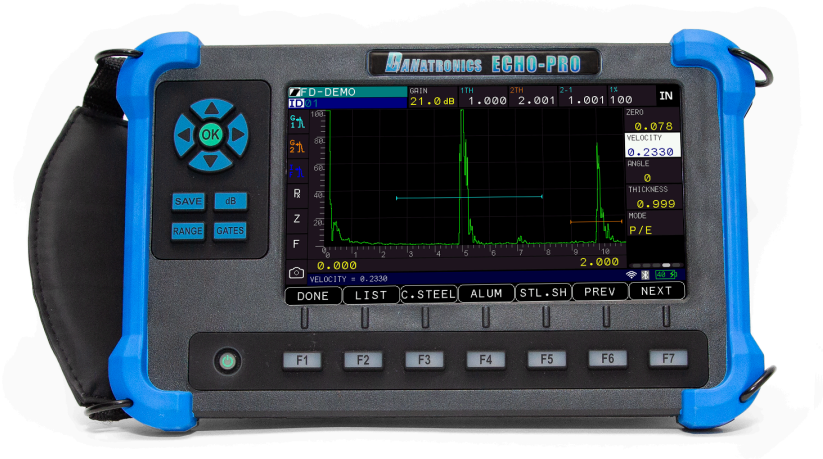
ECHO Pro Manual



ECHO PRO Ultrasonic Flaw Detector

DANATRONICS NDT Made Easy

Version:1.00A

This is a preliminary manual for the earliest ECHO PRO software. You may see references to software that is not available yet or sections that don't exist. That is an indication that those items will be included in future software updates. Please check back regularly in the coming months for both manual updates as well as FREE software updates. Both can be found on the resources tab of the ECHO PRO page of our website

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.

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1 Getting Started

About the ECHO PRO

ECHO PRO is a portable touchscreen ultrasonic flaw detector and represents a breakthrough in terms of cost, size, ease of use, and versatility. ECHO PRO has many built in features for practical, every day flaw detection applications such as a 60 Hz update rate, 2 independent gates, damping, filters, 600 Volt pulser…Our new hand-held ultrasonic flaw detector is packed with many useful and practical features including:

- Bright, sunlight readable 7” Wide VGA touchscreen display
- Keypad and touchscreen navigation
- Change color, beep and vibrate on alarm
- 2 independent gates
- DAC/TVG
- AWS
- API-5UE
- Peak Pitch Memory
- Datalogger including B-scan and export of reading to excel
- Wifi
- Bluetooth
- Intuitive user interface combining touchscreen and keypad
- Advanced Features Include: Extended Range, TVG, Back ECHO Attenuation, Interface Gage, Damping and Energy
- Micro SD, expandable to 32GB, micro SD card memory
- 10+ hour battery life
- Custom case with protective rubber bumpers, padded wrist strap, neck harness and variable angle hinge/stand

- Made and designed in the USA

2 Basic Operations

Display Screen

ECHO PRO has a graphic-style 7” multi-touch color display with 800 x 480 (Wide VGA) pixel density. Viewing the screen is best from straight above or slightly below the surface rather than from side to side. If the external temperature is below 32°F (0°C), the display may be slower to update information.

Power On the Unit

To power on any ECHO PRO, follow these steps:

1. Press and hold the green **Power** button/ley on the lower left side of the front of the unit. The power symbol, as shown below, is printed on the power key. This key is also used to turn the unit off.

Power symbol

2. After powering on the ECHO PRO, the unit will briefly display the *Power Up* screen before opening the *Measurement* screen.

3. The *Measurement* screen displays the last instrument settings as well as the battery life in the bottom right corner. The image below shows the battery life at 84%.

Note: Set your parameters based on the type of probe you are using (See Measurement Screen).

Navigation with Touchscreen and Keypad

ECHO PRO is designed for virtually all actions to be completed with either the touchscreen or with the physical keys on the keypad. Use of the touchscreen and physical keys are interchangeable and the user can use either option for each key press.

Keypad Navigation

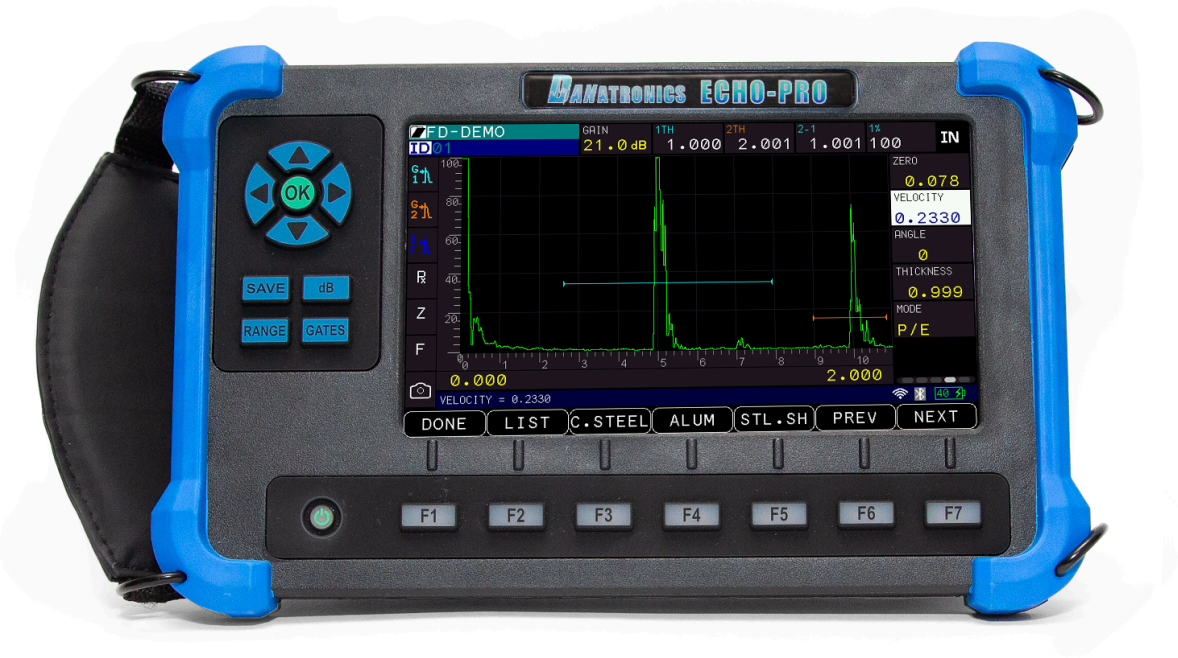
The left and right arrow keys will move the cursor clockwise around the parameters located on the outside edge of the display. To edit a parameter use the left and right arrow keys to highlight the desired parameter, then use the up and down arrow keys to adjust the value.

Touchscreen Navigation

To use the touchscreen to physically touch the screen to select the parameter you would like to adjust or the action you would like to complete. For some functions like gain and range you can drag a finger across the screen to change values. The bottom of the screen corresponds with the physical F-keys, many of which are user customizable.

Keypad Functions

The figure below shows the full keypad layout representative of each ECHO PRO 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 key
	Save key
	dB key

	Range Key
	Gates Key
F1	Varies
F2	Varies
F3	Varies
F4	Varies
F5	Varies
F6	Varies
F7	Varies

Function Keys

The function keys or F keys (e.g., F1, F2, F3, F4, F5, F6, F7), 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

Quick access Keys (Save, db, Range, Gates Keys))

The SAVE, dB, RANGE, and GATES keys on the left hand side of the unit allow the user to quickly access the functions for the respective key.

- **Save** - Saves reading to Datalogger
- **dB** - engages gain setting, use the **UP** and **DOWN** arrow keys or touchscreen to adjust
- **RANGE** - engages range setting, use the **UP** and **DOWN** arrow keys or touchscreen to adjust
- **GATES** - Press once to engage Gate 1 Start. Press a second time to Engage Gate 2 start. Use the **UP** and **DOWN** arrow keys or touchscreen to adjust

Navigating the Main Menu

Many parameter settings are able to be adjusted directly from the *Measurement Screen*, but other settings can only be changed in the *Main Menu*. The *Main menu* contains 6 sub menus that are covered throughout this manual. To access the *Main Menu* from the *Measurement Screen* use the touchscreen or physical key to select **F2-Menu** or press the **Ok** key.

Available sub-menus within the Main Menu include:

- Calibration
- Datalogger/Comm
- Display
- Initial Settings
- Locks
- Measurements
- Setups
- Test

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

ECHO PRO 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 yellow. When the battery life is below 5%, the indicator will turn red and flash. Plug in ECHO PRO using USB-C or AC wall adapter to avoid shut off.

Note: Power off the ECHO PRO unit at the end of use to ensure any saved data is stored internally.

Recharging the Battery

To recharge the battery, plug the charger into an AC outlet (between 100-240V) and plug the other end into the 12V connector on the top of the ECHO PRO unit. The **Power** Key ⏻ will light up with a blue LED when charging, and the light will go out when fully charged. The unit can also be charged using the USB-C port. Allow several hours (up to 10 hours) to fully charge. We recommend using the supplied charger charger or a high-quality USB-C cable and wall adapter. Using lower quality USB-C cables and adapters can result in little to 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. If charging the flaw detector using this method, make sure the unit is powered off before connecting the USB to the computer and flaw detector.

When charging is complete, the **Power** key will appear translucent in color. You can now unplug the charger from the connector on the top of the unit. When the flaw detector is turned on the battery indication monitor on the bottom right of the screen displays the percentage of battery life, as shown in the image below at 44%.

Micro SD Card

ECHO Pro has both internal memory as well as a micro SD. Data and screenshots can be saved to the microSD. To access all files on the MicoSD card you can remove the MicroSD and plug into a card reader connected to a computer. To remove the MicroSD card, unscrew the battery door and remove the battery. Then press the MicroSD card found in the upper right hand side of the battery compartment. That will release the SD card. It can now be plugged into a card reader so files can be accessed directly from a computer.

Other Gage Features

Using the TX and RX Ports

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

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

Locating the USB Slot

The ECHO PROs are furnished with a USB-C version 2.0 slot on the top of the unit. Use the USB slot to connect AC chargers or to connect to a computer for cross-functionality.

Note: It is possible to insert a thumb drive to transfer data from the ECHO PRO. If using a thumb drive, the thumb drive must be USB-C version 2.0

OUT

The out port is a 0 -1 Volt or 0-10 Volts Analog output proportional to Measurement box 1.

I/O

The I/O port is a Multi-functional Digital 14 Pin Connector.

Pin	Descriptions
1	+5V
2	Combined all gate Alarm (Gate1 Alarm or Gate 2 Alarm or IF Alarm)
3	Gate1 Alarm
4	Gate 2 Alarm
5	IF Alarm
6	Alarm Clock
7	Not Used
8	External trigger Out
9	X - Encoder A Input
10	X – Encoder B Input
11	Y – Encoder A Input
12	Y – Encoder B Input
13	Ext trigger Input
14	GND

12V

The 12V connector is used to charge the ECHO PRO with the included AC wall charger.

RS-232

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

Using the Accessory Mount

On the back of the ECHO PRO is a ¼ x 20 accessory mount. This connector point is compatible with a multitude of accessories including a magnetic pipe stand that allows ECHO PRO to be attached to any ferrous surface.

Locating the Altitude Change Release Regulator

On the back of the ECHO PRO is a circular outline with small holes. This feature regulates pressure due to altitude change. Any pressure built up inside the unit will be automatically released.

Connecting to an External Monitor

The ECHO PRO can be connected to the HDMI Port of an external monitor if a larger display is required. To connect the ECHO PRO plug a USB-C to HDMI cable (not included) into the USB-C port at the top of the ECHO PRO and into the HDMI Port of the external display. The image will appear on your external monitor

3 Transducer/Setup Selection

Before making readings it is important to make sure you have the correct transducer setup selected.

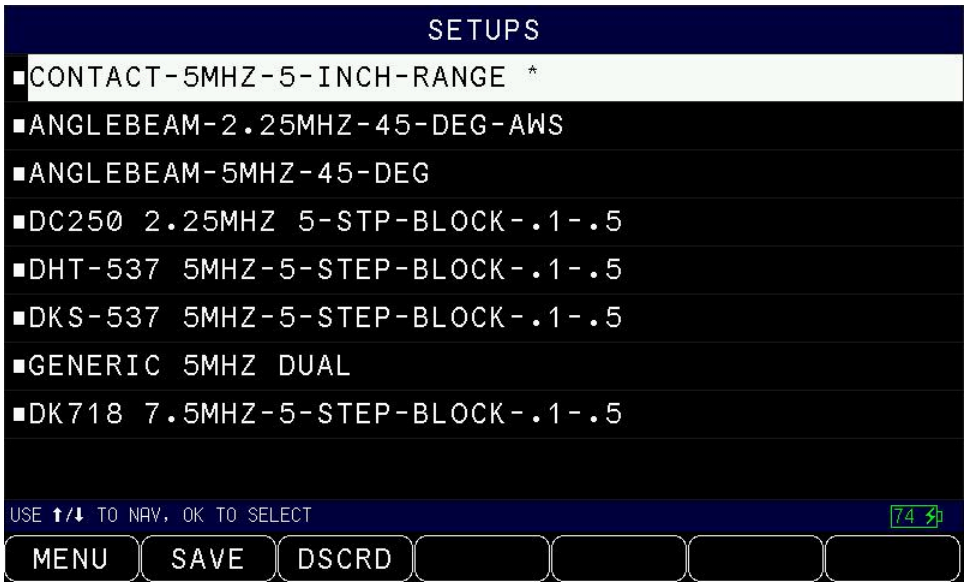
Setups can be selected and created from the *Setup Menu*. The transducer *Setups Menu* can be accessed by going to the *Main Menu*, then selecting **Setups**.

To get started, we recommend choosing the default setup closest to the probe you will be using or a previously created custom setup for the probe. 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 use the Data XL interface program (available for download on our website) to transfer and save the setup files on your computer where they can be saved as a backup or transferred to other ECHO PROs.

Stored Setups

The ECHO PRO can save more than 2,700 custom setups which is ideal for varying applications. Setup files keep track of calibration and instrument settings upon file creation. In addition, ECHO PRO has 8 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 Anglebeam - 2.25 MHz - 45 deg - AWS
3 Anglebeam - 5.0 MHz - 45 deg
4 DC-250 Dual Probe 2.25MHz -5 Step block - 01”-.05”
5 DHT-537 High Temp Dual probe 5 MHz-5 Step block - 01”-.05”
6 DKS-537 Dual probe 5 MHz-5 Step block - 01”-.05”
7 Generic 5MHz Dual Probe
8 DK-718 Dual Probe 7.5 MHz -5 Step block - 01”-.05”



Selecting a Setup File

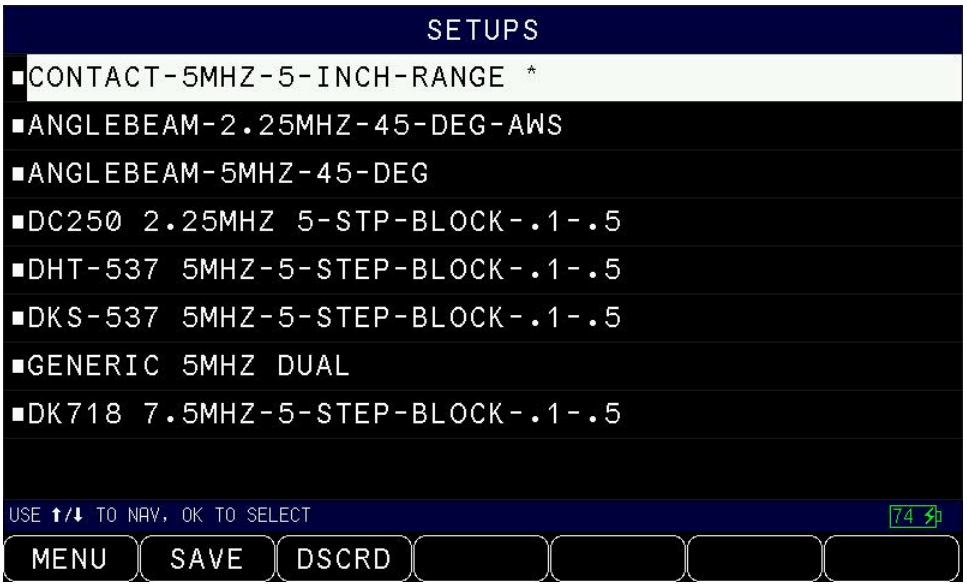
To select a Setup file

1. Use the **Up** and **Down** arrow key followed by **Ok** or use the touchscreen to physically press the desired setup and ECHO PRO will adjust the parameters accordingly.
2. Once a setup is selected you will be brought directly to the *Measurement Screen*

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 unit. If this does not work, the transducer likely needs to be replaced.

Saving and discarding an altered stored setup:

If any default parameter is altered after selection on the *Measurement Screen*, such as changing the Gain or Range, an asterisk will appear at the end of the file name denoting the change when you go back to the *Setups Menu*.



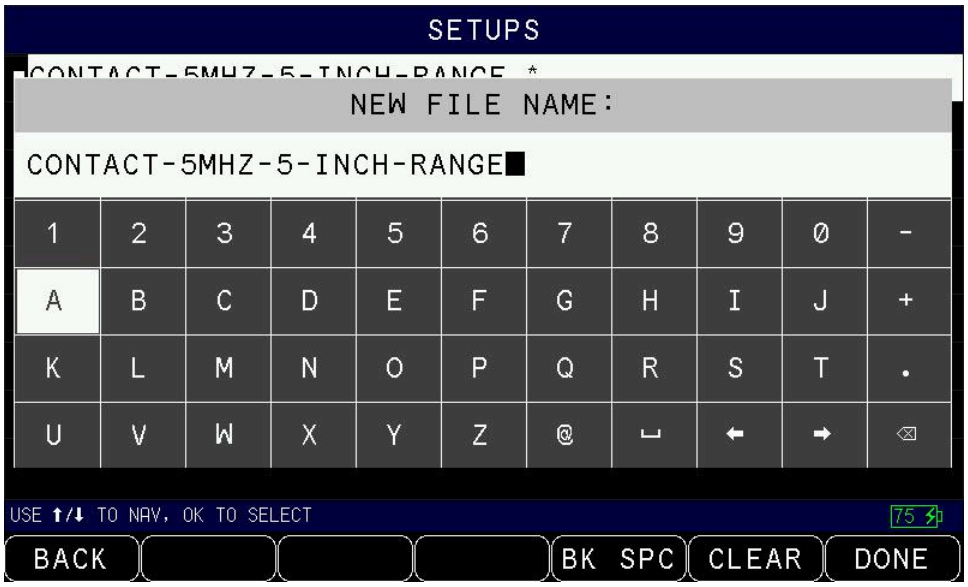
The altered setup file can be discarded or saved as a new setups.

To discard an altered stored setup

1. Using the touchscreen or physical keys select **F3 – DSCRD (Discard)**
2. The asterisk that denotes an altered setup will not longer appear to the right of the Setup file name and the parameters will revert to the default settings

To save the file as a new setup file

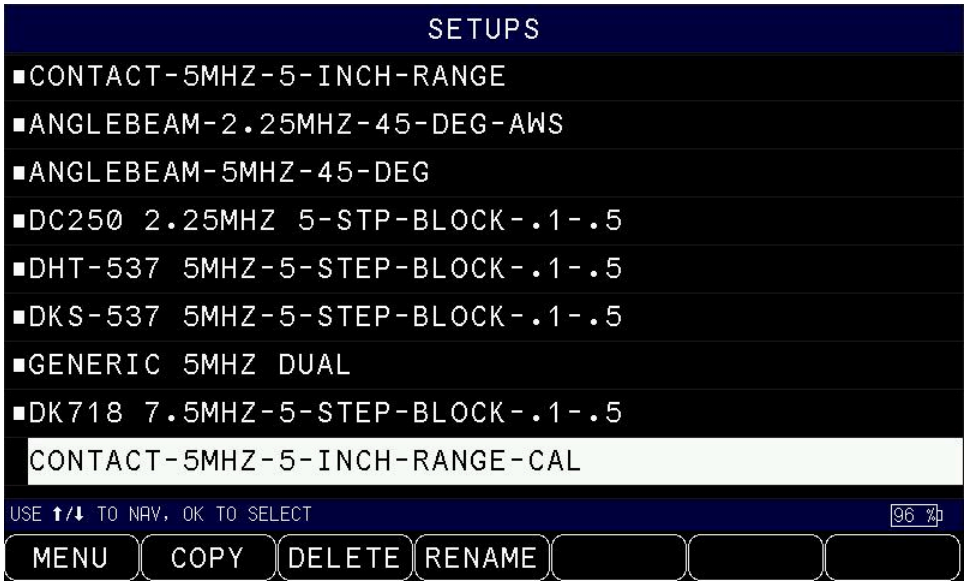
1. Use the touchscreen or physical keys to select **F2 - Save**
2. Use the on screen keypad to enter the desired file name. To delete a character press **F5 - Bk Spc** (Backspace) or to clear the current file name completely press **F6 - Clear**



3. Use the touchscreen or physical keys to press **F7-Done** when finished to return to the *Setup Menu*

Note: The default setups will not be erased when assigning a new Setup File

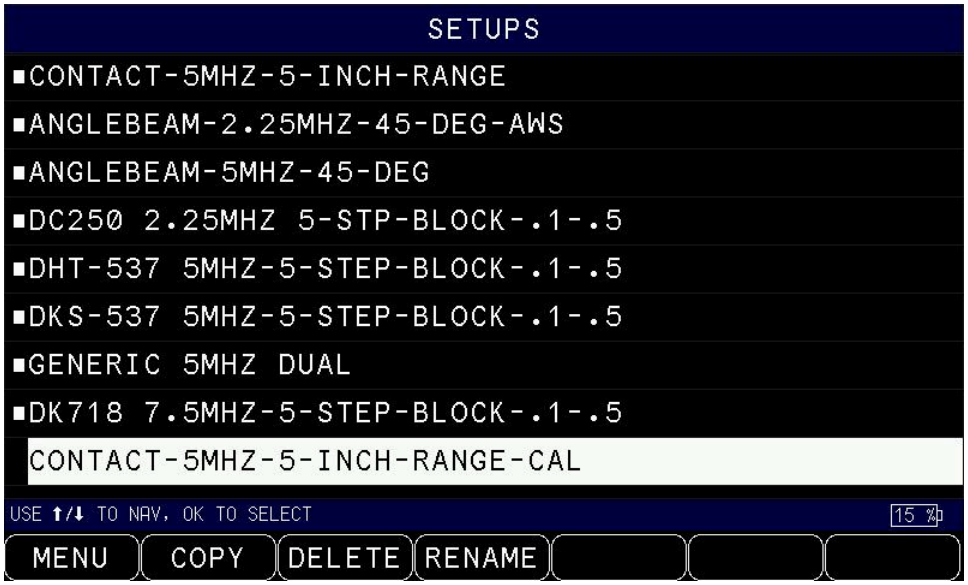
The setup file will now display under the new file name at the bottom of the list of Setup files. The new file can now be copied, deleted or renamed via the function keys.



Copying, Renaming, and Deleting Existing Setup Files

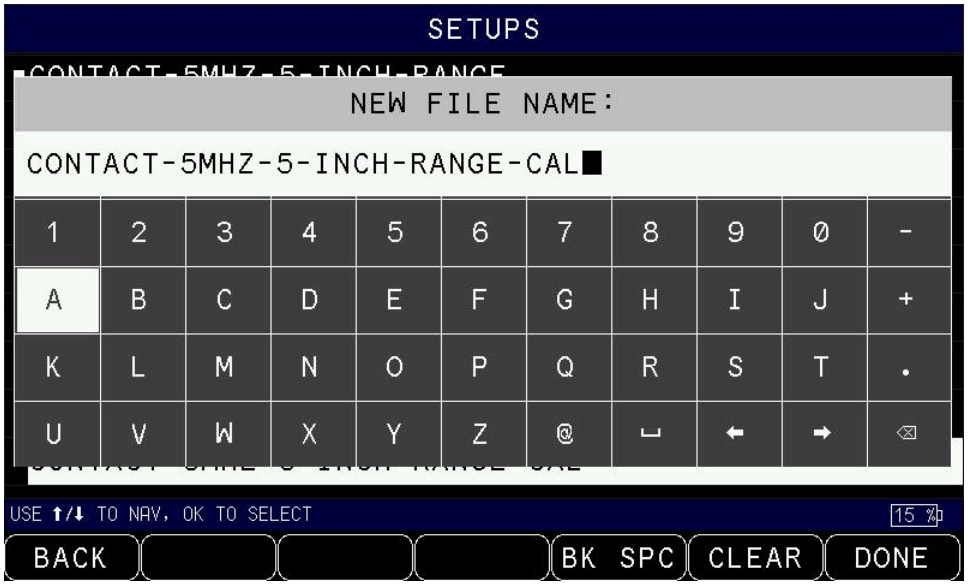
All setup files can be copied to create a new, alternate version of the setup. Custom

created setup files can have their file names edited or deleted. Default Setup Files can not be edited or deleted.



To **Copy** a setup file

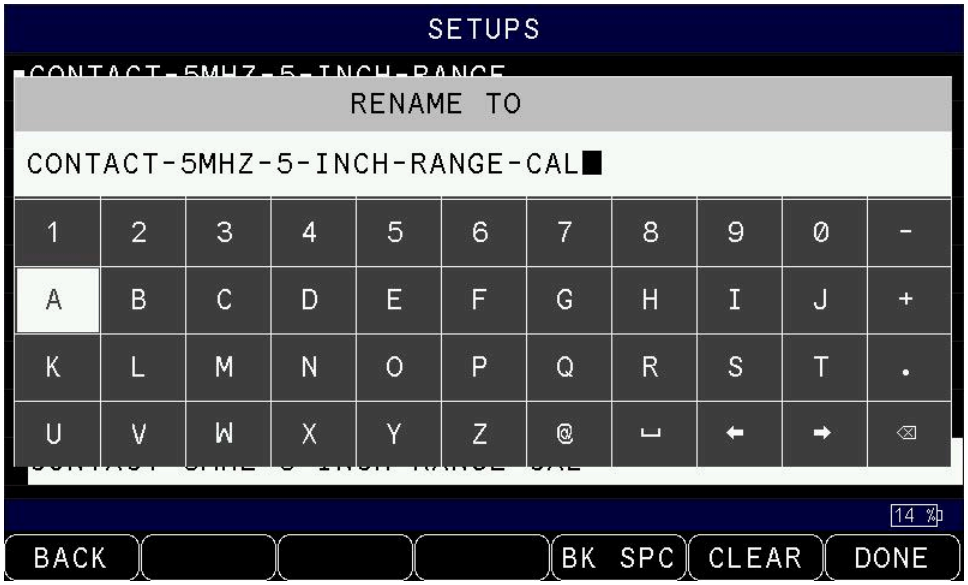
1. Using the touchscreen or **Up** and **Down** arrows to highlight the desired setup file. If using the touchscreen press and drag finger slightly up on the screen to highlight a file without fully selecting and entering the measurement screen
2. Using the touchscreen or physical keys press **F2-Copy.** A keypad will appear



3. Using the on screen keypad enter the desired file name. To delete a character press **F5 - Bk Spc** (Backspace) or to clear the current file name completely press **F6 - Clear**
4. Use the touchscreen or physical keys to press **F7-Done** when finished to return to the *Setup Menu*

To **Rename** a custom setup file name *(default setup names can not be edited)*

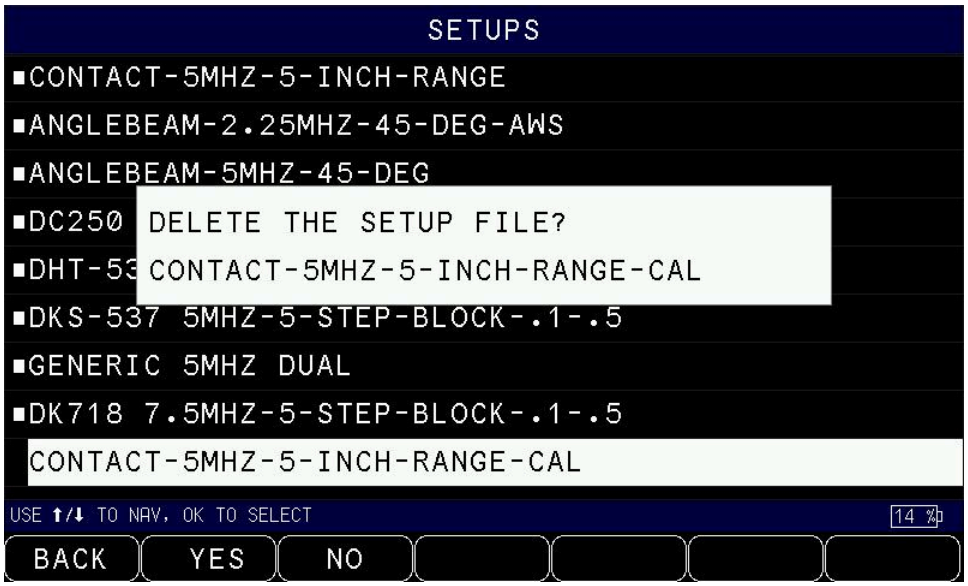
1. Using the touchscreen or **Up** and **Down** arrows to highlight the desired setup file. If using the touchscreen press and drag finger slightly up on the screen to highlight a file without fully selecting and entering the measurement screen
2. Using the touchscreen or physical keys press **F4-Rename.** A keypad will appear



3. Using the on screen keypad enter the desired file name. To delete a character press **F5 - Bk Spc** (Backspace) or to clear the current file name completely press **F6 - Clear.**
   Alternatively you can use the **Arrow** keys followed by an **OK** key press to enter the desired setup name
4. Use the touchscreen or physical keys to press **F7-Done** when finished to return to the *Setup Menu*

To Delete a custom setup file *(default setup files can not be deleted)*

1. Using the touchscreen or **Up** and **Down** arrows to highlight the desired setup file. If using the touchscreen press and drag finger slightly up on the screen to highlight a file without fully selecting and entering the measurement screen
2. Using the touchscreen or physical keys press **F3-Delete.**
3. A pop up will appear asking if you want to delete the selected file.



