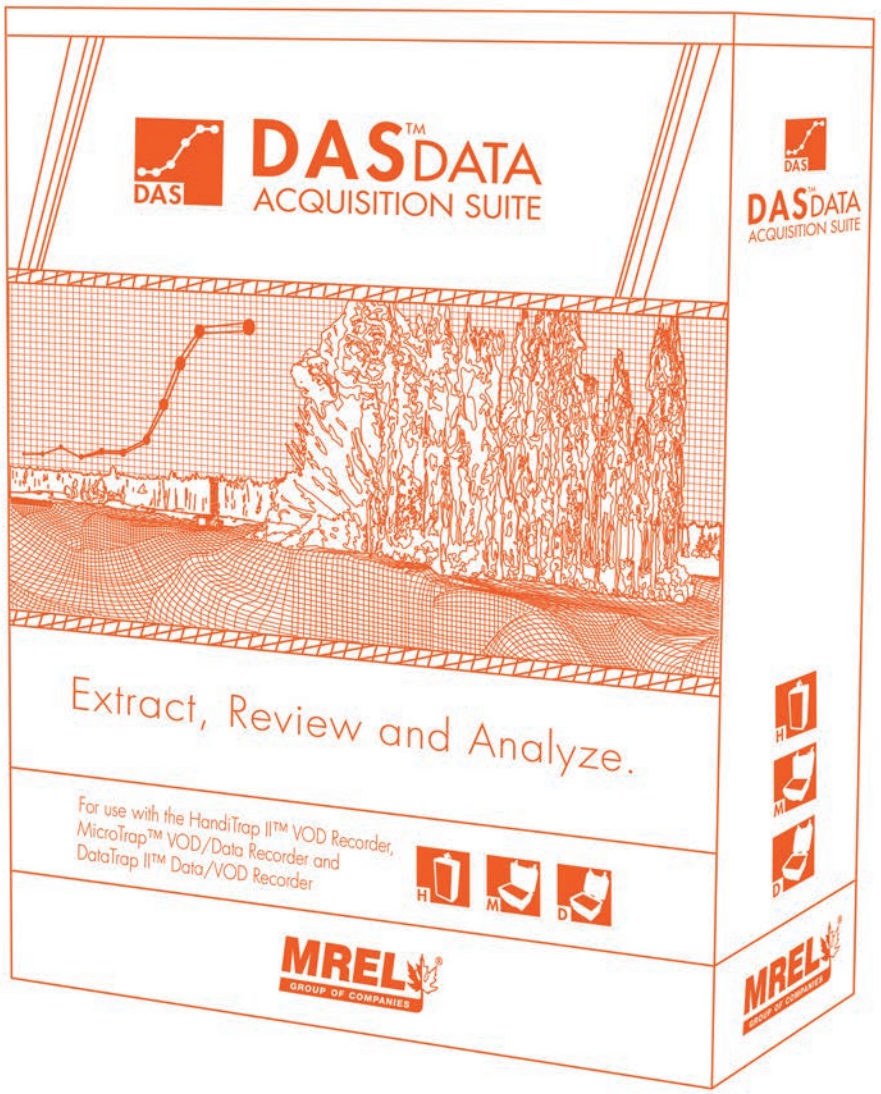
DAS™ DATA ACQUISITION SUITE

Operations Manual

Edition 1.3



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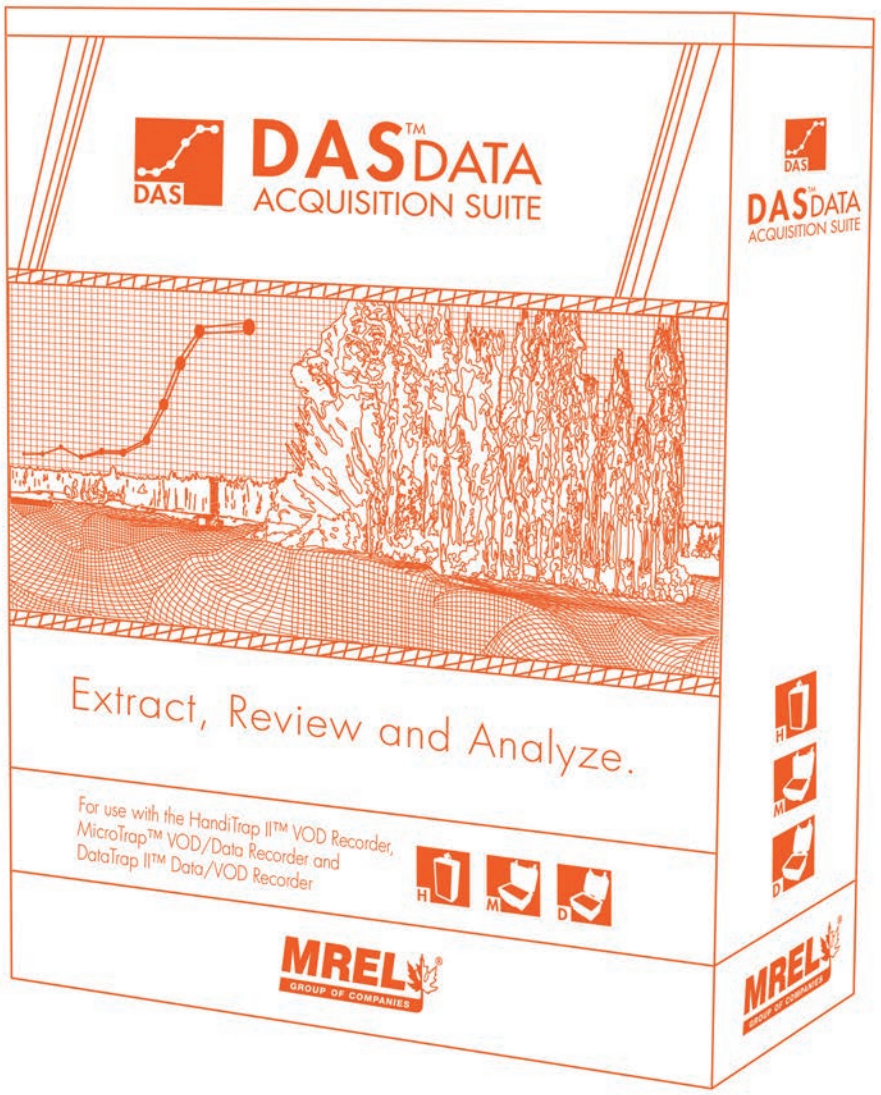


Overview

This is a synopsis of the DAS™ Data Acquisition Suite and its various features.

1.1 Introduction

MREL's DAS™ Data Acquisition Suite has been designed to be utilized with **MREL** VOD/Data recorders. This software suite will allow the user to program (where applicable), download and analyze the data from each recorder. The **DAS™ Data Acquisition Suite** will allow the user to manage all of the files downloaded from **MREL** VOD/Data recorders using a single software.

The **Standard Edition** will allow the user to open data files from any of the three recorders. The user can perform all of the standard features that the users have been accustom to. For a **VOD** channel, the measurements that a user can do are as follows:

- Measure Velocity of Detonation
- Borehole or Sample
- Measure Column Height
- Measure Booster Location
- Measure Time Delay Between Holes
- Measure Effectiveness of Decking

NOTE: Some of the features discussed in this manual are available in **DAS™** version later than 1.0.0.0. Please check for any available updates in **DAS™**.

For a **Scope** channel, the measurements that a user can do are as follows:

- Analyze DC Voltage Data
- Apply Offsets
- Measure Values of Peaks
- Measure Time Between Peaks
- Apply Formulas to Convert Voltage to Engineering Units

For a **Strain** channel, the measurements that a user can do is as follows:

- Convert the data from the strain gauges into Microstrain (μE)

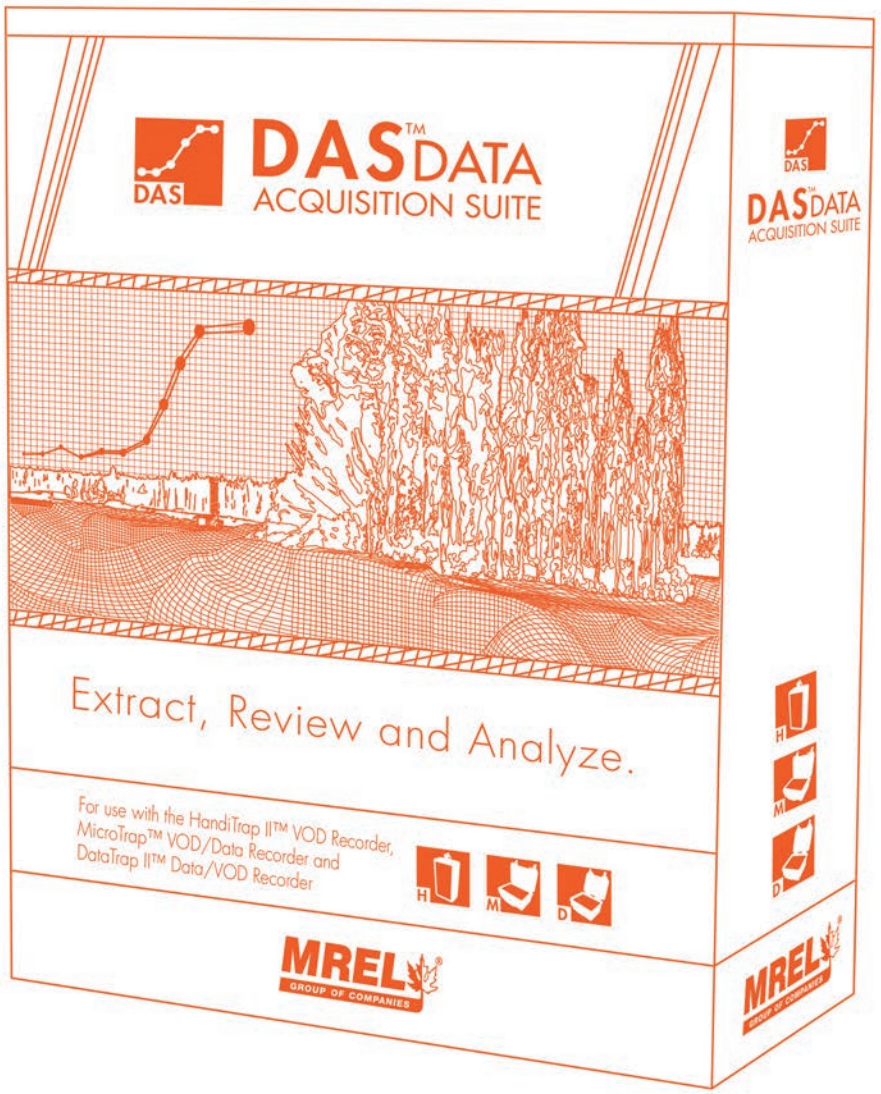
The **Advanced Edition** will allow the user to apply filters to the data to either clean the data up for ease of reading/presentation or to apply a specific filter to allow the data to be compliant with a particular standard. Some additional operations such as curve fitting and integration are available.

The **Advanced Edition** can perform all of the **Standard Edition** features plus the following to a channel data:

- Apply the following filters to the data
  - Bessel
  - Butterworth
  - Chebyshev
  - Elliptic
  - Median
  - Moving Average
  - Savitzky-Golay
  - Windowed Finite Impulse Response
  - Miscellaneous Filters
  - Negative Distance Removal (**VOD** channel only)
- Apply the following operations to one (or two) selected plot/s
  - Curve Fitting (Polynomial, Exponential, Linear, Gaussian etc.)
  - Differentiation and Integration
  - Area under the curve
  - Normalize, Scale, Quick Scale, Clip
  - AC/DC Estimation, Statistics
  - Add, Subtract, Multiply, Divide (all 2-plot operations)

See **Section 8** for more details on the **Advanced Edition**. The software can be downloaded from **www.mrel.com/das** at any time.

Chapter 2
Installation



Overview

This section will step the user through the installation procedure on their computer.

2.1 System Requirements

The minimum system requirements for **DAS™ Data Acquisition Suite** are as follows:

- 32-bit/64-bit CPU: AMD/Intel
- Memory: 2 GB
- Hard disk space: 1 GB, more space is required for large number of files.
- Ports: USB port (internal or powered)
- Monitor resolution: 1200 x 800
- Operating system: Windows XP (SP3) or above (32 or 64 bit)
- Full .NET 4 framework

Administrative type of user account and Internet connection required for registration, upgrades, updates and support. The software can be used offline when not performing any of the previous tasks.

2.2 Recommended System Requirements

The recommended system requirements for **DAS™ Data Acquisition Suite** are as follows:

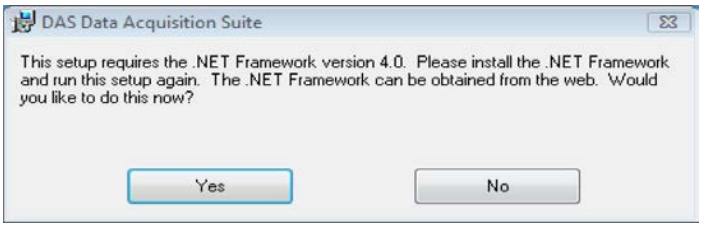
- 64-bit CPU: AMD/Intel
- Memory: 8 GB or more
- Hard disk space: 25 GB or more
- Ports: USB 2.0 or 3.0 port (internal or powered)
- Monitor resolution: 1200 x 800 or more
- Operating system: Windows 7 or above (64-bit)
- Any suitable mail client program such as Microsoft Outlook, Mozilla Thunderbird etc.
- Full .NET 4.5 or above framework
- Administrative type of user account and Internet connection required for registration, upgrades, updates and support. The software can be used offline when not performing any of the previous tasks.

2.3 Prerequisites Installation Process

The **DAS™ Data Acquisition Suite** setup will display a message if necessary prerequisites from internet are needed to be installed first. It will direct user to the correct download page if computer is connected to the internet. If not connected, it will show the error page in the computer's default web browser.

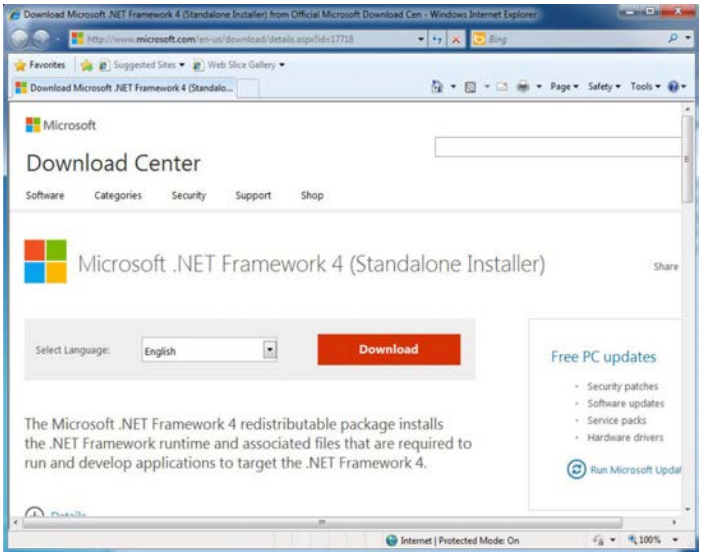
2.3.1 .NET Framework 4.0 Installation Process (if required)

Double click on the **DAS™ Data Acquisition Suite** install package (.msi) file or **Right-Click** on the file and choose install. **You need to be using administrative type of user account on the computer to perform the installation.**



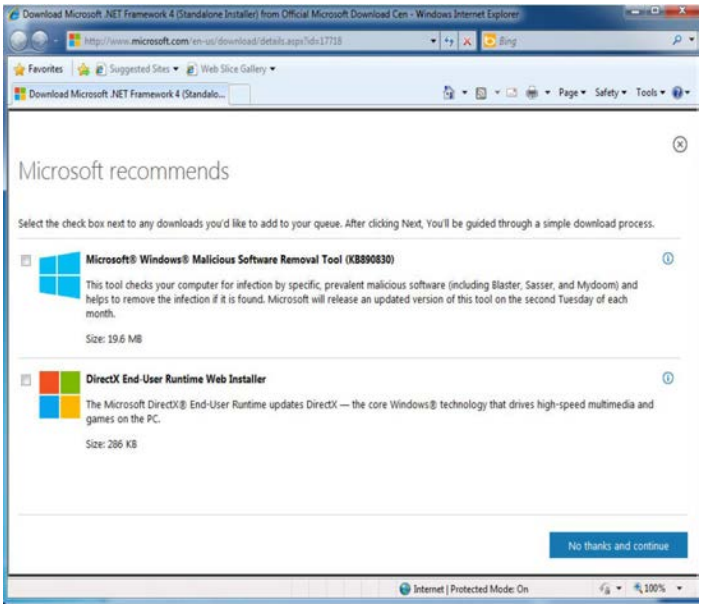
If setup program has detected that the .NET Framework 4.0 is not installed, it will show the message as shown on the right.

If the computer is connected to the internet and user chooses **Yes** in above dialog, the default web browser is opened showing the .**NET Framework 4.0** Full package download page.

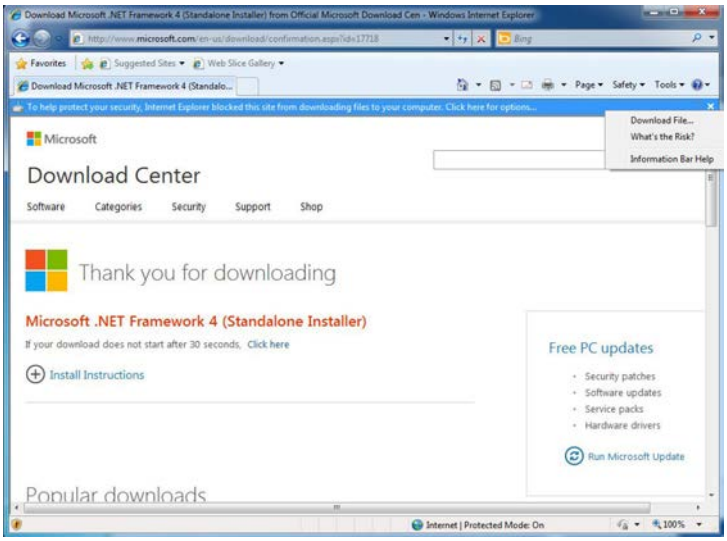


Click the **Download** button to download **.NET Framework 4.0** setup.

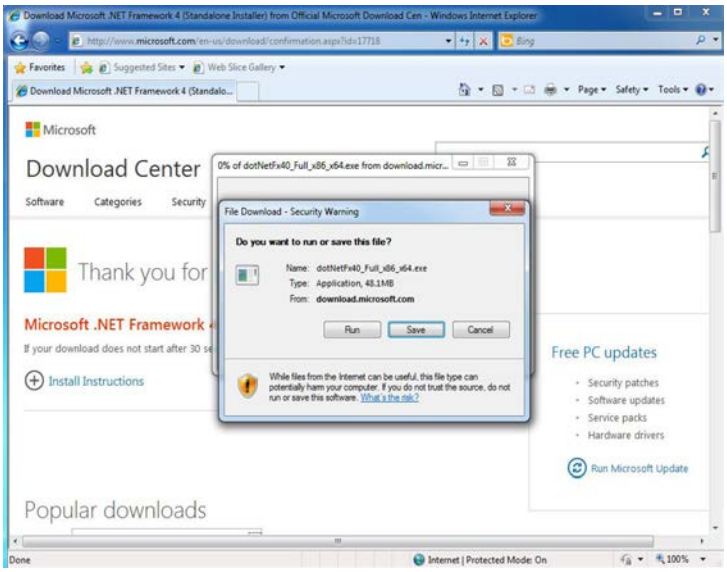
The optional components suggested by the page can be ignored by clicking **No thanks and continue** button as shown to the right.



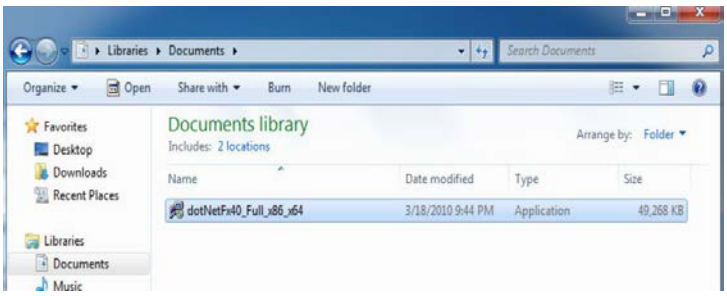
Click the blocked pop-up tool-bar (if pop-up is blocked by browser) and select **Download File...** option as shown to the right.



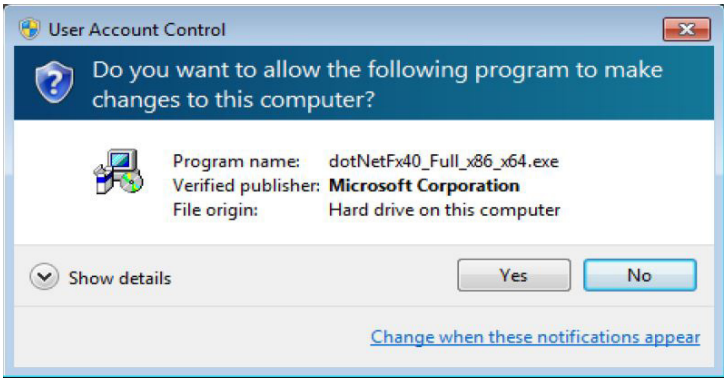
Save the file in a desired temporary location as shown to the right.



Double click the downloaded file (.exe file) to install **.NET Framework 4.0** shown to the right.



Click the **Yes** button in UAC "User Account Control" dialog shown to the right.



The package will uncompress and shows the initial **Microsoft .NET Framework 4 license Agreement** dialog. Check **Accept** check box and click **Install** button as shown to the right.

When Installation finishes with success, you can proceed to run the installation package for **DAS™ Data Acquisition Suite** as described in the following section.

2.4 Installation Process

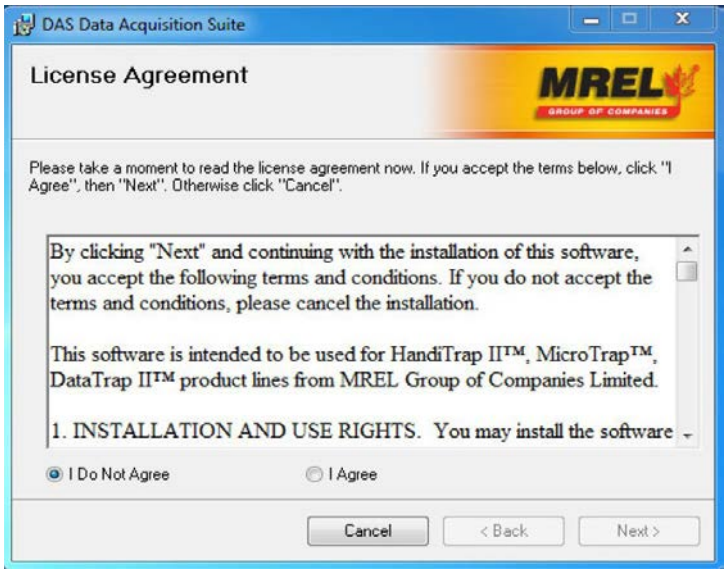
The installation package can be obtained at **http://www.mrel.com/das** and locally save it if you have either not received copy or have misplaced it.

2.4.1 Installation Process for Windows Vista® and Higher

IMPORTANT

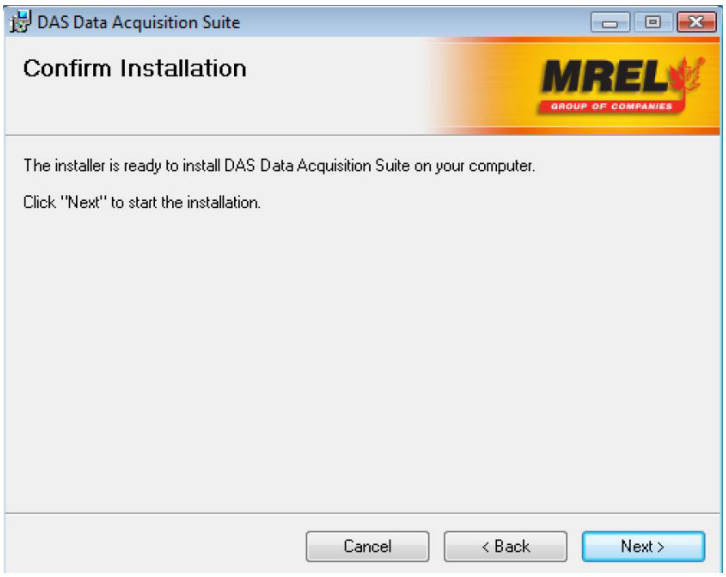
MREL recommends exiting all programs before starting installation.

Double click on the **DAS™ Data Acquisition Suite** setup package (.msi) or **Right-Click** on the file and choose install. You need to be using an administrative type of account on the computer to perform the installation. The installation dialog will appear with License Agreement as shown to the right.



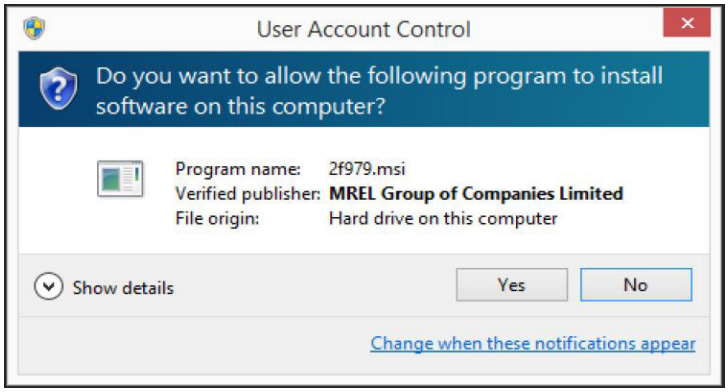
Click **I Agree** and click on **Next**. This will display the image to the right.

Click the **Next** button to confirm the installation process to begin. This will results in the following screen.

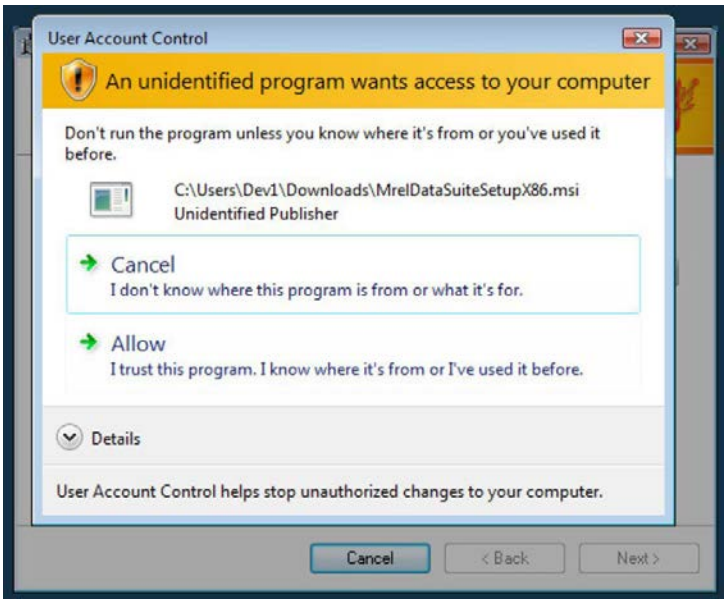


Click the **Next** button which results in the following **User Account Control (UAC)** dialog for Windows 7® or above.

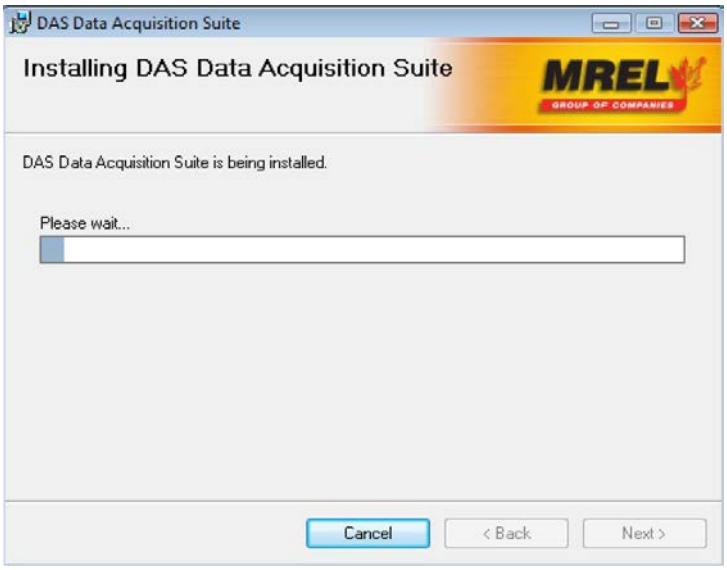
Click **YES** to proceed.



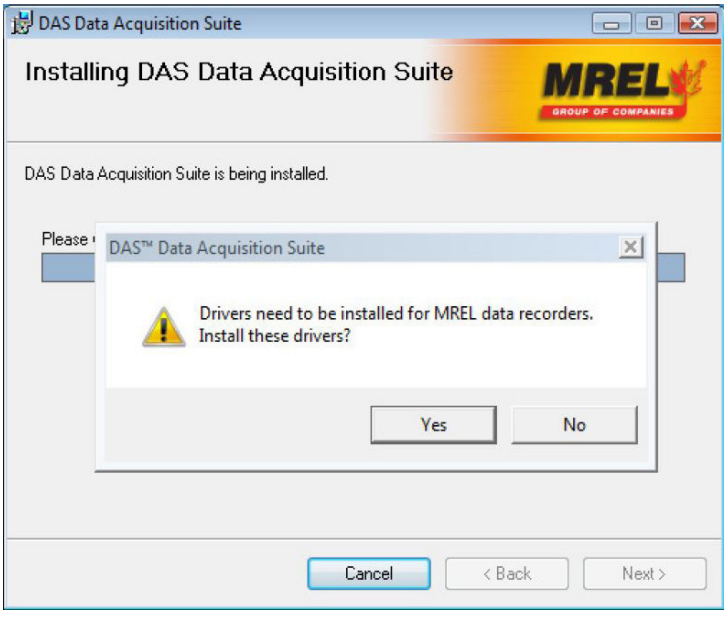
In **Windows Vista®**, the User Account Control (UAC) dialog may look like the image shown to the right. Click **Allow** to proceed



Installation process will begin and the image to the right will be shown.

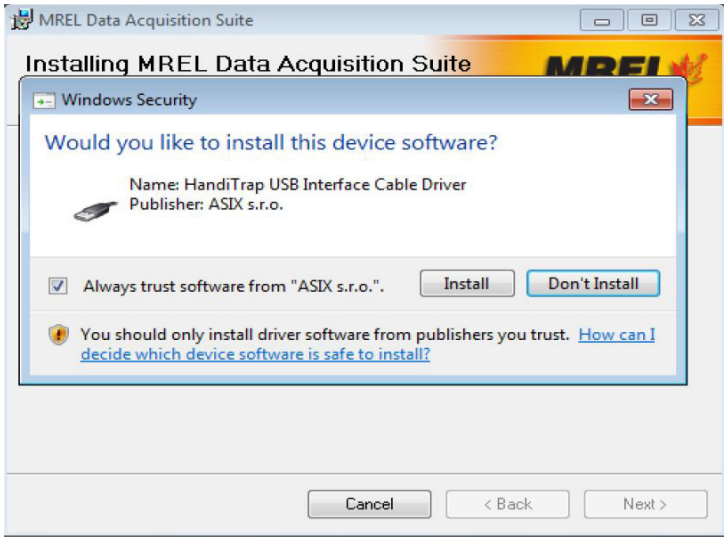


Click the **YES** button to install the needed drivers.

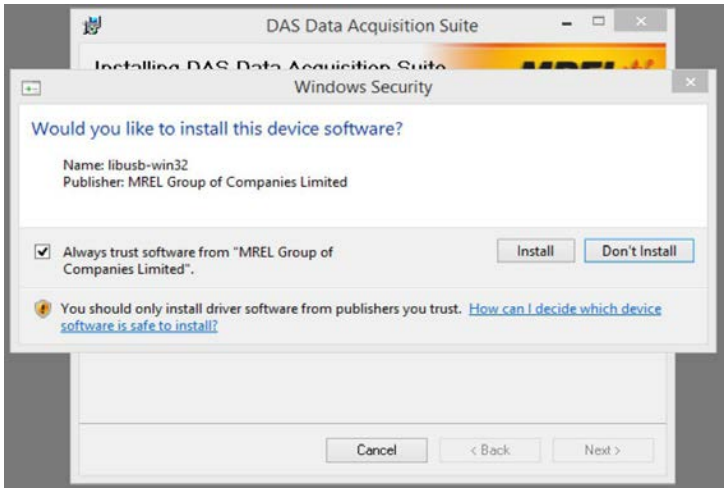


Make sure to check the **HandiTrap II™ USB Interface Cable** driver's manufacturer's trust **check box** and click the **Install** button to install the needed drivers as shown right.

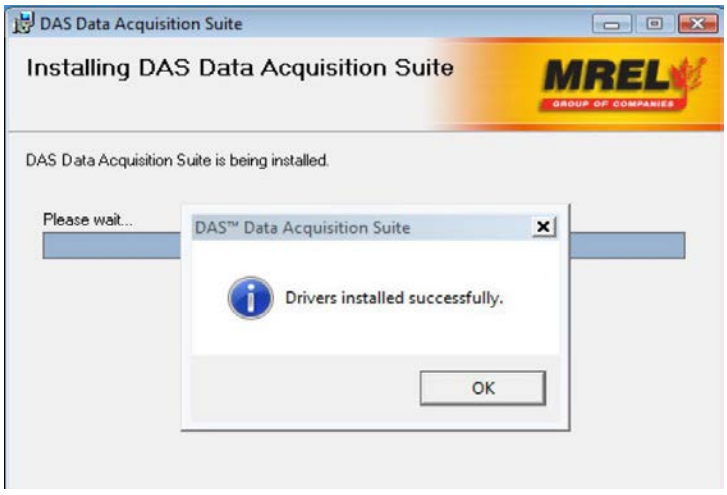
Follow the same procedure if **MicroTrap™ USB Interface Cable** driver installation message is displayed.



For **DataTrap II™ USB Interface Cable** driver installation, check the driver's manufacturer's trust check box and click the **Install** button to install the needed drivers as follows.



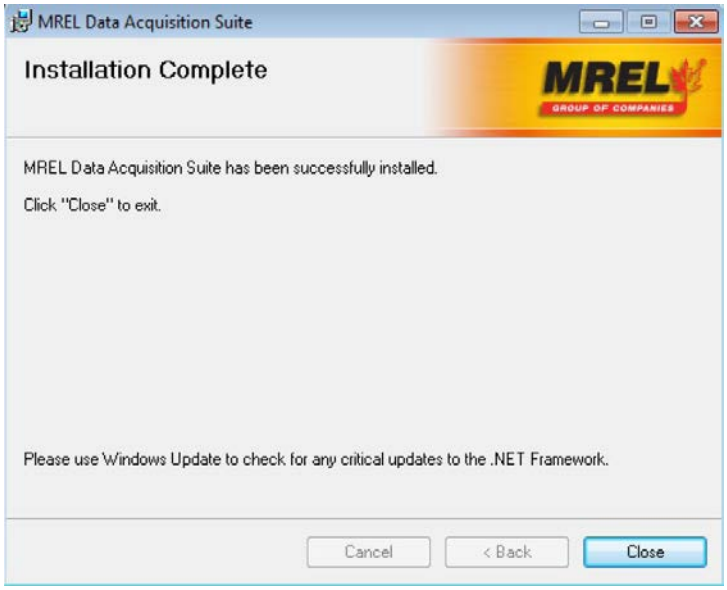
Click **OK** to the following message box which shows the drivers installation was successful. Click **Close** to complete the installation.



Click **Yes** to restart the system to complete the installation (this is recommended) in the image shown right.

System will restart to complete the installation.

If you clicked **No** so as not to restart the system, click **Close** to complete the installation.

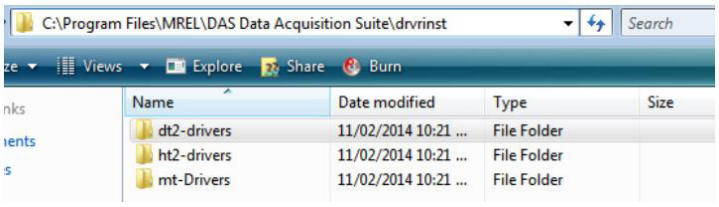


The **DAS™ Data Acquisition Suite** has been successfully installed.

