

User's Guide

EHC-09B / EHC-09 / EHC-09DL
Ultrasonic
Thickness Gages

Software version 1.0



Ver: 1.1B

The information in this document is subject to change without notice and describes only the product defined in the introduction of this documentation. This document is intended for the use of Danatronics, Corp. customers only for the purposes of the agreement under which the document is submitted, and no part of it may be reproduced or transmitted in any form or means without the prior written permission of Danatronics, Corp. For information address: Danatronics Corp., 14 Electronic Avenue, Danvers, MA 01923. The document has been prepared to be used by professional and properly trained personnel, and the customer assumes full responsibility when using it. Danatronics, Corp. welcomes customer comments as part of the process of continuous development and improvement of the documentation.

The information or statements given in this document concerning the suitability, capacity, or performance of the mentioned hardware or software products cannot be considered binding but shall be defined in the agreement made between Danatronics, Corp. and the customer. However, Danatronics, Corp. has made all reasonable efforts to ensure that the instructions contained in the document are adequate and free of material errors and omissions. Danatronics, Corp. will, if necessary, explain issues which may not be covered by the document.

Danatronics, Corp. liability for any errors in the document is limited to the documentary correction of errors. Danatronics, Corp. WILL NOT BE RESPONSIBLE IN ANY EVENT FOR ERRORS IN THIS DOCUMENT OR FOR ANY DAMAGES, INCIDENTAL OR CONSEQUENTIAL (INCLUDING MONETARY LOSSES), that might arise from the use of this document or the information in it.

This document and the product it describes are considered protected by copyright according to the applicable laws.

Other product names mentioned in this document may be trademarks of their respective companies, and they are mentioned for identification purposes only.

Copyright 2005 by Danatronics Corp. All Rights Reserved

Printed in the United States of America

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.

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

Table of Contents

Liability 3

Table of Contents..... 4

1 Getting Started 8

About the EHC-09 8

Probe Zero 10

Keypad Functions 11

Function Keys 12

Display Screen..... 12

Using the Battery Pack..... 14

 Monitoring the Battery Charge from the Display
 Screen..... 14

 Replacing the Battery Pack 14

2 Basic Gage Operations 15

Power on the Gage 15

Performing a Reset 16

 Database Reset..... 18

 Parameter Reset 19

Database/Parameter Reset	20
<i>Backlight</i>	22
<i>About Screen</i>	22
3 Calibrating the Gage and Making Measurements	24
<i>Velocity Calibration Only</i>	24
<i>Velocity and Zero Calibration</i>	25
<i>Zero Calibration Only</i>	26
<i>Delay Line Calibration</i>	27
<i>Automatic Zero</i>	28
Measurement Mode with a Datalogger	29
Measurement Mode without a Datalogger	30
4 Using Setup Mode on the Gage	32
<i>Using the Clock</i>	34
<i>Setting LCD Contrast</i>	37
<i>Understanding a LOS Reading</i>	37
<i>Using the Hold Option</i>	37
<i>Using the Fast Option</i>	38

<i>Using the Gain Option</i>	<i>41</i>
<i>Using the Diff Option.....</i>	<i>44</i>
<i>Using the Alarm Option</i>	<i>45</i>
<i>Setting the Visual and Audible Alarm.....</i>	<i>48</i>
<i>Setting the Vibra Alarm.....</i>	<i>49</i>
<i>Using the Echo-to-Echo Option.....</i>	<i>53</i>
5 Special Gage Functions	54
<i>Using the Save Option.....</i>	<i>54</i>
<i>Using the Freeze Option</i>	<i>57</i>
<i>Using the Menu Option.....</i>	<i>60</i>
6 Using the Datalogger Directory Mode	62
<i>Managing the Datalogger File System.....</i>	<i>65</i>
<i>Creating Custom Files</i>	<i>68</i>
<i>Selecting a Custom Linear File</i>	<i>70</i>
<i>Selecting a Custom Grid File.....</i>	<i>71</i>
<i>Reviewing a File</i>	<i>73</i>
<i>Reviewing a Linear File</i>	<i>75</i>
<i>Reviewing a Grid File.....</i>	<i>76</i>
<i>Renaming a File</i>	<i>77</i>
<i>Clearing a File.....</i>	<i>80</i>

<i>Copying a File</i>	82
<i>Deleting a File</i>	84
7 Technical Specifications	87
<i>Specifications for the EHC-09B/EHC-09/ECH-DL Ultrasonic Thickness Gages</i>	87
<i>Technical Assistance</i>	90
8 Software Options	
Echo to Echo	90
B-Scan	92

1 Getting Started

About the EHC-09

The EHC-09B, EHC-09, and EHC-09DL are portable, digital, handheld thickness gages. The EHC series of ultrasonic thickness gages are specifically designed to measure the remaining wall thickness of primarily steel structures.

- Vibralarm (vibrates gage below/above minimum/maximum thickness value)
- Illuminating keypad for easy to view go-no go thickness values (patent pending)
- Automatic transducer replacement intelligence built in (patent pending)
- Unique, programmable left-hand/right-hand operation (patent pending)
- Up to 200 hour battery life with 2 AA batteries
- Small, easy to hold, ergonomic, custom molded, durable case with rubber keypad
- Automatic zero capability
- Gain boost
- Multiple dual and single element transducer options including high temperature

The EHC-09B is a base gage offering a simple user interface packaged in the same custom molded high-density plastic case with rubber keypad as the other more sophisticated models. This gage offers reliable, accurate thickness readings on mostly steel structures with access to only one side. The EHC-09B can be easily upgraded in the field to the EHC-09 or EHC-09DL models.

The EHC-09 is a mid-range model consisting of the most commonly used features in a thickness gage not requiring a datalogger. This model offers gain adjustment, vibrating alarm and illuminating keypad conditions, and automated transducer replacement notification feature. Like the EHC-09B, this model is field upgradeable to a datalogger version, the EHC-09DL.

Our top of the line model, EHC-09DL, contains all the same features of the EHC-09B and EHC-09 plus:

- 50,000 (expandable to 100,000) reading datalogger capacity with complete setup tracking
- Three pre-set files for linear, grid (row advance) and grid (column advance)
- Echo-to-Echo
- B-scan
- Custom molded carrying pouch with belt clip and elastic strap

Probe Zero

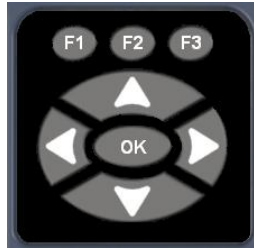
When turning on the EHC-09B, EHC-09, and EHC-09DL (for the sake of this manual, with the exception of the datalogger, B-scan, and Echo-to-Echo features, the three model numbers are interchangeable for the basic operation and calibration), the gage does an automatic zeroing of the transducer thus eliminating the need for an on-block zero. The EHC-09B, EHC-09, and EHC-09DL will electronically zero the transducer upon power up and at a particular time during normal operation. This feature ensures the transducer is working in accordance with electronic zeroing procedures. This feature is particularly important on high temperature materials and when the transducer becomes worn.

Important Notice: Please make sure the transducer is not coupled to the test piece when the gage is first turned on and that there is no couplant on the end of the transducer. The transducer should also be at room temperature, clean without any noticeable wear.

For a more accurate “span” of calibration, Danatronics recommends a zero calibration and sound velocity calibration as well.

Keypad Functions

The figure below shows the full keypad of the EHC Series thickness gages. Refer to the following table that lists the function of each key on the keypad.



Key	Function
	Up arrow key
	Down arrow key
	Left arrow key
	Right arrow key
	On/Off symbol (under the F1 key)

	OK key
	F1 key
	F2 key
	F3 key

Function Keys

Function keys, or F keys, such as F1, F2, and F3 have various gage 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 (Dir).

Display Screen

The gage has a graphic style Liquid Crystal Display (LCD). Viewing the screen is best from straight above or slightly below the surface rather than from side to side. If external temperatures are below 32°F (0°C), the display may be slow to update information.

At the top right corner of the display screen is the “available key mode”. The EHC-09B and EHC-09 is

designed to show the parameters selected in the center of the display screen.

X D U C E R ^v	
DK550	5.0MHZ
DC550	5.0MHZ
DK537	5.0MHZ
DC537	5.0MHZ
DHT537	5.0MHZ
SETUP	RESET BKLITE

F1

F2

F3

The top part of the display screen for EHC-09DL model shows the File name, ID number, AA, and 0001 for grid column and row. The lower part of the display acts as an interactive tool that allows you to decide how you want to proceed with the information that is displayed on the screen. The middle part of the screen shows the thickness value, In, mm or usec, Echo-to-Echo symbol, LOS for loss of signal, Freeze, Fast Min or Max, Alarm indicator, Differential mode, Low, Med or High gain and percent remaining battery life.

