

# NDI DataView User Guide

Revision 2  
September 2006

NDI DataView User Guide

**Part number: IL-1070088**

Copyright 2003, 2006 Northern Digital Inc. All Rights Reserved.

NDI and Optotrak are registered trademarks of Northern Digital Inc.

Measurement You Can Trust is a trademark of Northern Digital Inc.

🍁 Printed in Canada.

---

Published by:

Northern Digital Inc.  
103 Randall Dr.  
Waterloo, Ontario, Canada N2V 1C5

Telephone: +1 (519) 884-5142  
Toll Free: +1 (877) 634 634 0  
Global: + (800) 634 634 00  
Facsimile: +1 (519) 884-5184  
Website: [www.ndigital.com](http://www.ndigital.com)

Copyright 2003, 2006 Northern Digital Inc.

All rights reserved. No part of this document may be reproduced, transcribed, transmitted, distributed, modified, merged, translated into any language or used in any form by any means - graphic, electronic, or mechanical, including but not limited to photocopying, recording, taping or information storage and retrieval systems - without the prior written consent of Northern Digital Inc. Certain copying of the software included herein is unlawful. Refer to your software license agreement for information respecting permitted copying.

### **Disclaimer of Warranties and Limitation of Liabilities**

Northern Digital Inc. has taken due care in preparing this document and the programs and data on the electronic media accompanying this document including research, development, and testing.

This document describes the state of Northern Digital Inc.'s knowledge respecting the subject matter herein at the time of its publication, and may not reflect its state of knowledge at all times in the future. Northern Digital Inc. has carefully reviewed this document for technical accuracy. If errors are suspected, the user should consult with Northern Digital Inc. prior to proceeding. Northern Digital Inc. makes no expressed or implied warranty of any kind with regard to these programs nor the supplemental documentation in this book.

Northern Digital Inc. makes no representation, condition or warranty to the user or any other party with respect to the adequacy of this document for any particular purpose or with respect to its adequacy to produce a particular result. The user's right to recover damages caused by fault or negligence on the part of Northern Digital Inc. shall be limited to the amount paid by the user to Northern Digital Inc. for the provision of this document. In no event shall Northern Digital Inc. be liable for special, collateral, incidental, direct, indirect or consequential damages, losses, costs, charges, claims, demands, or claim for lost profits, data, fees or expenses of any nature or kind.

NDI and Optotrak are registered trademarks of Northern Digital Inc. Measurement You Can Trust is a trademark of Northern Digital Inc.

Product names listed are trademarks of their respective manufacturers. Company names listed are trademarks or trade names of their respective companies.



---

# Table of Contents

<b>1 Getting Started</b>	<b>1</b>
1.1 NDI DataView	1
1.2 How to Use this Guide	1
1.3 Installing NDI DataView	1
1.4 The NDI DataView Main Window	2
<b>2 Common Procedures</b>	<b>6</b>
2.1 Opening Data Files	6
2.2 Viewing Data in a Table	23
2.3 Viewing Data in a Graph	36
<b>3 File Breakdown</b>	<b>73</b>
3.1 Data File Types	73
3.2 Items and Subitems	75
3.3 File Naming Conventions	76
<b>4 Glossary</b>	<b>77</b>
<b>5 Appendix A: Menu Guide</b>	<b>92</b>
<b>6 Appendix B: Icon Guide</b>	<b>96</b>
6.1 Main Window Toolbar Icons	96
6.2 File Type Icons	97



# 1 Getting Started

## 1.1 NDI DataView

NDI DataView software allows you to view, edit, and print the data stored in NDI floating point data files. With NDI DataView, you can create tables and graphs of data to observe characteristic features of data.

## 1.2 How to Use this Guide

This guide is divided into four sections:

- **Getting Started:** explains the basic concepts of NDI DataView and the layout of its main window, as well as how to install the software.
- **Common Procedures:** shows how to accomplish specific tasks using NDI DataView. These tasks include opening data files, viewing data as a graph or a table, and editing data.
- **File Breakdown:** describes the different file formats that NDI DataView can open.
- **Glossary:** defines terms often used with NDI DataView.

If you are new to NDI DataView, begin with the Getting Started section to become familiar with the basic concepts. The Common Procedures section provides examples to help you accomplish specific tasks.

Additional information about NDI DataView is available in the online help.

## 1.3 Installing NDI DataView

1. Place the NDI DataView CD in the CD-ROM drive.

The NDI DataView install wizard starts.

2. Follow the on screen instructions to install NDI DataView.

The install wizard will ask you to specify the location at which to install NDI DataView. By default, this location is *c:\Program Files\Northern Digital Inc\NDI DataView*.

The examples in this guide use the location *c:\My Experiments* to store data files.

## 1.4 The NDI DataView Main Window

The NDI DataView main window allows you to open, display, edit, and print data files as tables and graphs. Windows containing individual table and graph views of opened data files appear within this window. The main window itself contains four sections:

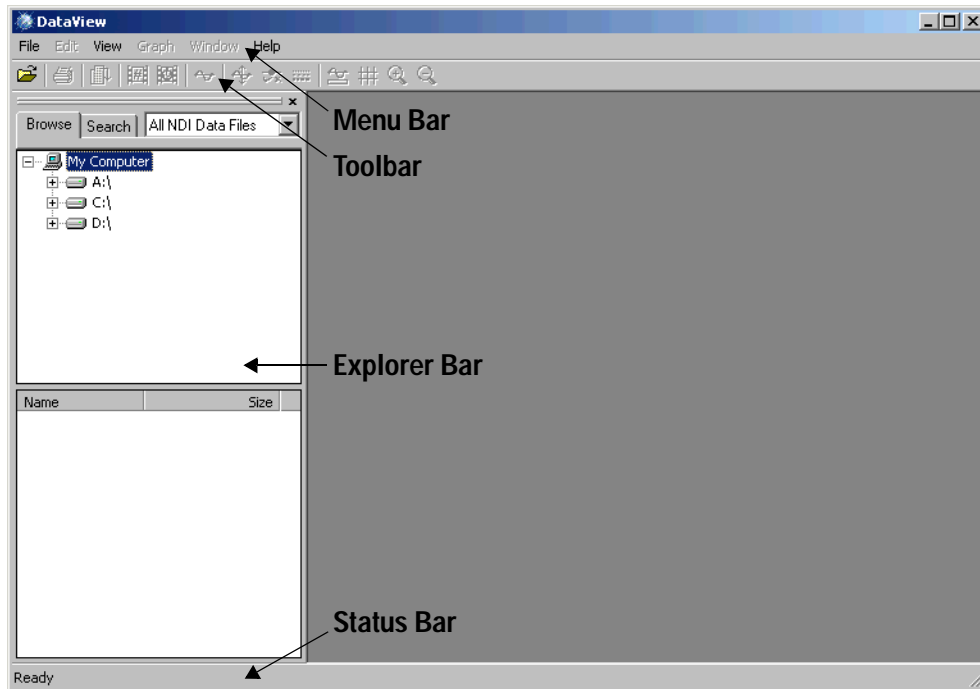


Figure 1-1: The NDI DataView main window

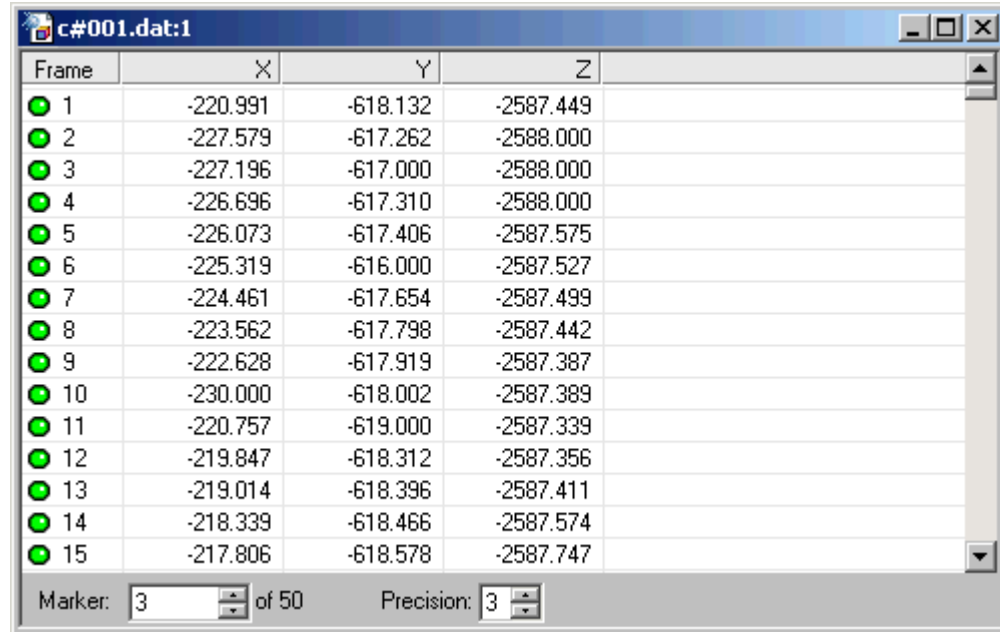
### NDI DataView Window Sections

- **Menu Bar:** manages data files and the table and graph view windows within the main window.
- **Toolbar:** provides many of the same functions as the menu bar. Each toolbar icon corresponds to a function which is often also available through the menu bar. Holding the mouse pointer over a toolbar icon will display a tool tip showing the function of that icon.
- **Explorer Bar:** browses and searches for data files. It appears at the left side of the main window by default.
- **Status Bar:** displays the meanings of menu items and toolbar icons as they are selected. It appears by default as a grey area at the bottom of the main window.



### 1.4.1 The Table View

In a table view, the data in a particular data file is sorted and displayed in a table. This table appears in a separate window within the NDI DataView main window. A table view appears when a data file is opened:



The screenshot shows a window titled 'c#001.dat:1' containing a table of 3D data. The table has four columns: 'Frame', 'X', 'Y', and 'Z'. The 'Frame' column lists frames from 1 to 15, each preceded by a green circle icon. The 'X', 'Y', and 'Z' columns contain numerical values representing 3D coordinates. At the bottom of the window, there are controls for 'Marker: 3 of 50' and 'Precision: 3'.

Frame	X	Y	Z
1	-220.991	-618.132	-2587.449
2	-227.579	-617.262	-2588.000
3	-227.196	-617.000	-2588.000
4	-226.696	-617.310	-2588.000
5	-226.073	-617.406	-2587.575
6	-225.319	-616.000	-2587.527
7	-224.461	-617.654	-2587.499
8	-223.562	-617.798	-2587.442
9	-222.628	-617.919	-2587.387
10	-230.000	-618.002	-2587.389
11	-220.757	-619.000	-2587.339
12	-219.847	-618.312	-2587.356
13	-219.014	-618.396	-2587.411
14	-218.339	-618.466	-2587.574
15	-217.806	-618.578	-2587.747

**Figure 1-2: A table view of 3D data**

The table displays either the values of a particular item for all frames in the data file (e.g. the x, y, and z positions of a given marker for all frames) or the values of all items for a specific frame (e.g. the x, y, and z positions of all markers for a specific frame).

For more information on working with the table view, see “Viewing Data in a Table” on page 23. For more information on the items found in each type of NDI data file, see “File Breakdown” on page 73.

## 1.4.2 The Graph View

In a graph view, the data in a particular data file is displayed as a line graph that appears in a separate window within the NDI DataView main window. To create a graph view of a particular set of data, select **Graph>Display Graph** in the NDI DataView main window:



Figure 1-3: A graph view of 3D data

The values of items and subitems in the data file are plotted versus frame number. The set of values plotted for a given subitem is called a dataset. Items and subitems that appear in the graph can be changed after the graph is created. For more information on working with the graph view, see “Viewing Data in a Graph” on page 36.

### 1.4.3 Working with Views

Table and graph views appear in individual windows within the NDI DataView main window. A table view is created when a data file is opened, and a graph view is initially created from a table view by selecting **Graph>Display Graph**. The graph view and table view windows for the same data can exist simultaneously and closing one window will not close the other. The two windows can be worked with separately.

Multiple graph views can be created for the same data file, allowing graph views of a variety of datasets with a variety of appearances and zoom levels at the same time. Multiple table views can be created by selecting **Window>New Window**.

If a graph view of a data file is open within NDI DataView but the table view of that data file has been closed, opening the file again will not create a new table view. Instead, NDI DataView will make the existing graph view active. To create a new table view of a data file, select **Window>New Window** while any graph view of that data file is active.

Table and/or graph views of different data files can be open at the same time. The name of the data file that the particular view corresponds to appears in the title bar of the view window. The data file type appears as an icon in the upper left corner of the window. For more information on file type icons, see “Appendix B: Icon Guide” on page 96.

## 2 Common Procedures

This section describes how to accomplish tasks for which NDI DataView is often used. These tasks are described as procedures, and each step of each procedure is explained in detail. The following tasks are included:

- Opening Data Files
- Viewing Data in a Table
- Viewing Data in a Graph

Install NDI DataView before beginning any of these procedures. For more information on installing NDI DataView, see “Installing NDI DataView” on page 1.

### 2.1 Opening Data Files

NDI DataView can open five types of NDI data files. Four ways of opening data files are available:

- Using the Open Window
- Browsing for a Data File
- Searching for a Data File
- Dragging and Dropping a Data File

To obtain information about a data file, view the file header after opening the file. For more information on the file header, see “Editing File Header Information” on page 21.

For more information on the types of data files NDI DataView can open, see “File Breakdown” on page 73.

### 2.1.1 Starting NDI DataView

1. Double click the NDI DataView icon  on your Microsoft Windows desktop.

The NDI DataView main window opens:

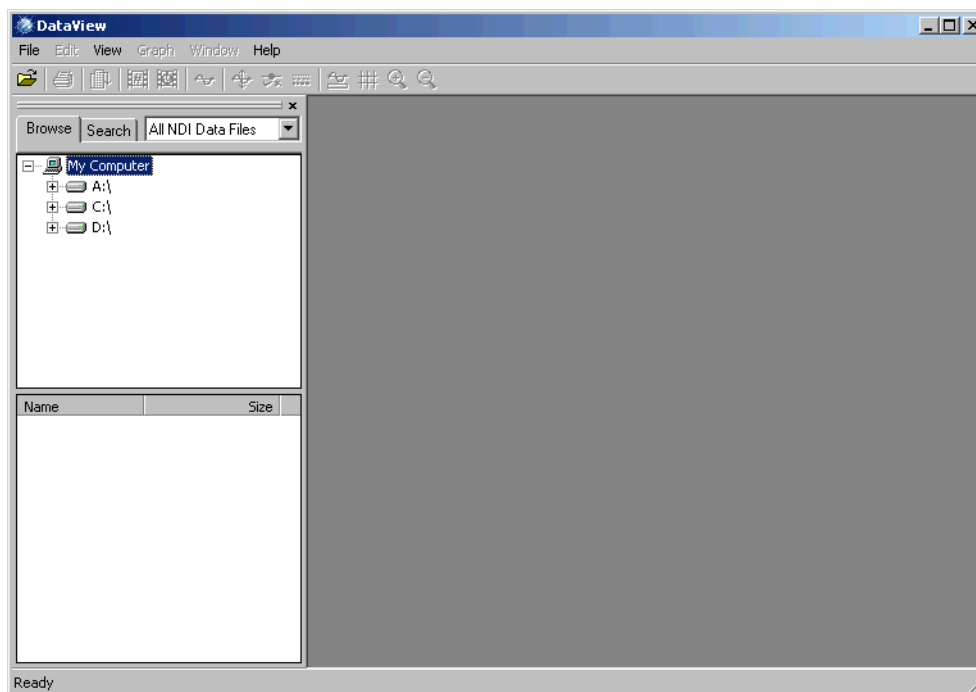


Figure 2-1: The NDI DataView main window

## 2.1.2 Using the Open Window

Use the Open window to open an NDI data file of a specific name and type.

1. Select **File>Open** in the NDI DataView main window.

The Open window opens:

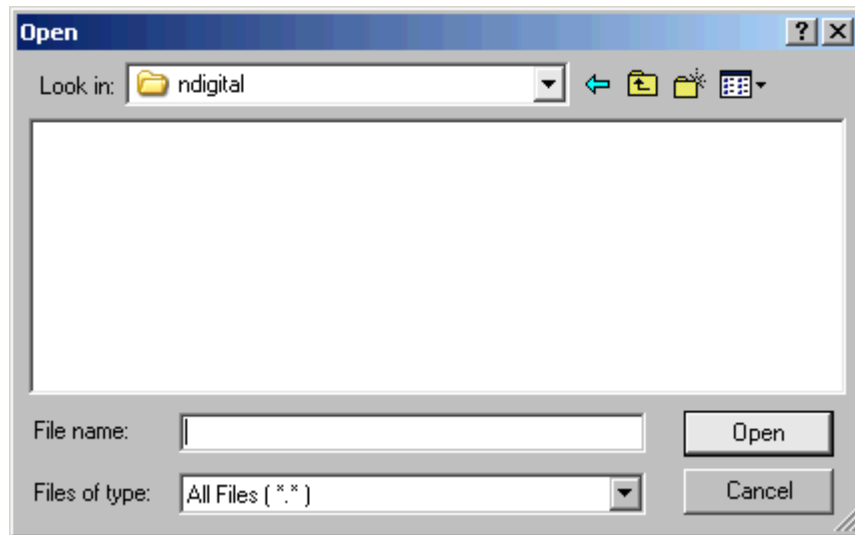


Figure 2-2: The Open window

2. Browse to the location of the data file you want to open:

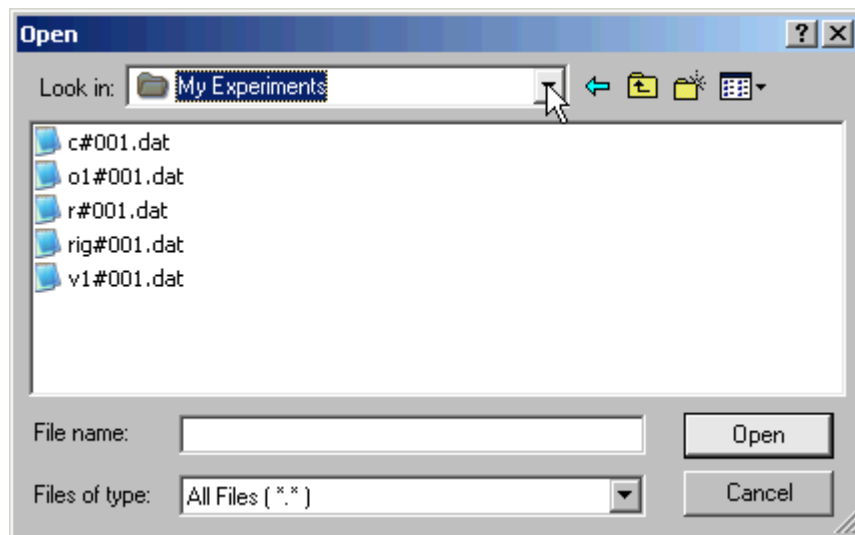
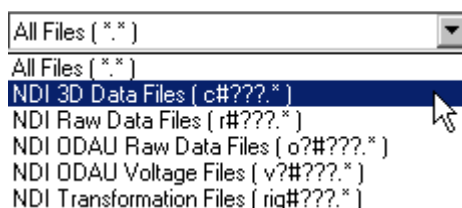


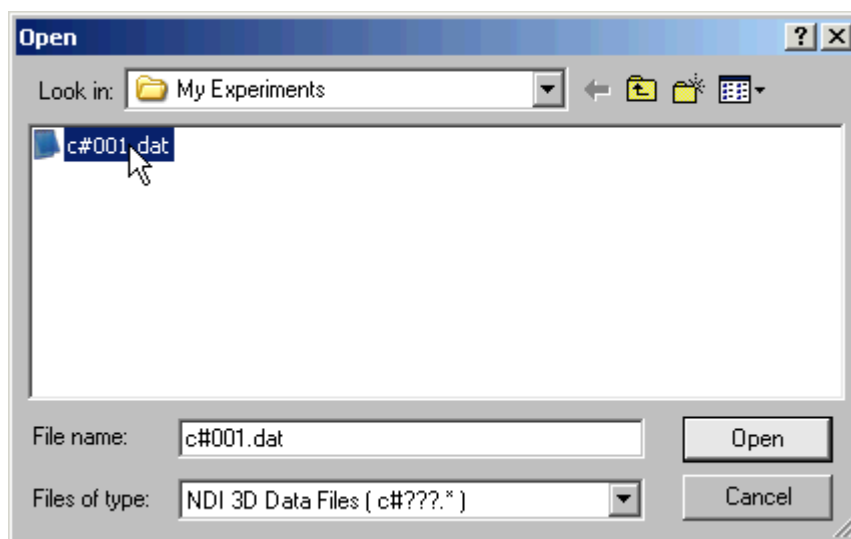
Figure 2-3: A sample location of NDI data files

3. Select the type of data file you want to open from the **Files of type** list:



**Figure 2-4: A list of file types NDI DataView can open**

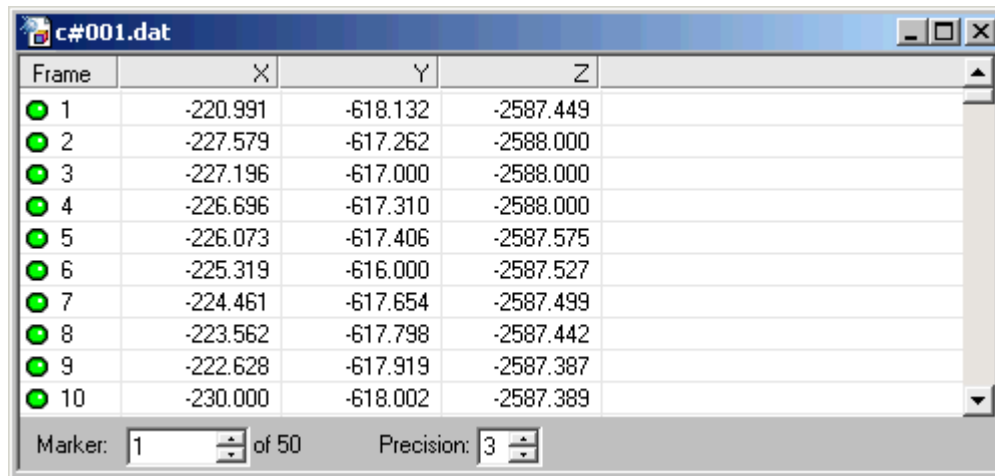
4. Select the data file to open:



**Figure 2-5: A 3D data file selected in the Open window**

5. Click **Open**.

A table view of the data file opens in the main window:



Frame	X	Y	Z
1	-220.991	-618.132	-2587.449
2	-227.579	-617.262	-2588.000
3	-227.196	-617.000	-2588.000
4	-226.696	-617.310	-2588.000
5	-226.073	-617.406	-2587.575
6	-225.319	-616.000	-2587.527
7	-224.461	-617.654	-2587.499
8	-223.562	-617.798	-2587.442
9	-222.628	-617.919	-2587.387
10	-230.000	-618.002	-2587.389

Marker: 1 of 50 Precision: 3

**Figure 2-6: A table view of 3D data**

For more information on working with the table view, see “Viewing Data in a Table” on page 23.



### 2.1.3 Browsing for a Data File

Use the Explorer Bar to browse among NDI data files in a particular location.