A program group **MREL** with the folder **DAS™** will be created in Start > All Programs menu. Also a shortcut named **DAS™ Data Acquisition Suite** is created on the desktop as show to the right.

2.5 Drivers Files Location for Manual Installation

In some instances such as **Windows XP®**, when the **USB cable** for **MREL** recorders is connected for the first time, the **Found New Hardware** dialog box asks for driver location. All driver installation files reside in their respective folder under **DAS™** installation directory which is installed on the Windows operating system's "Program Files" location as shown to the right.



Just point the **Found New Hardware** dialog to search in folders dt2-drivers, ht2-drivers or mt-drivers for **HandiTrap II™**, **MicroTrap™** and **DataTrap II™ USB Cables** respectively.

2.6 Uninstallation of DAS™ Data Acquisition Suite

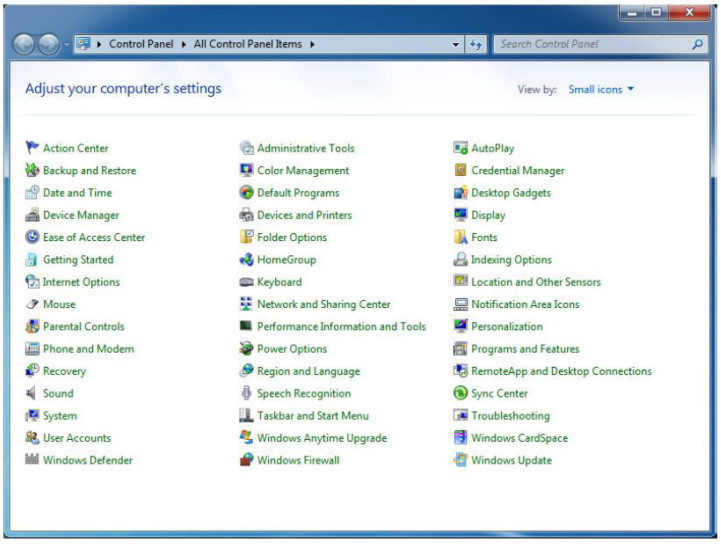
IMPORTANT

To uninstall the software, you need to use an administrative type of user account on the computer.

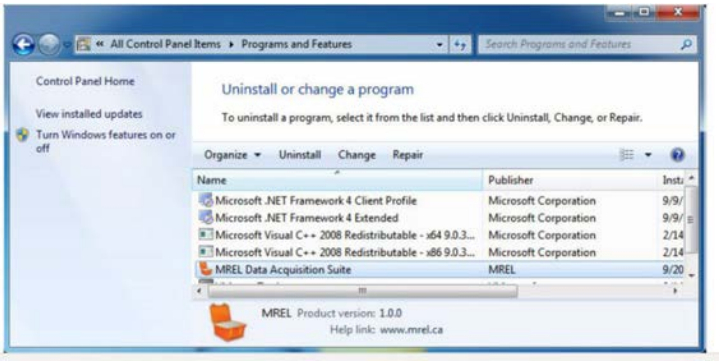
2.6.1 Uninstallation Process

Uninstalling **DAS™ Data Acquisition Suite** on supported version of **Windows®** Operating Systems is similar.

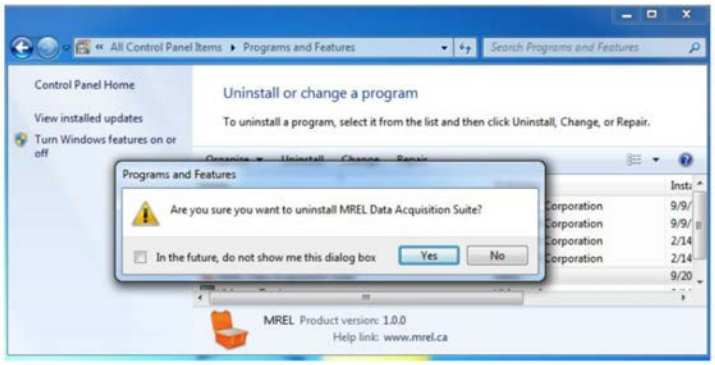
To uninstall **DAS™ Data Acquisition Suite,** click **Control Panel** panel in **Start**. The control panel is displayed as follows.



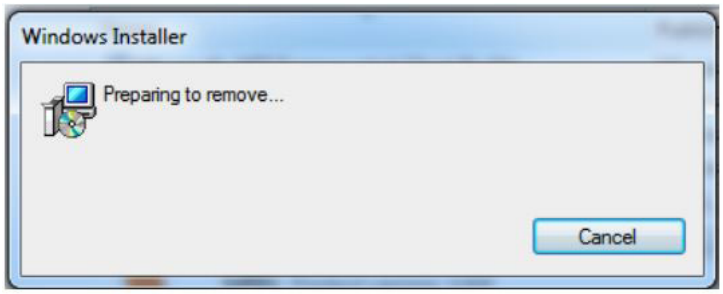
Click **Programs and Feature** icon in **Control Panel** which displays a screen shown as to the right.



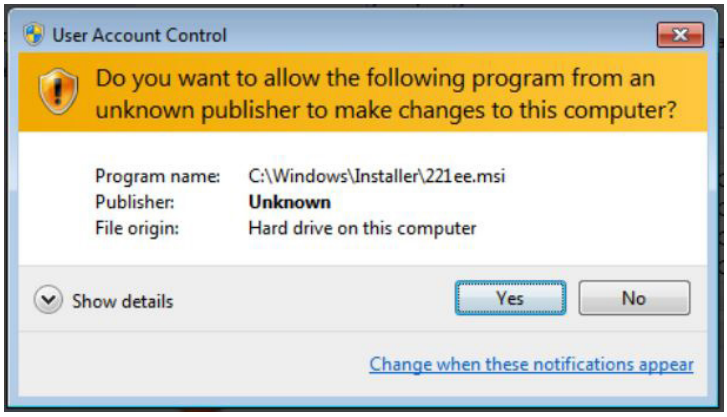
Select **MREL Data Acquisition Suite** in the list and Double-Click it. This shows the image on the right.



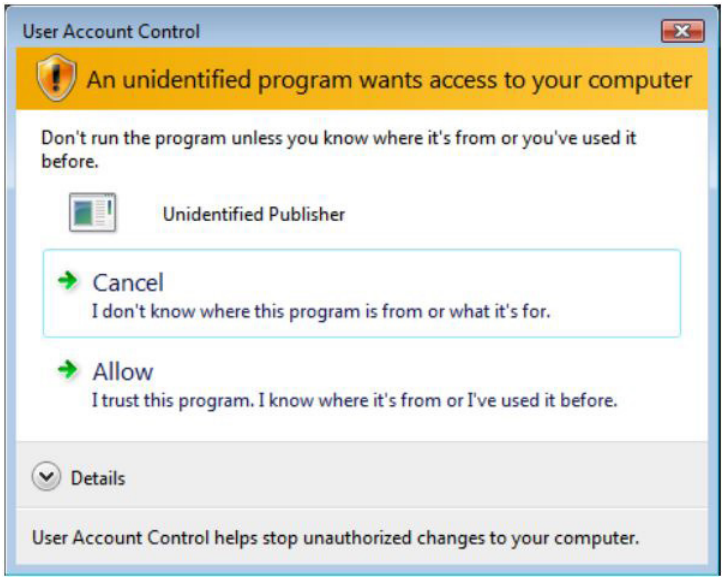
Click **Yes** button to the dialog asking A**re you sure you want to uninstall MREL Data Acquisition Suite?** which shows the **Preparing to remove** status dialog.



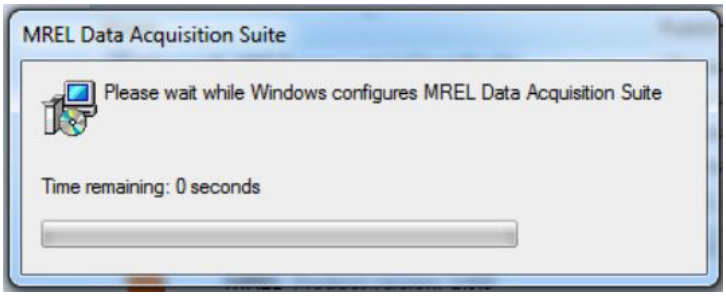
Click **Yes** button in **UAC (User Account Control)** dialog as shown to the right.



In **Windows Vista®**, the **UAC** dialog box will look like the image shown to the right. Click **Allow** to proceed



Uninstall will show a progress dialog box similar to the image to the right.



Once the progress dialog box completes, the **DAS™ Data Acquisition Suite** will be successfully uninstalled. However, your data and related settings will still be present.

You can now close **Programs and Features** dialog and the **Control Panel** itself.

2.7 Software Registration

DAS™ always installs as Evaluation version. With the **DAS™ Data Acquisition Suite** software installed, the lower right-hand corner will display **Evaluation Edition, Unregistered**.

The **Evaluation** edition allows the user to evaluate the software for 30 days (one-time) on a given computer. After evaluation period expires, the user will need to either register the software or uninstall the **DAS™ Data Acquisition Suite Software**. Registration is required to upgrade **DAS™** to **Standard Edition** (FREE) or **Advanced Edition** (Paid). The user has to apply upgrade key after registration to complete the process.

The user can at any time click on the **Help** tab in ribbon menu and then on **Register** in the tab or use top menu **Help > Register/Upgrade**. The registration (and upgrade) requires an administrative type of user account and internet access. After **DAS™** asks to be restarted, it will display registration dialog. The user will fill in the required fields (red-coloured) such as First Name, Last Name, Company Name, City, Country, Email and Industry. Any required field having invalid data will be flagged by red exclamation icon next to it. After all required fields are filled, user will click the **Register** button. After successful processing, the software will be registered and display a success message. Click **OK** to close that message.

At this point, the lower right corner of the software will display **Evaluation Edition**, **Registered**.

An email will be sent to the email address provided while registering and will include the **Standard Edition** upgrade Key for the computer. When the email arrives, the user will click on Help and then **Register/Upgrade**... menu item, displaying the registration dialog. At the bottom of the form is **Upgrade** checkbox. Check mark that and **Install/Upgrade** Type drop-down menu is now enabled. Select **Standard Edition** in this drop-down menu and a text box will appear for the input of the upgrade key. Copy and paste the key (as is) from the email into the text box and click **Upgrade** button. After successful processing, the displayed text on status bar on lower-right will change to **Standard Edition, Registered**. Close **DAS™** and run it again. At this point, the software is registered/upgraded successfully and will not expire on the computer until uninstalled. The software is available to all users who have account on the computer. Only one user must run **DAS™** at a given time. The users have their own default data area under **My Documents\MREL\Data**.

Note that registered **DAS™** will expire until the upgrade key is applied. The software will stop normal function and will only allow registration/upgrade after 30 days of installation.

To upgrade to the **Advanced** Edition, refer to **Chapter 8**.

2.8 Updating DAS™

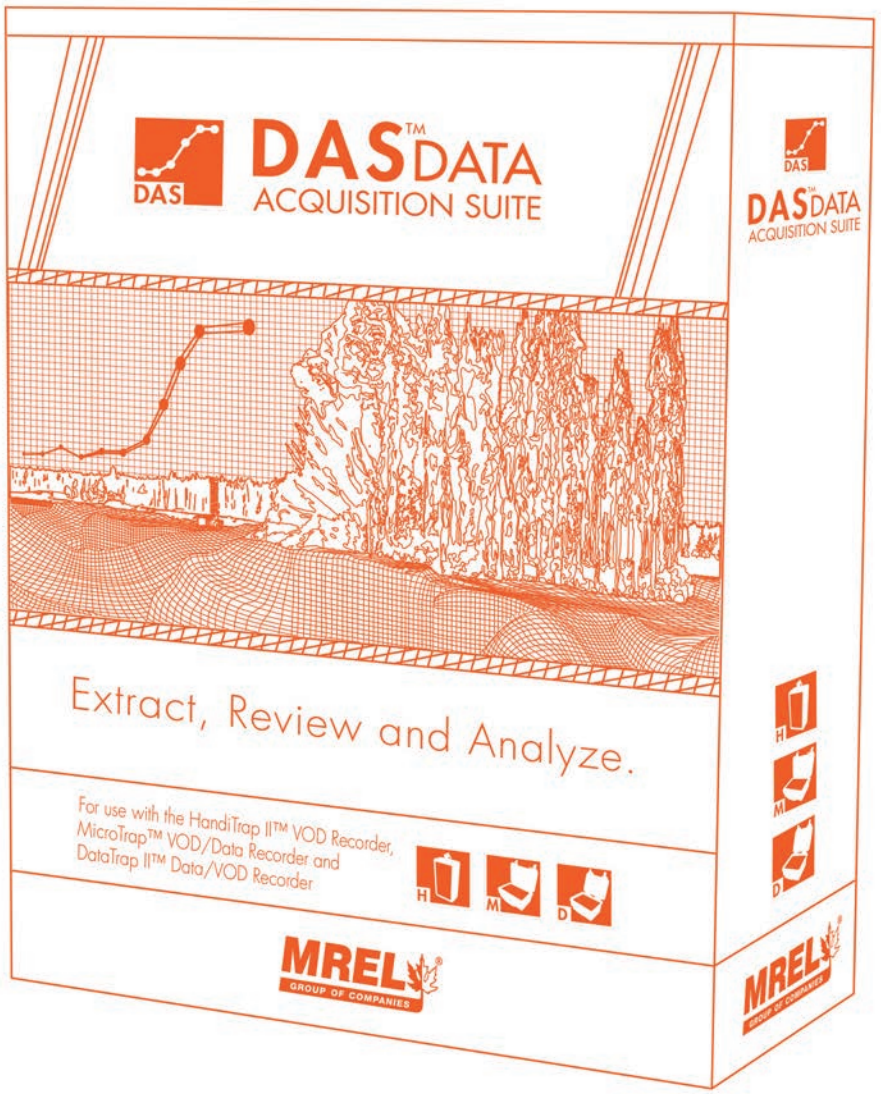
Updating to new version of **DAS™** software requires that lower version of **DAS™** exists on the machine. **DAS™** must be registered and upgraded to either **Standard Edition** or **Advanced Edition**. Evaluation version of **DAS™** can not be upgraded to newer version.

Update Process:

Check for updates from within **DAS™** by clicking on **Help > Updates...**

If an updated version of **DAS™** software exists, it will be offered to be downloaded.
Download the software (a compressed (**.zip**) file) and save in a local temporary folder where you can later extract it.
After download is complete, Exit **DAS™** and extract downloaded file. Double-click to run the extracted file. Follow prompt.

Chapter 3
Starting the DAS™ Data Acquisition Suite



Overview

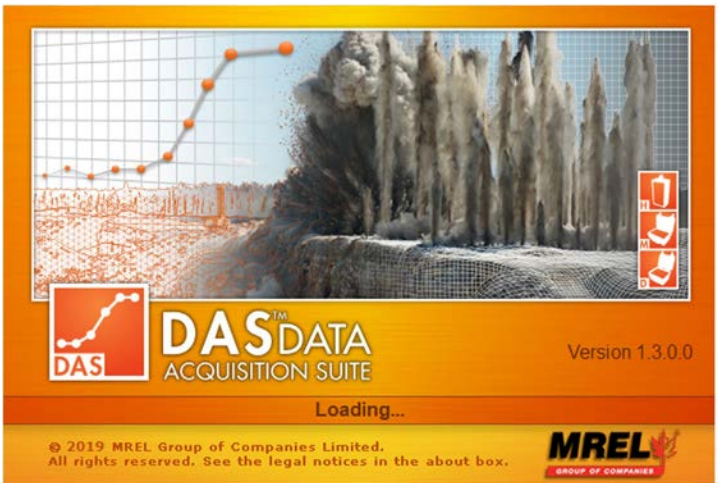
This Chapter describes the starting process for the DAS™ Data Acquisition Suite.

3.1 Starting the DAS™ Data Acquisition Suite

Double click on the **DAS™ Data Acquisition Suite** desktop icon.

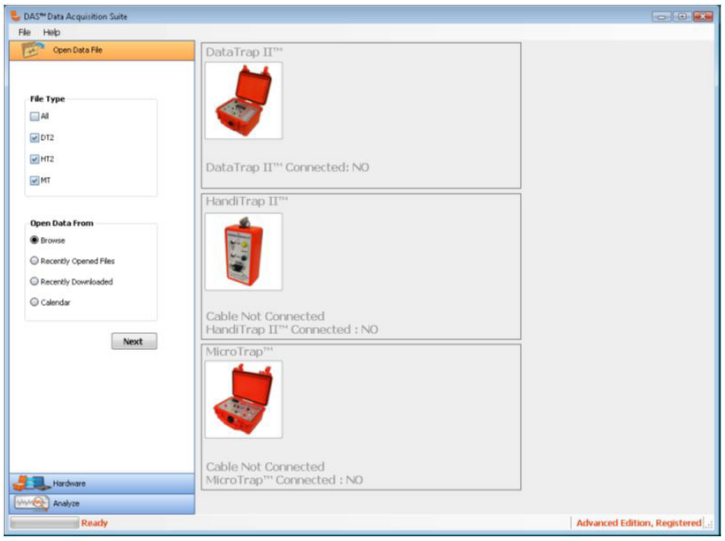
Alternatively access the program through the **Start Menu**.
Start > All Programs > MREL > DAS > DAS™ Data Acquisition Suite.

The following splash screen will show up.



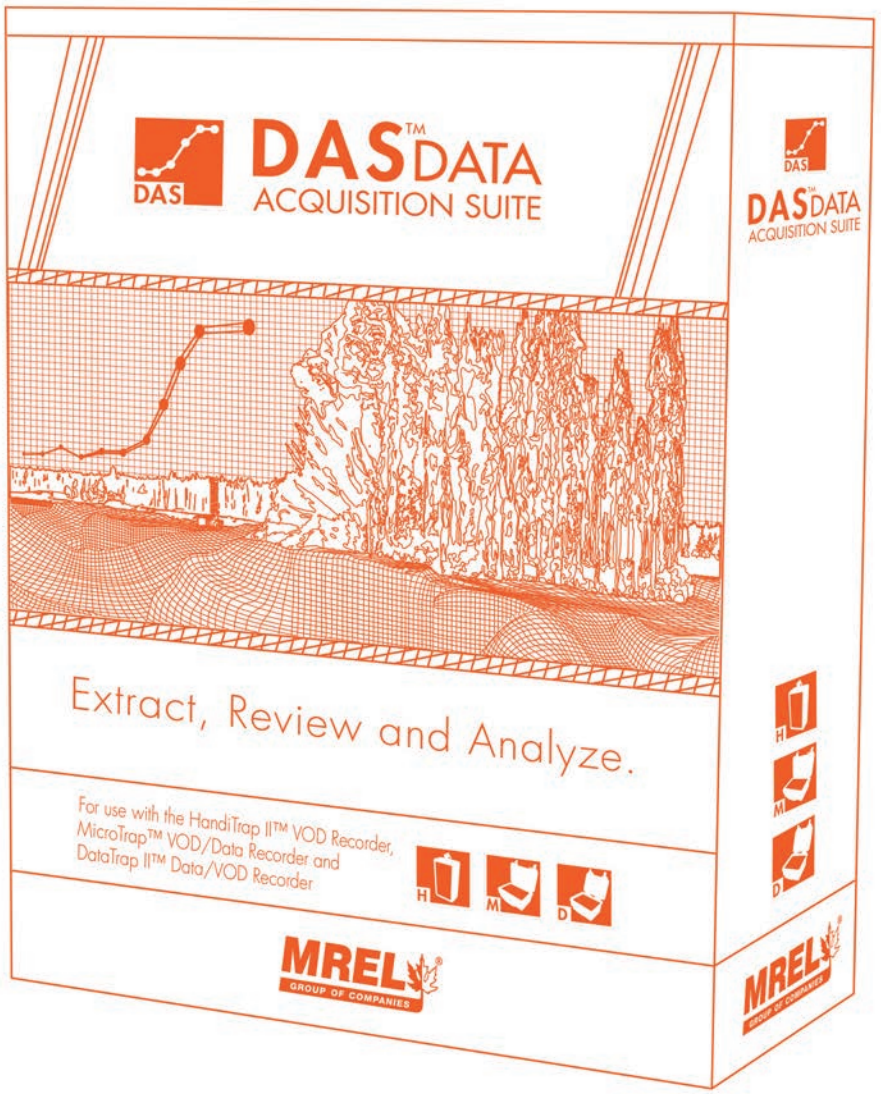
When **DAS™ Data Acquisition Suite** completes loading, the splash screen fades away to show the main screen as shown to the right.

After the initial screen is displayed, the **DAS™ Data Acquisition Suite** may check and update the main display for any connected **MREL** Data or VOD recorders and any tests stored if any.



Note: The message box to the right is displayed for a short period of time upon starting the software. The software is checking for any hardware attached to the computer. The software periodically checks for any changes in connected status of the recorders.

Chapter 4
Programming the Recorders



Overview

This Chapter describes the programming procedures for all of the Recorders.

4.1 Programming the Recorders

This section will define how the recorders can be programmed using **DAS™ Data Acquisition Suite**.

4.2 Programming the HandiTrap II™ VOD Recorder

The **HandiTrap II™ VOD Recorder** cannot be programmed. It does not have any user-programmable settings. Please refer to the **HandiTrap II™ VOD Recorder Operations Manual** for clarification.

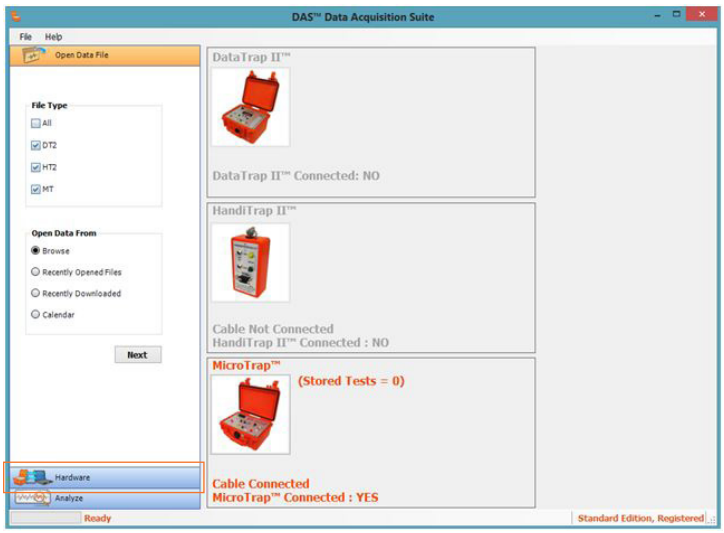
4.3 Programming the MicroTrap™ VOD/Data Recorder

The **MicroTrap™ VOD/Data Recorde**r has the ability to record the velocity of detonation (**VOD**) as the standard feature with an upgrade to measure scope data. In order to program the **MicroTrap™ VOD/Data Recorder**, ensure that the cable drivers have been installed (normally done when **DAS™** is being installed), the USB interface cable has been connected to the computer (displaying a green light at its end). The cable is then connected to the **MicroTrap™ VOD/Data Recorder** after 10 seconds, the unit is powered on. If unsure how to complete this task, refer to the **MicroTrap™ VOD/Data Recorder Operations Manual**.

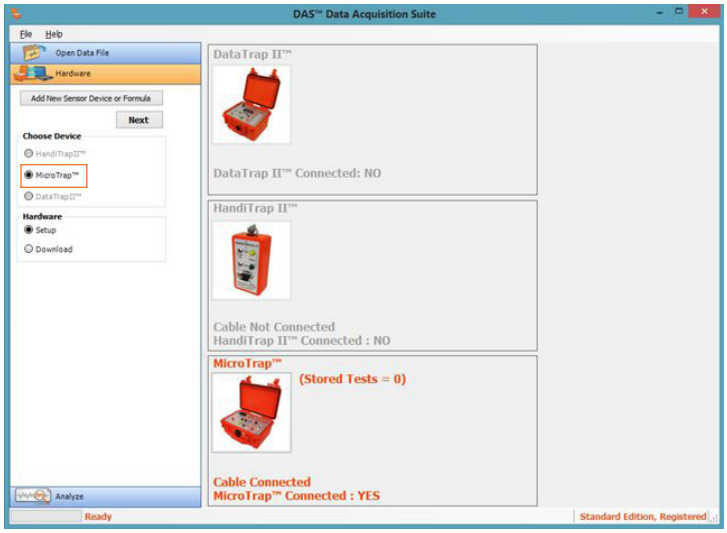
4.3.1 VOD Setup in the MicroTrap™ VOD/Data Recorder

With the **MicroTrap™ VOD/Data Recorder** connected to the computer, start the **DAS™ Data Acquisition Suite**. Upon fully starting, the screen will appear as shown to the right.

Click on the **Hardware** tab on the left panel of the screen (As marked in the right image) and the image on the next page will be displayed.

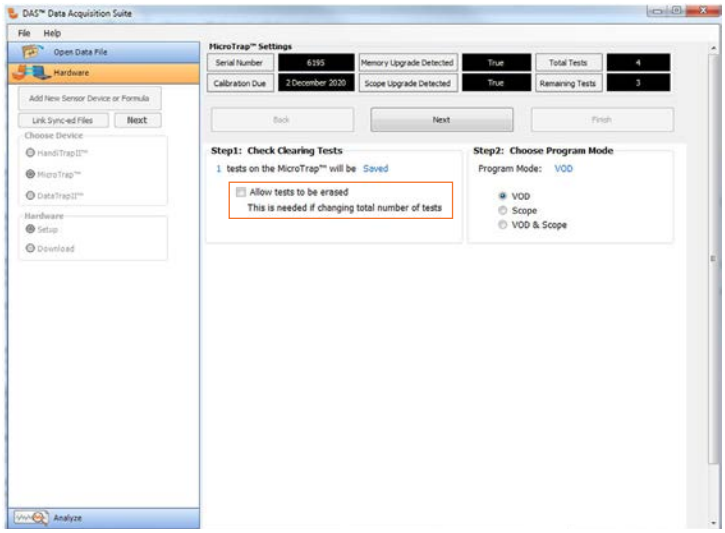


Click on the **MicroTrap™ VOD/Data Recorder** radio button under **Choose Device** and the Setup radio button under **Hardware**. Then click on the **Next** button.



This screen will display many details of the individual unit. This includes the **serial number**, **calibration due date**, if a **Memory Upgrade** or **Scope Upgrade** has been installed. This screen will also display the **total number of tests** that the memory has been divided into and the **number of tests remaining**.

Also, the area highlighted by the box, is the **Erase Tests** check box. When checked, it will allow all saved tests to be deleted in the **MicroTrap™ VOD/Data Recorder** when the settings are saved.



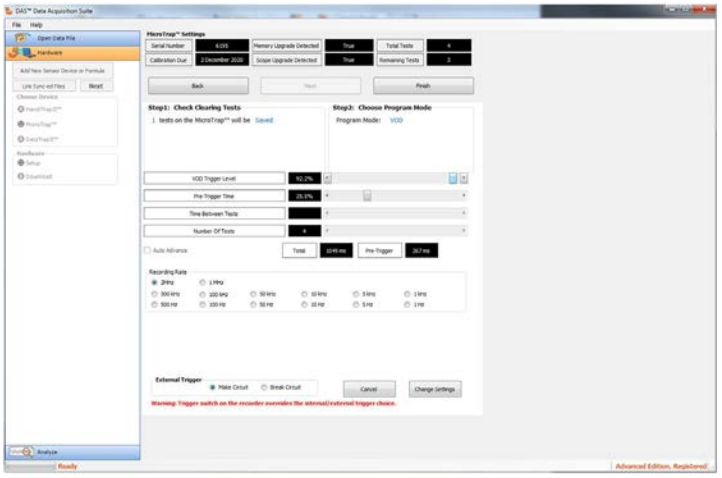
CAUTION

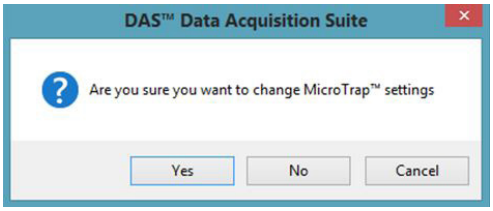
IF THERE IS IMPORTANT DATA IN THE UNIT, DO NOT CHECK THIS BOX.
If the box is checked, the total number of tests allowed can be changed on next screen.
With the box checked, the software will tell the user how many tests will be erased.

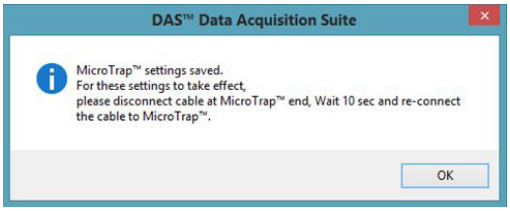
With the standard **MicroTrap™ VOD/Data Recorder**, only the **VOD** radio button can be selected. If existing tests needs to be cleared or number of total tests needs to be changed, check mark "**Allow tests to be erased**" (Tests can also be erased directly on the recorder, please refer to the **MicroTrap™ VOD/Data Recorder Operations Manual**.)

Once the choices have been made on this screen, click on the **Next** button.

On this screen, the user will be able to adjust all of the **VOD** settings on the **MicroTrap™ VOD/Data Recorder**. This includes the **VOD Trigger Level**, **Pre-Trigger Time**, **Number of Tests** (if the **Erase Tests** check box on previous screen is checked)), the **Sampling Rate** and the settings for the external trigger. Refer to the **MicroTrap™ VOD/ Data Recorder Operations Manual** for definitions on these settings. Once the settings have been selected, click on **Change Settings** button.





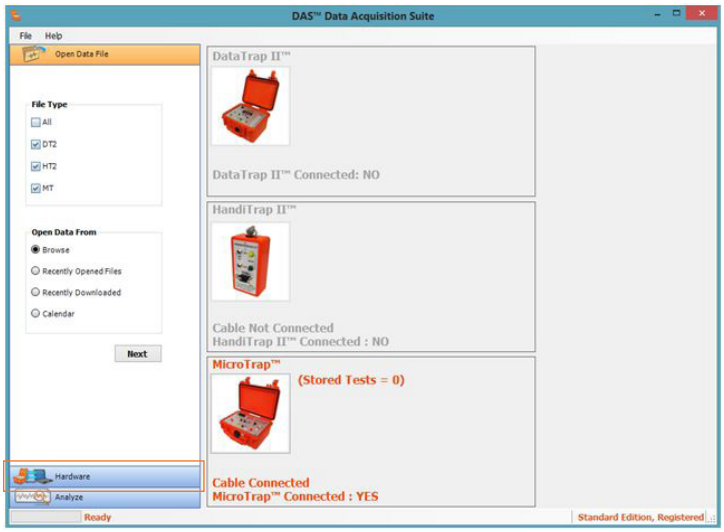


The **DAS™ Data Acquisition Suite** will confirm that the user wishes to changes the settings. If the user is sure, click **Yes,** if not click **No**. Once **Yes** has been selected, the software will confirm that the settings have been saved and that the **USB cable** will need to be disconnected from the unit, wait 10 seconds then reconnect so that new settings can take effect. Generally, this is also done with a power off, wait 10 seconds and then power on **MicroTrap™ VOD/Data Recorder**. Then select the **Finish** button and the software will return to the main screen of the software.

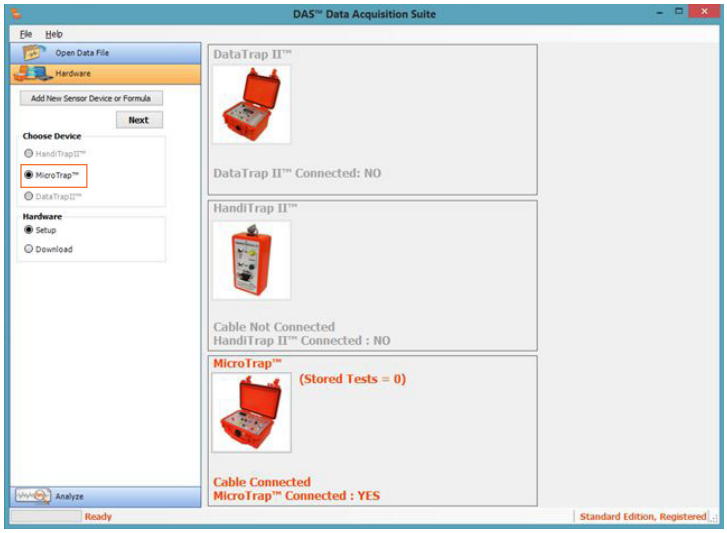
4.3.2 Scope Setup in the MicroTrap™ VOD/ Data Recorder

With the **MicroTrap™ VOD/Data Recorder** connected to the computer, start the **DAS™ Data Acquisition Suite**. Upon fully starting, the screen will appear as shown to the right.

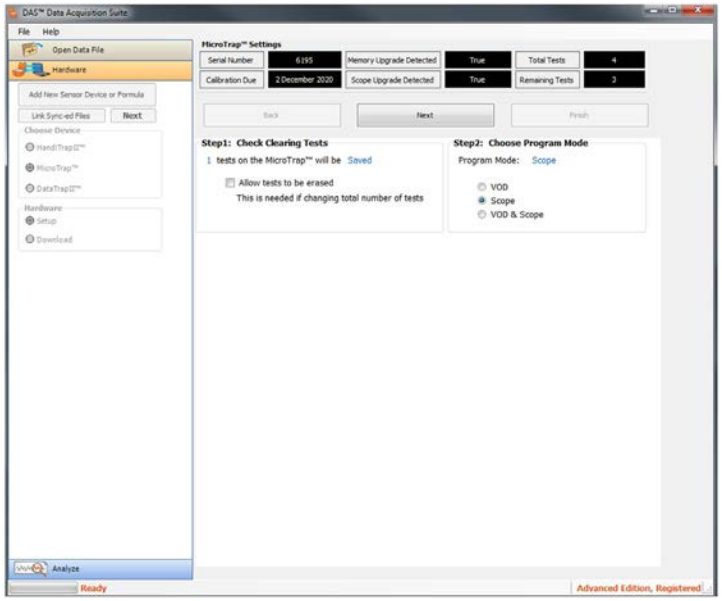
Click on the **Hardware** tab on the left panel of the screen as highlighted in the image and the image on the next page will be displayed.



Click on the **MicroTrap™ VOD/Data Recorder** radio button under **Choose Device** and the **Setup** radio button under **Hardware**. Then click on the **Next** button.



This screen will display many details of the individual unit. This includes the **serial number**, **calibration due date**, if a **Memory Upgrade** or **Scope Upgrade** has been installed. This screen will also display the **total number of tests** that the memory has been divided into and the **number of tests remaining**.

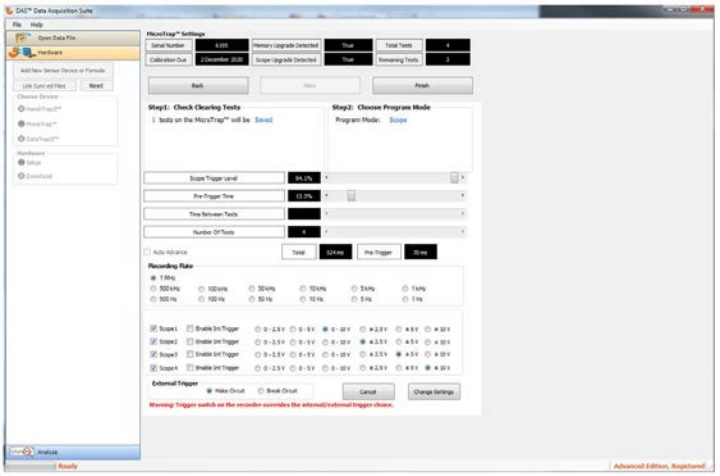


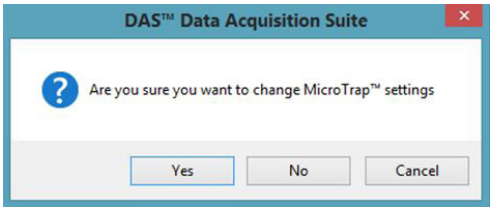
CAUTION

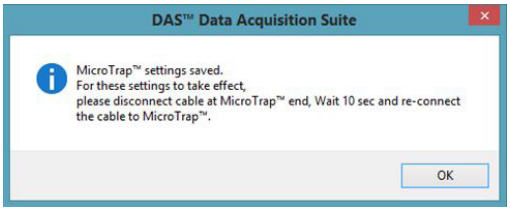
IF THERE IS IMPORTANT DATA IN THE UNIT, DO NOT CHECK THIS BOX.
If the box is checked, the total number of tests allowed can be changed on next screen.
With the box checked, the software will tell the user how many tests will be erased.