Select from the following options

- **F1:** Back - Exits and returns to the *Setup Menu*
- **F2:** Yes - Deletes the selected file
- **F3:** No - Exits and returns to the *Setup Menu*

Note: Default setup files denoted with a square to the left of the file name can not be deleted

4 ECHO PRO 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 set your basic adjustments such as range, material velocity, zero angle, etc. before calibration. These can be set on the Measurement Screen.

Initiating Calibration

The calibration process is initiated by using the touchscreen or physical keys to press **F2-Menu** on the Measurement screen to enter the *Main Menu.* Once in the *Main Menu,* use the touchscreen or physical keys to select *Calibration.* The calibration process is slightly different depending on the probe type chosen. See below for specific instructions calibrating Dual, Straight Beam and Angle Beam transducers.

Note: Any of the 4 boxes on the top right side of the screen can be set to Gate 1 Thickness or Gate 1 Soundpath (when in angle beam). If multiple boxes are set to Gate 1 thickness/Soundpath the box set to Gate 1 Thickness/Soundpath that is closest to Gain is the one that will control calibration

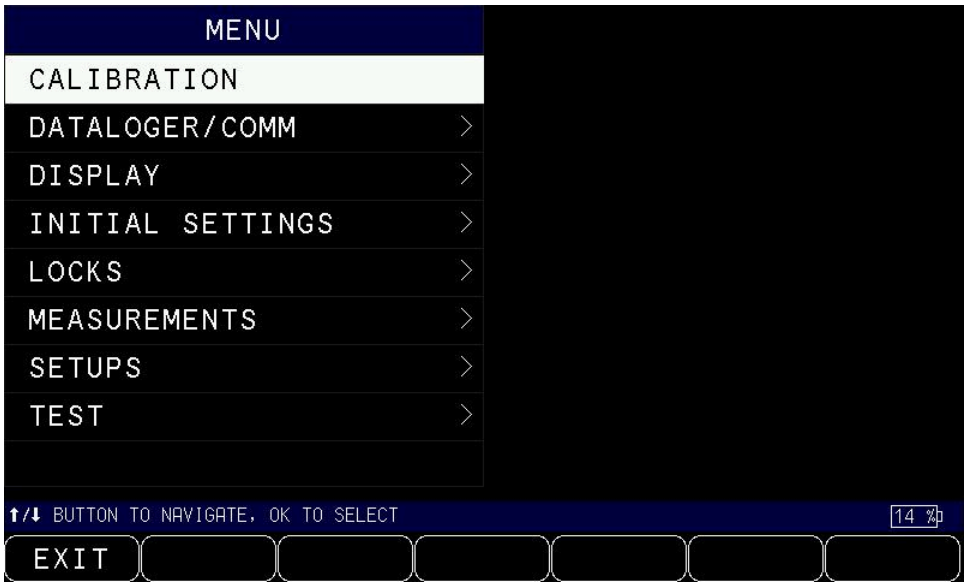
Dual Calibration

When performing a dual calibration it is important to check your initial parameter settings from the *Measurement Screen*. Many of Danatronics common dual transducers have setup files that can be used to ensure recommended parameters are selected that can be selected from the *Setups Menu*. For our popular DKS-537, 5.0MHz dual transducer, your initial settings should look like the parameters shown below:

The example below uses the DKS-537 setup with a 5-step test block (0.100" – 0.500" or 2.54mm-12.70mm)

To begin calibrating a Dual Transducer on the ECHO PRO, follow these steps:

1. Using the touchscreen or physical keys press **F2-Menu** to enter the *Main Menu*. Use the touchscreen or arrow keys followed by **OK** to select *Calibration*



2. Couple to the 0.100"step of your block, then using touchscreen or F-Keys press **F3 – Zero**. The thickness reading will be frozen and you can remove the probe from the test block surface.

   When calibration is engaged the measurement box closest to gain will change to Gate 1 Thickness. If multiple measurement boxes are set to Gate 1 Thickness, the number in the Gate 1 Thickness box closest to gain will be the one engaged for the purposes of calibration.
3. If the frozen number in the Gate 1 Thickness box is not 0.100" use the **Up** or **Down** arrow keys to scroll to the known thickness of 0.100", and then press the **F1 – Cal** key.

   Alternatively, if Quick Cal values have been set to match your test block in the manual (see Initial Settings:Quick Cal Zero or Initial Settings Quick Cal Velocity) you can select **F3-0.100** to quickly set the thickness to 0.100". Then press **F1-Cal.**
4. Couple to the 0.500" step of your block(you may need to press the **F2 – Gain** key if the signal is too low to get the echo in the gate). Using the touchscreen or physical key select **F4 – Vel**. The reading in Gate 1 Thickness box will again be frozen. Use the **Up** or **Down** arrow key to scroll to the known thickness of 0.500" and then press the **F1-Cal OK** to complete the calibration process.

   Alternatively if the Quick Cal keys are set, press F3-0.500" to set the thickness to 0.500" then press **F1-Cal OK** to complete the calibration process.

ECHO PRO will briefly display the calibrated acoustic sound speed. For steel, the speed should be around 0.2300 in/usec.

Straight Beam Calibration

When performing a single element straight beam calibration it is important to check your initial parameter settings from the *Measurement* screen (see Measurement Screen). There is a default setup file for a 5mhz contact probe on a 5" range available in the Setups Menu. For a straight beam probe, 5.0 MHz, with a 5" range your initial settings should look like the parameters shown below:

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 use the touchscreen or physical key to select **F2-Auto 80** after detecting the first echo at 0.100" to automatically adjust the amplitude to 80% FSH (full screen height).

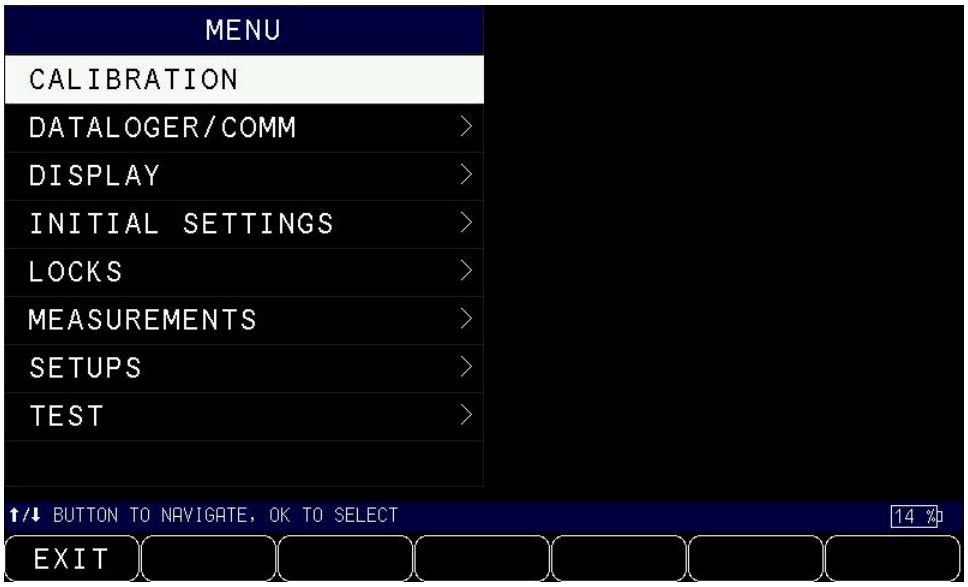
When using a default setup ECHO PRO will assign peak detection, but the user can alter the default setting and choose between first peak, edge and peak depth by adjusting **Gate Detection** from the *Measurement* screen (see Measurement Screen:Gate Detection).

Straight Beam Calibration without moving Gate

The example below uses a “Straight beam contact probe 5 MHz, 5" range” setup with a DCK-537 transducer and a 5-step test block (0.100" – 0.500" or 2.54mm-12.70mm)

To begin calibrating a Single Element Straight Beam Transducer on the ECHO PRO, follow these steps:

1. Using the touchscreen or physical keys press **F2-Menu** to enter the *Main Menu*. Use the touchscreen or arrow keys followed by **OK** to select *Calibration*



2. Couple to the 0.100"step of your block, then using touchscreen or F-Keys press **F3 – Zero**. The thickness reading will be frozen and you can remove the probe from the test block surface.

   When calibration is engaged the measurement box closest to gain will change to Gate 1 Thickness. If multiple measurement boxes are set to Gate 1 Thickness, the number in the Gate 1 Thickness box closest to gain will be the one engaged for the purposes of calibration.

3. If the frozen number in the Gate 1 Thickness box is not 0.100" use the **Up** or **Down** arrow keys to scroll to the known thickness of 0.100", and then press the **F1 – Cal** key.

   Alternatively, if Quick Cal values have been set to match your test block (see Initial Settings:Quick Cal Zero or Initial Settings Quick Cal Velocity) you can select **F3-0.100** to quickly set the thickness to 0.100". Then press **F1-Cal.**

4. Couple to the 0.500" step of your block(you may need to press the **F2 – Gain** key if the signal is too low to get the echo in the gate). Using the touchscreen or physical key select **F4 – Vel**. The reading in Gate 1 Thickness box will again be frozen. Use the **Up** or **Down** arrow key to scroll to the known thickness of 0.500" and then press the **F1-Cal OK** to complete the calibration process.

   Alternatively, if Quick Cal values have been set to match your test block (see Initial Settings:Quick Cal Zero or Initial Settings Quick Cal Velocity) you can select **F4-0.500** to quickly set the thickness to 0.500". Then press **F1-Cal.**.

ECHO PRO will briefly display the calibrated acoustic sound speed. For steel, the speed should be around 0.2300 in/usec.

Straight Beam Calibration with Multiple Echos

Straight Beam Calibration with multiple echos involves a different procedure that requires the gate one start to be moved after you have performed a Zero calibration.

The example below uses the “Straight beam contact probe 5 MHz, 5" range” setup with a DCK-537 transducer and 1” (2.54cm) calibration block

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

1. Couple the transducer to the test block, and adjust Gate 1 covering the 1.000" echo.
2. Using the touchscreen or physical keys press **F2-Menu** to enter the *Main Menu*. Use the touchscreen or arrow keys followed by **OK** to select *Calibration*
3. Couple to the 1.000” (2.54cm) step of your block, then, using the touchscreen or F-Keys select **F3 – Zero**. The thickness reading will be frozen and you can remove the probe from the test block surface.

   When calibration is engaged the measurement box closest to gain will change to Gate 1 Thickness. If multiple measurement boxes are set to Gate 1 Thickness, the number in the Gate 1 Thickness box closest to gain will be the one engaged for the purposes of calibration.

4. If the frozen number in the Gate 1 Thickness box is not 1.00" use the **Up** or **Down** arrow keys to scroll to the known thickness of 1.00", and then press the **F1**

– **Cal** key.

Alternatively, if Quick Cal values have been set to match your test block (see Initial Settings:Quick Cal Zero or Initial Settings Quick Cal Velocity) you can select **F3-1.00** to quickly set the thickness to 1.00". Then press **F1-Cal.**

5. Use the left or right arrow keys or touchscreen to select the Gate 1 Start Parameter on the second page of the *Menu Pane* (see Adjusting Menu Pane Parameters). Once Gate 1 Start is selected, use the up arrow key or drag the touchscreen 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.)
6. Use the touchscreen or physical keys to select the **F1 – Done** to exit the Gate 1 Start parameter
7. Use the touchscreen or physical keys to select **F4-VEL** and use the **Up** or **Down** arrow keys to scroll to the known 5.000" value of the gated 5th echo and then press the **F1-Cal OK** to complete the calibration process.

Angle Beam Calibration

The calibration process for an angle beam is much like a straight beam calibration with multiple echos in the sense that you will need to move the gate in the middle of the calibration process.

There is a default setup file for a 5mhz angle beam with 45 degree wedge available in the Setups Menu. For an angle beam probe, 5.0 MHz, with a 45 degree wedge your initial settings should look like the parameters shown below:

The probe used in this calibration example is a 5.0MHz with a 45 degree angle and a IIW, type 2 block with reflectors at 2" and 4". Other common test blocks include 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 (see Measurement Screen:Peak Memory) . You will see an “echo envelope” in dark blue, which represents the maximum amplitude recorded.
2. Move the angle beam probe back and forth to peak the signal. You may want to use Gain or Auto 80 to achieve this peak.

3. Once the echo is peaked, 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. Do not move the probe at this point.
4. Using the touchscreen or physical keys press **F2-Menu** to enter the *Main Menu*. Use the touchscreen or arrow keys followed by **OK** to select *Calibration*
5. Gate first echo then, using the touchscreen or F-Keys select **F3 – Zero**. The thickness reading will be frozen and you can remove the probe from the test block surface.

   When calibration is engaged the measurement box closest to gain will change to Gate 1 Soundpath. If multiple measurement boxes are set to Gate 1 Soundpath, the number in the Gate 1 Soundpath box closest to gain will be the one engaged for the purposes of calibration.

6. If the frozen number in the Gate 1 Soundpath box is not 2.00" use the **Up** or **Down** arrow keys to scroll to the known angular distance of 2.00", and then press the **F1 – Cal** key.

   Alternatively, if Quick Cal values have been set to match your test block (see Initial Settings:Quick Cal Zero or Initial Settings Quick Cal Velocity) you can select **F3-2.00** to quickly set the thickness to 2.00". Then press **F1-Cal.**

7. Use the left or right arrow keys or touchscreen to select the Gate 1 Start Parameter on the second page of the *Menu Pane* (see Adjusting Menu Pane Parameters). Once Gate 1 Start is selected, use the up arrow key or drag the touchscreen to increase the Gate 1 Start until the 5th echo at 4.000" 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.)
8. Use the touchscreen or physical keys to select the **F1 – Done** to exit the Gate 1 Start parameter
9. Use the touchscreen or physical keys to select **F4-VEL** and use the **Up** or **Down** arrow keys to adjust the angular distance to 4.000" and then press the **F1-Cal OK** to complete the calibration process.
10. Press the **F4 – Vel** key. The thickness reading will be frozen and you can remove the probe from the test block surface.

11. If the frozen number in the Gate 1 Soundpath box is not 4.00" use the **Up** or **Down** arrow keys to scroll to the known angular distance of 4.00", and then select **F1 – Cal OK** to complete the calibration process. ECHO PRO will display the shear wave velocity of approximately 0.1270 in/usec.

Velocity Only Calibration

If you are working with a test piece of known thickness but unknown material, then you can calibrate the 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.

Before beginning calibration check your parameter settings. Make sure the range is set so you can see the proper echoes and adjust gate to cover the thickness echo, either move echo to the known depth or use auto cal and enter the known thickness of the detected echo.

The example below uses the DKS-537 setup with a 5-step test block (0.100" – 0.500" or 2.54mm-12.70mm)

To perform a Velocity only calibration, follow these steps:

1. Using the touchscreen or physical keys press **F2-Menu** to enter the *Main Menu*. Use the touchscreen or arrow keys followed by **OK** to select *Calibration*

2. Couple to the thick, 0.500" step of your block(you may need to press the **F2 – Gain** key if the signal is too low to get the echo in the gate). Using the touchscreen or physical key select **F4 – Vel**. The reading in Gate 1 Thickness box will again be frozen. Use the **Up** or **Down** arrow key to scroll to the known thickness of 0.500" and then press the **F1-Cal OK** to complete the calibration process.

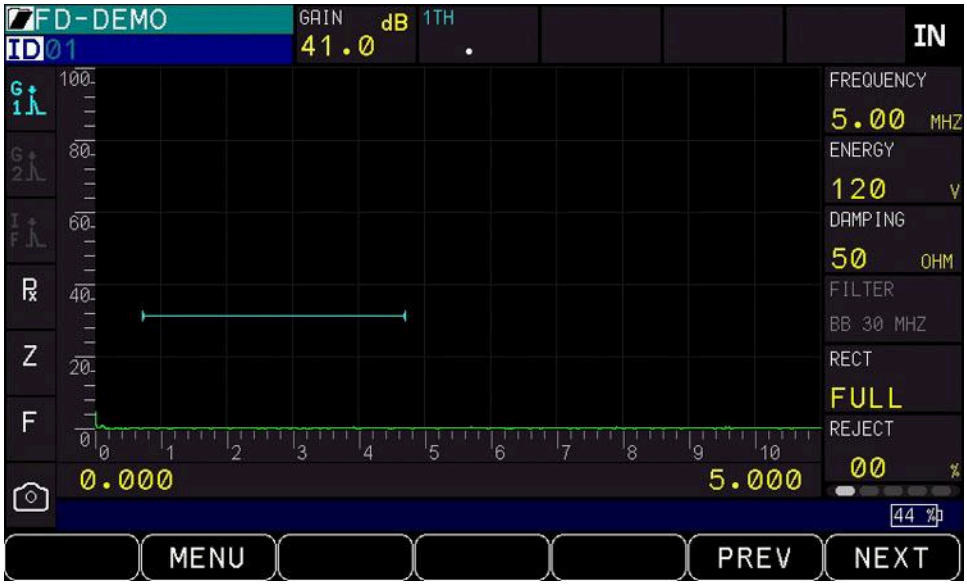
   Alternatively if the Quick Cal keys are set, press F3-0.500” to set the thickness to 0.500” then press **F1-Cal OK** to complete the calibration process.

The unit will briefly display the calibrated velocity value.

5 Measurement Screen

ECHO PRO User Interface

When ECHO PRO is turned on the default screen that will display is the *Measurement* Screen.



The *Measurement* screen has five distinct areas:

1. **Top part of the display screen**: Shows the File Name, ID Number, Gain, 4 user selectable measurement readings, unit of measure (in, mm, usec)
   The user selectable measurement reading windows can be set to display any of the following:
   Gate 1 or Gate 2: thickness, Minimum depth, current amplitude, max amplitude, min amplitude
   Gate 2 only: Echo to Echo, Echo to Echo Min, , Echo to Echo Max
2. **Right side of the display screen:** Displays the 5 page *Menu Pane***.**
   Page 1: Frequency, Energy, Damping, Filter, Rectification, Reject,
   Page 2: G1 start, G1 Width, G1 Level, G1 Alarm, G1 Minimum ,
   Page 3: Gate 2 start, Gate 2 Width, Gate 2 Level, Gate 2, Alarm, Gate 2 Minimum, Gate 2 on/off,
   Page 4: Zero, Velocity, Angle, Thickness, Measurement Mode,
   Page 5: DAC, Curve, DAC Gain
3. **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 and can be selected on screen or with the F1-F7 function keys below. Above the function keys, on the right hand side of the blue box are touchscreen (appears when turned off),wifi, bluetooth and battery life. The left hand side of the box is where instructions and error messages will appear

4. **The left side of the display screen:** shows Gate 1 Detection, Gate 2 Detection, Interface Gate Detection, Peak, Zoom, Freeze, Screenshot

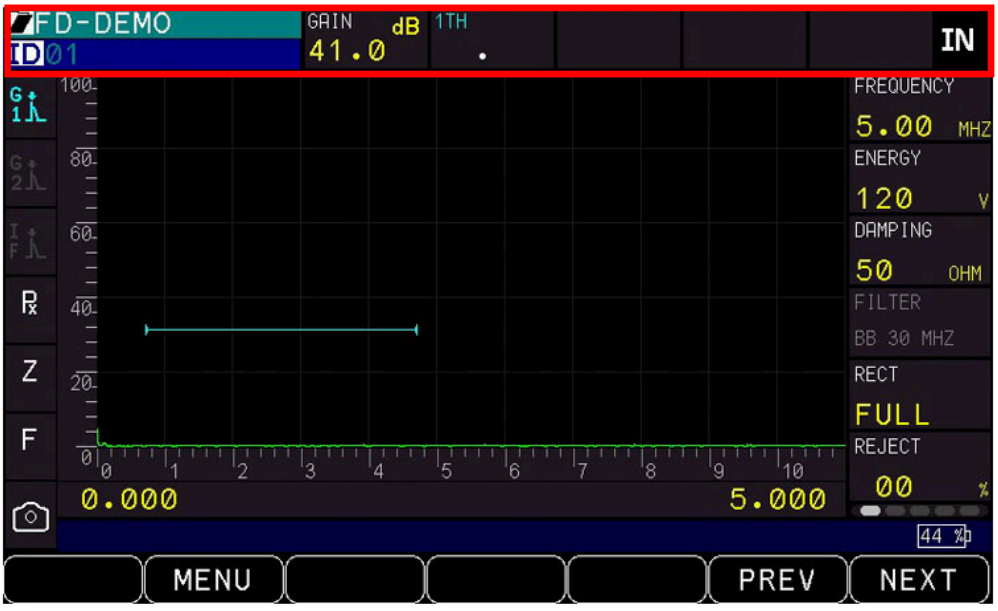
Changing Parameters from the Measurement Screen

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

Note: Some of the below function key screen shots are subject to change with software updates.

Top of Measurement screen

The top of the measurement screen displays the current datalogger file name and ID, gain, units of measure and allows for 4 user selectable measurements to display. The Datalogger file name and ID as well as units of measure are not able to be adjusted on screen and instead need to be adjusted from within the *Main Menu*. Datalogger adjustments can be made in the *Datalogger* Menu. Units of measure can be changed in the *Initial Settings* menu



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, making it easier to add or subtract gain. When gain is selected you can adjust the gain from 0.00db to 110.0 db in 0.1 db increments by using the **Up** and **Down** arrow keys or to auto 80 using the

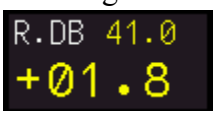
physical **Function** keys described below

To adjust gain from the display use the touchscreen to press gain at the top of the screen or press the physical **dB**-key to bring the cursor directly to the gain setting. Gain can also be adjusted from the measurements menu (see section 10 Measurements Menu).

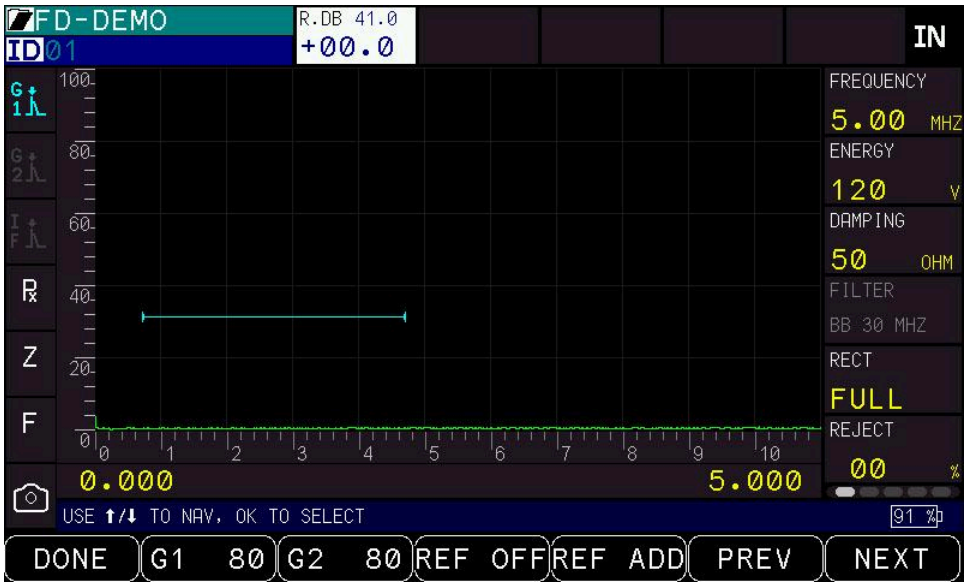
When **Gain** is selected from the *Menu Pane*, use the Function Keys or or corresponding touchscreen icons to select from the standard gain list or use the **UP** and **DOWN** arrow keys to scroll to a specific gain.

The default function keys are listed below. To change the **F2-F5** keys select the desired gain, then press and hold the **Function** key or the corresponding touchscreen icon until the key updates to the currently selected decibels.

- **F1**: Done (exit return to measurement screen)
- **F2**: Gate 1 Auto 80 – set signal within Gate 1 amplitude to 80% by adjusting gain automatically
- **F3:** Gate 2 Auto 80 – set signal within Gate 1 amplitude to 80% by adjusting gain automatically
- **F4**: Toggle Reference Gain On/Off. If Ref Gain is active, then Ref Gain and Scanning Gain will appear as follows:



- **F5:** If Reference Gain is turned on **F5** will become **ADD**. In this situation when **F5** is pressed, Ref Gain and Scanning Gain will be added and Scanning Gain will be deactivated.



- **F6:** PREV - Moves clockwise around the display screen parameter settings
- **F7:** NEXT - Moves counter-clockwise around the display screen parameter settings
- **Up Arrow:** Increases the gain
- **Down Arrow:** Decreases the gain
- **Right Arrow:** Scrolls clockwise to the next on screen parameter setting
- **Left Arrow:** Scrolls counter-clockwise to previous on screen parameter settings
- **OK:** Exits and returns to measurement screen

User Selectable Measurement Windows

On the top of the measurement display there are 4 user selectable measurement display boxes. Each of these can be turned off and left blank or set to display a specific type of measurement.

To select a measurement type press the box you would like to change. A pop up will appear with a list of available options. All 4 boxes can be set to display the following measurement types depending on the current parameters. Gate 1 options will appear in blue, Gate 2 options will appear in orange. Some options are only available if an angle beam angle is set or if Gate 2 is turned on:

Off	Turns Off
1TH	Gate 1 Thickness (non-angle beam)

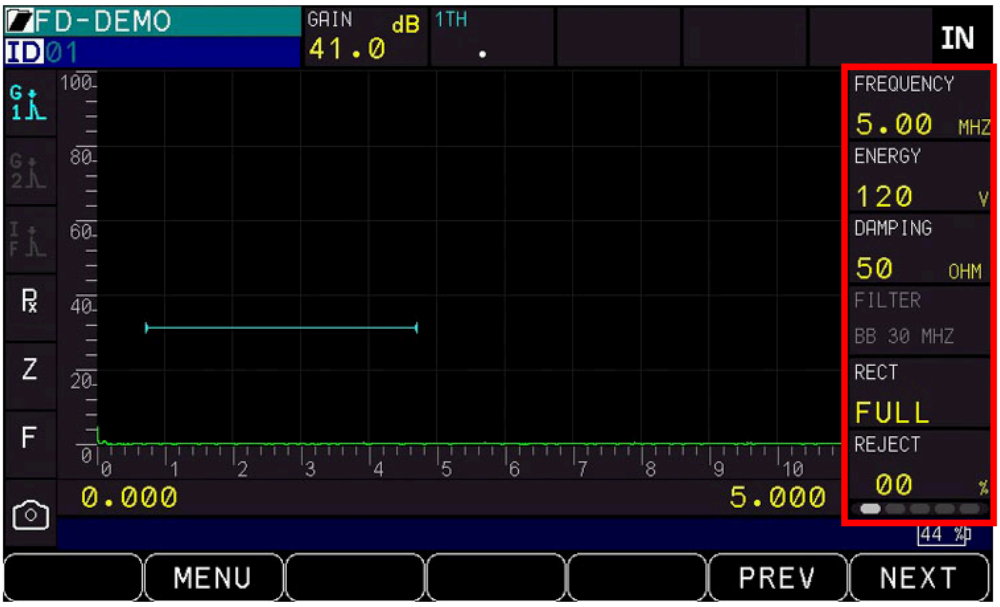
	Gate 1 Soundpath (angle beam)
	Gate 1 Depth to Reflector (angle beam)
	Gate 1 Surface Distance (angle beam)
	Gate 1 Surface Distance X-Value (angle beam)
	Gate 1 Reflector Leg (angle beam)
	AWS D1 Consult with the AWS code for specific values and calculations. ● A = Total of system gain, base gain plus reference gain ● B = Base system gain ● C = Soundpath minus 1 times 2 ● D = A-B-C
	Gate 1 Min Depth
	Gate 1 Max Depth
	Gate 1 Current Amplitude
	Gate 1 Max Amplitude
	Gate 1 Min Amplitude

	Gate 2 Thickness (non-angle beam)
	Gate 2 Sountpath (angle beam)
	Gate 2 Depth to Reflector (angle beam)
	Gate 2 Surface Distance (angle beam)
	Gate 2 Surface Distance X-Value (angle beam)
	Gate 2 Reflector Leg (angle beam)
	Gate 2 Min Depth
	Gate 2 Max Depth
	Gate 2 Current Amplitude
	Gate 2 Max Amplitude
	Gate 2 Min Amplitude
	Echo to Echo (Gate 2)
	Echo to Echo Min (Gate 2)

2-1T	Echo to Echo Max (Gate 2)

Right Side of Measurement Screen

The right side of the ECHO PRO display has a rotating *Menu Pane* that allows you to access parameter settings directly from the display. There are 5 pages of the *Menu Pane*



- **Page 1:** Frequency, Energy, Damping, Filter, Rectification, Reject,
- **Page 2:** G1 start, G1 Width, G1 Level, G1 Alarm, G1 Minimum ,
- **Page 3:** Gate 2 start, Gate 2 Width, Gate 2 Level, Gate 2, Alarm, Gate 2 Minimum, Gate 2 on/off,
- **Page 4:** Zero, Velocity, Angle, Thickness, Measurement Mode,
- **Page 5:** DAC, Curve, DAC Gain

Adjusting Menu Pane Parameters

The *Menu Pane* of parameter settings is found on the right side of the display. Use the touchscreen or use the left and right arrows to highlight the *Menu Pane* then use the **UP** and **DOWN** arrows or **PREV/NEXT** buttons that correspond with **F6-PREV** key and **F7-NEXT** keys to scroll through the parameter menu screens.

Menu Pane Page 1

Frequency

Frequency is used to select the frequency of the probe in use. ECHO PRO has a bandwidth of .5-30 MHz in .25 MHz increments at - 3 dB. It is best to match the frequency of the probe to the exact setting listed on your transducer.

When **Frequency** is selected from the **Menu Pane**, use the Function Keys or corresponding touchscreen icons to select from the standard frequency list or use the **UP** and **DOWN** arrow keys to scroll to a specific frequency.

The default function keys are listed below. To change the **F2-F5** keys select the desired frequency, then press and hold the **Function** key or the corresponding touchscreen icon until the key updates to the currently selected frequency.

