

# Chapter N: The Motus File Converter Tool

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DATAPAC 2000 User's Manual, Ver 2.0

# Chapter N: The Motus Converter Tool

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## **N-1. Introduction to the Peak Motus File Converter Tool.**


The purpose of the Motus file converter tool is to import Peak Performance Technologies' Motus 2D and 3D kinematic data files into a DATAPAC 2000 compatible format so that the data they contain can be displayed, processed, and analyzed within DATAPAC 2000. Once converted, kinematic data can be merged with analog data as well.

As you probably already know, the Motus system distributes information across many individual component files. For example, displacement information associated with individual markers are contained within one file, velocity information in another, and acceleration information in still another. The same is true for angular data. The Motus file converter tool allows you to select information from any or all of the various individual component files and consolidates it into a single data file for use in DATAPAC 2000. Thus, you can combine point and angle displacement, velocity, and acceleration data all together in a single file.

Note that the Motus file converter tool is intended for the conversion of kinematic data only. It is not intended for analog data simply because it doesn't need to be. Motus analog data files can be accessed by DATAPAC 2000 in their original, native format. Consequently, if your intention is to use DATAPAC 2000 to display, process, and analyze analog data acquired with your Motus system, there is nothing you

need to do other than to adjust your ADC Hardware and ADC Software settings accordingly, as described in Chapter 1, Section 1-5.

If, on the other hand, your intention is to merge kinematic with analog data, the two forms of data must be converted to a common format prior to being merged. See Section N-5 for more information on how to prepare and merge kinematic and analog data.

 If you intend to modify Motus analog data files, please see Section N-6.

## N-2. Getting Started

### Configuring DATAPAC 2000 to use the Motus File Converter

DATAPAC 2000 must be configured correctly before you are allowed to enter the Motus file converter tool. More specifically, you must have your ADC Hardware and ADC Software configuration options set to **Peak Performance** and **Peak Perf: Import Motus Kinematic/Analog**, respectively. To adjust your ADC Hardware and ADC Software options, select **Preferences|ADC Hardware** and **Preferences|ADC Software**, respectively, from DATAPAC 2000's main window menu bar.

The Motus file converter tool searches for the data it will import in the directory you specify after you select one of the "Import..." options within the file converter tool. More information about specifying the import file directory is provided in the sections covering those issues (Sections N-3 and N-4). In contrast, the output files (i.e., the DATAPAC 2000 compatible files created as a result of the conversion process) are always stored in the directory designated as the default data file directory. Select **Preferences|File Paths** from the DATAPAC 2000 main window menu bar to select the default data file directory before entering the Motus file conversion tool.

### Entering the Motus File Converter

To access the Motus file converter tool, select **Tools|Motus Converter** from the DATAPAC 2000 main window menu bar to produce the following menu:

**Import 2D Kinematic Data**  
**Import 3D Kinematic Data**

Select the option corresponding to the type of kinematic data you have. Additional information is provided in Sections N-3 and N-4.

## N-3. Importing 2D Kinematic Data

### Selecting the File to Import

The **Import 2D Kinematic Data** option of the Motus file converter tool menu is used to import Motus 2D kinematic data files into DATAPAC 2000 compatible data files. Upon selecting the Import 2D Kinematic Data option a file directory window appears, allowing you to select the Motus trial file (the Motus component file with the extension, .trl) from which you wish to import kinematic data from. Why the trial file? Because it alone contains the information DATAPAC 2000 needs to accurately interpret the information in all the other component files. An example of such a directory window is shown in Figure N-1.