With the **Scope Upgrade** in the **MicroTrap™ VOD/Data Recorder**, the user can select any of the 3 different radio buttons. In this section, the **Scope** radio button will be selected. Once the items have been selected on this screen, click on the **Next** button.

This screen will allow the user to adjust all of the Scope settings including the **Scope Trigger Level**, **Pre Trigger Time**, **Number of Tests**, **Sampling Rate**, **Enabled Scope Channels** with the voltage range and if that channel will be a **Trigger**. This screen will also allow the user to configure the **External Trigger**. Refer to the **MicroTrap™ VOD/Data Recorder Operations Manual** for definitions of the settings. Once all of the settings have been selected, the user will need to click on **Change Settings**.





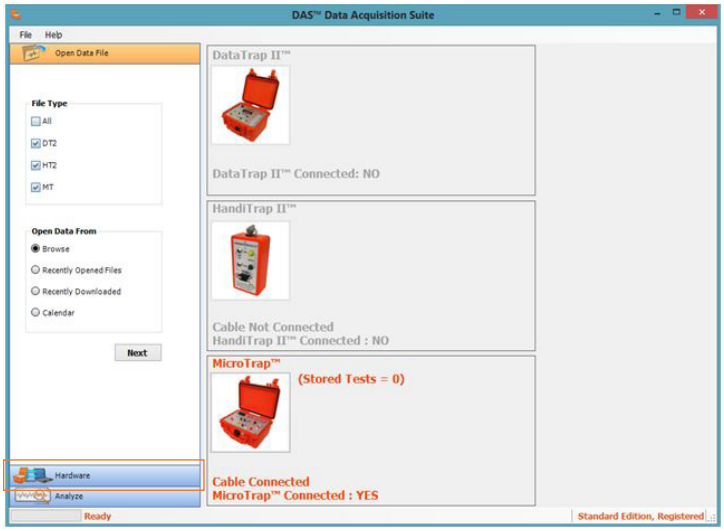


The **DAS™ Data Acquisition Suite** will confirm that the user wishes to changes the settings. If the user is sure, click **Yes,** if not click **No**. Once **Yes** has been selected, the software will confirm that the **USB cable** will need to be disconnected from the unit, wait 10 seconds then reconnect so that new settings can take effect. Generally, this is also done with a power off, wait 10 seconds and then power on the **MicroTrap™ VOD/Data Recorder**. Then select the **Finish** button and the software will return to the main screen of the software.

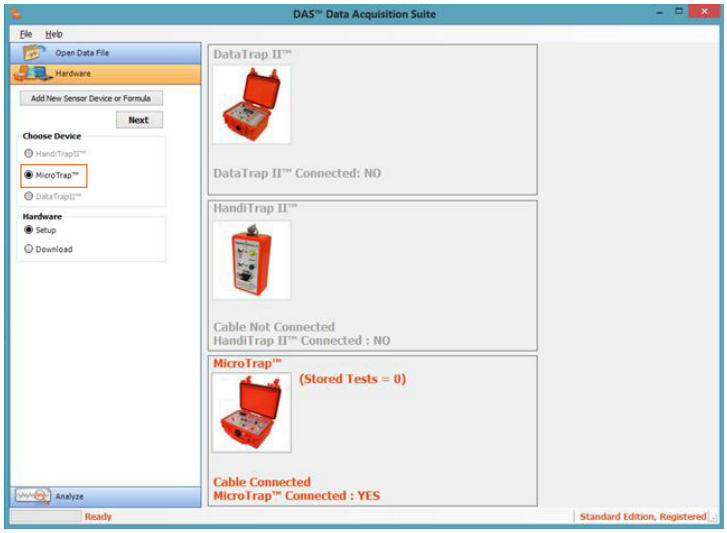
4.3.3 VOD & Scope Setup in the MicroTrap™ VOD/Data Recorder

With the **MicroTrap™ VOD/Data Recorder** connected to the computer, start the **DAS™ Data Acquisition Suite**. Upon fully starting, the screen will appear as shown to the right.

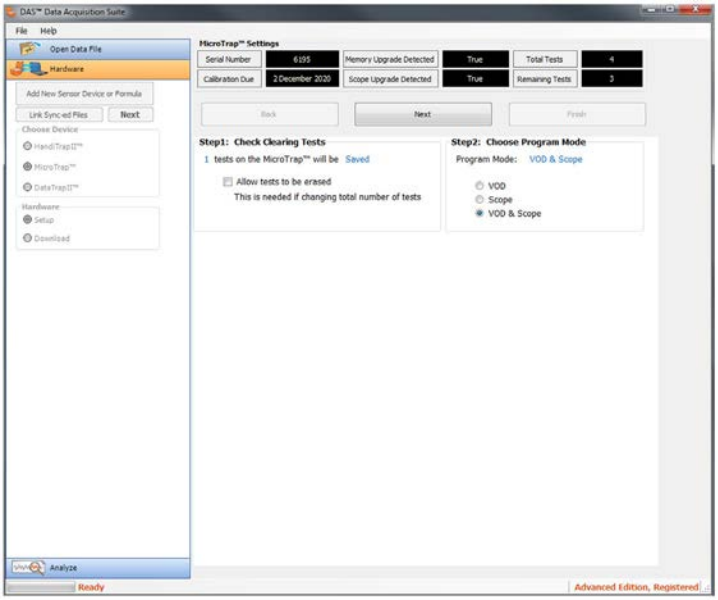
Click on the **Hardware** tab on the left panel of the screen as highlighted in the image and the image on the next page will be displayed.



Click on the **MicroTrap™ VOD/Data Recorder** radio button under **Choose Device** and the **Setup** radio button under **Hardware**. Then click on the **Next** button.



This screen will display many details of the individual unit. This includes the **serial number**, **calibration due date**, if a **Memory Upgrade** or **Scope Upgrade** has been installed. This screen will also display the **total number of tests** that the memory has been divided into and the **number of tests remaining**.

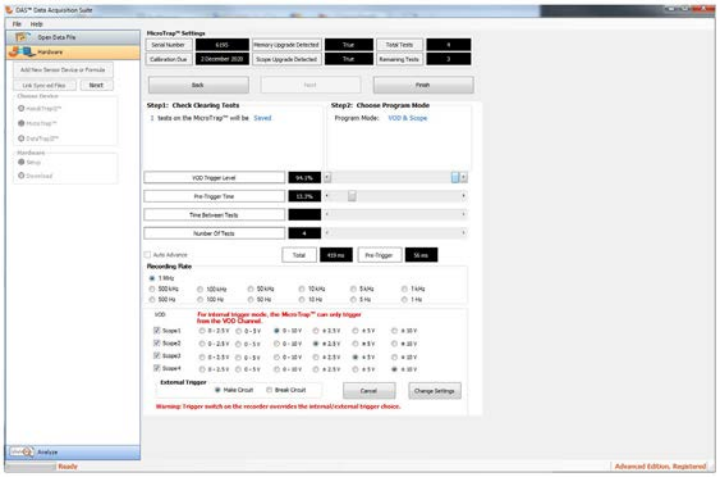


CAUTION

IF THERE IS IMPORTANT DATA IN THE UNIT, DO NOT CHECK THIS BOX.
If the box is checked, the total number of tests allowed can be changed on next screen.
With the box checked, the software will tell the user how many tests will be erased.

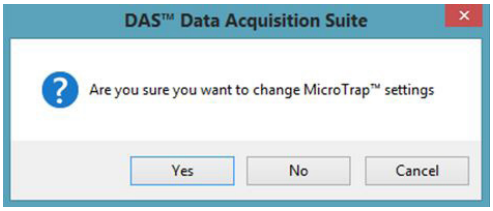
With the **Scope Upgrade** in the **MicroTrap™ VOD/Data Recorder**, the user can select any of the 3 different radio buttons. In this section, the **VOD & Scope** radio button will be selected. Once the items have been selected on this screen, click on the **Next** button.

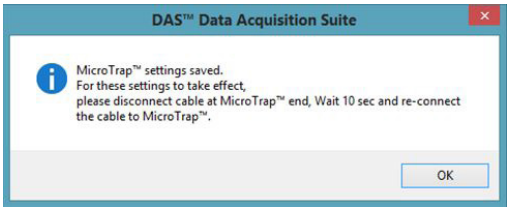
This screen will allow the user to adjust all of the **Scope** settings including the **VOD Trigger Level**, **Pre Trigger Time**, **Number of Tests**, **Sampling Rate** and **Enabled Scope Channels** with the voltage range.



Note: With the **MicroTrap™ VOD/Data Recorder** having **VOD** enabled, the unit can only trigger internally from the **VOD Channel**. The **External Trigger** can still be used.

This screen will also allow the user to configure the **External Trigger**. Refer to the **MicroTrap™ VOD/Data Recorder Operations Manual** for definitions of the settings. Once all of the settings have been selected, the user will need to click on **Change Settings**.

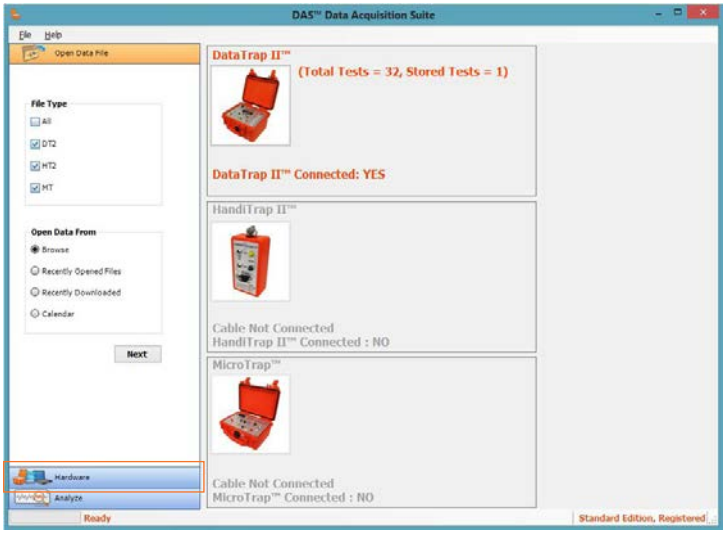




The **DAS™ Data Acquisition Suite** will confirm that the user wishes to changes the settings. If the user is sure, click **Yes,** if not click **No**. Once **Yes** has been selected, the software will confirm that the settings have been saved and that the **USB cable** will need to be disconnected from the unit, wait 10 seconds then reconnect so that new settings can take effect. Generally, this is also done with a power off, wait 10 seconds and then power on the **MicroTrap™ VOD/Data Recorder**. Then select the **Finish** button and the software will return to the main screen of the software.

4.4 Programming the DataTrap II™ Data/VOD Recorder

The **DataTrap II™ Data/VOD Recorder** has the ability to function as ±10 Volt DC Scope as the standard feature with an upgrade to measure **Velocity of Detonation** (**VOD**) data. In order to program the **DataTrap II™ Data/VOD Recorder**, ensure that the driver has been installed, the cable has been connected to the computer, connected to the **DataTrap II™ Data/VOD Recorder** with the unit powered on. If unsure how to complete this task, refer to the **DataTrap II™ Data/VOD Recorder Operations Manual**.

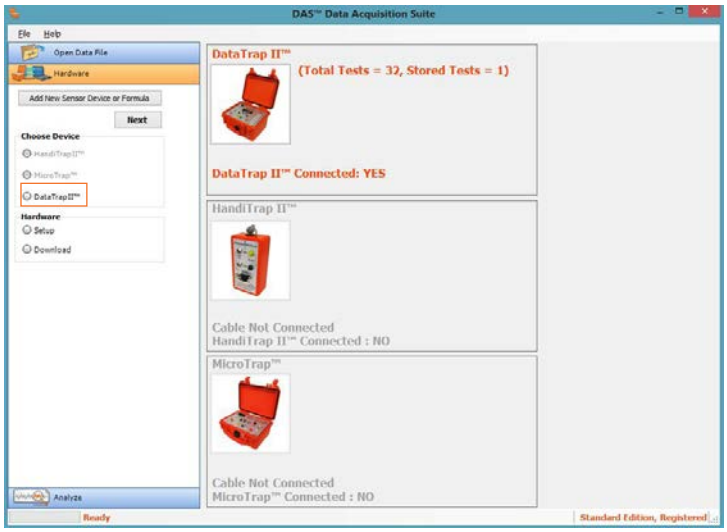


4.4.1 Scope and VOD Programming in the DataTrap II™ Data/VOD Recorder

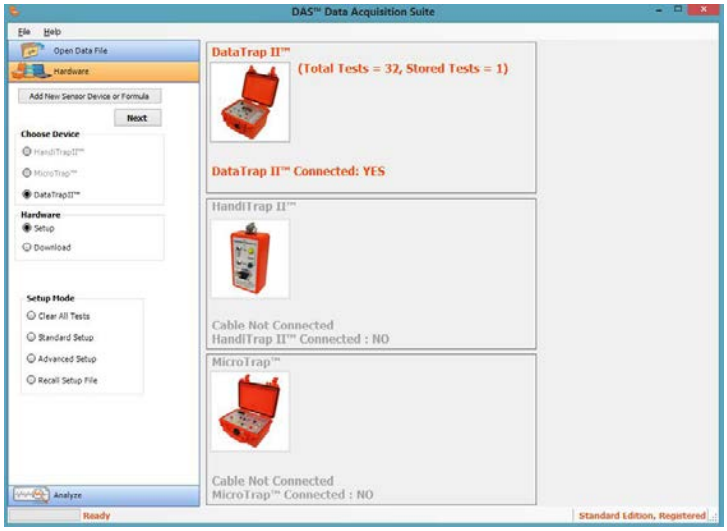
With the **DataTrap II™ Data/VOD Recorder** connected to the computer, start the **DAS™ Data Acquisition Suite**. Upon fully starting, the screen will appear as shown to the right.

Click on the **Hardware** tab on the left panel of the screen and the following will be displayed.

Select **DataTrap II™ Data/VOD Recorder** from the **Choose Device** and **Setup** from the **Hardware** window and the following window is displayed.

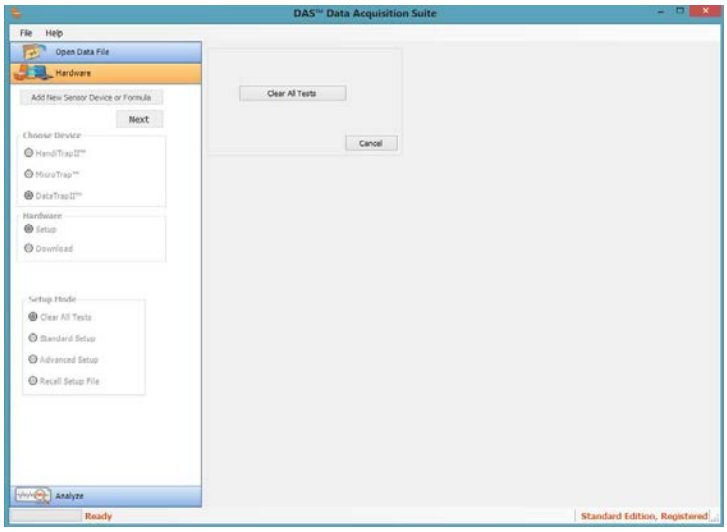


In the **Setup Mode** window, there are four (4) options. The options are: **Clear All Tests**, **Standard Setup**, **Advanced Setup** and **Recall Setup File**.



4.4.1.1 Clear All Tests

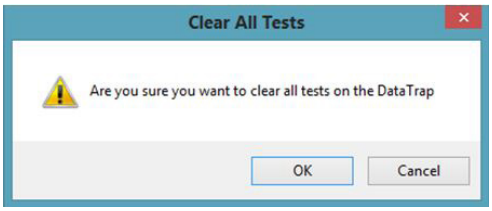
When the user selects **Clear All Tests** radio button on the **Hardware tab** and clicks **Next**, the following window will appear.



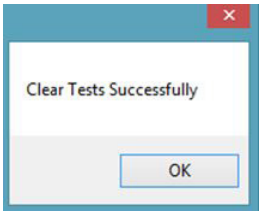
This operation will delete all of the tests currently saved in the **DataTrap II™ Data/VOD Recorder** and will keep the settings.

Note that if there are no more tests available to be conducted in **DataTrap II™**, the **Clear All Tests** option must be used first before user is allowed to use **Standard** or **Advanced** setup screens.

The user will need to confirm the action of clearing all the test data in the unit by clicking **Clear All Tests** button. If the user does not want to proceed, the **Cancel** button can be clicked.

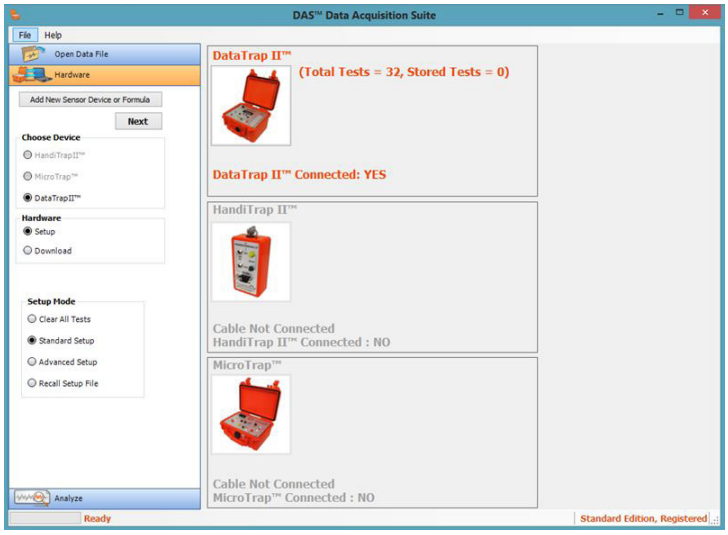


When **OK** has been selected, the user will receive conformation that the data has been deleted. The user will then need to click the **Cancel** button on the **Clear All Tests** screen to return back to the main menu.

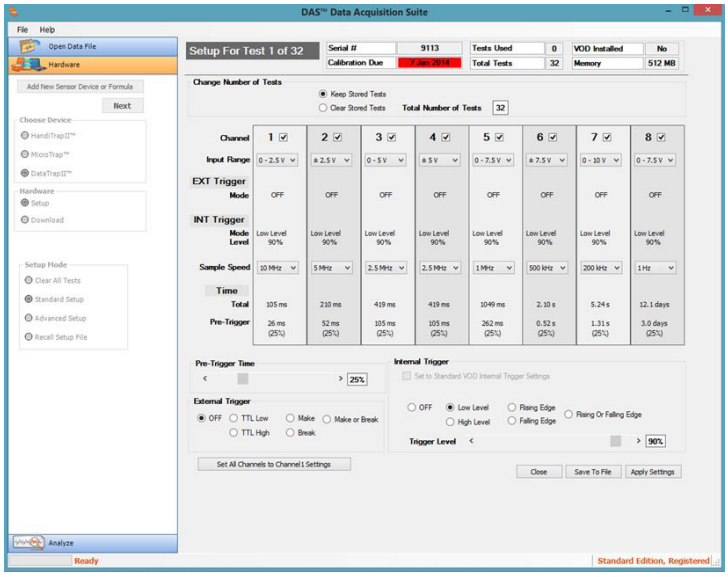


4.4.1.2 Standard Setup

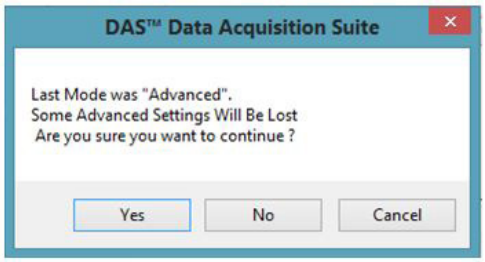
This section describes the details of the **Standard Setup** for the **DataTrap II™ Data/VOD Recorder**. This will be the recommended programming option for majority of the users.



When the user selects **Standard Setup** radio button on the **Hardware tab** and clicks **Next**, the following window will appear.



If the unit's last setup was **Advanced Setup** and now the **Standard Setup** is chosen, the following message will appear.



If the user wishes to continue in the **Standard Setup** click **Yes**, if not, click **No** or **Cancel**.

This is the standard setup screen for the **DataTrap II™ Data/VOD Recorder**. This screen will tell a lot of information about the **DataTrap II™ Data/VOD Recorder**, working top to bottom, in the first section the **Serial Number**, the date the **Calibration** is due, the **number of tests** used, the **total tests the memory** has been divided into, if the **VOD Upgrade** has been installed and the amount of memory installed. This menu will allow the user to control the setup of each individual channel with its own settings.

In the next section down labeled **Change Number of Tests**, if the radio button **Keep Stored Tests** is selected, the box to the right of **Total Number of Tests** will display the number of tests the memory has been divided into, if **Clear Stored Tests** is selected, a slide bar is displayed to the right of **Total Number of Tests** for the user to change the number of total tests the memory is divided into.

The third section is the details of each channel. With the **DataTrap II™ Data/VOD Recorder**, there are 8 channels for the user to configure. The check box beside each number will enable (when checked) or disable (when not checked) each channel. The user can independently change the voltage range setting of each channel to suit the voltage range of input signal. This is the standard setup for a scope channel on the recorder.

Note: If the **VOD Upgrade** is installed in the unit, **VOD** will be able to be selected in the **Input Range**. The standard **Trigger** settings for the internal **Trigger** or a **VOD Channel** is **Low Level** with the **Trigger Level** set to **90%**.

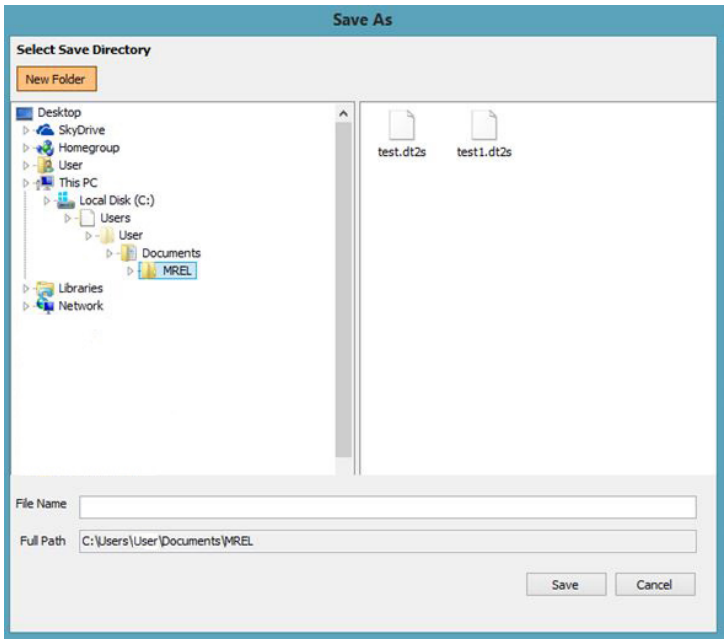
The next line in the third section displays the status of the **External Trigger**. The **External Trigger** can be modified in the lower left corner of the screen and will be described later in the manual. The next line displays the status of the **Internal Trigger** which can be modified in the lower right corner of the screen and will be described later in the manual. The sample speed of each channel can be independently changed to suit the input signal or the recording time required. In the bottom part of the third section is the display of total time for each channel followed by the **Pre-Trigger time**. The **Pre-Trigger time** can be adjusted by the slider below and to the left labeled **Pre-Trigger Time**. It is adjusted in percentage of the total time available for the channel.

To the right of the **Pre-Trigger Time** slider is the check box for **Internal Trigger** to set the internal trigger for **VOD**. Since this unit does not have the **VOD** option installed, this check box is not available and has been greyed out. If the **VOD Upgrade** was installed, the check box would be available but this check box would only effect tthe channels which have their **Input Range** set to **VOD**. Below the check box is the settings for the internal trigger. There are six (6) choices: **Low Level**, **High Level**, **Rising Edge**, **Falling Edge**, **Rising** or **Falling Edge** and **Off** with a sider bar to adjust the level for the trigger. To the left of the **Internal Trigger** settings is the **External Trigger** settings. There are six (6) choices: **TTL Low**, **TTL High**, **Make**, **Break**, **Make** or **Break** and **Off**. For details of each of the twelve (12) settings, refer to the **DataTrap II™ Data/VOD Recorder Operations Manual**.

The bottom left of the screen is a button that will change all of the settings of **Channels 2 through 8** to how **Channel 1** has been setup. This is a quick option for the user to configure **Channel 1** and click this button to automatically setup all the other channels.

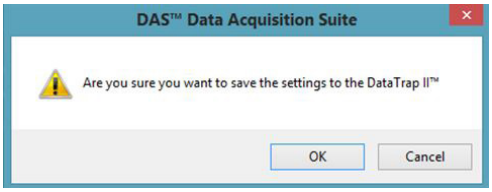
At any time the user wishes to exit the **Standard Setup** of the **DataTrap II™ Data/VOD Recorder** without saving new settings, the user can select the **Close** button in the lower right.

If the operator uses multiple setups with the unit, the user can save the individual setups in a setup file to be recalled at a later date. To save the file, the user will need to configure the unit as described above and once complete, the user will click on the **Save to File** button. This will open a directory/file structure window from the local computer as shown to the right.



The software will default to a standard location on the local hard drive, but the user can place the files in any location that is desired. A file name that describes the setup is required by the user to be typed into the **File Name** window. The user then would click **Save**. The file extension for this file is **.dt2s**. The description on recalling this file will be described later.

Once the user has configured the **DataTrap II™ Data/VOD Recorder** with the desired settings, **Apply Settings** must be clicked to upload the settings into the unit. Once the button has been clicked, the following box will appear.

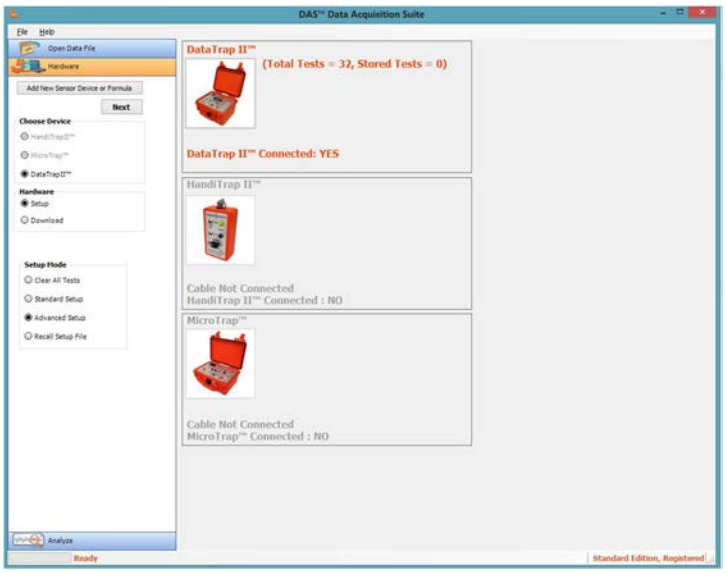


The user will need to click **OK** if the settings are desired to be uploaded to the unit or **Cancel** if a mistake has been made. Once **OK** has been selected, the file will upload new settings to the unit and the following message will be displayed.

Once **OK** has been selected, the software will return to the main screen.

4.4.1.3 Advanced Setup

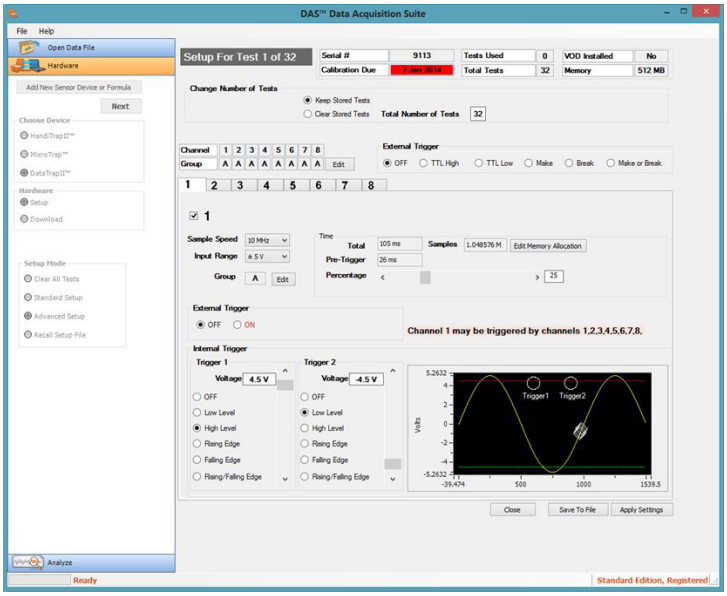
This section describes the **Advanced Setup** of the **DataTrap II™ Data/VOD Recorder**.



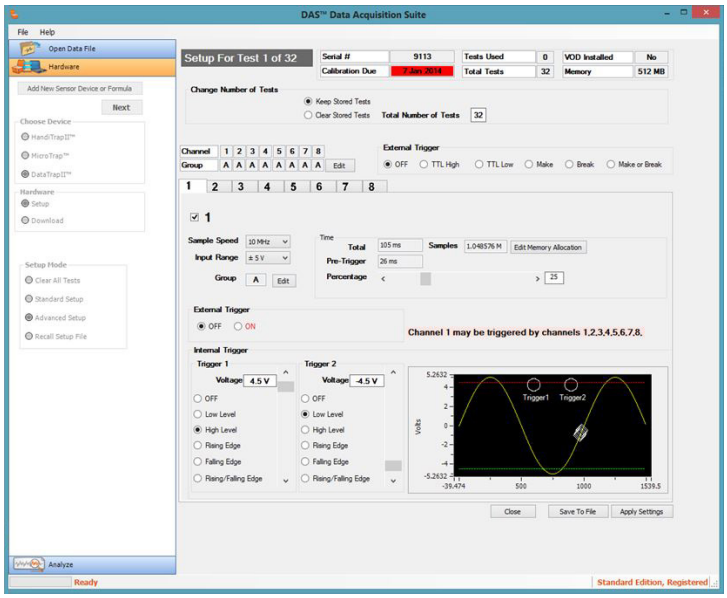
IMPORTANT

This section should only be used by either experienced **DataTrap II™ Data/VOD Recorder** users or veteran data collectors.

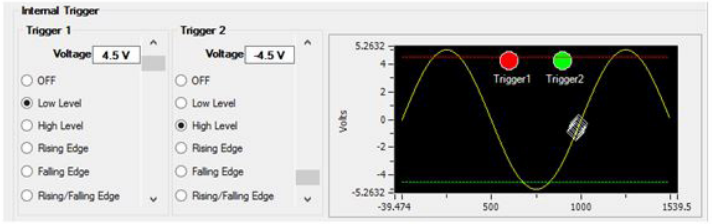
With the **Advanced Setup** radio button selected on the **Hardware tab** and the **Next** button clicked, the following screen will appear.



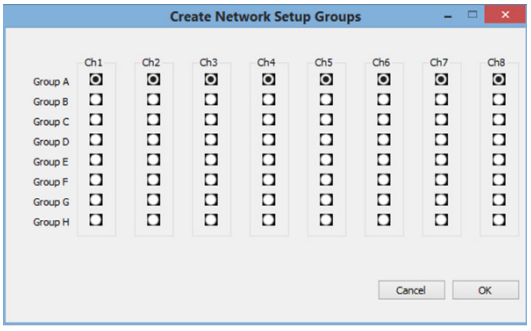
The **Advanced Setup** of the **DataTrap II™ Data/VOD Recorder** is quite powerful and if the user is not careful, some channels may not get recorded due to an invalid trigger setting. This screen will tell a lot of information about the **DataTrap II™ Data/VOD Recorder**, working top to bottom, in the first section the **Serial Number**, the date the **Calibration** is due, the number of tests used, the total tests the memory has been divided into, if the **VOD Upgrade** has been installed and the amount of memory installed. This menu will allow the user to control the setup of each individual channel with its very own settings.



In the next section down labeled **Change Number of Tests**, if the radio button **Keep Stored Tests** is selected, the box to the right of **Total Number of Tests** will display the number of tests the memory has been divided into. If **Clear Stored Tests** is selected, a slide bar is displayed to the right of **Total Number of Tests** for the user to change the total number of tests the total memory is divided into.

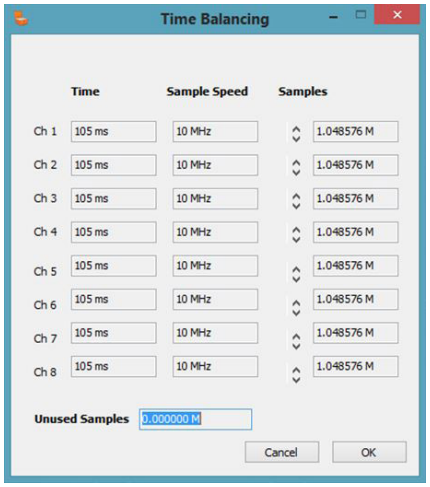


The next section describes the **Network Setup Groups** (or trigger grouping). This is a quick overview of the trigger setup for all of the triggers. In the above example, all of the channels are in **Group A**. This means that if any of those channels cross the trigger threshold (to be described later) then all of those channels will trigger and call that point in time the zero point. In the **Advanced Setup**, the user can select groupings of channels to be triggered. By placing different channels in different groups, one grouped channels will trigger when any channel in that group triggers. This gives channels in different grouping the ability to trigger at a different time and possibly record for longer time if recording at slower sampling rate. This kind of setup calls for careful planning of channel grouping so as to ensure reliable capture of valuable data. If the user clicks on the **Edit** button at the end of the Group row, the following window will be displayed.



In **Network Setup Groups** window, the user can select the groupings of the channels that are to be triggered together. The user has the ability to have each and every channel trigger separately. Once the user has selected the required groupings of the channels, click **OK**. If a change is not required, click **Cancel**.

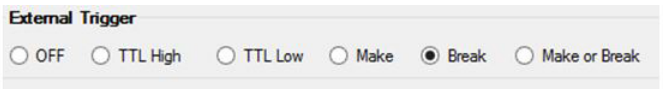
To the right of the trigger group selection is the **External Trigger**. There are six (6) choices: **TTL Low**, **TTL High**, **Make**, **Break**, **Make** or **Break** and **Off**. For details of each of the six (6) settings, refer to the **DataTrap II™ Data/VOD Recorder Operations Manual**.



Below the trigger group selection is tabs labelled **1-8**. These are the individual details and the configuration settings for each channel, beside the number at top there is a check box. If this check box is not checked, the channel will be disabled. Within this section, the user can select the **sampling rate**, **voltage range**, including **VOD** if the **VOD Upgrade** has been installed, can review and change the triggering group (by clicking on **Edit**), review the total amount of time and change and review the pre-trigger time with the slide bar. This is the setup for a standard scope channel on the unit. If the **VOD Upgrade** is installed in the unit, the standard **Trigger Level** for the internal **Trigger** are **Low Level** with a **Trigger Level** set at **90%**. In this section, the user can click on **Edit Memory Allocation**. It will display the **Time Balancing** window.

The user has the ability to change the number of points allocated to each channel. The user can click on the **up** and **down** arrows beside the number of samples (points) to change the memory available to each channel. The user will need to monitor the value in the **Unused Samples** as this can never be less than zero. Therefore, the number of points will need to be reduced in one of the channels prior to increasing them in another. With the changing of the number of points, the amount of time in each channel will change. This screen will display the amount of time with the selected sampling rate for the user to review prior to continuing. When the user is satisfied with the memory allocation, they will need to click **OK** or if the changes are not desired, click **Cancel**.

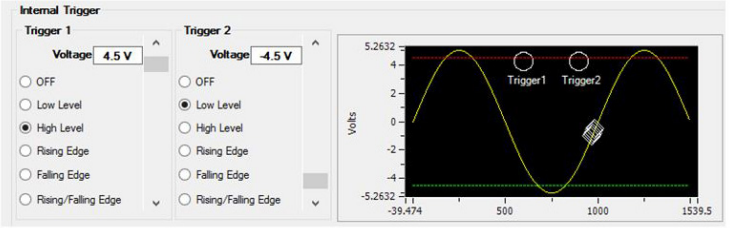
The next section refers to the **External Trigger**. If in the upper section the **External Trigger** is set to **OFF**, then in this section the only choice is **OFF** for all channels and the **ON** is labelled in red for each channel. If a selection in the upper section other than **OFF** is selected, than **ON** is in black and the radio button has the ability of being selected for the channel. When the **ON** radio button is selected, the type of trigger that was selected above is displayed to the right of the button. To the right of the **External Trigger OFF/ON** area is a label displaying the current channel and any channels that can trigger the current channel. This is confirmation display of the trigger grouping window settings and to ensure the user is aware of the channels that are effected by the decisions above.