- **F1:** Done (exit return to measurement screen)
- **F2:** 1.0 MHz
- **F3:** 2.25 MHz
- **F4:** 5.0 MHz
- **F5:** 7.5 MHz
- **F6:** PREV - Moves to the next tab of the menu pane
- **F7:** NEXT - Moves to the previous menu pane tab
- **Up Arrow:** Increases the frequency
- **Down Arrow:** Decreases the frequency
- **Right Arrow:** Scrolls clockwise to the next on screen parameter setting
- **Left Arrow:** Scrolls counter-clockwise to previous on screen parameter settings
- **OK:** Exits and returns to measurement screen

Energy

Energy sets the strength of the signal from 50-600 Volts in 5 volt increments. An increase in energy will increase the signal and a decrease will reduce the signal. **Energy** is used with **Filters** and **Damping** to get the best signal to noise ratio. Look at waveform to determine the best settings.

When setting **Energy** it is important to never select over 400V when a transducer 5 MHz or higher is being used or your probe could be damaged. If the frequency of the transducer is properly set, ECHO PRO will prevent choosing an energy setting over 400V for probes 5MHz and higher. If the frequency is incorrectly set to less than 5 MHz ECHO PRO will not know to limit energy and your probe could become damaged if a higher voltage is set.

When **Energy** is selected from the **Menu Pane**, use the Function Keys or corresponding touchscreen icons to select from the standard options or use the **UP** and **DOWN** arrow keys to scroll to a specific voltage.

- **F1**: Done (exit return to measurement screen)
- **F2**: 100 volts
- **F3**: 200 volts
- **F4**: 300 volts
- **F5:** 400 volts
- **F6:** PREV - Moves to the next tab of the menu pane
- **F7:** NEXT - Moves to the previous menu pane tab
- **Up Arrow:** Increases the volts
- **Down Arrow:** Decreases the volts
- **Right Arrow:** Scrolls clockwise to the next on screen parameter setting

- **Left Arrow:** Scrolls counter-clockwise to previous on screen parameter settings
- **OK:** Exits and returns to measurement screen

Note: DO NOT USE 600V SETTING FOR ANY PROBE ABOVE 5 MHz. ECHO PRO will prevent this if the correct frequency is selected. If an incorrect probe frequency is selected the ECHO PRO will not know to limit the voltage and your probe could be damaged.

Damping

There are four **Damping** settings 50,63,150 and 400 Ohms. Decreasing the damping reduces the amplitude of the signal. Increasing damping increases the amplitude of the signal. **Damping** is used with **Filters** and **Energy** to get the best signal to noise ratio. Look at waveform to determine the best settings.

When **Damping** is selected from the *Menu Pane*, options will appear next to the Menu Pane as well along the bottom of the screen. To change the **Damping**, use the Function Keys or corresponding touchscreen icons to select from the options at the bottom of the screen or use the **UP** and **DOWN** arrow keys or touchscreen icons next to the **Damping** parameter setting to select a specific value.

- **F1**: Done (exit return to measurement screen)
- **F2**: 50 Ohms
- **F3**: 63 Ohms
- **F4**: 150 Ohms
- **F5:** 400 Ohms

- **F6:** PREV - Moves to the next tab of the Menu Pane
- **F7:** NEXT - Moves to the previous Menu Pane tab
- **Up Arrow:** Scrolls down the list of daming options
- **Down Arrow:** Scrolls up the list of damping options
- **Right Arrow:** Scrolls clockwise to the next on screen parameter setting
- **Left Arrow:** Scrolls counter-clockwise to previous on screen parameter settings
- **OK:** Exits and returns to measurement screen

Filter

Filters allow broadband or narrowband settings to match the requirements of a given application. **Filters** are used with **Damping** and **Energy** to get the best signal to noise ratio. **Filters** should be chosen based on the current probe being used. Look at the waveform to determine the best settings.

By Default ECHO PRO Filters are locked to BB 30 MHz (broadband 30 MHz) and the icon in the *Menu Pane* will be grayed out. To unlock filters selection see Filter Select within Section 10 *Measurement Menu*)

If filters are unlocked, they can be changed from the *Measurement* screen on the first page of the *Menu Pane*

When **Filter** is selected from the *Menu Pane*, available filter options will appear next to the Menu Pane. To change the **Filter**, use the **UP** and **DOWN** arrow keys or touchscreen icons next to the **Filter** parameter setting to select a specific value.

Available filters are

- 0.50 MHz Narrow
- 0.50 MHz Wide
- 1 MHz Narrow
- 1 MHz Wide
- 1.25 MHz Narrow
- 1.25 MHz Wide
- 2.0 MHz Narrow
- 2.0 MHz Wide
- 2.25 MHz Narrow
- 2.25 MHz Wide
- 3.5 MHz Narrow
- 3.5 MHz Wide
- 4.0 MHz Narrow
- 4.0 MHz Wide
- 4.5 MHz Narrow
- 4.5 MHz Wide
- 5.0 MHz Narrow
- 5.0 MHz Wide
- 7.5 MHz Narrow
- 7.5 MHz Wide
- 10.0 MHz Narrow
- 10.0 MHz Wide
- 15.0 MHz Narrow
- 15.0 MHz Wide
- 20.0 MHz Narrow

- 20.0 MHz Wide
- BB Low (Broadband Low)
- BB High (Broadband High)
- BB All Pass (Broadband All Pass)
- BB 30 MHz (Broadband 30 MHz

Rectification

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: Full wave, half wave +, half wave - and RF. RF should be used for phase reversal applications such as bonding from rubber to steel.

When **RECT** is selected from the *Menu Pane*, options will appear next to the Menu Pane as well along the bottom of the screen. To change the rectification mode, use the Function Keys or corresponding touchscreen icons to select from the options at the bottom of the screen or use the **UP** and **DOWN** arrow keys or touchscreen icons next to the **RECT** parameter setting to select a specific rectification mode.

- **F1**: Done (exit return to measurement screen)
- **F2**: Full
- **F3**: HW+ (Half Wave Positive)
- **F4**: HW- (Half Wave Negative)
- **F5:** RF (Radio Frequency)
- **F6:** PREV - Moves to the next tab of the menu pane
- **F7:** NEXT - Moves to the previous menu pane tab
- **Up Arrow:** Scrolls up the list in the rectification pop up

- **Down Arrow:** Scrolls down the list in the rectification pop up
- **Right Arrow:** Scrolls clockwise to the next on screen parameter setting
- **Left Arrow:** Scrolls counter-clockwise to previous on screen parameter settings
- **OK:** Exits and returns to measurement screen

Reject

Reject eliminates unwanted signals such as baseline noise below the set value. **Reject** is set to 0-50% of full screen height (FSH) in 1% increments. When using reject it is important to watch to ensure you are not eliminating desired signals.

When **REJECT** is selected from the **Menu Pane**, use the Function Keys or corresponding touchscreen icons to select from the standard options or use the **UP** and **DOWN** arrow keys to scroll to a specific reject percentage

The default function keys are listed below. To change the **F2-F5** keys select the desired reject percentage, then press and hold the **Function** key or the corresponding touchscreen icon until the key updates to the currently selected percentage.

- **F1**: Done (exit return to measurement screen)
- **F2**: Off - turns reject off and sets to 0%
- **F3**: 05
- **F4**: 10
- **F5:** 20
- **F6:** PREV - Moves to the next tab of the menu pane
- **F7:** NEXT - Moves to the previous menu pane tab
- **Up Arrow:** Increases the reject percentage
- **Down Arrow:** Decreases the reject percentage

- **Right Arrow:** Scrolls clockwise to the next on screen parameter setting
- **Left Arrow:** Scrolls counter-clockwise to previous on screen parameter settings
- **OK:** Exits and returns to measurement screen

Menu Pane Page 2 and 3

Gates

Gates help making consistent edge depth thickness readings while scanning at a 60htz update rate. Gates can be used to make readings of depth, amplitude and echo to echo.

ECHO PRO comes standard with two gates. Gate 1 settings are adjusted on page 2 of the Menu Pane. Gate 2 settings are adjusted on page 3 of the Menu Pane. Gate 1 and gate one settings display in light blue, Gate 2 and Gate 2 settings display in orange. Interface Gate and Floating Gate can be added as optional features, their settings are adjusted

Users can interact with ECHO PRO Gates both directly by pressing and holding the gate.

A short press will add arrows that can be dragged to adjust the gate start (arrows on the left of the gate), gate width (arrows on the right side of the gate) and level (arrows in the middle of the gate) as shown below. To exit the gate adjustment press anywhere on the measurement screen away from the gate.

A long press will add 4 arrows in the center of the gate that allow you to move the entire gate at one time to anywhere within the measurement area. When the gate is place the gate start, width and level will be adjusted accordingly. To exit the gate adjustment press anywhere on the measurement screen away from the gate.

Gate 1 Start/ Gate 2 Start

The Gate Start sets the starting position of the gate in the unit of measurement the ECHO PRO is set to (in/mm/μ)

When **Gate 1 Start** or **Gate 2 Start** are selected from the *Menu Pane*, use the Function Keys or corresponding touchscreen icons to select from the standard options, use the **UP** and **DOWN** arrow keys to scroll to a specific numeric starting point, or press and hold the gate to adjust the gate directly.

- **F1:** Done (exit return to measurement screen)
- **F2**: G1 80/G2 80 (Auto 80) – sets the signal within the Gate amplitude to 80% by adjusting gain automatically
- **F3**: None (when Gate 1 level is selected) or G2 Off - turns gate 2 off (when Gate 2 level is selected)
- **F4**: None
- **F5:** None
- **F6:** PREV - Moves to the next tab of the Menu Pane
- **F7:** NEXT - Moves to the previous Menu Pane tab
- **Up Arrow:** Increase the value of the Gate Start
- **Down Arrow:** Decreases the value of the Gate Start
- **Right Arrow:** Scrolls clockwise to the next on screen parameter setting
- **Left Arrow:** Scrolls counter-clockwise to previous on screen parameter settings
- **OK:** Exits and returns to measurement screen

Gate 1 Width/Gate 2 Width

The gate width sets the width of gate 1 in the unit of measurement the ECHO PRO is set to (in/mm/µ)

When Gate 1 Width or Gate 2 Width are selected from the Menu Pane, use the Function Keys or corresponding touchscreen icons to select from the standard options, use the UP and DOWN arrow keys to scroll to a specific numeric starting point, or press and hold the gate to adjust the gate directly.

- **F1:** Done (exit return to measurement screen)
- **F2**: G1 80/G2 80 (Auto 80) – sets the signal within the Gate amplitude to 80% by adjusting gain automatically
- **F3**: None (when Gate 1 level is selected) or G2 Off - turns gate 2 off (when Gate 2 level is selected)
- **F4**: None
- **F5:** None
- **F6:** PREV - Moves to the next tab of the Menu Pane
- **F7:** NEXT - Moves to the previous Menu Pane tab
- **Up Arrow:** Increase the value of the Gate Width
- **Down Arrow:** Decreases the value of the Gate Width
- **Right Arrow:** Scrolls clockwise to the next on screen parameter setting
- **Left Arrow:** Scrolls counter-clockwise to previous on screen parameter settings
- **OK:** Exits and returns to measurement screen

Gate 1 Level/Gate 2 Level

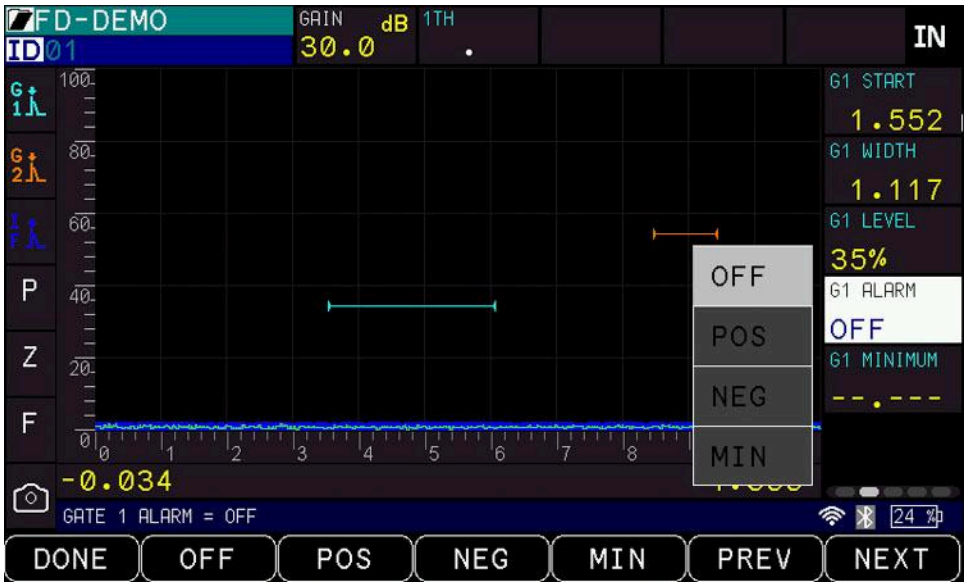
The **Gate Level** sets the level or height position of the gate from 2-95% in 1 % increments

When **Gate 1 Level** or **Gate 2 Level** are selected from the *Menu Pane*, use the Function Keys or corresponding touchscreen icons to select from the standard options, use the **UP** and **DOWN** arrow keys to scroll to a specific numeric starting point, or press and hold the gate to adjust the gate directly.

- **F1:** Done (exit return to measurement screen)
- **F2**: G1 80/G2 80 (Auto 80) – sets the signal within the Gate amplitude to 80% by adjusting gain automatically
- **F3**: None (when Gate 1 level is selected) or G2 Off - turns gate 2 off (when Gate 2 level is selected)
- **F4**: None
- **F5:** None
- **F6:** PREV - Moves to the next tab of the Menu Pane
- **F7:** NEXT - Moves to the previous Menu Pane tab
- **Up Arrow:** Increase the value of the Gate Level
- **Down Arrow:** Decreases the value of the Gate Level
- **Right Arrow:** Scrolls clockwise to the next on screen parameter setting
- **Left Arrow:** Scrolls counter-clockwise to previous on screen parameter settings
- **OK:** Exits and returns to measurement screen

Gate 1 Alarm/Gate 2 Alarm

Alarms can be set to alert the user of where the echo is in relation to the gate. When alarms are set the waveform and F1 key will light up in red. The red color is independent of A-Scan colors. Alarm colors take priority over other colors. If the vibrate or beeper parameters are 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.



When the alarm is turned off the handles at the start and end of the gate will appear as triangles facing the gate as seen in the image below:

When turned on the alarm can be set to three different modes:

POS (Positive Gate Alarm)

The **Positive Gate Alarm** monitors when an echo breaks into the gate. When the **Positive Gate Alarm** is set the handles at the start and end of the gate will be pointing upwards as seen in the image below:

When an echo breaks into the gate, it will trip the alarm and cause the waveform and F1 key to light up red. If vibrate is turned on the flaw detector will also vibrate.

NEG (Negative Gate Alarm)

The **Negative Gate Alarm** monitors when an echo has dropped out of a gate. When the **Negative Gate Alarm** is set, the handles on the start and end of the gate will be pointing down as seen in the image below:

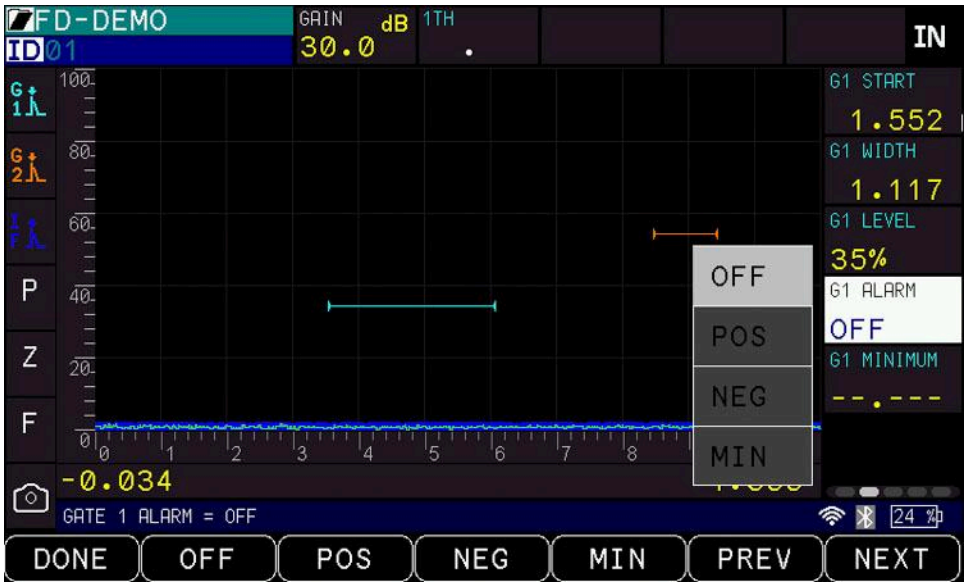
Typically you would set Gate 1 Positive to look for a flaw and Gate 2 Negative to monitor a back wall echo.

MIN (Minimum Depth Alarm)

When the minimum depth alarm monitors when you go below a user set minimum thickness value. When the Minimum Gate Alarm is set, a marker will appear below the gate (to the right of the middle) as shown in the image below:

.

When **Gate 1 Alarm** or **Gate 2 Alarm** is selected from the **Menu Pane**, options will appear next to the **Menu Pane** as well along the bottom of the screen. To change the alarm, use the Function Keys or corresponding touchscreen icons to select from the options at the bottom of the screen or use the **UP** and **DOWN** arrow keys or touchscreen icons next to the **Gate 1 or Gate 2 Alarm** parameter setting to select the desired alarm type.



- **F1**: Done (exit return to measurement screen)
- **F2**: Off - turns Gate 1 Alarm off
- **F3**: POS - echo in gate
- **F4**: NEG - echo drops out of gate
- **F5:** MIN - minimum thickness
- **F6:** PREV - Moves to the next tab of the Menu Pane
- **F7:** NEXT - Moves to the previous Menu Pane tab
- **Up Arrow:** Scrolls up the list in the Gate 1 Alarm pop up
- **Down Arrow:** Scrolls up the list in the Gate 1 Alarm pop up
- **Right Arrow:** Scrolls clockwise to the next on screen parameter setting
- **Left Arrow:** Scrolls counter-clockwise to previous on screen parameter settings
- **OK:** Exits and returns to measurement screen

Gate 1 Minimum/ Gate 2 Minimum

Gate Minimum sets the Minimum Depth Alarm. It can only be set when the alarm is set to MIN. When the Minimum Depth Alarm is set, a marker will appear below the gate (to the right of the middle), as shown in the image below:

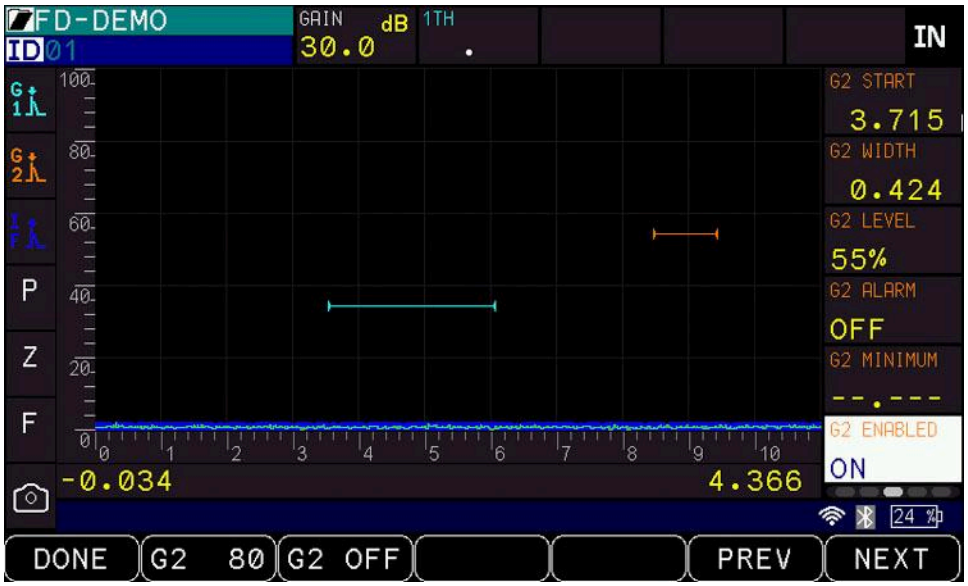
When **Gate 1 Minimum or Gate 2 Minimum** is selected from the *Menu Pane*, use the Function Keys or corresponding touchscreen icons to select from the standard options or use the **UP** and **DOWN** arrow keys to scroll to a specific value.

The default function keys are listed below. To change the **F2-F5** keys select the desired value, then press and hold the **Function** key or the corresponding touchscreen icon until the key updates to the currently selected percentage.

- **F1:** Done (exit return to measurement screen)
- **F2**: 0.100
- **F3**: 0.225
- **F4**: 0.500
- **F5:** 1.000
- **F6:** PREV - Moves to the next tab of the Menu Pane
- **F7:** NEXT - Moves to the previous Menu Pane tab
- **Up Arrow:** Increase the value of the Gate Minimum
- **Down Arrow:** Decreases the value of the Gate Minimum
- **Right Arrow:** Scrolls clockwise to the next on screen parameter setting
- **Left Arrow:** Scrolls counter-clockwise to previous on screen parameter settings
- **OK:** Exits and returns to measurement screen

Gate 2 Enabled

The Gate 2 Enabled setting is only available on the 3rd Menu Pane tab where Gate 2 settings are listed. Gate 2 Enabled turns gate 2 on or off.



- **F1:** Done (exit return to measurement screen)
- **F2**: G1 80/G2 80 (Auto 80) – sets the signal within the Gate amplitude to 80% by adjusting gain automatically
- **F3**: G2 Off - turns gate 2 off (when Gate 2 level is selected)
- **F4**: None
- **F5:** None
- **F6:** PREV - Moves to the next tab of the Menu Pane
- **F7:** NEXT - Moves to the previous Menu Pane tab
- **Up Arrow:** Changes from off to on
- **Down Arrow:** Changes from off to on
- **Right Arrow:** Scrolls clockwise to the next on screen parameter setting
- **Left Arrow:** Scrolls counter-clockwise to previous on screen parameter settings
- **OK:** Exits and returns to measurement screen

Menu Pane Page 4

Zero

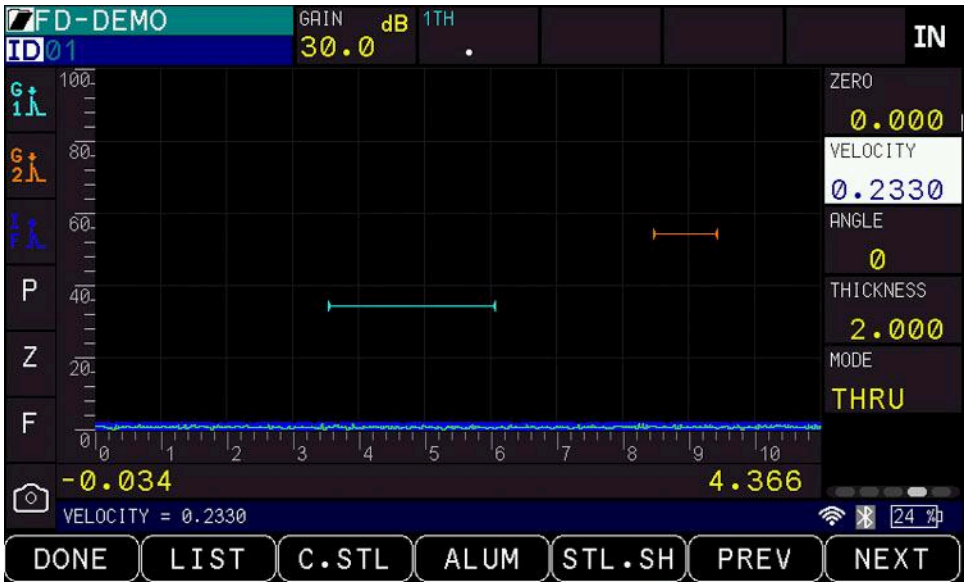
The zero calculates the zero offset value.

- **F1**: Done (exit return to measurement screen)
- **F2**: None
- **F3**: None
- **F4**: None
- **F5:** None
- **F6:** PREV - Moves to the next tab of the Menu Pane
- **F7:** NEXT - Moves to the previous Menu Pane tab
- **Up Arrow:** Increase the zero value
- **Down Arrow:** Decrease the zero value
- **Right Arrow:** Scrolls clockwise to the next on screen parameter setting
- **Left Arrow:** Scrolls counter-clockwise to previous on screen parameter settings
- **OK:** Exits and returns to measurement screen

Velocity

The velocity displays the material velocity. Velocity can be set manually for a known material velocity or velocity can be determined by performing a velocity calibration. See calibration section

When **Velocity** is selected from the **Menu Pane**, use the Function Keys or corresponding touchscreen icons to select from the standard options or use the **UP** and **DOWN** arrow keys to scroll to a specific value.



- **F1**: Done (exit return to measurement screen)
- **F2**: List - displays a list of common materials and their velocities. Use the **up/down** arrow keys or touchscreen to scroll through the list
- **F3**: C. STEEL - Carbon Steel - Sets velocity to 0.2330 in/us
- **F4**: ALUM - Aluminum - sets velocity to 0.2500 in/us
- **F5**: STL.SH - Steel, Sheer Wave
- **F6:** PREV - Moves to the next tab of the Menu Pane
- **F7:** NEXT - Moves to the previous Menu Pane tab
- **Up Arrow:** Increase the velocity value
- **Down Arrow:** Decrease the velocity value
- **Right Arrow:** Scrolls clockwise to the next on screen parameter setting
- **Left Arrow:** Scrolls counter-clockwise to previous on screen parameter settings
- **OK:** Exits and returns to measurement screen

Angle

Angle sets degree of angle for angle beam inspection from. The angle can be set from 1-85% in 1% increments

When **Angle** is selected from the **Menu Pane**, use the Function Keys or corresponding touchscreen icons to select from the standard options or use the **UP** and **DOWN** arrow keys to scroll to a specific value.

- **F1**: Done (exit return to measurement screen)
- **F2**: Off - Turns Angle off and sets to 0 degrees
- **F3**: 30 degrees
- **F4**: 45 degrees
- **F5:** 60 degrees
- **F6:** PREV - Moves to the next tab of the Menu Pane
- **F7:** NEXT - Moves to the previous Menu Pane tab
- **Up Arrow:** Increase the angle degrees
- **Down Arrow:** Decrease the angle degrees
- **Right Arrow:** Scrolls clockwise to the next on screen parameter setting
- **Left Arrow:** Scrolls counter-clockwise to previous on screen parameter settings
- **OK:** Exits and returns to measurement screen

Note: When angle is other than Zero, ECHO PRO 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

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. The ECHO PRO angle beam thickness can be set to 0.01-200”

- **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
- **OK**: Go to Menu to set Thickness parameters

Measurement Mode

Measurement mode is used to select the appropriate measurement type depending on the type of transducer being used.

When **Measurement Mode** is selected from the *Menu Pane*, use the Function Keys or corresponding touchscreen icons to select from the standard options or use the **UP** and **DOWN** arrow keys to scroll to a specific value.

- **F1:** Done (exit return to measurement screen)
- **F2:** P/E - Pulse ECHO mode -for straight beam single element transducers
- **F3:** Dual - Dual Mode - For dual transducers
- **F4**: THRU -Thru Mode - For through transmission inspections utilizing a probe placed on opposite sides of the material being tested
- **F5:** None
- **F6:** PREV - Moves to the next tab of the Menu Pane
- **F7:** NEXT - Moves to the previous Menu Pane tab
- **Up Arrow:** Scrolls up the list of measurement modes
- **Down Arrow:** Scrolls down the list of measurement modes
- **Right Arrow:** Scrolls clockwise to the next on screen parameter setting
- **Left Arrow:** Scrolls counter-clockwise to previous on screen parameter settings
- **OK:** Exits and returns to measurement screen

Menu Pane Page 5

DAC Mode

The Distance Amplitude Curve (DAC) adjusts for signal amplitude as a function of time. DAC displays the curve of the detected echos further in time due to normal attenuation

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 ECHO PRO adjusts --- Anything below the DAC curve it is relayed as smaller than the reference if above the DAC higher than the reference

When **DAC/Mode**, options will appear next to the *Menu Pane* as well along the bottom of the screen. To change the DAC mode, use the **UP** and **DOWN** arrow keys or touchcreen icons next to the **DAC/Mode** parameter setting to select from the following DAC modes:

- *Off:* Turns DAC off
- *ASME:* Creates a single DAC curve based on ASME standards
- *ASME-3:* Creates 3 DAC curves based on ASME standards. Sometimes called a triple DAC
- *Custom:* Allows for user input of RL, SL and EL gain
- *JIS:* Creates DAC curve based on Japanese Industrial Standards with curves at +6dB, 0dB, -6dB, -12dB.
- *TVG:* Time Varied Gain - increases gain to keep amplitude of echoes consistent

When a DAC Mode is selected ECHO PRO will enter the DAC Curve creation mode.

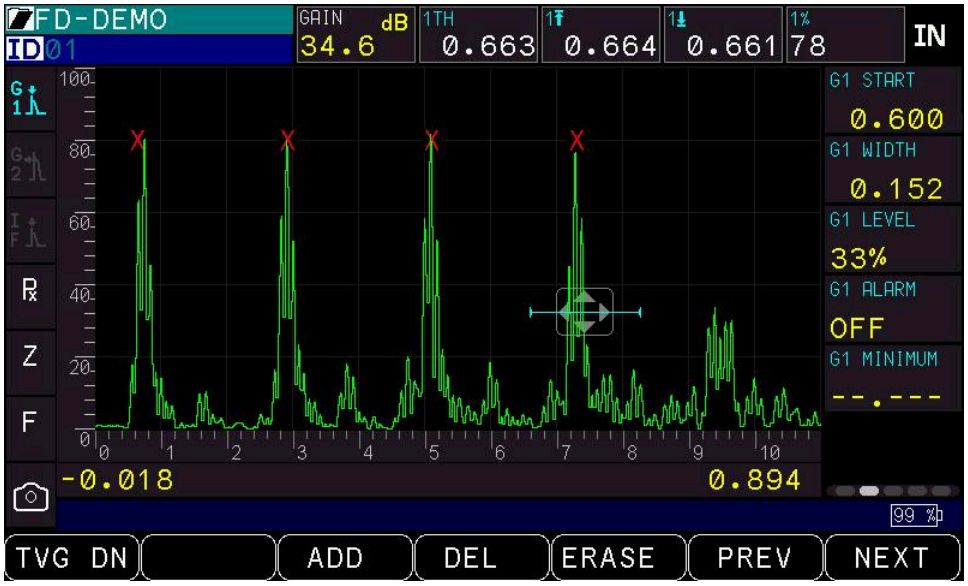
To set up a DAC Curve:

1. When in DAC Curve Creation Mode the right side of the display will show GATE 1 panel with G1ST (Gate 1 Start) highlighted.