1. Select the **Browse** tab in the Explorer Bar:



Figure 2-7: The Explorer Bar Browse and Search tabs

The Browse Bar opens in the main window:

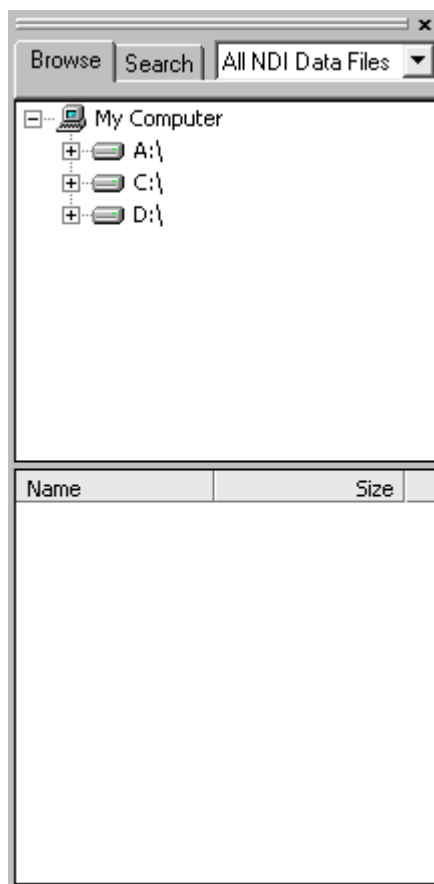


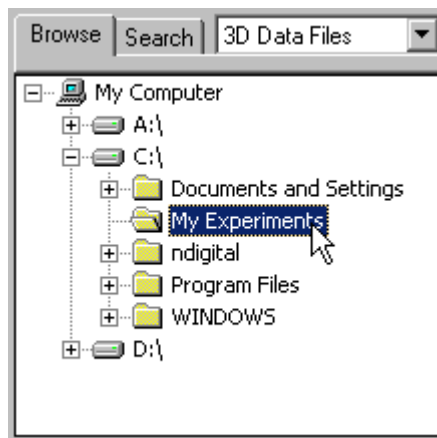
Figure 2-8: The Browse Bar

---

**Note** To open the Explorer Bar, select View>Explorer Bar in the NDI DataView main window.

---

2. Expand the list in the Browse Bar and select the location you want to browse for NDI data files:



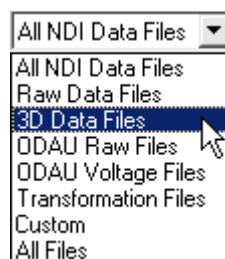
**Figure 2-9: A location selected in the Browse Bar**

The Browse Bar displays a list of all the NDI data files in that location:

Name	Size
c#001.dat	528 KB
o1#001.dat	16 KB
r#001.dat	170 KB
rig#001.dat	165 KB
v1#001.dat	32 KB

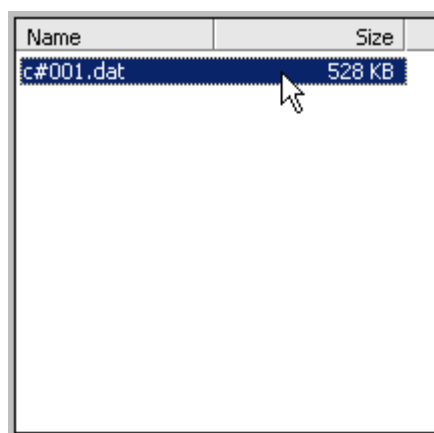
**Figure 2-10: A list of NDI data files in the Browse Bar**

3. Select the type of file you want to open from the list in the Browse Bar:



**Figure 2-11: The Browse Bar list of file types**

The Browse Bar only displays files of the selected type:

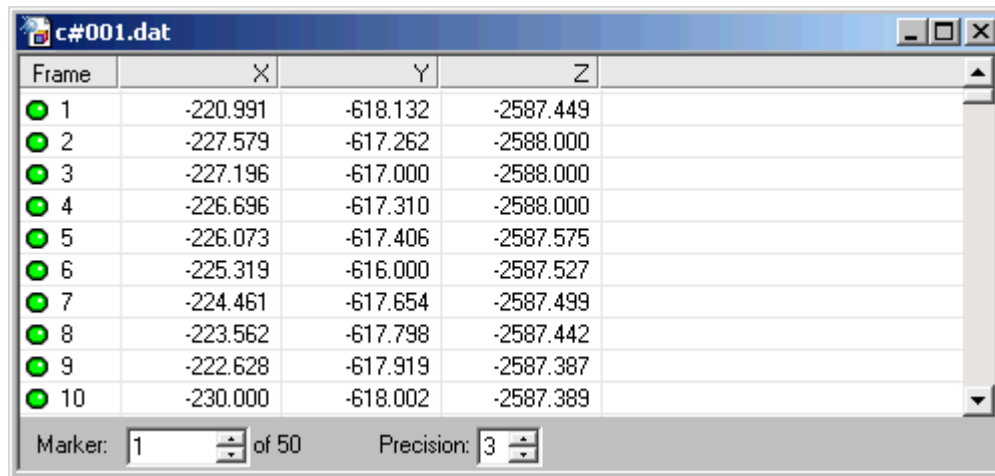


**Figure 2-12: A list of 3D data files in the Browse Bar**

The *Custom* file type refers to a non-standard file mask. This mask can only be specified in the Search Bar. The default mask is “\*#\*”.

4. Double click the name of the file to open.

A table view of the data file opens in the main window:



Frame	X	Y	Z
1	-220.991	-618.132	-2587.449
2	-227.579	-617.262	-2588.000
3	-227.196	-617.000	-2588.000
4	-226.696	-617.310	-2588.000
5	-226.073	-617.406	-2587.575
6	-225.319	-616.000	-2587.527
7	-224.461	-617.654	-2587.499
8	-223.562	-617.798	-2587.442
9	-222.628	-617.919	-2587.387
10	-230.000	-618.002	-2587.389

Marker: 1 of 50 Precision: 3

**Figure 2-13: A table view of 3D data**

For more information on working with the table view, see “Viewing Data in a Table” on page 23.

### 2.1.4 Searching for a Data File

Use the Explorer Bar to search for NDI data files in a particular location.

1. Select the **Search** tab in the Explorer Bar:



Figure 2-14: The Explorer Bar Browse and Search tabs

The Search Bar opens in the main window:

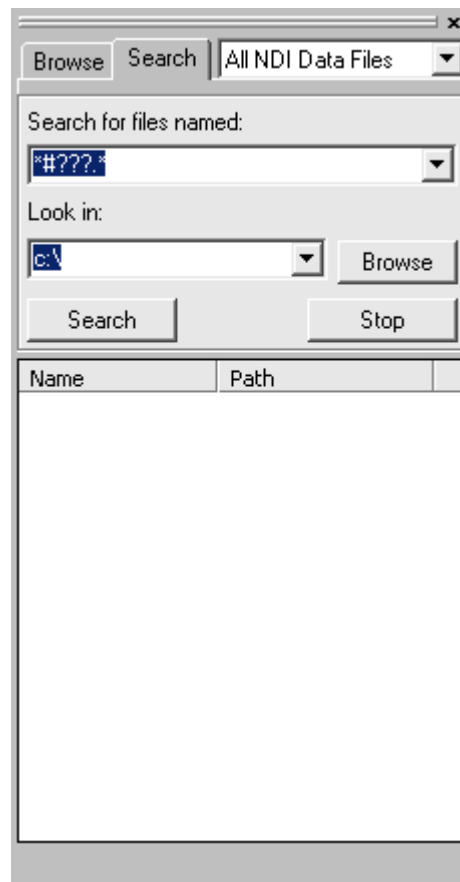


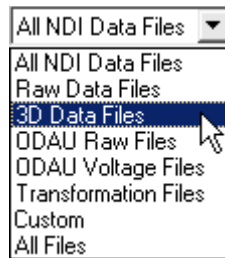
Figure 2-15: The Search Bar

---

**Note** To open the Explorer Bar, select **View>Explorer Bar** in the NDI DataView main window.

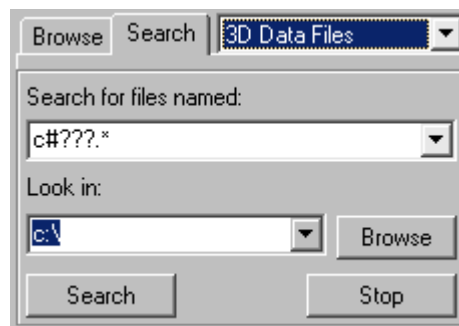
---

2. Select the type of file you want to search for from the list in the Search Bar:



**Figure 2-16: The Search Bar list of file types**

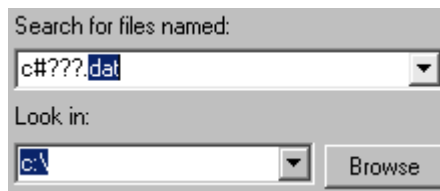
The Search for files named box displays the general name for the selected file type:



**Figure 2-17: The file mask for 3D data files in the Search Bar**

The *Custom* file type refers to a non-standard file mask. This mask can only be specified in the Search Bar. The default mask is “\*#\*”.

3. Further refine the file name you want to search for in the **Search for files named** box:



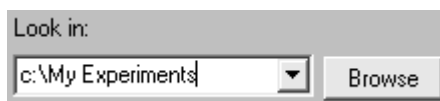
**Figure 2-18: A modified 3D data file mask in the Search Bar**

The file name is not case-sensitive. The wildcards “\*” and “?”, referring to any number of any characters and any single character, respectively, can be used to search for partial file names. For example, searching for “rig\*?.at” would find any file with a file name beginning with “rig” and having a three-letter file name extension ending in “at”.

When the file name is changed, the selected file type changes to *Custom* to reflect that the entered file name no longer matches the general name for any NDI data file type.

File names previously searched for can be selected from the Search for files named list.

4. Enter the location to search for files in the **Look in** box:



**Figure 2-19: The Search Bar search location**

Previously searched locations can be selected from the Look in list.

Click Browse to select a search location by browsing. For more information, see “Browsing for a Search Location” on page 19.

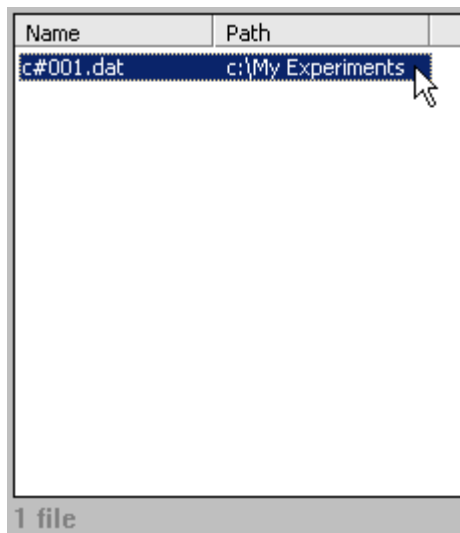
---

**Note** NDI DataView also searches all sub-locations within the location you specify.

---

5. Click **Search**.

The names of files that match the search criteria begin to appear in the Search Bar:



**Figure 2-20: A list of 3D data files in the Search Bar**

To stop the search before it is finished, click Stop.

6. Double click the name of the file to open.

A table view of the data file opens in the main window:

Frame	X	Y	Z
1	-220.991	-618.132	-2587.449
2	-227.579	-617.262	-2588.000
3	-227.196	-617.000	-2588.000
4	-226.696	-617.310	-2588.000
5	-226.073	-617.406	-2587.575
6	-225.319	-616.000	-2587.527
7	-224.461	-617.654	-2587.499
8	-223.562	-617.798	-2587.442
9	-222.628	-617.919	-2587.387
10	-230.000	-618.002	-2587.389

Marker: 1 of 50 Precision: 3

**Figure 2-21: A table view of 3D data**

For more information on working with the table view, see “Viewing Data in a Table” on page 23.



## Browsing for a Search Location

The search location in the Search Bar can be selected by browsing instead of being entered manually.

1. Click **Browse** in the Search Bar.

The Select Folder window opens:

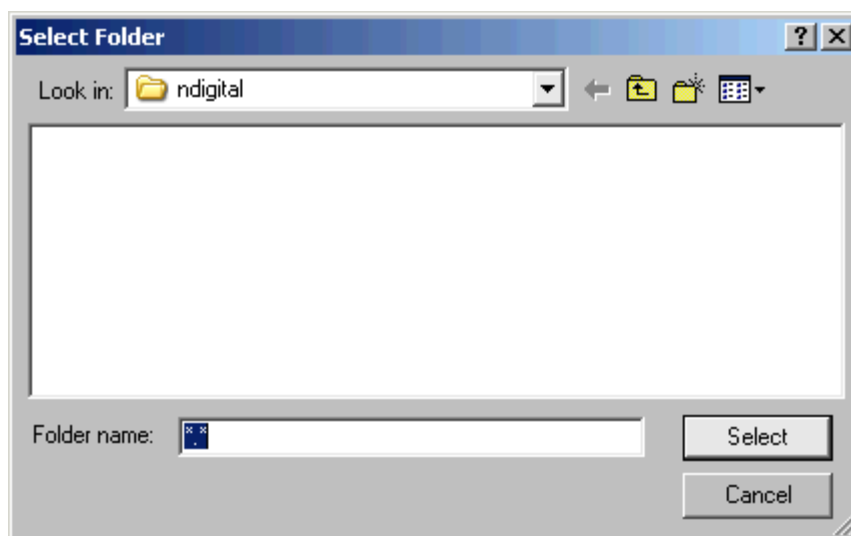


Figure 2-22: The Select Folder window

2. Browse to the location you want to search.
3. Select the location:

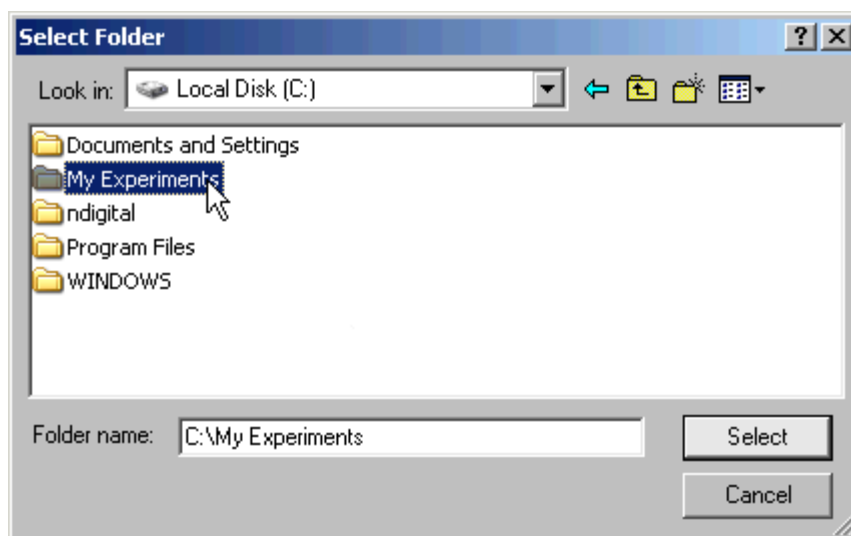


Figure 2-23: Locations displayed in the Select Folder window

4. Click **Select**.

The Select Folder window closes and the Look in box of the Search Bar displays the selected location:



**Figure 2-24: A selected search location in the Search Bar**

---

**Note** If no location is highlighted in the Select Folder window when the Select button is clicked, NDI DataView will select the last location opened in that window by default.

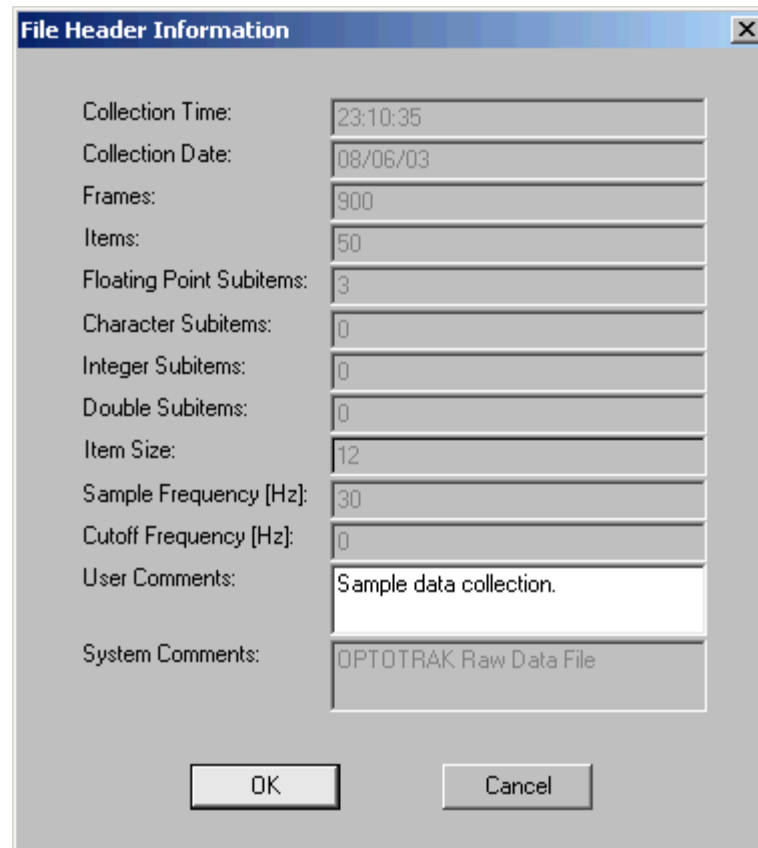
---

### 2.1.5 Editing File Header Information

NDI DataView can display the header information of an NDI data file after it is opened.

1. Select **Edit>File Header** in the NDI DataView main window.

The File Header Information window opens:



**Figure 2-25: The File Header Information window**

The File Header Information window displays the following information about the data file:

- **Collection Time:** the time of day, in 24 hour format, at which the data in the file was collected.
- **Collection Date:** the date on which the data in the file was collected.
- **Frames:** the total number of frames in the file.
- **Items:** the total number of items in the file.
- **Floating Point Subitems:** the number of floating point subitems per item.

- **Character Subitems:** the number of character subitems per item.
- **Integer Subitems:** the number of integer subitems per item.
- **Double Subitems:** the number of double subitems per item.
- **Item Size:** the size of each item of data, in bytes.
- **Sample Frequency:** the number of frames of data that were recorded to the file per second.
- **Cutoff Frequency:** the cutoff frequency used if 3D data was filtered.
- **User Comments:** often a description of the data the file contains. User comments can be edited using NDI DataView.
- **System Comments:** may contain a short description of the data file type or other file information.

For a complete description of the composition of NDI floating point data files, refer to “Appendix B: File Formats” in the *“Optotrak Certus User Guide”*.

2. Enter any new comment information in the **User Comments** box:

A screenshot of a software window showing a text input field. The label 'User Comments:' is on the left, and the text 'NDI DataView sample data file.' is entered into the text box on the right.

**Figure 2-26: A new user comment in the File Header Information window**

3. Click **OK**.

The File Header Information windows closes.

---

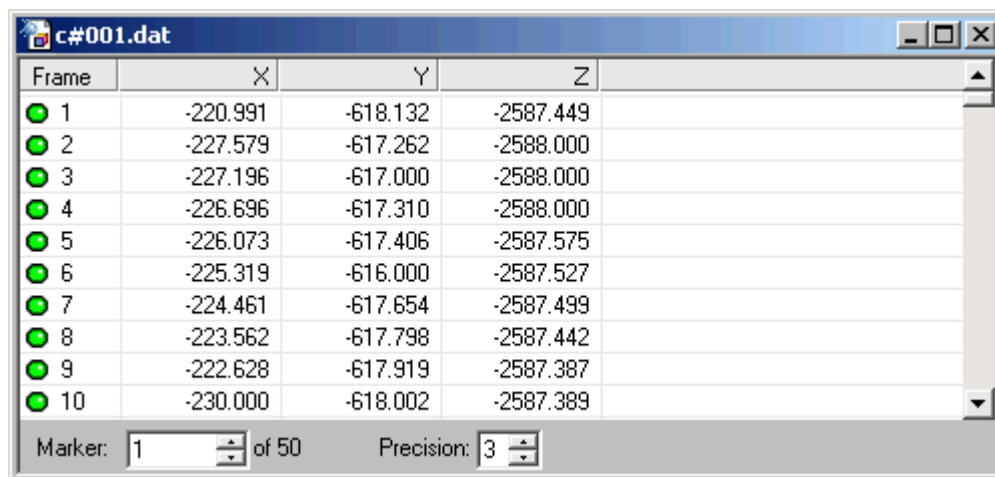
**Note** The data file must be saved for any changes to the file header to be preserved. For more information on saving data files, see “Saving a Data File” on page 34.

---

## 2.2 Viewing Data in a Table

The table view displays the contents of a data file in a table and allows you to edit individual values. Values in the table are sorted by frame or item.

To create a table view, open an NDI data file. The table window for that file opens within the NDI DataView main window, with the data for the first item in the file listed by frame number:



Frame	X	Y	Z	
1	-220.991	-618.132	-2587.449	
2	-227.579	-617.262	-2588.000	
3	-227.196	-617.000	-2588.000	
4	-226.696	-617.310	-2588.000	
5	-226.073	-617.406	-2587.575	
6	-225.319	-616.000	-2587.527	
7	-224.461	-617.654	-2587.499	
8	-223.562	-617.798	-2587.442	
9	-222.628	-617.919	-2587.387	
10	-230.000	-618.002	-2587.389	

Marker: 1 of 50 Precision: 3

Figure 2-27: A table view of 3D data

For more information on opening data files, see “Opening Data Files” on page 6.

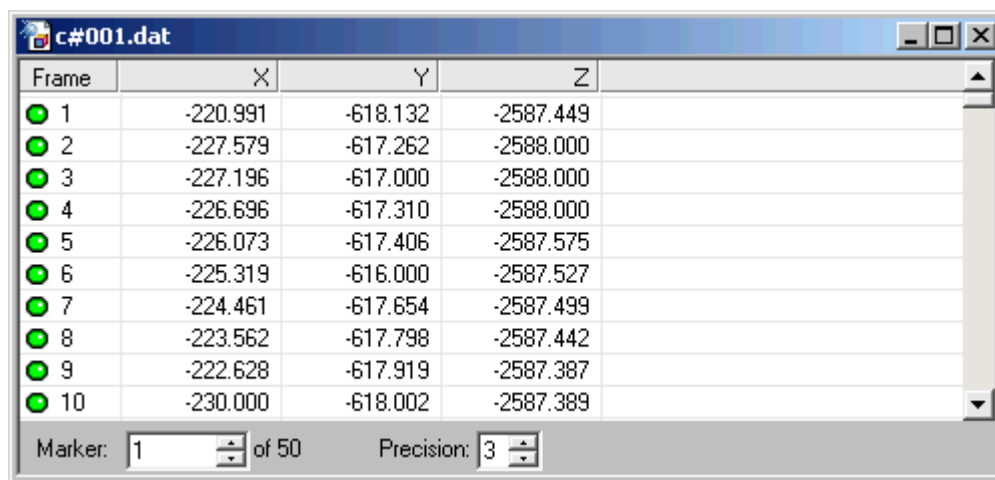
## 2.2.1 Viewing Data by Item

When viewing data by item a table view displays the values of all the subitems of one item, for all frames. The item for which values are displayed can be selected within the table window.

In 3D data files, the items are markers and the subitems are the x, y, and z positions of those markers. For more information on the types of items and subitems found in data files, see “File Breakdown” on page 73.

1. Select **View>View By Item** in the NDI DataView main window.

The values of the subitems, for all frames, of the first item in the data file are displayed in the table window:

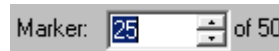


The screenshot shows a window titled 'c#001.dat' with a table of 3D data. The table has four columns: 'Frame', 'X', 'Y', and 'Z'. There are 10 rows of data, each corresponding to a frame. Each row starts with a green circle icon. The 'X' column values range from -220.991 to -230.000. The 'Y' column values range from -618.132 to -616.000. The 'Z' column values range from -2587.449 to -2587.389. At the bottom of the window, there is a status bar that says 'Marker: 1 of 50' and 'Precision: 3'.