PIPE01 ID: AA,0001	
DO UNFREEZE	
1.234	
FREEZE FASTMIN HOLD	
DIFF LOW dB [90 %]	
SAVE FREEZE DIR	

F1

F2

F3

Using the Battery Pack

Monitoring the Battery Charge from the Display Screen

The EHC-09 series constantly displays the percent battery life on the bottom right hand corner of the display screen. When the gage gets below 20 %, the indicator will flash.

Replacing the Battery Pack

To replace the battery pack, unscrew the battery door on the bottom of the gage and slide out the two “AA” batteries. Replace with two new “AA” batteries paying attention that both positive ends should be facing towards the top of the gage.

2 Basic Gage Operations

Power on the Gage

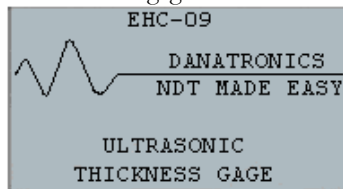
To power on any of the EHC series thickness gages follow these steps:

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



Power symbol
under the F1 key

2. The following will appear on the display screen of the thickness gage:



3. The next screen that appears automatically is the *Xducer* (transducer) selection screen, also referred to as *Home* screen in the manual.

4. Use the up and down arrow keys to select a transducer and press **OK** key. (Please note, the transducer selection will automatically display the transducer last used prior to shut off.) The following default transducer choices are available:

USER	5.0MHZ
DC110	1.0MHZ
DC175	1.0MHZ
DK250	2.0MHZ
DC250	2.0MHZ
DK525	5.0MHZ
DC525	5.0MHZ
DK550	5.0MHZ
DC550	5.0MHZ
DK537	5.0MHZ
DC537	5.0MHZ
DHT537	5.0MHZ
DK718	7.5MHZ
DK1025	10.0MHZ
DC1025	10.0MHZ

5. Press **F1** to select the **Setup** option.
6. Press **F2** to select the **Reset** option.
7. Press **F3** to select the **Bklite** option.

Performing a Reset

You can reset the gage settings back to the default settings by performing a gage reset.

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

X D U C E R	^v
DK550 5.0MHZ	
DC550 5.0MHZ	
DK537 5.0MHZ	
DC537 5.0MHZ	
DHT537 5.0MHZ	
SETUP	RESET BKLITE

To perform a reset, follow these steps:

1. From the *Home* screen, press the **F1 – Reset** key. The following Reset screen appears:

R E S E T	^v
DATABASE	
PARAMETER	
DATABASE/ PARAMETER	
EXIT	ABOUT

2. Select the **Database**, **Parameter**, or **Database/Parameter** option by using the up and down arrow keys and press the **Ok** key to make a selection. See the following sections to perform each of these reset options.

Database Reset

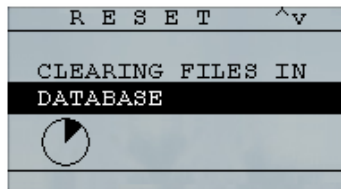
Performing a Database Reset clears all the files in the database and keeps the first three: Linear, Row increment and Col increment database files with cleared readings. All the user created files in the database will be cleared and deleted. To perform a Database Reset, follow these steps:

1. From the *Home* screen, press the **F1 – Reset** key. The Reset screen appears.
2. Select the **Database** option and press the **OK** key. The following screen appears:

R E S E T ^v		
CLEAR ALL FILES IN		
DATABASE		
ARE YOU SURE?		
EXIT	YES	NO

If you want to exit this screen press either the **F1 – Exit** key or **F3 – No** key to take no action and return to *Home* screen.

3. Press the **F2 – Yes** key to perform a Database reset. The following screen appears while the database is resetting.

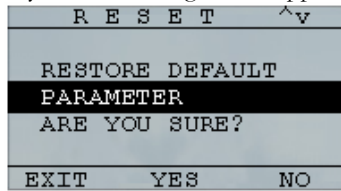


After performing a Database Reset, the *Home* screen appears automatically.

Parameter Reset

Performing a Parameter Reset restores default parameters to the factory settings. To perform a Parameter Reset, follow these steps:

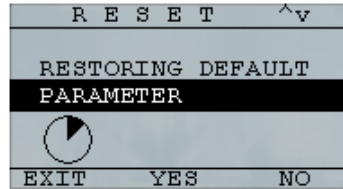
1. From the *Home* screen, press the **F1 – Reset** key. The *Reset* screen appears.
2. Select the **Parameter** option and press the **OK** key. The following screen appears:



If you want to exit this screen press either the **F1**

– **Exit** key or **F3 – No** key to take no action and return to *Home* screen.

3. Press the **F2 – Yes** key to perform a **Parameter** reset. The following screen appears while the default parameters are restored.



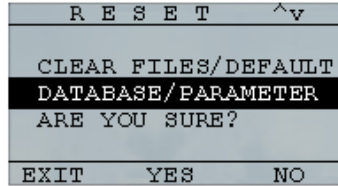
After performing a Parameter Reset, the *Home* screen appears automatically.

Database/Parameter Reset

Performing a Database/Parameter Reset clears all the files in the database and keeps the first three Linear, Row increment and Col increment database files with cleared readings. All the user created files in the database will be deleted and the default parameters will be restored at the same time. This selection is the equivalent of performing MASTER RESET on the instrument, restoring original factory setting. To perform a Database/Parameter Reset, follow these steps:

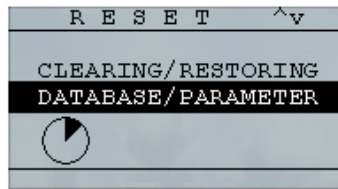
1. From the *Home* screen, press the **F1 – Reset** key. The *Reset* screen appears.

2. Select the **Database** option and press the **OK** key. The following screen appears:



If you want to exit this screen press either the **F1 – Exit** key or **F3 – No** key to take no action and return to *Home* screen.

3. Press the **F2 – Yes** key to perform a **Database/Parameter** reset. The following screen appears while the database/parameter is cleared/restored.



After performing a Database/Parameter Reset, the *Home* screen appears automatically.

Backlight

The backlight can be turned On or Off by pressing **F3 – Bklite**. Backlight can also be turned On, Off or set on Auto using the **Bklight** option in the Setup Menu.

Note: Leaving the backlight on will reduce battery life.

If you set the backlight to Auto, the backlight will turn on during active readings and hold for 15 seconds or unless otherwise specified.

Note: If the backlight is set to Auto and you have the gage in Hold mode, the backlight will shut off after 15 seconds. If you would like the hold to remain lit, then you must enable the backlight on instead of using Auto.

About Screen

You can find information about any of the EHC series thickness gages such as the model number, version number and contact information from the gage's *About* screen. To go to the *About* Screen, follow these steps:

1. From the *Home* screen, press the **F1 – Reset** key. The following *Reset* screen appears:

R E S E T ^v	
DATABASE	
PARAMETER	
DATABASE/PARAMETER	
EXIT	ABOUT

2. Press the **F3 – About** key. The following *About* screen appears.

A B O U T	
DANATRONICS	
EHC-09	V1.0.7-G
WWW.DANATRONICS.COM	
PHONE: 978.777.0081	
EXIT	

3. Press the **F1 – Exit** key to return back to *Reset* selection screen.

3 Calibrating the Gage and Making Measurements

Calibrating is the process of adjusting the gage for a specific material and transducer before testing material to make sure that all measurements are accurate. You must always calibrate before measuring material for standard accuracy.

To measure a thickness of unknown material you need to know the velocity of the sound in the unknown material. To find the velocity of the sound you can use one of the following methods:

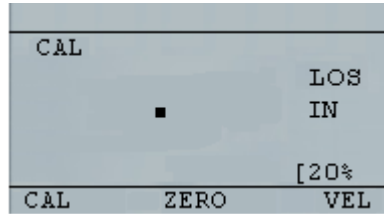
- Velocity calibration only
- Velocity and zero calibration
- Zero calibration only
- Delay line calibration

Velocity Calibration Only

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.

To perform any calibration, first go to the measure mode and press Menu/OK. Then go to the Cal option in the Menu screen and press OK. The following Cal mode screen should appear. To exit the cal screen without

performing any calibration, press OK. To proceed to velocity cal, follow the following instructions.



