Astro-Med, Inc
TEST & MEASUREMENT PRODUCT GROUP

DASH-MX

Multi-Channel High Speed Data Acquisition Recorder

QUICK START GUIDE

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1. INTRODUCTION

Thank you for choosing the Dash-MX Multi-Channel High Speed Data Acquisition System from Astro-Med. This Quick Start Guide was prepared to help the user become acquainted with the recorder as quickly as possible. Exercises are also included to assist in familiarizing the user with the basic functions. The Dash-MX contains many advanced features not covered in this quick start guide. For additional operational information, please refer to the Dash-MX Operations manual or talk to our technical support staff in Rhode Island by dialing toll free 1-877-867-9783 and asking for Test & Measurement Technical Support or email techserv@astromed.com

The Dash-MX is a powerful and versatile data acquisition recording system that provides the capability to display, record, and analyze waveform data. The Dash-MX uses optional input boards to condition analog signals based on the user application. The Dash-MX channel sample rate and bandwidth are input board specific (listed in Table 1) and streamed directly to a high capacity 160 GB hard drive.

MX-1 Isolated Voltage Module – 2 channels
250 VRMS or DC, Isolated Cat II
1V to 800 VFS
DC to 40KHz Bandwidth

MX-2 Isolated High Voltage Module – 2 channels
600V Cat III, 300V Cat IV
20VFS to 2000 VFS
DC to 40KHz Bandwidth

MX-6 Isolated Thermocouple Module -- 4 channels including 3 Thermocouple channels and 1 RTD channel
Thermocouple Types: J, K, E, T, N, B, R, S
Connection Type: three U miniature and one PT100 RTD- 4 wire screw terminal
Isolation: 250 VRMS or DC

MX-5 Isolated Bridge Module – 2 channels
Bandwidth: DC to 40 KHz
Isolation: 250 VRMS or DC, Cat II
Excitation Voltage: up do 10 VDC Current- up to 100 mA
Ranges: 5 mVFS to 4 VFS

Table 1: Dash-MX Optional Input Modules

Please see section A of the Dash-MX Operations Manual for detailed specifications on these PCBs and any other PCBs that are available.

2. HARDWARE OVERVIEW

The following is a summary of the location of the physical components of the Dash-MX.

FRONT	Touch Screen
TOP	Carry Handle
LEFT SIDE	Power indicator light, ON/OFF Power switch, Power inlet, PS2 peripheral connections, USB ports, 1000BaseT Ethernet port, Mouse/Keyboard port, VGA port along with additional connections for optional accessories.
RIGHT SIDE	4 input module board slots

Table 2: Dash-MX Optional Input Modules

3. GETTING STARTED

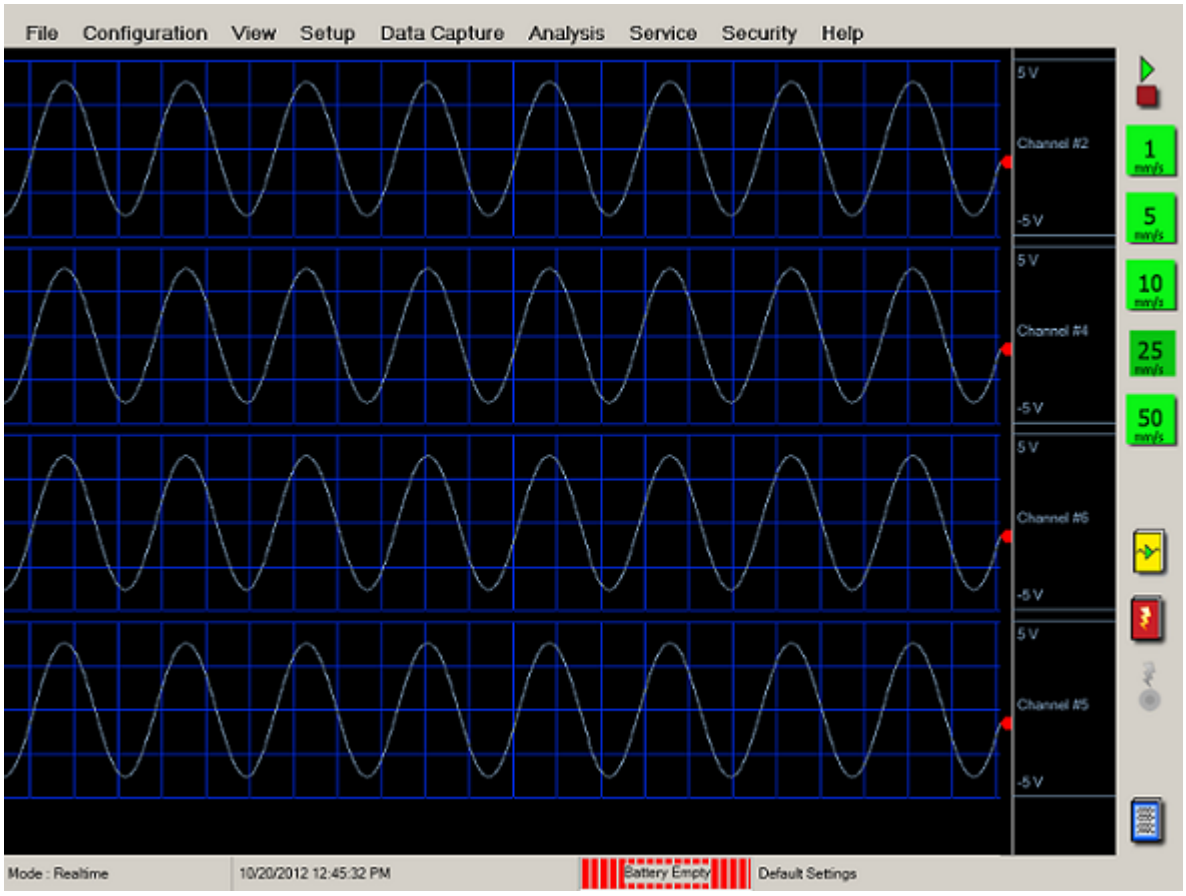
Start-Up Kit: The Dash-MX comes with a free start up kit. This includes the Dash-MX Operations manual on CD, AC power cord, AstroVIEW X Review software, cross over Ethernet cable, and this Dash-MX Quick Start Guide.

Connect Power to the Dash-MX: The Dash-MX can be powered by AC or DC voltage. If using AC Power, connect the AC power cord to the power inlet found on the top of the left side panel of the Dash-MX (when facing the touchscreen), then to an outlet. The Dash-MX has an auto-sensing power supply that operates from 100 – 264 VAC @ 50 or 60 Hz. If using DC Power, connect a 24 VDC power supply that can source at least 7.5A to the DC input connection located on the top of the left side panel (when facing the touch screen). The correct polarity is indicated beside the DC input connections.

Power on the Dash-MX: The Dash-MX is powered by the ON/OFF power switch. There is no need to shut down any software before powering down the Dash-MX. In the event of an unexpected loss of power, the Dash-MX contains internal power shutdown circuitry that will close your data acquisition file and shut down the system and Windows safely. Turn on the Dash-MX power switch, which is located on the top of the left side panel (when facing the touch screen). Upon start-up, the display will show various initialization screens and then load in the last setup it was using before the last power down.

4. DISPLAY AREA

The Dash-MX has a 12.1" (30.73 cm) (diagonal) touch-screen display. The display is divided into three main areas, the Waveform Display Area which shows each waveform signal on it's own grid, the Menu bar on the top that has pull down commands for Dash-MX operation, and the Control Panel on the right side with rows of control icons for Dash-MX operation.



Dash-MX screen

Menu Bar: The menu bar, located across the top of the display, allows access to a group of drop-down menus. All Dash-MX modes and features are accessible from this menu. Options available from the menu bar will vary based on the mode of operation used. Adding icons to each configuration control panel will make your often-used choices easier to find and activate.

5. Menu Bar Summary

File: Depending on the configuration (mode) chosen, the File menu is used to save and load setups or captured files.

Configuration: The Configuration menu is used to select the mode of operation (Realtime, Scope, Review or Utilities)

- ✓ **Scope Mode:** Scope mode provides time-base resolution for viewing high frequency signals along with waveform scrolling, monitoring, and data capture capabilities.
- ✓ **Realtime Mode:** This mode provides realtime waveform scrolling, monitoring, and data capture capabilities.
- ✓ **Review Mode:** This mode provides the capability to review and analyze saved data and scope captures.
- ✓ **Utilities Mode:** This mode provides access to the upgrade, calibration, applications, and advanced settings menus.

View: The View menu is used to make changes to the graph display of your signals.

Setup: The Setup menu is used to configure the Channel and Control Panel settings on the Dash-MX.

Data Capture: This menu sets the data capture parameters.

Analysis: The Analysis menu provides the analysis tools listed below. The available tools vary based on the Dash-MX operating mode selected.
Realtime Mode: Channel/Cursor Information, Channel Meters and XYY Plotter.
Scope Mode: Channel/Cursor Information, Channel Meters, Derived Channels, XYY Plotter, and Fourier Transform tool.
Review Mode: Channel/Cursor Information, Channel Meters, Derived channels, XYY Plotter, Fourier Transform tool, Waveform Zoom Windows, Advanced Search and Note Annotation editor/viewer, and Scope Viewer

Service: Allows access to Calibration, the Utility port, IP address setup, and the calculator features.

Security: Allows the user to set a Dash-MX system and calibration passwords and to lock the control panel from changes.

Help: Provides icon identification tool, the Dash-MX Operations Manual, and About the Dash-MX

Icon Help: The icon help feature provides a brief description of the selected icon. Icon help is available in each mode and menu. For Realtime, Scope and Review mode icon help, first Select ***Help > Icon Help***. When activated the pull down Icon Help selection should have a check mark to the left of the icon Help selection. Then touch and hold a control panel icon. A short description of the icon will appear. To exit icon help, choose ***Help > Icon Help*** again.
Icon help is also available on each setup menu by pressing the Blue I found in the upper right hand corner of the setup menu and then selecting the icon in question. To exit icon help on the setup menu press the icon Blue I again.

The question mark button in some windows will give you general information about that window.

Note: *Remember to deactivate the icon help function after using it, as icons will not perform their functions when icon help is active.*

Operations Manual: The Adobe Portable Document Format (PDF) version of the manual is available in the Dash-MX for on-screen viewing. This softcopy manual can be viewed from any mode by selecting ***Help > Operations Manual*** from the drop-down menu. If you connect a keyboard, you can use the Search function for the manual. This will let you find every section in the manual about any subject, by entering one or more key words related to that subject.