Frame	X	Y	Z
1	-220.991	-618.132	-2587.449
2	-227.579	-617.262	-2588.000
3	-227.196	-617.000	-2588.000
4	-226.696	-617.310	-2588.000
5	-226.073	-617.406	-2587.575
6	-225.319	-616.000	-2587.527
7	-224.461	-617.654	-2587.499
8	-223.562	-617.798	-2587.442
9	-222.628	-617.919	-2587.387
10	-230.000	-618.002	-2587.389

Figure 2-28: 3D data viewed by item

- In the Marker box of the table window, enter the item number that the table should display values for:



**Figure 2-29: The item selected for the table view**

The table updates to display values for the new item number as it is entered:

Frame	X	Y	Z
1	-273.987	27.292	-2525.340
2	-271.333	33.930	-2525.772
3	-271.666	33.054	-2525.703
4	-271.974	32.198	-2525.544
5	-272.296	31.385	-2525.435
6	-272.623	30.581	-2525.457
7	-272.959	29.816	-2525.502
8	-273.261	29.087	-2525.454
9	-273.528	28.365	-2525.360
10	-273.792	27.710	-2525.309
11	-274.038	27.104	-2525.318
12	-274.287	26.545	-2525.362

**Figure 2-30: A table view of 3D data for item 25**

The name of the box used to select the displayed item corresponds to the type of items in the data file. The box is alternately named Marker, Data, Voltage, or Item, corresponding to 3D and raw data files, ODAU raw data files, ODAU voltage data files, and transformation data files, respectively.

**Note** You can switch directly from a table sorted by frame to a specific item in a table sorted by item. In the table sorted by frame, select the line containing values for the item you want to switch to, right click, and select View <Item> *n* (where <Item> is the item name and *n* is the number of the selected item).

3. Select **Edit>Go To** in the NDI DataView main window.

The Go To window opens:

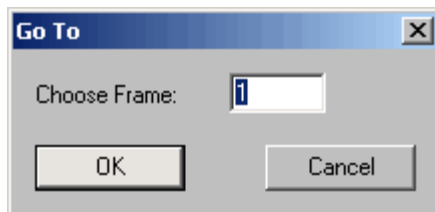


Figure 2-31: The Go To window for data viewed by item

4. Enter the number of the frame you want to view in the **Choose Frame** box:

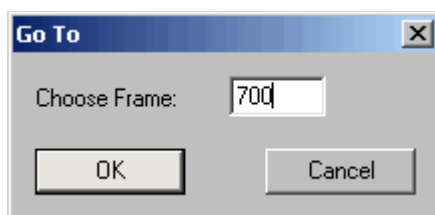


Figure 2-32: A selected frame in the Go To window

5. Click **OK**.

The table window highlights the specified frame and displays the time at which it was collected in milliseconds (offset from the start of the data collection) in the lower right corner:

A screenshot of a table window titled 'c#001.dat'. The table has four columns: 'Frame', 'X', 'Y', and 'Z'. The 'Frame' column contains values from 689 to 700. The 'X', 'Y', and 'Z' columns contain numerical values. The row for frame 700 is highlighted. Below the table, there is a status bar with 'Marker: 25 of 50', 'Precision: 3', and '23300.000 [ms]'.

Frame	X	Y	Z
689	-217.662	-618.623	-2589.046
690	-218.419	-618.552	-2589.220
691	-219.324	-618.446	-2589.375
692	-220.351	-618.301	-2589.457
693	-221.486	-618.156	-2589.471
694	-222.717	-618.004	-2589.454
695	-223.920	-617.842	-2589.294
696	-225.087	-617.643	-2588.979
697	-226.141	-617.429	-2588.591
698	-227.106	-617.286	-2588.191
699	-227.974	-617.164	-2587.814
700	-228.714	-617.056	-2587.482

Figure 2-33: Frame 700 selected in a table view





## Displaying Frame Time

When displaying data by item, the table view can display both the frame number and frame time corresponding to each subitem.

- Click the **Frame Time** icon  on the NDI DataView toolbar.


The table displays the Time [ms] column:





	Frame	Time [ms]	X	Y	Z
●	689	22933.333	-275.574	24.115	-2525.871
●	690	22966.667	-275.566	24.214	-2525.912
●	691	23000.000	-275.544	24.370	-2525.950
●	692	23033.333	-275.499	24.599	-2525.963
●	693	23066.667	-275.432	24.900	-2525.952
●	694	23100.000	-275.341	25.267	-2525.912
●	695	23133.333	-275.204	25.776	-2525.932
●	696	23166.667	-275.051	26.366	-2525.966
●	697	23200.000	-274.895	27.026	-2526.062
●	698	23233.333	-274.727	27.753	-2526.141
●	699	23266.667	-274.567	28.573	-2526.292
●	700	23300.000	-274.403	29.485	-2526.623

Marker: 25 of 50      Precision: 3      23300.000 [ms]

**Figure 2-34: A table view of 3D data including frame time**

The Time [ms] column displays the time, in milliseconds from the beginning of the data collection, at which each row of data values was collected. Use the Frame Time icon  on the NDI DataView toolbar to toggle the inclusion of this column in the table.

Use the Frame Number icon  on the NDI DataView toolbar to similarly toggle the inclusion of the Frame column.

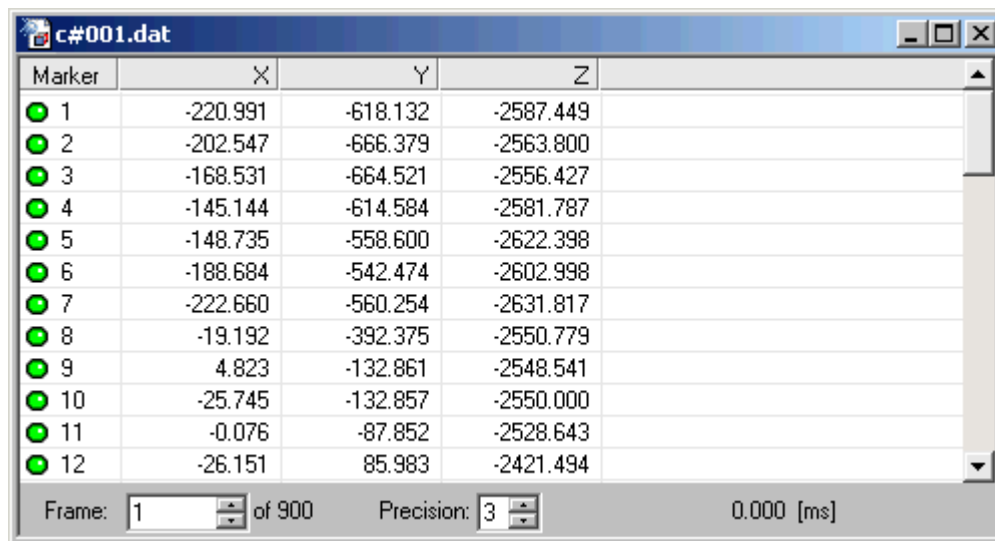
## 2.2.2 Viewing Data by Frame

When viewing data by frame a table view displays the values of all items and subitems for one frame at a time. The frame for which values are displayed can be selected within the table window.

In 3D data files, the items are markers and the subitems are the x, y, and z positions of those markers. For more information on the types of items and subitems found in data files, see “File Breakdown” on page 73.

1. Select **View>View By Frame** in the NDI DataView main window.

The values of all items and subitems in the first frame of the data file are displayed in the table window:



Marker	X	Y	Z
1	-220.991	-618.132	-2587.449
2	-202.547	-666.379	-2563.800
3	-168.531	-664.521	-2556.427
4	-145.144	-614.584	-2581.787
5	-148.735	-558.600	-2622.398
6	-188.684	-542.474	-2602.998
7	-222.660	-560.254	-2631.817
8	-19.192	-392.375	-2550.779
9	4.823	-132.861	-2548.541
10	-25.745	-132.857	-2550.000
11	-0.076	-87.852	-2528.643
12	-26.151	85.983	-2421.494

Frame: 1 of 900 Precision: 3 0.000 [ms]

Figure 2-35: 3D data viewed by frame

2. Enter the number of the frame the table should display values for in the Frame box of the table window:



**Figure 2-36: The frame selected for the table view**

The table updates to display values for the new frame number as it is entered:

Marker	X	Y	Z
1	-226.444	-617.287	-2587.337
2	-208.562	-665.741	-2563.645
3	-174.529	-664.339	-2556.465
4	-150.512	-614.729	-2581.845
5	-153.513	-558.752	-2622.521
6	-193.173	-542.084	-2603.051
7	-227.462	-559.405	-2631.622
8	-16.579	-390.175	-2555.910
9	17.537	-134.372	-2592.578
10	-13.388	-133.918	-2597.635
11	15.917	-99.598	-2571.865
12	-3.275	30.694	-2413.725

**Figure 2-37: A table view of 3D data for frame 500**

The table windows display the time at which the specified frame was collected (offset from the start of the data collection) in the lower right corner.

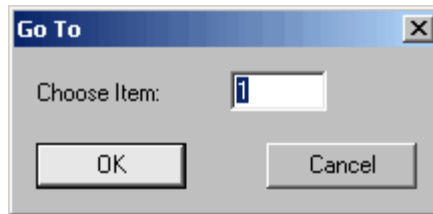
---

**Note** You can switch directly from a table sorted by item to a specific frame in a table sorted by frame. In the table sorted by item, select the line containing values for the frame you want to switch to, right click, and select View Frame *n* (where *n* is the number of the selected frame).

---

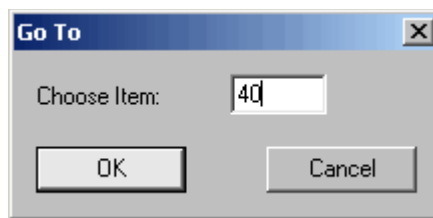
3. Select **Edit>Go To** in the NDI DataView main window.

The Go To window opens:



**Figure 2-38: The Go To window for data viewed by frame**

4. Enter the number of the item you want to view in the **Choose Item** box:



**Figure 2-39: A selected item in the Go To window**

5. Click **OK**.

The table window highlights the specified item:

A table window titled "c#001.dat" with a standard Windows window border. The table has four columns: "Marker", "X", "Y", and "Z". The rows are numbered 29 to 40. Row 40 is highlighted with a black background. The "X", "Y", and "Z" columns for row 40 contain the word "MISSING". At the bottom of the window, there is a status bar with "Frame: 500 of 900", "Precision: 3", and "16633.334 [ms]".

Marker	X	Y	Z
29	-320.833	-104.479	-2627.190
30	-349.272	-99.780	-2633.623
31	-341.464	-349.289	-2620.365
32	-66.645	-35.114	-2542.334
33	-259.699	-28.999	-2550.037
34	-256.366	-347.999	-2560.371
35	-178.288	-425.625	-2599.922
36	-95.034	-347.314	-2553.395
37	-173.687	-272.894	-2538.616
38	MISSING	MISSING	MISSING
39	MISSING	MISSING	MISSING
40	MISSING	MISSING	MISSING

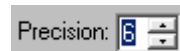
**Figure 2-40: Item 40 selected in a table view**

### 2.2.3 Changing Precision

The table view can display data values rounded to as few as zero or as many as fifteen decimal places.

**Note** Changing precision in a table view only affects the precision with which data values are displayed. It does not affect the precision of the data stored in the file.

1. Enter the number of decimal places to which values should be rounded in the Precision box of the table window:



**Figure 2-41: The table view Precision box**

The table displays all values to the specified number of decimal places:

	Frame	X	Y	Z
●	1	-220.990997	-618.132324	-2587.448975
●	2	-227.578720	-617.262268	-2588.000000
●	3	-227.195938	-617.000000	-2588.000000
●	4	-226.695770	-617.309631	-2588.000000
●	5	-226.072952	-617.405945	-2587.574707
●	6	-225.319138	-616.000000	-2587.527100
●	7	-224.460556	-617.653870	-2587.499268
●	8	-223.561768	-617.797729	-2587.442383
●	9	-222.628403	-617.918701	-2587.386963
●	10	-230.000000	-618.002319	-2587.388916
●	11	-220.757431	-619.000000	-2587.339111
●	12	-219.846786	-618.311584	-2587.355713

Marker: 1 of 50    Precision: 6

**Figure 2-42: 3D data displayed to six decimal places**

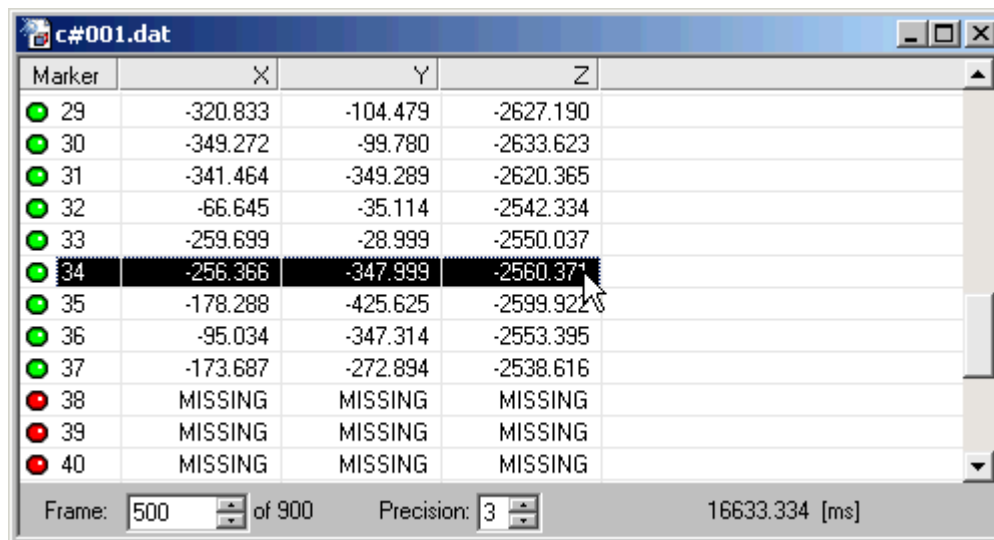
The only valid values for precision are integer values between zero and fifteen, inclusive. If an invalid value is entered, an error message will appear and the precision will not be changed.

## 2.2.4 Editing Data

Data values can be edited one at a time using the table view.

A data file must be saved after changes are made to it or those changes will be lost when the file is closed. If you close a data file that has not been saved since it was last edited, NDI DataView will prompt you to save the file before it is closed.

1. Select the row of the table containing the cell you want to edit:



Marker	X	Y	Z
29	-320.833	-104.479	-2627.190
30	-349.272	-99.780	-2633.623
31	-341.464	-349.289	-2620.365
32	-66.645	-35.114	-2542.334
33	-259.699	-28.999	-2550.037
34	-256.366	-347.999	-2560.371
35	-178.288	-425.625	-2599.922
36	-95.034	-347.314	-2553.395
37	-173.687	-272.894	-2538.616
38	MISSING	MISSING	MISSING
39	MISSING	MISSING	MISSING
40	MISSING	MISSING	MISSING

Frame: 500 of 900 Precision: 3 16633.334 [ms]

**Figure 2-43: Item 34 selected in a table view**

2. Double click the cell you want to edit.

The cell becomes editable:

33	-259.699	-28.999	-2550.037
34	-256.366	-347.999	-2560.371
35	-178.288	-425.625	-2599.922

**Figure 2-44: An editable cell**

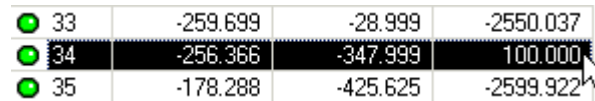
3. Type the new data value in the cell:

33	-259.699	-28.999	-2550.037
34	-256.366	-347.999	100
35	-178.288	-425.625	-2599.922

**Figure 2-45: A new cell value being entered**

To change the value of a cell to MISSING, enter the text “missing”. This text is not case sensitive. You can enter the beginning of “missing” instead of the full text.

4. Press **Enter** to confirm the change:



33	-259.699	-28.999	-2550.037
34	-256.366	-347.999	100.000
35	-178.288	-425.625	-2599.922

**Figure 2-46: A confirmed new cell value**

If an invalid value is entered, an error message will appear and the cell value will not be changed.

## 2.2.5 Saving a Data File

Save a data file to preserve any changes made to the data or the file header.

1. Select **File>Save As** in the NDI DataView main window.

The Save As window opens:

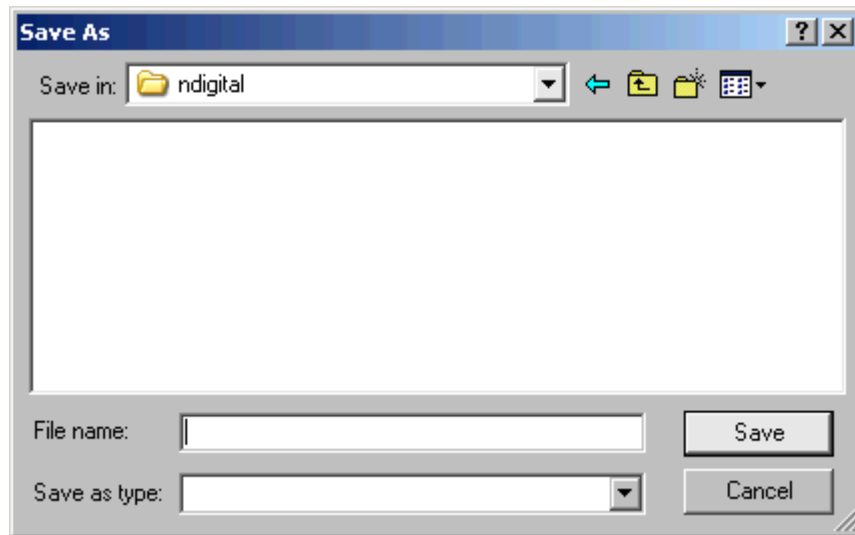


Figure 2-47: The Save As window

2. Browse to the location in which you want to save the data:

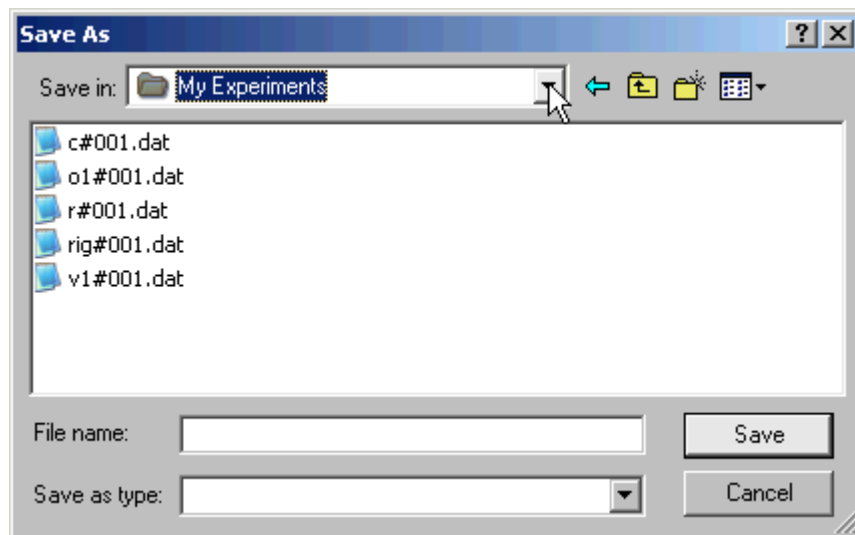


Figure 2-48: A sample save location



3. Enter a new name for the data file in the **File name** box:

A screenshot of a software interface showing a text input field. To the left of the field is the label "File name:". The input field contains the text "c#002.dat". The field has a light gray border and a small vertical line at the end, indicating the cursor position.

**Figure 2-49: A new 3D file name**

For more information on NDI data file naming conventions, see “File Naming Conventions” on page 76.

4. Click **Save**.

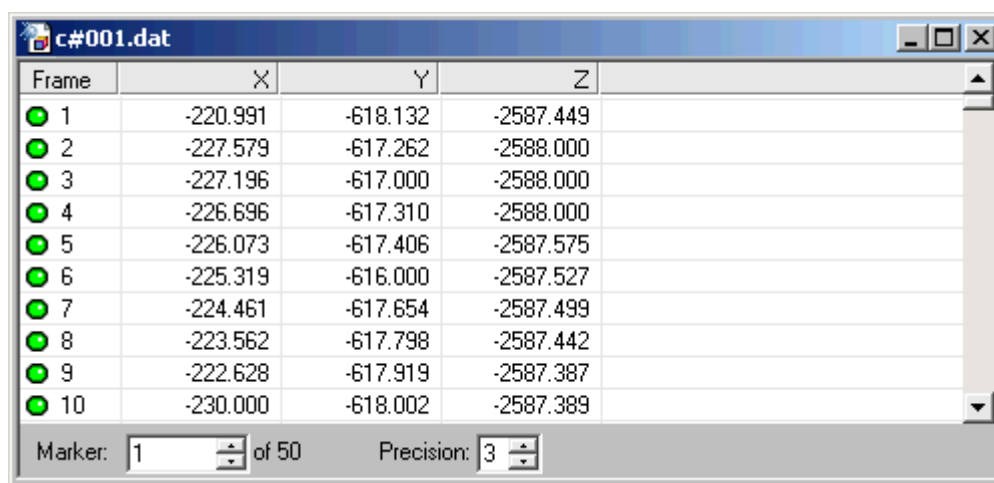
The Save As window closes and a new data file with the specified name is saved.

## 2.3 Viewing Data in a Graph

The graph view displays the contents of a data file as a line graph. In this graph, the values of the items and subitems in the data file are plotted versus frame number. Which items and subitems appear in a graph can be selected after the graph is created.

After a graph has been created, subsequent graphs can be created regardless of whether the table window or graph window is active by selecting **Graph>Display Graph**.

To create a table view for an NDI data file, open the file. A table window for that file opens within the NDI DataView main window, with the data for the first item in the file listed by frame number:



Frame	X	Y	Z
1	-220.991	-618.132	-2587.449
2	-227.579	-617.262	-2588.000
3	-227.196	-617.000	-2588.000
4	-226.696	-617.310	-2588.000
5	-226.073	-617.406	-2587.575
6	-225.319	-616.000	-2587.527
7	-224.461	-617.654	-2587.499
8	-223.562	-617.798	-2587.442
9	-222.628	-617.919	-2587.387
10	-230.000	-618.002	-2587.389

Marker: 1 of 50 Precision: 3

Figure 2-50: A table view of 3D data

In 3D data files, the items are markers and the subitems are the x, y, and z positions of those markers. For more information on the types of items and subitems found in data files, see “File Breakdown” on page 73.

For more information on opening data files, see “Opening Data Files” on page 6.

### 2.3.1 Creating a Graph

Graphs are created using existing table views. A graph initially displays a dataset for each item that is selected in the table view when the graph is created. The datasets displayed in the graph can be changed after the graph is created.

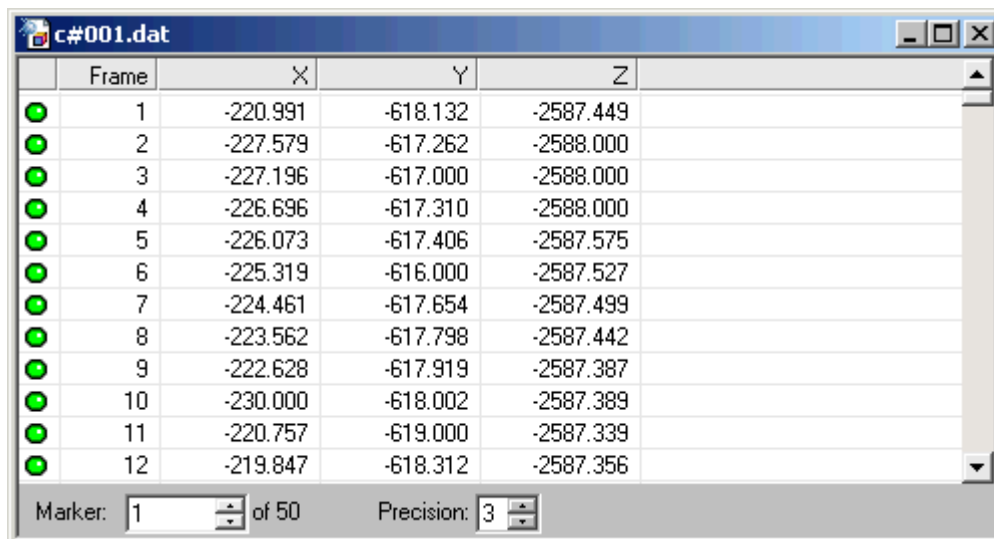
For more information on working with table views, see “Viewing Data in a Table” on page 23.