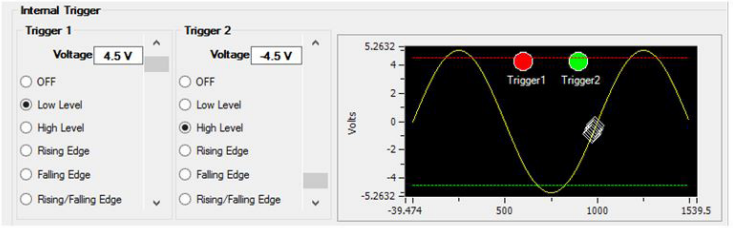


The bottom part of the screen is the **Internal Trigger** setup.

IMPORTANT

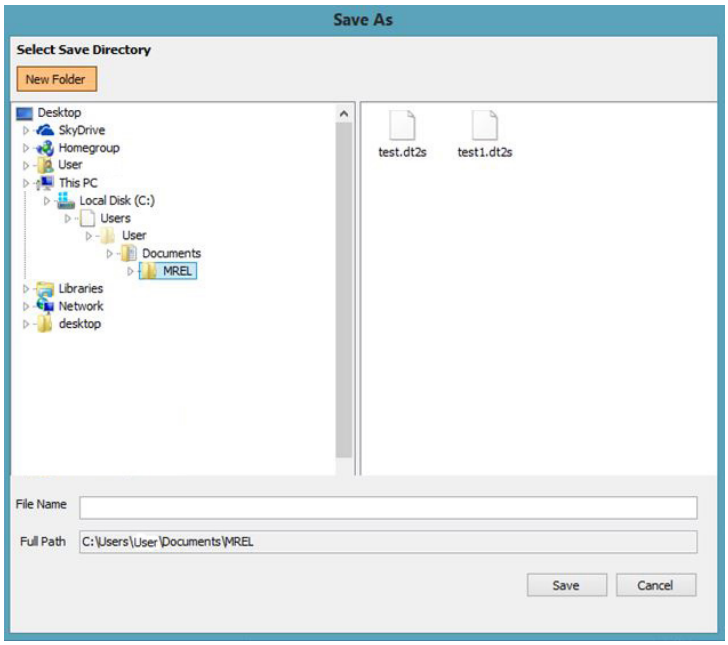
This is the setup for each individual channel.





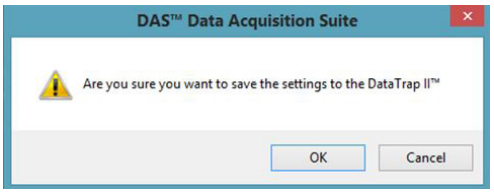
Each channel has independent trigger levels. The small graphic of simulated data trace is to demonstrate when a valid trigger is received. Each channel can have two (2) **Internal Trigger** levels as shown. **Trigger 1** is the red line while **Trigger 2** is the green line. In the top image **Trigger 1** is set to **High Level** at 4.5 Volts and **Trigger 2** is set to **Low Level** at -4.5 Volts. In the graphic on the right side, the circles will indicate when a valid trigger is received. When the circle is lit, the **DataTrap II™ Data/VOD Recorder** would register a valid trigger for that channel. In the top example the data tracer is between -4.5 and 4.5 Volts so both indicators are off. In the bottom example, **Trigger 1** is set to Low Level at 4.5 Volts and **Trigger 2** is set to High Level at -4.5 Volts, so with the data tracer in the middle, it is registering a valid trigger. For more details on the effect of the individual triggering modes, refer to the **DataTrap II™ Data/VOD Recorder Operations Manual**.

At any time the user wishes to exit the **Advanced Setup** of the **DataTrap II™ Data/VOD Recorder** with out saving, the user can select the **Close** button in the lower right. If the operator uses multiple setups with the unit, the user can save the individual setups in a setup file to be recalled at a later date. To save the file, the user will need to configure the unit as described above and once complete, the user will click on the **Save to File** button. This will open a directory/file structure window from the local computer as shown to the right.



The software will default to a standard location on the local hard drive, but the user can place the files in any location that is desired. A file name that describes the setup is required by the user to be typed into the **File Name** window. The user then would click **Save**. The file extension for this file is **.dt2s.** The description on recalling this file will be described later.

Once the user has configured the **DataTrap II™ Data/VOD Recorder** with the desired settings, **Apply Settings** must be clicked to upload the settings into the unit. Once the button has been clicked, the following box will appear.

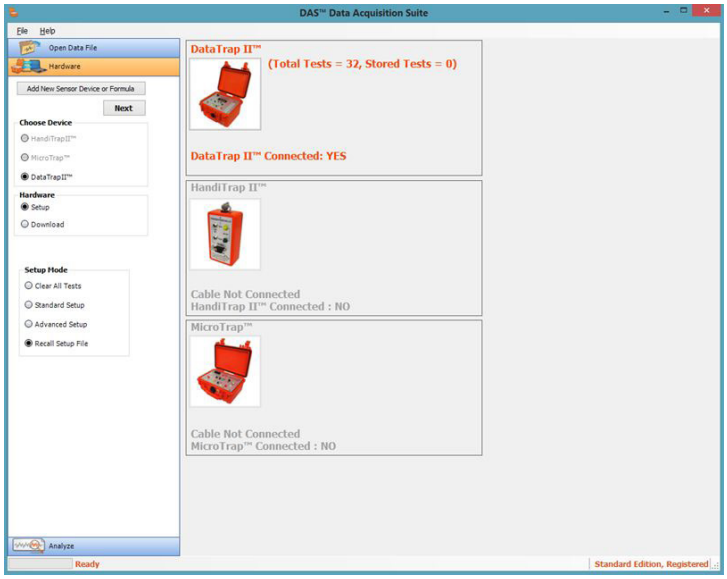


The user will need to click **OK** if the settings are desired to be uploaded to the unit or **Cancel** if a mistake has been made. **Once** OK has been selected, the file will upload to the unit and the following message will be displayed.

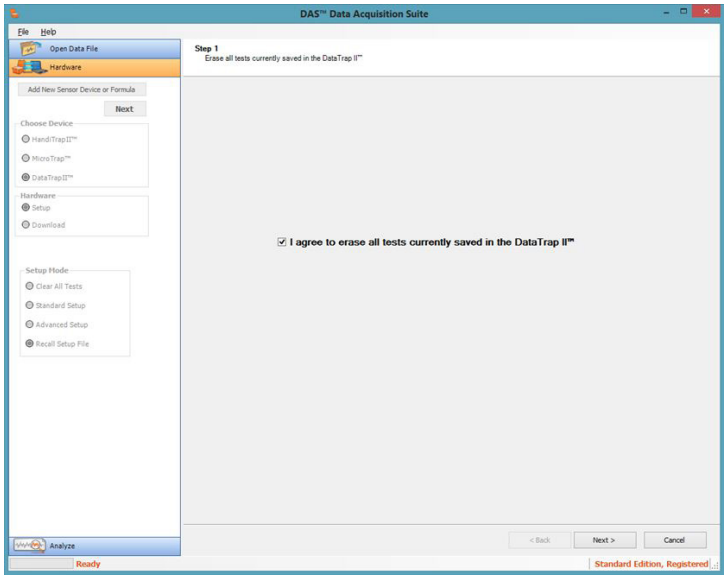
Once **OK** has been selected, the software will return to the main screen.

4.4.1.4 Recall Setup File

This section describes how the user can recall a saved setup file generated from the previous section.

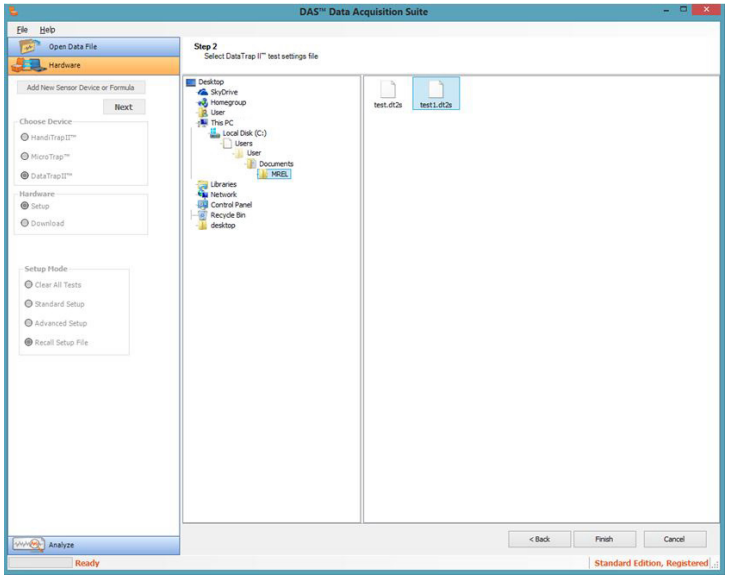


When the user selects **Recall Setup** File and clicks **Next**, the following window will appear.

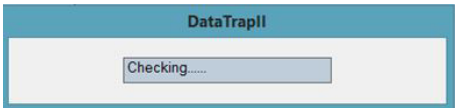


The user **MUST** check the check box to agree to erase all of the current data saved in the **DataTrap II™ Data/VOD Recorder**, otherwise the **Next** button will not be able to be selected. Only the **Cancel** button is available to be selected without the check box checked. With the box checked, the user can click on the **Next** button.

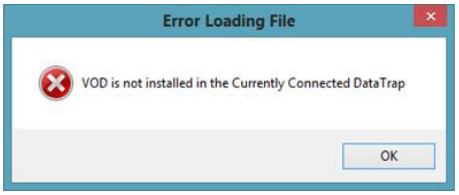
The next screen displays the same file structure window displayed when the file was saved. The user **MUST** select a file or only the **Back** and **Cancel** buttons are available. When the file has been selected, the **Finish** button will become selectable.



This window to the right will be displayed as the file is being checked against the configuration of the **DataTrap II™ Data/VOD Recorder**.

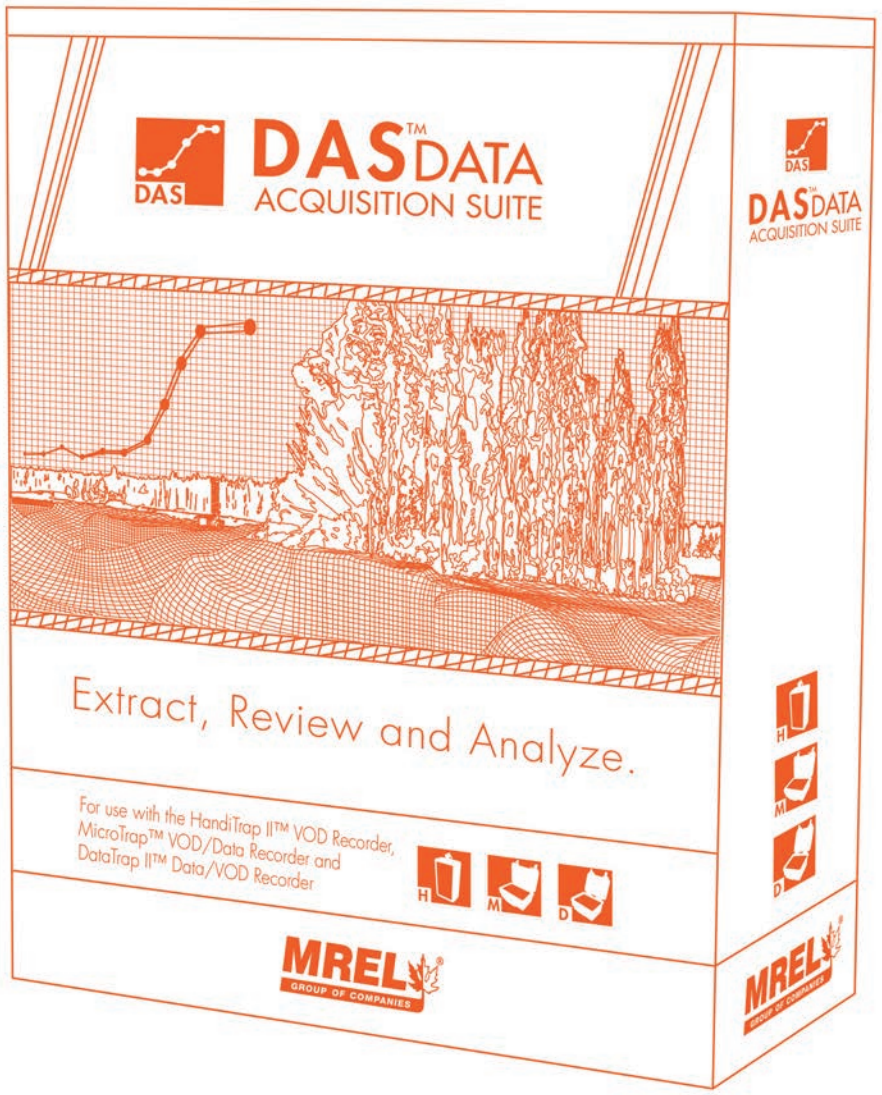


If the file is configured for a **VOD** setting and the unit does not have a **VOD Upgrade** installed, the following window will be displayed.



If the **Setup File** is configured properly for the **DataTrap II™ Data/VOD Recorder**, the screen of either **Standard** or **Advanced Setup** will be displayed. This will depend on which type of setup was used to create the file being recalled. The user would then need to click **Apply Settings** to save the configuration to the unit.

Chapter 5
Downloading from the Recorders

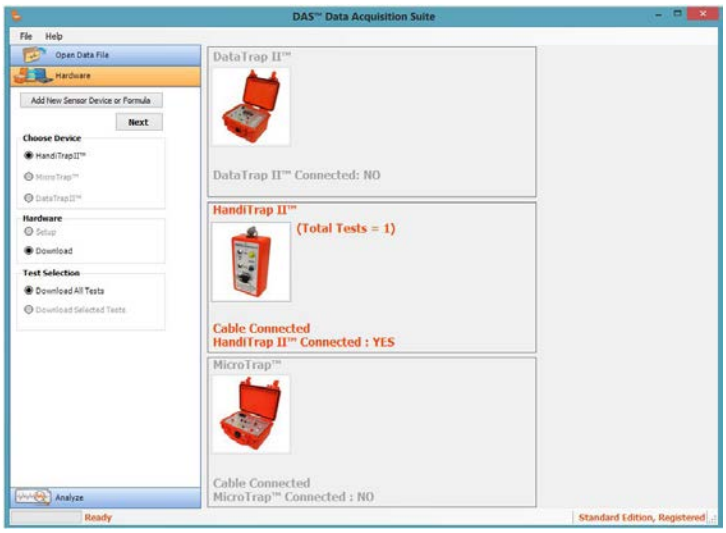


Overview

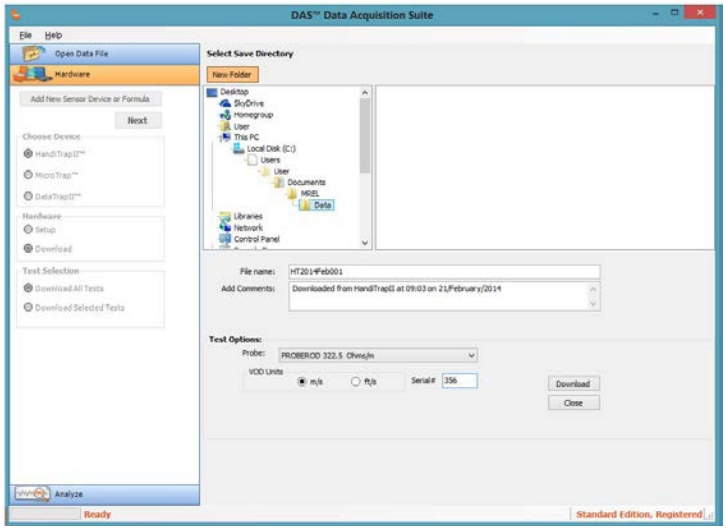
This section describes how the data is retrieved from the recorders. Here the procedure is described for each type of recorder.

5.1 Downloading from the HandiTrap II™ VOD Recorder

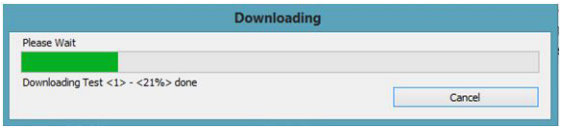
This section will detail the download procedure for the **HandiTrap II™ VOD Recorder**. With the unit connected to the computer and the hardware tab selected, the following screen will be displayed.



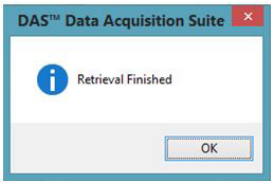
With the radio buttons selected of **HandiTrap II™ VOD Recorder** in the **Choose Device** section, **Download** selected in the **Hardware** section and **Download All Tests** in the **Test Selection**, the user will click on **Next**. The following screen is displayed.



This window shows the directory/file structure of the computer. The user will need to select a directory on the hard drive where the data is to be saved. With the location selected, an appropriate file name that is meaningful to the data will need to be typed into **File name.** The default file name provided can be used as well. In the box below is a comments box where some details are captured including the type of recorder and date with time of download. The user can add additional notes regarding the test including but not limited to: location, hole size, hole depth, explosive type, explosive column length and designed booster location. The selection of the **VOD** units should be selected next in order to display the **Probe** values in the selected units. The user will need to select the correct probe that was used during the test, by choosing a valid option from the pull-down menu. The user should type in the **Serial Number** of the unit in the box to the right of the **VOD** Units. The user can click **Download** to start the process or **Cancel** to exit. When **Download** process has been started, the following progress bar will be displayed.



Once complete, the following box will be displayed informing the user that the retrieval has been completed. The user must click **OK**.

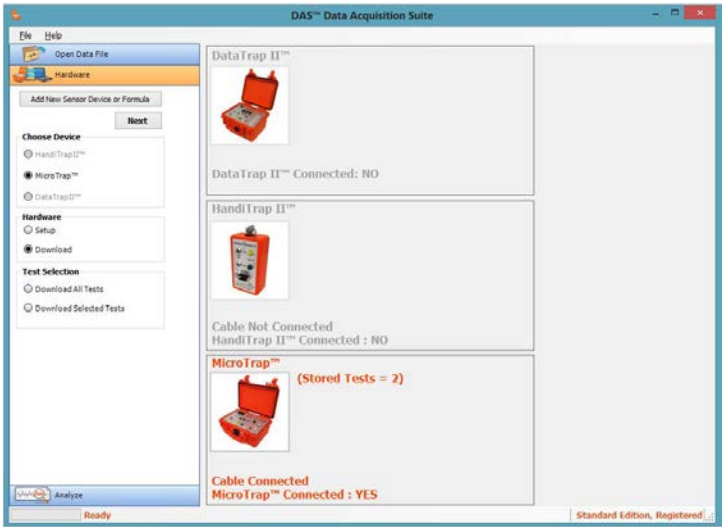


This will return to the download screen and the user can click **Close** to exit the download area for the **HandiTrap II™ VOD Recorder**. Each of the downloaded files from the **HandiTrap II™ VOD Recorder** generates two files with the same user file name entered while downloading. The **.ht2** file is the configuration file while the **.raw** is the data file. If the test files are moved from one directory to another, both files are required to be moved.

If the user has download a test with incorrect probe value, download the test again with correct choice of probe value. **(Do not turn off the recorder otherwise test will be lost).**

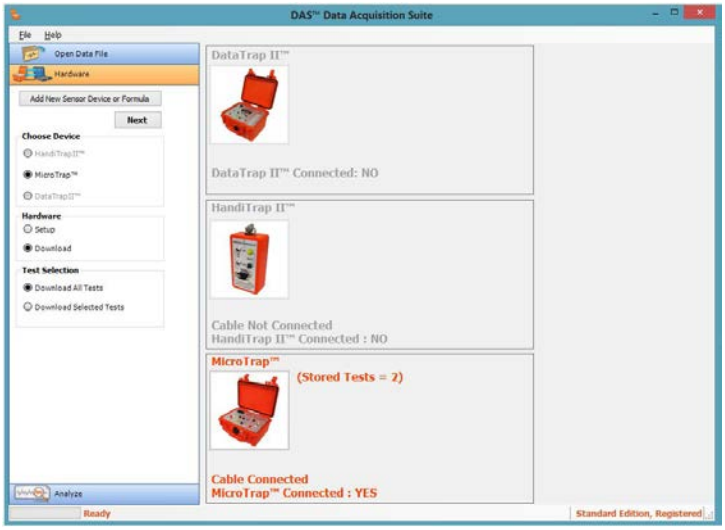
5.2 Downloading from the MicroTrap™ VOD/Data Recorder

This section will detail the download procedure for the **MicroTrap™ VOD/Data Recorder**. With the unit connected to the computer and the hardware tab selected, the follow screen will be displayed.



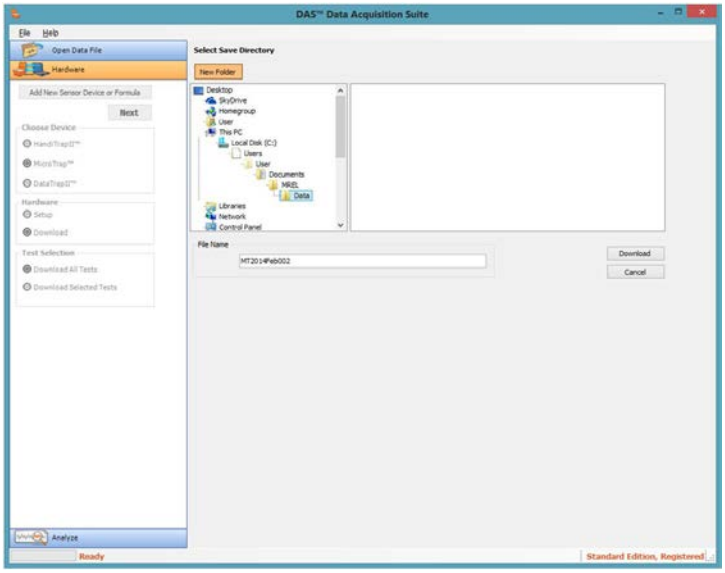
With the radio buttons selected of **MicroTrap™ VOD/Data Recorder** in the **Choose Device** section and **Download** selected in the **Hardware** section. There are two types of downloads that can occur with the **MicroTrap™ VOD/Data Recorder**. When there are more than one test stored in the memory of the unit, both radio buttons are available, **Download All Tests** and **Download Selected Tests**. This manual will step through both options.

5.2.1 Download All Tests - MicroTrap™ VOD/ Data Recorder

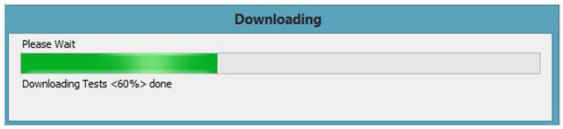


With the **Download All Tests** radio button selected, the user will need to click on **Next**.

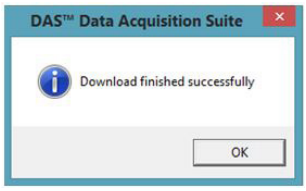
This is the screen that the user will view showing the directory/file structure of the computer. The user will need to select a directory on the hard drive where the data is to be saved. With the directory selected, an appropriate file name for the group of tests that are to be downloaded needs to be entered in the **File Name** text box. The default file name provided can be used as well.



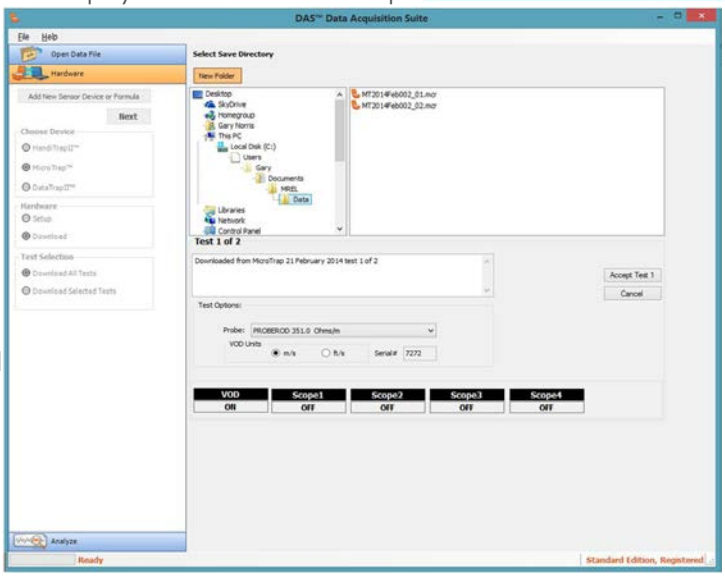
When the **Download** button is clicked, the following progress bar is displayed.



When the download has been completed, click **OK** to display the **Accept** screen as shown below.



When the downloading of tests has been finished, the following screen is displayed. The user has to accept the test by clicking **Accept Test** button for each test downloaded.



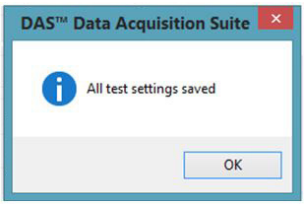
On the top of the screen is the directory/file structure of the local computer.

On the right side, the user selected name appended by _01 for the first test and _02 for the second test. Each of the **MicroTrap™ VOD/ Data Recorder** downloaded tests comprise of two files. A **.mcr** file for the configuration of the unit and a **.raw** is the data file. If these files are moved from one directory to another, both files are required to be moved. This example shows the download of both tests.

Just below the file structure window shows the following information about this test. In the image to the right, this is the comments text box for Test 1 of 2 downloaded in this session. The user can enter any important and relevant information regarding the test. For example: Location, hole size, hole depth, explosive type, gauge type, gauge serial number, signal amplification, gauge location.

In the next section, the user should select the units prior to selecting the **Probe** to ensure the correct units are displayed in the pull-down box. To the right of the **VOD Units** is the display of the **Serial Number**. Below is the display of the individual channel details. If the **VOD** channel is **OFF** (on units with the **Scope Upgrade**), the **Probe** selection pull-down is unavailable. When all of the data has been entered into **Test 1**, the user needs to click **Accept Test 1**. The next test will be displayed and the above process needs to be completed for each individual test downloaded. The unit can store up to 16 individual tests in the recorder.

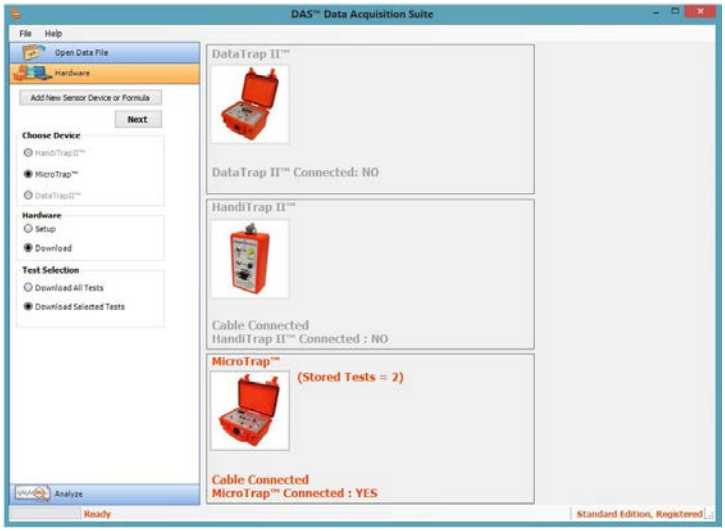
Note: For **VOD** channels, the correct Probe **MUST** be selected. This cannot be changed later.



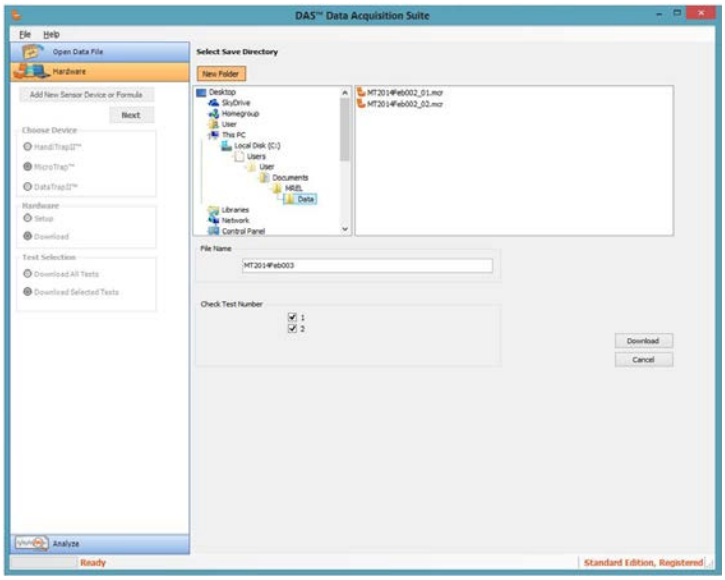
Once all of the data has been entered for all of the downloaded tests, the following window appears. The **Cancel button** if clicked rejects the test and no files for it will be created when download process is finished.

5.2.2 Download Selected Tests - MicroTrap™ VOD/Data Recorder

This section will detail the **Download Selected Tests** options of the **MicroTrap™ VOD/Data Recorder** download feature.

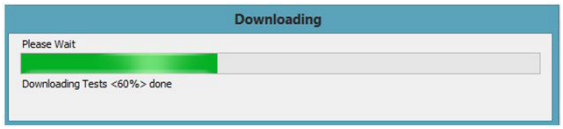


When the user selects the **Download Selected Tests** and presses the **Next** button, the following screen will appear.

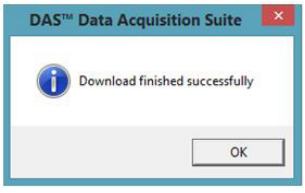


This is the screen showing the directory/file structure of the computer. The user will need to select a directory on the hard drive where the data is to be saved. With the directory selected, an appropriate file name for the group of tests that are to be download needs to be entered in the **File Name** text box (a default name is suggested). If all of the tests are checked, the software will act as if the **Download All Tests** button was selected and is described in **Section 5.2.1**. The user will enter the name (a default name is suggested) and only check-mark the tests that is desired to be downloaded.

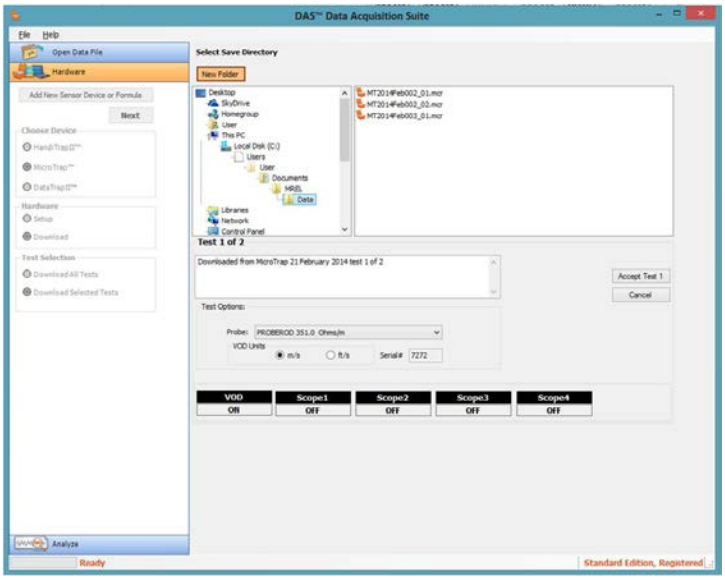
When the **Download button** is clicked, the following progress bar is displayed.



When the download has been completed, click **OK** to display the **Accept** screen as shown below.



On the top of the screen is the directory/file structure of the local computer.

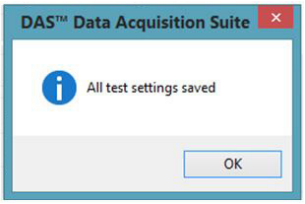


On the right side, the user selected name followed by _01 for the first test and _02 for the second test from memory. Each of the **MicroTrap™ VOD/Data Recorder** downloaded tests comprise of two files. A **.mcr** file for the configuration of the unit and a **.raw** is the actual data. If these files are moved from one directory to another, both files are required to be moved. This example shows the download of 1 test.

Just below the file structure window shows which test the following information is for. In the image above, this is the comments text box for **Test 1 of 2**. The user can enter any important and relevant information regarding the test.

In the next section, the user should select the units prior to selecting the **Probe** to ensure the correct units are displayed in the pull-down box. To the right of the **VOD Units** is the display of the **Serial Number**. Below is the display of the individual channel details. If the **VOD** channel is **OFF** (on units with the **Scope Upgrade**), the **Probe** selection pull-down is unavailable. When all of the data has been entered into **Test 1**, the user needs to click **Accept Test 1**. If more than one test was selected for download, each test will cycle with the same screen.

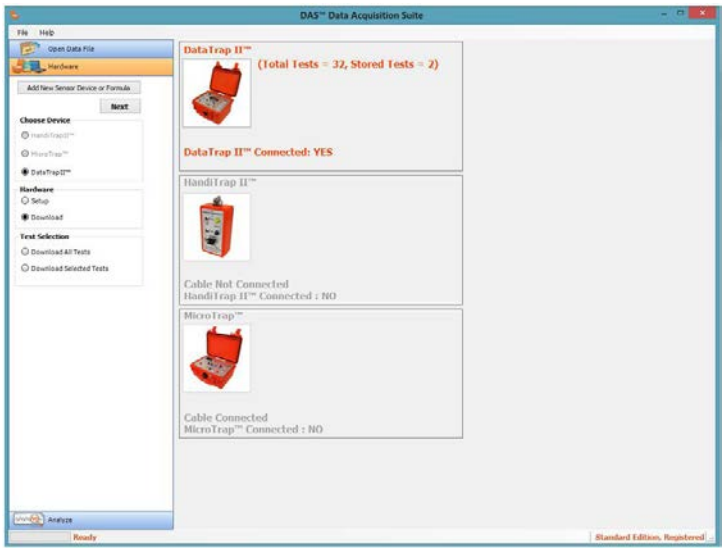
Note: For **VOD** channels, the correct Probe **MUST** be selected. This cannot be changed later.



If only one test was selected, as in this example, the user will click on **Accept Test 1** and the following window will be displayed. The **Cancel button** if clicked rejects the test and no files for it will be created when download process is finished.

5.3 Downloading from the DataTrap II™ Data/VOD Recorder

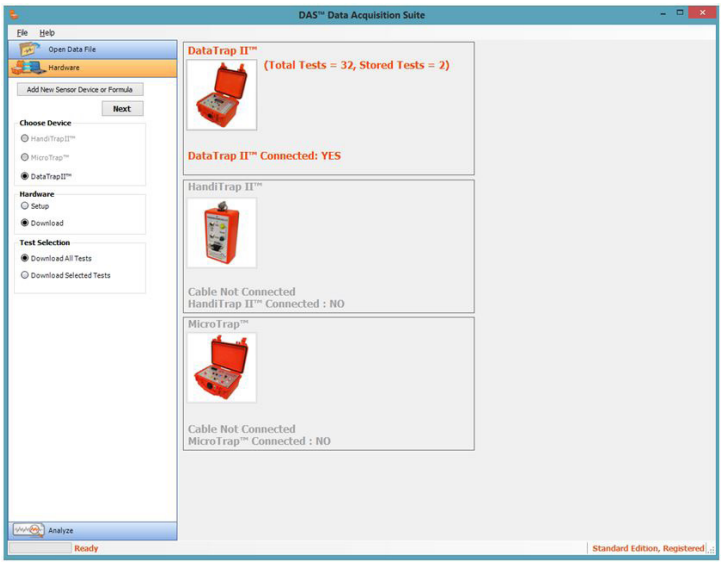
This section will detail the download procedure of test data for the **DataTrap II™ Data/VOD Recorder**. With the unit connected to the computer and the hardware tab selected, the follow screen will be displayed.



