicking the TOCSY1D button a second time deselects it and removes any saved parameter customization for TOCSY1D.
Acquire

1. Click the **Do** button in the Select H1 and Selective 1D Experiments window to start acquisition. A proton spectrum is acquired, processed, plotted and saved.
   TOCSY1D experiment parameters are set up and the proton spectrum displays, similar to Figure 20. Five buttons appear on the second row of the VNMR menu bar, **Cursor, Expand, Select, Proceed, Cancel, restart, and Return**.

![GLIDE Selection of Peaks for TOCSY1D and NOESY1D](image)

**Figure 20.** GLIDE Selection of Peaks for TOCSY1D and NOESY1D

2. Select the peak you want using the left and right mouse buttons by placing two cursors on either side of the peak. Expand the proton spectrum as needed.

3. Click the **Select** button on the menu bar.
   Select additional peaks repeating step 2 and step 3 for a series of TOCSY1D spectra.

4. Click the **Proceed** button to start a series of TOCSY1D acquisitions.
   TOCSY1D spectra are acquired and individually saved. NOESY1D experiment parameters are set up and the proton spectrum is redisplayed to enable peak selection for NOESY1D.

5. Repeat step 2 and step 3 to select peaks and start NOESY1D acquisition.

6. Click the **Proceed** button to start a series of NOESY1D spectra.
   NOESY1D spectra are acquired and individually saved.

All FIDs are saved with the file names PROTON.fid, TOCSY1D_ppm1.fid, TOCSY1D_ppm2.fid, etc., NOESY1D_ppm3.fid, NOESY1D_ppm4.fid, etc., where ppm1 to ppm4 are center of the selected band. The HOMODEC experiment is run as an array of decoupling frequencies and saved as HOMODEC.fid.

The FIDs are saved in the directory `~/vnmrsys/data/filename-date`. If this directory already exists, the FIDs are saved in the directory `~/vnmrsys/data/filename-date-time`. 
Chapter 4. \textit{GLIDE} Calibration

Sections in this chapter:

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- 4.2 “Calibrate Proton,” page 49
- 4.3 “Calibrate Carbon,” page 50
- 4.4 “Calibrate Fluorine,” page 51
- 4.5 “Calibrate Phosphorus,” page 52
- 4.6 “Calibrate H, C, Ind. Det., and Gradients (CH3I),” page 53
- 4.7 “Calibrate H, Ind. Det., and Gradients (CH3OH),” page 55
- 4.8 “Calibrate Z0 and Make LOCK gmap,” page 56

4.1 Introduction to System Calibration Using \textit{Glide}

Proper calibration of the instrument is essential for experimental success. The \textit{GLIDE} user interface provides the system administrator with a simple method to automatically calibrate the system. Autocalibration options are added to the system administrator list of standard experiments accessible through the \textit{GLIDE} interface. The system administrator can automatically calibrate the system to make sure that its performance is optimum. \textit{GLIDE} Autocalibration options are \textit{not} accessible to other users.

When the autocalibration is run by the user VNMR1, all results are automatically written to the probe file in:

```
/vnmr/probes/probe_name or $vnmrsys/probes/probe_name
```

The autocalibration macros first determine power and the 90° pulse width, then write the power and pulse width values into the probe’s file.

The autocalibration macros call four parameter sets:

- \texttt{stdpar/H1.par} (either the system \texttt{/vnmr/stdpar/H1.par} or the user’s \texttt{vnmrsys/stdpar/H1.par}).
- \texttt{/vnmr/tests/gamah2}.
- \texttt{/vnmr/tests/P31sn.par}.
- \texttt{/vnmr/tests/F19sn.par}.

If the user is not \texttt{vnmr1} but is part of the \texttt{admin} group, the probe calibration file is locally created in \texttt{~/.vnmrsys/probes}. If the user is \texttt{vnmr1}, the probe’s calibration file is created in \texttt{/vnmr/probes}.

Total time for system calibration is about 45 minutes.
Chapter 4. GLIDE Calibration

Autocalibration Samples

The samples listed in Table 1 can be used for autocalibration. Not all samples are provided with each system. The required samples for the acceptance test procedure during system installation will include one or more of these six samples.

Table 1. AutoCalibration Samples

<table>
<thead>
<tr>
<th>Sample</th>
<th>Calibrate Option</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1% ethylbenzene in CDCl₃</td>
<td>Proton</td>
<td>00-968120-70</td>
</tr>
<tr>
<td>40% dioxane in C₆D₆</td>
<td>Carbon</td>
<td>00-968120-69</td>
</tr>
<tr>
<td>0.485 M triphenylphosphate in CDCl₃</td>
<td>Phosphorus</td>
<td>00-968120-87</td>
</tr>
<tr>
<td>0.05% trifluorotoluene in benzene–d₆</td>
<td>Fluorine</td>
<td>00-968120-82</td>
</tr>
<tr>
<td>1% ¹³C-enriched methyl iodide, 1% trimethyl phosphite, and 0.2% Cr(AcAc) in Chloroform-d</td>
<td>Proton, Carbon, ID, and Gradients (organic solvents)</td>
<td>00-968120-96</td>
</tr>
<tr>
<td>0.1% ¹³C-enriched methanol with 0.30 mg/ml GdCl₃ in 1% H₂O/99% D₂O (AutoTest Sample)</td>
<td>Proton, Carbon, ID, and Gradients (aqueous solvents)</td>
<td>00-968120-68</td>
</tr>
<tr>
<td>2 Hz D₂O</td>
<td>LOCK, gmap and Z0</td>
<td>01-901855-01</td>
</tr>
</tbody>
</table>

Autocalibration Macros

The following macros improve system automated calibration:

- **AC1S–AC11S** are called by the interactive autocalibration window and determine the ¹H 90° pulse width, ¹³C 90° pulse width, decoupler γH₂, and 90° pulse width of the decoupler at high power, ¹⁹F 90° pulse width, and ³¹P 90° pulse width.
- **AC1S–AC11S** perform automatic calibration on **UNITY/INOVA, MERCURY-Series, and GEMINI 2000** systems. When the macros finish the calibration routines, the current probe file is updated. If the probe is new to the system (i.e., all values in the probe file are zero), then the macros determine system power followed by calibration. If power levels are listed in the current probe file, these values are used, instead of taking time to determine power. The macro **AC1S** determines ¹H pw90, **AC5S** begins ¹³C calibration, including decoupler power calibrations. **AC10S** performs ¹⁹F calibration, and **AC11S** performs ³¹P calibration.
- **ACreport** is called by the autocalibration macros **AC1S–AC11S** to print a copy of the probe file after calibration is completed.
- **ACbackup** is called by the autocalibration macros **AC1S–AC11S** to back up the probe file before beginning a new autocalibration run. This macro is not usually called by the user.

Setting up Probe Calibration Files

Before you calibrate a probe for the first time, enter the following command:

- To make a probe file available to all system users enter
  `addprobe('probename', 'system')`.
- To create a new probe entry in the current user directory, enter
  `addprobe('probename')`, where `probename` is a name of your choice (e.g., `addprobe('idpfg')`.)
4.2 Calibrate Proton

This section describes how to calibrate proton.

Setup

1. Click on the GLIDE Setup button to display the Experiment and Calibration Setup.
2. Eject the sample from the magnet and insert the 0.1% ethylbenzene in CDCl₃ ¹H sensitivity sample. Tune the probe if needed.
3. Right click the Experiment drop-down menu and select Calibrate Proton (EtBz), as shown in Figure 21.
4. Right click the Solvent drop-down menu and select CDCl₃ as shown in Figure 21.
5. Set Autoshim and Autolock. Click the NO button if your sample is already locked and shimmed or if you would prefer to lock and shim manually.
6. Click on Setup. Standard proton parameters are recalled and the sample confirmation window appears.
7. Click the Confirm button if the correct sample is inserted in the magnet. Click Cancel if the wrong sample is inserted and to end the calibration routine and begin again. If you set Autoshim and Autolock to NO, manually lock and shim now.

Customize and Acquire

The Custom button is no longer shaded and the Acquire button appears after the Confirm button is selected at the end of the setup operation.

1. Click the Acquire button to open the Acquisition Setup window.
2. Enter the max pw90 value that your probe and spectrometer typically achieve. The value is usually the H1 pulse specification for your probe.
3. Click the Do button to start the calibration routine.

At the end of the calibration routine, the power and pulse width values are automatically incorporated into the probe file.
4.3 Calibrate Carbon

This section describes how to calibrate carbon.

Setup

1. Click on the GLIDE Setup button to display the Experiment and Calibration Setup window.
2. Eject the sample from the magnet and insert the 40% dioxane in C₆D₆⁻¹³C sensitivity sample. Tune the probe if needed.
3. Right click the Experiment drop-down menu and select Calibrate Carbon (ASTM), as shown in Figure 22.
4. Right click the Solvent drop-down menu and select Benzene as shown in Figure 22.
5. Set Autoshim and Autolock. Click the NO button if your sample is already locked and shimmed or if you would prefer to lock and shim manually.
6. Click on Setup. Standard carbon parameters are recalled and the sample confirmation window appears.
7. Click the Confirm button if the correct sample is inserted in the magnet. Click Cancel if the wrong sample is inserted and to end the calibration routine and begin again.
   If you set Autoshim and Autolock to NO in step 6, this would be the time to perform a manual lock and shim.

Customize and Acquire

The Custom button is no longer shaded and the Acquire button appears after the Confirm button is selected at the end of the setup operation.

1. Click the Acquire button to open the Acquisition Setup window.
2. Enter the max pw90 value that your probe and spectrometer typically achieve. The value is usually the ¹³C pulse specification for your probe.
3. Select a Relaxation delay. Choose 60 (default) for the undoped signal to noise sample (P/N 00-968120-69) or choose 10 (if doped) for a doped sample (not supplied).

4. Click the Do button to start the calibration routine.
At the end of the calibration routine, the power and pulse width values are automatically incorporated into the probe file.

4.4 Calibrate Fluorine

This section describes how to calibrate fluorine.

Setup

1. Click on the GLIDE Setup button to display the Experiment and Calibration Setup window.

2. Eject the sample from the magnet and insert the 0.05% trifluorotoluene in benzene-\textsubscript{d}\textsubscript{6} 19\textsubscript{F} sensitivity sample. Tune the probe if needed.

3. Right click the Experiment drop-down menu and select Calibrate Fluorine (F19 S/N), as shown in Figure 23.

4. Right click the Solvent drop-down menu and select Benzene, as shown in Figure 23.

5. Set Autoshim and Autolock. Click the NO button if your sample is already locked and shimmed or if you would prefer to lock and shim manually.

6. Click on Setup.
Standard fluorine parameters are recalled and the sample confirmation window appears.

7. Click the Confirm button if the correct sample is inserted in the magnet. Click Cancel if the wrong sample is inserted and to end the calibration routine and begin again.
If you set Autoshim and Autolock to NO, manually lock and shim now.
Customize and Acquire

The Custom button is no longer shaded and the Acquire button appears after the Confirm button is selected at the end of the setup operation.

1. Click the Acquire button to open the Acquisition Setup window.

2. Enter the max pw90 value that your probe and spectrometer typically achieve. The value is usually the 19F pulse specification for your probe.

3. Click the Do button to start the calibration routine.

At the end of the calibration routine, the power and pulse width values are automatically incorporated into the probe file.

4.5 Calibrate Phosphorus

This section describes how to calibrate phosphorus.

Setup

1. Click on the GLIDE Setup button to display the Experiment and Calibration Setup window.

2. Eject the sample from the magnet and insert the 0.485 M triphenylphosphate in CDCl₃ ³¹P sensitivity sample. Tune the probe if needed.

3. Right click the Experiment dropdown menu and select Calibrate Phosphorus (31P S/N), as shown in Figure 24.

4. Right click the Solvent dropdown menu and select CDCl₃ as shown in Figure 24.

5. Set Autoshim and Autolock. Click the NO button if your sample is already locked and shimmed or if you would prefer to lock and shim manually.

6. Click on Setup.

Standard proton parameters are recalled and the sample confirmation window appears.

Figure 24. GLIDE Calibrate Phosphorus
7. Click the Confirm button if the correct sample is inserted in the magnet. Click Cancel if the wrong sample is inserted and to end the calibration routine and begin again.

If you set Autoshim and Autolock to NO, manually lock and shim now.

**Customize and Acquire**

The Custom button is no longer shaded and the Acquire button appears after the Confirm button is selected at the end of the setup operation.

1. Click the Acquire button to open the Acquisition Setup window.
2. Enter the max \( \text{pw90} \) value that your probe and spectrometer typically achieve. The value is usually the \( ^{31}\text{P} \) pulse specification for your probe.
3. Click the Do button to start the calibration routine.

At the end of the calibration routine, the power and pulse width values are automatically incorporated into the probe file.

---

**4.6 Calibrate H, C, Ind. Det., and Gradients (CH\textsubscript{3}I)**

This procedure calibrates H1 and C13 observe, H1 and C13 decouple (pulses as well as \( \gamma \text{H}_2 \)), and gradients using the Indirect Detection I sample (C1\textsubscript{3} enriched CH\textsubscript{3}I in CDCl\textsubscript{3}). Specific calibration routines can be selected in the customization menu.

**Setup**

1. Click on the GLIDE Setup button to display the Experiment and Calibration Setup window.
2. Eject the sample from the magnet and insert the 1\% 13\text{C}-enriched methyl iodide, 1\% trimethyl phosphite, and 0.2\% Cr(AcAc) in Chloroform-d sample. Tune the probe if needed.
3. Right click the Experiment drop-down menu and select Calibrate H, C, Ind. det. & Grad. (CH\textsubscript{3}I), as shown in Figure 25.
4. Right click the Solvent drop-down menu and select CDC\textsubscript{3} as shown in Figure 25.

---

**Figure 25. GLIDE Calibrate Using CH\textsubscript{3}I**
5. Set **Autoshim** and **Autolock**. Click the **NO** button if your sample is already locked and shimmed or if you would prefer to lock and shim manually.

6. Click on **Setup**.
   Standard proton parameters are recalled and the sample confirmation window appears.

7. Click the **Confirm** button if the correct sample is inserted in the magnet. Click **Cancel** if the wrong sample is inserted and to end the calibration routine and begin again.
   If you set Autoshim and Autolock to **NO**, manually lock and shim now.

---

**Customize and Acquire**

The Custom button is no longer shaded and the Acquire button appears after the Confirm button is selected at the end of the setup operation.

1. Click the **Acquire** button to open the Acquisition Setup window.

   ![Acquisition Setup Window](image)

   Select Calibrations to be performed: H1 Observe, C13 Decouple
   (none): C13 Observe, H1 Decouple
   (none): gradient G/cm/dac, C/H gradient ratio

   NOTE: Power levels will be calibrated.
   H1 obs. pw90 (Target): 8.2
   C13 dec. pw90 (Target): 14
   C13 obs. pw90 (Target): 14
   H1 dec. pp90 (Target): 14
   Plot Results?: Yes/No

2. Enter the **1H obs pw90, 13C obs pw90, 1H dec pp90, and 13C dec pw90** values that your probe and spectrometer typically achieve or use the values for the probe’s specifications.

3. Select the **H1 Observe, C13 Decouple, C13 Observe**, and **H1 Decouple** calibration options. If the probe is equipped with gradients, also select **gradient G/cm/dac** and **C/H gradient ratio** options. These are typical calibration for autoswitchable, indirect detection, and triple resonance probes.

4. Click the **Do** button to start the calibration routine.
   At the end of the calibration routine, the power and pulse width values are automatically incorporated into the probe file. If the gradient calibration options are selected, the gradient calibrations are written into the probe calibration file.
4.7 Calibrate H, Ind. Det., and Gradients (CH$_3$OH)

This procedure calibrates H1, C13 decouple (pulse as well as $\gamma$H$_2$), and gradients using the AutoTest sample (C13 enriched CH$_3$OH in doped D$_2$O). You can select specific calibration routines in the customization menu.

**Setup**

1. Click on the **GLIDE Setup** button to display the Experiment and Calibration Setup window.

2. Eject the sample from the magnet and insert the AutoTest sample. Tune the probe if needed.

3. Right click the **Experiment** drop-down menu and select **Calibrate H, C, Ind. det. & Grad. (CH3OH)**, as shown in Figure 26.

4. Right click the **Solvent** drop-down menu and select D2O as shown in Figure 26.

5. Set **Autoshim** and **Autolock**. Click the NO button if your sample is already locked and shimmed or if you would prefer to lock and shim manually.

6. Click on **Setup**.

   Standard proton parameters are recalled and the sample confirmation window appears.

7. Click the **Confirm** button if the correct sample is inserted in the magnet. Click **Cancel** if the wrong sample is inserted and to end the calibration routine and begin again.

   If you set Autoshim and Autolock to NO, manually lock and shim now.

**Customize and Acquire**

The Custom button is no longer shaded and the Acquire button appears after the Confirm button is selected at the end of the setup operation.

1. Click the **Acquire** button to open the Acquisition Setup window.
Chapter 4. GLIDE Calibration

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2. Enter the $^1$H obs pw90 and $^{13}$C dec pw90 values that your probe and spectrometer typically achieve or use the values for the probe’s specifications.

3. Select the H1 Observe, and C13 Decouple calibration options. If the probe is equipped with gradients, also select gradient G/cm/dac and C/H gradient ratio options. These are typical calibration for AutoSwitchable, indirect detection, and triple resonance probes.

4. Click the Do button to start the calibration routine.

At the end of the calibration routine, the power and pulse width values are automatically incorporated into the probe file. If the gradient calibration options are selected, the gradient calibrations are written into the probe calibration file.

4.8 Calibrate Z0 and Make LOCK gmap

This procedure calibrates Z0 and makes a gradient map for gradient shimming for systems with gradients and gradient probes.

Setup

1. Click on the GLIDE Setup button to display the Experiment and Calibration Setup window (Figure 27A).

2. Eject the sample from the magnet and insert the 2-Hz D$_2$O sample. Tune the probe if needed.

3. Right click the Experiment dropdown menu and select Make Lock gmap and calibrate Z0 “(2 Hz D2O), as shown in Figure 27.

4. Right click the Solvent dropdown menu and select D2O as shown in Figure 27.

5. Set Autoshim and Autolock to NO

6. Click on Setup.

Figure 27. GLIDE Calibrate LOCK
4.8 Calibrate Z0 and Make LOCK gmap

Standard proton parameters are recalled and the sample confirmation window appears.

7. The message “Set z0 exactly on-resonance before starting acquisition” is displayed in the vnmr window. See Getting Started for more information on setting the lock. Open the lock display and set the lock as directed.

**Customize and Acquire**

1. Click on the **GO** icon to calibration. There are no customization option.

2. When the calibration finishes, it updates the probe calibration file.
Chapter 5. **GLIDE** Administrating and Customizing

Sections in this chapter:

**GLIDE Administration**
- 5.1 “Administration,” this page
- 5.2 “Administrative Customization and Key GLIDE Files,” page 60
- 5.3 “Administrative Customization with GLIDE Administration Tool,” page 64

**GLIDE Customization**
- 5.4 “GLIDE Directory Structure,” this page
- 5.5 “Customizing GLIDE Look and Feel,” page 74
- 5.6 “Creating Popup Window Definition Files for GLIDE,” page 78
- 5.7 “Example: Adding VT Control to the Experiment List,” page 81
- 5.8 “Further Considerations in Customizing GLIDE,” page 84

This chapter covers the administration of the **GLIDE** environment and user privileges and how to customize **GLIDE** for local or global use. Almost everything about the **GLIDE** interface can be modified by the user. This includes the parameters for each individual experiment, the titles shown on windows, and even the text on each button.

### 5.1 Administration

The probe calibration files must be maintained in order for **GLIDE** to work properly. Following are general guidelines for required calibrations. The calibration routines are only accessible by vnmr1 and users added to the **GLIDE** admin group. All members of the **GLIDE** admin group can access the local user directory probe calibration files but only vnmr1 can access the global probe calibration file.

1. To make a probe file available to all system users enter
   ```
   addprobe(proasename, 'system')
   ```

2. To create a new probe entry in the current user directory, enter
   ```
   addprobe(proasename)
   ```
   where `proasename` is a name of your choice (e.g., `addprobe('idpfg')`).

3. Refer to previous appropriate sections for calibration procedures.

Almost everything about the **GLIDE** interface can be modified by the user. This includes the parameters for each individual experiment, the titles shown on windows, and even the text on each button.
5.2 Administrative Customization and Key GLIDE Files

GLIDE can be customized by defining groups of users and then defining the environment, experiments, and solvents for each group. The GLIDE administration tool gladm simplifies the process.