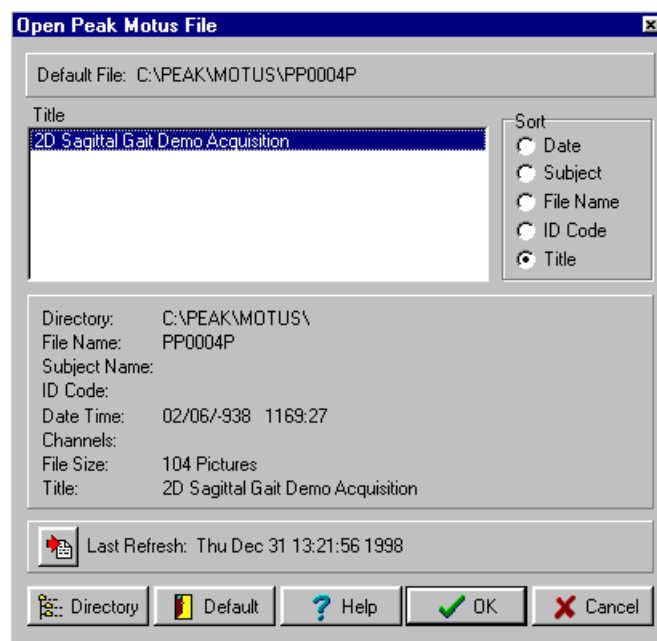


Figure N-1. The file directory window that is presented to allow selection of the desired Motus kinematic trial file.

When the file directory window first appears it searches the default data file directory named in the **Preferences|File Paths** option of the DATAPAC 2000 main window menu bar. To search a different directory, select the **Directory** button. Note that the file directory window contains a section entitled **Sort**. Depending upon which sort option is selected, the files in the target directory are listed in the order in which they were copied to the directory (Directory), the name of the subject for which the data were acquired (Subject), and so on. The Motus system internally identifies files by an extended title, not its name. To identify files in the same way within DATAPAC 2000, make sure Sort option is set to **Title**. Then highlight the data file you wish to access in the **Title** list box to the left of the sort section. Finally, select the **OK** button along the bottom of the window to close the file directory window and load the selected data file.

### Selecting the Data to Import

When the file directory window closes the **Import 2D** window opens. This is the window that contains the parameters that govern the way data are imported into a DATAPAC 2000 compatible data file. An example is provided in Figure N-2.

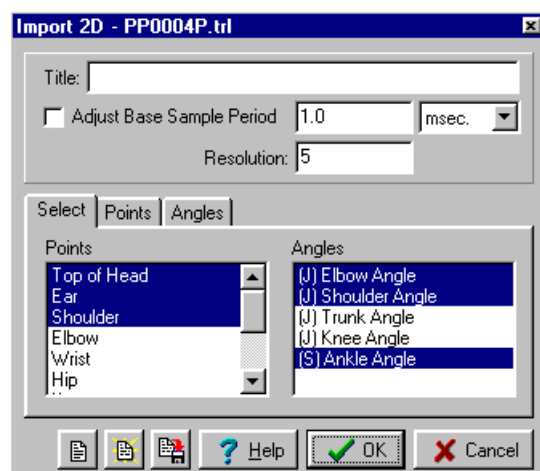


Figure N-2. An example of the Import 2D parameter window.

As Figure N-2 illustrates, the **Import 2D** window is divided into an upper and a lower part, with the lower part containing three tabbed sections. The upper part of the window contains a space for entering a **Title**, as well as enabling or disabling the **Adjust Base Sample Period** parameters. The title is stored, along with the other parameters, to a parameter file, should you elect to save one. Once stored it can be used as a long file name when the file is later retrieved. Other than that it serves no purpose (and it does not serve as the title of the imported data file). The **Adjust Base Sample Period** parameters need to be considered only if you intend to merge the file you are about to import with another file (usually an analog data file). For additional information on the Adjust Base Sample Period option, please see Section N-5.

The three tabs in the lower part of the window collectively contain the parameters that determine what specific kinds of kinematic data are to be imported. As you may know, the Motus system saves different kinds of point and angular data in different component files. Each file is assigned a unique filename extension according to the kind of data contained in it. For example, the file with the extension, RDA contains the raw displacement data obtained for each recorded spatial point. Table N-1 briefly describes the contents of each type of component file. As indicated in the table, each component file contains the data obtained for the recorded spatial points, or for the angles computed from those points. Spatial point data are stored in different component files than angular data. In the spatial point files, two or three different kinds of data are stored for each individual point and the center of mass (which is treated as an additional individual point). Each particular kind of data, obtained for each individual point, is considered a separate channel. In the angular data files, however, only one kind of data are stored for each computed angle. Thus, in the angular data files, the number of channels equals the number of computed angles.