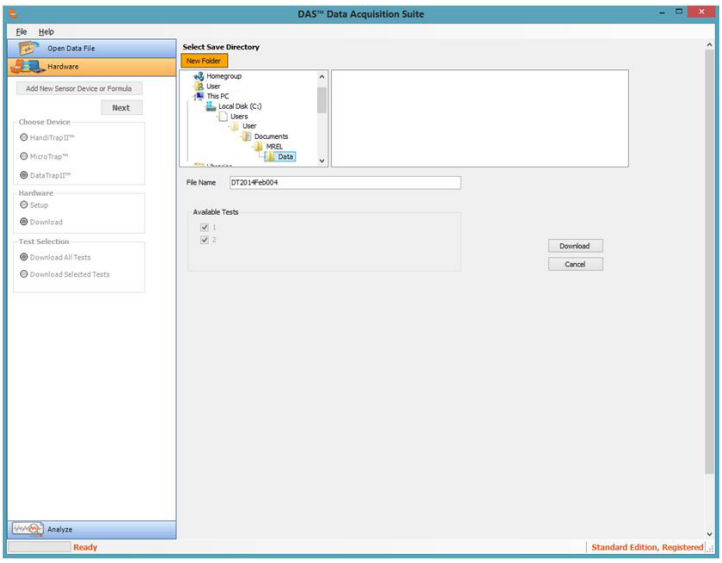
With the radio buttons selected of **DataTrap II™ Data/VOD Recorder** in the **Choose Device** section and **Download** selected in the **Hardware** section. There are two types of downloads that can occur with the **DataTrap II™ Data/VOD Recorder**. When there are more than one test stored in the memory of the unit, both radio buttons are available, **Download All Tests** and **Download Selected Tests**. This manual will step through both options.

5.3.1 Download All Tests – DataTrap II™ Data/VOD Recorder

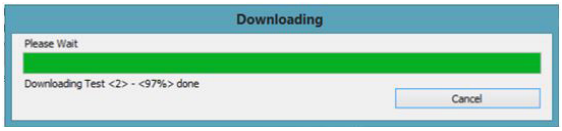
With the **Download All Tests** radio button selected, the user will need to click on **Next**.



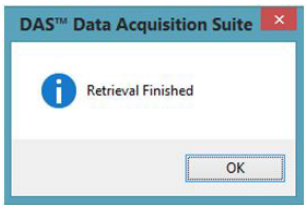
This is the screen that the user will view showing the directory/file structure of the computer. The user will need to select a directory on the hard drive where the data is to be saved. With the directory selected, an appropriate file name for the group of tests that are to be download needs to be entered in the **File Name** text box. The default file name provided can be used as well.



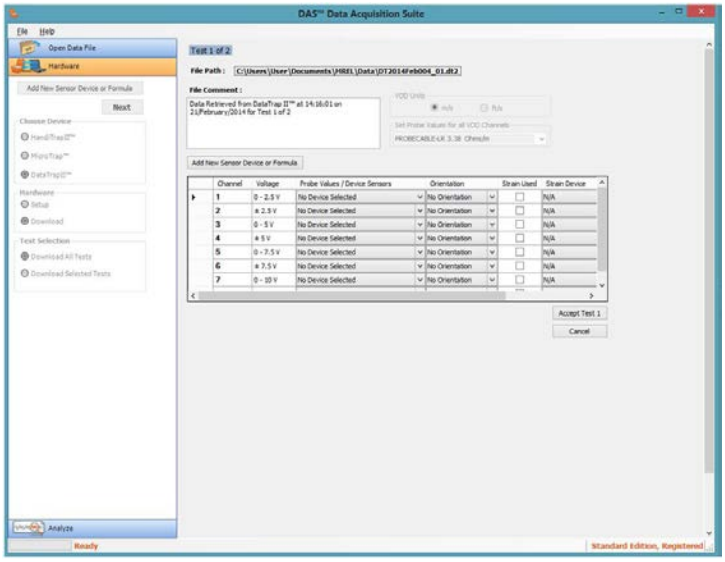
When the **Download** button is clicked, the following progress bar is displayed.



When the download has completed, the **DAS™ Data Acquisition Suite** will confirm the successful finish. The user will need to click on **OK** to continue with **Accept** screen as follows.



Afterwards the following **Accept** screen is displayed, which is essential part of download process.



On the top of the screen displays the file path on the local computer where the file has been saved.

In the **File Comment** section, the user can enter any important and relevant information regarding the test. For example: Location, hole size, hole depth, explosive type, gauge type, gauge serial number, signal amplification, gauge location.

To the right is the **VOD** selection. If **VOD** is present in data, the **VOD** Units will be selectable as well as the pull-down menu will be available for the user to select the correct probe. This will be the default setting for all **VOD** channels. The user should select the units prior to selecting the **Probe** to ensure the correct units are displayed in the pull-down box.

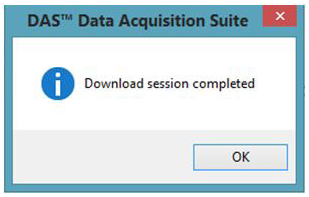
The next button down is the **Add New Sensor Device or Formula**. Refer to **Section 5.4** that describes this function separately.

In the grid view is the configuration of the **DataTrap II™ Data/VOD Recorder** referencing the channel number and the voltage settings (or **VOD**) during the recording. In the **Probe Values/Device Sensors**, the user would use this menu to pre-select the calibration factors of sensors that have been entered into the system using the **Add New Sensor Device or Formula** or **VOD Probe**. Otherwise, if **No Device Selected** is selected the data will be displayed in Volts.

Note: For **VOD** channels, the correct Probe **MUST** be selected. This cannot be changed later.

The Orientation column is designed for the user to input a specific orientation of the particular channel. This is generally used in accelerometers or strain gauges. This information is about the sensor & gauges used to collect data.

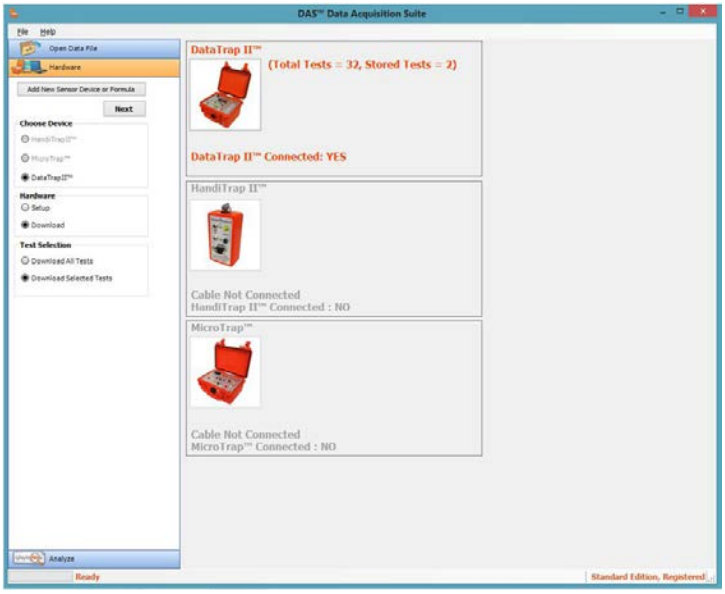
If the **DataTrap II™ Data/VOD Recorder** has the **Strain Upgrade** installed and the channel is connected to a strain gauge then the user must check the box of the particular channel that is a strain channel. This will allow the user to then select the **Pre-Amp Resistance** and the **Strain Gauge Factor**. The user will need to enter these values to allow the **DAS™ Data Acquisition Suite software** to convert the recorded data into the microstrain (με).



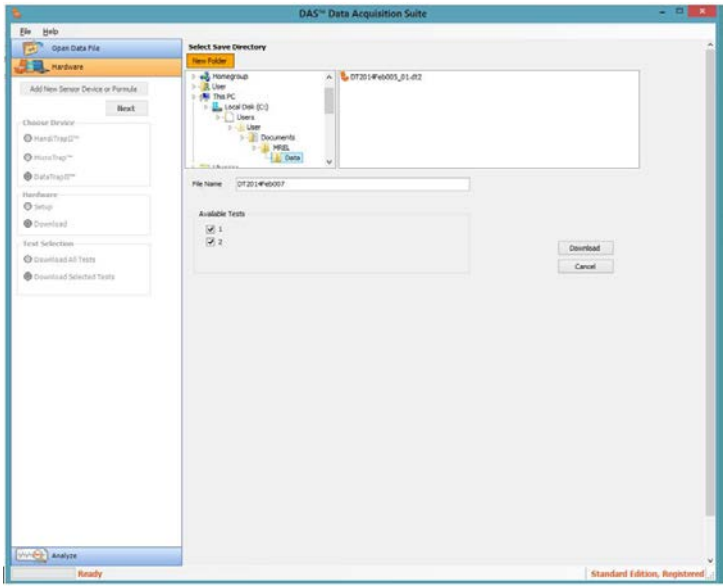
The user must then click **Accept** button to save the current test or **Cancel** button to reject it. Click **OK** in the final download message to finish the process.

5.3.2 Download Selected Tests – DataTrap II™ Data/VOD Recorder

This section will detail the **Download Selected Tests** options of the **DataTrap II™ Data/VOD Recorder** download feature.

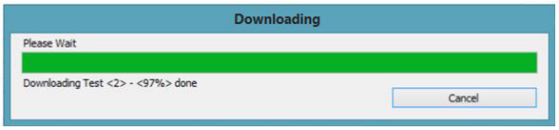


When the user selects the **Download Selected Tests** and presses the **Next** button, the following screen will appear.

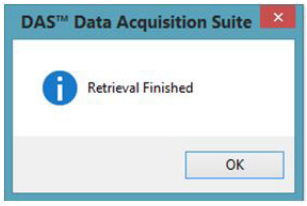


This is the screen that the user will view showing the directory/file structure of the computer. The user will need to select a directory on the hard drive where the data is to be saved. With the directory selected, an appropriate file name for the group of tests that are to be download needs to be entered in the **File Name** text box. The default file name provided can be used as well. Below the name text box, the test numbers available for download are being displayed. If all of the tests are checked, the software will act exactly as if the **Download All Tests** button was selected and is described in **Section 5.2.1**. The user will enter the name and only check-mark the tests that are desired to be downloaded. In this example, only **Test 1** will be selected.

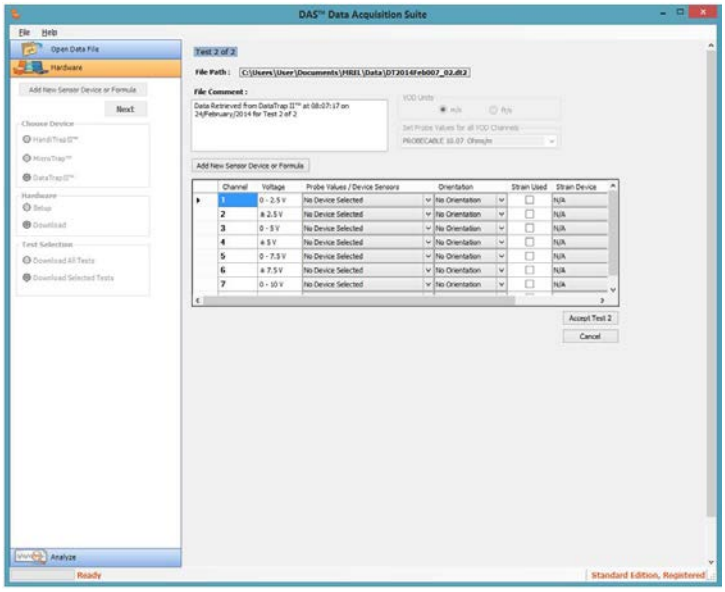
When the **Download** button is clicked, the following progress bar is displayed.



When the download has completed, the **DAS™ Data Acquisition Suite** will confirm the successful finish. The user will need to click on **OK** to continue with **Accept** screen as follows.



Afterwards the following **Accept** screen is displayed, which is essential part of download process.



In this example, only test 2 was selected for download.

On the top of the screen displays the file path on the local computer where the file has been saved.

In the **File Comment** section, the user can enter any important and relevant information regarding the test.

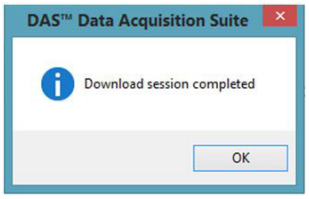
To the right is the **VOD** selection. If **VOD** channel is present in data, the **VOD Units** will be selectable as well as the pull-down probe values menu will will be available for the user to select the correct probe. This will be the default setting for all **VOD** channels. The user should select the **VOD Units** radio button prior to selecting the **Probe** to ensure the correct units are displayed in the pull-down box.

The next button down is the **Add New Sensor Device or Formula**. Refer to **Section 5.4** that describes this function separately.

In the grid view is the configuration of the **DataTrap II™ Data/VOD Recorder** referencing the channel number and the voltage settings (or **VOD**) during the recording. In the **Probe Values/Device Sensors**, the user would use this menu to pre-select the calibration factors of sensors that have been entered into the system using the **Add New Sensor Device or Formula** or **VOD Probe**. Otherwise, if **No Device Selected** is selected the data will be displayed in **Volts**.

Note: For **VOD channels**, the correct Probe **MUST** be selected. This cannot be changed later.

The **Orientation** column is designed for the user to input a specific orientation of the particular channel. This is generally used in accelerometers or strain gauges. If the **DataTrap II™ Data/VOD Recorder** has the **Strain Upgrade** installed and the channel is connected to a strain gauge then the user must check the box of the particular channel that is a strain channel. This will allow the user to then select the **Pre-Amp Resistance** and the **Strain Gauge Factor**. The user will need to enter these values to allow the **DAS™ Data Acquisition Suite software** to convert the recorded data into the microstrain (με) units. For hardware configurations for **Strain Channel** setup, refer to the **DataTrap II™ Data/VOD Recorder Operations Manual**.

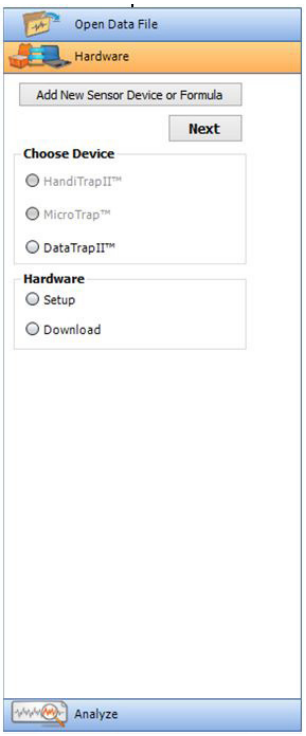


The user must then click **Accept** button to save the current test or **Cancel** button to reject it. Click **OK** in the final download message to finish the process,

5.4 Add New Sensor Device or Formula

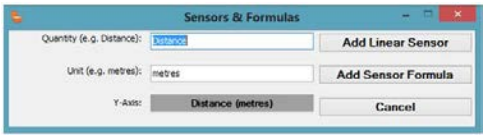
This section describes how the user can input commonly used equations for their applications or sensor calibration factors of sensors that are currently used. It only can be used on **Scope** data and **NOT** on **VOD** data. Therefore, this section is **not applicable** to the **HandiTrap II™ VOD Recorder** or the standard **MicroTrap™ VOD/Data Recorder**. Adding sensors will assist the user in allowing the ease of the application of the calibration data for each individual sensors. These sensor equation/calibration can be applied to the data **ONLY** during downloading of test data from **DataTrap II™ Data/VOD Recorder**.

5.4.1 Entering a New Sensor



A new sensor, device or formula can be added into the software from the main menu under the **Hardware** tab.

Click on **Add New Sensor Device or Formula** and the following widow will appear.

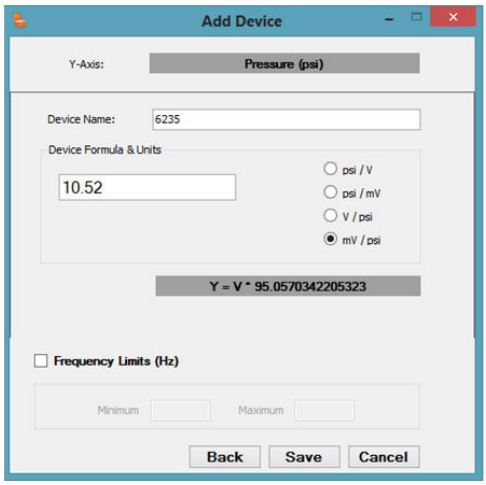


The names that are typed into the **Quantity** and **Unit** text boxes are the units of the Y-axis quantity in the graph. By default, y-axis label is generated using these units and quantity. Y-axis caption or label can be changed by user independently (note that does not change quantity or related units). Various examples for **Quantity** text box are Distance, Length, Pressure, Acceleration, Temperature, Force, etc. Various examples for the **Units** text box are metres, feet, kPa, psi, g's, m/s^2, Celsius, Fahrenheit, Kelvin, Rankine and so on. This is displayed in the **Y-Axis** box at the bottom. There are two options for adding information for quick reference: **Add Linear Sensor** and **Add Sensor Formula**. These formulas or equations can only be applied to the data while accepting each test during downloading of data from **DataTrap II™**. There are other facilities to create formulas and apply them on demand in **Analyze** ribbon menu (See **Apply Formula** in **Filters and Formulas tab**).

5.4.2 Add Linear Sensor

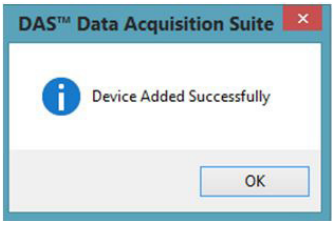
The user will use **Add Linear Sensor** when a sensor is used with a calibration value. This will allow a quick selection of the intended sensor with the proper calibration to be applied to the the collected data when accepting a test from **DataTrap II™**.

When the **Add Linear Sensor** button is clicked the following window is displayed.

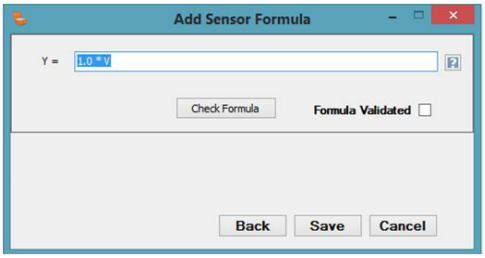


The definition of the Y-Axis is shown at the top and the user is required to enter a **Device Name**. This is the name of the sensor which will appear in a device list on the **Accept** screen of **DataTrap II™** data download process. In this example, the serial number of the sensor has been entered. From manufacturer calibration sheet, numerical value of the sensor calibration is entered in device formula text box and correct units is selected on the right with radio buttons choice. The **Frequency Limits** are informational values entered by the user. This information can be referred to at a later date without looking up the frequency limits on the technical specifications of the sensor. The user will then select **Save** to add the device to the list or **Back** to return to the previous screen or **Cancel** to stop the process.

Once **Save** has been clicked, the following message is displayed. The user should click **OK** to return to previous screen. The user can add another sensor or formula on the main screen or click **Cancel** to close it.

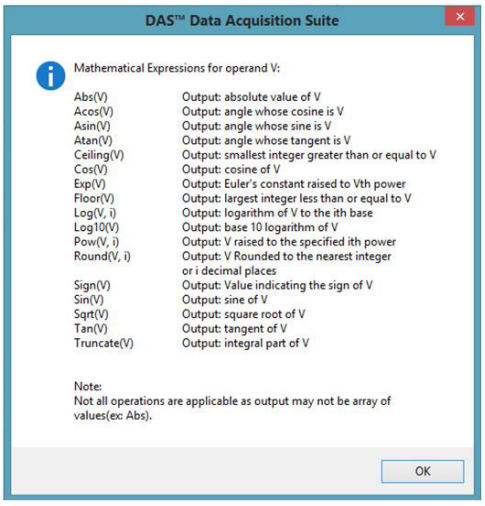


5.4.3 Add Sensor Formula



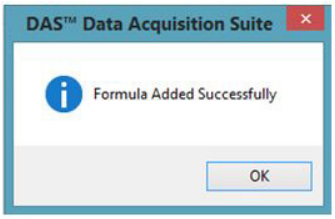
The user will select this button when straight math formula is needed to be applied to the collected data. When **Add Sensor Formula** button is clicked, the following window is displayed.

The user can enter any valid mathematical equation into the **Y=** text box. To the right is a window describing all of the different mathematical expressions that can be used to modify the voltage that has been recorded.



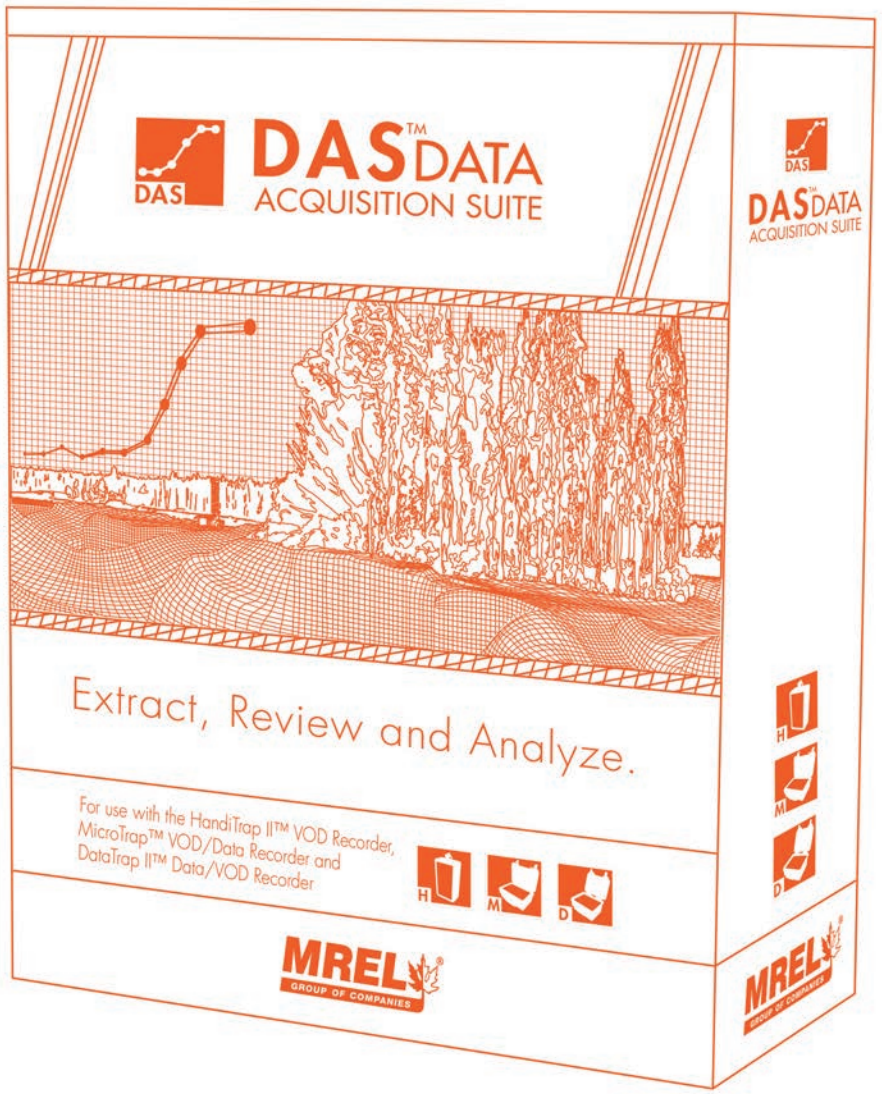
With the formula entered into the text box, the user can click **Check Formula** and confirm that the format of the equation is correct if a check mark appears in the check box labeled **Formula Validated**.

At any time, the user can select **Back** to return to the previous screen and **Cancel** to exit.



When the user clicks **Save**, the following message is displayed. Click **OK** to return to previous screen where the user can continue adding other sensors or **Cancel** to close it.

Chapter 6
Opening a Data File

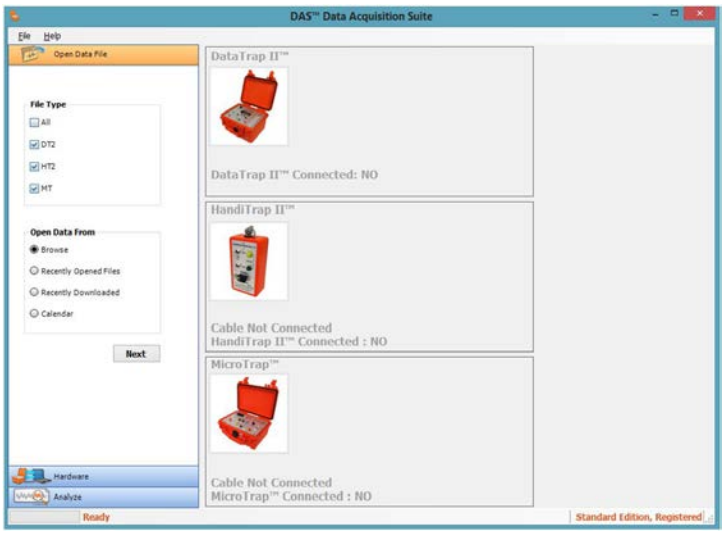


Overview

This section describes how to open a previously saved data file downloaded from either a HandiTrap II™ VOD Recorder, MicroTrap™ VOD/Data Recorder or DataTrap II™ Data/VOD Recorder.

6.1 Selecting a Data File

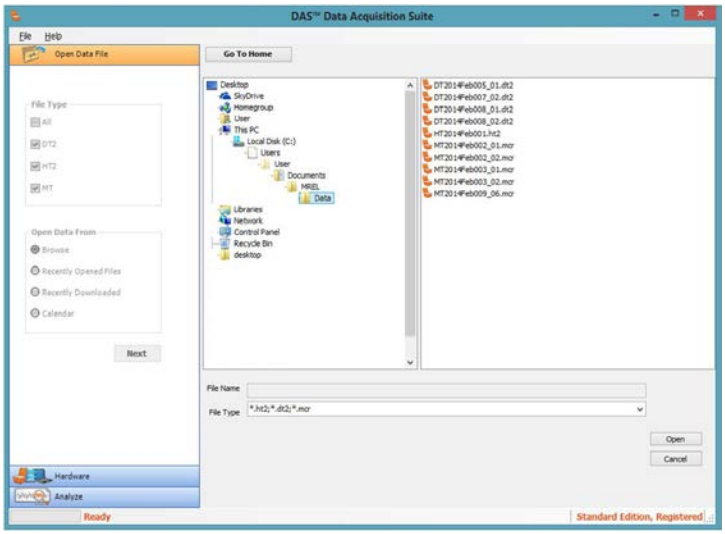
From the main screen, select the **Open Data File** tab. The following screen will be displayed.



By default, all recorder data file types are selected (DT2-**DataTrap II™ Data/VOD Recorder**, HT2-**HandiTrap II™ VOD Recorder**, MT-**MicroTrap™ VOD/Data Recorder**). The user can select only the one type of file if desired. Once the desired file type is selected to be visible in the next screen, there are four (4) different ways to search for a file. They are **Browse**, **Recently Opened Files**, **Recently Downloaded** and **Calendar**.

6.2 Browse

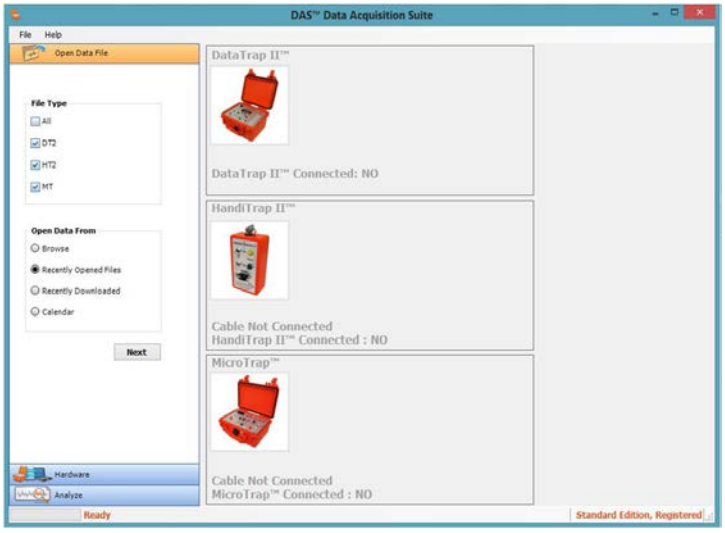
The **Browse** feature is the typical way to use the file browser to find a file. By clicking the **Browse** radio button and selecting Next, the following screen will be displayed.



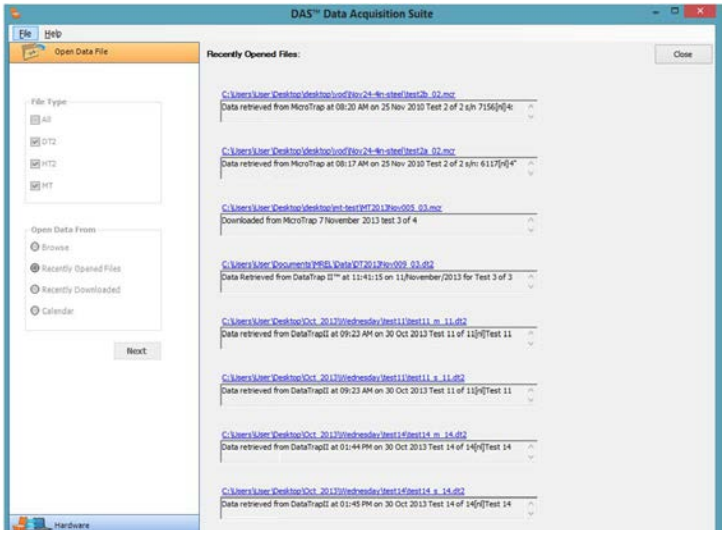
This screen will allow the user to navigate through the directory/file structure of the computer to find the desired file. From the previous page, only the selected file types will be displayed. The user can click on **Go To Home** to return to the default directory defined in the software. When the desired file is located, select the file by left clicking on the file name once and then clicking **Open**. To stop the process, click **Cancel**. When **Open** has been clicked, the file will start to load. After file is loaded, the main window will return with the **Analyze** tab opened. To analyze the data, refer to the **Analyze** section.

6.3 Recently Opened Files

This section is used to open a file that has been opened recently. The computer will record the files that have been opened and will produce a list of files for the user.



The user will select **Recently Opened Files** radio button from the **Open Data File** tab and select **Next** and the following window will appear.

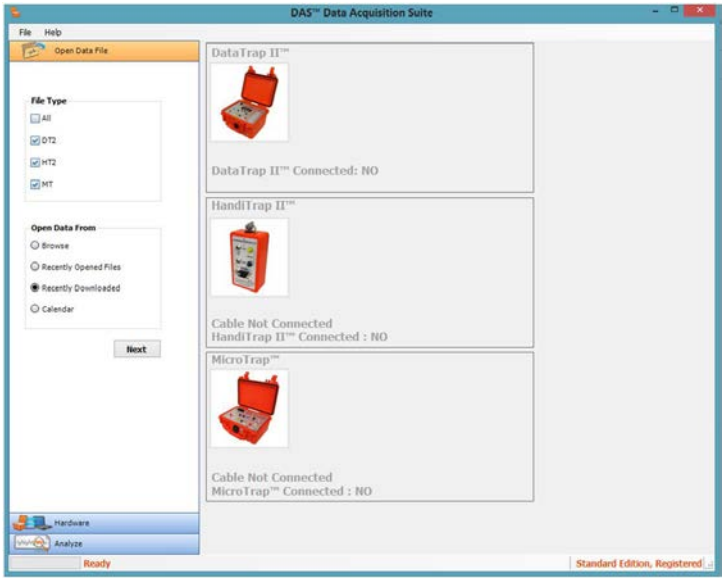


The **DAS™ Data Acquisition Suite** will display eight (8) previously opened files. This includes all of the file types selected in the **File Type** window in the previous section. The user will just click on the blue link and the file will open and the file will show up in the **Analyze** tab. If no files wish to be opened from the list, the user can click **Close**.

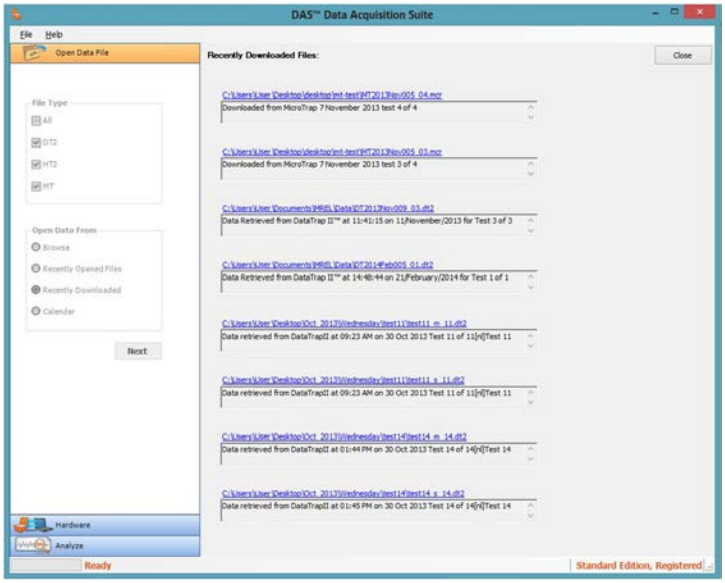
If there is a **zip button** present next to a file entry, clicking it will create a zip file of original data on your desktop. That is useful if you want to send data to **MREL** (see **Section 10.2**)

6.4 Recently Downloaded Files

This option will open a list of the most recent downloaded files from the recorders.



With the **Recently Downloaded** radio button selected and selecting **Next**, the following window will be displayed.

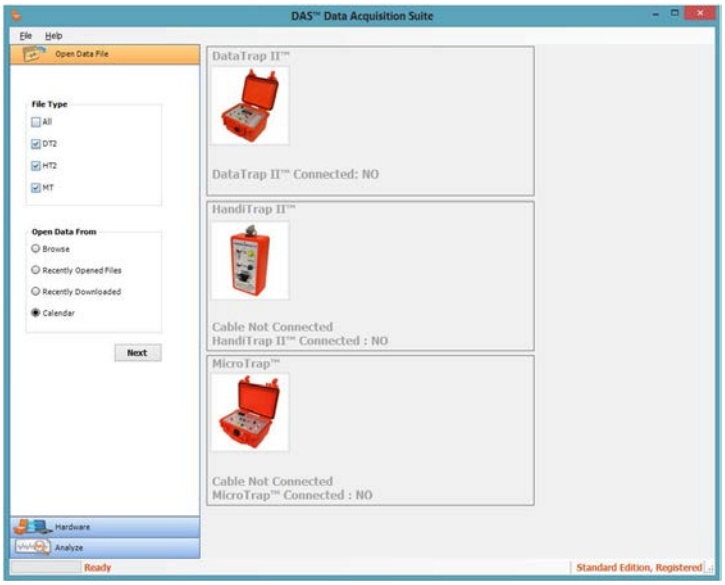


The **DAS™ Data Acquisition Suite** will display eight (8) previously downloaded files. This includes all of the file types selected in the **File Type** window in the previous section. The user will just click on the blue link and the file will open and the file will show up in the **Analyze** tab. If no files wish to be opened from the list, the user can click **Close**.

If there is a **zip button** present next to a file entry, clicking it will create a **zip** file of original data on your desktop. That is useful if you want to send data to **MREL** (see **Section 10.2**)

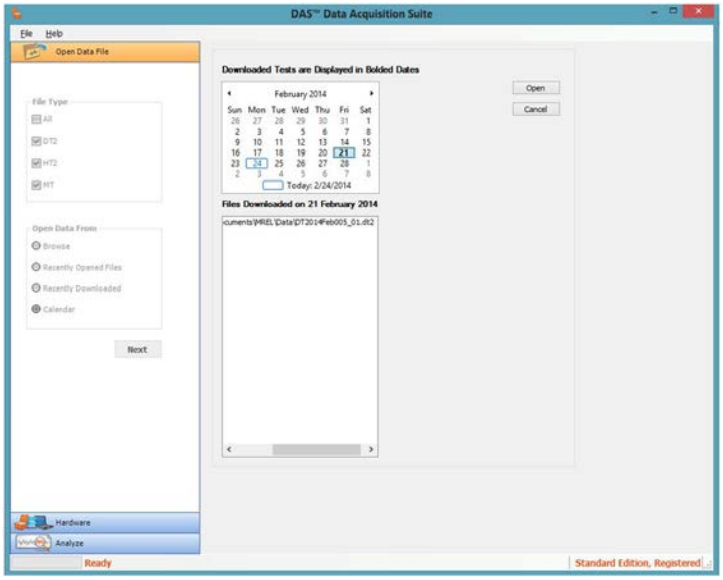
6.5 Calendar

This section is used to open a file if the download date is known.