If the customization is for a single user, the files are kept in the $vnmruser/glide directory. If the changes are for all users, the files should be stored in the directory $vnmrsystem/glide.

Defining Groups of Users

As many groups as needed can be created. Defining different groups of users is accomplished by editing the group file in the adm subdirectory. The following example shows how a group file might appear if there are three groups (applab, RD, and marketing).

```plaintext
applab: krish, george, paul, steve
RD: dan, frits, greg, phil, hung, chin
marketing: jan, evan, lisa, laima
```

Listing 1. /vnmr/glide/adm/group file

When a particular user logs in and runs GLIDE, that user can be assigned a specific experiments list, a solvents list, and a Store Data window, depending on the group to which that user has been assigned.

Defining the Environment for Each Group

Each group listed in the group file requires a file describing the functions of the group. This environment file is created automatically by the GLIDE Administration tool when a new group is created. This file and related files can also be created by using the vi text editor and modeling the new file after the corresponding standard file. In the example Listing 1, these files would be named applab.env, RD.env, and marketing.env. If a user does not belong to any group, the file public.env is used.

Provided in the software is the file public.env (see Listing 2) that shows how env files are laid out:

```plaintext
experiment_list: std_exp_unify
solvent_list: std_solvents
archive_def: /tmp
custom: On
disk_archive: On
```

Listing 2. /vnmr/glide/adm/public.env file

The first two entries, experiment_list and solvent_list, specify the files defining the experiments and solvents for the group. Each group could have its own files with names such as exp_applab and solv_applab for the applab group in the example above.
The custom entry can be set to On or Off (the letters are not case-sensitive). If set to On, the group can adjust the parameters of the experiment; if set to Off, the group can view the parameters, but any changes are ignored, and the default values are used.

Finally, the last entry, disk_archive, sets whether saving of data is allowed or disallowed. If set to Off, no saving of data is allowed and the Store button is not displayed in the Custom window for all users in this group. If set to On, the method of saving data can be selected by specifying a file name.

A typical example of a customized .env file is the file applab.env shown in Listing 3.

```
experiment_list: exp_applab
solvent_list: solv_applab
archive_def:
custom: On
disk_archive: On
```

**Listing 3. Example of a Custom .env file; applab.env**

Note that if users create their own glide.env file in $vnmruser/glide/adm, that glide.env file overwrites the group’s environment file. However, the entry for disk_archive in $vnmruser/glide/adm/glide.env is ignored, and the entry in $vnmrsystem/glide/adm for that user is applied instead.

This way, the VNMR administrator has control over disk use. If users create their own local glide.env in $vnmruser/glide/adm, they must also have an experiment_list and solvent_list in $vnmruser/glide.adm, and vice versa.

### Defining Experiments and Solvents for Each Group

Individualized experiment and solvent lists can be created for individual groups of users. For example, a group of users that will only need to run 1D proton, carbon, fluorine, and phosphorus experiments that have samples that are dissolved in either CDC13 or acetone-d6 need only these experiments and solvents as choices. The system administrator can prepare a customized experiment list and solvent list for this group and create group of users called, for example, group1. As you follow through the balance of this section on Administrative Customization, all the files necessary to create a new group with a customized environment in which only a 1D proton, carbon, fluorine, or phosphorus experiment is available will be set up.

### Defining an Experiment List

The experiments available to a group are defined by entries in the experiment_list file which and is located in $vnmrsystem/glide/adm or $vnmruser/glide/adm directory. In the experiment_list file, each experiment is defined by a group three lines:

<table>
<thead>
<tr>
<th>Line</th>
<th>Required Label</th>
<th>Entry</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>macro:</td>
<td>“macro name”</td>
</tr>
<tr>
<td>2</td>
<td>label:</td>
<td>“Button Label”</td>
</tr>
<tr>
<td>3</td>
<td>directory:</td>
<td>“directory containing the macro”</td>
</tr>
</tbody>
</table>
Note: $vnmrsystem is a variable created in UNIX that stores the path to the vnmr files. Typically these files are located in /export/home/vnmr. $vnmruser is another variable created in UNIX, in this case it is the path to the current user's vnmrsys directory. Typically this is located in /export/home/<user>/vnmrsys.

For example, the first four experiments: Proton 1D, Carbon 1D, Fluorine 1D, and Phosphorus 1D, in the standard experiment list (see Listing 4) are defined by the first four groups of three lines in the $vnmrsystem/glide/adm/std_experiments file:

```plaintext
macro: "AuH"
label: "Proton 1D"
directory: ""

macro: "AuC"
label: "Carbon 1D"
directory: ""

macro: "AuF"
label: "Fluorine 1D"
directory: ""

macro: "AuP"
label: "Phosphorus 1D"
directory: ""
```

Listing 4. Partial Listing of $vnmrsystem/glide/adm/std_experiments file

The macro, AuH in the example above, sets up the proton 1D experiment. When the OK button is clicked in the Setup window, this macro and several others are executed by VNMR. The Custom icon is active and an Acquisition Button appears. User selected acquisition parameters are loaded later when the Do button in the acquisition panel or the Go icon is pressed. If no customization of the acquisition is required and the Go icon is pressed, preset default parameters are loaded and acquisition begins.

The text in the label field is the text that will appear in the Experiment menu of the Setup window.

The directory field in this example does not have an entry. When the macro is called the local maclib directory will be checked first and then the system directory. This is a typical entry for the directory field.

Creating a customized experiment list using the GLIDE Administration interface is explained in the section “Setting Up An Experiment List Using,” page 67. A customized experiment list can also be created using vi or other text editor. The customized experiment list for the new user group, group1, is created by copying the first four entries in the std_experiment file into a file called group1_exps_list. The group1 users now have custom experiment list containing only these experiments.
The macros that call the standard experiments available to all users, the experiment’s GLIDE button label, and short descriptions of the macros are listed in Table 2.

**Table 2. Standard Experiments**

<table>
<thead>
<tr>
<th>Macro</th>
<th>Experiment Menu Label</th>
<th>Description of Macro*</th>
</tr>
</thead>
<tbody>
<tr>
<td>AuH</td>
<td>Proton 1D</td>
<td>Standard 1D experiment</td>
</tr>
<tr>
<td>AuC</td>
<td>Carbon 1D</td>
<td>Standard 1D experiment</td>
</tr>
<tr>
<td>AuF</td>
<td>Fluorine 1D</td>
<td>Standard 1D experiment</td>
</tr>
<tr>
<td>AuP</td>
<td>Phosphorus 1D</td>
<td>Standard 1D experiment</td>
</tr>
<tr>
<td>AuH4nuc</td>
<td>User selected HCPF 1Ds</td>
<td>Chained Proton, Carbon, Fluorine, and Phosphorus 1D experiments</td>
</tr>
<tr>
<td>AuHcosy</td>
<td>H1 and COSY only</td>
<td>Chained Proton 1D and COSY</td>
</tr>
<tr>
<td>AuCDEPT</td>
<td>C13 and DEPT only</td>
<td>Chained Carbon 1D and DEPT</td>
</tr>
<tr>
<td>AuHexp</td>
<td>H1 and H1 detected Expt</td>
<td>Proton 1D with options for chained 2D experiments: COSY, gCOSY, gDQ COSY, TOCSY, NOESY, ROESY, HMQC, gHMQC, HSQC, gHSQC, gHMBC, HMBC, HMQC TOXY, HSQC TOXY, gHMQC TOXY, gHSQC TOXY, and CARBON 1D</td>
</tr>
<tr>
<td>AuCexp</td>
<td>C13 and C13 detected Expt</td>
<td>Carbon 1D with options for chained 1D and 2D experiments: APT, DEPT, HETCOR, gHETCOR, PROTON 1D, COSY, and gCOSY</td>
</tr>
<tr>
<td>AuHsel</td>
<td>H1 and selective 1D Expt</td>
<td>Proton 1D with options for chained selective experiments: TOCSY1D, NOESY1D, ROESY1D, and HOMODEC.</td>
</tr>
</tbody>
</table>

*Gradient experiments are only available if a gradient equipped probe is installed and the console is equipped with the gradient option.

Additional macros are accessible to vnmr1 and users in the adm group for system and probe calibrations. These calibration macros are listed in Table 3 and added to the list of standard experiments in Table 2. The administrator’s experiment list is in $vnmrsystem/glide/adm/admin_experiments.

**Table 3. Calibration Macros**

<table>
<thead>
<tr>
<th>Macro</th>
<th>Experiment Menu Label</th>
<th>Calibrate**</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC1S</td>
<td>Calibrate Proton (EtBz)</td>
<td>$^{1}H$ pw90</td>
</tr>
<tr>
<td>AC5S</td>
<td>Calibrate Carbon (ASTM)</td>
<td>$^{13}C$ pw90 and 13C pwx90</td>
</tr>
<tr>
<td>AC10S</td>
<td>Calibrate Fluorine (19F S/N)</td>
<td>$^{19}F$ pw90</td>
</tr>
<tr>
<td>AC11S</td>
<td>Calibrate Phosphorus (31P S/N)</td>
<td>$^{31}P$ pw90</td>
</tr>
<tr>
<td>AuCALch3i1*</td>
<td>Calibrate H,C,Ind.det.&amp; Grad. (CH3I)</td>
<td>$^{1}H$ pw90, $^{1}H$ pp90, $^{13}C$ pw90, $^{13}C$ pwx90, gradient G/cm/dac, and C/H gradient ratio</td>
</tr>
<tr>
<td>AuCALch3oh1*</td>
<td>Calibrate H,Ind.det.&amp; Grad. (autotest)</td>
<td>$^{1}H$ pw90, $^{13}C$ pwx90, gradient G/cm/dac, and C/H gradient ratio</td>
</tr>
<tr>
<td>Augmapz0</td>
<td>Make LOCK gmap and calibrate z0 (2Hz D2O)</td>
<td>Lock and make gmap</td>
</tr>
</tbody>
</table>

*Gradient experiments are only available if a gradient equipped probe is installed and the console is equipped with the gradient option.

**The calibration samples and part numbers are listed in Table 1 on page 48.
Defining a Solvent List

Similarly, the file for the solvent_list entry, in \$vnmrsystem/glide/adm or \$vnmruser/glide/adm, contains two lines for each solvent:

- macro: "CDC13"
- label: "CDC13"

- macro: "acetone"
- label: "Acetone"

The macros are used to set up the experiment, and the labels are shown in the Solvent menu of the Setup window. For instance, if Proton 1D and Chloroform are selected, the command AuH('CDC13') is entered in the macro. Of course, the macro AuH must exist in maclib and CDC13 must exist in \$vnmrsystem/solvents. When OK is clicked, the definition files in the directory exp/ are loaded into GLIDE.

A custom solvent list can be created to match the requirements of the experiments in group1_exps_list by copying these two entries into a new file called group1_solvent_list in \$vnmrsystem/glide/adm or \$vnmruser/glide/adm.

5.3 Administrative Customization with GLIDE Administration Tool

This is a graphic interface for the management of user groups, experiment lists, and the GLIDE environment. You must be logged in as vnmr1 to use the GLIDE Administration Tool.

Starting the Glide Administration Tool

1. Type gadm on the VNMR command line or from UNIX window type:
   vnmr1> gadm
   To Start the GLIDE administration tool.

2. The main GLIDE Administration window has three buttons, System, User, and Exit. Select the System button to access Group, Experiment, and Solvent management windows. Select User to access local user GLIDE environment files. The local user GLIDE environment file have the same structure and function as their global counter parts but are located in \$vnmruser/glide/adm.
5.3 Administrative Customization with GLIDE Administration Tool

Setting Up Groups

1. Click the System button in the Glide Administration Main Window. The System Management window appears. All definition files, list files and group lists that are created in this window will be written in $vnmrsystem/glide/adm. Clicking on the User causes these files to be written to vnmruser/glide/adm. Use this option to create various GLIDE user groups within a single VNMR (and UNIX) user login.

2. Click the Group button in the System Management window and the Group Management window, Figure 28, appears.

3. Click Add New Group in the Group Management window and the Creating New Groups window, Figure 28, appears.

4. Enter the new group name in the Group Name field. For this example, enter group1.

5. GLIDE Enter the name or names of the users to be included in the group in the Group Users field. Right mouse button on the Group Users menu button and a drop down list of all users in the local hosts file. If the computer is on a network with a name server all names on the network are displayed. Click on the user to select and add the user to the Group Users field.

6. Enter the name of the experiment list file in the Experiment Files field. For this example enter group1_exps_list.

7. Enter the name of the solvent list file in the Solvent File field. For this example enter group1_solvent_list.

8. Leave the Archive Menu File field empty.

9. Click the Custom to On if you want the group to be able to customize their experiments (otherwise the Custom Setup icon remains inactive at all times).

10. Click the Disk Archive to On if you want this group to be able to save their data (otherwise, the Store Data button in the Custom Setup window is always inactive).
The completed form is shown in Figure 29.

![Figure 29. GLIDE Completed Create New Group Window](image)

11. Click on Do.

File `group1.env` is created in `$vnmrsystem/glide/adm` and the users are listed in the file `$vnmrsystem/glide/adm/group` as part of `group1`. The listing for `group1.env` is shown in Figure 5A and the listing for the group file is shown in Figure 5B.

```
experiment_list: group1_exps_list
solvent_list: group1_solv_list
archive_def:
custom: On
disk_archive: On
```

(A)`$vnmrsystem/glide/adm/group1.env`

```
admin: vnmrl
public:
group1: paul dan mike daina
```

(B)`$vnmrsystem/glide/adm/group`

**Listing 5.** Sample Files Created by GLIDE Group Management Tool
### 5.3 Administrative Customization with GLIDE Administration Tool

#### Setting Up An Experiment List Using

1. If the GLIDE Administration window is running begin at step 2. If the GLIDE Administration window is not running see “Starting the Glide Administration Tool” on page 64.

2. If you have just finished adding a new group go to step 3.
   
   If you has just opened the GLIDE Administration window the main window appears, click on System. Go to step 4.

3. Click on Return in the Group Management window (Figure 28A) to return to the System Management Window (Figure 30A).

4. Click on Experiment in the System Management Window (Figure 30A).

5. Click on Create New File (Figure 30B) in the Experiment File Management Window.

6. Enter the file name used in step 6 on page 65, `group1_exps_list`, in the Experiment File field of the Creating New Experiment File window (Figure 30C). Click on Do.

7. Enter the macro and Label for each entry in group1’s experiments list in the Creating Experiment File widow (Figure 30D). For our example, enter the following macro and label pairs by clicking the New button between each pair: AuH and Proton 1D, AuC and Carbon 1D, AuF and Fluorine 1D, and AuP and Phosphorus 1D. Click on Do.

8. Click on Yes in the Confirmation window (Figure 30E).

9. If you are not going to make and further additions click on Return -> Return -> Exit. If you are going to add a custom solvent list, continue with “Setting Up A Solvent List Using” on page 68.

---

**Figure 30.** Add Experiment List Windows
Setting Up A Solvent List Using

1. If the GLIDE Administration window is running begin at step 2. If the GLIDE Administration window is not running see “Starting the Glide Administration Tool” on page 64.

2. If you have just finished adding a new group go to step 3.
   If you has just opened the GLIDE Administration window the main window appears, click on System.

3. Click on Return in the Group Management window (Figure 31A) to return to the System Management Window (Figure 30A).

4. Click on Solvent in the System Management Window (Figure 31A).

5. Click on Create New File (Figure 31B) in the Solvent File Management Window.

6. Enter the file name used in step 7 on page 65, group1_solvent_list, in the Solvent File field of the Creating New Experiment File window (Figure 31C). Click Do.

7. Enter the macros and Labels for the experiments list of group1 in the Creating Solvent File widow (Figure 31D).
   For our example, enter the following macro and label pairs by clicking the New button between each pair: CDCl3 and Deutero Chloroform, and acetone and Acetone D6. The solvent’s name and case must be the same as its entry in the file $vnmruser/solvent. Solvent based shim files are case sensitive and the wrong or no shim file could be retrieved if solvent name in the custom solvent file list is not entered correctly. Click on Do.

8. Click on Yes in the Confirmation window (Figure 31E).

9. If you are not going to make and further additions click on Return -> Return -> Exit.
5.4 GLIDE Directory Structure

All information is stored in the glide and dialoglib directories and their subdirectories. When the GLIDE program searches for its input, it first searches the user’s directories in $vnmruser/glide and $vnmruser/dialoglib, and then the system directories $vnmrsystem/glide and $vnmrsystem/dialoglib. There are four subdirectories in the default layout provided with the software:

- **adm** subdirectory contains files for defining groups of users. Each group can have its own environment, defining a experiment list and a solvent list, customization can be allowed or disallowed, and archive capabilities can be set.

- **def** subdirectory contains definitions for popup windows.

- **exp** subdirectory contains further subdirectories, one for each experiment named in the list of standard experiments. Within each experiment subdirectory are files that describe which parameters can be adjusted for a particular experiment. Defining acquisition, processing, and plotting are the files called acquire.def, process.def, and plot.def, respectively.

- **dialoglib** subdirectory contains further subdirectories for each of the experiments that can be run in GLIDE, e.g., CARBON, COSY, etc. Each subdirectory contains the files acquire.def, process.def, and plot.def, which contain default parameter values and choices for an experiment. dialoglib is similar to the glide/exp directory, except that the experiments covered in dialoglib do not directly appear in the Experiment Setup experiment selection menu.

- **templates** subdirectory contains the glide_defaults file and template files for each icon displayed on the buttons in GLIDE (e.g., Acquire.icon). The glide_defaults file defines default values for the program. Listing 6 contains the complete text of the current default version. By replacing, adding, or deleting entries in this file, users can customize the look and feel of GLIDE.
Listing 6. Listing of glide_defaults File

# main buttons: Glide, Help, Recall, Expsolv, Custom, Go
# the order of the buttons will be the same order as their appearance

*Glide*Glide*icon: Glide.icon
*Glide*Expsolv*icon: Expsolv.icon
*Glide*Custom*icon: Custom.icon
*Glide*Go*icon: Go.icon
*Glide*Recall*icon: Recall.icon
*Glide*Exit*icon: Exit.icon
*Glide*Help*icon: Help.icon

# the resizeable can be yes or no
# the orientation can be horizontal or vertical

*Glide*resizeable: no
*Glide*orientation: horizontal

# buttons under the Custom: Acquire, Process, Plot, Archive

*Custom*Acquire*icon: Acquire.icon
*Custom*Process*icon: Process.icon
*Custom*Plot*icon: Plot.icon
*Custom*Archive*icon: Archive.icon

# the resizeable can be yes or no
# the orientation can be horizontal or vertical

*Custom*resizeable: no
*Custom*icon*orientation: vertical

# action: EXIT, CUSTOM, ARCHIVE, GO, DEF, VNMREXEC, MENU
# each button can have one and only one type of action.
# EXIT will popup a window to confirm exit.
# CUSTOM will popup a row of button for acquire, process, plot, and
# archive.
# GO will do all selected jobs in CUSTOM.
# DEF will popup a window which contents is defined in the file xx.def
# for example,
# *Glide*Mybutton*icon: mybutton.icon
# *Glide*Mybutton*action: DEF
# *Glide*Mybutton*def: my.def
# There will be a button using the pixmap in the file mybutton.icon,
# and when this button was clicked it will popup a subwindow that
# contains whatever defined in the file my.def.
# ARCHIVE is the same as DEF, except its appearance is based on the
# flag of archive.
Listing 6. Listing of glide_defaults File (continued)

# VNMREXEC will send command, which defined in the exec, to Vnmr.
# for example,
# *Glide*Mybutton*action: VNMREXEC
# *Glide*Mybutton*exec: dg
# When this button was clicked it will send command 'dg' to Vnmr.
# MENU will popup a window which contains a row of buttons.
#

*Glide*Exit*action: VNMREXEC
*Glide*Exit*exec: glide('exit') write('line3','Glide exit')
*Glide*Help*action: DEF
*Glide*Help*def: help.def
*Glide*Recall*action: DEF
*Glide*Recall*def: recall.def
*Glide*Expsolv*action: DEF
*Glide*Expsolv*def: expsolv.def
*Glide*Custom*action: CUSTOM
*Glide*Go*action: GO

# alignment can be left, right, or none
*Glide*Expsolv*label*alignment: left

# name will be used as alias
*Glide*Expsolv*name: Expsolv
*Glide*Custom*name: Custom
*Glide*Go*name: Go

# openAction: the actions will be executed when open the subwindow.
# closeAction: the actions will be executed when close the subwindow.
*Glide*Expsolv*openAction: MASK(Custom) MASK(Go)
*Glide*Expsolv*closeAction: UNMASK(Custom) UNMASK(Go) OPEN(Custom)