**Table N-1: Types of Motus 2D Kinematic Data Files****Spatial Point Data Files****Raw Displacement Data (RDA)**

X coordinate of each point

Y coordinate of each point

**Conditioned Displacement Data (CDA)**

X coordinate of each point

Y coordinate of each point

magnitude of resultant vector of each point in the X-Y plane

**Linear Displacement Data (2LD)**

X coordinate of each point

Y coordinate of each point

magnitude of resultant vector of each point in the X-Y plane

**Linear Velocity Data (VDA)**

X coordinate of each point

Y coordinate of each point

magnitude of resultant vector of each point in the X-Y plane

**Linear Acceleration Data (LDA)**

X coordinate of each point

Y coordinate of each point

magnitude of resultant vector of each point in the X-Y plane

\* center of mass is computed for all points combined.

\*\* the X, Y, and resultant coordinates of all points are selected or deselected together, rather than individually.

**Angular Data Files****Angular Displacement File (ADA)**

angular displacement data for each angle\*

**Angular Velocity File (WDA)**

angular acceleration data for each angle\*

**Angular Acceleration File (MDA)**

angular acceleration data for each angle\*

\* J = joint angles, S = segment angles

When summed together the total number of channels contained in all of the various kinds of Motus kinematic data files can be very large. However, when importing the data into a DATAPAC 2000 compatible file, all of the various kinds of data are combined into one file. The number of channels in that file is limited to a maximum of 512. Thus, it is the user's task to decide which kinds of data are to be imported. That is the purpose of the three tabs in the window's lower section.

**The Select, Points and Angles Tabs**

The **Select** tab indicates the points and/or angles for which information exists in the Motus system (the center of mass, computed for all available points, is also treated as an additional point). The contents of the Select tab was shown in Figure N-2 in the previous section. Highlight the points or angles for which you wish to import information. Then select the kinds of information you wish to import with the **Points** and **Angles** tabs. Use the **Points** tab to determine what specific kinds of information will be imported about each point, and the **Angles** tab to determine what specific kinds of information will be imported about each angle.

An example of the **Points** tab is shown in Figure N-3. As you can see, the tab lists the different kinds of files in the Motus system that are devoted to storing information about individual points and indicates the available types of information contained in each. If a particular file does not exist in the Motus system, the line corresponding to it is grayed out. Note that all of the files except the RDA file contain X and Y coordinate values as well as resultant vector values for each point. The RDA file contains X and Y coordinate values for each point but no resultant vector values. If you want to import a particular kind of data, check the checkbox associated with it. Conversely, clear the check box if you wish to exclude the corresponding kind of data. Note that *when you check a particular check box, the associated type of information is imported for all of the points highlighted in the **Select** tab.*

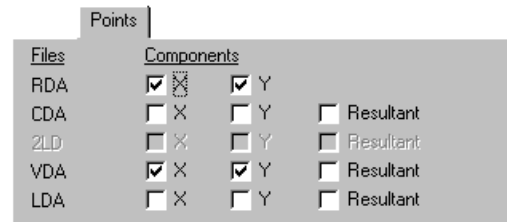


Figure N-3. An example of the Points tab in the Import 2D parameter window.

An example of the **Angles** tab is shown in Figure N-4. Like the Points tab, the Angles tab lists the different kinds of files that are devoted to storing information about individual joint or segment angles. In the case of angles, however, there is only one kind of data stored for each individual angle. If a particular file does not exist in the Motus system, the line corresponding to it is grayed out. If you want to import a particular kind of data, check the checkbox associated with it. Conversely, clear the check box if you wish to exclude the corresponding kind of data. Note that *when you check a particular check box, the associated type of information is imported for all of the angles highlighted in the **Select** tab.*

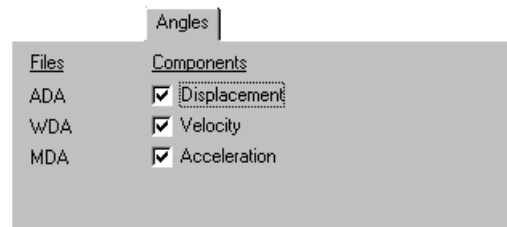




Figure N-4. An example of the Angles tab in the Import 2D parameter window.

 As you probably already know, the Motus system creates most of the different kinds of data files only on demand. Files which do not exist are grayed out in the **Points** and **Angles** tabs.