Cal screen for non-datalogger version

While measuring the thicker step, select VEL by pressing F3. After selecting VEL, you can take the transducer off the test block. If the displayed measurement is different than the known value of the step, use the up or down arrow key to adjust the displayed value to the known value of the step. Press OK to perform the calibration. The unit will briefly display the calibrated velocity value in the top of the screen and then return to measure mode.

Velocity and Zero Calibration

If you have a test step block of known thicknesses but unknown material, then you can calibrate the zero and velocity of the sound in the unknown material by measuring the time of flight from the main-bang to the first back echo for thinner step and thicker step.

To calibrate both: velocity and zero at the same time, first go to the Cal mode as shown in Velocity Calibration Only section. While measuring the thicker step, select VEL by pressing F3. After selecting VEL you can take the transducer off the test block. If the displayed value is different than the known value of the step, adjust the value by pressing up or down arrow keys and press F1/CAL. Then while measuring the thinner step select ZERO by pressing F2. After selecting ZERO you can take the transducer off the test block. If measured value is different than the known value of the step, adjust the measured value by pressing up or down arrow key and then press OK. The unit will briefly display the calibrated zero value and then return to Measure mode. Note that the order of Velocity and Zero calibration could be reversed. If Velocity calibration is performed after Zero calibration, the calibrated velocity value will be displayed at the end of the calibration process.

Zero Calibration Only

If you have a test step block of known thickness and known velocity of sound in the material, then you can calibrate the zero by measuring the time of flight from main-bang to the first back echo for the thinner step. The calibrated zero is the calculated zero minus the measured zero.

To accurately measure a thickness of unknown material you need to know the velocity of the sound in the unknown material and the errors introduced by the cable

and electronics. This is called delay line and zero calibrated value for the transducer.

To perform a zero calibration, go to the Cal mode as shown in Velocity Calibration Only section. Then while measuring the thinner step, select ZERO by pressing F2. After selecting ZERO, you can take the transducer off the test block. If the displayed measurement is different than the known value of the step, use the up or down arrow key to adjust the displayed value to the known value of the step. Press OK to perform the calibration. The unit will briefly display the calibrated zero value in the top of the screen and then return to measure mode.

Delay Line Calibration

Delay line calibration is done every time the thickness gage is powered on and a transducer is selected, or when a different transducer is selected during normal operation.

Delay line calibration is performed by measuring the echo of the transducer itself when it is not placed on any material and there is no couplant on the transducer surface.

Under normal usage, the surface of the transducer wears out over time, which reduces sensitivity of the transducer. When you power on any of the EHC series thickness gages and select a transducer, the gage performs automatic calculations and warns you (patent pending) if the sensitivity of the transducer is too low and whether the transducer should be replaced.

Automatic Zero

To perform an Automatic Zero or Auto Zero, you must first select a transducer option from the *Xducer* selection screen and press the **OK** key.

X D U C E R ^v	
DK550	5.0MHZ
DC550	5.0MHZ
DK537	5.0MHZ
DC537	5.0MHZ
DHT537	5.0MHZ
SETUP	RESET BKLITE

To continue the Auto Zero, follow these steps:

1. Follow the instructions given on each display screen; the first of which will prompt you to wipe off any couplant from the transducer and wait three seconds. The waiting time is shown in the changing pie-clock graphic on the display screen.

03 SEPT 04 10:30AM
WIPE OF COUPLANT

EXIT

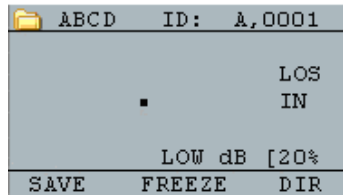
2. After three seconds the gage automatically begins to zero the transducer. During the delay line calibration a screen appears displaying the message “Performing Auto Zero”.

3. A warning message will appear on the display screen if the delay line is below the acceptable limit for accurate thickness measurements. You will need to replace the transducer or select the **F1** key to acknowledge the warning message and continue using the same transducer, which may have a worn surface.
4. After three seconds or after acknowledging the warning message, the display shows the instrument parameters for 3 seconds before going to **Measurement** mode.

XDUCER DK537 5.0MHz	
DELAY	--- 4856
VEL	0.2360 IN/US

Measurement Mode with a Datalogger

If your EHC series thickness gage is equipped with a datalogger, then the display screen in **Measurement** mode will look like the screen below:



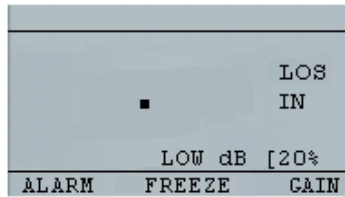
To continue in **Measurement** mode, follow these steps:

1. Press the **F1** key to select the **Save** option. (See: Save section.)
2. Press the **F2** key to select the **Freeze** option. (See: Freeze section.)
3. Press the **F3** key to select the **Dir** (Directory) option. (See: Directory section.)
4. Press the **Menu = OK** key to select the **Menu** option. (See: Menu section.)

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

Measurement Mode without a Datalogger

If your EHC series thickness gage is not equipped with a datalogger, then the display screen in **Measurement** mode will look like the screen below:

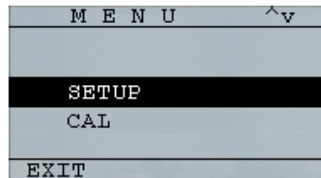
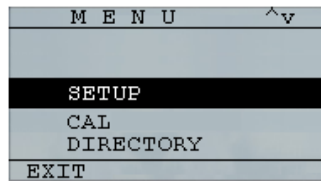


To continue in *Measurement* mode, follow these steps:

1. Press the **F1** key to select the **Alarm** option. (See: Alarm section.)
2. Press the **F2** key to select the **Freeze** option. (See: Freeze section.)
3. Press the **F3** key to select the **Gain** option. (See: Gain section.)
4. Press the **Menu = OK** key to select the Menu option. (See: Menu section.)

4 Using Setup Mode on the Gage

The following modes are available (please note that in the non-datalogger version of the EHC series, the **Directory** mode is not available.)



To select **Setup** mode, follow these steps:

1. Press **Menu OK** to get to **Setup** mode.
2. Use the up and down arrow keys to select the **Setup** option and press the **OK** key.

The following Setup choices are available:

S E T U P		<^v>
ALARM	OFF	
VEL	0.2360	IN/US
XDUCER	DK537	5.0MHz
UNITS	IN	
HOLD	OFF	
EXIT		

- Use the up and down arrow keys to select any of the setup parameters available and press the **OK** key to change the setting. You can also change the setting using the “Quick Access mode”. To do this, simply use the left and right key (indicated in the top right hand of the display screen) to change the setting of the highlighted parameter.

The entire list of available parameters are as follows:

GAIN	LOW dB
FAST	OFF
BKLIGHT	OFF
ALARM	OFF
VEL	0.2360 IN/US
XDUCER	DK537 5.0MHz
UNITS	IN
HOLD	OFF
DIFF	OFF
LOCK	OFF

NOTES	OFF
DBASE	
E-TO-E	OFF
BSCAN	OFF
USER	LEFT HAND
CLOCK	10:10 AM
CNTRST	26
AUTOOFF	00 MIN
OPTIONS	

Using the Clock

The EHC series thickness gages have an internal real-time clock that includes the year, month, day and time.

The entire list of available clock setup options are as follows:

TIME FMT	12 HR
DATE FMT	MM/DD
MINUTE	21
HOUR	01 PM
DAY	01
MONTH	01
YEAR	2005

To set the time and date, follow these steps:

1. Select **Clock option** from the *Setup* screen.

S E T U P ^{^v}	
CLOCK	10:10 AM
GAIN	LOW dB
FAST	MIN
BKLIGHT	OFF
ALARM	OFF
EXIT	

The following is an example of what the clock setup screen might look like depending on the previous setup.

CLOCK SETUP <^v>	
YEAR	2005
TIME FMT	12 HR
DATE FMT	MM/DD
MINUTE	21
HOUR	01 PM
EXIT	

2. To change the **Time Format**, select TIME FMT using up/down arrow keys. Use the left/right arrow keys to select between 12 HR and 24 HR options.
3. To change the **Date Format**, select DATE FMT using up/down arrow keys. Use the left/right

arrow keys to select between MM/DD and DD/MM options.