# updown: yes, no
# updown is used to display an updown button under icon, which will
# popup or popdown its subwindow
*Glide*Custom*updown: yes

*Custom*Acquire*action: ACQUIRE
*Custom*Acquire*def: acquire.def
*Custom*Process*action: DEF
*Custom*Process*def: process.def
*Custom*Plot*action: DEF
*Custom*Plot*def: plot.def
*Custom*Archive*action: ARCHIVE
*Custom*Archive*def: archive.def

# call: the function or macro will be executed after each task was
# done
*Glide*Go*goAcquire: glideau
*Glide*Go*noAcquire: glidewexp
*Custom*Acquire*call: glideau
Listing 6. Listing of glide_defaults File (continued)

*Custom*Process*call:   process
*Custom*Plot*call:     plot
*Custom*Archive*call:   archive($where)

*Custom*label*alignment:   right
*Custom*visibleLines:  9
*Custom*Process*visibleLines:  12

# Each window can have a row of buttons. Each button has attributes of
# label, exec, and help.
# The exec of button are: VNMREXEC, DO, RESET, CLOSE, MASK, UNMASK,
# OPEN, SHOW.
# VNMREXEC: will send command to Vnmr.
# *Glide*Process*button*4*exec: VNMREXEC(ft)
# When this button was clicked it will send command 'ft' to Vnmr.
# DO: will have Vnmr to do the all things in the specified window.
# RESET: reset the contents of pecified window to the default values.
# CLOSE: close window.
# MASK: deactivate button.
# UNMASK: activate button.
# OPEN: open window.
# SHOW: open subwindow.
# help: the text will be displayed in the footer.
#
*Glide*Recall*button*1*label:   Retrieve
*Glide*Recall*button*1*exec:    DO CLOSE UNMASK(Custom) UNMASK(Go)
*Glide*Recall*button*1*help:    Retrieve file
*Glide*Recall*button*2*label:   Close
*Glide*Recall*button*2*exec:    CLOSE
*Glide*Recall*button*2*help:    Close this window

*Glide*Expsolv*button*1*label:  Setup
*Glide*Expsolv*button*1*exec:   DO CLOSE
*Glide*Expsolv*button*1*help:   Setup experiment
*Glide*Expsolv*button*2*label:  Close
*Glide*Expsolv*button*2*exec:   CLOSE
*Glide*Expsolv*button*2*help:   Close this window

*Glide*Help*button*1*label:  Close
*Glide*Help*button*1*exec:   CLOSE
*Glide*Help*button*1*help:   Close this window
*Help*visiblelines:   25

*Custom*Acquire*button*1*label:  Do
*Custom*Acquire*button*1*exec:   DO CLOSE CLOSE(Custom)
*Custom*Acquire*button*1*help:   Vnmr will do acquire now
#*Custom*Acquire*button*2*label: Reset
#*Custom*Acquire*button*2*exec:  RESET
#*Custom*Acquire*button*2*help:  Reset to the defaults
*Custom*Acquire*button*3*label:  Close
*Custom*Acquire*button*3*exec:   CLOSE
*Custom*Acquire*button*3*help:  Close this window

*Custom*Process*button*1*label: Process
*Custom*Process*button*1*exec:   DO CLOSE CLOSE(Custom)
*Custom*Process*button*1*help:  Vnmr will do these selections ...
Listing 6. Listing of glide_defaults File (continued)

*Custom*Process*button*2*label: Reset
*Custom*Process*button*2*exec: RESET
*Custom*Process*button*2*help: Reset selections
*Custom*Process*button*3*label: Close
*Custom*Process*button*3*exec: CLOSE
*Custom*Process*button*3*help: Close window

*Custom*Plot*button*1*label: Do Plot
*Custom*Plot*button*1*exec: DO CLOSE close(Custom)
*Custom*Plot*button*1*help: Vnmr will do plot now
*Custom*Plot*button*2*label: Reset Plot
*Custom*Plot*button*2*exec: RESET
*Custom*Plot*button*2*help: Reset these selections
*Custom*Plot*button*3*label: Close Plot
*Custom*Plot*button*3*exec: close
*Custom*Plot*button*3*help: Close window

*Custom*Archive*button*1*label: Do
*Custom*Archive*button*1*exec: DO
*Custom*Archive*button*1*help: Vnmr will do archive now
*Custom*Archive*button*2*label: Reset
*Custom*Archive*button*2*exec: RESET
*Custom*Archive*button*2*help: Reset selections
*Custom*Archive*button*3*label: Close
*Custom*Archive*button*3*exec: close
*Custom*Archive*button*3*help: Close window

# the following are the attributes for Confirm window

*Glide*Confirm*title: Notice
*Glide*Confirm*Yes*label: Yes
*Glide*Confirm*Ok*label: Ok
*Glide*Confirm*No*label: No
*Glide*Confirm*exit*message: Do you want to exit from glide?

#*Glide*Main*geometry: 468x72-0+0
*Glide*Custom*geometry: +10+200
*Glide*Expsolv*geometry: +300+200
*Glide*Help*geometry: +300+200
*Glide*Acquire*geometry: +250+200
*Glide*Process*geometry: +250+200
*Glide*Plot*geometry: +250+200
*Glide*Archive*geometry: +250+200
*Glide*Recall*geometry: +10+200
*Glide*Confirm*geometry: +500+300

*Glide*Recall*title: Recall Setup
*Glide*Expsolv*title: Experiment Setup
*Glide*Help*title: Manual Help
*Glide*Custom*title: Custom Setup
*Custom*Acquire*title: Acquire Setup
*Custom*Process*title: Process Setup
*Custom*Plot*title: Plot Setup
*Custom*Archive*title: Archive Setup

*Glide*font: 9x15
*Glide*Confirm*font: courb24
5.5 Customizing GLIDE Look and Feel

The look and feel of the GLIDE program is easily customized by editing the contents of the glide_defaults file, which is located in $vnmrsystems/glide/templates or $vnmruser/glide/templates. Listing 6 contains the default version of this file. Most of GLIDE can be customized, including button icons, fonts, text, and actions.

Modifying Button Icons

Icons are in the 48×48×PM format. Although any colors can be used, we recommend that you use only the standard set provided by the icon editor. The icon for a button can be changed from an existing button or created from scratch. If you want to change an icon, take the following steps.

1. Copy the icon you want to modify from $vnmrsystem/glide/templates to your own $vnmruser/glide/templates directory. For example, if you want to modify Go.icon, enter the following cp command to copy the Go.icon file (type the command on a single line without the backslash):

   ```
   > cp $vnmrsystem/glide/templates/Go.icon \
   $vnmruser/glide/templates/Go.icon
   ```

2. Open the UNIX CDE tool dticon and modify the icon:

   ```
   > /usr/dt/bin/dticon
   ```

   or select the icon editor from the CDE desktop applications.

   If you start from scratch with dticonedit, you must select XPM as the format and 48×48 as the size. Make sure you save the new icon in the directory $vnmruser/glide/templates.

3. Save the icon. If you save the icon using the same file name as in the default directory, skip the next two steps and continue at step 6.

4. If you haven’t already done so, copy the file glide_defaults from the default directory $vnmrsystem/glide/templates to your own $vnmruser/glide/templates. Use the cp command as follows (type the command on a single line without the backslash):

   ```
   > cp $vnmrsystem/glide/templates/glide_defaults \
   $vnmruser/glide/templates/glide_defaults
   ```

5. Using a text editor, modify the glide_defaults file so that the name of the icon you changed is listed in the second column. For example, if you changed the Go icon (Go.icon file) and stored it as Mygo.icon, change glide_defaults as follows:

   ```
   *Glide*Go*icon:      Go.icon
   to
   *Glide*Go*icon:      Mygo.icon
   ```

   If you changed another icon, look for the corresponding line. If the original line does not exist, add the new line as a separate line anywhere in glide_defaults. Most names are fairly self-explanatory.

   Be sure you include the colon in the line as shown.

6. Exit GLIDE by clicking on the Exit button, then restart GLIDE by clicking on the GLIDE button in the Permanent menu. Check that the new icon is now used.
5.5 Customizing GLIDE Look and Feel

After you restart GLIDE, if the word custom appears where the new icon should be, GLIDE could not find the file you specified in glide_defaults. Most likely you typed the wrong file name or did not store the new icon in $vnmruser/glide/templates.

Additional changes are possible by editing the glide_defaults file. Refer to the comments in the default version of the file (Listing 6) for more information.

**Changing the Font and Text**

By default, GLIDE uses the 9×15 font. If you want to change the font, follow these steps:

1. If you haven't already done so, copy the file glide_defaults from the default directory $vnmrsystem/glide/templates to your own $vnmruser/glide/templates. Use the cp command as follows (type the command on a single line without the backslash):

   ```
   > cp $vnmrsystem/glide/templates/glide_defaults \\
   $vnmruser/glide/templates/glide_defaults
   ```

2. Using a text editor, modify the line for the font in the glide_defaults file. For example, to change to the 7 × 14 font, change the second column from

   *Glide*font:   9x15

   to

   *Glide*font:   7x14

   Be sure you include the colon in the line as shown.

3. Exit GLIDE by clicking on the Exit button, then restart GLIDE by clicking on the GLIDE button in the Permanent menu. Check that the new font is now used.

The text associated with the font (*Title, *label, *message, etc.) can be changed similarly. Remember that the first column must remain unchanged (exactly as shown in Listing 6), but the second column can be any text. This enables GLIDE to be translated into any language.

**Additional Icon Options**

Some additional options are available through glide_defaults:

*resizable:    yes or no

Sets whether the GLIDE icons can or cannot be resized. Default is yes.

*orientation:  horizontal or vertical

Sets whether the icons are laid out horizontal or vertical. Default is horizontal.

*updown:       yes or no

Sets whether the GLIDE icons will or will not have an up/down button under it. The effect of an up/down button is the same as clicking the icon, but its use is sometimes more obvious. Default is no.

*name:         string

Used as an alias. Can also be used as an argument to GLIDE internal functions such as MASK and OPEN.

*openAction:
*closeAction:

Sets actions to perform when an icon opens or closes a window. The window is normally defined with a .def file.

*goAcquire:
*noAcquire:
Sets action associated only with the Go icon. This action is performed before any other.
*goAcquire* is executed when Acquire is selected in the Custom window.
*noAcquire* is executed when Acquire is not selected in the Custom window.

*help:*
Specifies message on a window displayed when the cursor is at rest over the icon.

### Setting the Actions of the Icon Buttons

Each icon button in the main interface (such as Exit, Help, Go, and user-defined button names) can have the following attributes to define the action of the button:

- **action:** One (and only one) of the following internal *GLIDE* actions:
  - CUSTOM: Pops up the row of buttons for acquire, process, plot, and archive. This action is normally only associated with the Custom button.
  - GO: Does all jobs as selected in the Custom window. This action is normally only associated with the Go button.
  - DEF: Pops up a window with contents defined in a .def file. The .def file is named in the corresponding *def.
  - ARCHIVE: Same as DEF, except the button is only active if the archive flag in the .env file is set to *Yes*.
  - ACQUIRE: Same as DEF, except the results of the window actions are executed by the GO function before any other window commands, such as Process and Plot. Normally, there is only one ACQUIRE action within *GLIDE*, and it is inside the Custom window, associated with the Acquire Setup window.
  - MENU: Pops up a window that contains a row of buttons.
  - VNMREXEC: Sends a command to VNMR. The command string is defined by a corresponding *exec

- **exec:** Defines the VNMR command for the VNMREXEC action.
- **def:** Defines the name of the .def file for DEF, ACQUIRE, or ARCHIVE.
- **name:** Specifies an alias for the corresponding icon.

The following examples show how these terms are used in the default version of the *glide_defaults* file:

```plaintext
*Glide*Exit*action: VNMREXEC
*Glide*Exit*exec: glide('exit') write('line3','Glide exit')
*Glide*Expsolv*action: DEF
*Glide*Expsolv*def: expsolv.def
```

The following example shows how the action of a new button (*Mybutton*) is being defined. It will use the icon defined by the user in the file *mybutton.icon*. When the new button is clicked, it will popup a subwindow that contains whatever is defined by the user in the file *my.def*:

```plaintext
*Glide*Mybutton*icon: mybutton.icon
*GLIDE*Mybutton*action: DEF
*Glide*Mybutton*def: my.def
```

The following example adds an icon button (*Myicon.icon*) in the *GLIDE* window. This button is an up/down button that shows two icons (*Myicon2.icon* and
Myicon3.icon). Each of these two icons pops up a window defined by myicon2.def and myicon3.def:

*Glide*Myicon*icon: Myicon.icon
*Myicon*updown: yes
*Myid*on*action: MENU
*Myicon*Myicon2*icon: Myicon2.icon
*Myicon*Myicon3*icon: Myicon3.icon
*Myicon*Myicon2*action: DEF
*Myicon*Myicon3*action: DEF
*Myicon*Myicon3*def: Myicon2.def
*Myicon*Myicon3*def: Myicon3.def

Refer to Listing 6 for more information.

### Setting the Actions of the Popup Window Buttons

Each popup window in GLIDE has a row of buttons, such as the Do, Default, and Close buttons in the Acquire, Process, and Plot Setup windows. Additionally, each popup window may have buttons as part of choice_button, menus, and check_button. These buttons are defined in the file glide_defaults and can be customized:

```plaintext
exec: One or more of the following internal GLIDE actions:
CLOSE                Close the window itself
CLOSE(icon_name)     Close window or menu associated with icon_name.
OPEN                 Open window or menu of icon clicked.
OPEN(icon_name)       Open window or menu associated with icon_name.
SHOW                 Open up/down window of icon clicked.
SHOW(icon_name)       Open up/down window associated with icon_name.
RESET                Reset (default) contents of this window.
RESET(icon_name)      Reset (default) contents of the window associated with icon_name.
MASK                 Deactivate window.
MASK(icon_name)       Deactivate window associated with icon_name.
UNMASK               Activate window.
UNMASK(icon_name)     Activate window associated with icon_name.
DO                   Generate output and send it to VNMR. A macro is created, executed by VNMR, and deleted.
DO(icon_name)         Same as DO, except for window associated with icon_name.
SAVE                 Generate output and save it to a file. The name of the file is specified by the second argument of the dialog command.
SAVE(icon_name)       Same as SAVE, except for window associated with icon_name.
VNMREXEC(command)     Send command string to VNMR.
```
The following examples show the use of button attributes:

```
*Glide*Process*button*1*label: Process
*Glide*Process*button*1*exec: DO
   "VNMR will process this selections"
*Glide*Process*button*1*help: VNMREXEC(ft)
*Glide*Process*button*2*label: "VNMR will execute ft right now"
*Glide*Process*button*2*exec: 
*Glide*Process*button*2*help: 
```

Displayed in the Process window are two buttons: Process and Ft. When Process is clicked, a macro `eou_process` is created that contains all selections made, and VNMR executes this macro right away. When Ft is clicked, VNMR executes `ft` only. If the attribute `exec` is empty or missing, VNMR does not execute. See Listing 6 for more examples of defining `GLIDE` buttons.

### Changing the GLIDE Help Page

If you change the look and feel of `GLIDE`, remember that the help page displayed by entering `man('glide')` refers to items by certain names. You should also modify the help page by editing the file `$vnmrsystem/manual/glide`.

### 5.6 Creating Popup Window Definition Files for GLIDE

Experiments can be fully customized through experiment definition files. This section describes these files and shows how to create and use them.

All popup windows in `GLIDE` and for dialog boxes are defined with `.def` files. Icons and `.def` files can be created for `GLIDE` buttons, buttons in the Custom window, or buttons in an up/down menu.

The location of the `.def` files follows these rules:

1. The `.def` files specified in the `glide_defaults` file are stored in either `$vnmruser/glide/def` or `$vnmrsystem/glide/def`.
2. For experiments named directly in the Experiment Setup selection menu, such as the 1D experiments for each nucleus, the `.def` files to appear in the Custom window are

### SETVAL

- `item`, `value` - Sets the value of item to value. This is used in the `.def` file only. (The use of `id` is discussed later).
- `input<id>,xxx` -
- `menu<id>,1 to n` -
- `choice<id>,1 to n` -
- `check_button<id>, 0 or 1` -
- `value<id>,xxx` -

**help:** Help text displayed when the cursor is over the button.
5.6 Creating Popup Window Definition Files for GLIDE

in either $vnmruser/glide/exp/exp_name or $vnmrsystem/glide/ 
exp/exp_name.exp_name must correspond to the name of the macro used in 
the Experiment list. The exception to this rule is the file archive.def, which is 
only in $vnmrsystem/glide/def but is added for all experiments to the 
Custom window.

3. For experiments such as APT or COSY that are selected and set up within the 
Custom Acquire menu, the .def files are in either $vnmruser/dialoglib/ 
EXP_NAME or $vnmrsystem/dialoglib/EXP_NAME. The spelling of 
EXP_NAME must be the same as the entry in the experiment selection menu. The 
experiment setup macro itself (in maclib) must also have the same name with 
matching uppercase/lowercase characters (the convention is that all uppercase 
names are used).

4. If an absolute path is given for the .def file, the file can be stored anywhere.

Most of the .def files are created for a new experiment. Icons are already defined for 
acquire, process, and plot with their corresponding .def files, called acquire.def, 
process.def, and plot.def, respectively. If the .def file cannot be found, the icon 
is not displayed. For example, the directory structure for the “Proton 1D” experiment is 
$vnmrsystem/glide/exp/AuH/acquire.def 
$vnmrsystem/glide/exp/AuH/process.def 
$vnmrsystem/glide/exp/AuH/plot.def

The icons for these .def files will appear in the Custom window. None of the .def files are 
necessary to make an experiment. If omitted, no customization is possible.

For experiments setup using the Custom Acquire menu selection, the .def files are located 
in the directory .../dialoglib/EXP_NAME. The file acquire.def is read when the 
corresponding experiment is chosen, and immediately defines a new popup window that 
allows you to set acquisition parameter values for that experiment. The process.def 
and plot.def files are stored with the FID and recalled when the data is loaded for 
processing. When the data is loaded, you can customize processing and plotting by 
modifying the process.def and plot.def files, which define the Custom Process 
and Custom Plot menus (as well as default processing and plotting).

As an example, the following procedure adds a double-quantum-filtered COSY experiment 
(DQFCOSY) to the list of proton-detected experiments (accessible by choosing “H1 and 
H1 detected Experiments” in the Experiment Setup experiment selection menu).

1. Add DQFCOSY to the file exp/AuHexp/acquire.def; add it to the 
   experiment selection menus towards the end of the file.

2. Create a new subdirectory called $vnmruser/dialoglib/DQFCOSY.def that 
   includes the files acquire.def, process.def, and plot.def. Each of these 
   files contains fields for parameters—such as relaxation delay (d1), ni, and nt in 
   acquire.def or processing parameters such as linear prediction or fn in 
   process.def—that you are allowed to change.
Within the `.def` files are entries describing one parameter-change-line. Each entry is enclosed in braces `{ }`. For example,

```
{
label: Spectral Width
input: 3000
choice: "Hz" "PPM"
choice_value: "p" "P"
output: "sw=$input$choice_value"
remark: "Enter spectral width in Hz or PPM"
show: (sw<2000) and (np>3200)
}
```

would appear as

<table>
<thead>
<tr>
<th>Spectral Width: 3000 Hz</th>
<th>PPM</th>
</tr>
</thead>
</table>

Enter spectral width in Hz or PPM

Note that each entry between braces consists of several lines. Each line contains a label, a colon, and one or more values. Possible labels and their values are the following:

- **label**: String that serves as the label for the item being defined.
- **input**: Default numerical or string value for the item.
- **choice**: Series of string values to appear on radio buttons. The first value is the default.
- **choice_value**: String values to be used as $choice_value in output when the radio buttons are selected. The number of strings for choice_value must equal the number of values for choice.
- **cols**: Number of columns for item. Sets the line length of input.
- **rows**: Number of rows for item. Sets the number of lines of input.
- **menu**: Series of string values to appear on a menu. The first value is the default.
- **abbreviate_menu**: Same as menu, except the selected menu item is not shown, and only the menu button is shown.
- **menu_value**: String values to be used as $menu_value in output when choices in the menu are selected. The number of strings for menu_value must equal the number of values for menu.
- **value(id)**: Same as menu_value, choice_value, or input, when used. If id is missing, this line is ignored. id is any number assigned to an item to distinguish it from other similar items. For example, if you tried to create two choice buttons but did not assign id to each button, only one button would be created.
- **exec**: Sets GLIDE action. If no id is specified, the action applies to every button, menu, and choice.
- **text**: Displays the text.
- **button**: Button displayed in the bottom row of a window. By default, Do, Default, and Close are displayed.
- **check_button**: Multiple selection row of buttons.
- **check_set_exec**: Sets GLIDE actions for check_button when set or selected. If no id is specified, the action applies to every check_button.
- **output**: String to be inserted in a macro executed by VNMR. The string can contain characters, $input, $choice_value, and $menu_value.
5.7 Example: Adding VT Control to the Experiment List

You can customize as much as you wish the list of choices in the Experiment and Solvent popup menus. As an example, the following steps add an experiment called “1D proton with VT” to the list of experiments.