## Verifying Your Selections

Click the  (View Parameters) button to view a list of all the channels that will be created when you import your data. This is a good way to verify the accuracy of all your settings before creating the import file.

## Completing the Import Process

After selecting the types of data you wish to import along with the points and angles for which they are imported, select the **OK** button to start the import process. A window opens, allowing you to enter a name for the DATAPAC 2000 compatible data file you are about to create. The file is created on the directory designated as the default data file directory during DATAPAC 2000 configuration (see Chapter 1, Section 1-5 for details). After naming the file you are presented with the **Subject Record Window**, allowing you to enter comments and whatever information you deem appropriate about the subject from whom the data were acquired (see Chapter 1, Section 1-7 for details). When you close the window the import process is completed and the newly imported data file automatically becomes the open data file. Note that the import process does not affect the original Motus source data files in any way.

## N-4. Importing 3D Kinematic Data

### Selecting the File to Import

The **Import 3D Kinematic Data** option of the Motus file converter tool menu is used to import Motus 3D kinematic data files into DATAPAC 2000 compatible data files. Upon selecting the Import 3D Kinematic Data option a file directory window appears, allowing you to select the Motus trial file (the Motus component file with the extension, .trl) from which you wish to import kinematic data from. Why the trial file? Because it alone contains the information DATAPAC 2000 needs to accurately interpret the information in all the other component files. An example of such a directory window is shown in Figure N-5.

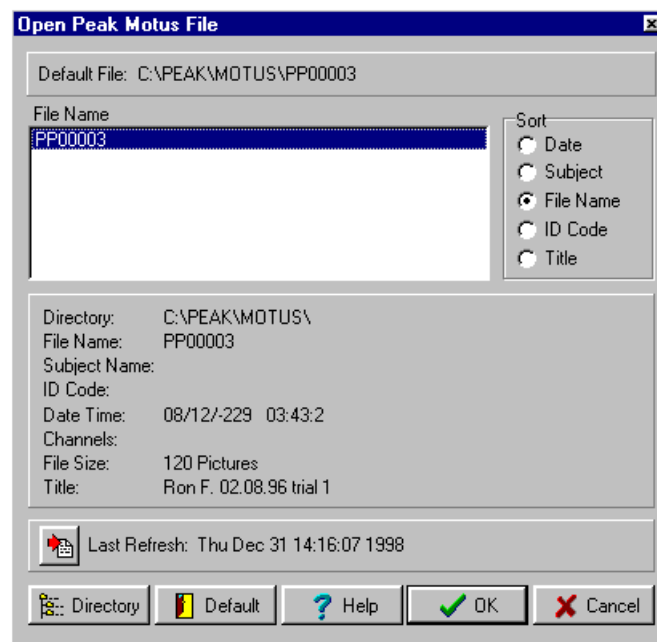


Figure N-5. The file directory window that is presented to allow selection of the desired Motus kinematic trial file.

When the file directory window first appears it searches the default data file directory named in the **Preferences|File Paths** option of the DATAPAC 2000 main window menu bar. To search a different directory, select the **Directory** button.

Note that the file directory window contains a section entitled **Sort**. Depending upon which sort option is selected, the files in the target directory are listed in the order in which they were copied to the directory (Directory), the name of the subject for which the data were acquired (Subject), and so on. The Motus system internally identifies files by an extended title, not its name. To identify files in the same way within DATAPAC 2000, make sure Sort option is set to **Title**. Then highlight the data file you wish to access in the **Title** list box to the left of the sort section. Finally, select the **OK** button along the bottom of the window to close the file directory window and load the selected data file.

## Selecting the Data to Import

When the file directory window closes the **Import 3D** window opens. This is the window that contains the parameters that govern the way data are imported into a DATAPAC 2000 compatible data file. An example is provided in Figure N-6.

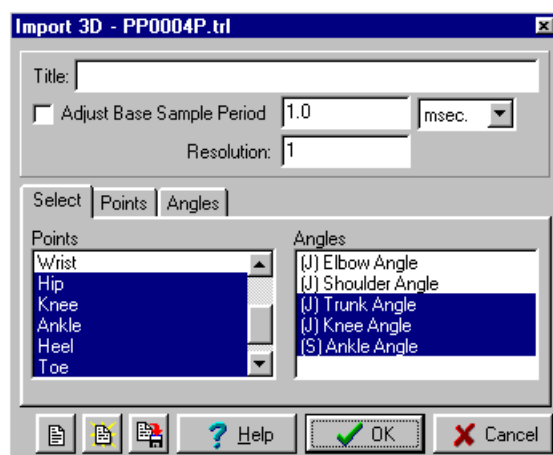


Figure N-6. An example of the Import 3D parameter window.

