ECHO FD Ultrasonic Flaw Detector

Ver:1.0A

Danatronics, Corp.

Liability

Ultrasonic testing is a function of using the proper equipment (electronics, transducer, cable and couplant combination) for the inspection and a qualified operator who knows how to use this manual, the instruments and all calibration procedures. The improper use of this equipment, along with the improper calibration can cause serious damage to components, factories, facilities, personal injury, and even death. ALL DANATRONICS ULTRASONIC THICKNESS GAGES ARE NOT INTRINSICALLY SAFE AND SHOULD NOT BE USED IN ANY HAZEDOUS OR EXPLOSIVE AREAS.

It is understood that the operator of this equipment is a well trained inspector qualified by either their own company or another outside agency to issue Ultrasonic Level I, 40 hour class room training in Ultrasonic Theory. Danatronics, Corp. and any of its employees or representatives shall not be held responsible for improper use of this equipment for its intended use. Proper training, a complete understanding of Ultrasonic wave propagation, thorough reading of this manual, proper transducer selection, correct zeroing of the transducer, correct sound velocity, proper test blocks, proper cable length, proper couplant selection all play a factor in successful ultrasonic thickness gaging. Special care should be taken when test pieces have rough or painted surfaces, particularly those applications where the test piece is thin to begin with as doubling of the echoes is possible even if the transducer is capable of measuring the desired thickness. As transducers wear or heat up, results can be either too thin due to a lack of sensitivity as a result of wear or too thick due to heating up of the transducer, referred to as "drift."

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1 Getting Started

About the ECHO Series

ECHO FD is a portable ultrasonic flaw detector in the same field-proven case as our popular ECHO series, and it represents a breakthrough in terms of cost, size, ease of use, and versatility. ECHO FD can even toggle from an every day flaw detector to a corrosion or precision thickness gage making it the smallest and most affordable unit in the world to offer such a vast application set. Our new hand-held ultrasonic flaw detector is packed with many useful and practical features including:

➢ 3.5" sunlight readable display with color pallet

➢ Change color and vibrate on alarm

➢ 2 independent gates

➢ DAC

➢ AWS

➢ API-5UE

➢ Peak Pitch Memory

➢ 2GB, expandable to 32GB, micro SD card memory

➢ Datalogger including B-scan and export of reading to excel

➢ 13 hour battery life

➢ Custom rubber boot with padded wrist strap and bail

➢ Made and designed in the USA

2 Basic Operations

Make sure the connector is plugged into TR 2 when using a single element probe.

Power On the Unit

To power on any ECHO FD, follow these steps:

1. Press and hold the **F1** key for more than 3 seconds. The power symbol, as shown below, is under the **F1** key printed on the keypad.

Power symbol
under the F1 key

2. After powering on the ECHO FD, the unit will display briefly display the Setup menu before opening the *Measurement Mode*. The *Measurement Mode* displays the last instrument settings as well as the battery life in the bottom right corner. The image below shows the battery life at 49%.
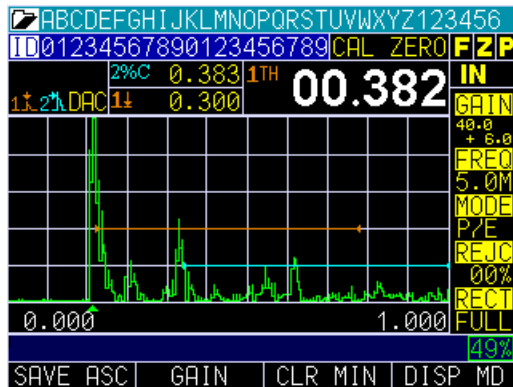
Note: Set your parameters based on the type of probe you are using.

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3. Press the **MENU/OK** key and use the up and down arrow keys to select the **Setups** option. Press the **MENU/OK** key again.

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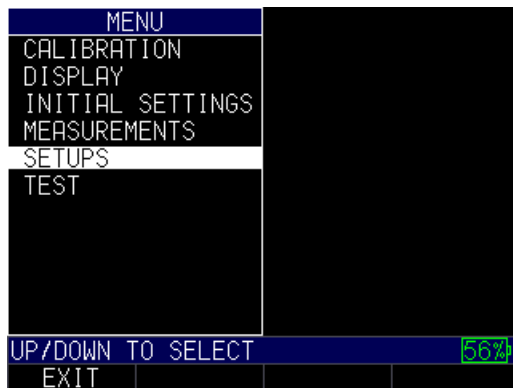
4. In the **Setups** menu, use the up and down arrow keys to select the probe closest to the one you will be using. If none of the options are close, then press the **F1 – Exit** key to set your own parameters.

ECHO FD has 4 default setup template files that cannot be deleted. They are as follows:

1. Straight beam contact probe 5 MHz, 5" range
2. Dual probe 5 MHz on a 0.100-0.500" (2.52-12.7mm) test block
3. Angle beam AWS type 2.25 with ref gain on
4. Angle beam quick change 5 MHz, 45 degree
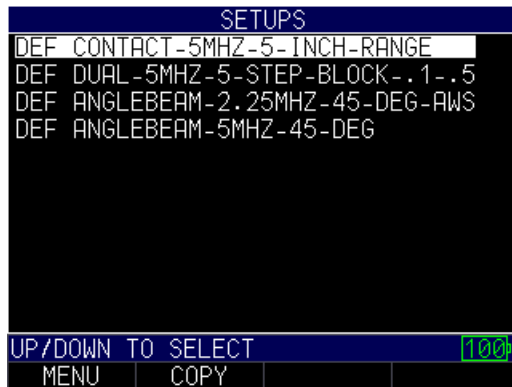
To get started, we recommend that you choose a setup close to what you will be using. This will allow you to get echoes and make smaller adjustments when fine-tuning your setups and calibrations. As stated, the default setups cannot be deleted. Once a new custom setup is saved (1,800 max.), you can also use the included Data XL interface program to save them on your computer and even send the setups to additional ECHO FDs.

Keypad Functions

The figure below shows the full keypad layout representative of each ECHO series unit.

The following table refers to each key or symbol shown on the keypad. Note, the F keys correspond to text above each key and prompts change depending on which screen you are adjusting.

Key	Function
▲	Up arrow key
▼	Down arrow key
◄	Left arrow key
►	Right arrow key
⏻	On/Off symbol (under the F1 key)
OK	MENU/OK key
F1	Varies
F2	Varies
F3	Varies
F4	Varies

Function keys, or F keys (e.g., F1, F2, F3, F4), have various unit functions and may change depending on the display screen. View the bottom of the display screen for the function that corresponds with the appropriate F key. For example, **F1** may correspond with the Save function, **F2** with the Freeze function, or **F3** with the Directory function

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Battery Pack

To ensure the highest level of performance and protection, the battery compartment is separated from the electronic components of the unit.

Monitoring the Battery Charge from the Display Screen

The ECHO unit continuously displays the percentage of battery life remaining on the bottom right corner of the measurement display screen. When the battery life is below 10%, the battery indicator will turn from green to red. When the battery life is below 5%, the indicator will flash.

Note: Power off the ECHO unit to ensure any saved data is stored internally.

Re-charging the Battery

USB port
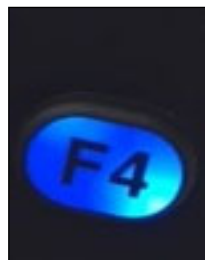
To re-charge the battery, simply plug in the charger to an AC outlet (between 100-240V) and plug the other end into the USB connector on the top of the ECHO series unit. The **F4** key will light up with a blue LED when charging, and the light will go out when fully charged. Allow several hours (up to 10 hours) to fully charge. We recommend using the charger and high-quality USB cable that is supplied with the ECHO unit. Using lower quality USB cables can result in little or no charge.

> **Note:** It is possible to use a computer to charge the unit, but this will take significantly more time than using an AC outlet and we do not recommend it; however, if you decide to charge the flaw detector using this method, make sure the unit is powered off before you connect the USB to the computer and to the flaw detector itself.

When charging is complete, the **F4** key will appear translucent in color. Power off the flaw detector, and unplug the charger from the USB connector on the top of the unit. Keep in mind, there is a battery indication monitor on the bottom right of the screen that displays the percentage of battery life, as shown in the image below at 71%.
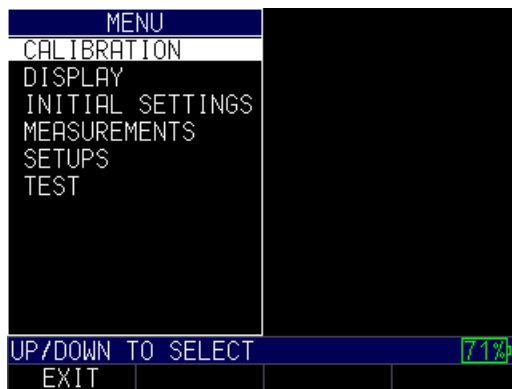
Boot, Bail, and Strap Features

The custom rubber boot with built in bail and padded wrist strap is an accessory for the ECHO series gages. Not only does the boot help to protect the gage from the elements, but the functional bail and strap also offers a variety of positioning options.

Placing the Boot on the Gage

To insert the gage into the rubber boot, follow these steps:

1. Guide the gage strap through the hole at the top of the boot (either right or left side).

2. Slide the gage into the top of the boot.
3. Gently apply pressure to the bottom of the gage until it fully pops into the boot.

Removing the Boot from the Gage

Be sure that the bail is set in the open position before attempting to remove the boot. Follow these steps:

1. Apply pressure to the bottom two corners of the boot until the gage pops out.
2. Wriggle the top section of the gage out of the boot.
3. Guide the gage strap through the hole at the top of the boot.

Using the Boot Strap and Bail

The boot strap is attached to the bail on the back of the boot. It can be used as a right- or left-handed strap, or a finger strap. You can also connect the strap to a 4-point chest harness for hands-free use.

The bail, including the straps, can be removed from the boot. This is useful when adding accessories or locating the gage's serial number. Simply open the bail and apply gentle pressure to one side of the connector, which is located at the top of the bail. The piece will pop off exposing the accessory mount (see below) and gage serial number.

Other Gage Features

Using the T/R 1 and T/R 2 Ports

On the top of the ECHO series gages are two ports for transducer connectivity.

If you are using a dual element transducer, you may use either port—T/R 1 or T/R 2—interchangeably. However, if you are using a single element transducer, plug the connector into the T/R 1 port only.

RS-232

RS-232 is available as a custom connector type (required paid hardware modification). The RS-232 connector can not be installed on gages modified to work with Danatronics EZ Scan encoder

Locating the USB Slot

The ECHO series gages are furnished with a USB 2.0 slot on the top of the gage. Use the USB slot to connect AC chargers or to connect to a computer for cross-functionality.

Using the Accessory Mount

On the back of the gage is a ¼ x 20 accessory mount. This connector point is compatible with a multitude of accessories including a magnetic pipe attachment and a Gorilla Pod.

Locating the Altitude Change Release Regulator

At the bottom of the gage is a circular outline with small holes. This feature regulates pressure due to altitude change. Any pressure built up inside the gage will be automatically released.

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New setups can be selected from the Setup selection screen, which appears briefly after the unit powers on. The Transducer Setup selection screen can also be accessed by going to the *Main Menu*, selecting **Initial Settings** then **Setup Selection**.

Stored Setups

Up to 2,700 setups can be stored in ECHO FD, which can keep track of calibration and instrument settings upon file creation. In addition, ECHO FD has 4 default template files denoted by a square to the left of the file name. None of the default files can be deleted. They are as follows:

1   Straight beam contact probe 5 MHz, 5" range
2   Dual probe 5 MHz.
3   Angle beam AWS type 2.25 with ref gain on
4   Angle beam quick change 5 MHz, 45 degree

```
                    SETUPS
 ■CONTACT-5MHZ-5-INCH-RANGE
 ■DUAL-5MHZ-5-STEP-BLOCK-.1-.5
 ■ANGLEBEAM-2.25MHZ-45-DEG-AWS
 ■ANGLEBEAM-5MHZ-45-DEG




 UP/DOWN TO SELECT              [100]
     MENU    | COPY    |
```

```
                    SETUPS
 ■CONTACT-5MHZ-5-INCH-RANGE  *
 ■DUAL-5MHZ-5-STEP-BLOCK-.1-.5
 ■ANGLEBEAM-2.25MHZ-45-DEG-AWS
 ■ANGLEBEAM-5MHZ-45-DEG




 UP/DOWN TO SELECT              [100]
     MENU    | SAVE   | DISCARD |
```
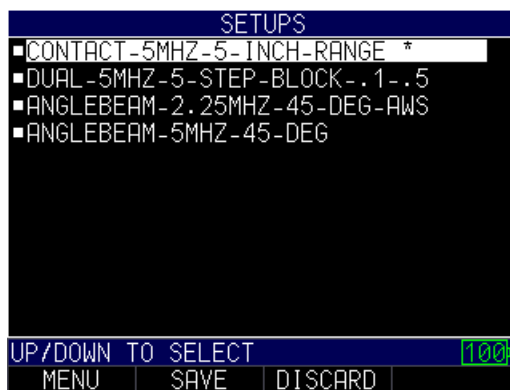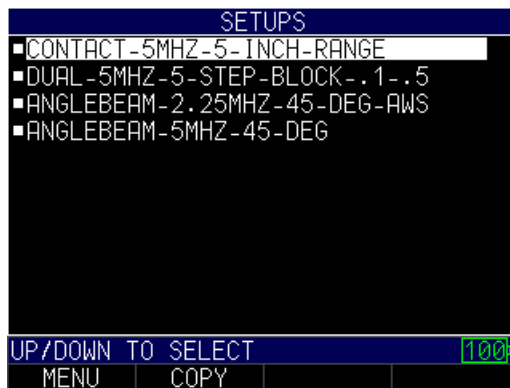
If any default parameter is altered, such as changing the Gain or Range, an asterisk will appear next to the file denoting the change (as shown in the image above). If you press the **F3 – Discard** key, then any changes made will be discarded. Pressing the **F2 – Save** key will allow you to save the setups, and the following screen will appear:

```
SAVE CONTACT-5MHZ-5-INCH-RANGE

NEW FILE NAME:
CONTACT-5MHZ-5-INCH-RANGE_


     1  2  3  4  5  6  7  8  9  0
     A  B  C  D  E  F  G  H  I  J
     K  L  M  N  O  P  Q  R  S  T
     U  V  W  X  Y  Z  -  +
                              58%
   EXIT  |  DELETE  |  CLEAR  |  DONE
```
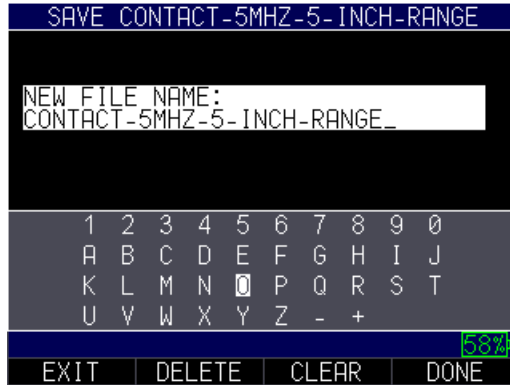
Press the **F4 – Rename** key when you are done and the new file name will populate at the end of the selection in the *Setups* screen.

```
            SETUPS
 ▪CONTACT-5MHZ-5-INCH-RANGE
 ▪DUAL-5MHZ-5-STEP-BLOCK-.1-.5
 ▪ANGLEBEAM-2.25MHZ-45-DEG-AWS
 ▪ANGLEBEAM-5MHZ-45-DEG
  CONTACT-5MHZ-5-INCH-RANGE-CAL




 UP/DOWN TO SELECT            100
   MENU  |  COPY  |  DELETE  | RENAME
```
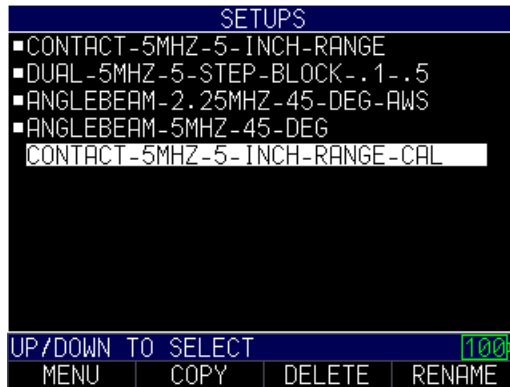
Saving and discarding an altered stored setup:

When making a change to any parameter to a default setup, the ECHO will put an asterisk next to the file indicating something has changed. Your choice is to Save the new setup by pressing F2 and typing in a new name or discarding the changes by pressing F3. The ECHO can save more than 2,600 custom setups which is ideal for varying applications.

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FLAW DETECTOR SETUPS
- CONTACT-5MHZ-5-INCH-RANGE *
- ANGLEBEAM-2.25MHZ-45-DEG-AWS
- ANGLEBEAM-5MHZ-45-DEG
- DC250 2.25MHZ 5-STP-BLOCK-.1-.5
- DHT-537 5MHZ-5-STEP-BLOCK-.1-.5
- DKS-537 5MHZ-5-STEP-BLOCK-.1-.5
- DK537EE 5MHZ-5-STEP-BLOCK-.1-.5
- DK718 7.5MHZ-5-STEP-BLOCK-.1-.5
- API5UE-ANGLEBEAM-5MHZ-45-DEG

↑/↓ TO NAV, MENU/OK TO SELECT 100
MENU | SAVE | DISCARD
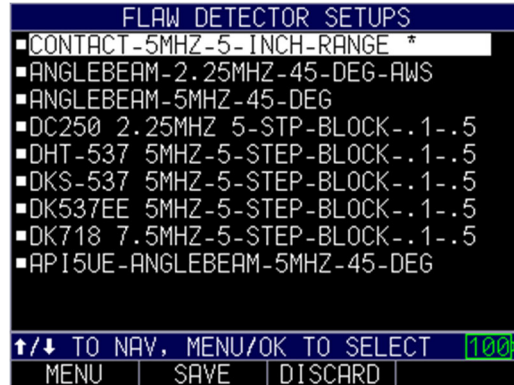
Note: The default setups will not be erased when assigning a new Setup File

**Note:** If you get an "insert transducer" message and are using a dual transducer you can try swapping the connector or rotating the molded plug from where the cable plugs into the top of the gage. If this does not work, the transducer likely needs to be replaced.

3 ECHO FD Calibration

Calibrating is the process of adjusting the unit for a specific material and transducer before testing material to ensure that all of the data are accurate. You must always calibrate before testing material for standard accuracy. It is always a good idea to start with the *Parameter* screen so you can set your basic adjustments such as range, material velocity, zero angle, etc.
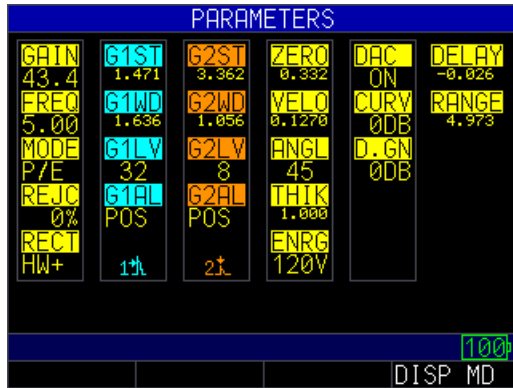
Use the left or right arrow key to begin Edit mode. There are two ways to enter Edit mode: (1) hold down the left or right arrow key to scroll to the desired parameter and adjust by using the up or down arrow keys; or (2) press the **F4 – Next** key to move to the next set of parameters. Press the **F1** key when done.

Straight Beam Calibration

Before performing a straight beam calibration on a 5-step test block (0.100" – 0.500" or 2.54mm-12.70mm) it is important to check your initial settings from the *Parameter* screen. For a straight beam probe, 5.0 MHz, your initial settings should look like the parameters shown in the image below:


Press the **F4 – DISP MD** key for Display mode and you will see a following screen after coupled to the 0.100" block. It is recommended that you adjust Gate 1 (light blue) to cover the first echo and the Gate Width to cover the last echo at 0.500". You can also

press the **F2** key for Auto 80 after detecting the first echo at 0.100" to automatically adjust the amplitude to 80% FSH (full screen height).

Note, when 0 angle is plugged in, ECHO FD will automatically put the large thickness box in the top right to Thickness. You can choose between edge depth or peak depth by using the right or left arrow key until you stop at this setting. Consequently, when an angle other than 0 is chosen, the top left measurement bar sets Soundpath as the proper setting.

In the case of contact transducers, the parameters should appear very similar to the ones shown below:
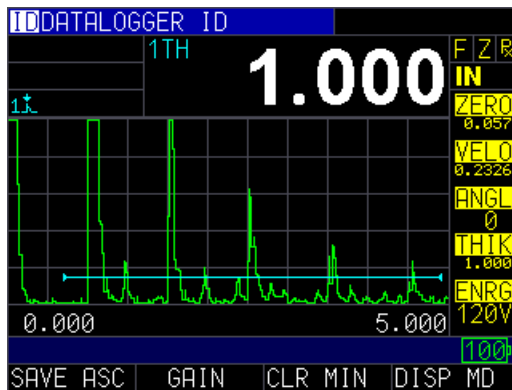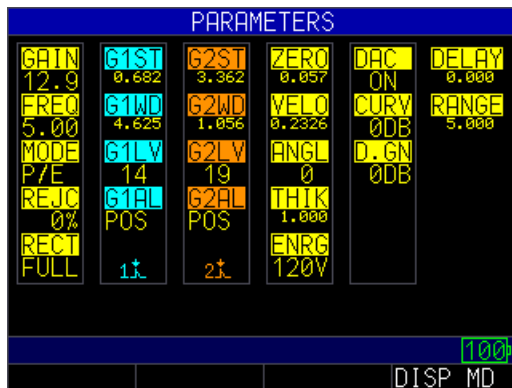
The example shown above is a contact probe on a 1" test piece on a 5" range. To choose parameters using the left or right arrow key, the peak or edge icon will be displayed in the top left for each gate. The above image shows Gate 1 set to peak.

To begin calibrating the ECHO FD, follow these steps:

1. Press the **MENU/OK** key. Use the arrow keys to scroll to the **Calibration** option and press the **MENU/OK** key again.
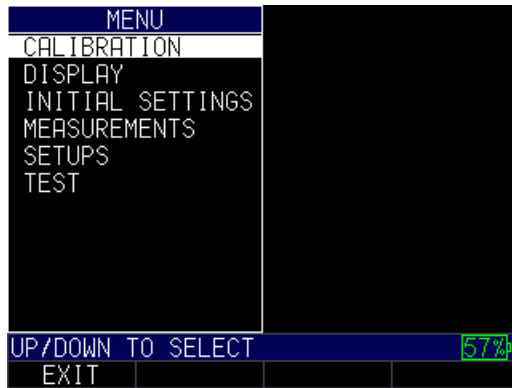
2. Couple to the 0.100", then press the **F3 – Zero** key. The number in the top right of the screen will be frozen and you can remove the probe from the test block surf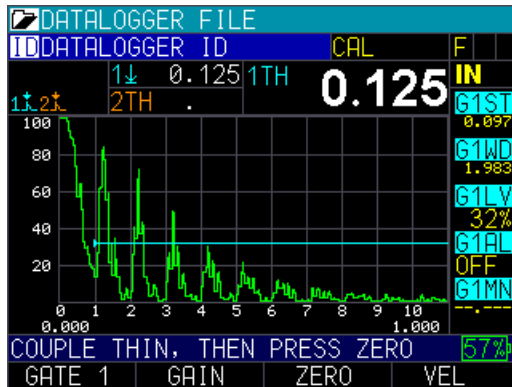ace. Hold the up arrow key until it reaches the known thickness of 0.100", and then press the **F1 – Cal** key. If the frozen number in the top right is above 0.100" then use the down arrow to scroll to the known thickness.

3. Couple to the 0.500" (you may need to press the **F2 – Gain** key if the signal is too low to get the echo in the gate), and then press the **F4 – Vel** key. The reading on the screen will be frozen. Use the up or down arrow key to scroll to the known thickness of 0.500" and then press the **MENU/OK** key. ECHO FD will briefly display the calibrated acoustic sound speed. For steel, the speed should be around 0.2300 in/usec.

You will need to use a different procedure for calibration when using multiple echoes across the display as shown below:
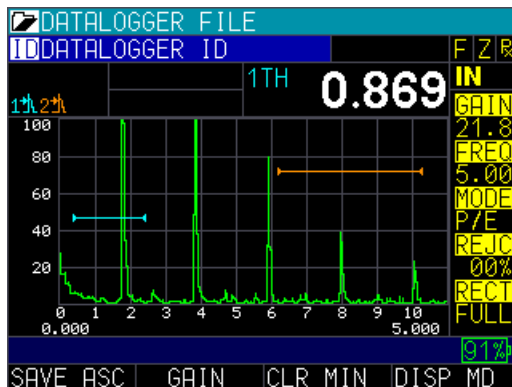
This procedure will require you to move the gate one start after you have performed a Calibrate Zero. In this scenario, use a 5" range and a 1" calibration block.

To calibrate when using multiple echos across the display, follow the steps below:

1. Couple the transducer to the test block, and adjust Gate 1 covering the 1.000" echo.
2. Press the **MENU/OK** key and use the arrow keys to scroll to the Calibration option. Press the **MENU/OK** key again.
3. Press the **F3** key and adjust the frozen thickness in the top right to 1.000". Press the **F1 – Cal** key.
4. Use the left or right arrow key, which will highlight Gate 1 Start. Next, use the up arrow key to increase the Gate 1 Start until the 5th echo at 5.000" is gated. (Note, you may need to press the **F2 – Gain** key or lower the Gate 1 level to make sure the echo is in the gate.)
5. Press the **F1 – Done** key.
6. Press the **F4** key again for **VEL** and slew the gated 5th echo to 5.000", and then press the **MENU/OK** key.
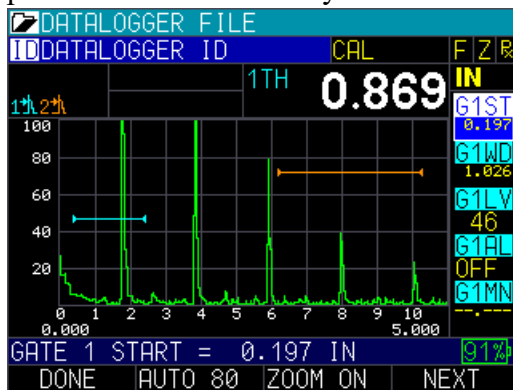
Angle Beam Calibration

The calibration process for an angle beam is much like a straight beam calibration in the sense that you will need to move the gate in the middle of the calibration process. Depending on the frequency and angle, you can start with parameters close to the ones shown in the image below. The probe used in this calibration is a 5.0MHz at 0.5" with a 60 degree angle and a IIW, type 2 block with reflectors at 2" and 4". Another common test block is a IIW, type 1 or DSC block.
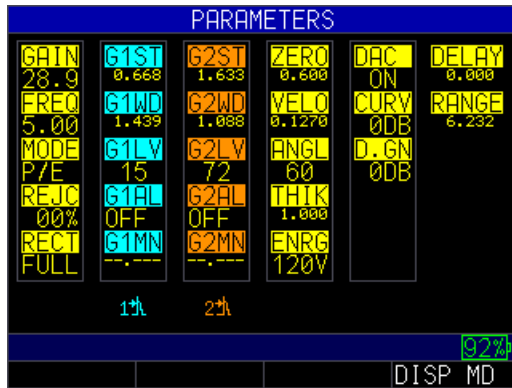
To perform an angle beam calibration, follow the steps:

1. It is recommended that you first turn on Peak Memory by highlighting the "P" in the top right corner of the display by using the left or right arrow key. You will see an "echo envelope" in dark blue, which represents the maximum amplitude recorded.

2. Move the angle beam probe back and peak the signal. You may want to use Gain or Auto 80 to achieve this peak.
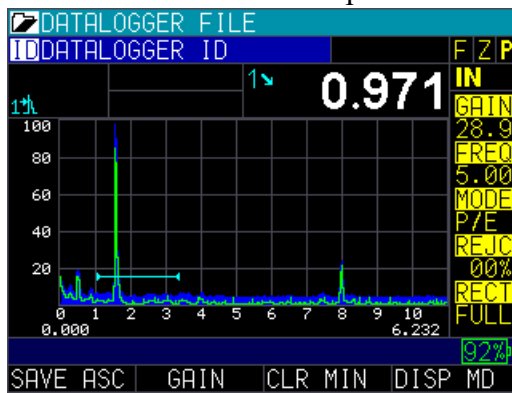
3. Once the echo is peak, verify that the angle is correct by looking at the Beam Index Point (BIP) on the wedge as it corresponds with the marking on the test block. Enter the correct angle, for example, 61 degrees.

4. Do not move the probe at this point. Press the **MENU/OK** key and scroll to the Calibration option.

5. Press the **MENU/OK** key again.
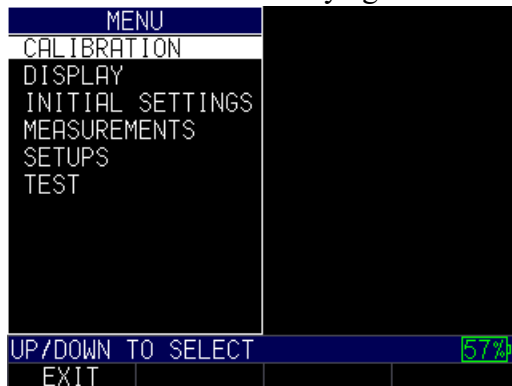
6. Gate first echo and press the **F3 – Zero** key. Adjust the angular distance in the top right of the screen to 2.000", and then press the **F1 – Cal** key.
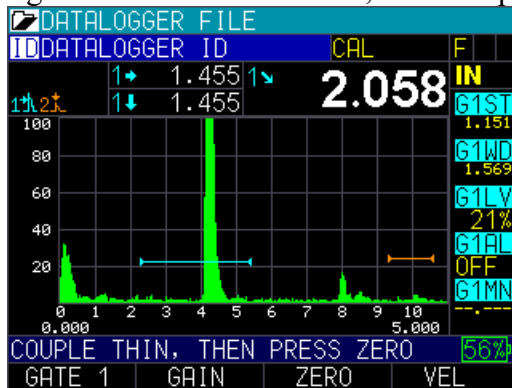
7. Use the **F1** key to move Gate 1 Start to 2nd echo (4.000") using the right arrow key in this case, and then press the **F1– Done** key.
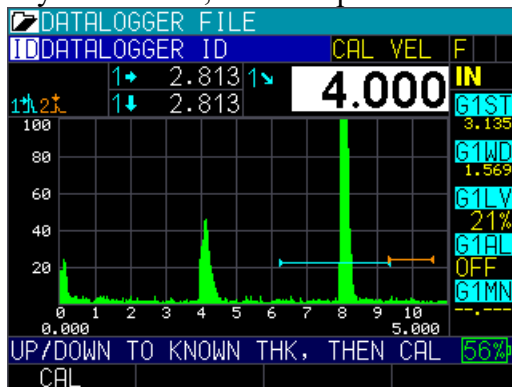
8. Press the **F4 – Vel** key and adjust the angular distance in top right to 4.000". Press the **MENU/OK** key. ECHO FD will display the shear wave velocity of approximately 0.1270 in/usec.

   You can also set the other two measurement boxes for **depth** to reflector and **surface distance** to reflector as shown in the images below:
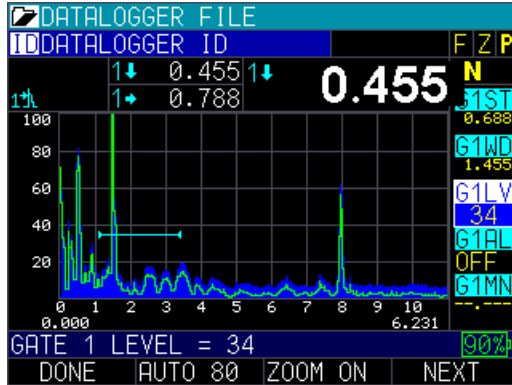
Setting the X-value physically marks the distance from the front of the wedge to the BIP. To enter this value into the unit, follow these steps:

1. Press the **MENU/OK** key and use the arrow keys to select the **Measurement** option.

2. Use the arrow keys to select the X-value parameter.
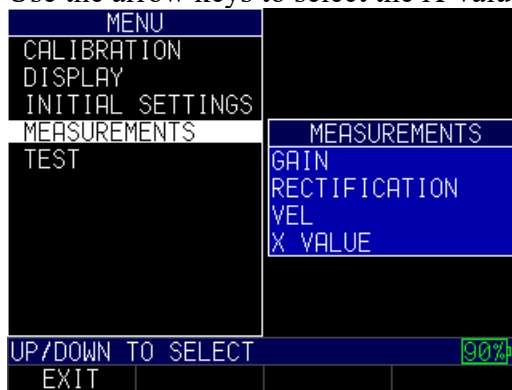
3. Enter the X-Value parameter.
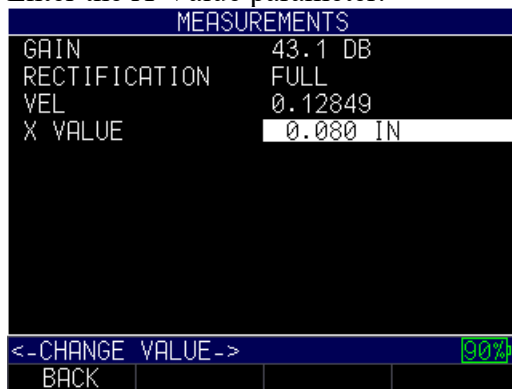
4. In the pull down menu of the measurement box, you can then choose Gate 1 Surface Distance (-X) as shown below:

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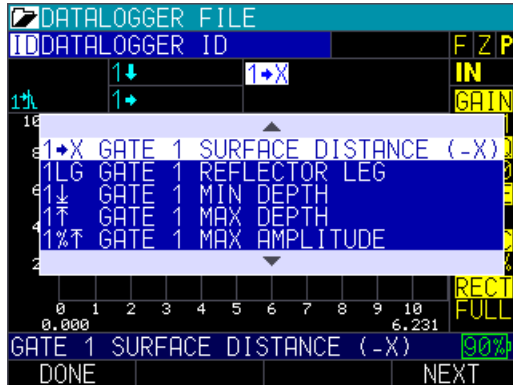
Velocity Calibration Only

If you are working with a test piece of known thickness but unknown material, then you can calibrate velocity of the sound in the unknown material by measuring the time of flight from main-bang to the first back echo. By using the known thickness you can calculate velocity of the sound for the unknown material.

To preform a Velocity calibration only, follow these steps:

1. Power on the unit.
2. Make sure the range is set so that you can see the proper echoes
3. Adjust gate to cover the thickness echo, either slew the echo to the known depth or use the auto cal and enter the known thickness of the detected echo.
4. Press **F1 – Menu** key.
5. Use the up and down arrow keys to select the **Calibration** option.
6. Press the **MENU/OK** key.
7. Verify your transducer selection and press the **MENU/OK** key.

To proceed with Velocity calibration, follow the instructions below:

1. Place couplant on the surface of a 5-step test block.
2. Couple the transducer to the material. A similar screen to the one shown below will appear:
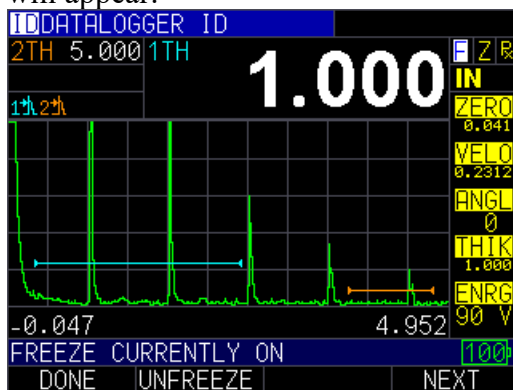
The above screen shows gate one measuring 1.000" and gate 2 measuring 5.000" after adjusting the zero for the thin (1.000") and velocity for the thick (5.000")

3. While measuring the thickest step, select **F3 - VEL** key.

4. After pressing the **F3** key, you can take the transducer off the test block. If the displayed measurement is different than the known value of the step, use the up or down arrow key to adjust the displayed value to the known value of the step.
5. Press the **MENU/OK** key to perform the calibration.

The unit will briefly display the calibrated velocity value in the top of the screen and then return to **Measure** mode.

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2 Measurement Screen

ECHO FD User Interface

Press and hold the **F1** key to power on the unit. The following *Display* screen will appear for 5 seconds.

Display screen shows remaining battery life

The *Measurement* screen will appear following the *Display* screen. There are five *Measurement* screens as shown below. Use the **F4 – DISP MD** key to toggle the screen between display modes.
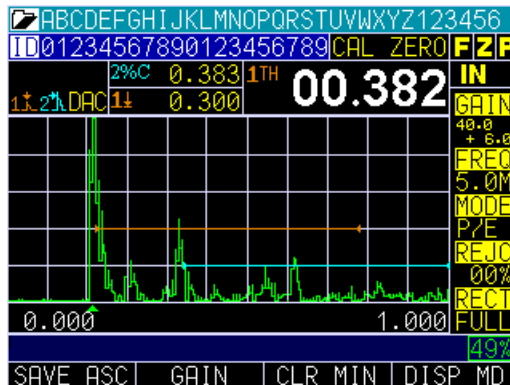
Display Mode 1

Display Mode 2
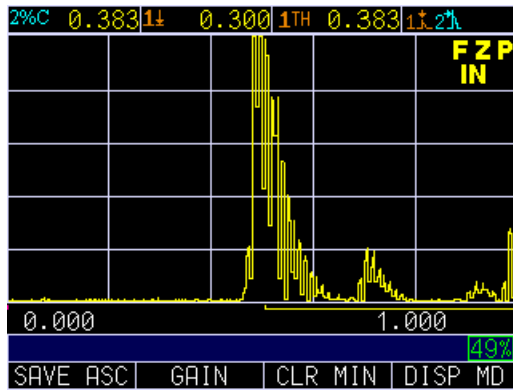
Display Mode 3
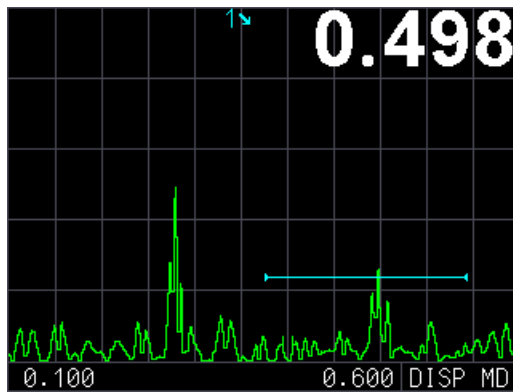
Display Mode 4 (Scan Mode)

> **Note:** You cannot use the left or right arrow keys to edit any parameter in the scanning mode screen. The parameter in the large measurement box (e.g., soundpath measurement of 0.498" shown above) will be displayed in the top right corner of the screen. To change a parameter, press the **F4 – DISP MD** key.