1. If you haven’t already done so, copy the default experiments list for your system from the directory $vnmrsystem/glide/adm to your own $vnmruser/glide/adm. Use the cp command as follows (type the command on a single line without the backslash)—on MERCURY-VX, MERCURY, and GEMINI 2000 systems, enter:

   > cp $vnmrsystem/glide/adm/std_exp_gem $vnmruser/glide/adm/my_std_exp

   On systems other than MERCURY-VX, MERCURY, and GEMINI 2000, enter:

   > cp $vnmrsystem/glide/adm/std_exp_unity $vnmruser/glide/adm/my_std_exp

2. Start the GLIDE administration tool:

   > gadm

   The opening window appears with three buttons: System, User, and Exit.

3. In the window, click on User | Do | Experiment | Change | Show.

   A new window appears with a single field labeled Experiment File.

4. Type in the new file name you want to give the experiment list:

   Experiment File:   my_std_exp

   Then click on Do.

   Another window appears with fields labeled Macro and Label for the first entry in the file my_std_exp.

5. Click on Next until an empty entry is shown (or click on New), then type in a new macro name and label. For our example, enter the following:

   Macro:   H1_VT
   Label:   1D proton with VT

   Be sure to remember the macro name you enter because it will be the name of the macro used to set up the experiment and will also be the name of the directory that hold the .def files that define the experiment (see below). Therefore, the macro name must be a valid VNMR and UNIX name. The label will be the text shown in the experiment list.
Beside adding an experiment using this window, notice you can replace an old experiment with the new one by erasing an entry and typing the new experiment in its place. You can also delete unneeded experiment here.

6. Click on Do and when the confirmation message appears click on Yes.
The list is now created. Next we need to tell GLIDE that we want to use this list.

7. Click on Return > Preference.
The window that appears has three fields, labeled Experiment files, Solvent files, and Archive Menu file.

8. Because we are changing the experiment list only, we change only the experiment file entry, as follows:
   Experiment files: my_std_exp
   We leave the other two entries alone. If we had instead changed the solvents list, we would of course modify that entry, or both entries if both were changed.

9. Click on Do and, when the confirmation message appears, click on Yes.

10. Exit gadm by clicking on Return > Exit.

11. Exit GLIDE by clicking on the Exit button, then restart GLIDE by clicking on the GLIDE button in the Permanent menu. Check that the new experiment appears in the list of experiments.

The next section shows how to create customization definition files for this experiment.

Creating New Customization Definition Files

In the example above, the experiment H1_VT was added to the experiments list. Now we need to create customization definition files for the experiment. These files, which have the .def extension, define the parameters that can be adjusted in the Custom Setup window. The easiest way to proceed is to copy the .def files from an existing experiment and modify the files as needed.

1. Because our example is a 1D proton experiment, start by copying 1H .def files from $vnmrsystem/glide/exp/h1 to your directory $vnmruser/glide/exp/H1_VT. The directory H1_VT is used because that is the name of the macro specified in the experiments list. Note the use of the “-r” option because we recursively want to copy a directory:
   > cp -r $vnmrsystem/glide/exp/h1  
   $vnmruser/glide/exp/H1_VT

2. List the files in H1_VT:
   > cd $vnmruser/glide/exp/H1_VT
   > 1f
   acquire.def  process.def  plot.def
   These three .def files determine which parameters can be adjusted for this experiment. Note that there is no file archive.def, because archiving privileges are set only by the VNMR system administrator.

3. Use a text editor and add the following entry to the file acquire.def:
   {
     label: Temperature
     input: 30
     choice: “No” “Set”
5.7 Example: Adding VT Control to the Experiment List

```plaintext
choice_value: "'n' "$input"
output: temp=$choice_value
remark: Enter temperature to use
show: (vttype<>0)
```

Notice that the entry is enclosed between braces “{ }” and consists of several lines. Each line has a label, a colon, followed by one or more values. The label must be exactly as shown—any typos and the line is ignored. A complete list of labels is given earlier in this chapter. This entry produces this graphic (note that No is selected because that is the first value following the choice label):

![Temperature Selection](image)

4. Save the file and exit the editor.

We leave the `process.def` and the `plot.def` files unchanged. Notice that if the `process.def` and the `plot.def` files did not exist in the `H1_VT` directory, the Process Setup and Plot Setup icon are not active in the Custom Setup window.

The next section considers writing a macro to set up this experiment.

Creating a Setup Macro

`GLIDE` now has the ability to set the temperature for a proton 1D experiment. But a macro is still needed to set up the experiment. This macro is called when, after an experiment and solvent is selected, the Setup button is clicked in the Experiment Setup window.

1. As with the `.def` files, it is easiest to start by copying and modifying an existing macro for an experiment similar to the new experiment. The closest macro to the new experiment is the `h1` macro. In fact, because all we added to the existing 1D proton experiment was the ability to change an existing parameter, we do not have to change `h1`, but we must call it `H1_VT` (of course we could also create a macro `H1_VT` that just calls `h1`):

   ```
   > cp $vnmrsystem/maclib/h1 $vnmruser/maclib/H1_VT
   ```

2. Processing and plotting is done with the standard proton 1D macros and need no further work.

We are now ready to run this experiment from `GLIDE`. 

5.8 Further Considerations in Customizing GLIDE

A few things should be remembered when programming for GLIDE. As described in the examples above, the macro name in the experiment list must be the same as the name of the setup macro as well as the name of the directory that holds the .def files. The experiment description is located in $vnmrsystem/glide/exp or in $vnmruser/glide/exp. The names must be VNMR and UNIX compliant. They are also case sensitive; for example, h1 and H1 are not the same.

We didn’t modify the h1 macro, just copied it to H1_VT, because we allowed for customizing of an already existing parameter (all parameter sets from Varian have the temp parameter). If we used a parameter unique to the experiment, we would have to create the parameter in the setup macro, the same as always.

What happens if the Go button is pushed?

1. GLIDE creates a macro, called eou_go that contains all the lines defined by the “output:” lines in the acquire.def file. At the end of eou_go, the value defined by *Glide*Go*goAcquire* in glide_defaults is added. By default, this value is glideau.

2. In the same manner, the macros eou_process_go, eou_plot_go, and eou_archive_go are created. Each get their lines from the corresponding .def file and one line is added from glide_defaults. By default, this is process for eou_process_go, plot for eou_plot_go, and archive($where) for eou_archive_go. These macros are stored in the current experiment and are erased as soon as they are executed.

3. After GLIDE creates these macros, it sends the macro eou_go to VNMR. VNMR sets the parameters as prescribed by eou_go and executes glideau. glideau resets the wexp parameter to be glidewexp (unless the experiment is a chained experiment such as H-C-APT, then it removes the first in the chain) and executes an au.

4. When the experiment is completed, glidewexp is executed. glidewexp first executes eou_process_go, which sets the processing parameters and executes the macro process. Next, glidewexp executes eou_plot_go, which sets the plotting parameters and executes the macro plot. Finally, glidewexp executes eou_archive_go, which sets archiving parameters (usually none) and executes archive($where). ($where is set by the VNMR system administrator when it creates the different groups and assigns archiving privileges.)

5. Ultimately the macros process and plot are executed. These macros process and plot all experiments; decisions on how to process and plot are based on the observe nucleus parameter tn for 1D, and whether certain parameter such as ni exists for 2D.

Refer to the manual VNMR Command and Parameter Reference for more information on plot and process.
Chapter 6. Tcl/Tk User Interfaces

Sections in this chapter:
- 6.1 “Experiments Available Through Each Tcl/Tk Interface,” page 86
- 6.2 “Setup EXP Window,” page 87
- 6.3 “CustomQ Window,” page 88
- 6.4 “Walkup Window,” page 89

There are three Tcl/Tk user interfaces supplied with VNMR 6.1C. Each interface provides the user with push button access to an extensive list of standard experiments. Through the Setup EXP window, an individual experiment can be set up and fully customized. Automated multiple experiment acquisition is set up using the Custom Q window. Predefined groups of experiments can be setup and run automatically as a series of experiments with no additional user intervention. Menu driven customization of acquisition and plotting parameters is an integral part of the Custom Q interface. The Walkup window provides one button operation for quick data acquisition and plotting.

This chapter covers the functions of the buttons in each of the user interfaces and the experiments available through each interface.

### 6.1 Experiments Available Through Each Tcl/Tk Interface

Table 4 lists the experiments available for each Tcl/Tk interface.

**Table 4. Available Experiments in Each Tcl/Tk Interface**

<table>
<thead>
<tr>
<th>Experiment*</th>
<th>Setup EXP</th>
<th>CustomQ</th>
<th>Walkup</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proton 1D</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Carbon 1D</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Fluorine 1D</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Phosphorus 1D</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Chained Proton, Carbon, Fluorine, and Phosphorus 1D experiments</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Chained Proton 1D and COSY</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Chained Carbon 1D and DEPT</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Proton 1D with chained proton detected 2D experiment options</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>gCOSY / COSY</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>gDQ COSY</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>gHMQC / HMQC</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>gTOCSY / TOCSY</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>gNOESY / NOESY</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>gROESY / ROESY</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>gHSQC / HSQC</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>gHMBC / HMBC</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>gHMQC TOXY / HMQC TOXY</td>
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<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>gHSQC TOXY / HSQC TOXY</td>
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<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>CARBON 1D</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Carbon 1D with chained 1D and 13C detected 2D experiments options</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>APT</td>
<td>✔</td>
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<td>✔</td>
</tr>
<tr>
<td>DEPT</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>gHETCOR / HETCOR</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>PROTON 1D</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>gCOSY / COSY</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Proton 1D with options for chained selective experiments</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>gTOCSY 1D</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>gNOESY 1D</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>gROESY 1D</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>HOMODEC</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Nitrogen indirect detection experiments</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>gHMQC / HMQC</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>gHSQC / HSQC</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>gHMBC / HMBC</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>gHMQC TOXY / HMQC TOXY</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>gHSQC TOXY / HSQC TOXY</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>

*Experiments requiring gradients are indicated by the prefix ‘g’ (e.g. gCOSY) and are only available if a gradient equipped probe is installed, the console is equipped with the gradients, and the gradient field in the probe file is set to ‘y’.
6.2 Setup EXP Window

The Setup EXP panel in the Tcl/dg window provides access to the experiments listed in Table 4 in the Setup EXP column. Open the Setup EXP window, shown in Figure 32, by clicking the Setup EXP button in the Tcl/dg window.

The Setup EXP window is divided into five major areas:

- **Sample Management** menus and buttons. These buttons facilitate changing the sample and setting the lock solvent. If the system is equipped with a sample changer the location of the sample is entered in the Location window and the change button used to change the sample. Eject and Insert buttons are provided for systems that do not have a sample changer. The appropriate lock solvent is selected from the list of lock solvents available in the drop down Solvent menu.

- **Individual Experiment Selection** menus. Use these menus to set up one experiment at a time. For example selecting HMQC from these menus converts the parameter set in the current experiment to HMQC. Parameters can be adjusted before starting the acquisition. The data is collected and processed. Plotting of data and saving of the FIDs are done manually. For step-by-step instruction, refer to Tcl/Ttk NMR Interfaces Step-by-Step on page 91.

- **Display Sequence, Dialog (drop down menu), Time, and Start Acquisition** buttons. These buttons are basic tools for displaying a pulse sequence, interactively adjusting acquisition, display and plotting parameters, calculating time (only for individual experiment), and starting acquisition.

- **Hardware, Find Z0, and Gradient Shimming** buttons and menus. The SETUP button sets up the hardware, find z0 starts the autolocking routine, and Grad. shim is a drop down menu of gradient shimming options. Gradient shimming is an integral part of Setup EXP operation. When the acquisition is started using the Start Acquisition button, the requirements for gradient shimming are automatically explored and the necessary files are found, gradient shimming is done before acquisition. See Tcl/Tk NMR Administration and Calibration on page 121.

- **Probe Administration** buttons and menus. Use these buttons and menus for probe administration, which is a key requirement for successful operation. Probes files can be calibrated automatically using the Autocalibration menus or manually edited. See Administration of Probe Calibration Files on page 121 for details on the probe administration files and Autocalibration.
6.3 CustomQ Window

The CustomQ interface panel in the Tcl/dg window provides access to the experiments listed in Table 4 in the CustomQ column. Open the CustomQ window, shown in Figure 33, by clicking the CustomQ button in the Tcl/dg window.

The CustomQ window is divided into four major areas:

- **Sample Management** menus and buttons. These buttons facilitate changing the sample and setting the lock solvent. If the system is equipped with a sample changer the location of the sample is entered in the *Location window* and the change button used to change the sample. *Eject* and *Insert* buttons are provided for systems that do not have a sample changer. The appropriate lock solvent is selected from the list of lock solvents available in the drop down *Solvent* menu.

- **Automated Experiment Selection and Setup** buttons. Use these buttons to set up and run either predefined or a custom chain of experiments on the sample. In these selections, experiments are acquired, processed, plotted and saved automatically. You have access to the collected FID for reprocessing and replotting. For step-by-step instructions, refer to Tcl/Ttk NMR Interfaces Step-by-Step on page 91.

- **EXPLIST, Start Acquisition, and Dialog (drop down menu)** buttons. These buttons are basic tools for displaying the list of experiments that have been selected, interactively adjusting acquisition, display and plotting parameters, and starting acquisition.

- **On Screen Instructions** provide step-by-step basic instructions for operation using the CustomQ window.

![CustomQ Window](image-url)
6.4 Walkup Window

The Walkup interface provides one button access to a preset group of experiments which makes set up and acquisition easy. The experiments are listed in Table 4 in the Walkup Column. Experiments are accessed from the Walkup window in the Tcl/dg window. Open the Walkup window, shown in Figure 34, by clicking the Walkup button in the Tcl/dg window.

The Walkup window is divided into three major areas:

- **Sample Management** menus and buttons. These buttons facilitate changing the sample and setting the lock solvent. If the system is equipped with a sample changer the location of the sample is entered in the Location window and the change button used to change the sample. Eject and Insert buttons are provided for systems that do not have a sample changer. The appropriate lock solvent is selected from the list of lock solvents available in the drop down Solvent menu.

- **Automated Experiment Selection and Setup** buttons. Use these buttons to set up and run predefined experiments on the sample. Experiments are acquired, processed, plotted automatically. For step-by-step instructions, refer to Tcl/Ttk NMR Interfaces Step-by-Step on page 91.

- **Start Acquisition** button.

- **On Screen Instructions** provide step-by-step basic instructions for operation using the Walkup window.

![Figure 34. Walkup Window](image-url)
Chapter 7. **Tcl/Ttk NMR Interfaces Step-by-Step**

Sections in this chapter:
- 7.1 “Setup EXP Window Experiments,” this page
- 7.2 “CustomQ Window Experiments,” page 94
- 7.3 “Walkup Window,” page 120

This chapter gives step-by-step instructions for performing automated and individual walkup NMR experiments using the Tool Command Language/Display Group (Tcl/dg) interface.

The general procedure for walkup NMR is to open the Setup EXP window (described in the next section):
- select a solvent
- insert the sample
- select a experiment from a list in the window

Once an experiment is selected, a window appears for setting up, customizing, and running the experiment.

### 7.1 Setup EXP Window Experiments

Perform the following steps to set up an individual experiment:

1. Click the **Setup EXP** button in the right side of the Tcl/dg window. The Setup EXP window shown in Figure 35 is displayed. Do the following steps to set up and customize the experiment.

![Figure 35. Setup EXP Window](image)

---

01-999159-00  A0800  Walkup NMR with VNMR 6.1C  91
2. Select the solvent in the sample management region of the window (Figure 35) by holding down the left mouse button on the solvent menu (Figure 36) and choosing the appropriate solvent from the solvent menu list.

3. Eject the current sample from the magnet and insert the new sample.

4. Click on the Eject and Insert buttons (Figure 36) in the sample management region of the Setup EXP window (Figure 35) or, from the command line, use the e command to eject the sample and the i command to insert a new sample.

5. Lock and shim the sample.

6. Click on the find z0 button (Figure 37) to AutoLock or manually establish lock.

7. Select a gradient shim method from the drop down Gradient Shim menu. Gradient shimming will take place when the start acquisition button is pressed.

8. Select the experiment you want to perform from the Experiment selection menus by holding down the left mouse button on the appropriate menu and selecting the “required” experiment from the menu list.
   - Click on the Basic 1D Experiments button to run a basic 1D proton, carbon, phosphorus, or fluorine experiment. Select an experiment from the list.
     - For proton1D and carbon1D experiments, standard parameters are selected from stdpar/H1.par and stdpar/C13.par files. For all other experiments, the current parameter set is modified. For example selecting HMQC converts the parameter set in the current experiment to do HMQC.
   - Click the H1 Homonuclear Expt button to run proton detected 2D experiments. Select an experiment from the list.
     - For selective 1D experiments (such as tocsy1D or NOESY1D), a “processed” proton spectrum is required in the current experiment.
• Click the **C13 Detected Expt** button to run carbon and carbon detected 1D and 2D experiments. Select an experiment from the list.

• Click the **C13 Ind. Det. Expt** button to run carbon indirect detection experiments. Select an experiment from the list.

• Click the **N15 Ind. Det. Expt.** button to run nitrogen indirect detection experiments. Select an experiment from the list.

9. After selecting an experiment, you can modify any parameters manually before starting the acquisition. Alternatively, you can use the **Do Parameter Dialog** button to open a dialog box. A customization window similar to those in Automated Experiment setup appears.

10. Start the acquisition by clicking the **start Acquisition** button. The acquired data is automatically processed at the end of the acquisition.
7.2 CustomQ Window Experiments

Selections listed below provide step-by-step instructions.

1. Begin with:
   • “Setting Up an Automated Experiment,” this page

2. Continue with one of the following experiments or experiment groups:
   • “Proton 1D Spectrum,” page 95
   • “Carbon 1D Spectrum,” page 97
   • “Phosphorus 1D Spectrum,” page 100
   • “User Cued HCPF 1Ds,” page 101
   • “H1 and COSY Experiments,” page 105
   • “C13 and DEPT Experiment,” page 107
   • “H1 and H1 Detected Experiments,” page 108
   • “C13 and C13 Detected Experiments,” page 112
   • “H1 and Selective 1D Experiments,” page 116

You access the same experiments through CustomQ interface in the Tcl/dg window and the GLIDE interface. The CustomQ interface provides menus and popup windows for easy experiment set up and acquisition.

Setting Up an Automated Experiment

Perform the following steps to set up an experiment:

1. Click the CustomQ button in the left side of the Tcl/dg window to display it.

![CustomQ Window](image-url)

**Figure 38.** CustomQ Window
1. Eject the current sample from the magnet and insert the new sample.

2. **Click** on the **Eject** and **Insert** buttons (Figure 38) in the sample management region of the CustomQ window (Figure 39) or, from the command line, use the `e` command to eject the sample and the `i` command to insert a new sample.

3. Select the solvent in the sample management region of the window (Figure 38) by holding down the left mouse button on the solvent menu (Figure 39) and choosing the appropriate solvent from the solvent menu list.

4. **On screen** instructions (Figure 40) are provided to assist the user in setting up the automated experiment list.

5. Choose the experiment you want to perform by clicking on the button in the **Automated Experiment Selection and Setup** region of the CustomQ window.

### Proton 1D Spectrum

**Setting Up and Customizing the Experiment**

1. Follow the directions in “Setting Up an Automated Experiment” on page 94 and select the **H1 Only** experiment from the **Experiment selection/setup** buttons.

   The AutoLOCK-AutoSHIM window opens. Do the following steps to set up and customize the experiment.

2. Set **Autoshim** and **Autolock**. Click the **NO** button if your sample is already locked and shimmed or if you would prefer to manually lock and shim your sample.

3. Enter a name for the directory, in the **Save As** field, to save the FID after the experiment is completed. If no file name is entered, the login name is used as the name.

4. Enter appropriate text in the **Text** box for your sample.
5. Click on OK, then Exit. The window shown in Figure 41 opens.