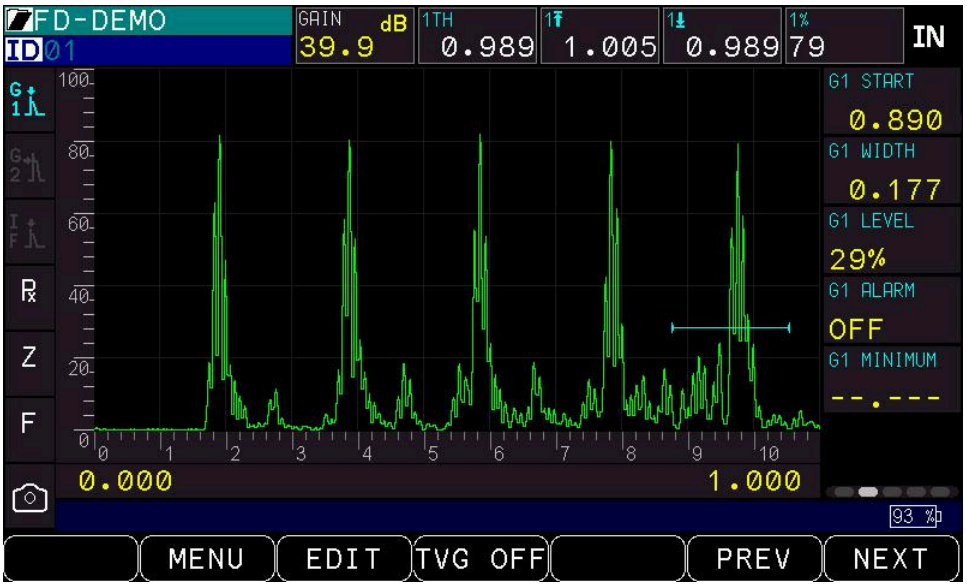
2. Press the **F3 – Add** key to add DAC point to the curve. An “X” will appear on the peak point to indicate the DAC point (see image above). If an error is made when adding a DAC point use, the **F4 – Delete** key and **F5 – Erase** key will become

available.

You can select and adjust different parameters using the touchscreen or **Right** and **Left** arrow keys to navigate to different parameters around the screen followed by the using the **Up** and **Down** arrow keys to adjust the parameter. It will be necessary to move the Gate to add different points.
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.



3. Use the touchscreen or function keys to select **F1 – DAC DN (DAC DONE)** after adding points to finish DAC Creation. You will notice that the “X” marks will disappear from the screen (shown below).

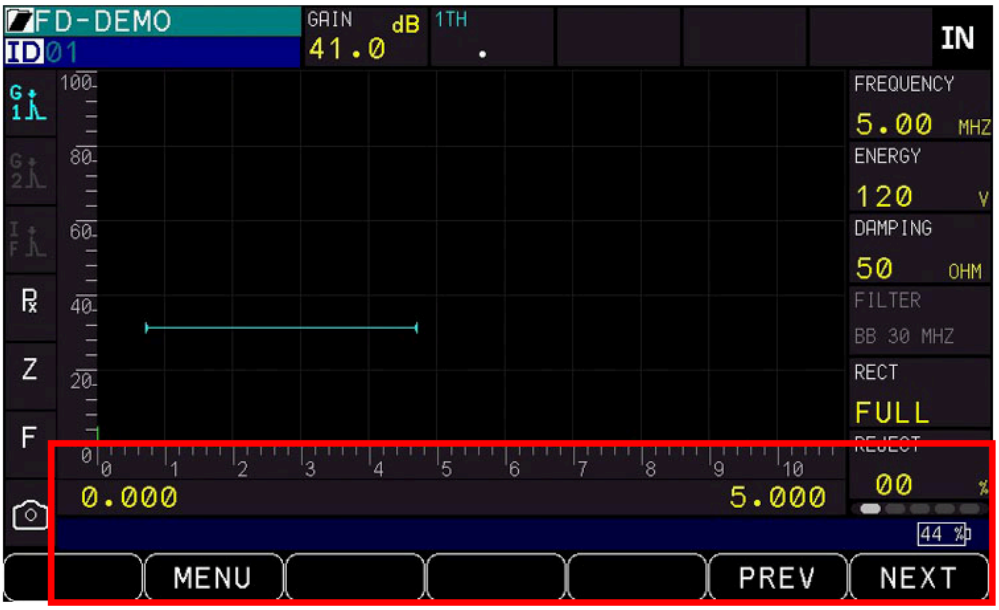


4. Once DAC curve is created, the DAC panel will be available for DAC gain adjustment, DAC curve selection (for the ASME-3 parameter), and custom curves. When DAC is created, DAC alarm options will become available in the Gate Alarm.

   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.

Bottom of Measurement Screen

The majority of the bottom of the measurement screen corresponds with the physical Function keys (F-keys). The F- keys change depending on the parameter selected. When within a given parameter setting it is sometimes possible to change the function key to another number by selecting the desired value then pressing with a long hold on the corresponding function key via the display or physical key. To reset all keys back to their default values go to the *Initial Settings Menu* within the *Main Menu* and select Reset, then Parameters. Note: This will change all parameters back to their default settings.



Above the touchscreen function keys notes may appear to guide the user through completing a task or navigating an area. Error messages will also appear here as seen in the image below.

The right side of the bottom of the display includes icons for touchscreen (when turned off) wifi and bluetooth (when turned on) and battery %

Range

Range sets the instrument's range according to the sound level setting. **Range** can be set from 0.353" to 277" (8.96 mm to 7035.8 mm) in 0.001" increments @ 5,900 m/s (0.2320 in./μ). There is an optional extended range that increases the range to 554" (14071.6mm). To adjust the **Range** parameter from the display you can press the physical **Range** Quick Access button on the left side of unit or press the range number on the right side of the bottom of the display as shown in the image below

When **Range** is selected, use the Function Keys or corresponding touchscreen icons to select from the standard options or use the **UP** and **DOWN** arrow keys to scroll to a specific value.

- **F1**: Done (exit return to measurement screen)
- **F2:** 0.500”
- **F3:** 1.00”
- **F4:** 2.00”
- **F5**: 5.00”
- **F6:** PREV - Moves to the next tab of the *menu pane*
- **F7:** NEXT - Moves to the previous *menu pane*
- **Up Arrow:** Increases the Range
- **Down Arrow:** Decreases the Range
- **Right Arrow:** Scrolls clockwise to the next on screen parameter setting
- **Left Arrow:** Scrolls counter-clockwise to previous on screen parameter settings
- **OK:** Exits and returns to measurement screen

Delay

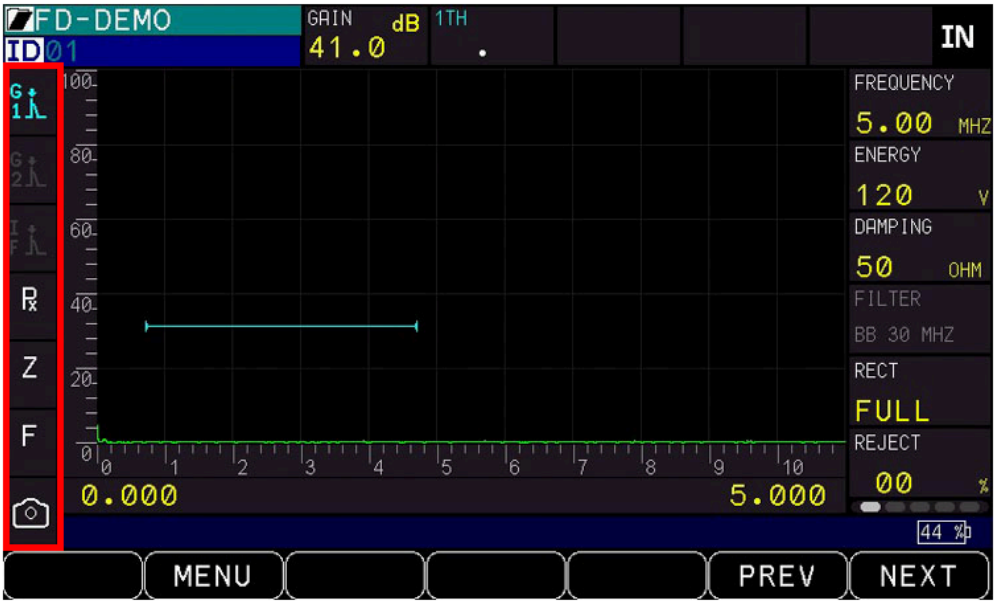
Delay represents the offset on the left side of the A-Scan. **Delay** can be set from -0.018” to 276.647” (8.96 to 7035.8mm) @ longitudinal velocity in steel in 0.001” increments.To adjust the **Delay** parameter from the display press the delay number on the left side of the bottom of the display as shown in the image below

When **Delay** is selected, use the Function Keys or corresponding touchscreen icons to select from the standard options or use the **UP** and **DOWN** arrow keys to scroll to a specific value.

- **F1**: Done (exit return to measurement screen)
- **F2:** 0.500”
- **F3**: 1.00”
- **F4**: 2.00”
- F5: 5.00”
- **F6:** PREV - Moves to the next tab of the *menu pane*
- **F7:** NEXT - Moves to the previous *menu pane*
- **Up Arrow:** Increases the Delay
- **Down Arrow:** Decreases the Delay
- **Right Arrow:** Scrolls clockwise to the next on screen parameter setting
- **Left Arrow:** Scrolls counter-clockwise to previous on screen parameter settings
- **OK:** Exits and returns to measurement screen

Left side of Measurement Screen

The left side of the measurement screen contains settings including gate detection, peak, zoom, freeze and screenshot.



Gate 1 Detection

Allows user to select between the first peak, edge, and peak of gate 1

Gate 1 detection icons:

Gate 1 Peak	
Gate 1 First Peak	
Gate 1 Edge	

To change the Gate 1 detection:

Press the Gate 1 detection icon on the display to rotate through the gate detection options

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

Gate 2 Detection

Allows user to select between the first peak, edge, and peak of gate 2

When Gate 2 enabled is set to off the Gate 2 detection icon on the left side of the screen will turn gray as shown in the image below. Gate 2 can be turned on on page 3 of the *Menu Pane*

Gate 2 detection icons

Gate 2 Peak	
Gate 2 First Peak	

Gate 2 Edge	

To change the Gate 2 detection:

Press the Gate 2 detection icon on the display to rotate through the gate detection options

- **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
- **OK**: Go to Menu to edit Gate 2 Detection mode parameters

Interface Gate Detection

Allows user to select between the first peak, edge, and peak of the interface gate option used for immersion testing

When the Interface Gate (IF Gate) is turned off the IF Gate detection icon on the left side of the screen will turn grey as shown in the image below

IF Gate detection icons

IF Gate Peak	
IF Gate First Peak	
IF Gate Edge	

To change the IF Gate detection:

Press the IF Gate detection icon on the display to rotate through the gate detection options

- **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
- **OK**: Go to Menu to edit Gate 2 Detection mode parameters

Peak Memory

Peak Memory is a feature used to track signal peaks. There are three types of peak memory: Peak, Peak Hold and Peak Pitch. Press the **Peak Memory** parameter button on the touchscreen to change between the different peak settings

Peak settings are structured as a progression where you peak the signal, hold the signal then can turn on peak pitch memory. Because of this, the arrow keys only work in one direction so the progression is followed in the correct order

Peak Memory Icons

Peak Off	

Peak	
Peak Hold	
Peak Pitch Memory	

- **P:** Peak: tracks the signal amplitude and updates based on the highest value inside the gate
- **PH:** Peak Hold: similar to peak, but it holds the peak and does not continue to update if signal with a higher amplitude is received
- **PP:** 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.
- **Px:** Turns peak off

Note: For Peak Pitch Memory **Beeper** must also be turned on in the *Initial Settings Menu*

Zoom

Zoom adjusts the gate 1 width to minimum range capability effectively zooming in on gate 1. **Zoom** Can be set to on or off. Press the **Zoom** parameter button on the touchscreen to toggle between on and off

- **Z**: Zoom off
- **Zon**: Zoom on

Freeze

Freeze holds the displayed waveform until **Freeze** is turned off. **Freeze** Can be set to on or off. Press the **Freeze** parameter button on the touchscreen to toggle between on and off

- **F:** Freeze off

[1]

- **FON**: Freeze on

Screenshot

When pressed, the screenshot icon  will save a screenshot of the display to the microSD card inside the unit. To access screenshots the SD card needs to be removed from the ECHO PRO and plugged into a computer using a card reader.

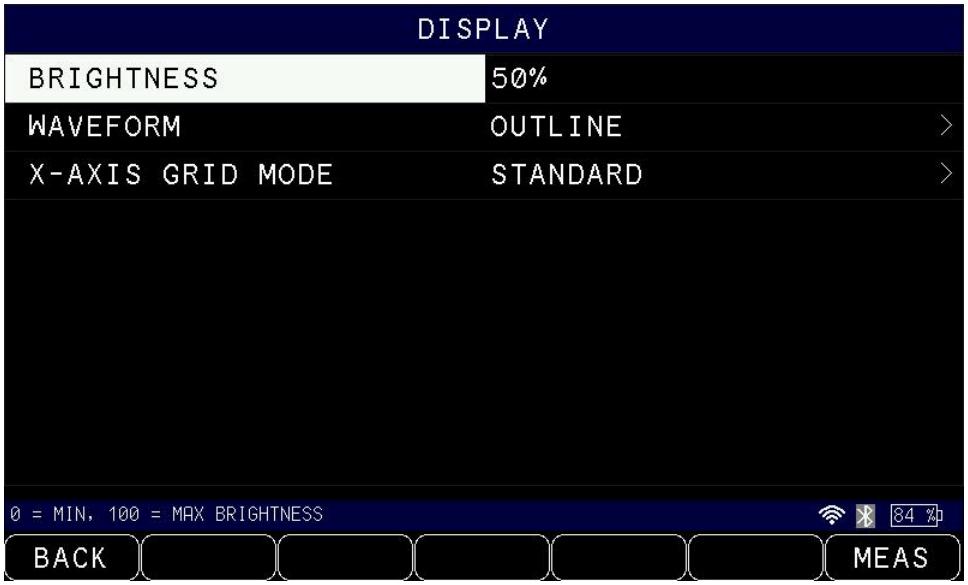
Alternatively screenshots can be taken directly on the computer using the DataXL software program. See Section 13 DataXL/DataXL Mobile for more details

7 Customizing Display Options using the Display Menu

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

To get to the *Display Menu*, follow these steps first:

1. From the *Measurement* screen enter the *Main Menu* f by pressing the **OK** button or **F2-Menu** via the physical F-key or touchscreen.
2. Use the **Up** and **Down arrow** keys or touchscreen to highlight the *Display* option. If using the arrow keys a *Look-Ahead Menu* will appear showing the settings found within the *Display Menu.* If the touchscreen is used you will fully enter the menu when *Display* is selected.



3. If using the arrow keys press the **OK** key to fully enter the *Display Menu*
4. Use the **Up** and **Down Arrow** keys or touchscreen to select any of the settings you wish to change.
5. When finished, press the **F1 – BACK** key to exit the screen and return to the Main Menu or the **F-7 Meas** (Measurement) to enter the *Measurement* screen

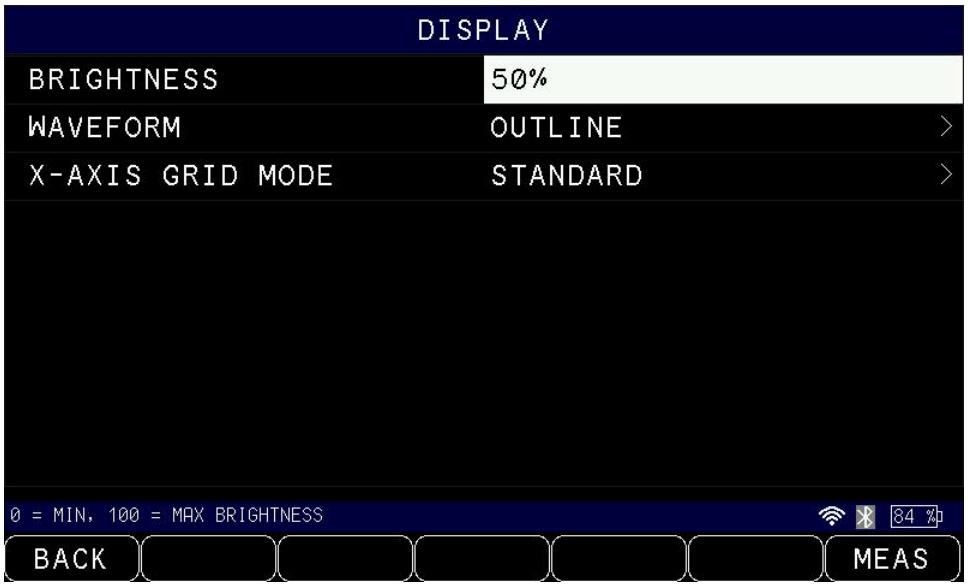
Brightness

The ECHO PRO display can be adjusted to suit the lighting conditions the ECHO PRO 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*, select the **Brightness** option by scrolling using the **Up** or **Down** arrow keys then pressing **OK** or using the touchscreen to directly select

Brightness.

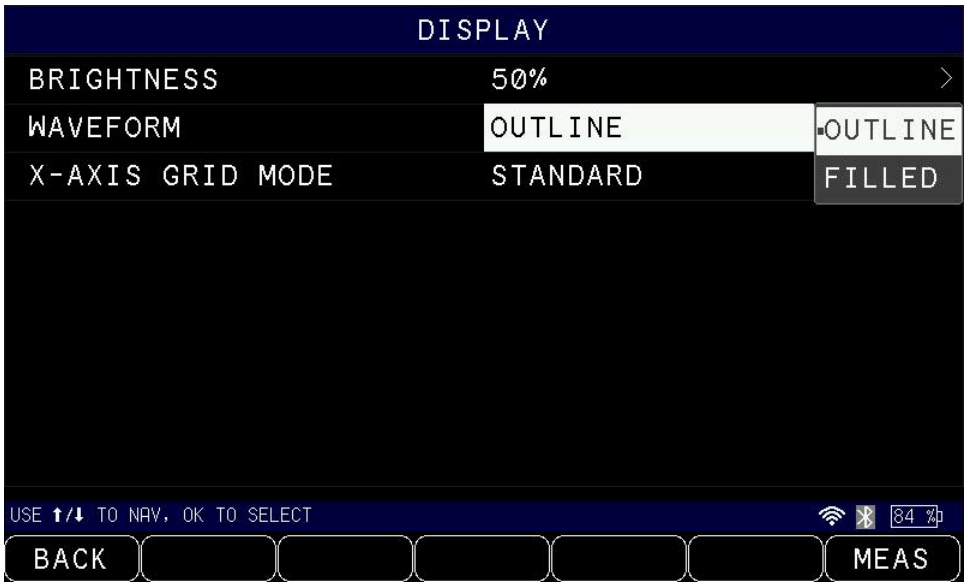


2. Use the **Up** arrow to increase the screen brightness and the **Down** arrow to decrease brightness.
3. Press the **OK** key or the **F1 – Back** key to exit the screen.

Waveform

The waveforms that appear on the screen when taking measurements 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. In the *Display Menu*, select the **Waveform** option by scrolling using the **Up** or **Down** arrow keys then pressing **OK** or using the touchscreen to directly select **Waveform**.

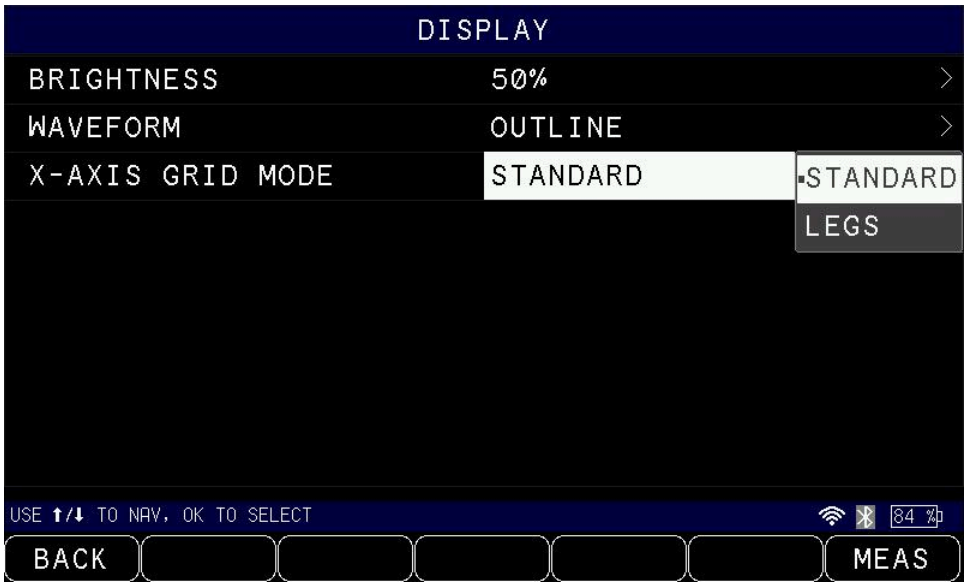


2. Use the **Up** and **Down** arrow keys or touchscreen to select either option:
   - *Filled*: Waveform will be solid
   - *Outline*: Waveform will be outlined
3. When done press the **F1 – Back** key twice to go back to the *Main Menu* or the **F7-Meas** (Measurement) key to go to the *Measurement Screen*

X-Axis Grid Mode

X axis is 0-10 on the baseline. When making angle beam measurements legs can be turned on and will display yellow lines based on bottom and top reflections for trig calculations that provide visual cues for operator to know what " leg" they are in

1. In the *Display Menu*, select the **Waveform** option by scrolling using the **Up** or **Down** arrow keys then pressing **OK** or using the touchscreen to directly select **X-Axis Grid Mode**.



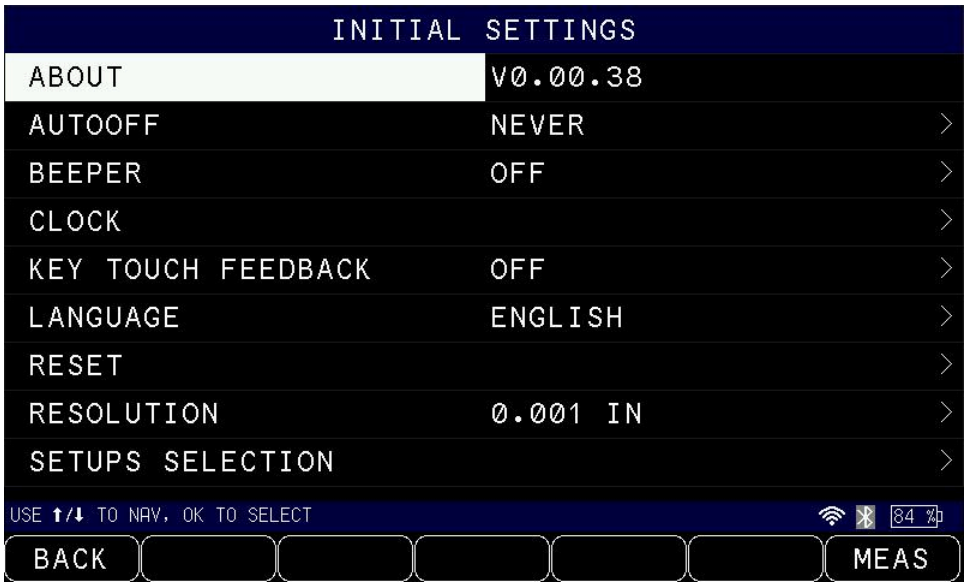
2. Use the **Up** and **Down** arrow keys or touchscreen to select either option:
   - *Standard*: No yellow lines will appear
   - *Legs*: yellow lines will appear
3. When done press the **F1 – Back** key twice to go back to the *Main Menu* or the **F7-Meas** (Measurement) key to go to the *Measurement Screen*

8 Adjusting the Initial Settings Menu

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

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

1. From the *Measurement* screen enter the *Main Menu* by pressing the **OK** button or **F2-Menu** via the physical F-key or touchscreen.
2. Use the **Up** and **Down arrow** keys or touchscreen to highlight the *Initial Settings* option. If using the arrow keys a *Look-Ahead* menu will appear showing the settings found within the *Initial Settings* menu. If the touchscreen is used you will fully enter the menu when *Initial Settings* is selected.



3. If using the arrow keys press the **OK** key to fully enter the
4. Use the **Up** and **Down Arrow** keys or touchscreen to select any of the settings you wish to change.
5. When finished, press the **F1 – BACK** key to exit the screen and return to the *Main Menu* or the **F-7 Meas** (Measurement) to enter the *Measurement* screen

About

The **About** setting will display an image of the ECHO PRO start up screen. The start up screen shows the model number, current software version as well as Danatronics contact information. If you need information about your software or Danatronics contact information, follow these steps:

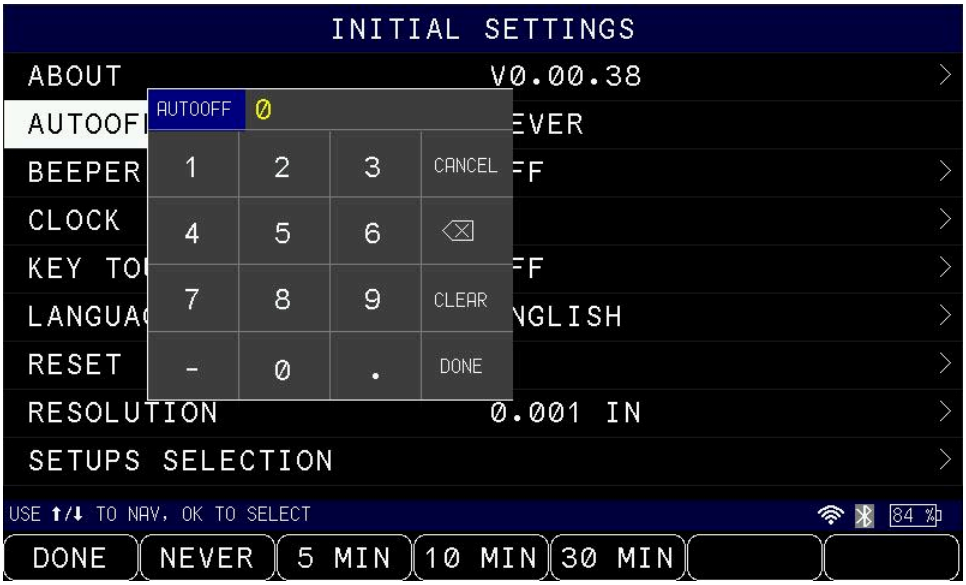
1. From the *Initial Settings* menu, select the **About** option by scrolling using the **Up** or **Down** arrow keys then pressing **OK** or using the touchscreen to directly select **About.** A similar image to the one shown below will appear:

2. When finished, press the **F1 – BACK** key to exit the screen and return to the *Main Menu* or the **F-7 Meas** (Measurement) to enter the *Measurement* screen

Auto Off

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

1. From the *Initial Settings* menu, select the **Autooff** option by scrolling using the **Up** or **Down** arrow keys then pressing **OK** or using the touchscreen to directly select **Autooff.**.



2. Use the **Up** and **Down** arrow keys to scroll through the following settings
   - *1–31 minutes*: The ECHO PRO will turn off automatically between 1–31 minutes
   - *Never*: The ECHO PRO will never turn off automatically

Or use the F-Keys by pressing the physical key or pressing and holding the touchscreen to select from the following settings

- *F1* - Done
- *F2* - Never - Never shut off automatically
- *F3* - 5 minutes
- *F4* - 10 minutes
- *F5* - 30 minutes
- F7 - Meas (Measurement) - go to the *Measurement Screen*

Or use the touchscreen to select **Autooff** which will open a number pad where any number 1-31 can be entered along with the following options:

- *Cancel* - exits without saving
- *Back ICON* - backspace
- *Clear* - removes all numbers currently typed
- *Done* - saves and exits the number pad

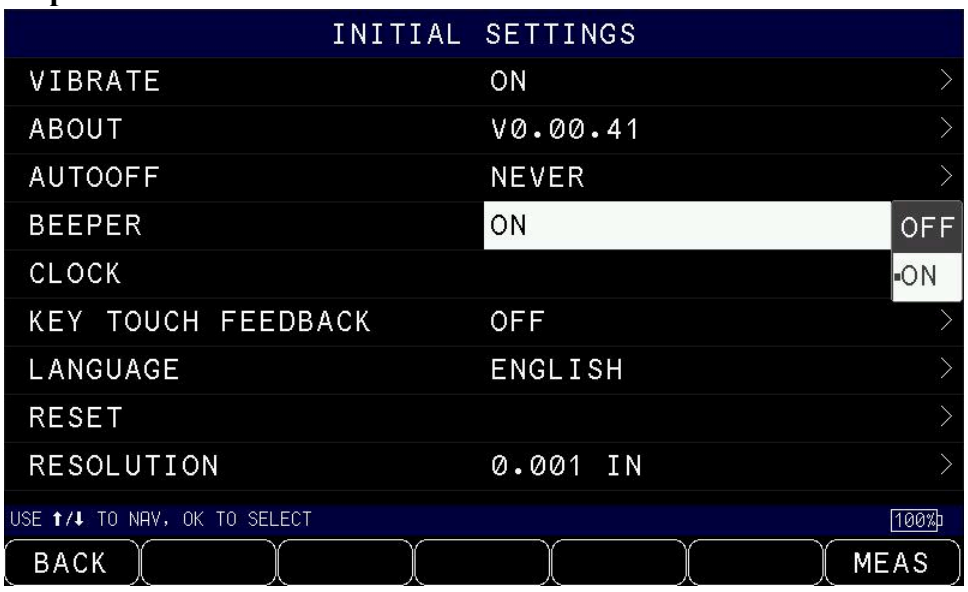
3. When finished, press the **F1 – BACK** key to exit the screen and return to the *Main Menu* or the **F-7 Meas** (Measurement) to enter the *Measurement* screen.