Display Mode 5

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Similar to ECHO 9 and ECHO 7, the left and right arrow keys will activate editing of the parameters. A parameter that is highlighted will be active to edit by using the up and down arrow keys. The right arrow key will select parameters in a clockwise direction and the left arrow key will select parameters in a counter clockwise direction. Red-circled parameters, shown below, will be editable. This screen also represents the default screen because it allows full instrument operation while showing the largest A-scan. This screen will appear 10 seconds after the *Parameter* screen is displayed upon powering on the unit. To change the Display mode, simply press the **F4 – DISP MD** key.
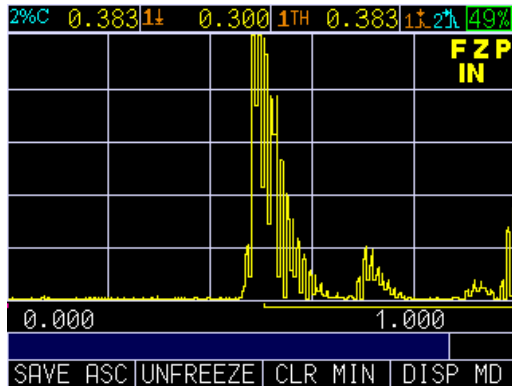
Color Waveform in Echo-to-Echo mode, filename, ID, thickness value, gain, rectification, battery life, alarm, freeze, backlight, and display mode.
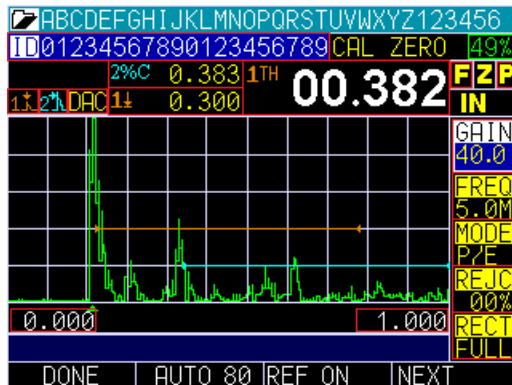

Press the left or right arrow key to activate the Parameter Edit mode. Once active, you can scroll through the list using the left or right arrow key and then use the up and down arrow keys to make adjustments. When finished, press the **F1 – Done** key to end editing or the **F4** key to select the next set of parameters. The list will toggle the right side parameter list in following order:
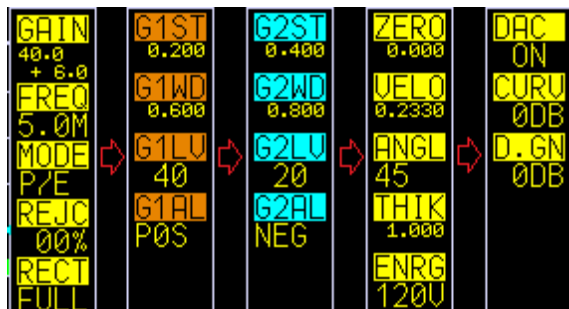
Display Screen

ECHO FD has a graphic-style color display with 320 x 240 (1/4 VGA) pixel density. Viewing the screen is best from straight above or slightly below the surface rather than from side to side. If external temperature is below 32°F (0°C), the display may be slower to update information.
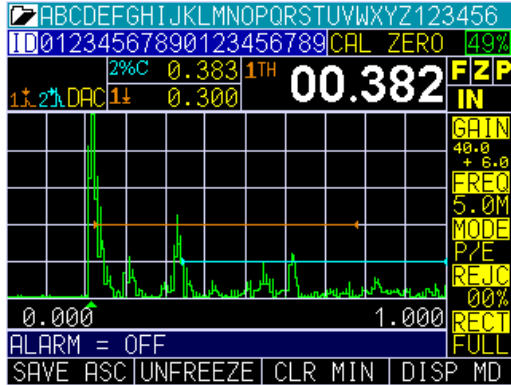
Color thickness reading only on ECHO 9

Color Waveform in Echo-to-Echo mode, filename, ID, thickness value, gain, rectification, battery life, alarm, freeze, backlight, and display mode. This screen represents the default screen because it allows full instrument operation while showing the largest A-scan. Ten seconds after the parameter screen is displayed upon power up, this screen will appear. To change it, simply press **F4 – Disp MD** for Display mode.

Transducer screen, menu, reset, backlight

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The screen has three distinct areas:

1. Top part of the display screen: Shows the File Name, ID Number, AA, and 0001 for grid column and row.
2. Lower part of the display screen: Acts as an interactive tool that allows you to decide how you want to proceed with the information that is displayed on the screen.
3. Middle part of the display screen: Shows the following: thickness value; In, mm or usec; Echo-to-Echo symbol; LOS (loss of signal); Freeze; Fast Min or Max; Alarm indicator; Low, Med or High gain; and percent remaining battery life.
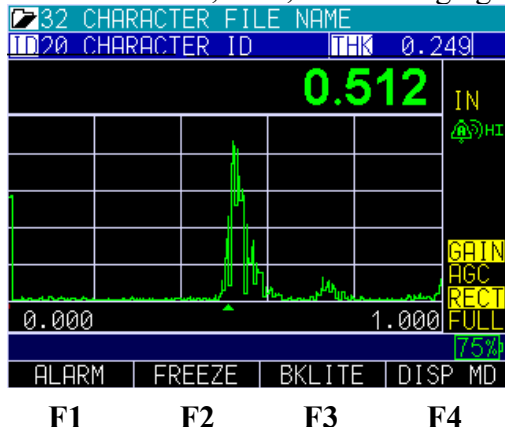
Changing Parameters from the Measurement Screen

ECHO FD Ultrasonic Flaw Detector has many parameters that can be edited from the measurement screen by using the functions keys. Note, the function keys will vary depending on the current screen in use. Below is an overview of editable parameters for ECHO FD and how the function keys work for each relevant screen.

Note: Some of the below F1, F2, F3 and F4 screen shots are subject to change with software updates.

Gain
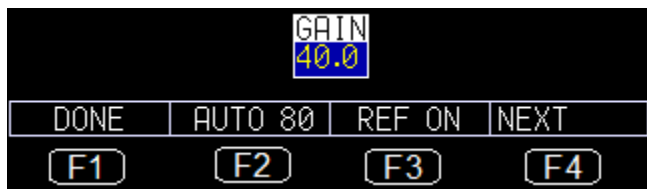
- **F1**: Done (exit edit mode)
- **F2**: Gate 1 Auto 80 – set signal within Gate 1 amplitude to 80% by adjusting gain automatic
- **F3**: Toggle Ref Gain On/Off. If Ref Gain is active, then Ref Gain and Scanning Gain will appear as follows:

  Also **F2** will become **ADD**. In this situation when **F2** is pressed, Ref Gain and Scanning Gain will be added and Scanning Gain will be deactivated.

- **F4**: Next page of Gate 1 parameters
- **Up/Down Arrow**: Slew gain from 0.0 dB to 90.0 dB, and if Ref Gain is active, the Up/Down arrow keys will slew Scanning Gain
- **Right Arrow:** Select Scanning Gain if Ref Gain is selected, or select Freq to edit if Scanning Gain is selected
- **Left Arrow:** Select Peak to edit if you are in Gain or Ref Gain and if Scanning Gain is selected
- **MENU/OK**: Go to Menu to set the Gain parameters

Frequency

- **F1:** Done (exit edit mode)
- **F2:** Cycle through fixed list of frequencies: 1.0M, 2.2M, 5.0M, 7.5M, 10.0M, 12.0M
- **F3:** None
- **F4:** Next page of Gate 1 parameters
- **Up/down Arrow:** Slew frequency from 1.0MHz to 12.0 MHz
- **Right Arrows:** Select Measurement mode to edit
- **Left Arrows:** If Ref Gain is on, then select Scanning Gain or else select Gain to edit
- **MENU/OK:** Go to Menu to set the Frequency parameters

Measurement Mode
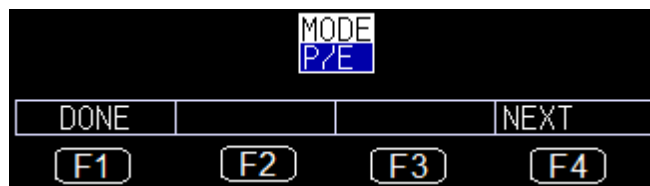
- **F1:** Done (exit edit mode)
- **F2:** None
- **F3:** None
- **F4:** Next page of Gate 1 parameters
- **Up/Down Arrow:** Cycle thru P/E, THRU, DUAL
- **Right Arrow:** Select Reject to edit
- **Left Arrow:** Select Frequency to edit
- **MENU/OK:** Go to Menu to set Measurement mode parameters

Reject
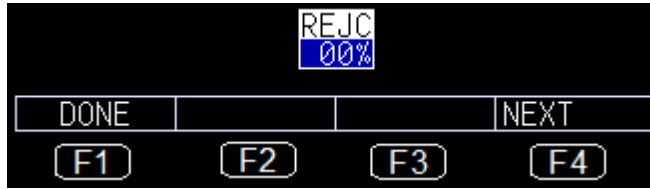
- **F1:** Done (exit edit mode)
- **F2:** None
- **F3:** None
- **F4:** Next page of Gate 1 parameters
- **Up/Down Arrow:** Slew 0 to 85%
- **Right Arrow:** Select Rectification to edit
- **Left Arrow:** Select Mode to edit
- **MENU/OK:** Go to Menu to set Reject parameters

Rectification

- **F1:** Done (exit edit mode)
- **F2:** None
- **F3:** None
- **F4:** Next page of Gate 1 parameters
- **Up/Down Arrow:** Cycle thru FULL, HW+, HW-, RF
- **Right Arrow:** Select Range to edit
- **Left Arrow:** Select Reject to edit
- **MENU/OK:** Go to Menu to set Rectification parameters

Gate 1 Start

- **F1:** Done (exit edit mode)
- **F2**: None
- **F3**: None
- **F4**: Next page of Gate 2 parameters
- **Up/Down Arrow:** Slew Gate 1 Start value from Delay up to (Delay + Current Range)
- **Right Arrow:** Select Gate 1 Width to edit
- **Left Arrow:** Select Peak to edit
- **MENU/OK**: Go to Menu to set Gate 1 Start parameters

Gate 1 Width
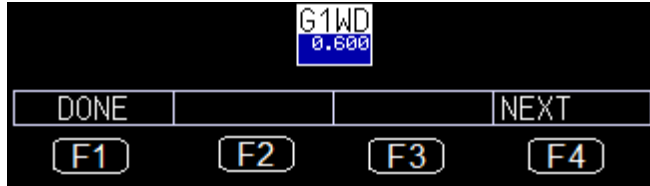
- **F1**: Done (exit edit mode)
- **F2**: None
- **F3**: None
- **F4**: Next page of Gate 2 parameters
- **Up/Down Arrow**: Slew Gate 1 Width value from 0.010" to (Delay + Current Range)
- **Right Arrow**: Select Gate 1 Level to edit
- **Left Arrow**: Select Gate 1 Start to edit
- **MENU/OK**: Go to Menu to set Gate 1 Width parameters

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Gate 1 Level

- **F1:** Done (exit edit mode)
- **F2**: None
- **F3**: None
- **F4**: Next page of Gate 1 parameters
- **Up/Down Arrow**: Slew Gate 1 Level value from 2% to 95%
- **Right Arrow**: Select Gate 1 Alarm to edit
- **Left Arrow**: Select Gate 1 Width to edit
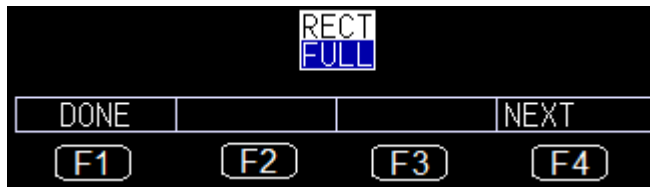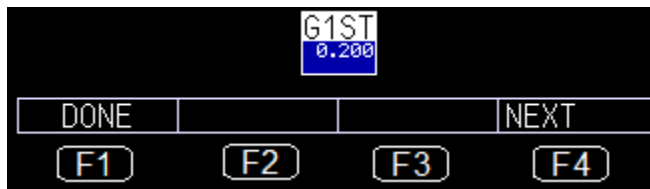- **MENU/OK**: Go to Menu to set Gate 1 Level parameters

Gate 1 Alarm

- **F1**: Done (exit edit mode)
- **F2**: None
- **F3**: None
- **F4**: Next page of Gate 2 parameters
- **Up/Down Arrow**: Toggle options: OFF, POS, NEG, MIN DEPTH if DAC is inactive
  OFF, POS, NEG, MIN DEPTH, ASME if DAC = ASME

  OFF, POS, NEG, MIN DEPTH, 0 dB, -6 dB, -14 dB if DAC = ASME3

  OFF, POS, NEG, MIN DEPTH, RL, SL, EL if DAC = CUSTOM

- **Right Arrow**: Select Gate 1 Auto 80 to set
- **Left Arrow**: Select Gate 1 Level to edit
- **MENU/OK**: Go to Menu to set Gate 1 Alarm parameters

Gate 1 Auto 80
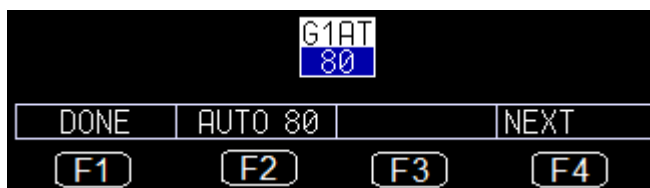
- **F1**: Done (exit edit mode)
- **F2**: Perform Auto 80

- **F3**: None
- **F4**: Next page of Gate 2 parameters
- **Up/Down Arrow**: None
- **Right Arrow**: Select Range to set
- **Left Arrow**: Select Gate 1 Alarm to edit
- **MENU/OK**: None

Gate 2 Start

- **F1**: Done (exit edit mode)
- **F2**: None
- **F3**: G2 OFF or ON
- **F4**: Next page of parameters
- **Up/Down Arrow**: Slew Gate 2 Start value from Delay up to (Delay + Current Range)
- **Right Arrow**: Select Gate 2 Width to edit
- **Left Arrow**: Select Peak to edit
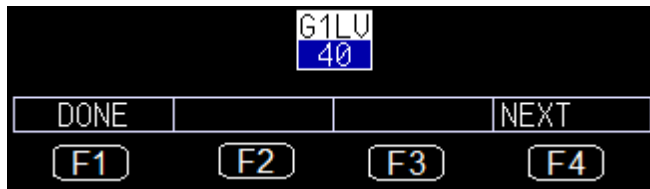- **MENU/OK**: Go to Menu to set Gate 2 Start parameters

Gate 2 Width

- **F1**: Done (exit edit mode)
- **F2**: None
- **F3**: G2 OFF or ON
- **F4**: Next page of Parameters
- **Up/Down Arrow**: Slew Gate 2 Width value from 0.010" to (Delay + Current Range)
- **Right Arrow**: Select Gate 2 Level to edit
- **Left Arrow**: Select Gate 2 Start to edit
- **MENU/OK**: Go to Menu to set Gate 2 Width parameters

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Gate 2 Level

```
                          G2LV
                           40

        DONE                        NEXT
         F1        F2        F3       F4
```

- **F1**: Done (exit edit mode)
- **F2**: None
- **F3**: G2 OFF or ON
- **F4**: Next page of parameters
- **Up/Down Arrow**: Slew Gate 2 Level value from 2% to 95%
- **Right Arrow**: Select Gate 2 Alarm to edit
- **Left Arrow**: Select Gate 2 Width to edit
- **MENU/OK**: Go to Menu to set Gate 2 Level parameters

Gate 2 Alarm

```
                          G2AL
                          POS

        DONE                        NEXT
         F1        F2        F3       F4
```

- **F1**: Done (exit edit mode)
- **F2**: None
- **F3**: G2 OFF or ON
- **F4**: Next page of parameters
- **Up/Down Arrow**: Toggle options: OFF, POS, NEG, MIN DEPTH if DAC is OFF
  OFF, POS, NEG, MIN DEPTH, ASME if DAC = ASME

  OFF, POS, NEG, MIN DEPTH, 0 dB, -6 dB, -14 dB if DAC = ASME3

  OFF, POS, NEG, MIN DEPTH, RL, SL, EL if DAC = CUSTOM

- **Right Arrow**: Select Gate 2 Auto 80 to set
- **Left Arrow**: Select Gate 2 Level to edit
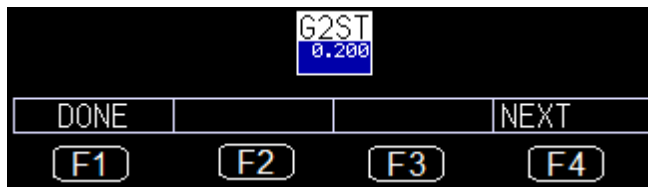- **MENU/OK**: Go to Menu to set Gate 1 Alarm parameters

Gate 2 Auto 80

```
                          G2AT
                           80

        DONE   AUTO 80            NEXT
         F1        F2        F3       F4
```
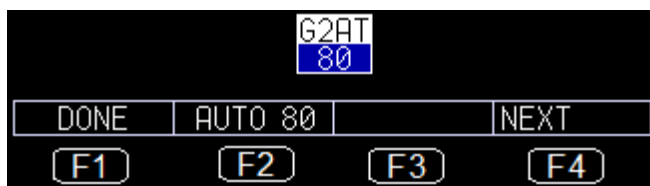
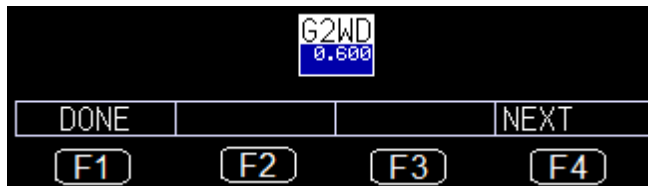- **F1**: Done (exit edit mode)
- **F2**: Perform Auto 80

- **F3**: G2 OFF or ON
- **F4**: Next page of parameters
- **Up/Down Arrow**: None
- **Right Arrow**: Select Range to set
- **Left Arrow**: Select Gate 2 Alarm to edit
- **MENU/OK**: None

Zero

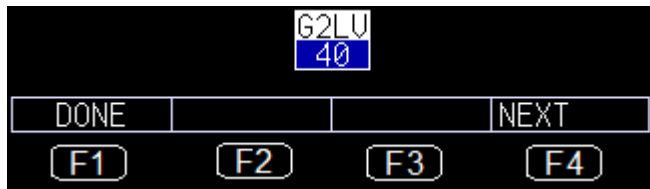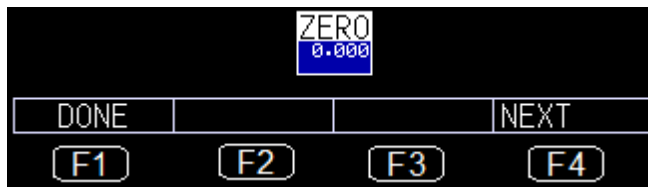- **F1**: Done (exit edit mode)
- **F2**: None
- **F3**: None
- **F4**: Next page of parameters
- **Up/Down Arrow**: Slew Zero from 0.000" to 20.000"
- **Right Arrow**: Select Velocity to set
- **Left Arrow**: Select Peak to edit
- **MENU/OK**: Go to Menu to set Zero parameters

Velocity
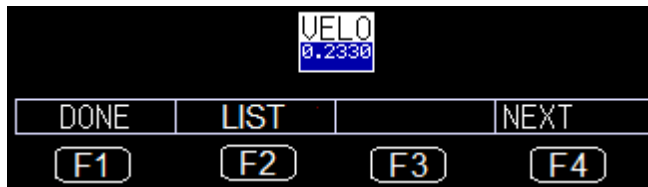
- **F1**: Done (exit edit mode)
- **F2**: Display list of material to pick a material velocity
- **F3**: None
- **F4**: Next page of parameters
- **Up/Down Arrow**: Slew Velocity from 0.0800 in/us to .3000 in/us
- **Right Arrow**: Select Angle to set
- **Left Arrow**: Select Zero to edit
- **MENU/OK**: Go to Menu to set Velocity parameters

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Angle

ANGL
45

DONE | PRESET | | NEXT
F1 | F2 | F3 | F4

- **F1**: Done (exit edit mode)
- **F2**: Toggle through preset values 30, 45, and 60 degrees
- **F3**: None
- **F4**: Next page of parameters
- **Up/Down Arrow**: Slew Angle from 0 to 85 degrees
- **Right Arrow**: Select Thickness to set
- **Left Arrow**: Select Velocity to edit
- **MENU/OK**: Go to Menu to set Angle parameters

Note: When angle is other than Zero, ECHO FD will automatically set the acoustic velocity to shear wave at 0.1270 in/usec and set the 3 measurement screens for Gate 1 as follows: Large box is soundpath, other boxes will be depth and surface distance. When angle is re-set to 0 degrees, velocity will revert back to Longitudinal or 0.2330 in/usec and the large measurement box will be set to thickness.

Thickness

THIK
1.000

DONE | | | NEXT
F1 | F2 | F3 | F4

- **F1**: Done (exit edit mode)
- **F2**: None
- **F3**: None
- **F4**: Next page of parameters
- **Up/Down Arrow**: Slew Thickness from 0.020" to 20.000"
- **Right Arrow**: Select Energy to set
- **Left Arrow**: Select Angle to edit
- **MENU/OK**: Go to Menu to set Thickness parameters

Energy

ENRG
120V

DONE | PRESET | | NEXT
F1 | F2 | F3 | F4

- **F1**: Done (exit edit mode)
- **F2**: Toggle through preset values 30, 60, 90, and 120 Volts
- **F3**: None
- **F4**: Next page of parameters

- **Up/Down Arrow**: Toggle thru preset values 30, 60, 90, and 120 Volts
- **Right Arrow**: Select Range to set
- **Left Arrow**: Select Thickness to edit
- **MENU/OK**: Go to Menu to set Energy parameters

DAC
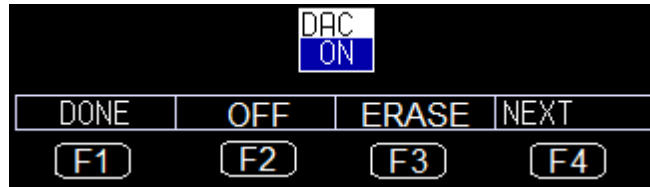
- **F1**: Done (exit edit mode)
- **F2**: Turn Off DAC
- **F3**: Erase DAC curve(s)
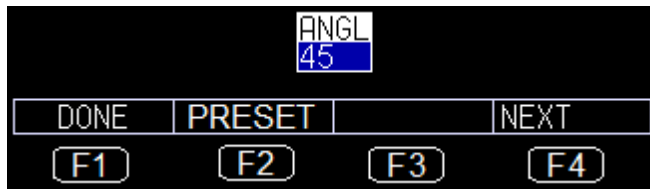- **F4**: Next page of parameters
- **Up/Down Arrow**: Toggle between ON and OFF
- **Right Arrow**: Select DAC curve to set
- **Left Arrow**: Select PEAK mem to edit
- **MENU/OK**: Go to Menu to set DAC parameters

Curve
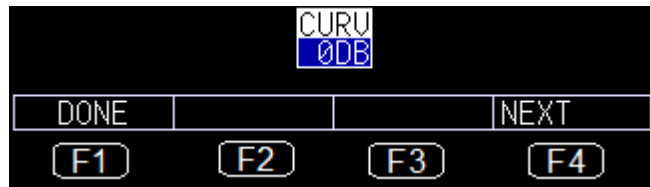
- **F1**: Done (exit edit mode)
- **F2**: None
- **F3**: None
- **F4**: Next page of parameters
- **Up/Down Arrow**: Toggle between Curve for ASME-3 and Custom
- **Right Arrow**: Select DAC Gain to set
- **Left Arrow**: Select DAC On/Off to edit
- **MENU/OK**: Go to Menu to select DAC Curve parameters

DAC Gain
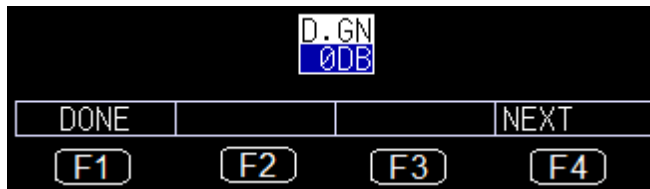
- **F1**: Done (exit edit mode)
- **F2**: None
- **F3**: None
- **F4**: Next page of parameters
- **Up/Down Arrow**: Slew DAC gain
- **Right Arrow**: Select Range to edit
- **Left Arrow**: Select DAC Curve to edit
- **MENU/OK**: Go to Menu to edit DAC Gain parameters

Range

- **F1**: Done (exit edit mode)
- **F2**: Preset – IT will toggle through preset values 0.100", 0.200", 0.500", 1.000", 2.000", 5.000", 10.000", 20.000" and equivalent in mm and uSec mode
- **F3**: None
- **F4**: Next page of parameters
- **Up/Down Arrow**: Slew Range from 0.100" to 23" in 0.001" resolution and equivalent in mm and uSec mode
- **Right Arrow**: Select Delay to edit
- **Left Arrow**: Select last parameter of current Parameter page to edit
- **MENU/OK**: Go to Menu to edit Range parameters

Delay

- **F1**: Done (exit edit mode)
- **F2**: None
- **F3**: None
- **F4**: Next page of parameters

- **Up/Down Arrow**: Slew Delay from 0.0" to 20" in 0.001" resolution and equivalent in mm and uSec mode
- **Right Arrow**: Select Gate 1 Detection mode to edit
- **Left Arrow**: Select Range to edit
- **MENU/OK**: Go to Menu to edit Delay parameters

Gate 1 Detection

- **F1**: Done (exit edit mode)
- **F2**: None
- **F3**: None
- **F4**: Next page of parameters
- **Up/Down Arrow**: Toggle between Edge and Peak
- **Right Arrow**: Select Gate 2 Detection mode to edit
- **Left Arrow**: Select Delay to edit
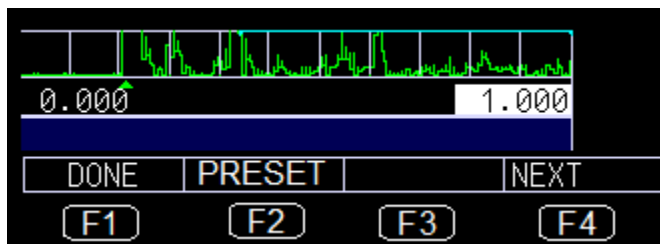- **MENU/OK**: Go to Menu to edit Gate 1 Detection mode parameters

Gate 2 Detection

- **F1**: Done (exit edit mode)
- **F2**: None
- **F3**: None
- **F4**: Next page of parameters
- **Up/Down Arrow**: Toggle between Edge and Peak
- **Right Arrow**: Select Measurement Box 2 to edit
- **Left Arrow**: Select Gate 1 Detection mode to edit
- **MENU/OK**: Go to Menu to edit Gate 2 Detection mode parameters

Measurement Box 2
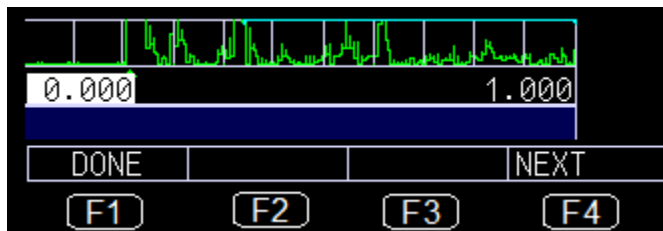

- **F:** Done (exit edit mode)
- **F2**: None
- **F3**: None
- **F4**: Next page of parameters
- **Up/Down Arrow**: Cycle through list of measurements
- **Right Arrow**: Select Measurement Box 3 to edit

- **Left Arrow**: Select Gate 2 Detection mode to edit
- **MENU/OK**: Go to Menu to edit Measurement Box 2 parameters

Measurement Box 3

- **F1**: Done (exit edit mode)
- **F2**: None
- **F3**: None
- **F4**: Next page of parameters
- **Up/Down Arrow**: Cycle through list of measurements
- **Right Arrow**: Select Measurement Box 1 to edit
- **Left Arrow**: Select Measurement Box 2 to edit
- **MENU/OK**: Go to Menu to edit Measurement Box 3 parameters

Measurement Box 1

- **F1**: Done (exit edit mode)
- **F2**: None
- **F3**: None
- **F4**: Next page of parameters
- **Up/Down Arrow**: Cycle through list of measurements
- **Right Arrow**: Select ID to edit
- **Left Arrow**: Select Measurement Box 3 to edit
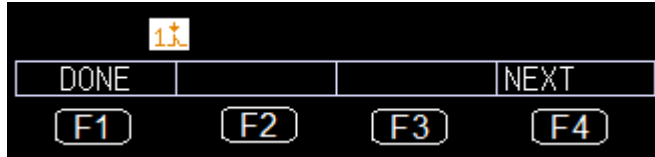- **MENU/OK**: Go to Menu to edit Measurement Box 1 parameters

ID
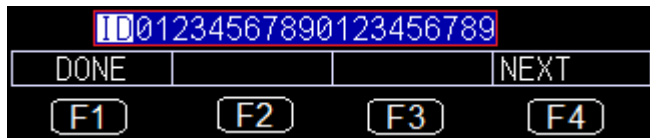
- **F1**: Done (exit edit mode)
- **F2**: None
- **F3**: None
- **F4**: Next page of parameters
- **Up/Down Arrow**: Cycle through IDs
- **Right Arrow**: Select Peak Memory to edit
- **Left Arrow**: Select Measurement Box 1 to edit
- **MENU/OK**: Go to Menu to edit ID parameters

Peak Memory
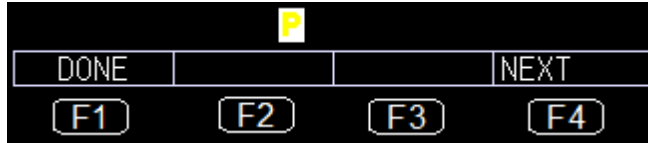
- **F:** Done (exit edit mode)
- **F2**: None
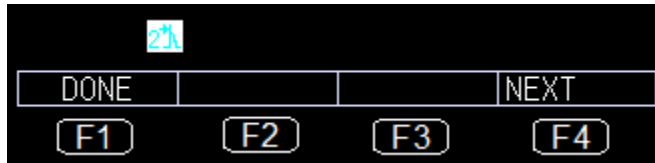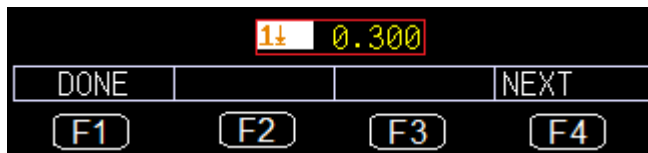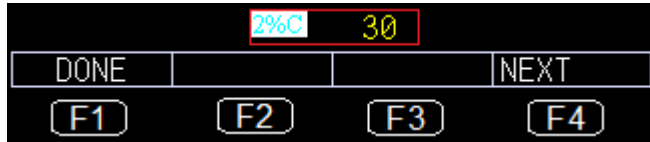- **F3**: None
- **F4**: Next page of parameters
- **Up/Down Arrow**: Toggle between Peak, Peak Hold, and OFF
- **Right Arrow**: Select 1st parameter of current Parameter page to edit
- **Left Arrow**: Select ID to edit
- **MENU/OK**: Go to Menu to edit Peak Memory parameters

AWS D-rating

When ECHO FD has an entered angle and an active reference gain, the AWS D1 rating is available in the large pull down menu as shown here:
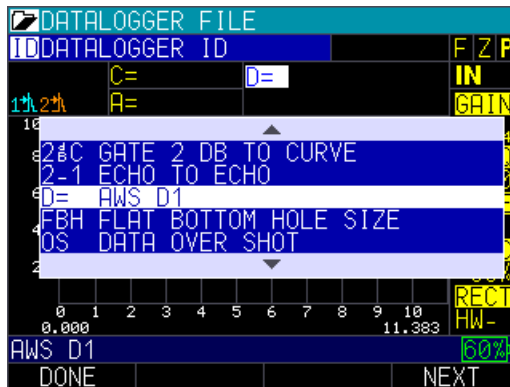
To use the AWS D1 rating, follow these steps:

1. Calibrate ECHO FD using your angle beam probe and a IIW block.
2. Use peak memory and find the 0.060" side drilled hole, and bring this signal to a preset and known full screen height percentage. Because Auto 80 is available as a direct access key, we suggest 80%.
3. Hold the probe steady and use the right or left arrow key to toggle to the largest top right measurement box.
4. Select D = AWS D1.
5. Once the **F1 – Done** key or **MENU/OK** key is selected, the other 2 smaller measurement boxes will automatically populate to A and C values as shown in the image below:
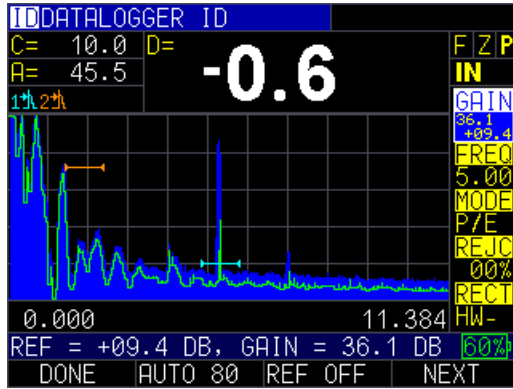
Consult with the AWS code for specific values and calculations.

- A = Total of system gain, base gain plus reference gain
- B = Base system gain
- C = Soundpath minus 1 times 2
- D = A-B-C

3 Datalogger/Communications

ECHO series gages with Bluetooth or Datalogger have several unique setup options available in the Datalogger/Communications menu

Bluetooth Name

When an ECHO gage is enabled with Bluetooth it is automatically given a name.   This is the name the gage will show up as when using programs like DataXL Mobile and can be changed at any time.

View Name

To view the **Bluetooth Name**, follow these steps

1. Use the up and down arrow keys to select the **Bluetooth Name** option

2. The Name will display in the right hand column
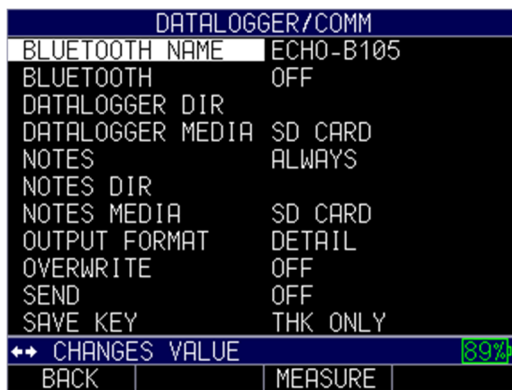
Change Name

To change the **Bluetooth Name**, follow these steps

1. Turn the Bluetooth feature off using instruction in the **Turning Bluetooth on/off** section

2. Use the up and down arrow keys to select the **Bluetooth Name** option

3. Press **F2-Clear** or **F3-Delete** to remove any characters you don't want

4. Use the up and down Arrows and the **Menu/Ok** key to enter the new name

5. Press **F1-Done** when finished

Turning Bluetooth on/off

Bluetooth can be turned on and off on ECHO gages enabled with **Bluetooth.**

To turn **Bluetooth** on/off, follow these steps
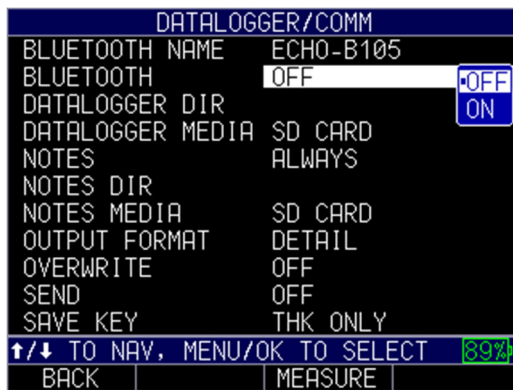
Turn the Bluetooth feature off using instruction in the **Bluetooth** section below

1. Use the up and down arrow keys to select **Bluetooth**

2. Press **Menu/OK**

3. Use the up and down arrows to toggle between on and off

4. Press **Menu/OK** when done to save selection

Using the Datalogger Directory
The datalogger has a built-in file and data management system. Each thickness reading and/or waveform is stored and tagged with an alphanumeric identification number and file name with descriptive field. A complete description of the measurement type, gage calibration, and setup parameters are stored along with each reading.

To use the datalogger **Directory** mode, follow these steps:

1. Press **F1 – Menu** key.

```
     MENU        INITIAL SETTINGS
CALIBRATION MAN  RESOLUTION
DATALOGGER/COMM  SETUPS SELECTION
DISPLAY          UNITS
 INITIAL SETTINGS VIBRATE
LOCKS            ABOUT
MEASUREMENTS     AUTOOFF
XDUCER SETUPS    BEEPER
TEST             CAL TYPE
                 CLOCK
                 GAGE TYPE
                 LANGUAGE
↑/↓ TO NAV, MENU/OK TO SELECT  88%
     EXIT
```

2. Use the up and down arrow keys to select the **Datalogger** option.
3. Press the **MENU/OK** key.
4. The following screen will appear:

```
        DATALOGGER/COMM
BLUETOOTH NAME    ECHO-EE89
BLUETOOTH         ON
 DATALOGGER DIR
DATALOGGER MEDIA  SD CARD
NOTES             OFF
NOTES DIR
NOTES MEDIA       SD CARD
OUTPUT FORMAT     DETAIL
OVERWRITE         OFF
SEND              OFF
SAVE KEY          THK ONLY
REFRESH SUCCESSFUL          ⁂
     BACK         | MEASURE |
```

5. Use the up and down arrow keys to toggle between the following settings:
    - *Directory*: Create and edit files
    - *Notes*: Customized comments/description per reading
    - *Output Format*: Choice of output format

To select the **Directory** option, press the **MENU/OK** key. The following screen will appear:
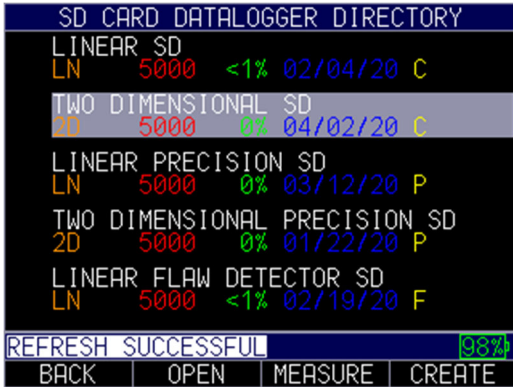
To create a new file:

1. Press the **F4-Create** button. The following screen will appear:
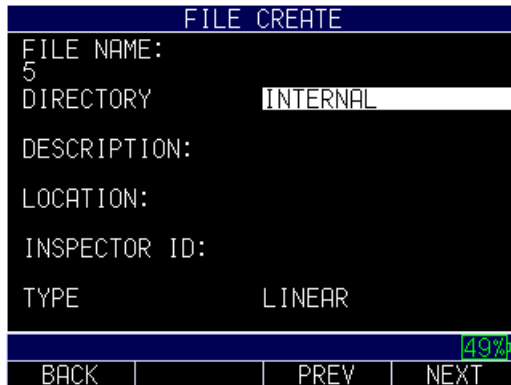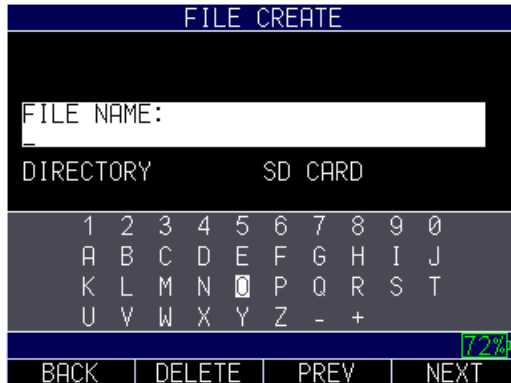
2. Use the up and down arrow keys to determine the file type and the number of readings stored per file. The following file types include:
   - Linear
   - Linear + CPT (Custom point)
   - 2D
   - 2D + CPT

- 3D
- Boiler
- 4D

Note: It is not necessary to enter data into such fields as: Description, Location, Inspector ID, or Prefix.

```
        FILE CREATE                          FILE CREATE
DIRECTORY        SD CARD            INSPECTOR ID:

DESCRIPTION:                        TYPE              LINEAR
_
LOCATION:                          PREFIX:

INSPECTOR ID:                      START COL:
   1  2  3  4  5  6  7  8  9  0
   A  B  C  D  E  F  G  H  I  J     END COL:
   K  L  M  N  0  P  Q  R  S  T
   U  V  W  X  Y  Z  -  +           COL STEP:
                            49%     1                        50%
  BACK  | DELETE |  PREV  | NEXT     BACK  |        |  PREV  | NEXT

        FILE CREATE                          FILE CREATE
DESCRIPTION:                        LOCATION:

LOCATION:                          INSPECTOR ID:
_                                  _
INSPECTOR ID:                      TYPE              LINEAR

TYPE            LINEAR             PREFIX:
   1  2  3  4  5  6  7  8  9  0        1  2  3  4  5  6  7  8  9  0
   A  B  C  D  E  F  G  H  I  J        A  B  C  D  E  F  G  H  I  J
   K  L  M  N  0  P  Q  R  S  T        K  L  M  N  0  P  Q  R  S  T
   U  V  W  X  Y  Z  -  +              U  V  W  X  Y  Z  -  +
                            49%                                49%
  BACK  | DELETE |  PREV  | NEXT     BACK  | DELETE |  PREV  | NEXT
```

3. Use the arrow keys to select any letter or symbol on the screen to create a Starting ID.

```
        FILE CREATE
PREFIX:

START COL:
100_
END COL:

COL STEP:
   1  2  3  4  5  6  7  8  9  0
   A  B  C  D  E  F  G  H  I  J
   K  L  M  N  0  P  Q  R  S  T
   U  V  W  X  Y  Z  -  +
                            51%
  BACK  | DELETE |  PREV  | NEXT
```

Note: The starting and ending IDs do not have to be the exact same number of digits.

4. Press the **F4 – Next** key when you are done.
5. Repeat instructions above for the Ending ID.
6. Use the up and down arrow keys to select a pattern (standard or reverse). Press the **F4-Done** key when you are finished.