As Figure N-7 illustrates, the **Import 3D** window is divided into an upper and a lower part, with the lower part containing three tabbed sections. The upper part of the window contains a space for entering a **Title**, as well as enabling or disabling the **Adjust Base Sample Period** parameters. The title is stored, along with the other parameters, to a parameter file, should you elect to save one. Once stored it can be used as a long file name when the file is later retrieved. Other than that it serves no purpose (and it does not serve as the title of the imported data file). The **Adjust Base Sample Period** parameters need to be considered only if you intend to merge the file you are about to import with another file (usually an analog data file). For additional information on the Adjust Base Sample Period option, please see Section N-5.

The three tabs in the lower part of the window collectively contain the parameters that determine what specific kinds of kinematic data are to be imported. As you may know, the Motus system saves different kinds of point and angular data in different component files. Each file is assigned a unique filename extension according to the kind of data contained in it. For example, the file with the extension, 3RN contains the raw displacement data obtained for each recorded spatial point whereas the file with the extension, 3LV contains the linear velocity data computed for each recorded spatial point. Table N-2 briefly describes the contents of each type of component file. As indicated in the table, each component file contains the data obtained for the recorded spatial points, or for the angles computed from those points. Spatial point data are stored in different component files than angular data. In the spatial point files, two or three different kinds of data are stored for each individual point and the center of mass (which is treated as an additional individual point). Each particular kind of data, obtained for each individual point, is considered a separate channel. In the angular data files, however, only one kind of data are

stored for each computed angle. Thus, in the angular data files, the number of channels equals the number of computed angles.

**Table N-2: Types of Motus 3D Kinematic Data Files**

### **Spatial Point Data Files**

#### **Raw Displacement Data (3RN)**

X coordinate of each point  
Y coordinate of each point  
Z coordinate of each point

#### **Conditioned Displacement Data (3TD)**

X coordinate of each point  
Y coordinate of each point  
Z coordinate of each point  
magnitude of the resultant vector for each point in 3D space

#### **Linear Displacement Data (3LD)**

X coordinate of each point  
Y coordinate of each point  
Z coordinate of each point  
magnitude of the resultant vector for each point in 3D space

#### **Linear Velocity Data (3LV)**

X coordinate of each point  
coordinate of each point  
coordinate of each point  
magnitude of the resultant vector for each point in 3D space

#### **Linear Acceleration Data (3LA)**

X coordinate of each point  
Y coordinate of each point  
Z coordinate of each point  
magnitude of the resultant vector for each point in 3D space

\* center of mass is computed for all points combined.

\*\* the X, Y, or Z coordinates of all reference points are selected or deselected together, rather than individually.

### **Angular Data Files**

#### **Angular Displacement File (3AD)**

angular displacement data for each angle\*

#### **Angular Velocity File (3AV)**

angular velocity data for each angle\*

#### **Angular Acceleration File (3AA)**

angular acceleration data for each angle\*

\* J = joint angles, S = segment angles, PJ = projected joint angles, SP = segment to plane angles, PS = projected segment angles

When summed together the total number of channels contained in all of the various kinds of Motus kinematic data files can be very large. However, when importing the data into a DATAPAC 2000 compatible file, all of the various kinds of data are combined into one file. The number of channels in that file is limited to a maximum of 512. Thus, it is the user's task to decide which kinds of data are to be imported. That is the purpose of the three tabs in the window's lower section.

## The Select, Points and Angles Tabs

The **Select** tab indicates the points and/or angles for which information exists in the Motus system (the center of mass, computed for all available points, is also treated as an additional point). The contents of the Select tab was shown in Figure N-6 in the previous section. Highlight the points or angles for which you wish to import information. Then select the kinds of information you wish to import with the **Points** and **Angles** tabs. Use the **Points** tab to determine what specific kinds of information will be imported about each point, and the **Angles** tab to determine what specific kinds of information will be imported about each angle.