Beeper/Measurement Beep

The **Beeper** setting is an audio feature that sounds when 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. From the *Initial Settings* menu, select the **Beeper** option by scrolling using the **Up** or **Down** arrow keys then pressing **OK** or using the touchscreen to directly select **Beeper.**



2. Use the up and down arrow keys or touchscreen to choose between the following options:
   - *Off*: Disables the Beeper option

- *On*: Enables the Beeper option

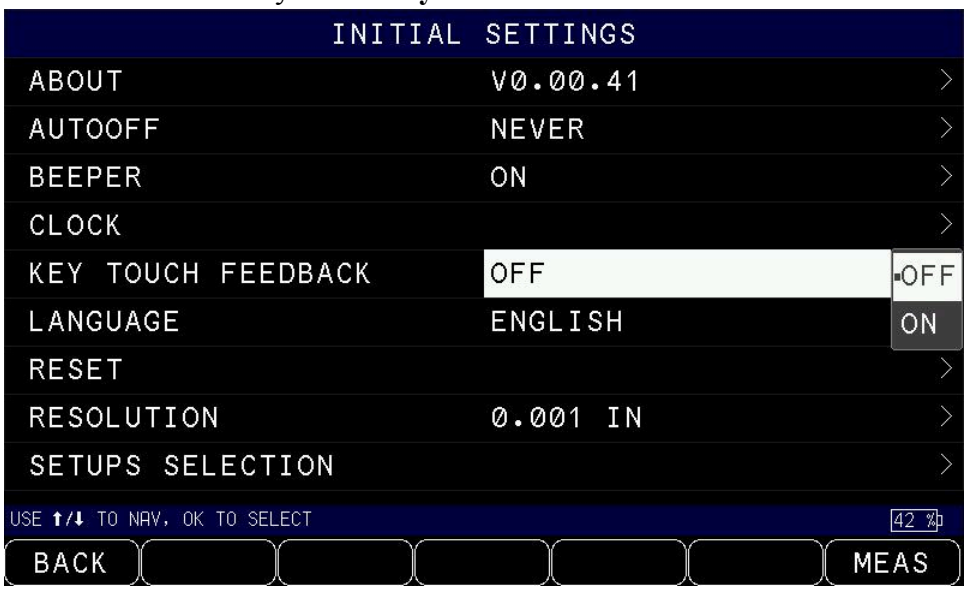
3. When finished, press the **F1 – BACK** key to exit the screen and return to the *Main Menu* or the **F-7 Meas** (Measurement) to enter the *Measurement* screen.

Key touch Feedback

The **Key Touch Feedback** setting is an audio feature that sounds when any key on the ECHO PRO is pressed.

To turn on/off the **Key Touch Feedback** feature, follow these steps:

1. From the *Initial Settings* menu, select the **Key Touch Feedback** option by scrolling using the **Up** or **Down** arrow keys then pressing **OK** or using the touchscreen to directly select **Key Touch Feedback.**



2. Use the up and down arrow keys or touchscreen to choose between the following options:
   - *Off*: Disables audio feedback when keys are pressed
   - *On*: Enables audio feedback when keys are pressed

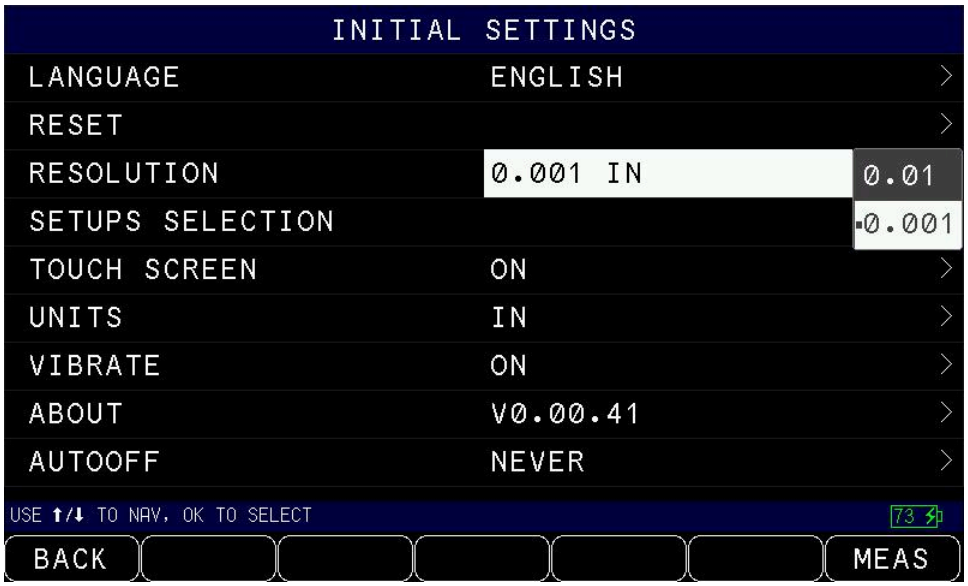
3. When finished, press the **F1 – BACK** key to exit the screen and return to the *Main Menu* or the **F-7 Meas** (Measurement) to enter the *Measurement* screen.

Resolution

The **Resolution** setting can be modified allowing the user to select between 0.01" and 0.001", 0.1mm to 0.01mm, or 0.1µ/s to 0.01 µ/s depending on the units selected using the process described below.

To select a resolution parameter, follow these steps:

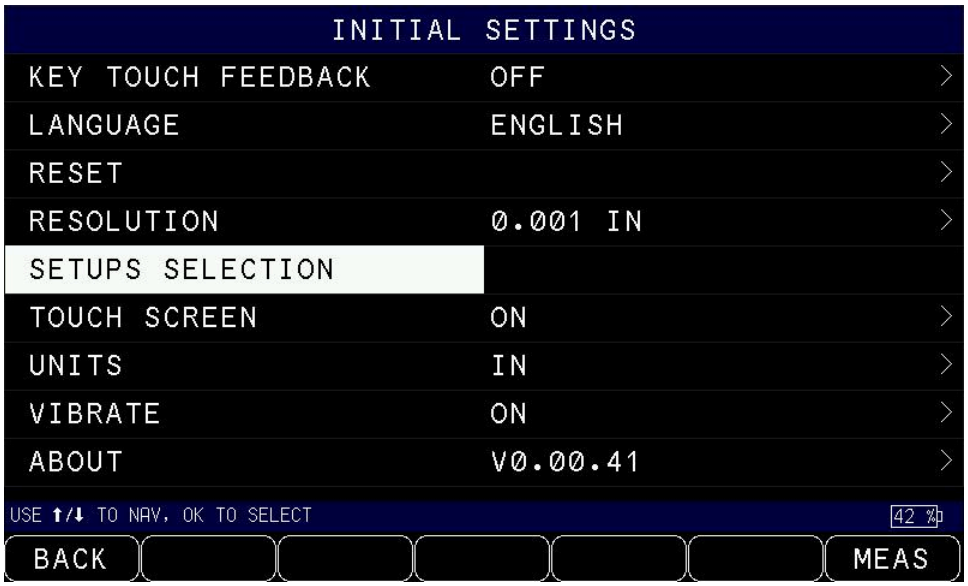
1. From the *Initial Settings* menu, select the **Resolution** option by scrolling using the **Up** or **Down** arrow keys then pressing **OK** or using the touchscreen to directly select **Resolution.**



2. Use the up and down arrow keys to choose between the following options:
   - 0.01 IN/0.1 mm/0.1 µ/s
   - 0.001 IN/0.01 mm/0.01 µ/s
3. When finished, press the **F1 – BACK** key to exit the screen and return to the *Main Menu* or the **F-7 Meas** (Measurement) to enter the *Measurement* screen.

Setups

The *Setups* Selection Menu can be accessed from the *Initial Settings* Menu.



To access the *Setups* Menu, follow these steps:

1. When in the *Initial Settings* menu use the up and down arrow keys to select the **Setups Selection** and press the **OK** key.

2. Use the **Up** and **Down** arrow keys followed by **OK** or the touchscreen to select the desired setup and continue to *Measurement Screen*

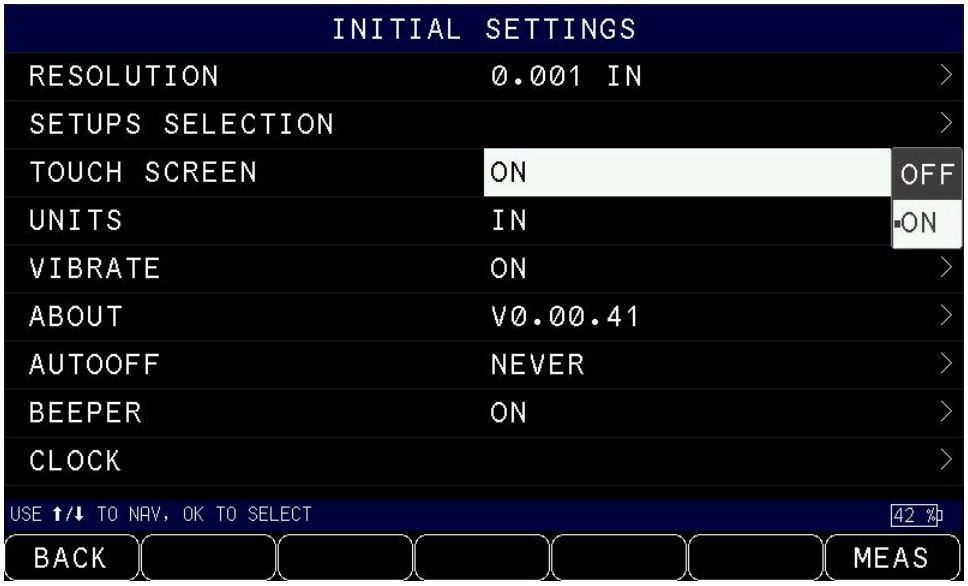
Note: For more information on creating Setups see Section 3 - Setups

Touchscreen

The **Touchscreen** setting controls whether the touchscreen can be used or not. When the touchscreen is turned off it can only be turned on again through physical key presses

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

3. From the *Initial Settings* menu, select the **Touchscreen** option by scrolling using the **Up** or **Down** arrow keys then pressing **OK** or using the touchscreen to directly select **Touchscreen.**



4. Use the up and down arrow keys or touchscreen to choose between the following options:
   - *Off:* Turns the touchscreen off
   - *On*: Tuns the touchscreen on

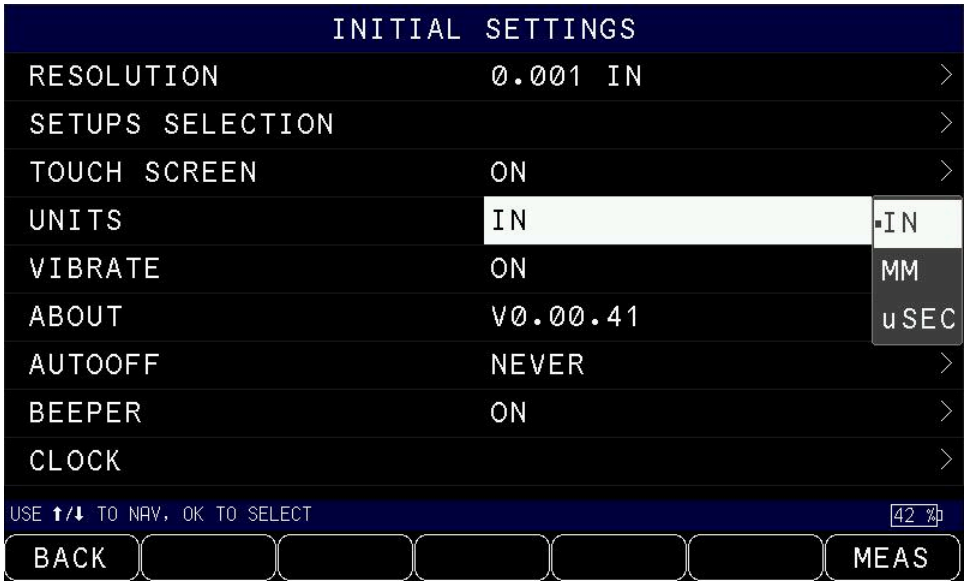
   When the touchscreen is set to off, the following icon will appear to the left of the battery indicator on the lower right hand corner of the screen.

5. When finished, press the **F1 – BACK** key to exit the screen and return to the *Main Menu* or the **F-7 Meas** (Measurement) to enter the *Measurement* screen.

Units

There are three different **Units** of measure available on the ECHO PRO: in, mm and µ/s . To select one, follow these steps:

1. From the *Initial Settings* menu, select the **Units** option by scrolling using the **Up** or **Down** arrow keys then pressing **OK** or using the touchscreen to directly select **Units.**



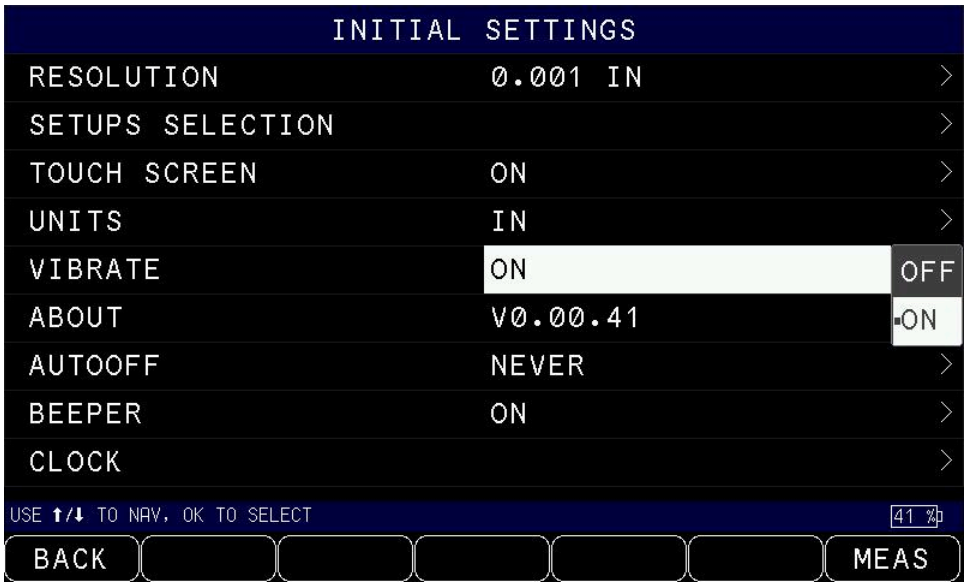
2. Use the up and down arrow keys to or touchscreen choose between the following options:
   - *IN*: Inch
   - *MM*: Millimeter
   - µ*SEC*: Microsecond
3. When finished, press the **F1 – BACK** key to exit the screen and return to the *Main Menu* or the **F-7 Meas** (Measurement) to enter the *Measurement* screen.

Vibrate

ECHO PRO 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. From the *Initial Settings* menu, select the **Vibrate** option by scrolling using the **Up** or **Down** arrow keys then pressing **OK** or using the touchscreen to directly select **Vibrate.**



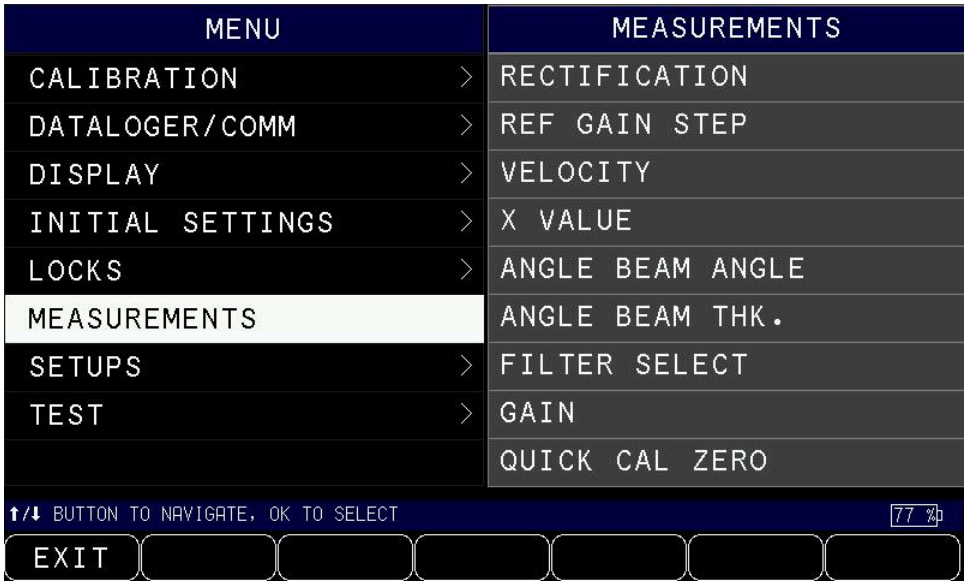
2. Use the up and down arrow keys to or touchscreen to choose between the following options:
   - *Off*: Disables the Vibrate feature
   - *On*: Enables the Vibrate feature
3. When finished, press the **F1 – BACK** key to exit the screen and return to the *Main Menu* or the **F-7 Meas** (Measurement) to enter the *Measurement* screen.

10 Measurements Menu

ECHO PROs has many measurement settings that can be set from within the *Measurements* Menu, many of these settings can also be set directly from the Measurement screen (for more information on making adjustments from the Measurement screen see section 5- Measurement Screen).

To get to the *Measurement* menu, follow these steps first:

1. From the *Measurement* screen enter the *Main Menu* by pressing the **OK** button or **F2-Menu** via the physical F-key or touchscreen.
2. Use the **Up** and **Down arrow** keys or touchscreen to highlight the *Measurements* option. If using the arrow keys a *Look-Ahead* menu will appear showing the settings found within the *Measurements* menu. If the touchscreen is used you will fully enter the menu when *Measurements* is selected.



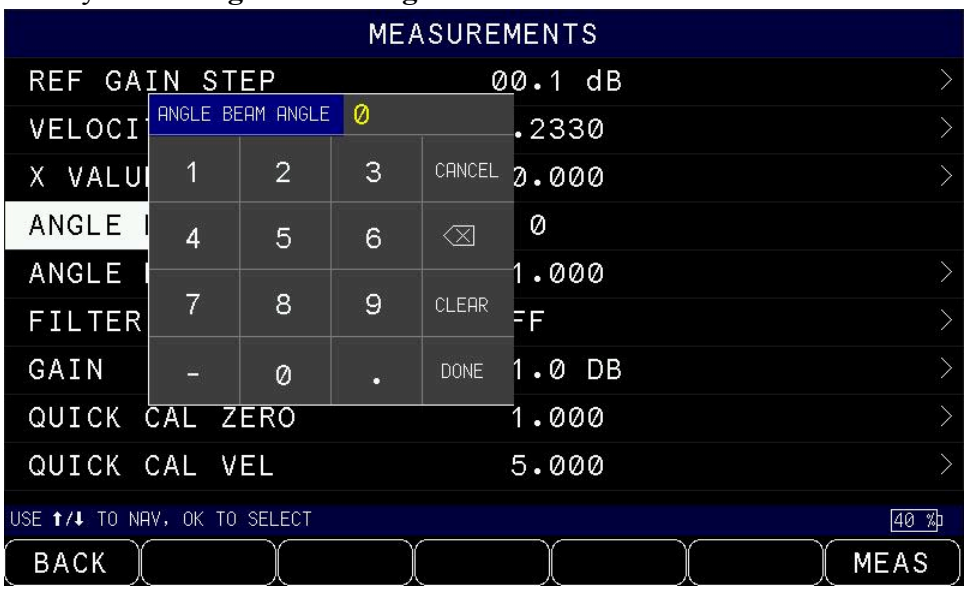
3. If using the arrow keys press the **OK** key to fully enter the
4. Use the **Up** and **Down Arrow** keys or touchscreen to select any of the settings you wish to change.
5. When finished, press the **F1 – BACK** key to exit the screen and return to the *Main Menu* or the **F-7 Meas** (Measurement) to enter the *Measurement* screen

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. The Angle Beam Angle can be set to any value between 0 and 85.

To set the Angle Beam Angle follow these steps:

1. From the *Measurements* menu, select the **Angle Beam Angle** option by scrolling using the **Up** or **Down** arrow keys then pressing **OK** or using the touchscreen to directly select **Angle Beam Angle**.



2. Use the **Up** and **Down** arrow keys to scroll to the desired angle.

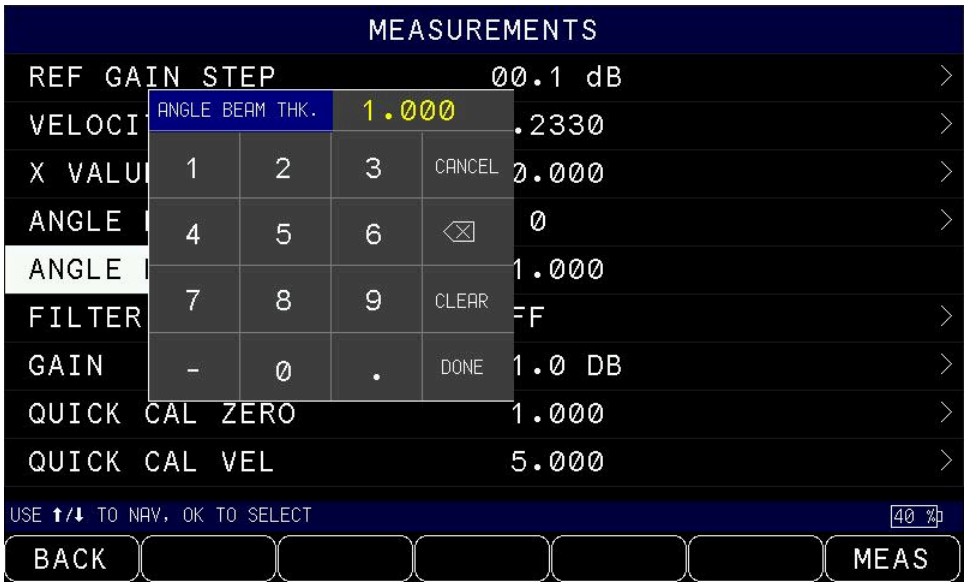
   Or use the touchscreen to select **Angle Beam Angle** which will open a number pad where any number 1-85 can be entered along with the following options:
   - *Cancel* - exits without saving
   - *Back ICON* - backspace
   - *Clear* - removes all numbers currently typed
   - *Done* - saves and exits the number pad
3. When finished, press the **F1 – BACK** key to exit the screen and return to the *Main Menu* or the **F-7 Meas** (Measurement) to enter the *Measurement* 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. The ECHO PRO angle beam thickness can be set to 0.01-200”

To set the Angle Beam Thickness follow these steps:

1. From the *Measurements* menu, select the **Angle Beam Thk.** (Thickness) option by scrolling using the **Up** or **Down** arrow keys then pressing **OK** or using the touchscreen to directly select **Angle Beam Thk.** (Thickness).



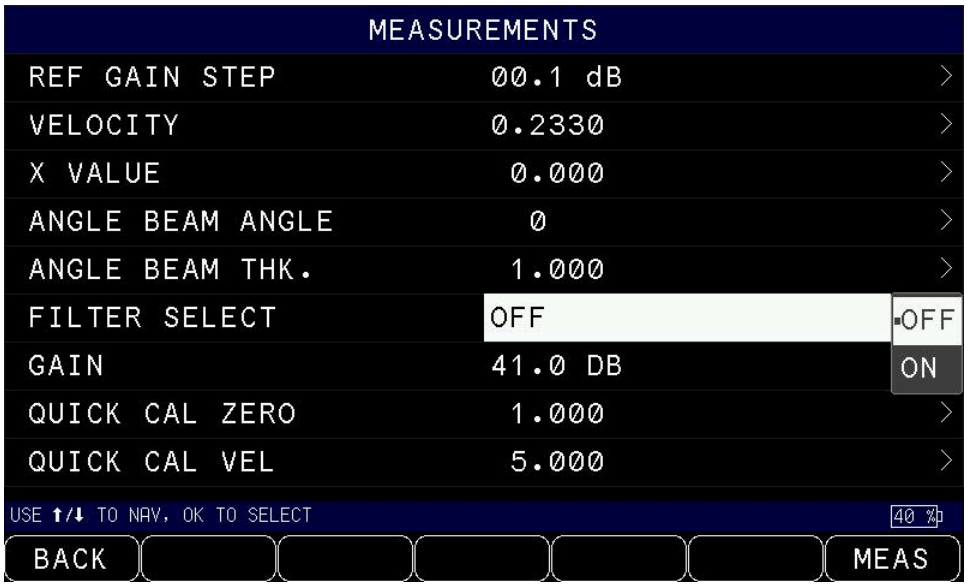
2. Use the up and down arrow keys to select the desired angle beam thickness then press **OK**
3. Press **F1-Back** to exit the screen

Filter Select

ECHO PRO by default is locked to BB 30 MHz. In order to change filter settings on the *Measurement Screen* you need to unlock the filter selection by turning filter select on. To lock the filter that's currently selected, turn filter Select off.

To set the Filter Select follow these steps:

1. From the *Measurements* menu, select the **Filter Select** option by scrolling using the **Up** or **Down** arrow keys then pressing **OK** or using the touchscreen to directly select **Filter Select**.



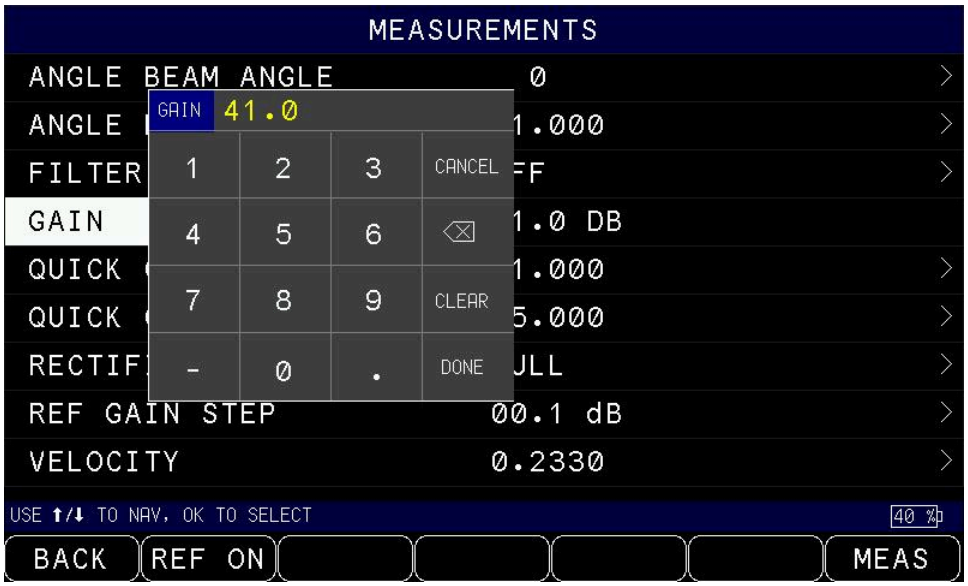
2. Use the up and down arrow keys or touchscreen to select between on and off.
   On: Allows for the filter to be changed
   Off: Locks the filter from being changed
3. Press **F1-Back** to exit the screen and go back or Press **F7-Measure** to enter the measurement screen where a new filter can be selected from Page 1 of the *Menu Pane*

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, making it easier to add or subtract gain. When gain is selected you can adjust the gain from 0.0 db to 110.0 db in 0.1 db increments

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

1. From the *Measurements* menu, select the **Gain** option by scrolling using the **Up** or **Down** arrow keys then pressing **OK** or using the touchscreen to directly select **Gain**.



2. The Option to turn Reference Gain on or off will appear above the **F2 key**. Press F2 to toggle between on and off. If Reference Gain is turned on you will be asked to enter a gain+ref gain value rather than just gain
3. If using key presses, use the Up and Down arrow keys to scroll to the desired decibel level.
   If using touchscreen, a number pad will appear where any number from .01- 110 can be entered along with the following options:
   - *Cancel* - exits without saving
   - *Back ICON* - backspace
   - *Clear* - removes all numbers currently typed
   - *Done* - saves and exits the number pad

4. Press **F1-Back** to exit the screen and go back or Press **F7-Measure** to enter the measurement screen where a new filter can be selected from Page 1 of the *Menu Pane* (see Section 2 for more details)

Quick Cal Zero

The **Quick Cal Zero** sets a standard thickness value for the thin piece that is used to calibrate. If using a 5-step block from .100-.500" to calibrate the user should set the Quick Cal Zero to .100"

To set **Quick Cal Zero**:

1. From the *Measurements* menu, select the **Quick Cal Zero** option by scrolling using the **Up** or **Down** arrow keys then pressing **OK** or using the touchscreen to directly select **Quick Cal Zero**.

2. Use the **Up** and **Down** arrow keys to scroll to the desired value

3. Press **F1-Back** to exit the screen and go back or Press **F7-Measure** to enter the measurement screen where a new filter can be selected from Page 1 of the *Menu Pane*

Quick Cal Velocity (Vel)

The **Quick Cal Velocity** sets a standard thickness value for the thin piece that is used to calibrate. If using a 5-step block from .100-.500" to calibrate the user should set the Quick Cal Zero to .500"

To set **Quick Cal Velocity**:

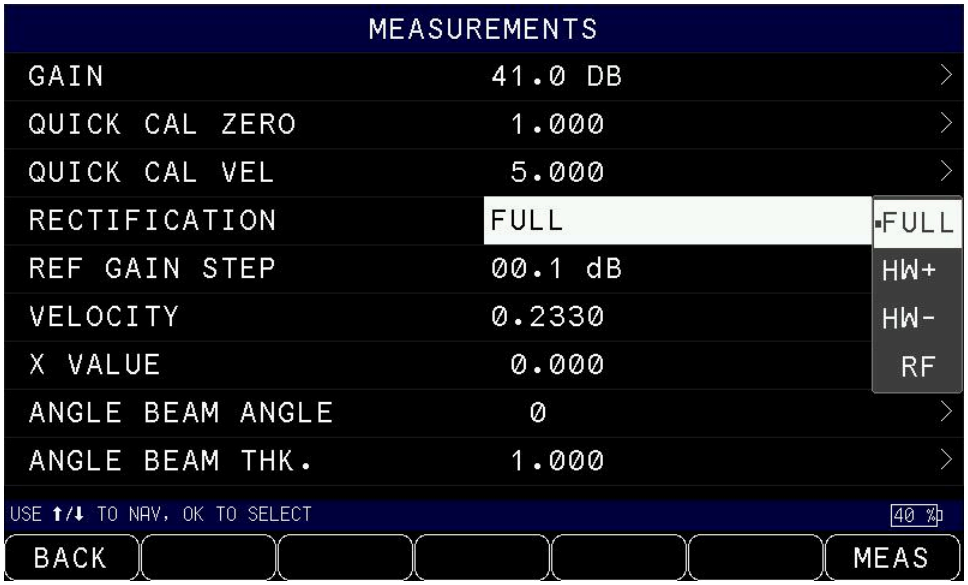
1. From the *Measurements* menu, select the **Quick Cal Vel** option by scrolling using the **Up** or **Down** arrow keys then pressing **OK** or using the touchscreen to directly select **Quick Cal Vel**.
2. Use the **Up** and **Down** arrow keys to scroll to the desired value
3. Press **F1-Back** to exit the screen and go back or Press **F7-Measure** to enter the measurement screen where a new filter can be selected from Page 1 of the *Menu Pane*

Rectification

The **Rectification** 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. From the *Measurements* menu, select the **Rectification** option by scrolling using the **Up** or **Down** arrow keys then pressing **OK** or using the touchscreen to directly select **Rectification**.