6. Common Icons

Apply Changes	Clicking on this Icon will save your settings and keep you in the same window.	
Cancel changes and Exit	Clicking on this Icon will cancel any changes made and exit the window you are in.	
Apply and Exit	Clicking on this Icon will apply your changes and exit the window.	
Select All Channels	Clicking on this Icon will select all the channels. This comes in handy not only if you are changing all the channels, but also if you are changing most of the channels. Then you can click on just the channels you do not wish to change, so they are no longer selected for this change.	
Deselect Channels	Clicking on this Icon will deselect all the channels that you had previously selected.	
Copy	Clicking on this Icon will copy what has been selected. This will be gray until you make a selection to copy. The Paste button below will then be in color after this button is clicked on.	
Paste	Clicking on this Icon will paste what you have copied once you have selected where you want it pasted. It will be gray until the copy button is clicked on.	

7. Adding Icons to the Control Panel

In Configuration > Scope > click on Setup > Control Panel. Here you can add icons to make operations easier. Any operation you can accomplish by clicking on two or more Menu choices can be done quicker by creating an Icon on the right for it.

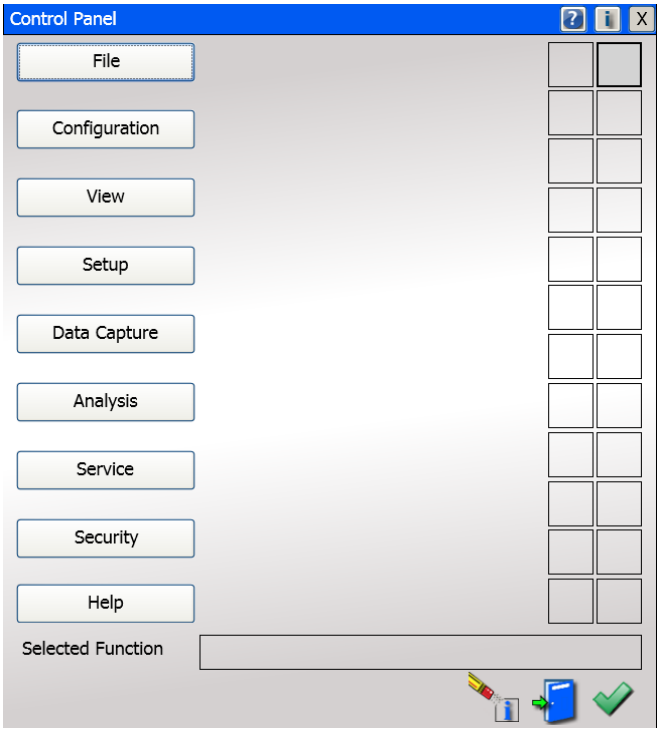
Move the black outline where you would like the next Icon by touching one of the spaces. If you put it where a button is located now, the new button will take its place. You can have up to 4 columns of Icons.

If you want to remove an Icon, you can click on it and then the eraser Icon at the bottom.

Click on the View button on left and then choose **Channel Information**. This will allow you to bring up or remove the Channel Information window quickly.

Next click on **Setup** and choose **Scope**. This way you can quickly change the Scope settings by just clicking on this Icon. Hit the green check mark (Apply and Exit Icon).

IMPORTANT: Add Icons for any other functions that you do on a regular basis during your testing. This will make using the Dash-MX easier, rather than searching through all the menu bar choices. Just like you have just added Icons to the Scope Control Panel, you can also add Icons to the Realtime and Review Control Panels. Not all the choices are available in every configuration, so if you do not see what you are looking for, it might only be available in another configuration (Scope, Realtime, or Review).



Scope Control Panel Settings

8. Channel Setup

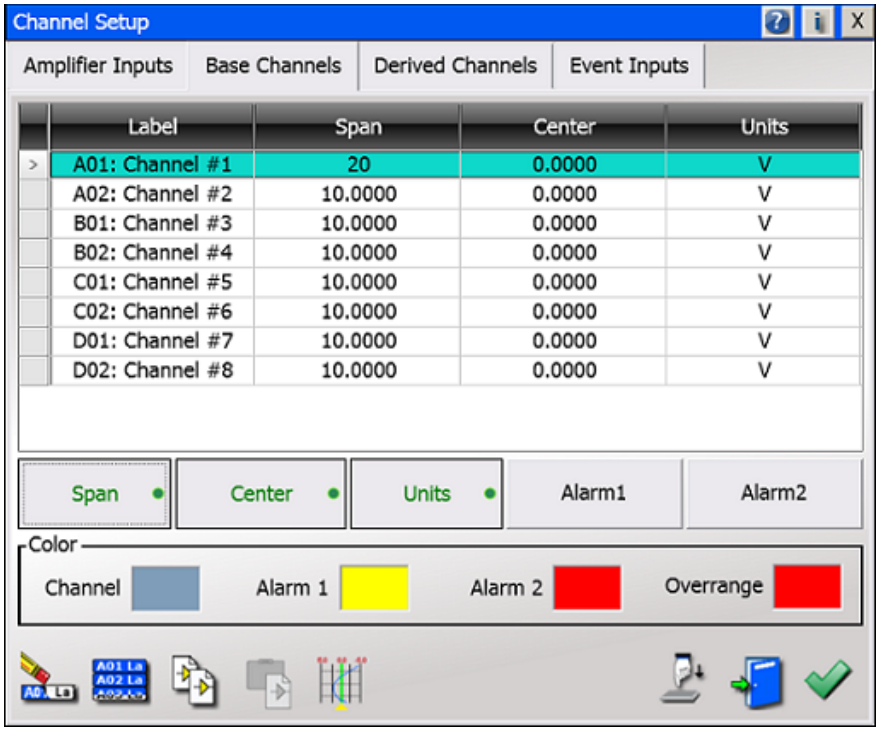
First, give the recorder defaults, because you do not know how previous changes that were made could affect your set up.

Default the Dash-MX

Choose **Configuration > Utilities** from the menu bar to open the **Utilities** window.
Click Advanced > Restore **Defaults >** from the menu bar to set the recorder to factory defaults.

Note: This uses a MX-1 PCB for the following setup explanations.

Set Channel #1 to be 20 Volts Full Scale with 0 Volts as the center

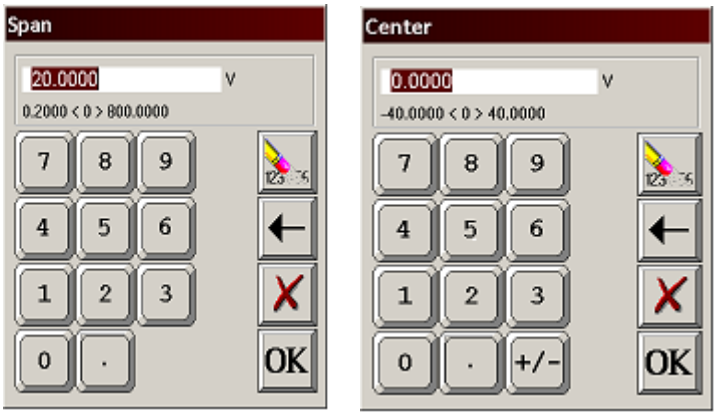


***Dash-MX** Channel Settings Window*

Set Waveform 1

Choose **Setup** > **Channel** from the menu bar. You can also use the **Channel Setup** Icon located on the control panel and the above Channel Settings window will appear.
Click on the **Base Channels** tab and click on A01: **Channel #1**
Note: Base Channels is where you will make most of your changes.

Channel Setup Icon



Span and Center adjustment keypads

Set Span for Waveform 1	Press the **Span** column heading. The Span Adjustment box will appear. Press the digit "**2**" and "**0**" to select **20**. Press **OK** on the Span Adjustment box. **Note the range limits of your choices under the white box. Any keypad that comes up will show you the range of your choices. It will only except within these ranges.**
Set Center for Waveform 1	Press the **Center** column heading. The Center Adjustment box will appear. Press the digit "**0**" to select zero. Press **OK** on the Center box. Press **OK** on the **Channel Settings** Window. **Note again the range limits under the white box**.
Input a 20V Peak to Peak 2 kHz sine wave signal into Channel #1	Use the banana jack input connection located on the side of the Dash-MX to input the signal into Channel A01. This is Channel 1 on the analog PCB that is closest to the display. It is the top channel. Turn on the generator. Set the generator for a **20V PP 2 kHz** sine wave.

9. SAMPLE EXERCISES

Scope Mode Exercise #1: Signal Monitoring and Recording

Scope mode acts like a digital storage oscilloscope, providing high time-base resolution for viewing high frequency signals and provides waveform scrolling, monitoring, and data capture capabilities.

In the following hands-on exercise, you will set up a channel to monitor a 2 kHz sine wave in Scope mode

In the exercises, every action needed is detailed in a step-by-step fashion to help you quickly become familiar with the operation of the Dash-MX Scope mode. The **ACTION** on the left-hand side describes what is to be done. The **HOW TO** section provides the detailed steps to take using the pull-down menus of the Menu Bar.

Items needed: Signal Generator and a Signal input lead

ACTION **HOW TO** **(Use the Menu Bar Pull-Down menus)**

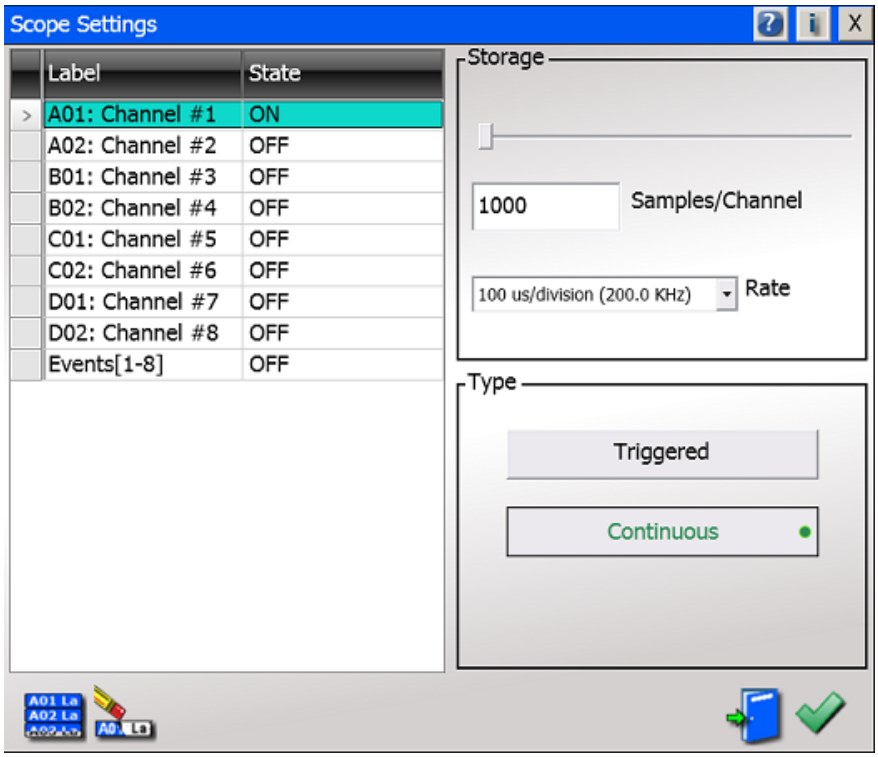
__Dash-MX__ Scope Mode Menu Bar

Enter Scope Mode	Choose **Configuration** > **Scope** from the menu bar
View Channel 1	Choose **View** > Display **Wizard** > enter **1** into the Channels block and **0** Events in Event block.
Set Scope Screen to View Signals	**Scope Settings > Scope Captures** and the Scope Settings window will appear.
Set Scope Capture Size	Slide the **Scope Capture Size** slide bar all the way to the right. The **Scope Capture Size** slide bar is located at the top right of the **Scope Settings** window under **Storage**. This sets the amount of samples per channel that stream to the scope memory and screen for viewing.
Turn off unused channels	To turn off unused channels in the **Scope Settings** click on the "**Select All**" icon. This will select all of the waveforms in the **Scope Channel Selection** section. Deselect **Waveform 1**, which is set to **On**. All channels should be highlighted with the exception of **Waveform 1**. Click on the heading State and select **Off**. The status of **Waveform 1** should be **On** while the remaining **Waveforms** and **Events** should have a status of **Off**.