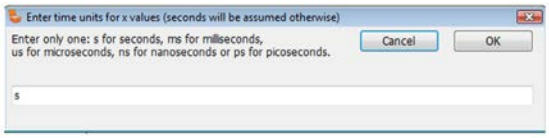
With the **Calendar** radio button selected and selecting **Next**, the following window will be displayed.

This option will display a calendar for the user to select the date that the file was downloaded. A blue box is placed around the current date and the date that is in bold font has a file associated with that date. In the example above, February 21, 2014 has a **DataTrap II™ Data/VOD Recorder** file associated the date. In the box below is the file location of the data with the file name. All of the files downloaded on the selected date will show in the bottom window. The user will select the file from the bottom box and click **Open**. The file will open in the **Analyze** tab. If no files are to be opened, click **Cancel**.



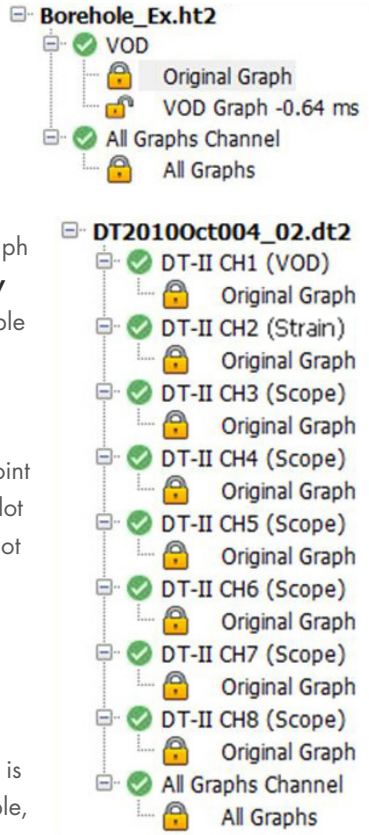
If there is a **zip button** present next to a file entry, clicking it will create a **zip** file of original data on your desktop. That is useful if you want to send data to **MREL** (see **Section 10.2**)

6.6 Open CSV file



A 2-column CSV (comma separated values) file can be imported in **DAS™**. The imported data creates a scope channel. The user has to enter correct time units for 1st column when asked by importation process. The user has to enter "s" for seconds, "ms" for milliseconds etc. See the following text box for an example.

6.7 Working With the Data File



The image to the right shows a data file **Borehole_Ex.ht2** open. It shows one **VOD** channel with the **Original Graph**, which is indicated by a locked icon, and a saved graph (**VOD Graph -0.64 ms**) which is indicated by an unlocked icon. The meaning of the lock is that the data cannot be modified on permanent basis or saved though it allows you to work with it. A user should always create a saved graph to work on. A saved graph needs to be created for **VOD/Delta calculation**, **apply filters, formulas, apply offset (zero shift), moving data points, creating point cursors** and **annotations** and more. To create savable graphs, the user can **Right-Click** on the locked graph and save it as a different graph (a default name is suggested). The saved graph can also be deleted in this manner.

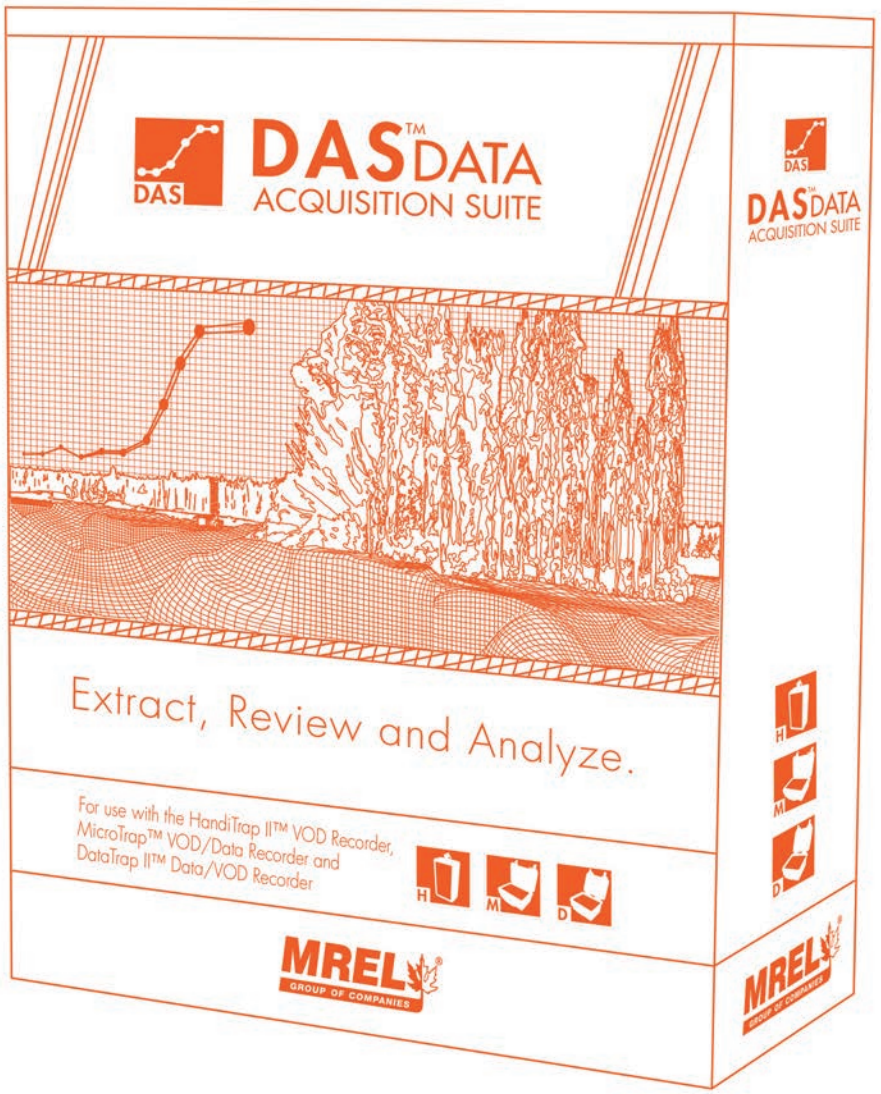
An **Active Plot** is normally required to do most operations such as exporting data, change plot line or point colour, creating point cursors, creating annotations, creating **VOD** or **Delta** calculations. For making a plot active, check mark a plot entry in **Active Plot Selector Grid** on the lower left of **Analysis tab**. Only one plot in a graph can be active at a given time.

In the next example shown to the right, the file name of **DT2010Oct004_02.dt2** shows **8** channels and the display **All Graphs**. The user can also select the **All Graphs** which provides a display of all original data from all active channels overlaid on the same screen for visual comparison. There are not savable operations on this graph but new graph can be saved from this. In this scenario, only current active plot is saved as new graph. Instead working on individual channels is strongly encouraged. Also in this example, channel **1** is a **VOD** channel, channel **2** is a **Strain** channel and channels **3** through **8** are scope. This example has no saved graphs on any of the channels. When the user clicks on the channel number, the software will display a summary of the settings and information for the selected channel on the right side of the screen when the file was downloaded.

6.8 Closing a Data File

To close a data file, **Right-Click** on the file name in the **Graph Tree** and select **Close**. The software will ask for a confirmation, click **Yes** to close the file or **No** to cancel and return to the file. The user can also use **Close All** in top **File** menu which closes all opened files.

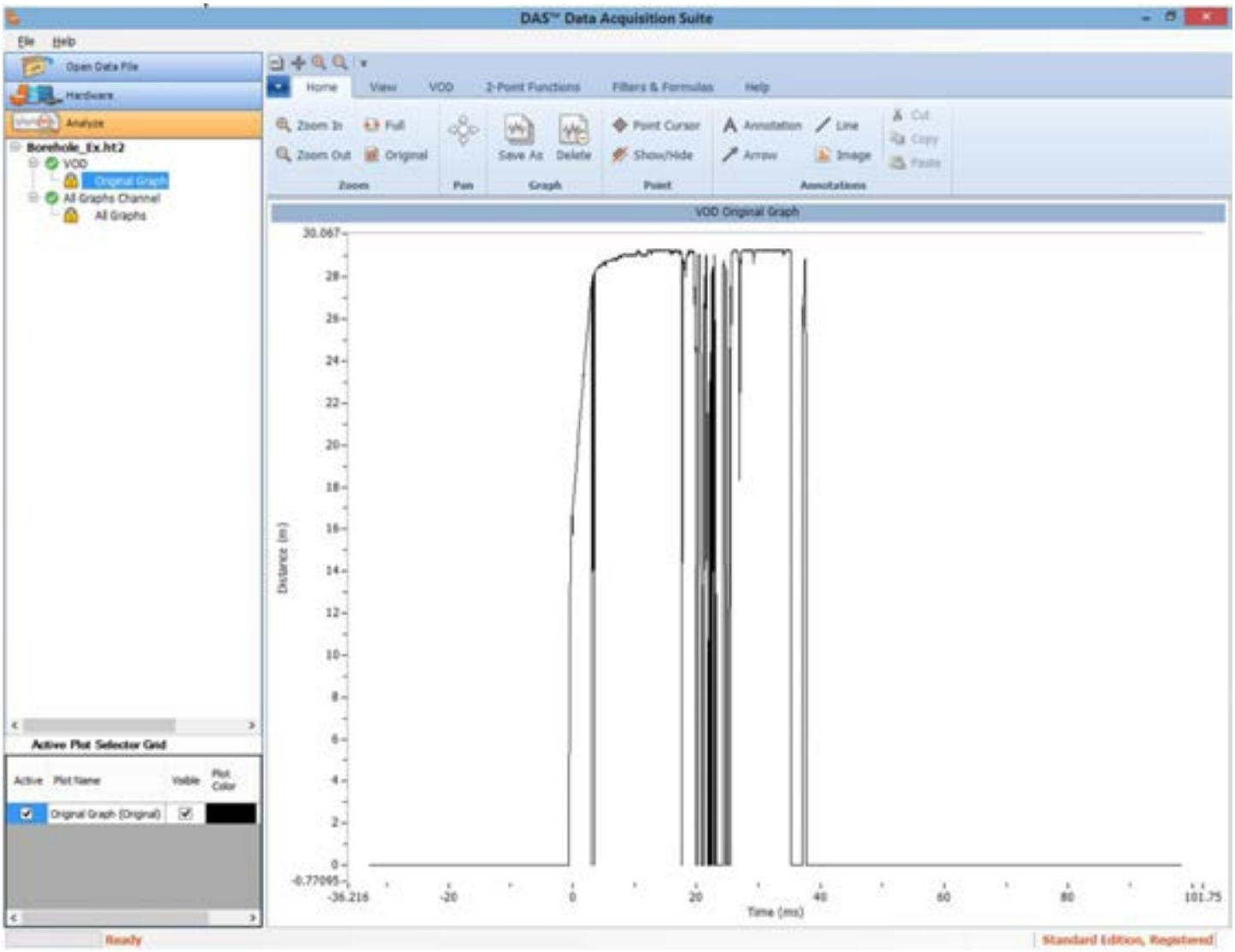
Chapter 7
Data Analysis



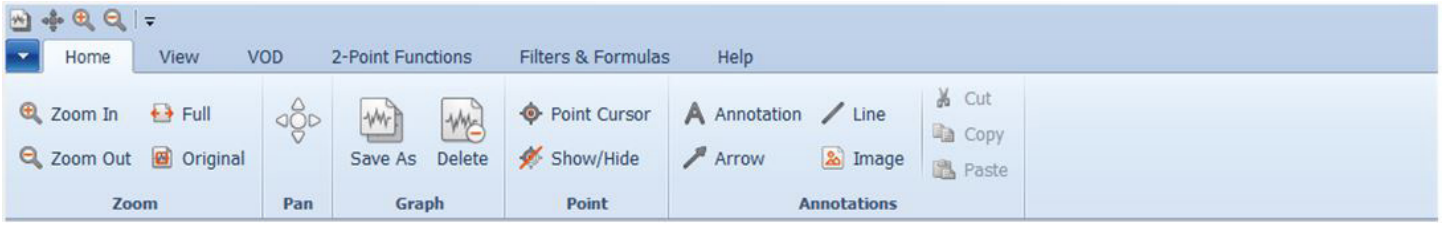
Overview

This section will detail the analysis of the data collected from the HandiTrap II™ VOD Recorder, the MicroTrap™ VOD/Data Recorder and the DataTrap II™ Data/VOD Recorder.

This section will detail the analysis of the data collected from the recorders. It will show how the software will work and not the correct or incorrect way to analyze certain types of data. The data filtering portion of the software can be found in **Section 8**. Below is the view of the software with a data file open. Across the top of the screen is a ribbon menu with six (6) different tabs.



7.1 Home Tab



In the **Home** tab most functions are of general nature that are used in graphing, saving and zooming. It includes the following functions:

- **Zoom In** – Allows the user to zoom in on the graph to an area of interest.
  The feature works by clicking on **Zoom In** and selecting a box around the area of interest by dragging a mouse with left mouse button pressed in.

- **Zoom Out** – Allows the user to zoom out.
  Click on **Zoom Out** as many times it is required or until the full view has been reached.

- **Full** – Allows a single button click to zoom out to the maximum range of the graph. Click on once for maximum zoomed out area.

- **Original** – Allows a one button click to zoom out to the maximum range of the saved graph.
  Click on once for the saved graph to return to its original saved range.

- **Pan** – Allows for the scrolling of the graph.
  The pan button is a toggle **ON** or **OFF**. When it is on, the mouse can be used to click in and drag the graph.

- **Save As** – Allows a graph to be saved as a new graph with the current zoomed range.
  With the current viewable area as desired range, click on **Save As** and a text box will pop up to allow a name to be entered by the user.

- **Delete** – Allows the **Saved As** graphs to be deleted. Will not delete the original graphs.
  With a saved graph selected, the user can click this button and a conformation box will appear to confirm the deletion of the graph.

- **Point Cursor** – Creates a movable vertical point cursor which shows the X, Y coordinate of current data point on the graph.
  Click on the button and follow the on screen directions. The **Point Cursor** can be moved with the mouse or the left and right arrow keys.
  To select an individual point, the user may need to zoom in closer to select the desired point. The user can have multiple **Point Cursors** on the screen.
  To remove, **Right-Click** on the **Point Cursor** and select **Delete**. Also with the **Right-Click** on the **Point Cursor** and selecting **Modify**, the user can adjust all of the individual properties on the **Point Cursor**.
  The **Show/Hide Point Cursor** will allow the user to copy the individual coordinates pointed by point cursors to the clipboard to be pasted into a different application.

- **Show/Hide** - Will allow the user to copy the individual coordinates pointed by the point cursors in the graph to the clipboard so as to be pasted into a different application. Click on the button. It can also be found in the **Right-Click** context menu of the individual **Point Cursor** or graph.

- **Annotation** – Will allow user to enter text onto the graph. Follow the instructions on screen.
  Click on the button and then click on the screen. **Right-Click** on the **Annotation** and select **Modify** to modify the text, colour or font. From the **Right-Click** menu, the user can also delete the **Annotation**.

- **Arrow** – Will allow the user to draw an **Arrow** with a caption.
  The user will draw an arrow with a textual caption attached to the end of the line. The user can change the text in the box by right-clicking and selecting **Modify**. The shape at the arrow end of the line can be removed by in the same **Modify** box, scroll down to **ShapeStyle** and select none. The arrow tip can not be moved without a **ShapeStyle** present.

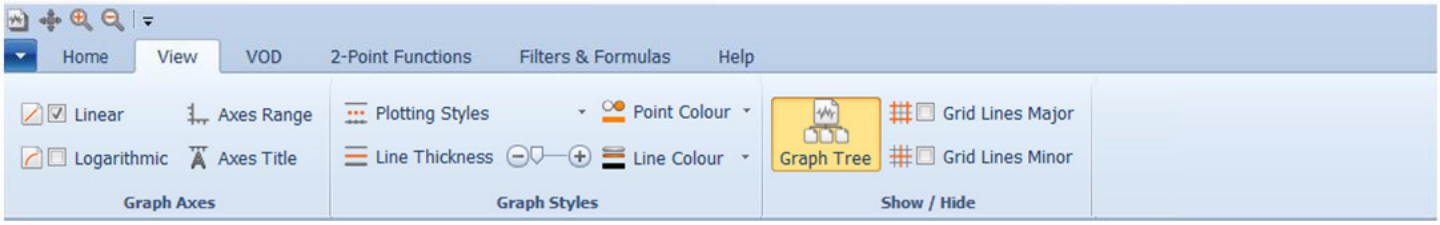
- **Line** – Will allow the user to draw a Line.
  The user will click on the **Line** button and follow the on screen instructions. The line can be extended or moved. User can modify its font or thickness using its Modify context menu.

- **Image** – Will allow the user to insert a picture.
  The user will click on Image and follow the on screen directions. A directory/file structure window will pop up of the local computer. The user can navigate the computer and select the image of interest. The user will need to select top-left corner of the image to drag it to the area of interest and will be able to **Right-Click** on the corner to select **Modify** and adjust the displayed size. The **Modify** dialog box also allows user to select a different image using "**Change...**" button.

- **Cut** – Will allow the selected annotation to be cut. The selected annotation has a red rectangle around it when user **Left-Click** it once.
  The user will need to select an item and then select **Cut**. If no item or a non-valid item is selected, the **Cut** button will not be available. The item will be placed on the computer's clipboard.

- **Copy** – Will allow the selected annotation to be copied.
  The user will need to select an annotation and then select Copy. If no annotation or a non-valid item is selected, the Copy button will not be available. The annotation will be placed on the computer's clipboard.

- **Paste** – Will allow the last copied or cut annotation to be pasted.
  This button will allow the user to **Paste** the item in the same graph that has been placed on the computer's clipboard. Note that annotation can be pasted to different graph nodes of the same or different data file (in version later than 1.0.0.0). **VOD** and Delta values cannot be copied or pasted.



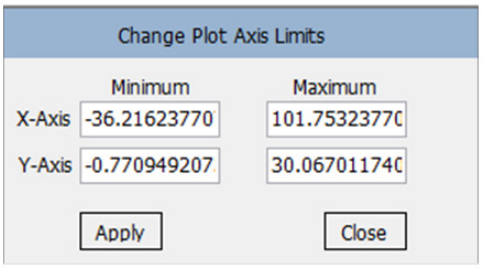
7.2 View Tab

In the **View tab** are features that effect how the data is displayed.

- **Linear** – Displays the X and Y axes with a linear scale.
  The user can click on the Linear check box to change the axes to **Logarithmic**

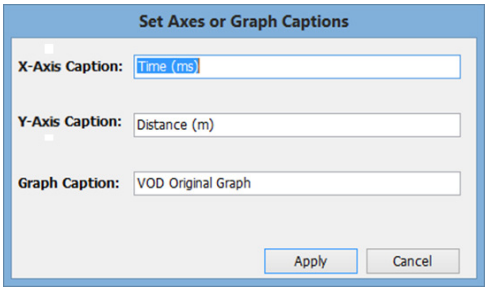
- **Logarithmic** – Displays the X and Y axes with a logarithmic scale.
  The user can click on the **Logarithmic** check box to change the axes to Linear

- **Axes Range** – Displays the following text box for the user to manually enter the axes range
  The user can enter specific ranges into the menu without the requirement to zoom. Enter the desired values and click **Apply** or if no changes are desired, click **Close**.

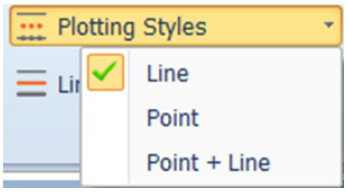


- **Axes Title** – Allows the user to modify the axes titles or graph caption.
  The user can modify the titles by entering the desired information in the text box and clicking **Apply**. If no changes are desired, click **Cancel**.

  From the main graph window, **CTRL Key + Left-Click** on the X-axis, Y-axis or graph caption bar to display individual title change dialog.



- **Plotting Styles** – Allows the user to change the way a plot is drawn.
  The default is **Line** connecting the data points with a line. **Point** will only display the data points while **Point + Line** will display both. Only the **Active** plot is affected.

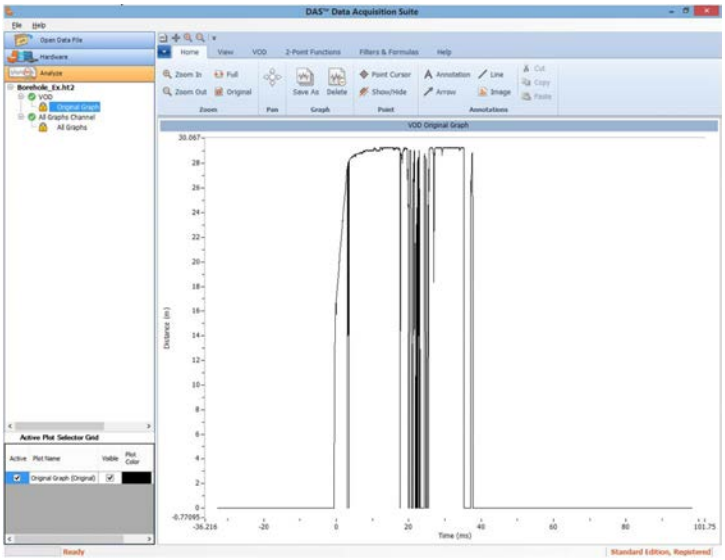


- **Line Thickness** – Allows the user to change the line thickness of the active plot.
  The user can either click and drag the slider bar or use the **+** and **–** buttons to change the thickness of the drawn line.

- **Point Colour** – Allows the user to change colour of the data points of active plot.
  The **Point Colour** button will change the colour of the data points of active plot while the pull down arrow will allow the user to select the colour from a pallet of colours.

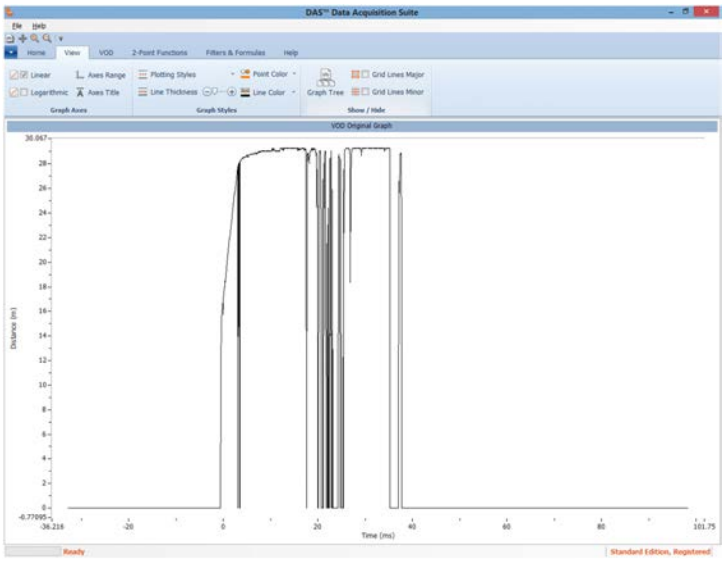
- **Line Colour** – Will allow the user to change the line colour of the active plot.
  The **Line Colour** button will change the line colour of the active plot while the pull down arrow will allow the user to select the colour from a pallet of colours.

- **Graph Tree** – Allows the user to show and hide the graph tree view on the left side of the screen. It will allow the graph area to extend from the right image all the way to left edge of main window:



To the image to the right:

A single click on the **Graph Tree** button will change back and forth between the two screens.

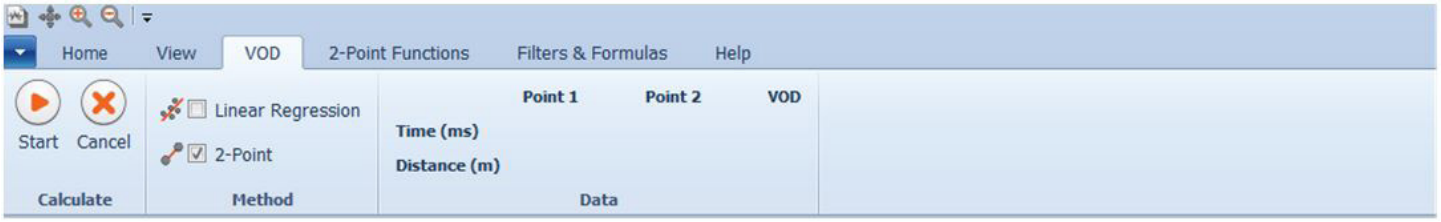


- **Grid Lines Major** – By selecting the check box will display the major grid lines. It can be turned on and off by the check box.

- **Grid Lines Minor** – By selecting the check box will display the minor grid lines. It can be turned on and off by the check box.

7.3 VOD Tab

NOTE: This tab is only visible when the selected graph (or channel) is **VOD** data.



- **Start/Done** – Allows the start of the **VOD** measurement. The button will change to **Done** after the process has been started. Follow the on-screen directions and click and drag the vertical point cursors to the desired location. See the **Quick Start Guide** for the use of the button. Clicking **Done** will finish the **VOD** measurement process.

- **Cancel** – Allows the **VOD** measurement to be canceled.

- **Linear Regression** – Allows the user to use **Simple Linear Regression** to produce a line of best fit of the points between the two end points.
  The definition of **Simple Linear Regression** is a fit of a straight line through the set of n points in such a way that makes the sum of squared residuals of the model (that is, vertical distances between the points of the data set and the fitted line) as small as possible.

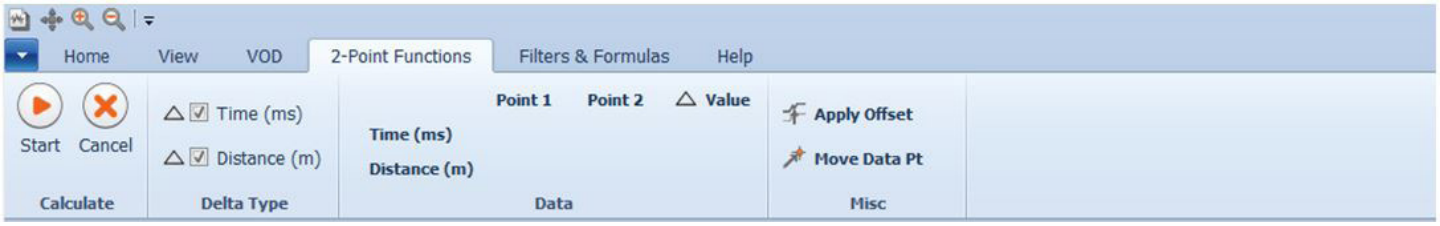
- **2-Point** – Allows the user to measure **VOD** with using only the start and end point.
  The **VOD** is calculated by the following equation: (y2-y1)/(x2-x1), where (x1,y1) is the first point and (x2,y2) is the second point. This is used when the data is 'noisy' and the points in the middle need to be ignored. As long as the line matches the straight edge of the data, then the value obtained from the calculation is valid.

- **Data Section**
  In this area, values being calculated are displayed when a **VOD** measurement has started and being calculated dynamically. The **VOD** value will be displayed and will change if the user selects Linear Regression or 2-Point method. The values will change accordingly as user moves vertical data cursors by mouse or left (right) keys. The user can finish **VOD** calculation process either by clicking **Done** button in the **VOD** tab or in "**Choose points for VOD/Delta calculation**" dialog. (See more details in Analysis section or in **built-in help**.)

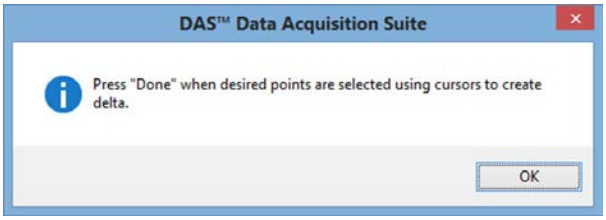
7.3.1 How to measure VOD

See **VOD Analysis Section 7.7**.

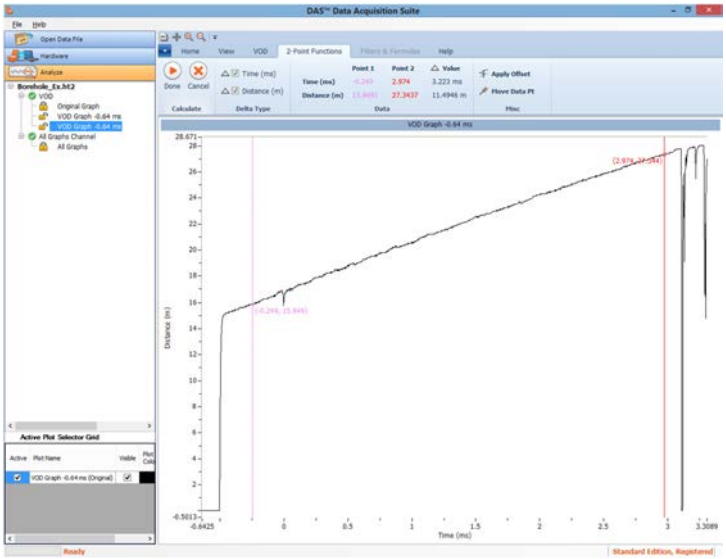
7.4 2-Point Functions Tab



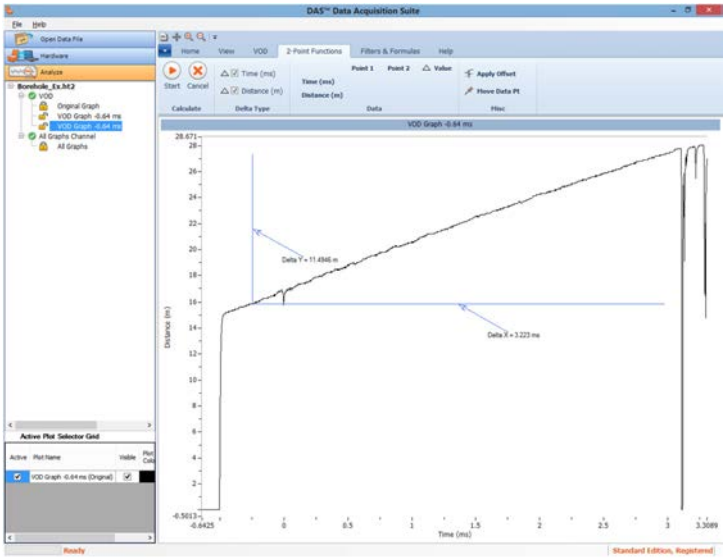
- **Start/Done** – Allows the user to measure the amount of time (delta X) and the amount of Y-axis units (m, V or engineering units) (delta Y) between the two selected points.
  The user will select start and will follow the on-screen instruction.



The screen to the right shows the two vertical point cursors and the two (X,Y) points.In the ribbon menu in the **Data** section, the values of the two points and the difference is also displayed.



When **Done** is clicked, the calculated values are shown on the graph as in the second screen.

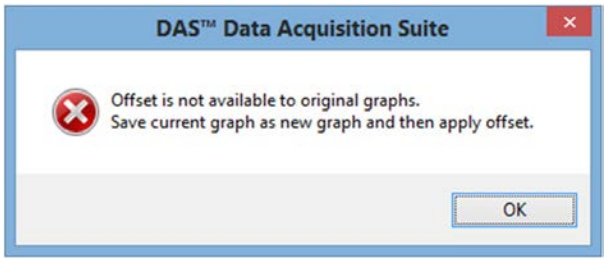


- **Cancel** – The **Cancel** button is to stop the **2-Point Function** operation.

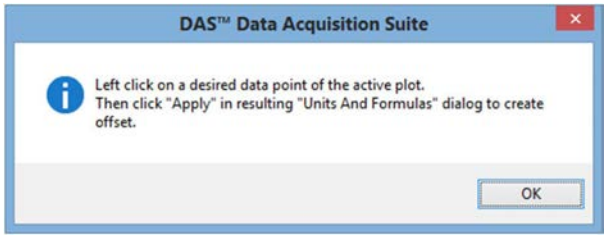
- **Delta X** (x-axis units of graph such as ms, s) – This check box defines if the delta value for quantity X (usually time) is to be calculated and displayed. If the box is unchecked, the delta value will disappear in the Data section. Also, if the box is unchecked, the value will not be calculated or displayed when **Done** is selected.

- **Delta Y** (y-axis units of graph such as m, V or engineering units) – This check box defines if the delta value for quantity Y (such as distance, voltage etc.) is to be calculated and displayed. If the box is unchecked, the delta value will disappear in the Data section. Also, if the box is unchecked, the value will not be displayed during the calculation process or after when **Done** button is clicked.

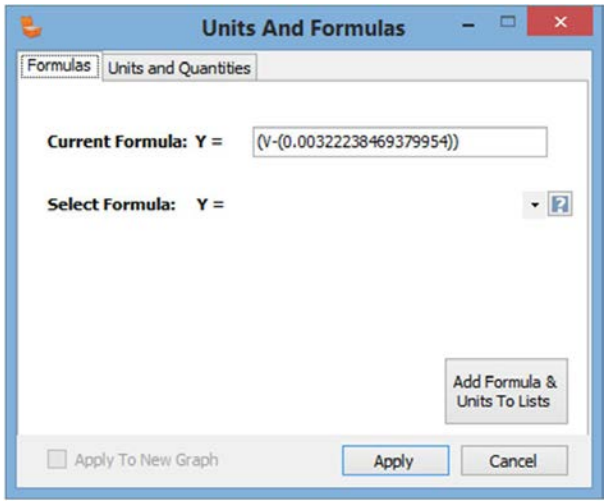
- **Apply Offset** – Allows the user to shift all of the data on the vertical axis of a single channel. This is not applicable to **VOD** data. The offset cannot be applied to the original data. It only can be applied to the saved graphs. If it is attempted to be performed on an original graph, the following pop up is displayed.



Click on the button and follow the on-screen directions. On the pop up to the right, click **OK** and then select the data point which the user wants to be a zero value on the **Y-Axis**. When the desired point has been selected, the following **Units And Formula** dialog is displayed.

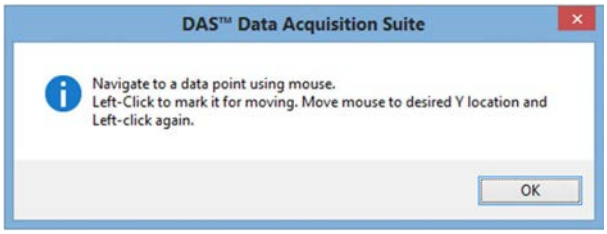


The actual operation is the subtraction of the selected data point's **Y** component as displayed in the formula bar above. The user will select **Apply** to shift the data the desired amount in the **Y-Axis** or Cancel to stop the operation.



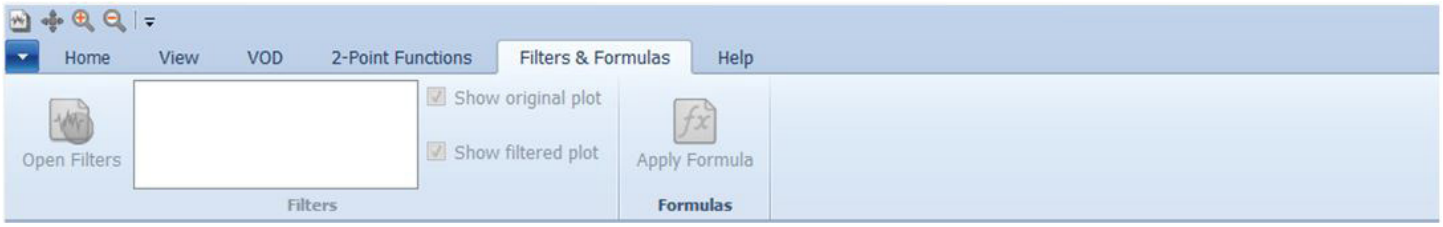
- **Move Data Pt** – Allows the user to move a single point in the vertical direction. This operation can only be performed on **Saved Graphs** and not on original graphs.

This feature will allow the user to move a data point that has an error in the data capture. The user will select **Move Data Pt** and the following pop up is displayed. Select **OK** to continue. Select the point of interest to move and then the user will be able to move it in the vertical direction.The user will click again where to place the point.



If the user is having trouble finding the individual point, the user can go to the **View** tab and click on **Plotting Styles** and select **Point + Line**.