Standard   Reverse

7. Press **F4-DONE**, the gage will create the file and show the new file in the Directory shown below
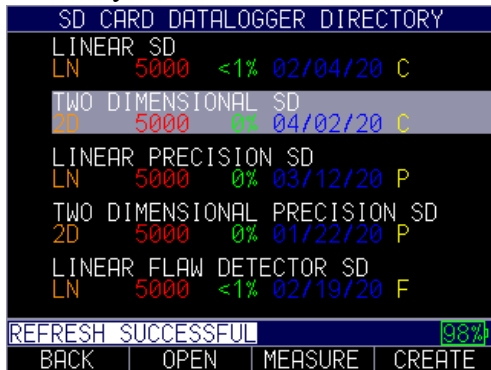
8. Find the file from the Directory and press the **F3 – Measure** key.
9. Press the **F1 – Save ASC** key to save the measurement as an A-scan as show below:
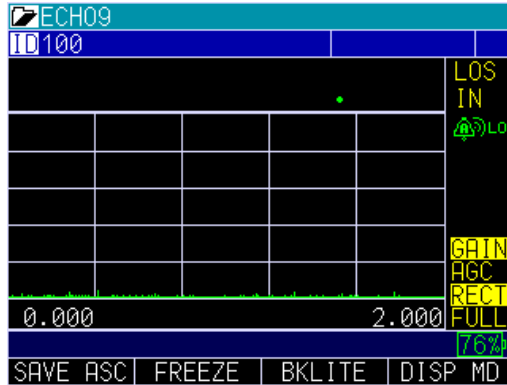
4D Data File Creation

The ECHO Datalogger supports the creation and use of 4-D files with 4 dimensions for identification.
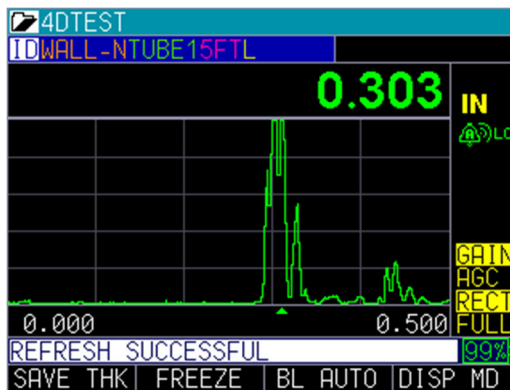
Above shows 4D file "WALL-NTUBE15FTL" where WALL-N is Dimension 1 (North,East,South,West), TUBE1 is Dimension 2 (Tube #), 5FT is Dimension 3 (Elevation), L(Left,Center,Right) is Dimension 4

To create a 4D file:

1. From the *Datalogger/Comm Menu* use the up and down arrow keys to select **Datalogger Dir** and press **Menu/OK**

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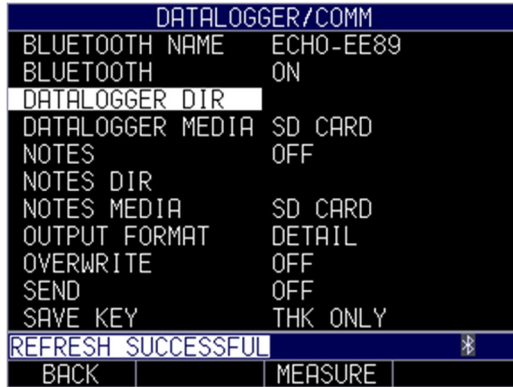
2. From the *Datalogger Directory* press **F4-Create**
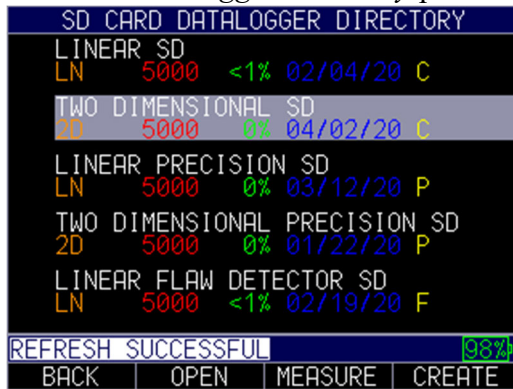
Below we'll create a sample 4D file "WALL-NTUBE15FTL" where WALL-N is Dimension 1 (North,East,South,West), TUBE1 is Dimension 2 (Tube #), 5FT is Dimension 3 (Elevation), L (Left,Center,Right) is Dimension 4

3. Use the arrow keys and **Menu/Ok** to assign a File Name using the Alpha/Numeric keyboard shown. When finished, Press **F4-NEXT**.

For "WALL-NTUBE15FTL" enter WALL-NTUBE15FTL
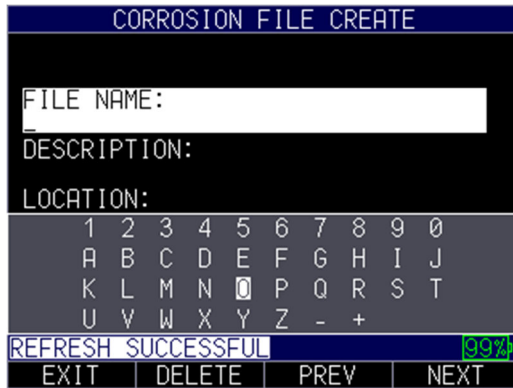
Note: There is a 20 character max ID for the file name

4. Optional - Use the arrow keys and **Menu/Ok** to add a **Description**, **Location** and **Inspector ID**.
5. Under Type use the left and right arrow keys to select **4D Manual** then press **F4-Next**
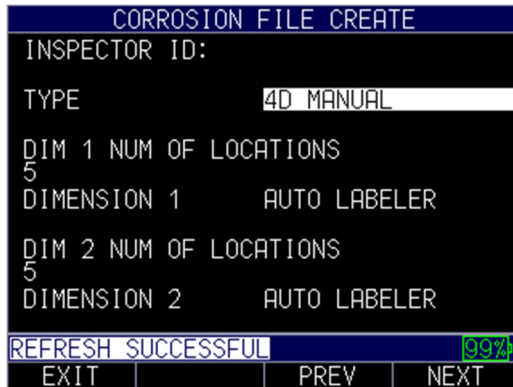
6. Enter the number of DIM 1 Locations and press **F4-Next**
    For "WALL-NTUBE15FTL" enter 4

7. Use the left and right arrow keys to highlight desired labeling type

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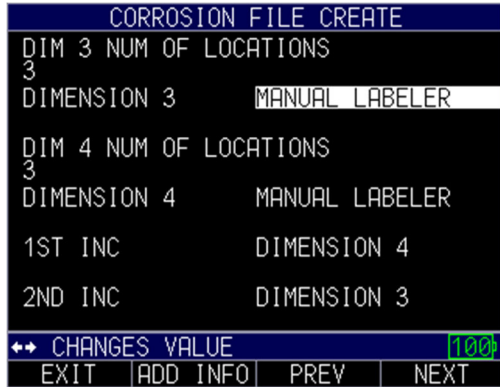
- *Auto Labeler:* automatically builds the list for the dimension based on user supplied information.
- *Manual Labeler:* operator manually enters each label separately

Note: Different dimensions do not need to use the same method of labeling. Ex. Dimensions 1 and 4 can be set to Manual Labeler while dimensions 2 and 3 are set to Auto Labeler

For "WALL-NTUBE15FTL" we will start with Manual Labeler

8. Press **F2 -ADD INFO**

   For **AutoLabeler:** Use the arrow keys and **Menu/Ok** to type and **F4-Next** to advance. Enter the following information:

   DIM Prefix: Text prior to the dimension (Wall in image below)
   DIM Start Index: First Letter or Number the first dimensions starts at (1 in image below)
   DIM Suffix: Text following the dimension (not shown in image below)

DIM Step: Increments in a predetermined number of readings. Most users take every reading (1 step).

```
REVIEW DIMENSION 1 LABELS
LOC 1: WALL1
LOC 2: WALL2
LOC 3: WALL3
LOC 4: WALL4




REFRESH SUCCESSFUL          [100]
   BACK    |        | EDIT  | DONE
```

For **Manual Labeler:** Use the arrow keys and **Menu/Ok** to manually enter the label you want for each location of the dimension.

```
CORROSION FILE CREATE
DIM 3 NUM OF LOCATIONS
3
DIMENSION 3       MANUAL LABELER

DIM 4 NUM OF LOCATIONS
3
DIMENSION 4       MANUAL LABELER

1ST INC           DIMENSION 4

2ND INC           DIMENSION 3

↔ CHANGES VALUE             [100]
  EXIT  |ADD INFO| PREV  | NEXT
```
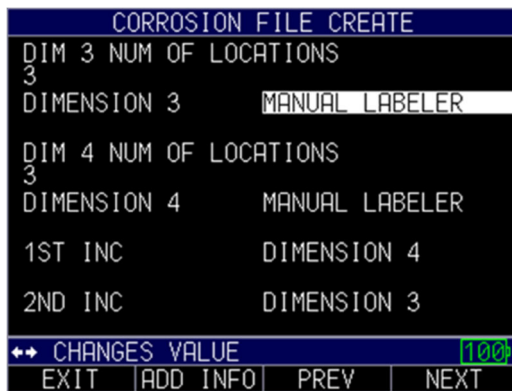
To create "WALL-NTUBE15FTL" use the following inputs:

Dimention 1 – Wall Direction North (N), South (S), East (E), West (W) - (WALL-N)**:**

```
         DIMENSION 1 MANUAL LABELER
 LOC 1: WALL-N_
 LOC 2:
 LOC 3:
 LOC 4:


     1  2  3  4  5  6  7  8  9  0
     A  B  C  D  E  F  G  H  I  J
     K  L  M  N  O  P  Q  R  S  T
     U  V  W  X  Y  Z  -  +
 REFRESH SUCCESSFUL             100
    BACK  |  DELETE  |  PREV  |  NEXT
```

Label type: Manual Labeler
Number of locations: 4

Manually enter the following:
Loc 1: Wall-N

Loc 2: Wall-E

Loc 3: Wall-S

Loc 4: Wall-W

Dimention 2 – Tube number **- (**TUBE1**):**

```
         REVIEW DIMENSION 2 LABELS
 LOC 1:  TUBE1
 LOC 2:  TUBE2
 LOC 3:  TUBE3
 LOC 4:  TUBE4
 LOC 5:  TUBE5
 LOC 6:  TUBE6
 LOC 7:  TUBE7
 LOC 8:  TUBE8
 LOC 9:  TUBE9
 LOC 10: TUBE10
 LOC 11: TUBE11
 REFRESH SUCCESSFUL             100
    BACK  |        |  EDIT  |  DONE
```
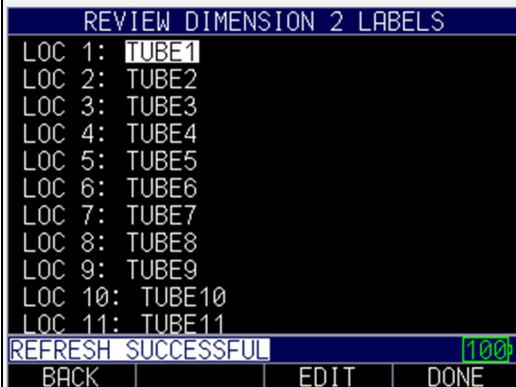
Label Type: Manual Labeler or Auto Labeler

Number of locations:15
Prefix: Tube

Start Index: 1

Suffix: (leave blank)

Step: 1

Manually enter the below Tube locations or use the above information with Autolabeler to create the following list:

Loc 1: Tube1

Loc 2: Tube2

Loc 3: Tube3

Loc 4: Tube4

Loc 5: Tube5

Loc 6: Tube6

Loc 7: Tube7

Loc 8: Tube8

Loc 9: Tube9

Loc 10: Tube10

Loc 11: Tube11

Loc 12: Tube12

Loc 13: Tube13

Loc 14: Tube14

Loc 15: Tube15

Dimension 3 - Elevation 5-25FT **-(5FT):**
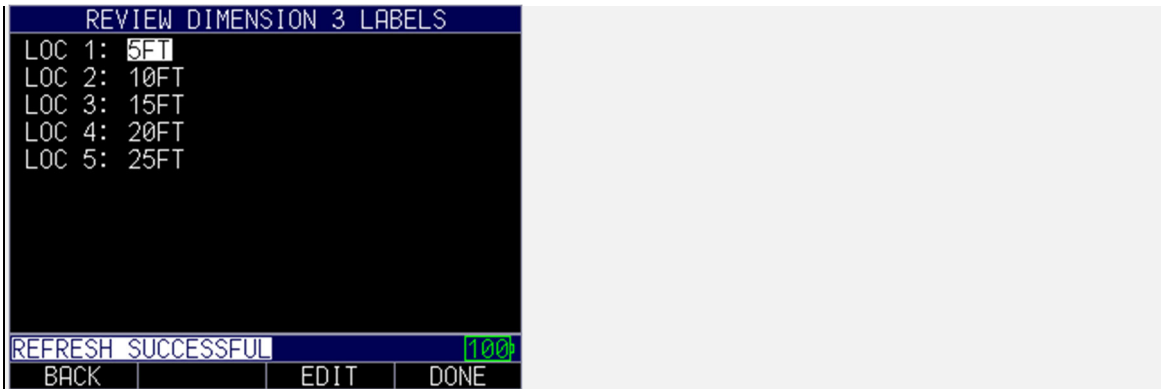
Label Type: Manual Labeler or Auto Labeler

Number of locations: 5

Prefix: (leave blank)

Start Index: 5

Suffix: FT

Step: 5

Manually enter the below Elevation heights or use the above information with Autolabeler to create the following list:
Loc 1: 5FT

Loc 2: 10FT

Loc 3: 15FT

Loc 4: 20FT

Loc 5: 25FT

Dimension 4 – Left (L), Center (C), Right (R) –(L)

Label Type: Manual

Number of Locations: 32

Manually enter the following:
Loc 1: L

Loc 2: C

Loc 3: R

9. When finished press **F4- Review** to view full list of Locations within the dimension
10. Press **F4-Done** to return to the file creation screen. Repeat steps for Dimensions 2-4
11. Use the arrow keys and Menu/Ok to select the order you will take readings and increment dimensions.

    The gage will use this information to determine the order to move on to the next reading.   All Locations in the first increment dimension will be measured before moving on to the following increment. The same is true of each subsequent increment.

For "WALL-NTUBE15FTL" select the following:

1st Increment - Dimension 4- (L,C,R)
2nd Increment – Dimension 3 - Elevations (5FT-25FT)
3rd Increment – Dimension 2 - Tube Number (1-15)
4th Increment (not entered) – Dimension 1 – (NESW)

This will set the file up so when in standard mode the gage expects readings to be taken in the following order:

1st reading - The Left location, at 5FT elevation on Tube 1 of Wall-N
2nd Reading - The Center location, at 5FT elevation on Tube 1 of Wall-N
3rd Reading - The Right location, at 5FT elevation at Tube 1 of Wall-N

Now that the 1st increment (LCR) is complete, it will repeat the first three readings at 10FT (readings 4-6), 15FT (reading 7-9), 20FT (readings 10-12) and 25FT (readings 13-15) before moving on to the 2nd Tube.

The file will then repeat the same 15 readings on tube 2, followed by tube 3,4,5, etc   Once all 15 tubes have had the 3 LCR measurements made at each of the 5 elevation heights, the file will proceed to the East wall where it will repeat all of the readings taken on the North wall.   Once the east wall is complete, the gage will proceed to the South Wall and finish with the West wall.

12. Use the up and down arrow keys to select pattern type from the following options
    - *Standard*: file advances to the next reading in chronological order
    - *Reverse:* file advances to the next reading in reverse chronological order
    - *ZigZag:* file advances in a zigzag pattern ie right to left in first row then left to right in section row
    - *Reverse ZigZag:* file advances in a reverse zigzag pattern ie left to right in first row then right to left in section row

13. Use the left and right arrow keys to choose which notes file to associate with your 4D file
14. Press **F4-Done** when finished to create file and return to the Datalogger Directory.

Using the Save Option

If equipped with the Datalogger, the ECHO 9 series can save thousands of thickness readings and waveforms either internal or onto a removable SD card.

To use the **Save Key**, follow these steps:

1. From the *Home* screen, press the **F1 – Menu** key.
2. Use the up and down arrow keys to select the **DATALOGGER/COMM** option and press the **MENU/OK** key.
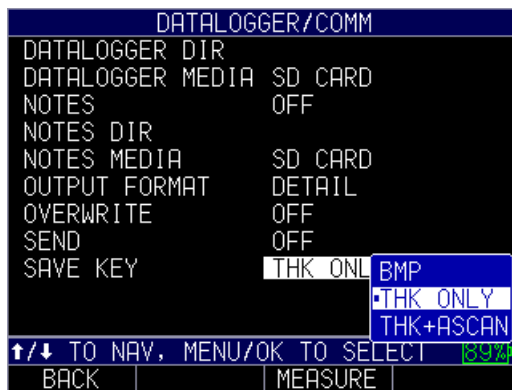
1. Use the up and down arrow keys to toggle between the following settings:
    - *BMP*: Bitmap or screen shot captures
    - *THK ONLY*: Thickness only
    - *THK+ASCAN*: Thickness and A-scan
2. After this selection is made, the **F1** key will display BMP, SAVE THK, or SAVE ASC. Data can later be sent to Microsoft Excel using a standard USB cable and DATA XL provided on the mini CD in your gage kit, or by removing the SD card to a card reader and also using DATA XL.

Choosing Where to Save the Readings
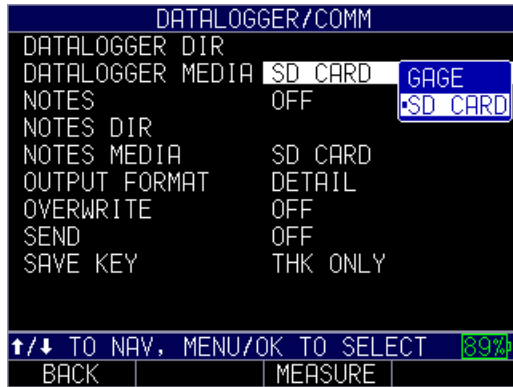
ECHO series has both internal and SD card memory. Be certain to select and note where your files are located, and always check for adequate memory before taking readings.
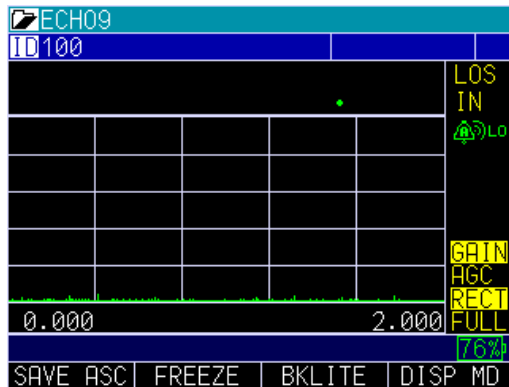
For the datalogger version only, you can save your data via the **Save** key, which is **F4** if right hand setting is enabled, or **F1** if left hand setting is enabled. (See Section 4 for right hand and left hand setting options.)

Note: Save is on the left.
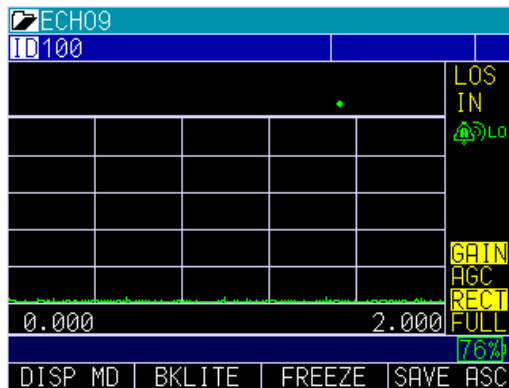
Note: Save is on the right.

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The data saved will depend on your setup parameters, which are selected from the *Setup* screen. For example, if the **Notes** option is set to **Off** then saved thickness reading will be stored at the ID location [Linear], [Row], [Col] without notes. (See: Directory selection for file type details.)

Reviewing a File

To review a file from the **Measurement** mode screen in datalogger version only, follow these steps:

1. Press the **MENU/OK** key.

2. Highlight **DATALOGGER/COMM,** press **OK,** then highlight

   DATALOGGER DIR, then **OK.** The Directory list is shown**.** Highlight the file you want to review and press **OK**
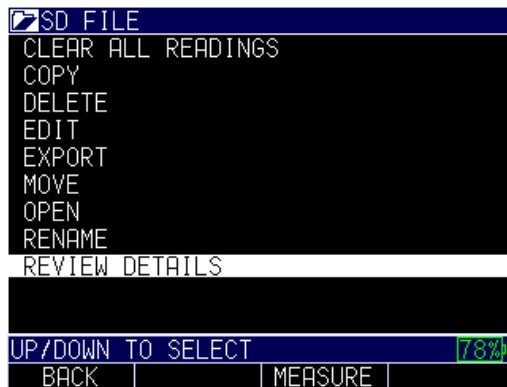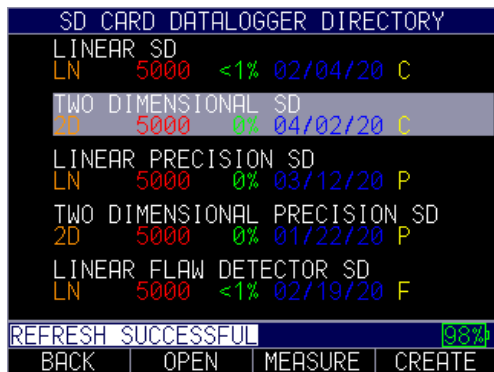
3. Use the up and down arrows to select a function, and press the **MENU/OK** key.

4. Use the up and down arrows to review the file details.

If there is an A in the right of the file (as shown in the image above) that means A-scan is saved, or if there is a T that means there is a Thickness. You can scroll down to any of them then press the **MENU/OK** key and the recalled reading in that location will appear on the screen. Use the left or right arrow to quickly scroll to the next stored value.

To clear a reading, highlight the reading to be cleared then press the **F3** key for clear. A prompt will appear: Are you sure. Press **F2** for yes and **F3** for no, or **F1** for Exit.

If you clear a reading, or a series of readings, press the **MENU/OK** key over the reading you would like to re-take and the ID will go back to the reading to be re-taken. The ID will then advance to any open (cleared) readings until it gets to the next available ID in the series to be taken. For example; if you clear readings 1 and 3 and the last reading in the file is ID number 10, the sequence upon clearing readings 3 and 1, **MENU/OK** will be reading 1 to re-take, skip over 2, and to 3 save, then ID number 11 as the next available id.

Datalogger Measurement Screen

If your ECHO series thickness gage is equipped with a datalogger, the display screen in *Measurement* mode will look like the screen below:
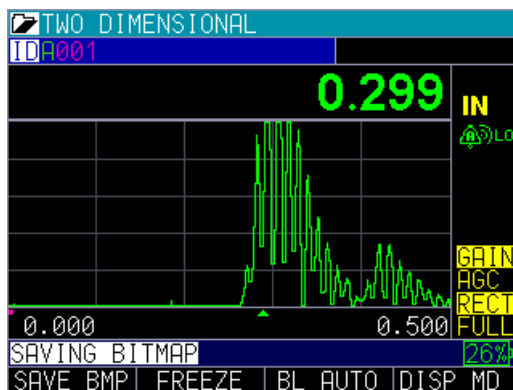
To continue in *Measurement* mode, follow these steps:

1. Press the **F1** key to select the **Save** option.

2. Press the **F2** key to select the **Freeze** option.

3. Press the **F3** key to select the **Dir** (Directory) option.

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4. Press the **Menu = OK** key to select the **Menu** option.

> **Note:** The available choices for F1, F2, F3, and F4 are different for the ECHO series thickness gages without a datalogger. Also, the file symbol, filename, ID: xx,xxxx are not displayed in the non-datalogger version of the ECHO series thickness gages.

Datalogger Media

Datalogger readings can be saved directly to the gages internal storage or they can be saved to the removeable SD

To change where the ECHO gage saves datalogger readings, follow these steps:

1. Use the up and down arrow keys to select the **Datalogger Media** Option
2. Press **Menu/Ok**
3. Use the up and down arrows to toggle between Gage and SD card
4. Press **Menu/OK** when done to save selection

Notes

When using the datalogger, ECHO gages can be set to record notes under certain conditions

To change when the ECHO gage records notes, follow these steps:

1. In the *Datalogger/Comm Menu* use the up and down arrow keys to select **Notes**

2. Press **Menu/Ok**

3. Use the up and down arrows to choose from the following options

   Off: Turns notes off

   Always: Always records notes

   LOS (Loss of Signal): records notes upon LOS

4. Once the appropriate selection is highlighted press **Menu/OK** to save selection

Notes Directory
Lists of preset notes are stored and edited in the Notes Directory.   New collections of notes can be imported using DataXL or they can be created within the Notes Directory
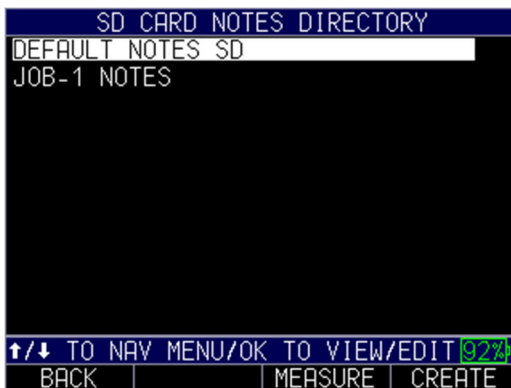
Reviewing Notes
Notes files can be cleared, copied, deleted, edited, moved, renamed or reviewed from within the notes directory.

Danatronics, Corp.
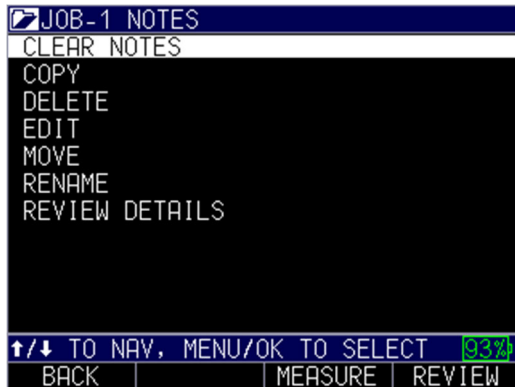
To review a current list of notes:

1. From the *Datalogger/Comm Menu*, use the up and down arrow keys to select **Notes Directory** and press **Menu/Ok.**
2. Use the up and down arrow keys to select the file of notes you would like to review and press **Menu/Ok**
3. Available options will appear. Use the up and down arrow keys to select and press **Menu/OK**
4. Press **F1-Back** to exit when finished

Creating A New Notes File

New notes files that contain preset notes can be created from within the Notes directory
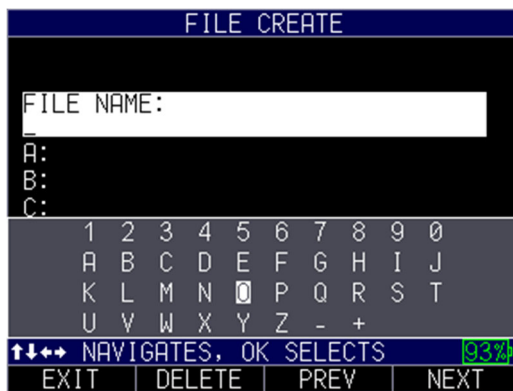
To create a new notes file:

1. From the *Datalogger/Comms Menu*, use the up and down arrow keys to select **Notes Directory** and press **Menu/Ok.**
2. Press **F4-Create** to Create a new file
3. Use the arrow keys and **Menu/Ok** to enter a file name in the file name row. Press **F4-Next** when done
4. Cursor will advance to Row A, this is the first row of your notes list. Use the arrow keys and Menu/Ok to enter note. Press **F4-Next** when done - Repeat this step until all notes are entered.

5. Press **F4-Next** until row P.   The F4 key will change to **F4-Done**. Press **F4-Done** to save and exit

Notes Media

Notes can be saved directly to the gages internal storage or they can be saved to the removeable SD

To change where the ECHO gage saves **Notes**, follow these steps:
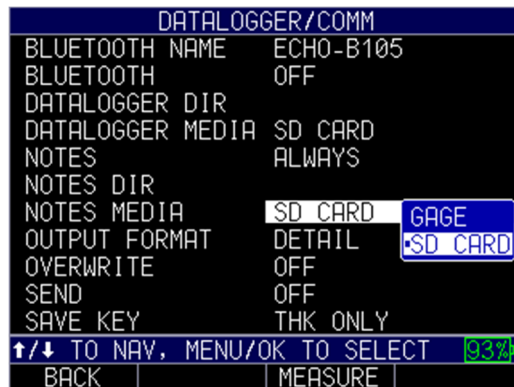
1. From the *Datalogger/Comms Menu* use the up and down arrow keys to select **Notes Media**

2. Press **Menu/Ok**

3. Use the up and down arrows to toggle between **Gage** and **SD card**

4. Once the appropriate selection is highlighted press **Menu/OK** to save selection

Output Format

The datalogger Output Format can be set to either Grid or Detail depending on how much information is required

To change ECHO datalogger **Output Format**, follow these steps:

Danatronics, Corp.
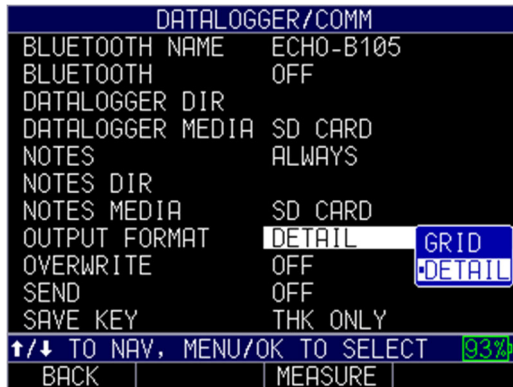
1. From the *Datalogger/Comms Menu* use the up and down arrow keys to select **Output Format**

2. Press **Menu/Ok**

3. Use the up and down arrows to toggle between **Grid** and **Detail**

   Grid: Includes only the CSV style grid data

   Detail: Includes everything in the setup and the data with you with ID and thickness

4. Once the appropriate selection is highlighted press **Menu/OK** to save selection

Overwrite

The overwrite feature allows the operator to overwrite a bad reading rather than having to redo everything.

To change whether or not the ECHO datalogger is set to **Overwrite**, follow these steps:
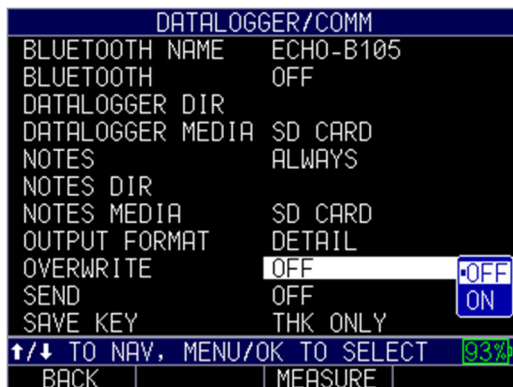
1. From the *Datalogger/Comms Menu* use the up and down arrow keys to select **Overwrite**

2. Press **Menu/Ok**

3. Use the up and down arrows to toggle between **On** and **Off**

4. Once the appropriate selection is highlighted press **Menu/OK** to save selection

Send

The send key is used to send readings externally to DataXL when using Bluetooth

To change whether or not the ECHO datalogger is set to **Send**, follow these steps:

```
              DATALOGGER/COMM
NOTES DIR
NOTES MEDIA       SD CARD
OUTPUT FORMAT     DETAIL
OVERWRITE         OFF
SEND              ON            OFF
SEND KEY          THK ONLY     •ON
SEND VIA          USB
BLUETOOTH NAME    ECHO-B105
BLUETOOTH         OFF
DATALOGGER DIR
DATALOGGER MEDIA  SD CARD
↑/↓ TO NAV, MENU/OK TO SELECT  93%
    BACK          |  MEASURE  |
```
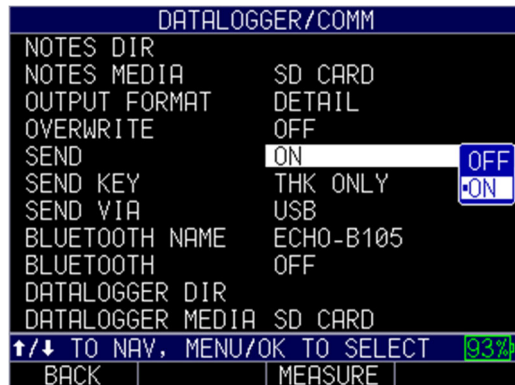
1. From the *Datalogger/Comms Menu* use the up and down arrow keys to select **Send**

2. Press **Menu/Ok**

3. Use the up and down arrow keys to choose the any of the following parameters:
   - *Off*: **Send** remains off
   - *On*: Enables the **Send** feature

4. Once the appropriate selection is highlighted press **Menu/OK** to save selection.

Send Key

When in *Measurements Mode* ECHO gages with Datalogger have a save key that saves readings to the selected datalogger file.

To select the types of data that will be Saved by the datalogger, follow these steps:

Danatronics, Corp.
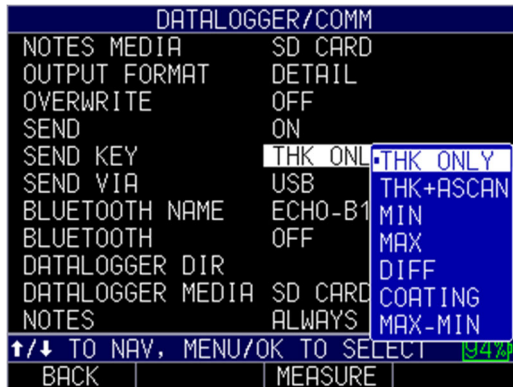
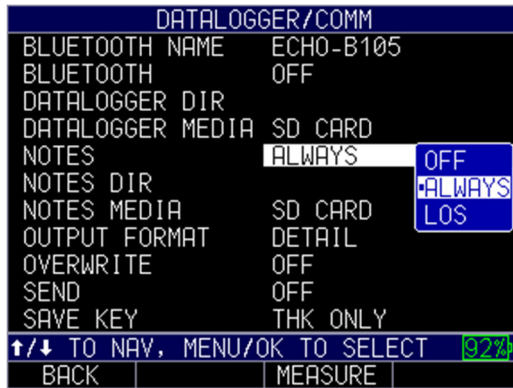1. From the *Datalogger/Comms Menu* use the up and down arrow keys to select **Save Key**

2. Press **Menu/Ok**

3. Use the up and down arrows to toggle between available options. Depending on your gage configuration a combination of the following will appear

   - *BMP:* sends bitmap of thickness reading
   - *THK Only:* sends the numeric value of the thickness reading
   - *Thk+ASCAN:* sends the numeric value of the thickness reading as well as the A-Scan data
   - *Min:* sends the thinnest recorded value
   - *Max:* sends thickest recorded value
   - Coating: sends coating thickness value
   - Max-Min: Sends the thinnest and thickest recorded values

4. Once the appropriate selection is highlighted press **Menu/OK** to save selection

Send Via

The send via option allows the user to choose to send readings to DataXL via USB or DataXL Mobile via Bluetooth

To change how the gage sends readings, follow these steps:

1. From the *Datalogger/Comms Menu,* use the up and down arrow keys to select **Send Via**

2. Press **Menu/Ok**

3. Use the up and down arrow keys to choose the between of the following parameters:
   - *USB* Sends via USB
   - *Bluetooth*: Sends via Bluetooth

4. Once the appropriate selection is highlighted press **Menu/OK** to save selection.

4 Customizing Display Options 0

ECHO series gages have several display options that are customizable within the **Display Menu** based on your preferences.

```
        MENU
CALIBRATION MAN
DATALOGGER/COMM
 DISPLAY               DISPLAY
INITIAL SETTINGS  BKLIGHT
LOCKS             BRIGHTNESS
MEASUREMENTS      COLOR
XDUCER SETUPS     DEMO
TEST              GRID VIEW
                  GRID VIEW FONT
                  USER
                  WAVEFORM
↑/↓ TO NAV, MENU/OK TO SELECT   87%
  EXIT
```
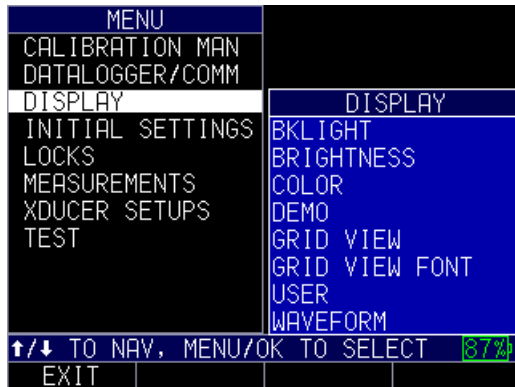
Backlight

The gage is readable in direct sunlight as well as indoors. The backlight is always on by default, and it's highly recommended to leave it on when using the gage indoors.

To use the backlight, follow these steps:

1. From this *Display Menu*, select the **Bklight** option, and press the **MENU/OK** key.

```
              DISPLAY
 BKLIGHT             ON
BRIGHTNESS          74%
COLOR
DEMO
GRID VIEW           OFF
GRID VIEW FONT      SMALL FONT
USER                LEFT HAND
WAVEFORM            OUTLINE



↑/↓ TO NAV, MENU/OK TO SELECT   87%
  BACK              MEASURE
```
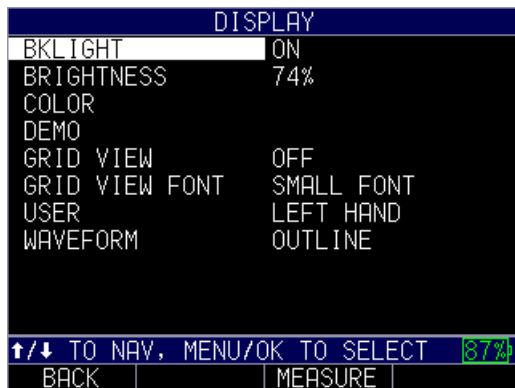
2. Use the up and down arrow keys to choose from the following parameters:
   - *Off*: Backlite remains off
   - *On*: Backlite remains on
3. Press the **MENU/OK** key or the **F1 – Back** key to exit the screen.

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Brightness

The gage display can be adjusted to suit the lighting conditions the gage is being used in. The brightness increases in incremental steps with minimum brightness level of 0 and a maximum of 100.

To adjust the screen brightness, follow these steps:

1. In the *Display Menu*, use the up and down arrow keys to select the **Brightness** option, and press the **MENU/OK** key.


```
                    DISPLAY
BKLIGHT             AUTO
BRIGHTNESS          74%
COLOR
DEMO
GRID VIEW           OFF
GRID VIEW FONT      SMALL FONT
USER                LEFT HAND
WAVEFORM            OUTLINE



0 = MIN, 100 = MAX BRIGHTNESS   [100]
   BACK         |    MEASURE |
```
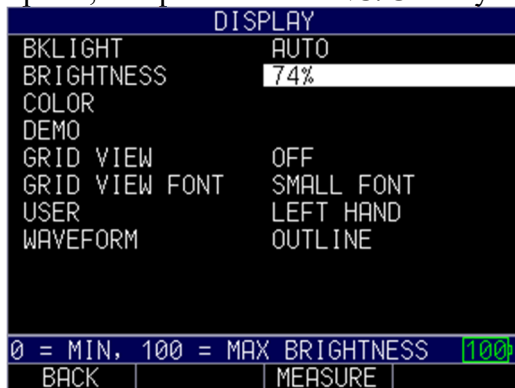
2. Use the up arrow to increase the screen brightness and the down arrow to decrease brightness.
3. Press the **MENU/OK** key or the **F1 – Back** key to exit the screen.

Color

The ECHO series gages have a high-resolution color display with multiple color choices. By varying the colors, you can optimize visibility and improve contrast. You cannot chose two of the same colors, however, and the gage will prompt you to pick the next available color if a duplicate is selected.

Some color changes are dynamic, meaning you will see the changes as you make the selection (e.g., Flags, Background). Others, such as Waveform and Pop Up Background, can only be seen once the change is made and you return to the *Home* screen.