6. Select the spectral window in the PROTON Spectral Width (ppm) field.

7. Select the number of proton scans to acquire in the PROTON scans field.

8. Select a relaxation delay in the Relaxation Delay (sec) field.

9. Enter a value for the pulse angle (observe pulse) in the PROTON Pulse Angle field and click on Set or click on Default to select a 45-degree pulse angle.

10. Click on OK and click on Exit. Standard proton parameters are recalled. Relevant parameters and text are reset according to your choices. The Text panel displays the experiment that will be run.

11. Click on the CustomQ tab.

12. Click on the Dialog button in the Display Sequence, Dialog (drop down menu), Time, and Start region and select plotOPTIONS from the drop down menu to start the customize the plot window. Skip this step to use the default plotting options.

13. Select Displayed Spectrum or Full Spectrum in the Spectral Width field.

14. Select Partial, Full, or Off in the Plot Integral field.

15. Select how to plot the parameters from the Plot Parameters menu.

16. Select a peak-picking option from the Plot Peaks menu.

17. Click on OK to save the values you selected or click Reset to return to the default conditions.

18. Click Exit to close the window.

19. If you set the Autoshim and Autolock options to NO in step 2, now is the time to manually lock and shim your sample. Tune the probe if needed.

**Acquiring the Spectrum**

Click the Start ACQ button in the CustomQ window.

- The proton spectrum is acquired, plotted, and saved according to your choices.
- The FID is saved with the name PROTON.fid in the directory ~/vnmrsys/data/filename-date. If this directory already exists, the FID is saved in the directory ~/vnmrsys/data/filename-date-time.
Carbon 1D Spectrum

Setting Up and Customizing the Experiment

1. Follow the directions in “Setting Up an Automated Experiment” on page 94 and select the C13 Only experiment from the Experiment selection/setup buttons.

   The AutoLOCK-AutoSHIM window opens. Do the following steps to set up and customize the experiment.

2. Set Autoshim and Autolock. Click the NO button if your sample is already locked and shimmed or if you would prefer to manually lock and shim your sample.

3. Enter a name for the directory, in the Save As field, to save the FID after the experiment is completed. If no file name is entered, the login name is used as the name.

4. Enter appropriate text in the Text box for your sample.

5. Click on OK, then Exit. The window shown in Figure 42 opens.

6. Select the spectral window in the CARBON Spectral Width (ppm) field and the number of scans to acquire or enter a value in the CARBON scans field.

7. Select a relaxation delay in the Relaxation Delay (sec) field and enter a value for the pulse angle (observe pulse) in the CARBON Pulse Angle field and click on Set or click on Default to select a 45-degree pulse angle.

8. Select a decoupler mode. Click on the H1 dec mode menu button and left click on the decoupler mode. The choices are: Decoupled+NOE (normal decoupled spectrum with NOE), Decoupled-NOE (decoupled spectrum with no NOE - used for integration), Coupled+NOE (coupled spectrum with NOE), and Coupled-NOE (coupled spectrum with no NOE).

9. Select CARBON S/N TEST option: Default (S/N=100), Set (user entered value in test field), or DO NOT TEST. If either the Default or Set option is selected, the acquisition continues until the signal to noise tests matches the value in the test field or the number of carbon scans are reached, which ever comes first. The signal to noise is measured on the tallest peak in the spectrum which is often the solvent peak. If the DO NOT TEST options is selected, acquisition continues until the number of carbon scans set in the CARBON scans field are acquired.

10. Click on OK and click on Exit.

Figure 42. CustomQ Carbon 1D Acquisition Options
Standard proton parameters are recalled. Relevant parameters and text are reset according to your choices. The Text panel displays the experiment that will be run.

11. Click on the CustomQ tab.

12. Click on the Dialog button in the Display Sequence, Dialog (drop down menu), Time, and Start region and select plotOPTIONS from the drop down menu to start the customize the plot window. Skip this step to use the default plotting options.

13. Select how to plot the parameters from the Plot Parameters menu.

14. Select a peak-picking option from the Plot Peaks menu.

15. Click on OK to save the values you selected or click Reset to return to the default conditions.

16. Click Exit to close the window.

17. If you set the Autoshim and Autolock options to NO in step 2, now is the time to manually lock and shim your sample. Tune the probe if needed.

**Acquiring the Spectrum**

Click the Start ACQ button in the CustomQ window.

- The Carbon spectrum is acquired, plotted, and saved according to your choices.
- The FID is saved with the name CARBON.fid in the directory `~/vnmrsys/data/filename-date` If this directory already exists, the FID is saved in the directory `~/vnmrsys/data/filename-date-time`.

**Fluorine 1D Spectrum**

**Setting Up and Customizing the Experiment**

1. Follow the directions in “Setting Up an Automated Experiment” on page 94 and select the F19 Only experiment from the Experiment selection/setup buttons.

   The AutoLOCK-AutoSHIM window shown in opens. Do the following steps to set up and customize the experiment.

2. Set Autoshim and Autolock. Click the NO button if your sample is already locked and shimmed or if you would prefer to manually lock and shim your sample.

3. Enter a name for the directory, in the Save As field, to save the FID after the experiment is completed. If no file name is entered, the login name is used as the name.

4. Enter appropriate text in the Text box for your sample.
5. Click on OK, then Exit. The window shown in Figure 43 opens.

6. Enter a start of spectrum value in the Start of Spectrum field and an end of spectrum in the End of Spectrum field to set the spectral window. Enter all values in ppm.

7. Enter a value for the pulse angle.

8. Enter a value for the recovery delay.

9. Enter the number of scans to acquire.

10. Click on OK to save the values you selected or click Reset to return to the default conditions.

11. Click on Exit.

   Standard proton parameters are recalled. Relevant parameters and text are reset according to your choices. The Text panel displays the experiment that will be run.

12. Click on the CustomQ tab.

13. Click on the Dialog button in the Display Sequence, Dialog (drop down menu), Time, and Start region and select plotOPTIONS from the drop down menu to start the customize the plot window. Skip this step to use the default plotting options.


15. Select Partial, Full, or Off in the Plot Integral field.

16. Select how to plot the parameters from the Plot Parameters menu.

17. Select a peak-picking option from the Plot Peaks menu.

18. Click on OK to save the values you selected or click Reset to return to the default conditions.

19. Click Exit to close the window.

20. If you set the Autoshim and Autolock options to NO in step 2, now is the time to manually lock and shim your sample. Tune the probe if needed.

**Acquiring the Spectrum**

Click the Start ACQ button in the CustomQ window.

- The Fluorine spectrum is acquired, plotted, and saved according to your choices.
- The FID is saved with the name FLUORINE.fid in the directory `~/vnmrsys/data/filename-date`. If this directory already exists, the FID is saved in the directory `~/vnmrsys/data/filename-date-time`. 

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Figure 43. CustomQ Fluorine 1D Acquisition Options
Phosphorus 1D Spectrum

Setting Up and Customizing the Experiment

1. Follow the directions in “Setting Up an Automated Experiment” on page 94 and select the C13 Only experiment from the Experiment selection/setup buttons.

The AutoLOCK-AutoSHIM window opens. Do the following steps to set up and customize the experiment.

2. Set Autoshim and Autolock. Click the NO button if your sample is already locked and shimmed or if you would prefer to manually lock and shim your sample.

3. Enter a name for the directory, in the Save As field, to save the FID after the experiment is completed. If no file name is entered, the login name is used as the name.

4. Enter appropriate text in the Text box for your sample.

5. Click on OK, then Exit. The window shown in Figure 44 opens.

6. Enter a start of spectrum value in the Start of Spectrum field and an end of spectrum in the End of Spectrum field to set the spectral window. Enter all values in ppm.

7. Enter a value for the pulse angle.

8. Enter a value for the recovery delay.

9. Enter the number of scans to acquire.

10. Select a decoupler mode. Click on the H1 dec mode menu button and left click on the decoupler mode. The choices are: Decoupled+NOE (normal decoupled spectrum with NOE), Decoupled-NOE (decoupled spectrum with no NOE - used for integration), Coupled+NOE (coupled spectrum with NOE), and Coupled-NOE (coupled spectrum with no NOE).

11. Click on OK to save the values you selected or click Reset to return to the default conditions.

12. Click on Exit.

Standard proton parameters are recalled. Relevant parameters and text are reset according to your choices. The Text panel displays the experiment that will be run.

13. Click on the CustomQ tab.

Figure 44. CustomQ Phosphorus 1D Acquisition Options
14. Click on the **Dialog** button in the *Display Sequence, Dialog (drop down menu), Time, and Start region* and select **plotOPTIONS** from the drop down menu to start the customize the plot window. Skip this step to use the default plotting options.

15. Select **Displayed Spectrum or Full Spectrum** in the **Spectral Width field**.

16. Select how to plot the parameters from the **Plot Parameters** menu.

17. Select a peak-picking option from the **Plot Peaks** menu.

18. Click on **OK** to save the values you selected or click **Reset** to return to the default conditions.

19. Click **Exit** to close the window.

20. If you set the **Autoshim and Autolock** options to **NO** in step 2, now is the time to manually lock and shim your sample. Tune the probe if needed.

**Acquiring the Spectrum**

Click the **Start ACQ** button in the **CustomQ** window.

- The Phosphorus spectrum is acquired, plotted, and saved according to your choices.
- The FID is saved with the name **PHOSPHORUS.fid** in the directory `~/vnmrsys/data/filename-date`. If this directory already exists, the FID is saved in the directory `~/vnmrsys/data/filename-date-time`.

**User Cued HCPF 1Ds**

**Setting Up and Customizing the Experiment**

1. Follow the directions in “Setting Up an Automated Experiment” on page 94 and select the **C13 Only** experiment from the **Experiment selection/setup** buttons.

    The AutoLOCK-AutoSHIM window opens. Do the following steps to set up and customize the experiment.

2. Set **Autoshim** and **Autolock**. Click the **NO** button if your sample is already locked and shimmed or if you would prefer to manually lock and shim your sample.

3. Enter a name for the directory, in the **Save As** field, to save the FID after the experiment is completed. If no file name is entered, the login name is used as the name.

4. Enter appropriate text in the **Text** box for your sample.

5. Click on **OK**, then **Exit**. The window shown in Figure 45 opens.
Chapter 7. Tcl/Ttk NMR Interfaces Step-by-Step

Proton Acquisition

1. Select the spectral window in the PROTON Spectral Width (ppm) field.

2. Select an option for “Minimize SW?” NO uses the proton spectral width selected in step 1, Auto examines the proton 1D and sets SW, and Manual prompts the user for input after the 1D spectra has been acquired. If you select Manual, the proton spectrum is acquired and a SetSW button appears on the second row of the VNMR menu bar. Using the mouse, place the cursors on either side of proton spectrum that is displayed and press the SetSW button.

3. Select the number of proton scans to acquire in the PROTON scans field.

4. Select a relaxation delay in the Relaxation Delay (sec) field.

5. Enter a value for the pulse angle (observe pulse) in the PROTON Pulse Angle field and click on Set or click on Default to select a 45-degree pulse angle.

The remaining three nuclei are presented in this order: CARBON, PHOSPHORUS, and FLUORINE. The user has the option to acquire the 1D spectrum for each nucleus or combination of nuclei in any desired order. Acquisition will always begin with a proton 1D followed by each nucleus in the order of its selection.

- Acquire the proton 1D spectra by doing the following:
  a. Click on OK and click Exit. The experiment list is displayed in the Tcl/dg Text window.
  b. Click on the CustomQ tab.
  c. Click on the Dialog box and select plotting options.
  d. Click the Start ACQ button to begin acquisition.
- Add another nucleus to the experiment list.

Carbon Acquisition

1. Select CARBON to set bring up the carbon acquisition options window.
2. Select the spectral window in the **CARBON Spectral Width (ppm)** field.
3. Select the number of carbon scans to acquire or enter a value in the **CARBON scans** field.
4. Select a relaxation delay in the **Relaxation Delay (sec)** field.
5. Enter a value for the pulse angle (observe pulse) in the **CARBON Pulse Angle** field.
6. Select a decoupler mode. Click on the **H1 dec mode** menu button and left click on the decoupler mode. The choices are: Decoupled+NOE (normal decoupled spectrum with NOE), Decoupled-NOE (decoupled spectrum with no NOE - used for integration), Coupled+NOE (coupled spectrum with NOE), and Coupled-NOE (coupled spectrum with no NOE).
7. Select CARBON S/N TEST option: **Default** (S/N=100), **Set** (user entered value in test field), or **DO NOT TEST**. If either the Default or Set option is selected, the acquisition continues until the signal to noise tests matches the value in the test field or the number of carbon scans are reached, which ever comes first. The signal to noise is measured on the tallest peak in the spectrum which is often the solvent peak. If the DO NOT TEST options is selected, acquisition continues until the number of carbon scans set in the CARBON scans field are acquired.
8. At this point you can do one of the following:
   - Click on **OK** if you want to save the values you selected and return to the **CustomQ HCPF 1D Acquisition Options** window.
   - Click **Reset** to return to the default settings and either accept the defaults by clicking **OK** or select new parameters and then clicking **OK** and return to the **CustomQ HCPF 1D Acquisition Options** window.
9. From the **CustomQ HCPF 1D Acquisition Options** window you can do one of the following:
   - Acquire the 1D spectra of the nuclei selected to this point by doing the following:
     a. Click on **OK** and click **Exit**. The experiment list is displayed in the Tcl/dg Text window.
     b. Click on the **CustomQ** tab.
     c. Click on the **Dialog** box and select plotting options.
     d. Click the **Start ACQ** button to begin acquisition.
   - Add another nucleus to the experiment list.

**Phosphorus Acquisition**

1. Click on **Phosphorus** in the **CustomQ HCPF 1D Acquisition Options** window. The window shown in **Figure 46A** opens.
2. Enter a start of spectrum value in the **Start of Spectrum** field and an end of spectrum in the **End of Spectrum** field to set the spectral window (**Figure 46A**). Enter all values in ppm.
3. Enter a value for the **pulse angle**, **recovery delay**, and **scans to acquire** (**Figure 46A**).
4. Click on the decoupler mode button (**Figure 46A**) and, from the drop down menu (**Figure 46B**), select a decoupler mode. Click on the **H1 dec mode** menu button and left click on the decoupler mode. The choices are: Decoupled+NOE (normal
decoupled spectrum with NOE), Decoupled-NOE (decoupled spectrum with no NOE - used for integration), Coupled+NOE (coupled spectrum with NOE), and Coupled-NOE (coupled spectrum with no NOE).

5. At this point you can do one of the following:
   • Click on **OK** if you want to save the values you selected and return to the *CustomQ HCPF 1D Acquisition Options* window.
   • Click **Reset** to return to the default settings and either accept the defaults by clicking **OK** or select new parameters and then clicking **OK** and return to the *CustomQ HCPF 1D Acquisition Options* window.

6. From the *CustomQ HCPF 1D Acquisition Options* window you can do one of the following:
   • Acquire the 1D spectra of the nuclei selected to this point by doing the following:
     a. Click on **OK** and click **Exit**. The experiment list is displayed in the Tcl/dg Text window.
     b. Click on the **CustomQ** tab.
     c. Click on the **Dialog** box and select plotting options.
     d. Click the **Start ACQ** button to begin acquisition.
   • Add another nucleus to the experiment list.

**Fluorine Acquisition**

1. Click on **Fluorine** in the *CustomQ HCPF 1D Acquisition Options* window. The window shown in Figure 47 opens.

2. Enter a start of spectrum value in the **Start of Spectrum** field and an end of spectrum in the **End of Spectrum** field to set the spectral window. Enter all values in **ppm**.

3. Enter a value for the **pulse angle**.

4. Enter a value for the **recovery delay**.

5. Enter the number of **scans to acquire**.

6. At this point you can do one of the following:
   • Click on **OK** if you want to save the values you selected and return to the *CustomQ HCPF 1D Acquisition Options* window.
7. From the *CustomQ HCPF 1D Acquisition Options* window you can do one of the following:

- Acquire the 1D spectra of the nuclei selected to this point by doing the following:
  
a. Click **OK** and click **Exit**. The experiment list is displayed in the Tcl/dg Text window.
  
b. Click on the **CustomQ** tab.
  
c. Click on the **Dialog** box and select plotting options.
  
d. Click the **Start ACQ** button to begin acquisition.

- Add another nucleus to the experiment list.

When you have finished selecting the nuclei and related acquisition parameters, the spectra will be acquired in order of their selection beginning with a proton 1D spectrum.

**H1 and COSY Experiments**

Depending on the type of probe (PFG or non-PFG) and the system, this experiment automatically selects the gCOSY (PFG probe) or COSY (non-PFG probe) experiment.

**Setting Up and Customizing the Experiment**

1. Follow the directions in “Setting Up an Automated Experiment” on page 94 and select the **H1&COSY** experiment from the **Experiment selection/setup** buttons.

   The AutoLOCK-AutoSHIM window opens. Do the following steps to set up and customize the experiment.

2. Set **Autoshim** and **Autolock**. Click the **NO** button if your sample is already locked and shimmed or if you would prefer to manually lock and shim your sample.

3. Enter a name for the directory, in the **Save As** field, to save the FID after the experiment is completed. If no file name is entered, the login name is used as the name.

4. Enter appropriate text in the **Text** box for your sample.
5. Click on OK and click on Exit. The window shown in Figure 48 opens.

6. Select the spectral window in the PROTON Spectral Width (ppm) field.

7. Select an option for “Minimize SW?” NO uses the proton spectral width selected in step 6, Auto examines the proton 1D and sets SW, and Manual prompts the user for input after the 1D spectra has been acquired. If you select Manual, the proton spectrum is acquired and a SetSW button appears on the second row of the VNMR menu bar. Using the mouse, place the cursors on either side of proton spectrum that is displayed and press the SetSW button. The COSY experiment executes using this SW.

8. Select the number of proton scans to acquire in the PROTON scans field.

9. Select a relaxation delay in the Relaxation Delay (sec) field.

10. Enter a value for the pulse angle (observe pulse) in the PROTON Pulse Angle field and click on Set or click on Default to select a 45-degree pulse angle.

11. Select the number of scans per increment to acquire for the COSY experiment.

12. Select the number of increments to acquire for the COSY experiment.

13. Click the OK button to save the values you selected or click Reset to return to the default settings.

14. Click on OK and click Exit

The experiment list is displayed in the Tcl/dg Text window.

Standard proton parameters are recalled. Relevant parameters and text are reset according to your choices. The Text panel displays the experiment that will be run.

15. If you set the Autoshim and Autolock options to NO, now is the time to manually lock and shim your sample. Tune the probe if needed.

**Acquiring the Spectrum**

1. Click on the CustomQ tab.

2. Click on the Dialog box and select plotting options.

3. Click the Start ACQ button in the Tcl/dg CustomQ window.

   - The proton and COSY spectra are acquired and saved according to your choices.
   - The proton data is processed and plotted using the default choices in the stdpar/H1.par file. The COSY data is processed and a full spectrum is plotted.
   - The FID is saved with the name PROTON.fid and COSY.fid (or gCOSY.fid for gradient probe) in the directory ~/vnmrsys/data/filename-date. If this directory already exists, the FIDs are saved in the directory ~/vnmrsys/data/filename-date-time.
C13 and DEPT Experiment

Setting Up and Customizing the Experiment

1. Follow the directions in “Setting Up an Automated Experiment” on page 94 and select the C13 & DEPT experiment from the Experiment selection/setup buttons. The AutoLOCK-AutoSHIM window opens. Do the following steps to set up and customize the experiment.

2. Set Autoshim and Autolock. Click the NO button if your sample is already locked and shimmed or if you would prefer to manually lock and shim your sample.

3. Enter a name for the directory, in the Save As field, to save the FID after the experiment is completed. If no file name is entered, the login name is used as the name.

4. Enter appropriate text in the Text box for your sample.

5. Click on OK and click on Exit. The window shown in Figure 49 opens.

Figure 49. CustomQ 13C and DEPT Acquisition Options

6. Select the spectral window in the CARBON Spectral Width (ppm) field and the number of scans to acquire or enter a value in the CARBON scans field.

7. Select a relaxation delay in the Relaxation Delay (sec) field and enter a value for the pulse angle (observe pulse) in the CARBON Pulse Angle field and click on Set or click on Default to select a 45-degree pulse angle.

8. Select a decoupler mode. Click on the H1 dec mode menu button and left click on the decoupler mode. The choices are: Decoupled+NOE (normal decoupled spectrum with NOE), Decoupled-NOE (decoupled spectrum with no NOE - used for integration), Coupled+NOE (coupled spectrum with NOE), and Coupled-NOE (coupled spectrum with no NOE).