Select All Icon

Scope Capture Size could be increased

Note how the **Scope Capture Size** slide bar at the top of the **Scope Settings** window moved to the left since you turned off the additional channels. Since the additional waveforms were turned off, there is now more Scope memory available for **Waveform A01**. For this test slide it all the way to the left to **1000 samples,** but just realize you could save more.



***Dash-MX** Scope Settings Window*

Set time per division and sample rate to screen

Click on pull down menu beside the Rate box **>** choose **100 us/Division** using the pull down menu. This will set the time per division and sample rate of the data streaming to the scope screen. The 100 us/Division corresponds to a 200 KHz sample rate.

Input 2 kHz sine wave signal into Channel A01

Connect your waveform generator to Channel #A01. Turn on the generator. Set the generator for a **2KHz 20V pk-pk** sine wave.

Choose Type & Save Setup

Under Type choose Continuous. Leave Triggered undepressed. Hit Apply to save setup.

Start Scope Capture to the Screen

Click on the **Arm/Abort** icon located on the control panel at the top right of the Scope mode screen. You are now seeing a Continuous update of your data like you would on a scope.

Scope Arm/ Abort Icon

Bring up cursors
Check sine wave amplitude

Use the **Cursor A and B** icons located on the Control panel to toggle the cursors on. Touch the **Cursor A block at the bottom of the cursor, release and then touch it again and move it** to the left side of the screen. Then click on and release the B cursor block, then touch the block again and drag the **Cursor B** to the right side of the screen.

The bottom Cursor Icon is a three way toggle Icon. Clicking on it will change the active cursor. It will go from showing no letters to AB to A to B. You will notice that the active cursor letter block at the bottom of the screen will turn blue .

When both are blue, both are active. You can move them using your finger once they are blue. Click on the active cursor button or click on the letter block to activate the cursor you want to move. Then touch the block and move it where you want. You can fine-tune the position by using the yellow arrow Icons.

Cursor A and B & AB Toggle Icons

View Channel Information. Size and move the Channel Information window that comes up.

Click on the blue **I** Icon, that you added to the Control Panel earlier, to bring up the Channel Information window.
Click and drag a corner or a side of this window to change its size.
Click and drag the title bar in order to move the entire window.

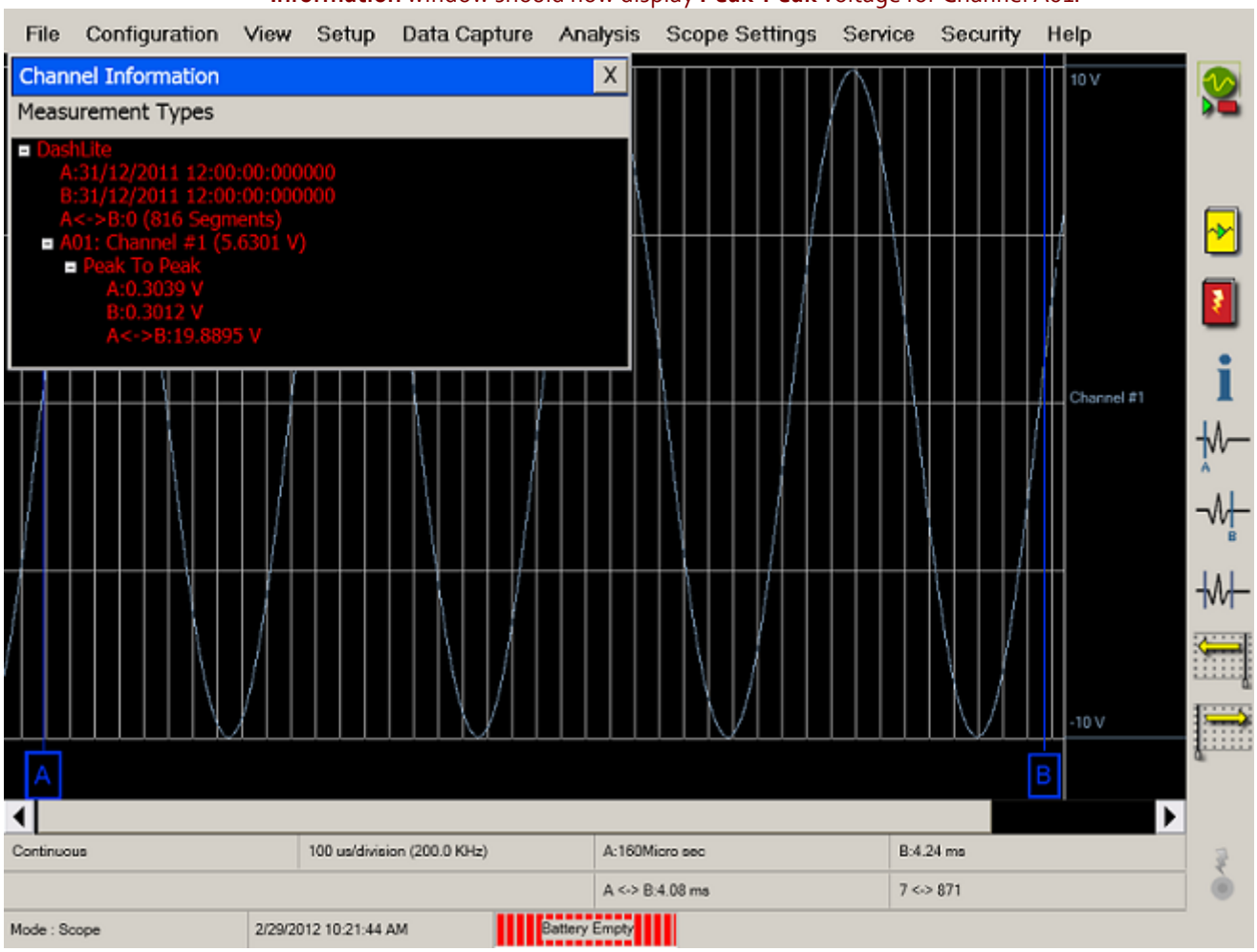
Channel Information Icon

Stop the capture

Click on the Scope Arm/Abort Icon again to stop the continuous capture

Choose Show Channel Information Measurement Type

On the **Channel Information** window, click on the words **Measurement Type > Peak-Peak**. Then click on the (+) beside Channel A01 and again on the (+) beside Peak to Peak. The **Channel Information** window should now display **Peak-Peak** voltage for Channel A01.



Peak to Peak Measurement using Cursors and the Channel Information Window

Save the Scope screen

The scope screen will not be automatically saved. In order to save it, first, stop the continuous scope captures, and then click on **File** > **Archive Scope Captures**. You can choose Entire File, Current Page or Between Cursors (if they are down). You can then review what you saved by going to **Configuration** > **Review** and click on the **Scope** Icon in the bottom right hand corner. Then choose the file you want to open and hit Apply to open and view the saved file.

Scope Icon

10. 9V Battery Exercises

In the following hands-on exercises, you will:
A – Setup a channel to monitor a 9V battery in Realtime
B – Setup a data capture
C – Setup trigger to trigger a capture when battery voltage is applied
D – Trigger a data capture
E – Review the data capture

Items needed: 9 Volt battery, a Signal input lead, and to add some buttons to the Realtime screen first.
(Note: You could remove some of the speed buttons or use a second column for added Icons).

Add Icons to Realtime Control Panel

Setup Control Panel >

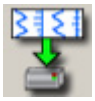
Add these Icons

View > Display Wizard

Data Capture > Capture Settings

Setup > Trigger/Abort

Data Capture > Arm



Data Capture > Abort

Data Capture > Capture Indicator

This Icon will be gray until you start a capture normally, although it is in color now until you hit Apply. It will illuminate once the capture has started, so you will know a capture is still going on in the background if the progress window is hidden. You can always bring the progress window back up by clicking on the Arm Icon again.