An example of the **Points** tab is shown in Figure N-7. As you can see, the tab lists the different kinds of files in the Motus system that are devoted to storing information about individual points and indicates the available types of information contained in each. If a particular file does not exist in the Motus system, the line corresponding to it is grayed out. Note that all of the files except the 3RN file contain X and Y coordinate values as well as resultant vector values for each point. The 3RN file contains X and Y coordinate values for each point but no resultant vector values. If you want to import a particular kind of data, check the checkbox associated with it. Conversely, clear the check box if you wish to exclude the corresponding kind of data. Note that *when you check a particular check box, the associated type of information is imported for all of the points highlighted in the **Select** tab*. For example, you cannot elect to import the X and Y components from the 3TD file for one selected point without doing the same for all other selected points.

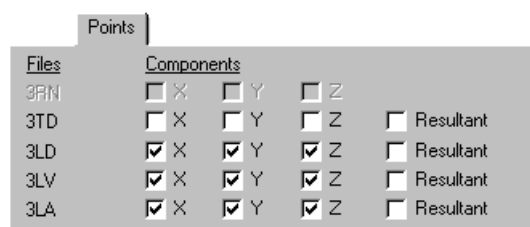


Figure N-7. An example of the Points tab in the Import 3D parameter window.

An example of the **Angles** tab is shown in Figure N-8. Like the Points tab, the Angles tab lists the different kinds of files that are devoted to storing information about individual joint or segment angles. In the case of angles, however, there is only one kind of data stored for each individual angle. If a particular file does not exist in the Motus system, the line corresponding to it is grayed out. If you want to import a particular kind of data, check the checkbox associated with it. Conversely, clear the check box if you wish to exclude the corresponding kind of data. Note that *when you check a particular check box, the associated type of information is imported for all of the angles highlighted in the **Select** tab*.

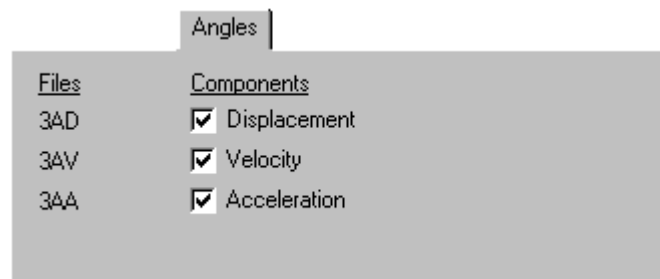




Figure N-8. An example of the Angles tab in the Import 3D parameter window.

 As you probably already know, the Motus system creates most of the different kinds of data files only on demand. Files which do not exist are grayed out in the **Points** and **Angles** tabs.

## Verifying Your Selections

Click the  (View Parameters) button to view a list of all the channels that will be created when you import your data. This is a good way to verify the accuracy of all your settings before creating the import file.

## Completing the Import Process

After selecting the types of data you wish to import along with the points and angles for which they are imported, select the **OK** button to start the import process. A window opens, allowing you to enter a name for the DATAPAC 2000 compatible data file you are about to create. The file is created on the directory designated as the default data file directory during DATAPAC 2000 configuration (see Chapter 1, Section 1-5 for details). After naming the file you are presented with the **Subject Record Window**, allowing you to enter comments and whatever information you deem appropriate about the subject from whom the data were acquired (see Chapter 1, Section 1-7 for details). When you close the window the import process is completed and the newly imported data file automatically becomes the open data file. Note that the import process does not affect the original Motus source data files in any way.

## N-5. Merging Motus Kinematic and Analog Data

To successfully merge kinematic and analog data files, three things must be accomplished. They are briefly described below, and in more detail in the remaining paragraphs of this section.