#### Creating a Graph Using Data Viewed by Item

When creating a graph from a table view that is sorted by item, select the item initially included in the graph by changing the item displayed in the table.

1. Select **View>View By Item** in the NDI DataView main window.

The table view displays the values of all subitems, for all frames, of the first item in the data file:



	Frame	X	Y	Z
●	1	-220.991	-618.132	-2587.449
●	2	-227.579	-617.262	-2588.000
●	3	-227.196	-617.000	-2588.000
●	4	-226.696	-617.310	-2588.000
●	5	-226.073	-617.406	-2587.575
●	6	-225.319	-616.000	-2587.527
●	7	-224.461	-617.654	-2587.499
●	8	-223.562	-617.798	-2587.442
●	9	-222.628	-617.919	-2587.387
●	10	-230.000	-618.002	-2587.389
●	11	-220.757	-619.000	-2587.339
●	12	-219.847	-618.312	-2587.356

Marker: 1 of 50      Precision: 3

Figure 2-51: 3D data viewed by item

2. Enter the number of the item the graph should initially display values for in the Marker box of the table window:



**Figure 2-52: The item selected for the table view**

The table updates to display values for the new item number as it is entered:

Frame	X	Y	Z
1	-273.987	27.292	-2525.340
2	-271.333	33.930	-2525.772
3	-271.666	33.054	-2525.703
4	-271.974	32.198	-2525.544
5	-272.296	31.385	-2525.435
6	-272.623	30.581	-2525.457
7	-272.959	29.816	-2525.502
8	-273.261	29.087	-2525.454
9	-273.528	28.365	-2525.360
10	-273.792	27.710	-2525.309
11	-274.038	27.104	-2525.318
12	-274.287	26.545	-2525.362

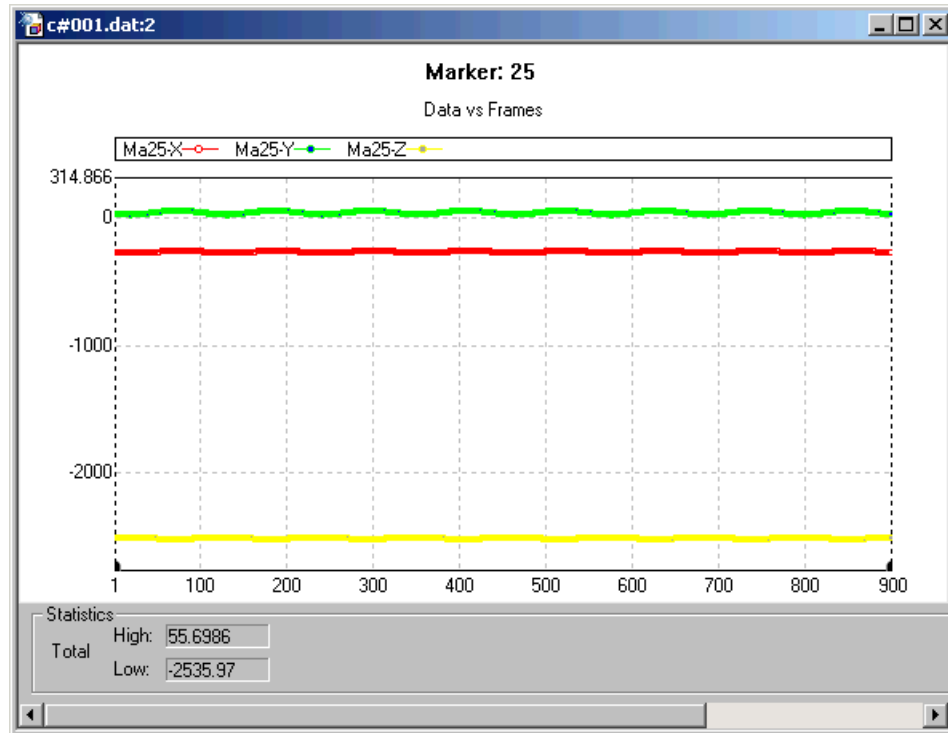
Marker: 25 of 50      Precision: 3      0.000 [ms]

**Figure 2-53: A table view of data for the selected item**

The name of the box used to select the displayed item corresponds to the type of items in the data file. The box is alternately named Marker, Data, Voltage, or Item, corresponding to 3D and raw data files, ODAU raw data files, ODAU voltage data files, and transformation data files, respectively.

3. Select **Graph>Display Graph**.


A graph view of the data opens in the main window:



**Figure 2-54: A graph view of data for the selected item**

The graph displays datasets for all subitems of the selected item.

The graph title displays the numbers of the items included in the graph. A legend below the title displays the names of the datasets shown in the graph and the line and point styles with which they are displayed.

Graphs can be created at any time by clicking the Display Graph icon  on the toolbar. Use this icon to create multiple graphs and zoom in on different sections of the graphs at the same time. If a graph view is active in the main window when this icon is clicked, NDI DataView creates the new graph based on the table associated with the active graph view.

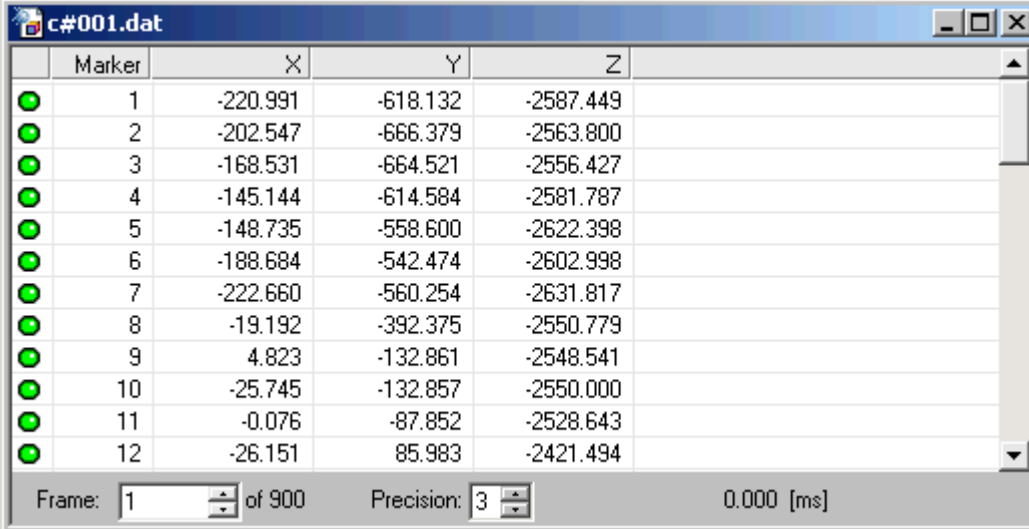
For more information on zooming the graph view, see “Zooming with Tabs” on page 68.

## Creating a Graph Using Data Viewed by Frame

When creating a graph from a table view that is sorted by frame, select items in the table to include in the graph.

1. Select **View>View By Frame** in the NDI DataView main window.

The table view displays the values of all items in the first frame of data:

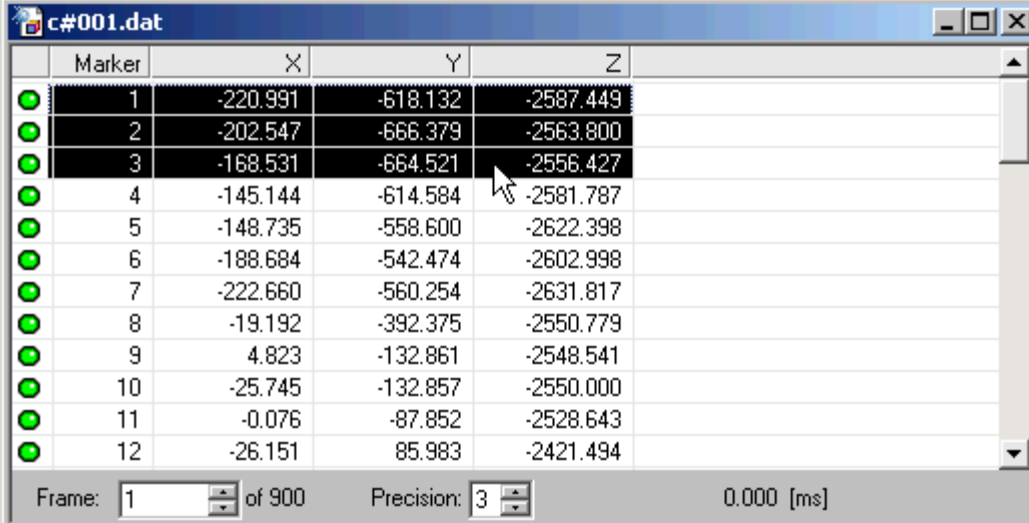


Marker	X	Y	Z
1	-220.991	-618.132	-2587.449
2	-202.547	-666.379	-2563.800
3	-168.531	-664.521	-2556.427
4	-145.144	-614.584	-2581.787
5	-148.735	-558.600	-2622.398
6	-188.684	-542.474	-2602.998
7	-222.660	-560.254	-2631.817
8	-19.192	-392.375	-2550.779
9	4.823	-132.861	-2548.541
10	-25.745	-132.857	-2550.000
11	-0.076	-87.852	-2528.643
12	-26.151	85.983	-2421.494

Frame: 1 of 900 Precision: 3 0.000 [ms]

Figure 2-55: 3D data viewed by frame

2. Select the item you want to appear in the graph:



Marker	X	Y	Z
1	-220.991	-618.132	-2587.449
2	-202.547	-666.379	-2563.800
3	-168.531	-664.521	-2556.427
4	-145.144	-614.584	-2581.787
5	-148.735	-558.600	-2622.398
6	-188.684	-542.474	-2602.998
7	-222.660	-560.254	-2631.817
8	-19.192	-392.375	-2550.779
9	4.823	-132.861	-2548.541
10	-25.745	-132.857	-2550.000
11	-0.076	-87.852	-2528.643
12	-26.151	85.983	-2421.494

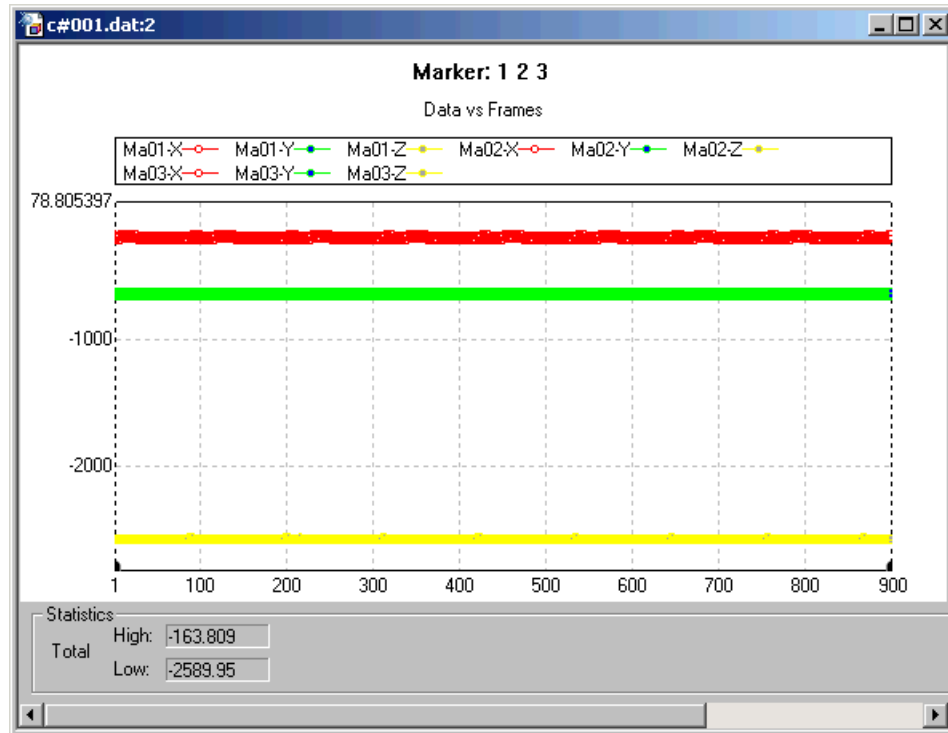
Frame: 1 of 900 Precision: 3 0.000 [ms]

Figure 2-56: Selected items in a table view

Hold down the left or right Shift key to select a range of items.

3. Select **Graph>Display Graph**.


A graph view of the data opens in the main window:



**Figure 2-57: A graph view of data for the selected items**

The graph displays datasets for all the subitems of the selected items.

The graph title displays the numbers of the items included in the graph. A legend below the title displays the names of the datasets shown in the graph and the line and point styles with which they are displayed.

Graphs can be created at any time by clicking the Display Graph icon  on the toolbar. Use this icon to create multiple graphs and zoom in on different sections of the graphs at the same time. If a graph view is active in the main window when this icon is clicked, NDI DataView creates the new graph based on the table associated with the active graph view.

For more information on zooming the graph view, see “Zooming with Tabs” on page 68.

## 2.3.2 Selecting Datasets

The Select Datasets window is used to change which items and subitems are displayed in a graph after that graph has been created.

4. Select **Graph>Select Datasets** in the NDI DataView main window.

The Select Datasets window opens:

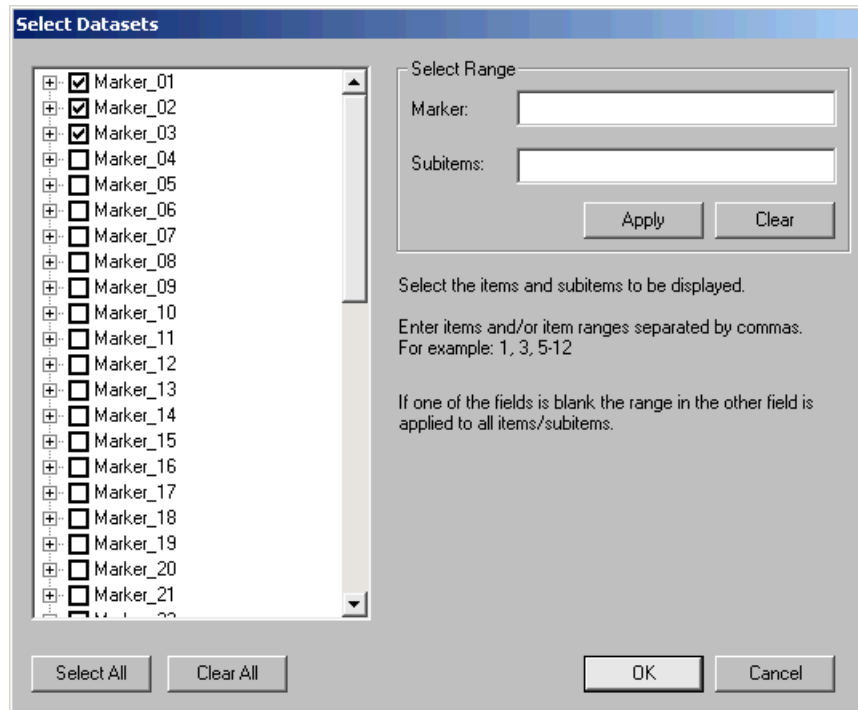
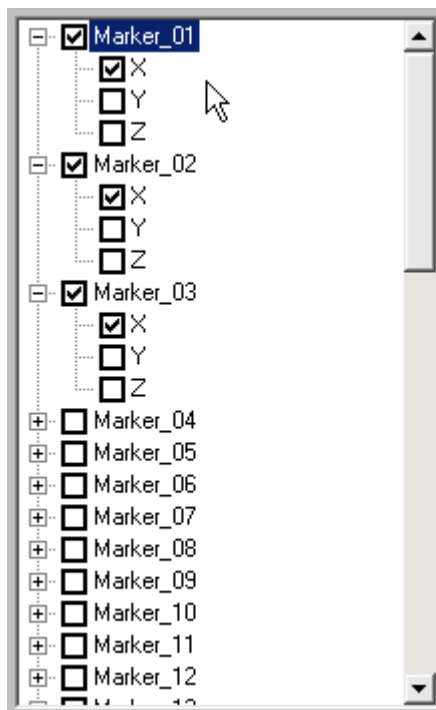


Figure 2-58: The Select Datasets window



5. Select the items and subitems you want to appear in the graph in the list at the left of the window:



**Figure 2-59: A list of selected datasets in the Select Datasets window**

Checked items in the list appear in the graph. Checking ☒ or unchecking ☐ an item name (e.g. a marker) checks or unchecks all of the subitems belonging to that item (e.g. the x, y, and z positions belonging to a given marker). Expand an item to check or uncheck the subitems belonging to it individually.

Click Select All in the Select Datasets window to check all of the items and subitems in the list.

Click Clear All in the Select Datasets window to uncheck all of the items and subitems in the list.

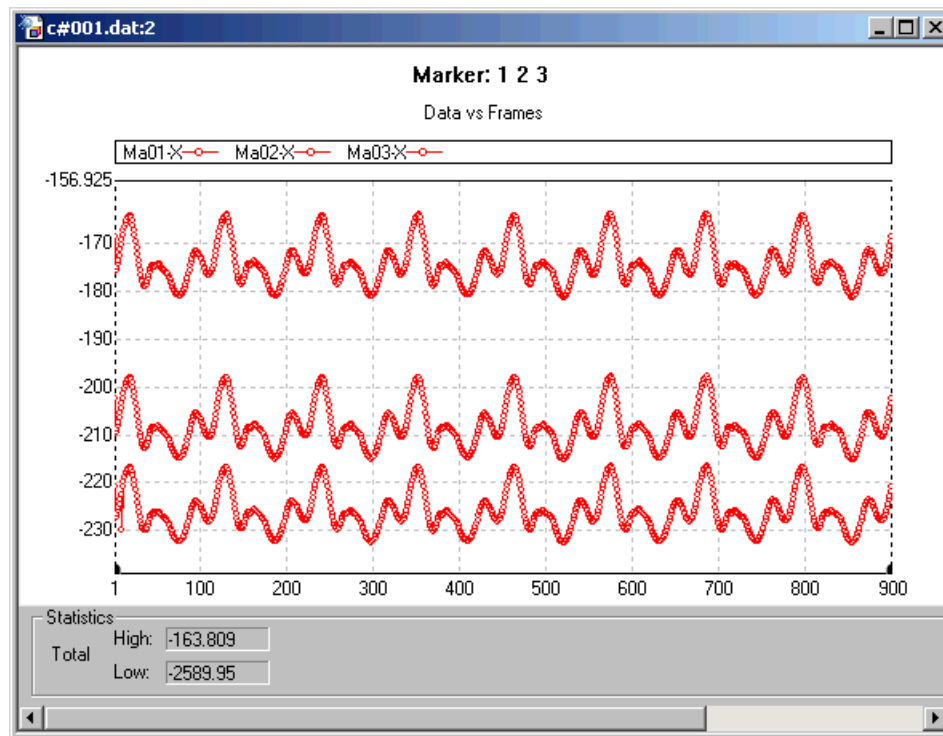
---

**Note** Use the Select Range section of the Select Datasets window to specify which items and subitems to display in the graph without having to select them in the list. For more information on how to use the Select Range section, see “Selecting Datasets Using the Select Range Section” on page 45.

---

6. Click **OK**.

The graph view displays only those items and subitems that were checked in the list:



**Figure 2-60: A graph view of three datasets**

The vertical scale of the graph changes to better accommodate the values now included in the graph.

For information on how to specify the range of the graph, see “Changing Axis Properties” on page 48.

## Selecting Datasets Using the Select Range Section

The Select Range section of the Select Datasets window can be used to quickly specify a range of data to include in a graph. Specify which items to select in the upper box and which subitems to select in the lower box:



Figure 2-61: The Select Range section of the Select Datasets window

In the Select Range section, the upper box is named *Marker* because that is the name of each item in a 3D data file. When working with another NDI data file type, the name of this box may change to match the name of the items in that file type. For more information on the items found in each file type, see “File Breakdown” on page 73.

The lower box is always named *Subitems*.

1. Enter the numbers of the items you want to select in the **Marker** box:



Figure 2-62: Selected items in the Select Range section

Enter item ranges by using a hyphen between two item numbers, and separate all items and item ranges using commas. The text above selects items 1, 3, 4, and 5.

2. Enter the numbers of the subitems you want to select in the **Subitems** box:



Figure 2-63: Selected subitems in the Select Range section

Enter subitem ranges by using a hyphen between two subitem numbers, and separate all subitems and subitem ranges using commas. The specified subitems will be selected for every item specified in the Marker box. The text above selects subitems 2 and 3.

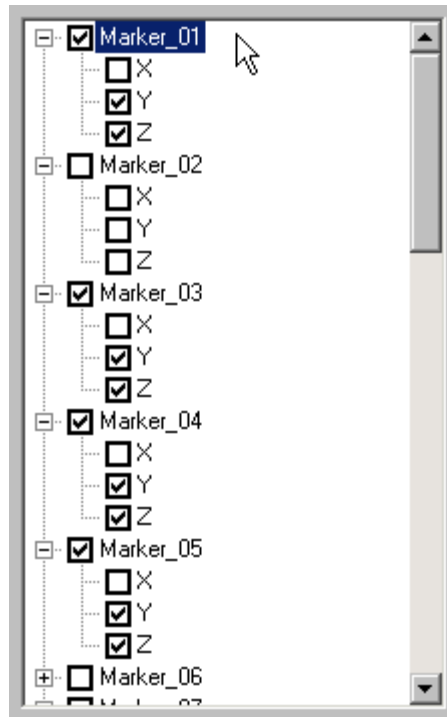
---

**Note** You can quickly apply your subitem selection to all items by leaving the Marker box empty.

---

3. Click **Apply**.

The list displays the items and subitems selected:



**Figure 2-64: A new list of selected datasets in the Select Dataset window**

### 2.3.3 Changing Graph Settings

Options affecting the appearance of a graph can be changed using the Graph Settings window. Select the graph you want to change the appearance of within the NDI DataView main window before using the Graph Settings window.

Graph settings are stored separately from data in graph settings files. Any changes made to graph settings must be saved in a graph settings file or they will be lost when the graph window is closed. For more information on saving a graph settings file, see “Saving Graph Settings” on page 55.