To adjust the color settings, follow these steps:

1. From the H*ome* screen, press the **F1 – Menu** key. The *Menu* screen appears.
2. Use the up and down arrow keys to select the **Display** option, and press the **MENU/OK** key.
3. Use the up and down arrow keys to select the **Color** option, and press the **MENU/OK** key.
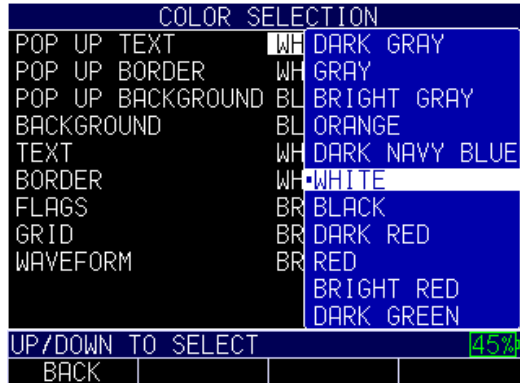
4. The *Color Selection* screen will appear.
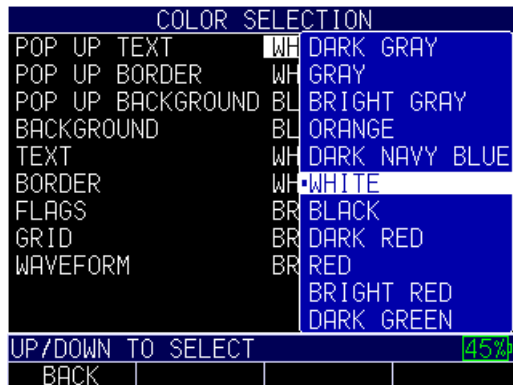
5. You may select any of the following items in the list for color modification:
   ● Pop up text
   ● Pop up border
   ● Pop up background
   ● Background
   ● Text
   ● Border
   ● Flags
   ● Grid
   ● Waveform
6. Press the **MENU/OK** key or the **F1 – Back** key to exit the screen.

Demo

The ECHO series is a robust collection of gages offering a variety of features and software options.   Our **Demonstration Mode (Demo Mode)** displays the various reading types available on each of the lines within the ECHO series.

To use **Demo Mode**, follow these steps:

1. In the *Display Menu*, use the up and down arrow keys to select the **Demo** option, and press the **MENU/OK** key.
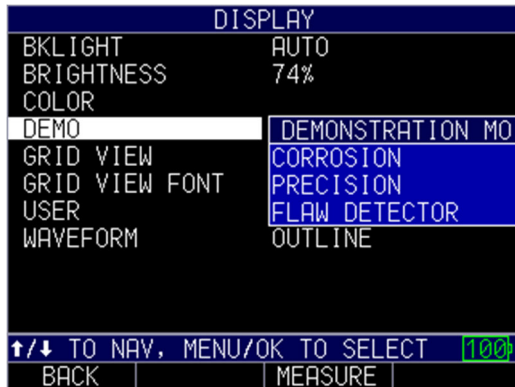
2. Use the up arrow and down arrow keys to select the line you would like demonstrated. You can choose from Corrosion (ECHO 9/8), Precision (ECHO 7/8) or Flaw Detector (ECHO FD) and press **MENU/OK**
3. Use the up and down arrow keys to select on or off then press **MENU/OK.**
4. To turn additional demos on, repeat steps 2 and 3 or press **F3-Demo All** to turn all options on.
5. Press **F2 -Demo** to begin demo.   Screens will advance automatically every 3 seconds

In the demo you can select the following options:

F1- Exit: Exits the demo mode
F2- Pause: Pauses the demo
Resume: Resumes the demo mode
*F3-Outline:*Displays waveform as a single line
Filled: Fills in waveform
Left and Right Arrows: Advances the displayed screen or goes back
6. Press **F1 – Exit** key to exit the screen.

Grid View

Grid view is a standard feature on any gage (version 2.07 or higher) equipped with the datalogger. This feature has two options to view the screen: (1) display the grid by itself or (2) display a split screen with the A-scan on the top and the grid on the bottom. One advantage of using the grid view is that you can see the datalogger populating as you make readings. Also, alarms—if activated—can even be color-coded. Below is an example of the split screen grid view in Corrosion mode:

To activate the grid view option, follow the steps below:

1. Press **MENU/OK**, scroll to display, and turn on the Grid View option. You can also choose small or large font parameters, which will affect how large the grid will appear.
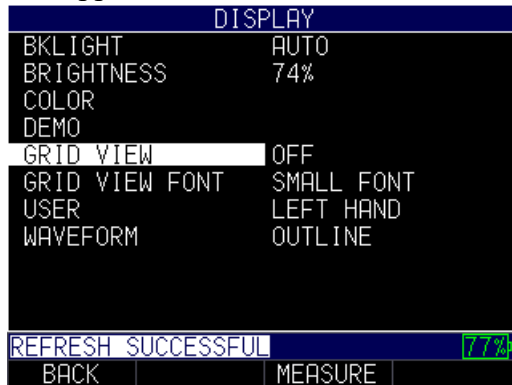
2. Use the up and down arrow keys to chose the any of the following parameters:
   - *Off*: Grid View remains off
   - *Small Font*: Determines how many rows and columns can be viewed simultaneously
   - *Left Hand*: Option for left hand users
   - *Outline*: Waveform will be outlined
3. Press the **MENU/OK** key or the **F1 – Back** key to exit the screen.

With grid view turned on—while in the A-scan split screen mode—use the left or right keys (edit keys) to highlight the grid with a white box, and press **F2 – Grid Nav** key to use grid navigation.

From grid navigation you can select the following options:

- **F1 – Exit Nav:** Goes back to the previous screen
- **F3 – Sel ID:** Goes to the specific ID of a reading that you with to re-take.
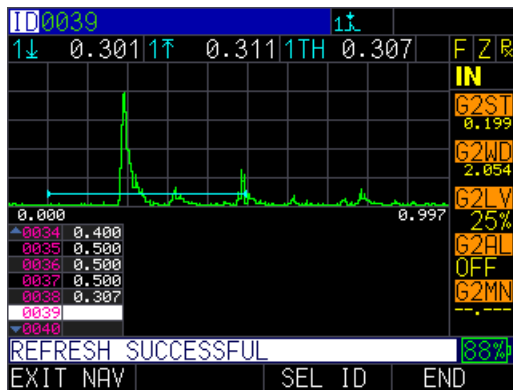
If you have a suspect reading and would like to delete it from the system, follow the steps below:

1. Press **F3 – Clear** key.

2. Verify that you wish to delete the reading by pressing **F2 – Yes** key. If you decide not to delete the reading, then press **F3 – No** key.
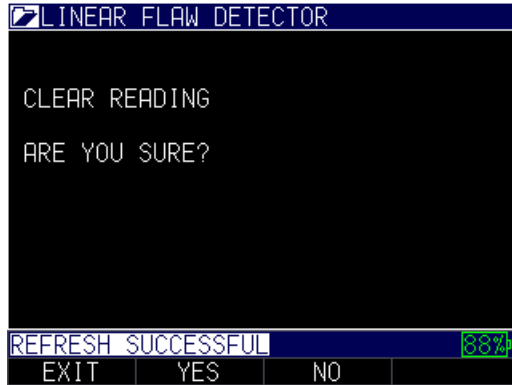
3. Press **F1 – Exit** key to leave the screen.

Grid View Front

When grid view is turned on there are two font sizes available.

To adjust the the **Grid Font Size**, follow these steps:

1. From this *Display Menu*, select the **Grid View Font** option, and press the **MENU/OK** key.
2. Use the up and down arrow keys to chose the any of the following parameters:
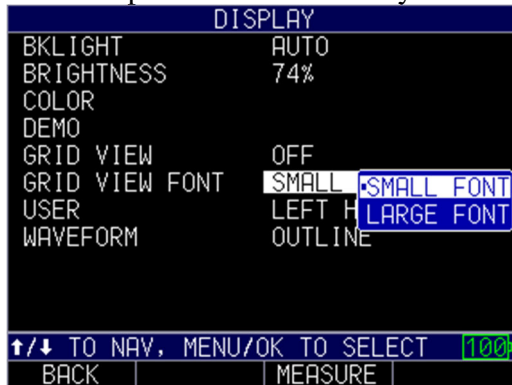
   - *Small:* Selects the smaller font size
   - *Large*: Selects the larger font size
3. Press the **MENU/OK** key or the **F1 – Back** key to exit the screen.

User (Left Hand/Right Hand)

The ECHO series gage is compatible with both right-handed and left-handed users. To adjust your preference, follow the steps below:

1. When in the *Display Menu*, use the up and down arrow keys to select the **User** option, and press the **MENU/OK** key.

```
                  DISPLAY
 BKLIGHT           ON
 BRIGHTNESS        74%
 COLOR
 DEMO
 GRID VIEW         OFF
 GRID VIEW FONT    SMALL FONT
 USER              LEFT H·LEFT HAND
 WAVEFORM          OUTLIN RIGHT HAND

 ↑/↓ TO NAV, MENU/OK TO SELECT  87%
   BACK          │ MEASURE │
```
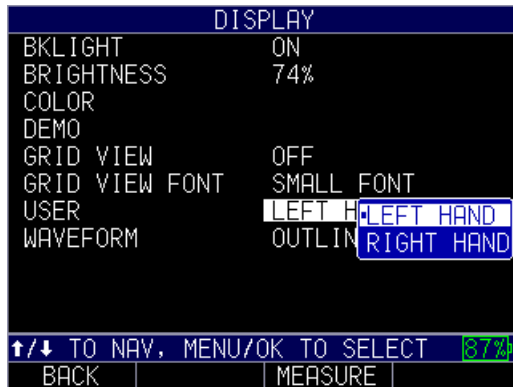
2. Select either option:
   - *Left hand*: Soft keys options appear on the left of the screen
   - *Right hand*: Soft keys options appear on the right of the screen
3. Press the **MENU/OK** key or the **F1 – Back** key to exit the screen.

Note: For the purposes of this manual, all images shown are based on the left hand user setting.

Waveform

The waveforms that appear on the screen when taking measurements, on units equipped with the waveform feature, can be viewed as either a solid waveform or an outline. Depending on the lighting conditions and your overall preference, follow the steps below to toggle between options:

1. From the H*ome* screen, press the **F1 – Menu** key. The *Menu* screen appears.
2. Use the up and down arrow keys to select the **Display** option, and press the **MENU/OK** key.
3. Use the up and down arrow keys to select the **Waveform** option, and press the **MENU/OK** key.

```
                  DISPLAY
 BKLIGHT           ON
 BRIGHTNESS        74%
 COLOR
 DEMO
 GRID VIEW         OFF
 GRID VIEW FONT    SMALL FONT
 USER              LEFT HAND
 WAVEFORM          OUTLINE  FILLED
                           ·OUTLINE

 ↑/↓ TO NAV, MENU/OK TO SELECT  87%
   BACK          │ MEASURE │
```
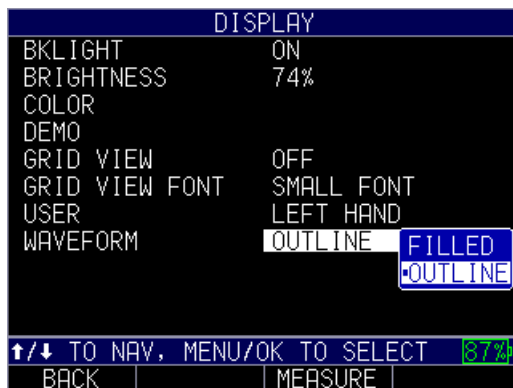
4. Select either option:
   - *Filled*: Waveform will be solid
   - *Outline*: Waveform will be outlinedPress
5. Press the **MENU/OK** key or the **F1 – Back** key to exit the screen.

5 Adjusting the Initial Settings

The ECHO series gages provide many usage settings that you can adjust depending on your location and preference.

To get to the *Initial Settings* screen, follow these steps first:

1. From the *Home* screen, press the **F1 – Menu** key.
2. Use the up and down arrow keys to select the **Initial Settings** option.
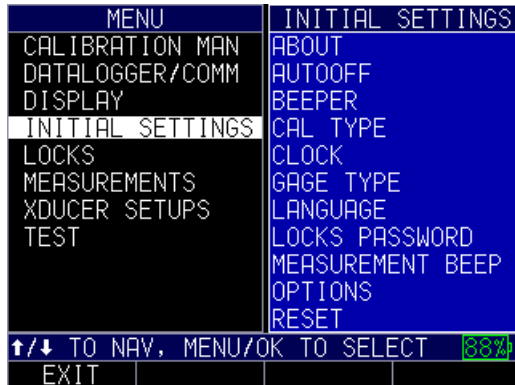
3. Press the **MENU/OK** key.
4. Use the up and down arrow keys to select any of the settings you wish to change.
5. When finished, press the **F1 – Back** key to exit the screen.

About

The **About** setting will display the gage's current software version. If you would like further information about Danatronics, including contact information, follow these steps:

1. Use the up and down arrow keys to select the **About** option and press the **MENU/OK** key. A similar image to the one shown below will appear:
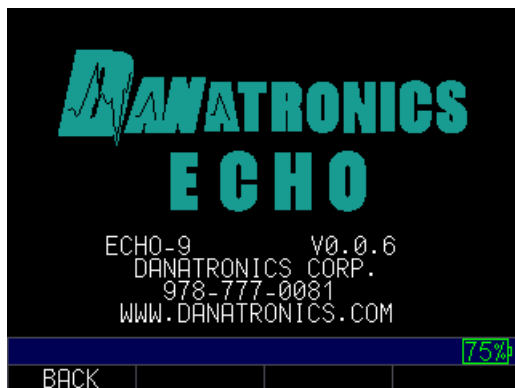
2. When finished, press the **F1 – Back** key to exit the screen.

Auto Off

The **Auto Off** setting shows the amount of time the gage will remain on during a period of inactivity. To change the parameters, follow these steps:

1. Use the up and down arrow keys to select the **Auto Off** option and press the **MENU/OK** key.

```
         INITIAL SETTINGS
 ABOUT              V0.0.6
 AUTOOFF            5  MIN
 CLOCK              12:08 PM
 LANGUAGE           ENGLISH
 LOCK               OFF
 OPTIONS
 RESET
 RESOLUTION         0.001 IN
 UNITS              IN
 BEEPER             OFF
 VIBRATE            OFF
 UP/DOWN TO SELECT          75%
    BACK
```
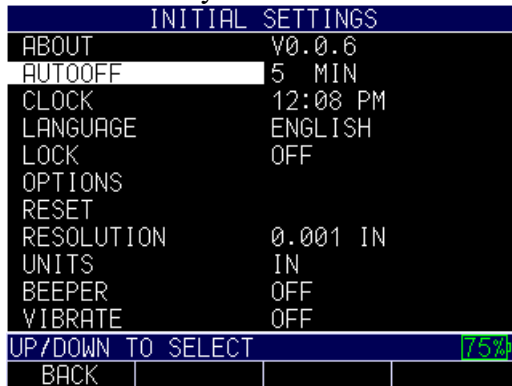
2. Use the up and down arrow keys to scroll through the following settings.
   - *1–31 minutes*: The gage will turn off automatically between 1–31 minutes
   - *Never*: The gage will never turn off automatically
3. When finished, press the **F1 – Back** key to exit the screen.

Beeper/Measurement Beep

The **Beeper** setting is an audio feature that sounds when any key on the gage is pressed or if an alarm condition is triggered. (See Section 6 for more information about alarm settings.)

To turn on/off the **Beeper** feature, follow these steps:

1. Use the up and down arrow keys to select the **Beeper** option and press the **MENU/OK** key.

```
         INITIAL SETTINGS
 ABOUT              V0.0.6
 AUTOOFF            NEVER
 CLOCK              10:22 PM
 LANGUAGE           ENGLISH
 LOCK               OFF
 OPTIONS
 RESET
 RESOLUTION         0.01 MM
 UNITS              MM
 BEEPER             OFF        ·OFF
 VIBRATE            OFF         ON
 <-CHANGE VALUE->           75%
    BACK
```
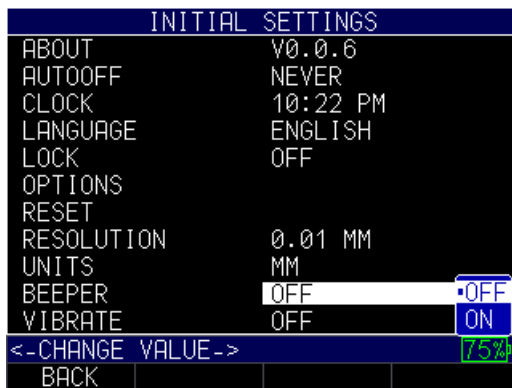
2. Use the up and down arrow keys to chose between the following options:
   - *Off*: Disables the Beeper option
   - *On*: Enables the Beeper option
3. When finished, press the **F1 – Back** key to exit the screen.

Calibration Type

The **Calibration Type** can be set to either Manual or Auto Calibration.   By default the gage is set to Manual calibration. For more information on Calibrating the gage see the **Calibration** section

To change the **Calibration Type**, follow these steps:

1. When in the *Initial Settings* menu use the up and down arrow keys to select the **Calibration Type** option and press the **MENU/OK** key.
2. Use the up and down arrow keys to select from the following options:
   - *Manual*: Calibration performed by user
   - *Auto*: Calibration automatically performed by gage
3. Press the **MENU/OK** key to enter selection.
4. If Calibration is set to Auto:
   - Use the up and down arrow keys to enter the value of the thin step – **CAL ZERO (Thin)**, then press **Menu/Ok**.
   - Use the up and down arrow keys to enter the value of the thick step – **CAL VEL (Thick),** then press **Menu/Ok**.
5. When finished, press the **F1 – Back** key to exit the screen.

Clock

The gage has a real-time clock with several time and date formats in which to choose.

To change the clock parameters, follow these steps:

1. When in the *Initial Settings* menu use the up and down arrow keys to select the **Clock** option and press the **MENU/OK** key.

2. Use the up and down arrow keys to change the settings in the *Clock Setup* screen shown below:

```
           CLOCK SETUP
 TIME FORMAT      12 HR
 DATE FORMAT      MM/DD
 MINUTE           19
 HOUR             10 PM
 DAY              9
 MONTH            JAN
 YEAR             2014



<-CHANGE VALUE->            75%
   BACK
```

3. Use the left and right arrow keys to change any of the following settings:
   - *Time Format*: 12 hour or 24 hour
   - *Date Format*: Day/Month (DD/MM) or Month/Day (MM/DD)
   - *Minute*: Current minute (1–59)
   - *Hour*: Current hour (12 hour: 1–12 AM/PM; 24 hour: 1–23)
   - *Day*: Current day (1–31)
   - *Month*: Current month (Jan.–Dec.)
   - *Year*: Current year (2014–2025)
4. When finished, press the **F1 – Back** key to exit the screen.

Gage Type

ECHO series gages can be corrosion gages, precision gages or flaw detectors all in the same unit, but they are not able to be used as all three gage types at the same time.   Not all ECHO gages are enabled with all three gage types, but ECHO gages are field upgradable and additional features can be added at any time.

To change the **Gage Type** that is currently set to follow these steps:

1. When in the *Initial Settings* menu use the up and down arrow keys to select the **Gage Type** option and press the **MENU/OK** key.
2. Use the up and down arrow keys to select from the following options:
   - *Corrosion*: ECHO 9/8
   - *Precision*: ECHO 7/8
   - *Flaw Detector*: ECHO FD
3. Press the **MENU/OK** key to enter selection.
4. When finished, press the **F1 – Back** key to exit the screen.

5. the *Initial Settings* menu use the up and down arrow keys to select the **Gage Type** option and press the **MENU/OK** key.
6. Use the up and down arrow keys to select from available gage types and press the **MENU/OK** key.
   Possible options include:
   - *Corrosion*: ECHO 9/8

- *Precision*: ECHO 7/8
- *Flaw Detector*: ECHO FD

7. When finished, press the **F1 – Back** key to exit the screen.

Language

There are multiple pre-loaded languages on the gage, such as: English, Italian, Spanish, French, German, Russian, Czech, Finnish, Chinese, Japanese, Hungarian, and Portuguese. Please contact Danatronics if you require a language other than the ones provided.

To select a language, follow these steps:

1. Use the up and down arrow keys to select the **Language** option and press the **MENU/OK** key.

```
        INITIAL SETTINGS
 ABOUT          V0.0.6
 AUTOOFF        NEVER
 CLOCK          10:19 PM ·ENGLISH
 LANGUAGE       ENGLISH   ITALIANO
 LOCK           OFF       ESPANOL
 OPTIONS                  FRANCAIS
 RESET                    CESTINA
 RESOLUTION     0.01 MM   SUOMI
 UNITS          MM        DEUTSCH
 BEEPER         OFF       MAGYAR
 VIBRATE        OFF       PORTUGUE
<-CHANGE VALUE->          SLOVAK
   BACK
```
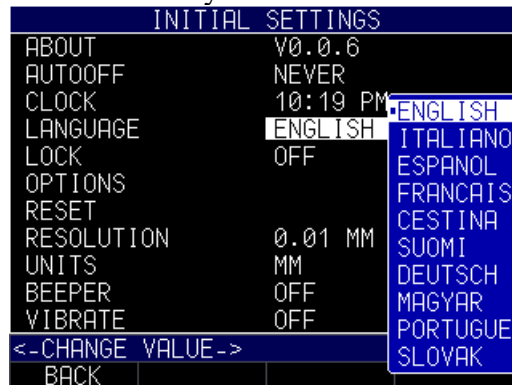
2. Use the up and down arrow keys to change the setting.
3. When finished, press the **F1 – Back** key to exit the screen.

Locks Password

1. By default the locks can be locked and unlocked at any time without a password in the *Locks Menu*. The Locks Password acts as a Supervisor Lock and can be used to limit the number of people who can adjust the lock.

   To set the **Locks Password,** follow these steps:
   From the *Home* screen, press the **F1 – Menu** key.
2. Use the up and down arrow keys to select the **Initial Settings** option.
3. Press the **MENU/OK** key.
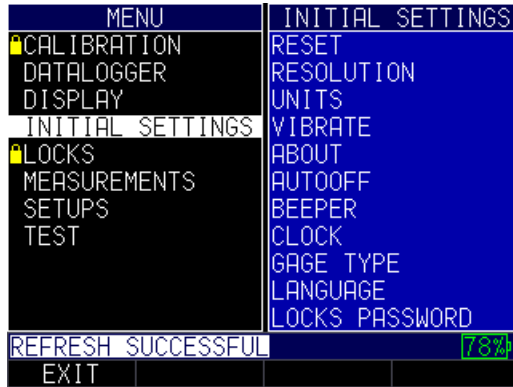
4. Use the up and down arrow keys to select **Locks Password**.
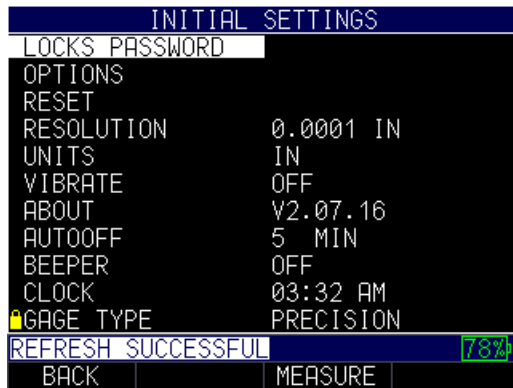
5. Press the **MENU/OK** key.
6. Enter your 4-digit password/code by scrolling over each character and pressing the **MENU/OK** key.
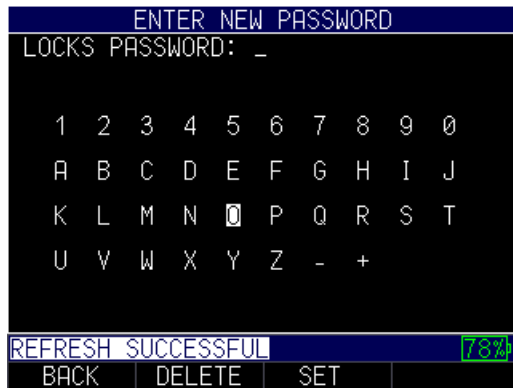
7. Press **F3 – Set** key to complete the password.

Note: If you forget or want to clear the password, enter 0081 to reset it. Once the code is activated, any locked function will require the password to unlock it.

To clear a password, you will first need to enter your 4-digit password. Next, **press F3 – Clear** key when done:
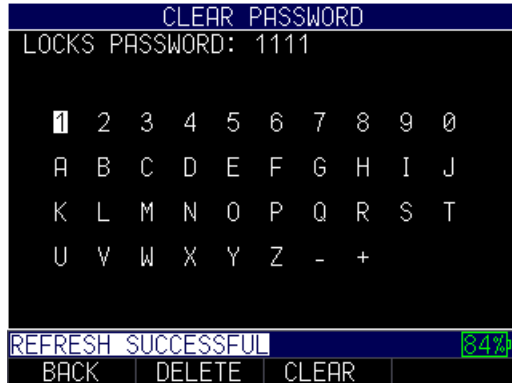
Options

The **Options** setting is used for the datalogger.

To enter a key, follow these steps:

1. Use the up and down arrow keys to select **Options** and press the **MENU/OK** key.
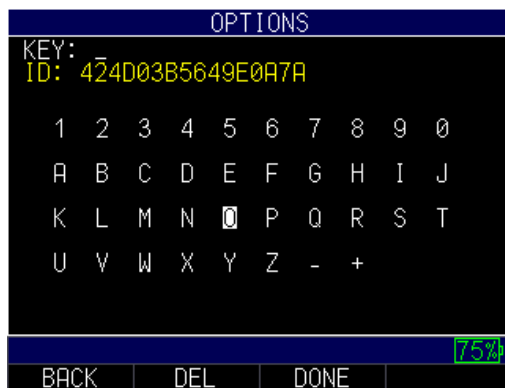
2. Use the arrow keys to enter the correct Key code. After each numerical or alphabetical selection, press the **MENU/OK** key. Note, your selection will appear in the Key field.
3. If you make an error during the Key code selection process, press the **F2 – Del** key to delete the last entered selection.
4. When finished, press the **F3 – Done** key to complete the selection process or press the **F1 – Back** key to exit the screen.

Note: The Key code must be at least six characters. An invalid message will appear if the Key code is incorrect.

Reset

You can choose to reset the Parameters (settings), Database (datalogger files), Setups (Setup files) or Bluetooth back to the default settings by performing a gage reset.

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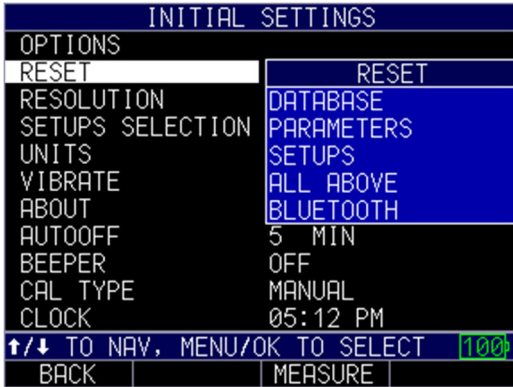
Database Reset

Performing a Database Reset clears all the files in the database and keeps the first three: Linear, Row Increment and Col Increment database files with cleared readings. All of the user created files in the database will be cleared and deleted.

Note: Performing a database reset permanently deletes all of the files saved in the datalogger directory

To perform a Database Reset, follow these steps:

1. When in the *Initial Settings* menu use the up and down arrow keys to select the **Reset** option and press the **MENU/OK** key.
2. The *Reset Menu* screen will appear, use the up and down arrow keys to select the **Database** option and press the **MENU/OK** key.
3. Use the up and down arrow keys to select from the following options:
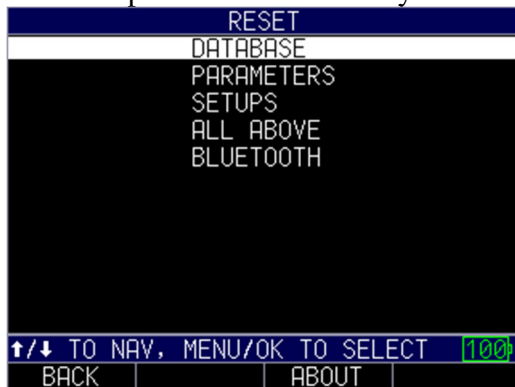
- *Gage*: Removes all files stored on the internal gage storage
- *SD Card*: Removes all files stored on the removeable microSD Card
- *All Above:* Removes all files saved on both the internal gage storage and removeable microSD card
4. Press **MENU/OK** to select

5. For gages enabled with multiple gage types, a Gage Type Reset Menu will appear. Select the gage type whose files you wish to delete from the following:

    - *Corrosion*: Permanently deletes ECHO 9/8 Corrosion datalogger files
    - *Precision*: Permanently deletes ECHO 7/8 Precision datalogger files
    - *Flaw Detector*: Permanently deletes ECHO FD Flaw Detector datalogger files
    - *All Above*: Permanently deletes all datalogger files from all available gage types

6. Press **Menu/OK** to select the gage type

7. The gage will ask "Are you sure?"

    Select from the following options:

    - *F1-Back*: Exits the screen
    - *F2*-Yes: Resets the database of the selected gage type
    - *F2-No:*Exits the screen

8. When finished, press the **F1 – Back** key to exit the screen.

Parameter Reset

Performing a Parameter Reset restores default parameters to the factory settings.

> **Note:** Performing a parameter reset permanently deletes all of the saved parameters from the gage and replaces the settings with default values.

To perform a Parameter Reset, follow these steps:

1. When in the *Initial Settings* menu use the up and down arrow keys to select the **Reset** option and press the **MENU/OK** key.
2. The *Reset Menu* screen will appear, use the up and down arrow keys to select the **Parameter** option and press the **MENU/OK** key.

3. For gages enabled with multiple gage types, a Gage Type Reset Menu will appear.

Select the gage type whose files you wish to delete from the following:

- *Corrosion*: Resets ECHO 9/8 Corrosion parameters
- *Precision*: Resets ECHO 7/8 Precision datalogger files
- *Flaw Detector*: Resets ECHO FD Flaw Detector datalogger files
- *All Above*: Resets all parameters from all available gage types

4. Press **Menu/OK** to select the gage type

5. The gage will ask "Are you sure?"
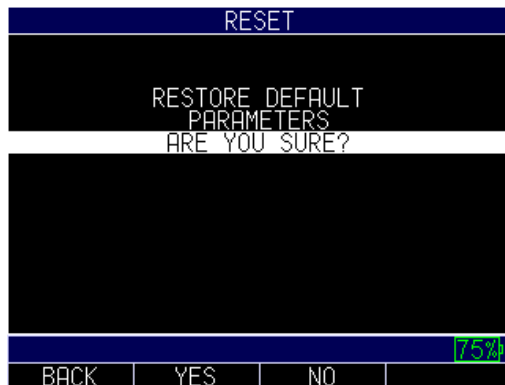
Select from the following options:

- *F1-Back*: Exits the screen
- *F2-Yes*: Resets the parameters for the selected gage type
- *F2-No:*Exits the screen

6. When finished, press the **F1 – Back** key to exit the screen.

Setups Reset

Performing a Setup Reset permanently deletes all user created setup files and leaves only the default setups

Note: Performing a setup reset permanently deletes all of the user created files from the gage and leaves only the default setups
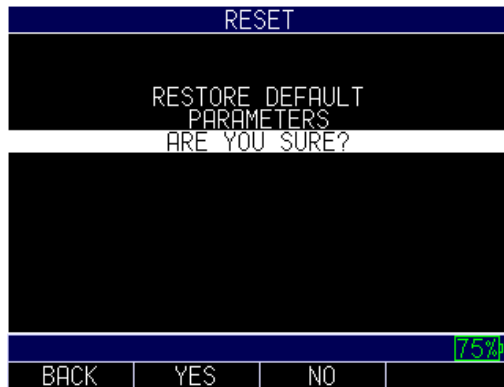
To perform a Setups Reset, follow these steps:

1. When in the *Initial Settings* menu use the up and down arrow keys to select the **Reset** option and press the **MENU/OK** key.
2. The *Reset Menu* screen will appear, use the up and down arrow keys to select the **Setups** option and press the **MENU/OK** key.
3. For gages enabled with multiple gage types, a Gage Type Reset Menu will appear.

Select the gage type whose files you wish to delete from the following:

- *Corrosion*: Resets ECHO 9/8 Corrosion parameters
- *Precision*: Resets ECHO 7/8 Precision datalogger files
- *Flaw Detector*: Resets ECHO FD Flaw Detector datalogger files
- *All Above*: Resets all parameters from all available gage types

4. Press **Menu/OK** to select the gage type

5. The gage will ask "Are you sure?"
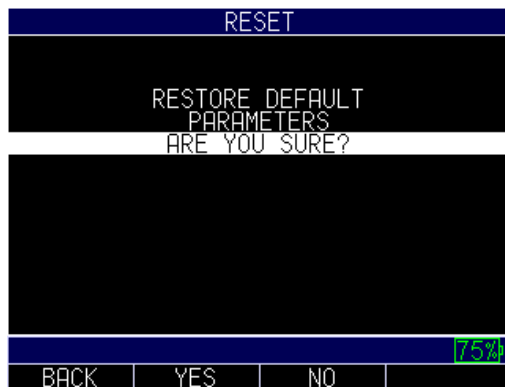
Select from the following options:

- *F1-Back*: Exits the screen
- *F2-Yes*: Resets setup files for the selected gage type
- *F2-No:*Exits the screen

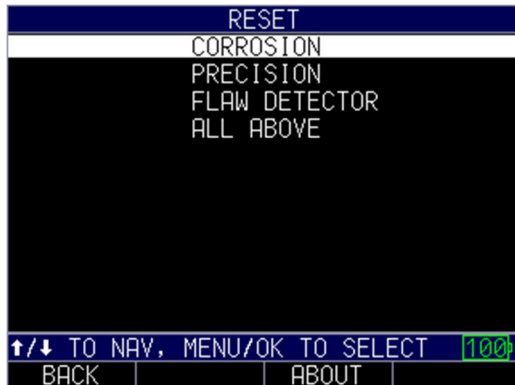6. When finished, press the **F1 – Back** key to exit the screen.

All of the Above (Database/Parameter/Setup) Reset

Performing an All Above Reset clears all the files in the database and keeps the first three Linear, Row Increment and Col Increment database files with cleared readings. All of the user created Setups files and Database will be deleted and the default parameters will be restored at the same time. This selection is the equivalent of performing MASTER RESET on the instrument, restoring original factory setting.

> **Note:** Performing an All of the Above (parameter,database, setup) reset permanently deletes all of the saved parameter settings, all stored setups and all files saved in the datalogger directory

To perform an All of the Above Reset (Database/Parameter/Setup), follow these steps:

1. When in the *Initial Settings* menu use the up and down arrow keys to select the **Reset** option and press the **MENU/OK** key.
2. The *Reset Menu* screen will appear, use the up and down arrow keys to select the **All Above** option and press the **MENU/OK** key.
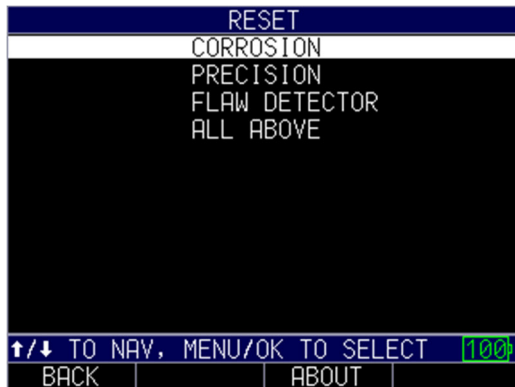3. The gage will ask "Are you sure?"
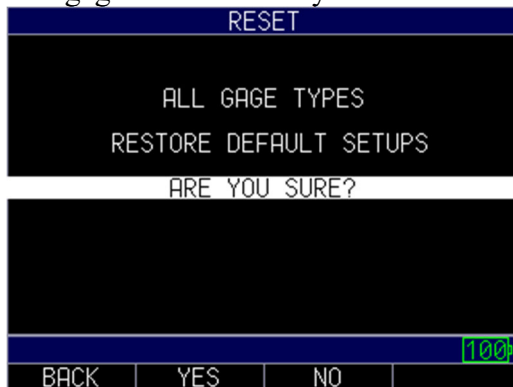
Select from the following options:
- *F1-Back*: Exits the screen
- *F2-Yes*: Resets Parameter/Database/Setup for all gage types
- *F2-No:*Exits the screen

4. When finished, press the **F1 – Back** key to exit the screen.

Bluetooth Reset

2. From the *Initial Settings* menu use the up and down arrow keys to select the **Reset** option and press the **MENU/OK** key.
3. The *Reset Menu* screen will appear, use the up and down arrow keys to select the **Bluetooth** option and press the **MENU/OK** key.
4. The gage will ask "Restore Default Bluetooth"

Select from the following options:

- *F1-Back*: Exits the screen
- *F2-*Yes: Resets the Bluetooth
- *F2-No:*Exits the screen

5. To perform a Bluetooth Reset Press **F2-Yes**. When reset is complete gage will return to initial settings menu and display "BLE Ready" message

Resolution

The **Resolution** setting can be modified for corrosion or precision use. If your gage is equipped with the precision option, the user can select between 0.001" and 0.0001" or 0.01mm to 0.001mm using the same process described below.

To select a resolution parameter, follow these steps:

1. From the *Initial Settings* menu, use the up and down arrow keys to select the **Resolution** option and press the **MENU/OK** key.
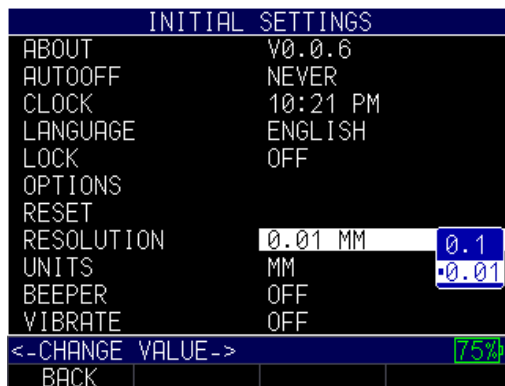
2. Use the up and down arrow keys to chose between the following options:
- 0.01 IN/0.1 MM/0.1 US
- 0.001 IN/0.01 MM/0.01 US

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3. When finished, press the **F1 – Back** key to exit the screen.

Transducer Selection(Xducer)/Setups Selection

The Transducer Selection/Setups Selection Menu can appears when the gage is first turned on, but can also be accessed from the *Initial Settings* Menu.

For ECHO 9/ECHO 8 Corrosion gages, the Transducer Selection Menu is used to select the transducer you will be using
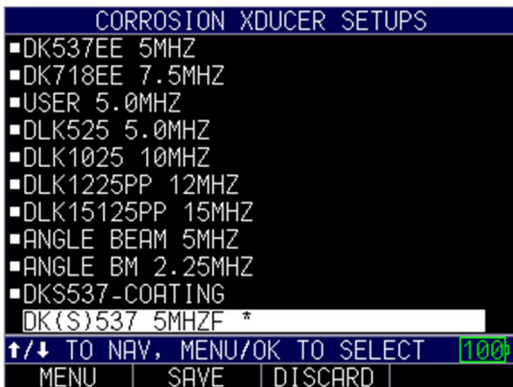
For ECHO 7/ECHO 8 Precision Thickness Gages, the *Setups Menu* is used to select the transducer you will be using as well as the class of measurement.
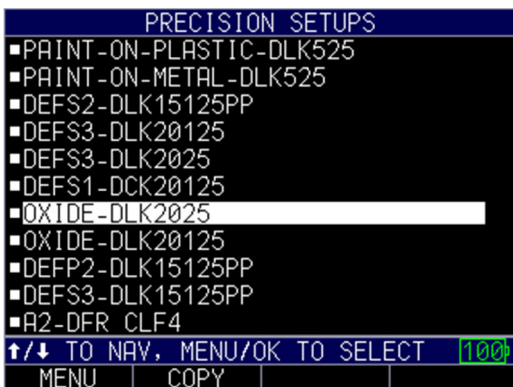
To access the *Xducer Selection/Setups Selection* Menu, follow these steps:

1. When in the *Initial Settings* menu use the up and down arrow keys to select the **Xducer Selection(Corrosion Gages)/Setups Selection (Precision Gages)** option and press the **MENU/OK** key.
2. Use the up and down arrow keys to select the transducer being used
3. Press the **MENU/OK** key to enter selection and begin making measurements.
4. For Precision Gages a screen will appear before Measurement mode. Use the arrow keys to make adjustments to available settings otherwise, Press **F-4-**

Measure to continue to *Measurement Screen*

Note: For more information on Selecting a Transducer view the Transducer Selection Section/Setup of the meu

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Units

There are three different **Units** settings available on the gage. To select one, follow these steps:

1. Use the up and down arrow keys to select the **Unit** option and press the **MENU/OK** key.
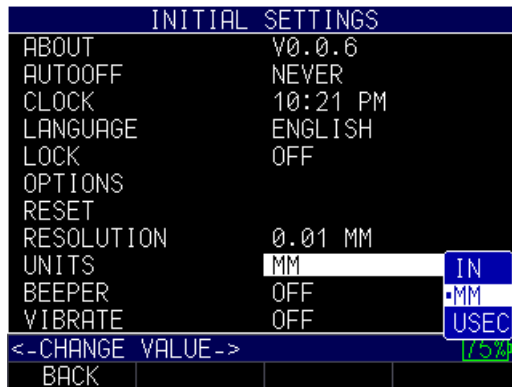
2. Use the up and down arrow keys to chose between the following options:
   - *IN*: Inch
   - *MM*: Millimeter
   - *USEC*: Microsecond
3. When finished, press the **F1 – Back** key to exit the screen.