9. Select CARBON S/N TEST option: Default (S/N=100), Set (user entered value in test field), or DO NOT TEST. If either the Default or Set option is selected, the acquisition continues until the signal to noise tests matches the value in the test field or the number of carbon scans are reached, which ever comes first. The signal to noise is measured on the tallest peak in the spectrum which is often the solvent peak.

If the DO NOT TEST options is selected, acquisition continues until the number of carbon scans set in the CARBON scans field are acquired.
10. Select the number of **DEPT Scans per inc:** to acquire for the DEPT experiment.

11. Select a **DEPT multiplicity.**
   a. **Full Edit** produces 4 edited sub-spectra showing: all protonated carbons, CH carbons only, CH₂ carbons only, and CH₃ carbons only.
   b. **CH and CH₃ up/CH₂ down** produces an unedited dept 135 experiment.
   c. **CH only** produces an unedited dept 90 experiment.
   d. **Protonated Carbons** produces an unedited spectra containing only protonated carbons.

12. Click the **OK** button to save the values you selected or click **Reset** to return to the default settings.

13. Click on **OK** and click **Exit**
   - The experiment list is displayed in the Tcl/dg Text window.
   - Standard proton parameters are recalled. Relevant parameters and text are reset according to your choices. The **Text** panel displays the experiment that will be run.

14. If you set the **Autoshim** and **Autolock** options to **NO**, now is the time to manually lock and shim your sample. Tune the probe if needed.

**Acquiring the Spectrum**

1. Click on the **CustomQ** tab.
2. Click on the **Dialog** box and select plotting options.
3. Click the **Start ACQ** button in the Tcl/dg CustomQ window.
   - The carbon and DEPT spectra are acquired and saved according to your choices.
   - The carbon data is processed and plotted using the default choices in the `stdpar/C13.par` file. The DEPT data is processed and full spectra is plotted.
   - The FID is saved with the name CARBON.fid and DEPT. in the directory `~/vnmrsys/data/`filename-date. If this directory already exists, the FIDs are saved in the directory `~/vnmrsys/data/`filename-date-time.

**H1 and H1 Detected Experiments**

An experiment chain of H1, gCOSY, HMQC, gHMBC, and gHSQCTOXY representing a portion of the available H1 and H1 detected experiments accessible through the CustomQ interface is described below.

**Setting Up and Customizing the Experiment**

1. Follow the directions in “Setting Up an Automated Experiment” on page 94 and select the **H1&H1 Detected** experiment from the **Experiment selection/setup** buttons.
7.2 CustomQ Window Experiments

The AutoLOCK-AutoSHIM window opens. Do the following steps to set up and customize the experiment.

2. Set **Autoshim** and **Autolock**. Click the **NO** button if your sample is already locked and shimmed or if you would prefer to manually lock and shim your sample.

3. Enter a name for the directory, in the **Save As** field, to save the FID after the experiment is completed. If no file name is entered, the login name is used as the name.

4. Enter appropriate text in the **Text** box for your sample.

5. Click on **OK** and click on **Exit**. The window shown in Figure 50 opens.

![Figure 50. CustomQ $^1$H and $^1$H Detected Experiments Selection Window](image)

**Proton Acquisition**

1. Select the spectral window in the **PROTON Spectral Width (ppm)** field.

2. Select an option for “Minimize SW?” **NO** uses the proton spectral width selected in step 1, **Auto** examines the proton 1D and sets SW, and **Manual** prompts the user for input after the 1D spectra has been acquired. If you select **Manual**, the proton spectrum is acquired and a **SetSW** button appears on the second row of the VNMR menu bar. Using the mouse, place the cursors on either side of proton spectrum that is displayed and press the **SetSW** button.

3. Select the number of proton scans to acquire in the **PROTON scans** field.

4. Select a relaxation delay in the **Relaxation Delay (sec)** field.

5. Enter a value for the pulse angle (observe pulse) in the **PROTON Pulse Angle** field and click on **Set** or click on **Default** to select a 45-degree pulse angle.

**Acquisition of Selected 1H Detected Experiments**

All chained experiments begin with a 1D spectrum, in this case a proton 1D. Selected experiments are run, following the 1D experiment, in the order in which they are selected. Each experiment has an associated popup window for customizing the acquisition.
parameters associated with the experiment. In this example the order of the experiments, following the proton 1D is: gCOSY, HMQC, gHMBC, and gHSQCTOXY.

**gCOSY Acquisition**

1. Select **gCOSY** and open the gCOSY Acquisition popup window.
2. Select a value for **gCOSY scans per inc** to acquire from the choices in the popup window.
3. Select a value for **gCOSY number of inc** to acquire from the choices in the popup window.
4. Click OK to use the values chosen and return to the Select H1 and H1 Detected Experiments window. Click RESET to return to the default values and either use the default values or enter different parameters. Click OK to close the popup window and return to the Select H1 and H1 Detected Experiments window.

**HMOC Acquisition**

1. Select **HMOC** and open the HMOC Acquisition popup window.
2. Select a value for **HMQC scans per inc** to acquire from the choices in the popup window.
3. Select a value for **HMQC number of inc** to acquire from the choices in the popup window.
4. Select a **Carbon Spectra Width (ppm)** from the choices presented.
5. Click OK to use the values chosen and return to the Select H1 and H1 Detected Experiments window. Click RESET to return to the default values and either use the default values or enter different parameters. Click OK to close the popup window and return to the Select H1 and H1 Detected Experiments window.

**gHMBC Acquisition**

1. Select **gHMBC** and open the gHMBC Acquisition popup window.
2. Select a value for **gHMBC scans per inc** to acquire from the choices in the popup window.
3. Select a value for **gHMBC number of inc** to acquire from the choices in the popup window.

4. Select a **Carbon Spectra Width (ppm)** from the choices presented.

5. Select a **gHMBC coupling constant** from the choices presented.

6. Click OK to use the values chosen and return to the Select H1 and H1 Detected Experiments window. Click RESET to return to the default values and either use the default values or enter different parameters. Click OK to close the popup window and return to the Select H1 and H1 Detected Experiments window.

   gHMBC is added to the experiment chain.

**gHSQCTOXY Acquisition**

1. Select **gHSQCTOXY** and open the gHHSQCTOXY Acquisition popup window.

2. Select a value for **gHSQCTOXY scans per inc** to acquire from the choices in the popup window.

3. Select a value for **gHSQCTOXY number of inc** to acquire from the choices in the popup window.

4. Select a **Carbon Spectra Width (ppm)** from the choices presented.

5. Select a **gHSQCTOXY mixing time** from the choices presented.

6. Select a **gHSQCTOXY Direct Corr.** from the choices presented.

7. Click OK to use the values chosen and return to the Select H1 and H1 Detected Experiments window. Click RESET to return to the default values and either use the default values or enter different parameters. Click OK to close the popup window and return to the Select H1 and H1 Detected Experiments window.

   gHSQCTOXY is added to the experiment chain.

The Select H1 and H1 Detected Experiments window shows the selected experiments and proton 1D acquisition parameters, see Figure 51.

**Verifying the Experiment List**

The order that you selected experiments in the Acquisition Setup window is the acquisition order which is displayed in the Text panel of the dg screen. To remove a selection from the experiment chain, deselect it by clicking on the button again. For example, clicking the gHSQCTOXY button a second time deselects it and removes any saved parameter customization for gHSQCTOXY.
1. Click the OK button to save the values you selected or click Reset to return to the default settings.

2. Click on OK and click Exit
   The experiment list is displayed in the Tcl/dg Text window.
   Standard proton parameters are recalled, and relevant parameters and text are reset according to your choices.

3. If you set the Autoshim and Autolock options to NO, now is the time to manually lock and shim your sample. Tune the probe if needed.

**Acquiring the Spectrum**

1. Click on the CustomQ tab.

2. Click on the Dialog box and select plotting options.

3. Click the Start ACQ button in the Tcl/dg CustomQ window.

4. Click the Start Acquisition button in the Tcl/dg CustomQ window.
   - Spectra are acquired, processed, plotted and saved.
   - The FIDs are saved with the names PROTON.fid, gCOSY.fid, HMOC.fid, gHMBC.fid, and HSQCTOXY.fid in the directory ~/vnmrsys/data/filename-date. If this directory already exists, the FIDs are saved in the directory ~/vnmrsys/data/filename-date-time.

**C13 and C13 Detected Experiments**

An experiment chain of proton, carbon, APT, DEPT, and gHETCOR representing a portion of the available C13 and C13 detected experiments accessible through the CustomQ interface is described below.

**Setting Up and Customizing the Experiment**

1. Follow the directions in “Setting Up an Automated Experiment” on page 94 and select the H1&H1 Detected experiment from the Experiment selection/setup buttons.
The AutoLOCK-AutoSHIM window opens. Do the following steps to set up and customize the experiment.

2. Set **Autoshim** and **Autolock**. Click the **NO** button if your sample is already locked and shimmed or if you would prefer to manually lock and shim your sample.

3. Enter a name for the directory, in the **Save As** field, to save the FID after the experiment is completed. If no file name is entered, the login name is used as the name.

4. Enter appropriate text in the **Text** box for your sample.

5. Click on **OK** and click on **Exit**. The window shown in Figure 52 opens.

![Figure 52. CustomQ Selected C13 and C13 Detected Experiments Window](image)

**Carbon Acquisition**

1. Select the spectral window in the **CARBON Spectral Width (ppm)** field and the number of scans to acquire or enter a value in the **CARBON scans** field.

2. Select a relaxation delay in the **Relaxation Delay (sec)** field and enter a value for the pulse angle (observe pulse) in the **CARBON Pulse Angle** field and click on **Set** or click on **Default** to select a 45-degree pulse angle.

3. Select a decoupler mode. Click on the **H1 dec mode** menu button and left click on the decoupler mode. The choices are: Decoupled+NOE (normal decoupled spectrum with NOE), Decoupled-NOE (decoupled spectrum with no NOE - used for integration), Coupled+NOE (coupled spectrum with NOE), and Coupled-NOE (coupled spectrum with no NOE).

4. Select a CARBON S/N TEST option: **Default** ($S/N=100$), **Set** (user entered value in test field), or **DO NOT TEST**. If either the Default or Set option is selected, the acquisition continues until the signal to noise tests matches the value in the test field or the number of carbon scans are reached, which ever comes first. If the DO NOT TEST options is selected, acquisition continues until the number of carbon scans set in the CARBON scans field are acquired.
Acquisition of Selected 13C Detected Experiments

All chained experiments begin with a 1D S2PUL experiment. If the proton 1D experiment option is selected, it will be the first experiment run regardless of when it is selected. The proton 1D experiment is followed by a carbon S2PUL. Selected experiments are run, following the carbon S2PUL experiment, in the order in which they are selected. Each experiment has an associated popup window for customizing the acquisition parameters associated with the experiment. In this example the order of the experiments, following the carbon 1D is: APT, DEPT, and gHETCOR.

**APT Acquisition**

1. Select **APT** from the Select C13 and C13 Detected Experiments window and the APT Acquisition popup window opens.
2. Select the number of **APT Scans per inc** to acquire for the APT experiment.
3. Click OK to use the values chosen and return to the Select C13 and C13 Detected Experiments window. Click RESET to return to the default values and either use the default values or enter different parameters. Click OK to close the popup window and return to the Select C13 and C13 Detected Experiments window.

**DEPT Acquisition**

1. Select **DEPT** from the Select C13 and C13 Detected Experiments window and the DEPT Acquisition popup window opens.
2. Select the number of **DEPT Scans per inc** to acquire for the DEPT experiment.
3. Select a **DEPT multiplicity**.
4. Click OK to use the values chosen and return to the Select H1 and H1 Detected Experiments window. Click RESET to return to the default values and either use the default values or enter different parameters. Click OK to close the popup window and return to the Select C13 and C13 Detected Experiments window.

**gHETCOR Acquisition**

1. Select **gHETCOR** from the Select C13 and C13 Detected Experiments window and the gHETCOR Acquisition popup window opens.
2. Select a value for **gHETCOR scans per inc** to acquire from the choices in the popup window.
3. Select a value for **gHETCOR number of inc** to acquire from the choices in the popup window.
4. Click OK to use the values chosen and return to the Select C13 and C13 Detected Experiments window. Click RESET to return to the default values and either use the
default values or enter different parameters. Click OK to close the popup window and return to the Select C13 and C13 Detected Experiments window.

Proton Acquisition

1. Select PROTON from the Select C13 and C13 Detected Experiments window and the DEPT Acquisition popup window opens.

2. Select the spectral window in the PROTON Spectral Width (ppm) field.

3. Select an option for “Minimize SW?” NO uses the proton spectral width selected in step 2, Auto examines the proton 1D and sets SW, and Manual prompts the user for input after the 1D spectra has been acquired. If you select Manual, the proton spectrum is acquired and a SetSW button appears on the second row of the VNMR menu bar. Using the mouse, place the cursors on either side of proton spectrum that is displayed and press the SetSW button. The HETCOR experiment executes using this SW.

4. Select the number of proton scans to acquire in the PROTON scans field.

5. Select a relaxation delay in the Relaxation Delay (sec) field.

6. Enter a value for the pulse angle (observe pulse) in the PROTON Pulse Angle field and click on Set or click on Default to select a 45-degree pulse angle.

7. Click OK to use the values chosen and return to the Select H1 and H1 Detected Experiments window. Click RESET to return to the default values and either use the default values or enter different parameters. Click OK to close the popup window and return to the Select C13 and C13 Detected Experiments window.

The Select C1 and C13 Detected Experiments window shows the selected experiments and proton 1D acquisition parameters.
Verifying the Experiment List

PROTON always runs first followed by CARBON and the other experiments in the order that you selected experiments in the Acquisition Setup window is the acquisition order which is displayed in the Text panel of the dg screen. To remove a selection from the experiment chain, deselect it by clicking on the button again. For example, clicking the DEPT button a second time deselects it and removes any saved parameter customization for DEPT.

1. Click the **OK** button to save the values you selected or click **Reset** to return to the default settings.
2. Click on **OK** and click **Exit**
   The experiment list is displayed in the Tcl/dg Text window.
   Standard proton parameters are recalled.
   Relevant parameters and text are reset according to your choices.
3. If you set the **Autoshim** and **Autolock** options to **NO**, now is the time to manually lock and shim your sample. Tune the probe if needed.

Acquiring the Spectrum

1. Click on the **CustomQ** tab.
2. Click on the **Dialog** box and select plotting options.
3. Click the **Start ACQ** button in the Tcl/dg CustomQ window.
4. Click the **Start Acquisition** button in the Tcl/dg CustomQ window.
   - Spectra are acquired, processed, plotted and saved.
   - The FIDs are saved with the names PROTON.fid, CARBON.fid, APT.fid, and HETCOR.fid in the directory ~/vnmrsys/data/filename-date. If this directory already exists, the FIDs are saved in the directory ~/vnmrsys/data/filename-date-time.

H1 and Selective 1D Experiments

An experiment chain of H1, TOCSY1D, and NOESY1D representing a portion of the available H1 and Selective H1 experiments accessible through the CustomQ interface is described below.

Setting Up and Customizing the Experiment

1. Follow the directions in “Setting Up an Automated Experiment” on page 94 and select the **H1& Selective 1D** experiment from the **Experiment selection/setup** buttons.
The AutoLOCK-AutoSHIM window opens. Do the following steps to set up and customize the experiment.

2. Set **Autoshim** and **Autolock**. Click the NO button if your sample is already locked and shimmed or if you would prefer to manually lock and shim your sample.

3. Enter a name for the directory, in the **Save As** field, to save the FID after the experiment is completed. If no file name is entered, the login name is used as the name.

4. Enter appropriate text in the **Text** box for your sample.

5. Click on **OK** and click on **Exit**. The window shown in Figure 53 opens.

---

**Proton Acquisition**

1. Select the spectral window in the **PROTON Spectral Width (ppm)** field.

2. Select an option for “Minimize SW?” NO uses the proton spectral width selected in step 1, Auto examines the proton 1D and sets SW, and Manual prompts the user for input after the 1D spectra has been acquired. If you select **Manual**, the proton spectrum is acquired and a **SetSW** button appears on the second row of the VNMR menu bar. Using the mouse, place the cursors on either side of proton spectrum that is displayed and press the **SetSW** button. The selective 1D experiment executes using this SW.

3. Select the number of proton scans to acquire in the **PROTON scans** field.

4. Select a relaxation delay in the **Relaxation Delay (sec)** field.

5. Enter a value for the pulse angle (observe pulse) in the **PROTON Pulse Angle** field and click on **Set** or click on **Default** to select a 45-degree pulse angle.

---

**Acquisition of Selected 1H Selective Experiments**

All chained experiments begin with a 1D spectrum, in this case a proton 1D. Selected experiments are run, following the 1D experiment, in the order in which they are selected. Each experiment has an associated popup window for customizing the acquisition parameters associated with the experiment. In this example the order of the experiments, is PROTON 1D, TOCSY1D, and NOSY1D.
**TOCSY1D Acquisition**

1. Select TOCSY1D and open the TOCSY1D Acquisition popup window.
2. Select a value for **TOCSY1D scans per inc** to acquire from the choices in the popup window.
3. Select a value for **TOCSY1D mixing time** from the choices in the popup window.
4. Click OK to use the values chosen and return to the Select H1 and Selective 1D Experiments window. Click RESET to return to the default values and either use the default values or enter different parameters. Click OK to close the popup window and return to the Select H1 and Selective 1D Experiments window.
5. TOCSY1D is added to the experiment chain.

**NOESY1D Acquisition**

1. Select NOESY1D and open the NOESY1D Acquisition popup window.
2. Select a value for **NOESY1D scans per inc** to acquire from the choices in the popup window.
3. Select a value for **NOESY1D mixing time** from the choices in the popup window.
4. Click OK to use the values chosen and return to the Select H1 and H1 Detected Experiments window. Click RESET to return to the default values and either use the default values or enter different parameters. Click OK to close the popup window and return to the Select H1 and Selective 1D Experiments window.
5. NOESY1D is added to the experiment chain.

The Select H1 and H1 Selective Experiments window shows the selected experiments and proton 1D acquisition parameters.

**Verifying the Experiment List**

The order that you selected experiments in the Acquisition Setup window is the acquisition order which is displayed in the Text panel of the dg screen.

To remove a selection from the experiment chain, deselect it by clicking on the button again. For example, clicking the TOCSY1D button a second time deselects it and removes any saved parameter customization for TOCSY1D.
7.2 CustomQ Window Experiments

1. Click the OK button to save the values you selected or click Reset to return to the default settings.

2. Click on OK and click Exit
   The experiment list is displayed in the Tcl/dg Text window.
   Standard proton parameters are recalled, and relevant parameters and text are reset according to your choices.

3. If you set the Autoshim and Autolock options to NO, now is the time to manually lock and shim your sample. Tune the probe if needed.

**Acquiring the Spectrum**

1. Click on the CustomQ tab.

2. Click on the Dialog box and select plotting options.

3. Click the Start ACQ button in the Tcl/dg CustomQ window.

4. Click the Start Acquisition button in the Tcl/dg CustomQ window.

TOCSY1D experiment parameters are set up and the proton spectrum is displayed (Figure 54). Five buttons appear on the second row of the VNMR menu bar, Cursor, Expand, Select, Proceed, Cancel, restart, and Return.

5. Select the peak you want using the left and right mouse buttons by placing two cursors on either side of the peak. Expand the proton spectrum as needed.

6. Click the Select button on the menu bar.
   Select additional peaks repeating step 5 and step 6 for a series of TOCSY1D spectra.

7. Click the Proceed button to start a series of TOCSY1D acquisitions.
   TOCSY1D spectra are acquired and individually saved. NOESY1D experiment parameters are set up and the proton spectrum is redisplayed to enable peak selection for NOESY1D.

8. Repeat step 6 and step 7 to select peaks and start NOESY1D acquisition.

9. Click the Proceed button to start a series of NOESY1D spectra.
   NOESY1D spectra are acquired and individually saved.
All FIDs are saved with the file names PROTON.fid, TOCSY1D_ppm1.fid, TOCSY1D_ppm2.fid, etc., NOESY1D_ppm3.fid, NOESY1D_ppm4.fid, etc., where ppm1 to ppm4 are center of the selected band. The HOMODEC experiment is run as an array of decoupling frequencies and saved as HOMODEC.fid.

The FIDs are saved in the directory ~/vnmrsys/data/filename-date. If this directory already exists, the FIDs are saved in the directory ~/vnmrsys/data/filename-date-time.