Data Capture > Trigger Indicator

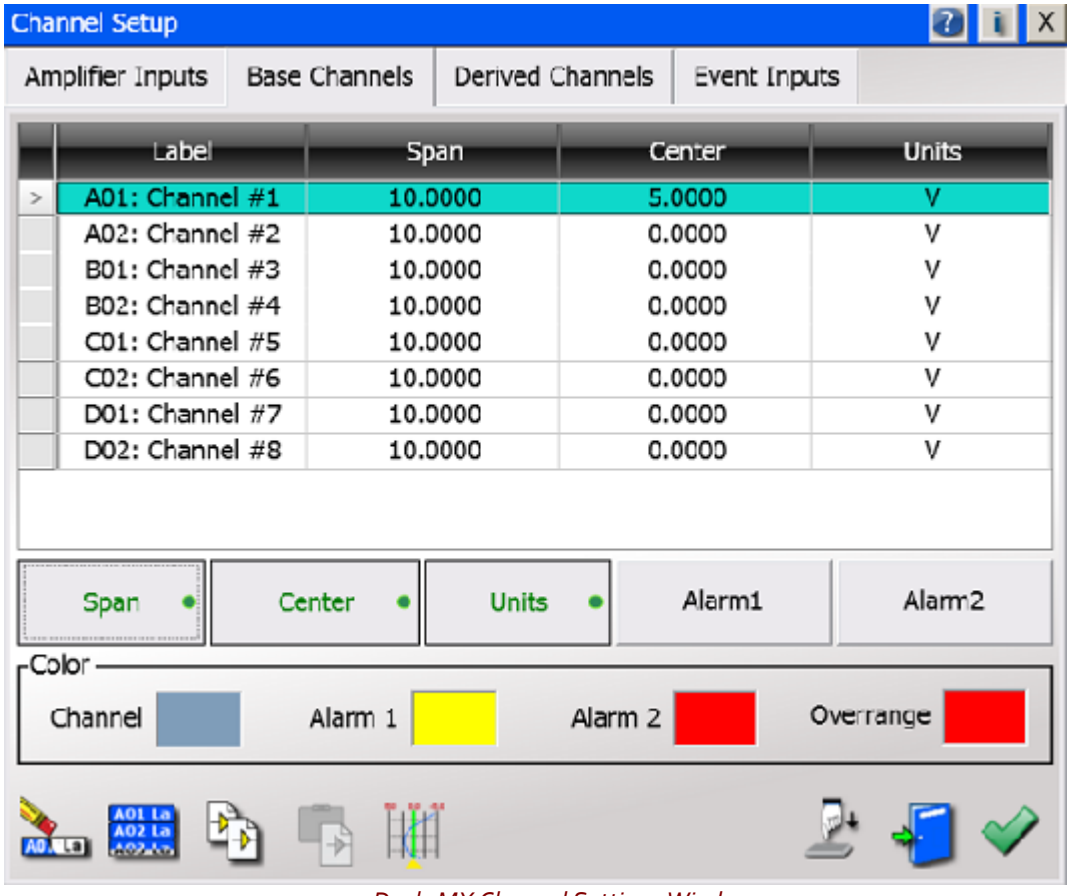
This Icon will tell you if your trigger is setup properly without doing a capture. If you can create or simulate your trigger condition you will see this turn from gray to yellow. If it is right at the trigger level, it will stay yellow. If you pass the trigger level, it will just flash and go back to gray.

A - Set up a channel to monitor a 9V battery in Realtime

ACTION	HOW TO
Change Configuration	Choose **Configuration** > **Realtime** from the menu bar to enter **Realtime** Mode. NOTE: Realtime data is gone once it scrolls off the screen. This data is not stored anywhere. We will setup a Data Capture, so the data will be stored in the background. The Data Capture function is completely separate from Realtime and it is not affected by any changes to the Realtime display.
View 1 channel	Click on the Wizard Icon Enter "**1**" into the Channels box and "**0**" into the Event box **Press Apply**
Set speed to 25 mm/sec	Press the **25 mm/s** Icon and the screen will scroll across at 25 mm/s

Wizard Icon

25 mm/s Icon



Dash-MX Channel Settings Window

Set Channel #1 to be 10 Volts Full Scale and Center of 5 Volts

Click on **Channel Setup** Icon > click on **Base Channels** tab > click on **Span** heading and enter **10** on the keypad
Click on **Center** heading and enter **5** on the keypad. This will make bottom zero since the center is 5V and the top grid line is 10V. See above screen shot.

Change headings to Top and Bottom

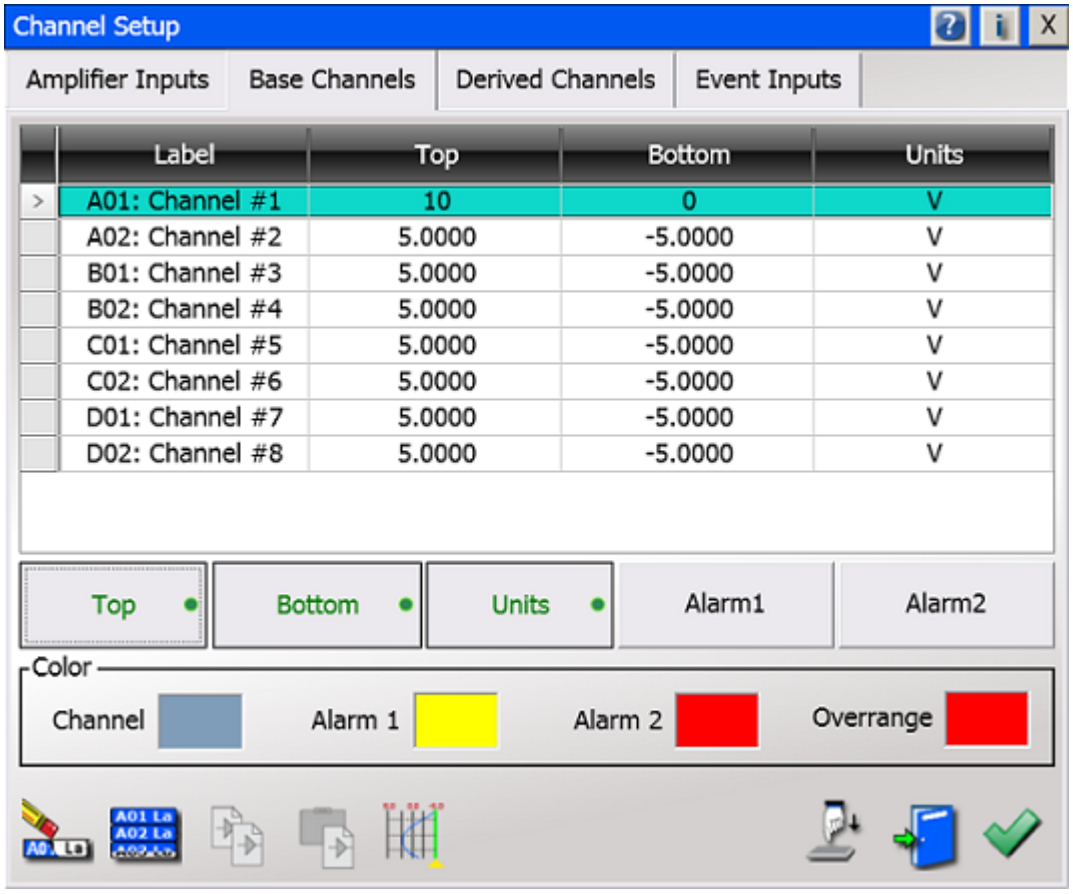
In the screen shot below you will notice that the headings are no longer **Span** and **Center,** but rather **Top** and **Bottom**. This is accomplished by clicking on the **Top/Bottom** to **Span/Center Toggle** Icon and it will cause this change and back again if clicked on again.

Top/Bottom to Span /Center Toggle

This is just two ways of looking at the full range voltage. If you have a AC sine wave or a DC signal that goes positive and negative, you would want zero in the middle. However, if your DC signal only goes positive or you are looking at a RMS signal, you would want your Bottom as zero and your Top the upper limit of your signal.

You will notice after comparing both the above and below screen shots, that 10V Top and zero Bottom is the same as a 10V Span and a 5V center.

Set Channel #1 to have a Top of 10 Volts and Bottom as 0 Volts



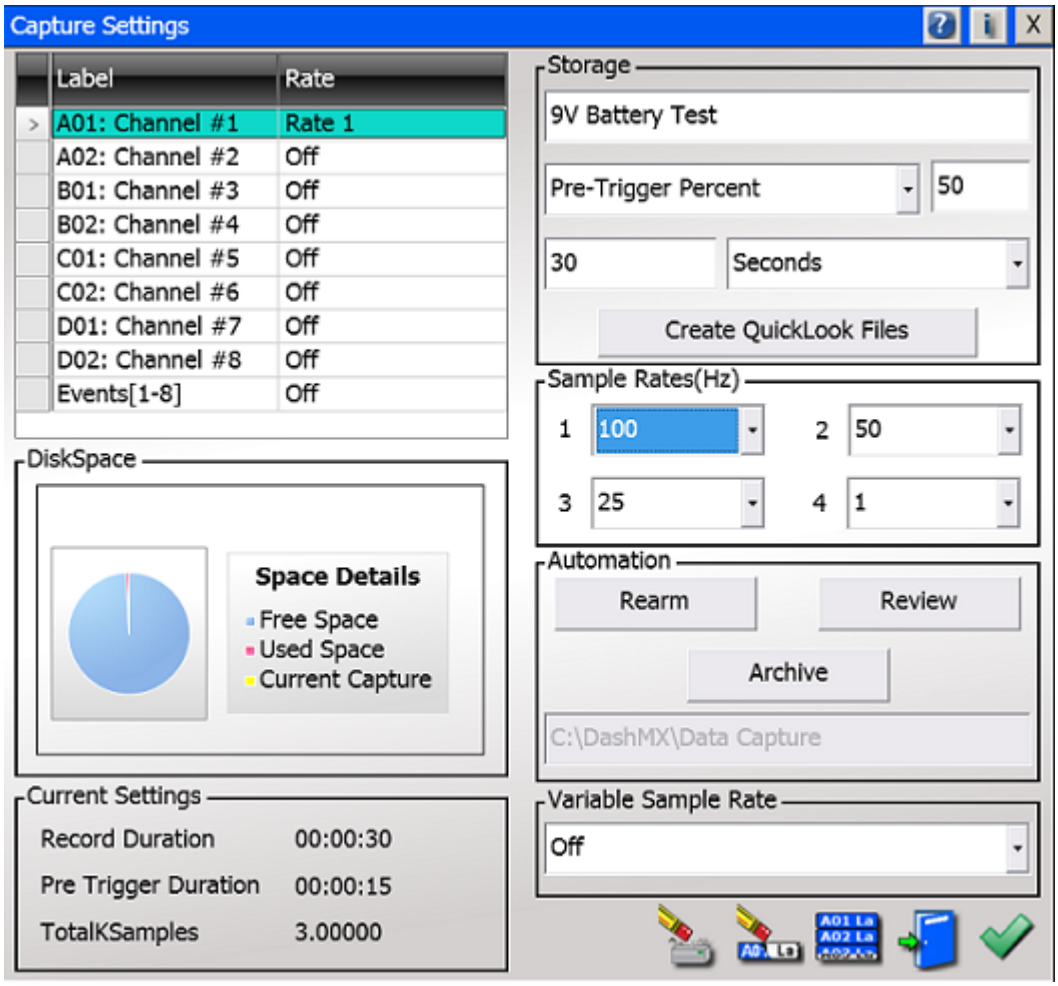
Measure the battery voltage

Click **Analysis** > **Meter** and choose one of the meters for Channel #1
Notice the actual 9V battery voltage. You will use this in the next section to set your trigger level voltage.

This concludes the A - Realtime monitoring of the 9V battery portion of this exercise.

B - Data Capture Setup

Setup a single data capture on Channel 1 only for 30 seconds and 50% pre-trigger. Of the total capture time, fifteen seconds of the capture will be the pre-trigger time, because the pre-trigger time is part of the total time. The pre-trigger data will show what the signal looked like before the trigger condition happened (in this case when the battery voltage is applied). The sample rate will be 100 samples per second, which is more than enough for a low frequency signal like this battery test.