4. To set **Minute**, select the MINUTE option using up/down arrow keys. Use left/right arrow keys to decrease/increase the minute value. You can set the minute value from 00 to 59.
5. To set the **Hour**, select the HOUR option using up/down arrow keys. Use left/right arrow keys to decrease/increase the hour value. If time is set in 12 HR format, the available hour values are from 00 AM to 11 PM. If time is set in 24 HR format, the available hour values are 00 to 23.
6. To set **Day**, select the DAY option using up/down arrow keys. Use left/right arrow keys to decrease/increase the day value. You can set the day value from 01 to 31.
7. To set **Month**, select the MONTH option using up/down arrow keys. Use left/right arrow keys to select a Month from JAN to DEC.
8. To set **Year**, select the YEAR option using the up/down arrow keys. Use left/right arrow keys to select the year value from 2005 to 2025.

Press F1 – EXIT to exit the clock setup and return to the setup screen. The real-time clock will automatically update the date and time once the clock parameters are selected.

Setting LCD Contrast

To change the display contrast, select **Cntrst option** from the *Setup* screen. Use left and right arrow keys to select contrast value from 1-64. Press EXIT to save the selection and return to the previous screen.

Understanding a LOS Reading

LOS (Loss of Signal) occurs when the gage is not making a valid reading for a variety of reasons. This may be because there is not enough couplant, the surface is too rough or rusty, the transducer is low in sensitivity, the temperature is too high, there is a disbond between the coating and the steel or for a variety of other reasons. In the event you try to save a reading in LOS with the datalogger version, the *Notes* screen will automatically appear so that a reason is given for saving an LOS. You can scroll to the appropriate note and press the soft save key.

Using the Hold Option

If a LOS occurs, the gage can continue to display the last measured thickness by “holding” the measurement. There are two **Hold** options, which include:

- **Hold On:** Continues to display the last measured thickness
- **Hold Off:** Does not continue to display the last measured thickness

Using the Fast Option

The **Fast** option is available in the **Setup** mode in both the Datalogger and Non-datalogger versions of the gage.

To select the **Fast** option in **Setup** mode, follow these steps:

- 1. Use the up and down arrow keys to highlight the **Fast** option and press the **OK** key. Or once **Fast** is highlighted, use Quick Access mode by pressing left or right arrow key as indicated in the top right corner of the display screen.

S E T U P		<^v>
CLOCK	10:10 AM	
GAIN	LOW dB	
FAST	MIN	
BKLIGHT	OFF	
ALARM	OFF	
EXIT		

The following parameters are available:

F A S T	^v
OFF	
ON	
MIN	
MAX	
EXIT	

- 2. Use the up and down arrow keys to select the desired parameter and press the **OK** key.

3. Press **OK** key again to accept and return to **Measure** mode.

In the **Measure** mode in either the Datalogger or Non-datalogger version of the gage, the selected **Fast** option setting is displayed under the thickness reading as shown in the screens below:

PIPE01 ID: AA,0001		
MIN 1.221		
1.234 IN		
FASTMIN		
[80%		
SAVE	FREEZE	MINCR

MIN 1.221		
1.234 IN		
FASTMIN		
[80%		
ALARM	FREEZE	MINCR

Helpful Hint: When using the FASTMIN mode, if you press the **F2** key "Freeze" prior to LOS, the gage will display the last minimum prior to the LOS so that the actual couplant on the end of the transducer is not registered as a legitimate minimum reading.

The parameters that you selected in the **Fast** option are shown as follows in **Measure** mode:

FAST	when On is selected
FASTMIN	when Min is selected
FASTMAX	when Max is selected
<BLANK>	when Off is selected

The **Fast** option allows you to select fast updates of measurements at 20 Hz compared to 4 Hz. If you selected the **FastMax** option, the LOS will display the LAST MAX measured value, or if you selected the **FastMin** parameter the LOS will display the LAST MIN measured value. If you select the **On** parameter from the **Fast** option, the LOS will work normally and not show the measured reading.

The screens below reflect different parameters selected from the Fast option. For example, the top screen shows the FASTMAX with LAST MAX measurement on LOS, and the bottom screen shows the FASTMIN with LAST MIN measurement on LOS.

MAX 1.344		
		LOS
	■	IN
	FASTMAX	[80%
SAVE	FREEZE	MAXCR

MIN 1.221		
		LOS
	■	IN
	FASTMIN	[80%
ALARM	FREEZE	MINCR

Note: The LOS flag indicates the LAST MAX or the LAST MIN value and is shown based on the *FastMax* or *FastMin* setting.

To reset the tracking of LAST MAX and LAST MIN measured value press the **OK** (Menu) key.

Using the Gain Option

Gain refers to an increase in signal power (echo height) and is typically measured in decibels (dBs). The Gain function is useful for setting a reference level where by making it easier to add or subtract gain. There are three Gain options, which include: LOW dB, STD dB & HI dB.

The Gain selection is available from the **Setup** mode of the datalogger and non-datalogger version gages.

In the non-datalogger version gage, the **F3** key allows you to select the **Gain** option directly without having to go through the **Setup** mode. In the datalogger version, F3 becomes **Dir** (Directory).

S E T U P <^v>	
USER	LEFT HAND
CLOCK	10:10 AM
GAIN	LOW dB
FAST	OFF
BKLIGHT	OFF
EXIT	

1.234 IN	
STD dB [20%	
ALARM	FREEZE GAIN

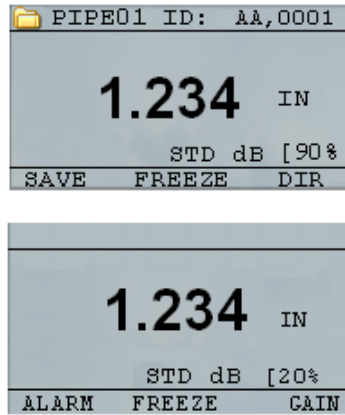
1. For the datalogger version, use the up and down arrow keys in the *Setup* screen to highlight the **Gain** option and press the **OK** key, or select the **F3** key if you are using the non-datalogger version.

The following Gain parameters are available:

G A I N ^v
LO dB
STD dB
HI dB
EXIT

2. Use the up and down arrow keys to select the desired **Gain** option.
3. Press the **OK** key to accept the parameter and return to **Measure** mode.

In the **Measure** mode screen of the datalogger and non-datalogger versions of the gage, the **Gain** option that you select is displayed to the left of the battery indicator as shown below:



Using the Diff Option

There are two Diff options, which include:

- **Diff ABS:** Absolute where the gage will display a thickness value as an absolute number of what has been entered. For example, diff abs = 0.500" and the real thickness is 1.000 inch, the display will show diff abs 0.500. If the real value is 0.300, the gage will display, -0.200"
- **Diff %:** When this mode is on, the displayed value will be listed as a percentage of the value entered into as the diff. For Example, if the operator set the diff to percentage at 0.500", a reading of 0.250" will result in 50%

Using the Alarm Option

The EHC series thickness gages offers various alarm settings to alert you of low or high thresholds via audible sounds, display flashes, sensational vibrations (if on) and illuminating keypad. There are several; different alarms options, which include:

- ***Alarm Off:*** Sets the audible alarm either off.
- ***Low Alarm:*** Audible alarm will occur and display will flash when the displayed reading is less than the low alarm reference value.
- ***High Alarm:*** Audible alarm will occur when the displayed reading is higher than the high alarm reference value.
- ***High_Low Alarm:*** Audible alarm will occur and display will flash when the displayed reading is less than the low alarm or greater than the High alarm reference value.
- ***Low Alarm/Vibra:*** Vibration alarm will occur and display will flash when the displayed reading is less than the low alarm reference value.
- ***High Alarm/Vibra:*** Vibration alarm will occur and display will flash when the displayed reading is higher than the high alarm reference value.

- **High_Low Alarm/Vibra:** Audible alarm will occur and display will flash as well as vibrate when the displayed reading is less than the low alarm or greater than the High alarm reference value.

The **Alarm** option is available from the **Setup** mode in the datalogger and non-datalogger versions of the gage.

S E T U P		<^v>
FAST	OFF	
BKLIGHT	OFF	
ALARM	HIGH-LOW	
VEL	0.2365	IN/US
XDUCER	DK537	5.0MHz
EXIT		

1. Use the up and down arrow keys to highlight the **Alarm** option and press the **OK** key or you can use Quick Access mode by using the right or left keys once **Alarm** is highlighted from the **Setup** mode. If you are using the non-datalogger version you can also press the **F1** (Alarm) key to go directly to the **Alarm** option without having to go through the **Setup** Mode.