1. Select **Graph>Graph Settings** in the NDI DataView main window.

The Graph Settings window opens:

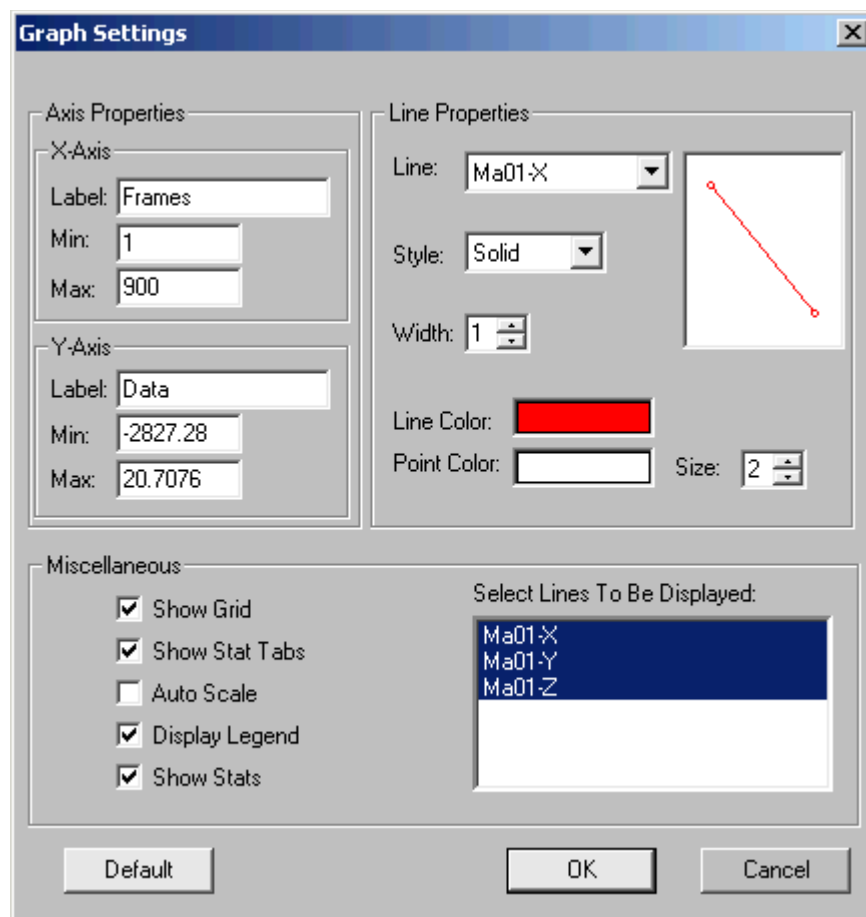
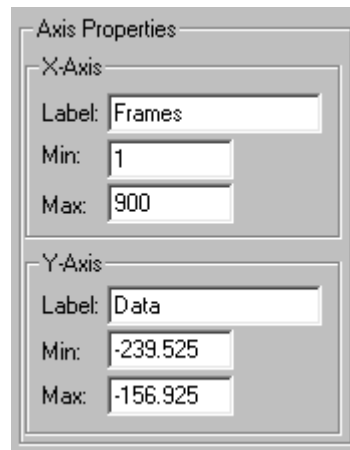


Figure 2-65: The Graph Settings window

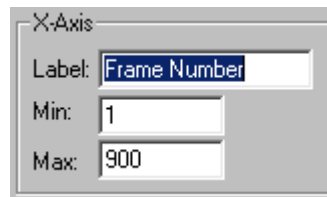
## Changing Axis Properties

The Axis Properties section controls the names of the x and y axes of the graph, as well as the ranges of values they display. It contains separate sections for each axis:



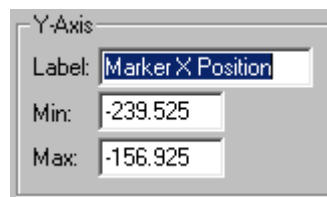
**Figure 2-66: The Axis Properties section of the Graph Settings window**

2. Enter a name to display on the x axis in the **Label** box of the **X-Axis** section:



**Figure 2-67: X-Axis properties of the selected graph view**

3. Enter the first frame for which to display a value in the **Min** box.
4. Enter the last frame for which to display a value in the **Max** box.
5. Enter a name to display on the y axis in the **Label** box of the **Y-Axis** section:

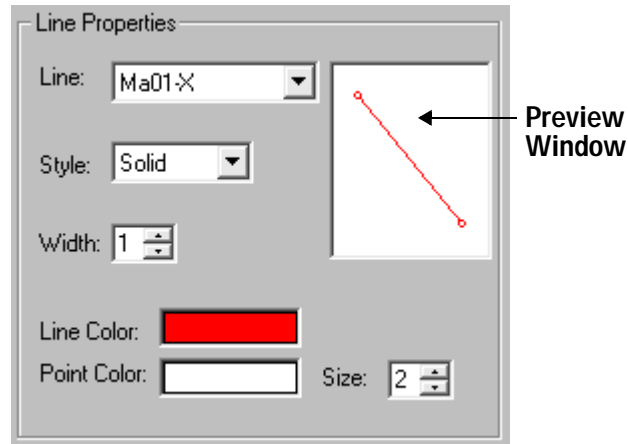


**Figure 2-68: Y-Axis properties of the selected graph view**

6. Enter the minimum value to display on the y axis in the **Min** box.
7. Enter the maximum value to display on the y axis in the **Max** box.

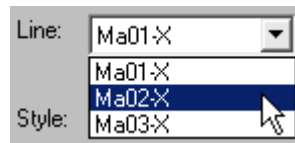
## Changing Line Properties

The Line Properties section controls the colours and styles of the lines and points used to represent each dataset. A preview window at the right side of the section displays how the selected dataset will look as the line properties are changed:



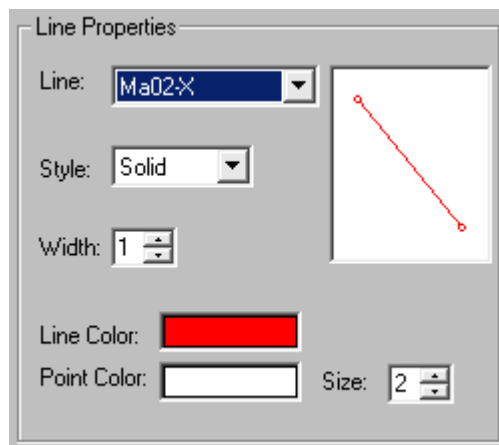
**Figure 2-69: The Line Properties section of the Graph Settings window**

8. Select the dataset you want to change the display of in the **Line** box:



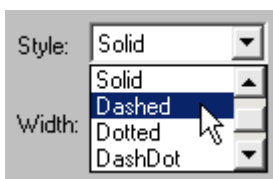
**Figure 2-70: A list of datasets available in the Graph Settings window**

The Line Properties section displays the current settings for the dataset:



**Figure 2-71: Line properties of the selected dataset**

9. Select the style of line for the dataset from the **Style** box:



**Figure 2-72: The line styles available for the selected dataset**

10. Enter the width of the line for the dataset in the **Width** box:



**Figure 2-73: The line width for the selected dataset**

---

**Note** Only lines drawn using the Solid line style can have a width greater than one. NDI DataView automatically selects the Solid line style if a width greater than one is entered.

---

11. Click the **Line Color** box.

The Color window opens:



**Figure 2-74: The Color window**



12. Select the colour in which to display the line:

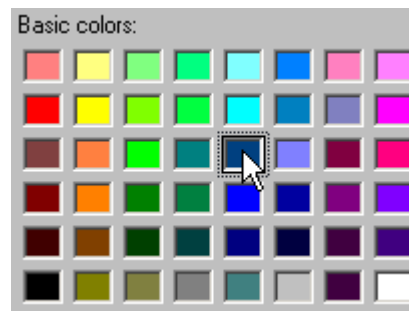


Figure 2-75: The new line colour for the selected dataset

13. Click **OK**.
14. Click the **Point Color** box.

The Color window opens:

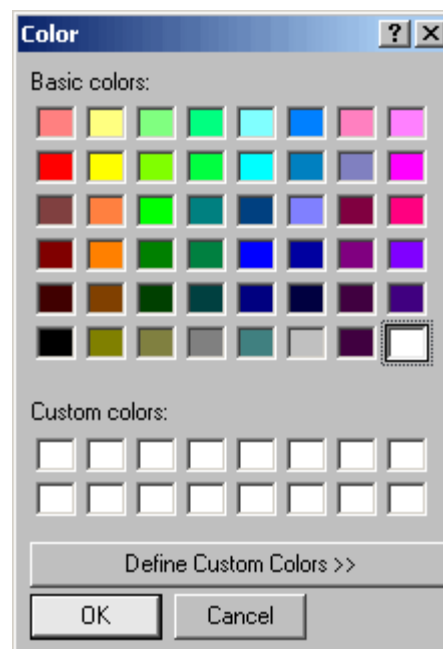


Figure 2-76: The Color window

15. Select the colour in which to display the data points:



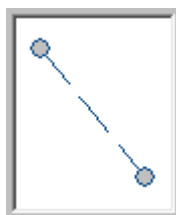
**Figure 2-77: The point colour for the selected dataset**

16. Click **OK**.
17. Enter the size at which the data points should appear in the **Size** box:



**Figure 2-78: The point size for the selected dataset**

The preview window shows how the dataset will be displayed in the graph:



**Figure 2-79: The Graph Settings window preview**

---

**Note** These changes affect only the selected dataset. Change the line properties for other datasets as desired.

---

## Changing Miscellaneous Options

18. Use the **Miscellaneous** section of the Graph Settings window to adjust the following settings:

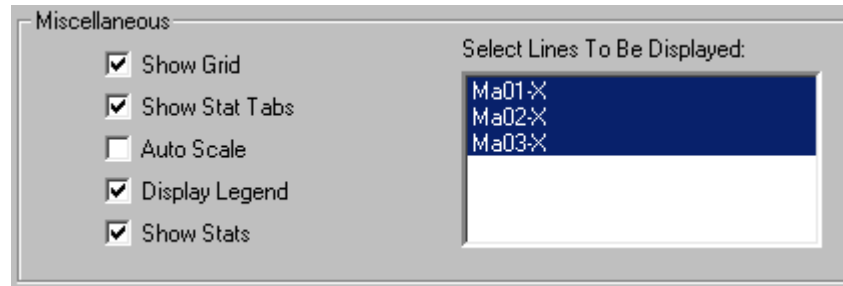
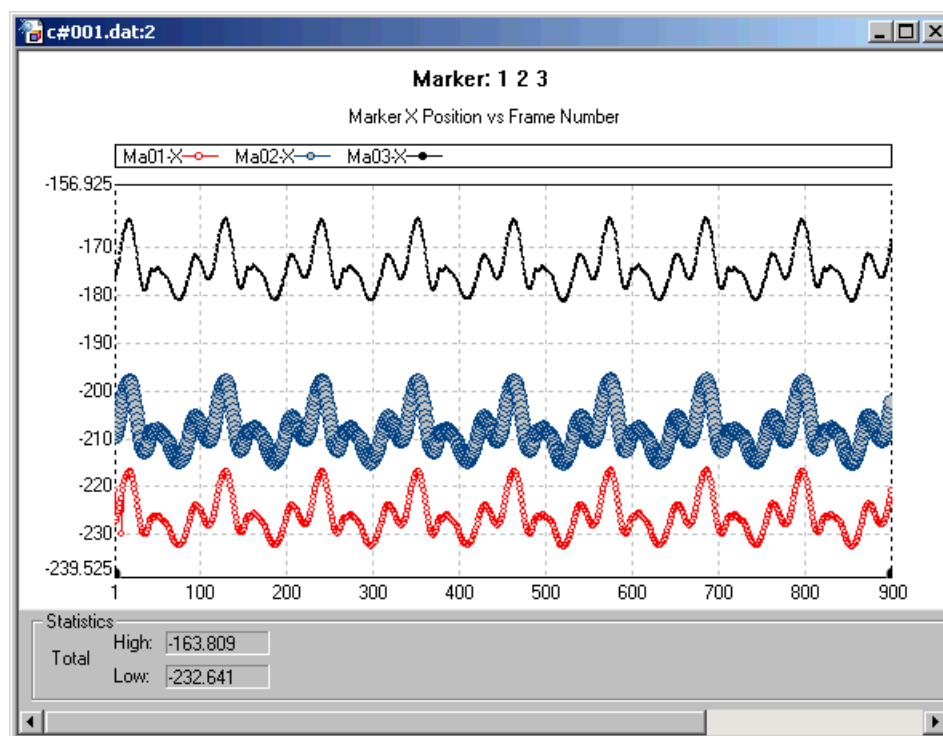


Figure 2-80: Miscellaneous Graph Settings

- **Show Grid:** selects whether a grid of dashed, light grey lines appears on the graph.
- **Show Stat Tabs:** selects whether tabs, used to set the range for statistics and zoom, appear on the graph. For more information on using tabs, see “Using Tabs to Limit Statistics Ranges” on page 65 and “Zooming with Tabs” on page 68.
- **Auto Scale:** selects whether the y axis of the graph is automatically scaled to fit the data between the tabs whenever the tabs are moved.
- **Display Legend:** selects whether the legend appears above the graph. The legend displays the names of the subitems shown in the graph and the line and point styles with which they are displayed.
- **Show Stats:** selects whether the statistics panel appears below the graph. For more information on using statistics, see “Working with Graph Statistics” on page 59.
- **Select Lines To Be Displayed:** selects which datasets appear in the graph. Use this setting to temporarily hide particular datasets in the graph instead of removing them from the graph completely.

19. Click **OK**.

NDI DataView applies the new settings to the graph:



**Figure 2-81: A graph view of three datasets with different graph settings**

Save any changes to graph settings in a graph settings file or they will be lost when the graph window is closed.

### 2.3.4 Saving Graph Settings

Save a graph settings file to preserve any changes made to the graph settings for future use. NDI DataView graph settings files have the file name extension “.dgs”.

1. Select **Graph>Save Graph Settings** in the NDI DataView main window.

The Save As window opens:

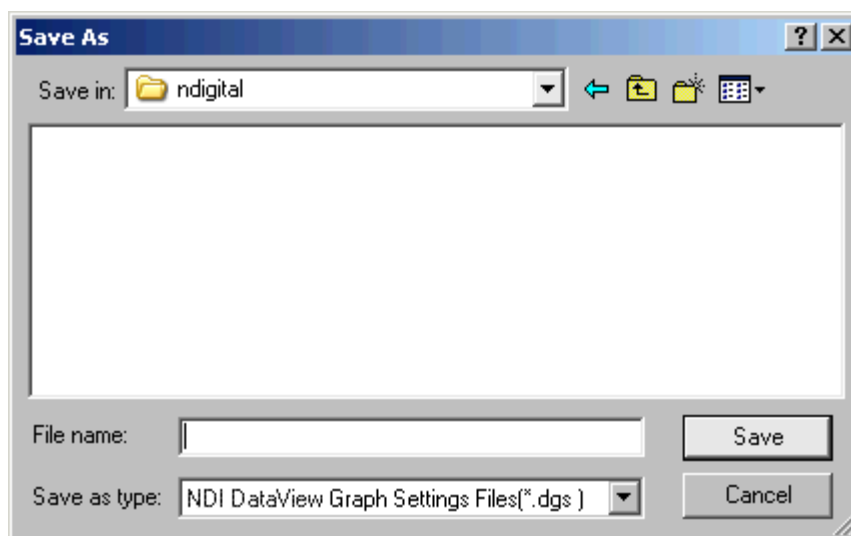


Figure 2-82: The Save As window

2. Browse to the location in which you want to save the graph settings:

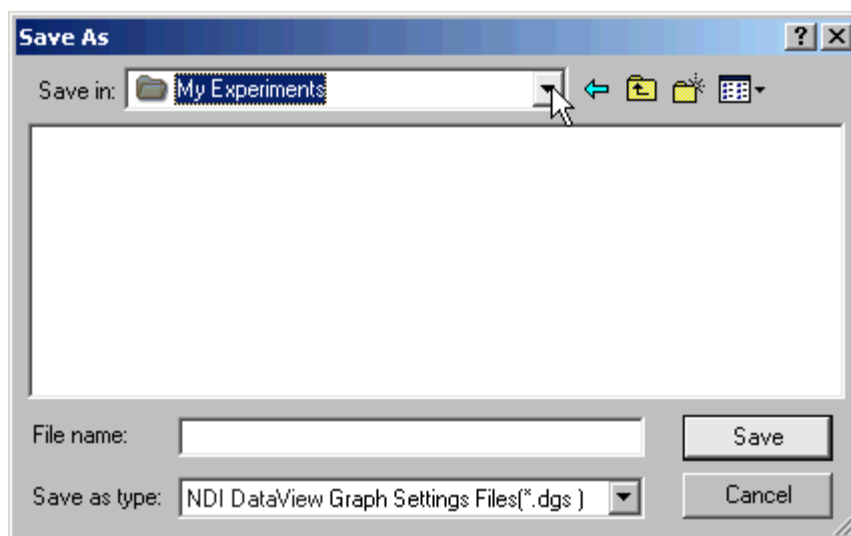


Figure 2-83: A sample save location

3. Enter a new name for the graph settings file in the **File name** box:

A screenshot of a software interface showing a text input field. To the left of the field is the label 'File name:'. The input field contains the text 'sample\_graph\_settings' and has a small cursor at the end of the text. The field has a light gray border and a subtle shadow.

**Figure 2-84: A new graph settings file name**

4. Click **Save**.

The Save As window closes and a new graph settings file with the specified name is saved.

### 2.3.5 Loading Graph Settings

Load a graph settings file to apply the settings in that file to the graph window currently active in NDI DataView.

1. Select **Graph>Load Graph Settings** in the NDI DataView main window.

The Open window opens:

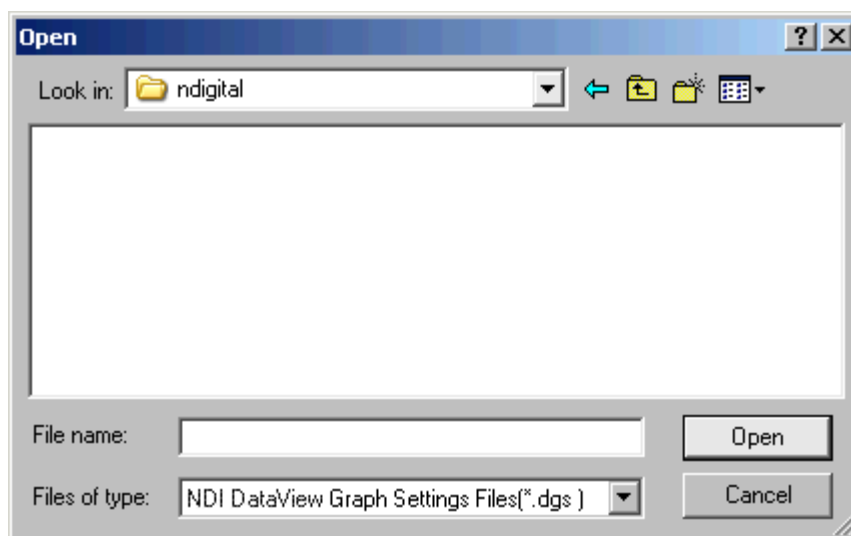


Figure 2-85: The Open window

2. Browse to the location of the graph settings file you want to open:

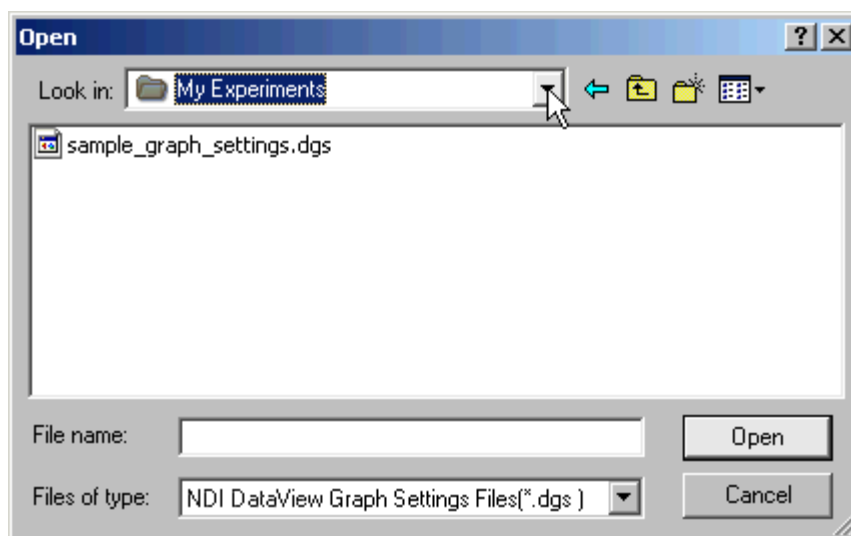


Figure 2-86: A sample location of graph settings files

3. Select the graph settings file you want to open:

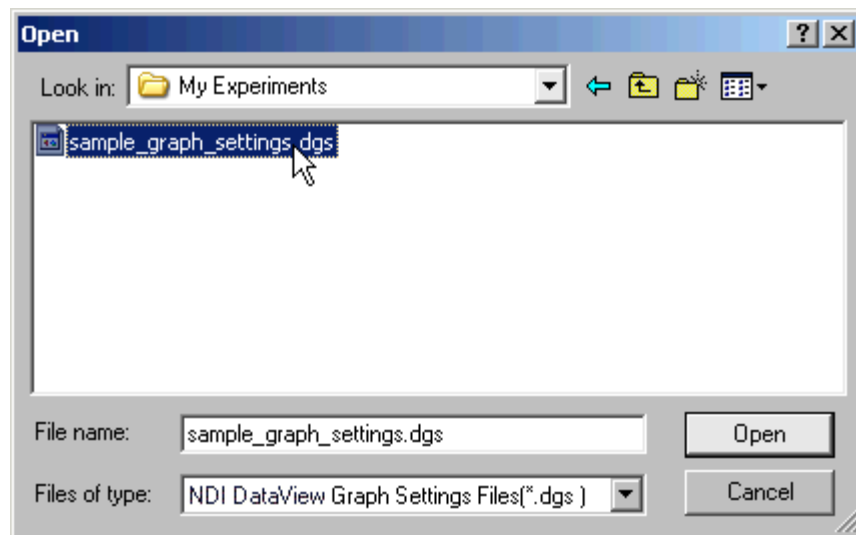


Figure 2-87: A graph settings file selected in the Open window

4. Click **Open**.

NDI DataView applies the graph settings contained in the selected file to the active graph view:

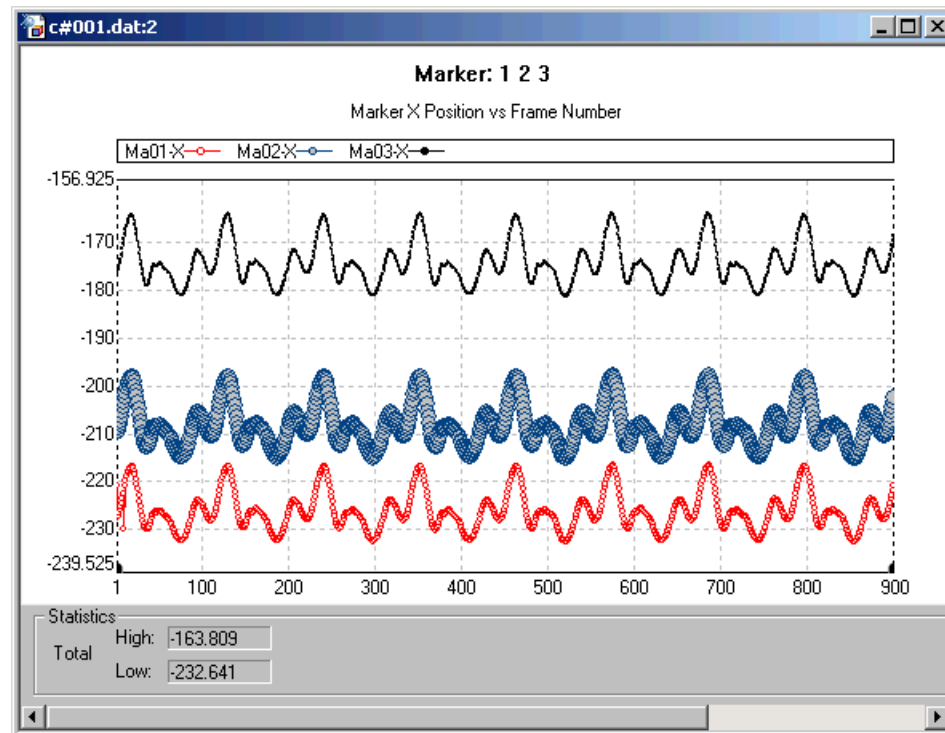
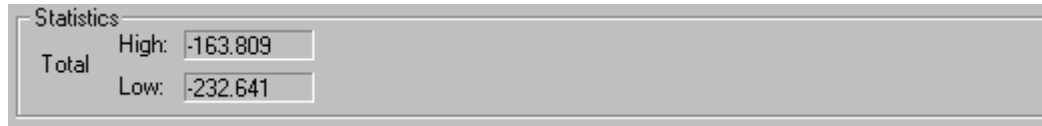


Figure 2-88: A graph view using the selected graph settings file



### 2.3.6 Working with Graph Statistics

NDI DataView can display statistics about the datasets shown in a graph. These statistics all appear in the statistics panel at the bottom of the graph window:

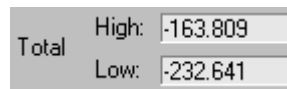


**Figure 2-89: The statistics panel**

The statistics panel can display the following, based on the data between the graph tabs:

- the maximum and minimum values of all displayed data
- the coordinates of a selected data point, with the maximum and minimum values of the dataset it is part of
- the range of a selected dataset, shown as an absolute value
- the coordinates of a reference point, with the coordinates of a selected data point relative to it

The statistics panel initially displays two numbers in the Total section:



**Figure 2-90: The Total section of the statistics panel**

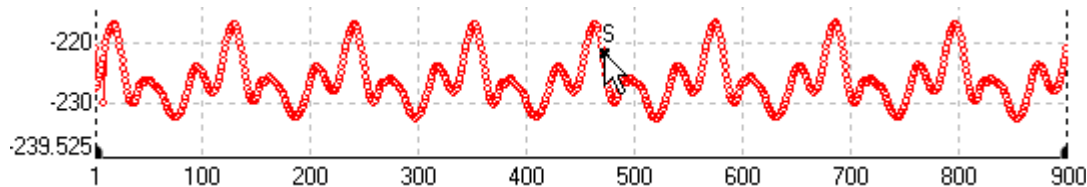
The High box displays the maximum value of all the data between the graph tabs, and the Low box displays the minimum value of all the data between the graph tabs.