### 7.3 Walkup Window

**Acquiring the Spectrum**

1. Click on the Walkup tab in the Tcl/dg window to display the Walkup interface.
2. Change the sample and insert a new sample. Use the Sample Management menus and buttons. Click the Eject and Insert buttons to eject a sample and insert the new sample. If the system is equipped with a sample changer, enter the location of the sample in the Location window and click the change button.
3. Select the appropriate lock solvent from the list of lock solvents available in the drop down Solvent menu.
4. Automated Experiment Selection and Setup buttons - all parameters are preset.
5. Start Acquisition button.
6. Spectra are acquired and plotted automatically.
Chapter 8. **Tcl/Tk NMR Administration and Calibration**

Sections in this chapter:

- 8.1 “Administration of Probe Calibration Files,” this page
- 8.2 “System Calibrations Using the Calibrate Macro,” page 124
- 8.3 “Manually Editing the Probe File,” page 135

### 8.1 Administration of Probe Calibration Files

The probes file needs to be maintained in order for walkup NMR to properly work. This section contains general guidelines for required calibrations.

**Setup EXP, CustomQ, and Walkup** NMR require maintaining calibrations for each probe. Beginning with VNMR 5.3B, the calibration results for each probe are stored in a file and retrieved by the setup macros (HMQC, HMBC, COSY, etc.) as needed. Therefore, only one generic parameter set is required for each nucleus (stdpar) or experiment (parlib), and the probe-specific parameter values are retrieved from the calibration files, which are located in a directory specific to a given probe. These probe-specific directories are all subdirectories of a directory called `probes`, either `/vnmr/probes` or `userdir+/probes`, with the usual distinction between all-user and individual access. In general, it is better to use the `/vnmr/probes` directory.

Autocalibration procedures (described in “System Calibrations Using the Calibrate Macro” on page 124), by default, edit the “local” probe file. To store the probe file in the system directory (`/vnmr/probes`), you must log in as `vnmr1`, and copy the probe directory from the “local” directory to the system.

The `probes` directory contains subdirectories, one for each probe. The names of those subdirectories identify the probe, and the VNMR parameter `probe` (a global variable) must be set to match the name of one of these subdirectories. For example, you might have a 4-nucleus probe and a PFG indirect detection probe. Likely subdirectories would be `../probes/4nuc` and `./probes/pfgid`. Correspondingly, you would set the parameter `probe` to `4nuc` or `pfgid`, depending on which probe was in the magnet. Each subdirectory contains a plain text file, with the same name as the subdirectory itself, e.g., `../probes/4nuc/4nuc`; it is this text file that contains the actual calibrations for different nuclei. **Table 5** shows an example of a probe file.

**Table 5.** Example Probe Calibration File

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<th>Parameters</th>
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Table 5. Example Probe Calibration File (continued)

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Table 5. Example Probe Calibration File (continued)

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**P31 Parameters**

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8.2 System Calibrations Using the Calibrate Macro

Probes can be calibrated either using autocalibration routines or by manually editing the probe file. See the following sections for details:

- “Samples Required” on page 124
- “Calibrate Lock” on page 127
- “Calibrate Proton” on page 127
- “Calibrate Carbon” on page 128
- “Calibrate Fluorine” on page 129
- “Calibrate Phosphorus” on page 130
- “Calibrate H, C, Ind. Det., and Gradients (CH3I)” on page 132
- “Calibrate H, Ind. Det., and Gradients (CH3OH)” on page 133
- “Manually Editing the Probe File” on page 135

Samples Required

The six samples listed in Table 7 can be used for autocalibration. Not all samples are provided with each system. The required samples for the acceptance test procedure during system installation will include one or more of these six samples.
When the autocalibration is run by the user VNMR1, all results are automatically written to the probe file in
/vnmr/probes/probe_name or $vnmrsys/probes/probe_name.

The autocalibration macros first determine power and the 90° pulse width, then write the power and pulse width values into the probe’s file.

The autocalibration macros call four parameter sets:

- stdpar/H1.par (either the system /vnmr/stdpar/H1.par or the user’s vnmrsys/stdpar/H1.par).
- /vnmr/tests/gamah2.
- /vnmr/tests/P31sn.par.
- /vnmr/tests/F19sn.par.

If the user is not vnmr1 but is part of the admin group, the probe’s calibration file is locally created in ~/vnmrsys/probes. If the user is vnmr1, the probe’s calibration file is created in /vnmr/probes.

### Autocalibration Macros

The following macros improve system automated calibration:

- **AC1S–AC11S** are called by the interactive autocalibration window and determine the $^1$H 90° pulse width, $^{13}$C 90° pulse width, decoupler $^\gamma$H, and 90° pulse width of the decoupler at high power, $^{19}$F 90° pulse width, and $^{31}$P 90° pulse width.

- **AC1S–AC11S** perform automatic calibration on **UNITY/INOVA, MERCURY-Series, and GEMINI 2000** systems. When the macros finish the calibration routines, the current probe file is updated. If the probe is new to the system (i.e., all values in the probe file are zero), then the macros determine system power followed by calibration. If power levels are listed in the current probe file, these values are used, instead of taking time to determine power. The macro **AC1S** determines $^1$H pw90, **AC5S** begins $^{13}$C calibration, including decoupler power calibrations. **AC10S** performs $^{19}$F calibration, and **AC11S** performs $^{31}$P calibration.

- **ACreport** is called by the autocalibration macros **AC1S–AC11S** to print a copy of the probe file after calibration is completed.

---

**Table 7. AutoCalibration Samples**

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<th>Sample</th>
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<th>Part Number</th>
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</thead>
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<tr>
<td>40% dioxane in C&lt;sub&gt;8&lt;/sub&gt;D&lt;sub&gt;8&lt;/sub&gt; $^{13}$C sensitivity</td>
<td>Carbon</td>
<td>00-968120-69</td>
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<td>0.485 M triphenylphosphate in CDCl&lt;sub&gt;3&lt;/sub&gt; $^{31}$P sensitivity</td>
<td>Phosphorus</td>
<td>00-968120-87</td>
</tr>
<tr>
<td>0.05% trifluorotoluene in benzene–d&lt;sub&gt;6&lt;/sub&gt; $^{19}$F sensitivity</td>
<td>Fluorine</td>
<td>00-968120-82</td>
</tr>
<tr>
<td>1% $^{13}$C-enriched methyl iodide, 1% trimethyl phosphate, and 0.2% Cr(AcAc) in Chloroform-d</td>
<td>Proton, Carbon, ID, and Gradients (organic solvents)</td>
<td>00-968120-96</td>
</tr>
<tr>
<td>1% $^{13}$C-enriched methanol with 0.30 mg/ml GdCl&lt;sub&gt;3&lt;/sub&gt; in 1% H&lt;sub&gt;2&lt;/sub&gt;O/99% D&lt;sub&gt;2&lt;/sub&gt;O</td>
<td>Proton, Carbon, ID, and Gradients (aqueous solvents)</td>
<td>00-968120-68</td>
</tr>
<tr>
<td>(AutoTest Sample)</td>
<td>LOCK, gmap and Z0</td>
<td>01-901855-01</td>
</tr>
<tr>
<td>2 Hz D&lt;sub&gt;2&lt;/sub&gt;O</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ACbackup is called by the autocalibration macros AC1S–AC11S to back up the probe file before beginning a new autocalibration run. This macro is not usually called by the user.

Performing an Autocalibration

Before you calibrate a probe for the first time, type the following command:

1. To make a probe file available to all system users enter
   \texttt{addprobe(proasename, 'system')}.
2. To create a new probe entry in the current user directory, enter
   \texttt{addprobe(proasename)}, where \texttt{proasename} is a name of your choice (e.g., \texttt{addprobe('idpfg')}).

\texttt{addprobe} is a macro that is run during VNMR installation and makes a probe file available only to an individual system user.

\texttt{addprobe(probe_name, 'system')} creates a system-level probe directory (typically /vnmr/probes; users need write permission to this directory) and makes a probe file available to all users on the system.

Total time for system calibration is about 45 minutes.

Calibrate LOCK gmap and z0

This procedure calibrates the lock and gradients using the 2 Hz doped D$_2$O sample. Both the lock and gradients must be calibrated for the autoshim and autolock procedures to function efficiently.

1. Click the \texttt{Setup EXP} button in the right side of the Tcl/dg window.
2. \textbf{Eject} the current sample from the magnet and \textbf{insert} the \textit{2 Hz Doped D2O sample}. Click on the \texttt{Eject} and \texttt{Insert} buttons (Figure 55) in the sample management region of the Setup EXP window or, from the command line, use the \texttt{e} command to eject the sample and the \texttt{i} command to insert a new sample.
3. Select the solvent by holding down the left mouse button on the solvent menu (Figure 55) and choosing the appropriate solvent from the solvent menu list.

   \textbf{Figure 55.} Setup EXP - Changing Calibration Samples

4. Select \texttt{D2O} from the \textbf{Solvent menu} in the \textit{Sample Management} region of the Setup EXP panel.
8.2 System Calibrations Using the Calibrate Macro

5. Open the acqi window by pressing the acqi button on the VNMR menu. Lock onto the D2O resonance. The lock must be set on-resonance.

6. Adjust Z0 as necessary.

7. Adjust Lock Gain and Lock Power and set the lock level at 80%.

8. Exit acqi.

9. Type calibrate on the vnmr command line to display the interactive autocalibration menu (Figure 56A).

10. Set Autoshim and Autolock to NO.

11. Select the Lock calibration routine, from the Autocalibration menu (Figure 56B), by holding down the left mouse button on the Autocalibration menu and selecting “LOCK:gmap and z0 (2Hz D2O)” from the menu list.

12. Click on OK to continue with the lock calibration (or click Reset to return to the default value).

13. Click the Confirm button (Figure 56C). If the current sample is not the correct sample, click Cancel.

14. Click on the Setup EXP button.

15. Click on the Start ACQ button to begin the calibration.

Calibrate Proton

1. Click the Setup EXP button in the right side of the Tcl/dg window.

2. Eject the current sample from the magnet and insert the $^1$H sensitivity sample. Click on the Eject and Insert buttons (Figure 57) in the sample management region of the Setup EXP window or, from the command line, use the e command to eject the sample and the i command to insert a new sample.

3. Select the solvent by holding down the left mouse button on the solvent menu (Figure 57) and choosing the appropriate solvent from the solvent menu list.

4. Type calibrate on the vnmr command line to display the interactive autocalibration menu (Figure 58A).
5. Set Autoshim and Autolock. Click the NO button if your sample is already locked and shimmed or if you would prefer to lock and shim manually.

6. Select the $^1$H calibration routine from the Autocalibration menu (Figure 58B) by holding down the left mouse button on the Autocalibration menu and selecting “Calibrate Proton (EtBz)” from the menu list. The sample confirmation window opens.

7. Click the Confirm button Figure 58C. If the current sample is not the correct sample, click Cancel.

8. In the target calibration window (Figure 58D), Enter a target pw90 value. The value is usually the $^1$H pulse specification for your probe.

9. Click on OK to accept the value shown or the value you entered or click Reset to return to the default value.

10. Click on Exit. Proton sensitivity parameters are recalled.

11. If you set the Autoshim and Autolock options to NO in step 5, manually lock and shim your sample now. Tune the probe if needed.

12. Click on the Setup EXP button. Click on the Start ACQ button to begin the calibration.

At the end of the calibration routine, the power and pulse width values are automatically incorporated into the probe file.

**Calibrate Carbon**

1. Click the Setup EXP button in the right side of the Tcl/dg window.

2. Eject the current sample from the magnet and insert the $^{13}$C ASTM sensitivity sample. Click on the Eject and Insert buttons (Figure 59) in the sample management region of the Setup EXP window or, from the command line, use the e command to eject the sample and the i command to insert a new sample.

3. Select the solvent by holding down the left mouse button on the solvent menu (Figure 59) and choosing the appropriate solvent from the solvent menu list.

**Figure 59.** Setup EXP - Changing Calibration Samples
8.2 System Calibrations Using the Calibrate Macro

4. Type calibrate on the vnmr command line to display the interactive autocalibration menu (Figure 60A).

5. Set **Autoshim** and **Autolock**. Click the NO button if your sample is already locked and shimmed or if you would prefer to lock and shim manually.

6. Select the $^{13}$C calibration routine, from the **Autocalibration** menu (Figure 60B), by holding down the left mouse button on the **Autocalibration** menu and selecting “**Calibrate Carbon (ASTM)**” from the menu list.

7. Click the **Confirm** button (Figure 60C). If the current sample is not the correct sample, click **Cancel**.

8. In the target calibration window (Figure 60D), **Enter** a target pw90 value. The value is usually the $^{13}$C pulse specification for your probe.

9. **Select** the correct relaxation based on the ASTM sample used.

10. Click on **OK** to accept the value shown or the value you entered (or click **Reset** to return to the default value).

11. Click on **Exit**. Carbon sensitivity parameters are recalled.

12. If you set the **Autoshim** and **Autolock** options to NO in step 5, manually lock and shim your sample now. Tune the probe if needed.

13. Click on the **Setup EXP** button.

14. Click on the **Start ACQ** button to begin the calibration.

At the end of the calibration routine, the power and pulse width values are automatically incorporated into the probe calibration file.

**Calibrate Fluorine**

1. Click the **Setup EXP** button in the right side of the Tcl/dg window.

2. **Eject** the current sample from the magnet and **insert** the $^{19}$F sensitivity sample. Click on the **Eject** and **Insert** buttons (Figure 61) in the sample management region.
Chapter 8. Tcl/Tk NMR Administration and Calibration

3. Select the solvent by holding down the left mouse button on the solvent menu (Figure 61) and choosing the appropriate solvent from the solvent menu list.

4. Type `calibrate` on the vnmr command line to display the interactive autocalibration menu (Figure 62A).

5. Set `Autoshim` and `Autolock`. Click the NO button if your sample is already locked and shimmed or if you would prefer to lock and shim manually.

6. Select the $^{19}$F calibration routine from the Autocalibration menu (Figure 62B) by holding down the left mouse button on the Autocalibration menu and selecting “Calibrate Fluorine ($^{19}$F S/N)” from the menu list. The sample confirmation window opens.

7. Click the Confirm button Figure 62C. If the current sample is not the correct sample, click Cancel.

8. In the target calibration window (Figure 62D), Enter a target pw90 value. The value is usually the $^{19}$F pulse specification for your probe.

9. Click on OK to accept the value shown or the value you entered (or click Reset to return to the default value).

10. Click on Exit. Fluorine sensitivity parameters are recalled.

11. If you set the `Autoshim` and `Autolock` options to NO in step 5, manually lock and shim your sample now. Tune the probe if needed.

12. Click on the Setup EXP button. Click on the Start ACQ button to begin the calibration.

At the end of the calibration routine, the power and pulse width values are automatically incorporated into the probe file.

**Calibrate Phosphorus**

1. Click the Setup EXP button in the right side of the Tcl/dg window.
2. **Eject** the current sample from the magnet and **insert** the $^{31}$P sensitivity sample. Click on the **Eject** and **Insert** buttons (Figure 61) in the sample management region of the **Setup EXP** window or, from the command line, use the `e` command to eject the sample and the `i` command to insert a new sample.

3. Select the solvent by holding down the left mouse button on the solvent menu (Figure 61) and choosing the appropriate solvent from the solvent menu list.

4. Type `calibrate` on the vnmr command line to display the interactive autocalibration menu (Figure 62A).

5. Set **Autoshim** and **Autolock**. Click the NO button if your sample is already locked and shimmmed or if you would prefer to lock and shim manually.

6. Select the $^{31}$P calibration routine from the **Autocalibration** menu (Figure 62B) by holding down the left mouse button on the **Autocalibration** menu and selecting **“Calibrate Phosphorus (19F S/N)”** from the menu list. The sample confirmation window opens.

7. Click the **Confirm** button Figure 62C. If the current sample is not the correct sample, click **Cancel**.

8. In the target calibration window (Figure 62D), **Enter** a target pw90 value. The value is usually the $^{31}$P pulse specification for your probe.

9. Click on **OK** to accept the value shown or the value you entered (or click **Reset** to return to the default value).

10. Click on **Exit**. Phosphorus sensitivity parameters are recalled.

11. If you set the **Autoshim** and **Autolock** options to NO in step 5, manually lock and shim your sample now. Tune the probe if needed.

12. Click on the **Setup EXP** button. Click on the **Start ACQ** button to begin the calibration.

At the end of the calibration routine, the power and pulse width values are automatically incorporated into the probe file.
Chapter 8. Tcl/Tk NMR Administration and Calibration

Calibrate H, C, Ind. Det., and Gradients (CH₃I)

This procedure calibrates H₁ and C₁₃ observe, H₁ and C₁₃ decouple (pulses as well as \( \gamma H₂ \)), and gradients using the \(^{13}\)C enriched CH₃I in CDCl₃ sample.

1. Click the Setup EXP button in the right side of the Tcl/dg window.

2. **Eject** the current sample from the magnet and **insert** the \(^{13}\)C enriched CH₃I sample. Click on the Eject and Insert buttons (Figure 65) in the sample management region of the Setup EXP window or, from the command line, use the `e` command to eject the sample and the `i` command to insert a new sample.

3. Select the solvent by holding down the left mouse button on the solvent menu (Figure 65) and choosing the appropriate solvent from the solvent menu list.

4. Type calibrate on the vnmr command line to display the interactive autocalibration menu (Figure 66A).

5. Set Autoshim and Autolock. Click the NO button if your sample is already locked and shimmed or if you would prefer to lock and shim manually.

6. Select the Indirect Detection calibration routine, from the Autocalibration menu (Figure 66B), by holding down the left mouse button on the Autocalibration menu and selecting “Calibrate H, C, Ind. Det. Grad (CH₃I)” from the menu list.

7. Click the Confirm button (Figure 66C). If the current sample is not the correct sample, click Cancel.

8. In the calibration window (Figure 67), select the calibration(s) to be run, H₁ Observe, C₁₃ Decouple, C₁₃ Observe, H₁ Decouple, Gradient (g/cm/dac), and C/H gradient ratio.

9. **Enter** the following target calibration values for the observe and decoupler calibrations:
   
a. \(^1\)H observe pw90
b. \(^{13}\)C dec pwx90
c. \(^{13}\)C observe pw90
d. \(^1\)H dec pp90

The target values are typically the pulse specifications for your probe.
10. Click on **OK** to accept the value shown or the value you entered (or click **Reset** to return to the default value).

![Image](image.png)

**Figure 67.** CH3I Calibration Target Values

11. Click on **Exit**.

12. If you set the **Autoshim** and **Autolock** options to **NO** in step 5, manually lock and shim your sample now. Tune the probe if needed.

13. Click on the **Setup EXP** button.

14. Click on the **Start ACQ** button to begin the calibration.

At the end of the calibration routine, the power and pulse width values are automatically incorporated into the probe calibration file.

**Calibrate H, Ind. Det., and Gradients (CH₃OH)**

This procedure calibrates H1, C13 decouple (pulse as well as $\gamma$H2), and gradients using the AutoTest sample ($^{13}$C enriched CH₃OH in doped D₂O). Specific calibration routines can be selected in the customization menu.

1. Click the **Setup EXP** button in the right side of the Tcl/dg window.

2. **Eject** the current sample from the magnet and **insert** the **AutoTest sample**. Click on the **Eject** and **Insert** buttons (Figure 68) in the sample management region of the **Setup EXP window or, from the command line**, use the `e` command to eject the sample and the `i` command to insert a new sample.

3. Select the solvent by holding down the left mouse button on the solvent menu (Figure 68) and choosing the appropriate solvent from the solvent menu list.

![Image](image.png)

**Figure 68.** Setup EXP - Changing Calibration Samples

4. Type `calibrate` on the vnmr command line to display the interactive autocalibration menu (Figure 69A).
5. Set **Autoshim** and **Autolock**. Click the NO button if your sample is already locked and shimmed or if you would prefer to lock and shim manually.

6. Select the **Indirect Detection** calibration routine, from the **Autocalibration** menu (Figure 69B), by holding down the left mouse button on the **Autocalibration** menu and selecting “**Calibrate H, Ind. Det. Grad (autotest)**” from the menu list.

7. Click the **Confirm** button (Figure 69C). If the current sample is not the correct sample, click **Cancel**.

8. In the calibration window (Figure 70), select the calibration(s) to be run, **H1 Observe**, **C13 Decouple**, **Gradient (g/cm/dac)**, and **C/H gradient ratio**.

9. **Enter** the following target calibration values for the observe and decoupler calibrations:
   a. 1H observe pw90
   b. 13C dec pwx90

   The target values are typically the pulse specifications for your probe.

10. Click on **OK** to accept the value shown or the value you entered (or click **Reset** to return to the default value).