The following ALARM selections are available:

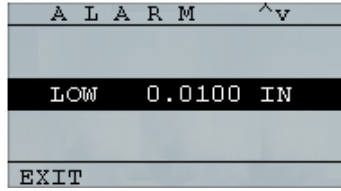
A L A R M	^v
HIGH	
LOW	
HIGH-LOW	
HIGH ((.))	
LOW ((.))	
EXIT	

2. Use the up and down arrow keys to select the desired alarm parameters and press the **OK** key.

For example, when you select the **High-Low** option the following screen below appears. Use the up and down arrow keys to change the Alarm High limits and press the **OK** key to continue.

A L A R M	^v
HIGH	0.1000 IN
EXIT	

3. Use the same steps from above to set the Alarm Low settings.



Note: The Low Alarm limit will not go beyond the High Alarm limit.

4. When you are finished adjusting the setting, press the **OK** key to return to **Measure** mode.

Setting the Visual and Audible Alarm

The Visual Alarm conditions can be viewed from either a red, yellow or green LED that lights up under the **F1**, **F2**, or **F3** keys on the keypad.

As an example, when using the 5 step English test block with thicknesses of 0.100, 0.200, 0.300, 0.400 and 0.500 inches, if you enter alarm high-low you will first need to enter the high value. Enter 0.500 and press enter. Next you will need to enter the low value of 0.100 in. The display will ask you to enter the percent reading of the high low. The gage will default to 20% (this can be changed with the up or down keys), so any reading within 20% of the high value (approaching high, between 0.400 and 0.499 as 0.400 is within the 20% range of 0.500.) will result in the yellow

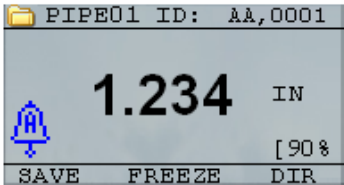
keypad lighting up. Also, any reading above the low value of 0.101 and 0.120 will result in the yellow F2 keypad lighting up as you are approaching the minimum

So, in **Alarm** mode, choosing a non-zero percent value provides the user with warning for readings approaching the selected percent value of the high or low limits. For example, if the alarm value is 0.100" and 20% is entered as the "percent value", reading from 0.101" to 0.120" will result in the **F2** "yellow" key being illuminated. Also, reading less than 0.100" will result in the F1 key "Red" being illuminated and greater than 0.120" will result in the **F3** "Green" key being illuminated.

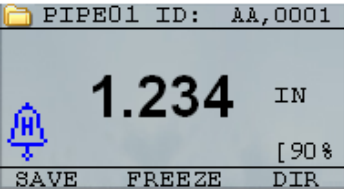
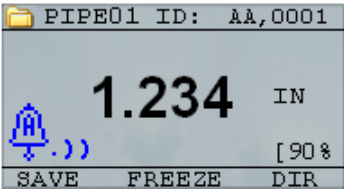
The Audible Alarm turns the beeper on the gage either on or off based on the same alarm conditions used for visual alarm stated above.

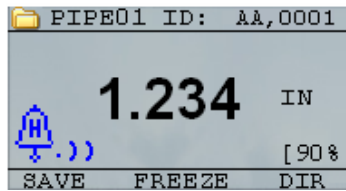
Setting the Vibra Alarm

The gage will physically vibrate when the Vibrating Alarm is active based on the same alarm condition used for visual alarm. The Vibrating Alarm, noted as ((.)) on the gage display, can be enabled with varying alarms and alarm conditions as shown on the screens below:



Visual and Audible Alarm is enabled.
The letter **A** (Alarm) appears in the alarm icon

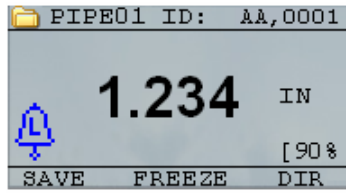


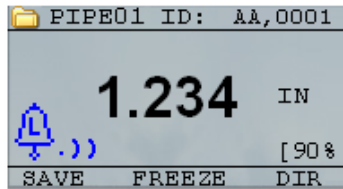


Visual, Audible, and Vibrating alarm enabled

) symbol appears next to the alarm icon. The letter **H** (High) appears in the alarm icon

Alarm condition has occurred meaning the measured reading is greater than the High Alarm limit. The letter **H** (High) appears in the alarm icon. The screen above has the Vibrating alarm enabled as the)) symbol appears next to the alarm icon.





Visual, Audible, and Vibrating alarm enabled
) symbol appears next to the alarm icon. The letter **L** (Low) appears in the alarm icon

Alarm condition has occurred meaning the measurement reading is less than the Low Alarm limit. The letter **L** (Low) appears in the alarm icon. The screen above has the Vibrating alarm enabled as the .)) symbol appears next to the alarm icon.

Note: In the NON-DATALOGGER version the **F1**, **F2**, and **F3** choices are different and the file symbol or the filename along with ID# are not shown.

Using the Echo-to-Echo Option

The **Echo-to-Echo** option (available on the datalogger version only) allows you to make measurements between two consecutive backwall echoes. Therefore, a good usage of the **Echo-to-Echo** option is for measuring through coatings to measure only the true metal thickness. There are two Echo-to-Echo options you can select, which are as follows:

- ***Echo-to-Echo On:*** Enables the Echo-to-Echo function
- ***Echo-to-Echo Off:*** Disables the Echo-to-Echo function

5 Special Gage Functions

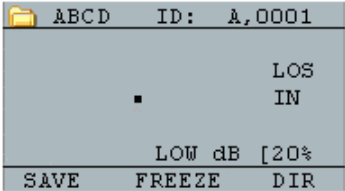
The EHC series thickness gages have many special functions that go beyond the basics, mainly in the EHC-09 and EHC-09DL models. This section will discuss these special gage functions in detail.

Using the Save Option

For the datalogger version only, you are able to save your data via the **Save** option.

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

- 1. From the **Measurement** mode screen, press **[F1] (Save)**.



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

details.)

S E T U P <^v>	
DIFF	OFF
LOCK	OFF
NOTES	OFF
DBASE	
E-TO-E	OFF
EXIT	

- If the **Notes** option is set to **On** then the thickness reading is stored at the ID location [Linear], [Row], [Col] with notes. To change the Notes settings, select the Notes option from the *Setup* screen.

S E T U P <^v>	
DIFF	OFF
LOCK	OFF
NOTES	ON
DBASE	
E-TO-E	OFF
EXIT	

Now when you press **Save** to store a reading in measurement mode, the following *Notes* screen

will appear.

N O T E S ^v
NEEDS PAINTING
BROKEN/MISSED PLUG
NO COMMENTS
RUST
PITTING
EXIT

3. Use the up and down arrow keys to select a note for the reading and press the **OK** key. The selected note will be stored at the ID location, and based on the file type, [Linear], [Row], or [Col] is incremented. (See: Directory selection for file type details.)

The following notes are available:

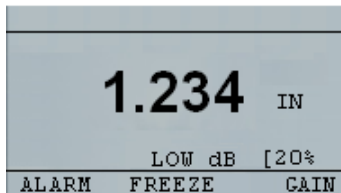
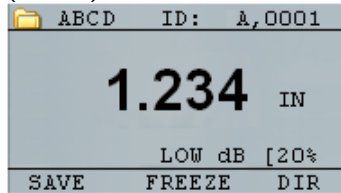
0. NO COMMENTS
1. RUST
2. PITTING
3. TOO HOT
4. BROKEN INSULATION
5. POOR/NO ACCESS
6. NEEDS PAINTING
7. BROKEN/MISSED PLUG

Using the Freeze Option

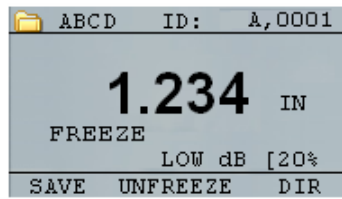
For the datalogger version and non-datalogger version thickness gages, you can freeze your data via the **Freeze** option.

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

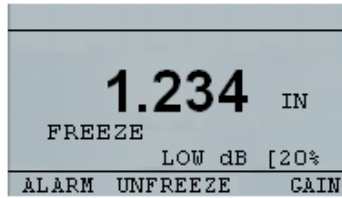
1. From the **Measurement** mode screen, press **[F2]** (**Freeze**).



The following screen comes up after pressing **[F2] (Freeze)** whereby showing the flag “**Freeze**” under the thickness reading. You are now in **Freeze** mode. The **[F2]** selection also changes from **Freeze** to **Unfreeze**.