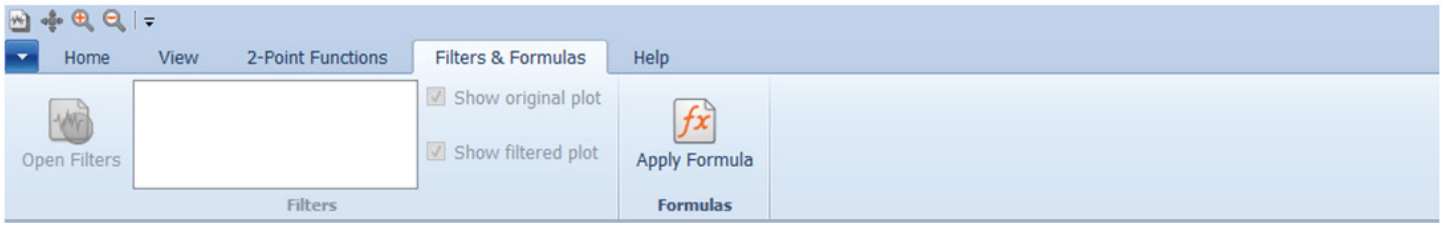
7.5 Filters & Formulas Tab



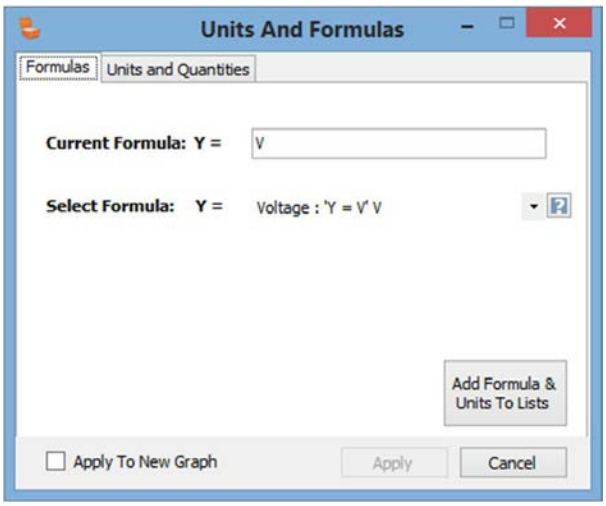
This section describes the use of **Formulas**. It is the preferred way of applying sensor equation and math formula to scope data. For discussion on **Filters**, which is only available in the **Advanced Edition**, refer to the **Advanced Edition Section**.

The image above is the tab status when a **VOD** data channel has been selected. There is no formula that can be applied to the graph.

In the image below is the tab when a scope data channel has been selected.



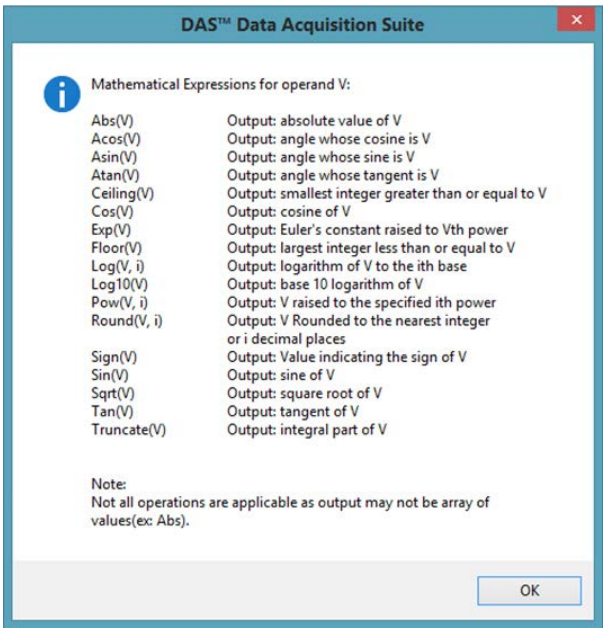
When the user selects **Apply Formula**, the following window will appear.



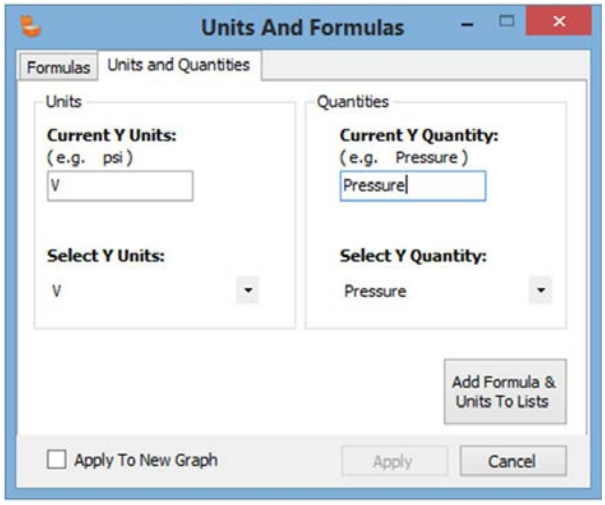
In the **Current Formula** text box is the current formula being applied to the data.

In this example, **Y=V**. The user will enter the formula equation into this text box using V as the current value of the y data.

To the right, available operations for the formula box are displayed.



When the equation has been entered, the user can select the **Units** and **Quantities** tab. The user will assign the **Y Units** (psi, g's, etc.) and the **Quantities** (Pressure, Acceleration, etc.). These quantities and units can be selected from the pull down menus (if already in the system) or typed in. The formula and associated quantity/units can be saved by clicking button **Add Formula & Units To Lists**. As stated previously, the formula cannot be applied to an original graph. The Apply button will be greyed out if current graph is original graph. The user must check-mark **Apply To New Graph** check box and then the **Apply** button will be enabled. The user can always select **Cancel**.



7.6 Help Tab

This section describes the **Help** tab.

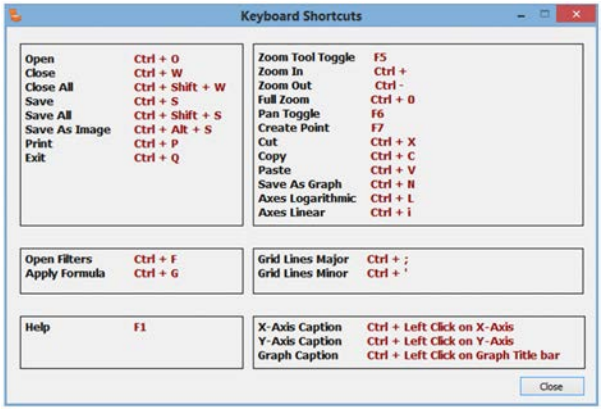
- **Help** – Opens the built-in **Data Acquisition Suite Help** on the screen in a separate window.
- **Support** – Opens an email using your default email client to send an email to **das@mrel.com**
- **Updates** – This will check for any updated releases for the software (Internet access is required). If there is an updated version available, user can answer **YES** to download updated package (a zip file) to a temporary folder such as **Download** folder. Once

download process is finished, Exit **DAS™** (Do not uninstall it), extract the downloaded package in the same temporary folder and double-click the extracted executable to run it. Follow the prompt. Local **Administrative type user account** is required to successfully install the update package.

- **Register** – This will restart **DAS™** and display registration dialog. The user fills and submit this to get the software registered. Once registered, user needs to upgrade to **Standard** or **Advanced** Edition to continue to use the software beyond one-time 30 day evaluation period.

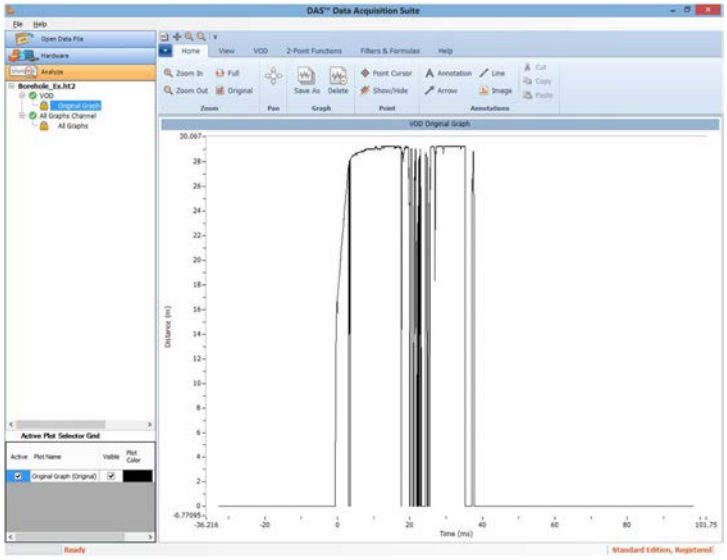
- **About** – Opens the window showing the version number of the software and the contact details for **MREL Group of Companies Limited** including website, email, address and phone and fax numbers.

- **Keyboard Shortcuts** – Displays the keyboard shortcuts. To the right is the screen.



7.7 VOD Analysis

Analysis of **VOD** is the measurement of the velocity of detonation of explosives. The instruments capable of this measurement is: **HandiTrap II™ VOD Recorder**, **MicroTrap™ VOD/Data Recorder** and **DataTrap II™ Data/VOD Recorder** with **VOD Upgrade**. With the graph opened, the screen to the right is displayed.

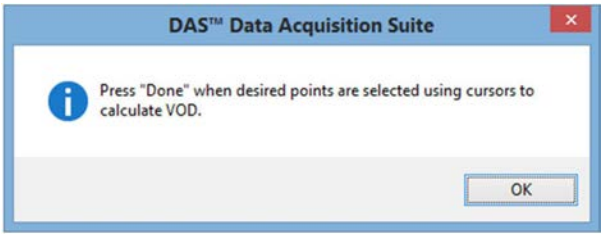


In this example, the file name is **Borehole_Ex.ht2** which is a **HandiTrap II™ VOD Recorder** file. On the left side of the screen, the column displays all of the important information regarding the file. This example shows that there is 1 active **VOD** channel (shown with a green circle with a white check mark).

The user will need to decide which type of **VOD** measurement that is desired: **Linear Regression** or **2-Point**.

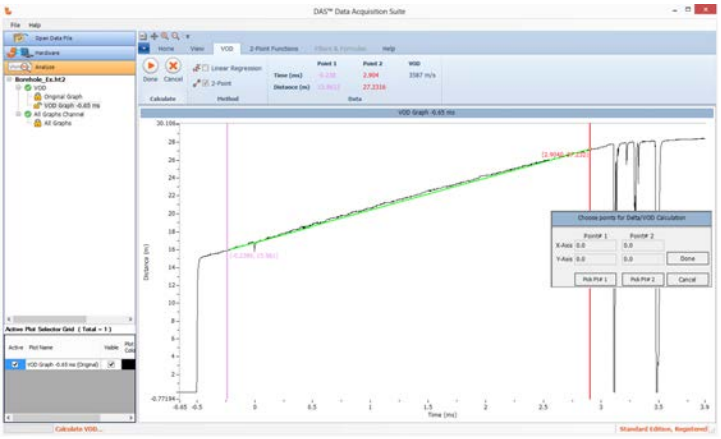
Please refer to the descriptions below to which type of **VOD** measurement is desired.

With the desired check box selected and the graph zoomed into the relevant area, click **Start**. The following screen will be displayed.



Click **OK** to continue.

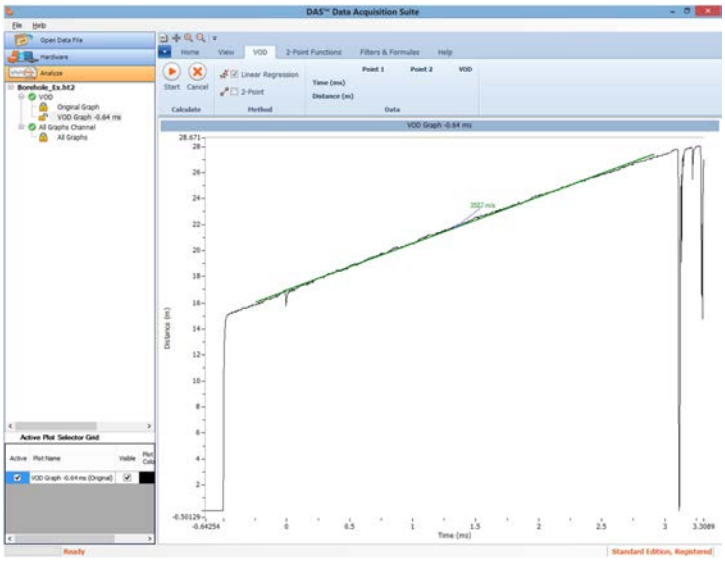
The user will see two vertical point cursors. The selected data points are displayed (**X**,**Y**) where the point cursors intersect the data. The user can click and drag the point cursors to the the desired locations. The **VOD Feedback Line** shown in green here, is a visual aid to user so a better close match to actual data can be achieved. If you do not have this, please update **DAS™** to latest version (See **Section 2.8**).



Reconfirm that the desired method has been selected and the **Data** section will display a quick reference to the two points and the **VOD** prior to pressing **Done**.

Once **Done** has been pressed and the **VOD** line is displayed, this is the only time that the user can compare the **VOD** line to the data.

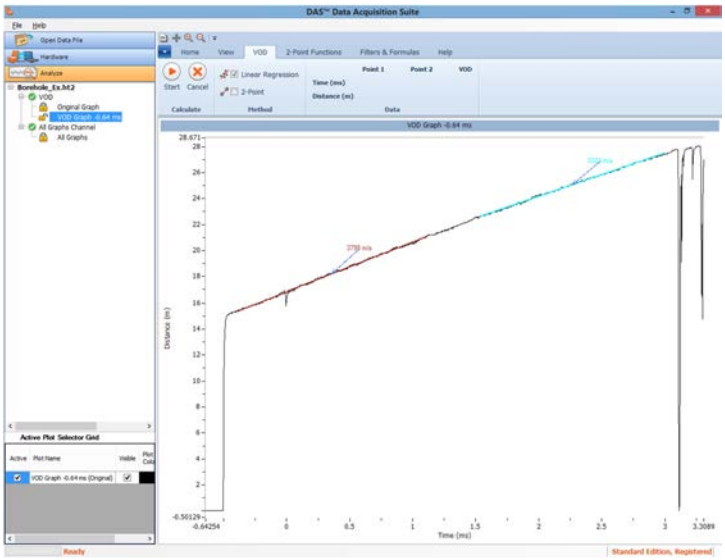
If the **VOD** line does not match the data, it is not a valid **VOD** measurement.



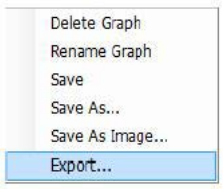
As shown in the graph to the right, the selected line is not the best fit for the data. The user can place as many different **VOD** measurements as desired.

The line is shown above the data at the beginning, below in the middle and above the measurement at the end. The image to the right is a better measurement.

From the screen to the right, the two **VOD** lines have been closely fit to the data where each line fits the data in the section of measurement. This shows a change in velocity from the bottom of the hole to the top.



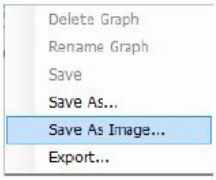
7.8 Exporting Graph



7.8.1 Export Graph Data

Right-Click a graph which displays following context menu.

Choose Export to export active plot original data range to a CSV file. Or choose **Export Visible** to export active plot data using current visible range of graph to a 2-column CSV file.

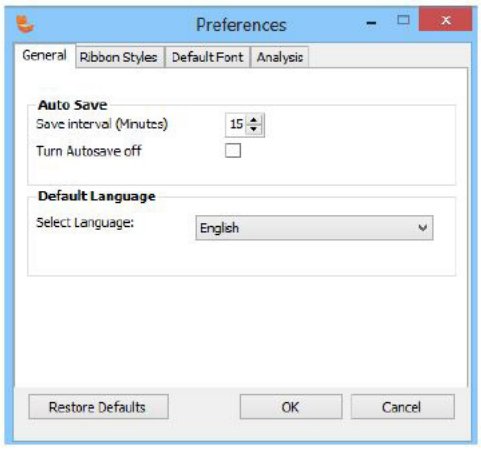


7.8.2 Export Graph Image

Right-Click a graph which displays following context menu.

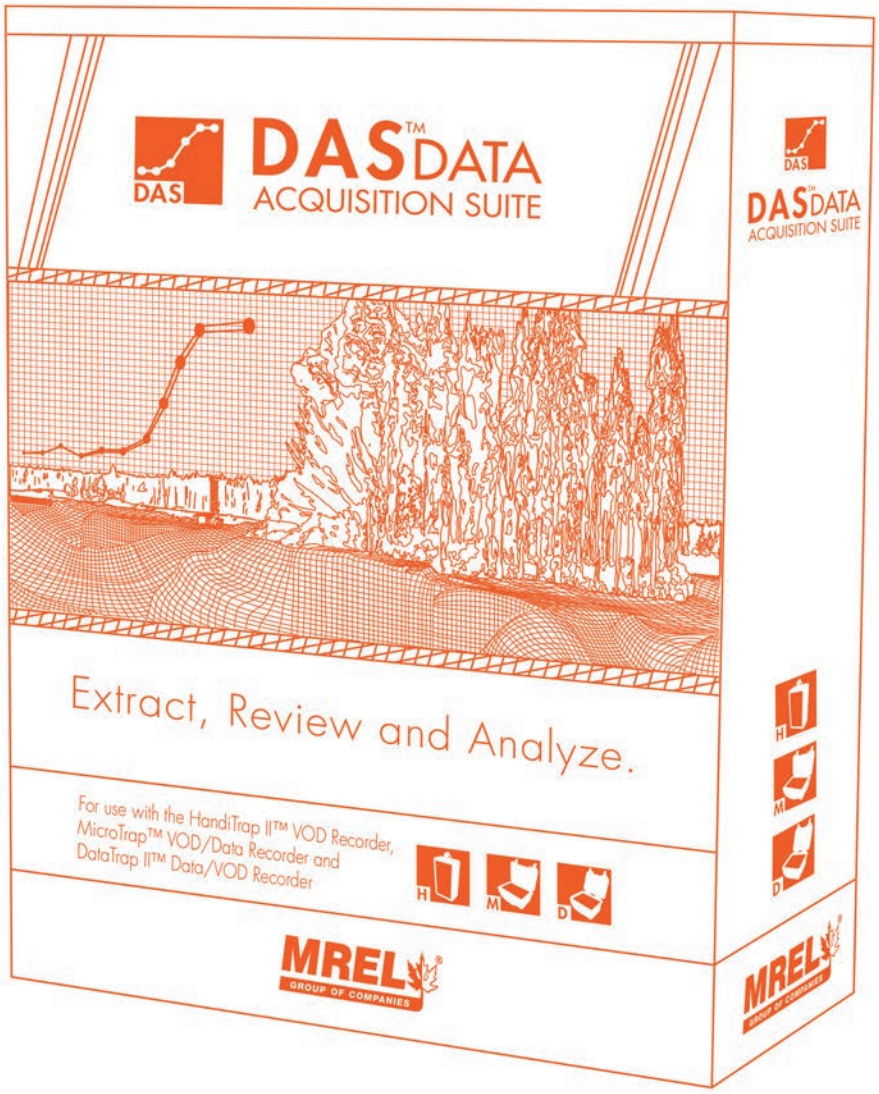
Choose **Save As** Image which displays a Save as dialog with directory structure displayed on the computer. The user can save the graph image as Jpeg, Bitmap, Gif and PNG files.

7.9 User Preferences



The user can change various preference applicable (some available in version beyond 1.0.0.0) to many aspects of the software operation. These includes **Auto Save**, **Default Language** (English (default) or French), **Ribbon menu Style**, **Default font**, **Active plot legend ON/OFF**, **Export Time units type** (seconds or default), **Apply Offset type** and **Visual Feedback** line colour for **VOD**. These preferences are controlled through the following dialog using menu item **File > Preferences**. See built-in help for details.

Chapter 8
Advanced Edition



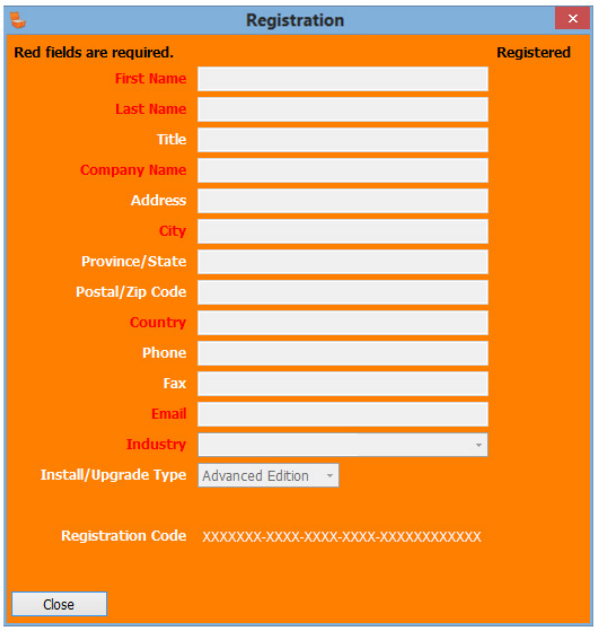
Overview

This Chapter provides detailed instructions on the Advanced Edition operations and how to upgrade to the Advanced Edition.

8.1 Upgrade to Advanced Edition

To **Upgrade** to the **Advanced Edition**, the user will need to select **Help** from the top menu structure and then **Select Register/Upgrade...**

The registration dialog will appear empty if software is not registered. It will appear with filled information if it is registered whether upgraded to **Standard Edition** or Not upgraded yet. The first image shows an **Advanced Edition** registered software (user information is removed here)



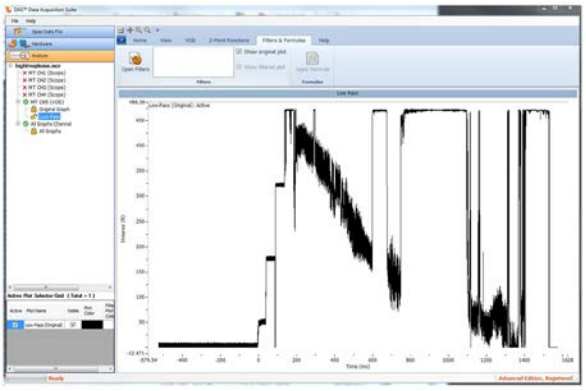
At the bottom of the registration dialog is a link to get a quote (info) for **Advanced** version upgrade from **MREL**. If the user has paid for the **Advanced Edition** in full, have already registered the **DAS™** software on the PC using **Help > Register** menu item. After completing registration process, send request to upgrade using email to **das@mrel.com**. The invoice# (or its screen shot) needs to be mentioned in the email. A screen shot of registration screen is needed for the computer for which **Advanced Edition** is going to be licensed. The user will be provided an **Advanced Edition** license key along with instructions to apply it.

The processing time may take up to 1 business day or more depending upon payment status.

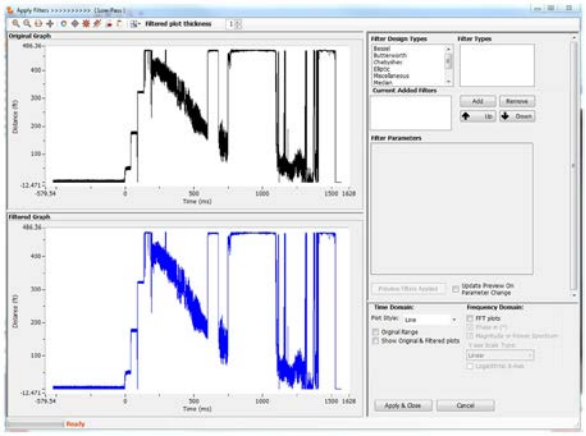
NOTE: Some of the features discussed in this manual are available in **DAS™** version later than 1.0.0.0. Please check for any available updates in **DAS™**.

8.2 Using Advanced Edition – Filters

Once the software has been upgraded to the **Advanced Edition** as described in the previous section, the features of the **Advanced Edition** will be accessible. The **Advanced Edition** offers extra functionality in-addition to what is offered in **Standard Edition**. The **Advanced Edition** will allow the user to apply filters to the data downloaded from a **HandiTrap II™ VOD Recorder**, **MicroTrap™ VOD/ Data Recorder**, **DataTrap II™ Data/VOD Recorder** or an imported **CSV file data**. Moreover, **Auxiliary Plots** operations such as **Curve Fitting** and **Integration** etc. are available in **Advanced Edition**. In the image below we have saved **Original Graph** as new graph named Low-Pass. Then in the **Filters and Formulas** tab, the **Open Filters** button is clicked. This data has high frequency noise.

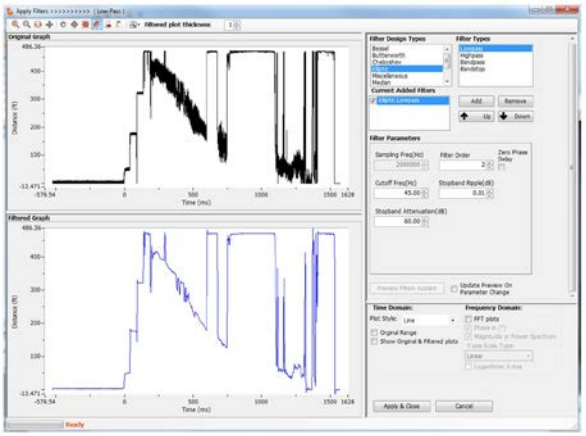


When the user clicks on the **Open Filters** button, the following screen will appear which shows that the original and filtered plot are the same as no filter is added and applied yet.



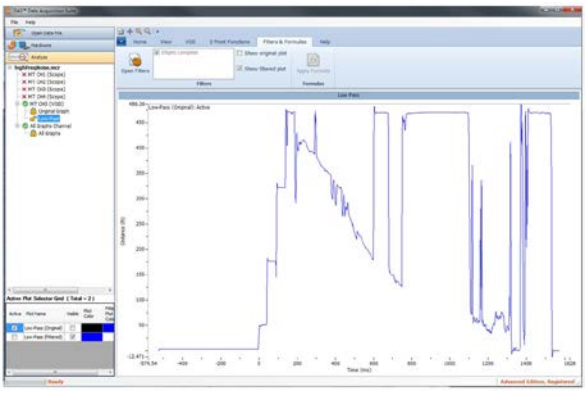
This window allows the user to select different filters to be applied to the data. In the top-left half (**Time-domain view**), the original data is displayed from the file and the lower-half, the filtered Data is displayed if any filters are added and applied. The user selects an added filter on the right, changes its design parameters and preview the filtered data by clicking **Preview Filters Applied** button, the filtered data changes in lower half of left window. Finally when filter output meets the design criteria (parameters), user can click **Apply & Close** button to create a filtered plot in the main window. The unfiltered plot does not change.

See below for an example of Elliptic Low pass filter applied to clean the unfiltered data.



When user is done previewing the filter, the **Apply & Close** button can be clicked to accept the results and the main window has filtered plot (blue colour) added as shown below (or user can **Cancel**).

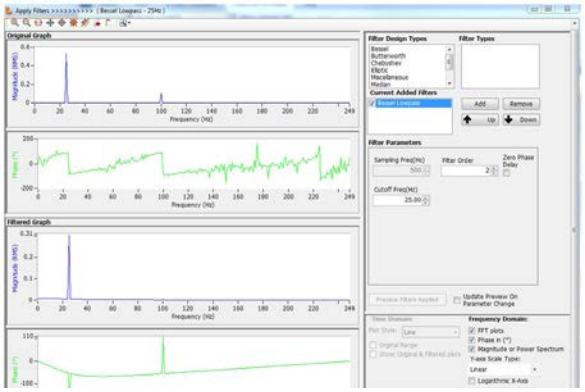
We have made Original plot hidden to show Filtered plot clearly in the screen shot on the right.



Frequency Domain View:

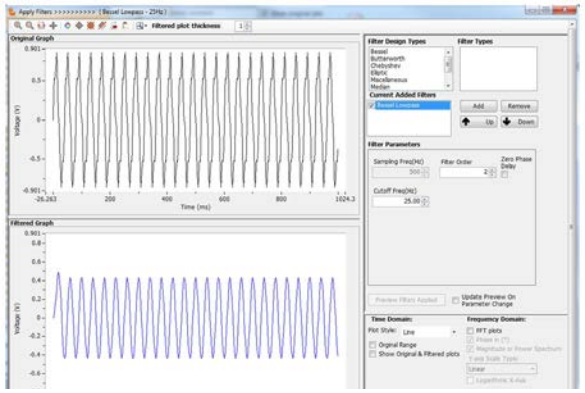
This view is active when **FFT plots** checkbox is checked marked. It offers frequency domain plots as an aid to design filters by creating plots such as **Magnitude-Phase** plots showing **RMS Magnitude** (or **Power RMS^2**) against linear frequency in Hertz (Hz). Phase is shown in Degrees. A user can switch to Logarithmic scales using related checkboxes for X and Y scales. The following is an example of a composite Sine wave (0.75Sine25 + 0.15Sine100) being filtered for 25 Hz.

Clearing FFT plots checkbox switches to **Time Domain View** and shows the filtered output as shown below:



The **Advanced Edition** offer the following filter design types which a user can select to apply to the data:

- **Bessel**
- **Butterworth**
- **Chebyshev**
- **Elliptic**
- **Miscellaneous**
- **Median**
- **Moving Average**
- **Savitzky-Golay**
- **WindowedFir**



Along the top of the filter dialog window, there are 5 tool bar buttons that include: **Zoom In**, **Zoom Out**, **Zoom to Full range**, **Pan**, **Filtered Data Graph Colour** and a text box for filtered plot line thickness represented by a number.

On the lower-right, the **Plot Settings** will adjust the settings for both the top and bottom graph. The **Plot Style** defines the plotting method of the graphs. The choices are: **Line**, **Point** or **Point + Line**. The check box **Show Original Range** will zoom the graph to the range when filter dialog was started. If the graph has been zoomed in, out or paned, this is the quickest way to return to the range you started with. If unchecked, it will return to current zoom level. The next check box **Original & Filtered** will place both original and filtered plots in lower half on the same axis to allow the user to view the data to see the differences of the effect of the filtering.

8.2.1 Bessel

Bessel filter family is a type of IIR (Infinite Impulse Response) digital filters which provides a maximally flat group delay with linear phase response. Bessel filters offer very low level of ripples or ringing in the pass band.

The four filter types of **Bessel** filter design family are: **Lowpass**, **Highpass**, **Bandpass** and **Bandstop**

Generally Lowpass filter passes through signals having lower frequency than cutoff frequency. Highpass filter passes through signals having higher frequency than cutoff frequency. Bandpass filter passes through signals which have frequencies within the frequency range defined by lower cutoff and higher cutoff frequencies. Bandstop filter passes through signals which are not within frequency range defined by lower cutoff and higher cutoff frequencies.

With the type of **Bessel** filter added and selected, the user will specify the following parameters for **Lowpass** and **Highpass** filters.

- Filter Order
- Cutoff Frequency (Hz)

The parameters for **Bandpass** and **Bandstop** are as follows:

- Filter Order
- Lower Cutoff (Hz)
- Upper Cutoff (Hz)

With these parameters provided by the user, the user needs to click **Preview Filters Applied** to update the Filtered graph and if the desired filtering effect has been achieved, the **Apply & Close** button can be clicked. That will create a filtered plot in the Main window of software in-addition to original unfiltered plot.

Zero Phase Delay checkbox is an optional parameter. If this option is check-marked, filter tries to reduce possible phase delay in output response. The user should reduce **Filter Order** to half of its value compared to when this options is NOT on.

The user can apply different filters and arrange their order of application by using **Up** and **Down** buttons in Filter dialog. The filters are applied from top to bottom as per the **Current Added Filters** list. The **Cancel** button will close the Filter dialog without applying any changes and main software window is displayed.

8.2.2 Butterworth

The **Butterworth** filter design family is a type of IIR (Infinite Impulse Response) digital filters which provides as flat a frequency response as possible in the **passband**. It is also referred to as a maximally flat magnitude filter.

The frequency response of the **Butterworth** filter has a steeper rolls off than **Bessel** filters. **Butterworth** filters have moderate ripple and provide good overall performance.

The four types of filters for the **Butterworth** filter design family are: **Lowpass**, **Highpass**, **Bandpass** and **Bandstop**.

With the type of **Butterworth** filter added and selected in the list, the user will provide the following parameters for **Lowpass** and **Highpass**.

- Filter Order
- Cutoff Frequency (Hz)

The parameters for **Bandpass** and **Bandstop** are as follows:

- Filter Order
- Lower Cutoff (Hz)
- Upper Cutoff (Hz)

With these parameters provided by the user, the user needs to click **Preview Filters Applied** to update the bottom graph and if the desired filtering effect has been achieved, the **Apply & Close** button can be clicked. That will create a filtered plot in the Main window of software in-addition to original unfiltered plot.

Zero Phase Delay checkbox is an optional parameter. If this option is check-marked, filter tries to reduce possible phase delay in output response. The user should reduce **Filter Order** to half of its value compared to when this options is NOT on.

8.2.3 Chebyshev

Chebyshev filter family is a type of IIR (Infinite Impulse Response) digital filters, having a steeper roll-off and more **passband** ripple than **Butterworth** filters. Steeper roll off can be achieved using **Chebyshev** filters if more ripples are allowed in pass band. These filters have better attenuation in the stop band than **Butterworth** filters.

With the type of **Chebyshev** filter added and selected, the user will have the following parameters for **Lowpass** and **Highpass**.

- Filter Order
- Cutoff Frequency (Hz)
- Stopband Ripple (dB)

The parameters for **Bandpass** and **Bandstop** are as follows:

- Filter Order
- Lower Cutoff (Hz)
- Upper Cutoff (Hz)
- Stopband Ripple (dB)

With these parameters provided by the user, the user needs to click **Preview Filters Applied** to update the bottom graph and if the desired filtering effect has been achieved, the **Apply & Close** button can be clicked. That will create a filtered plot in the Main window of software in-addition to original unfiltered plot.

Zero Phase Delay checkbox is an optional parameter. If this option is check-marked, filter tries to reduce possible phase delay in output response. The user should reduce **Filter Order** to half of its value compared to when this options is NOT on.

8.2.4 Elliptic

The **Elliptic** or (Cauer) filter family is a type of IIR (Infinite Impulse Response) digital filter. It provides sharpest roll-off and narrow transition band for a given filter order. This filter provides good control for amount of stop band ripples along with excellent attenuation for stop band and has non-linear phase response. The choices of stop band ripple and stop band attenuation controls the transition rate.

With the type of **Elliptic** filter added and selected, the user will have the following parameters for **Lowpass** and **Highpass**.

- Filter Order
- Cutoff Frequency (Hz)
- Stopband Ripple (dB)
- Stopband Attenuation (dB)

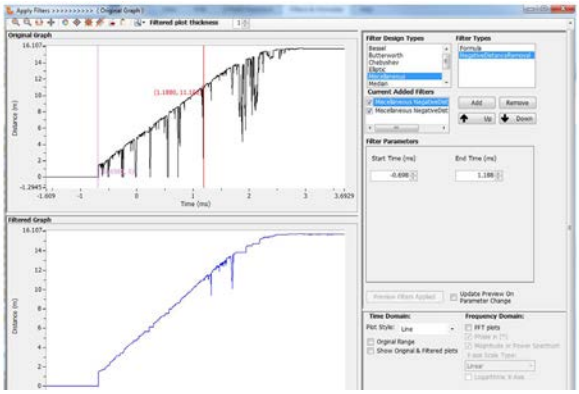
The parameters for **Bandpass** and **Bandstop** are as follows:

- Filter Order
- Lower Cutoff (Hz)
- Upper Cutoff (Hz)
- Stopband Ripple (dB)
- Stopband Attenuation (dB)

With these parameters provided by the user, the user needs to click **Preview Filters Applied** to update the bottom graph and if the desired filtering effect has been achieved, the **Apply & Close** button can be clicked. That will create a filtered plot in the Main window of software in-addition to original unfiltered plot.

Zero Phase Delay checkbox is an optional parameter. If this option is check-marked, filter tries to reduce possible phase delay in output response. The user should reduce **Filter Order** to half of its value compared to when this options is NOT on.

8.2.5 Miscellaneous Filters



Formula

The Formula filter applies a math formula to create a filtered plot. The original plot is not modified. The quantity/units remain the same. Quick examples of formula filter is inversion (-1.0*V), Signal Offsetting (V + 2.58) or other possible formula equations. This is in contrast to **Apply Formula** functionality in the main screen where formula is applied to unfiltered plot along with any quantity/units changes. Both Formula filter and **Apply Formula** are applicable to Scope type of graphs only.