For more information on how tabs are used to limit the data used for statistics in a graph, see “Using Tabs to Limit Statistics Ranges” on page 65.

## Displaying Statistics About a Dataset

1. Click on any data point of the dataset in the graph.

A black marker and the text “S” appears at the data point:



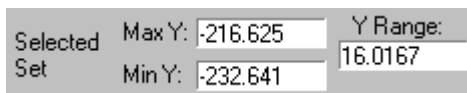
**Figure 2-91: A data point selected in a dataset**

This marker and text indicates that the data point is selected. The legend displays the name of the dataset the point is part of in bold:



**Figure 2-92: The selected dataset in the graph view legend**

The statistics panel displays a section called Selected Set:



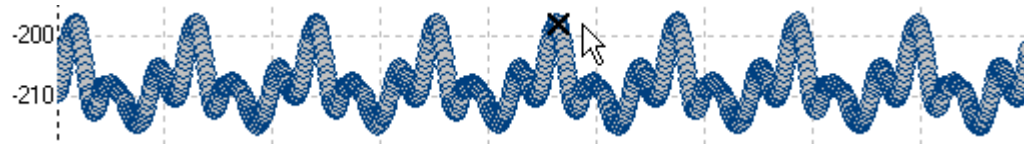
**Figure 2-93: The Selected Set section of the statistics panel**

The Selected Set section displays the maximum and minimum values, between the graph tabs, of the dataset that contains the selected point. These values appear in the Max Y and Min Y boxes, respectively. The absolute difference between these two values appears in the Y Range box.

For more information on tabs and how they affect statistics, see “Using Tabs to Limit Statistics Ranges” on page 65.

2. Select other datasets by clicking on data points contained in them.

The size of the selected point marker varies with the size at which the data point is displayed:



**Figure 2-94: A large selected point marker**

---

**Note** You can use the up and down arrow keys to switch between datasets.

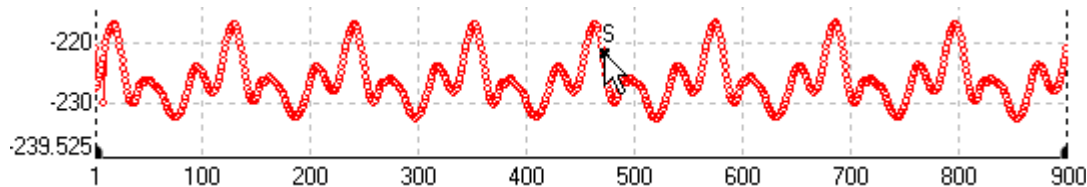
---

3. Deselect a dataset by clicking on the graph at a location that is not occupied by a data point.

## Displaying Statistics About a Data Point

1. Click on the data point in the graph that you want to observe.

A black marker and the text “S” appears at the data point:



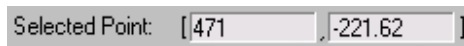
**Figure 2-95: A data point selected in a dataset**

This marker and text indicates that the data point is selected. The legend displays the name of the dataset the point is part of in bold:



**Figure 2-96: The selected dataset in the graph view legend**

The statistics panel displays a section called Selected Point:



**Figure 2-97: The Selected Point section of the statistics panel**

The Selected Point section displays the number of the frame that contains the selected data point and the value of the point. These values appear in the Selected Point and x boxes, respectively.

If the graph displays many data points, it may be difficult to select exactly the data point that you want to observe. If this occurs, use the graph tabs to zoom in on the area of the graph that you want to select from. For more information on zooming, see “Zooming with Tabs” on page 68.

2. Select other data points by clicking on them.

---

**Note** You can use the left and right arrow keys to switch between data points in the same dataset.

---

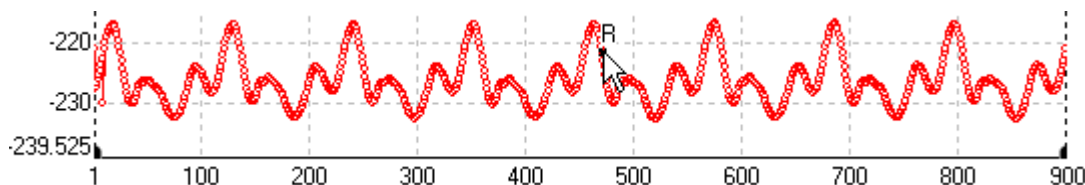
3. Deselect a data point by clicking on the graph at a location that is not occupied by a data point.

## Setting Reference Points

Reference points can be used to determine the difference between the selected data point and another on the graph.

4. Hold down the **Ctrl** key and select a data point to use as a reference point.

A black marker and the text “R” appears at the data point:



**Figure 2-98: A reference point selected in a dataset**

This marker and text indicates that the data point is the reference point. The statistics panel displays a section called Reference Point:

Reference Point: [471] , -221.62 ]

**Figure 2-99: The Reference Point section of the statistics panel**

The Reference Point section displays the number of the frame that contains the reference data point and the value of the point. These values appear in the Reference Point and x boxes, respectively.

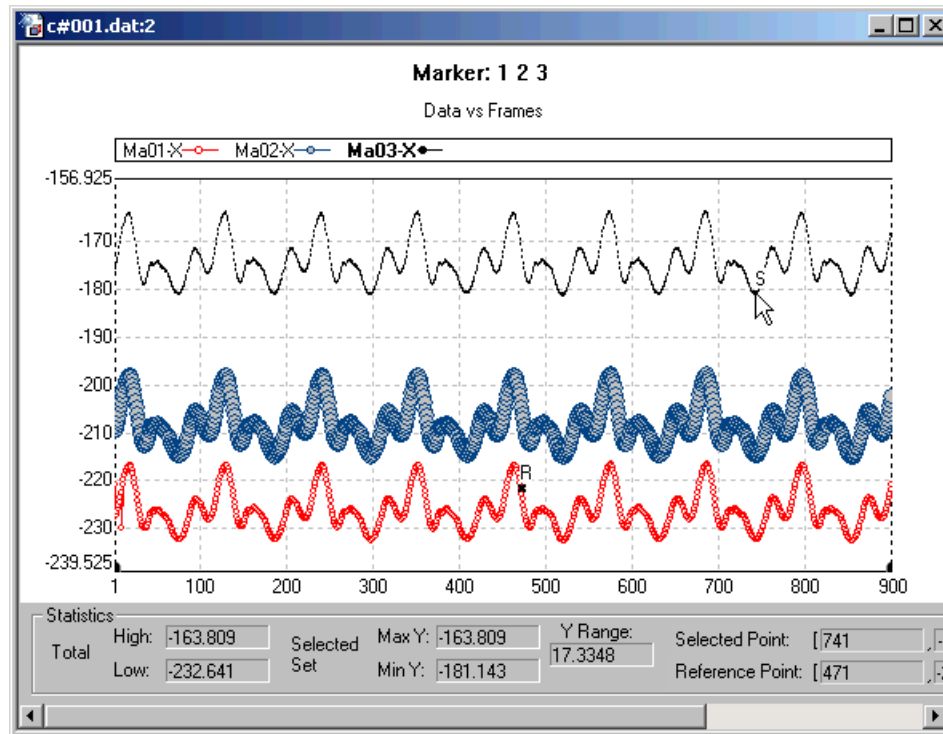
---

**Note** Hold down the **Ctrl** key to use the left and right arrow keys to switch between data points in the same dataset.

---

- Click on the data point in the graph that you want to compare to the reference point.

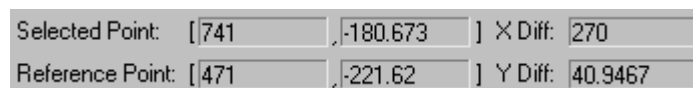
A black marker and the text “S” appears at the data point:



**Figure 2-100: A selected point and a reference point in a graph view**

This marker and text indicates that the data point is selected. The selected point can be from any dataset, not just the dataset that contains the reference point.

The statistics panel displays new boxes named X Diff and Y Diff:



**Figure 2-101: The X Diff and Y Diff boxes of the statistics panel**

The X Diff box displays the difference in frame number between the selected and reference data points. The Y Diff box displays the difference in value between the points.

- Remove the reference point by holding the **Ctrl** key and clicking on the graph at a location that is not occupied by a data point.

## Using Tabs to Limit Statistics Ranges

Tabs are small black markers that appear at the bottom of the graph. They are used to set limits on the range of data used for statistics, zooming, and data export.

Two tabs appear on each graph, one initially at each of the far edges:

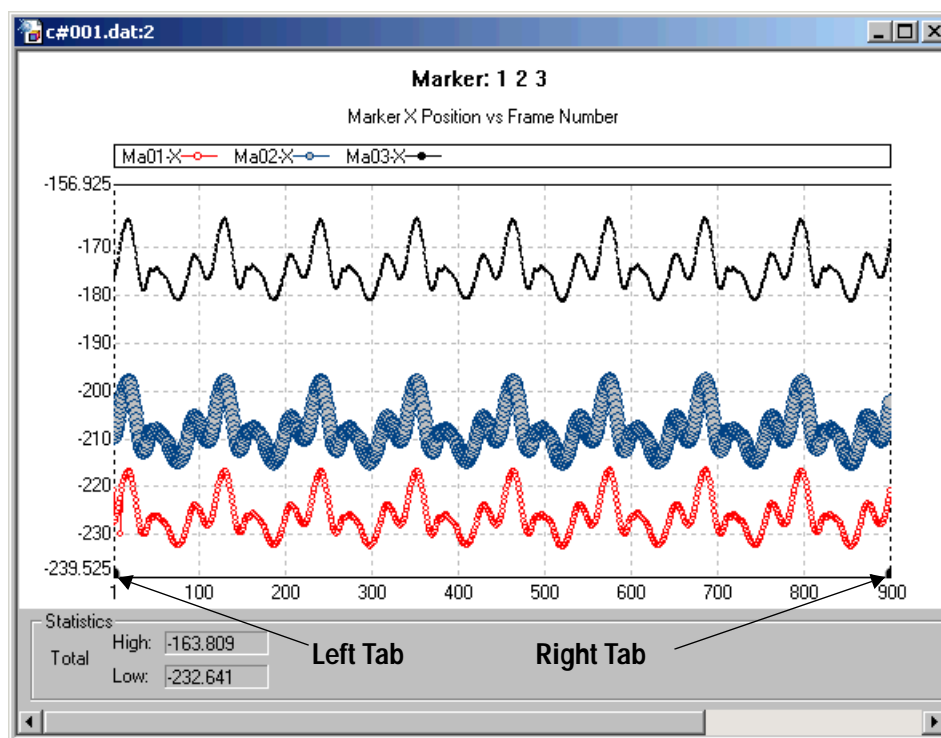


Figure 2-102: Default locations of tabs in a graph view

**Note** Tabs only appear if the option **Show Stat Tabs** is selected in the **Graph Settings** window. For more information on the **Show Stat Tabs** option, see “**Changing Miscellaneous Options**” on page 53.

Click and drag the black area of a tab to move it left or right:

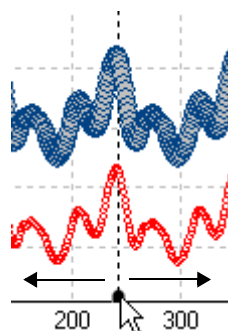
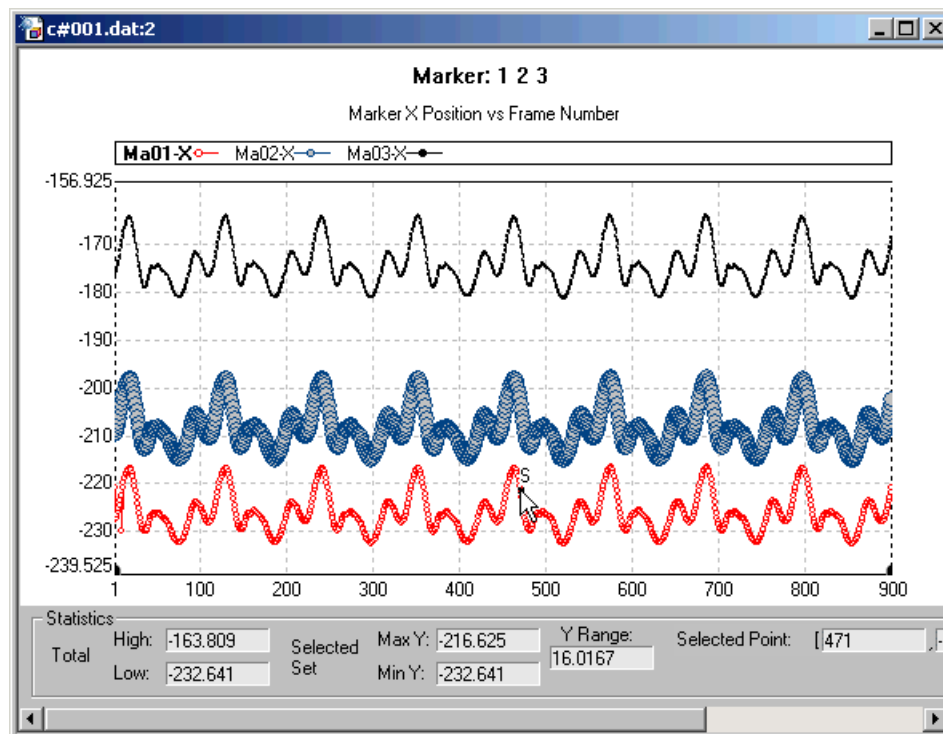


Figure 2-103: Moving a tab

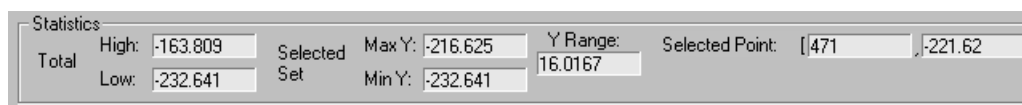
A dashed black vertical line moves with each tab to show the exact position it marks on the graph. The left tab cannot move farther right than the right tab, and the right tab cannot move farther left than the left tab.

1. Select a dataset to observe:



**Figure 2-104: A selected dataset in the graph view**

The statistics panel displays information about the minimum and maximum values of all datasets and the selected dataset:

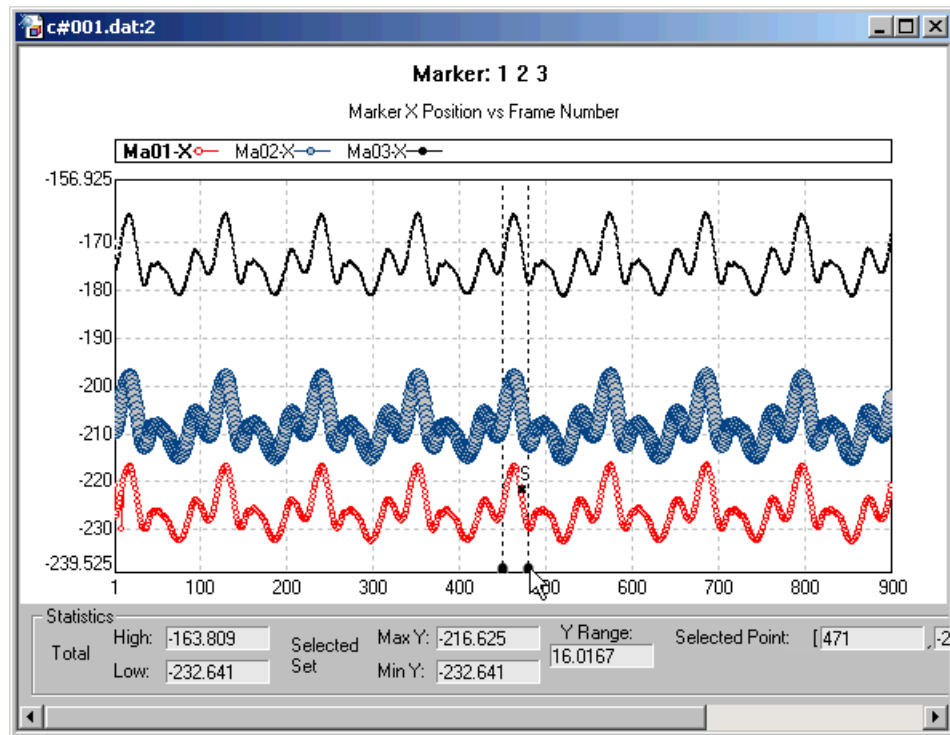


**Figure 2-105: The statistics panel for a selected dataset**

For more information about dataset statistics, see “Displaying Statistics About a Dataset” on page 60.

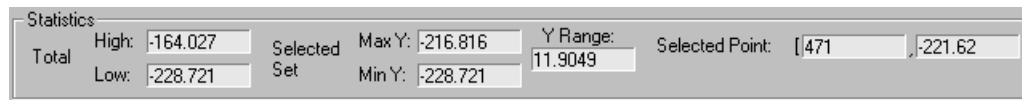


2. Move the left and right tabs in to mark the edges of the data range upon which statistics should be calculated:



**Figure 2-106: Tabs define new statistics limits in the graph view**

The statistics panel displays the minimum and maximum values of the data within the range marked by the tabs only:



**Figure 2-107: The statistics panel based on new tab positions**

## Zooming with Tabs

The tabs can also be used to zoom in and out of the graph view. Zooming in can make it easier to see and select individual data points and to select ranges of values for statistics or export.

For more information on tabs, see “Using Tabs to Limit Statistics Ranges” on page 65.

1. Move the tabs to the edges of the range you want to zoom in on:

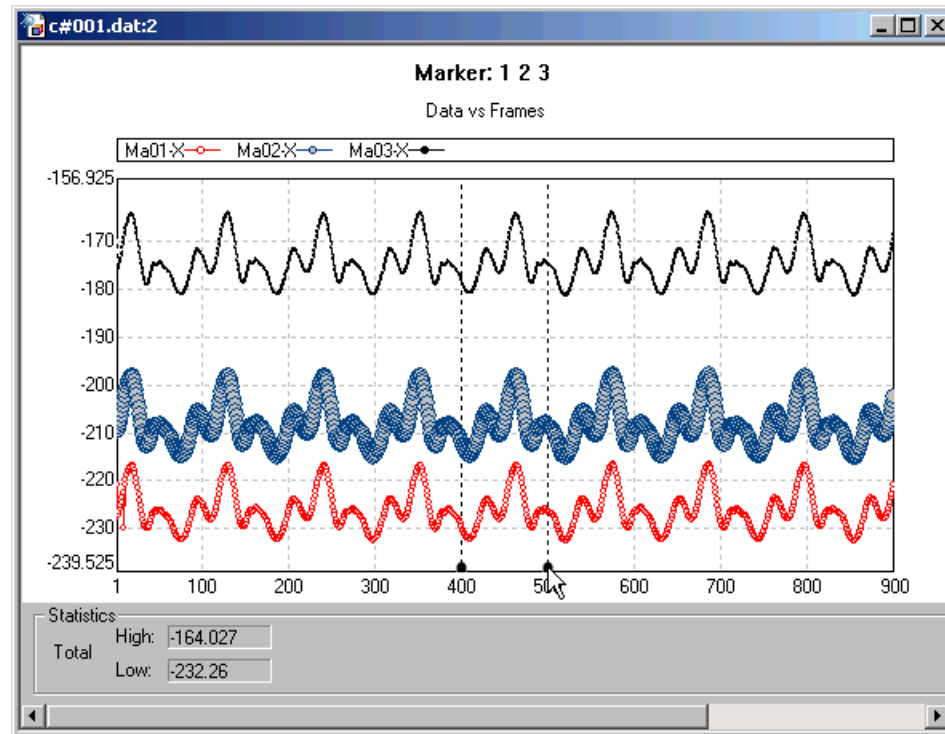
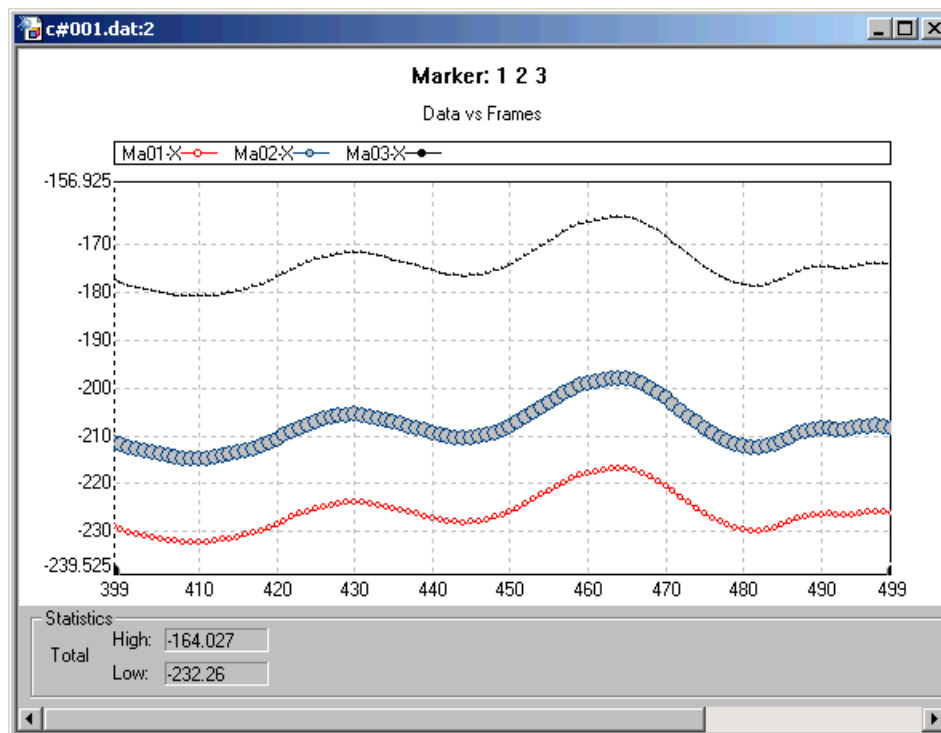


Figure 2-108: Tabs define a zoom range in the graph view

2. Select **Graph>Zoom In**.

The range defined by the tabs expands to fill the graph:



**Figure 2-109: A zoomed graph view**

Because the tabs define the range which is zoomed into, they again appear at the edges of the graph. Repeat the zoom in process as many times as necessary to display the desired range of values in the graph.