Capture Setup Window

ACTION	HOW TO	
Enter data capture setup	Click on **Capture Settings** Icon	 **Capture Settings Icon**
Select capture of Channel 1	Highlight **Waveform 1**. Be sure the **Status** for **Waveform 1** is **Rate 1**. If not, click on the **Rate** heading and select **Rate 1**.	

	To reduce the size of the data capture, we recommend that unused channels and events be turned off. This will result in a smaller file size saving space on the data capture drive.
Turn off capture of remaining channels	To turn off unused channels in the **Capture Setup** window, click on the **Select All** Icon. Then deselect **Waveform 1** by clicking on it, which was set to **Rate 1** in the previous step. All channels should be highlighted with the exception of **Waveform 1**. Click the **Rate** heading and select **Off**. The Rate of **Waveform 1** will display **Rate 1,** while the remaining waveforms and events should display Rate **Off**.
Clear the Select All	Click on the **Clear Selection** Icon, so the channels are no longer selected
Set capture name	Press the **Storage** box (at the top), erase the name **DCR** and type in > **9V Battery Test**
Set trigger point at 50%	If below the name it shows No Trigger, click on it and choose Pre-Trigger Percent. Then click on the block to the right and enter 50 on the keypad that comes up.
Set capture for 30 seconds	Click on the Units pull-down arrow below that and select **Seconds**. *(Other choices are minutes, hours and KS/Channel).* Press the value box located to the left of the units pull down menu to open the Seconds Window. Enter the digits **"3 "** and **"0"** and press **OK**.
Set sample rate to 100Hz	In the **Sample Rates (Hz)** section, press the down arrow and choose **100**.
Verify time of capture	In the Current Setting box, on the lower left, the Record Duration should be **30 seconds**; the Pre-Trigger Duration should be **15 seconds**. It also shows the total number of samples.
Set capture for one record	In the Automation Box, be sure that both the **Auto Re-Arm** & **Auto Archive** are **not** checked. *At this point, your Capture Settings Window should look like the image above.*
Save and exit data capture setup	Press **Apply**.

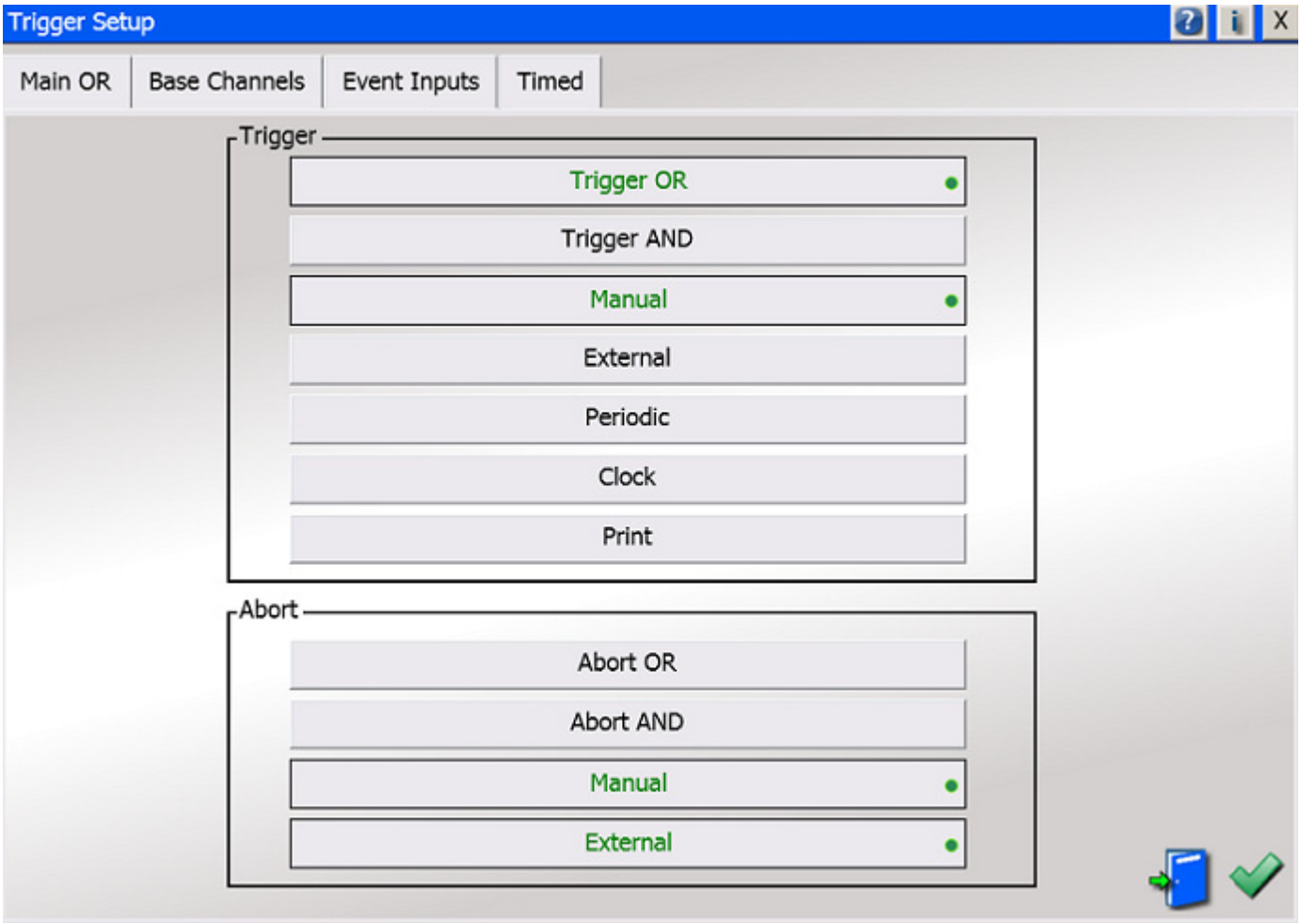
Select All Icon

This concludes the B - Data Capture setup portion of this exercise.

C. Trigger Setup

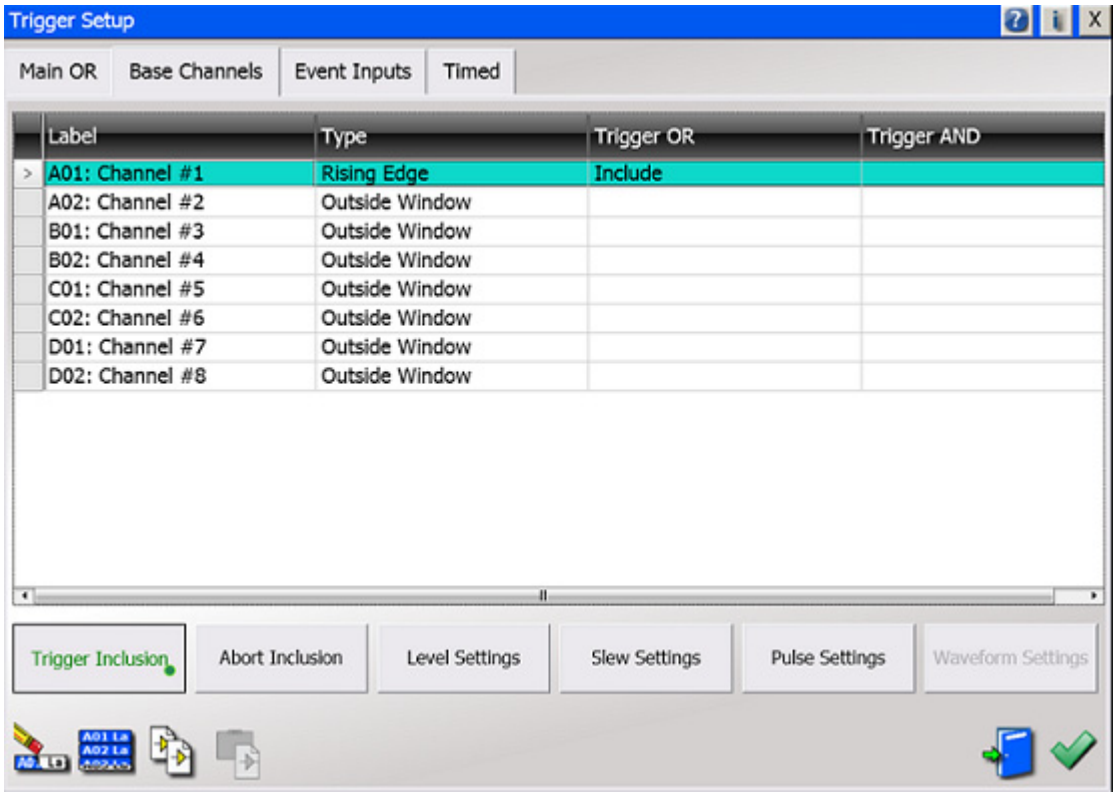
In the Data Capture Settings section above, a thirty-second capture was set up with 15 seconds of pre-trigger (data before the trigger). In this section, a trigger level of 8 Volts will be set with a rising edge type trigger, so that as the signal rises and reaches 8 Volts, the data capture will be triggered. While this is not a real life test, this does simulate a real voltage and it does show how to set up a real life test. It is just a matter of setting different levels in these same screens. You can choose to OR several channels and set each one up differently. If any of the channel trigger levels are reached, a post trigger capture will be initiated.

Enter Trigger Settings Click on **Trigger Setup** Icon **=** **Trigger Setup Icon**



Trigger Settings Menu – Main OR Tab

Turn on Trigger OR Click on the **Main OR** Tab and click on **Trigger OR**. You can leave on Manual and the bottom two Abort choices. Hit Apply. **NOTE: It is important to leave the Manual Abort active. Otherwise, you would have to use the external connector to stop a capture, especially if Auto-Rearm is enabled.**



Trigger Settings Menu – Base Channels Tab

Turn on Trigger Or — Click on the **Base Channels** tab, choose **A01 Channel #1,** and then on the heading **Trigger OR** and choose **Include** under **Trigger OR.**

Set Type of Trigger — Click on heading **Type** and choose **Rising Edge**

Set trigger level — Click on the **Level Settings** block near the bottom middle. This will **add High Level** and **Low Level** to headings at the top. Click on the **High Level** block and set the level to **8** Volts. **It is not necessary to set the Low Level for this test. Note: if your battery is less than 8 volts, then set this to less than your battery voltage. It is important to know your trigger level. This is because if your trigger level is set too high you will not capture any data. If your trigger level is set too low, you could capture way more data than you wanted.**

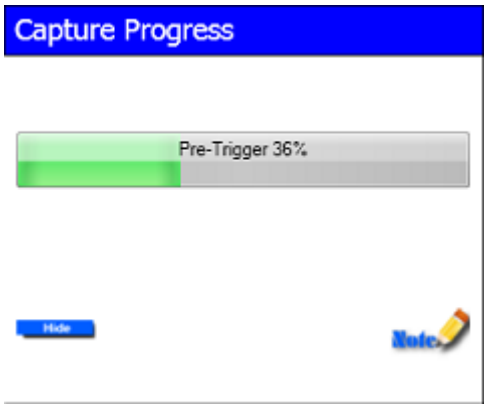
Test your trigger — Input the battery voltage into channel one. If all is setup correctly, the trigger indicator Icon will turn yellow just for a second. If not, check your settings and make sure your battery voltage is greater than your trigger level. **Always do this to verify your trigger is working the way it should to capture your data.**

This concludes C. The Trigger Setup of this exercise.