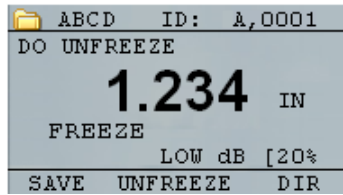


Datalogger version

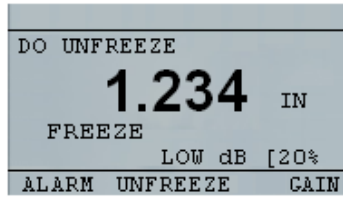


Non-datalogger version

2. Press **[F1] (Save)** to save the reading. (See Using the Save Option for more information.)
3. Press **[F2] (Unfreeze)** to disable the **Freeze** mode
4. Press **[F3] (Dir)** to perform file operations. (See Using the Directory Option for more information.)
5. While in **Freeze** mode the menu options are disabled. The display will prompt you to unfreeze the gage.



Datalogger version



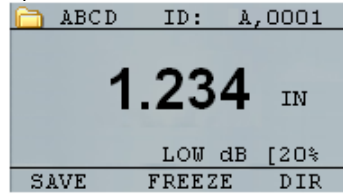
Non-datalogger version

Using the Menu Option

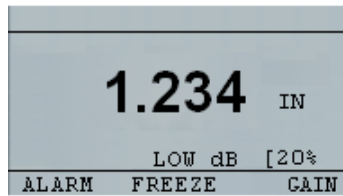
For the datalogger version and non-datalogger version thickness gages, you can operate in **Measure** mode.

To use the **Measure** mode, follow these steps:

1. Press the **Menu (OK)** key to select the **Menu** options from **Measure** mode.



Datalogger version



Non-datalogger version

The following **Menu** options are available:

M E N U	^v
SETUP	
CAL	
DIRECTORY	
EXIT	

Datalogger version

M E N U	^v
SETUP	
CAL	
EXIT	

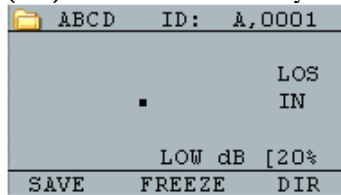
Non-datalogger version

6 Using the Datalogger Directory Mode

Note: This section applies only to the EHC-09DL Thickness Gage with a datalogger. If you do not have a datalogger, you may skip this section. Please note, the EHC-09B and EHC-09 gages are field upgradeable to the Datalogger version. Call the factory for installation instructions.

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

1. From the **Measurement** mode screen press **[F3] (Dir)** to select the **Directory** mode.



By pressing **[F3] (Dir)** you will be able to review, create, delete, select, rename and clear stored thickness and copy.

2. Use the up and down arrow keys to view the list of files, and select which ever one is relevant.

List of Filenames

NAME	COL	ROW	INC	%
LINEAR		0001	L	000
ROWINC	A	0003	R	<1%
COLINC	C	0001	C	<1%
EMPTY01				
EMPTY02				
EXIT				

Increment Row [R] or Column [C] in grid file or Linear [L] in linear file after every save operation

Column, Row matrix for grid file or linear size

% of ID locations stored with thickness reading in this file

3. Press the **OK** key to select a file in the directory view.
4. To create a custom file see *Creating Custom Files* section.
5. To review thickness readings, see *Reviewing a File* section.
6. To rename custom file, see *Renaming a File* section.
7. To clear an entire file, see *Clearing a File* section.
8. To clear selected readings from a file, see *Reviewing a File* section.
9. To create copy of the existing file structures, see *Copying a File* section.
10. To delete a custom file, see *Deleting a File* section.

The first three files [LINEAR], [ROW INCREMENT] and [COLUMN INCREMENT] cannot be deleted or renamed. These files are factory default files available for you to start storing thickness reading or make a quick copy of the file structure (Linear or Grid [Col, Row]) in order to start saving data in the new file. (See File System for more information.)

Managing the Datalogger File System

The EHC-09DL supports the following two files types:

- **Linear file:** Consists of ID# from 0001 to 5000. The extended memory option consists of ID# from 1 to 500000.
- **Grid file:** Consists of ID# as COLUMN and ROW. The COLUMN is single or double digit capital alpha character from A to Z and AA to ZZ. The ROW is a four digit numbers based on the $5000 / \text{COLUMN}$.

For example, when you create a new GRID file with END COLUMN = C, then the maximum ROW you can slew up to is limited to 1666 calculated by the instrument as follows:

- The total storage space per file is 5000 reading.
- For Columns ending at C means 3 columns are required and the maximum Row allowed is limited to $5000 / 3 = 1666$.

If you create a new GRID file with END COLUMN = Z, then the maximum ROW you can slew up to is limited to $5000/26 = 192$.

If you create a new GRID file with END COLUMN = AF, then the maximum ROW you can slew up to is limited

to $5000/(26 \text{ for A to Z} + 6 \text{ for AA to AF}) = 156$ the grids are created as shown below:

```
A,1 to A,156 then
B,1 to B,156 then
:
Z,1 to Z,156 then
AA,1 to AA,156 then
AB,1 to AB,156 then
:
AF,1 to AF,156
```

If a new GRID file with END COLUMN = ZZ, then the maximum ROW you can slew up to is limited to $5000/(26 \text{ for A to Z} + 26*26 \text{ for AA to ZZ}) = 7$.

```
A,1 to A,7 then
B,1 to B,7 then
:
Z,1 to Z,7 then
AA,1 to AA,7 then
AB,1 to AB,7 then
:
AZ,1 to AZ,7 then
BA,1 to BA,7 then
BB,1 to BB,7 then
:
:
ZZ,1 to ZZ,7
```

Note that there are two different types of Grid file: ROWINC and COLINC. The above two examples show how the ID locations are incremented in ROWINC type file only. Here the Row value is incremented first, while updating ID location. Whereas, in a COLINC type file, Column value is incremented first.

So for a COLINC file with END COLUMN value AF, the ID locations will increment as follows:

A,1 to AF,1 then

A,2 to AF,2 then

.

.

A,156 to AF,156

A COLINC file with END COLUMN value ZZ will have ID increments as follows:

A,1 to ZZ,1 then

A,2 to ZZ,2 then

.

A,7 to ZZ,7

Creating Custom Files

To create a custom file in the datalogger, follow these steps:

- 1. Press **[F3] (Dir)** from the **Measurement** mode screen.

COLINC	ID: A,0001
LOS	
IN	
LOW dB	[20%
SAVE	FREEZE DIR

The following screen appears:

NAME	COL,ROW	INC	%
LINEAR	0001	L	000
ROWINC	A,0003	R	<1%
COLINC	C,0001	C	<1%
EMPTY01			
EMPTY02			
EXIT			

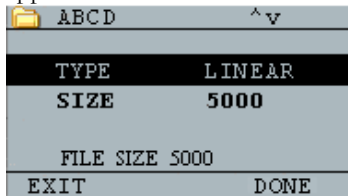
- 2. Use the up and down arrow keys to highlight the next **Empty** file in the list.

NAME	COL,ROW	INC	%
ROWINC	A,0003	R	<1%
COLINC	C,0001	C	<1%
EMPTY01			
EMPTY02			
EMPTY03			
EXIT			

3. Press the **OK** key and the following screen appears:



4. Use the up, down, left, and right arrow keys to select the characters of the filename. Press the **OK** key to accept the selected characters. If you make an error, press **[F2] (Del)** to delete the last character of the entered filename.
5. Press **[F3] (Done)** when you are finished entering the filename. The following screen appears:



6. Use the left and right arrow keys to select a file type: LINEAR, ROWINC or COLINC. **See the next two sections for more information on selecting file type for the new file.**

Selecting a Custom Linear File

When you select a LINEAR file format the following screen appears displaying the maximum reading you can store in the LINEAR file.

ABCD ^v	
TYPE	LINEAR
SIZE	5000
FILE SIZE 5000	
EXIT	DONE

With the extended memory, you can store up to 100,000 readings allowing you more total files.

Pressing the **F3 (Done)** key again will take you to the **Measure** mode displaying the new filename in the top left corner and the next ID location in the top right corner.

ABCD ID: 0001	
LOS IN	
LOW dB [20%	
SAVE	FREEZE DIR

Selecting a Custom Grid File

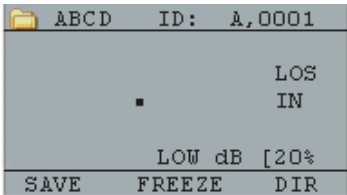
When you select ROWINC or COLINC file type, the display changes as shown below. You can now select the number of rows and columns for your new file.