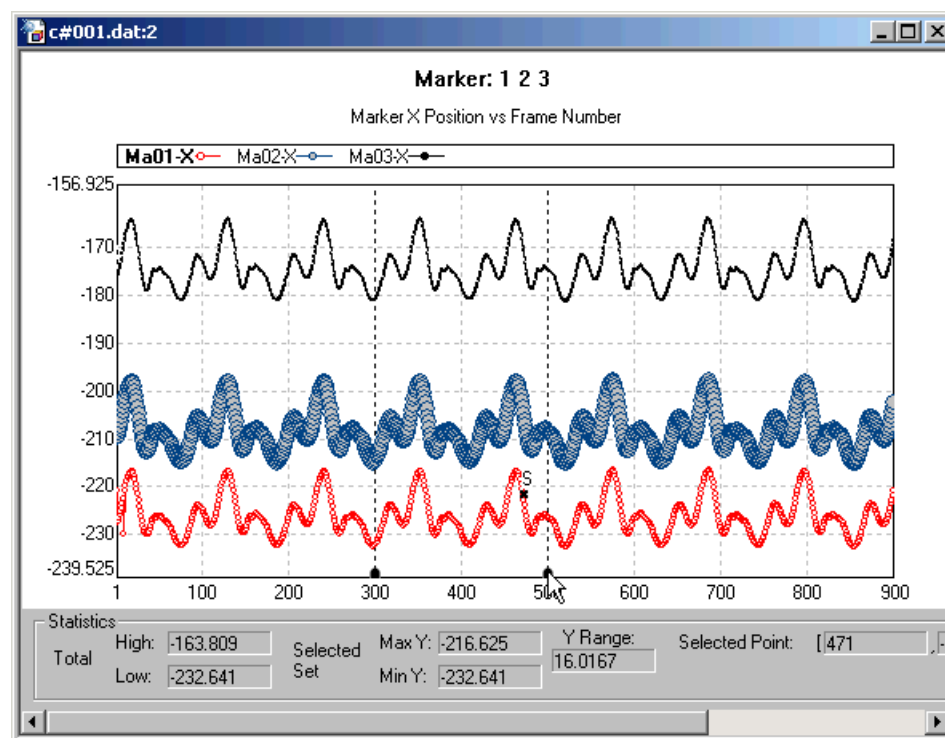
3. Select **Graph>Zoom Out**.

The graph returns to its previous size.

## 2.3.7 Exporting Graph Data

NDI DataView can export the data displayed in a graph as an ASCII file that can be used by other applications, such as Microsoft Excel. You can control what range of data is exported by using the tabs.

1. Move the tabs to define the range of values you want to export:

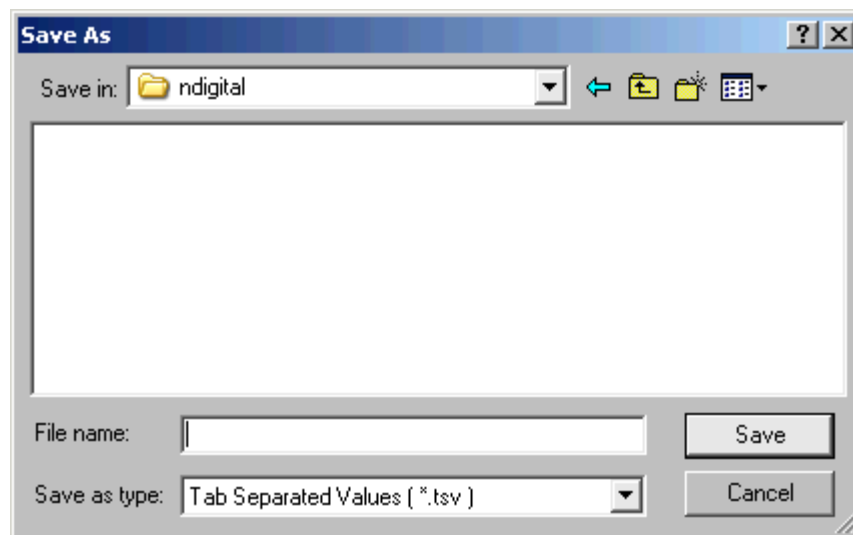


**Figure 2-110: Tabs define a range of data to export in the graph view**

NDI DataView will only export values that appear between the tabs. The values of all datasets displayed in the graph are exported, not just those in the currently selected dataset.

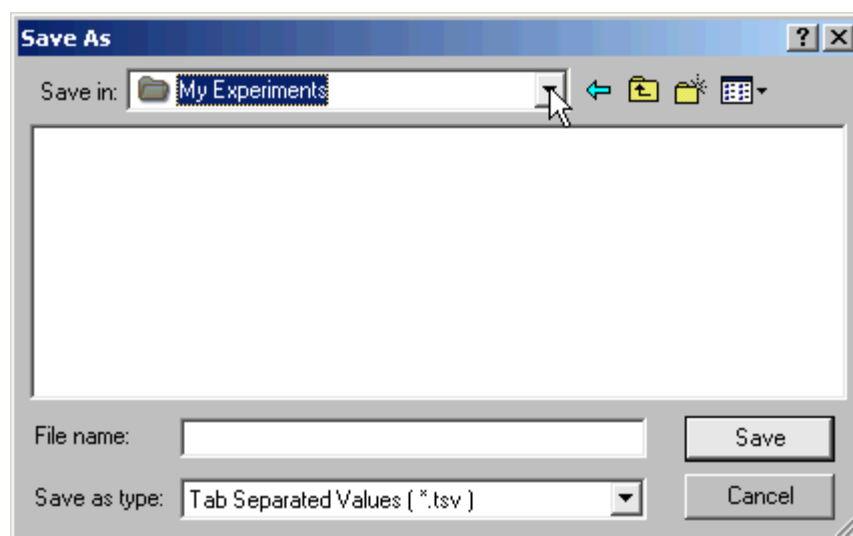
2. Select **Graph>Export As ASCII**.

The Save As window opens:



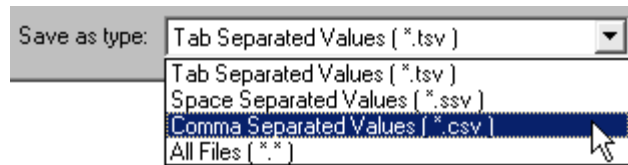
**Figure 2-111: The Save As window**

3. Browse to the location to which you want to export to the data:



**Figure 2-112: A sample save location**

4. Select the type of ASCII file in which to export the data:



**Figure 2-113: A list of file types NDI DataView can export**

In every type of ASCII file, each line contains the values of all subitems in a single frame and the corresponding frame number. In files with tab separated values, space separated values, and comma separated values the data values on each line are separated by tab, space, and comma characters, respectively.

5. Enter a name for the ASCII file in the **File name** box:



**Figure 2-114: A new ASCII file name**

6. Click **Save**.

The Save As window closes and a new ASCII file with the specified name is saved.

## 3 File Breakdown

NDI data files are stored in the NDI floating point file format. Each data file consists of a header, which describes the file, followed by the data itself. For more information on working with the file header, see “Editing File Header Information” on page 21.

The data in a file is organized into frames, with each frame describing the data at a particular point in time. Each frame is then divided into a number of items, with each item describing a component in that frame (for example, each marker in a 3D data file is a separate item). Finally, every item is subdivided into a number of subitems, with each subitem describing a component in that item (for example, the x, y, and z coordinates of a marker in a 3D data file are separate subitems).

For a complete description of NDI file formats, refer to the user guide that accompanied your system.

### 3.1 Data File Types

NDI DataView can open five types of NDI data files:

- **3D Data Files:** 3D data files contain the x, y, and z positions of markers as measured over a period of time. Each item in a 3D data file represents a marker and has three subitems: *X*, *Y*, and *Z*, each representing the position of the marker on the corresponding axis.
- **Raw Data Files:** raw data files contain the centroids of markers as measured over a period of time. Each item in a raw data file represents a marker and has multiple subitems named *Centroid\_nn* corresponding to the marker’s centroid over the different sensors, where *nn* is a two digit number representing the sensor number starting at *01*.

Raw data files may also include information about the quality of each centroid measured: signal strength, amplification, and error code. These quantities appear in the separate subitems *Peak\_nn*, *Amplification\_nn*, and *Code\_nn* corresponding to a particular centroid, respectively, where *nn* is a two digit number identifying the sensor on which the centroid was measured, starting at *01*. Raw data files that contain this extra information are called full raw data files.

- **ODAU Raw Data Files:** Optotrak Data Acquisition Unit (ODAU) raw data files contain the raw readings of the input channels of a single ODAU unit over a period of time. ODAU raw data files contain only one item, named *Data*. This item has multiple subitems named *Channel\_nn*, where *nn* is a two digit number, which correspond to the multiple analog channels of the ODAU.

If the data file also contains ODAU digital input, each bit of the digital input appears in a separate subitem named *DigitalCh\_nn*. The least significant bit appears in *DigitalCh\_01*.

- **ODAU Voltage Data Files:** ODAU voltage data files contain the readings of the input channels of a single ODAU unit over a period of time, converted into voltages. ODAU voltage data files contain only one item, named *Voltage*. This item has multiple subitems named *Channel\_nn*, where *nn* is a two digit number, which correspond to the multiple analog channels of the ODAU.

If the data file also contains ODAU digital input, each bit of the digital input appears in a separate subitem named *DigitalCh\_nn*. The least significant bit appears in *DigitalCh\_01*.

- **Transformation Data Files:** transformation data files contain the x, y, and z positions and the orientations of rigid bodies as measured over a period of time. The orientation can be stored in any one of four formats: Euler angle rotation format (with angles stored in degrees or radians), quaternion rotation format, or rotation matrix format. Transformation data files also contain the root-mean-square error of the rigid body fit.

Items in transformation data files, corresponding to rigid bodies, have the generic name *Item*. Subitems named  $T_x$ ,  $T_y$ , and  $T_z$  represent the translation elements of the origin of the rigid body in millimetres. Different subitems represent the orientation, depending on the format in which the orientation is stored: subitems named  $R_x$ ,  $R_y$ , and  $R_z$  represent rotation elements in Euler format (in degrees or radians), subitems named  $Q_0$ ,  $Q_x$ ,  $Q_y$ , and  $Q_z$  represent rotation elements in quaternion format, and subitems named  $R_{ij}$ , where  $0 \leq i \leq 2$  and  $0 \leq j \leq 2$ , represent rotation elements in 3x3 rotation matrix format (in which “i” is row number, “j” is column number, and data is stored by rows).

The subitem *Error* represents the root-mean-square error of the rigid body fit.



## 3.2 Items and Subitems

Each type of data file contains different items and subitems:

**Table 3-1: Items and subitems in NDI data files**

Data File Type	Item	Subitems
<b>3D Data</b>	Marker	x, y, z
<b>Raw Data</b>	Marker	Centroid_ <i>nn</i> , Peak_ <i>nn</i> (Full Raw Data), Amplification_ <i>nn</i> (Full Raw Data), Code_ <i>nn</i> (Full Raw Data)
<b>ODAU Raw Data</b>	Data	Channel_ <i>nn</i> , DigitalCh_ <i>nn</i> (optional)
<b>ODAU Voltage Data</b>	Voltage	Channel_ <i>nn</i> , DigitalCh_ <i>nn</i> (optional)
<b>Transformation Data</b>	Item	Tx, Ty, Tz (translation elements), Rx, Ry, Rz (Euler rotation), Q0, Qx, Qy, Qz (quaternion rotation), Rij where $0 \leq i, j \leq 2$ (rotation matrix), Error

The suffix *nn* denotes a two digit number used to distinguish between multiple subitems of the same name.

### 3.3 File Naming Conventions

The naming convention for NDI floating point data files is:

<prefix>#<trial number>.<extension>

The “#” sign must be included in the file name. The naming convention for NDI floating point data files is unusual in that you can use any extension that is appropriate. The trial number and the extension are each typically three characters long.

The naming convention in NDI First Principles is:

<session name>\_<date>\_<time>\_<collection number>.<extension>

Standard file names for the data file types that NDI DataView can open are as follows:

**Table 3-2: File naming conventions for NDI data files**

Data File Type	File Name (Previous Software)	NDI First Principles
<b>3D Data</b>	c#???.*	.n3d
<b>Raw Data</b>	r#???.*	.nrw
<b>ODAU Raw Data</b>	o?#???.*	.nor
<b>ODAU Voltage Data</b>	v?#???.*	.nov
<b>Transformation Data</b>	rig#???.*	.n6d

The wildcards “\*” and “?” refer to any number of any characters and any single character, respectively.

In the case of ODAU raw data and ODAU voltage data files, the first “?” wildcard denotes a single digit number used to distinguish between multiple ODAUs in a chain. When multiple ODAUs are chained together, separate data files are collected for each ODAU.

---

**Note** If NDI DataView opens a file and successfully recognizes data in the file, but the name of the file does not conform to these conventions, it will display the data in a generic format. In this generic format, items are named *Item\_nn* and subitems are named *Subitem\_nn*, where *nn* is a two digit number that distinguishes between multiple subitems.

---

## 4 Glossary

### 3D Data

3D data refers to the x, y, and z positions of markers. If the position of a marker cannot be determined, that marker will be considered missing. The x, y, and z coordinate values for a missing marker are each set to the numeric constant BAD\_FLOAT (-3.697314E28).

*See also:* 3D Data File, Missing Data.

### 3D Data File

A 3D data file is an NDI floating point data file containing the x, y, and z coordinates of markers as measured over a period of time. The naming convention for 3D data files is c#xxx.yyy, where “c” identifies the file as a 3D data file, “xxx” represents the trial number, and “yyy” represents the trial extension. The general naming convention for NDI floating point data files is:

<prefix>#<trial number>.<extension>

The “#” sign must be included in the file name. You can use any extension that is appropriate for your experiment. Both the extension and the trial number can be changed.

For more information on the contents and organization of 3D data files, refer to “Appendix B: File Formats” in the *Optotrak Certus User Guide*.

*See also:* 3D Data, NDI Floating Point File Format.

### 6D Data

*See:* Transformation.

*See also:* Transformation Data File.

### 6D Data File

*See:* Transformation Data File.

*See also:* Transformation.

## Active Marker

An active marker is an InfraRed light Emitting Diode (IRED) attached to a metallic base that can be tracked by the Optotrak System, either individually or as part of a group of markers comprising a rigid body. The Optotrak controls the activation sequence of markers through the System Control Unit.

Active markers are used to define the positions of objects to be measured by the Optotrak System.

See also: InfraRed light Emitting Diode (IRED).

## Amplification

Amplification refers to a level of amplification applied to a marker signal in order to detect it. In NDI DataView, amplification is represented by a value between 0% and 100%. A value of 0% indicates that a minimum amount of amplification was required to detect the marker in question, while a value of 100% means that a maximum amount of amplification was required to detect that marker.

If markers have amplification levels close to 100%, these markers may be too dim for the Position Sensors to determine their positions.

If markers have amplification levels close to 0%, these markers may be too bright for the Position Sensors to determine their positions.

See also: Active Marker, Full Raw Data.

## ASCII File Format

In files of the ASCII file format, data values are stored using the ASCII character set. This allows the data within an ASCII file to be viewed using a text editor. The ASCII file format is machine independent, so it allows data to be transferred easily to other computer platforms for processing. ASCII files can be imported into spreadsheet programs such as Microsoft Excel.

ASCII format data files can be generated from NDI floating point format data files using an NDI DataView graph view: use the tabs to select a range of data, and then select Graph>Export As ASCII. Data can be written to ASCII files in comma separated values format (with the .csv file name extension), space separated values format (with the .ssv file name extension), or tab separated values format (with the .tsv file name extension).

For more information on the contents and organization of ASCII data files, refer to “Appendix B: File Formats” in the *Optotrak Certus User Guide*.”

See also: Comma Separated Values, File Types, Space Separated Values, Tab Separated Values.

## ASCII File Header

ASCII file headers are sections of text that precede the data within an ASCII file. To determine whether an ASCII file contains a header, open the file using a text editor.

ASCII data files created by converting NDI floating point data files can contain headers with trial information. Trial information identifies the trial the data was recorded for and the options it was recorded with.

For more information on the contents and organization of ASCII data files, refer to “Appendix B: File Formats” in the *“Optotrak Certus User Guide”*.

*See also:* ASCII File Format.

## ASCII File Separator

Separators mark the boundaries between groups of data within an ASCII file. Some common separators are commas, spaces, and tabs. To determine whether an ASCII file contains a header, and if so what type of separator is used in the file, open the file using a text editor.

When importing an ASCII file into another program, you may need to know the type of separator used in the file. To determine the type of separator, examine the file name extension or, if it is present, examine the ASCII file header.

*See also:* ASCII File Format, ASCII File Header, Comma Separated Values, File Types, Space Separated Values, Tab Separated Values.

## Browse Bar

The Browse Bar is a specialized window used to browse for NDI data files. It is part of the Explorer Bar in the NDI DataView main window.

*See also:* Explorer Bar.

## Centroid

A centroid is the mean position of a marker’s infrared emission over a sensor.

*See also:* Full Raw Data, Raw Data.


## Comma Separated Values

Comma separated values are data values in an ASCII file separated by the ASCII character “,”. An ASCII data file with comma separated values is generally used as an intermediary transfer format for programs that store data in different formats.

For example, Microsoft Excel cannot open files in the NDI floating point file format. To open an NDI floating point data file in Microsoft Excel, convert the file into a comma separated values ASCII file that Excel can then load.

*See also:* ASCII File Format, ASCII File Separator, File Types, NDI Floating Point File Format, Space Separated Values, Tab Separated Values.

## Docking Bar

A docking bar  can be used to move a section of a window. By clicking and dragging the docking bar attached to a section of a window, that section can be floated or fixed to any one of the four borders of the window.

In NDI DataView, a docking bar can be used to adjust the position of the Explorer Bar.

*See also:* Explorer Bar.

## Error Code

An error code indicates the status of the signal being received from a marker. If a marker is missing, the error code for that marker will indicate the reason that the Optotrak Position Sensors cannot determine the position of the marker.

Here is a list of possible error codes:

**Table 4-1: List of error codes.**

Error	Error Code	Explanation
Centroid acceptable	0	The sensor successfully calculated the marker centroid.
Waveform too wide	1	The amount of light visible is above the noise threshold for the system to determine the marker centroid. The marker is too close to the Position Sensor. Move the marker farther away from the Position Sensor to correct this problem.
Peak too small	2	The marker signal is too weak. This may be due to the marker being obscured or the marker having insufficient power. Increase the strober voltage and/or duty cycle to strengthen the marker signal.

Table 4-1: List of error codes.

Error	Error Code	Explanation
Peak too large	3	The marker signal is too strong. Decrease the strober voltage and/or duty cycle to weaken the marker signal.
Waveform out of volume	4	The marker waveform is partially out of the field of view of the sensor. Check the measurement volume of the Position Sensor on the name plate located at the back. (See the <i>Optotrak Certus User Guide</i> for details.) Relocate the marker so that the marker waveform is within the measurement volume.
Fell behind	5	The sensor fails to process the current marker's signal before required to process the next marker's signals. Lower the marker frequency to correct this problem.
Bad last centroid	6	Interpolation cannot be carried out because a marker was not visible in the previous frame. This would only occur if the collection was configured to perform interpolation on the raw sensor values.
Buffer full	7	The internal centroid data buffer on the sensor is full and the sensor fails to store the current marker data. Lower the frame rate to correct this condition.
Missed sensor	8	The sensor has determined that it has missed a time control signal from the Optotrak System Control Unit, probably because of a communication error.
Corrupted data	9	The sensor failed to process the marker data due to an internal communication error.

See also: Full Raw Data, Missing Data.

## Euler Rotation

An Euler rotation is a mathematical method of describing rotations in three dimensions. The rotations around each of the axes are described as  $R_x$ ,  $R_y$  and  $R_z$ . Euler rotations can be expressed in both degrees and radians.

See also: Quaternion Rotation, Transformation.

## Explorer Bar

The Explorer Bar is a window used to browse and search for NDI data files. By default, it appears at the left side of the NDI DataView main window.

*See also:* Browse Bar, Search Bar.

## File Header

The first 256 bytes of the NDI floating point file format is known as the file header. The file header describes the organization of the data within each NDI floating point file. For a complete description of file headers, refer to “Appendix B: File Formats” in the *“Optotrak Certus User Guide”*.

Files in the NDI floating point file format are not the same as those in the ASCII file format. NDI floating point files cannot be viewed with a text editor.

*See also:* ASCII File Format, NDI Floating Point File Format.

## File Types

File Name Extension	File Type
.csv	Comma Separated Values File
.dgs	NDI DataView Graph Settings File
.ssv	Space Separated Values File
.tsv	Tab Separated Values File

## Floating Point File Format

*See:* NDI Floating Point File Format.

## Full Raw Data

Full raw data refers to the centroid, amplification, error code, and signal strength of a marker. Full raw data includes the same centroid information for each marker as raw data, as well as information about the quality of the signal measured for each marker by each Optotrak Position Sensor.

Full raw data is typically used for troubleshooting purposes.

*See also:* Amplification, Error Code, Raw Data, Signal Strength.



## Full Raw Data File

A full raw data file is an NDI floating point data file containing the centroid, amplification, error code, and signal strength values of markers as measured over time. The naming convention for full raw data files is r#xxx.yyy, where “r” identifies the file as a raw or full raw data file, “xxx” represents the trial number, and “yyy” represents the trial extension.

Full raw data files are typically recorded to determine why certain markers cannot be detected by an Optotrak Position Sensor. Because full raw data files are much larger than raw data files, they should only be used when you suspect there is a problem with either the marker signals or a Position Sensor.

The general naming convention for NDI floating point data files is:

<prefix>#<trial number>.<extension>

The “#” sign must be included in the file name. You can use any extension that is appropriate for your experiment. Both the extension and the trial number can be changed.

For more information on the contents and organization of 3D data files, refer to “Appendix B: File Formats” in the *Optotrak Certus User Guide*.

*See also:* Full Raw Data, NDI Floating Point File Format, Raw Data File.

## Graph View

A graph view is a window that displays the contents of a data file as a line graph. The values of the items and subitems selected to appear in the graph are plotted versus frame number.

Graph windows appear separately within the NDI DataView main window.

*See also:* Table View.

## InfraRed light Emitting Diode (IRED)

An InfraRed light Emitting Diode (IRED) is an electronic device that emits infrared light when a voltage is applied to it. When attached to a cable and a connector, IREDs are called markers. Markers are used to define the points measured by the Optotrak System.

*See also:* Active Marker.

### Item

An item is a division of data in an NDI floating point data file. Each frame of data is divided into a number of items, each of which describes a component in that frame (such as the 3D position of one marker). Every item is subdivided into a number of subitems, each of which describes a component in that item (such as the x value in a 3D position).

*See also:* NDI Floating Point File Format, Subitem.

### Link

A link is a hyperlink used to navigate within the NDI DataView online help system. Links appear on each page of online help.

Links within each page direct you to related and/or supplemental information for particular topics and terms. These links are not organized sequentially. After following these links, use the Back button of your browser to return to previous pages.

Links at the bottoms of pages direct you through specific topics and procedures. Follow these links to find information on complete topics and how to perform particular steps of procedures.

### Marker

*See:* Active Marker.

### Missing Data

If the Optotrak System cannot determine the 3D position of a marker or a rigid body, that marker or rigid body is considered missing. A marker might be missing if it is not in the measurement volume of the Optotrak Position Sensors, or if it is obscured by being covered or rotated out of view. A rigid body might be missing if the maximum error settings are exceeded when calculating its position. The x, y, and z coordinate values for missing markers are each set to the numeric constant BAD\_FLOAT (-3.697314E28).

NDI DataView reports missing data by using the text “MISSING” in place of the missing values.

*See also:* 3D Data, Active Marker, Rigid Body, Transformation Data File.

## NDI Floating Point File Format

The NDI floating point file format is the file format used by NDI to store data. Each floating point data file consists of a header, which describes the file, followed by the data, which is organized into frames. The naming convention for floating point data files is:

<prefix>#<trial number>.<extension>

The “#” sign must be included in the file name. You can use any extension that is appropriate for your experiment. Both the extension and the trial number can be changed.