Vibrate

The gage will physically vibrate when this setting is enabled and an alarm condition is triggered. (See Section 6 for more information about alarm settings.)

To turn on/off the **Vibrate** feature, follow these steps:

1. Use the up and down arrow keys to select the **Vibrate** option and press the **MENU/OK** key.

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```
          INITIAL SETTINGS
ABOUT              V0.0.6
AUTOOFF            NEVER
CLOCK              10:22 PM
LANGUAGE           ENGLISH
LOCK               OFF
OPTIONS
RESET
RESOLUTION         0.01 MM
UNITS              MM
BEEPER             OFF        ·OFF
VIBRATE            OFF         ON
<-CHANGE VALUE->               75%
    BACK
```

2. Use the up and down arrow keys to chose between the following options:
   - *Off*: Disables the Vibrate feature
   - *On*: Enables the Vibrate feature
4. When finished, press the **F1 – Back** key to exit the screen.

6 Locks

Advanced Locks

There are several types of advanced locks from which to choose. The available options are ideal for supervisors or managers who need to protect settings from being changed by other users. These advanced lock options are located in the main menu.

To use advanced **Locks**, follow these steps:.

1. Use the up and down arrow keys to select the **Locks** option, and press the **MENU/OK** key.

2. Select from the following lock options:
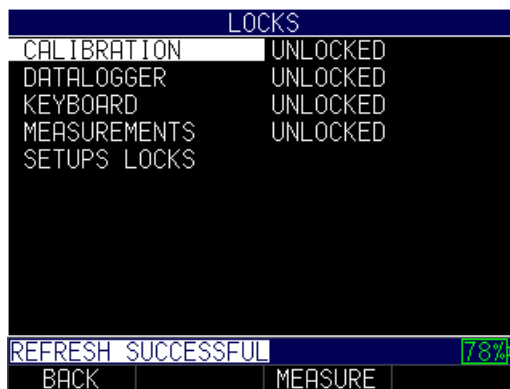
- *Calibration*: Locks or unlocks calibration settings
- *Datalogger*: Locks or unlocks datalogger settings
- *Keyboard*: Locks or unlocks the keyboard
- *Measurements*: Locks or unlocks measurement settings
- *Setups Locks*: Locks or unlocks setups

When locked, a lock symbol will appear next to the locked feature or a stored setup, as shown below:
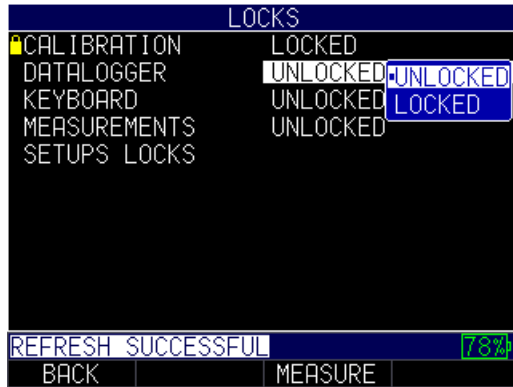
To set a password for the advanced **Locks** feature, see the **Locks Password** *Initial Settings* screen by following these steps:

7 Measurements

API 5UE

API 5UE is a recommended inspection practice from the American Petroleum Institute used to test ID cracking in new steel pipes to identify the defect size.

To turn on/off the **API 5UE** feature, follow these steps:

3. From the *Measurements* menu use the up and down arrow keys to select the **API 5UE** option. Then press the **MENU/OK** key.
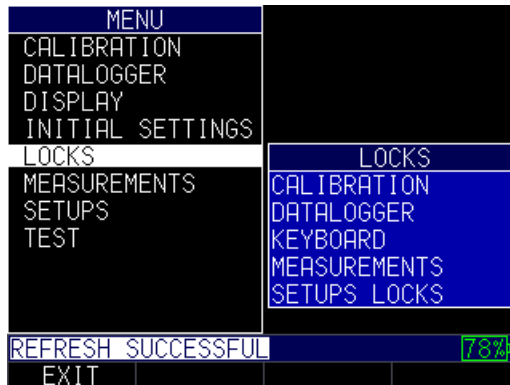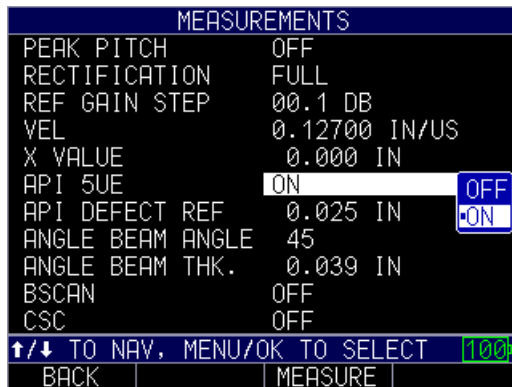

4. Use the up and down arrow keys to chose between the following options:
   - *Off*: Disables the API 5UE feature
   - *On*: Enables the API 5UE feature

5. Press the **Menu/OK** key to select. API Defect Ref will appear below. Enter reference value (instructions below) or press **F1-Back** to exit the screen

When API is turned on, the Setup Menu, will only display available API setups. All other setups will be hidden until API is turned off.

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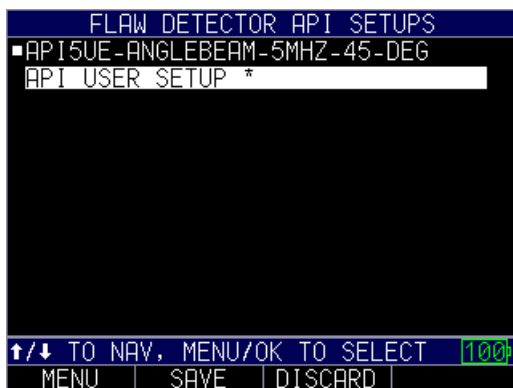
API Defect Reference (API Defect REF)

The **API Defect reference** is the discontinuity reference standard, typically a test block, being used by the user. ECHO FD will size defects accordingly based on the **Defect Reference**

To set the API Defect Reference value follow these steps:

1. From the *Measurements* menu use the up and down arrow keys to select the **API Defect Reference** option. Then press the **MENU/OK** key.

```
        MEASUREMENTS
GAIN             29.4 DB
PEAK PITCH       OFF
RECTIFICATION    FULL
REF GAIN STEP    00.1 DB
VEL              0.23300 IN/US
X VALUE           0.500 IN
API 5UE          ON
API DEFECT REF   0.025 IN
ANGLE BEAM ANGLE  0
ANGLE BEAM THK.  1.000 IN
BSCAN            OFF
↑/↓ TO NAV, MENU/OK TO SELECT  100
  BACK          MEASURE
```

2. Use the up and down arrow keys to select the desired reference value (Default value is 0.025 in) and press **MENU/OK**

3. Press **F1-Back** to exit the screen

Turning API on in the Setup Menu

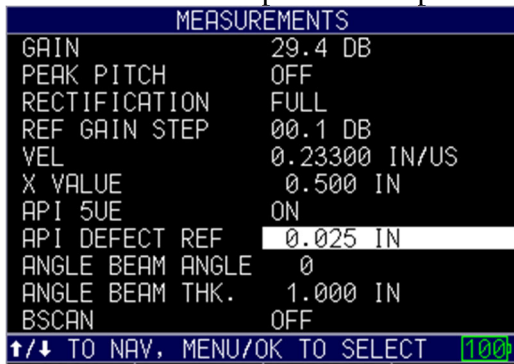Another way to turn API on is by selecting an API setup in *Setup Menu*. The *Setup Menu* has one default API setup "**API5UE-ANGLEBEAM-5MHZ-45-DEG**." Any user created API setups will also appear in the list. Selecting any API setup will turn API on and set some of the required parameters. As an example, Gate1 detection will be set to peak detect and peak memory will be turned on.

```
      FLAW DETECTOR SETUPS
■CONTACT-5MHZ-5-INCH-RANGE
■ANGLEBEAM-2.25MHZ-45-DEG-AWS
■ANGLEBEAM-5MHZ-45-DEG
■DC250 2.25MHZ 5-STP-BLOCK-.1-.5
■DHT-537 5MHZ-5-STEP-BLOCK-.1-.5
■DKS-537 5MHZ-5-STEP-BLOCK-.1-.5
■DK537EE 5MHZ-5-STEP-BLOCK-.1-.5
■DK718 7.5MHZ-5-STEP-BLOCK-.1-.5
■API5UE-ANGLEBEAM-5MHZ-45-DEG
 API USER SETUP *

↑/↓ TO NAV, MENU/OK TO SELECT  100
  MENU    SAVE   DISCARD
```
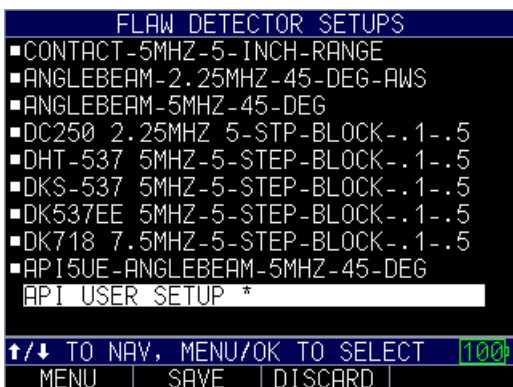
API Calibration

Once the API is ON and we go to measurement screen for first time (Or after selecting different API setup we go to measurement screen) then we see "CAL API" text inn screen heading area, this means we are in calibration mode for API.

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During this mode we are going to generate "K factor", a constant which is used in subsequent calculations.

1. Press F2 "COLLECT" button, and generate an envelope of waveform by scanning(sliding) transducer on calibration target. Check screen 4 example below.
2. Now press F2 "DONE" button to accept the envelope and perform calculations. (screen 5)

   2.1 this step will generate "K" value which will be displayed in prompt message area, (screen 6)

   2.2 also crosses " x " are put on screen to mark the 'Max Amplitude' and two -6dB point on waveform.

   2.3 The API comes out of Calibration mode, notice "CAL API" string disappear.
3. If it's needed to clear the peak memory and start over during or after step one(after clicking COLLECT), then press F3 "CLEAR" button, this will allow to re-create the envelope.
4. User can change the gain and gate settings before pressing DONE key.

User can re calibrate the API by going to "Main Menu" and selecting CALIBRATION as shown in screen 7.
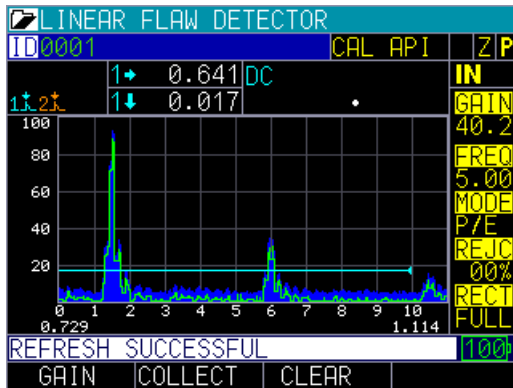
Screen 4: API is in initial mode, ready to COLLECT
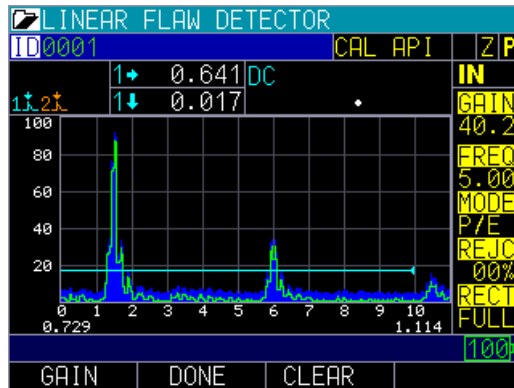
Screen 5: Envelope is created, press DONE to calculate k-factor
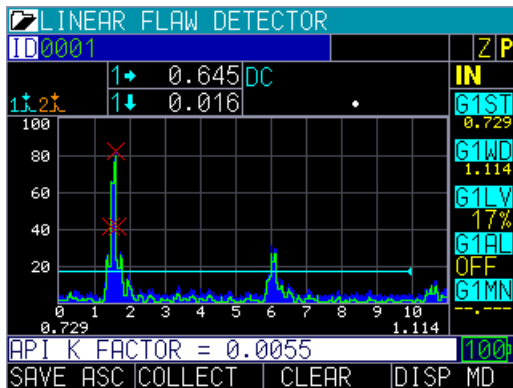
Screen 6: API k-factor is generated, displayed in prompt area
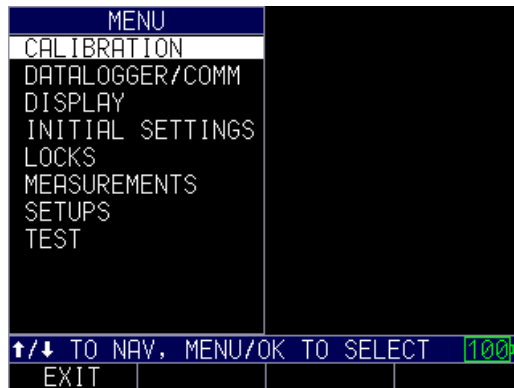
Screen 7: to re-calibrate API

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API Measurement

Once the calibration is done the API is in measurement mode, during this operation we create "Dc" value and display it in Measurement Box1.

the F-Key operations are same as explained in section 3, we use COLLECT button to start creating envelope, press DONE button to accept the envelope and calculate "Dc" value.

F4 DISP: this button would change the measurement screen mode and put the API in initial state (meaning we will have to re-create the envelope)

F1 SAVE/SEND: this will save the latest values in measurement boxes and current A-scan to DL file or send out this value on selected channel (depending on F1 functions selected in DL Menu).
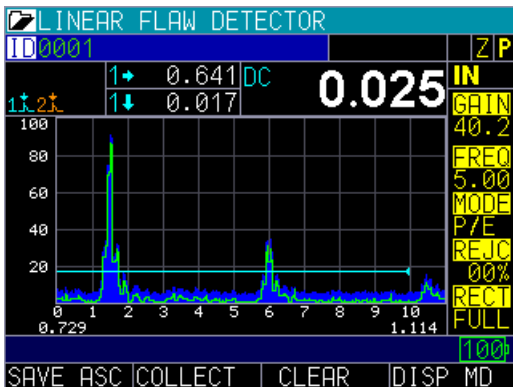
Screen 8: API is in initial mode, ready to COLLECT
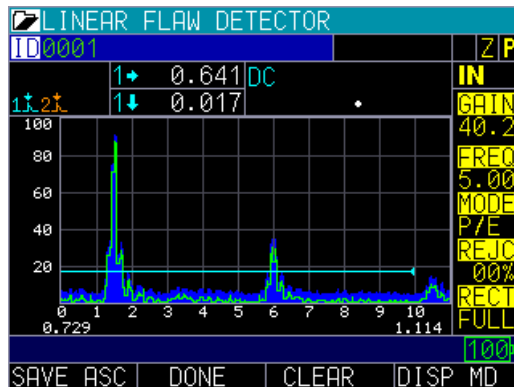
Screen 9: Envelope is created, press DONE to calculate k-factor
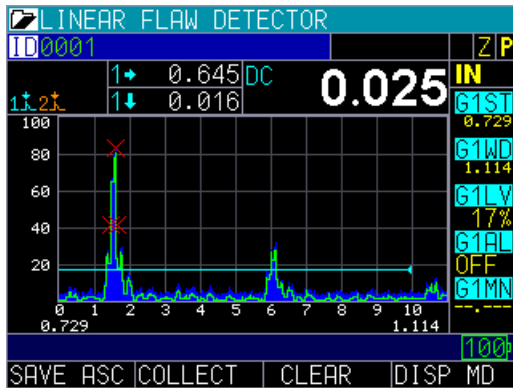
Screen 10: API Dc value is generated

Angle Beam Angle

Angle beam transducers can use a variety of wedges allowing for measurements at different angles.   Common wedge angles are 30, 45, 60 and 70 degrees.

To set the Angle Beam Angle follow these steps:

1. From the *Measurements* menu use the up and down arrow keys to select **Angle Beam Angle** and press the **MENU/OK** key.
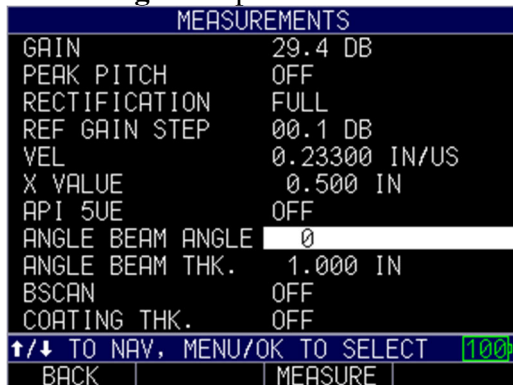
2. Use the up and down arrow keys to select the desired angle beam angle then press **MENU/OK**
3. Press **F1-Back** to exit the screen

Angle Beam Thickness

When making angle beam readings, the thickness of the part must be entered in order to properly calculate the trig functions used to locate defects.

To set the Angle Beam Thickness follow these steps:

1. From the *Measurements* menu use the up and down arrow keys to select **Angle Beam THK.** and press the **MENU/OK** key.

```
            MEASUREMENTS
RECTIFICATION      FULL
REF GAIN STEP      00.1 DB
VEL                0.23300 IN/US
X VALUE             0.500 IN
API 5UE            OFF
ANGLE BEAM ANGLE    0
ANGLE BEAM THK.    1.000 IN
BSCAN              OFF
COATING THK.       OFF
DAC                OFF
FLOATING GATE 1    OFF
↑/↓ TO NAV, MENU/OK TO SELECT  [100]
   BACK    |      | MEASURE |
```
Use the up and down arrow keys to select the desired angle beam thickness then press **MENU/OK**

2. Press **F1-Back** to exit the screen

B-scan

The datalogger versions of ECHO 7, 8, 9 series gages and all ECHO FD gages come standard with the B-scan, which is a side view of the test piece being inspected. The B-scan is a great visual tool to quickly and easily show a representation of wall thinning. The standard B-scan is non-encoded, which means there is no correlation to the image relative to the test piece. Danatronics offers the EZ Scan 6 as a hardware option, which is a magnetic wheel, single axis encoder. When the EZ Scan 6 is used with the ECHO 9DLW or ECHO FD, the image shows the Distance Traveled (DT) so you can correlate the image on the gage to a spot that was tested.

The image below shows a B-scan image of a 5-step test block with both high and low alarms enabled after it stops. The minimum thickness will be shown in the middle of the display. Use the left or right arrow to scroll the B-scan and see the thickness value at the vertical blue line. See the image below for a description of the various visual indicators for the B-scan display.

cursor

Index value

Min alarm line

Max alarm line

Scan direction

B-scan max thickness reference

B-Scan Setup

Use the **B-scan** option to setup a manual or time encoded B-scan.

To turn on B-scan follow these steps:

1. From the *Measurements* menu use the up and down arrow keys to select **BScan** and press **Menu/OK**
2. Use the up and down arrow keys to choose from the available options and press **Menu/OK**
   - *Off:* Disables the B-scan Feature
   - *Manual:* Enables manual, non-encoded B-Scan
   - *Encoded:* Enables encoded B-Scan (requires hardware upgrade and EZ Scan 6 single axis encoder)
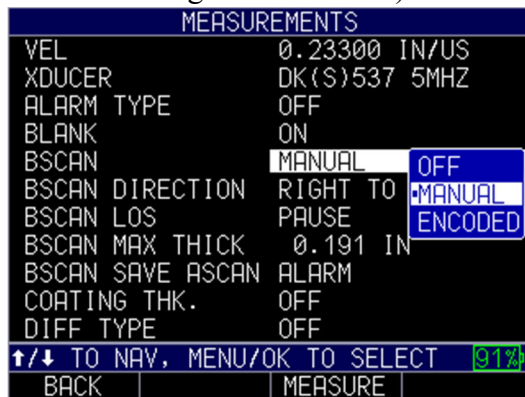
3. The **BScan Direction** menu option will appear. Use the up and down arrow keys to choose from the available BScan directions and press **Menu/OK**
   - *Left to right:* records readings from left to right

- *Right to left:* records readings from right to left

4. The **BScan LOS** menu option will be selected. Use the up and down arrow keys to choose from the available options and press **Menu/OK**

   - *Pause (default):pauses B-Scan until the next stable reading*
   - *Continue: continues recording B-Scan readings including LOS*

5. The **BScan Max Thickness** menu option will be selected. The **Max Thickness** should be set slightly higher than your maximum thickness so that the screen resolution on the vertical axis is maximized. The ECHO defaults to 0.500" or 12.7mm. Use the up and down arrow keys to select a maximum thickness and press **Menu/OK**

6. The **BScan Save AScan** menu option will appear. Use the up and down arrow keys to choose from the available and press **Menu/OK** When alarm is chosen, you can save the B-scan by simply pressing the **F1 - Save** key when in

Measurement mode. The B-scan will be saved to the Datalogger file. Press **F3-Measure** when done to begin making measurements

- *Never:* Never saves readings
- *Min/Max:* Saves the max/min A-Scan reading
- *Alarm:* Saves on alarm

Note: We recommend using either Never or Min because the alarm will fill up the buffer quickly (61 events).

Below are descriptions of the different capacities in which the B-scan buffer can save thicknesses and A-scans.

Save A-scan on Alarm
>   Worst Case:
>   65 A-scans
>   185 thickness readings
>   Best Case:
>   10,000 thickness readings
>   0 A-scans

Save A-scan on Min or Max
>   10,000 thickness readings
>   1 A-scan for the min or max

Never
>   10,000 thickness readings

CAUTION: Saving A-scan on alarm is limited to 65 A-scan and 185 B-scans and can fill up the buffer memory quickly.

Making B-Scan Measurements

When in **Measurement** mode the bottom of the display will read SAVE, START or STOP and CLEAR.   These are used to control the B-Scan image.

- *F1 – Save:* To save all readings, press the **F1 – Save** key. The amount of saved readings up to the file size of 10,000 readings or what was pre-determined in the current datalogger file set up. See Datalogger directory mode for information on setting up a file. Datalogger files for Bscan must be linear files set to thickness only. Each B-Scan represents approximately 200 data points and a thickness + waveform file would be full before one B-Scan screen is complete

> When setting up a datalogger file for B-Scan, file must be a linear file set to thickness only.

- *F2-Start:* To Start a B-scan, couple to the test block and press the **F2 – Start** key. If you uncouple the transducer, by default the B-scan will stop due to LOS - change **BScan LOS** setting in *Measurements menu* to for continuous readings.
- *F2-Stop:* When the **F2 – Stop** key is pressed, the minimum thickness will be displayed in the center of the screen while a vertical cursor allows for review of readings. During review the thickness value is updated in the top right of the display.
- *F3-Clear*: Clears the B-Scan data on the screen
- *F4-Disp MD*: Changes the display mode

B-Scan Display Options

When B-scan is enabled you can toggle between Full B-scan and Split Screen showing A-scan at the top and B-scan at the bottom by pressing the Display mode key (**F4**). By using the left or right arrows in this mode, you can scroll to various real time settings and adjust on the fly:
1. Echo to echo
2. ID
3. Alarm

4. B-scan off
5. Gain
6. Rectification
7. B-scan max range
8. A-scan range

Note: If blank is on under measurement, they would be adjustable as well.
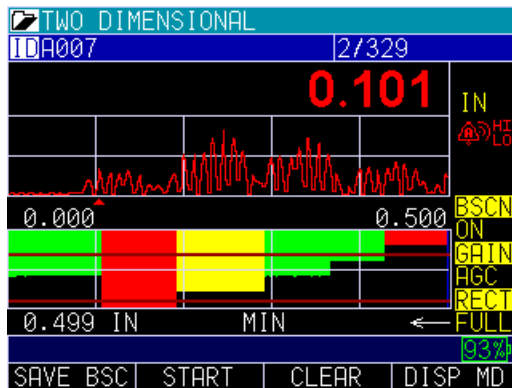
Split A and B-scan

B-Scan File Review

B-scan file saved to the datalogger can be reviewed on the gage.

To review a B-Scan Datalogger File follow these steps:

1. From the **Measurement** screen, press the **Menu/Ok** key to enter the *Main Menu*.

2. Highlight **Datalogger/Comm,** press **Menu/Ok,** then highlight

   Datalogger Dir, then **Menu/Ok.** The Directory list is shown**.** Highlight the file you want to review and press **Menu/Ok**
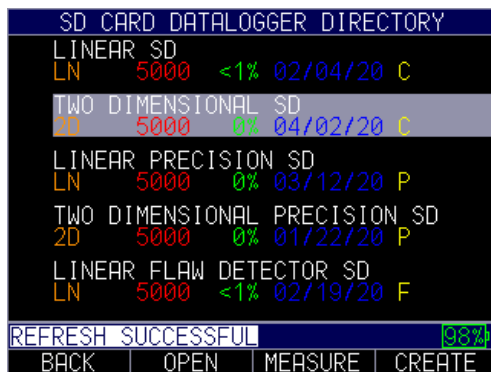
3. Use the up and down arrows to select a function, and press the **MENU/OK** key.
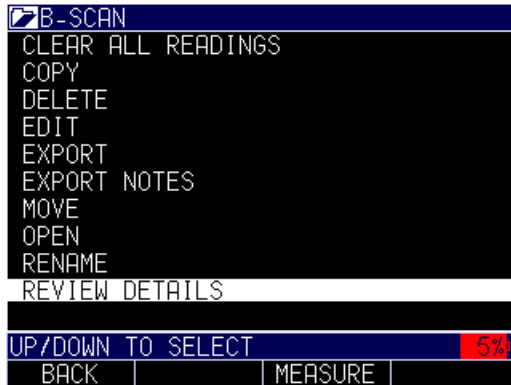
4. Use the up and down arrows to review the file list.   Highlight and press **Menu/Ok** to open a file

   The image below shows the ID where the entire B-scan image is saved; it is indicated by the letter "B" to the right of the file. Press **MENU/OK** to review the image.

5. To review the image, use the left or right arrow key to scroll or use the **F Keys**
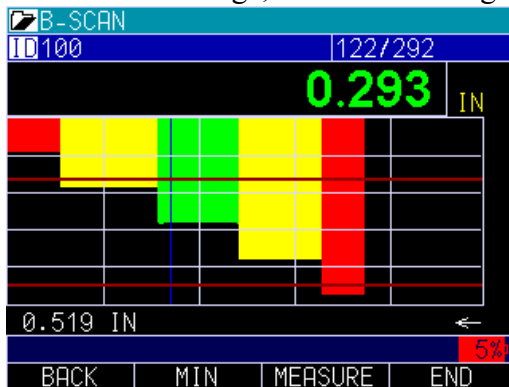
   - *F1-Back:* Exits the file
   - *F2- Min:* Centers the minimum (min) in the middle of the screen
   - *F3-Display MD:* Changes the display mode
   - *F4-Beg/End*: Go to the beginning or end of file. You can also use the left or right keys to move the cursor (triangle) to show the thickness in the top right above the triangle.

Encoded B-scan

The ECHO 9DLW, ECHO 8DLW and ECHO FD can be equipped with the EZ Scan 6, magnetic wheel linear axis encoder with high temperature transducer and pole attachment options. Use of the EZ Scan 6 requires a paid hardware modification to the gage and the purchase of an EZ Scan 6 encoder.   Gages with the EZ Scan connector can not be modified for use with RS-232 connectors.

> **Note:** Use of the encoded B-scan requires a new hardware jack, not initially supplied with your Echo unless otherwise ordered. Also, the extra connector is NOT IP67 rated.

When the Encoder B-scan option is selected from the *Measurement Menu*, select EZ Scan 6, as shown below.
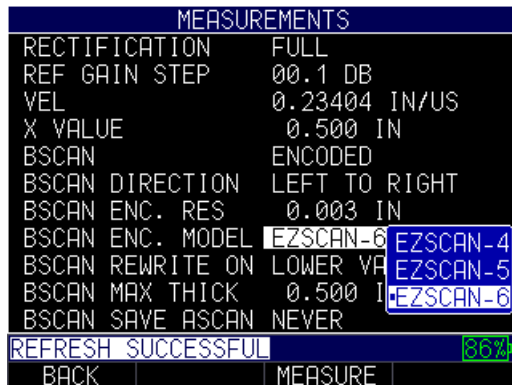
B-Scan Encoder Resolution

The B-Scan encoder resolution can be set to record readings in preset distance intervals when the B-Scan option is set to encoded and the gage is being used with the EZ Scan 6.

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To adjust the Encoder Resolution

1. From the *Main Menu* use the up and down arrow keys to highlight the *Measurements Menu* and press **MENU/OK**
2. Use the up and down arrow keys to select **BScan Enc. Res.** and press **Menu/OK.** If BScan Enc. Res. does not appear in the list, make sure B-Scan is set to encoded.
3. Use the up and down arrow keys to adjust the resolution to the desired distance and press **Menu/OK**
4. Press **F1-Back** to go back or **F4-Meausure** to measure when done

Bscan Rewrite On
When using the EZ Scan 6, the operator can move too quickly for the gage to make a reading, resulting in missing data.   When the operator scans back over the previous area the operator has control over how the data is overwritten.

To set the Bscan rewrite.

1. From the *Main Menu* use the up and down arrow keys to highlight the *Measurements Menu* and press **MENU/OK**
2. Use the up and down arrow keys to select **BScan Rewrite On** and press **Menu/OK.** If **BScan Rewrite On** does not appear in the list, make sure **BScan** is set to **Encoded**.
3. Use the up and down arrow keys to select from the following and press **Menu/OK**
   Lower Value: Only overwrites data if the new value is lower than the previous value
   First Valid Thickness: Overwrites data if new data is a valid reading
4. Press **F1-Back** to go back or **F4-Meausure** to measure when done

CSC (Curved Surface Correction)

Used for angle beam measurements on pipes or other round parts, CSC can be used to adjust for the curvature of the pipe to provide an accurate measurement by adjusting the angular distance, surface distance and depth.

To turn the **CSC** feature on/off, follow these steps:

1. From the *Measurements* menu use the up and down arrow keys to select the **CSC** option. Then press the **MENU/OK** key. If **CSC** is not displaying on the screen check to make sure the angle beam angle has been set
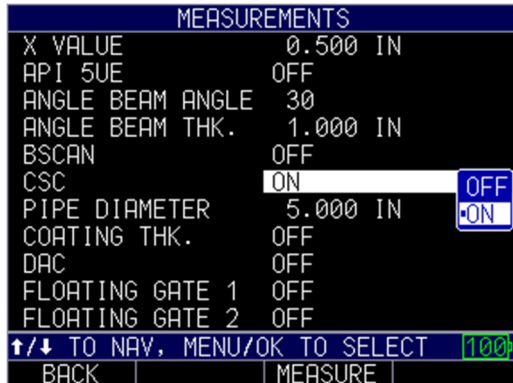
2. Use the up and down arrow keys to chose between the following options:

   - *Off*: Disables the CSC
   - *On*: Enables the CSC

3. Press the **Menu/OK** key to select. **Pipe Diameter** will appear below. Enter **Pipe Diameter** value (instructions below) or press **F1-Back** to exit the screen

Pipe Diameter

When **CSC** is turned on, **Pipe Diameter** will appear. When the pipe diameter is entered, the gage will make **Curved Surface Corrections** based on the curve of the pipe.

To set the Pipe Diameter follow these steps:

1. From the *Measurements* menu use the up and down arrow keys to select the **Pipe Diameter** option. Then press the **MENU/OK** key.
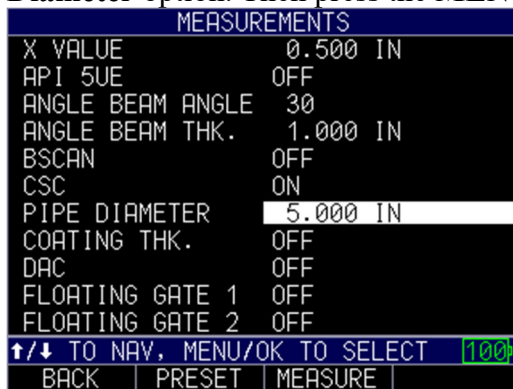
2. Use the up and down arrow keys to select the desired reference value and press **MENU/OK**
3. Press **F1-Back** to exit the screen

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Coating Thickness

For ECHO 9/8 Corrosion gages with waveform (A-Scan) and ECHO FD flaw detectors, the Coating Thickness mode allows you to calibrate and view the coating and substrate thickness simultaneously on the screen without the need for Special transducers.

To using the Coating Thickness mode:

1. From the *Measurements Menu*, using the up and down arrow keys select, **Coating Thickness** and Press **Menu/Ok**.

2. Use the up and down arrow keys to select **On** and press **Menu/Ok**
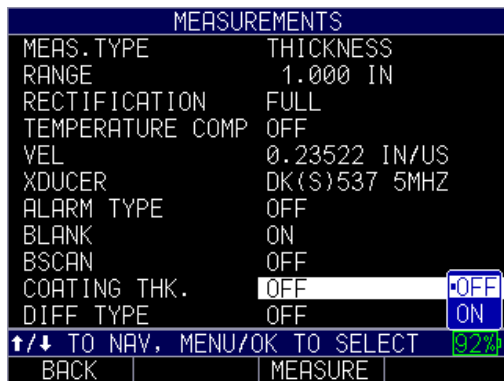
3. **Coating Velocity** will appear under **Coating Thk.** If you know the velocity of the material you can enter/adjust there
4. Press **F1-Back** to exit the *Measurements Menu* and return the *Main Menu.*
5. Use the up and down arrow keys to select **Calibration Man** to begin calibrating the coating and substrate. If you if your calibration type is set to auto, change to manual in the Initial Settings menu before continuing
6. Follow the instructions on screen to calibrate the coating and substrate. The substrate must be calibrated prior to the coating. Press **F2-Substrt** to begin calibrating the substrate

---
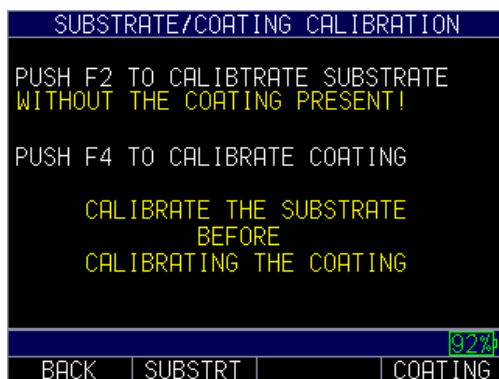
Note: Substrate must be calibrated before the coating

---

7. Make reading on the thin substrate sample and press **F2-ZERO**. Use the up and down arrow keys until the known value and press **F1-CAL**

8. Make readings on the thick substrate sample and press **F3-VEL**. Use the up and down arrow keys to scroll to the known value and press **MENU/OK**

9. The gage will now ask you to calibrate the coating. Make a reading that includes the coating and press **F3-VEL**. Use the up and down arrow keys to scroll to the known value and press **MENU/OK**

10. After Calibration, the measurement screen shows the Substrate and the Coating thickness on the same screen with the coating thickness just above the substrate thickness.

DAC (Distance Amplitude Correction Curves)

The **Distance Aplitude Curve** adjusts for signal amplitude as a function of time. DAC display sthe curve of the detected echos further in time due to normal attenuation

To enable the DAC feature, follow these steps:

1. From the *Measurement Menu*, use the up and down arrow keys to select **DAC Curve**.

2. Use the up and down arrow keys to
   - *Off:* Turns DAC off
   - *On:* Turns DAC on

3. Once DAC Curve is selected, press the **F3-Measure** key to return to the *Measurement* screen. The unit will be in **DAC Curve Creation** mode and the right side of the display will show GATE 1 panel with G1ST highlighted. "DAC" will be displayed at the "CAL" location to indicate **DAC** mode is active (see image below).
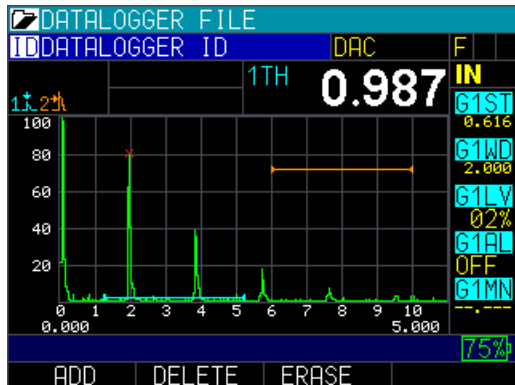
Until DAC Curve is done, the right side panel navigation will not be available; however, you can still navigate parameters by using the left and right arrow keys.

4. Press the **F1 – Add** key to add DAC point to the curve. An "X" will appear on the peak point to indicate the DAC point (see image above). After at least one point is added, the **F2 – Delete** key and **F3 – Erase** key will become available.

   You can select different parameters using the right and left arrow keys, and adjust parameter values by using the up and down arrow keys, which will allow you to move the Gate and to add different points. Note, when a parameter is highlighted, the Function (**F**) keys will be available for editing that specific parameter, but after **DONE** is pressed, the **F** keys will return to **DAC Creation** mode.

5. After adding the 2nd point, the **F4 – DAC DONE** key will appear as an option.
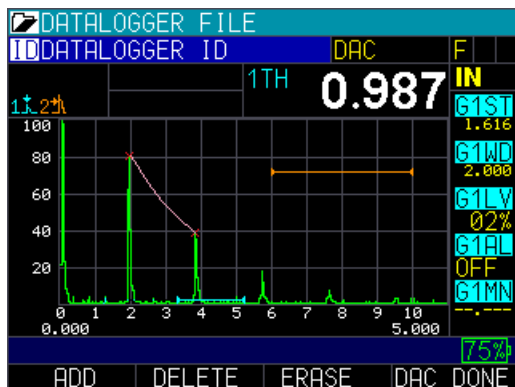
Press the **F4 – DAC DONE** key after adding points to finish DAC Creation. You will notice that the "X" marks will disappear from the screen (shown below).
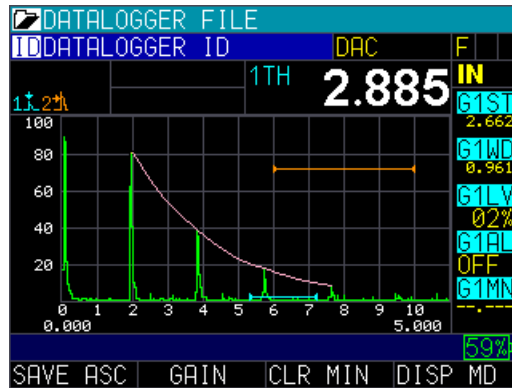
Once DAC curve is created, the DAC panel will be available for DAC gain adjustment, DAC curve selection (for the ASME-3 parameter), and custom curves. When DAC is created, DAC alarm options will become available in the Gate Alarm.

When the DAC feature is disabled, DAC points will be erased from the DAC table and you must create a new DAC when the feature is enabled again; however, DAC will be stored you can recall it from **Setup** mode and Datalogger.

DAC Mode

The DAC Curve can be set up according to recognized standards or a custom setup can be created. The DAC curve is your reference and you build the curve based on the amplitude of the same sized flaw further out in time.   The further the defect is from the transducer, the lower the amplitude, so the gage adjusts --- Anything below the DAC curve it is relayed as smaller than the reference if above the DAC higher than the reference

To choose the **DAC Mode**, follow these steps:

1. From this *Measurements Menu*, select the **DAC Mode** option, and press the **MENU/OK** key.
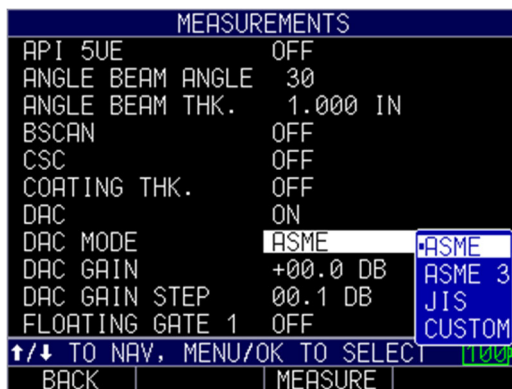
2. Use the up and down arrow keys to choose from the following parameters:
    *   *Off:* Turns DAC off
    *   *ASME:* Creates a single DAC curve based on ASME standards
    *   *ASME-3:* Creates 3 DAC curve based on ASME standards. Sometimes called a triple DAC
    *   *Custom:* Allows for user input of RL, SL and EL gain WHAT ARE THESE?
    *   *JIS:* Creates DAC curve based on Japanese Industrial Standards with curves at +6dB, 0dB, -6dB, -12dB.
3. Press the **MENU/OK** key or the **F1 – Back** key to exit the screen.

DAC Gain

DAC Gain allows you to increase the Gain of a smaller signal and the DAC curve, so you don't have to reset the curve. When you increase Gain, both the Curve and signal increase at the same time.

1. From this *Measurements Menu*, select the **DAC Mode** option, and press the **MENU/OK** key.
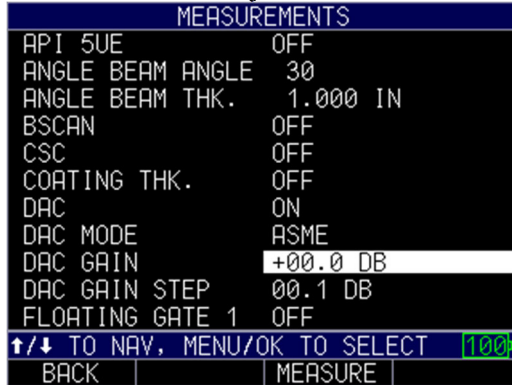
```
            MEASUREMENTS
 API 5UE            OFF
 ANGLE BEAM ANGLE   30
 ANGLE BEAM THK.    1.000 IN
 BSCAN              OFF
 CSC                OFF
 COATING THK.       OFF
 DAC                ON
 DAC MODE           ASME
 DAC GAIN           +00.0 DB
 DAC GAIN STEP      00.1 DB
 FLOATING GATE 1    OFF
↑/↓ TO NAV, MENU/OK TO SELECT  100
    BACK      |      | MEASURE |
```

2. Use the up and down arrow keys to select the DAC Gain value
3. Press the **MENU/OK** key or the **F1 – Back** key to exit the screen

DAC Gain Step

DAC Gain Step is the preset increment the DAC gain (db) will be adjusted by

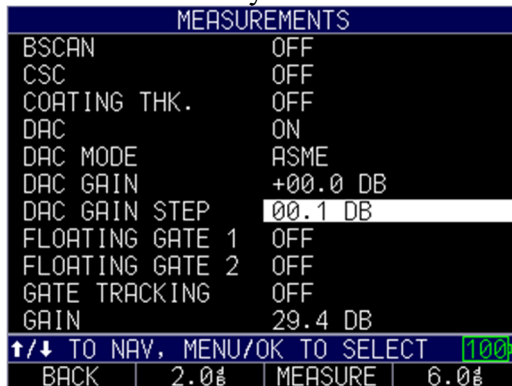1. From this *Measurements Menu*, select the **DAC Mode** option, and press the **MENU/OK** key.