ABCD ^v	
FILE SIZE 4992	
TYPE	ROWINC
END ROW	0192
END COL	Z
EXIT	DONE

ABCD ^v	
FILE SIZE 4992	
TYPE	COLINC
END ROW	0192
END COL	Z
EXIT	DONE

Use the up and down arrow keys to select the END ROW option. Now press left or right arrow key to change the END ROW value. Then press down arrow key to select END COL option. Press left or right arrow key to change the END COL value. Since the file size is limited to 5000, the END COL value is limited to 5000/END ROW. Note that the 'FILE SIZE' will change depending on the END ROW and END COL settings.

When you are finished selecting END ROW and END COL values, press F3 (Done). The display will go back to Measure mode, showing the new filename and next ID location in the top row as shown below.



Reviewing a File

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

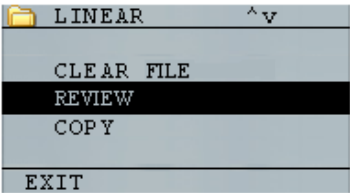
1. Press **[F3] (Dir)** from the **Measurement** mode screen.

ABCD	ID: A,0001
■	LOS IN
LOW dB [20%	
SAVE	FREEZE DIR

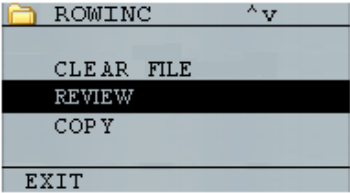
The following screen appears:

NAME	COL, ROW	INC %
ROWINC	A,0003	R <1%
COLINC	C,0001	C <1%
ABCD	A,0001	R 000
EMPTY02		
EMPTY03		
EXIT		

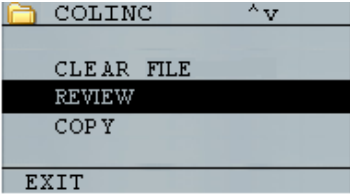
2. Select the file you would like to review using the up and down arrow keys and press the **OK** key. Based on the type of file you select, one of the following screens will appear:



Factory default file Linear (**Rename** and **Delete** options are not available)



Factory default file Row Incremental (**Rename** and **Delete** options are not available)



Factory default file Column Incremental (**Rename** and **Delete** options are not available)

	ABCD	^v
	RENAME	
	CLEAR FILE	
	REVIEW	
	COPY	
	DELETE	
	EXIT	

Custom file choices

The three factory default files have only 3 options: Clear File, Review and Copy. Custom files have 5 options: Rename, Clear File, Review, Copy, and Delete. Select the **Review** option and press the **OK** key to review the file.

Reviewing a Linear File

The linear file shows the ID# and the stored readings along with the units. You can browse the readings by pressing the up or down arrow key. You can also press **F3** (**Beg/End**) to go to the beginning or end of the file.

	LINEAR	^v
1	0.080 IN	
2	0.100 IN	
3	0.103 IN	
4	1.000 IN	
5	0.908 IN	
EXIT	CLEAR	BEG

To clear a reading from the file, select the reading to be cleared by pressing up or down arrow key and then press **F2** (**Clear**). Note that once a reading is cleared, it cannot

be restored. To store another reading in the file location that has been emptied by the **Clear** operation, highlight that location by pressing up or down arrow key. Then press **OK** to go to the measure mode. When you have the new reading to be stored in the emptied file location, press **F1 (Save)**. The new reading will be saved in that location and the display will show the next empty file location in the top right corner.

Reviewing a Grid File

The grid file shows the ID# as COL, ROW and the stored reading with the units.

ROWINC	^v
A,0001	0.392 IN
A,0002	0.390 IN
A,0003	0.400 IN
A,0004	0.500 IN
A,0005	0.501 IN
EXIT	CLEAR
BEG	

COLINC	^v
A,0001	0.392 IN
A,0002	0.390 IN
A,0003	0.400 IN
A,0004	0.500 IN
A,0005	0.501 IN
EXIT	CLEAR
BEG	

F2 and F3 function keys operate in the same way as discussed in *Reviewing a Linear File* section.

Renaming a File

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

1. Press **[F3] (Dir)** for the **Directory** mode.

ABCD	ID: A,0001
LOS	
IN	
LOW dB [20%	
SAVE	FREEZE DIR

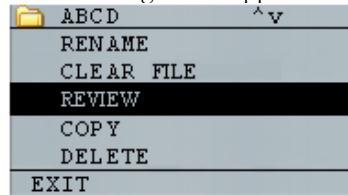
The following screen appears:

NAME	COL,ROW	INC %
ROWINC	A,0003	R <1%
COLINC	C,0001	C <1%
ABCD	A,0001	R 000
EMPTY02		
EMPTY03		
EXIT		

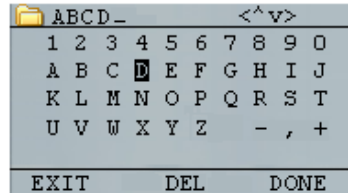
2. Use the up and down arrow keys to select the file you would like to rename and press the **OK** key.

Note: The **Rename** option is not available for the first three factory default files.

The following screen appears:



- Use the up and down arrow keys to select the **Rename** option and press the **OK** key to rename the file.

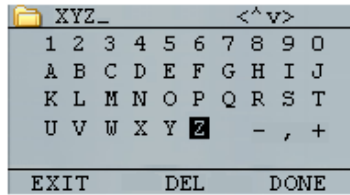


- Use the up, down, left, and right arrow keys to select the characters of the filename. Press the **OK** key to accept the selected characters. If you make an error, press **[F2] (Del)** to delete the last character of the entered filename.
- Press **[F3] (Done)** when you are finished entering the filename. The old filename will be updated with the new filename in the directory as shown in the example below.

Note: Press **[F1] (Exit)** to exit the screen without renaming the file.

Example:

A user erases a file named ABCD by pressing **[F2] (Del)** and selects XYZ as the new filename and presses **[F3] (Done)** to accept the entered new filename.



The old filename in the directory is updated with the new filename as shown.

NAME	COL	ROW	INC	%
ROWINC	A,0003	R	<1%	
COLINC	C,0001	C	<1%	
XYZ	A,0001	R	000	
EMPTY02				
EMPTY03				
EXIT				

Clearing a File

To clear (or delete) a single thickness reading at a time from a file, see *Reviewing a File* section. To clear all the readings from a file, use the clear file option. To do this, from measurement mode, press **[F3] (Dir)** for the **Directory** mode.

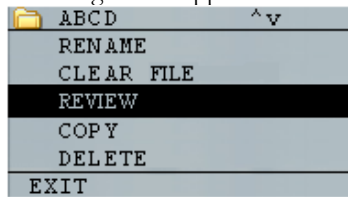
	ABCD	ID:	A,0001
			LOS
	■		IN
		LOW dB	[20%
SAVE	FREEZE	DIR	

The following screen appears:

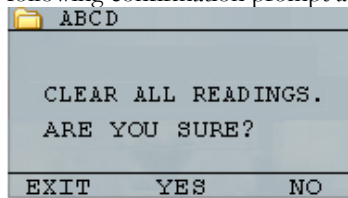
	NAME	COL,ROW	INC	%
	ROWINC	A,0003	R	<1%
	COLINC	C,0001	C	<1%
	ABCD	A,0001	R	000
	EMPTY02			
	EMPTY03			
	EXIT			

1. Use the up and down arrow keys to select the file you want to clear and press the **OK** key. The

following screen appears:



2. Use the up and down arrow keys to select the **Clear File** option and press the **OK** key to clear all the stored thickness readings in that file. The following confirmation prompt appears:



Press **[F1] (Exit)** to exit without clearing the thickness readings.

Press **[F2] (Yes)** to clear the stored thickness from the entire file.

Press **[F3] (No)** to exit without clearing the thickness readings.

If the file is already clear, the unit will show 'NO READINGS TO CLEAR.' message.

Copying a File

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

- 1. Press **[F3] (Dir)** for the **Directory** mode.

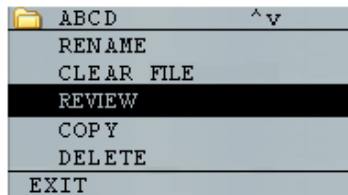
ABCD	ID: A,0001
LOS	
IN	
LOW dB [20%	
SAVE	FREEZE DIR

The following screen appears:

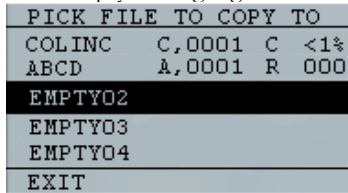
NAME	COL,ROW	INC %
ROWINC	A,0003	R <1%
COLINC	C,0001	C <1%
ABCD	A,0001	R 000
EMPTY02		
EMPTY03		
EXIT		

- 2. Use the up and down arrow keys to select a file and press the **OK** key. Any file structure (factory default or custom) can be copied.