2. Use the **Up** and **Down** arrow keys or touchscreen to select from the following options:

   RF: Both positive and negative lobes are displayed in the RF waveform, which 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 ECHO PRO.

   HW-: Displays the negative echo lobes as positive and does not show the positive lobes at all. An indicator is shown on the ECHO PRO.

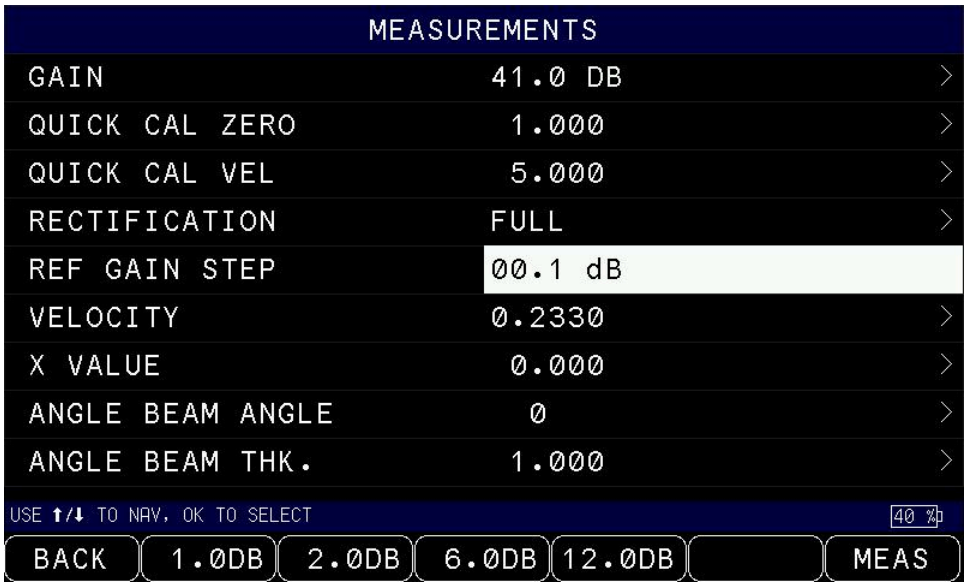
3. Press **F1-Back** to exit the screen and go back or Press **F7-Measure** to enter the measurement screen

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 is 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:

To set the **Reference Gain Step,** follow these steps:

1. From the *Measurements* menu, select the **Rectification** option by scrolling using the **Up** or **Down** arrow keys then pressing **OK** or using the touchscreen to directly select **Rectification**.
2. Use the arrow keys to scroll to a specific value, or use the touchscreen or F-keys to select from the following preset options:
   - **F1**: Back (exit return to measurement menu)
   - **F2**: 1.0 dB
   - **F3**: 2.0 dB
   - **F4**: 6.0 dB
   - **F5:** 12.0 dB
   - **F6:** None
   - **F7:** Meas - exits and returns to the measurement screen



Set the Reference Gain Step from 0.1 dB to the total system gain (Ref Gain plus Scan Gain).

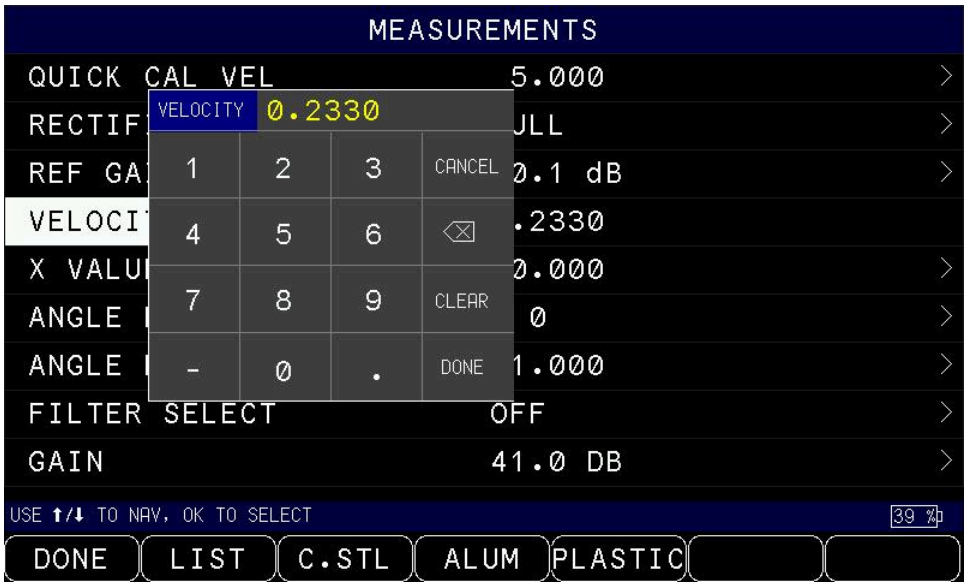
In the example below, the Ref Gain Step parameter was turned on after the dB step was set to 6 dB. This means that after pressing gain, each up or down setting to gain, the gain will change by the step size of 6 dB.

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. From the *Measurements* menu, select the **Velocity** option by scrolling using the **Up** or **Down** arrow keys then pressing **OK** or using the touchscreen to directly select **Velocity**.
2. Use the **Up** and **Down** arrow keys to scroll to the desired angle.



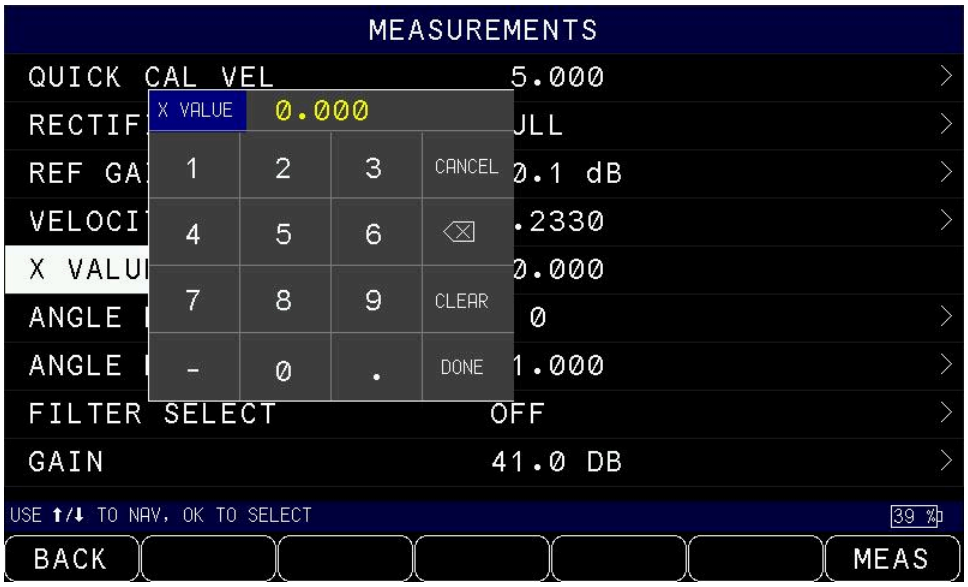
Or use the touchscreen to select **Velocity** which will open a number pad where any value from 0.04000 IN/µS – 0.60000 IN/µS can be entered along with the following options:

- *Cancel* - exits without saving
- *Back ICON* - backspace
- *Clear* - removes all numbers currently typed
- *Done* - saves and exits the number pad

3. When finished, press the **F1 – BACK** key to exit the screen and return to the *Main Menu* or the **F-7 Meas** (Measurement) to enter the *Measurement* screen.

X-Value

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



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

1. From the *Measurements* menu, select the **X-Value** option by scrolling using the **Up** or **Down** arrow keys then pressing **OK** or using the touchscreen to directly select **X-Value.**
2. Use the **Up** and **Down** arrow keys to scroll to the desired value.

   Or use the touchscreen to select **X-Value** which will open a number pad where any value from _____TO _____ can be entered along with the following options:
   - *Cancel* - exits without saving
   - *Left Arrow* - backspace
   - *Clear* - removes all numbers currently typed
   - *Done* - saves and exits the number pad
3. When finished, press the **F1 – BACK** key to exit the screen and return to the *Main Menu* or the **F-7 Meas** (Measurement) to enter the *Measurement* screen.
4. In the pull down menu of the measurements box, you can then choose Gate 1 Surface Distance (-X) as shown below:

13 Exporting and Updating with DataXL and DataXL Mobile

DataXL

DataXL is Danatronics free PC based interface program used to update Dantronics gage and flaw detector software and to send/receive datalogger files on your computer. When used with a flaw detector or 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 PRO models.

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

DataXL Installation Troubleshooting

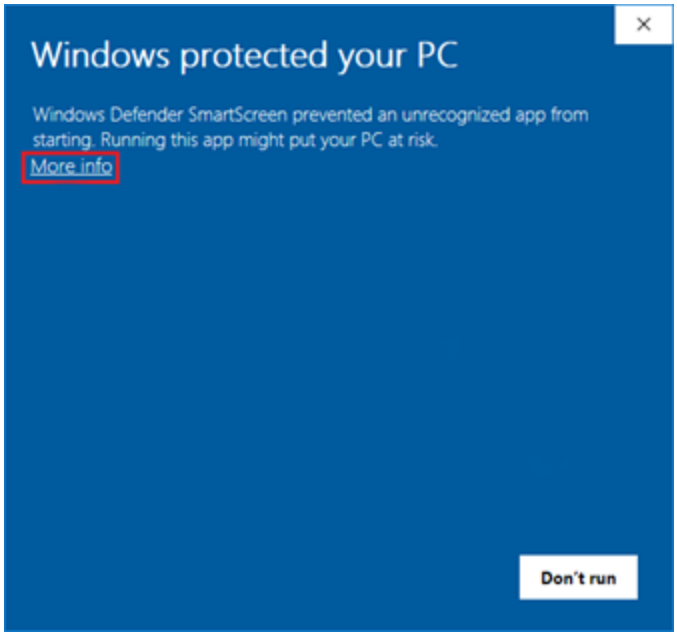
If problems arise when installing DataXL that are not covered below, please call us at 978-777-0081 or email us at support@danatronics.com

Windows Defender Smart Screen

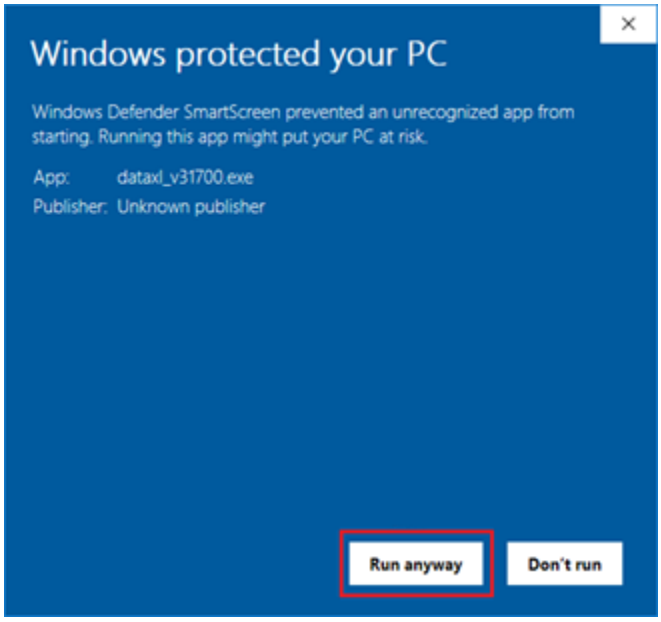
Sometimes Windows Defender SmartScreen will appear when the Data XL installation file is opened.

If that happens follow these steps:

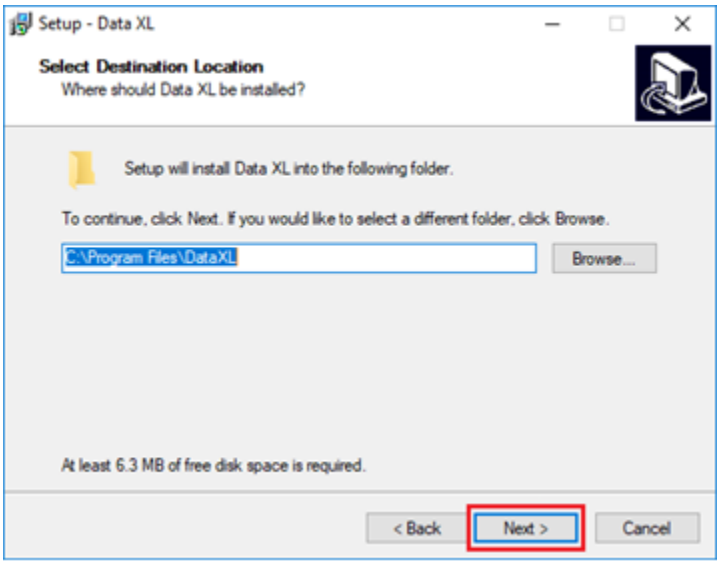
1. Click the **More Info** button on the screen



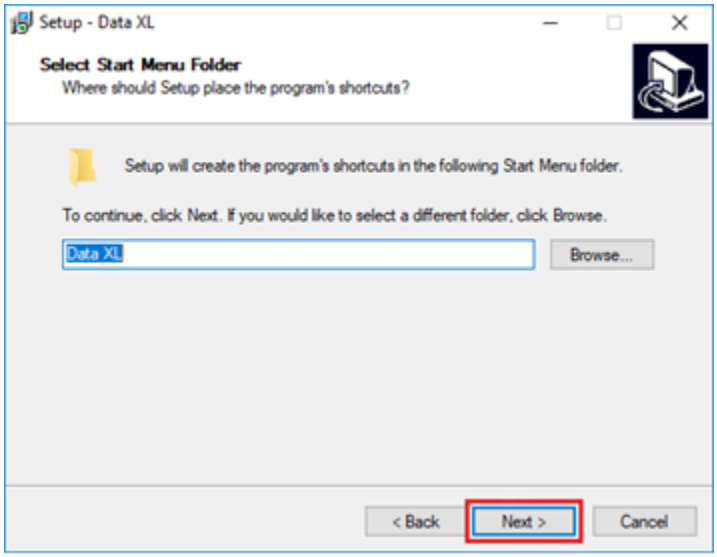
2. Click the **Run Anyway** button to continue with installation.



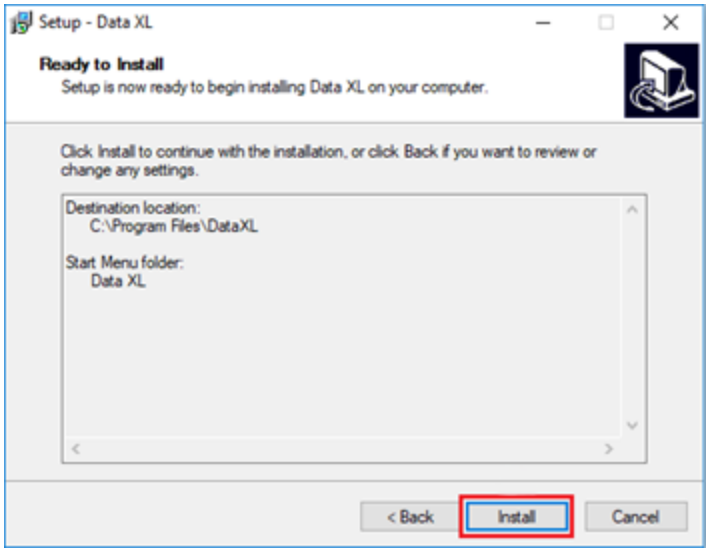
3. Click the **Next** button to select the default folder for Data XL to be installed into.



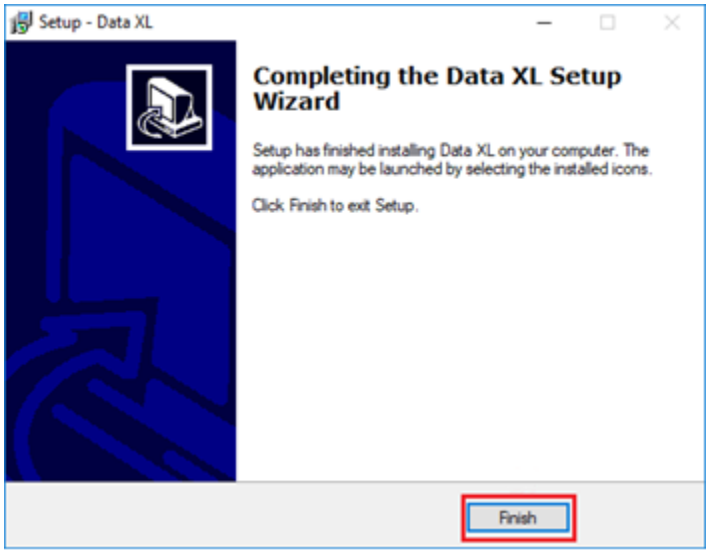
4. Click the **Next** button (1d below) to allow a shortcut to be installed in the Start Menu.



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.

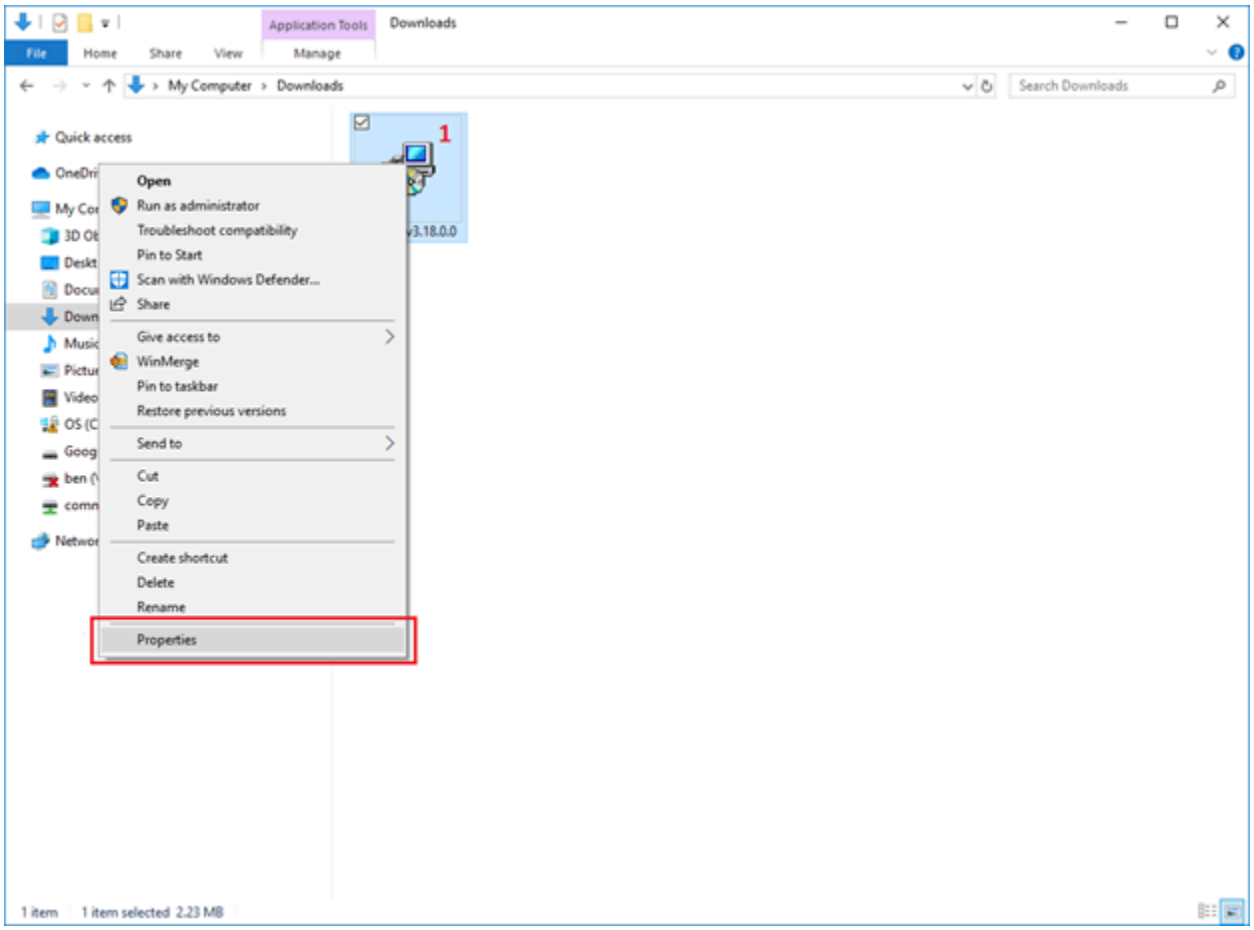


Setup File Failure to Launch

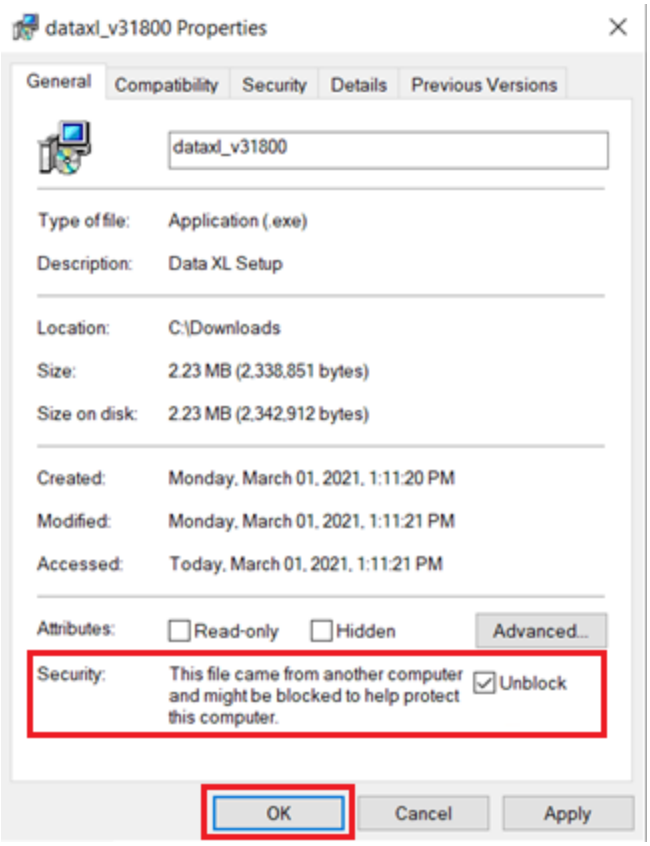
In some instances the Windows OS may block the DataXL setup file from ever launching. This is also done silently so the user has no indication as to why the file fails to launch.

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 PRO Software

Danatronics periodically releases software updates with new and improved functionality and features. These software updates are free and available for download on our website (http://www.danatronics.com). The current ECHO PRO software file can be found on the resources tab of the ECHO PRO product page (http://www.danatronics.com/echopro).

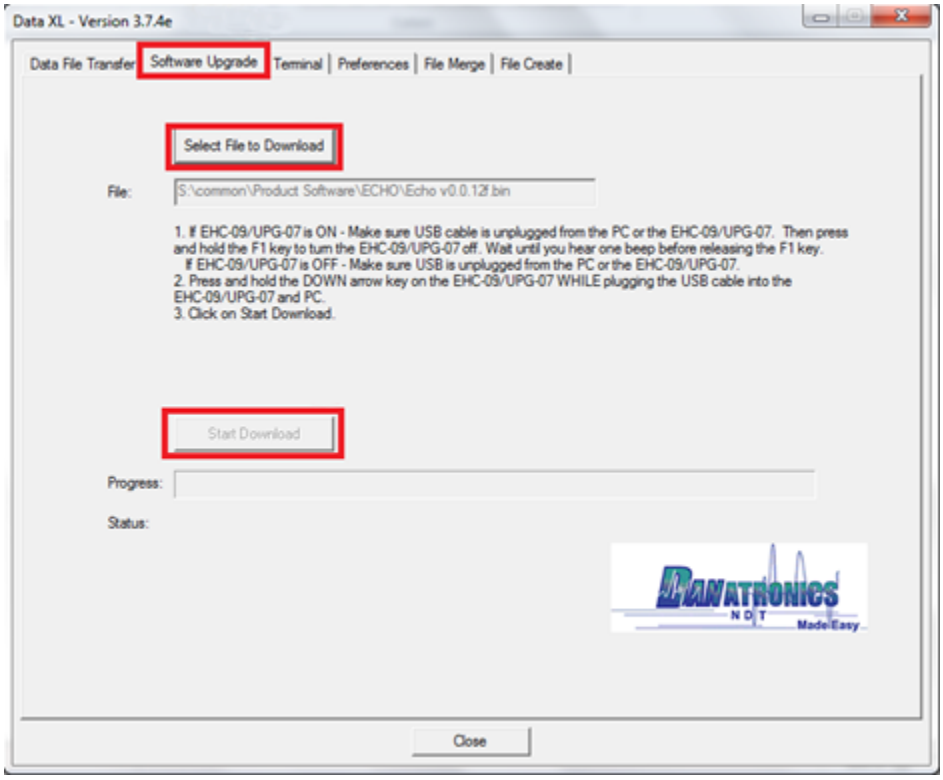
The following items are require in order to update ECHO software:

- ECHO PRO Flaw Detector
- USB-C 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 ECHO PRO software.

To update an ECHO PRO, follow the below steps:

1. Power on the ECHO PRO by holding the **F1** key until the unit beeps and displays the splash screen.
2. Connect the ECHO PRO 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 PRO. (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 PRO should display the message "**Launching Update**" on the screen. Shortly after, the update program will proceed to update the ECHO PRO. 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 PRO flaw detectors can send and receive files between the flaw detector and Windows Computers

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

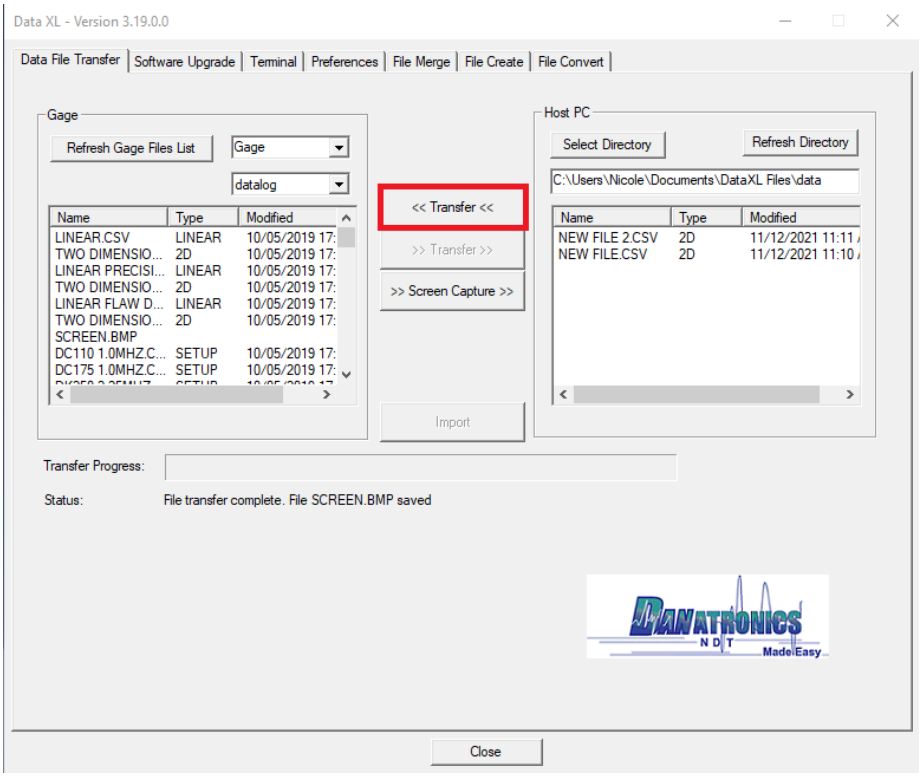
- ECHO PRO Flaw Detector
- USB-C cable
- A Computer with Windows XP, 7, 8 or 10 operating system
- Data XL Software installed on PC

Sending files to ECHO Gages

ECHO PRO flaw detectors are able to accept .CSV datalogger files created in spreadsheet programs like Excel.