```
            MEASUREMENTS
 BSCAN              OFF
 CSC                OFF
 COATING THK.       OFF
 DAC                ON
 DAC MODE           ASME
 DAC GAIN           +00.0 DB
 DAC GAIN STEP      00.1 DB
 FLOATING GATE 1    OFF
 FLOATING GATE 2    OFF
 GATE TRACKING      OFF
 GAIN               29.4 DB
↑/↓ TO NAV, MENU/OK TO SELECT  100
    BACK   | 2.0↕ | MEASURE | 6.0↕
```

2. Use the up and down arrow keys to select the DAC Gain value
3. Press the **MENU/OK** key or the **F1 – Back** key to exit the screen

Floating Gates (Floating Gate 1 and Floating Gate 2)

Floating gates help making consistent edge depth thickness reads while scanning at a 60htz update rate. The floating gate varies the level of the gate relative to the peak of the signal.

To turn the **Floating Gates** on/off, follow these steps:

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1. From the *Measurements* menu use the up and down arrow keys to select the
   Floating Gate to be changed. **Floating Gate 1** and **Floating Gate 2** are available
   options. Then press the **MENU/OK** key.

2. Use the up and down arrow keys to chose between the following options:
   - *Off*: Disables the Floating Gate so it does not appear on the measurement
     screen
   - *On*: Turns the **Floating Gate** on so it will appear on the measurement
     screen

3. Press the **Menu/OK** key to select.

4. **Floating Gate Level** will appear below. Enter the **Floating Gate Level**
   (instructions below) or press **F1-Back** to exit the screen

Floating Gate Level

The floating gate level can be set from -1db to -19db. Most users set at 6db (half
amplitude)

1. From this *Measurements Menu*, select **Floating Gate Level**, and press the
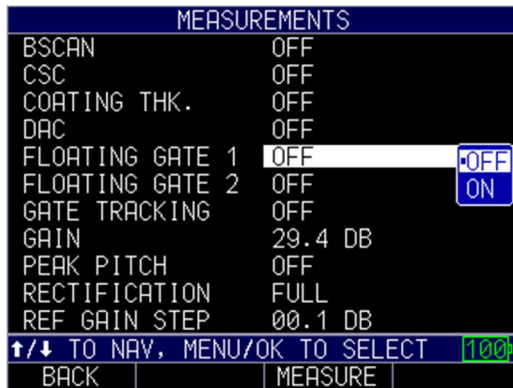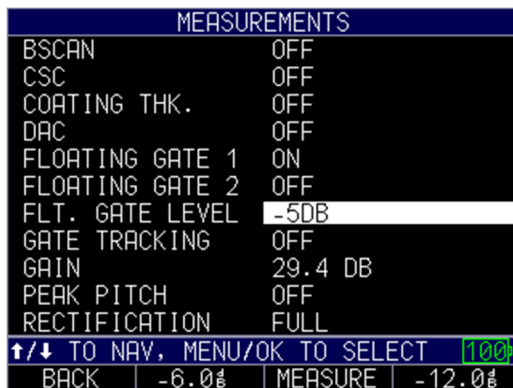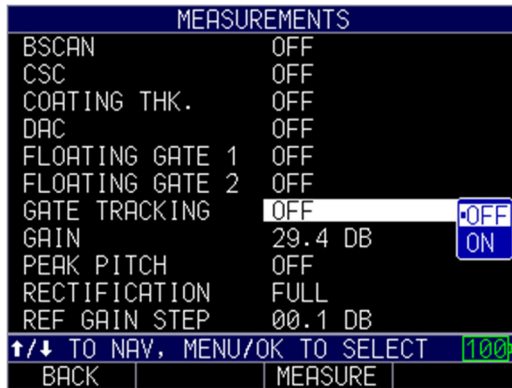   **MENU/OK** key.

2. Use the up and down arrow keys to enter the **Floating Gate Level**
3. Press the **MENU/OK** key or the **F1 – Back** key to exit the screen

Gate Tracking

Gate Tracking sets the position of the second gate as an offset from the first gate so they will move in tandem with one another.

To turn the **Gate Tracking** on/off, follow these steps:

1. From the *Measurements* menu use the up and down arrow keys to select **Gate Tracking** and press **Menu/Ok**

2. Use the up and down arrow keys to chose between the following options:
   - *Off*: Disables **Gate Tracking**
   - *On*: Enables **Gate Tracking**
3. Press the **Menu/OK** key to select and **F1-Back** to exit the screen

Setting Gate Alarms

ECHO FD has 2 independent color-coded gates. Gate 1 is light blue and Gate 2 is tan. You can make Gate 2 inactive, but never Gate 1. To make Gate 2 inactive, simply use the right or left arrow key and press the **F4 – Next** key until the tan colored Gate 2 prompts are on the right side of the screen. Press the **F3** key to activate this option again.

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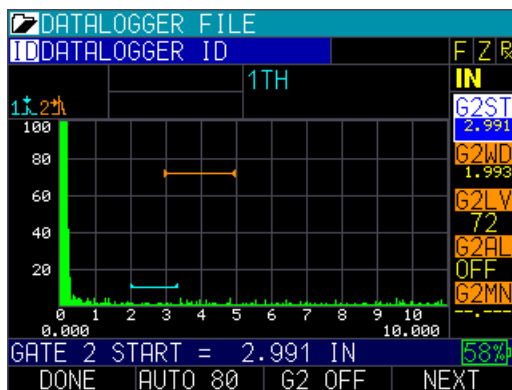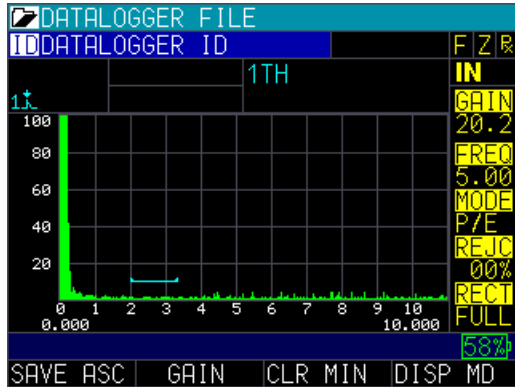
There are several options to choose from when using the gates to set alarms. Each gate can be set to the following parameters:
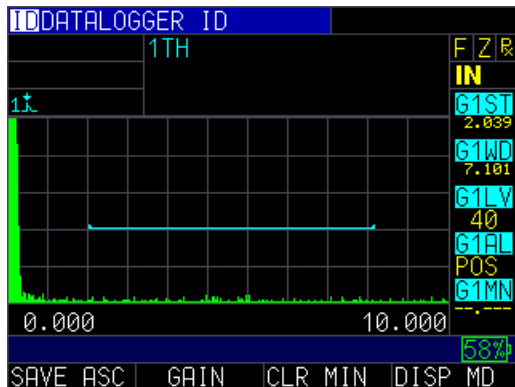
- OFF
- Positive
- Negative
- Minimum depth alarm

Positive Gate Alarm

To set a Positive Gate Alarm, highlight G1AL. The arrows on the start and end of the gate will be positive facing line as shown in the image below:

When an echo breaks into the gate, it will cause the waveform to light up red. Note, this color red is independent of A-Scan colors. **Alarm colors take priority over other colors as well as the F1 key, which lights up red.**

Also, if the vibrate or beeper parameters were set to ON, the unit will also beep and vibrate if an alarm occurs. Setting the vibrate option to ON is a good choice for loud environments.

Negative Gate Alarm

Set a Negative Gate Alarm to monitor when an echo has dropped out of a gate. Typically you would set Gate 1 Positive to look for a flaw and Gate 2 Negative to monitor a back wall echo.
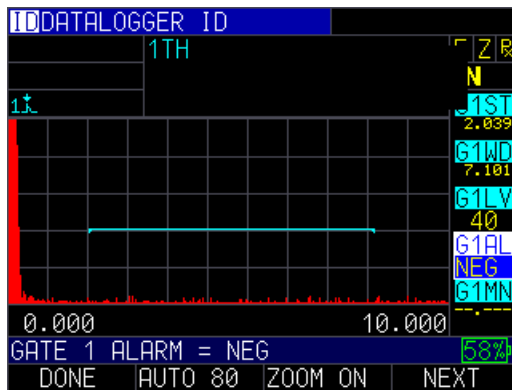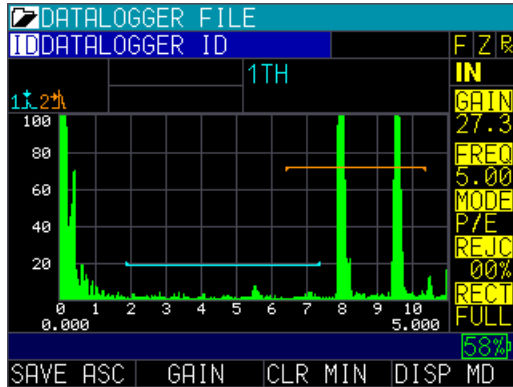

Minimum Depth Alarm

When the minimum depth alarm is set, you can see a small triangle of where the alarm is and the G1 MIN value of 4.705 INCH, as shown in the image below:
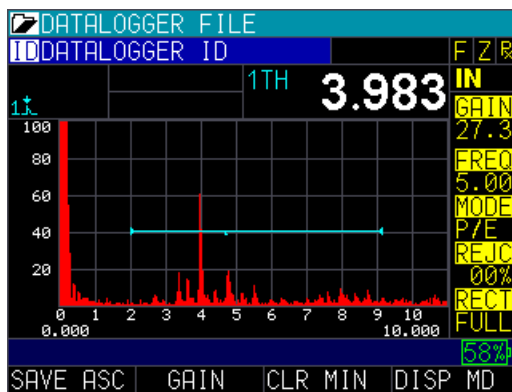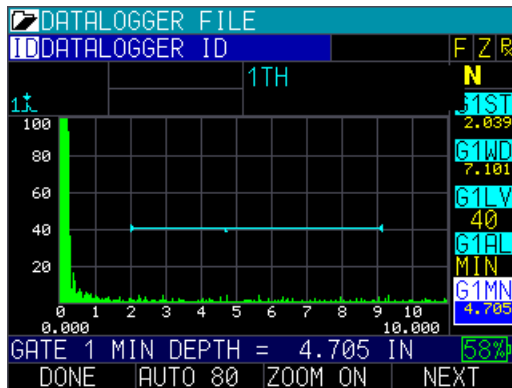
Below is an example of Gate 1 Positive and Gate 2 Negative:

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Gain

Gain refers to an increase in signal power (echo height) and is typically measured in decibels (dBs). The Gain feature is useful for setting a reference level where by making it easier to add or subtract gain.

To set the **Gain** option, follow these steps:

1. Use the up and down arrow keys to select the **Gain** option.
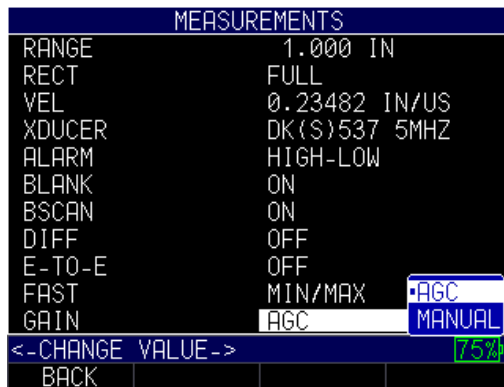
2. Use the up and down arrow keys to toggle between the following two settings.
   - *AGC (Auto Gain Control)*: When in **AGC** mode, the gage will use its sophisticated algorithms to automatically set the gain to the desired height. If echoes are not being detected but are somewhat visible, try increasing or decreasing the gain as described above. Use the **F2** key to adjust from 20 dB or 94 dB.
   - *Manual*: When in **Manual** mode, gain adjustment can be set to low, std, and high representing a 3 dB change in each for the ECHO 9 (and the ECHO 9DL)
3. When finished, press the **F1 – Back** key to exit the screen.

You can also adjust the gain for waveform gages from the live A-scan. To adjust gain during a live A-scan, press the right or left arrow keys until the gain is highlighted, then use the up or down arrow, or the **F2** key, to return to AGC. Press the **F1** key when done. For the ECHO 9 or DL version, you can adjust the gain in the same manner or by using the *Measurement* screen.
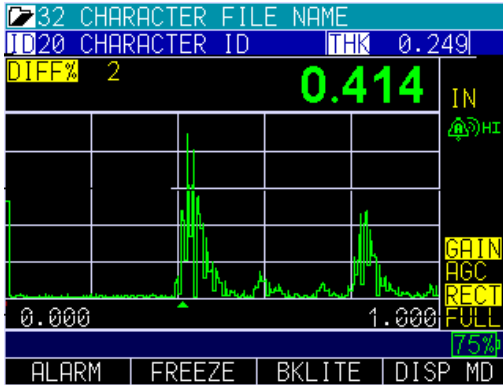
Peak Pitch Memory

Peak Pitch Memory is used for angle beam measurements and produces a chip that alerts the user when a signal has been peaked. To peak the signal, the operator moves the probe back and forth viewing the signal to determine the point at which the signal has been peaked by looking at the current amplitude of the signal or by using peak memory which holds onto the outline of the peaked signal.

To turn the **Peak Pitch** feature on/off, follow these steps:

1. From the *Measurements* menu use the up and down arrow keys to select the **Peak Pitch** option. Then press the **MENU/OK** key.
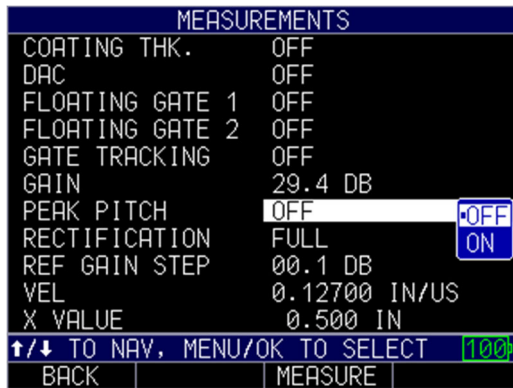
2. Use the up and down arrow keys to chose between the following options:
   - *Off*: Disables Peak Pitch
   - *On*: Enables Peak Pitch

3. Press the **Menu/OK** key to select then press **F1-Back** to exit the screen

Note: **Beeper** must also be turned on in the *Initial Settings Menu*

When you return to the measurement screen, the display should show a PH in the top right corner of the screen.

Rectification (Rect)

The **Rect** option will vary the way in which the echoes are shown on the waveform display. Rectification does not affect the thickness measurement in any way. There are four options available.

To set the **Rect** option, follow these steps:

1. Use the up and down arrow keys to select the **Rect** option and press the **MENU/OK** key.
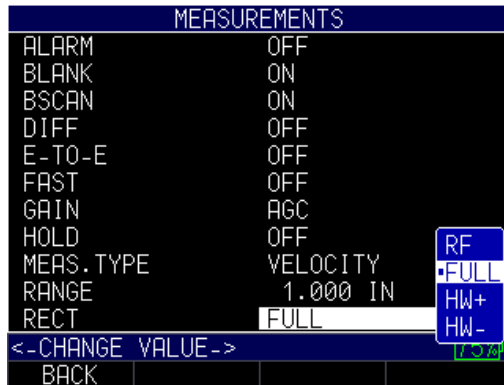
2. Use the up and down arrow keys to select the settings you wish to change.

   RF: Both positive and negative lobes are displayed in the RF waveform, which the gives the greatest overall representation of position for more applications.
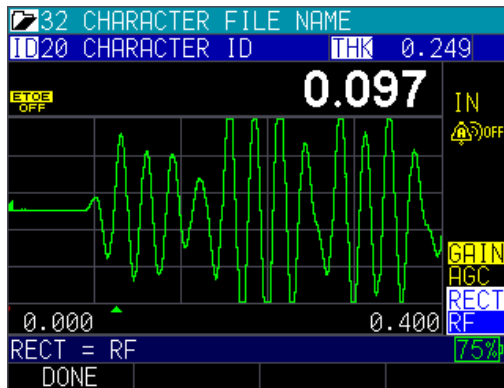
   Full: Displays the negative section of the echo folded around the baseline so that both the positive and negative lobes are shown.
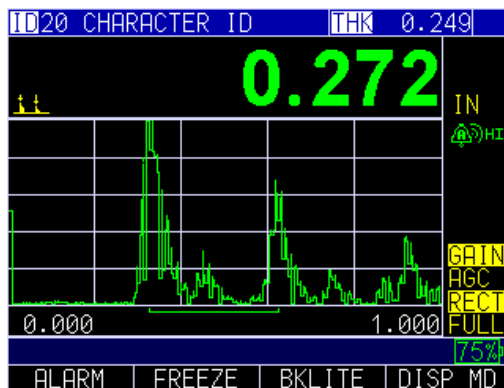
HW+: Displays the positive lobes, but not the negative lobes. An indicator is shown on the gage.
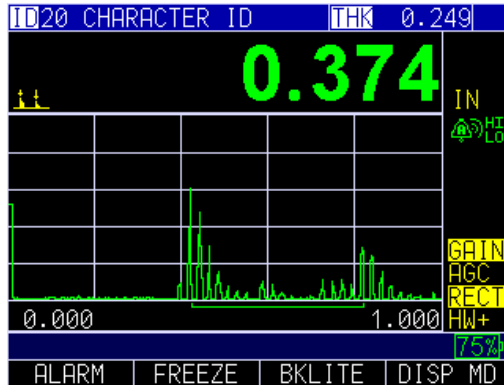
HW-: Displays the negative echo lobes as positive and does not show the positive lobes at all. An indicator is shown on the gage.
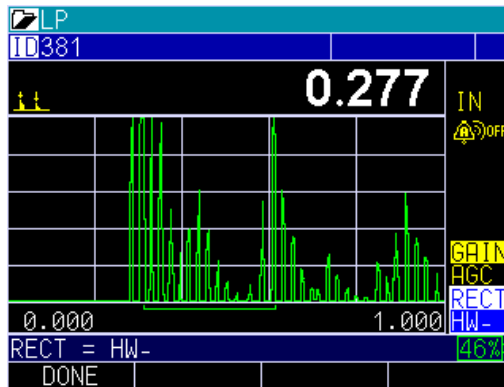
3. When finished, press the **F1 – Back** key to exit the screen.

Ref Gain Step

Some procedures require you peak a signal on a given reflector by peaking the signal to 80 full screen height (FSH), for example. This is easy to do by gating the signal and pressing the **F2 – Auto 80** key. Once this done, some codes will dictate how much scanning gain should then be added for inspecting parts in the field to account for attenuation, scattering, and surface condition. If your code and procedure stated to add +14 dB of scanning gain, this can also be done by pressing the function key for **REF ON** and using the up arrow key to +14 dB as shown in the image below:

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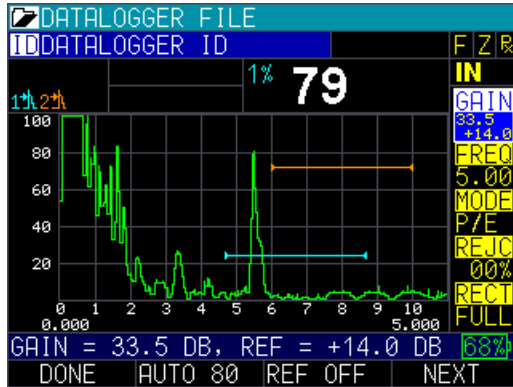
Setting the Ref Gain Step can be achieved by following these steps:

1. Press the **MENU/OK** key and use the arrow keys to select the **Measurement** option.
2. Use the arrow keys to select the Ref Gain Step option.
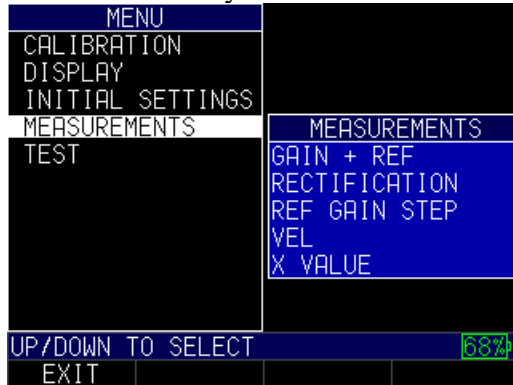
3. Set the Ref Gain Step from 0.1 dB to the total system gain (Ref Gain plus Scan Gain).

   In the example below, the Ref Gain Step parameter was turned on after the dB step was set to 6 dB. This means that after pressing gain, each up or down setting to gain, the gain will change by the step size of 6 dB.
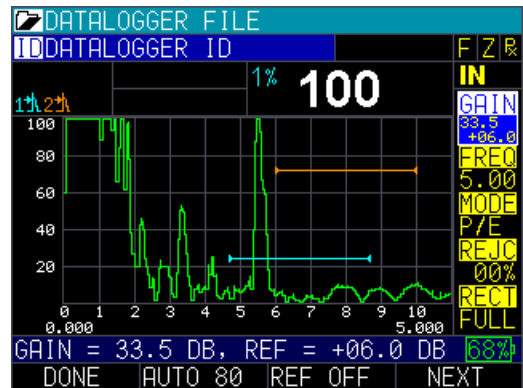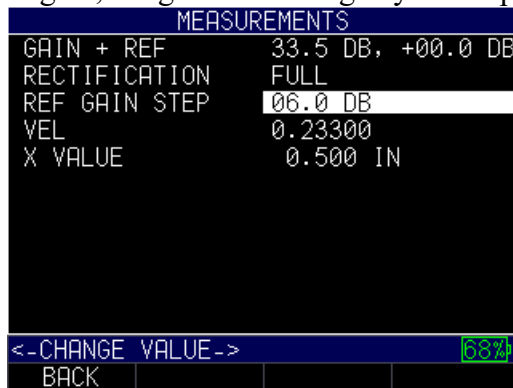
Velocity (VEL)

You can enter the range of velocity depending on your measurement needs and calibration by using the **Velocity** option.

To set the **Velocity** option, follow these steps:

1. Use the up and down arrow keys to select the **Velocity** option and press **MENU/OK** key.