11. Click on **Exit**.

12. If you set the **Autoshim** and **Autolock** options to NO in step 5, manually lock and shim your sample now. Tune the probe if needed.

13. Click on the **Setup EXP** button.

14. Click on the **Start ACQ** button to begin the calibration.

At the end of the calibration routine, the power and pulse width values are automatically incorporated into the probe file.
8.3 Manually Editing the Probe File

You can manually edit the probe file by using the edit buttons shown in the probe administration region of the Setup Exp Window (Figure 71).

For example, to edit H1 calibrations for the current probe, click on the Proton button. The window shown in Figure 72 opens.

Enter the new calibration values in the appropriate field and click SAVE and EXIT. The new calibration value is incorporated into the current probe file.

Gradient, maps, and other related information are accessed by clicking on the Probe button (Figure 73).

All the calibration widows access the local probe calibration files in userdir+/probes. To store the probe file in the system directory (/vnmr/probes), you must log in as vnmr1 or root, and copy the probe directory from the “local” directory to the system directory.
Chapter 9. **Processing and Plotting Saved Data**

Sections in this chapter:

- 9.1 “Retrieving Stored Data,” this page
- 9.2 “Plotting Retrieved Data Using GLIDE,” page 139
- 9.3 “Plotting Spectra Using Plot Designer,” page 141

You retrieve and process saved data using the File Manager and the Common Desktop Environment (CDE) interface or VNMR and GLIDE in the OpenLook Environment. The processed data is displayed on the VNMR screen ready for you to plot. Plot Designer provides you with tools to customize the way the data is presented. Plot Designer also provides different formats (GIF, JPEG, and other) for saving the plotted data to a file for later plotting or display.

**9.1 Retrieving Stored Data**

**Common Desktop Environment.**

Steps 1 and 2 need to be done only once during a VNMR session.

1. Click the **GLIDE** button in the Permanent Menu to bring the VNMR input window to the front (**Figure 74**).

   ![Figure 74. VNMR Permanent Menu](image)

2. Enter the command `listenon` in the input window

3. Click the file drawer icon in the CDE Front Panel(**Figure 75**).

   ![Figure 75. CDE Front Panel](image)
4. Using the File Manager navigate to the directory ~/vnmrsys/data/ and double click on the FID file you want to process. A Step by Step example is given in Figure 76.

A File Manager windows appears. Double-click on vnmrsys to change to the directory ~/vnmrsys

Double-click on data to change to the directory ~/vnmrsys/data

Change to the directory where the FIDs are stored.

Double-click on the FID file you want process. The FID is loaded to the current experiment and automatically processed. After that, the final spectrum is displayed.

Figure 76. Processing With GLIDE in the CDE Environment

OpenLook Environment.

1. Click the Main Menu button in the Permanent menu, and then click on the DATA button in the Main menu, Figure 77A.

2. Find the name of the directory where the FIDs are stored, highlight the name (click on the name with left mouse button), and then click the Set Directory button, Figure 77B.
3. Highlight the FID file and click the Load button. The FID is loaded to the current experiment, Figure 77C.

4. Click the Main Menu button in the Permanent menu.

5. Click the AutoProcess button.

The FID is automatically processed and the final spectrum is displayed.

9.2 Plotting Retrieved Data Using GLIDE

After processing, the 1D or 2D spectrum are displayed in the Interactive mode so you can adjust the vertical scale, expansion, and threshold. To plot the spectrum:

1. Click the Main Menu button in the Permanent menu.

Figure 77. Processing with GLIDE in the Openlook Environment

9.2 Plotting Retrieved Data Using GLIDE

After processing, the 1D or 2D spectrum are displayed in the Interactive mode so you can adjust the vertical scale, expansion, and threshold. To plot the spectrum:

1. Click the Main Menu button in the Permanent menu.
2. Click the Autoplot button (Figure 78). This generates a 1D plot or 2D plot. 2D plots are plotted with appropriate high-resolution 1D spectra and/or skyline projections.

**Figure 78.** Plotting from GLIDE
9.3 Plotting Spectra Using Plot Designer

Plot Designer allows you to see and design a plot before you print it. It provides templates, drawing tools, and a text editor that give you the capability of positioning spectra, parameters, axes, and other plot output on a page.

System Requirement

Plot Designer is a Java-based application. You must have Solaris 2.6 or later installed in order to use Plot Designer. The Java™ Runtime Environment (JRE) for SolarisTM from Sun Microsystems provides an environment in which you can run Java applications. Plot Designer requires at least JRE 1.1.6. You can download the latest version of JRE for Solaris™ from the Sun Microsystems Web site at http://www.sun.com/solaris/jre/index.html.

Creating a Plot Design

1. Start the Plot Designer program by entering jdesign in the VNMR input window. The window shown in Figure 79 appears.

2. In the main menu, click on Region, then New to create a region on the workspace. The cursor arrow changes to cross-hairs.

3. Draw a region by pressing and holding down the left mouse button and dragging the cursor across the workspace. Release the mouse button when the region is the size that you want it.

Importing a Plot into a Region

After you have created a region, you can use the Region Editor, shown in Figure 80, to import a plot from the VNMR graphics window into the workspace. Region Editor is a text editor in which you can enter commands to change the look of a plot and then import it. For more information about using Region Editor, see the section “Editing a Plot” on page 150.

To open the Region Editor, do the following procedure:

1. Click on Region in the main menu, then Edit.

   If you created multiple regions and do not select one, when you click Region-Edit, the first region created is automatically selected.

2. Enter a VNMR command (such as pl or pscale) in the text input area. For more information about commands, see “Storing Commands” on page 150.
Chapter 9. Processing and Plotting Saved Data

3. Click on **Preview** in the main menu, then **Selected** to import the plot into the region. If you created multiple regions, click **Preview-All** to import plots into all regions.

You can also import a plot into a region by doing the following procedure:

1. Select the region by double-clicking anywhere inside it.
2. Press the right mouse button anywhere in the workspace to open the plot menu window shown in Figure 81.
3. Choose a command to import the plot.

### Customizing a Plot

You can customize the plot by adding simple graphics and text to it and changing its size and appearance with the tools listed in Table 1.

### Adding Text to Your Design

To add text to your design, do the following procedure:

1. Click on the text input tool to open the Text Input window shown in Figure 82.

2. Type text in the input area in the top of the window.
   - Click on the desired **Font family** and **Font style** selections and enter a **Font size**.
3. Click on **Put** and drag the cursor (and the text) into the workspace.
4. Click once to paste the text.
### Table 1. Plot Designer Tools

<table>
<thead>
<tr>
<th>Tool</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Line</strong></td>
<td>Draws a line. To draw a line, place the cursor in a region or anywhere in the workspace. Press and hold down the left mouse button, then drag the cursor. Release the mouse button to complete the drawing.</td>
</tr>
<tr>
<td><strong>Box</strong></td>
<td>Draws a box. To draw a box, place the cursor in a region or anywhere in the workspace. Press and hold down the left mouse button, then drag the cursor down diagonally. Release the mouse button to complete the drawing.</td>
</tr>
<tr>
<td><strong>Arrow</strong></td>
<td>Drawing an arrow is similar to the procedure for drawing a line. The left-pointing arrows places the arrowhead at the point in which you START to draw the arrow. The right-pointing arrow places the arrowhead at the point in which you END drawing the arrow.</td>
</tr>
<tr>
<td><strong>Item Preferences</strong></td>
<td>Sets the color and size of lines and fonts. You can also choose three styles of fonts: monospaced, SansSerif, and serif. To edit an object, select it by double-clicking on it. For instructions and a description of Item Preferences properties, see “Customizing Objects” on page 149.</td>
</tr>
<tr>
<td><strong>Text Input</strong></td>
<td>Allows you to add text into your design. Several options allow you to control the size and appearance of the text. To use this tool, see “Adding Text to Your Design” on page 142.</td>
</tr>
<tr>
<td><strong>Eraser</strong></td>
<td>The eraser tool removes only selected objects. The ALL eraser clears the workspace. To remove all objects and regions, click on Region in the main menu, then Delete All. Objects removed with Delete All cannot be restored to the workspace. For more information about removing and restoring regions and objects, see page 149.</td>
</tr>
<tr>
<td><strong>Print</strong></td>
<td>Prints a file. No window opens; your plot design is automatically printed.</td>
</tr>
</tbody>
</table>

Chapter 9. Processing and Plotting Saved Data

**Saving Your Design**

1. When you are satisfied with the plot that you have created, click on **File** in the main menu, then **Save Data** to open the Plot Save window shown in Figure 83.

2. Scroll down the list of directories and choose a directory. You can also enter a path for your file in the text input area of the **Directory** field.

3. Label your file by clicking on a name in the **File** list or entering a name in the text input area of the **File** field.

4. Click on the **Data format** button to select a format for your file. Table 2 lists the formats that are available.

5. Enter a **Data resolution**.

6. Click **Save** to store the data.

7. Click **Close** to exit the window.

**Printing Your Design**

Print your plot by clicking on the print tool. No window appears; your design is automatically printed.

**Exiting Plot Designer**

To exit Plot Designer, click on **File** in the main menu, then click on **Quit**.

**Table 2. Formats Available in Plot Designer**

<table>
<thead>
<tr>
<th>Format</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVS</td>
<td>AVS X image file</td>
</tr>
<tr>
<td>BMP</td>
<td>Microsoft Windows bitmap image file</td>
</tr>
<tr>
<td>EPS</td>
<td>Adobe Encapsulated PostScript file</td>
</tr>
<tr>
<td>FAX</td>
<td>Group 3 FAX</td>
</tr>
<tr>
<td>FITS</td>
<td>Flexible Image Transport System</td>
</tr>
<tr>
<td>GIF</td>
<td>Compuserve Graphics Interchange Format (version 89a)</td>
</tr>
<tr>
<td>GIF87</td>
<td>Compuserve Graphics Interchange Format (version 87a)</td>
</tr>
<tr>
<td>JPEG</td>
<td>Compressed format from Joint Photographic Experts Group</td>
</tr>
<tr>
<td>MIFF</td>
<td>Magick image file format</td>
</tr>
<tr>
<td>PCD</td>
<td>Photo CD</td>
</tr>
<tr>
<td>PCX</td>
<td>ZSoft IBM PC Paintbrush file</td>
</tr>
<tr>
<td>PDF</td>
<td>Portable Document Format</td>
</tr>
<tr>
<td>PICT</td>
<td>Apple Macintosh QuickDraw/PICT file</td>
</tr>
<tr>
<td>PGM</td>
<td>Portable gray map</td>
</tr>
</tbody>
</table>
### Using Templates

After you have created a plot design, you can save your design as a template. To create a template, do the following procedure:

1. Click on **File** in the main menu, then click on **Templates** to open the Plot Templates window shown in Figure 84.

2. Enter a name in the **Template** field. If you want the file to be the default template, click on the box next to **Use this template as default**.

3. Click **Save** to store the template in `$vnmruser/templates/plot` directory.

   If you try to save a template with the same name as an already existing template, a warning notifying you that the file will be overwritten appears. If you do not want the file replaced, click on **Cancel**.

4. Quit the Plot Templates window by clicking on **Close**.

If you close Plot Designer with a template in the workspace, the next time that you start Plot Designer, it will open with the template and any changes that you made to it automatically loaded on the workspace.

---

**Table 3. Formats Available in Plot Designer (continued)**

<table>
<thead>
<tr>
<th>Format</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PNG</td>
<td>Portable Network Graphics</td>
</tr>
<tr>
<td>PS</td>
<td>Adobe PostScript file</td>
</tr>
<tr>
<td>PS2</td>
<td>Adobe Level II PostScript file</td>
</tr>
<tr>
<td>SGI</td>
<td>Irix RGB image file</td>
</tr>
<tr>
<td>SUN</td>
<td>Sun Rasterfile</td>
</tr>
<tr>
<td>TGA</td>
<td>Truevision Targa image file</td>
</tr>
<tr>
<td>TIFF</td>
<td>Tagged Image File Format</td>
</tr>
<tr>
<td>VIFF</td>
<td>Khoros Visualization image file</td>
</tr>
<tr>
<td>XBM</td>
<td>X11 bitmap file</td>
</tr>
<tr>
<td>XPM</td>
<td>X11 pixmap file</td>
</tr>
<tr>
<td>XWD</td>
<td>X Window System window dump image file</td>
</tr>
</tbody>
</table>

If you leave a design in the window when you exit Plot Designer, your design will automatically appear in the workspace the next time that you use the program.
Specifying Templates

You can plot a page with a specific template by typing the `jplot` command and the template name. For example, entering `jplot('t1')` starts a plot with the t1 template automatically loaded.

When you open Plot Designer with the `jdesign` macro, the workspace is either empty or it contains the design that was being worked on the previous time Plot Designer was used. Do the following procedure to load a template file:

1. Click on File in the main menu, then Templates to open the Plot Templates window.
2. Select a template by either clicking on a file in the list in the upper region of the window or by entering the file name in the Template field. If you want the file to be the default template, click on the field Use this template as default.
3. To insert the template into the Plot Designer window, click on Open.
4. Click Close to exit the window.

Removing Templates

To remove a template from the list in the Plot Templates window, click on the file then click on Delete. A warning appears notifying you that the template will be deleted. Click Cancel if you do not want to delete the template.

Customizing Plot Designer

You can customize Plot Designer by changing the orientation and size of the window and the appearance of, and properties in, the workspace.

Changing Window Orientation

Plot Designer can be viewed in either a landscape or a portrait (the default) orientation. To change the orientation of the Plot Designer window, click on Orient in the main menu, then click on Landscape or Portrait.

Changing Window Size

You can shrink or enlarge the Plot Designer window. To increase or decrease the size of the window, click on Magnify in the main menu, then select a percentage by which you want to reduce or expand the size of the window.

Customizing the Workspace

You can change the look and properties of the workspace by doing the following procedure:
1. In the main menu, click on Preferences, then Set Up to open the Workspace Preferences panel shown in Figure 85.

2. To change an aspect of, or property in, the workspace, click on its corresponding control button; a pull-down list appears. See Table 4 for a description of each control.

3. After you have entered all of your preferences, click on Apply to execute the changes.

4. Click Close to exit the window.

Figure 86 is an example of the workspace without visible region borders and a grid.

**Working with Regions**

Regions on the workspace are smaller workspaces in which you can create designs. This section describes how to adjust plot parameters within regions, manipulate regions and objects on the workspace, and customize regions.

**Adjusting and Restoring Plot Parameters in a Region**

When you draw a region, the scaling parameters of the plotting area (\(wc_{\text{max}}\) and \(wc_{\text{max}2}\)) are adjusted by the macro \(\text{jplotscale}\), \(\text{jplotunscale}\) is a macro that restores the original parameters of the current experiment to the plot. The scaling parameters (\(io\), \(is\), \(vs\), \(wc\), and \(wc2\)) of a plot that is imported into a region are automatically adjusted according to \(wc_{\text{max}}\) and \(wc_{\text{max}2}\).

**Table 4. Workspace Preference Controls**

<table>
<thead>
<tr>
<th>Control</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Background</td>
<td>Changes the background color of the workspace.</td>
</tr>
<tr>
<td>Border Color</td>
<td>Changes the color of the border surrounding the workspace.</td>
</tr>
<tr>
<td>Highlight Color</td>
<td>When you double-click on an object, its color changes to indicate that it is selected (or highlighted). This option controls the highlight color.</td>
</tr>
<tr>
<td>Grid Color</td>
<td>Changes the color of the grid.</td>
</tr>
<tr>
<td>Plotter</td>
<td>Allows you to choose a black and white or color plotter.</td>
</tr>
<tr>
<td>Border</td>
<td>Shows (on) and hides (off) region borders.</td>
</tr>
<tr>
<td>Grid</td>
<td>Turns on and turns off the grid in the workspace.</td>
</tr>
<tr>
<td>Snap</td>
<td>The grid is magnetic. When it is turned on, the path of an object (the center of its border) automatically snaps (is magnetized) to the grid whenever you draw or move the object or change its size or shape. Turning off Snap demagnetizes the grid.</td>
</tr>
<tr>
<td>Snap Spacing</td>
<td>Controls the amount of space on the grid to which an object snaps. Spacing can be in inches, centimeters, or points.</td>
</tr>
</tbody>
</table>
If you want to use the adjusted parameters, enter the following command string, which first restores the parameters of the current experiment \( n \) to the plot, then applies the adjusted parameters to the plot:

```plaintext
jplotunscale jexpn jplotscale
```

If you do not want to use the adjusted parameters, enter the following command:

```plaintext
jplotunscale jexpn
```

**Moving Regions and Objects**

To move a region, double-click the left mouse button anywhere inside it, then drag the mouse. Double-click anywhere outside the region to deselect the region.

To move an object, double-click the left mouse button on it and drag the mouse. Release the mouse button to deselect the object.

After you select an object or region, you can also use the arrow keys on your keyboard to move regions and objects.

**Changing the Size of a Region**

You can shrink or enlarge a region by double-clicking on it, placing the cursor on a border anchor, and dragging the cursor up, down, or diagonally.

**Deleting a Region**

To delete a region from the workspace, double-click anywhere inside the region. In the main menu, click on **Region**, then **Delete**.

To remove all regions from the workspace, click **Region**, then **Delete All**.
Note: Regions removed with **Delete All** are not stored in a buffer and cannot be restored to the workspace.

**Restoring a Deleted Region**

To restore a region deleted from the workspace, click on **Region** in the main menu, then **Undelete**.

**Clearing the Workspace**

To *permanently* remove all regions from the workspace, click **Delete All**. Remember, when you remove all regions, you cannot restore them with **Undelete**.

**Customizing Objects**

You can change the line width and color of objects and the family, style, and size of fonts with the Item Preferences window, shown in **Figure 87**. To open the window, either click on **Region** in the main menu, then **Preferences** or click on the Item Preferences tool described on page 143.

![Figure 87. Item Preferences Window](image)

**Changing Line Color**

You can change the color of a line by doing the following procedure:

1. Double-click on the line to select it.
2. In the Item Preferences window, click on the color button to open a pop-up list showing a range of colors.
3. Click on a color. The color appears in the color bar. Move the tuning needle left or right to change a color. You can also change a color by clicking on the left or right arrows in the **Red**, **Green**, and **Blue** fields; the values in the **Color(RGB)** field automatically change as you move a needle.
4. When you are satisfied with a color, click **Apply**.
5. Place the cursor anywhere in the workspace and click once to see the color change.
**Changing Line Width**

Change the width of a line by doing the following procedure:

1. Highlight the line by double-clicking on it.
2. Enter a new width in the **Line Width** field.
3. Click **Apply** to change the line.
4. Click anywhere in the workspace to deselect the line.

**Changing Fonts**

Plot Designer has three font families: SansSerif, Monospaced, and Serif. Fonts can be Plain, **Bold**, or **Italic**. To change fonts, do the following procedure:

1. Double-click on the text to select it.
2. Click on the Item Preferences tool to open the Item Preferences window.
3. Choose a family, style, and enter a size in the **Font** field.
4. Click **Apply** to change the text.

**Changing Font Color**

You can change the color of text that you add to your design. To change the color of fonts, repeat the procedure for “Changing Line Color” on page 149.

**Editing a Plot**

You can edit a plot by using the Region Editor shown in Figure 80. To edit a plot, do the following procedure:

1. Double-click anywhere inside a region to select it.
2. In the main menu, click on **Region**, then **Edit** to open the Region Editor window.
3. Enter a command (such as `pl` or `pscale`) in the text input area. Use the buttons listed in Table 5 to edit text.
4. Exit Region Editor by clicking **Close**.

**Storing Commands**

Commands are stored in the `/$vnmruser/templates/plot/menu` file or `/$vnmrsystem/user_templates/plot/menu` file. You can edit both of these files to add or delete commands. In the `menu` file, the command is indicated by the following two lines:

- The first line is the label of the command that appears in the plot menu window.
- The second line is the command itself.

In Figure 88, the label `pl` identifies the command line `pl pscale`. The label `PAP` identifies the `pap` command.
Table 5. Region Editor Buttons

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restore</td>
<td>Applies the original template to a region. If you opened a template and made changes to it, you can restore your design to the original template design by using this button.</td>
</tr>
<tr>
<td>Delete</td>
<td>Removes text. This option is not similar to Copy. Deleted text is not stored in a buffer; do not use Delete to cut and paste text.</td>
</tr>
<tr>
<td>Delete all</td>
<td>Clears all text from the input area.</td>
</tr>
<tr>
<td>Copy</td>
<td>Duplicates text.</td>
</tr>
<tr>
<td>Paste</td>
<td>Inserts copied text in the text input area.</td>
</tr>
</tbody>
</table>

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