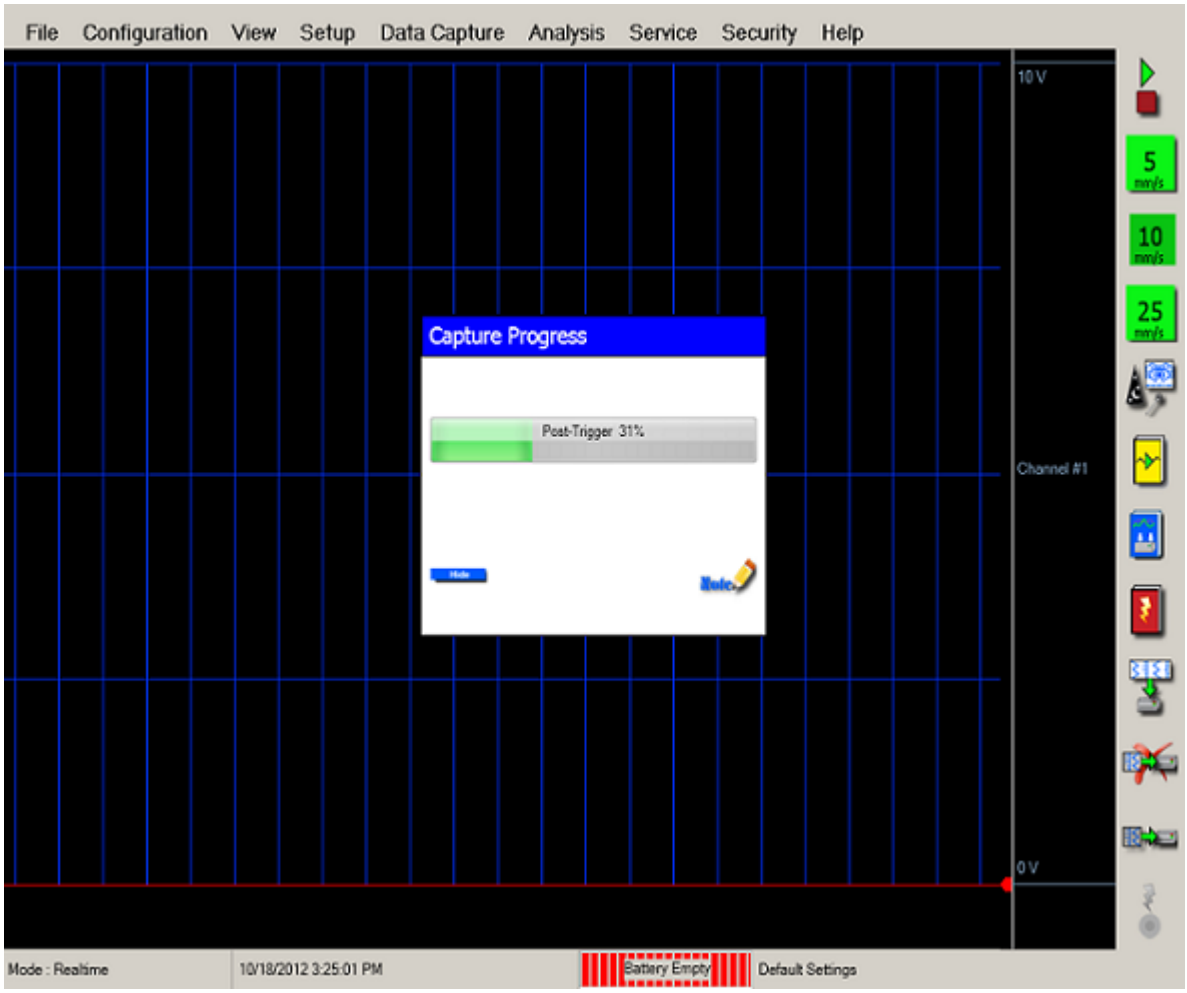
D - Trigger a Data Capture using 9V Battery

Start capturing data — Click on the **Arm Capture** Icon. A window will come up showing Pre-Trigger Capture progress window (shown below). It will take 15 seconds for the progress window to fill. This is the initial 15 seconds only. A circular buffer will keep overwriting itself until the trigger condition occurs. Then just the last 15 seconds will be saved as the Pre-Trigger data for this data capture.

Arm Capture Icon



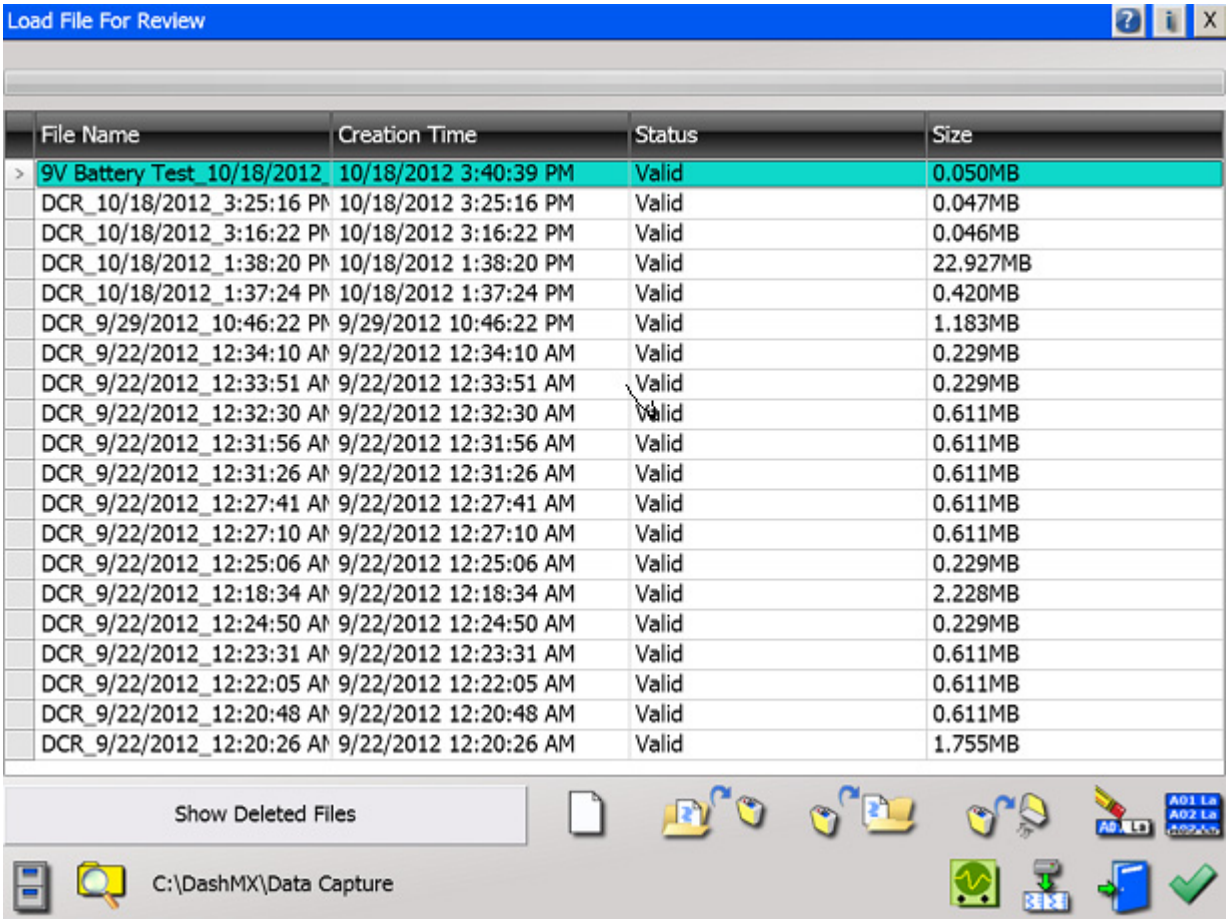
Trigger the capture Input the battery voltage into channel A01. Once the trigger is seen, the Capture Progress window (shown below) will now show Post-Trigger and it will take 15 seconds to finish the capture. The full screen will look like what is shown below.



This concludes D, the Triggering portion of this exercise.

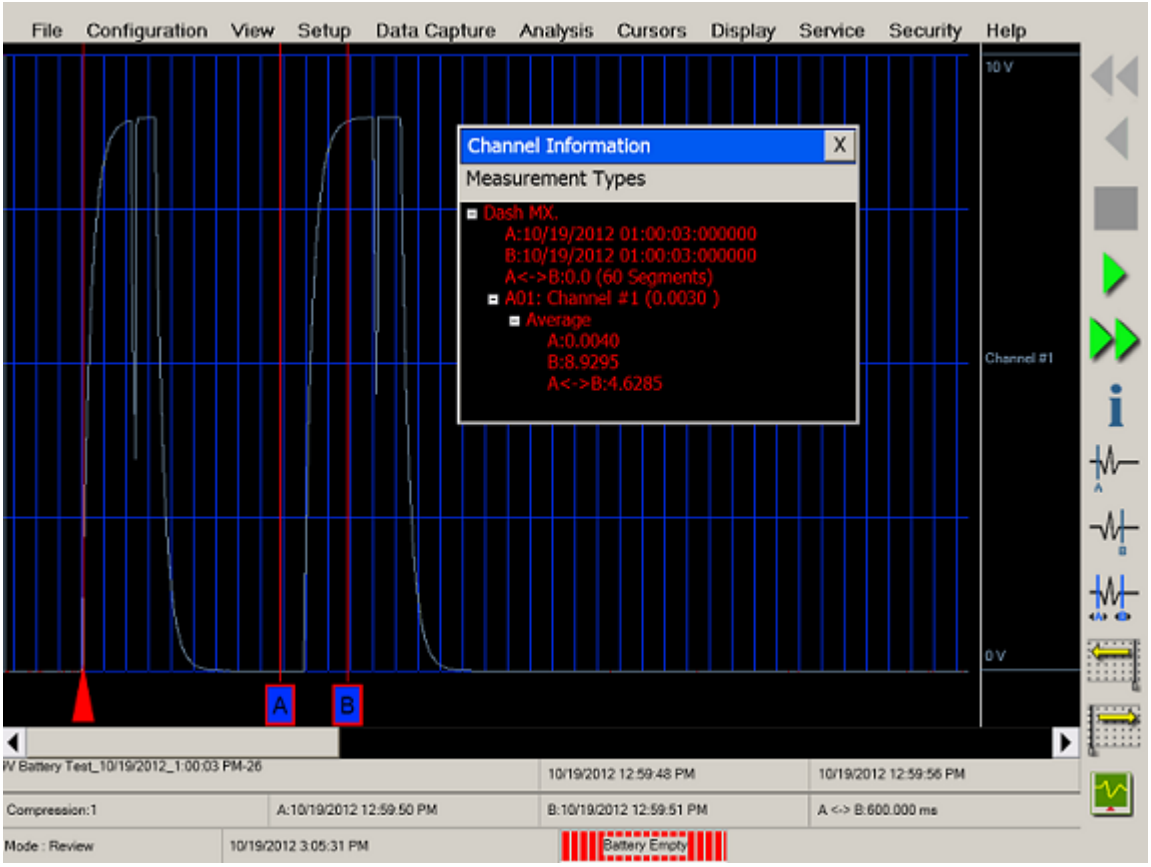
E. Data Review

Data capture records can be reviewed on the color touch-screen display. DVD-like control icons allow for convenient scrolling through the data. Cursors can be placed on the data for measurements.