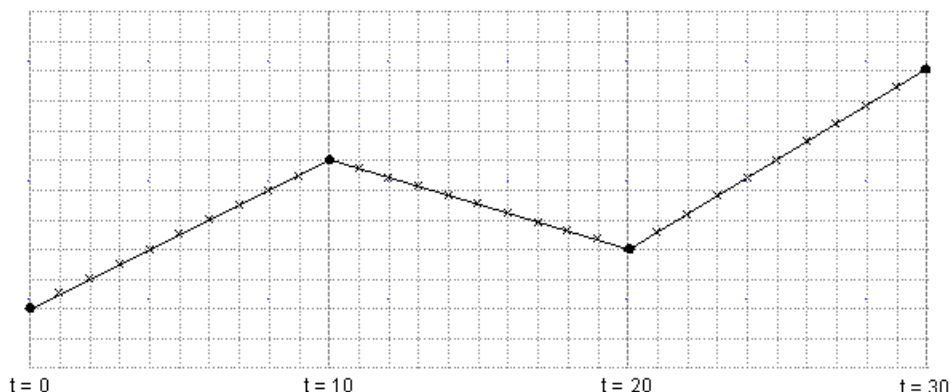
1. The kinematic data file must be converted to a DATAPAC 2000 compatible structure using the Motus Import . When converting the kinematic file it is important to use the **Adjust Base Sample Period** and **Resolution** options, and to set the base sample period value to equal that of the analog file you intend to merge with it.
2. The analog file must be converted to the same DATAPAC 2000 compatible format as the (converted) kinematic file. The Data File Management Module's Convert tool is used for this purpose.
3. After your two files are successfully converted, you are ready to merge them. The merge is accomplished with the **Tools|File Management|Merge** tool.

### Converting the Kinematic Data File (Using the Adjust Sample Period and the Resolution Features)

Details concerning the general use of the Motus kinematic file converter tool are provided in Sections N-3 through N-4. After entering the **Tools|Motus Converter|Import 2D Kinematic Data** or **Import 3D Kinematic Data** feature and reaching the Import 2D or Import 3D parameter window, be sure to check the **Adjust Base Sample Period** check box, then enter the base sample period value of the analog data file you intend to merge with it. For example, if you intend to merge the file you are importing with another file with a base sample period of 500 microseconds, then enter the value **500** and select the **usec** (microseconds) option.

When a file is imported with the Adjust Base Sample Period option in effect the import operation uses a linear interpolation algorithm to estimate the amplitude of each signal at each new sampling interval. In other words, the program assumes an imaginary line between the amplitudes of the original data points, then computes the amplitudes for the locations along those lines at intervals corresponding to the new sample period. The figure below illustrates the operation of the interpolation algorithm. The dots represent the original data points. It can be seen that the sample period used to acquire the original data file was 10 (the units are irrelevant). The crosses (x) indicate the sample points that would be added if

the base sample period was adjusted to 1. Note that the amplitude of the added points fall along a line drawn between the original data points.



It may have already occurred to the reader that one unfortunate consequence of reducing a file's base sample period is that it also increases the number of data points it contains, thus increasing the amount of disk space required to store the file. But that is not necessarily the case, thanks to the **Resolution** parameter. The Resolution parameter allows you to change the *effective sample period* (that is, the sample period used to store the data in the imported data file) to an integer multiple of the base sample period. More specifically, the Resolution value indicates the value by which the base sample period is multiplied to obtain the effective sample period. For example, if the base sample period is set to 500 microseconds and the Resolution value is set to 20, then the effective sample period is 10 milliseconds (20 x 500 usec. = 10 msec). Thus, even though the file's base sample period is 500 microseconds, the data are actually stored using a sample period of 10 milliseconds. It should be noted that the resolution values employed by the two files you intend to merge do not have to be the same. In other words, the *effective sample periods* employed by the two source files can differ as long as the *base sample periods* are the same.



If you intend to later merge the file you are about to import with another file it is generally recommended that you use a Resolution value that will yield an effective sample period that is close to the original sample period value. For example, if the sample period of your original file was 16666 microseconds (i.e., a sampling rate of 60 Hz) and you intend to merge the file with another that employed a base sample period of 500 microseconds, then it is recommended that you use a Resolution value of about 30 to 32. This results in an effective sample period of about 15000 to 16000 microseconds, which is close to the original sample period.


## Converting the Analog File

After converting your kinematic data file, exit the Motus file converter tool and proceed to the **Tools|File Management|Convert** feature to convert your analog data file. As you enter the Convert feature you will be asked to specify the **ADC Software** and **ADC Hardware** options which will serve to determine the file structure of your input analog file. Make sure these are consistent with your analog file. For example, if you are attempting to convert a Motus VMD analog file, select **Peak Perf. Motus Analog VMD** as your ADC Software option and **Peak Performance** as your ADC Hardware option.