```
             MEASUREMENTS
 FLOATING GATE 2   OFF
 GATE TRACKING     OFF
 GAIN              29.4 DB
 PEAK PITCH        OFF
 RECTIFICATION     FULL
 REF GAIN STEP     00.1 DB
 VEL               0.12700 IN/US
 X VALUE           0.500 IN
 API 5UE           OFF
 ANGLE BEAM ANGLE  30
 ANGLE BEAM THK.   1.000 IN
 ↑/↓ TO NAV, MENU/OK TO SELECT   100
    BACK      |       | MEASURE |
```

2. Use the up and down arrow keys to scroll through the options ranging between 0.04000 IN/US – 0.60000 IN/US.

3. When finished, press the **F1 – Back** key to exit the screen.

X-Value

Setting the **X-Value** physically marks the distance from the front of the wedge to the BIP (Beam Index Point).

To enter the **X-Value** into the unit, follow these steps:

1. Press the **MENU/OK** key and use the arrow keys to select the **Measurement** option.

2. From the measurements menu, use the arrow keys to select **X-value** and press **Menu/OK.**
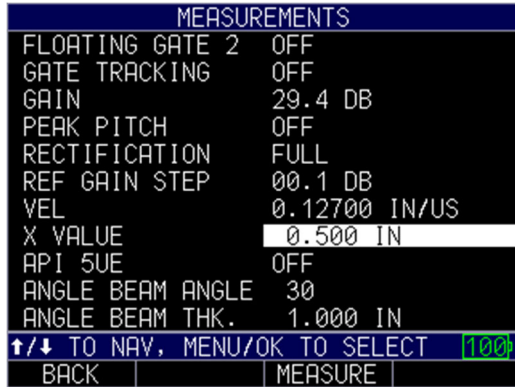
3. Enter the X-Value parameter.
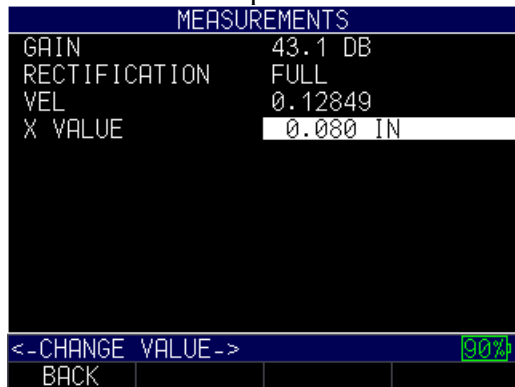
4. In the pull down menu of the measurement box, you can then choose Gate 1
   Surface Distance (-X) as shown below:
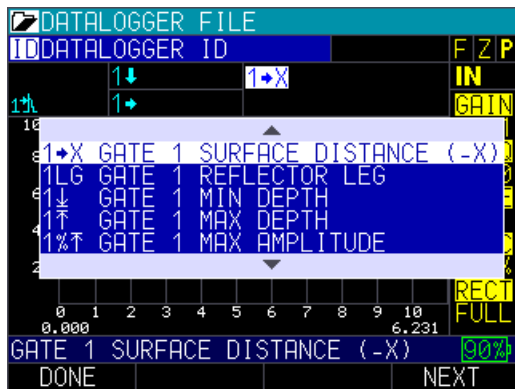
9 Test

The **Test** option is designed to perform one or many internal tests on the gage to make sure it is running optimally. The **Test** option is found under the *Menu* settings.

To perform a **Test**, follow these steps:

1. From the *Home* screen, press the **F1 – Menu** key.
2. Use the up and down arrow keys to select the **Test** option and press the **MENU/OK** key.
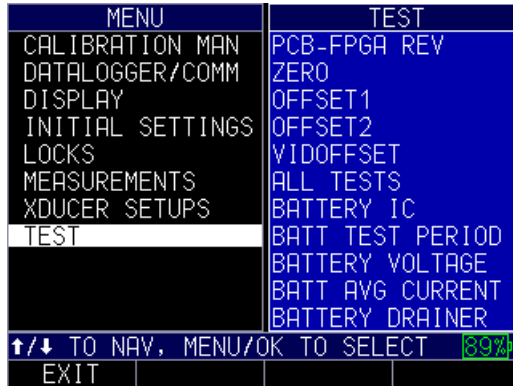
3. Use the up and down arrow keys to scroll through the tests in which you would like to select.
4. Press the **MENU/OK** key once you have selected the test you wish to perform.
5. When finished, press the **F1 – Back** key.

10 Special Gage Functions

The ECHO series thickness gages have many special functions that go beyond the basics. This section will discuss these special gage functions in detail.

Display Size Options

The gage provides four different reading sizes on the display depending on your preference and operation environment. The images below show how each display will appear on your gage from smallest to largest display option.

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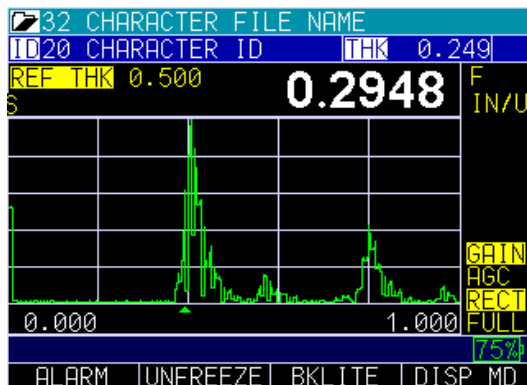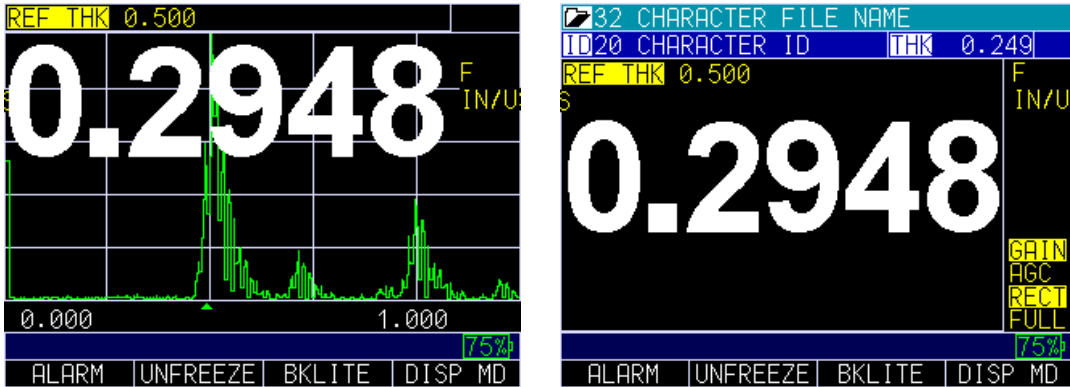
To change the display size when making a thickness reading simply press the **F4- Disp MD** key until you are satisfied with the selection.

Freeze

For the datalogger version and non-datalogger version thickness gages, you can freeze your data via the **Freeze** option.

To use the **Freeze** option, follow these steps:

1. From the thickness measurement screen, press the **F2 – Freeze** key.
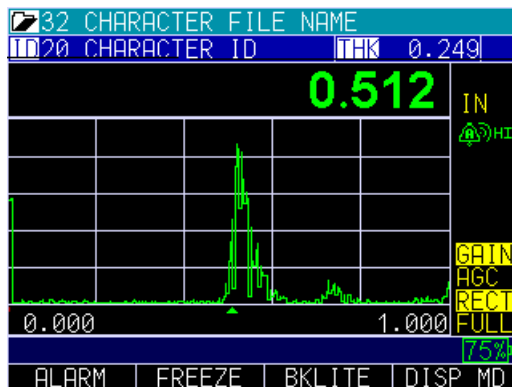
The following screen is display whereby showing the "F" flag next to the thickness reading. You are now in **Freeze** mode. The **F2** selection changes from **Freeze** to **Unfreeze**. While in **Freeze** mode, the menu options are disabled.
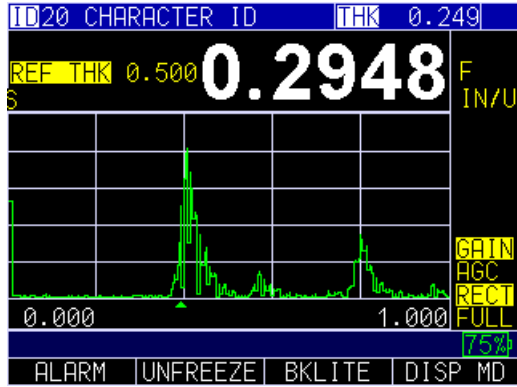
2. Press the **F2 - Unfreeze** key to disable **Freeze** mode.

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11 Exporting and Updating with DataXL and DataXL Mobile

DataXL

DataXL is Danatronics free PC based interface program used to update gage software and send/receive datalogger files on your computer. When used with a gage with datalogger, Data XL saves readings to .csv files that can be used in any spreadsheet program such as Microsoft Excel or Google Sheets. For gages without a datalogger, DataXL is used to update your software to the latest release so you can stay updated on the latest features. DataXL is also used to interface with Ultrapipe.

Downloading and Installing DataXL
Before you can install DataXL you will need to download the file. The DataXL installation file can be found on the resources tab of our DataXL page (https://www.danatronics.com/dataxl) or on the resources tab of any of our ECHO series models.

To Install DataXL follow double click the installation file and follow the on screen instructions.

DataXL Installation Troubleshooting

If problems arise when installing DataXL that are not covered below, please call us at 978-777-0081

<u>Windows Defender Smart Screen</u>

Sometimes Windows Defender SmartScreen will appear when the Data XL installation file is opened.

If that happens follow these steps:

1. Click the **More Info** button on the screen

2. Click the **Run Anyway** button to continue with installation.
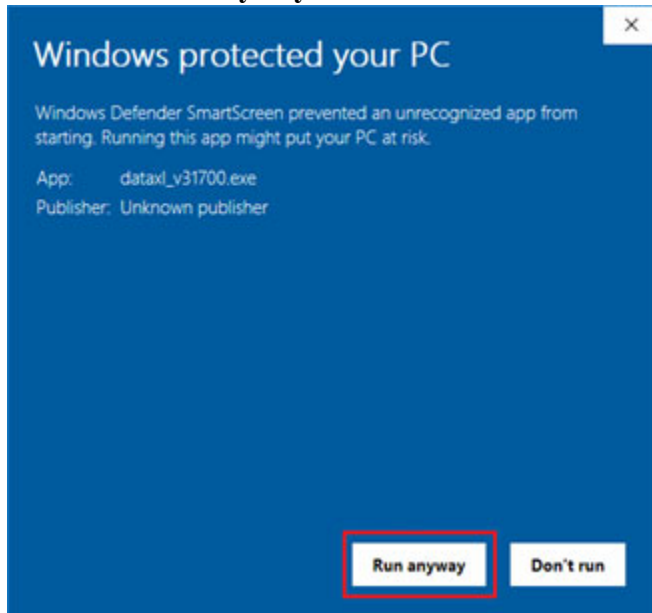
3. Click the **Next** button to select the default folder for Data XL to be installed into.
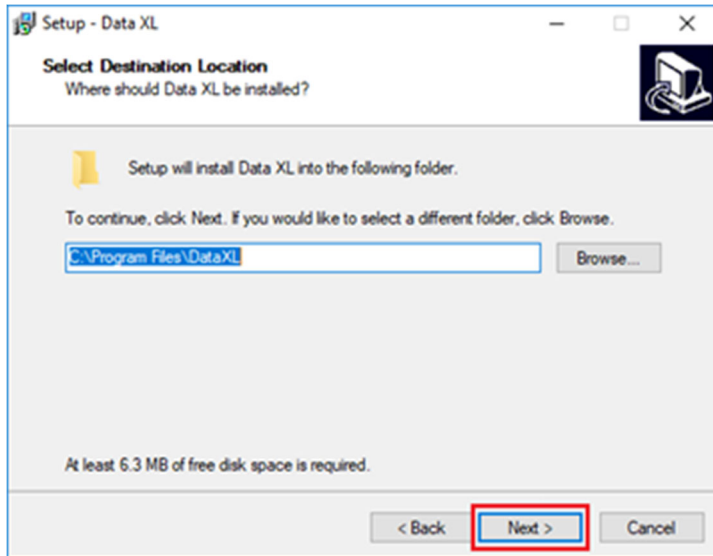
4. Click the **Next** button (1d below) to allow a shortcut to be installed in the Start Menu.
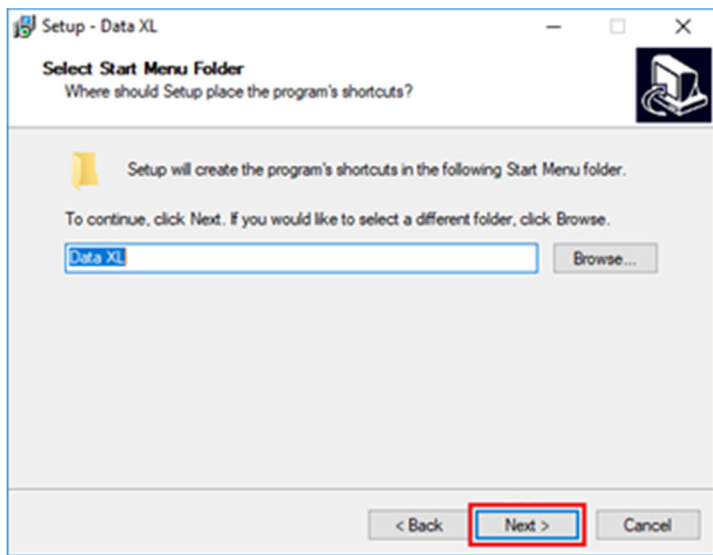
5. Click the **Install** button (1e below) to commence with the installation of Data XL.
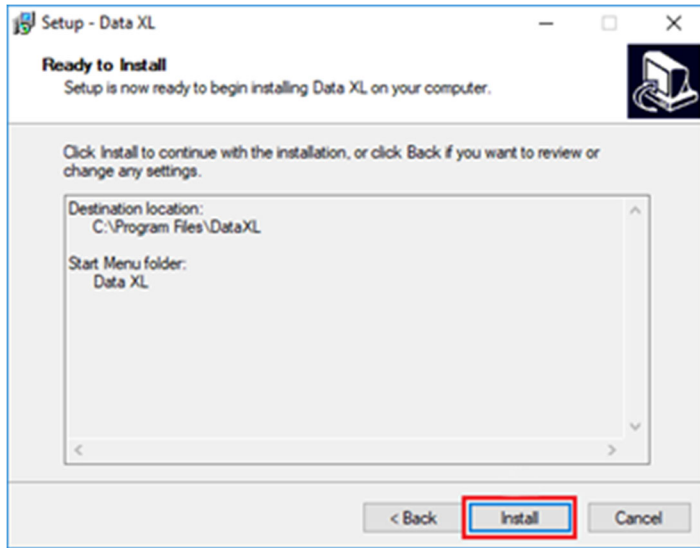
6. Once the installation is completed click the **Finish** button (1f below). Data XL is now installed on the computer.

Danatronics, Corp.
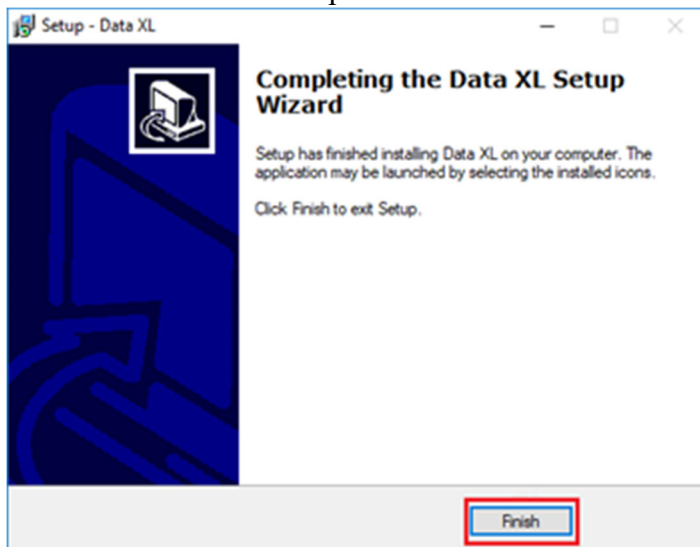
Setup File Failure to Launch

In some instances the Windows OS may block the DataXL setup file from ever launching. This is also done silently so the user has no indication as to why the file fails to launch.

To check for this issue and correct it follow the below steps.

1. Right click on the setup file.
2. Click on Properties
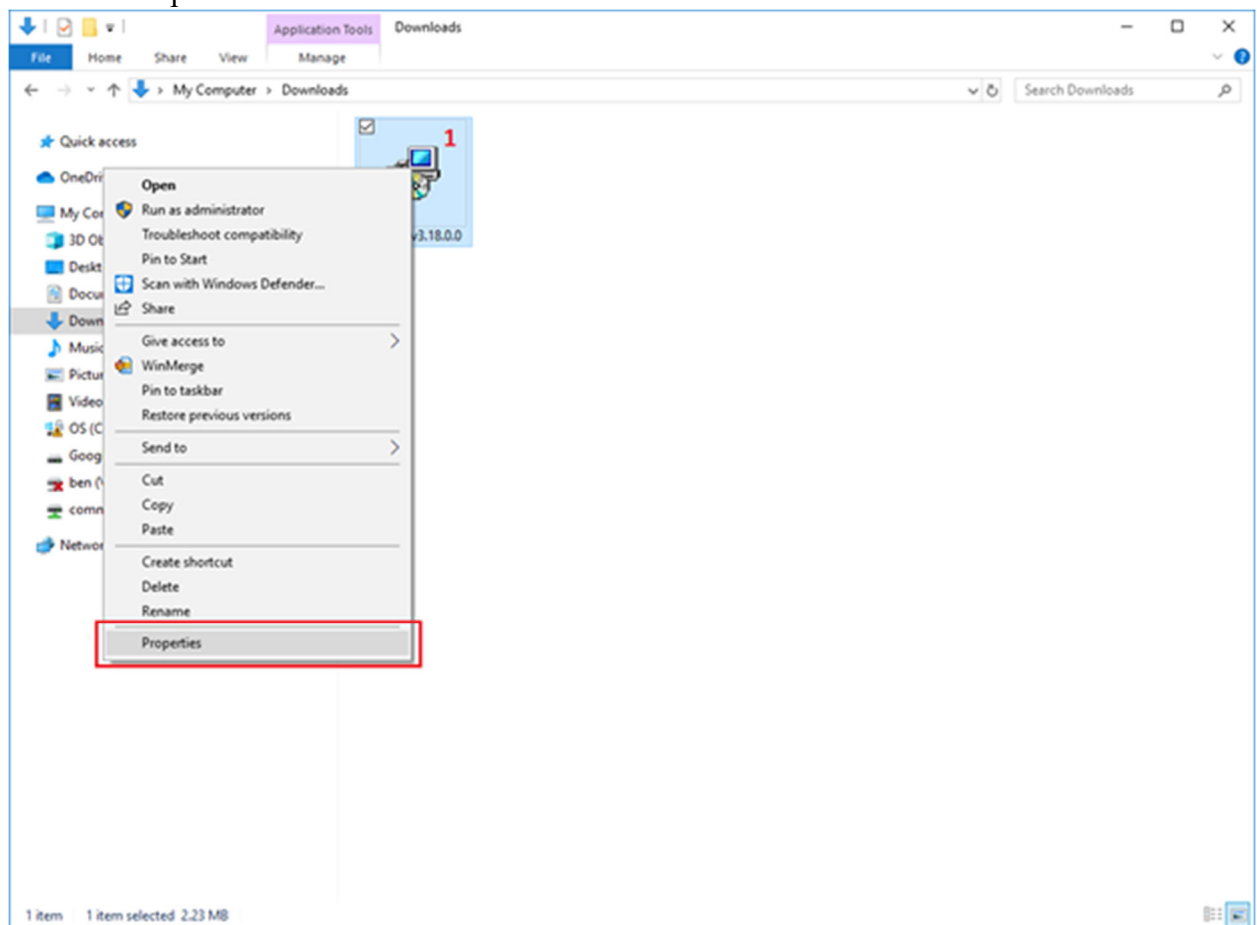
3. If the Security section is present in the project properties click the Unblock checkbox.
4. Click the OK button to accept the changes.
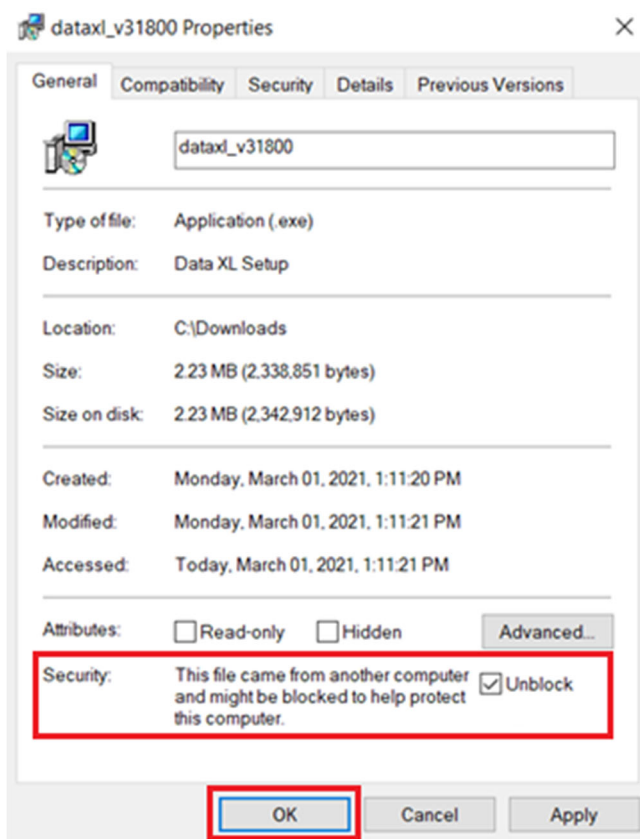
5. Launch the installation file again and it should run.

Updating ECHO Software

Danatronics periodically releases software updates with new and improved gage functionality and features. These software updates are free and available for download on our website (http://www.danatronics.com). The current ECHO series software file can be found on the resources tab of any of our ECHO series product pages (ECHO 9, ECHO 8, ECHO 7, ECHO FD).

The following items are require in order to update ECHO software:

- An ultrasonic thickness gage (ECHO 7, ECHO 8, ECHO 9, or ECHO FD)
- Mini B USB cable
- A Computer with Windows XP, 7, 8 or 10 operating system
- Data XL Software installed on PC

Use the most recent version of Data XL to upgrade your gage software.

To update an ECHO gage, follow the below steps:

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1. Power on the ECHO Series gage by holding the **F1** key until the unit beeps and displays the splash screen.

2. Connect the ECHO Series gage via a USB cable to a computer that already has Data XL software installed on it.

3. Launch Data XL software.

4. Click the **Software Upgrade** tab (3a in below image) located in the upper portion of Data XL.

5. Click the **Select File To Download** button (3b in below image), which will launch an open file dialog box. Select the file to update the ECHO Series gage. (In the example below, the file **Echo v.0.0.12f.bin** was chosen.)

6. Click the **Start Download** button (3c in below image), which will commence with the software update. The ECHO gage should display the message "**Launching Update**" on the screen. Shortly after, the update program will proceed to update the gage. Once the update is complete, the screen will display a message to "**Unplug USB cable to turn off power**". At this point, the software update process is completed.
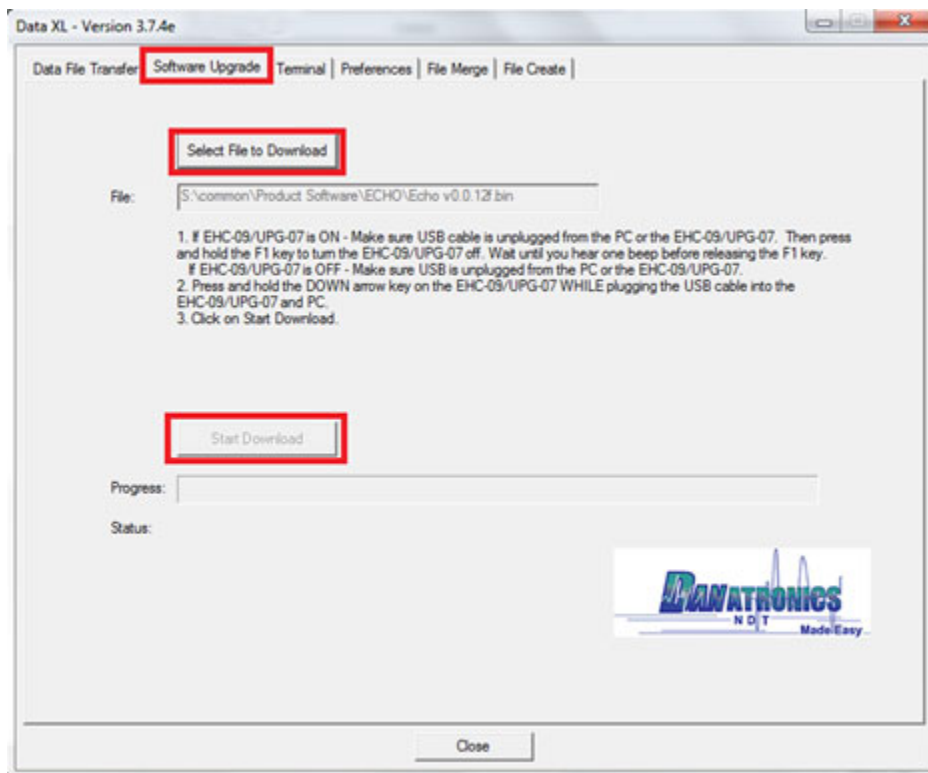
Sending and Receiving Files

ECHO gages with the datalogger feature (-DL and -DLW versions) can send and receive files between the gage and Windows Computers

The following items are require in order to export/import files:

- An ultrasonic thickness gage (ECHO 7, ECHO 8, ECHO 9, or ECHO FD)
- Mini B USB cable
- A Computer with Windows XP, 7, 8 or 10 operating system
- Data XL Software installed on PC

Sending files to ECHO Gages

ECHO gages are able to accept .CSV datalogger files created in spreadsheet programs like Excel.

To import files from a gage, follow these steps:

1. Power on the ECHO Series gage by holding the **F1** key until the unit beeps and displays the splash screen.

2. Connect the ECHO Series gage via a USB cable to a computer that already has Data XL software installed on it.

3. Launch Data XL software.

4. The files that are present in the computer will appear in the right side file list in the "Host PC" area. Select the file you wish to export to the computer by left clicking it once.

5. Click the "<< Transfer <<" button to send the file from the pc to the computer. The imported file will now appear on the left side file list in the "Gage" area. The file will now appear on your gage

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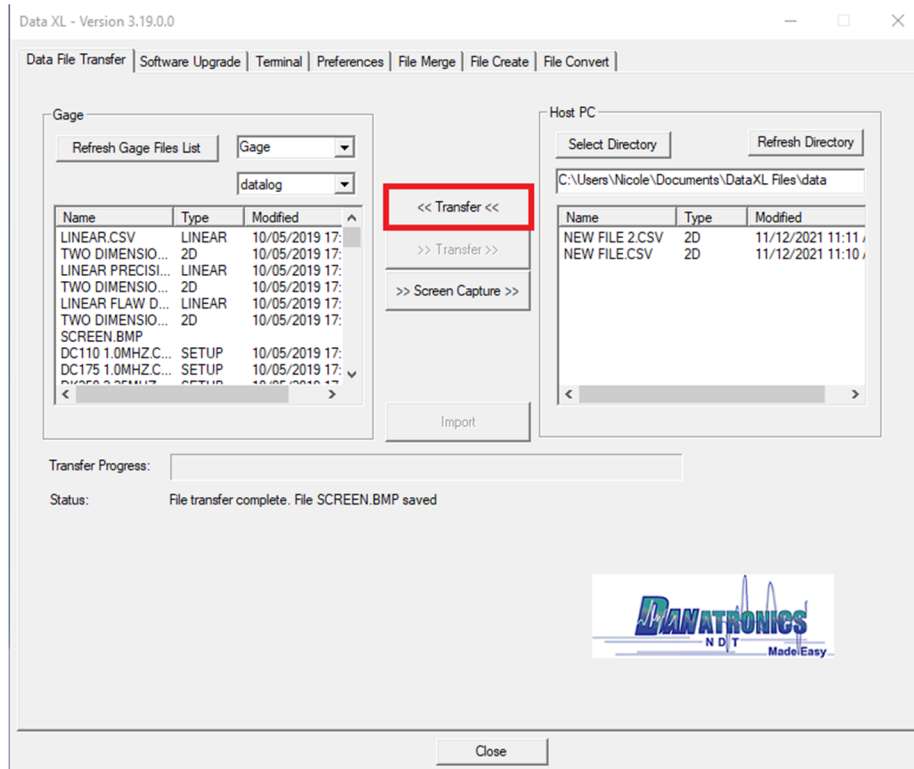
Exporting files from ECHO Gages

To export files from a gage, follow these steps:

1. Plug the USB cable into the gage and the host computer.
2. Turn the gage on by holding the **F1** key until the gage beeps.
3. Launch Data XL on the host computer.
4. Click the **Refresh Gage File List** button in Data XL to get the file list loaded into Data XL.
5. The files that are present in the gage will now appear in the left side file list in the "Gage" area. Select the file you wish to export to the computer by left clicking it once.
6. Click the **>> Transfer >>** button to export the file from the gage to the computer. The exported file will now appear on the right side file list in the "Host PC" area. To view the file, double click the filename located on the right side file list in the "Host PC" area.
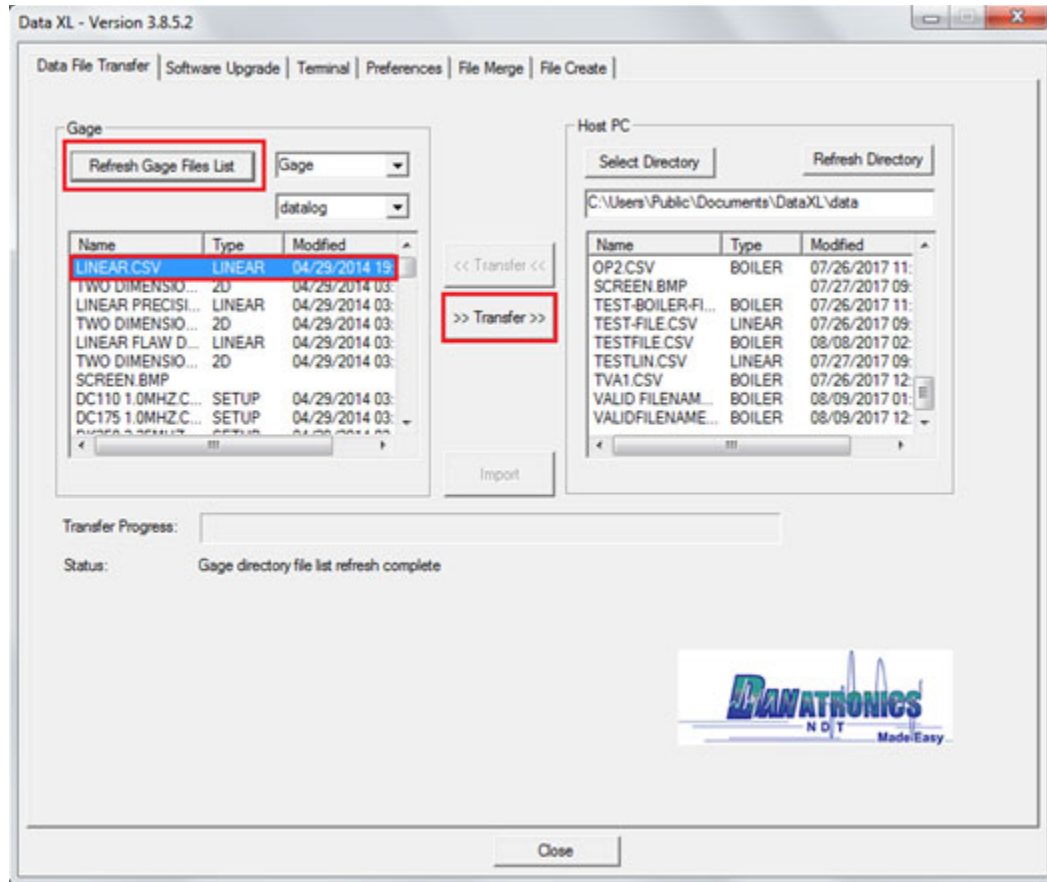
Taking Screen Captures of ECHO Gages

Using the DataXL Screen Capture feature, the user is able to save screenshots of the ECHO display

To take a screen capture of your ECHO series display, follow these steps:

1. Plug the USB cable into the gage and the host computer.
2. Turn the gage on by holding the **F1** key until the gage beeps.
3. Launch Data XL on the host computer.
4. Click the **Refresh Gage File List** button in Data XL to ensure the current display will be copied
5. Press the **>> Screen Capture>>** button to save an image of the current gage display. The exported image file will save in the currently selected Directory

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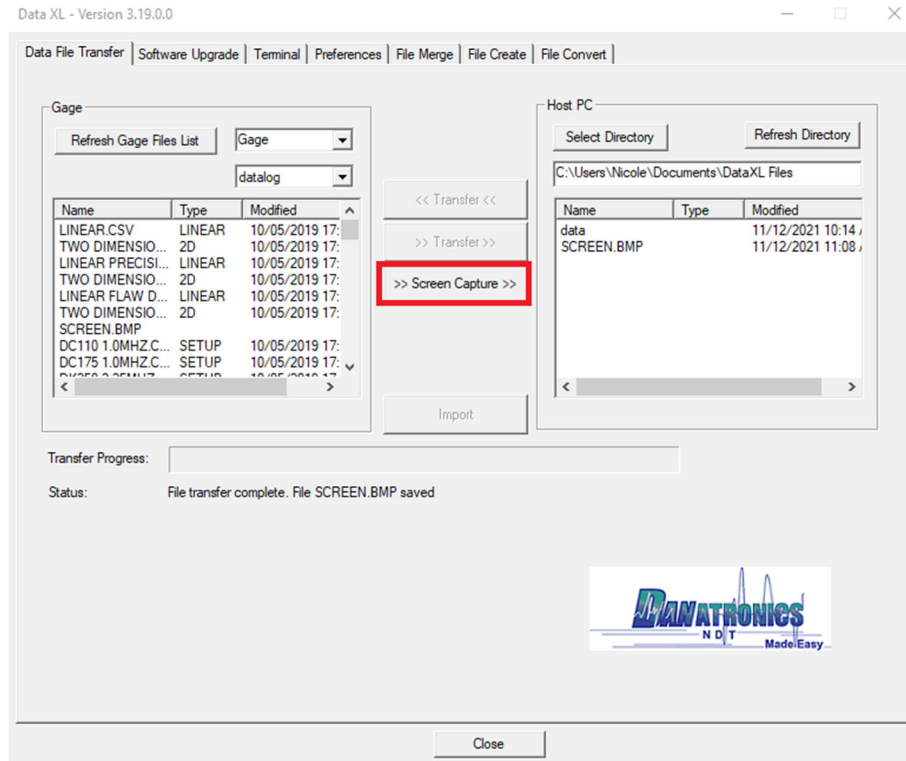
Terminal

The terminal is a developer area not used by most customers.

Terminal Commands

The case sensitive commands available in the terminal are as follows:

get thickness

> This command is used to obtain a thickness reading from the gage.

> If the gage has a thickness reading available, the gage will respond with a line containing the thickness reading and units (IN, MM, or US), followed by carriage return and line feed (\r\n). For example:

> 0.496 IN

> If the gage is detecting a loss of signal from the transducer, it will return dashes:

--.--- IN

If no thickness reading is available (for example, if the gage is powering up, displaying a menu, or otherwise not in measurement mode), the gage will respond as follows:

thickness unavailable

Note that all gage responses end with a carriage return and a line feed (\r\n).

dir /dev/datalog

This command is used to obtain a list of the files on the gage. The gage will transfer a list of all files on the gage, terminated by x'FFFF'.

read /dev/datalog/*<filename>*

This command is used to transfer the named file *to* the host, in Danatronics .CSV format. The transfer is terminated by x'FFFF'.

write /dev/datalog/*<filename>*

This command is used to transfer the named file *from* the host *to* the gage. The file can be either a new file (the filename doesn't already exist on the gage) or an existing file (the filename does exist on the gage).

Normally, the gage will respond with "OK\r\n", indicating that it is in import mode, ready to receive the file. If an error is encountered, such as the gage having no more room for another file, the gage will respond with "ERROR: *message*\r\n" where *message* is a descriptive message, such as "No room for another file".

poweroff

This command is used to power off the gage. The gage will display the power-down logo screen, save all parameter and file information in the flash, respond with an "OK\r\n" message indicating it is done, and then power off. This takes about 2 seconds.

Reading a Datalogger file from the DataXL Terminal

1. In DataXL go to *Terminal tab* and type the following command to read a file from gage's internal memory

---

read /dev/datalog/<FILE NAME>
OR Write following command to read a file from sd card
read /sd/datalog/<FILE NAME>
Replace <FILE NAME> with name of the required file (without brackets or extension).
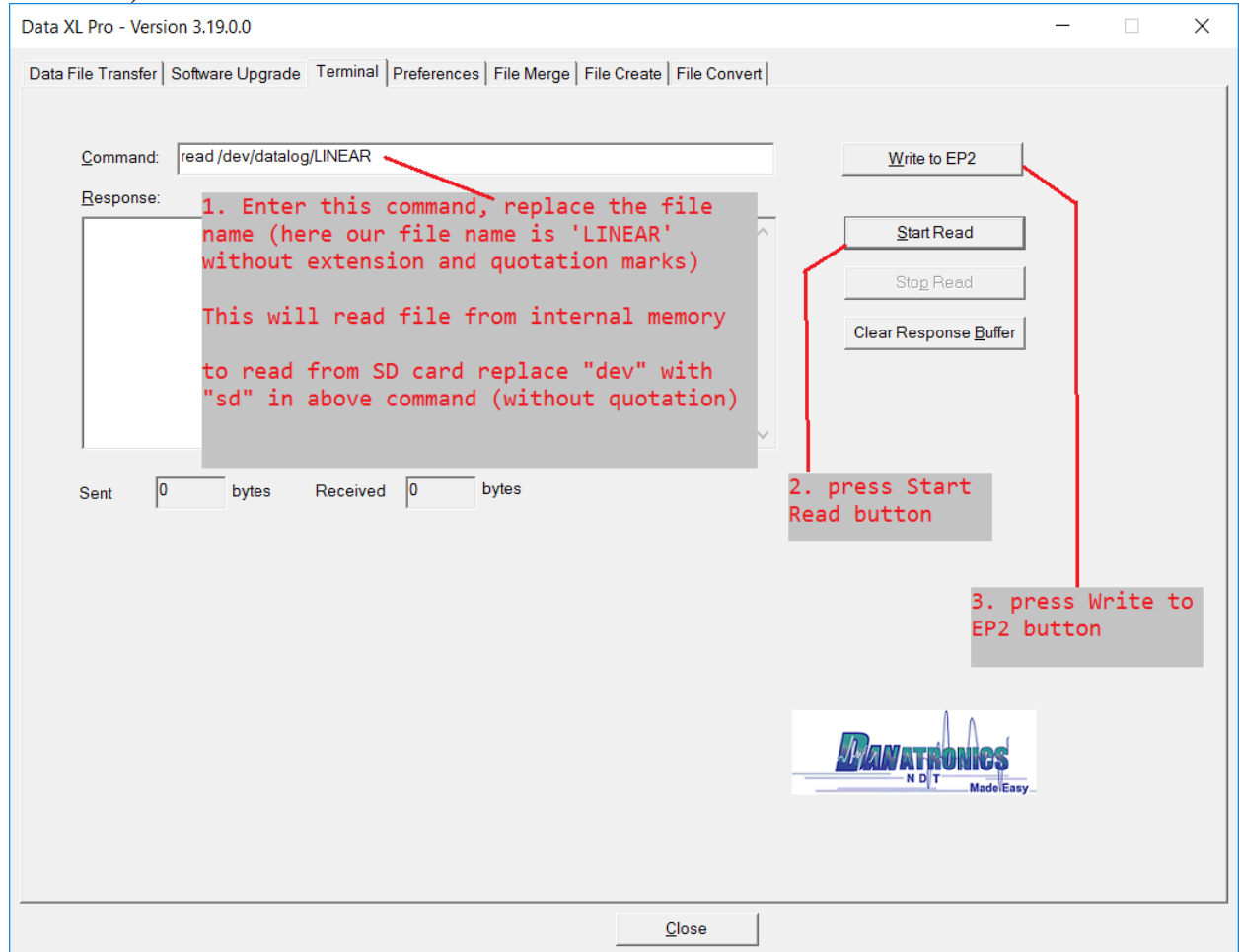
2. Press "Start read" button on terminal tab
3. Press "Write to EP2" button
4. File transfer will start and will take some time depending on size of file and its data. After process is finished, copy the content of terminal to new text file to review the data.
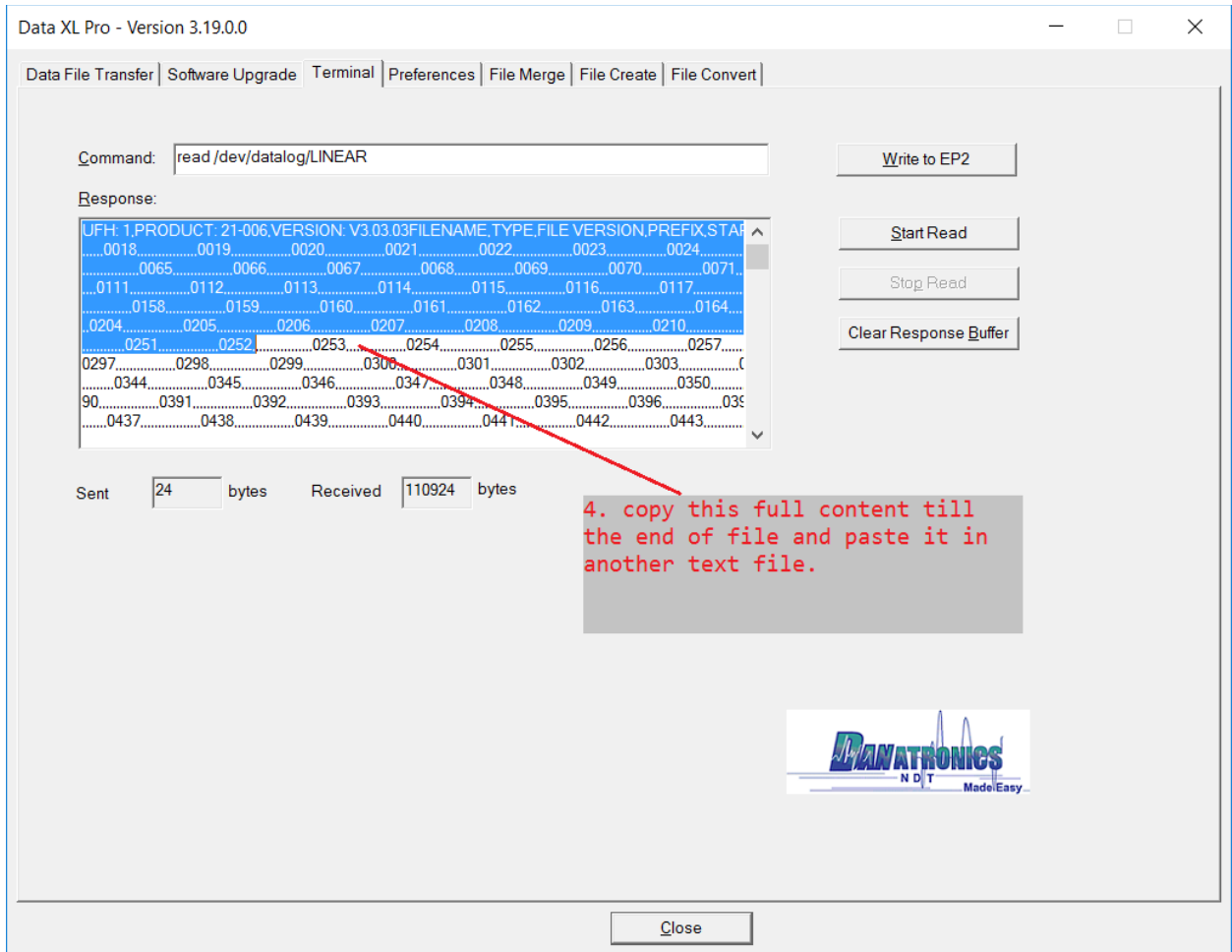
Preferences

The DataXL preferences tab allows the user to change the language displayed within DataXL and view their MAC addresses (required for DataXL Pro upgrade).

To change the DataXL Language follow these steps

1. 1.With DataXL open, click the preferences tab
2. Click the down arrow to the right of the current language.
3. A dropdown will appear, select from the available languages
    - English
    - Suomen
    - Française
    - Cestina
    - Deutsch

Danatronics, Corp.
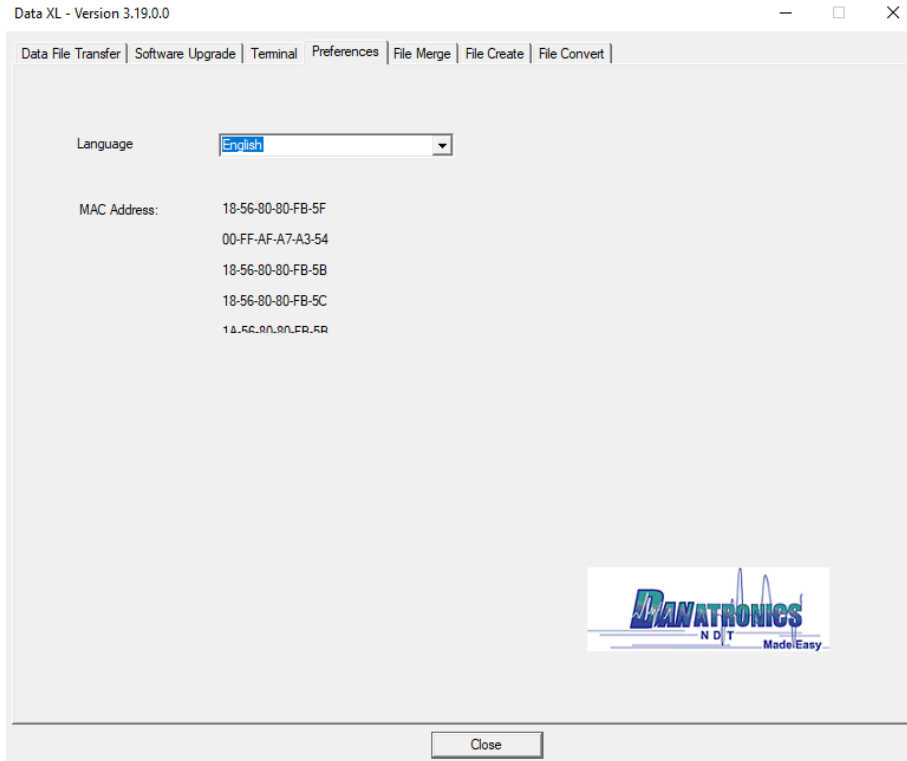
File Merge

When multiple inspectors are taking readings that are part of the same main file, their data can be merged back into one file after the readings are complete using the **File Merge** feature

To **Merge Files** with DataXL follow these steps:

1. Open DataXL and click the File Merge tab.
2. Select directory where files are transferred and click "Refresh Directory".
3. Select first file to be merged from left side window and then click on "Search Matching Files"
4. All matching files will appear in right hand side window.
5. Enter file name including extension (.csv) for new merged file.
6. Select files to be merged from right hand side window and click "Merge Selected Files" button. Message will appear showing the status of merge.
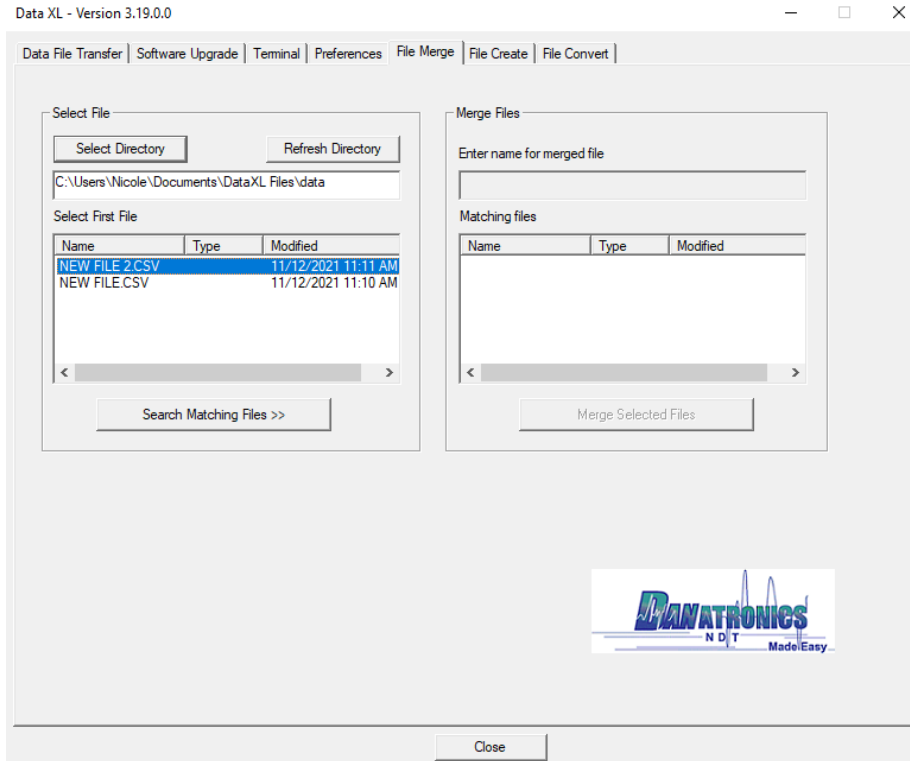
File Create

New Datalogger files can be created within DataXL then sent to Danatronics thickness gages with Datalogger.

To **Create** a new DataXL datalogger file, follow these steps:

1. Open DataXL and click the **File Create** tab.
2. Select the product type from the available options:
   - *Color Corrosion Gage* - Corrosion file for EHC-09 Color
   - *Monochrome Corrosion gage* - Corrosion file for EHC-09 monochrome
   - *Color Precision gage* - Precision file for UPG-07 Color
   - *Monochrome Precision Gage* - Precision file for UPG-07 monochrome
   - *ECHO 9/8* - Corrosion file for ECHO series gages
   - *ECHO 7/8* - Precision file for ECHO series gages
   - *ECHO FD* - Flaw Detector file for ECHO series Gages

3. Select the file type from the available options:

Danatronics, Corp.
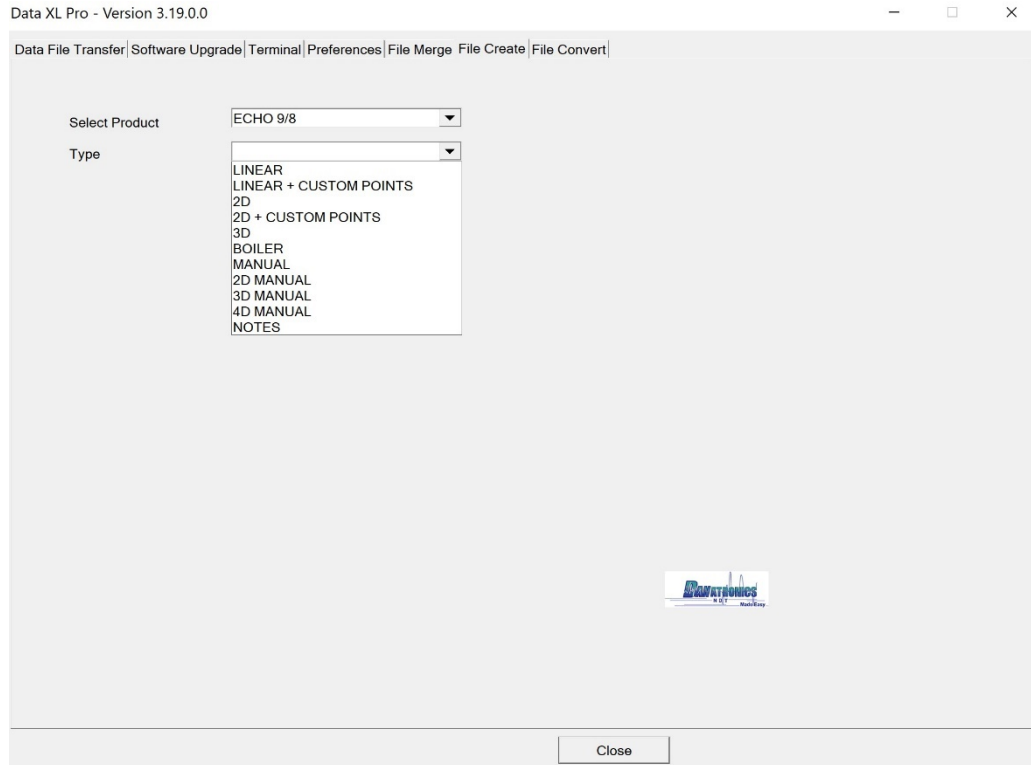
- Linear
- 2D
- 3D
- Boiler
- Manual
- 2D Manual
- 3D Manual
- 4D Manual
- Notes

4. A window will appear displaying the available inputs for the selected file type. Enter a file name

5. Under the save parameter select from available options
    - *THK Only:* Saves thickness value
    - *THK + ASCAN:* Saves thickness value and A-Scan data
6. Fill in the remaining parameters then press **Create File**. Once saved, click the *Data File Transfer* tab. The new file will appear in the **Host PC file list** on the right side of the screen.

File Convert

File Convert is a custom feature not used by most customers

DataXL PRO

