



## Technical Bulletin L0415 – Background Subtraction

Background subtraction is an easy process to remove any background signals. In order to produce a clean spectrum, the background subtraction functions requires:

- 1) Acquire a blank spectra of an exact spectral width (sw) and number of points (np)
  - a. This could be done with just solvent.
- 2) Acquire the sample spectra with the exact same sw and np as your blank in step 1.

Varian has always made experiment 5 the add/subtract processing experiment so you need to be in any experiment *EXCEPT* experiment 5. For example, experiment 1 and 2 will be used.

- 3) Load the sample spectra into experiment 1 & transform and phase the data
- 4) Load the blank spectra in experiment 2 & transform and phase the data
- 5) type *jexp1 clradd spadd jexp2 spsub* on the VNMR command line

This should result in a 'clean' spectra without the background in experiment 5.

For additional details and examples, below are excerpted lines for *clradd*, *spadd*, and *spsub* from the Varian manual Commands and Parameters (copyrighted by Varian) for reference only.

Note: The carbon background peaks around 90 and 100 ppm will always be very broad and won't conflict with any real sample peaks so it will be easy to identify your narrower, more intense aromatic sample peaks.

### **clradd Clear add/subtract experiment (C)**

Syntax: clradd

Description: Deletes the add/subtract experiment (exp5).

Alternate: clear button in the Add/Subtract Menu.

See also: *User Guide: Liquids NMR*

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### **spadd Add current spectrum to add/subtract experiment (C)**

Syntax: (1) spadd<(multiplier<,shift>)>  
(2) spadd('new')  
(3) spadd('trace',index)

Description: Performs noninteractive spectral addition. The last displayed or selected spectrum is added to the current contents of the add/subtract experiment (exp5). A multi-element add/subtract experiment can be created using the 'new' keyword. Individual spectra in a multi-element add/subtract experiment can be subsequently added to using the 'trace' keyword followed by an index number of the spectrum.

Related: **lookup** Look up words and lines from a text file (C)

**solvent** Lock solvent (P)

Related: **sp1** Start of plot in 1st indirectly detected dimension (P)

**sp2** Start of plot in 2nd indirectly detected dimension (P)

Related: **sp** Start of plot in directly detected dimension (P)

**sp2** Start of plot in 2nd indirectly detected dimension (P)

Related: **sp** Start of plot in directly detected dimension (P)

Arguments: multiplier is a value to multiply each spectrum being added to the add/subtract experiment (exp5). The normal range of multiplier would be +1 to -1 but the range is actually unlimited. The default is 1.0.  
shift is the number of data points to shift each spectrum. A positive value shifts the spectrum being added to a higher frequency, or to the left. A negative value shifts the spectrum to a lower frequency, or to the right. The default is 0.  
'new' is a keyword to create a new spectrum in the add/subtract experiment.  
'trace' is a keyword to select the spectrum given by the index number argument (index) and add it to the add/subtract experiment. The default is to add to the first spectrum in the add/subtract experiment.  
index is the index number of the spectrum to be used as a target in a multielement add/subtract experiment.

Examples: spadd  
spadd(.5,25)

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spadd('new')
spadd('trace',2)
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Alternate: Add Spectrum button in the Add/Subtract Menu.

See also: *User Guide: Liquids NMR*

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### **spsub Subtract current spectrum from add/subtract experiment (C)**

Syntax: (1) spsub<(multiplier<,shift>)>  
(2) spsub('new')  
(3) spsub('trace',index)

Description: Performs non-interactive spectral subtraction. The last displayed or selected spectrum is subtracted from the current contents of the add/subtract experiment (exp5). A multi-element add/subtract experiment can be created using the 'new' keyword. Individual spectra in a multi-element add/subtract experiment can be subsequently subtracted from using the 'trace' keyword followed by an index number of the spectrum.

Arguments: multiplier is a value to multiply each spectrum being subtracted from the add/subtract experiment (exp5). The normal range of multiplier would be +1 to -1 but is actually unlimited. The default is 1.0.  
shift is the number of data points to shift each spectrum. A positive value shifts the spectrum being added to a higher frequency, or to the left. A negative value shifts the spectrum to a lower frequency, or to the right. The default is 0.  
'new' is a keyword to create a new spectrum in the add/subtract experiment.  
'trace' is a keyword to select the spectrum given by the index number argument (index) and subtract it from the add/subtract experiment. The default is to subtract from the first spectrum in the add/subtract experiment.

Related: **addi** Start interactive add/subtract mode (C)

**spadd** Add current spectrum to add/subtract experiment (C)

**spsub** Subtract current spectrum from add/subtract experiment (C)

Related: **sfrq** Transmitter frequency of observe nucleus (P)

**spins** Perform spin simulation calculation (C)

index is the index number of the spectrum to be used as a target in a multielement add/subtract experiment.

Examples: spsub  
          spsub(.5,25)  
          spsub('new')  
          spsub('trace',2)

Alternate: Subtract button in the Add/Subtract Menu.

See also: *User Guide: Liquids NMR*