For more information on the contents and organization of 3D data files, refer to “Appendix B: File Formats” in the *Optotrak Certus User Guide*.

*See also:* 3D Data File, Full Raw Data File, ODAU Raw Data File, ODAU Voltage Data File, Raw Data File, Transformation Data File.

## ODAU Raw Data

ODAU raw data refers to unconverted analog and digital input values measured using an ODAU II.

*See also:* ODAU Raw Data File, Optotrak Data Acquisition Unit (ODAU II).

## ODAU Raw Data File

An ODAU raw data file is an NDI floating point data file containing the unconverted analog and digital input values of an ODAU II, as measured over a period of time. The naming convention for ODAU raw data files is o?#xxx.yyy, where “o” identifies the file as an ODAU raw data file and “?” is a number corresponding to the position of the ODAU II unit in the system setup (multiple ODAUs can be chained together). The “xxx” represents the trial number, and “yyy” represents the trial extension. The general naming convention for NDI floating point data files is:

<prefix>#<trial number>.<extension>

The “#” sign must be included in the file name. You can use any extension that is appropriate for your experiment. Both the extension and the trial number can be changed.

For more information on the contents and organization of ODAU raw data files, refer to “Appendix B: File Formats” in the *Optotrak Certus User Guide*.

*See also:* NDI Floating Point File Format, ODAU Raw Data.

## ODAU Voltage Data

ODAU voltage data refers to analog and digital input values that have been measured and converted into voltage values by an ODAU II.

*See also:* ODAU Voltage Data File, Optotrak Data Acquisition Unit (ODAU II).

## ODAU Voltage Data File

An ODAU voltage data file is an NDI floating point data file containing the analog and digital input values, converted into voltages, of an ODAU II as measured over a period of time. The naming convention for ODAU voltage data files is v?#xxx.yyy, where “v” identifies the file as an ODAU voltage data file and “?” is a number corresponding to the position of the ODAU II unit in the system setup (multiple ODAUs can be chained together). The “xxx” represents the trial number, and “yyy” represents the trial extension. The general naming convention for NDI floating point data files is:

<prefix>#<trial number>.<extension>

The “#” sign must be included in the file name. You can use any extension that is appropriate for your experiment. Both the extension and the trial number can be changed.

For more information on the contents and organization of ODAU voltage data files, refer to “Appendix B: File Formats” in the *Optotrak Certus User Guide*.

*See also:* NDI Floating Point File Format, ODAU Voltage Data.

## Optotrak Data Acquisition Unit (ODAU II)

The ODAU II is an optional hardware component that provides analog signal acquisition and digital input/output capability in synchronization with Optotrak data (3D or raw).

*See also:* ODAU Raw Data, ODAU Voltage Data.

## Peak

*See:* Signal Strength.

## Quaternion Rotation

Quaternion rotation is a mathematical method of describing rotations in three-dimensional space in terms of four-dimensional objects that are represented as ordered quadruples  $[q_0, q_x, q_y, q_z]$ . The components represent a rotation about an axis (related to the vector  $[q_x, q_y, q_z]$ ) by an angle (determined by the scalar  $q_0$ ). For normalized (or unit) quaternions, the rotation of a vector  $v$  by the quaternion  $q$  is given by  $v' = qvq^{-1}$ .

Quaternion rotation has several advantages over other representations such as Euler angles, including robustness, faster computation, and greater numerical stability.

*See also:* Euler Rotation, Transformation.

## Raw Data

Raw data refers to the centroid of a marker (the mean position of the infrared light emitted by a marker across an Optotrak sensor).

*See also:* Centroid, Raw Data File.

## Raw Data File

A raw data file is an NDI floating point data file containing the numeric values of the centroids of markers as measured over a period of time. The naming convention for raw data files is  $r\#xxx.yyy$ , where “r” identifies the file as a raw or full raw data file, “xxx” represents the trial number, and “yyy” represents the trial extension. The general naming convention for NDI floating point data files is:

`<prefix>#<trial number>.<extension>`

The “#” sign must be included in the file name. You can use any extension that is appropriate for your experiment. Both the extension and the trial number can be changed.

For more information on the contents and organization of raw data files, refer to “Appendix B: File Formats” in the *Optotrak Certus User Guide*.

*See also:* Full Raw Data File, NDI Floating Point File Format, Raw Data.

## Rigid Body

A rigid body is an object on which three or more markers are fixed so that no relative movement between the markers is possible. The Optotrak System can track the 3D position and orientation of rigid bodies.

*See also:* Active Marker, Transformation.

## Root-Mean-Square (RMS) Error

RMS error is calculated as the square root of the mean of the squares of the individual distance errors along the x, y, and z axes. The RMS error for  $n$  measured 3D positions, with distance errors of  $x_e$ ,  $y_e$ , and  $z_e$  along each of the x, y, and z axes, respectively, is:

$$RMS\ Error = \sqrt{\frac{\sum x_e^2 + \sum y_e^2 + \sum z_e^2}{n}}$$

*See also:* Full Raw Data.

## Rotation Matrix

The rotation matrix can be expressed as:

$$R_{RPY}(f,q,y)=R_z(f)*R_y(q)*R_x(y).$$

The order in which the rotations are applied is: (1) x, (2) y, (3) z.

The single axis rotations are as follows:

$$\begin{aligned} R_z(\phi) &= \begin{bmatrix} \cos \phi & -\sin \phi & 0 \\ \sin \phi & \cos \phi & 0 \\ 0 & 0 & 1 \end{bmatrix} \\ R_y(\theta) &= \begin{bmatrix} \cos \theta & 0 & \sin \theta \\ 0 & 1 & 0 \\ -\sin \theta & 0 & \cos \theta \end{bmatrix} \\ R_x(\psi) &= \begin{bmatrix} 1 & 0 & 0 \\ 0 & \cos \psi & -\sin \psi \\ 0 & \sin \psi & \cos \psi \end{bmatrix} \end{aligned}$$

**Figure 4-1: Rotation Matrices**

With this form of Euler angles, care must be taken to avoid y angles of 90 degrees and -90 degrees because the rotation matrix,  $R_{RPY}(f,q,y)$ , will become unstable.

*See also:* Transformation, Quaternion Rotation.

## Search Bar

The Search Bar is a specialized window used to search for NDI data files. It is part of the Explorer Bar in the NDI DataView main window.

*See also:* Explorer Bar.

## Signal Strength

Signal strength refers to the strength of a signal received from a marker. It is represented by a value between 0% and 100%.

If markers have signal strengths close to 0%, these markers may be too dim for the Position Sensors to determine their positions.

Similarly, if markers have signal strengths close to 100%, these markers may be too bright for the Position Sensors to determine their positions.

In a full raw data file, signal strength is split between two fields: signal strength high and signal strength low. The signal strength is derived from the combination of the two fields.

*See also:* Full Raw Data.

## Space Separated Values

Space separated values are data values in an ASCII file separated by the ASCII character “ ”. An ASCII data file with space separated values is generally used as an intermediary transfer format for programs that store data in different formats.

For example, Microsoft Excel cannot open files in the NDI floating point file format. To open an NDI floating point data file in Microsoft Excel, convert the file into a space separated values ASCII file that Excel can then load.

*See also:* ASCII File Format, ASCII File Separator, Comma Separated Values, File Types, NDI Floating Point File Format, Tab Separated Values.

## Status Bar

A status bar is a grey area at the bottom of a window that displays information about the selections and tasks being performed within that window.

The NDI DataView main window status bar displays the meanings of menu items and toolbar icons as they are selected.

*See also:* Toolbar.

## Status Code

*See:* Error Code.

## Subitem

A subitem is a division of data in an NDI floating point data file. Every item in a data file is subdivided into a number of subitems, each of which describes a component in that item. For example, the 3D position of one marker (which is itself a single item) is divided into three subitems: one for each of the x, y, and z values in the 3D position.

*See also:* Item, NDI Floating Point File Format.

## Tab Separated Values

Tab separated values are data values in an ASCII file separated by the ASCII character for Tab. An ASCII data file with tab separated values is generally used as an intermediary transfer format for programs that store data in different formats.

For example, Microsoft Excel cannot open files in the NDI floating point file format. To open an NDI floating point data file in Microsoft Excel, convert the file into a tab separated values ASCII file that Excel can then load.

*See also:* ASCII File Format, ASCII File Separator, Comma Separated Values, File Types, NDI Floating Point File Format, Space Separated Values.

## Table View

A table view is a window that displays the contents of a data file in a table. The data is either viewed by item, in which case the table displays the values of a particular item for all frames in the data file, or viewed by frame, in which case the table displays the values of all items and subitems for a particular frame.

Table windows appear separately within the NDI DataView main window.

*See also:* Graph View.

## Toolbar

A toolbar is a group of icons displayed in a window, typically in a row below the menu bar. Generally, each icon in a toolbar provides access to a commonly used function.

NDI DataView provides a single toolbar in the main window.

*See also:* Status Bar.



## Transformation

A transformation refers to a combination of a translation and a rotation that describes a position and orientation in space. In NDI DataView the translation data is stored as  $T_x$ ,  $T_y$ , and  $T_z$  positions, measured in millimetres, and the rotation data can be stored in any one of four formats: Euler rotation format (with angles stored in degrees or in radians), quaternion rotation format, or rotation matrix format.

*See also:* Euler Rotation, Quaternion Rotation, Transformation Data File.

## Transformation Data File

A transformation data file is an NDI floating point data file containing translations and rotations that describe the positions and orientations of rigid bodies as measured over a period of time. The translation data is stored as  $T_x$ ,  $T_y$ , and  $T_z$  positions, measured in millimetres, and the rotation data can be stored in any one of four formats: Euler rotation format (with angles stored in degrees or in radians), quaternion rotation format, or rotation matrix format. A transformation data file also includes the rigid body error, which is a 3D root-mean-square error value in millimeters between the 3D measured position and the 3D calculated positions based on the rigid bodies movement.



For more information on the contents and organization of transformation data files, refer to “Appendix B: File Formats” in the *“Optotrak Certus User Guide”*.

*See also:* NDI Floating Point File Format, Transformation.

## 5 Appendix A: Menu Guide


This section lists the menu commands available in NDI DataView, as well as their hotkeys and their icons. Certain menu commands are available only when working with a table or a graph view.

### File Menu

Menu Command	Hotkey	Icon
Open	Ctrl + O	
Close	-	-
Save	Ctrl + S	-
Save As	-	-
Print	Ctrl + P	
Print Preview	-	-
Print Setup	-	-
Exit	-	-

## Edit Menu

When working with a table view:

Menu Command	Hotkey	Icon
Undo	Ctrl + Z	-
Redo	Ctrl + Y	-
Copy	Ctrl + C	-
Select All	Ctrl + A	-
Go To	Ctrl + G	
File Header	Ctrl + H	-

When working with a graph view:

Menu Command	Hotkey	Icon
Undo	Ctrl + Z	-
Redo	Ctrl + Y	-
File Header	Ctrl + H	-

## View Menu

When working with a table view:


Menu Command	Hotkey	Icon
Toolbar	-	-
Status Bar	-	-
Explorer Bar	-	-
View By Frame	Ctrl + F	-
View By Item	Ctrl + I	-

When working with a graph view:




Menu Command	Hotkey	Icon
Toolbar	-	-
Status Bar	-	-
Explorer Bar	-	-

## Graph Menu

When working with a table view:

Menu Command	Hotkey	Icon
Display Graph	-	

When working with a graph view:

Menu Command	Hotkey	Icon
Display Graph	-	
Graph Settings	F9	-
Select Datasets	-	-
Save Graph Settings	-	-
Load Graph Settings	F8	-
Zoom In	Ctrl + '+'	
Zoom Out	Ctrl + '-'	
Export As ASCII	-	-

## Window Menu

Menu Command	Hotkey	Icon
New Window	-	-
Cascade	-	-
Tile	-	-














## Help Menu

Menu Command	Hotkey	Icon
NDI DataView Help	F1	-
About NDI DataView	-	-

## 6 Appendix B: Icon Guide







### 6.1 Main Window Toolbar Icons

These icons appear on the toolbar of the NDI DataView main window:

	<b>Open</b>	Opens a data file.
	<b>Print</b>	Prints a data file.
	<b>Go To Line</b>	Jumps to a specific line in a table view.
	<b>Frame Number</b>	Toggles display of the frame number in a table view.
	<b>Frame Time</b>	Toggles display of the frame time in a table view sorted by item.
	<b>Display Graph</b>	Creates a graph from an existing table.
	<b>Vertical Auto Range</b>	Automatically sets the vertical range of a graph based on the data between the tabs.
	<b>Show/Hide Lines</b>	Selects the datasets to be displayed in a graph.
	<b>Line Properties</b>	Changes the appearance of datasets in a graph.
	<b>Statistics Panel</b>	Toggles display of the statistics panel in a graph.
	<b>Graph Grid</b>	Toggles display of the grid in a graph.
	<b>Zoom In</b>	Zooms display of a graph in to the range defined by the tabs.
	<b>Zoom Out</b>	Zooms display of a graph out to its previous size.

## 6.2 File Type Icons

These icons appear in the title bars of table and graph windows:

	<b>3D Data</b>	Identifies a 3D data file.
	<b>Generic Data</b>	Identifies a generic floating point data file.
	<b>Raw Data</b>	Identifies a raw or full raw data file.
	<b>ODAU Raw Data</b>	Identifies an ODAU raw data file.
	<b>ODAU Voltage Data</b>	Identifies an ODAU voltage data file.
	<b>Transformation Data</b>	Identifies a transformation data file.

# Index

## Numerics

3D Data, 77  
 3D Data File, 73, 77  
 6D Data, 77  
 6D Data File, 77

## A

Active Marker, 78  
 Amplification, 73, 78  
 Appearance  
   Changing Axis, 48  
   Changing Graph, 47  
   Changing Line, 49  
   Changing Point, 49  
 ASCII File Format, 78  
 ASCII File Header, 79  
 ASCII File Separator, 79  
 Auto Scale, 53  
 Axis Properties, 48

## B

Browse Bar, 79  
 Browsing  
   for a Data File, 6  
   for a Search Location, 19

## C

Centroid, 73, 79  
 Changing  
   Axis Names, 48  
   Axis Ranges, 48  
   Data Values, 32  
   File Header, 21  
   Graph Settings, 47  
   Line Properties, 49  
   Miscellaneous Graph Options, 53  
   Precision, 31  
 Channel, 74  
 Character Subitems, 22  
 Code  
   Error, 73, 80

Status, 90  
 Collection  
   Date, 21  
   Time, 21  
 Comma Separated Values, 80  
 Comments  
   System, 22  
   User, 22  
 Common Procedures, 6  
 Conventions, File Naming, 76, 82  
 Creating  
   Graphs, 37  
   Tables, 23  
 Creating a Graph  
   with Data Viewed by Frame, 40  
   with Data Viewed by Item, 37  
 Creating a Table, 23  
 Custom File Type, 13, 16  
 Cutoff Frequency, 22

## D

Data  
   3D, 77  
   6D, 77  
   Browsing for a File, 6  
   Changing Precision of, 31  
   Editing, 32  
   Full Raw, 82  
   Missing, 84  
   ODAU Raw, 85  
   ODAU Voltage, 86  
   Opening Files, 6  
   Raw, 87  
   Searching for a File, 15  
   Transformation, 91  
   Viewing by Frame, 28  
   Viewing by Item, 24  
   Viewing in a Graph, 36  
   Viewing in a Table, 23  
 Data File Types  
   3D, 73, 77  
   6D, 77  
   Full Raw, 83  
   ODAU Raw, 74, 85  
   ODAU Voltage, 74, 86  
   Raw, 73, 87  
   Saving, 34  
   Transformation, 74, 91



- Data Files
  - Browsing for, 6
  - Opening, 6
  - Saving, 34
  - Searching for, 15
- Data Point
  - Displaying Statistics for, 62
  - Selecting, 59
- Dataset
  - Displaying Statistics for, 60
- Datasets
  - Selecting, 42, 45
  - Showing or Hiding, 53
- DataView
  - Installing, 1
  - Main Window, 2
  - Starting, 7
- Date, Collection, 21
- Default
  - Install Location, 1
- Delimiter, 79
- Displaying
  - Frame Time, 27
  - Statistics About a Data Point, 62
  - Statistics About a Dataset, 60
- Docking Bar, 80
- Double Subitems, 22

## E

- Edit Menu, 93
- Editing
  - Data, 32
  - File Header, 21
- Error
  - Code, 73, 80
  - Root-Mean-Square (RMS), 74, 88
- Euler Rotation, 81
- Explorer Bar, 2, 82
- Exporting Data, 70

## F

- File Breakdown, 73
- File Header, 21, 79, 82
- File Menu, 92
- File Names, 76, 82
- File Naming Conventions, 76, 82
- File Separator, 79
- File Type Icons, 97
- File Types

- 3D Data, 73, 77
- 6D Data, 77
- ASCII, 78
- Custom, 13, 16
- Data, 73
- Full Raw Data, 83
- NDI Floating Point, 85
- ODAU Raw Data, 74, 85
- ODAU Voltage Data, 74, 86
- Raw Data, 73, 87
- Transformation Data, 74, 91
- Floating Point File Format, 73, 82, 85
- Floating Point Subitems, 21
- Frame
  - Viewing Data by, 28
- Frame Time
  - Showing and Hiding, 27
- Frames, 21
- Frequency
  - Cutoff, 22
  - Sample, 22
- Full Raw Data, 82
- Full Raw Data File, 83

## G

- Getting Started, 1
- Glossary, 77
- Graph
  - Creating, 37, 40
  - Viewing Data in a, 36
- Graph Menu, 95
- Graph Settings
  - Axis, 48
  - Changing, 47
  - Line and Point, 49
  - Miscellaneous, 53
  - Saving, 55
- Graph Statistics
  - Displaying About a Data Point, 62
  - Displaying About a Dataset, 60
  - High, 59
  - Low, 59
  - Max Y, 60
  - Min Y, 60
  - Setting Range for, 65
  - Setting Reference Points, 63
  - Working with, 59
  - X Diff, 64
  - Y Diff, 64
  - Y Range, 60
- Graph View, 4, 83

- Graph Window, 4
- Graphs
  - Exporting Data, 70
- Graphs Settings
  - Loading, 57
- Grid, 53
- Guide
  - How to Use this, 1
  - Icon, 96
  - Menu, 92

## **H**

- Header, 21, 79, 82
- Help Menu, 95
- Hiding
  - Datasets, 53
  - Frame Time, 27
  - Grid, 53
  - Lines, 53
  - Statistics Panel, 53
  - Tabs, 53
- High, 59
- How to Use this Guide, 1

## **I**

- Icon Guide, 96
- Icons
  - File Type, 97
  - Main Window Toolbar, 96
- InfraRed light Emitting Diode (IRED), 83
- Install Location, 1
- Installing, 1
- Integer Subitems, 22
- IRED, 83
- Item, 74, 76, 84
  - Viewing Data by, 24
- Item Size, 22
- Items, 21, 75

## **L**

- Legend, 53
- Lines
  - Changing Properties, 49
  - Showing or Hiding, 53
- Link, 84
- Loading

- a Data File, 8
  - Data Files, 6, 15
  - Graph Settings, 57
- Low, 59

## **M**

- Main Window
  - Icons, 96
- Main Window Sections, 2
- Marker, 45, 78, 84
- Marker Precision, 31
- Max Y, 60
- Menu Bar, 2
- Menu Guide, 92
- Menus
  - Edit, 93
  - File, 92
  - Graph, 95
  - Help, 95
  - View, 94
  - Window, 95
- Min Y, 60
- Miscellaneous Graph Options, 53
- Missing Data, 84

## **N**

- Name
  - Changing Axis, 48
- Naming Conventions, 76, 82
- NDI DataView
  - Installing, 1
  - Main Window, 2
  - Starting, 7
- NDI Floating Point File Format, 73, 85

## **O**

- ODAU, 86
- ODAU Raw Data, 85
- ODAU Raw Data File, 74, 85
- ODAU Voltage Data, 86
- ODAU Voltage Data File, 74, 86
- Opening
  - a Data File, 8
  - Data Files, 6, 15
  - Graph Settings, 57
- Options

Miscellaneous Graph, 53  
 Optotrak Data Acquisition Unit (ODAU), 86  
 Orientation  
   Euler, 81  
   Quaternion, 87

## P

Peak, 73, 86  
 Point  
   Reference, 59  
 Point Properties, 49  
 Points  
   Setting Reference, 63  
 Precision, 31  
 Procedures  
   Opening Data Files, 6  
   Viewing Data in a Graph, 36  
   Viewing Data in a Table, 23  
 Properties  
   Changing Axis, 48  
   Changing Graph, 47  
   Changing Point, 49

## Q

Q0, Qx, Qy, and Qz, 74  
 Quaternion Rotation, 87

## R

Range  
   Changing Axis, 48  
   Limiting Statistics, 65  
 Raw Data, 87  
 Raw Data File, 73, 87  
 Reference Point, 59  
 Reference Points, Setting, 63  
 Rigid Body, 87  
 Root-Mean-Square (RMS) Error, 74, 88  
 Rotation  
   Euler, 81  
   Quaternion, 87  
 Rotation Matrix, 88  
 Rx, Ry, and Rz, 74

## S

Sample Frequency, 22  
 Saving  
   a Data File, 34  
   Data in ASCII Format, 70  
   Graph Settings, 55  
 Scaling  
   Automatic, 53  
   Setting Axis, 48  
 Search Bar, 89  
 Search Location  
   Browsing for, 19  
 Searching  
   for a Data File, 15  
 Select Range Section, 45  
 Selecting  
   Data Points, 59  
   Datasets, 42, 45  
   Reference Points, 63  
 Separator, 79  
 Setting Up, 1  
 Settings  
   Miscellaneous Graph, 53  
   Saving Graph, 55  
 Showing  
   Datasets, 53  
   Frame Time, 27  
   Grid, 53  
   Legend, 53  
   Lines, 53  
   Main Window, 7  
   Statistics Panel, 53  
   Tabs, 53  
 Signal  
   Strength, 89  
 Size, Item, 22  
 Space Separated Values, 89  
 Starting NDI DataView, 7  
 Statistics  
   Displaying About a Data Point, 62  
   Displaying About a Dataset, 60  
   High, 59  
   Limiting Range with Tabs, 65  
   Low, 59  
   Max Y, 60  
   Min Y, 60  
   Setting Range for, 65  
   Setting Reference Points, 63  
   X Diff, 64  
   Y Diff, 64  
   Y Range, 60  
 Statistics Panel, 53

- Status Bar, 2, 89
- Status Code, 90
- Strength, Signal, 89
- Subitem, 76, 90
- Subitems
  - Character, 22
  - Double, 22
  - Floating Point, 21
  - Integer, 22
  - Types, 75
- System Comments, 22

## **T**

- Tab Separated Values, 90
- Table
  - Changing Precision in, 31
  - Viewing Data in a, 23
- Table View, 3
- Table Window, 3
- Tabs
  - Limiting Statistics Ranges with, 65
  - Showing or Hiding, 53
  - Zooming with, 68
- Time, Collection, 21
- Toolbar, 2, 90
- Toolbar Icons, 96
- Total
  - Frames, 21
  - Items, 21
- Transformation Data, 91
- Transformation Data File, 74, 91
- Tx, Ty, and Tz, 74

## **U**

- User Comments, 22

## **V**

- Values
  - Comma Separated, 80

- Space Separated, 89
- Tab Separated, 90
- View Menu, 94
- Viewing, 24
- Viewing Data
  - by Frame, 28
  - by Item, 24
  - in a Graph, 36
  - in a Table, 23
- Views
  - Graph, 4
  - Table, 3
  - Working with, 5
- Voltage, 74

## **W**

- Window Menu, 95
- Windows
  - Graph, 4
  - Main Window, 2
  - Table, 3
- Working with
  - Graph Statistics, 59
  - Views, 5

## **X**

- X Diff, 64
- X, Y, and Z, 73

## **Y**

- Y Diff, 64
- Y Range, 60

## **Z**

- Zooming, 68