9V Battery Test data capture record for review

ACTION	HOW TO
Enter Review Mode	Choose **Configuration** > **Review** from the menu bar to enter Review Mode.
Select Review File	Click on the top-most file name to highlight the most recent capture. You may have several files with the same base file name, but each will have a unique date and time stamp. The base file name will remain 9V Battery Test until it is changed by the user. Press **Apply** and the chosen file will automatically open for review. Note: If you click too high and click one of the headings instead, it will sort the files You can re sort them by choosing the appropriate column heading for the order you would like them in.



Data Capture Review of 9 Volt battery data capture

Show the trigger point

Choose **Display** > **Show/Hide Trigger Line** to show the trigger point, if it isn't on display already.
Note: The trigger line is shown as a Red vertical line with a Red pointer at the base of the line. If the trigger line is already shown, a check mark will be next to Show Trigger Line in the Display pull-down menu. Be sure the trigger line is shown on the display.

Add missing Icons

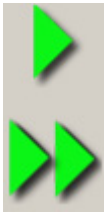
If you are missing any of the below Icons > go to **Settings** > **Control Panel** and add them

Expand or Compress the time base

Click on Display > choose Compression or Expansion and enter a number using the keypad that comes up.
NOTE: The Compression number is located in the lower left hand corner of the review screen shown above. If the data is too compressed, you can expand it either by choosing an expansion number or a lower compression number.

Scroll through the data

Use the **Scroll** icons or scroll though the file using your finger and dragging the screen. You can stop at any points of interest. Experiment by scrolling forwards and backwards.
Continue to scroll and stop the display when you have reached the trigger point (Red vertical line) in the middle of the display.
Then Scroll to the end of this file.



Scroll Icons

Find the trigger point again easily

Click on **Display** > **Go to Point** > **Trigger**

Put down the Cursors

Press the **A** cursor icon. Slide the cursor just to the left of the trigger point. Do this by clicking on the square at the base of the cursor. It is active if it is blue. If it isn't blue, touch it once to turn it blue and then touch it again and drag it where you want it. Use the yellow arrow buttons to fine tune its location.
Press the **B** cursor icon. Slide the cursor just to the right of the trigger point.
The bottom Icon determines which cursor is active. It will toggle between None (shown), A, B, and AB, so you can move both cursors at the same time.

Cursor Icons

Choose absolute time

View > **Status Text Format** > **Absolute Time** (this is actual time) and you will now see the time the recorder captured this data at the bottom.
Samples just gives you sample numbers
Relative time gives you – (negative) time before trigger point and + (Positive) time after the trigger
Percent: You see just percentage of the total capture at the bottom.

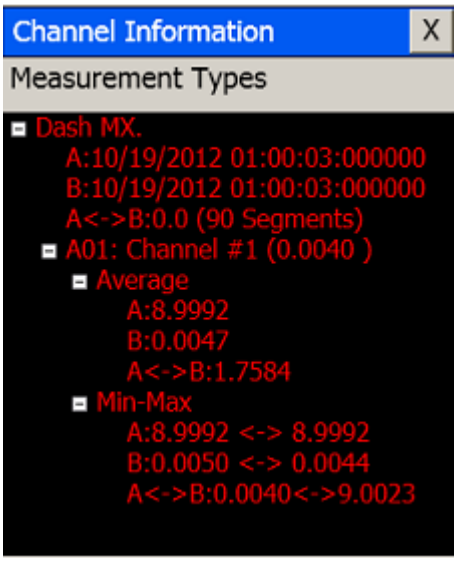
Open the Channel Information window

Click on the **I** Channel Information Icon

Information Icon

Choose what type of measurements you wish to see in this window.

Click on **Measurement Type** near the top of the information window
You will have several choices and this screen shot shows just two of the possibilities. For this exercise choose **Average** and **Min-Max**.



Open up channels you want to see measurements for in the channel information window	Each Channel and type measurement will have a + or – sign beside it. Click on the **+** sign beside the channel to see that channel. Then click on the **+** sign to see each type measurement for that channel. Hit the **–** sign to hide any channel or type measurement. You can grab any corner or side to resize this window. You can grab the **Channel Information** title bar and drag it where you want it located on the screen.
Amplitude measurements using cursors	Move Cursor **B** by sliding it to the right. As you move the cursor, observe the change in values in the Channel Information window.
View Time, Date of each cursor, and time in between both cursors	You will notice also that the time of each cursor will change at the bottom of the Review screen as you move the cursors. In addition, in the bottom right hand corner, it will show the amount of time in between the 2 cursors (A<->B).
Remove the cursors	Press the **A** cursor icon and **B** cursor icon to remove them.
Remove the Channel Information window	Press the blue **I** Information Icon to remove this window

This concludes E. The Review portion of this exercise.

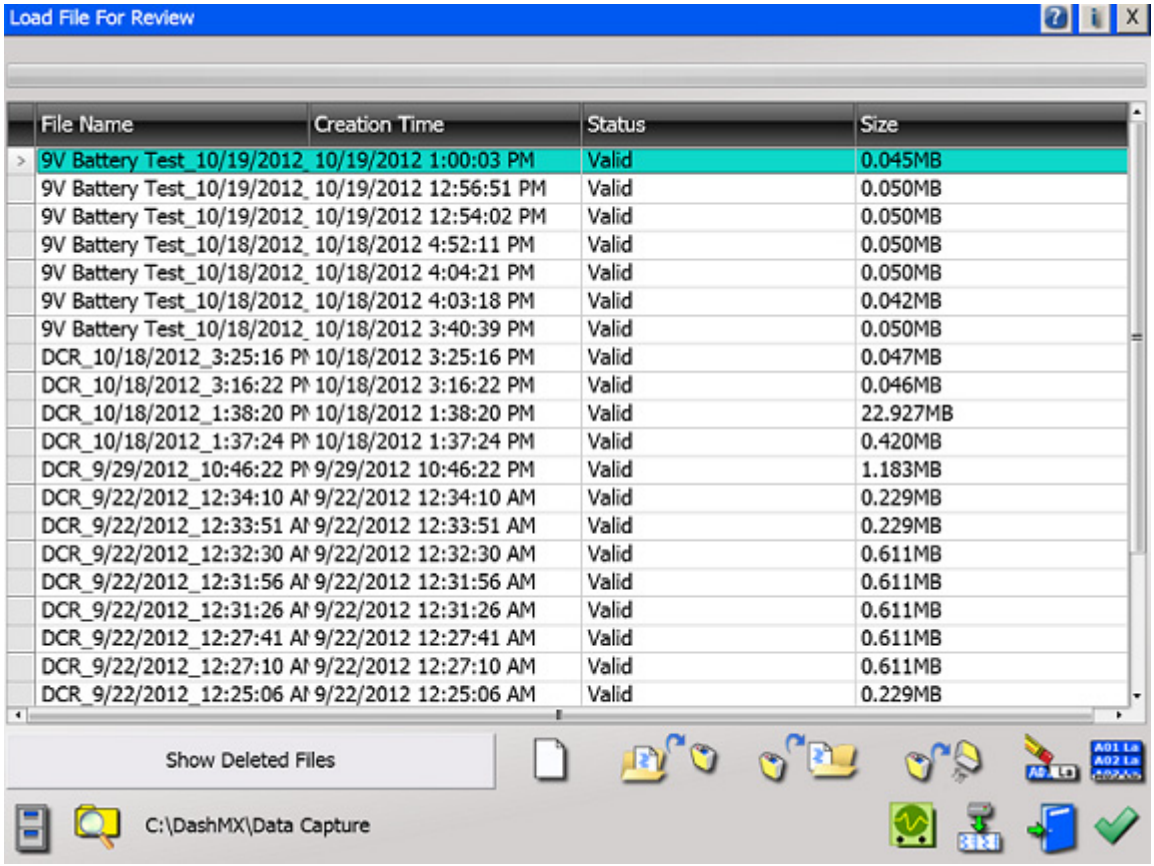
11. *ARCHIVING DATA RECORDS*

There are two hard drives in the ***Dash-MX***. The first is the Windows (System) drive and the second is the data capture drive. During data capture, the data is always streamed to the data capture drive. Once the data capture is complete, the file can be reviewed on the Dash-MX and deleted or archived. You can archive it automatically to the internal System drive (C) or a USB drive (D) if Archive is chosen in the Capture Settings window under Automation. You can manually archive one or more files directly to the internal System drive or to a USB drive from the capture drive. If you decide to access and save them to another location via Ethernet, it is necessary for them to be archived to the internal system drive first (C). The data capture drive is not accessible through Windows Explorer and it does not have a drive letter. It just communicates with the system drive. The only way to export or archive the data off the capture drive is by using the ***Dash-MX*** software environment. Data is handled this way in order to maintain the integrity of the recording. Everything can be done through the Dash-MX software. There is virtually no need to go into the Windows operating system.

ACTION	HOW TO
Enter Review Mode	Choose **Configuration** > **Review** from the menu bar to enter Review Mode.

Select File to Archive

Select the file or files that you wish to archive. The selected file or files will be highlighted.