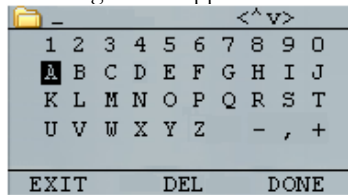
Note: When you copy a file only the structure of the file ID# is copied and not the associated file readings.



3. Use the up and down arrow keys to select the **Copy** option and press the **OK** key. The following confirmation prompt appears with the next Empty file highlighted as the default choice.



Press up or down to select an Empty file and press **OK** to assign it a new filename. The following screen appears.

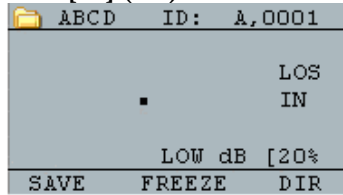


4. Use the up, down, left, right arrow keys to select the characters of the filename and press the **OK** key to accept the selected characters. If you make an error, press **[F2] (Del)** to erase last character before the cursor.
5. Press **[F1] (Exit)** to exit without copying the file.
6. Press **[F3] (Done)** when you are finished entering the filename. A new file with the selected name will be added in the directory with the file structure of the original file **ABCD**.

Deleting a File

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

1. Press **[F3] (Dir)** for the **Directory** mode.



The following screen appears:

 NAME	COL	ROW	INC	%
ROWINC	A	0003	R	<1%
COLINC	C	0001	C	<1%
ABCD	A	0001	R	000
EMPTY02				
EMPTY03				
EXIT				

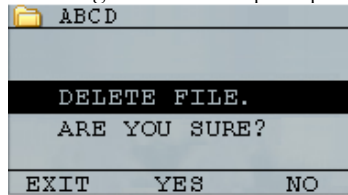
- Use the up and down arrow keys to select the file to be deleted and press the **OK** key.

Note: Only custom files can be deleted. The factory default files cannot be deleted.

 ABCD	^ v
RENAME	
CLEAR FILE	
REVIEW	
COPY	
DELETE	
EXIT	

- Use the up and down arrow keys to select the **Delete** option and press the **OK** key. The

following confirmation prompt appears:



Press **[F1] (Exit)** to exit the screen without deleting the file.

Press **[F3] (No)** to exit the screen without deleting the file.

Press **[F2] (Yes)** to delete the file and remove the file from the directory.

7 Technical Specifications

Specifications for the EHC-09B/EHC-09/ECH-DL Ultrasonic Thickness Gages

Size: 5" (127 mm) (L) x 3" (76.2 mm) (W) x 1.25" (31.75 mm) (H)
Weight: 8 OZ (.23 kg)
Thickness range: 0.008 - 20 inches (0.20 mm - 508 mm), depending on material, temperature and transducer selection
Material velocity calibration range: 0.200-0.7362 in/ μ S (0.508-18.699 mm/ μ S)
Temperature: Gage Operating: -4° F to 122° F (-20° C to 50° C) Surface temperature of material: Depending on probe used, from -5° F to 1000° F (-20° C to 537° C)
Battery life: Up to 200 hours (40 hours with backlight on)
Battery type: 2 "AA" Alkaline
Display: 128 X 64 Graphics LCD monochrome
Information displays: LOS, min, max, large reading while displaying min at the same time, velocity, zero, calibration, units, freeze, unfreeze, % battery life remaining, gain - low, std, high, echo-to-echo symbol
Resolution: 0.001" (0.01 mm), 0.01" (0.1mm)
Probe recognition: Via pick list from a menu
Delay line zero measurement: Auto at power up with listed numeric value. Ideal for correcting delay line wear/curvature and for transducer acoustic drift at elevated temperatures
Package: Custom, splash-proof, high-impact plastic with rubber, illuminating keypad for go/no-go testing
Bandwidth: 0.5-20 MHz (-3dB)
Units: English/Metric/Microseconds
Gain: Low, Standard and High for varying test conditions
Measurement rate: 4/sec and 20/sec in fast mode
Differential Mode: Displays the difference from the actual thickness measurement and a user entered reference value
Alarms: Minimum/Maximum depth, vibralarm, beeps and display

flashes as well as keypad illumination
Illuminating keypad: F1 = Red, F2 = Yellow and F3 = Green for easy, go/no-go testing (Patent Pending)
Automatic probe wear indicator (Transducer attendant): Automatically informs the operator to replace the transducer (Patent Pending)
Ergonomics: User selectable lefty or righty display changes via keypad (Patent Pending)
Backlight: Light Emitting Diode, On/Off or Auto On based on valid readings or last keypress
Shut off: Auto, time out (after X minutes user programmable after no reading, loss or no key press)
Scan mode: Displays minimum or maximum thickness value at 20 measurements per second (ideal for high temperature thickness reading and tracking the minimum depth alarm). Press Freeze to capture last valid minimum thickness readings prior to Loss of Signal (LOS), without reading the couplant upon lifting probe off the test piece
Carrying case: Custom molded pouch with wrist strap for either left-handed or right-handed operators.(optional)
Shipping case: Hard plastic with high-density molded cut out for all accessories (optional)
Freeze mode: Freezes display
Hold mode: Holds display to retain last thickness reading in reverse video display
Standard EHC-09 includes: Ultrasonic thickness gage, DK-537 potted, 5 MHz 0.375 inch diameter, operational manual, cable, couplant
Warranty: Limited 2 year warranty on parts and labor

Item	Specification	EHC-09DL	EHC-09	EHC-09B
Thickness range:	0.008-20inches (20mm-508mm)	x	x	x
Delay line zero measurement:	Auto at power up with listed numeric value. Ideal for correcting delay line wear/curvature and for transducer acoustic drift at elevated temperatures	x	x	x
Scan mode:	Displays minimum or maximum thickness value at 20 measurements per second	x	x	x
Hold mode:	Holds display to retain last thickness reading with reverse video display	x	x	x
Freeze mode:	Freezes display	x	x	x
Units:	Inches/Millimeters/Microseconds	x	x	x
Gain:	Low, Standard or High for varying test conditions	x	x	0
Differential mode:	Displays the difference from the actual thickness measurement and a user entered reference value	x	x	0
Alarms:	Minimum/Maximum depth, vibratarm, beeps and display flashes as well as keypad illumination and vibration	x	x	0
Illuminating keypad:	F1=Red, F2=Yellow, and F3=Green for easy, go/no-go testing (Patent Pending)	x	x	0
Automatic probe wear indicator:	Automatically informs the operator to replace the transducer (Patent Pending)	x	x	0
Echo-to-Echo	Measures the metal thickness only (ignore paint and coatings)	x	0	0
Non-Encoded B-Scan	Displays a cross section of the test piece	x	0	0
Datalogger version:	Upgrade to Datalogger version	x	0	0
Carrying pouch:	Custom molded with belt clip and elastic strap	x	0	0
All software options are field upgradeable, no need to return the unit to the factory				

Software Options

Echo to Echo

The Echo to Echo feature should and can be used within the thickness range of the chart listed below. It is best to use the transducers designated with a –EE part number such as DK 537EE and DK 718EE. These transducers have greater damping allowing more stable readings in Echo to Echo mode. To calibrate in Echo to Echo, first press MENU OK, scroll to set up, press MENU OK and find where E to E is displayed. Either use the right arrow to turn on or press MENU OK and scroll to on. You will see a symbol in the top right looking like Echo to Echo. Next, press MENU OK, turn on calibration and perform CAL VEL on the thick part with the coating and CAL ZERO on the think part with coating, then MENU OK.



B-Scan

The B-Scan represents a cross sectional view on the test piece. The simplest example is to show a 5 step test block. To turn on the option B-Scan for EHC-09 and standard on the EHC-09DL, press MENU/OK, go to set up, find B-scan and press MENU/OK. First enter the maximum thickness you expect to scan using the up, down, left and right keys, then turn on the B-Scan scrolling down and right arrow (left arrow for off). Press F3 in lefty or F1 in Righty mode when done. The bottom of the display will read SAVE, START or STOP and CLEAR. To Start a B-Scan, couple to the test block and press F2 [START]. If you uncouple the transducer, B-Scan will stop due to LOS. If you press F2 [STOP] the minimum thickness will be displayed in the center of the screen while a vertical cursor allows you to review readings. During review the thickness value is updated in the top right of the display. To save all the readings, press F1 [SAVE]. The amount of saved readings up to the file size of 5,000 readings or what was pre-determined in the current file (See Datalogging) set up. Here is a picture of the B-Scan on a test block.

Danatronics, Corp.