To import files from an ECHO PRO, follow these steps:

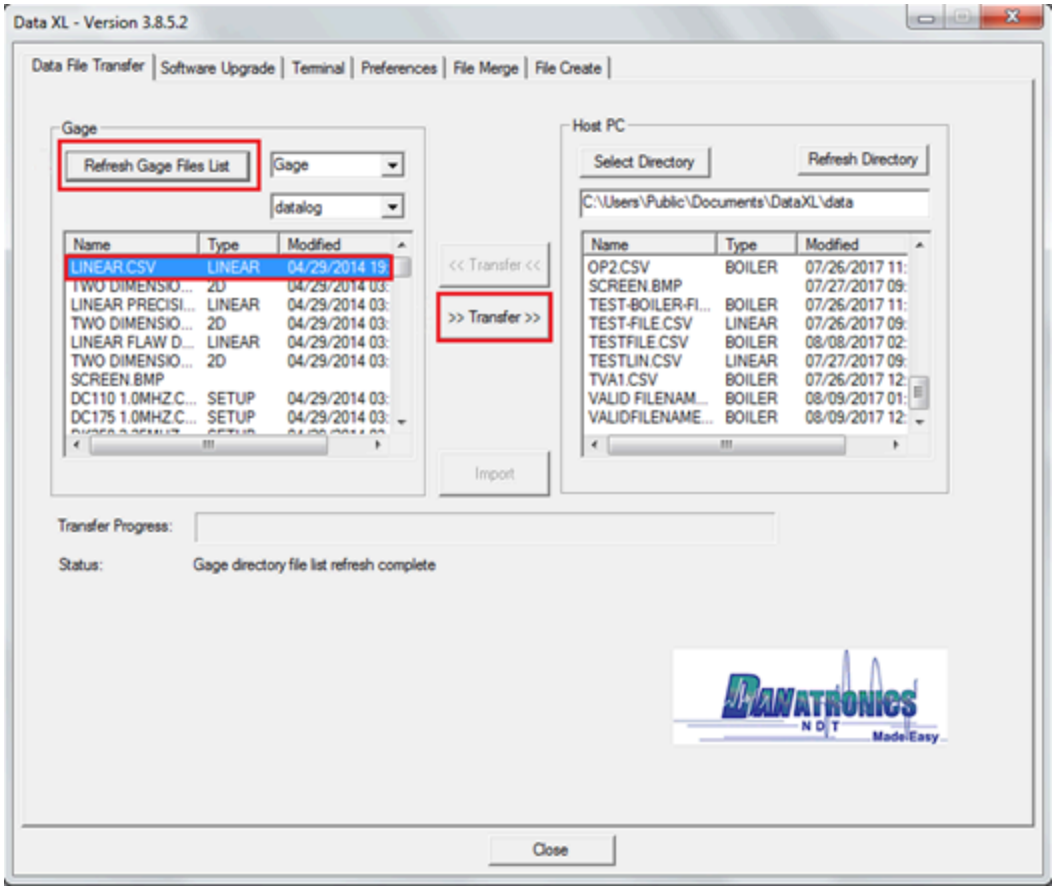
1. Power on the ECHO PRO by holding the **F1** key until the unit beeps and displays the splash screen.
2. Connect the ECHO PRO via a USB cable to a computer that already has Data XL software installed on it.
3. Launch Data XL software.
4. The files that are present in the computer will appear in the 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 ECHO PRO



Exporting files from ECHO PRO

To export files from ECHO PRO, follow these steps:

1. Plug the USB cable into the ECHO PRO and the host computer.
2. Turn the ECHO PRO on by holding the **F1** key until the the unit 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 ECHO PRO 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 ECHO PRO 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.

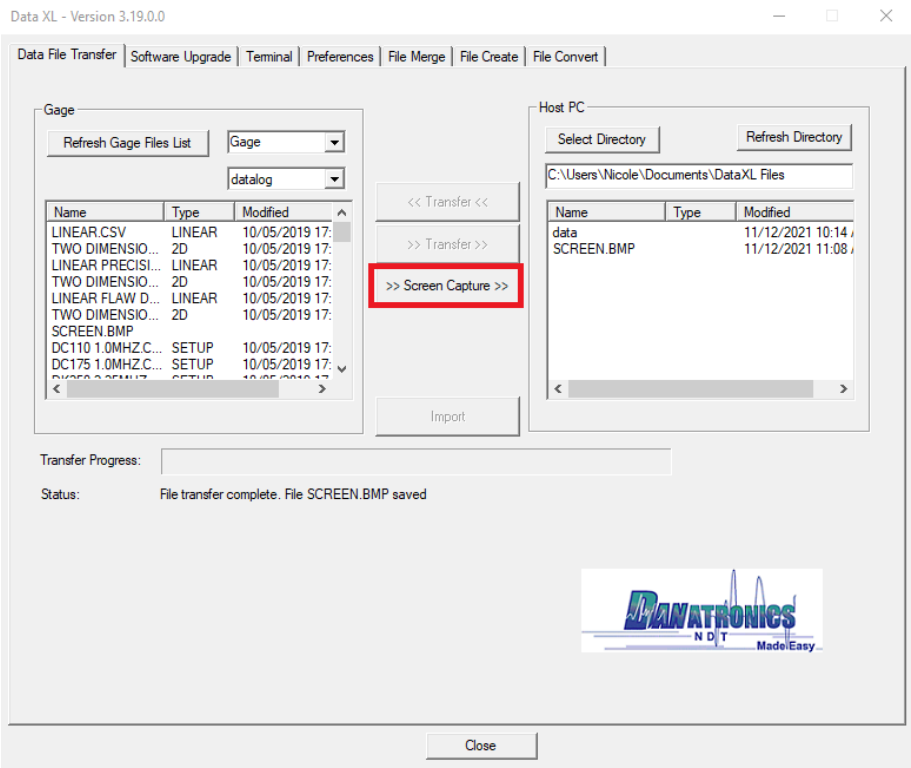


Taking Screen Captures from ECHO PRO

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

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

1. Plug the USB cable into the ECHO PRO and the host computer.
2. Turn the ECHO PRO on by holding the **F1** key until the unit 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 display. The exported image file will save in the currently selected Directory



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 ECHO PRO.

If the ECHO PRO has a thickness reading available, the ECHO PRO 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 ECHO PRO is detecting a loss of signal from the transducer, it will return dashes:

--.--- IN

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

thickness unavailable

Note that all ECHO PRO 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 ECHO PRO. The ECHO PRO will transfer a list of all files on the unit, 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 ECHO PRO. The file can be either a new file (the filename doesn't already exist on the ECHO PRO) or an existing file (the filename does exist on the ECHO PRO).

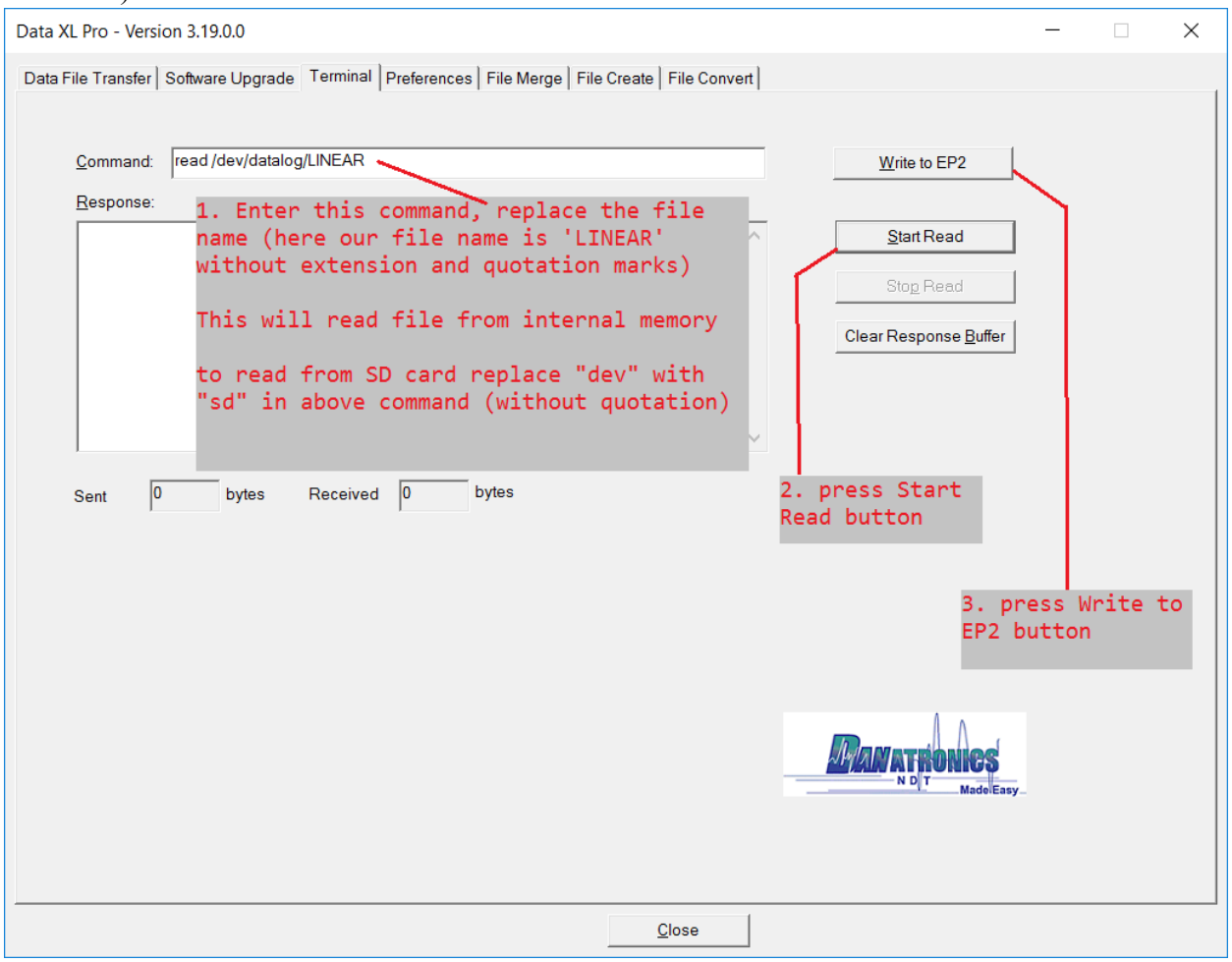
Normally, the ECHO PRO will respond with "OK\r\n", indicating that it is in import mode, ready to receive the file. If an error is encountered, such as the ECHO PRO having no more room for another file, the ECHO PRO will respond with "ERROR: *message*\r\n" where *message* is a descriptive message, such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

poweroff

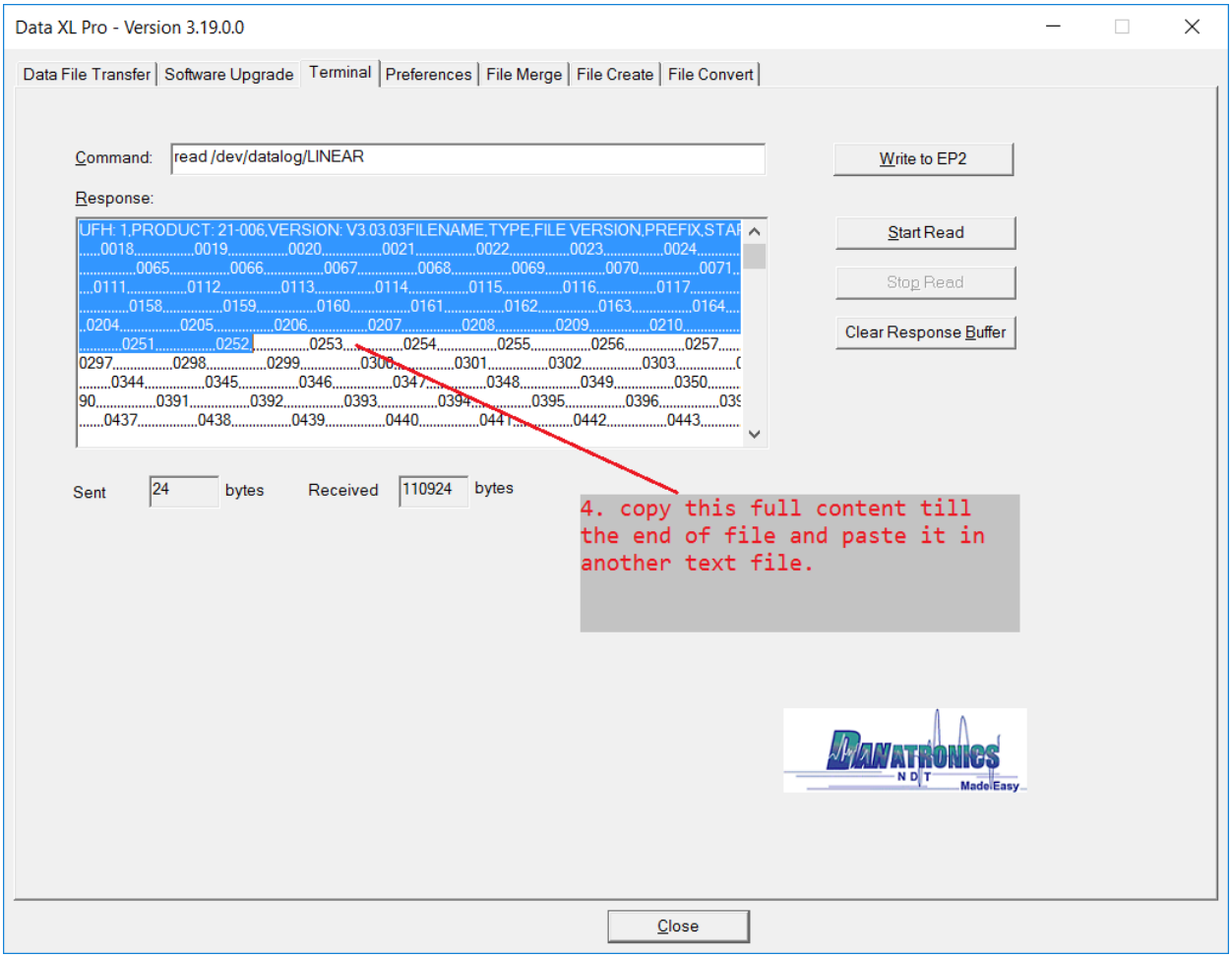
This command is used to power off the ECHO PRO. The ECHO PRO will display the power-down logo screen, save all parameter and file information in the flash, respond with an "OK\r\n" message indicating it is done, and then power off. This takes about 2 seconds.

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 ECHO PRO'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.

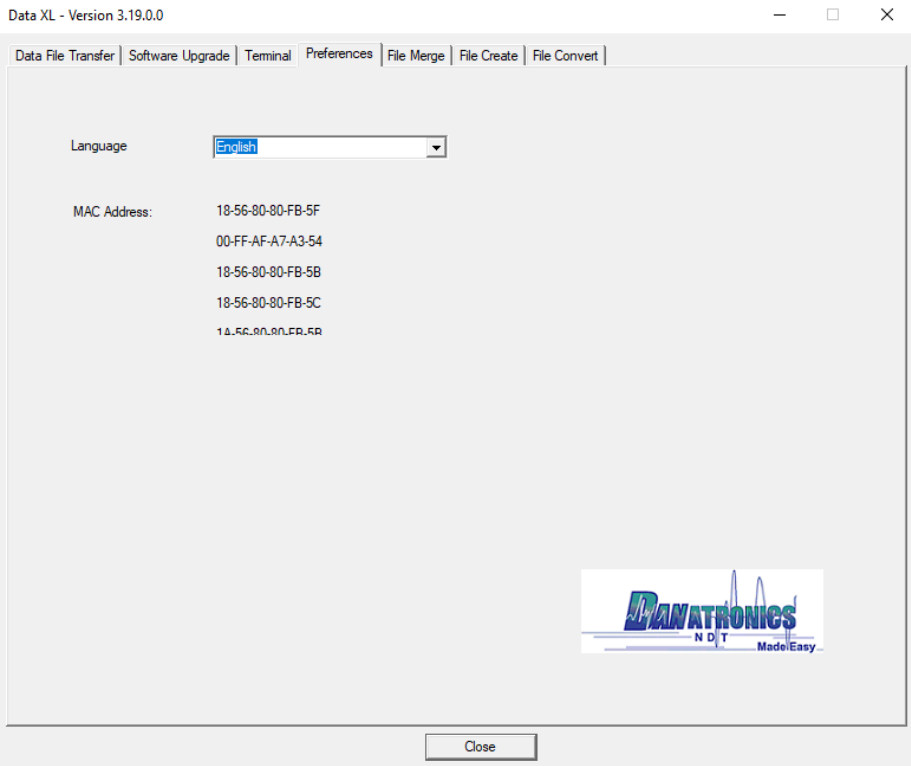


Preferences

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

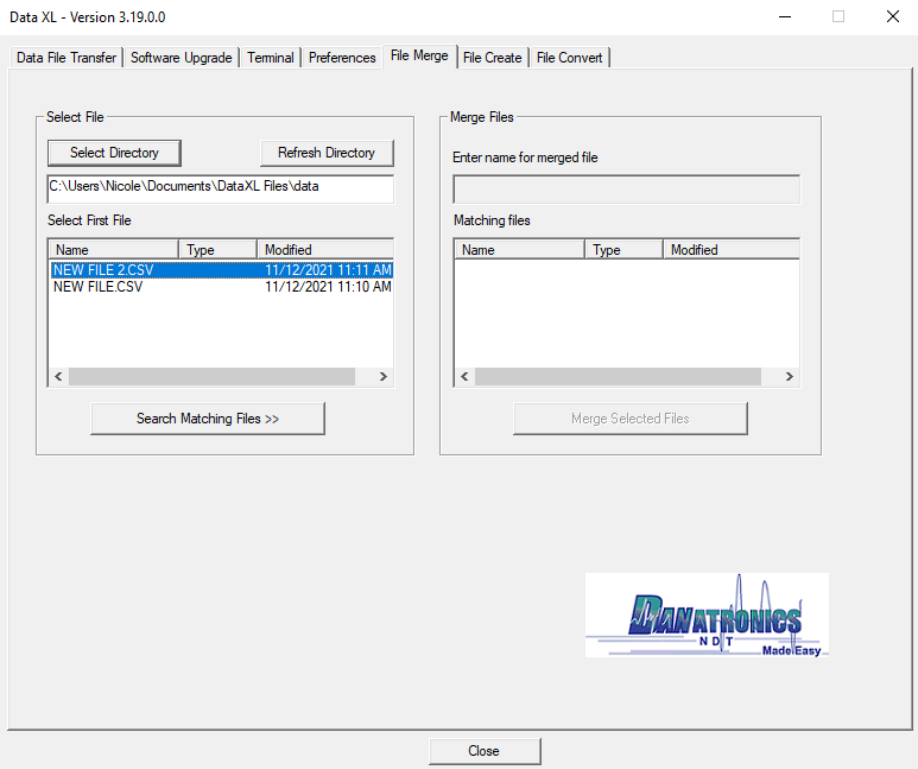


File Merge

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.



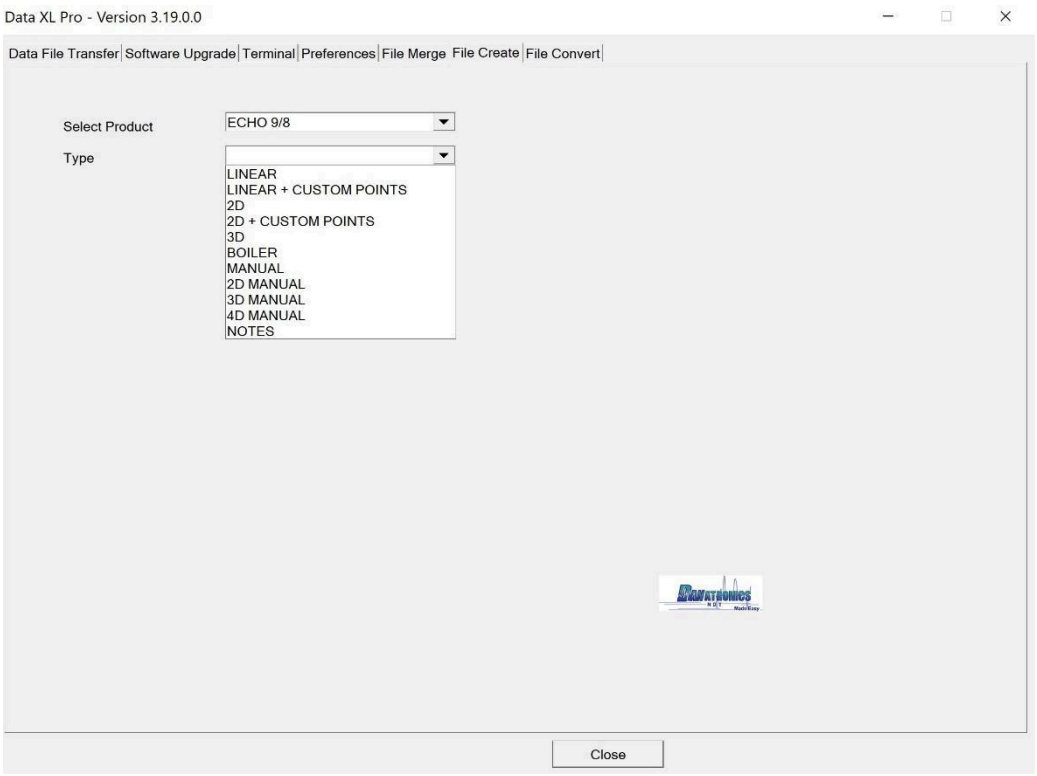
File Create

New Datalogger files can be created within DataXL then sent to Danatronics flaw detectors.

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

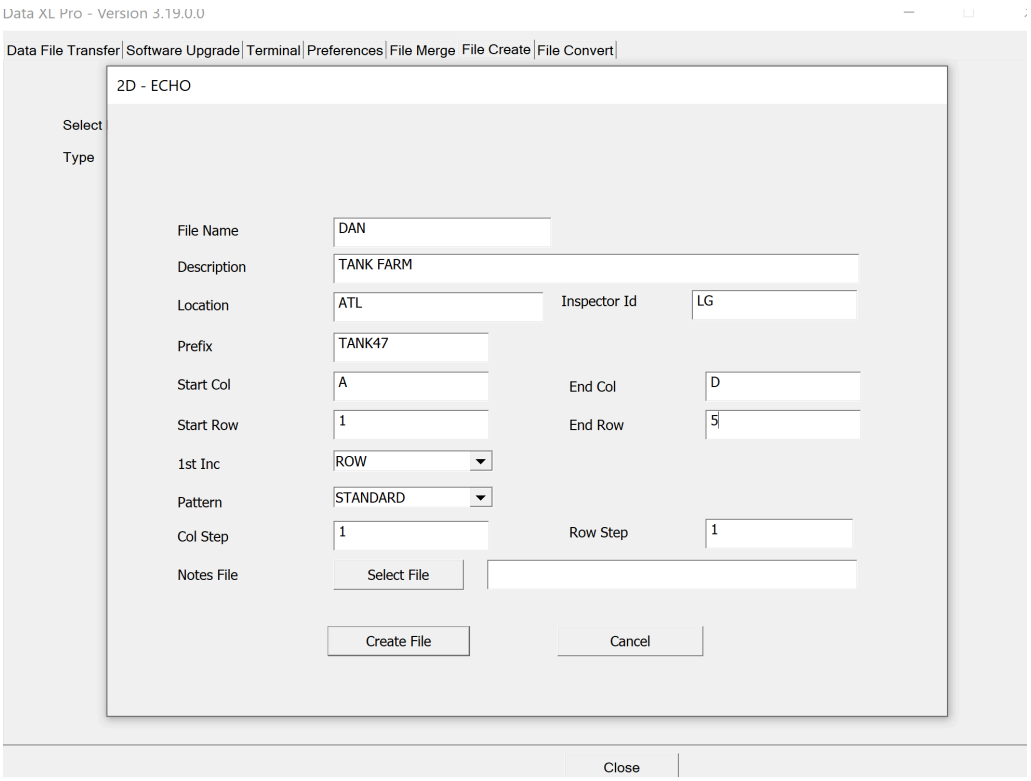
1. Open DataXL and click the **File Create** tab.
2. Select the product type from the available options:
    - *Color Corrosion Gage* - Corrosion file for EHC-09 Color
    - *Monochrome Corrosion gage* - Corrosion file for EHC-09 monochrome
    - *Color Precision gage* - Precision file for UPG-07 Color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

3. Select the file type from the available options:



- 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

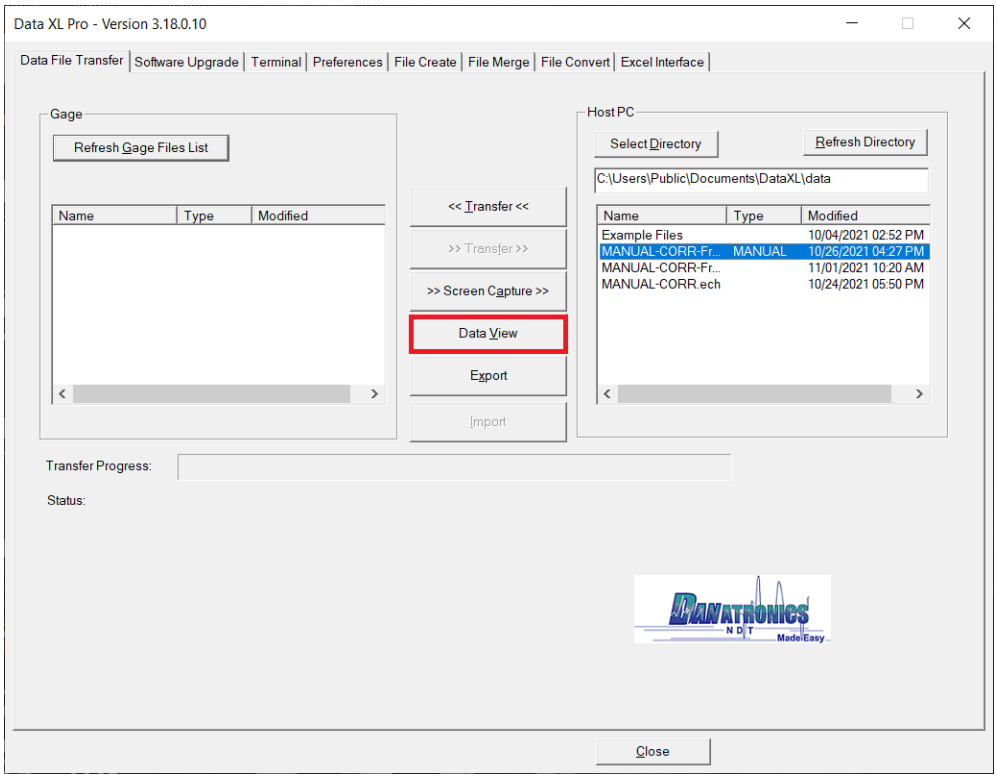
File Convert is a custom feature not used by most customers

DataXL PRO

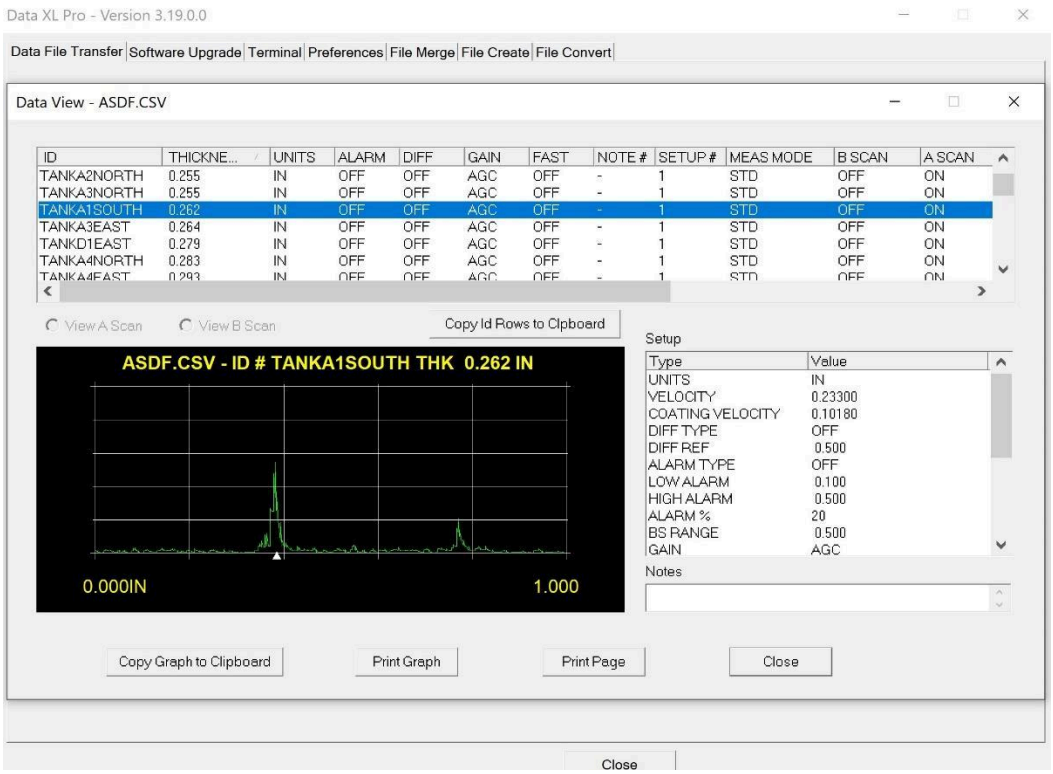
DataXL Pro is Danatronics paid version of DataXL. DataXL Pro displays the A-Scan and thickness displays on the screen as they would have been displayed on the ECHO PRO. The DataXL Pro interface is identical to the standard DataXL interface aside from the ability to view A-Scan and B-Scan displays.

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

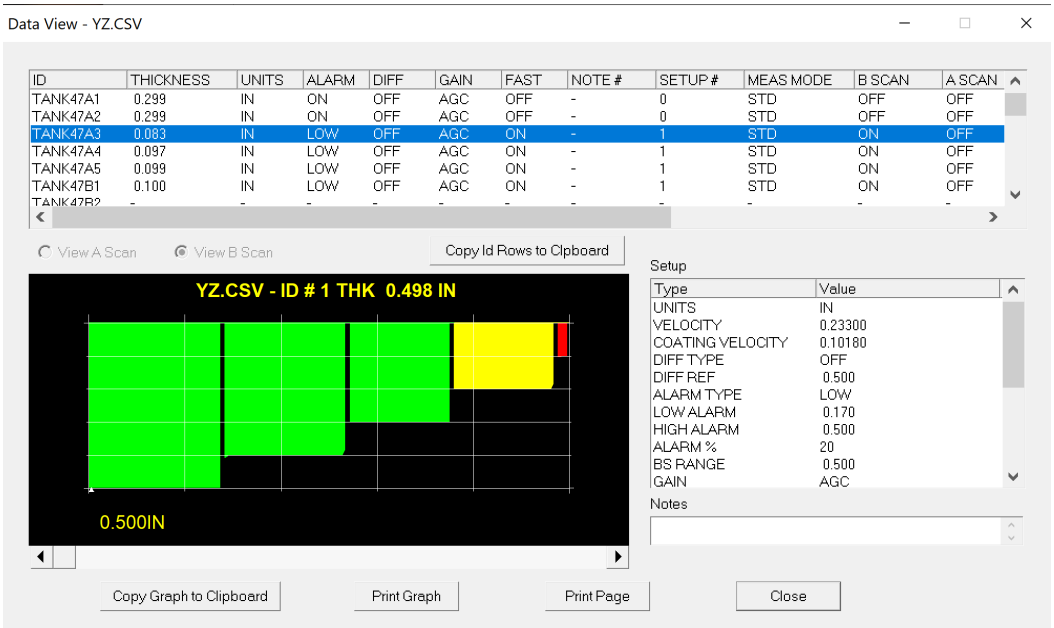
1. Open DataXL and click on the **Data File Transfer** tab if it not the currently opened tab
2. Click to highlight the file you want to view



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

DataXL Mobile

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

System Requirements

- Hardware Requirements
  - DataXL Mobile is for use with all Danatronics ECHO PRO flaw detectors.