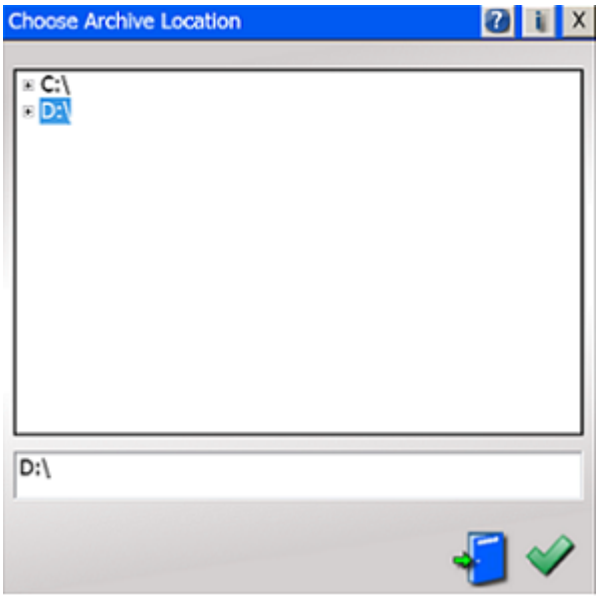


Choose Archive Directory

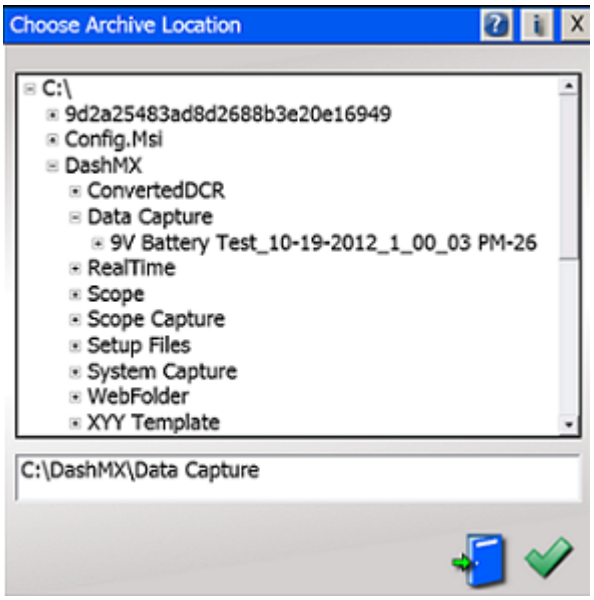
By default, the file will be saved on the system drive (C) in the noted location (C:\DashMX\Data Capture). The path to this location is displayed in black text in the lower left hand corner to the left of the Browse Icon. If necessary, the file can be saved in a different location. To select an alternative file location, click on the Browse Icon and select a location. If you have a USB Drive in the Dash-MX, you can choose D. If you want it to go to the System Drive, choose C:\DashMX\Data Capture. This is the folder where it should be stored, so you can see it as a choice when you click on the Open Data Capture Files button in the lower right hand corner of the Configuration > Review screen.

Browse Icon

Select Location where you want file archived



Location choices if thumb drive is in USB port.



Choices to choose the normal C Drive file location.

Use the pull down menu to select a file location and choose the **Apply** Icon on the Choose Archive Location window. You will only have a choice of **C** if you do not have a USB flash drive plugged into the Dash-MX. If you do, the USB flash drive will be drive **D**. The path displayed in black text will be updated to indicate the new file destination.

Archive File

Select the **Archive Files** icon to archive the selected file or files.
A status pop-up will appear showing the percentage completed.
Once the file has completely archived, select **Exit** to exit the Review mode screen.

Archive Files Icon

Note: The ***Dash-MX*** series offers additional methods to archive data.
The user can archive all or part of a file while reviewing a single file , as well as archiving in ASCII format. Please see the ***Dash-MX*** operations manual for additional information.

This concludes the Archiving Data Records section.

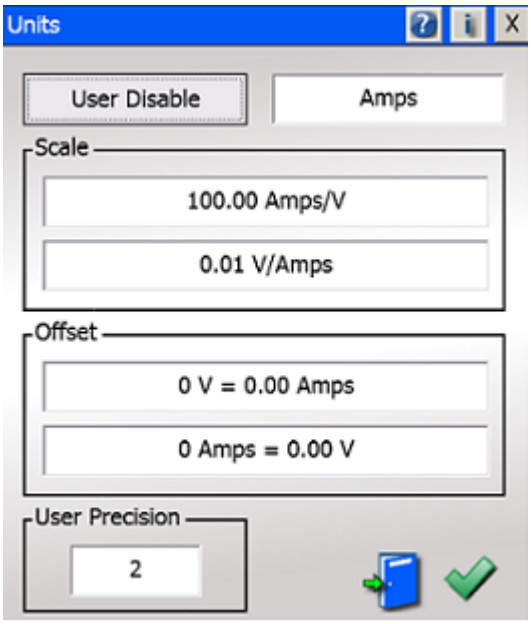
12. ENTERING ENGINEERING UNITS

Engineering units provide the capability to display user-selected units instead of voltage. All signal information enters the ***Dash-MX*** as voltage. However, converting the voltage unit to an alternative engineering unit of measure may be desirable in applications that measure current, pressure, strain, or any non-voltage unit.

This allows the ***Dash-MX*** to be compatible with transducers and probes that can provide a voltage output to the ***Dash-MX***. The relationship between the voltage and the engineering unit is assumed to be linear, characterized by a slope and offset (y = mx + b).

The following is an example of entering engineering units into the ***Dash-MX***. For this example, we will assume we are entering the engineering units for a current probe that provides a **10 mV/A** voltage output to the ***Dash-MX*** with a **1000 Amp** maximum.

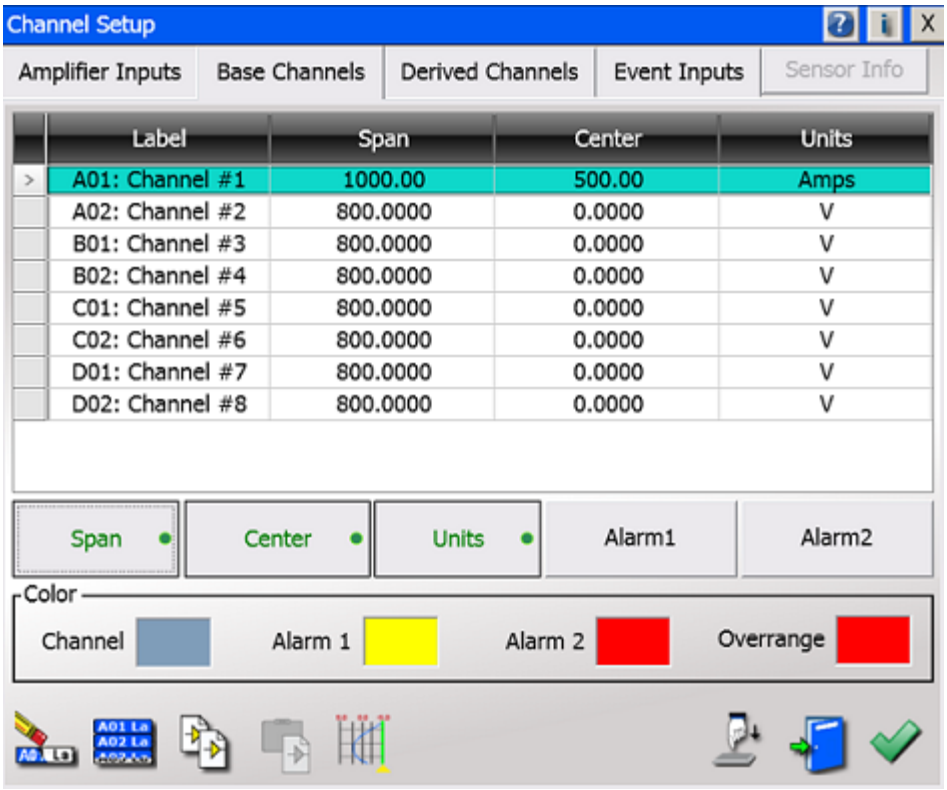
Remember, whenever setting up Engineering Units, it is best and less confusing to set the Dash-MX for the actual voltage you are going to be inputting first. This should be done before enabling Units. Setup the Span/Center or the Top/Bottom for the actual voltage. Then click on Units. After you have set up Units, the Span or Top will now show the upper range you are expecting.



***Dash-MX** Units Window*

ACTION	HOW TO
Set range as in section A	Click on the **Channel Settings** Icon. Click on the **Base Channels** tab. Highlight Waveform 1. Set Span to be 10V and Center to 5V as in section A (if it was changed)
Set the engineering units on Channel #1 to be 100 mV/A	Click on the **Units** heading (you will see the above window) Note: There is a Units heading under the Amplifier Inputs tab, however this is only used for the output of a math channel. Just remember that most of your setup is done under the **Base Channels** tab.
Enable User Units	Click on the **User Enable** block. Note: The block will now read User Disable As shown above), since that is what would happen if you clicked on it again.
Enter User Unit Scaling	Select the block to right of User Disable. A keypad will appear. Enter **Amps.**
Enter Scale	Now that you have entered Amps, click on apply to change the units to Amps. You can now click on either Amps/Vs or V/Amps block, **(**whichever one is easier to figure out > the other block will automatically change**)**. Since our current probe has a 10 mV/A output, enter **0.01** into the **V/ Amps** box keypad.
Set number of decimal places	At the bottom of the Units window you will see a block beside **User Precision**. Click on it and enter the number of decimal places that you would like to see. Note: You can even use this for voltage channels, as long as your scaling is 1/1 when there is no scaling factor involved. Just change the user units to **V** for Volts and click on **User Enable** to activate the decimal places.
Offset	Offset is normally not used, unless you have some value that is to equal zero.
Adjust span for current level expected	Press **Apply** on the Units window. You will now notice the Channel 1 Span is **1000 Amps** instead of the 10 Volts it was set for before. (See below screen) If you find that you are getting much less than 1000 Amps, you can adjust the Span, so your signal is nearly full scale. Note: While you can change the Span to adjust to your actual

reading, it will not be necessary to change your scale, if it was correct to start with. However, if your Span and Center do not make sense, double check your work and especially the scaling.



Span and Center after Units has been setup

This concludes the Engineering Units example.

13. ADVANCED FEATURES

The Dash-MX has many advanced features not discussed in this quick start guide. Please refer to the Dash-MX Operations manual for information on additional capabilities.

14. POWERING DOWN

When the power switch is set to the off position or if AC power is lost or removed, the Dash-MX begins the power down sequence. This is indicated by the green LED next to the power switch that will be on while the power down sequence occurs. Note that the LED will either be a solid green or it may flicker. It is very important not to turn the power switch back to the on position during the power down stage. The Dash-MX recorder must be allowed to complete the power down sequence to ensure proper operation when you go to turn it back on.

This completes the ***Dash-MX*** Quick Start Guide.