DataXL Pro is Danatronics paid version of DataXL.   DataXL Pro displays the A-Scan and thickness displays on the screen as they would have been displayed on the thickness gage. The DataXL Pro interface is identical to the standard DataXL interface aside from the ability to view A-Scan and B-Scan displays.

To view your A-Scan or B-Scan readings within DataXL Pro follow these steps:

1. Open DataXL and click on the **Data File Transfer** tab if it not the currently opened tab
2. Click to highlight the file you want to view
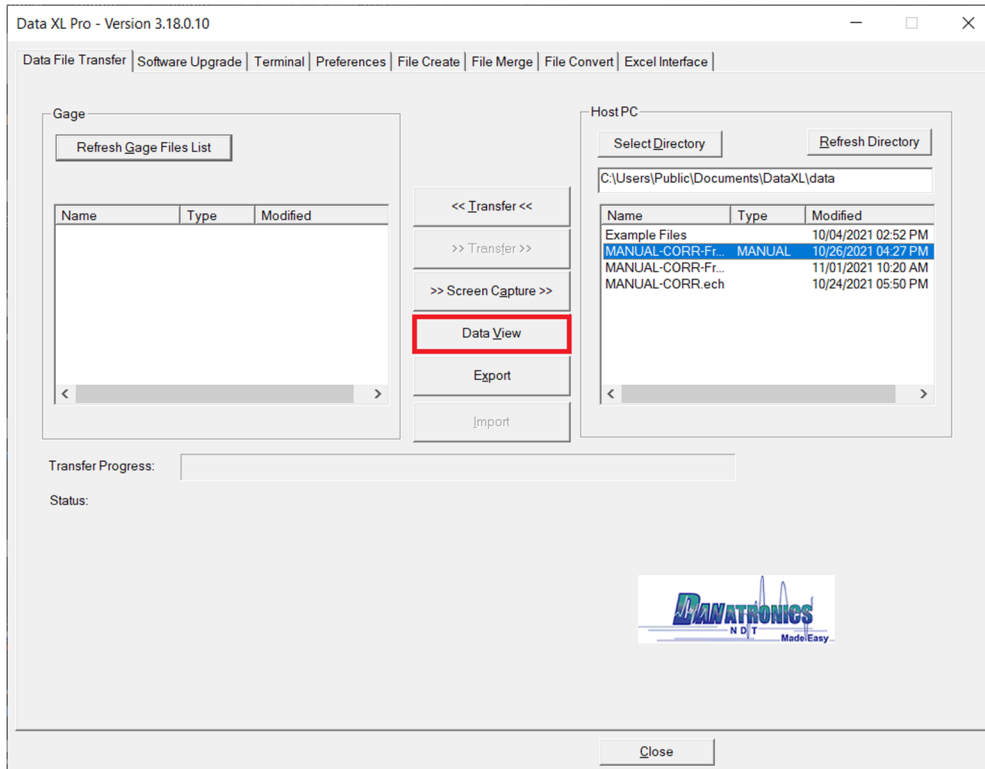
3. Press the **DataView** button and DataXL will open the selected file within DataXL

A-Scan file view in DataXL Pro

B-Scan file view in DataXL Pro

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DataXL Mobile

DataXL Mobile is Danatronics Mobile application available for iOS in the AppStore and for Android in the Google Play store. DataXL Mobile

<u>**System Requirements**</u>

- Hardware Requirements
  - o DataXL Mobile is for use with Danatronics ECHO series thickness gages enabled with bluetooth hardware.   If you would like to use our app, but don't have bluetooth yet, call us 978-777-0081 or send us an email <u>sales@danatronics.com</u> and we can help you get your gage upgraded

- Software Requirements
  - o ECHO software Version 3.00 or higher
  - o For iOS/iPadOS - v11 or higher

<u>**Device Connection**</u>

Before you can use any of the features available in DataXL Mobile, you need to connect your ECHO series thickness gage.   When the gage is connected a green dot will appear on the upper left corner of the **Device Connection** section of the DataXL Mobile main menu.

To connect your bluetooth enabled ECHO series thickness gage
- Open DataXL Mobile on your IOS or Android device and turn on your gage
- Select **Device Connection** in the upper left corner of the DataXL Mobile main menu
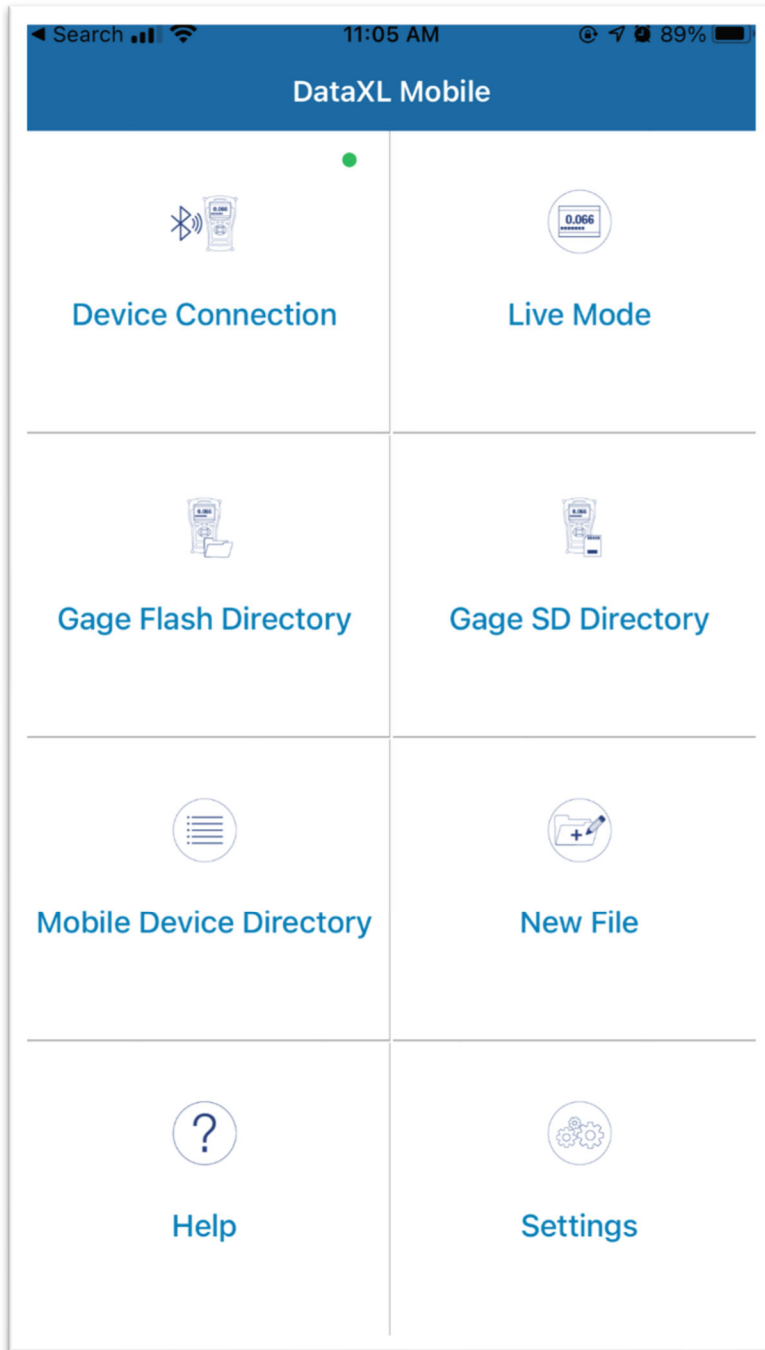
- A list will display that will include an ECHO-xxxx option if your thickness gage is turned on.   Select the ECHO device from the list.   It will turn green and a green button will appear at the bottom of the screen that says "DISCONNECT." Your gage is now connected and ready to use the other DataXL Mobile features
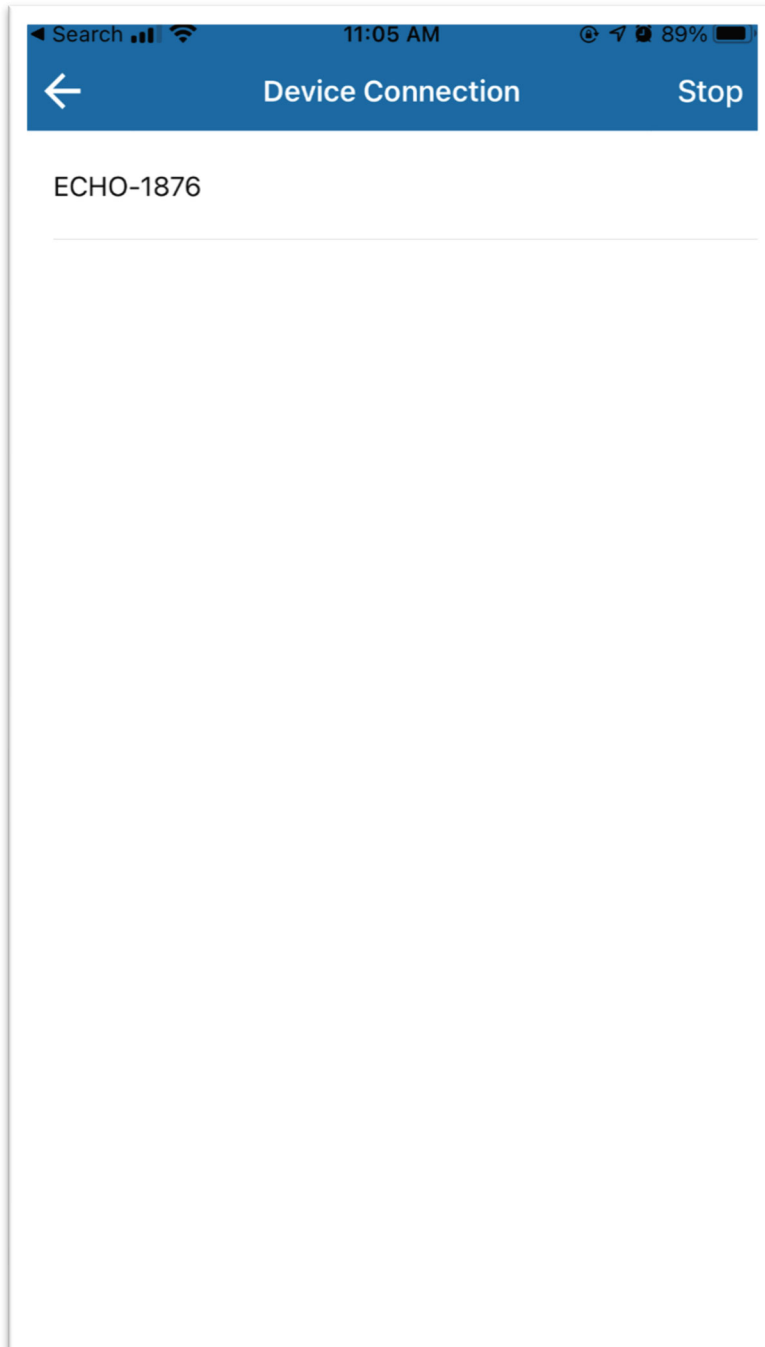
- If your gage does not appear in the list, make sure your ECHO with bluetooth is on and press the scan button in the upper right corner to refresh the list.
- Note: Only one device can be connected to your thickness gage at a time

To disconnect your bluetooth Enabled ECHO series thickness gage

- Press the green "DISCONNECT" button at the bottom of the Device connection Screen or turn of your ECHO series thickness gage

Live Mode

Live Mode allows the user to see the readings from the gage on their IOS or Android device.

To use Live Mode
- Make sure ECHO series thickness gage is connected to your IOS or Android device - See **Device Connection** section for more information on how to connect
- Select **Live Mode** in the upper right corner of the DataXL Mobile main menu to enter **Live Mode**
- Begin making readings with thickness gage and they will appear on the DataXL Mobile screen within in approximately 3-5 seconds
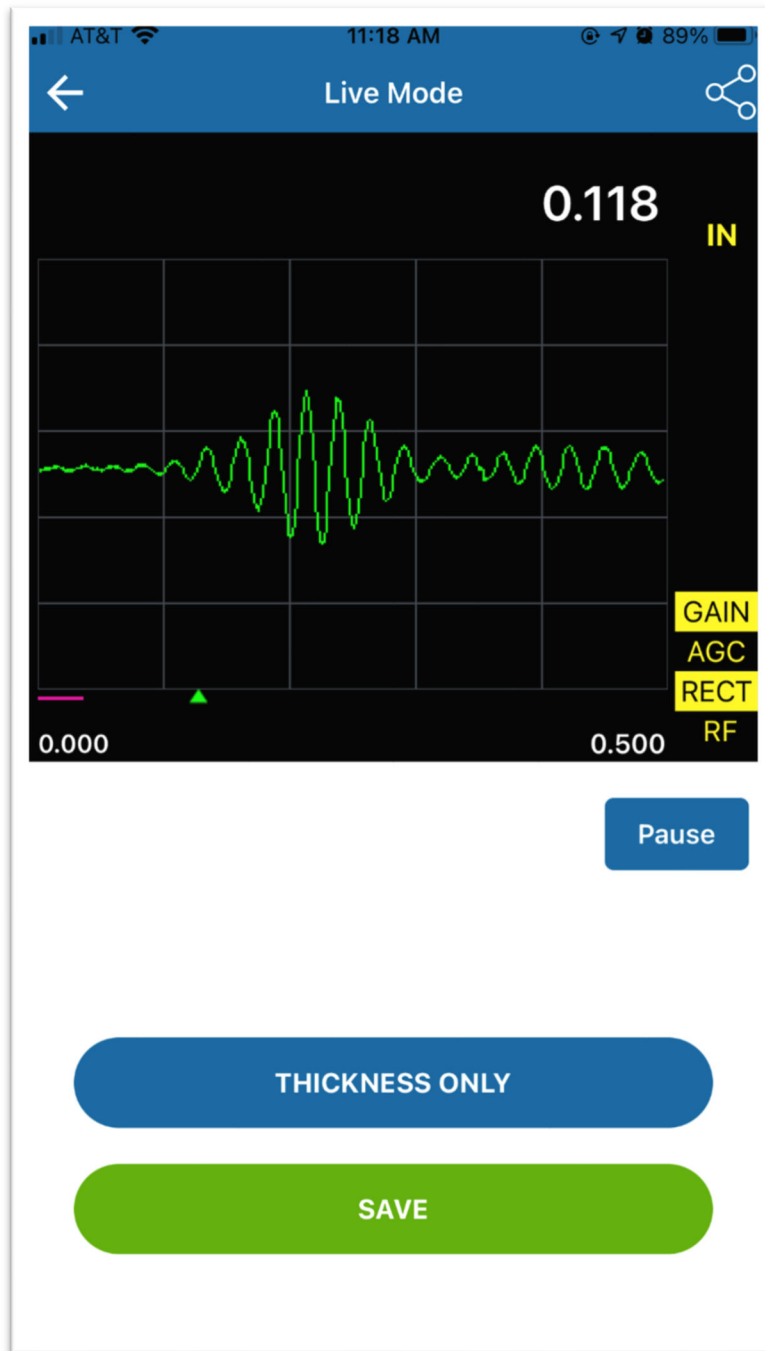
- By default DataXL Mobile will display both the thickness and waveform. To view the thickness reading only or if you don't have a waveform displayed on your gage, press the Blue "Thickness Only" button in the middle of the "Live Mode" screen. If you would like to change it back, the blue button in the middle of the screen will now say "ASCAN + THICKNESS", press to display both A-Scan and Thickness Reading
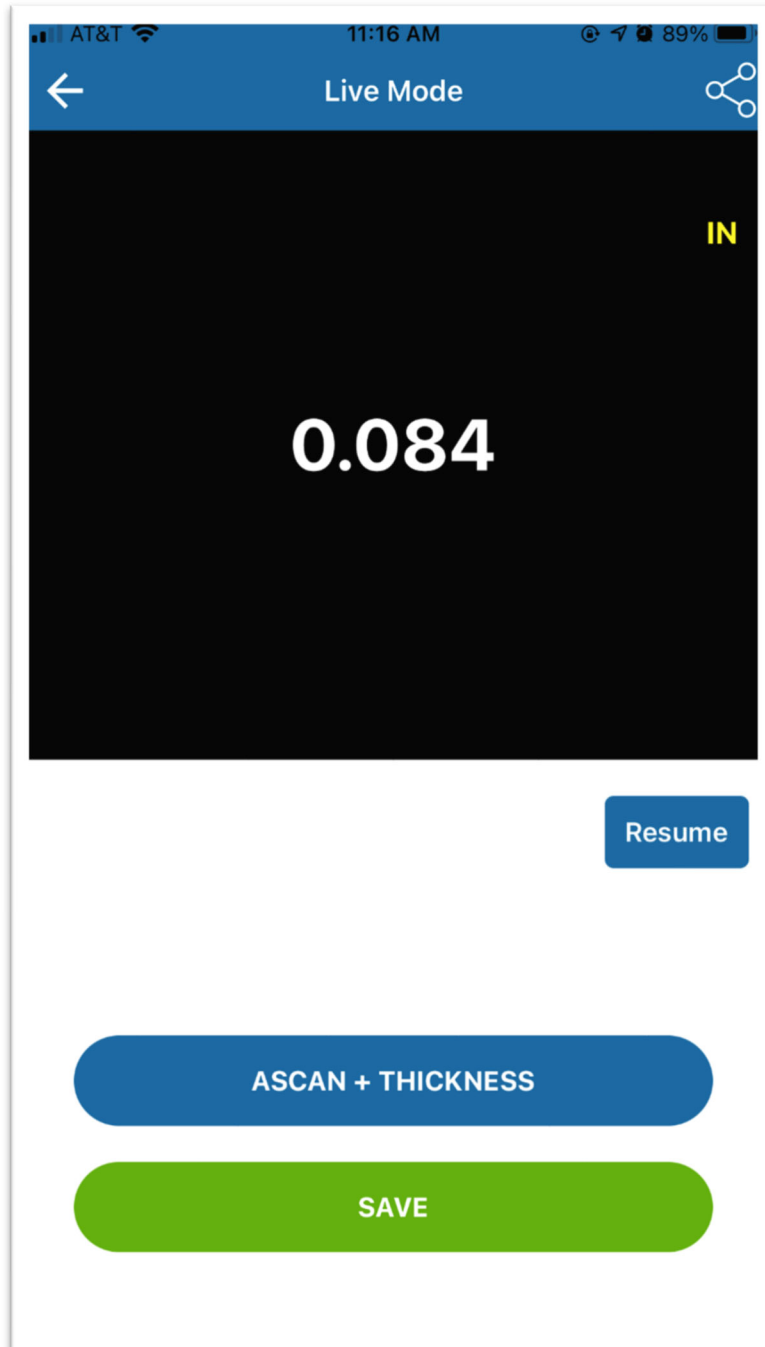
- To pause readings within DataXL Mobile, press the blue Pause button just below the display window. They key will change to say Resume. Press to being making reading again

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- To save readings using DataXL Mobile, Press the green "SAVE" button.   You can save readings as an image, PDF or CSV file.   After selecting the file type, a message may appear asking you to enter a file name before saving, follow the prompts on the screen. Files are saved in the **Mobile Device Directory** section of DataXL Mobile
- To share readings, click the share icon on the upper right hand corner of the screen, select the file type you want to share and share using the standard IOS/Android share functions

Gage Flash Directory and Gage SD Directory

 The Gage Flash Directory contains files stored on the gage's internal flash drive.   The Gage SD Directory contains files stored on the removable microSD card in the gage.

- Make sure ECHO series thickness gage is connected to your IOS or Android device - See **Device Connection** section for more information on how to connect
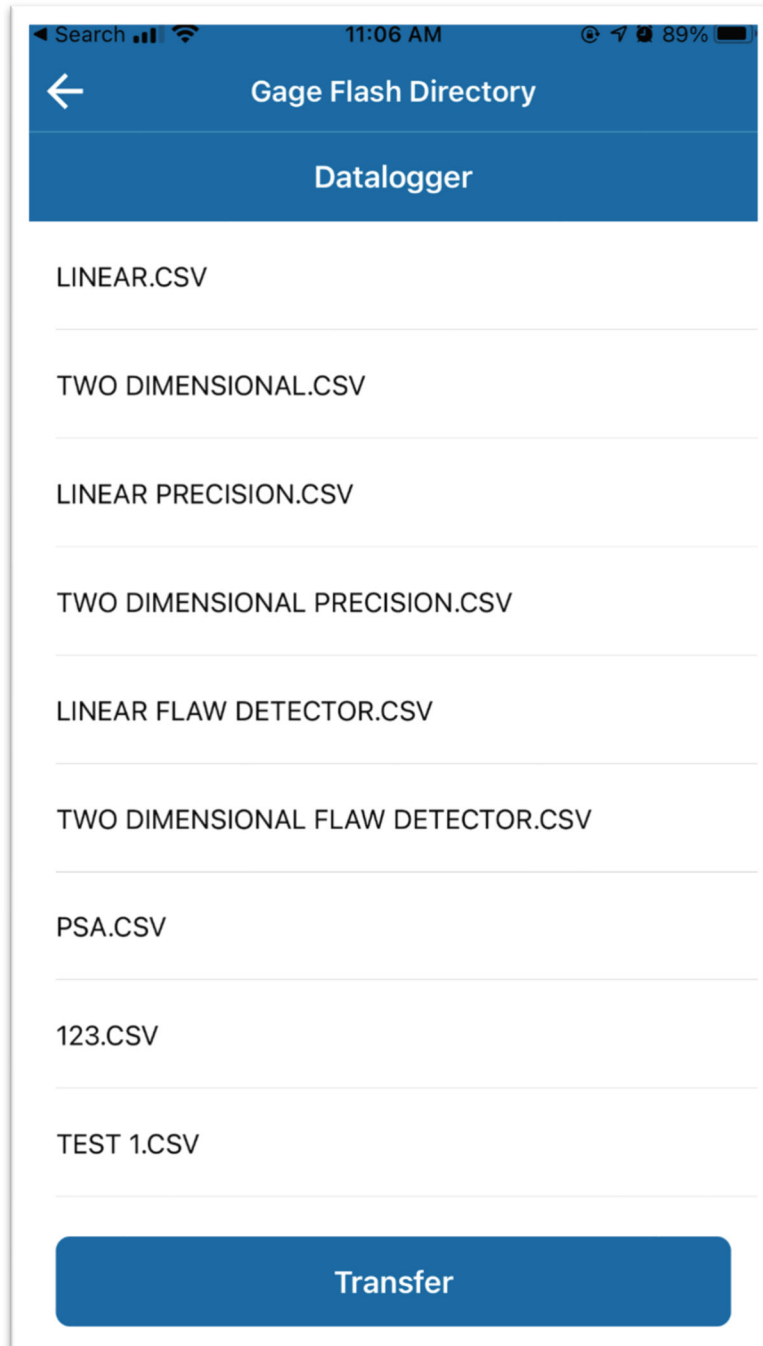
- To view files stored in either directory, choose the directory you wish to view from the DataXL Mobile main menu. A list of the files will appear on your mobile device. You can select any file, then press the transfer button to export a copy of the file to your mobile device.

- Once the file is transferred to your mobile device, you can go to the **Mobile Device Directory** to view file data

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Mobile Device Directory

The Mobile Device Directory contains files stored on your mobile device

- When in the Mobile Device Directory, a list of files stored on your mobile device will appear.   Click on a file to choose from the available options
-
  - Transfer - When the gage is connected to your mobile device the transfer feature will export selected file to the gage
  - Review - Displays the thickness readings contained within the file.   Use the "BEGINNING" and "END" buttons to toggle between the beginning and end of the file
  - Delete - Selecting delete will remove the file
  - Share - Brings up options to share file using the standard IOS/Android share functions
  - Copy - Creates a new copy of the file. You will be asked to enter a new file name before saving
  - Rename - Allows you to rename the file
  - Clear - Removes thickness readings from the file, but retains the file structure
- The "Delete All" button at the top of the Mobile Device Directory permanently removes all files saved on the device

Creating a New File

The **New File** menu option allows the user to create new files that can be transferred to ECHO thickness gages

- To create a new file, select the product you want to create a file for.   For ECHO 8 gages you should select the ECHO 9/8 option when setting up a corrosion file and ECHO 7/8 when setting up a precision file.   ECHO FD should be chosen for Flaw detector files.   You'll then want to select the type of file you want to create and a new file will open. Available file types include Linear, Linear + Custom Points, 2D, 2D + Custom Points, 3D, Boiler, Manual and Notes

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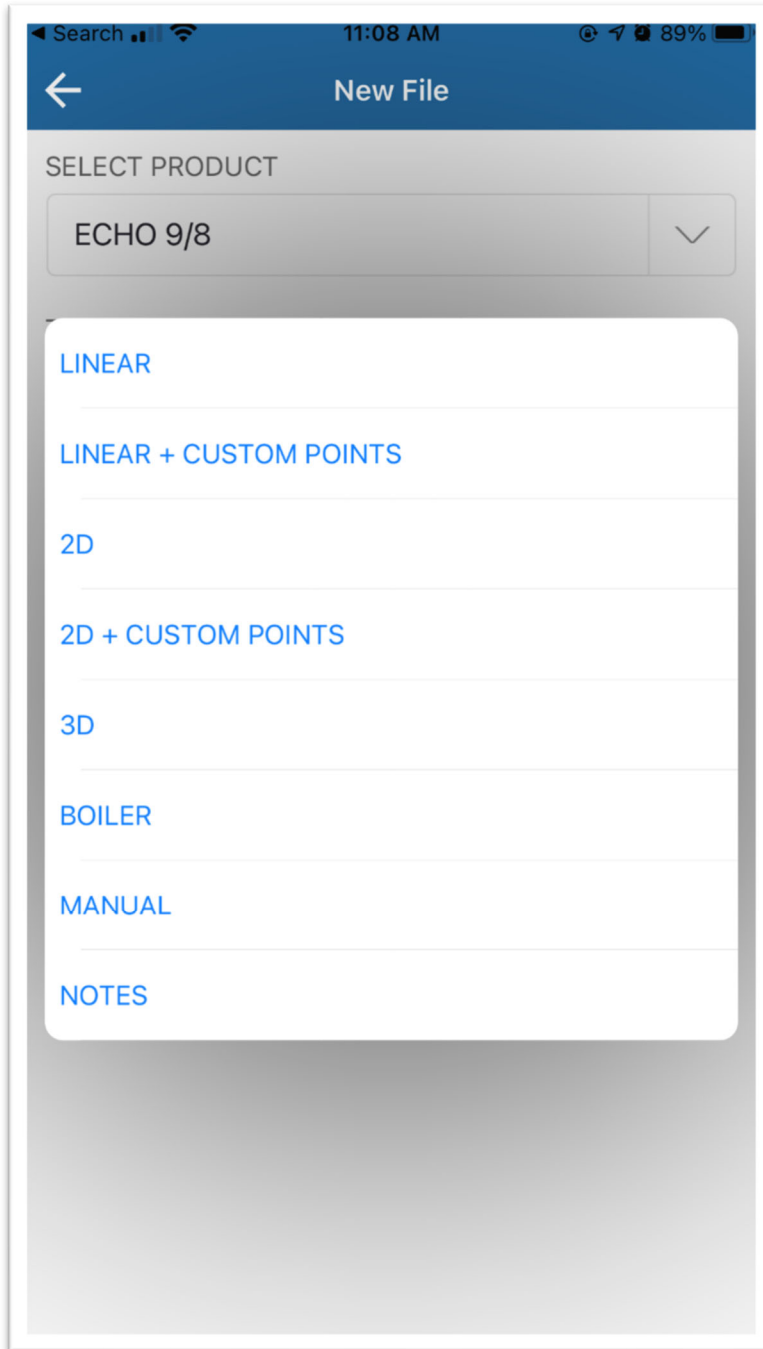
- Once your new file is open you can fill in the available fields with your desired information.   Note: Start and end columns need to be the same number of characters
- Press create file to save file to your device.   The file is now available in the **Device Directory** section of DataXL Mobile
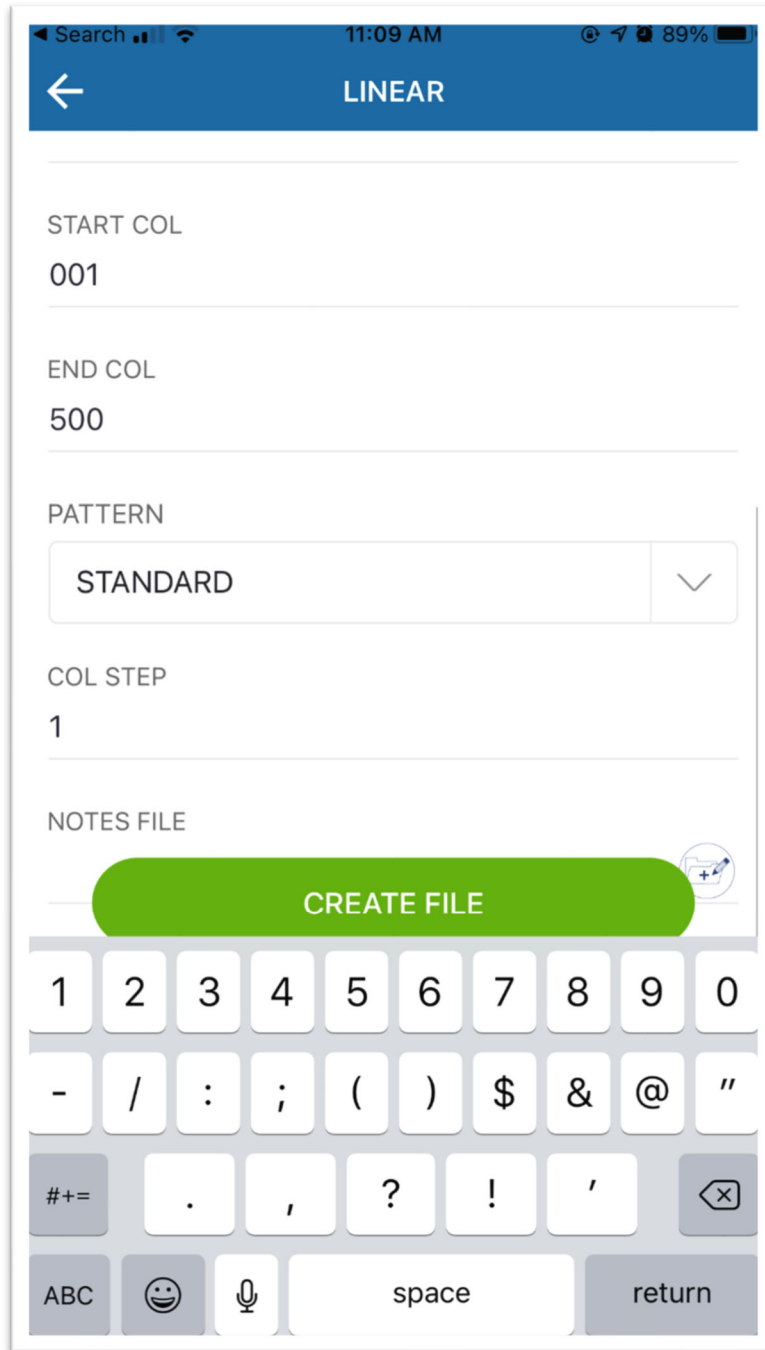
Settings

Within the setting menu the user can change languages and toggle between Thickness only and A-Scan + Thickness for live view

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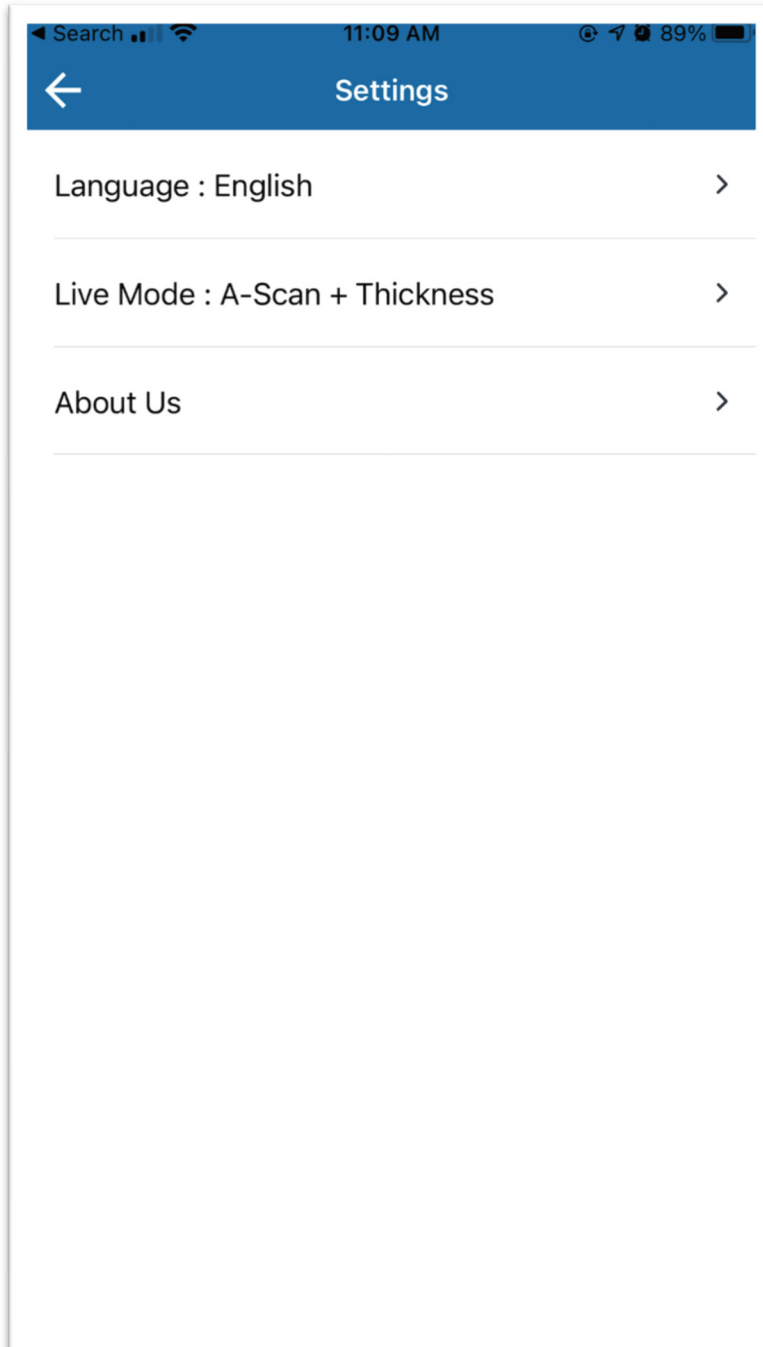
- Available languages include:
  - English
  - Italian
  - Spanish
  - French
  - Czech
  - Finnish

- o German
- o Hungarian
- o Portuguese
- o Slovakian
- o Romanian
- o Chinese
- o Russian

12 Technical Specifications

Product Specifications for ECHO Series

Size: Length 7.25" x Width 4.00" x Height 2.00" (184mm x 101.6mm x 50.8mm)

Weight: 1.15 lbs (.52 kg) with internal Li-Ion battery, 1.0 lb. (.45 kg) with optional Alkaline tray including 3 AA batteries

Display: 3.5" high resolution color display, 320 x 240 pixels (1/4 VGA), sunlight readable, including multiple color choices

Backlight: Light Emitting Diode (LED) backlight. Includes variable light intensity, indoor and outdoor modes

Temperature (Gage operating): -4 to 122F (-20 to 50C)

Package: Designed for IP67 rating, custom, splash-proof, high impact plastic with illuminating rubber keypad for go/no-go testing

Transducer Connector Type: Lemo 00 (2qty)

Bandwidth: 0.5-30 Mhz (-3dB)

Measurement Rate: 4 Hz or 25 Hz.

Pulser: 150V, Square Wave

Range: Thickness range depends on gage type, probe selection and material conditions. Typical range in corrosion mode, .004"-23" (.508 - 584 mm)

Calibration: Cal zero, Cal velocity, Two-point calibration or Auto Calibration performs a two-point calibration using a 5-step test block

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Material Velocity Range: .0200 in/usec-.7362 in/ uS (0.508-18.699 mm/ uS)

Batteries: Standard 3.7 V Li Ion internally rechargeable battery (11-27 hours...Standard mode of 4Hz. and 74% brightness: 27 hour continous operation, Fast mode at 25Hz., continuous measurements in echo to echo mode: 11 Hours) or optional alkaline tray for 3 AA batteries

Data XL: Interface program to send and receive stored readings, latest firmware and application set up files as two way communication from ECHO to computer (excel)

USB: USB 2.0

Stored Setups: Storage and recall of calibration and set up files (up to 5,000)

Memory: Internal memory standard on all models. For Datalogger models 2GB micro SD card standard and expandable up to 32GB

Gain: AGC 20-90 db in 1 db increments as a corrosion gage and initial gain, final gain and slope. 20-90 db in .1 db increments as a precision gage

Zoom: Automatically centers echos in the center of the display independent of material thickness

Units: English, Metric, Microseconds

Temperature correction: Software to correct for varying sound speed as a function of entered temperature

Languages: English, French, German, Spanish, Italian, Russian, Czech, Finnish, Chinese, Japanese, Hungarian

Fast Min/Max: Displays minimum, maximum or both simultaneously with actual thickness at 25 Hz.

Alarms: Gage vibrates and beeps. Display changes color based on alarm condition

Transducers: Single, delay lines, contact, immersion

Measurement Types: Main bang to first backwall echo, echo to echo and velocity mode (displays acoustic sound speed based on entered thickness)

Freeze Mode: Direct access to freeze display (ideal for high temperature applications)

Hold Mode: Holds display to retain last thickness reading

Warranty: Limited 2 year warranty under normal use on parts and labor for gage. Optional Dan-A-Care to add up to 3 more years

Shut off: selectable auto shut off 1-31 minutes or never shut off

Differential Mode: Displays the difference from actual thickness measurement in absolute or percentage of a user entered reference value

Resolution: .001" or .01" (.01mm or .1mm) as a corrosion gage and .0001" or .001" (.001mm or .01mm) as a precision gage

Transport case: Hard Plastic with high density molded foam cut out for gage and most accessories

Certifications: CE certified, RHOS compliant, designed for IP67

Accessory Mount: ECHO 8 includes a 1/4x20 standard connection point on the back of the unit to allow for a multitude of accessories including a magnetic pipe attachment and a Gorilla Pod

Standard Inclusions: ECHO 8 series ultrasonic thickness gage, DKS-537, transducer up to 10 Mhz., LM-06 cable, 2oz bottle of couplant, operation manual, Data XL interface program, USB cable, Charger Adapter, Transport Case *A transducer is included with each model. Contact Danatronics for details

Available Software Options: Datalogger with B-scan, Live waveform, Precision mode, Oxide scale

Hardware Options: Bluetooth, Alkaline battery tray, rubber boot, Magnetic pipe stand, footswitch, magnetic wheel encoder

Bluetooth Regulatory Information

Danatronics uses the Bluetooth RN4870 module for ECHO gages enabled with Bluetooth. Regulatory information for the RN4870 module is as follows

Regulatory Approval ID Numbers

The RN4871 module has received the regulatory approval for the following countries:
- United States/FCC ID: A8TBM71S2
- Canada/ISED
    - IC: 12246A-BM71S2
    - HVIN: BM71BLES1FC2
- Europe/CE
- Japan/MIC: 005-101150
- Korea/KCC: MSIP-CRM-mcp-BM71BLES1FC2
- Taiwan/NCC No: CCAN16LP0011T7

- China/SRRC: CMIIT ID: 2016DJ589

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Regulatory Approval Details and Marks

<u>Brazil</u>

Modelo: RN4871

ANATEL

Agência Nacional de Telecomunicações

02699-19-08759

"Este equipamento não tem direito à proteção contra interferência prejudicial e não pode causar interferência em sistemas devidamente autorizados".

Este producto contém a placa Modelo RN4871 código de homologação ANATEL 02699-19-08759.

<u>Canada</u>

This device contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's license-exempt RSS(s). Operation is subject to the following two conditions:

1.This device may not cause interference.

2.This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1.L'appareil ne doit pas produire de brouillage.

2.L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This radio transmitter [IC: 12246A-BM70BLES1F2 and IC: 12246A-BM71S2] has been

approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Le présent émetteur radio

[IC: 12246A-BM70BLES1F2 and IC: 12246A-BM71S2] a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés cidessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué pour tout type figurant sur la liste, sont strictement interdits pour l'exploitation de l'émetteur.

Danatronics ECHO gages with Bluetooth come integrated with the below antenna. It is the only approve antenna for ECHO gages with Bluetooth

Antenna Description – ANT AANT3216LL00R2400A PIFA 2.4GHz L3 2W1.6

Manufacturer – Yageo Corporation

Manufacturer Part Number - ANT3216LL00R2400A

Frequency2442 MHz

Max Gain0.1 dBi

Efficiency42.7%

China

注意！

依據 低功率電波輻射性電機管理辦法

第十二條 經型式認證合格之低功率射頻電機，

非經許可，

公司、商號或使用者均不得擅自變更頻率、加大

功率或變更原設計

之特性及功能。

第十四條 低功率射頻電機之使用不得影響飛航安

全及干擾合法通信；

經發現有干擾現象時，應立即停用，並改善至無

干擾時方得繼續使用。

前項合法通信，指依電信規定作業之無線電信。

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低功率射頻電機須忍受合法通信或工業、科學及

醫療用電波輻射性

電機設備之干擾。

United States

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio

frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the

following measures:

•Reorient or relocate the receiving antenna.

•Increase the separation between the equipment and receiver.

•Connect the equipment into an outlet on a circuit different from that to which the receiver is

connected.

• Consult the dealer or an experienced radio/TV technician for help.

Acoustic Sound Speed for Common Materials

The sound velocity table below shows a list of the speed of sound in various materials. This information is necessary to have when using the gage as the speed of the ultrasound moving through the material in question needs to be programmed into the gage to obtain an accurate thickness. All velocities in this sound velocity table are approximations:

Material	Sound Velocity Inch/µSecond	Metres/second
Air	0.013	330
Aluminium	0.250	6300
Alumina Oxide	0.390	9900
Beryllium	0.510	12900
Boron Carbide	0.430	11000
Brass	0.170	4300

Cadmium	0.110	2800
Copper	0.180	4700
Glass(crown)	0.210	5300
Glycerine	0.075	1900
Gold	0.130	3200
Ice	0.160	4000
Inconel	0.220	5700
Iron	0.230	5900
Iron (cast)	0.180	4600
Lead	0.085	2200
Magnesium	0.230	5800
Mercury	0.057	1400
Molybdenum	0.250	6300
Monel	0.210	5400
Neoprene	0.063	1600
Nickel	0.220	5600
Nylon, 6.6	0.100	2600
Oil (SAE 30)	0.067	1700
Platinum	0.130	3300
Plexiglas	0.110	1700
Polyethylene	0.070	1900
Polystyrene	0.0930	2400
Polyurethane	0.0700	1900
Quartz	0.230	5800
Rubber, Butyl	0.070	1800
Silver	0.140	3600
Steel, Mild	0.230	5920
Steel, Stainless	0.230	5800
Teflon	0.060	1400
Tin	0.130	3300
Titanium	0.240	6100

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Tungsten	0.200	5200
Uranium	0.130	3400
Water	0.0584	1480
Zinc	0.170	4200

13 Technical Assistance

Call Danatronics, Corp. at 978-777-0081 or email us at sales@danatronics.com for specific technical assistance or troubleshooting questions.