Negative Distance Removal

This filter is applicable to **VOD** type of graph only. It has two parameters which specifies the starting and end x-axis range values. The negative distance spikes on distance data (y values) are removed which occur between this x-axis range specified. Multiple filters can be added to operate using different x-axis ranges as shown below:

8.2.6 Median

The **Median** filter is a nonlinear digital filtering technique, often used to remove noise. The only parameter is the number of points which needs to be an odd number between 1 (no change to data) and 99.

To demonstrate, using a window size of three with one point immediately preceding and following each point, a **Median** filter will be applied to the following simple 1D signal with a window set of 3:

x = [2 80 6 3]

So, the median filtered output signal y will be:
y[1] = Median[2 2 80] = 2
y[2] = Median[2 80 6] = Median[2 6 80] = 6
y[3] = Median[80 6 3] = Median[3 6 80] = 6
y[4] = Median[6 3 3] = Median[3 3 6] = 3

i.e. y = [2 6 6 3].

8.2.7 Moving Average

Moving Average filter works on input sampled data using a sliding fixed size window of number of data points. The first point of the **Moving Average** filter is obtained by taking the average of this initial fixed window of points. Then the window is shifted forward such that excluding the first point of the series and including the next point following the original subset in the series. This creates a new subset of points, which is averaged. This process is repeated over the entire data series. The plot line connecting all the (fixed) averages is the moving average. A Moving Average is a set of data points, each of which is the average of the corresponding subset of a larger set of datum points. The only parameter is the number of points which needs to be an odd number between 1 and 99.

8.2.8 Savitzky-Golay

A **Savitzky–Golay** filter is a digital filter that is used to smooth sampled data such that to increase the signal-to-noise ratio without greatly distorting the signal. This is achieved, in a process known as convolution, by fitting successive sub-sets of adjacent data points with a low-degree polynomial by the method of linear least squares. Using this **Un-weighted Smoothing filter**, there are two parameters to be adjusted by the user. The **Polynomial Order** and the **Number of Side Points**. The number of side points MUST be greater than or equal to the order of the polynomial.

8.2.9 WindowedFir (Windowed Finite Impulse Response)

A smoothing window is a mathematical function that is zero-valued outside of some chosen interval. When another function or waveform/data-sequence is multiplied by a window function, the product is also zero-valued outside the interval, all that is left is the part where they overlap, the "view through the window".

Within the filter parameters, there are different types of **Smoothing Windows** that can be used. Below is a list of the available smoothing windows.

1. **Rectangular**
2. **Hanning**
3. **Hamming**
4. **BlackmanHarris**
5. **ExactBlackman**
6. **Blackman**
7. **FlatTop**
8. **BlackmanHarris4Term**
9. **BlackmanHarris7Term**
10. **LowSidelobe**
11. **BlackmanNuttall**
12. **Triangle**
13. **Kaiser**
14. **DolphChebyshev**
15. **Gaussian**

For **Lowpass** and **Highpass** of the **WindowedFir**, the following Filter Parameters are available.

- Number of Coefficients
- Cutoff Frequency (Hz)
- Smoothing Window
- Window Parameter (With a Smoothing Window of type 13 – 15).

For **Bandpass** and **Bandstop** of the **WindowedFir**, the following Filter Parameters are available.

- Number of Coefficients
- Lower Cutoff (Hz)
- Upper Cutoff (Hz)
- Smoothing Window
- Window Parameter (With a Smoothing Window of type 13 – 15).

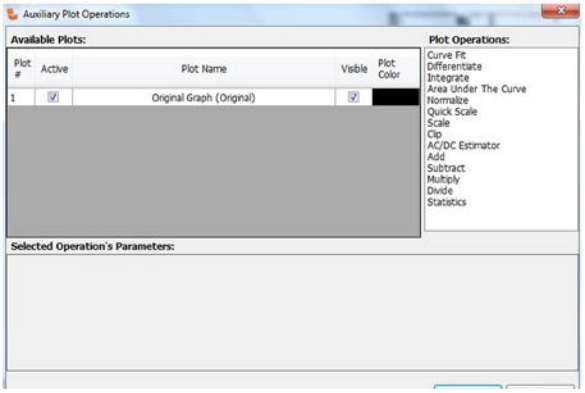
Windows Parameter specifies Beta for **Kaiser**, Main-to-Side lobe ratio for **DolphChebyshev**, Standard Deviation for **Gaussian**. Large Beta results in narrower smoothing window, Standard Deviation (if 0 or less then default value will be used which is 0.2) and Main-to-Side lobe height ratio is in decibels.

NOTE: Please see more information about filters in built-in Help (Press F1 in **DAS™** application).

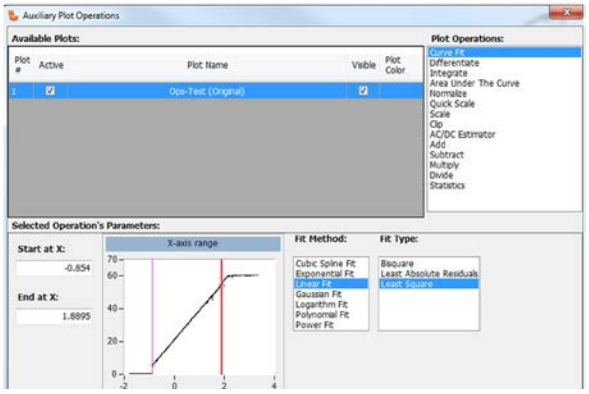
8.3 Using Advanced Edition – Auxiliary Plots

NOTE: Some of the features discussed in this manual are available in **DAS™** version later than 1.0.0.0. Please check for any available updates in **DAS™**.

DAS™ Advanced Edition provides functionality of applying a selected operation to a plot to create an auxiliary plot. Some auxiliary operations can operate on single plot or on two plots. The operands, i.e. the plots selected from a list for a given operation which may require one plot operand or two. More than one plot can be selected using **CTRL Key + Left-Click**. Order of selection of more than one plot is important in some operations such as Subtraction or Division. The selected plot/s are not needed to be **Active** to be selected as operands.

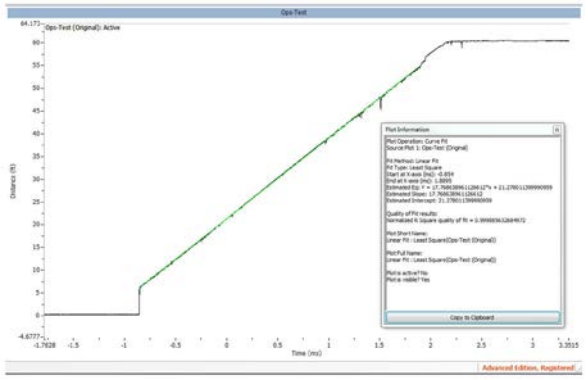


When a user click on **Operations** in **Auxiliary Plots** group in the ribbon menu, the following dialog is displayed.



Various plot operations are available for a selected plot (some operations require two selected plots) in Auxiliary Plots Operations dialog.

- Curve Fit (Linear, Polynomial, Exponential, Power etc.)
- Differentiate
- Integrate
- Area Under The Curve
- Normalize
- Quick Scale
- Scale
- Clip
- AC/DC Estimator
- Add
- Subtract
- Multiply
- Divide
- Statistics

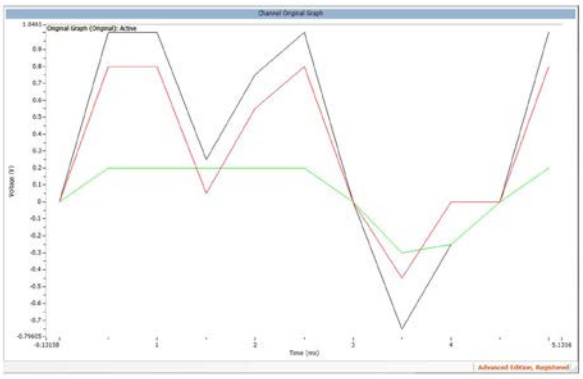


As an example the following shows a curve fit operation on a selected plot.

When **OK** is clicked, the **Operations** dialog closes and creates a curve fit plot line (in green colour) with textual output in the main window showing the parameters values and quality of fit result as follow:

Some operations do not create a graphical output or plot and display textual information only which needs to be copied to clipboard before closing textual information dialog box.

As an example of two-plot operation, the following shows a subtraction operation (red colour) between original plot (black colour) and clipped (y value between -0.3 and 0.2) version of original plot (green colour). Two plot operations requires that both operand plots have the same x-axis range.



The user can delete an **Auxiliary plot** by selecting it in **Active Plot Selector Grid** and pressing **Delete** key or by **Delete** menu in **Auxiliary Plots group** in the ribbon menu.

Auxiliary Plot Operations:

Curve Fit: This option provides various types of curve fitting methods such as **Exponential**, **Linear**, **Gaussian**, **Polynomial** etc. All curve fitting operation require a source plot along with x-axis range selected by user either by entering values in **Start at X/End at X** text boxes or by moving vertical cursors in small plot view window as shown in figures above.

Differentiate: This operation requires a source plot along with x-axis range selected by user either by entering values in **Start at X/End at X text boxes** or by moving vertical cursors in small plot view window. The output is differentiation curve of the source plot. Textual information is also created which can be displayed by **Double-Clicking** the auxiliary plot entry created in **Active Plot Selector Grid** on the lower-left corner of main window.

Integrate: This operation requires a source plot along with x-axis range selected by user either by entering values in **Start at X/End at X text boxes** or by moving vertical cursors in small plot view window. The output is integration curve of the source plot. Textual information is also created which can be displayed by **Double-Clicking** the auxiliary plot entry created in **Active Plot Selector Grid** on the lower-left corner of main window. The textual information includes **Area Under The Curve** as well.

Area Under The Curve: This operation a source plot along with requires x-axis range selected by user either by entering values in **Start at X/End at X text boxes** or by moving vertical cursors in small plot view window. The output is only textual information and an annotation is also created in the main window showing **Area Under The Curve** value and input x-axis range.

Normalize: This operation only requires selected source plot. It uses calculated average and standard deviation to create normalized plot. It creates some textual information as well.

Quick Scale: This operation only requires selected source plot. It uses calculated average and standard deviation to create normalized plot which has range of y values in [–1:1]. It creates some textual information as well.

Scale: This operation only requires selected source plot. It uses calculated scale and offset to create scaled plot which has range of y values in [–1:1]. It creates some textual information as well.

Clip: This operation requires selected source plot along with Lower and Upper Limit parameters. It uses these limits to clip the plot. It creates some textual information as well.

AC/DC Estimate: This operation only requires selected source plot. There are no related parameters. The output is textual only which needs to be copied to clipboard by the user.
The operation calculates an estimate of AC and DC levels of the input signal data. AC level is reported in RMS value of the input signal (data) units, for example volts (RMS) if input data is in volts.
The DC level is reported in input signal (data) units, for example if input data is in volts then this value is in volts. At least **three** cycles of the signal must be contained in the time-domain signal for a valid estimate.

Add: This operation only requires two selected source plots and uses addition to create resulting plot. It creates some textual information as well.

Subtract: This operation only requires two selected source plots and uses subtraction (first select plot minus 2nd selected plot hence order of selection is important) to create resulting plot. **CTRL** key + mouse **Left-Click** is used in the grid entries to select/unselect 2nd plot. It creates some textual information as well.

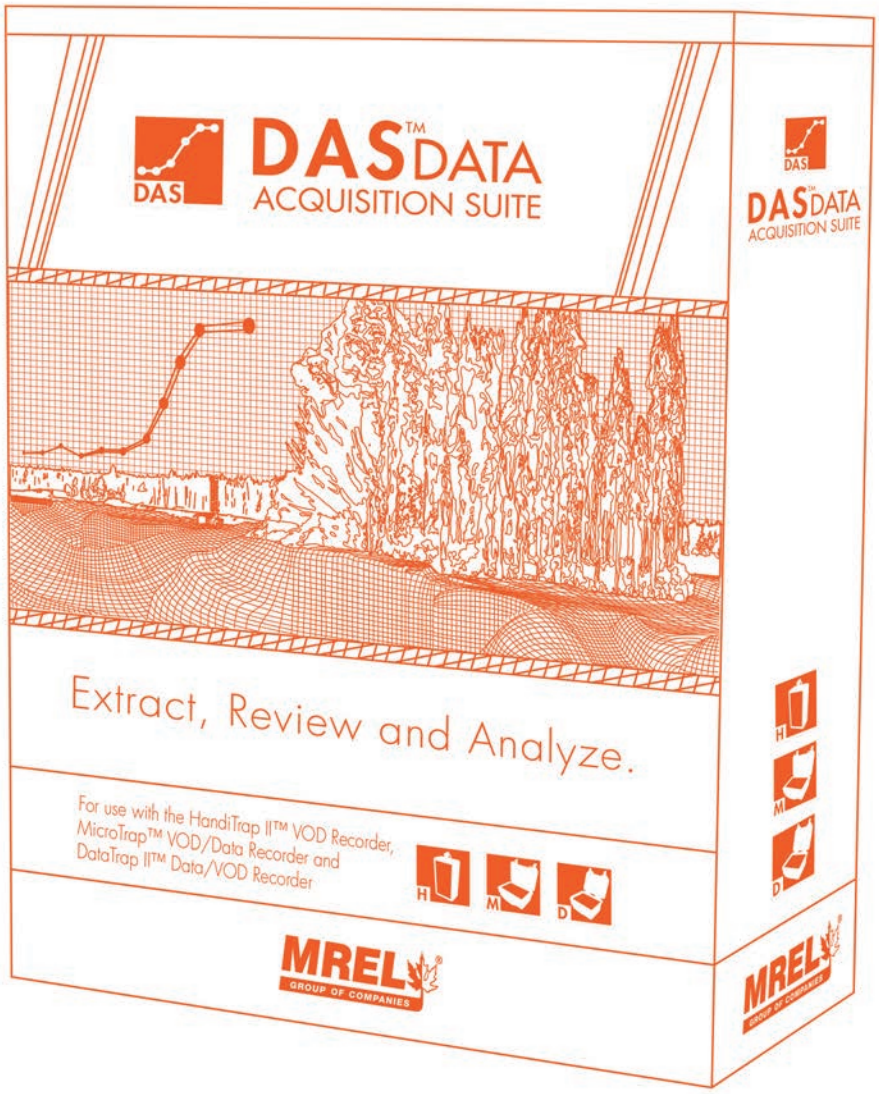
Multiply: This operation only requires two selected source plots and uses multiplication to create resulting plot. It creates some textual information as well.

Divide: This operation only requires two selected source plots and uses division (first select plot divided by 2nd selected plot hence order of selection is important) to create resulting plot. It creates some textual information as well.

Statistics: This operation only requires one selected source plot and x-axis range selected by user either by entering values in **Start at X/ End at X text boxes** or by moving vertical cursors in small plot view window. The operation calculates various statistical outputs values such as Mean, Standard Deviation, Variance, Median and RMS (Root Mean Squared). The output is textual only which needs to be copied to clipboard by the user.

NOTE: Please see more information about **Auxiliary Plots** in built-in Help (Press F1 in **DAS™** application).

Chapter 9
Advanced Edition – DataTrap II™ Synchronization



Overview

Multiple DataTrap II™ units (minimum 2 and maximum 7) can be synchronized to get additional measurement capacity of 16 to 56 channels of data. The units have to be setup for 5 MHz or less sampling rate. One unit has to be setup as Sync-Primary (or Master) and other units as Sync-Secondary (or Slave) as described later in this chapter.

9.1 Necessary Equipment

At least 2 **DataTrap II™** units are required. One **DataTrap II™** unit will be the **Sync-Primary (or Master)** unit, the others will be **Sync-Secondary (or Slave)** units. One Synchronization cable for each **Sync-Secondary** unit. If the operator use 2 units, 1 cable is required. If the operator use 3 units, 2 cables are required, etc.

9.2 Summary of Test Process

Using the menu buttons on the **DataTrap II™**, set one unit to be **Sync-Primary** (**or Master**) and the others to be **Sync-Secondary** (**or Slave**). Use the setup software to ensure that all channels are set up to be triggered by the synchronization cable. (They can also be setup to trigger later but still with synchronized time). Set sample speed to 5 MHz or less. See more details in **Section 9.6**.
Connect the synchronization cable(s).

Press Next Test on each **DataTrap II™**. Confirm from the menu that they are synchronized, then press **Start** on each **DataTrap II™**. They are now ready to be triggered.

Download the data from all **DataTrap II™** units to the same directory for this synchronization test (".dt2" and ".d2d" files).

Once all data has been downloaded, create group files (".**syncd**" files) for the data. This is done by picking one of the **Sync-Primary files**, then choosing its **Sync-Secondary file(s)**. This creates a ".**syncd**" file.

Open the "**.syncd**" file. It will now display data from all channels of all tests in the synchronized group.

9.3 Hardware Setup

DataTrap II™ Synchronization Menu Setup

The **DataTrap II™** units are user-programmed for synchronized data collection using the push button menu on the metal faceplate. This is started by turning on the **DataTrap II™** and pressing the **left arrow**(🡅) button to start Services.

Normally, this is below the word **Services** on the menu, but it may have turned off to save power. After pressing this, the menu shows the 1st service **Erase Last Test**. Press the **right arrow** (🡇) button to choose other services until the option **Synchronization** is shown.

Press the **Enter** button to choose that option. Press the right arrow (🡇) button to change **Synchronization** mode from **Off** to **Sync-Secondary** (or **Slave**) or **Sync-Primary** (or **Master**). Press the **Enter** button to choose that mode. Press **Esc** after pressing **Enter** to go up one level in the menu. Keep pressing **Esc** to get back to the original menu state that showed: **DataTrapII Services Config**

Repeat this procedure for the other **DataTrap II™(s)** except that **Sync-Secondary** (**or Slave**) should be chosen.

NOTE: The operator can press **Esc** instead of pressing **Enter** to make no choice.

9.4 Synchronization Cable Setup

The cables are connected in the following way, with power either on or off.

Connect the **Sync Out** connector to the lower connector of the **Sync-Primary DataTrap II™**.

Connect the **Sync In** connector to the upper connector of the 1st **Sync-Secondary DataTrap II™**.

If this **DataTrap II™** is on and in **Sync-Secondary mode**, it will beep and briefly show **Synced** on the menu. If it is turned on later, it will show **Synced** briefly after powering on (if the **Sync-Primary DataTrap II™** has also been powered on). If the **Sync-Primary** unit is turned on after the **Sync-Secondary** unit, then it will briefly show **Synced** then.

3. If there are more units, connect the **Sync Out** from another cable to the 1st **Sync-Secondary** and connect the **Sync In** connector to the 2nd **Sync-Secondary**.

9.5 Synchronization Menu Start

Before conducting a test using synchronization, connect the cables as mentioned in **Section 9.4** and then do the following:

Power on each **DataTrap II™**.

Press **Next** Test on each **DataTrap II™**. If the cables have been correctly connected, the **Sync-Primary** unit will show a three-line symbol as shown:

The **Sync-Secondary** unit(s) will have a two-line symbol as shown:

If the cables are not connected or one of the units has not been set correctly by the menu, the two-line symbol will have a slash through it as shown:

Once it has been confirmed that all symbols show a correct connection and setup, press **Start** on all units. It is now ready to trigger and collect data.

9.6 Programming DataTrap II™ For Synchronization

Programming For a Synchronized Test

The trigger event from synchronized **DataTrap II™** is equivalent to another form of external trigger. If the operator wants all **DataTrap II™** to trigger simultaneously, then all active channels must be set to allow external trigger. They can also be set to be triggered from an internal trigger. The usual practice for a test with internal triggers is to set the **DataTrap II™** to "**External Trigger - Make**" and leave the external trigger input open. In this way, an actual "**Make**" event will never occur, but the **DataTrap II™** will receive a trigger from other **DataTrap II™**. If it fits the plan for the test, the **DataTrap II™** can be setup to wait for a trigger event just on that **DataTrap II™** by turning off all modes of external trigger. The time shown for the resulting data will still be time synchronized with the other **DataTrap II™**.

Programming – Trigger Only From Other DataTrap II™ Units

To setup a **DataTrap II™** so that it can only trigger from another **DataTrap II™** triggering, program it for "**External Trigger – Make**" with internal trigger turned off and leave the external trigger BNC connector in an open circuit state. Note that the chained cover for the BNC connector for Trigger-In will not "**make**" the circuit, so it can remain tightly closed over that connector.

Programming – External Trigger

If the plan for the test requires an external trigger, then the operator can choose any of the external trigger choices given when programming the **DataTrap II™**. It will be triggered by the external trigger or a trigger event on any other synchronized **DataTrap II™**. **Only one** of the **DataTrap II™** will be connected to the actual external trigger. The others should be set to **External Trigger – Make** with the connector left tightly closed.

Programming – Internal Trigger

If the plan for the test requires an internal trigger, then the operator should first turn on **External Trigger – Make**. Next, setup the internal trigger and apply it. The chained cover for the external trigger input should be left tightly closed.

Programming – Sample Speed

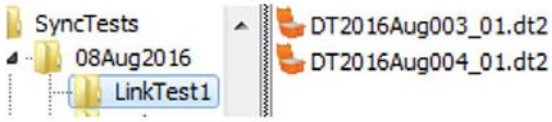
The **DataTrap II™** must be set to a sample speed of 5 MHz or less to be synchronized.

9.7 Synchronized Data Retrieval and Analysis

NOTE: This functionality is available only in the DAS™ Advanced Edition.

1. Initial Download

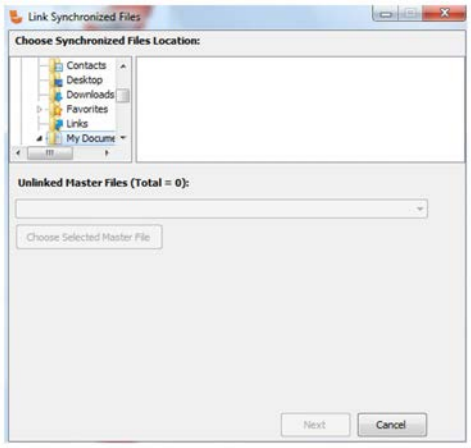
With the software installed on the computer, connect the **DataTrap II™** to the computer as described in the data download section. Next, start the **DAS™** software. Select or create a directory for this test where the data from all the **DataTrap II™** units will be downloaded, then download them. A screen shot below shows the downloaded files from **Sync-Primary** and **Sync-Secondary DataTrap II™** in a directory:



2. Linking Synchronized Files

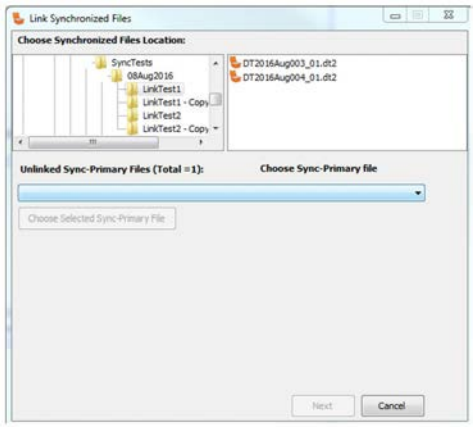
Once all the files have been downloaded in the directory of your choice, they have to be linked together to create a synchronization file. The following picture shows the **Hardware** tab with a **Link Sync-ed Files** button.

Clicking the above mentioned button, the following **Link Synchronized Files** dialog box will be displayed.

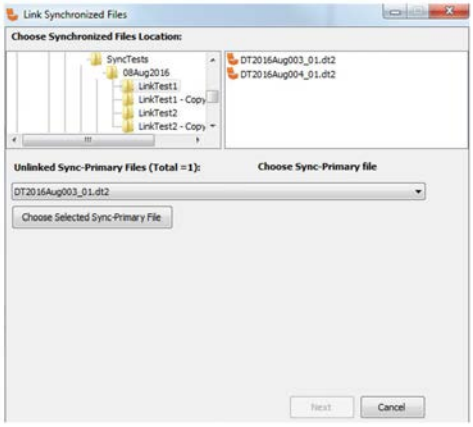


3. Choosing Sync-Primary File

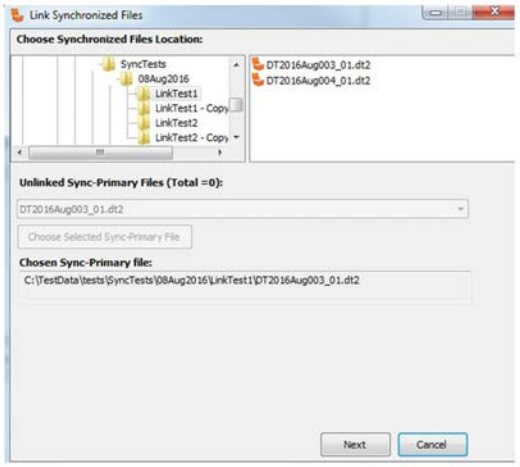
With **Link Synchronized Files** dialog displayed, browse to the directory where data files have been downloaded. If there are **Sync-Primary** synchronized files are downloaded and has not been linked yet to any **Sync-Secondary**, the **Unlinked Sync-Primary Files** dropdown will be enabled and those **Sync-Primary files** will be available in the dropdown **Unlinked Sync-Primary Files** (Total = x) as shown below:



After selecting a **Sync-Primary** file, Choose **Sync-Primary File** button should be enabled. Click it to choose the selected **Sync-Primary file**.



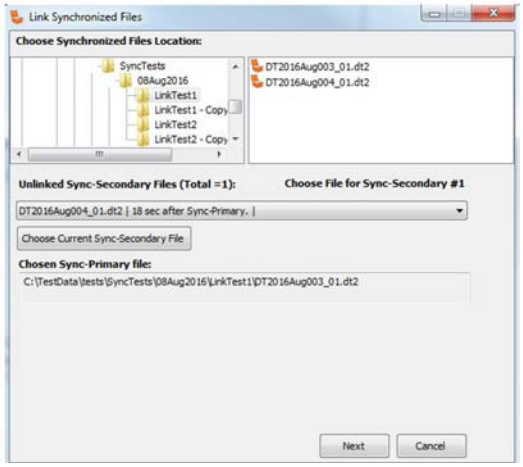
Sync-Primary file entry is displayed in the text box below with full path visible.



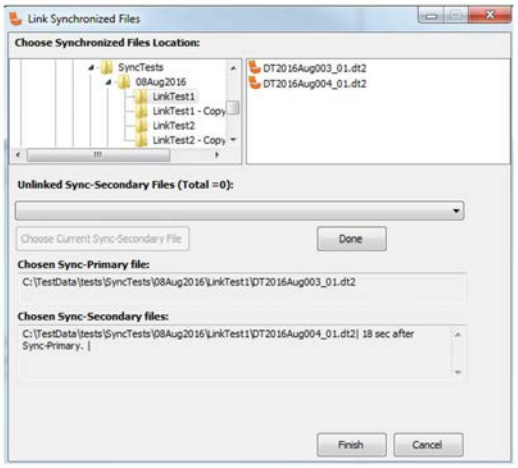
4. Choosing Sync-Secondary Files

Once the **Sync-Primary** file has been chosen, clicking **Next** shows the operator a list of files that were downloaded from a unit that was set as **Sync-Secondary** and also connected 1st in sequence after the **Sync-Primary** unit. It also uses the internal calendar/clock of each unit to show the difference between the times when the Start button was pressed on each unit. The date/time can be viewed by pressing the Info button on the **DataTrap II™**. Typically, this will be 0-60 seconds for data sets collected at the same time and will be much smaller than other possible files. If a **DataTrap II™** has been used with a computer that is set for a different time zone, then time stamps will be farther apart.

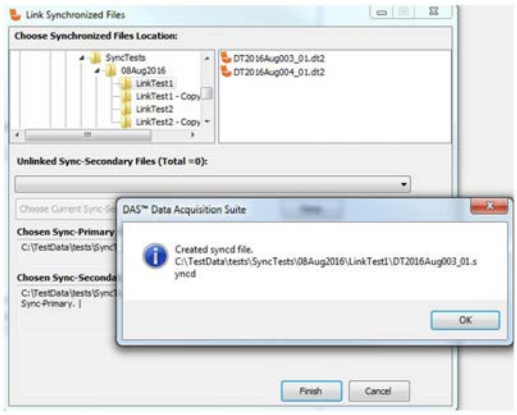
Select a **Sync-Secondary** file in the dropdown. This makes **Choose Current Sync-Secondary File** button enabled.



After clicking the **Choose Current Sync-Secondary File** button, first **Sync-Secondary** file entry is displayed in the **Chosen Sync-Secondary Files** text box.

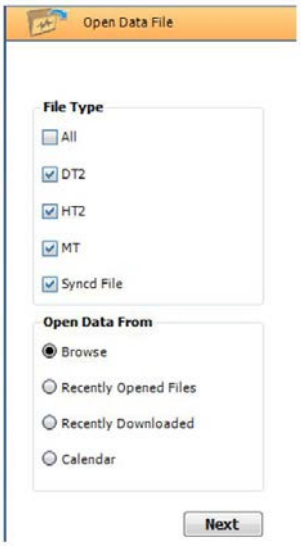


If there are additional related **Sync-Secondary** files available, user can select and add them too. In this single **Sync-Secondary** file example, we do not have any more file to add. Now the **Finish** is enabled. Clicking **Done** or **Finish** button will create the "**.syncd**" file and a message is displayed as shown below:

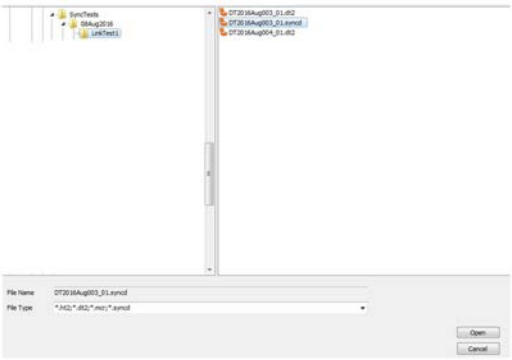


5. Viewing Synchronized File

To open a "**.syncd**" file, user can use the usual methods to browse to the directory where the "**.syncd**" file created. That is either using or check-marking "**.syncd**" file type on the **Open Data Files** tab and clicking **Next** button.

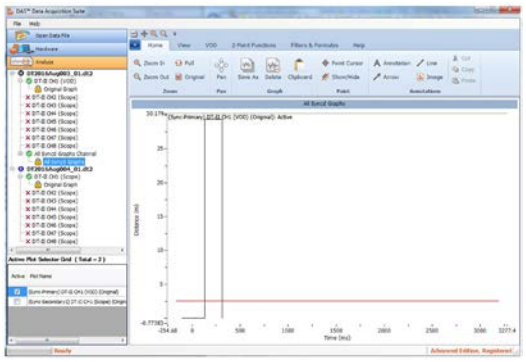


The following will be displayed:



Then select "**.syncd**" file and click "**Open**" button or double-click the file name. This will open the **Sync-Primary** file and its linked **Sync-Secondary** files with all their plots as shown below:

A **Sync-Primary** file is indicated in left-side graph tree by (M) and a **Sync-Secondary** file is indicated in left-side graph tree by (S)

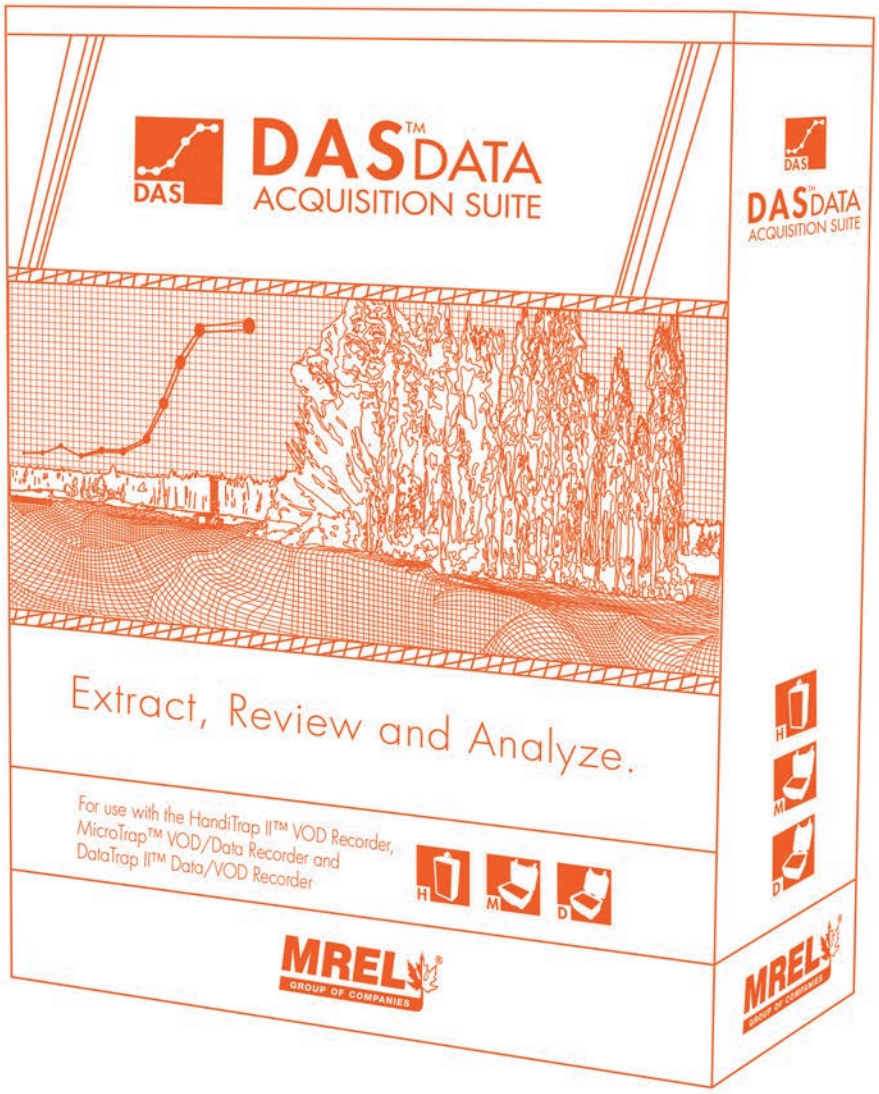


In addition an "**All Syncd Graph Channel**" node is created in **Sync-Primary** file with an "**All Syncd Graphs**" node under it. This graph node displays all original plots (related to **Sync-Primary** and **Sync-Secondary**) on a single graph. This gives an overall picture of all the plots in the related syncd data sets. Limited operations are also possible on this graph node plots such as calculating **VOD** for an active plot, calculating **Delta X** on one or between two plots and calculate **Delta Y** on one or between two plots (if they have same units and quantities). Working on individual channels are strongly recommended.

6. Definition Of "Time=0"

All the graphs drawn are synchronized to a common "**time=0**". This is normally set as the trigger time of channel 1 on the **Sync-Primary** unit. If channel 1 was not triggered, it is the Stop time for channel 1 on the **Sync-Primary** unit. Events at the same time from different data sets were recorded at the same time.

Chapter 10
Contacting MREL for Technical Support



10.1 Contacting MREL

MREL Group of Companies Limited

Data Acquisition Team (DAS™) Support Team

5-779 Sir John A MacDonald Blvd.
Kingston, Ontario K7L 1H3
Canada

Toll Free +1-877-544-MREL (Canada/USA)
Tel: +1-613-545-0466

Email: das@mrel.com

Support: www.mrel.com/contact.html

MREL looks forward to providing you with assistance.

10.2 Emailing Data Files to MREL

For **DAS™ Data Acquisition Suite software**, the user with need to send the following files for analysis of the user's data. In this example, the users file name is **Myfile**.

10.2.1 DataTrap II™ Data/VOD Recorder

The following files will be needed:

- Myfile.dt2
- Myfile.d2d
- Any related files with the same name such as Myfile.xml and Myfile.zip if applicable

10.2.2 MicroTrap™ VOD/Data Recorder

The following files will be needed:

- Myfile.mcr
- Myfile.raw or myfile.cmp
- Any related files with the same name such as Myfile.xml and Myfile.zip if applicable

10.2.3 HandiTrap II™ VOD Recorder

The following files will be needed:

- Myfile.ht2
- Myfile.raw
- Any related files with the same name such as Myfile.xml and Myfile.zip if applicable

MREL is committed to product innovation; accordingly product may undergo specification improvements without notice.

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