It is important to understand that the analog file will be converted to the file structure determined by the ADC Hardware and ADC Software options you selected through the **Preferences** option of the main window's menu bar. Assuming you just completed converting your kinematic file, the appropriate options (ADC Hardware = Peak Performance; ADC Software = Peak Performance: Motus Import Kinematic/Analog) should already be established and you do not need to change them.

After selecting the ADC Software and Hardware options consistent with your analog input file, you are presented with a file directory window to select the file you wish to convert. Highlight the name of the file and select the **OK** button.

 If you want to search for a file in a different directory, click the **Directory** button to change the drive and directory being searched.

Next you are presented with a window that allows you to select the channels of the source file you wish to copy to the new converted data file. An example of the window that appears is shown in Figure N-9.

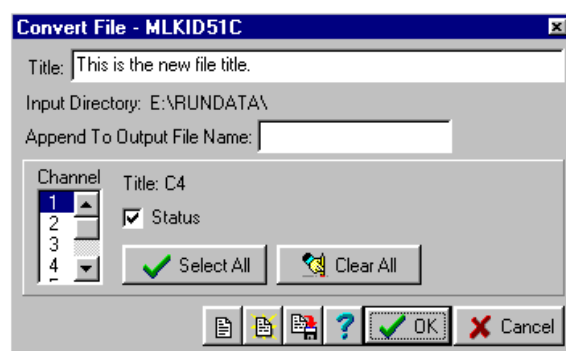


Figure N-9. An example of the Convert File parameters window.

There are many ways to select the channels you wish to include. For example, you can select all of the channels by selecting the **Select All** button. Alternatively, you can select individual channels by highlighting each channel you wish to add in the **Channel** list box and then checking the **Status** check box. [To avoid importing channels you wish to exclude, select the **Clear All** button before you start highlighting individual channels and checking their status.] Finally, you can use the **Load Parameters** button to load a parameter file that specifies which channels to import. Of course, in order to employ this last option you need to have previously saved the import parameters to a file using the **Save Parameters** button.

After making your selections it is a good idea to verify them using the **View Parameters** option to obtain a report of the channels to be imported. Then, when you are ready to proceed, select the **OK** button. The analog data file is now converted and it is made the currently open data file.

## Merging the Analog File with the Kinematic File

To begin the merge operation, select the **Tools|File Management|Merge** option from the main window menu bar. You are then presented with a series of file directory windows for selecting the source files for the operation. Click the **Refresh** button to update the file list. Then highlight the name of the first data file you want to merge (it can be either the converted kinematic file or the converted analog file) and click the **OK** button. When the file directory window reappears, highlight the second file you want to merge and click the **OK** button again. When the file directory window reappears the third time, click the **Cancel** button to terminate the sequence. You are then presented with one final window, allowing you to supply a name for the new data file that you are about to create. Enter only the filename prefix, not an extension. Then click the **OK** button. Your files are now merged, and the merged file becomes the open data file.

## N-6. Issues Concerning Motus Analog Data Files

Read this topic only if you intend to modify a native Motus .RAW, .CAW, or .VMD analog data file from within DATAPAC 2000.

DATAPAC 2000 makes no attempt to update the Motus internal file directory system when a change is introduced to a data file within DATAPAC 2000. For this reason, many of the changes that DATAPAC 2000 makes possible are not recognized by Motus. The general rule of thumb is this: **any modification to a data file that requires a concomitant change in the Motus internal file directory system is not recognized within Motus.** Modifications that do not require updates to the Motus internal file directory system, and thus *are* recognized by Motus, include interpolation operations (performed with the Data File Management Module's **Interpolate** feature) and all waveform processing functions that are permanently applied to the data file using the **Update File** feature within the Waveform Processing module. Modifications made within DATAPAC 2000 which do require modification to the Motus internal file directory system, and thus *are not* recognized by Motus, include changes to the file title or channel titles, channel calibration values, all subject demographic data and user comments, all event files, all functions which result in the generation of a new data file (e.g., file conversion, copy, merge, and concatenation functions), and all waveform processing functions which are applied "on-the-fly". Such changes continue to be recognized by DATAPAC 2000, however.