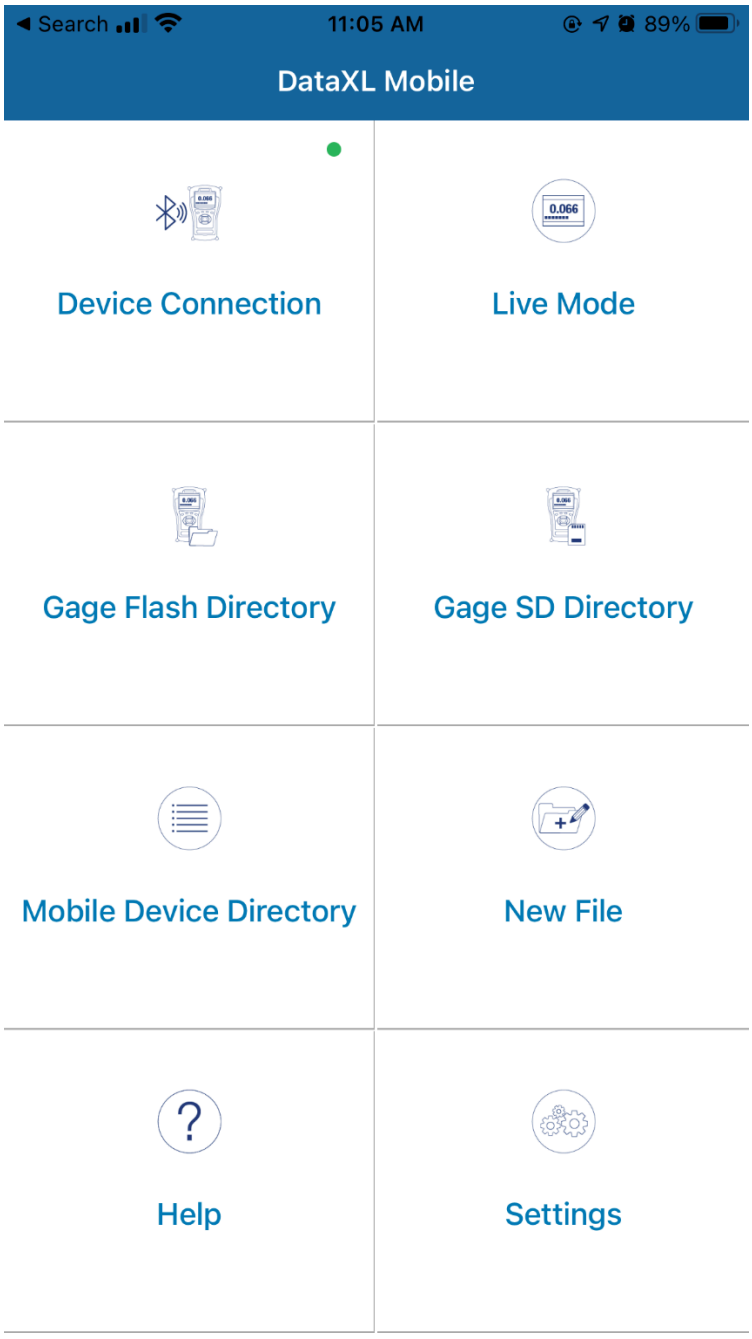
- Software Requirements
  - ECHO PRO software Version 1.00 or higher
  - For iOS/iPadOS - v11 or higher

Device Connection

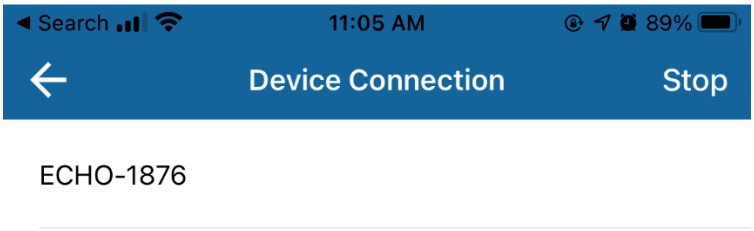
Before you can use any of the features available in DataXL Mobile, you need to connect your ECHO PRO. When the ECHO PRO is connected a green dot will appear on the upper left corner of the **Device Connection** section of the DataXL Mobile main menu.

To connect your bluetooth enabled ECHO PRO

- Open DataXL Mobile on your IOS or Android device and turn on your ECHO PRO
- Select **Device Connection** in the upper left corner of the DataXL Mobile main menu


Search
11:05 AM
89%
DataXL Mobile
Device Connection
Live Mode
Gage Flash Directory
Gage SD Directory
Mobile Device Directory
New File
Help
Settings

- A list will display that will include an ECHO-xxxx option if your ECHO PRO 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 ECHO PRO is now connected and ready to use the other DataXL Mobile features



- If your flaw detector does not appear in the list, make sure your ECHO PRO 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 flaw detector at a time

To disconnect your ECHO PRO

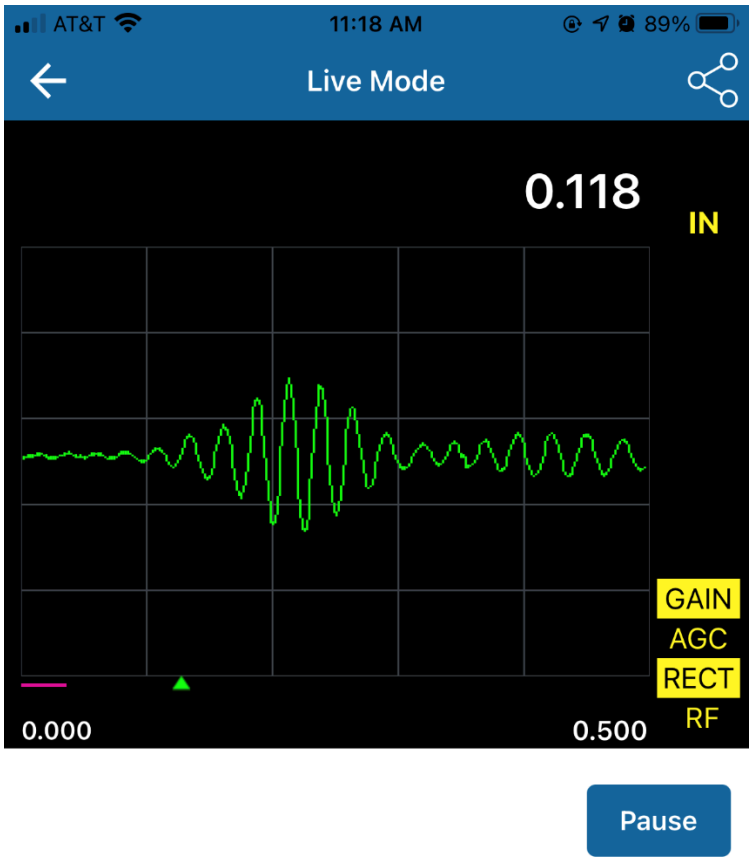
- Press the green “DISCONNECT” button at the bottom of the Device connection Screen or turn of your ECHO PRO

Live Mode

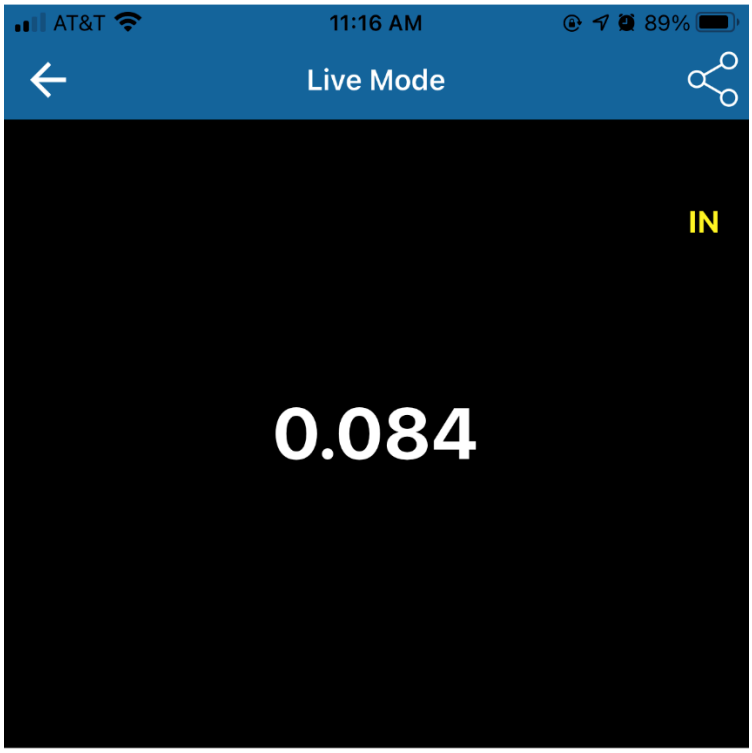
Live Mode allows the user to see the readings from the ECHO PRO on their IOS or Android device.

To use Live Mode

- Make sure ECHO PRO 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 ECHO PRO 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 ECHO PRO, 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



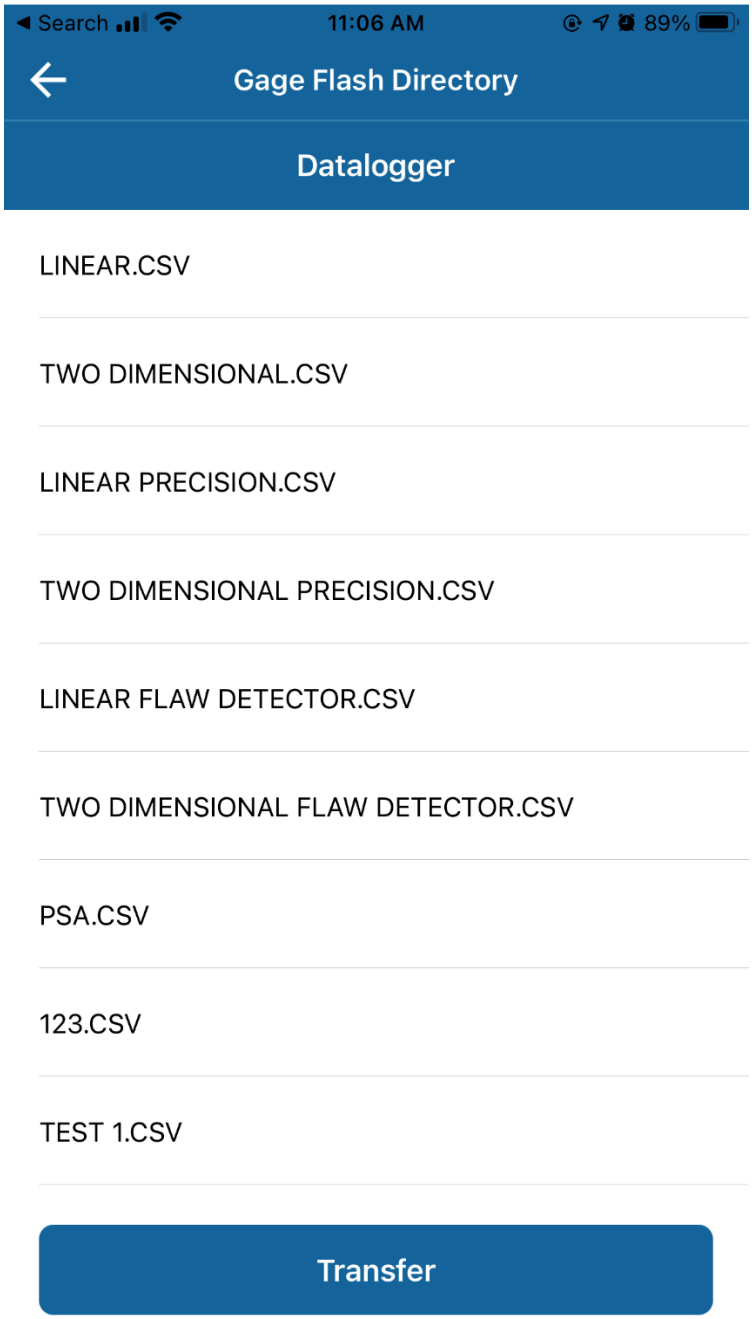
- To pause readings within DataXL Mobile, press the blue Pause button just below the display window. They key will change to say Resume. Press to being making reading again
- To save readings using DataXL Mobile, Press the green “SAVE” button. You can save readings as an image, PDF or CSV file. After 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

ECHO PRO Flash Directory and Gage SD Directory

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

- Make sure ECHO PRO 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

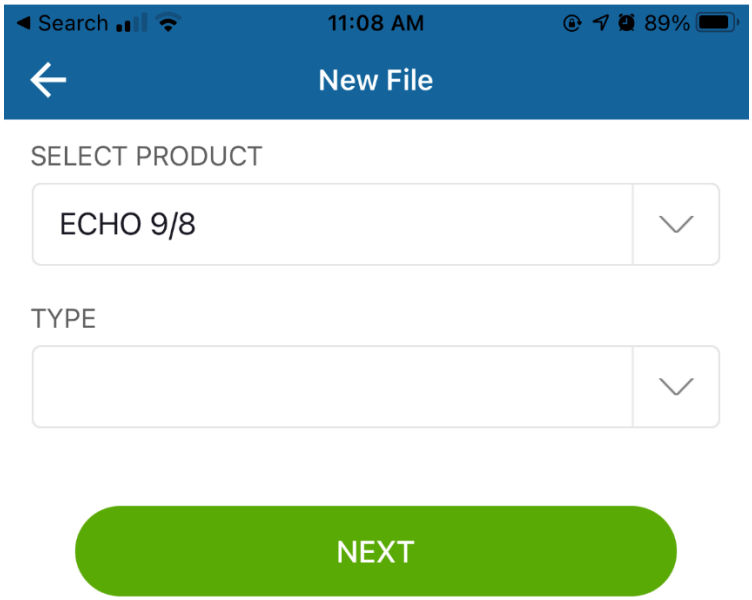
Mobile Device Directory

The Mobile Device Directory contains files stored on your mobile device

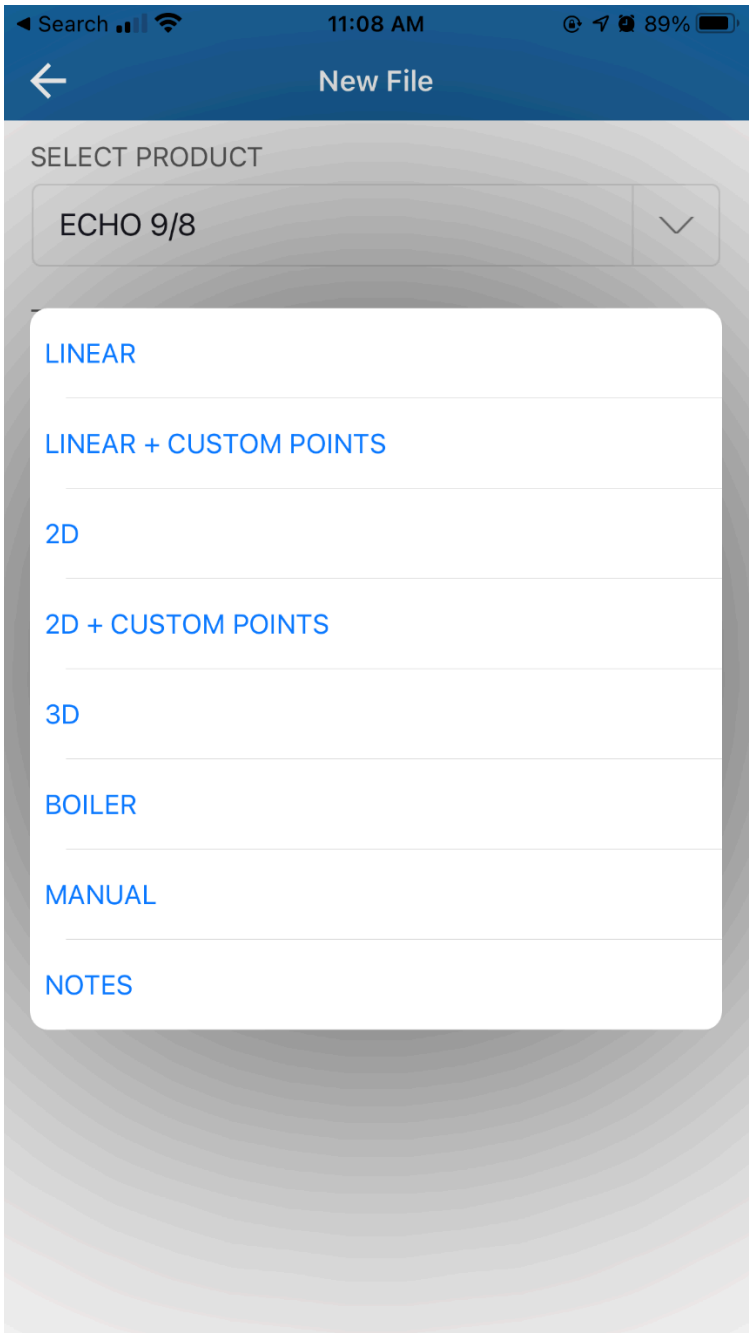
- When in the Mobile Device Directory, a list of files stored on your mobile device will appear. Click on a file to choose from the available options
-
    - Transfer - When the ECHO PRO is connected to your mobile device the transfer feature will export selected file to the ECHO PRO
    - Review - Displays 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

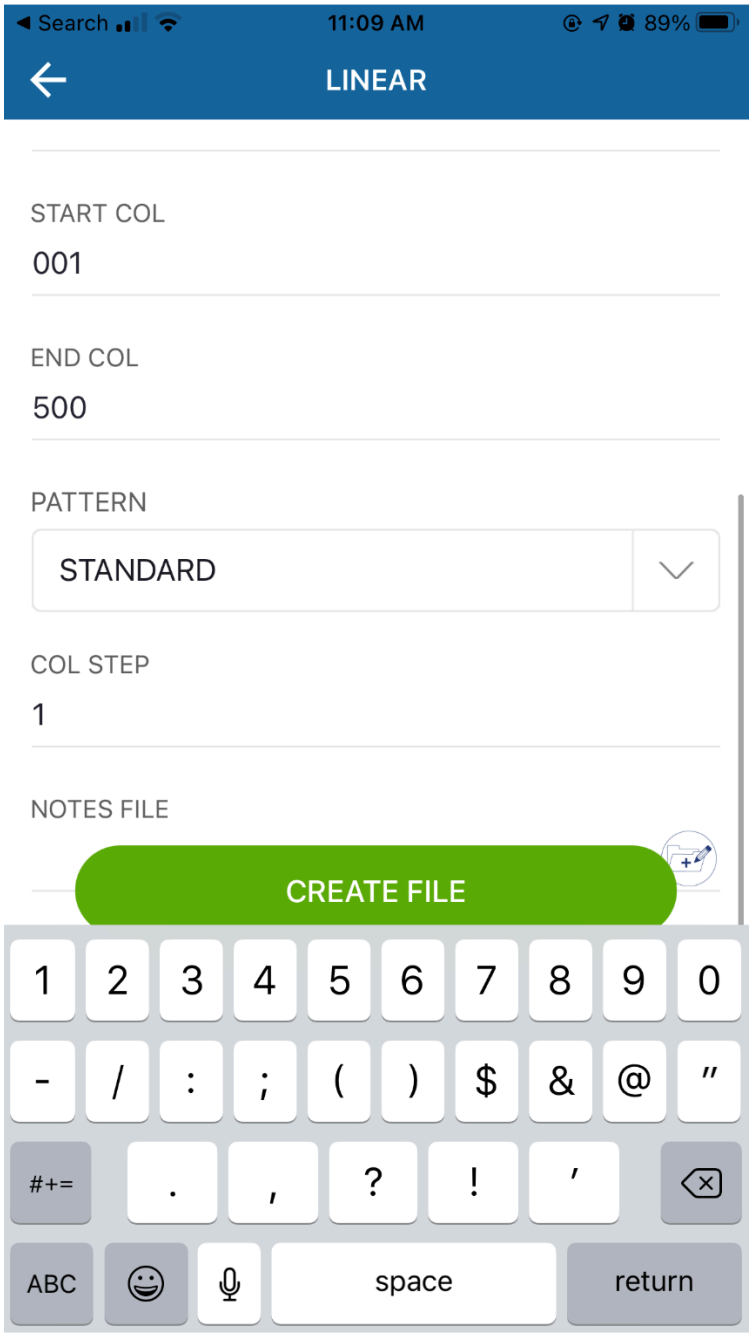
The **New File** menu option allows the user to create new files that can be transferred to ECHO PRO



- To create a new file, select the product you want to create a file for. ECHO PRO 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

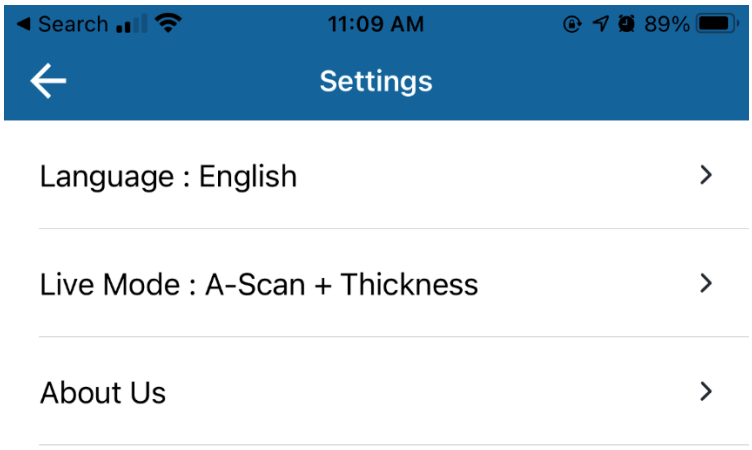


- Once your new file is open you can fill in the available fields with your desired information. Note: Start and end columns need to be the same number of characters
- Press create file to save file to your device. The file is now available in the **Device Directory** section of DataXL Mobile



Settings

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



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

- Hungarian
- Portuguese
- Slovakian
- Romanian
- Chinese
- Russian

14 Technical Specifications

General

Size: 9.9” x 6.16” x 2.50” (252 mm x 157 mm x 64 mm)

Weight: 3.6 lbs (1.63 kg) with internal rechargeable battery. 2.6 lbs (1.18 kg) without battery

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

Enclosure: Custom case with rubber over mold and padded hand strap, built in stand with variable angle, ¼-20 connector for magnetic pipe stand and 4 point chest harness optional

Battery Life: 8-10 hours

Battery Type: 7.2V, 13.6AHr rechargeable lithium-ion

Battery storage Temperature: 32 °F to 122 °F (0 °C to 50 °C)

Power Requirements: AC Mains: 100-240 VAC, 50-60 Hz 1.4A max Input

Units: inches, mm or µsec

Communication: USB, Wi-Fi, Bluetooth, RS-232 (Optional)

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

Standard Inclusions: Digital Ultrasonic flaw detector with 7” color sunlight readable touchscreen display including: 2 independent gates, DAC, AWS software, datalogger with B-Scan, Bluetooth, Wifi, enclosure includes protective rubber corners with built in stand and padded hand strap, microSD card, rechargeable Li-ion battery, AC adapter with power cord, USB-C cable, plastic carrying case, couplant, Data XL interface program to export saved readings to p.c. (Microsoft Excel), ASTM E317-15 calibration certificate

Certifications: CE certified, RHOS compliant, designed for IP67, ASTM E317-15 calibration certificate included with ECHO PRO

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

Display

Display: 7” sunlight readable Multi-Touch display with Wide VGA (800x480 pixels)

Backlight: Light Emitting Diode (LED) backlight. Includes variable light intensity

Interface: Operate with multi- touchscreen and/or keyboard - complete one-hand operation

Inputs/Outputs

USB Port: USB-C (Supports USB 2.0 On-The-Go (OTG), Power in to charge the unit, Display output)

RS-232 Port: Optional

Video Output: Wide VGA output via USB-C (Requires USB-C to HDMI cable)

Analog Output: 1 analog output (optional), Selectable 1 V/10 V Full Scale, 4mA max

Alarm Output: 3 alarm outputs, 5 V TTL, 10 mA

Trigger I/O: Trigger input, 5V TTL; Trigger output, 5V TTL, 10 mA max

Encoder Inputs: 2-axis encoder line

Charger Input: 12V DC, 5A

Transducer Connectors: Dual LEMO 00

Measurement

Transducer and Measurement Types: Single, dual, thru transmission, angle beam, delay lines, contact, immersion, echo to echo, dry couple

Measurement Rate: 10 Hz -2k Hz adjustable

Range: 0.353" to 277" (8.96 mm to 7035.8 mm) @ 5,900 m/s (0.2320 in./μ) Optional extended range 554" (14071.6mm)

Zoom: Zooms gate 1 width to minimum range capability

Display Delay: -0.018" to 276.647" (8.96 to 7035.8mm) @ longitudinal velocity in steel

Zero Offset: 0-2387 μsec.

Velocity: 0.0250"/μs to 0.6000"/μs (635 m/s to 15240 m/s)

Alarm: Dynamic change of color and vibrate on alarm for echo in gate, echo above DAC positive, DAC negative, gate, minimum depth alarm and polarity change (phase reversal)

Peak Hold: Holds curve of ECHO envelope with live echo. Peak on, Peak hold, Peak off, peak pitch memory (audible chirp based on maximum echo amplitude)

Freeze: Freezes for data storage and waveform viewing analysis - ideal for high temperature measurements

Waveform: Filled or outlined

Angle Beam: Displays all three leg components, angular distance, surface distance and depth (automatically displayed once an angle is entered) accounting for leg correction to correct for beam index point of wedge, fourth measurement box is gate 1 amplitude

Refracted Angle: 0° to 85° in 1° increments including 0, 30, 45, 60 and 70 as pre-set choices

Gate (1, 2): Thickness, Soundpath, Projection, Depth, Amplitude, Time-Of-Flight, Min./Max. Depth, Min./Max. Amplitude

Echo-to-Echo: Standard Gate 2-Gate 1, Optional IF Gate Tracking

Other measurements: Overshoot (dB) value for DGS/AVG, ERS (equivalent reflector size) for DGS/AVG, AWS D1.1/D1.5 A, B, C and D values, Reject Value, Echo to Ref dB values

DAC/TCG: Standard

DAC points: Up to 50 points, 110 dB dynamic range

Special DAC modes: Custom DAC (up to 6 curves), 20-80% View

Curved surface correction (Optional): Standard OD or Bar correction for Angle Beam measurements

Curves: AVG/DGS

Corrosion Module (Optional): Zero-cross measurement algorithm, V-Path correction, Single or Echo-to-Echo, Encoded B-scan

Pulser

Pulser: Tunable Square Wave (1-25 MHz) or spike

Pulse Repetition Frequency(PRF): 10- 2000 Hz in 10 Hz increments

Pulser Voltage: 50V-600V in 5V increments.

Pulse Width: Adjustable from 20 ns to 2,000 ns (30MHz-0.5 MHz)

Damping: 50, 63, 150, 400 Ω

Receiver

Gain: 0-110db in (.1db increments for 0-100db)

Max Input Signal: 20 V p-p

Receiver Input Impedance: 400 Ω ± 5%

Receiver Bandwidth: 0.5 MHz to 25 MHz (-3 dB)

Filters: TBD

Rectification: RF, Full Wave, Half +, Half –, RF

Linearity: Per ASTM E317-15 (1% on vertical axis, .5% on horizontal axis)

Resolution: 1% FSH, amplifier accuracy ± 1dB

Reject: 0-80% FSH, completely linear with vertical indication bar

Amplitude Measurement: 0 to 110% full screen height with 1% resolution

Measurement Rate: Equivalent to PRF in all modes

Calibration

Automated Calibration: Velocity, Zero Offset, Straight Beam (First Backwall or Echo-to-Echo), Angle Beam (Soundpath or Depth)

Test Modes: Pulse Echo, Dual, or Through Transmission

Gates

Measurement Gates: 2 fully independent gates for amplitude and TOF measurements,Optional Interface gate

Gate Start: Variable over entire displayed range

GateWidth: Variable from Gate Start to end of displayed range

Gate Height: Variable from 2 to 95% full screen height

Alarms: Positive and Negative Threshold, Minimum Depth (Gate 1 and Gate 2)

Gate Options: Floating, tracking and interface

Datalogger

Datalogger: file types linear, 2D, 2D with custom point, 3D, 3D with custom point, boiler with and without waveform storage options.32 character file name and 20 character longer I.D. strings

Data storage: 100,000 IDs onboard, removable MicroSD card standard, expandable to 32Gb file types linear, 2D, 2D with custom point, 3D, 3D with custom point, boiler with and without waveform storage options. 32 character file name and 20 character longer I.D. strings

Stored Setups: Storage and recall of 2700 calibration and setup files

Data XL: Interface program to send and receive files to and from PC. Displays thickness with ID in Microsoft Excel

Hardware/Software

Software Options: Corrosion module, precision module, floating gate, tracking gate, interface gate, pipe curvature correction, backwall echo attenuator (BEA), extended range up to 554”

Hardware Options: Magnetic wheel encoder, RS-232, heavy duty bail, spare battery, external charger, foot switch, test blocks, cables, probes, couplant, and magnetic pipe stand, heavy duty Pelican case, chest harness

16 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 ECHO PRO as the speed of the ultrasound moving through the material in question needs to be programmed into the ECHO PRO 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
Tungsten	0.200	5200
Uranium	0.130	3400
Water	0.0584	1480
Zinc	0.170	4200

17 Technical Assistance

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